ALOKA

ULTRASOUND DIAGNOSTIC EQUIPMENT
ALOKA SSD-5000
INSTRUCTION MANUAL

Manual number: MN1-1102

Rev.5

CE 0123

ALOKA CO., LTD.

Safety alert symbols

The four indications [Danger], [Warning], [Caution] and [Note] used on this equipment and in this instruction manual have the following meaning.

⚠ Danger
· Indicates an imminently hazardous situation which,if not avoided,will result in death or serious injury. · A warning message is inserted here.

⚠ Warning
· Indicates a potentially hazardous situation which,if not avoided,could result in death or serious injury. · A warning message is inserted here.

⚠ Caution
· Indicates a potentially hazardous situation which,if not avoided,may result in minor or moderate injury. · A caution message is inserted here.

⚠ Note
· Indicates a strong request concerning an item that must be observed in order to prevent damage or deterioration of the equipment and also to ensure that it is used efficiently. · An explanatory text is inserted here.

CONTENTS

5. COMPOSITION

6. Principle of Operation

7. Cleaning and Sterilizing

8. Preparations for Use

9. Screen Display

10. HOW TO USE THE SYSTEM

11. USEFUL FUNCTIONS

12. MEASUREMENT FUNCTION

13. BASIC MEASUREMENTS

14. CARDIAC CALCULATIONS

15. Obstetrical Calculations

16. GYNECOLOGICAL MEASUREMENTS

17. Peripheral Vessel Measurements

18. Other Measurements

19. Urological Measurement

20. After Using the Equipment

21. Storing the Equipment

22. Moving the Equipment

23. Safety Inspection

24. TROUBLESHOOTING

25. DISPOSAL THE EQUIPMENT

26. APPENDIX

1. PRECAUTIONS FOR USE

1-1. Purpose of use

This equipment is intended to be used by doctors and other qualified persons for performing slice diagnoses and blood circulation diagnoses in the following parts of the human body. Do not use it for any other applications.

- Thorax
- Abdomen
- Perineum and pelvis (When examining a fetus, use this equipment only for slice diagnosis.)
- Lower limbs
- Back
- Upper limbs
- Head
- Cranial nerves
- Neck
- Child

⚠ Warning

The acoustic power from this equipment exceeds the upper ophthalmological limit indicated in Track 1 of the U.S. FDA standards. DO NOT use this equipment for performing ultrasound diagnosis of the eyes.

⚠ Warning

The acoustic power from this equipment conforms to Track 1 of the U.S. FDA standards. Do not use this equipment on fetuses in a mode other than the B mode, M mode, B/M mode or B/B mode.

⚠ Caution

- The intened use of probe differs depending upon the type of probe.
  Select a probe that meets your purpose of use.
- The probe can harm the human body.
  Do not use it for any application that is not covered in the instruction manual of the probe.

This section consists of 6 pages.

1-1-1. Precautions concerning acoustic power

The tissues of the human body consist of soft tissues, water, bone, and other tissues. Ultrasound energy is progressively absorbed and attenuated by the body as it penetrates it, hence tissues located behind water, which causes only a small degree of attenuation, receive a relatively large amount of ultrasound energy.

Also, it is necessary to be careful of bioeffects due to heat in the vicinity of tissues, such as bone, that readily convert ultrasound energy into heat.

Particularly, a fetus at the bone formation stage is exposed to a high risk of damage due to heating because almost all of the ultrasound energy passes through the amniotic fluid without being attenuated. Even in the case of a fetus prior to bone development, the cells are active, hence there is a possibility of growth being affected, even when the temperature rise is low. The SSD-5000 echo camera enables you to check the blood circulation using the ultrasound Doppler method. However, because a fetus is still developing, it is necessary to be very careful when using the ultrasound Doppler method. A fetus is still developing and is liable to be subjected to bioeffects from acoustic power, so do not examine a fetus in a mode other than the B mode, M mode, B/M mode or B/B mode.

(This equipment conforms to the U.S. FDA Track 1, and is designed so that the intensity of the acoustic output from each probe does not exceed the limit for the particular application.)

Mechanical bioeffects such as heating and cavitation occur when the body is exposed to ultrasound energy for a long period. You can reduce the risk of damage to the tissues by interrupting the ultrasound energy before it reaches the level at which tissue damage occurs. To this end, it is necessary to obtain a grasp of the functions of the equipment, acquire familiarity with the method of operating it, and understand the parameters that affect the acoustic power. Also, get into the habit of always freezing the image as soon as you have obtained the necessary diagnostic information.

⚠Caution

- Use as low an output as possible within reason.
- Scan the body for only as long as is necessary to make a diagnosis. Prolonged use can harm the human body.
- Hold a probe tightly not to slip it especially when your hands get ultrasound gel or others; otherwise, the probe may slip out of your hands and hit a patient.

⚠Warning

- Clean and disinfect a probe every time it is used.
- Using contaminated probes may result in infection.

1-1-2. Use with an ultrasound enhancing agent

If you wish to use an ultrasound enhancing agent, be sure to use only a substance that has been approved for use as an ultrasound enhancing agent.

Before using an enhancing agent, carefully read the instructions for using the enhancing agent and also any cautionary notes.

1-1-3. Use with a general pharmaceutical

If you perform an ultrasound examination after having the patient ingest a general pharmaceutical, the ultrasound may affect the pharmacological effect of the pharmaceutical.

Before using a general pharmaceutical, carefully read the instructions for using the pharmaceutical and also any cautionary notes.

1-2. Classification

According to the type of protection against electric shock:

- Class I equipment

According to the degree of protection against electric shock:

- Type BF equipment

Classification	Probe or scanner	Physiological signal
Type BF equipment	All probes and scanners	ECG

Table Classification according to degree of protection

[Remark]

Type BF refers to ultrasound diagnostic equipment that uses only ultrasound probes that are intended for applications not involving direct contact with the heart.

According to the degree of protection against harmful ingress of water:

- Ordinary equipment

⚠ Warning

The equipment is not protected in any way whatever against water ingress, so do not use it in a place where there is a possibility of water getting into it.

Take care not to spill liquid onto or into the equipment. This is because of the danger of electric shock. If you do happen to spill liquid on the equipment, contact one of Aloka's sales offices or agents listed on the back cover of this instruction manual.

According to the degree of safety of application in the presence of a flammable anaesthetic mixture with air or with oxygen or nitrous oxide:

- Equipment not suitable for use in the presence of a flammable anaesthetic mixture with air or with oxygen or nitrous oxide.

⚠ Danger

Do not use this equipment in a flammable atmosphere. It may explode if used in such an atmosphere.

According to the mode of operation:

- Continuous operation

1-3. Safety

⚠Warning
Unexpected accident can take place. Do not try to remodel Equipment.

⚠Warning
· Clean and sterilize the probe after each examination. · The use of an unclean or unsterilized probe may result in an infection.

⚠Warning
Wear medical gloves during an examination, and be sure to wash your hands after the end of the examination. Failure to heed this warning may cause you to receive an infection from the patient.

Avoid rapid temperature change which may cause dew condensation.
Avoid using where dew condensation or waterdrops exist.

⚠Caution
Always use this in dried state. Dew condensation or waterdrops may appear by being moved from cold to warm place. Use without proper care, then, can cause short-circuiting.

1-4. Environmental Conditions

1-4-1. Working environment

This equipment is intended to be used under the following environmental conditions. Be sure to install it in an environment that satisfies these conditions.

Working environment

Ambient temperature: 10 ~ 40°C
Relative humidity: 30 ~ 75%
Atmospheric pressure: 700 ~ 1060 hPa

⚠Caution
The presence of electromagnetic waves may result in a mis-diagnosis or a breakdown of the equipment. If the equipment is to be used near a motor (elevator, pump room, etc.), power transmission line or wireless equipment, it is necessary to electrostatically shield it.

[Remark]
Mechanical scanner : Ambient temperature: 20 ~ 40°C
Please take more than 3minutes to start to use the scanner after turning the power switch on when Mechanical scanners were connected to the system.

1-4-2. Storage environmental

Store the equipment in an environment that satisfies the following conditions.

Storage environment

Ambient temperature: -10 ~ 50°C
Relative humidity: 10 ~ 90%
Atmospheric pressure: 700 ~ 1060 hPa

Avoid rapid temperature change which may cause dew condensation.
Avoid using where dew condensation or waterdrops exist.

⚠ Caution
Always use this in dried state. Dew condensation or waterdrops may appear by being moved from cold to warm place. Use without proper care, then, can cause short-circuiting.

[Remark]
Mechanical scanner : Ambient temperature: 0 ~ 50°C
Please do not store place mechanical scanning probes in any circumstances below 0°C to prevent the liquid inside the probes from being frozen.

1-5. Power Requirements

The power requirements for this equipment are as follows.

Power requirements	Unit
Rated supply voltages or voltage ranges (100 V specifications) (115 V specifications) (200~240 V specifications)	 100 V 115 V 200 ~ 240 V
Rated frequency or rated frequency range	50/60 Hz
Power input	1300 VA
Auxiliary mains socket outlets	300 VA

Table Power requirements

1-6. Electromagnetic environment

This equipment complies with International Standard IEC 60601-1-2 (1993).

⚠Caution

- Install this equipment where the electromagnetic radiation does not affect.
- Note that the electromagnetic radiation may cause the following phenomena on this equipment.
  - Distortion in viewing monitor
  - Noise on physiological signals
  - Noise from loudspeaker
  - Artifacts on image
- Locate this equipment and its cables (e.g. probe cables, ECG cables, I/O cables, etc.) as far away as possible from other medical electrical equipment.
- Note that electromagnetic radiation from this equipment may cause the abnormal operation on the other medical electrical equipment nearby. In this case, stop using such equipment immediately.
- This equipment intended to use in hospitals and/or institutions in order to prevent the electromagnetic interference.

Use this equipment in facilities equivalent to the hospital or institution.

- Note that electromagnetic radiation from this equipment may cause the disturbance to the radio receiver, TV set, etc.

Locate this equipment as far away as possible from the radio receiver, TV set, and its cables and antenna.

- Do not use the portable radio communication devices (e.g. cellular phone, cordless phone, radio transceiver, etc.) near this equipment.

1-7. Safety Instructions for Connecting Network Devices

1-7-1. Electrical safety Instructions for Connecting Network Devices

The following instructions are applicable, when connecting network devices to the Ultrasound system.
The instructions are provided in order for the entire system with network devices to meet
IEC60601-1-1 Electrical Safety Standard.

1. Network Devices

All non-medical network devices connected to the Ultrasound system, including Hubs, Work Stations and Personal
Computers, must comply with **IEC60950** standard and must be **Class I** devices.

2. Installation and Network Connections

2.1 Non-medical devices must be kept at least **1.5 meters** away from a patient.

2.2 When connecting the Ultrasound system with Computer Devices located out side of the Ultrasound examination room, a separation device (**Network Hub**) must be used in-between.

1-7-2. Other precautions

Once you switch ON the ultrasound diagnostic equipment, do not switch it OFF again for 2～3 minutes. If you switch OFF the equipment while it is starting up, the hard disk may brake down.

A primary battery is used to maintain the unit in an operable condition. If the battery runs down, the clock on the system is shown a wrong time.. (In this case, the operation of the ultrasound diagnostic equipment is unaffected.)
If the above phenomenon occurs, the battery must be replaced, so request your nearest Aloka branch to do this.

The equipment contains a primary battery (lithium battery), so when disposing of it conform to the "Laws Relating to the Disposal and Cleaning of Waste".

2. MEANING OF SYMBOLS, INDICATIONS AND TERMS

2-1. Symbols and Indications

1) Safety alert symbols

The four indications [Danger], [Warning], [Caution] and [Note] used on this equipment and in this instruction manual have the following meaning.

⚠Danger
· Indicates an imminently hazardous situation which , if not avoided, will result in death or serious injury. · A warning message is inserted here.

⚠Warning
· Indicates a potentially hazardous situation which , if not avoided, could result in death or serious injury. · A warning message is inserted here.

⚠Caution
· Indicates a potentially hazardous situation which , if not avoided, may result in minor or moderate injury. · A caution message is inserted here.

⚠Note
· Indicates a strong request concerning an item that must be observed in order to prevent damage or deterioration of the equipment and also to ensure that it is used efficiently. · An explanatory text is inserted here.

This section consists of 8 pages.

2) Other symbols and indications

The following marks are used in this equipment and this instruction manual.

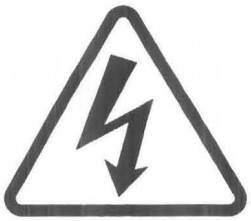
Symbol	Position	Meaning
	Various places	Danger Carefully read the pertinent items in this manual, and handle the equipment with great care. ANSI standard Z535.3 IEC60601-1, Attached table D BS 5378 PART1, Appendix A
	On the side of probe connector	Biohazard ANSI standard Z535.3 ISO7000 No.0659 BS 5378 PART 1, Appendix A
	Left side panel	Be careful of explosion
	Left side panel	Be careful of electric shock ANSI standard Z5335.3 BS 5378 PART1, Appendix A
	Left side panel	Be careful of acoustic power
	Probe connector;	Type BF applied part; IEC60601-1, Attached table D

Table Symbols and indications

Symbol	Position	Meaning
	Monitor Rear panel	Alternating current 417-IEC-5032
	Power switch	Indicates the ON position of the switch. 417-IEC-5007
	Power switch	Indicates the OFF position of the switch. 417-IEC-5008
	Left side panel	This mark indicates this product complies with Directive 93/42/EEC relating to Medical Device.
	Rear panel	This symbol indicates the equipotential terminal which brings the various parts of a system to the same potential. 417-IEC-5021

Table Symbols and indications

2-2. Meaning of Terms

The following terms used in this instruction manual have the meaning described below.

[Remark]: An item that must be known in order to use the equipment.

Assembly: Installing and connecting the standard component parts and options in the main equipment using tools.

⚠Caution
This equipment must be assembled by a person recognized by Aloka when it is delivered to the customer's premises. It must not be assembled by the customoer.

Installation: Placing the assembled equipment in an environment where it can be used by the customer, then installing and connecting the peripheral equipment.

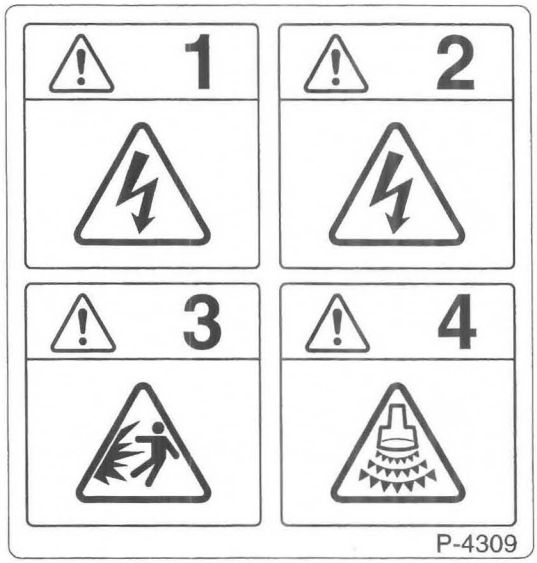
Moving: Moving the equipment in its assembled form manually.

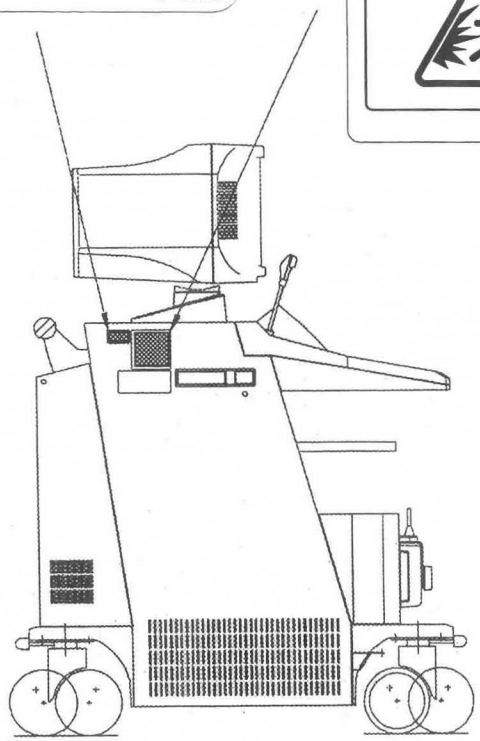
⚠Caution
Transport not conforming to instructed state can cause failure. For toransport of Device, be sure to contact us.

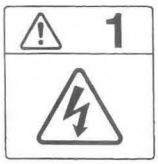
2-3. Position of Labels

[Remark]

For only 230V/PAL area.

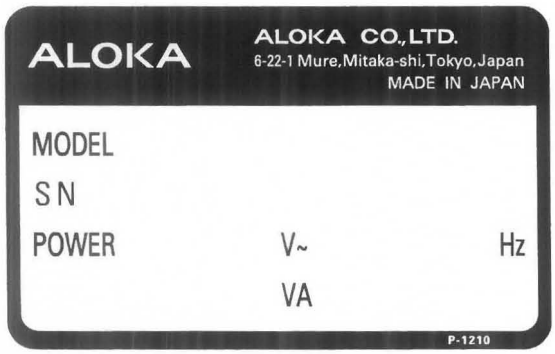


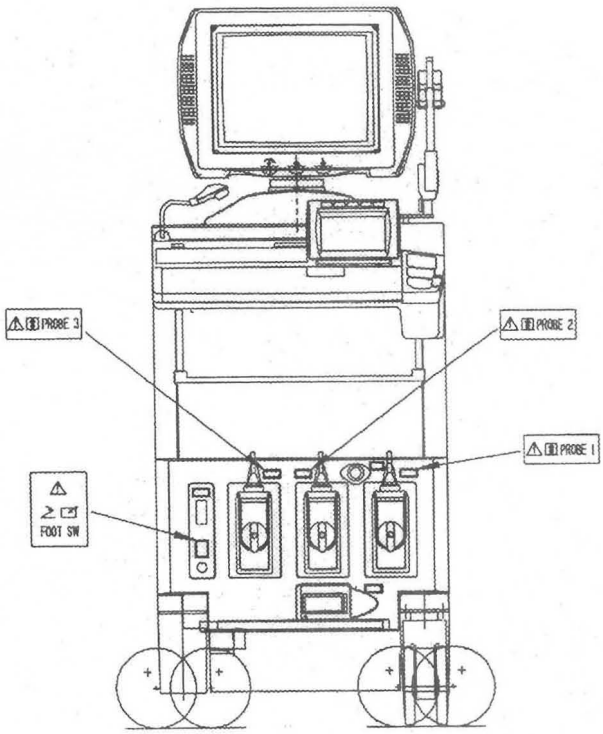


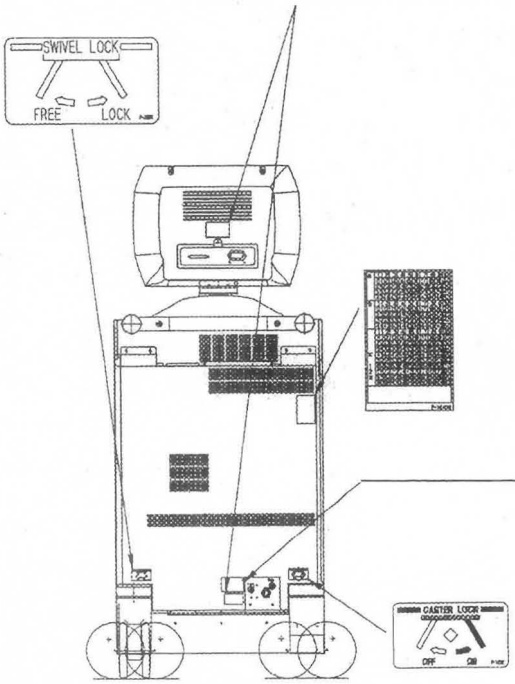
Labels	Warning · Caution message
	To ensure proper grounding and reduce the risk of electric shock, connect only to a hospital grade outlet.
	Caution to reduce the risk of electric shock, do not remove cover. Refer servicing to qualified personnel.

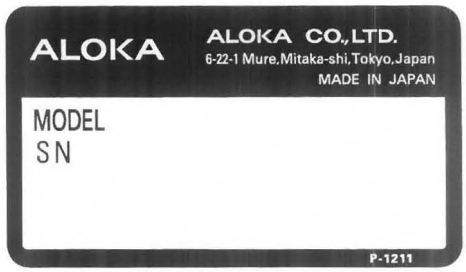
2-3. Position of Labels

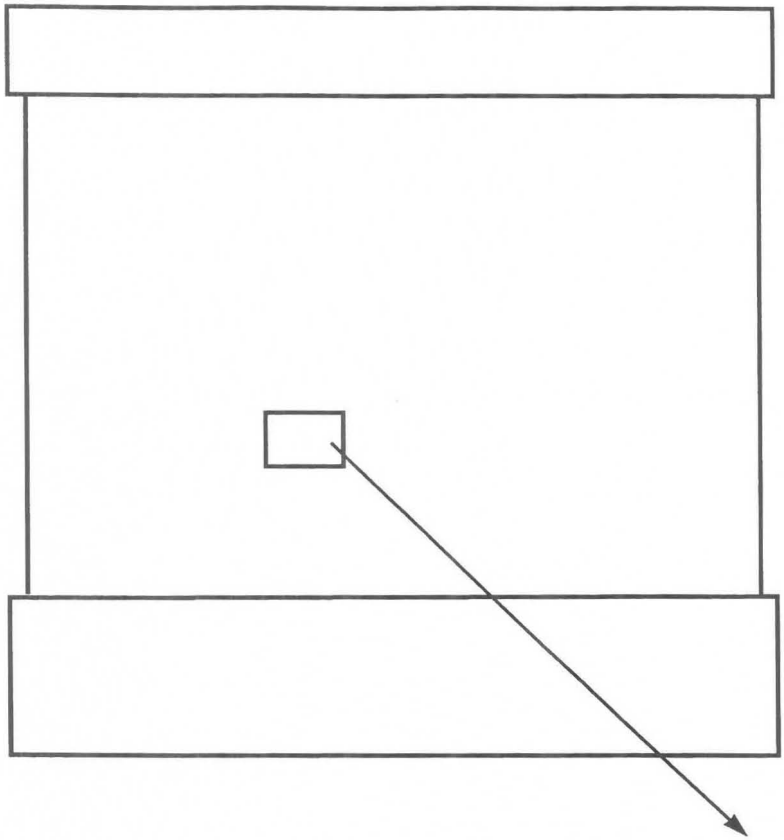
Labels	Warning · Caution message
	Risk of explosion if used in the persence of flammable anesthetics.
	Use acoustic exposure levels As Low As Reasonable Achievable (the ALARA principle) to obtain diagnostic information. Minmize exposure time.





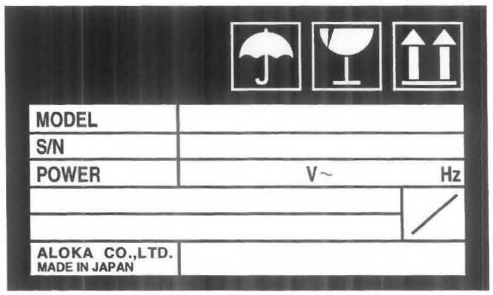






Model
Serial

Year of Manufacture
ex. □□-98□□□
→1998



3. INSTALLATION METHOD

3-1. Environmental Conditions of Installation Location

[Remark]

In this instruction manual, installation refers to the placing of assembled equipment in an environment where it can be used by the customer, and installing and connecting the peripheral equipment.

⚠Caution
This equipment must be assembled by a person recognized by Aloka when it is delivered to the user's premises. It must not be assembled by the user. When installing the equipment, place it on a stable surface where there is no possibility of the equipment toppling over.

(1) Working environment

This equipment is intended to be used under the following environmental conditions.

Working environment

Ambient temperature: 10 - 40°C

Relative humidity: 30 - 85%

Atmospheric pressure: 700 - 1060 hPa

Avoid rapid temperature change which may cause dew condensation.

Avoid using where dew condensation or waterdrops exist.

⚠Caution
Always use this in dried state. Dew condensation or waterdrops may appear by being moved from cold to warm place. Use without proper care, then, can cause short-circuiting.

(2) Installation location

Install the equipment in a location where sufficient clearance can be obtained on both sides of it.

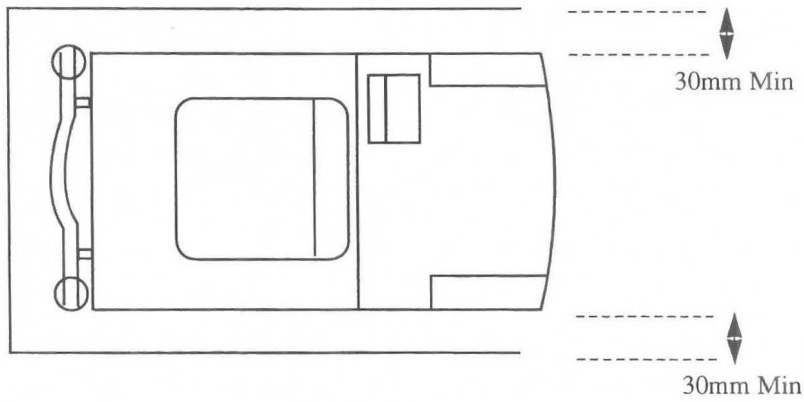


Fig. Installation location

⚠Caution
· Be sure to leave sufficient space on both sides of the equipment otherwise the temperature inside the equipment will rise, resulting in a possible breakdown.

(3) Power source

Install the equipment no more than 3.0 meters away from a power outlet in the wall. Ensure that the power outlet satisfies the following conditions.

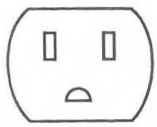
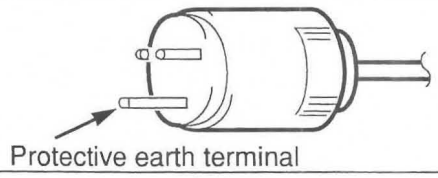
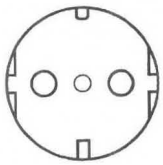
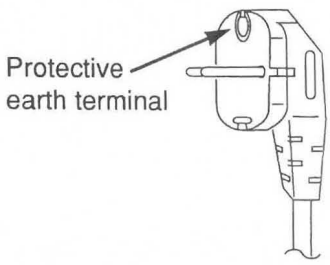
	Power outlet	Plug
100 V or 115 V specifications		
200 V - 240 V specifications		

Table Plugs and power outlets

(2) Installation location

Install the equipment in a location where sufficient clearance can be obtained on both sides of it.

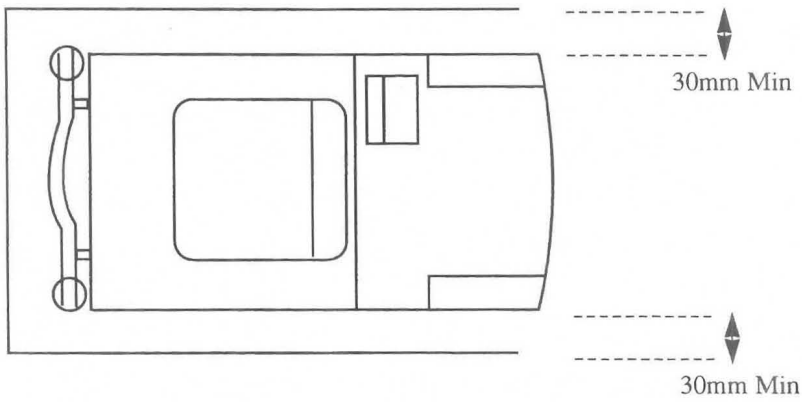


Fig. Installation location

⚠Caution
· Be sure to leave sufficient space on both sides of the equipment otherwise the temperature inside the equipment will rise, resulting in a possible breakdown.

(3) Power source

Install the equipment no more than 3.0 meters away from a power outlet in the wall. Ensure that the power outlet satisfies the following conditions.

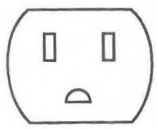
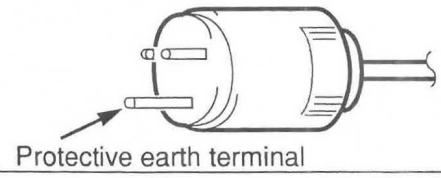
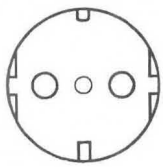
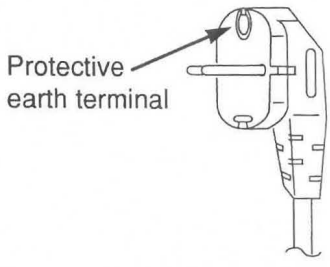
	Power outlet	Plug
100 V or 115 V specifications		
200 V - 240 V specifications		

Table Plugs and power outlets

3-2. Installing the Equipment

Installation procedure

① Move the equipment to the place where it is to be installed.

⚠Caution
If the temperature and humidity of the place where the equipment was stored are different to the temperature and humidity of the room to which the equipment is newly moved, condensation may occur. Leave the equipment to stand for a while in the newly installed location to allow it to become acclimatized to the environment before switching it ON. If you switch ON the equipment while there is condensation inside it, a breakdown may occur.

② Set the lock levers of the front casters in the ON position.

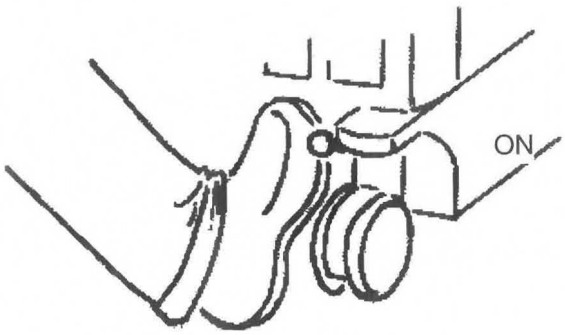


Fig. Lock levers of front casters

③ Install and connect the peripheral equipment.

[Remark]

For details of this procedure, refer to sub-section 3-4.

④ If you moved and re-installed equipment that was used in a different location, ensure that there are no loose parts, damage, or signs of wear on the equipment. Check to see if any of the cables of the peripheral equipment are protruding from the equipment.

⚠Warning
· Insert the power plug directly into a power outlet in the wall. · Do not connect the equipment to an extension cable, or to a branched circuit. This may cause you to receive an electric shock.

⑤ Insert the power plug into the power outlet.

⑥ Connect a probe to the equipment.

[Remark]

For details of this procedure, refer to sub-section 3-3.

⑦ Put the breaker in the ON position.

3-3. Connecting a probe to the equipment

On the right side panel of the equipment are probe connectors. Connect probes to these connectors.

[Remark]

The profile of the connector for an electronic type probe (electronic convex, electronic linear or electronic sector probe) is different to the profile of the connector for a mechanical scanner. Connect an electronic type probe to the large connector, and a mechanical scanner to the small connector.

⚠Note
Ensure that the pins on the probe connector are not bent. If you attempt to insert a connector with bent pins, you are liable to damage the probe connector on the equipment.

〈Method of connecting an electronic type probe〉

The lock lever of the connector moves over the range shown below.

[Remark]

When connecting a probe to the connector on the equipment, ensure that the lock lever (marked with a circle) is in the RELEASE position.

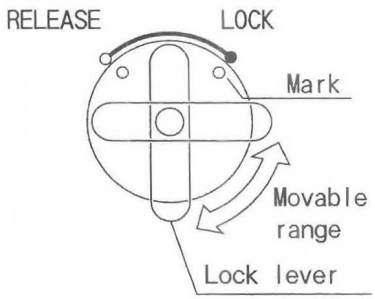


Fig. Lock lever

① Insert the connector of the electronic type probe firmly into the connector on the right side panel of the equipment.

② Once you have inserted the connector completely, turn the lock lever 1/4 of a turn clockwise to the LOCK position.

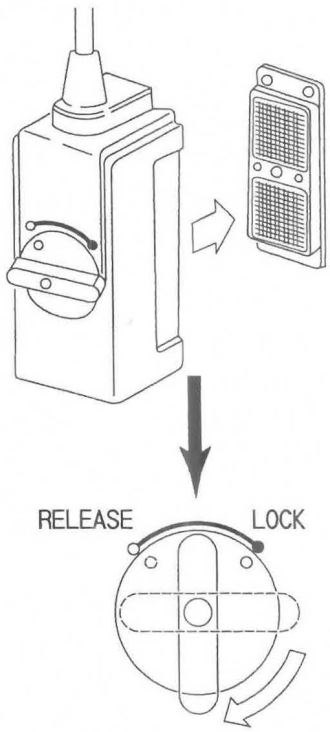


Fig. Connector

⚠Note
If the lock lever is difficult to turn, check to see if the connector is inserted completely. If you attempt to turn the lock lever without firmly inserting the probe connector, you are liable to damage both the probe connector and the connector on the equipment.

③ Finally, confirm that the probe connector is fixed securely to the connector on the equipment.

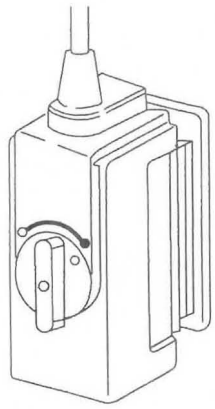


Fig. Connector

〈Method of connecting a mechanical scanner〉

The lock lever of the connector moves over the range shown below.
[Remark]
When connecting a scanner to the connector on the equipment, ensure that the lock lever (marked with a circle) is in the RELEASE position.

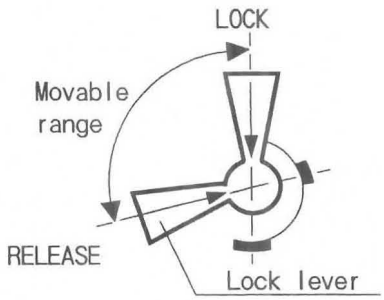


Fig. Lock lever

① Insert the connector of the mechanical scanner firmly into the connector on the right side panel of the equipment.

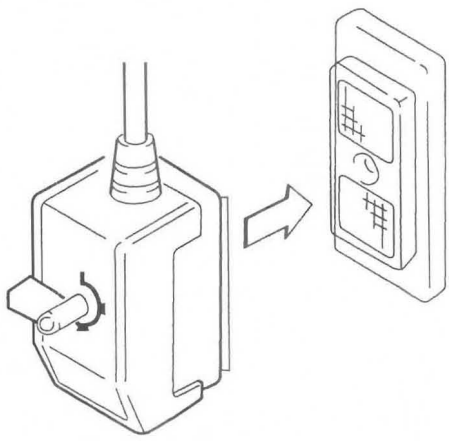


Fig. Connector

② Once you have inserted the connector completely, turn the lock lever 1/4 of a turn clockwise to the LOCK position.

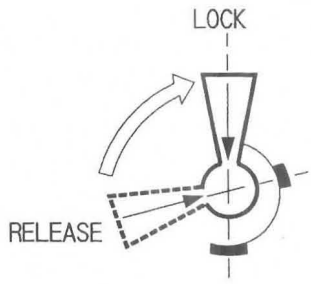


Fig. Lock lever

③ Finally, confirm that the scanner connector is fixed securely to the connector on the equipment.

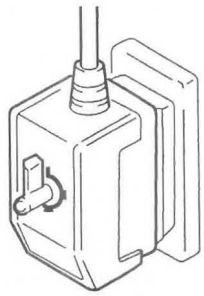


Fig. Connector

⚠Note

If the lock lever is difficult to turn, check to see if the connector is inserted completely.
If you attempt to turn the lock lever without firmly inserting the probe connector, you are liable to damage both the probe connector and the connector on the equipment.

3-4. Connecting the equipment to the physiological signal terminal

Connect the ECG lead cord, the phonocardiogram microphone and the pulse microphone to the respective connectors in the physiological signal unit.

(1) Connecting the ECG lead cord

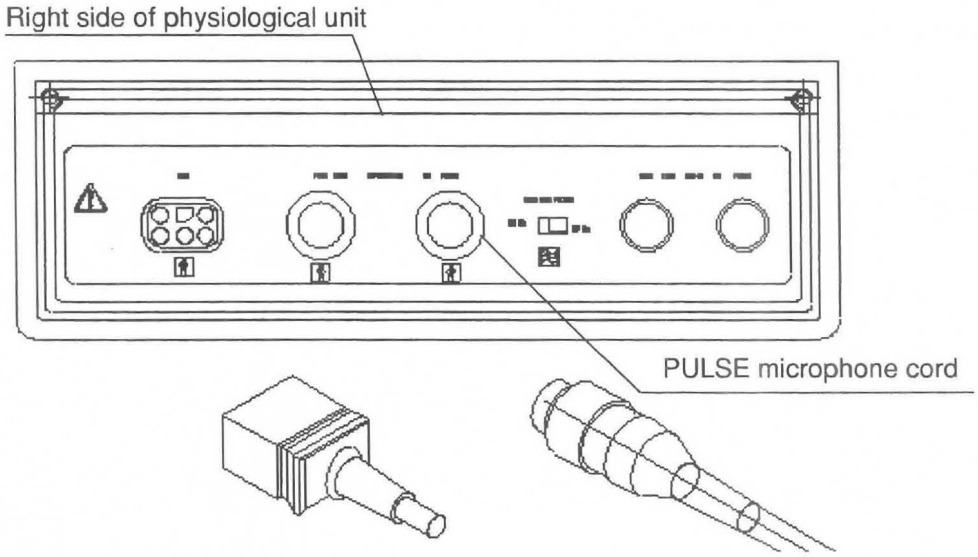


Fig. Connecting the ECG lead cord

① Insert the connector of the ECG lead cord firmly into the connector on the panel, ensuring that the groove in the connector is uppermost.

② Set the HUM FILTER switch to 50 Hz or 60 Hz, depending on the mains supply frequency.

③ Before connecting the ECG lead cord to the patient, insert the three jacks of the ECG lead cord into the corresponding clip electrodes.

[Remark]
The ECG lead method is second limb lead.

(2) Connecting the PCG microphone

① Insert the plug of the PCG microphone firmly into the connector of the PCG.

⚠ Note

The PCG microphone does not readily withstand impacts, so do not drop it or strike it against other objects.

(3) Connecting the PULSE microphone

① Insert the plug of the PULSE microphone firmly into the connector of the PULSE.

(4) Connecting the other equipment signal

① Insert the plug of the ECG or PULSE signal cable firmly into the connector of the DC IN.

⚠ Warrning

- If you use this equipment together with other equipment, you risk damaging the equipment or causing the patient to receive an electric shock.
- Use only an ECG,PULSE monitor that conforms to IEC60601-1 together with this equipment

⚠ Caution

- Carefully read the instruction manual of the ECG,PULSE monitor to be used with this equipment to ensure that you use the monitor correctly.
- Do not use the monitor if the instruction manual states that it must not be used together with ultrasound image diagnostic equipment or similar medical electronic equipment.
- Perform a safety check on the ECG,PULSE monitor to be used with this equipment. If the monitor is abnormal, do not use it with this equipment because you may receive an electric shock.

⚠ Caution

The use of an ECG,PULSE monitor with this equipment may cause electromagnetic interference to the equipment.
If an ECG,PULSE monitor impairs the diagnosis, do not use it together with this equipment.

⚠ Note

If cables are connected from both the PULSE and ECG to DC IN, the output signal from the ECG,PULSE monitor is displayed preferentially.
If an external signal is unnecessary, do not connect a cable to the DC IN connector.

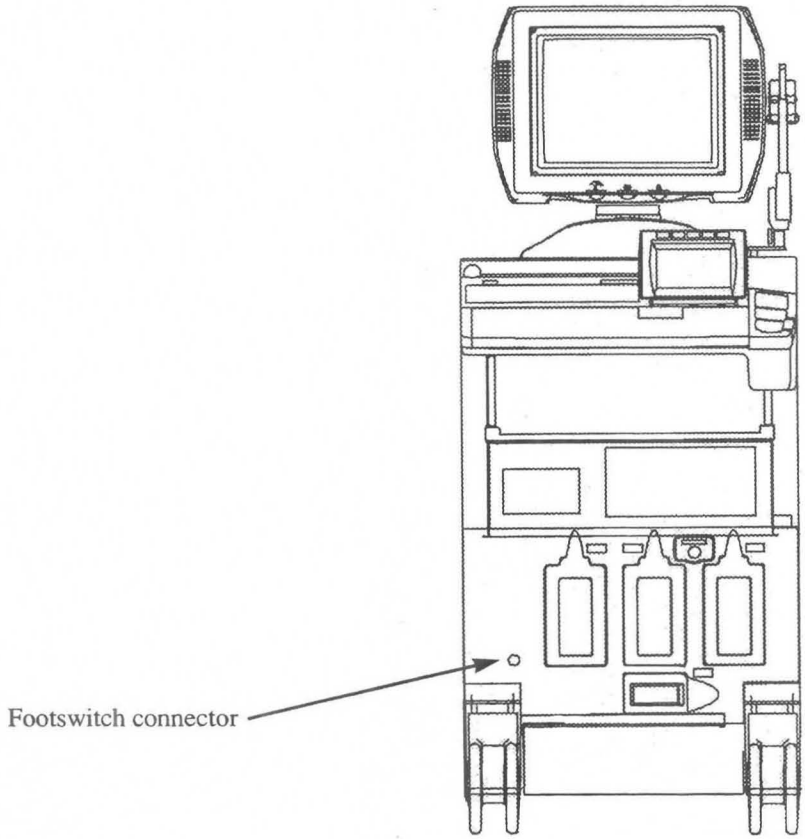
3-5. Connecting the footswitch

There is a connector at the lower left of the front panel.

Connect the footswitch to that connector.

The function can be assigned to each of the three pedals of the footswitch on the Preset.

Please refer to the "11-5. Preset" for the switch assignment.



4. Specifications and Name of Each Part

4-1. Specifications

Scanning methods:

Electronic sector scan

Electronic convex scan

Electronic linear scan

Modes:

B, B/B

M, B/M, M/D, B/M/D

D (PW and CW modes), B/D (PW and CW modes)

Flow

Power flow

Slice image direction:

Inversion

Left-right reversal (90°-step rotation display)

Image depth:

Can be set in 1-cm steps between 3 cm and 24 cm.

[Remark]

The maximum image depth differs depending upon the probe.

Image adjustment:

Gain:	Variable between 30 and 90 dB
STC:	8-step slider control
Contrast:	Switchable through 16 steps
Image processing:	GAMMA, RELIEF, POST PROCESS, FTC, frame correlation, etc.
AGC:	Switchable through 16 steps
Acoustic output:	0 to 100%

This section consists of 18 pages.

Character display:

ID (patient No.):	14 characters
Name (patient's name):	23 characters
Date and time:	Automatic display
Probe frequency:	Automatic display
Heartrate value:	Automatic display
EGC sync delay time value:	Automatic display

Measurement functions:

Basic measurements, cardiac function measurements, obstetric measurements, peripheral vessel measurements, other measurements

Display accuracy:

±5% (Range<6cm :2.5%)

Preset function:

Enables the user to register 15 different sets of conditions.

Physiological signals:

ECG、PCG、PULSE

M mode display:

Display method:	Scrolling, Moving Bar
Sweep speed:	Switchable through 7 steps

D mode display:

(PW)

Modulation method:	Pulse modulation
Signal analysis:	High speed Fourier conversion (FFT) method
Display pattern:	Power spectrum display
Speed range (PRF):	Approx. ±6.22 cm/s to ±318.8 cm/s
Low frequency rejection filter:	Switchable through 12 steps (for Auto operation)

(CW)

Signal analysis:	High speed Fourier conversion (FFT) method
Display pattern:	Power spectrum display
Velocity range (PRF):	Approx.±6.22 cm/s to ±796.2 cm/s
Low frequency rejection filter:	Switchable through 12 steps (for Auto operation)

Flow

Processing method:	Self-correlating method
Speed range (PRF):	Approx. ±6.22 cm/s to ±199.2 cm/s
Low frequency rejection filter:	MTI filter Switchable through 4 steps

Cine memory functions:

Search, scroll, store, review, loop playback

Dimensions:

Width 540 mm, Depth 930 mm, Height 1350 mm

Weight:

180 kg

[Remark]

The dimensions and weight may vary by up to ±10% of the values indicated above.

4-2. Name and Function of Each Part

4-2-1. External view and name of each part

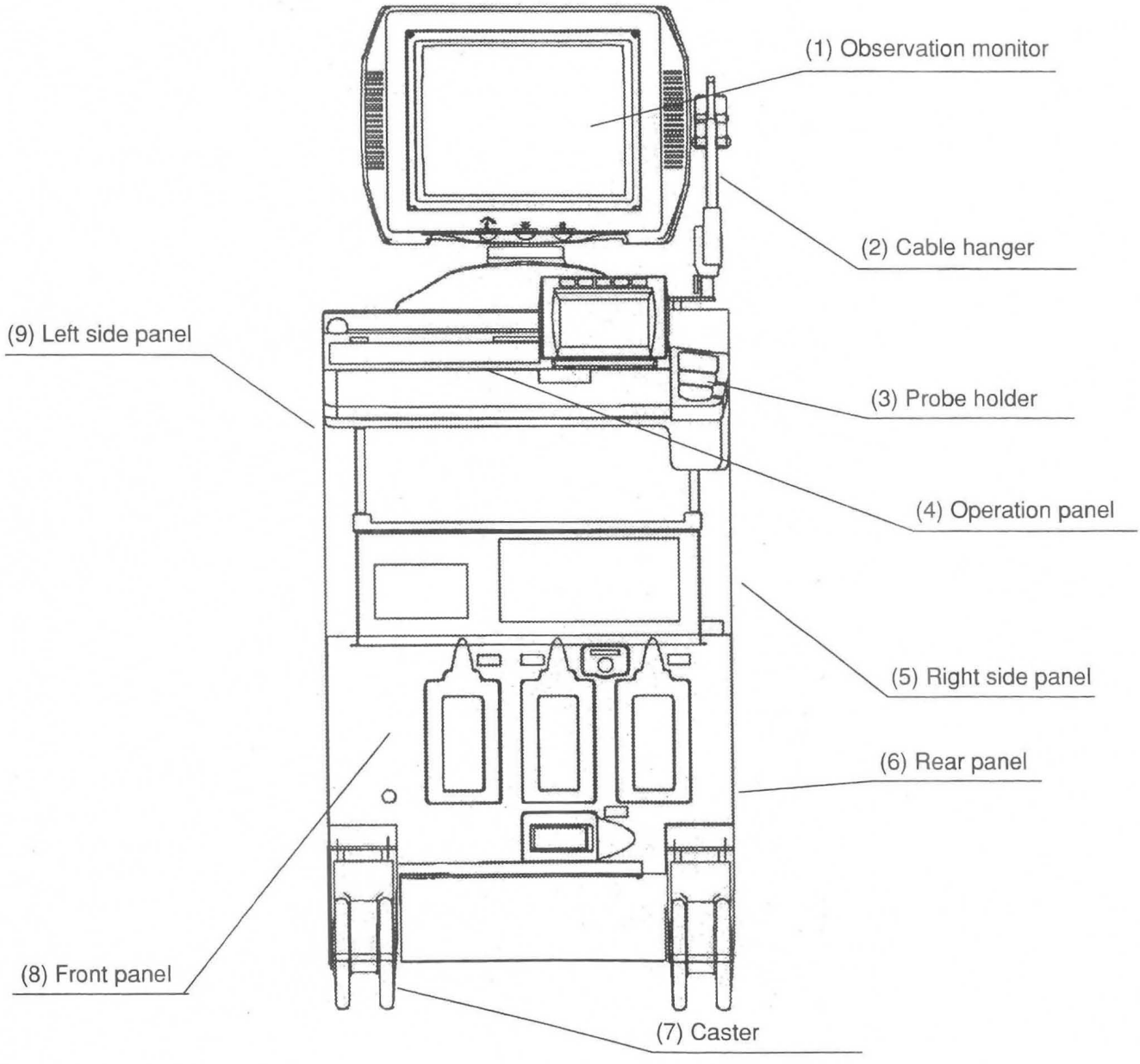


fig. 外観

(1) Observation monitor Displays diagnostic images. Can also display external video signals.

(2) Cable hanger Used to hang the probe cables.

(3) Probe holder Used for holding probes and ultrasound gel.

(4) Operation panel Has a variety of switches for setting the operation of the system.

⚠ Caution

Do not lift the equipment by grasping the operation panel or apply an unreasonable force to the equipment because this may result in a breakdown.

(5) Right side panel This panel has a connector for connecting a physiological signal cable.

(6) Rear panel The rear panel has a breaker power supply cable.

(7) Casters The casters enable the equipment to be moved about.
→ For details, see Section 20.

(8) Front panel The front panel has probe connectors and a foot switch.

(9) Left side panel The left side panel has input and output connectors for video signals and also a power switch.

4-2-2. Operation panel

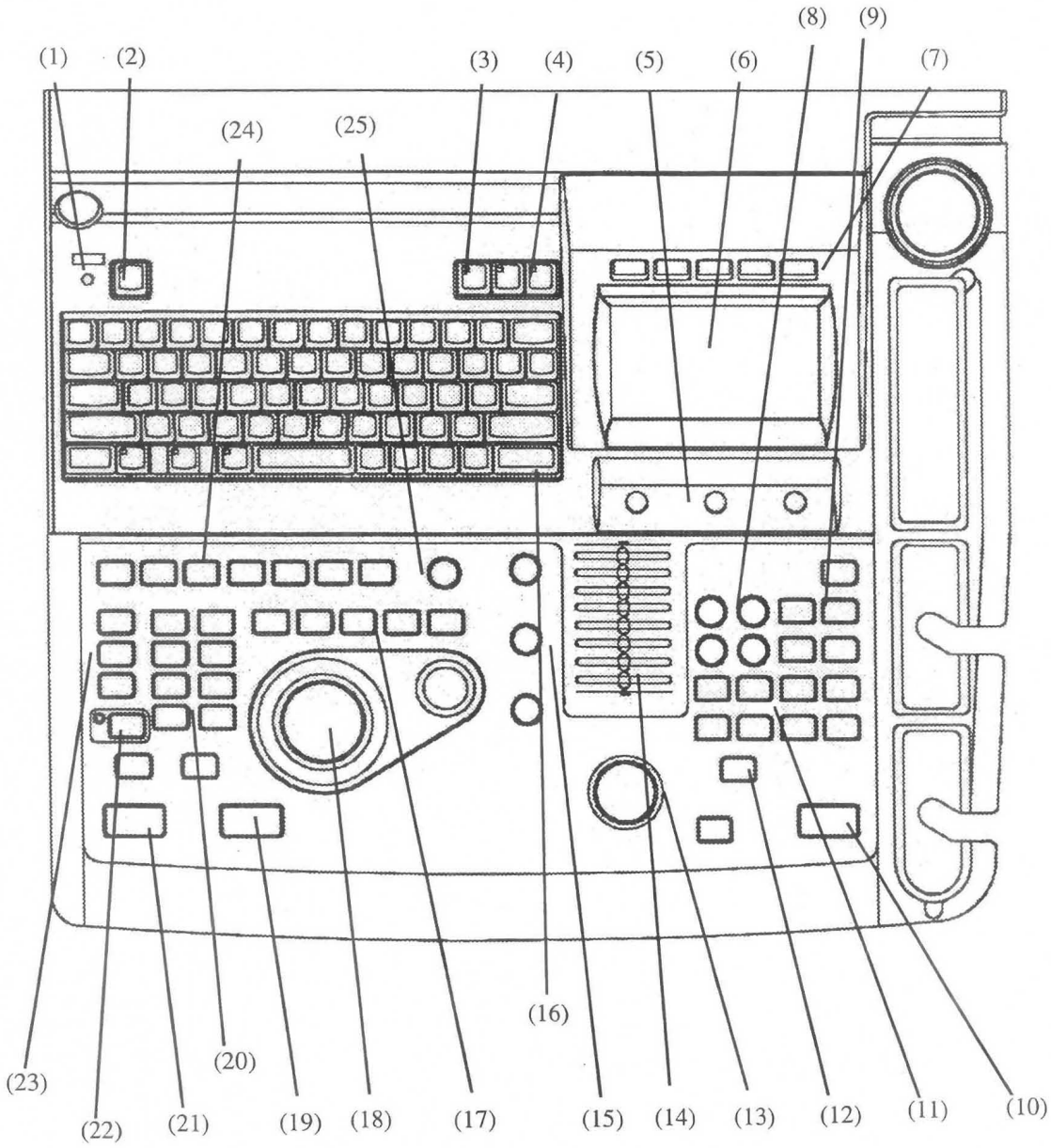


fig. Operation panel

(1)	LED	The LED flashes while the hard disk is being accessed or the system is starting up.
(2)	NEW PATIENT	This switch erases all IDs, names, comments and annotations, and returns the system to the initial set status. → For details, refer to 10-1 "Method of Operating Switches".
(3)	LARGE CHAR	This switch displays large characters when you enter a comment.

(4) EXT

This switch changes the status of the system between that in which a normal ultrasound image is displayed on the screen (INT status), and that in which an external signal (e.g. an image from a VCR) is displayed on the screen (EXT status).

→ For details, refer to 10-1 "Method of Operating Switches".

(5) Touch panel rotary encoder

Use the touch panel rotary encoder when using a function on the touch panel that involves the use of the rotary encoder.

→ For details, refer to 10-1 "Method of Operating Switches".

(6) Touch panel

The touch panel is used to set the functions built into the system. It is also used as a sub-operation panel for entering body marks, comments, and so on.

→ For details, refer to 10-1 "Method of Operating Switches".

(7) FUNCTION

This is a group of five switches for selecting a probe, displaying a physiological signal, and so on. When a switch is selected, the screen of the touch panel changes over. These switches are as follows.

PROBE

This switch selects the probe to be used when several probes are connected to the equipment.

→ For details, refer to 10-1 "Method of Operating Switches".

PRESET

This switch is used to activate a function in which various image conditions that are suitable for the region to be examined have been memorized in advance, and displays these conditions on the screen, in order to eliminate the nuisance of carrying out panel operations.

→ For details, refer to 11-5 "Preset".

PHYSIO

Turns the physiological signal to be displayed on the screen ON or OFF, and also adjusts the sensitivity and position of the signal.

→ For details, refer to 11-3 "Physiological Signal".

MENU

: Displays a menu.

→ For details, refer to 11-4 "Menu".

MEASUREMENT

: Activates the measurement function.

→ For details, refer to Sections 12 to 18.

(8) RANGE/VEL RANGE

This is a group of switches for selecting the display depth of an image, or selecting the velocity range when the blood flow is displayed.

Select the display depth based on the sending point of the displayed image. The display depth is common to B and M mode images. The last set display depth remains set, even if the mode changes.

You cannot change the display depth of a frozen image.

→ For details, refer to 10-1 "Method of Operating Switches".

(9) ASSING 1～3

You can register the menu function, for example, as a switch on the equipment. You can register one function per switch, that is, a total of three functions.
→ For details, refer to 11-5 "Preset".

(10) FREEZE

This switch freezes an image, or displays a frozen image in realtime.
When you press the **FREEZE** switch, an image freezes: A B mode image freezes upon completion of one ultrasound scan, and an M or D mode image freezes instantaneously. Simultaneously, the date and time display and transmission from the probe stop.
→ For details, refer to 10-1 "Method of Operating Switches".

(11) MODE

This is a group of eight switches for selecting the display mode.
When a mode in which several images are displayed is frozen, each mode switch acts as a request function. These switches are as follows.

B : Activates the B mode (status in which one B mode image alone is displayed on the screen).

B | B : Activates the 2B mode (status in which two B mode images are displayed on the screen).

M : Activates the M mode (status in which an M mode image alone is displayed on the screen).

D : Activates the D mode (status in which a D mode image alone is displayed on the screen).

B | D : Activates the B/D mode (status in which one B mode image and one D mode image are displayed on the screen).

PW/CW : Switches between PW and CW Doppler when certain kinds of electronic sector probes are being used.

FLOW : Displays the flow on a B mode image or an M mode image.

POWER FLOW : Displays the power flow on a B mode image or an M mode image.

→ For details, refer to 10-1 "Method of Operating Switches".

(12) SELECT

This switch selects an image on which operations can be performed when multiple images are displayed (2B mode display, B/M mode display, etc.).
→ For details, refer to 10-1 "Method of Operating Switches".

(13) B GAIN

The B GAIN knob adjust the sensitivity of B and M mode images.
→ For details, refer to 10-1 "Method of Operating Switches".

(14) STC

This consists of eight slider controls, each of which adjusts the sensitivity at a certain depth. The number (cm) indicated alongside each STC knob is the display depth at which the sensitivity can be adjusted.
→ For details, refer to 10-1 "Method of Operating Switches".

(15) GAIN

This is a group of three knobs used to adjust the sensitivity of the image. These knobs are as follows.

M GAIN : The M GAIN knob is used to finely adjust the sensitivity of an M mode image after the sensitivity has been adjusted with the GAIN knob.

D GAIN : Adjusts the intensity of the spectrum display of a D mode image.

FLOW GAIN : Adjusts the flow sensitivity.

→ For details, refer to 10-1 "Method of Operating Switches".

(16) Full keyboard — This is a group of keys that are used to enter characters to the screen.

CTRL : If you press this key while pressing a letter key, you can enter the European character or symbol displayed at the top part of the letter key.

CAPS : Switches between upper case and lower case letters.

SHIFT : If you press this key while pressing another key, you can change between upper and lower case letters, or enter the symbol displayed at the top part of a number key.

BS : Returns the underline cursor by one character, and deletes the character above the underline cursor.

Return key : When there are no characters in a line, this key shifts the underline cursor to the left edge of the next line down.

When there are characters in a line, this key shifts the underline cursor to a point one line below the first letter of the word entered last.

CLEAR : Deletes the character at the position of the underline cursor.

If there is no character at the position of the underline cursor, either press the CLEAR key simultaneously with the SHIFT key, or press the CLEAR key twice in succession, and all characters in the text area will be deleted.

SPACE : Deletes the character above the underline cursor, and advances the underline cursor one character.

The following two switches are also provided in addition to a general full keyboard.

ID : Starts the function that enters an ID. Three kinds of input method are provided. The method used depends upon the region to be examined.

→ For details, refer to 10-1 "Method of Operating Switches".

COMMENT : Displays an underline cursor at top left of the text area. Pressing this switch once again causes the underline cursor to disappear.

→ For details, refer to 10-1 "Method of Operating Switches".

(17) Trackball function switches — This is a group of five switches used to select the various functions that are controlled by the trackball. These switches are as follows.

→ For details, refer to 10-1 "Method of Operating Switches".

CURSOR/B.L.S : This switch displays the line (cursor) that indicates the detection position of an M or D mode image displayed on a B mode image. It moves the baseline of the Doppler waveform up or down to eliminate aliasing and enable the waveform to appear continuous.

ANNOTATION : This switch displays words pre-registered in the equipment, in the text area.

: This switch displays a body mark on the screen, and a list of body marks on the touch panel. It also changes the position of a probe mark placed over a body mark that is already displayed on the screen.

SCAN AREA : This switch continuously enlarges or reduces the scanning range of a B mode image. It also enables you to shift or set the flow area when a flow is displayed.

ZOOM : Displays a B mode image in enlarged form.

(18) Trackball and rotary encoder — Used to move measurement marks and also control various functions.

(19) MARK REF — MARK REF is used to select a display, and the **SET** switch is used to finalize the selection.

(20) Measurement-related switches — This is a group of eight switches used to start the measurement functions. These switches are as follows.

REPORT : Displays the results of measurement, computed values, and patient data in the form of a list.

USER1 to 3 : You can allocate frequently used functions to these switches.

: The measurement function starts directly when you press one of these switches.

+ × ⁘ : The mark corresponding to the pressed switch is displayed as a measurement mark.

→ For details, refer to Sections 12 to 18.

(21) PRINT — This switch records an image on a printer connected to the system. You can allocate a total of four printers to the PRINT switch and REC 1 to 3 switches.

→ For details, refer to 10-1 "Method of Operating Switches".

(22) DMS — This switch selects either the status in which a normal ultrasound image is displayed on the screen, or that in which an image is displayed on the DMS screen. While the DMS is starting up, the LED flashes.

(23) Cine memory switch — Starts an operation related to the image memory or the store memory.

SEARCH : Used with the trackball to display an image stored in the image memory.

STORE : Stores a frozen image or a searched image in the store memory.

REVIEW : Displays a stored image in the store memory.

→ For details, refer to 11-1-1 "Cine Memory".

(24) DIRECT 1～3 — You can register one kind of function, such as the menu function, in each of these switches.

→ For details, refer to 11-5 "Preset".

(25) Rotary encoder and function switches

This rotary encoder enables you to set a number of functions such as ACOUSTIC POWER and IP SELECT.

IP SELECT : This switch enables you to set the necessary functions for adjusting an image using the one rotary encoder. You can change the set values using a preset.

IMAGE/FREQ : Changes over the frequency of the ultrasound wave. You can make separate frequency settings for the B mode and M mode, and the D mode, FLOW mode and POWER FLOW mode.

ACOUSTIC POWER : This switch enables you to manually adjust the acoustic output value.

ANGLE : This switch corrects the Doppler flow velocity angle.

→ For details, refer to 10-1 "Method of Operating Switches".

4-2-3. Front panel

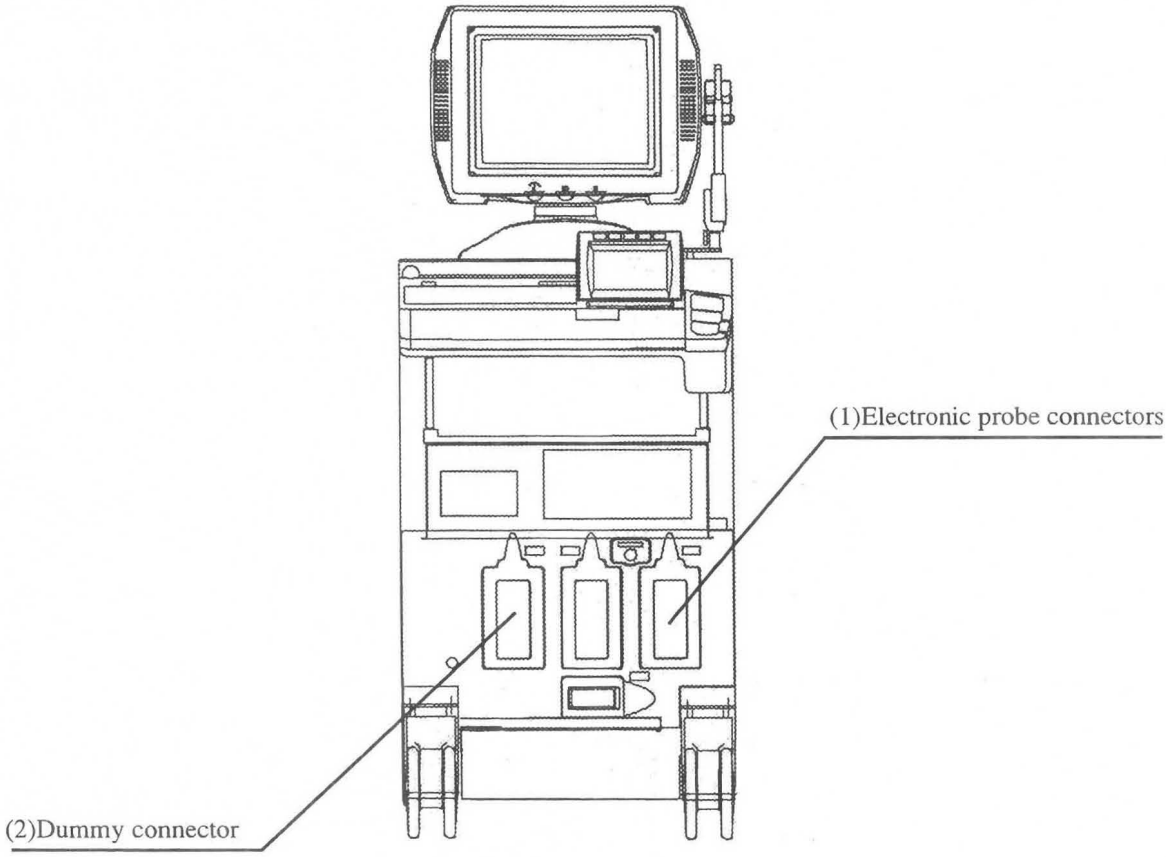


Fig. Front panel

(1) Electronic probe connectors — These connectors are for connecting the electronic convex, linear and sector probes. When two or more probes are connected, press the **PROBE** switch on the operation panel then select the probe to be used from the touch panel.

[Remark]
Do not connect probes other than electronic probes to these connectors.

(2) Dummy connector — Used to connect a probe that is not used.

4-2-4. Right side panel

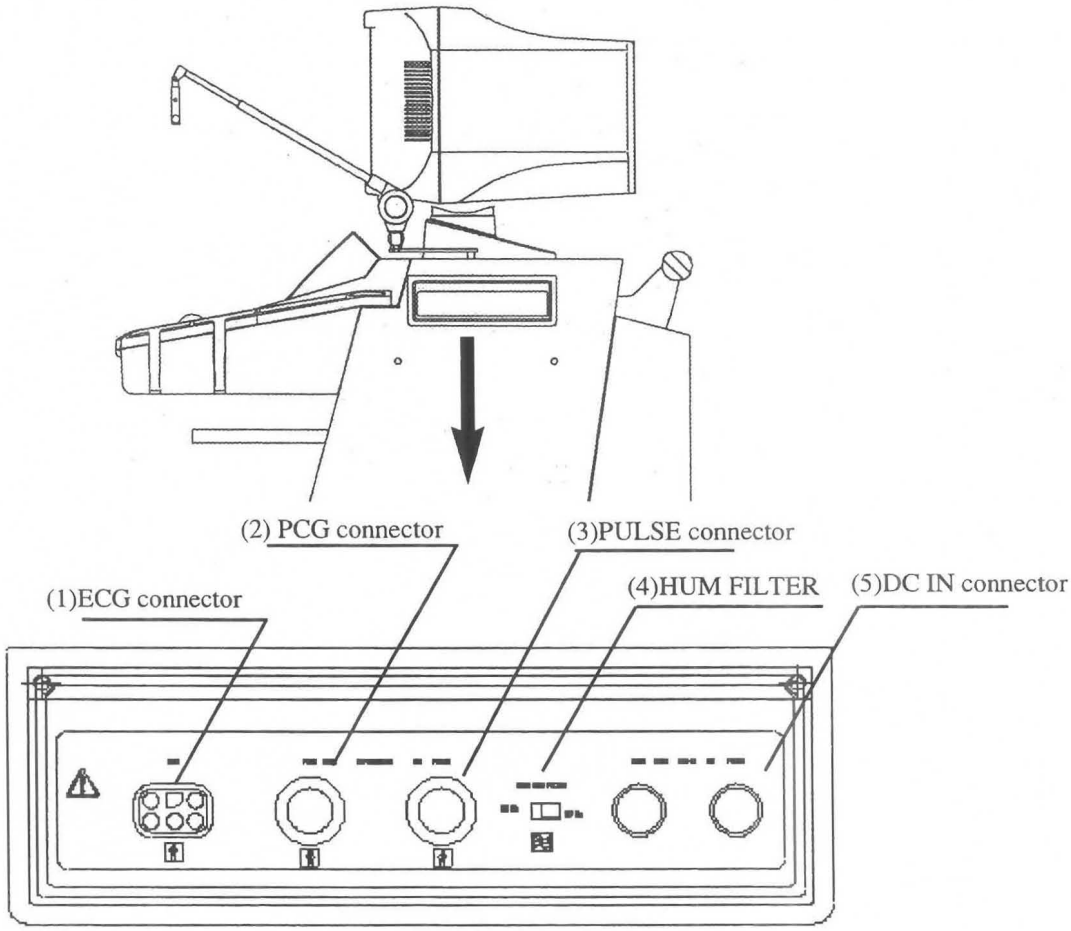


Fig. Right side panel

(1)	ECG connector	Used for connecting the ECG signal cable.
(2)	PCG connector	Used for connecting a PCG microphone cable.
(3)	PULSE connector	Used for connecting the cable of a pulse transducer.
(4)	HUM FILTER	This switch is for eliminating hum noise. Set the filter value to either 50 Hz or 60 Hz depending upon the frequency of the mains supply used.
(5)	DC IN connector	Used to connect a pre-amplified signal obtained from another piece of equipment such as a polygraph.

4-2-5. Left side panel

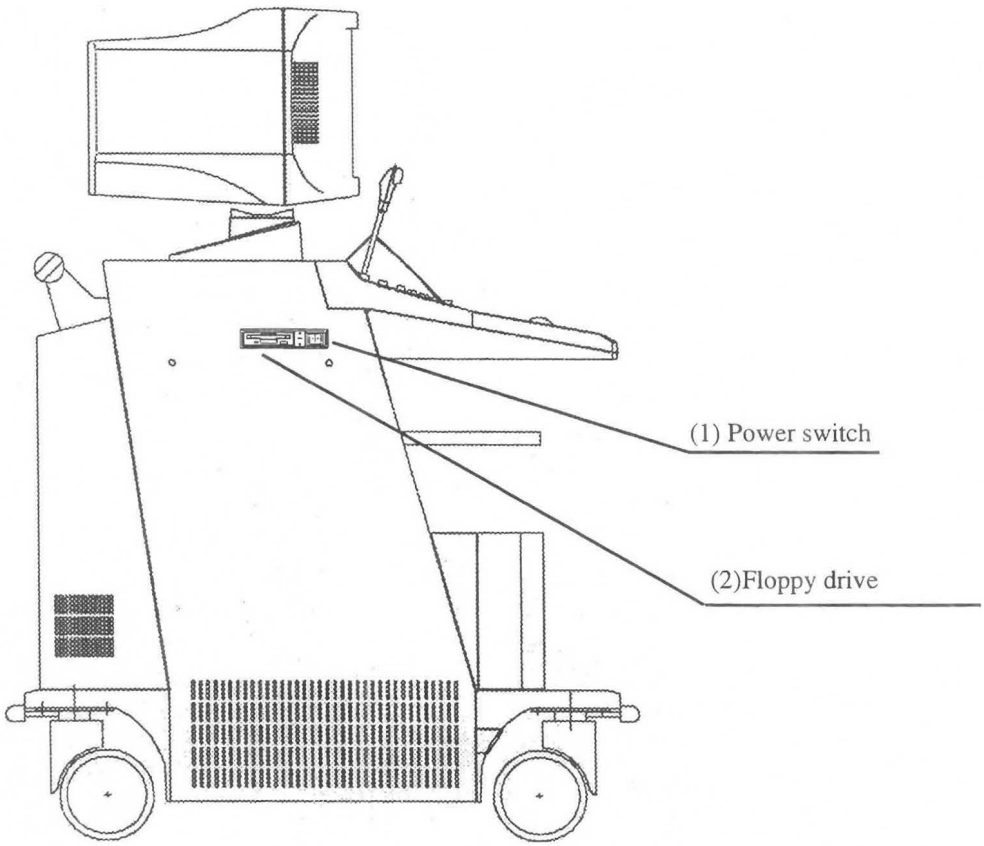


Fig. Left side panel

(1) Power switch

Switches the system ON and OFF.
If you put the switch in the I position, power is supplied to the system, and the green LED at top left of the operation panel lights, indicating that the system is ON.
If you put the switch in the ○ position, the power to the system is cut off.

(2) Floppy drive

The floppy drive enables you to transfer data inside the system to a 3.5 floppy disk, or to transfer data from another piece of equipment to the system via a floppy disk.
→ For details, refer to 10-1 "Method of Operating Switches".

4-2-6. Rear panel

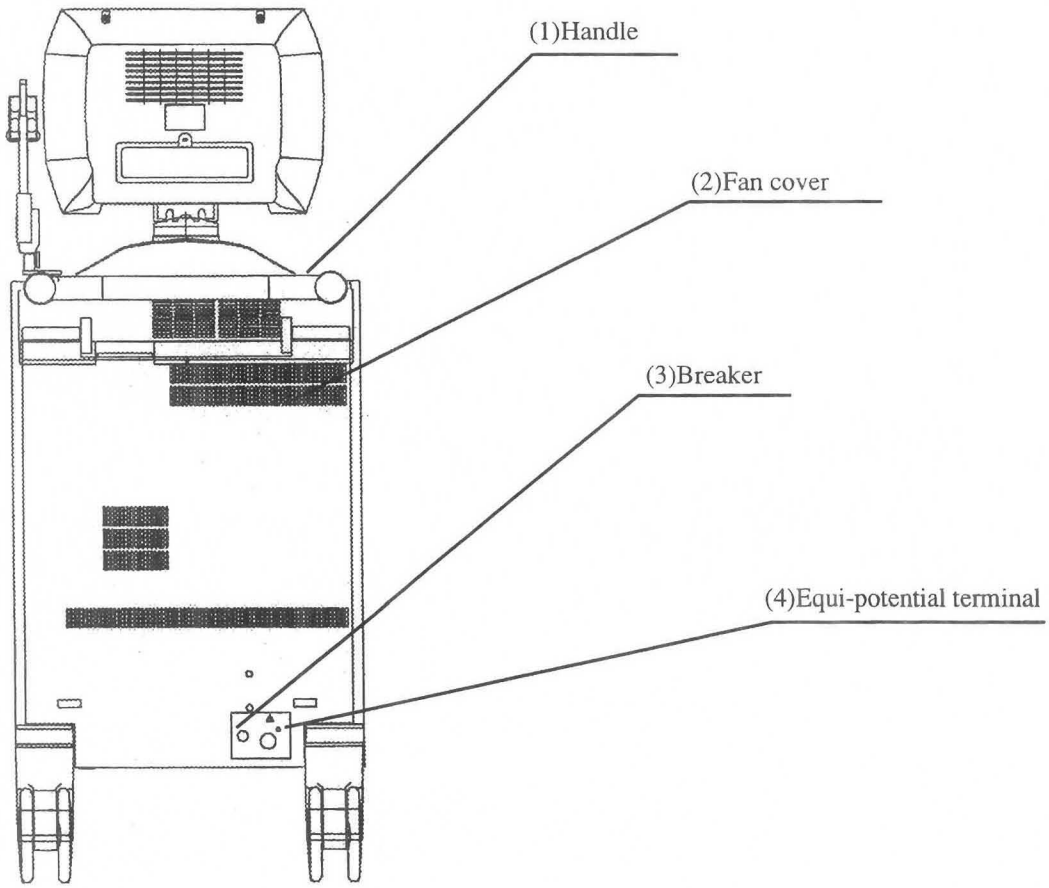


Fig. Rear panel

(1)	Handle	Used to carry the equipment about.
(2)	Fan cover	This is the cover of the fan that feeds air to the inside of the equipment.
(3)	Breaker	This is a switch that is used to supply power to the equipment. Normally, leave it ON.
(4)	Equi-potential terminal	In order to eliminate any potential difference between this equipment and other equipment, connect the equi-potential terminal on this equipment to the equi-potential terminal on the other medical equipment, bed, and so on.

⚠ Caution

The equi-potential terminal is a functional earth terminal of signal level not intended for protective grounding purposes.

4-2-7. Casters

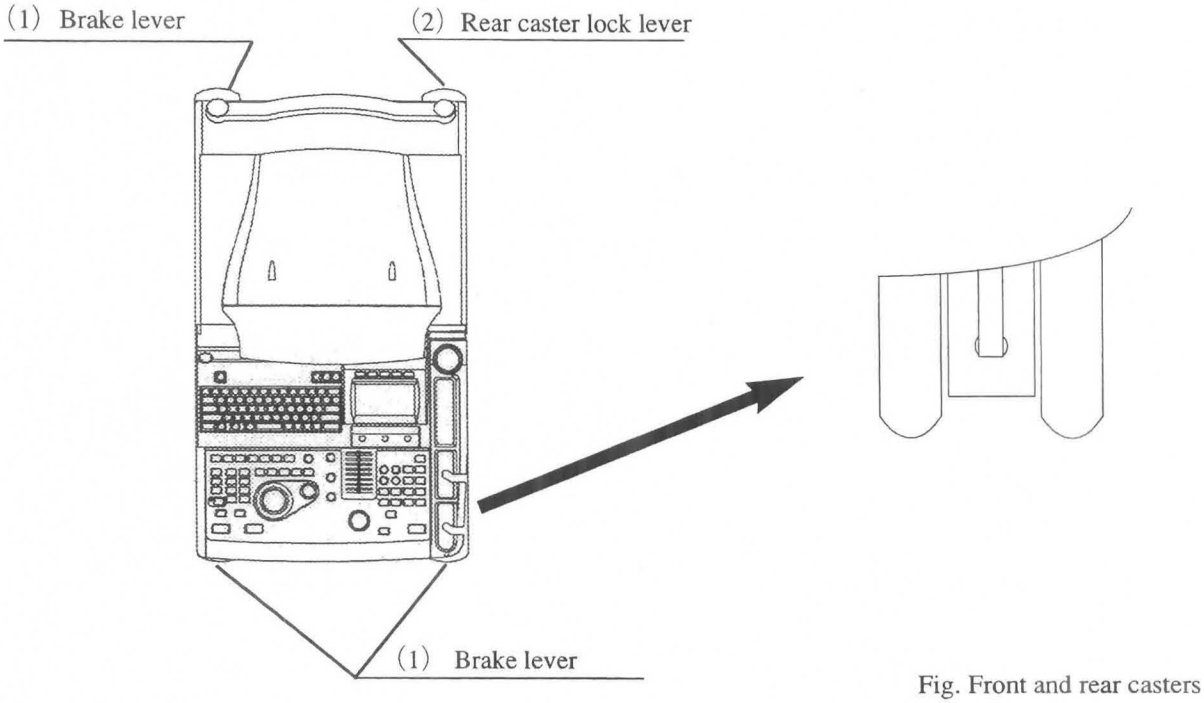


Fig. Front and rear casters

(1) Brake lever — Put the brake levers in the ON position when you wish to prevent the equipment from moving. The left rear caster also has a brake lever.

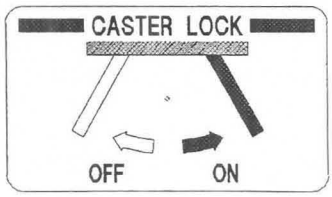


Fig. Caster lock

(2) Rear caster lock lever — Put the rear caster lock lever in the ON position when you wish to prevent the rear casters from swiveling. This ensures that the equipment moves straight forward when pushed, which is convenient when moving it from one place to another.

4-2-8. Observation monitor

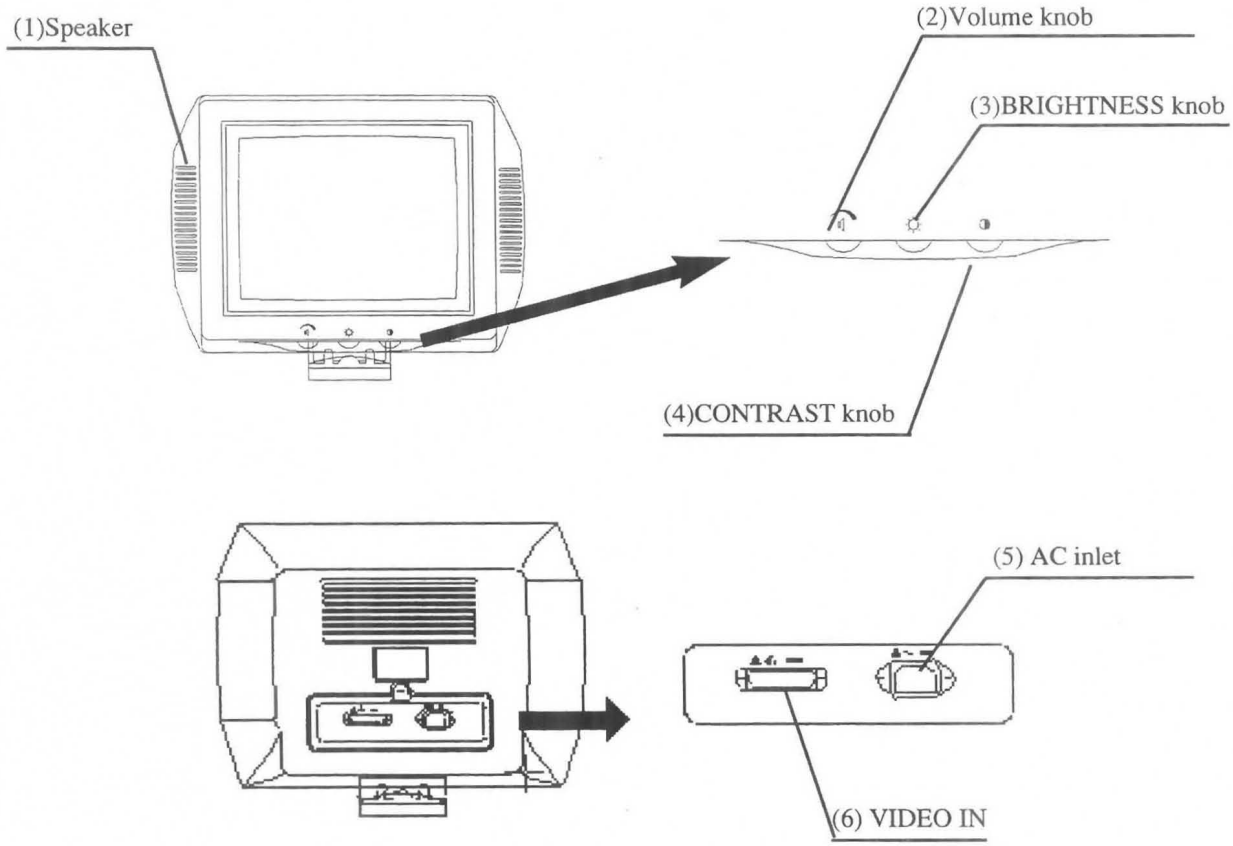


Fig. Observation monitor

(1)	Speaker	Enables you to listen to the Doppler sound.
(2)	Volume control	Adjusts the volume of the Doppler sound.
(3)	BRIGHTNESS knob	Adjusts the brightness of the observation monitor screen.
(4)	CONTRAST knob	Adjusts the contrast of the observation monitor screen.
(5)	AC IN	Used for connecting the cable that supplies power to the monitor.
(6)	VIDEO IN	Used for connecting a external video signal to the monitor.

5. COMPOSITION

5-1. Standard composition

	Type number	
Diagnostic equipment proper	USI - 149	1
15-inch viewing color monitor	IPC-1530	1
Cable hanger	MP-HA5500-1	1
Peripheral equipment connection cable	AUW1-100	1
VCR connection cable	L-CABLE-296	1
Ultrasound gel (consumable) (Except EU nations)	GEL-SCAN-PA	1
Instruction manual	MN1-1102	1
	MN1-0979	1

This section consists of 4 pages.

5-2. Options

> ⚠ Caution
>
> Optional parts forwarded to EU nations differ in structure from those forwarded outside EU.
> For use inside EU, connect optional parts with CE marks. Failure of this may cause unfitness in contents.

(1) Peripheral equipment

			EU nations	Outside EU
Recording equipment	Printer	SSZ-307E	○	○
	Color Printer	UP-2950MD(NTSC/PAL)	—	○
	Color Printer	UP-2850(PAL)	○	—
	VCR	SVO-9500MDP (PAL)	○	○
	VCR	SVO-9500MD (NTSC)	—	○
Functional expantion	Pyisio Signal unit	PEU-5500	○	○
	ECG Cable	L-CABLE-575	○	○
	ECG Clips	SEC141	○	○
	PCG Microphone	TP-06	○	○
	Pulse Transduser	TY-307A	○	○
	ECG cream	YGB106	○	○
	ST-CW Dopper Unit	UCW-5500	○	○
equipment	Data Management System	DMS-5500B	○	○
Other equipment	Triple foot switch	MP-2614B	○	○

(2) Table of optional probes (EU nations and Outside EU)

> ⚠ Caution
>
> Use probes only for their intended purpose. Do not use them incorrectly.

[Remark]

For details of using a probe or scanner, refer to the instruction manual for the probe or scanner.

Name	Type No.	Mainspecifications	Application	Applicable part of body	EU	Outside EU
Electronic sector probe	UST-5283-2.5	2.5MHz,90° ,ST-CW	Cardiac	Surface of body	—	○
	UST-5284-2.5	2.5MHz,90° ,ST-CW	Cardiac	Surface of body	○	○
	UST-5285-3.5	3.5MHz,90° ,ST-CW	Cardiac	Surface of body	○	○
	UST-5281-5	5.0MHz,90° ,ST-CW	Neonate	Surface of body	○	○
	UST-5280S-5	5.0MHz,90° ,ST-CW	Cardiac	Transesophagel	○	○
	UST-5290-5	5.0MHz,90° ,ST-CW	Cardiac	Transesophagel	○	○
	UST-5292-5	5.0MHz,90° ,ST-CW	Cardiac	Transesophagel	○	○
	UST-5293-5	5.0MHz,90° ,ST-CW	Cardiac	Transesophagel	○	○
	UST-5294-5	5.0MHz,90° ,ST-CW	Pediatrics	Surface of body	○	○
	UST-5268P-5	5.0MHz,90°	Intraoperative	Intraoperative	○	○
	UST-5271S-5	5.0MHz,90°	Cardiac	Transesophagel	○	○
	UST-5295	90° ,ST-CW	Neonate	Surface of body	○	○
	UST-5296	90° ,ST-CW	Neonate	Surface of body	○	○
	UST-5297	90° ,ST-CW	Cardiac	Surface of body	○	○
Electronic convex probe	UST-9114-3.5	3.5MHz,60° 60R	Abdomen,OB/GYN	Surface of body	○	○
	UST-9115-5	5MHz,60° 60R	Abdomen,OB/GYN	Surface of body	○	○
	UST-9101-7.5	3.5MHz,60° 40R	Abdomen,OB/GYN	Surface of body	○	○
	UST-978-3.5	3.5MHz,60° 14R	Abdomen,Cardiac	Surface of body	○	○
	UST-984-5	5.0MHz,120° 14R	OB/GYN,IVF	Transvagina	○	○
	UST-9112-5	5.0MHz,120° 14R	OB/GYN,IVF	Transvagina	○	○
	UST-670P-5	5.0MHz,120° 9R	Prostate	Transrectal	○	○
	UST-9104-5	5.0MHz,65° 20R	Abdomen,Smallpart	Intraoperative	○	○
	UST-987-7.5	7.5MHz,65° 20R	Abdomen,Smallpart	Intraoperative	○	○
	UST-995-7.5	7.5MHz,65° 20R	Abdomen	Intraoperative	○	○
	UST-979-3.5	3.5MHz,60° 60R	Abdomen,OB/GYN	Surface of body	○	○
	UST-9113P-3.5	3.5MHz,60° 60R	Abdomen,OB/GYN	Surface of body	○	○
	UST-990-5	5.0MHz,60° 60R	Abdomen,OB/GYN	Surface of body	○	○
	UST-988-2.5	2.5MHz,60° 60R	Abdomen,OB/GYN	Surface of body	○	○
	UST-9102-3.5	3.5MHz,90° 20R	Abdomen,Cardiac	Surface of body	○	○
	UST-9118	180° 9R	OB/GYN,IVF	Transvagina	○	○
	UST-9119	60° 60R	Abdomen,OB/GYN	Surface of body	○	○
	UST-675P	180° 9R	Prostate	Transrectal	○	○
	UST-9103-5	5.0MHz,90° 14R	Abdomen,Cardiac	Surface of body	○	○
	UST-992-5	5.0MHz,60° 40R	OB/GYN	Surface of body	○	○
	UCT240-AL5	180° 5R	Intra-Cavity	Intra-Cavity	○	○
	UC240P-AL5	180° 5R	Intra-Cavity	Intra-Cavity	○	○
	UC140P-AL5	180° 5R	Intra-Cavity	Intra-Cavity	○	○

Name	Type No.	Mainspecifications	Application	Applicable part of body	EU	Outside EU
Electronic linear probe	UST-5045P-3.5	3.5MHz,80mm	Abdomen	Surface of body	○	○
	UST-5539-7.5	7.5MHz,34mm	Smallpart	Surface of body	○	○
	UST-5524-7.5	7.5MHz,42mm	Smallpart	Surface of body	○	○
	UST-5710-7.5	7.5MHz,60mm	Smallpart	Surface of body	○	○
	UST-579T-7.5	7.5MHz,60mm	Abdomen	Intraoperative	○	○
	UST-5534T-7.5	7.5MHz,38mm	Abdomen	Intraoperative	○	○
	UST-5536-7.5	7.5MHz,33mm	Abdomen	Intraoperative	○	○
	UST-5526L-7.5	7.5MHz,33mm	Abdomen	Intraoperative	○	○
	UST-5046-3.5	3.5MHz,96mm	Abdomen	Surface of body	○	○
	UST-5524-5	5.0MHz,42mm	Smallpart	Surface of body	○	○
	UST-5819T-5	5.0MHz,60mm	Abdomen	Intraoperative	○	○
	UST-5712	60mm	Smallpart	Surface of body	○	○
	UST-5713T	60mm	Abdomen	Intraoperative	○	○
	UST-5543	34mm	Smallpart	Surface of body	○	○
	UST-5818-5	5.0MHz,60mm	Abdomen	Surface of body	○	○
	UST-5047-5	5.0MHz,96mm	Abdomen	Surface of body	○	○
	UST-5540P-7.5	7.5MHz,25mm	Abdomen	Surface of body	○	○
	UST-5531	10mm	Smallpart	Surface of body	○	○
	UST-5545	38mm	Smallpart	Surface of body	○	○
Convex/linear probe	UST-672-5/7.5	convex5.0M,120° 9R	Prostate	Transrectal	○	○
		linear7.5MHz,60mm	Prostate	Transrectal	○	○
Independent	UST-2265-2	2.0MHz	Abdomen	Surface of body	○	○
	UST-2266-5	5.0MHz	Smallpart	Surface of body	○	○
Electronic covex sector scanner	ASU-1000C-3.5	3.5MHz,60° 60R	OB/GYN	Surface of body	○	○
	ASU-1001	90° 14R	OB/GYN	Surface of body	○	○
	ASU-1002	180° 9R	OB/GYN	Transvagina	○	○
Mechanical sector scanner	ASU-36WL-10	10.0MHz,40°	Smallpart	Surface of body	○	○
Mechanical radial scanner	ASU-67	7.5MHz/10MHz,360°	Urinary organ	Trans rectal	○	○
	ASU-101	10MHz,360°	Intra-Cavity	Intra-Cavity	○	○

6. PRINCIPLE OF OPERATION

6-1. Principle of Operation

This equipment uses electronic sector probes,electronic convex probes, electronic linear probes, and mechanical scanners.

1) The scanning section of an electronic convex probe or a linear probe uses a row of vibrators. A fixed number of vibrators constitutes a block which transmits and receives ultrasound waves. These vibrator blocks are electronically switched in sequence in order to produce a slice image.
2) The scanning section of an electronic sector probe uses a row of vibrators. The transmission and receiving timing of each vibrator is progressively shifted slightly. As a result, the ultrasonic beam is deflected, and the angle of deflection switched sequentially in order to produce a slice image.
3) In the scanning section of a mechanical probe, the vibrator is mechanically swivelled at high speed. As a result, ultrasound pulses are aimed at the body, and the reflected waves from the body are received, enabling a slice image to be obtained.

The received signals obtained using one of the above scanning methods are amplified by the receiving amplifier to a level that is suitable for displaying an image, then detected, passed through a digital scan converter and output as television signals.
Further, with this equipment, ultrasonic waves are sent and received in the same direction so that the differential being detected. Through this, information of fluid like blood including its directional property, velocity, and variation is detected, colored, and displyaed superposed on B mode.
In addition to the above, blood information at any sample point can be detected through the pulse Doppler method. Blood information in the frontal direction can be detected and displayed, also, through use of the CW Doppler method.

This section consists of 2 pages.

7. CLEANING AND STERILIZING

7-1. Method of Cleaning and Sterilizing the Equipment

Cleaning consists of cleaning that is carried out at the end of each day, cleaning that must be carried out once a week, and cleaning that is carried out as necessary after use.

(1) Cleaning that is carried out at the end of each day

- Cleaning the surface of the probe

[Remark]

The method of cleaning the probe differs depending upon the kind of probe. For details, refer to the instruction manual for the probe.

- Cleaning the floor and removing moisture where the equipment is installed

If you use the equipment in a dusty location, the ventilation may deteriorate or the temperature inside the equipment may become abnormally high.

(2) Cleaning that must be carried out once a week

- Cleaning the operation panel and Doppler/Flow panel
- Cleaning the monitor
- Cleaning the fan cover

Clean the equipment with a soft, dry cloth. If the equipment is very dirty, remove the dirt with a soft cloth that has been immersed in a weak solution of a neutral detergent, then wipe off the detergent.

⚠ Note
Do not clean the equipment in such a way that liquid gets inside it because of the risk of damaging the internal circuits.

(3) Cleaning that is carried out as necessary after use

- Cleaning the head of the printer
- Cleaning the heads of the VCR

[Remark]

For the method of cleaning the peripheral equipment, refer to each instruction manual.

- Cleaning the photo switch

Clean the photo switch with a soft, dry cloth. If the photo switch is very dirty, remove the dirt with a soft cloth that has been immersed in a weak solution of a neutral detergent, then wipe off the detergent.

This section consists of 2 pages.

7-2. Cleaning and Sterilizing Conditions

⚠ Caution
Do not sterilize the equipment with chemical liquids or gases because of the risk of damaging the internal circuits.

⚠ Note
The method of cleaning and sterilizing the probes differs depending upon the type of probe. For details, refer to the instruction manual for the probe.

8. PREPARATIONS FOR USE

8-1. Starting Inspection

8-1-1. External Inspection

> **⚠ Warning**
>
> If you continue to use equipment that has been found to be defective as a result of an inspection, you risk causing injury to the patient. If you discover a defect, switch off the equipment immediately, then contact one of Aloka's sales offices or agents listed on the back cover of the instruction manual.

Perform the following external inspection before using the equipment.

1) Check to ensure that there are no scratches or cracks on the enclosure or panel.
2) Check to ensure that there are no scratches, cracks or discoloration.
3) Check to ensure that there are no scratches or cracks on the connecting parts of probes.
4) Check to ensure that the ECG lead cord and phonocardiogram microphone are not damaged.

8-1-2. Checking and Replacing Consumables

Confirm that there is an adequate supply of consumables including ultrasound gel, printing paper, instant film and VCR tape.

For details of the method of replacing the printing paper, instant film and VCR tape, refer to the respective instruction manuals.

8-1-3. Washing and Sterilizing Probes

Confirm that the probes to be used have been washed and sterilized according to the purpose of use.

> **⚠ Warning**
>
> If you use a contaminated probe, you run the risk of infecting a patient. Before using a probe, clean and sterilize it according to the instruction manual for the probe.

Use the puncture adaptor and needle after sterilizing them.

> **⚠ Warning**
>
> Using contaminated devices may result in infection. Before using a probe, clean and sterilize it according to the instruction manual for the probe.

This section consists of 2 pages.

8-1-4. Operation check

① Turn ON the power switch on the equipment.
→ The equipment is set up in 30 seconds, then a B mode image appears.

② Confirm that the connected probe, the image display and the frequency match each other.
→ For details of the image display, refer to Section 9.

③ Check to see if the date and time displayed at top right of the screen are correct.
→ If the date and time are incorrect, be sure to adjust them to the correct values.
For details of setting the date and time, refer to 11-4 "Menu".

⚠ Caution

If the date and time display is incorrect, the equipment may be broken. Stop using the equipment, then contact one of Aloka's sales offices or agents listed on the back cover of the instruction manual.

⚠ Note

If the equipment has been left in storage for a long period, the internal battery may be discharged causing the hospital name and presets to return to their initial settings.
Recharge the battery if one of the following phenomena occurs.

- The hospital name is not displayed.
- The power lamp of the equipment is lit, but an image is not displayed on the screen.

Recharge the internal battery continuously for about 15 hours, then reset the presets.

9. SCREEN DISPLAY

9-1. Character Display

Various character information displayed on the screen is called a character display. The following three kinds of information are displayed.

1. Information entered using a menu and displayed continuously by means of the backup function:
   Contents of the hospital name area
   Contents of the date and time display area

Note: Refer to 11-4 "Menu" for details of the displayed contents of these display areas and the method of entering data to them.

2. Data concerning probes being used and the set conditions of the ultrasound image:
   Contents of automatic display area 1
   Contents of automatic display area 2

Note: Refer to 9-1-1 "Automatic display area" for details of the displayed contents of these display areas.

3. Entered and displayed patient ID and name and comments concerning the ultrasound image:
   ID, NAME, etc., display area
   Text area

Note: Refer to 10-1 "Method of Operating Switches" for the displayed contents of the ID, NAME, etc., display area and the text area, and the method of entering data to these display areas.

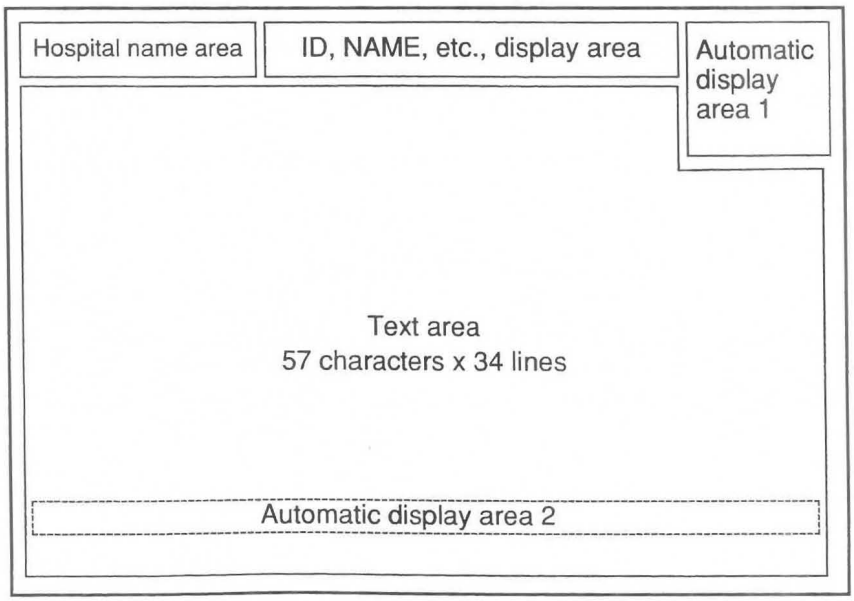
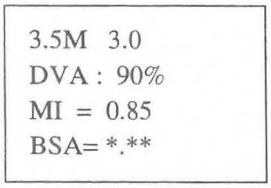


Fig. Character display on the screen

This section consists of 6 pages.

9-1-1. Automatic display area

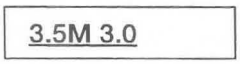
(1) Automatic display area 1



: Frequency of probe in use/Highest sending frequency in use
: Acoustic output setting data
: Acoustic power index data
: Body surface area data

Fig. Example of display in automatic display area 1

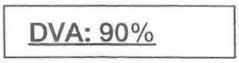
a) Data concerning the selected probe



Frequency of the selected probe
M means MHz.

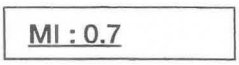
The letter on the left indicates the frequency of the probe.
The letter on the right indicates the transmit frequency.

b) Acoustic output setting data



The number after DVA: indicates the setting of the acoustic output adjusted using the **ACOUSTIC POWER** switch and the rotary encoder, as a percentage.

c) Acoustic power index data



Data that is displayed in this area differs with each mode, velocity range , and so on.

For details, refer to 24. Appendix.

MI: Mechanical physiological effect such as cavitation is displayed asan index.

TI*: Thermal physiological effect due to ultrasound waves is displayedas an index.

d) Body surface area data

The data displayed in this area differs depending upon the contents displayed in the ID, NAME, etc., area.
→ For details, refer to 10-1 "Method of Operating Switches".

(2) Automatic display area 2

This area is used for displaying B mode, B/B mode, B/M mode, and M mode images, and also the B image of B/D mode images.

	R : Data concerning display depth	Displays the display depth in units of cm.
R : 15 G : 45 C : 6 A : 1	G : Gain data	Displays the gain over the range 30 to 90.
	C : Contrast data	Displays the contrast over the range 1 to 16.
	A : AGC data	Display the AGC over the range 0 to 15.

Fig. Example of display in automatic display area 2 (for a 1-screen display)

Automatic display of other modes

The following data concerning an M mode image:

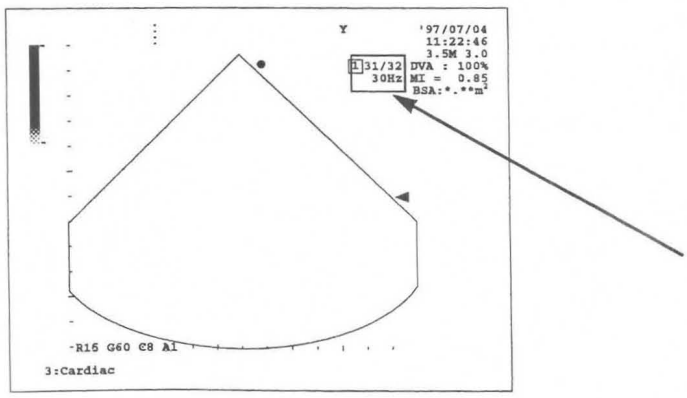
R : Data concerning display depth	Displays the display depth in units of cm.
G : Gain data	Displays the gain over the range 30 to 90.
C : Contrast data	Displays the contrast over the range 1 to 16.
A : AGC data	Display the AGC over the range 0 to 15.

The following data concerning a D mode image:

↑ *.** : Data concerning the velocity range	Displays the velocity in units of m/s.
G : Gain data	Displays the gain over the range 30 to 90.
C : Contrast data	Displays the contrast over the range 1 to 16.

9-1-2. Character display in the text area

You can set the display ON or OFF using a menu.



31/32 : Indicates the number of frames acquired to the cine memory.

15Hz : Indicates the number of B mode frames.

+0.11 : Indicates the R-DLY amount. (when ECG SYNC is ON)

9-2. Graphic Display

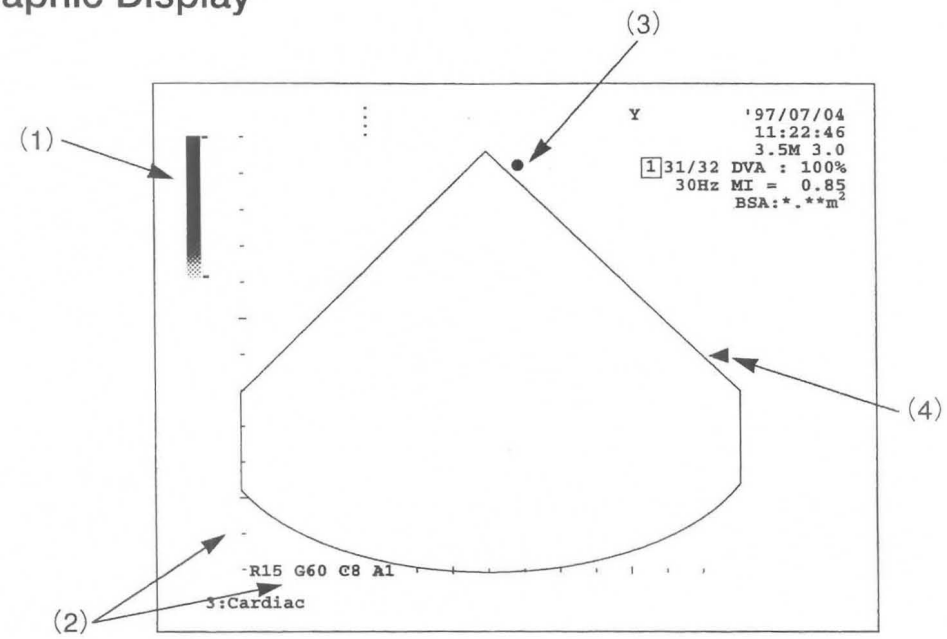


Fig. B mode image

(1) Gray scale bar

Indicates the gray scale (tonal gradations) on a B mode image.
An image is displayed after being divided into 64 tonal gradations.

(2) Scale mark

Range	1 graduation
R02 - R06	0.5cm
R08 - R24	1.0cm

(3) Front direction mark

Corresponds to the front direction mark on the probe.

Note: When the mark is "●", it indicates an active status. In other words, it indicates which of a number of images operations can be performed on.
When the mark is "○", it indicates the non-active status.

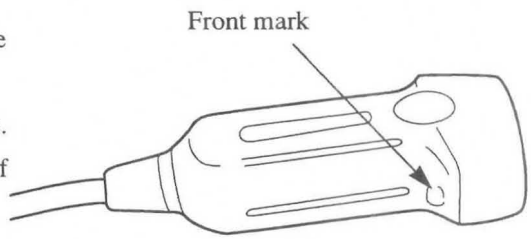


Fig. Probe

(4) Focus mark

Indicates the set focal point.

Fig. Focal point

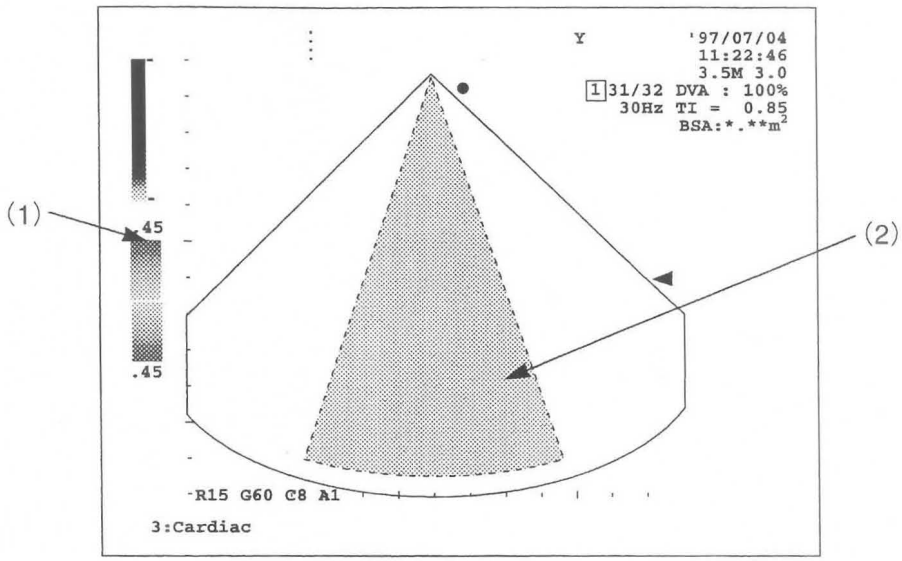


Fig. B mode + flow image

(1) This image is a color representation of the set flow velocity and dispersion set by color coding.
→ For details, refer to 11-5 "Preset".

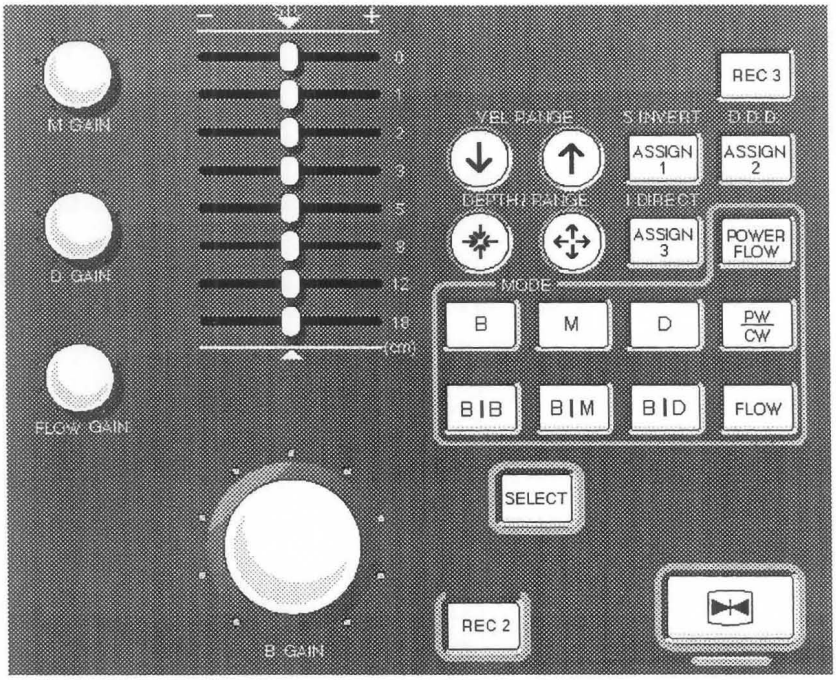
(2) Flow area
The flow display is limited to this area.
You can change the position and size of the area.
→ For details, refer to 10-5 "Flow Display".

Note: The power flow is also displayed in the flow area.

10. HOW TO USE THE SYSTEM

10-1. Method of Operating Switches

The method of operating the various switches is described below.



[Remark]
Lit status of switch
Green: Indicates that the switch can function.
Orange: Indicates that the function of theswitch is taking place.

MODE

Set the mode of the image displayed on the screen.
The modes in which an image can be displayed are as follows.

B B/B B/M M B/PW B/CW PW CW
B/M/PW M/PW

You can add the Flow or Power Flow mode to all of the above modes except the PW and CW modes.
The B/M/PW, and M/PW modes can be switched over using [M/D Mode] on the touch panel.

If you freeze an image in a multiple mode (B/B, B/M, B/D), each mode switch (B, M, D) operates as a request function. (The green lamp indicates a mode that can be requested.)

[Remark]
In the case of multiple modes (B/M, B/D), the mode switch functions as a switch which displays both images simultaneously in realtime.

This section consists of 52 pages.

<Request function>

In the case of a two-screen display, such as 2B, B/M and B/D, this function enables only one image to be called to the screen and displayed after it has been frozen.

There is also a function that enables the operator to hold an image while observing it in the 1B mode in realtime, then freeze it and transfer it to the 2B mode, and a 2B Mapping function that enables the operator to freeze an image in the 1B mode, then transfer it to the 2B mode and display the end- systolic and end-diastolic images in the same time phase alongside each other.

The 2B Mapping function must be set using a preset.

When an image is frozen, the switch, of the **B¦B, B¦M** and **B¦D** switches, that corresponds to the currently displayed mode, glows orange, and the switches, of the **B, M** and **D** switches, that can function, glow green.

Even if you press the switch corresponding to the mode that can be used to activate the request status, the lit status of the switch does not change.

Shown below are examples of transition between the 2B and B modes.

(Transition diagram)

Image frozen in the 2B mode

When the right image is the active image

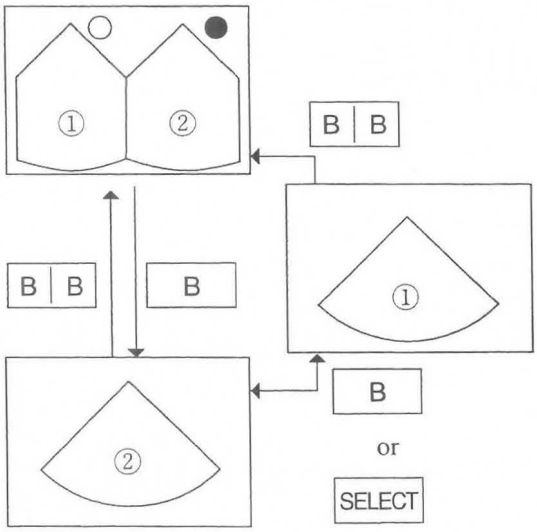


Image frozen in the *1B mode

Status in which an image is not stored

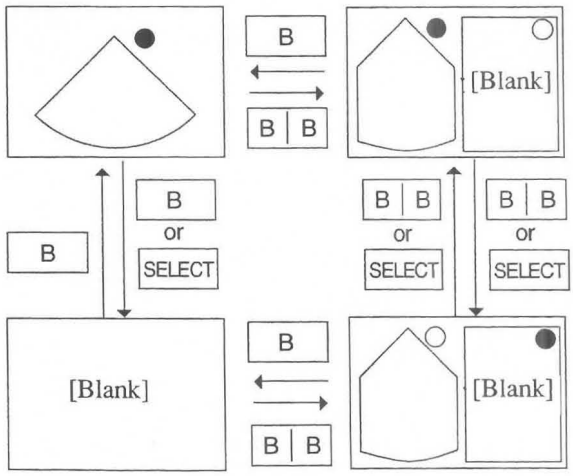
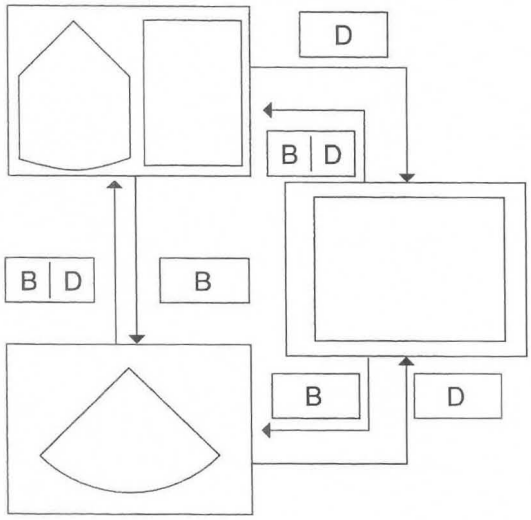


Fig. Transition figure 1

When *2B Mapping is ON, blank is not displayed, and a B mode image is displayed in the 2B mode in the same phase using [SELECT]. A search can be performed for each image, so different time phases can be placed side by side. When 2B Mapping is used, the display mode returns to the 1B mode after the image is unfrozen.

B/* mode (Example: B/D mode)

(a) For left-right display



B/* mode (Example: B/D mode)

(b) For up-down display

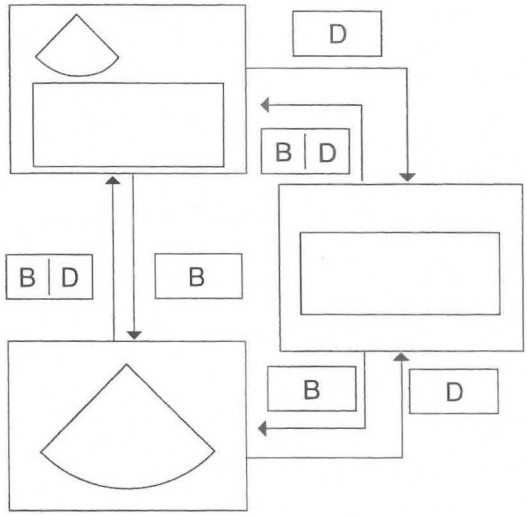


Fig. Transition figure 2

RANGE

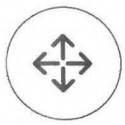
This function changes the display depth of an image.

This function changes the display depth based on the sending point of the displayed image. The display depth is common to the B and M modes, and even if the mode changes the display depth that was set last remains set.

You cannot change the display depth of a frozen image.

< Operation method>

: When this switch is pressed, the display depth increases (the image is progressively reduced). When the depth reaches a point past which it no longer increases, the switch no longer functions.



: When this switch is pressed, the display depth decreases (the image is progressively enlarged). When the depth reaches a point past which it no longer decreases, the switch no longer functions.

[Remark]

For both of the above switches, when a switch can function, it glows green. When a switch cannot function, it remains out. When a switch is pressed (while it is operating), it glows orange. You can set the RANGE step more accurately using a preset.

VEL RANGE

This function enlarges or reduces the flow velocity range (flow velocity display range).

In the case of PW Doppler, PRF is enlarged or reduced over the range 6.22 to 318.8 cm/s, and in the case of CW Doppler, PRF is enlarge or reduced over the range 6.22 to 796.2 cm/s. When B+Flow/M+Flow mode images move simultaneously, the B mode image is refreshed by the B REFRESH function. The B REFRESH time can be adjusted from a menu.

The flow velocity display range for color Doppler is also adjusted using this switch.

< Operation method >

: When this switch is pressed, the velocity range decreases. When the velocity range reaches a point past which it does not become any lower, the switch no longer functions.

: When this switch is pressed, the velocity range increases. When the velocity range reaches a point past which it does not become any higher, the switch no longer functions.

[Remark]

For both of the above switches, when a switch can function, it glows green. When a switch cannot function, it remains out. When a switch is pressed (while it is operating), it glows orange for one second.

FREEZE

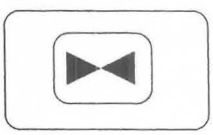
This switch freezes an image, or displays a frozen image in realtime.

When you press the **FREEZE** switch, an image freezes: A B mode image freezes upon completion of one ultrasound scan, and an M or D mode image freezes instantaneously. Simultaneously, the date and time display and transmission from the probe stop.

[Remark]

If a panel operation is not performed for at least 20 minutes, the freeze function automatically goes ON to protect the system. (You can also use a preset to change the 20-minute waiting period or turn this function OFF such as when using the monitor for a long period of time.)

<Operation method >



: If this switch is pressed, the displayed image is either frozen or becomes a realtime image. The switch glows orange (frozen image) or green (realtime image).

SELECT

SELECT

This function is used to select an image that enables you to perform operations on a 2B mode display, a B/M or B/D display, and so on, when two or more images are displayed.

< Operation method>

(For a 1B or 2B mode display)

1. Press the **SELECT** switch when you wish to switch a realtime 1B mode image for the left or right half of the screen.
2. Press the **SELECT** switch when you wish to switch over the realtime side image of a realtime 2B mode display.
3. Press the **SELECT** switch when you wish to switch over the active side image of a frozen 2B mode display.

(For a B/M or B/D mode + Flow or Power mode display)

1. Press the **SELECT** switch when you wish to switch over the realtime side image of a realtime B/M or B/D mode display.

   → To return to simultaneous operation, press the [B/M] or [B/D] switch once again.
2. Press the **SELECT** switch when you wish to switch over the active side image of a frozen 2B mode display.

REC2/REC3/ASSIGN1 to 3

REC 2

This switch enables you to register an item in a menu as a switch. It also enables you to set frequently used functions at your fingertips, or to transfer functions that are not used to a menu. Register settings using a preset. For details, refer to the description of the method of making settings using the preset function.

[Remark]

You cannot register all of the functions in a menu. You can only register some functions that consist of a choice of one of two items. Also, you cannot register functions from different menus in the presets. Registration items are common to all presets in the system.

< Functions that operate when the system is in the initial status>

REC 2 : This is the REC/PAUSE switch for remotely controlling the SVO-9500MD (made by SONY). It glows orange when the system is in the REC status. If you press this switch once again, it turns green and the system goes into a PAUSE status. In the REC status, a mark that indicates the scanning status appears on the screen.

REC 3 : This switch starts acquisition of images in realtime to a DMS unit (DMS-5500B) when a DMS unit is connected. Also, when an image is frozen, it acquires the currently displayed frozen image to the DMS unit.

ASSIGN 1 : This switch inverts the waveform of the Doppler spectrum. You can use a preset to set whether to fix the baseline and invert the waveform, or invert the waveform together with the baseline. This function continues to operate after the image is frozen. (Preset: Invert Axis of SP Invert)

ASSIGN 2 : This function enables you to display B mode (black and white) and Flow mode images alongside each other in realtime. The B+Flow image is displayed on the right half of the screen, and the B mode image on the left half.

ASSIGN 3 : This switch reverses the scanning direction of an image without any need to reverse the gripping direction of the probe. The direction of the index mark on the probe coincides with the index mark on the screen. This function continues to operate after the image is frozen.

STC

This function uses eight slider controls to adjust the sensitivity (gain) at each depth indicated alongside the corresponding control. The sensitivity for both B mode and M mode images changes simultaneously.

The number (cm) indicated alongside each STC knob is the display depth at which the sensitivity can be adjusted.

[Remark]

Normally, the STC knobs are set to the center click position.

<Operation method>

1 Move the STC knobs left or right so as to obtain a uniform sensitivity.

→ Moving an STC knob to the right increases the sensitivity at the indicated depth, while moving it to the left reduces the sensitivity.

GAIN

This function adjusts the sensitivity of a B, M, D or flow image. You can set it in advance using a preset.

(B GAIN)

The B GAIN knob is used to adjust the sensitivity of an M mode image. The sensitivity (gain) changes between 30 and 90 dB, and the value is displayed on the screen.

(M GAIN)

The M GAIN knob is used to perform fine adjustment of the sensitivity of an M mode image after adjustment has been done using the B GAIN knob. The sensitivity changes between -30 and 30 dB, and the value is displayed on the screen.

(D GAIN)

The D GAIN knob adjusts the sensitivity of the Doppler spectrum. The sensitivity (gain) varies between 0 and 50 dB, and the value is displayed on the screen.

(FLOW GAIN)

The FLOW GAIN knob adjusts the color sensitivity. The sensitivity (gain) varies between 0 and 32 dB, and the value is displayed on the screen. This knob also adjusts the sensitivity in the Power Flow mode.

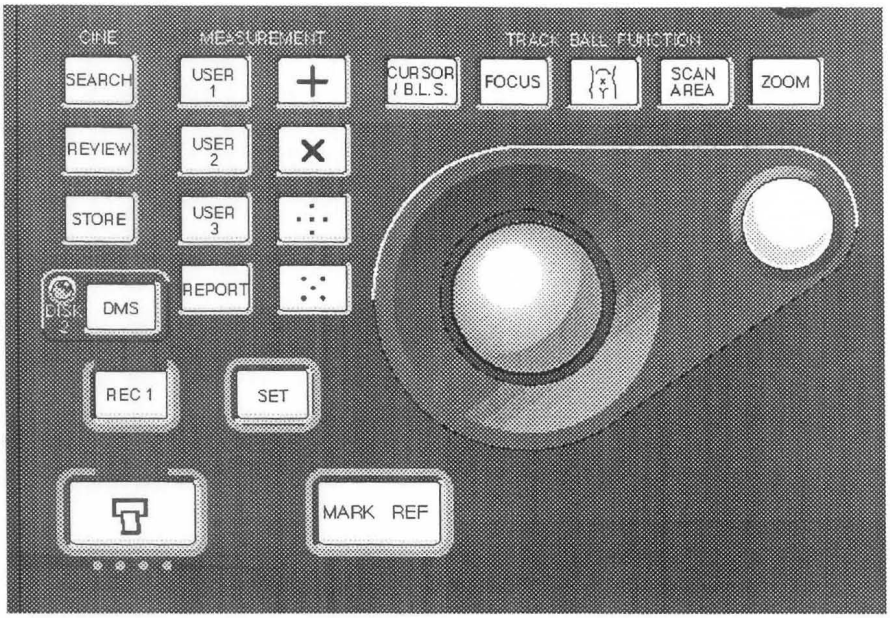
<Operation method>

1. Turn the knob to the left or right.

→ Turning any of the above knobs (B GAIN, M GAIN, D GAIN or FLOW GAIN) to the right increases the sensitivity of the image, and turning it to the left reduces the sensitivity.

[Remark]

B Gain and M Gain adjust the sensitivity while retaining the settings of the STC knobs. D Gain and Flow Gain override the settings of the STC knobs.



[Remark]
Lit status of switch
Green: Indicates that the switch can be operated.
Orange: Indicates that the switch is operating.

ZOOM

This function displays a B mode image after partially enlarging or reducing it. There are two methods of setting Zoom. These can be selected using a preset. If you use the Center preset of Zoom Method, the image is enlarged from the center, while if you use the Box preset, the Box that indicates the enlargement area is displayed on the screen. This enables you to enlarge an arbitrary position in advance.

For both methods, you can move the position of the enlarged image. Also, the focal point of an enlarged image is automatically set to the vicinity of the center for optimum performance.

ZOOM

: When this switch is glowing orange
Trackball → Moves an image or the Box.
Rotary encoder → Changes the enlargement magnification or the size of the Box.

[Remark]

When you do not intend to enlarge an image, you can use the [ZOOM] and the trackball to simply move the image.

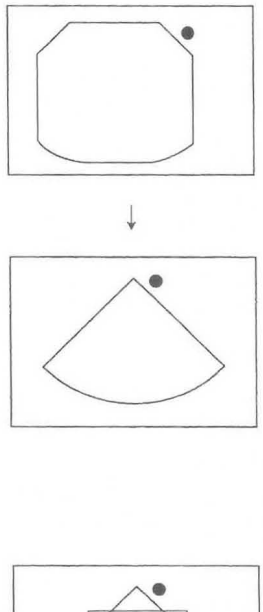
< Operation method> → When the preset is Center

1. Press the **ZOOM** switch.

→ The switch glows orange.

2. Turn the rotary encoder left or right.

→ Turning the rotary encoder to the right enlarges the image 1 cm at a time, while turning it to the left reduces the image. When the image reaches the maximum or minimum size, the rotary encoder stops functioning.



3. Move the image using the trackball.

→ You can also enlarge or reduce an image after moving it.

4. Press the **ZOOM** switch.

→ The zoom function is terminated, and the image returns to the original magnification.

<Operation method> → When using the Box preset

1. Press the **ZOOM** switch.

→ The switch glows orange. The Box is displayed on the image.

2. Turn the rotary encoder left or right. Move the Box with the trackball.

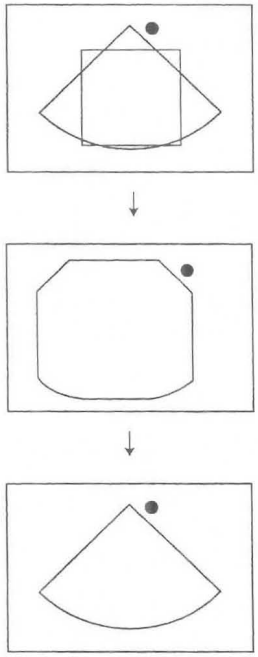
→ Turning the rotary encoder to the right enlarges the Box 1 cm at a time, while turning it to the left reduces it. When the Box reaches the maximum or minimum size, the rotary encoder stops functioning.

3. Press the **MARK REF** switch.

→ The image is enlarged. You can also enlarge or reduce the image with the rotary encoder after enlarging the Box.

4. Move the image using the trackball.

5. Press the **ZOOM** switch, or press the **MARK REF** switch.



→ The zoom function is terminated, and the image returns to the original magnification.

[Remark]

The set magnification and position remain memorized until the **PRESET, DEPTH** or **NEW PATIENT** switch is pressed.

[Remark]

The number of zoom steps and the magnification differ depending upon the probe used.

SCAN AREA

This function continuously enlarges or reduces the scanning range of a B mode image. It also enables you to increase the frame rate without reducing the display depth when you reduce the scanning range.

When the scanning range is narrower that the maximum scanning range, you can move it left or right with the trackball.

Also, if the Flow or Power mode is added, the scanning range of the flow area, or the flow area itself, is enlarge or reduced. If you reduce the scanning range, you can increase the frame rate without reducing the display depth.

SCAN AREA

: When this switch is glowing orange

Trackball → Moves the B mode image or the flow area scanning range
(When MARK REF is pressed: Flow area is enlarged or reduced.)

Rotary encoder → Changes the B mode image scanning range.

<Operation method>

1. Press the **SCAN AREA** switch.

→ The scanning range can be enlarged, reduced, or moved.

2. Enlarge or reduce the scanning range with the trackball.

→ Rolling the trackball to the right enlarges the B mode scanning range, and rolling it to the left reduces the scanning range.

3. Select the FLOW mode, then press the **MARK REF** switch.

→ The flow area changes to a solid line, enabling you to enlarge or reduce it with the trackball. If you press the **MARK REF** switch once again, the solid line of the flow area disappears, enabling the flow area to be moved.

4. Move the scanning range with the trackball.

→ Rolling the trackball to the right moves the scanning range to the right, while rolling it to the left moves the scanning range to the left. The flow area also moves in the same way.

5. Press the **SCAN AREA** switch.

→ The scanning range setting function is terminated.

[Remark]

- The reference point for enlargement and reduction is the center of the scanning range. Even if the scanning range moves, it can be enlarged or reduced about its center.
- When a cursor is displayed, if the cursor comes to the end of the scanning range, it moves along with the shift of the scanning range.

BODY MARK

This function displays the part of the body to be scanned, as a mark. You can change the position of the probe mark on a body mark that is already displayed on the screen.

: When this switch is glowing orange

Trackball → The probe mark moves, and the displayed mark switches over.

Rotary encoder → The probe mark rotates.

<Operation method>

1. Press the  switch.

→ The  switch glows orange. Also, marks specified in advance appear on the screen.

2. Press the body mark on the liquid crystal panel.

→ A body mark newly appears.

3. Using the trackball, move the probe mark up, down, left, or right.

→ When the probe mark reaches the end, the next mark appears.

4. Using the trackball, set the position of the probe mark.

→ Move the probe mark with the trackball, then rotate the probe mark with the rotary encoder.

5. Press the  switch once again.

→ The body mark disappears.

[Remark]

The fetus mark has a rotation function for observing an inverted fetus.

6. Display the fetus mark, then press the **MARK REF** switch.

7. Rotate the fetus mark with the rotary encoder.

8. Press the **MARK REF** switch.

→ The rotary encoder returns to the position setting function of the probe mark.

FOCUS

This function enables you to set the focus to a sending position of an arbitrary depth when using an electronic scanning type probe. It also enables you to set the sending position in multiple steps, resulting in a clearer image.

The receiving focus is automatically and continuously adjusted so as to provide the optimum beam at all times.

SCAN AREA

: When this switch is glowing orange

Trackball → The sending focus position changes.

Rotary encoder → The sending interval for multiple step setting is set.

<Operation method>

1. Press the **FOCUS** switch.

→ You can set the sending focus position.

2. Using the trackball, move the sending focus position.

→ Rolling the trackball upward moves the focus to a shallower position, while rolling it downward moves the focus to a deeper position.

3. Set the sending interval with the rotary encoder.

→ Turning the rotary encoder to the right widens the interval for multiple focusing, while turning it to the left reduces the interval.

4. Press the **FOCUS** switch.

→ The sending focus setting function is terminated.

[Remark]

- When AUTO focusing is used, the focus position does not move below the displayed depth. When MANUAL focusing is used, the focus position can be set to the maximum depth of the probe.
- When AUTO focusing is used, if you arbitrarily change the focus position then change the depth with the **RANGE** switch, for example, the focus position is reset to a point that is optimum for the depth. Also, if you change the depth, you can change the setting of the focus position accordingly.

⚠ Note

If you set the focus point to multiple points, an image of good resolution is obtained, however the frame rate is reduced.
Select the optimum setting for the region to be examined while observing the acoustic power index.

CURSOR/B.LINE

This switch is used to move or set the baseline of the cursor and the Doppler pattern.

SCAN AREA

: When this switch is glowing orange

Trackball → Moves the cursor or the sample point (in the D mode).

Rotary encoder → Moves the baseline of the spectrum display.

<CURSOR>

<Operation method>

1. Change the display from the 1B mode to the B/M mode.

→ The **CURSOR/B.L.S.** switch automatically glows orange, and the cursor is displayed in the B mode.

2. Using the trackball, move the cursor to the position where you wish to detect the M mode.

3. Change the display from the B/M mode to the 1B mode.

→ The **CURSOR/B.L.S.** switch automatically glows green, and the cursor disappears from the B mode display.

[Remark]

The method of moving the cursor in a B/D mode display is the same.
You cannot move the cursor on a frozen image, however you can change the baseline.

If you return the display from the B/M or B/D mode to the 1B mode, you can display a cursor in the B mode. For details, refer to "CURSOR DISPLAY" in 11-5 "Preset".

<B.L.S. (BASE LINE SHIF)>

<Operation method>

1. Change the display from the 1B mode to the B/D mode.

→ The **CURSOR/B.L.S.** switch automatically glows orange, and a cursor is displayed in the B mode.

2. Adjust the position of the baseline using the rotary encoder.

→ Turning the rotary encoder to the right raises the baseline, and turning it to the left lowers the baseline.

[Remark]

If the **CURSOR/B.L.S.** switch on the operation panel is glowing orange, you can move the baseline with the rotary encoder regardless of whether the **CURSOR/B.L.S.** switch is ON or OFF.

MEASUREMENT

This switch starts the measurement function.

<Operation method>

1. Press the **MEASUREMENT** switch.

→ Perform measurement according to the normal measurement procedure.
For details, refer to Sections 12 to 18.

CINE MEMORY

Many Images are temporarily stored in the memory of the system before an image is frozen, and also after it is frozen. The following three switches are used.

(1) SEARCH: Displays images stored in the cine memory (search and scroll functions).
(2) STORE: Stores the displayed images (store memory function).
(3) REVIEW: Displays images stored in the store memory (review function).

<Operation method>

(Search and scroll functions)

1. Press the **FREEZE** switch.
2. Press the **SEARCH** switch.

→ The **SEARCH** switch sometimes automatically glows orange when an image is frozen using a preset.

3. Using the trackball, search for the image that you wish to display.

→ You can search for an image on the active mark (● mark) side of a multi-screen display (e.g. 2B) with the trackball. You can search for other images with the rotary encoder.

[Remark]

You can perform measurements on a searched image. In this case, the trackball is used with the measurement functions, so you cannot use it with the search function. If you wish to use the search function once again, continue from step 2.

(Store mode function)

1. Display the image that you wish to store.
2. Press the **STORE** switch.

→ The number of images that you can store in the store memory differs depending upon the probe, mode, display depth, and so on.

[Remark]

When the DMS is connected, you can store images in an MO disk or a network server from this switch. For details, refer to 11-1 "Cine Mode and Store Memory".

(Review functions)

1. Press the **REVIEW** switch.

→ The image in the store memory is displayed. If multiple images are stored, you can search for the desired stored image using the trackball.

[Remark]

The review function operates only when the store memory is used. In this case, the **REVIEW** switch is displayed in green.

For details, refer to 11-1 "Cine Mode and Store Memory".

REC 1/PRINT

You can assign a menu function or a printer function to the print switch or REC switch. You can also assign a function other than SCR or a color printer to this switch.

Switches that can be assigned to a printer or other function

(1) Function in which a choice is made between two items, that is displayed in a menu (e.g. B FTC is a function in which a choice is made between ON or OFF.)
(2) SSZ-108 print
(3) SSZ-203 print
(4) SSZ-307 print
(5) SSZ-707 print
(6) 307+707AUTO print
(7) VCR REC/PAUSE function
(8) SCR REC function
(9) DMS ACQUIRE function
(10) FREEZE
(11) SELECT

<Operation method>

(e.g. 307+707AUTO print function)

1. Freeze a B mode image, then press the **PRINT** switch.

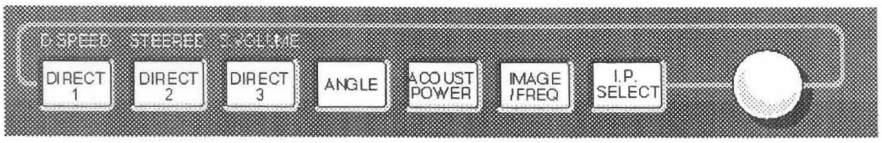
→ A hard copy is output from the SSZ-307 connected to the remote connector.

2. Freeze a B+Flow mode image, then press the **PRINT** switch.

→ A hard copy is output from the SSZ-707.

[Remark]

In addition, you can assign functions to **REC2, REC3. USER1, USER2, USER3**, and the **foot switch**.
For details, refer to "Common Presets" in 11-5 "Preset".



[Remark]
Lit status of switch
Green: Indicates that the switch can function.
Orange: Indicates that the function of the switch is taking place.

I.P. SELECT

The image processing functions are incorporated in a single switch, enabling you to select a different image instantaneously. There are a total of eight setting levels, and you can make settings for each of the B mode, M mode, D mode, FLOW, and POWER.

Functions that change with each mode

B mode: Frame CORRE、B Contrast、B AGC、B Relief

M mode: M SMOOTH、M Contrast、M AGC、M Relief

D mode: DOP Contrast、DOP COMP、DOP SMOOTH、DOP RESO、DOP Image Select

FLOW mode: Color Frame CORRE、Color SMOOTH、Color Image Select

POWER mode: Color Frame CORRE、Color SMOOTH、Color Image Select

<Operation method>

1. Display a B mode realtime image, then press the **I.P. SELECT** switch, and perform adjustment using the rotary encoder.

→ Turning the rotary encoder to the right increases the B mode setting number, while turning it to the left reduces the setting number. Simultaneously, the value of each menu item displayed on the touch panel (Frame CORRE, B Contrast, A AGC, B Relief) changes.

2. Display a B+Flow mode realtime image, then press the **I.P. SELECT** switch and perform adjustment with the rotary encoder.

→ Turning the rotary encoder to the right increases the FLOW setting number, while turning it to the left reduces the setting number. Simultaneously, the value of each menu item displayed on the touch panel (Color Frame CORRE, Color SMOOTH, Color Image Select) changes.

[Remark]

You can change or assign the desired setting of the image processing function. For details, refer to "Image Control", "DOP Control", "Flow" Control", and "Power Control" in 11-5 "Preset".

IMAGE/F SELECT

The probe sending and receiving frequencies can be switched in four steps. You can switch over images between sensitivity priority and image quality priority using one probe. When using the D mode or B+Flow mode, you can switch over the Doppler frequency.

The sending frequency is displayed after the probe frequency on the automatic display at the right of the screen.

<Operation method>

1. Display a B mode realtime image, then press the **IMAGE/F SELECT** switch, and perform adjustment using the rotary encoder.

→ Turning the rotary encoder to the right increases the B mode setting number, and turning it to the left reduces the setting number. Simultaneously, the value of each menu item displayed on the touch panel (Frame CORRE, B Contrast, B AGC, B Relief) changes.

2. Display a B+Flow mode realtime image, then press the **IMAGE/F SELECT** switch and perform adjustment with the rotary encoder.

→ Turning the rotary encoder to the right increases the B mode setting number, and turning it to the left reduces the setting number. Simultaneously, the value of each menu item displayed on the touch panel (Color Frame CORRE, Color SMOOTH, Color Image Select) changes.

[Remark]

You can register high and low sending and receiving frequencies in advance using a preset. For details, refer to "Image Control", "Flow Control", and "Power Control" of 11-5 "Preset".

⚠ Note
If you select a low frequency, the sensitivity increases, but the resolution falls. Conversely, if you select a high frequency, you can obtain an image with good resolution, but the sensitivity falls. Select the optimum setting for the region to be examined while observing the acoustic power index.

ANGLE

This function corrects the flow velocity according to the incident angle of the Doppler beam. Use it when you wish to obtain the correct flow velocity.

< Operation method >

1 Press the **ANGLE** switch in the D or B/D mode, then correct the angle using the rotary encoder.

→ Turning the rotary encoder to the right increases the angle, and vice-versa.

2 Press the **ANGLE** switch once again.

→The direction (plus or minus) of the angle switches over.

3 Press the **ANGLE** switch once again.

→ The function is terminated.

[Remark]

If the angle is ±80% or more, the error will be large, preventing the angle from being corrected.

DVA

This switch is used to change the acoustic output value from the initial setting when you wish to set it manually.

<Operation method>

1. Display an image in realtime, then press the **DVA** switch, and perform adjustment with the rotary encoder.

→ Turning the rotary encoder to the right increases the acoustic output and improves the sensitivity, while turning it to the left decreases the acoustic output. Simultaneously, the value of each menu item displayed on the touch panel (Color Frame CORRE, Color SMOOTH, Color Image Select) changes.

⚠ Note
If you increase the DVA the sensitivity rises, but the acoustic power increases. If you decrease the DVA, the acoustic output decreases, but the sensitivity falls. Select the optimum setting for the region to be examined while observing the acoustic power index.

DIRECT 1 to 3

You can assign the functions of a menu that involves the use of the rotary encoder to the **DIRECT** switches.

Assignable functions:

- Menu functions that involve the use of the rotary encoder (e.g. B CONT can be varied between steps 1 and 8)

<Operation method>

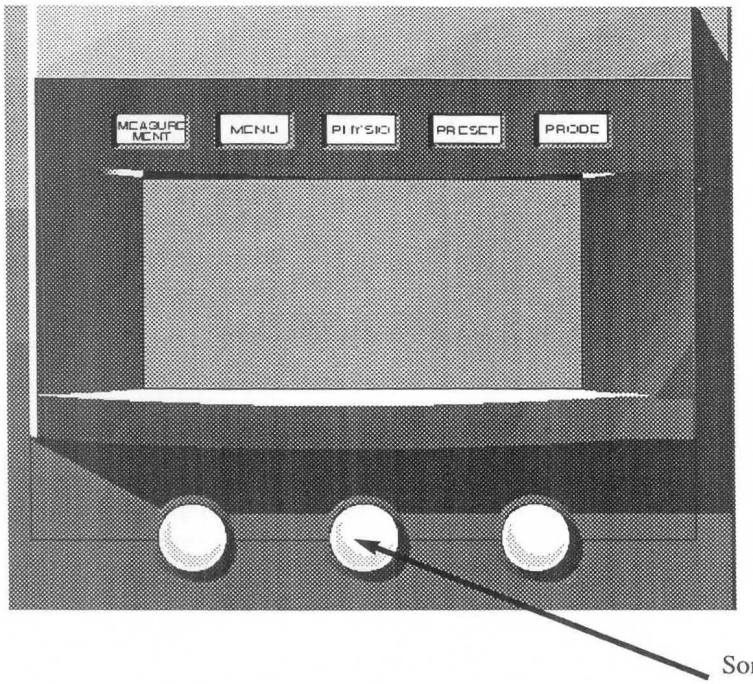
(e.g. When Image ROTAT is **assigned to DIRECT 1**)

1. Display a B mode image in realtime, then press the **DIRECT 1** switch, and perform adjustment with the rotary encoder.

→ Turning the rotary encoder to the right causes the B mode image to rotate clockwise in 90°-steps, and turning it to the left causes the image to rotate counterclockwise.

[Remark]

You can assign functions to the **DIRECT 1 to 3** switches using a preset. For details, refer to "Common Preset" of 11-7 "Preset".

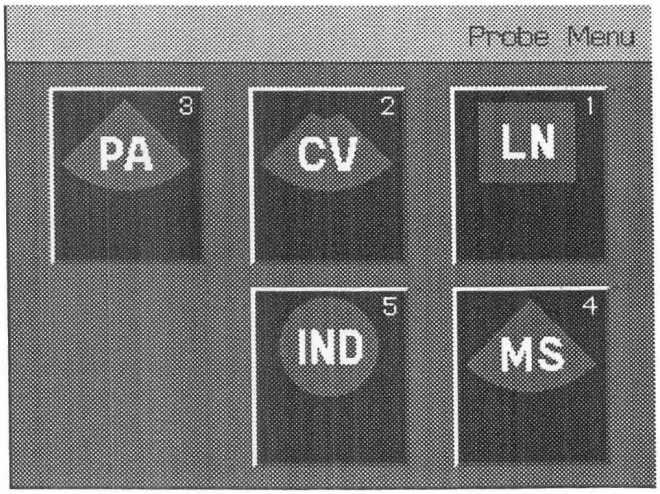


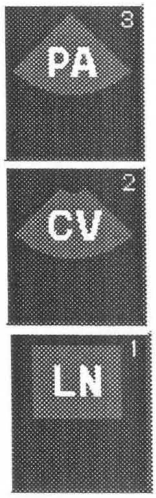
[Remark]
Lit status of switch
Green: Indicates that the switch can function.
Orange: Indicates that the function of the switch is taking place.

Some of the functions in the touch panel display involve the use of the rotary encoder.

PROBE

If a number of probes are connected to the system, select the probe to use. Pressing the **PROBE** switch causes the following menu to appear on the touch panel.





Phased Array (PA)
: Electronic sector

Convex (CV)
: Electronic convex

Linear (LN)
: Electronic linear

Connectors 1, 2 and 5 on the touch panel are standard connectors, and the other connectors are optional connectors. The probe currently in use is indicated by an orange glow on the touch panel, and probes that can be selected are indicated by a blue icon.

In the Probe Menu, the model number, frequency, etc., of the connected probes are displayed.

<Operation method>

1. Press the **PROBE** switch.

→ The probe menu appears on the touch panel.

2. Press the switch corresponding to the probe to be used.

→ An image of the selected probe appears.

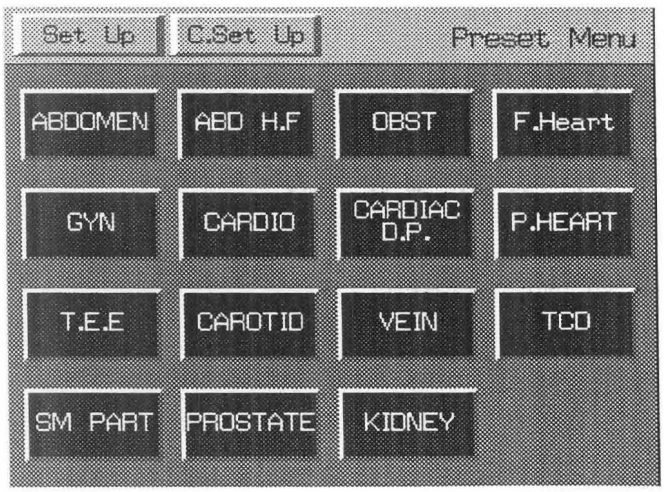
3. Press the **PROBE** switch.

→ The probe selection function is terminated, and the touch panel switches over to the MENU screen display.

PRESET

This switch is used to activate a function in which various image conditions that are suitable for the region to be examined have been memorized in advance, and displays these conditions on the screen, in order to eliminate the nuisance of carrying out panel operations.

For details of the method of changing the initial settings, refer to 11-5 "Preset".



Set Up:
Changes the values of the initial settings in a user's preset.

Common Set Up:
Changes the values of the initial settings that are common to the system.

User's preset:
Activates the registered initial settings.

Users' presets 1 to 15 on the touch panel are the initial settings contained in the system. The currently activated preset is indicated by an orange glow, and the presets that can be selected are indicated by a blue icon.

<Operation method>

1. Press the **PRESET** switch.

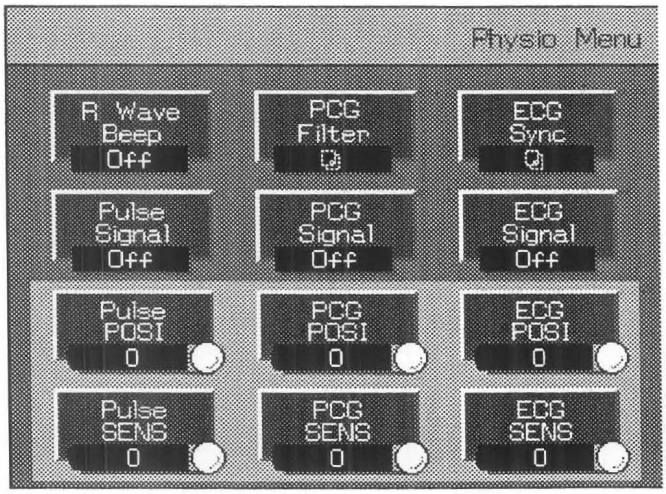
→ The preset menu appears on the touch panel.

2. Press the switch corresponding to the preset that you wish to use.

→ The initial settings of the selected preset are activated. The touch panel automatically switches over to the MENU screen display.

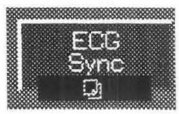
PHYSIO

This switch is used to select the probe to be used when a number of probes are connected to the system. When you press the **PHYSIO** switch, the following menu appears on the touch panel.



ECG Signal:
Displays a physiological signal on the image.

ECG POSI:
Moves the position of the physiological signal on the image.



ECG Sync:
Refreshes the B mode in synchronism with the ECG time delay.

If, like ECG Signal, there are two functions that can be selected, the function switches over each time you press the icon. The currently activated function is indicated by an orange glow, and the function that can be selected is indicated by a blue icon.

If, like ECG POSI, there is a function on the touch panel that has an encoder mark, use the rotary encoder.

If, like ECG Sync, there is an icon that has a menu mark, pressing this icon will cause the screen to change to the sub-menu level.

Also, the display of ECG, PCG and Pulse Signal can be switched On or Off independently in a sweep mode such as the B mode or the M mode.

<Operation method> (When displaying the ECG of a physiological signal)

1. Press the **PHYSIO** switch.

→ The Physio menu appears on the touch panel.

2. Press the ECG Signal switch.

→ The ECG appears on the screen.

3. Perform adjustment using the rotary encoders corresponding to ECG POSI and ECG SENS.

→ Adjust the displayed position of the ECG on the screen with ECG POSI, and the sensitivity of the ECG with ECG SENS.

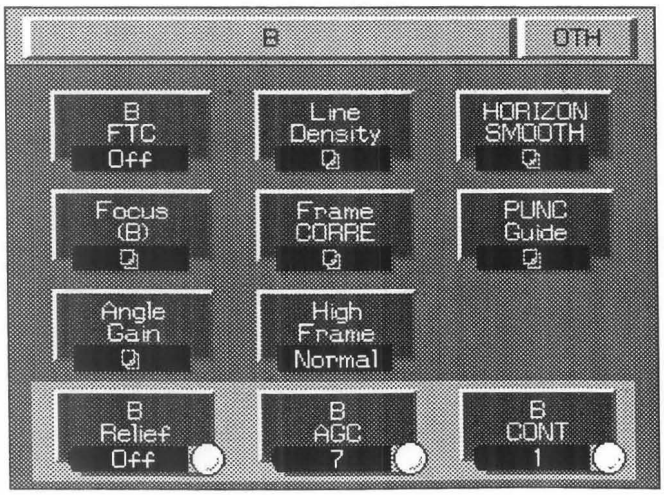
4. Press the **PHYSIO** switch.

→ The physiological signal selection function is terminated, and the touch panel switches over to the MENU screen display.

MENU

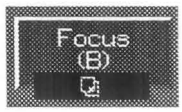
This switch is used to change the set conditions of the system or to start or select a function. When you press the **MENU** switch, the following menu appears on the touch panel.

For details of the method of operating each function, and so on, refer to 11-4 "Menu".



B FTC:
Enhances the a B mode image.

B Relief:
Enhances the a B mode image.

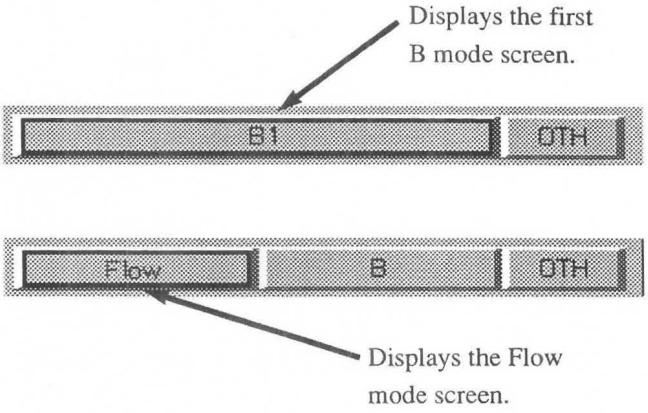


Focus (B):
Used to set the number of focus points in the B mode.

If, like B FTC there are two functions that can be selected, the function switches over each time you press the icon. The currently activated function is indicated by an orange glow, and the function that can be selected is indicated by a blue icon.

If, like B Relief, there is a function on the touch panel that has an encoder mark, use the rotary encoder.

If, like Focus (B), there is an icon that has a menu mark, pressing this icon will cause the screen to change to the sub-menu level.



With the exception of the Other menu, the menu screen displayed by the menu bar differs depending upon the mode used.

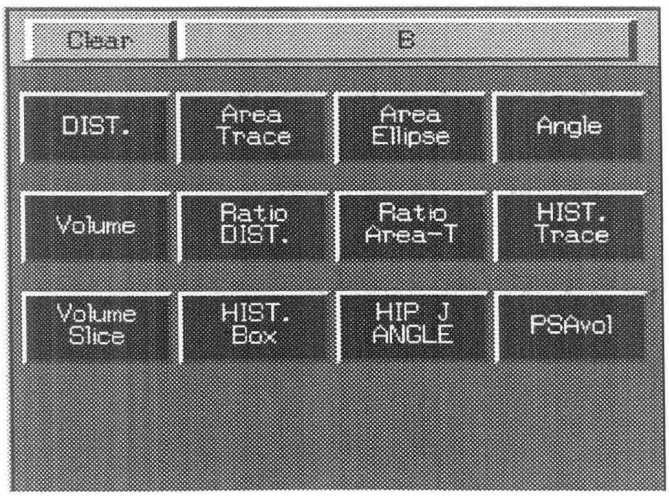
The upper half of the figure at left shows the menu bar for a B mode realtime image, and the lower half of the figure shows the menu bar for a B mode+Flow mode realtime image. Also, as shown in the upper half of the figure, if a number appears after the mode in a menu, it means that there are two B mode screens.

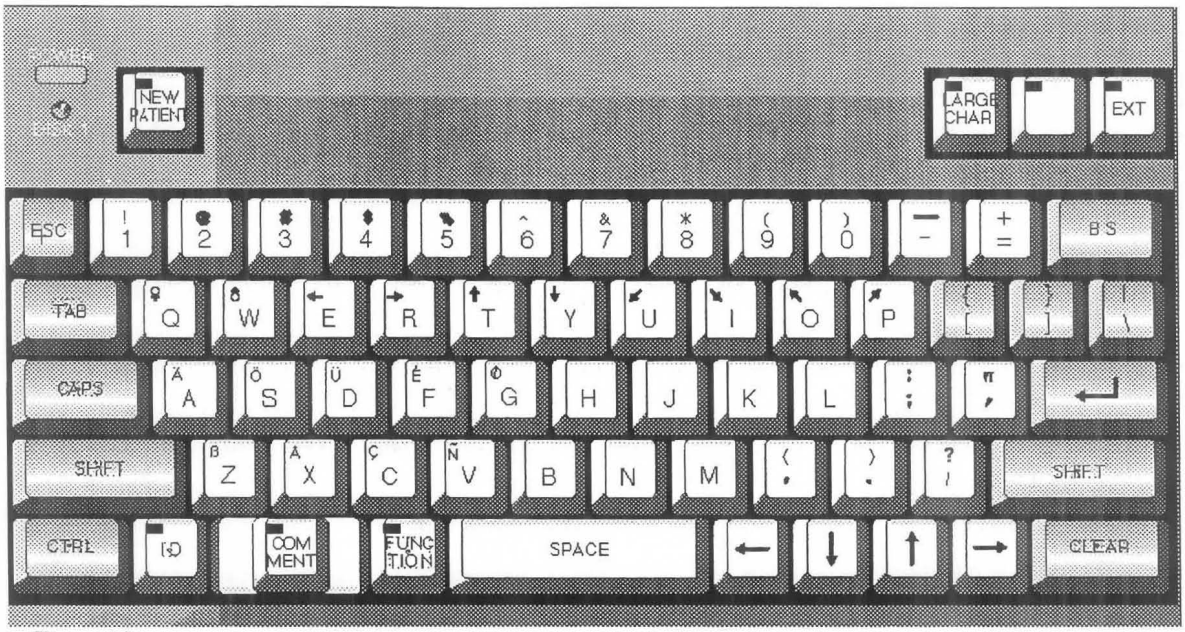
You can switch over to the second screen by pressing the B1 part of the menu bar once again.

MEASUREMENT

This switch is used to start or select a measurement function. If you press the **MEASUREMENT** switch, the following menu appears on the touch panel.

For details of the operation method for measurement, etc., refer to Sections 12 to 18.





[Remark]

Lit status of switch

Orange: Indicates that the function of the switch is taking place.

NEW PATIENT

This switch returns the system to the initial settings. When the initial settings are restored, entered patient data such as ID and comments are erased, enabling you to enter a new ID.

This function is convenient for examining a new patient after completion of the previous examination.

[Remark]

This function operates regardless of the status of the system (except the EXT (external signal input) status, ID screen status, STORE status, and REVIEW status).

<Operation method>

1. Upon completion of an examination, press the **NEW PATIENT** switch.

→ The system returns to the initial settings, and waits for the operator to enter an ID.

ID

This switch is used to enter patient data (ID No., name, etc.). The entered data can be used in a report display, for example. You can select one of the following four methods of entering an ID by using ID Input in the menu.

1) ID Area: Method in which only the patient's name, age and sex are entered

2) ID BSA: Method in which the patient's date of birth, height and weight are entered in addition to the items of 1)

[Remark]

The body surface area is automatically computed. You can freely change this formula using a preset.

Formula for computing BSA (body surface area): $BSA=W^{0.425} \times H^{0.725} \times 0.007184[m^2]$

3) ID GA: Method in which date of birth and obstetric data are entered in addition to the items of 1)

[Remark]

The pregnancy week and expected confinement date are automatically computed.

(When the LMP is entered)

GA = (Today's date - Date of last menstrual period) ÷ 7
EDC = 280 days + Date of last menstrual period

(When the BBT is entered)

GA = (Today's date - Estimated ovulation date + 14 days) ÷ 7
EDC = (280 days - 14 days) + Estimated ovulation date

(When the EGA is entered)

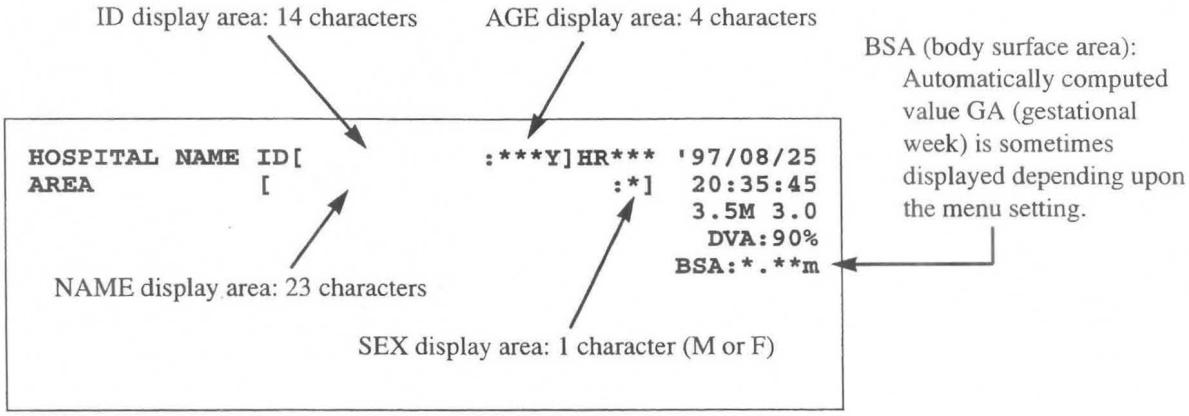
GA = (Today's date - Date of last examination) ÷ 7 + Gestational week on day of last examination
EDC = Day of last examination + (280 days - Gestational week on day of last examination)

For details of the setting method, refer to "ID Input" of 11-4 "Menu".

4) ID ULOR: Method in which the date of birth and serum value are entered in addition to the items of 1)

<Screen display>

The entered data is displayed at the following position on the screen.



ID display area: Up to 14 characters can be entered.

AGE display area: Up to 4 characters can be entered. If you entered an age consisting of no more than 2 digits, it is displayed on the right side of the AGE display area. By using the trackball, you can also move the underline cursor to "Y", delete "Y (Year)", or re-enter "D (Day)" or "M (Month)".

NAME display area: You can enter a name of up to 23 characters.

SEX display area: One character can be displayed. If you enter "MALE" in the BSA or GA screen, "M" is displayed; if you enter "FEMALE", "F" is displayed.

BSA (body surface area): The computed body surface area is displayed when the height and weight are entered from the input screen.

<Operation method>

Enter all items from the keyboard.

(When the menu setting is ID Area)

1. Press the **ID** switch.

→ An underline cursor appears at the left end of the ID display area.

2. Enter the ID from the keyboard, then press the Return key.

→ The underline cursor moves to the NAME display area.

3. Enter the name, then press the Return key.

→ The underline cursor moves to the AGE display area.

4. Enter the age, then press the Return key.

→ The underline cursor moves to the SEX display area.

5. Enter the sex of the patient.

→ Enter "M" for a male patient, or "F" for a female patient.

6. Once you have entered all items, press the **ID** switch.

→ The underline cursor disappears, and the ID entry function is terminated.

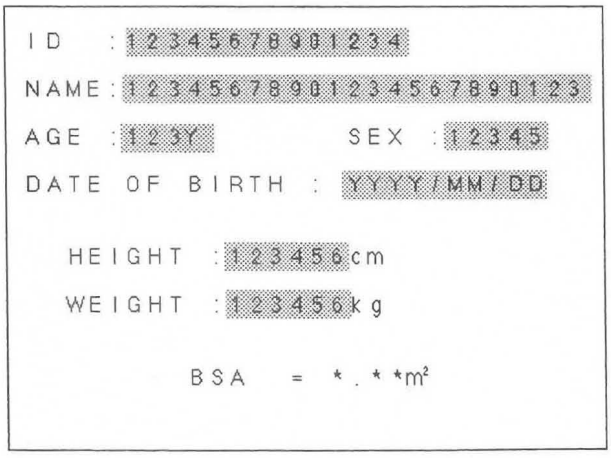
[Remark]

- Use the Return key or the trackball to move the underline cursor from one item to another. Note, however, that when you move the cursor with the trackball, the cursor does not necessary appear at the beginning of the item.
- If you wish to delete all characters in a certain area, move the underline cursor to that area, then press the **CLEAR** switch.
- If you wish to delete the characters from all areas in a single operation, press the **NEW PATIENT** switch.

(When the menu setting is ID-BSA)

1. Press the **ID** switch.

→ The screen changes to the following format, and the underline cursor appears in the ID input area.



ID: Enter the ID No.
NAME: Enter the name of the patient.
AGE: Enter the age of the patient.
SEX: Enter the sex of the patient. You can enter up to six characters, however only one character is displayed.
DATE OF BIRTH: Enter the patient's date of birth. The age is automatically computed. *1
HEIGHT: Enter the height of the patient. *1
WEIGHT: Enter the weight of the patient. *1
BSA: The body surface area is computed and displayed.

2. Enter the ID from the keyboard, then press the Return key.

→ The underline cursor moves to the NAME display area.

3. Enter the name, then press the Return key.

→ The underline cursor moves to the AGE display area.

4. Enter the age, then press the Return key.

→ The underline cursor moves to the SEX display area. If you do not know the age of the patient, move the underline cursor to the DATE OF BIRTH display area, enter the date of birth, then press the Return key.

5. Enter the sex of the patient, then press the Return key.

→ The underline cursor moves to the HEIGHT display area.

6. Enter the height of the patient, then press the Return key.

→ The underline cursor moves to the WEIGHT display area.

7. Enter the weight of the patient, then press the Return key.

→ The body surface area is displayed.

8. Once you have entered all items, press the **ID** switch.

→ The ID input function is terminated.

[Remark] *1

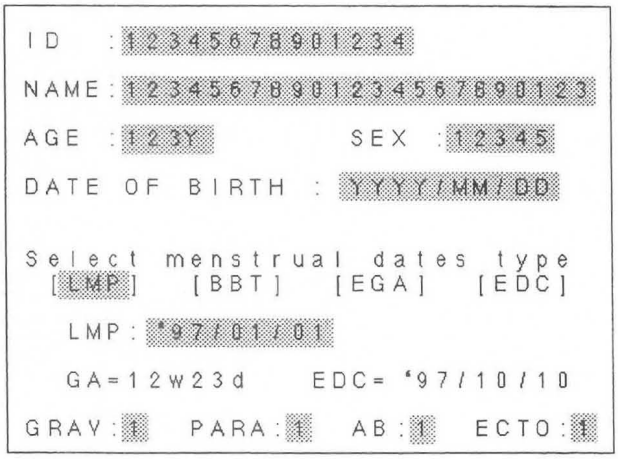
You can also enter the date of birth using the era name, the height in feet and inches, and the weight in pounds. In this case, enter the values as shown in the table below, and press the Return key. The entered values are automatically converted to metric values.

	Inches	Feet	Pounds
Entered characters	* * '	* * * "	* * * #
Conversion formula	1'=0.305m	1"=0.0254m	1#=0.45359

(When the menu setting is ID-GA)

1. Press the **ID** switch.

→ The screen changes to the input format shown below, and the underline cursor appears in the ID input area.



ID: Enter the ID No.
AGE: Enter the age of the patient.
SEX: Enter the sex of the patient. You can enter up to six characters, however only one character is displayed.
DATE OF BIRTH: Enter the patient's date of birth. The age is automatically computed. *1
LMP: Enter the last menstrual period.
BBT: Enter the basal body temperature.
EGA: Enter the date of the last examination and the estimated gestational week at that time.
EDC: Enter the estimated expected confinement date.
GA: The gestational week is automatically displayed.
EDC: The expected confinement date is automatically computed.
GRAV: Enter the number of pregnancies.
PARA: Enter the number of births.
AB: Enter the number of abortions and miscarriages.
ECTO: Enter the number of ectopic pregnancies.

2. Enter the ID from the keyboard, then press the Return key.

→ The underline cursor moves to the NAME display area.

3. Enter the name, then press the Return key.

→ The underline cursor moves to the AGE display area.

4. Enter the age, then press the Return key.

→ The underline cursor moves to the SEX display area. If the age of the patient is unknown, move the underline cursor to the DATE OF BIRTH display area, then press the Return key.

5. Enter the sex of the patient, then press the Return key.

→ The underline cursor moves to the expected confinement date computation method selection area.

6. Select the computation method for the expected confinement date, then press the **SET** key.

→ Using the trackball, select the computation method, then press the SET Return key to enter the selected method. If you enter the date (also enter the last gestational week for the EDC alone), then press the Return key, the GA (gestational week) and EDC (expected confinement date) are computed and displayed. The underline cursor moves to the "Number of pregnancies" area.

7. Enter the number of pregnancies, then press the Return key.

→ The underline cursor moves to the "Number of pregnancies" area.

8. Enter the number of births, then press the Return key.

→ The underline cursor moves to the "Number of abortions and miscarriages" area.

9. Enter the number of abortions and miscarriages, then press the Return key.

→ The underline cursor moves to the "Number of ectopic pregnancies" area.

10. Enter the number of ectopic pregnancies, then once you have entered all the necessary items, press the **ID** switch.

→ The ID input function is terminated.

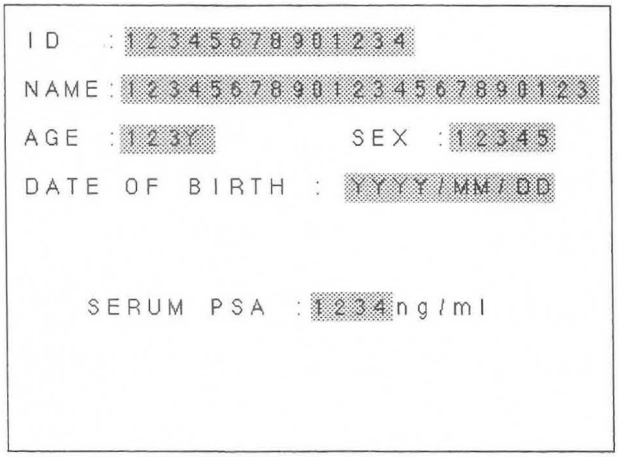
[Remark]

The GA (gestational week) and EDC (expected confinement) are automatically computed and displayed when one of the LMP, BBT, EGA and EDC values is entered.

(When the menu setting is ID-ULOR)

1. Press the **ID** switch.

→ The screen changes to the input format shown below, and the underline cursor is displayed in the ID input area.



ID: Enter the ID No.
NAME: Enter the name of the patient.
AGE: Enter the age of the patient.
SEX: Enter the sex of the patient. You can enter up to six characters, however only one character is displayed.
DATE OF BIRTH: Enter the patient's date of birth. The age is automatically computed. *1
SERUM PSA: Enter the serum PSA value.

2. Enter the ID from the keyboard, then press the Return key.

→ The underline cursor moves to the NAME display area.

3. Enter the name, then press the Return key.

→ The underline cursor moves to the AGE display area.

4. Enter the age, then press the Return key.

→ The underline cursor moves to the SEX display area. If the age of the patient is unknown, move the underline cursor to the DATE OF BIRTH display area, then press the Return key.

5. Enter the sex of the patient, then press the Return key.

→ The underline cursor moves to the SERUM PSA display area.

6. Enter the serum PSA value, then once you have entered all the necessary items, press the **ID** switch.

→ The ID input function is terminated.

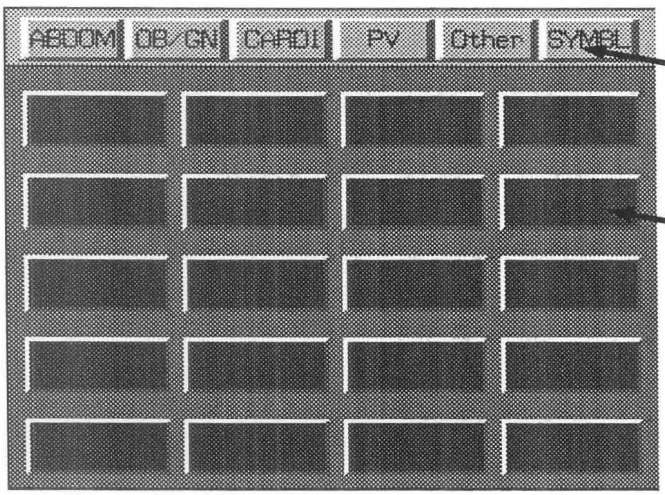
COMMENT

This switch displays an underline cursor at top left of the text area. Pressing it once again causes the underline to disappear.

<Operation method>

1. Press the **COMMENT** switch.

→ An underline cursor appears at top left of the text area. The following annotations appear on the touch panel.



These switches are used to select menus for up to six diagnostic fields.

The word registered in a preset is displayed.
By pressing the icon, you can display a word on the screen.

2. Roll the trackball so as to move the underline cursor to the position where you wish to enter a comment.
3. Enter characters and/or symbols from the keyboard or touch panel.
4. Press the **MARK REF** switch.

→ You can move characters entered from the keyboard as a word.

[Remark]

A space is judged as a demarcation between words.

5. Roll the trackball so as to move the words to the optimum positions.
6. Press the **MARK REF** switch.

→ An underline cursor appears, and you can enter characters and/or symbols.

7. Press the **COMMENT** switch.

→ The display on the touch panel switches over to the MENU screen, the underline cursor disappears, and the input function is terminated.

[Remark]
When you press **LARGE CHAR**, the characters entered on the screen are enlarged to four times normal size. This is convenient when you wish to emphasize a comment.
When you press **LARGE CHAR** once again, you can enter normal size characters.

[Remark]
When you press the **CLEAR** key, the word at the position of the underline cursor is deleted. If you press the **CLEAR** key when there are no characters at the position of the underline cursor, all of the characters and words on the screen are deleted (all clear function).

[Remark]
If the automatic display and a comment overlap each other, the automatic display takes priority, which sometimes makes the characters difficult to see.

[Remark]
You can freely register words such as anatomical terms and disease cases. For details, refer to "ANNOT Control" in 11-5 "Preset".

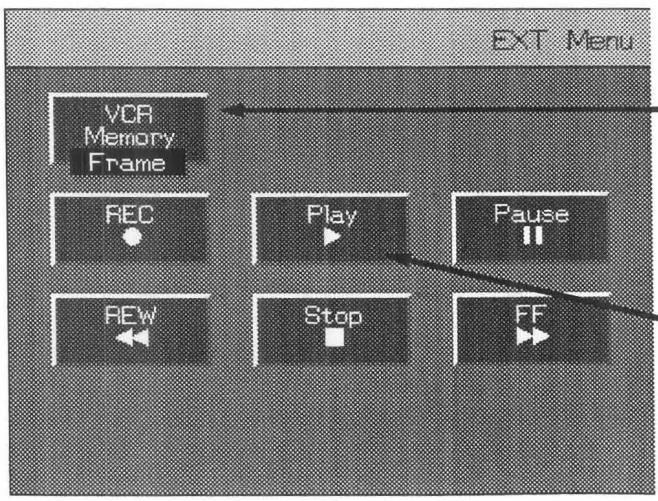
EXT

The video output from an external source such as a VCR is displayed on the monitor. Also, when the SONY SVO-9500MD is connected, you can remotely control the VCR from the touch panel.

<Operation method>

1. Press the **EXT** switch.

→ The monitor switches over to the external video source. The following menu appears on the touch panel.



Switches over the method of acquiring an EXT image to the system.
Frame: Suitable for a frozen image.
Field: Suitable for a moving image.

Enables you to remotely control the VCR switches other than REC.

2. Press the **EXT** switch.

→ The system screen switches over. The touch panel switches over to the MENU screen display.

10-2. B Mode

The B mode is a mode that displays an arbitrary cross-section of an organism as a slice image.

10-2-1. Basic operation procedure

<1-screen display>

1 Press the **B** switch on the operation panel to display a 1B mode image. Apply the probe to the part of the organism to be examined.

→ A B mode image of the part to be examined appears on the screen.

2 Perform adjustment so as to obtain a satisfactory image.

→ Adjust the brightness with the **STC** knob and the **B GAIN** knob. Perform image processing adjustments, including contrast adjustment, using the **rotary encoder** on the touch panel. Adjust the display depth to the optimum value with the **DEPTH** switch.

[Remark]

You can perform a number of image adjustments using the **IP SELECT** knob. When you wish to switch over the frequency, adjust the **IMAGE/F SELECT** knob.

3 Once you have obtained a satisfactory image, press the **FREEZE** switch to freeze the image.

4 Perform measurement as necessary.

→ For details, refer to Sections 12 to 18.

5 Record the image as necessary.

→ Set up the recorder to be used by performing menu operations. For details, refer to 11-7 "Menu".

<2-screen display>

You can display a B mode image on the left and right halves of the screen. Using a preset, select whether to divide a realtime image into 2B images, or to divide a frozen image into 2B images. Select the image using the **SELECT** switch.

For details, refer to 10-1 "Method of Operating Switches".

(When 2B Mapping in the preset is Off)

1 Press the **B¦B** switch.

→ The B image appears on the left half of the screen. (2B mode image)

[Remark]

You can switch over to a 2B display after freezing the B mode image. In this case, press the **B** switch while the B mode image is displayed. The cine division number on the screen changes from 1 to 2. If you press the **B¦B** switch after freezing the image, the image displayed at the instant that you pressed the **B** switch and the image displayed at the instant that it was frozen are both displayed on the screen.

2 Press the **SELECT** or **B¦B** switch.

→ The left image freezes and the right image is displayed in realtime.

3 Once again, press the **SELECT** or **B¦B** switch.

→ The right image freezes and the left image is displayed in realtime.

4 Press the **FREEZE** switch.

→ The image freezes. Next, if you press the **SELECT** or **B¦B** switch, you can perform measurements on the specified image. (However, when the left and right images are joined to each other, you can perform measurement across both of them.

5 When you wish to make a request, press the **B** switch while the image is frozen.

6 When the freeze condition is canceled, the specified image (the image on which the active mark "●" is displayed) is displayed in realtime.

(When 2B Mapping in the preset is On)

2B MAPPING is a function which displays a frozen B mode image stored in the cine memory as a 2B mode image display on the left and right halves of the screen.

1 Display a 1B image, then press the **FREEZE** switch.

→ The 1B image is displayed as a frozen image.

2 Press the **B¦B** switch.

→ The B mode image is displayed on the left half of the screen, and nothing is displayed on the right half of the screen. In this state, you can also use the search function. Select an image with the trackball.

3 Press the **SELECT** or **B¦B** switch.

→ The same image appears on both the left and right halves of the screen.

4 Press the **SEARCH** switch.

→ Using the search function, display an image on the right half of the screen that is in a different phase to the image on the left half. Using the trackball, select the desired image.

[Remark]

Specify the left and right images using the **SELECT** or **B¦B** switch.

5 Press the **FREEZE** switch or the **B** switch.

→ The 2B MAPPING function is terminated. The image that corresponded to the active side of the 2B mode display is displayed in the 1B mode.

10-2-2. Other functions

Shown below are convenient functions used in a typical B mode display. For details, refer to 10-1 "Method of Operating Switches" and 11-4 "Menu".

Function name	Description	Setting location
BodyMK Method	Function which changes over the mark according to the motion of the trackball.	Preset only
2B Width	Function which displays a 2B mode image over the entire screen.	Preset only
Image DIRECT	Function which reverses the scanning direction of the image. Can also be used after the image is frozen.	Menu
Image ROTAT	Function which inverts the image. Can also be used after the image is frozen.	Menu
Range Select	Function which enables the display range value to be arbitrarily set. 1-cm steps.	Preset only
Scan Area	Function which arbitrarily reduces the scanning width and raises the frame rate.	Panel
POSI Shift	Function which offsets the B mode display starting point when the system is switched on.	Preset only
DISPLAY Color	Function which colors a B mode image.	Menu
Zoom Method	Function which selects the method of indicating the Zoom magnification area using BOX.	Preset only
PUNC Guide	Function which displays puncture guidelines.	Menu
STC Display	Function which displays the set status of STC on the screen.	Preset only
Caliper Size	Function which enables the measurement caliper to be set to one of three sizes.	Preset only
Caliper AutoOff	Function which automatically erases the results of measurement when the image is unfrozen.	Preset only
Unit Select	Function which enables the measurement units to be selected from four combinations.	Preset only
MEASURE Move	Function which changes over the measurement display position or the method of displaying the results.	Menu
BSA EQUAT	Function which enables the BSA computation formula to be freely changed.	Preset only
T.B.PRIORI	Function which enables the operation function activated after the image is frozen to be specified in advance.	Preset only
Thermal Index	Function which selects the TIS, TIB or TIC acoustic power index.	Menu
Auto F.Type	Function which does not reset the focus position when the range changes during a focus shift.	Preset only
Focus	Function which sets the number of sending focus steps, position, etc.	Menu
Line Density	Function which selects one of three line densities in the B mode.	Menu
High Frame	Function which limits the frame rate to prevent multiple echoes.	Preset only
Post Process	Function which changes the signal and brightness display level.	Menu
View Gamma	Function which sets a suitable brightness level for the abdominal region or the cardiac region.	Menu
HORIZON SMOOTH	Function which set the degree of interpolation in the horizontal direction of the scanning lines.	Menu
FTC	Function which enhances the edges of a B mode image.	Menu
Image SOFNA	Function which sets a B mode image to one of two levels of fineness.	Menu

10-3. B/M and M Modes

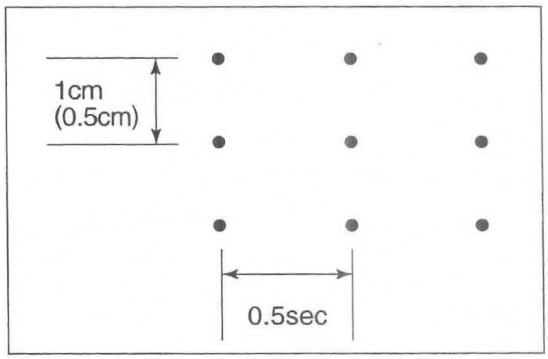
The M mode is a mode in which the ultrasound beam is fixed in a straight line on a B mode image, and the motion of the body that reflects the ultrasound wave on this straight line is displayed on the screen along with the passage of time, enabling it to be observed. The B/M mode is a mode in which a B mode image and an M mode image are displayed simultaneously.

You can observe an M mode image which checking the detection position with the B mode image.

A dotted line is displayed on a B mode image. This dotted line is called a cursor. You can set the cursor in any direction on the B mode image using the trackball on the operation panel. The data that lies along this cursor is displayed as an M mode image.

When the image is not frozen, graduation marks are displayed only at the top and bottom edges of the M mode image. When you freeze the image, the graduation marks are displayed as shown in the figure at right.

The graduation marks are displayed at intervals of 1 cm in the depth direction (or 0.5 cm when the display depth is 5 cm or less), and 0.5 sec in the sweep velocity direction.



10-3-1. Basic operation procedure

<B/M mode>

1 Press the **B/M** switch on the operation panel so as to display B/M mode images on the screen.

2 Set the detection position of the M mode image.

→ Using the trackball, move the cursor on the B mode image left or right until it is at the position where you wish to detect the M mode image.

3 Display a suitable M mode image.

→ Using the **M GAIN** knob, adjust the sensitivity with respect to the M mode image.

[Remark]

You can perform a number of image adjustments using the **IP SELECT** knob. When you wish to switch over the frequency, adjust the **IMAGE/F SELECT** knob.

4 Adjust the contrast of the M mode image.

→ Perform image processing adjustments, including contrast adjustment, using the **rotary encoder** on the touch panel.

5 Once satisfactory images are displayed, press the **FREEZE** switch to freeze the images.

→ If you wish to freeze only one of the images, press the **SELECT** switch. Each time you press this switch, the image switches in the sequence B freeze → M freeze → B freeze.

6 If you wish to move both images once again, press the **B/M** switch.

<M mode>

1 While both of the above B/M images are frozen, press the **M** switch on the operation panel.

→ A D mode image appears over the entire screen. As necessary, perform measurements on the image and record the results.

2 Press the **FREEZE** switch to unfreeze the image.

→ When the image returns to a realtime display, the mode automatically switches to the B/M mode.

<M-WINDOW function>

This function displays an M mode image in enlarged form.

1 Press the **CURSOR/B.L.S.** switch.

→ The switch glows orange, and a window appears on the cursor.

2 Turn the rotary encoder.

→ Turning the rotary encoder to the right reduces the size of the window, while turning it to the left increases the size of the window.

3 Move the window with the trackball.

→ An M mode image in the range of the window appears.

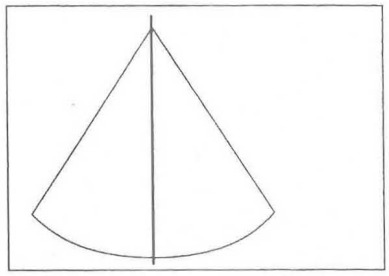
4 Terminate the M-WINDOW function.

→ To terminate this function, either press the **CURSOR/B.L.S.** switch or turn the rotary encoder fully left.

<Free M mode>(when optional equipment is installed)

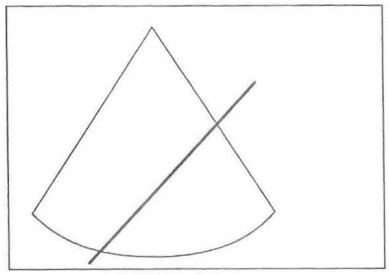
This is a function which draws a free M mode cursor on B mode images acquired continuously to the cine memory, and creates an M mode image from the data at the location of the cursor.

① Display a satisfactory B mode image.



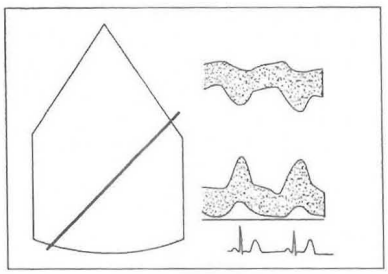
② Press the **CURSOR** switch to display the free M mode cursor.
→A solid line cursor for the free M mode appears at the center of the B mode image.

③ Move the free M cursor up, down, left and right with the trackball, and rotate it with the rotary encoder. Adjust the size of the free M cursor using Cursor Size in the menu.



④ Once you have created the desired free M cursor, press the **B/M** switch.
→The B mode images acquired to the cine memory are read one at a time, and the M mode image is created one line at a time.

[Remark]
Once the M mode image has been created, an image request can be made. To perform an M mode image search, use the rotary encoder. To perform a B mode image search, use the trackball.
You can change the display magnification of the created M mode image using the menu.



⑤ You can set the free mode M cursor by pressing the **CURSOR** switch once again.

<Simultaneously displaying a number of free M mode cursors>

This function displays a number of free M mode cursors on B mode images that were acquired continuously to the cine memory, and creates a number of free M mode images.

① Display a satisfactory B mode image.

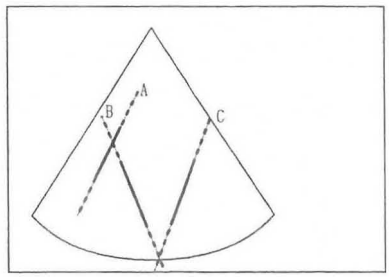
② Select Line Number from the menu, and set the number of M cursors.

[Remark]
You can display up to three cursors.

3 Press the **CURSOR** switch.
→ The first cursor (A) is displayed.

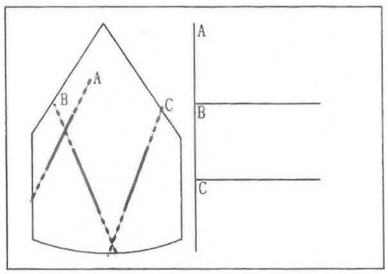
4 Set the position and size of the cursor using the trackball and the rotary encoder.

5 Press the **MARK REF** switch to display the second cursor (B).
By pressing the **MARK REF** switch again, a third cursor (C) will be displayed.



6 If all cursors are displayed, switch the active status with the **MARK REF** switch.
→Each time you press the **MARK REF** switch, the active cursor is switched over in the sequence A->B->C->A.

[Remark]
You can erase the active cursor by selecting CH CLR in the menu.



[Remark]
The size of the M cursor is represented by a dotted line, and the M mode display range is displayed as a solid line.

7 Press the **B/M** switch.
→The M mode image is divided in the vertical direction into a number of parts equal to the number of displayed M cursors.

[Remark]
You can change the display magnification of the M mode image after freezing it.

10-4. B/D and D Modes

The D mode is a mode that uses the Doppler effect to display information concerning the blood flow in the heart and blood vessels. The blood flow information displayed in this mode is called a D mode image. A D mode image is not an image of a part of the body, but is a graph of blood flow information. For this reason, it is also called a Doppler pattern.

The B/D mode is a mode in which a B mode image and a D mode image are displayed simultaneously. It enables you to observe blood flow information on a D mode image while checking the B mode image to see what part of the body the detected blood flow information belongs to.

The following two kinds of ultrasound beams are used to display a D mode image.

1 PW Doppler: The ultrasound beam is emitted as discrete pulses, and a D mode image displayed. You can obtain blood flow information concerning any point on a B mode image.

2 CW Doppler: The ultrasound beam is emitted continuously, and a D mode image displayed. If you connect a probe that supports steerable CW, you can change the direction of the emitted ultrasound beam.
CW Doppler enables all depth signals to be received, so it is suitable for detecting the maximum flow velocity.

Both PW Doppler and CW Doppler are suitable for obtaining information concerning high velocity blood flow for evaluating the seriousness of mitral or aortic stenosis or regurgitation, for example.

[Remark]

Flow velocity marks are displayed on a Doppler spectrum at intervals of 10 cm/s and 50 cm/s. The 50 cm/s marks are displayed slightly large. If the velocity exceeds the range of 0±50 cm/s, the 10 cm/s marks are not displayed.

[Remark]

For angle correction, if the velocity exceeds the range of 0±3 m/s, scale graduations are displayed at intervals of 1 m/s, and if the velocity exceeds the range of 5 m/s, scale graduations are displayed at intervals of 5 m/s.

10-4-1. Basic operation procedure

[Remark]

If a preset is set to the initial values, the Triplex Mode item of the preset is set to [Triplex] when measurements other than cardio measurements are being performed, and is set to the [B-Real] when cardio measurements are being performed. When the preset is set to B-Real, press the **B/D** switch, then press the **SELECT** switch to display a D mode image. Perform the same operation in the case of the Flow mode as well.

<B/D mode>

1 Press the **B/D** switch on the operation panel to display B/D images on the screen.

2 Set the detection position of the D mode image.

→ Using the trackball, move the sample volume on the B mode image left or right until it is at the position where you wish to detect the D mode image.

3 Display a suitable D mode image.

→ Using the D GAIN knob, adjust the sensitivity with respect to the D mode image.

[Remark]

You can perform a number of image adjustments using the **IP SELECT** knob. When you wish to switch over the frequency, adjust the **IMAGE/F SELECT** knob.

4 Adjust the contrast of the D mode image.

→ Perform image processing adjustments, including contrast adjustment, using the **rotary encoder** on the touch panel.

5 If you wish to display a flow velocity that is higher than the flow velocity displayed on the Doppler spectrum, press the ↑ VEL RANGE switch. Alternatively, press the **CURSOR/B.L.S.** switch to move the baseline.

[Remark]

If there is a difference between the incident angle of the ultrasound beam and the direction of the blood vessel, press the **ANGLE** switch then turn the rotary encoder to correct the angle.

6 Once satisfactory images are displayed, press the **FREEZE** switch to freeze the images.

→ If you wish to freeze only one of the images, press the **SELECT** switch. Each time you press this switch, the frozen image changes in the sequence B freeze → D freeze → B freeze.

7 To unfreeze the image and display both images simultaneously, press the **B/D** switch.

[Remark]

Sometimes, when you press the ↑ VEL RANGE switch while both images are displayed simultaneously, the frame rate of the B mode image falls and the D mode image is displayed at a higher flow rate. To restore the B mode image to the original frame rate, press the ↓ VEL RANGE switch or press the **B/D** switch once again.

<D mode>

1 While both of the above B/D images are frozen, press the **D** switch on the operation panel.

→ A D mode image appears over the entire screen. As necessary, perform measurements on the image and record the results.

2 Press the **FREEZE** switch to unfreeze the image.

→ When the image returns to a realtime display, the mode automatically switches to the B/D mode.

10-4-2. Other functions

Shown below are convenient functions used in a typical D mode display. For details, refer to 10-1 "Method of Operating Switches" and 11-5 "Menu".

Function name	Description	Setting location
T.B. Speed	Function which adjusts the sensitivity of the trackball (cursor, etc.).	Preset only
B/* Format	Function which changes the vertical width of the spectrum, and the upper and lower B/D mode display.	Preset only
Triplex Mode	Function which changes the method of transition between B and D mode images.	Preset only
B Shift	Function which pans a B mode display by following the cursor.	Preset only
Image POLAR	Function which reverses the brightness of a D mode image.	Menu
Sweep Speed	Function which adjusts the D mode sweep speed.	Menu
Sample Volume	Function which adjusts the detection width during PW Doppler.	Menu
Cursor DISP:D	Function which takes over the cursor display from the B/D mode to the B mode.	Preset only
PW SOUND ON	Function which performs a PW operation on a B mode display to confirm the detection position.	Preset only
Steered Beam	Function possessed by some linear probes which deflects the Doppler incident angle.	Menu
Cursor POSI	Function which selects the initial position of the cursor display from one of three positions.	Preset only
Focus	Function which automatically focuses on the sample volume.	Menu
DOP Filter	Filter which removes signals from valves, etc. Auto/Manual selection.	Menu
Zoom Lock	Function which follows the sample volume when Zoom is used.	Menu
INVERT AXIS	Function which inverts an image about the baseline.	Preset only
DISPLAY Color	Function which colors a D mode image.	Menu
M/D Mode	Function which selects either the D mode or the M/D mode.	Menu
DOP Image Select	Function that selects the D mode image quality	Menu

10-5. Flow Display

In addition to the morphological information that can be obtained from the conventional B mode and M mode images, you can also easily observe information concerning blood flow in blood vessels in realtime. Like other Doppler modes, Doppler information is obtained from the change in the approaching and receding blood flow.

Consequently, in order to obtain good flow information, it is necessary to predict in advance the direction of blood flow in the area to be examined, and approach this area from the position at which Doppler information is to be obtained.

10-5-1. Basic operation procedure

<Flow display/power flow display>

1 Display a satisfactory B mode image.

2 Press the **FLOW** switch or the **POWER** switch.

→ The blood flow is displayed on the B mode image. An approaching blood flow is displayed in red, and a receding blood flow in blue.

3 Put the flow area in the optimum condition.

→ Press the **SCAN AREA** switch, and enlarge, reduce or move the flow area.

4 Display a satisfactory blood flow.

→ Adjust the flow sensitivity using **FLOW GAIN**.

[Remark]

You can perform a number of image adjustments using the **IP SELECT** knob. When you wish to switch over the frequency, adjust the **IMAGE/F SELECT** knob.

5 Change the flow velocity range using the ↑ or ↓ switch.

→ When the blood flow is slow, reduce the flow velocity range; when it is fast, increase the flow velocity range.

6 Once you have obtained a satisfactory image, press the **FREEZE** switch to freeze the image.

[Remark]

The power flow is displayed in a color which corresponds to the intensity (area) of the color Doppler signal. A power flow display improves the sensitivity for a low flow velocity, but does not enable the directionality of the blood flow to be determined.

<Enlarging, reducing or moving the flow area>

1 Display an image in the B flow mode, then press the **SCAN AREA** switch.

→ The switch glows orange. In the B flow mode, marks are displayed at the four corners of the flow area.

2 Press the **MARK REF** switch.

→ The border of the flow area is displayed as solid lines. It can be enlarged or reduced using the trackball.

3 Press the **MARK REF** switch.

→ The solid lines representing the border of the flow area disappear, and the flow area shift function is re-activated.

4 Press the **SCAN AREA** switch.

→ This function is terminated.

10-5-2. Other functions

Shown below are convenient functions used in a typical Flow/Power mode display. For details, refer to 10-1 "Method of Operating Switches" and 11-4 "Menu".

Function name	Description	Setting location
Scan Area	Function which adjusts the B mode scanning range when Bflow or Bflow/D is used.	Panel
Steered Beam	Function possessed by some linear probes which deflects the Doppler incident angle.	Menu
Flow Area	Function which adjusts the Flow scanning range in the Bflow and Bflow/D modes.	Panel
F. Area Mode	Function which automatically reduces the velocity range when the depth is changed. Function that selects either a display consisting of solid arcs at the four corners of the flow area, or a display consisting of a dotted line enclosing the entire flow area.	Preset only
Triplex V.Range	Function which sets the D velocity range with respect to the flow in the B flow/D mode.	Preset only
Area Lock	Function which causes the flow area to follow the sample volume.	Menu
Capture Time/Mode	Function which holds a color pixel for a fixed period before displaying it.	Menu
Focus	Function which automatically focuses the beam on the flow area.	Menu
Flow Filter	Filter which removes clutter signals from the heart wall, for example.	Menu
C. Line Density	Function which selects one of three color scanning line densities.	Menu
Color Average	Function which selects one of three sending rates per color line.	Menu
Flow SENS	Function which corrects the set range of Flow gain.	Menu
Color Coding	Function which switches over the colors used to represent the direction of blood flow.	Menu
Display PRIORI	Function which sets the B mode and color pixel display priority.	Menu
Color POLAR	Function which reverses the polarity of the directionality in the Flow mode.	Menu
Color Reject	Function which removes the display from the low velocity end of the blood flow signal.	Menu
F.R. ACCEL	Function which improves the color continuity.	Menu
Frame Rate	Function which improves the frame rate in the Flow mode and Power mode.	Menu
D.D.D	Function which displays B mode and Bflow mode images simultaneously alongside each other.	Menu

10-6 Tissue H.E. Mode (when optional equipment is installed)

This mode receives ultrasound waves at a frequency equal to twice that used in the conventional B mode or M mode, and performs image processing at the second harmonic wave reflected from the patient's tissue, resulting in a clear image that is free from artifacts such as side lobes. Particularly, this mode offers improved image diagnosis of patients that do not readily transmit ultrasound wave signals. This function is limited to certain probes that have a wider frequency band than conventional probes.

This function can be used with the following four probes: UST-5283-2.5, UST-5284-2.5, UST-5297 and UST-9119.
(When using a probe that does not operate with this function, you cannot select this function from the menu.)

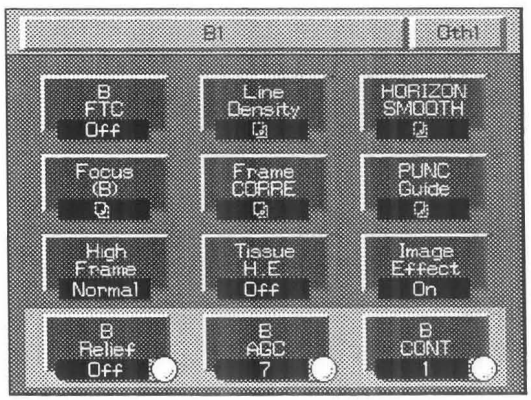
Because the receiving frequency is high, the sensitivity sometimes falls off slightly. When examining a patient, take care that the sensitivity is adequate.

10-6-1. Basic operation procedure

1 Display a satisfactory **B mode** image.

[Remark]

In this condition, re-arrange the menu so that Tissue HE is displayed in the B Mode menu. For details, refer to "Menu Control in 11-5 "Preset".



2 Touch **Tissue HE** on the touch panel.

→ The B mode receiving frequency is doubled.

[Remark]

You can adjust several images using the **IP SELECT** knob.
Use **IMAGE/F SELECT** to adjust the receiving frequency.
You can make up to three kinds of adjustments.

3 Press the **B/M** switch.

→ B/M images are displayed at double the normal receiving frequency.

4 Once a satisfactory image is displayed, press the **FREEZE** switch to freeze the image.

> **⚠ Note**
>
> You cannot use this function on the second harmonic wave obtained as a result of using an ultrasound contrast medium or medication

10-7. Tissue Doppler Imaging (when optional equipment is installed)

The Tissue Doppler Imaging (TDI) display is intended to make visible the motion of the cardiac muscle tissue, and so on. It thus differs from the target Doppler display which is intended to show normal blood flow.

10-7-1. Basic operation procedure

Before starting TDI, assign TDI FLOW, TDI POWER and TDI PW to the menu or customizable switches. For details, refer to 11-5 "Preset".

1 Display a satisfactory B mode image, then press the **FLOW** switch or the **POWER** switch.
→Blood flow data is displayed on the B mode image.

2 Press TDI FLOW or TDI POWER assigned to the menu, or press the customizable switch to which this item has been assigned.
→A TDI display appears.

3 To select TDI PW, display a D or B/D mode image.

4 Set the flow area, sensitivity, flow velocity range, and so on.

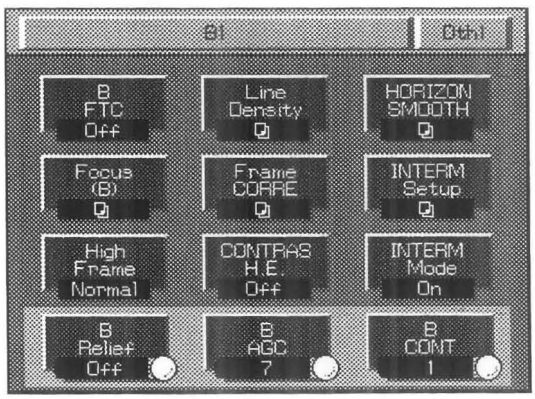
5 Once you have obtained a satisfactory image, press the **FREEZE** switch to freeze the image.

10-8. Contrast H.E. Mode (when option is installed)

In this mode, a contrast medium is used, and the receiving frequency in the B mode is doubled. Image processing is performed using the second harmonic of the wave reflected from the body tissue, resulting in a clear image with minimal artifact due to side lobes, and so on. This function makes for improved image diagnosis, particularly in the case of a patient whose body does not readily transmit ultrasound waves. Note that the use of this function is limited to probes that have a higher frequency bandwidth than that of a conventional probe.

This function can be used with the following five probes: UST-5284-2.5, UST-5285-3.5, UST-5297, UST-9114-3.5 and UST-9119.
(If you are using a probe that cannot be used with this function, you will be unable to select this function from the menu.)

10-8-1. Basic operation procedure



①. Display a satisfactory B mode image.
[Remark]
While the image is displayed, re-arrange the menu is such as way that **Contrast H.E.** is displayed in the **B Mode MENU**.

For details, refer to "Menu Control" in 11-5 "Preset".

②. Press **Contrast H.E.** on the touch panel.

→The B mode receiving frequency is doubled.

[Remark]
You can adjust a number of images with a single knob by using **IP SELECT**. When adjusting the receiving frequency, adjust **IMAGE/F SELECT**. You can perform up to four adjustments.

③. Switch between the modes as necessary.

④. Display a satisfactory image, then press the **FREEZE** switch to freeze the image.

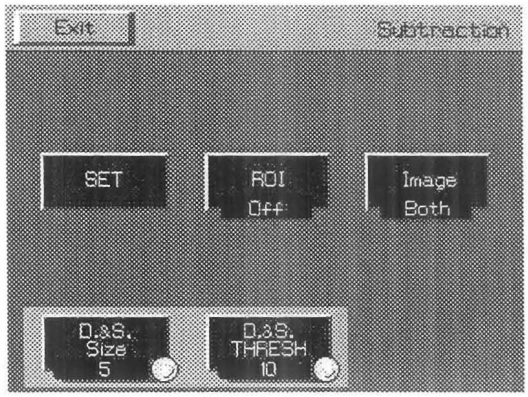
10-8-2. Subtraction function

This function evaluates how much the tissue is colored after a contrast agent is given.

[Remark]

The subtraction function can be operated in the black and white image or 2B mode of the power flow image.

SET	: Displays a differential image.
ROI	: Sets the area of the image that is differentiated.
Image	: Switches between the displays of the differential image.
D&S Size	: Sets the size of the window that averages brightness of the differential image.
D&S THRESH	: Sets a threshold of the differential image.



<Basic Operation>

① Press the **Contrast H.E.** on the touch panel to display the harmonic echo image in which the contrast agent is used.

② Press the **2B** switch.
→A harmonic echo image is displayed on the left, and no image is displayed on the right.

③ Press the **SELECT** switch.
→The image on the left freezes, and an active image on the right is displayed.

④ Press the **FREEZE** switch to freeze the image.

⑤ Sets the **ROI** , and press the **SET** switch or the **SET** on the touch panel.
→A differential image is displayed on the left.

[Remark]

The differential image is given by subtracting the left image data from the right image data. Only the part which is larger on the right image than it is on the left image is displayed as the differential image. The image contrasted by the contrast medium is displayed on the right, and the original image (before being contrasted by the contrast medium) or the image in which the contrast medium has faded is displayed on the left.

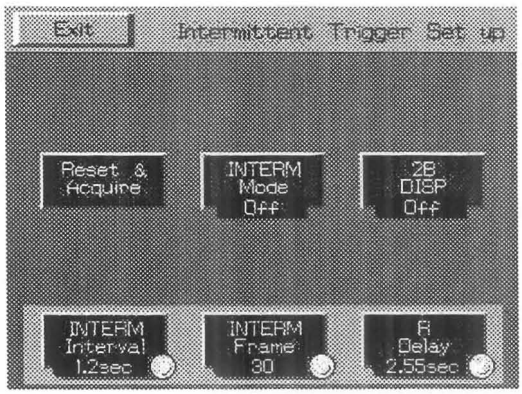
⑥ In order to eliminate noise on the differential image, sets the window size and the threshold in the **Dust&Scratch** on the touch panel, and press the **SET** switch or the **SET** on the touch panel.
→The differential image is displayed on the left again.

10-9. Intermittent Trigger Mode (when option is installed)

This mode is used when a contrast medium is used. It transmits the ultrasound beam intermittently in order to prevent the contrast medium from being destroyed by exposure to the beam.
This function can also be used for both sending and receiving even when a contrast medium is not used.

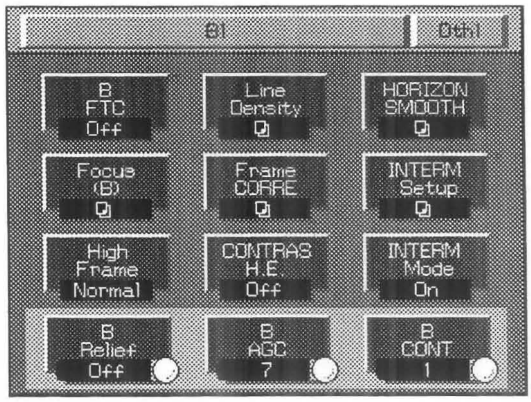
10-9-1. Intermittent Trigger Set up menu

Used to make various settings in the Intermittent Trigger Mode.



Reset & Acquire : Automatic display of the sending time is reset, and an image is aquired when the DMS is connected.
INTERM Mode : Starts/ends the Intermittent Mode.
2B DISP : Starts/ends the 2B Sync function of the Intermittent Mode.
INTERM Interval : Sets the interval of the R wave used for synchronization when ECG is ON, and sets the sending interval when ECG is OFF.
INTERM Frame : Sets the number of receiving/sending frames for each trigger.
R-Delay : Sets the delay time from the R wave that is synchronized with ECG ON.

10-9-2. Basic operation procedure



①. Display a satisfactory image.

②. Press **INTERM Mode** on the touch panel.

→The equipment enters the Intermittent Trigger mode.

[Remark]
First re-arrange the menu so as to display **INTERM Mode** or **INTERM Setup** in the **B Mode MENU**.
For details, refer to "Menu Control" in 11-5 "Preset".

③. Using **INTERM Setup** on the touch panel, set the sending interval, and so on.

④. Once again, press **INTERM Mode** on the touch panel.

→The Intermittent Trigger ends.

10-10. Troubleshooting

10-10-1. Ensuring patient safety

While using the system, monitor both the system and the patient to ensure that there is no abnormality.

If an abnormality occurs while the system is being used, immediately take the probe away from the patient and switch off the system.

If an abnormality occurs in the patient, carry out appropriate medical treatment.

10-10-2. System disposition

If an abnormality not described in 24. switch off the system, and attach a suitable sign, such as a BROKEN tag, on it, then contact Aloka's office indicated on the back cover of this manual.

11. USEFUL FUNCTIONS

11-1. Cine Memory and Store Memory

11-1-1. Cine memory

The cine memory function temporarily stores images in the memory of the system before an image is frozen, enabling them to be observed after the image has been frozen. It enables you to search for the required image to freeze from the images in the memory, thus ensuring that you do not miss the timing for freezing the image.

By using this function in combination with an ECG waveform, a cine scale and search mark are displayed, enabling you to search for an image of an arbitrary phase.

The cine memory has a search function for observing B mode images, and a scroll function for observing M mode images.

When two or more images are displayed, such as in the case of the 2B, B | M and B | D modes, you can store and observe each image separately. However, when one of the images is displayed in realtime, you cannot perform a search or scroll operation.

⚠ Note

Keep the following point in mind when using the cine function.

- The amount of image data that can be stored in the memory differs depending upon the probe used, and the various image display conditions such as the display mode and the display depth.

⚠ Note

Keep the following points in mind when using the cine function.

- You can only search or scroll images that are stored in the memory.
  If you unfreeze an image then immediately freeze it again, you can search or scroll only the images stored during that interval, even if the image data does not fill the memory.
  If the memory capacity is exceeded, images are erased in sequence from the oldest image prior to the point where the image was frozen. You cannot search or scroll erased images.
- When an image is unfrozen, the images that were stored in the memory up to that point in time are erased.

This section consists of 132 pages.

(1) Search function and scroll function

(Search function)

When you perform a forward direction search until the last image in the memory is displayed, then continue to perform a search, the images are displayed again from the first one.

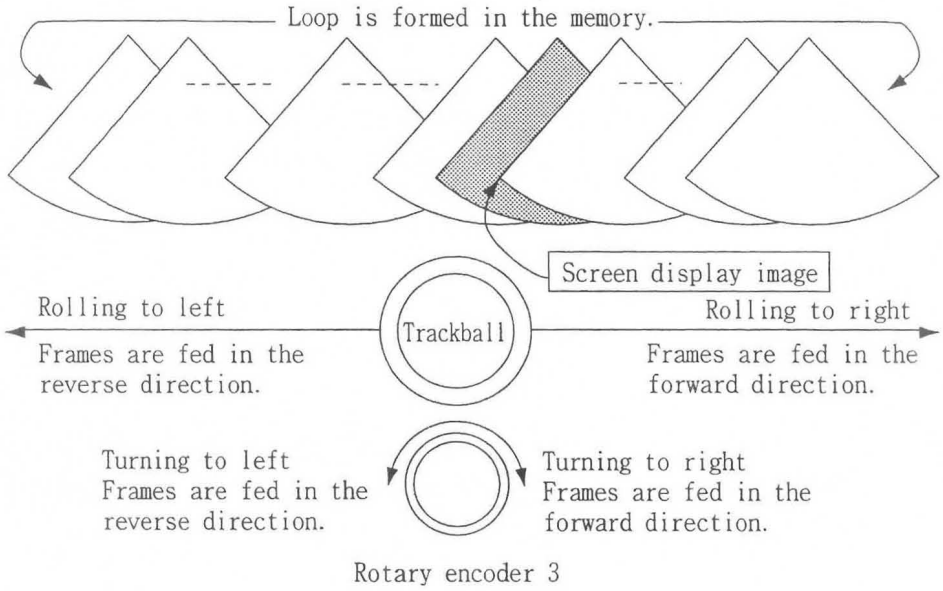


Fig. Search function

(Scroll function)

When you perform a forward direction scroll until the last image in the memory is displayed, you cannot scroll any further. (Unlike the case of a search operation, a loop is not formed.)

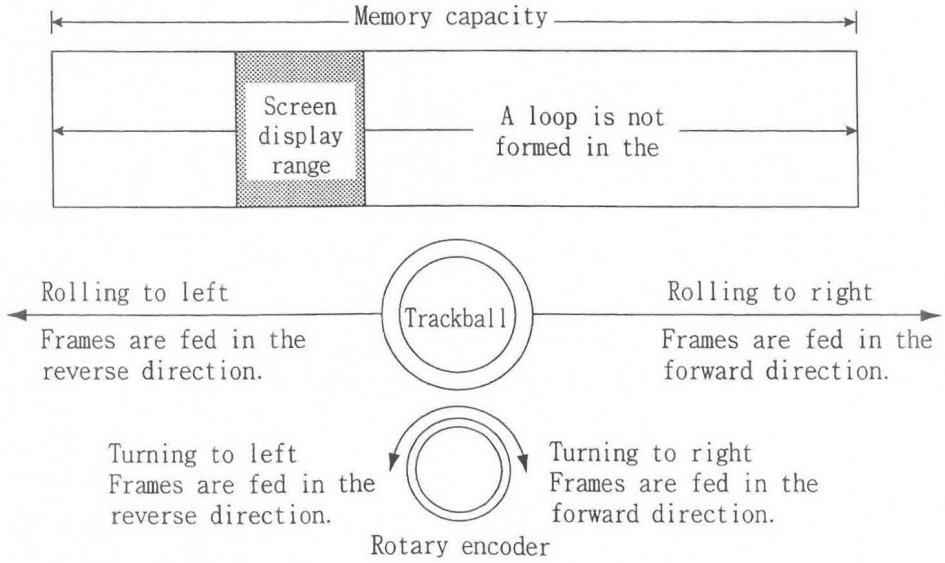


Fig. Scroll function

(2) Search number

If an image is frozen, a search number appears on the screen. The position of the search number differs depending upon the display mode. (No display related to the scroll function appears.)

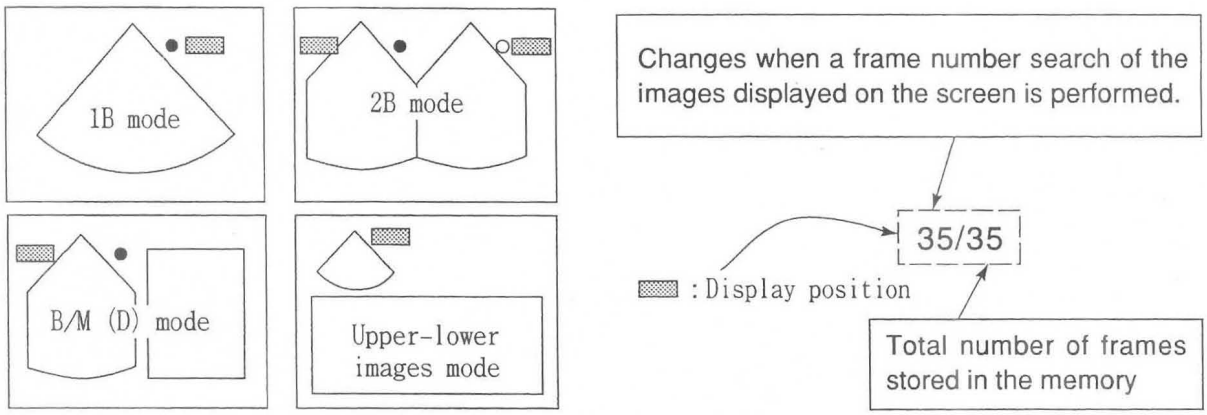


Fig. Search number

11-1-2. Basic operation

<When 2B Mapping of the preset is Off>

① Press the **FREEZE** switch.

→ The image freezes, and a search number is displayed.

[Remark]

If the image was frozen in the 2B mode, there is no need to carry out the following procedure up to step ⑧.

② Press the **SEARCH** switch.

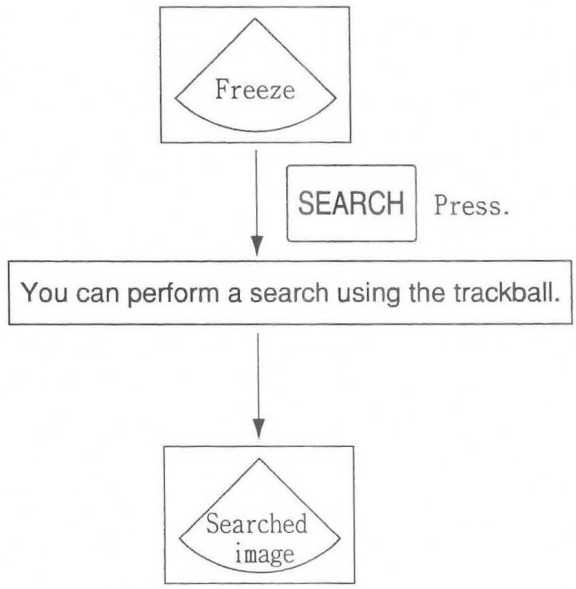
③ Search for the desired image using the trackball.

[Remark]

Depending upon the setting of the preset, the search function or scroll function is sometimes activated. For details, refer to 11-5 "Preset".

[Remark]

You can perform measurements on a searched image, however the trackball is used for measurement functions so you cannot use it to perform a search. If you wish to use the trackball again for a search operation, continue from step ②.



④ Press the **B | B** or **SELECT** switch.

→ The image in the memory that is displayed on the right half of the screen in the 2B mode appears.

[Remark]

If the previous image exists, it is displayed. If it does not exist, the display is blank.

⑤ Press the **FREEZE** switch, and when a satisfactory image is displayed, press the **FREEZE** switch once again.

→ The image freezes, and a search number is displayed.

⑥ Press the **B | B** switch.

→ The image that you froze previously and the image you froze just now are displayed on the left and right halves of the screen.

⑦ Press the **SEARCH** switch.

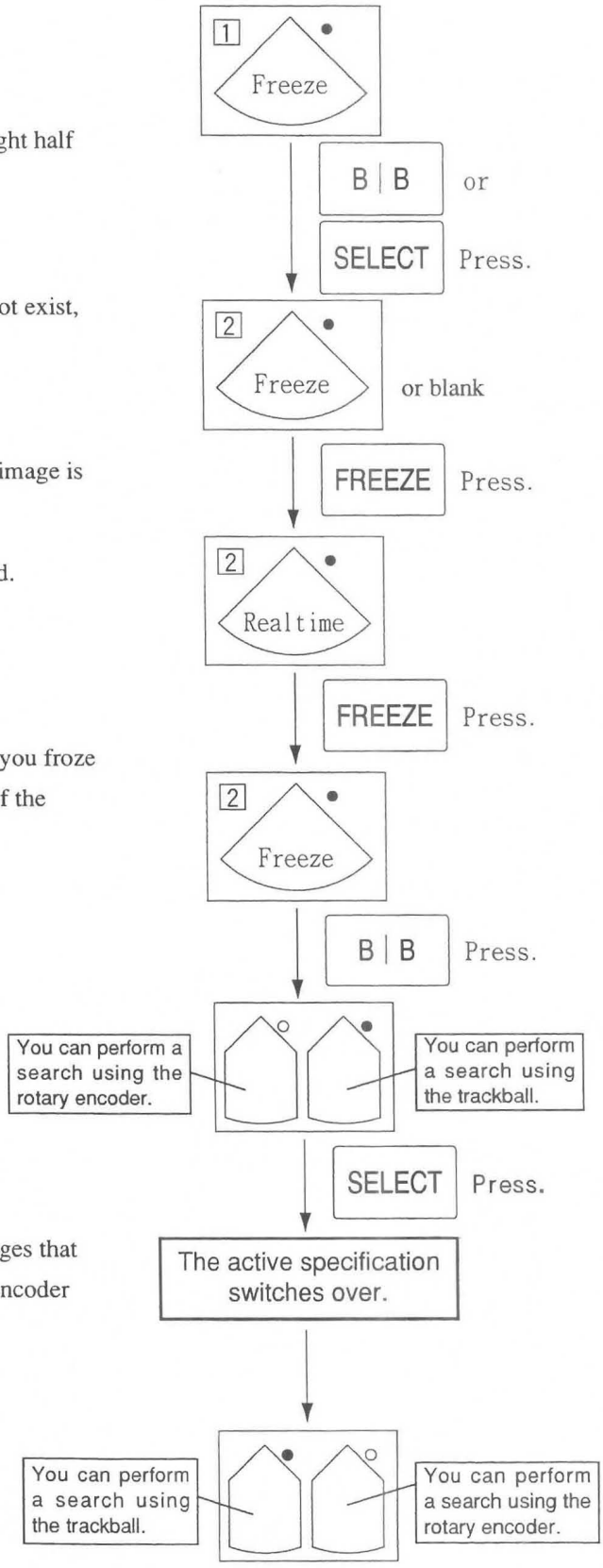
→ The search function is activated.

⑧ Search for an active image using the trackball.

→ Search for a non-active image using the rotary encoder.

⑨ Press the **SELECT** switch.

→ The active specification switches over, and the images that can be searched using the trackball and the rotary encoder also switch over.



<When 2B Mapping of the preset is On>

① Press the **FREEZE** switch.

→ The image freezes, and a search number is displayed.

[Remark]

If the image was frozen in the 2B mode, you cannot perform 2B Mapping.

② Press the **SEARCH** switch.

③ Search for the desired image using the trackball.

[Remark]

Depending upon the settings of the preset, the search function or scroll function is sometimes activated. For details, refer to 11-5 "Preset".

④ Press the **B | B** switch.

→ A frozen B mode image is displayed on the right side of the screen while the original B mode image remains held on the left side of the screen.

⑤ Using the trackball, search for the desired image.

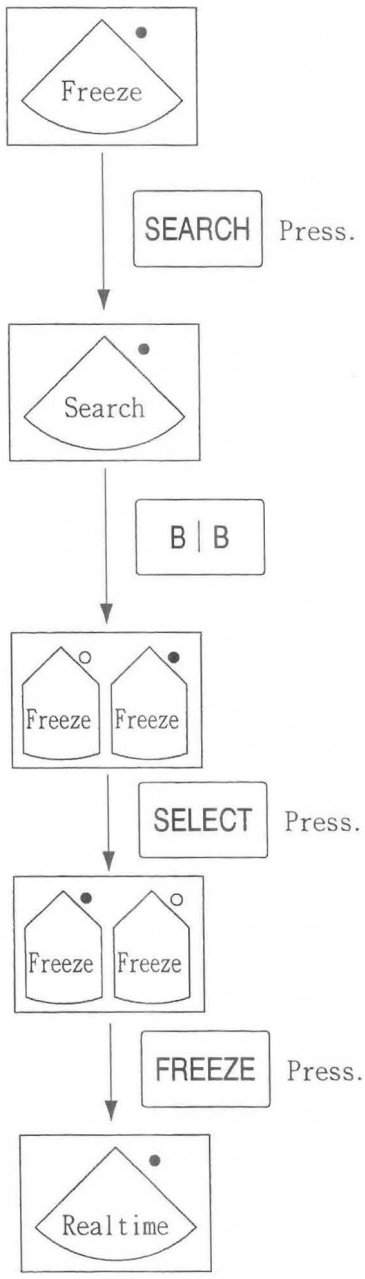
→ You can simultaneously display B mode images of different phases on the left and right halves of the screen.

⑥ Press the **SELECT** switch.

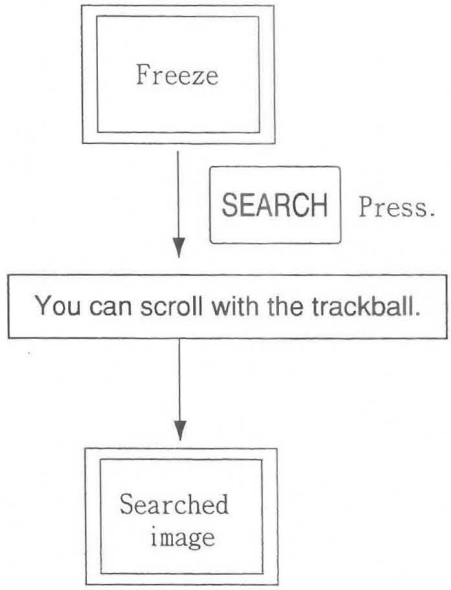
→ The active specification switches over, and the images that can be searched also switch over.

⑦ Press the **FREEZE** switch to freeze the image.

→ The 1B mode image switches over, and a realtime image appears.



When scrolling M or D mode images



① Press the **FREEZE** switch.

→ The image freezes.

② Press the **SEARCH** switch.

→ Images can be scrolled.

[Remark]

You can set the preset so that the system automatically goes into a status that enables it to scroll images without any need to press the **SEARCH** switch.

③ Using the trackball, scroll the necessary image range.

→ Rolling the trackball to the right enables the images to be scrolled in the forward direction, while rolling it to the left enables the images to be scrolled in the reverse direction.

When searching or scrolling B/M or B/D mode images

① Press the **FREEZE** switch.

→ The image freezes, and a search number appears on the B mode screen.

② Press the **SEARCH** switch.

→ Images can be searched or scrolled.

[Remark]

You can set the preset so that the system automatically goes into a status that enables it to scroll images without any need to press the **SEARCH** switch.

③ When the M mode image is active and the B mode image is non-active, scroll the M mode images with the trackball, and search the B mode images with the rotary encoder.

[Remark]

If you switch over the active image and non-active image using the **SELECT** switch, the trackball searches the B mode images and the rotary encoder scrolls the M mode images.

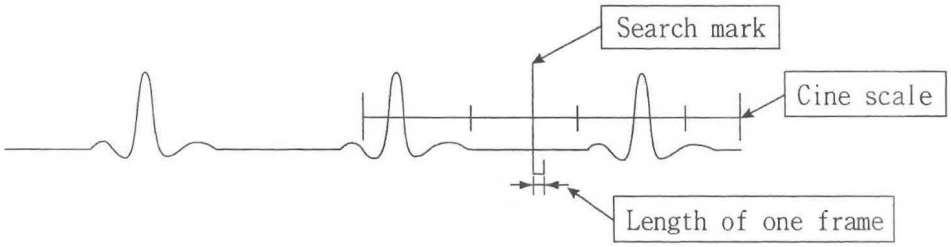
[Remark]

If you call one image using the request function, you can search or scroll the called image.

11-1-3. Cine scale and search mark

If you operate the cine memory when an ECG waveform is displayed, a cine scale and search mark appear on the ECG waveform. This makes it easier to obtain a grasp of the memory capacity, the size of one frame with respect to the memory capacity, the time phase on the ECG waveform of the currently displayed image, and so on.

Fig. Cine scale and search mark



Cine scale: Appears the instant that the image is frozen. The cine scale appears on the ECG waveform, enabling the operator to know the acquired time phase.

Search mark: The search mark moves when images are searched. This enables the operator to know the position in the memory of the searched and displayed image, and the time phase on the ECG waveform.

⚠ Note

Keep the following points in mind when using the cine scale.

- The number of frames stored in the memory corresponds to the total scale length, so the scale is not displayed as a constant length.
- If you store a large number of images of a slow frame rate in the system, the cine scale may sometimes fail to completely fit inside one screen.

11-1-4. Cine loop playback

This function continuously plays back images stores in the cine memory (loop playback). Loop playback can be performed in the 1B mode and 2B mode. However, in the 2B mode, loop playback takes place for one half of the screen at a time.

(1) Method of setting the loop playback range

Set a loop point at an arbitrary position. The example below is for the case where an ECG waveform is displayed.

[Remark]

You can automatically set a loop point at the R wave position of one heartbeat of the ECG using a preset. For details, refer to 11-5 "Preset". If you set the time phase for loop playback, the search mark on the cine scale of the ECG waveform is called the time phase setting mark.

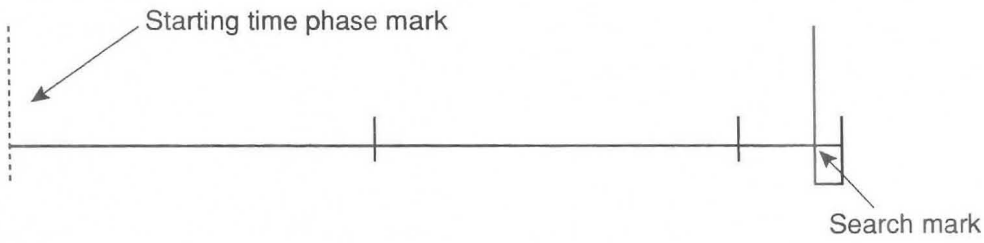
① Press the **FREEZE** switch.

→ The image freezes, and the images up to the point where you pressed the **FREEZE** switch are stored up to the capacity of the memory.

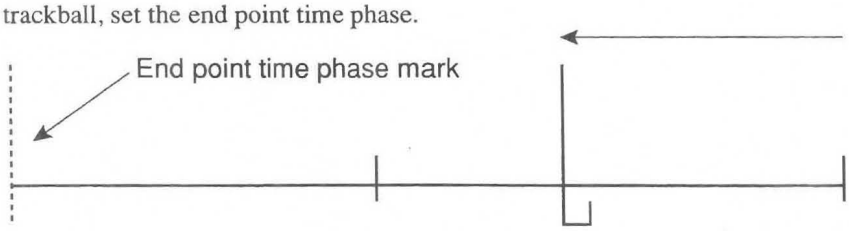
② Press the **SEARCH** switch, then press the **SET** switch.

→ A solid line time phase setting mark appears on the cine scale at the bottom of the image.

SEARCH + SET switches



Using the trackball, set the end point time phase.



③ Set the end point time phase.

→ Using the trackball, move the search mark to the position of the time phase corresponding to the end point.

④ Press the **MARK REF** switch.

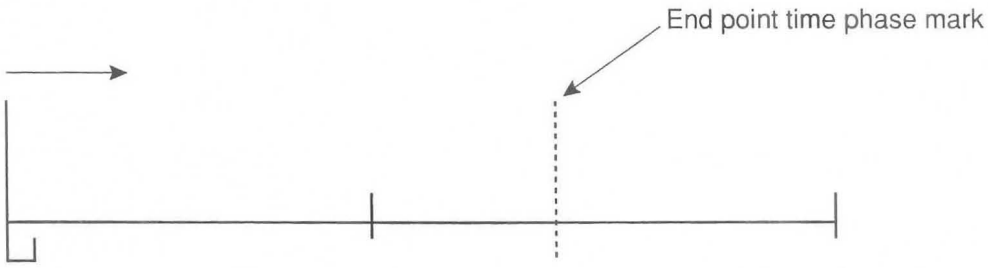
→ The loop playback end point is set, and the starting point time phase mark is replaced by the search mark.

⑤ Set the starting point.

→ Using the trackball, move the search mark to the position corresponding to the time phase of the starting point.

⑥ Press the **MARK REF** switch.

→ The starting point of loop playback is set.



[Remark]

Each time you press the **MARK REF** switch, the end point and starting point time phase setting marks are replaced by the search mark. To reset the end point or starting point, replace the time phase setting mark that you wish to reset with the search mark.

[Remark]

You cannot set the starting point to the right of the time phase of the end point. Also, you cannot set the end point to the left of the time phase.

⑦ Press the **SET** switch.

→ The time phase setting is terminated, and the starting and end point time phase setting marks disappear.

[Remark]

When you unfreeze the image, the time phases at the set starting and end points are canceled.

[Remark]

When an ECG waveform is not displayed, set the specified end point while observing a B mode image.

[Remark]

In the case of the 2B mode, you can set the time phase with respect to the active side image.

(2) Method of performing loop playback

① Press the **MENU** switch.

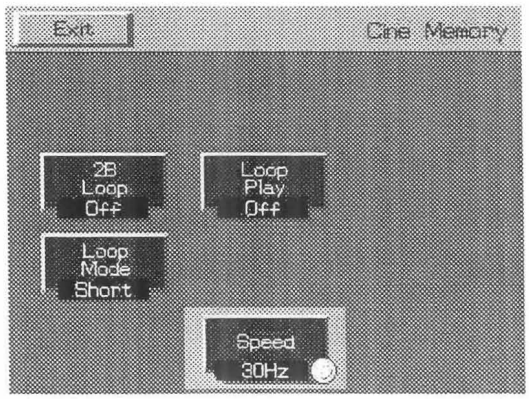
→ Select **Cine Menu** from the menu.

② Press **Start** on the menu.

→ Loop playback starts.

[Remark]

While loop playback is taking place, a search mark is not displayed on the cine scale.



③ Set the loop playback speed.

→ You can change the playback speed by turning the rotary encoder corresponding to **Speed** in the menu.

[Remark]

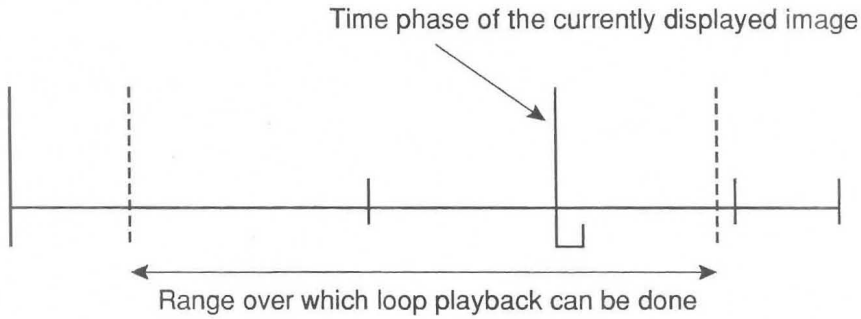
If you reduce the playback speed, playback takes place in slow motion.

④ Press **Stop** of the menu.

→ Loop playback is terminated. Also, a search mark appears at the time phase position of the displayed image.

[Remark]

The displayed search mark can be used as a normal cine memory search mark. To set the time phase once again, press the **SET** switch.



[Remark]

In the case of a 2B mode, you cannot play back both images simultaneously.

11-1-5. Store memory

The store memory function enables you to select the frozen image that you wish to store, then store it in the memory of the system, and play it back whenever necessary.

[Remark]

You can store images obtained using probes that use different scanning patterns.

⚠ Note

Keep the following points in mind when using the store memory function.

- The amount of image data that can be stored in the memory differs depending upon the probe used, and the various image display conditions such as the display mode and the display depth.
- The store memory uses part of the cine memory, so the capacity of the cine memory varies depending upon the amount of image data in the store memory.
- If you store a B mode image on which an ECG is superimposed, the ECG is reproduced when you play back the store memory.

The relationship between the capacity of the store memory and that of the cine memory in the B mode is shown below.

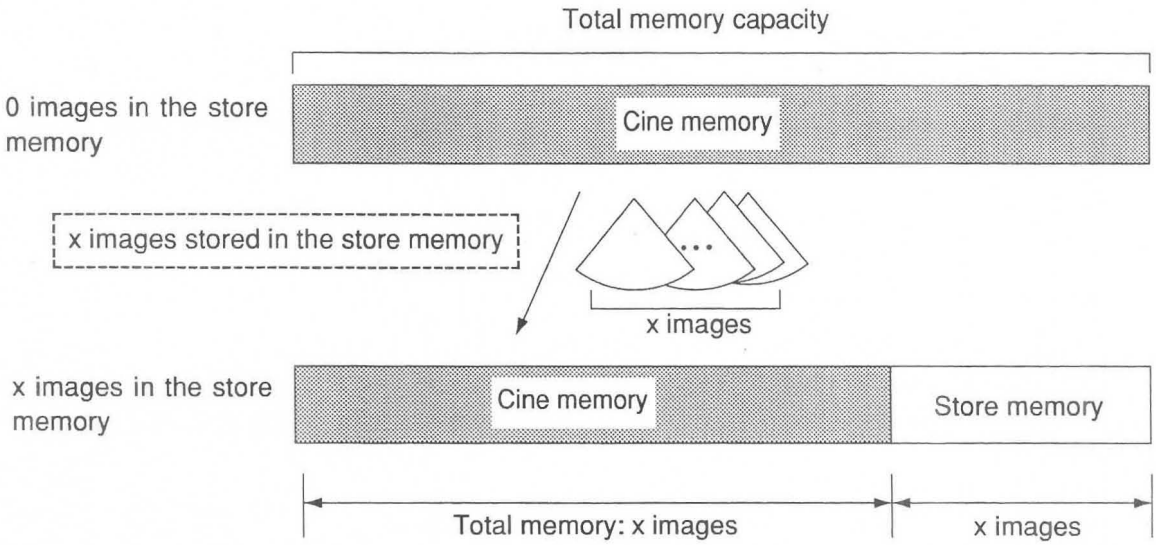
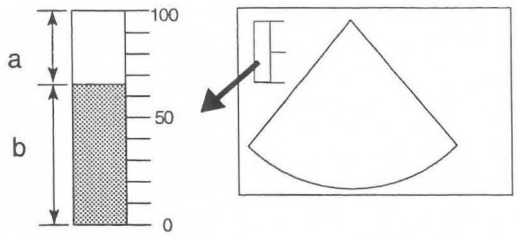


Fig. Memory assignment

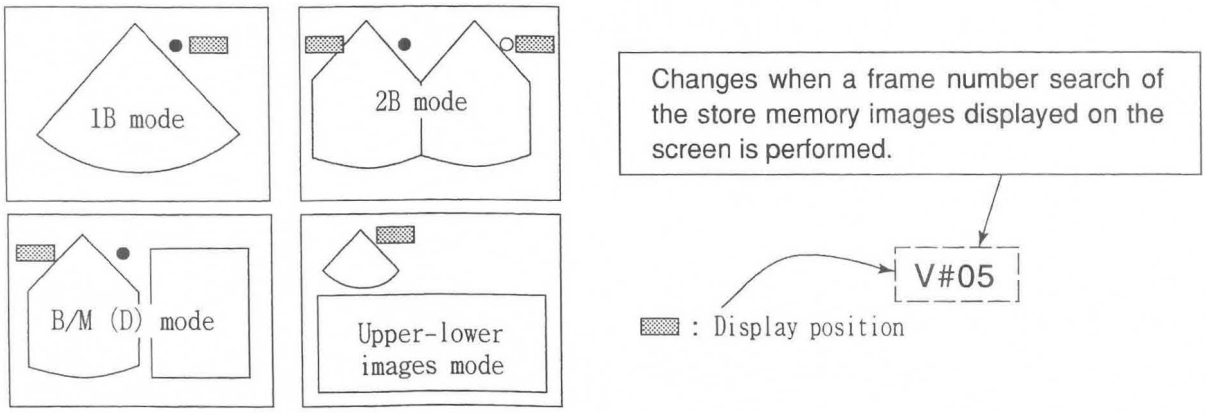
(1) Store memory remaining capacity display and frame number

When you press the **STORE** switch, the remaining capacity of the store memory is displayed for 5 seconds. the total settable memory capacity is displayed as 100%.



a: Memory area in which images are stored
b: Memory area in which images can be stored

Fig. Store memory remaining capacity display



(2) Basic operation

(Memory : Store)

①Press the **FREEZE** switch.

→Search for and display the images that you wish to store in the store memory.

②Press the **STORE** memory.

→The numbers are stored in the sequence in which the stored images are registered. The message "**Image stored in memory frame xx**" is displayed for 5 seconds at the bottom of the screen. Simultaneously, the store memory remaining capacity bar is displayed for 5 seconds.

(Review)

① Freeze the image, then press the **REVIEW** switch.

② The first image stored in the store memory is displayed.

→ Rolling the trackball to the right displays progressively newer image data, so select the image that you wish to display. Rolling the trackball to the left causes the previously displayed image to re-appear.

[Remark]

If you unfreeze the image, the image disappears, and the review of the store memory is terminated. (However, the system records the image at which review was terminated, so if you press the **REVIEW** switch once again the image that was displayed immediately before the review function was turned off re-appears.)

(Erase)

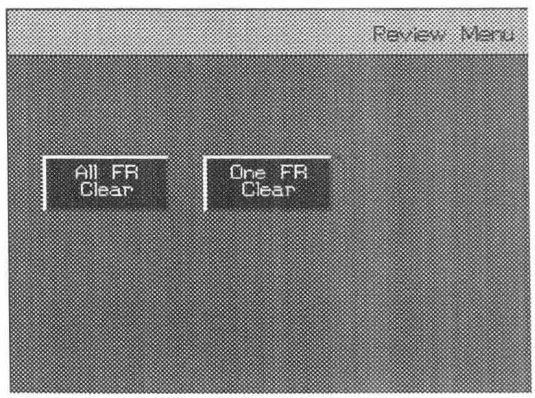
① Press the **REVIEW** switch, and display the image in the store memory that you wish to erase.

② Select All FR or One FR from the touch panel.

→ The following message appears on the screen.

```
Store memory clear
Data in the memory will be
deleted.
Press <SET> key to proceed.
<MARK REF.>:QUIT.
```

Fig. Message



[Remark]

If you press the **MARK REF** switch when the above message appears, or do not perform any operation for at least 10 seconds, the message will disappear but the data will not be deleted.

③ Press the **SET** switch.

→ If you selected All FR, all of the stored images are deleted, then the message "Data/Image deleted" appears, and the store function is terminated.

If you select One FR, the displayed image is deleted, then the message "Data/Image deleted" appears, and the image stored after the deleted image appears.

11-2. Recording Images

Install the system according to 3. "Installation Method".

11-2-1. Recording images to a printer

① Using the COMMON preset, assign a recorder name to the **PRINT** switch.

→ For details, refer to 11-5 "Preset".

② Freeze the image, and press the **PRINT** switch.

→ If 707/307(UP-2950MD/SSZ-307E) is assigned to the **PRINT** switch, you can record images to the SSZ-307(307E) in the black and white mode, or to the SSZ-707(UP-2950MD) in the color mode, using the same switch.

[Remark]

If the recorder set with the menu is different to the recorder actually connected, recording with not take place correctly.

[Remark]

While recording is taking place, the next recording operation is not accepted. If you press the **PRINT** switch when an image is not frozen, the following message is displayed.

Freeze, try again.

11-2-2. Recording and playback using a VCR

(1) Recording

① Using the COMMON preset, assign VCR REC to one of switches **REC 1** to 3.

→ For details, refer to 11-5 "Preset".

② Press the **REC** switch on the operation panel.

→ Recording starts. While recording is taking place, a mark that indicates the tape travel appears.

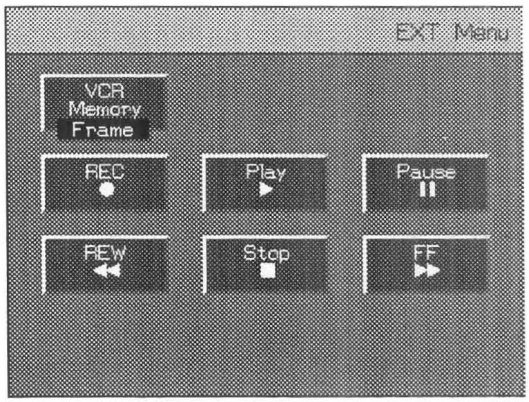
[Remark]

You can remotely control the SONY SVO-9500MD4 (9500MDP4)from the panel.

③ Press the **REC/PAUSE** switch.

→ Recording is terminated.

(2) Playback



① Press the **EXT** switch on the panel.

→ The monitor switches over to the external signal mode.

② Press the **PLAY/PAUSE** switch on the touch panel.

→ The VCR images are displayed on the monitor.

[Remark]

You can fast-forward the VCR images by pressing the **FF** switch on the sub-operation panel, or rewind the VCR images by pressing the **REW** switch.

You can search for a VCR image by pressing the **PLAY/PAUSE** switch simultaneously with the **FF** switch or the **REW** switch.

③ Press the **FREEZE** switch.

→ The image that was displayed when you pressed the **FREEZE** switch is stored in the memory, and also remains displayed on the screen. The VCR stops.

[Remark]

You can print or measure the displayed image. To print it, press the **PRINT** switch.

[Remark]

You can change over the method of storing images in the memory by switching over VCR MEMORY.

Frame: Applicable to the case of a frozen image.

Field: Applicable to the case of a moving image.

④ Press the **FREEZE** switch.

→ The image is unfrozen, and the image from the VCR appears on the screen.

(Switch the monitor to the SSD-5000 side images.)

① Press the **EXT** switch on the panel.

→ The image display goes into the INT status.

11-3. Physiological Signal

Install the system according to 3. "Installation Method".

⚠ Caution
Do not use a defibrillator when using a physiological signal unit because this may cause the unit to break down.

11-3-1. Method of displaying a physiological signal

① Attach the ECG electrodes to the patient.

→ This system uses the No.II ECG lead method, so connect the ECG cords as indicated below.

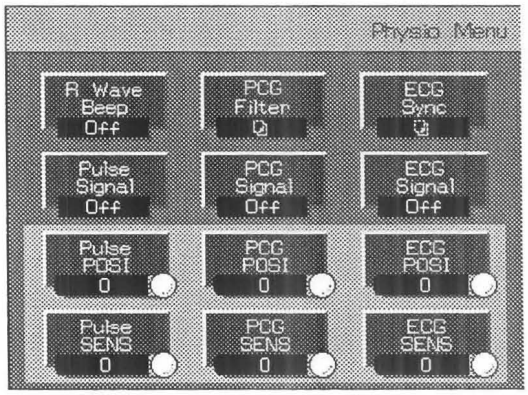
ECG lead cord	Red (R)	Green (F)	Black (RF)
Connection point	Right hand	Left leg	Right leg

② Cancel the freeze condition of the system, then press the **PHYSIO** switch on the panel.

→ You can display an ECG waveform, PCG waveform or a PULSE waveform on an image in all modes.

③ Select **ECG Signal**.

→ An ECG waveform appears on the image.



[Remark]

You can display physiological signals using **PCG Signal** or **PULSE Signal**, in addition to ECG. You can also switch the display On or Off independently for the B mode, and sweep modes such as the M or D mode.

④ Suitably adjust the sensitivity and display position using **ECG SENS** and **ECG POSI**.

→ You can adjust the functions corresponding to the switches that are glowing orange using the rotary encoder.

[Remark]

If the M mode image and a physiological signal overlap each other, making them difficult to see, you can erase part of the M mode image by using **Echo Erase** on the menu. For details, refer to 11-4 "Menu".

[Remark]

If the heart rate exceeds the display range, it is displayed in the form HR * * *. Also, if the R wave is not detected for at least 5 seconds, an assist message appears.

DETECTION ERROR

R-wave of ECG is not detected

Check to see whether or not the ECG electrodes are correctly attached to the patient.

[Remark]

When using ECG, the setting of the filter differs depending whether the frequency of the supply mains is 50 Hz or 60 Hz. Check the filter setting by observing the hum filter switch on the physiological signal connector panel on the side panel.

When using PCG, you can set **PCG Filter** on the touch panel to one of three values.

⑥ Press the **PHYSIO** switch.

→ The physiological signal setting function is terminated.

11-3-2. ECG sync display

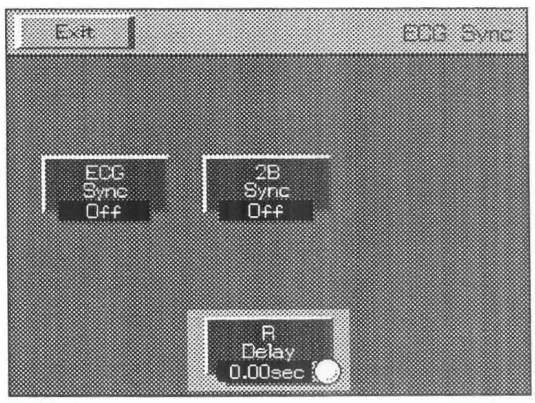
(What's ECG Sync display)

ECG sync display (SYNC) is a function that displays only the image corresponding to the position of the ECG sync mark displayed on the ECG waveform. You can acquire an image in any time phase while observing the time phase of the ECG waveform.

① Display an ECG waveform, then press **ECG Sync** on the Physio menu.

② Select **ECG Sync** or **2B Sync** on the touch panel.

→ If you press **ECG Sync**, the SYNC mark appears on the ECG waveform in the B mode. If you press **2B Sync**, the mode changes to the 2B mode, and the sync display starts. The DELAY time from the R wave appears on the screen. The DELAY time can be set in 10-ms steps.



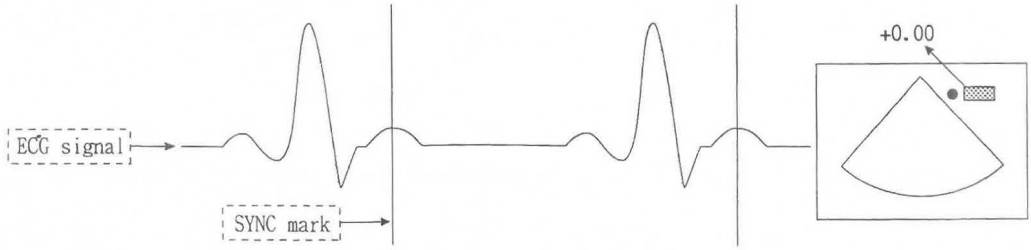


Fig. ECG sync display

[Remark]

In the case of the 2B Sync mode, the left side B mode image is in realtime, and the right side image is a sync display.

③ Adjust the sync display time.

→ Perform adjustment using the rotary encoder corresponding to R-Delay on the touch panel. Turning the rotary encoder to the right causes the sync time to be delayed with respect to the R wave, while turning it to the left causes the sync time to approach the R wave.

[Remark]

- In the case of ECG Sync in the 2B mode, you can set the sync time only on the active image. The other image is frozen. To switch over the active image, use the **SELECT** switch.
- In the B/M mode, the M mode image is not displayed while the B mode image is being refreshed.

④ Select **ECG Sync** or **2B Sync** once again.

→ The ECG sync display function is terminated.

[Remark]

If the R wave of the ECG is not detected for at least 5 seconds, the following assist message flashes at bottom left of the screen.

DETECTION ERROR
R-wave of ECG is not detected

Check to see whether or not the ECG electrodes are correctly attached to the patient.

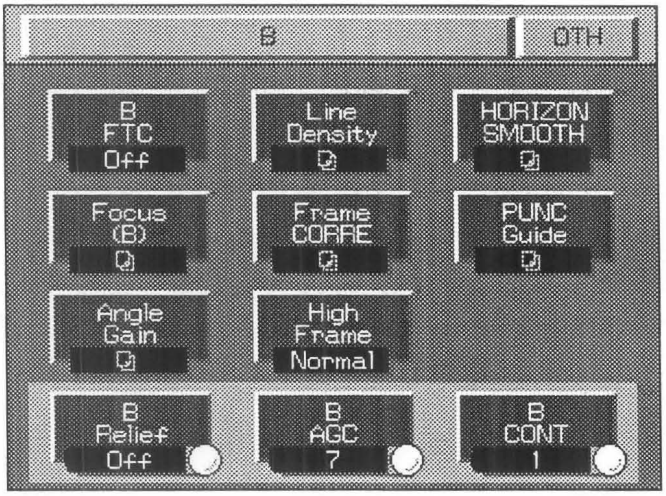
[Remark]

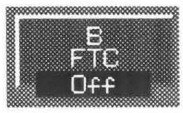
The cine memory contains only sync images. Consequently, even when a search is performed, only images in the same phase are displayed. Also, in this case, the search mark on the ECG does not indicate the correct position.

11-4. Menu

Menu is a function which displays function conditions and image conditions that cannot be manipulated directly from the operation manual, in a menu format on the monitor, enabling the necessary conditions to be set.

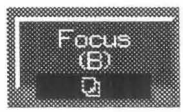
When you press the **MENU** switch, the following menu appears.





This icon indicates that there are two kinds of function settings.

When this icon is glowing orange, you can perform adjustment using the rotary encoder.



This icon is used to change over the menu and carry out setting work using a sub-menu.

The menu is designed to display the optimum functions for each mode with maximum priority. The table below shows the correspondence between the mode and the menu.

Mode switch	Priority menu screen	Other menu
B	B	B, OTHER
B/B	B	B, OTHER
B/M	M	M, B, OTHER
M	M	M, OTHER
M/D	D	D, M, OTHER
D	D	D, OTHER
B/D	D	D, B, OTHER
B+Flow	Flow	Flow, B, OTHER
BF/MF	Flow	Flow, M, B, OTHER
MF	Flow	Flow, M, OTHER
MF/D	D	D, Flow, M, OTHER
BF/D	D	D, Flow, B, OTHER
BF/MF/D	D	D, Flow, M, B, OTHER
B+Power	Power	Power, B, OTHER
BP/MP	Power	Power, M, B, OTHER
MP	Power	Power, M, OTHER
MP/D	D	D, Power, M, OTHER
BP/D	D	D, Power, B, OTHER
BP/MP/D	D	D, Power, M, B, OTHER
FREEZE	Freeze	Freeze, OTHER
EXT	EXT	EXT
REVIEW	Review	Review
PRESET	Preset	Preset
PHYSIO	Physio	Physio
PROBE	Probe	Probe
COMMENT	Annotation	Annotation
BODY MARK	Body Mark	Body Mark

[Remark]

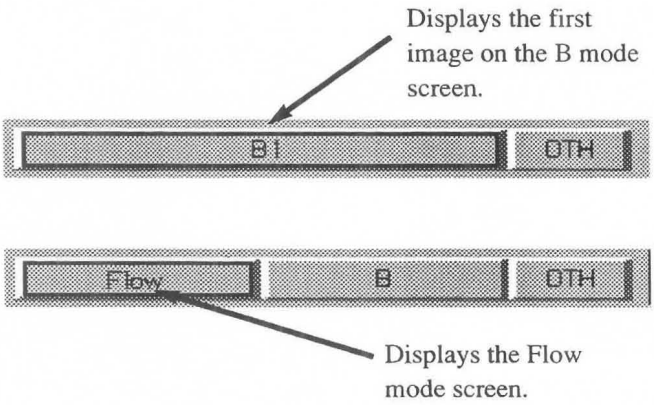
If a function switch on the touch panel that is used with a rotary encoder is blue, select that function by pressing the switch so that it glows orange, then perform adjustment.

[Remark]

You can change the display positions of the items in the menu, or prevent them from being displayed, using a preset. You can also assign certain function to switches on the panel.

For details, refer to 11-5 "Preset".

<Menu bar>



With the exception of the Other menu, the displayed menu screen differs depending upon the mode.
The upper part of the figure at left indicates that a B mode image is displayed in realtime, and the lower part indicates that a B+Flow mode image is displayed in realtime. As shown in the upper part of the figure, if the menu has a number after the mode, it means that the B mode menu has two screens. If you wish to switch over to the second screen, press the B1 part of the menu bar once again.

[Remark]

You can display the menu as two screens by means of a preset. For details, refer to 11-5 "Preset".

11-4-1. Menu contents

The functions that can be used for each mode are displayed on the touch panel. You can register the initial values of almost all of these functions using a preset. You can also prevent functions that are not frequently used from being displayed, or move the menu position to a location where it can be used easily.

The tables below show all of the functions built into the system

B mode menu

Display name	Format name	Main function	Classification
Angle Gain	Angle Gain	Sensitivity correction of electronic sector probe.	Sub-menu
B AGC	B AGC	Adjusts the contour enhancement in 16 steps.	Rotary encorder
B CONT	B Contrast	Adjusts the contrast in 16 steps.	Rotary encorder
B FTC	B FTC	Adjusts the contour enhancement in 2 steps.	Alternative choice function
B Relief	B Relief	Adjusts the contour enhancement in 4 steps.	Rotary encorder
Beam Process	Beam Process	Receives several beams.	Alternative choice function
Focus (B)	Focus (B)	Adjusts the focus point in the B mode.	Sub-menu
Frame CORRE	Frame Correlation	Adjusts the correlation between frames in 16 steps.	Sub-menu
Frame Correlation Type	Frame Correlation Type	Selects the frame correlation operation mode.	Sub-menu
HORIZON SMOOTH	Horizontal Smoothing	Adjusts the interpolation in the horizontal direction in 3 steps.	Sub-menu
High Frame	High Frame Rate	Applies a limit to the frame rate.	Alternative choice function
Image DIRECT	Image Direction	Reverses the scanning direction.	Alternative choice function
Image Effect	Image Effect	Enhances the smoothness of the echo.	Alternative choice function
Image ROTAT	Image Rotation	Rotates an image 90° .	Rotary encorder
Line Density	Line Density	Adjusts the number of scanning lines in the B mode in 3 steps.	Sub-menu
PUNC Guide	Puncture Guide Line	Displays puncture guide lines.	Sub-menu
Tissue HE	Tissue HarmonicEcho	Performs image processing at the second harmonic wave reflected from the patient's tissue.	Alternative choice function
CONTRAS HE	Contrast HarmonicEcho	Performs image processing at the second harmonic wave reflected from the patient's tissue.	Alternative choice function
INTERM Mode	Intermittent Trigger Mode	Select the intermittent mode for transmission.	Alternative choice function
INTERM Setup	Intermittent Setup	Sets the timing of transmission.	Sub-menu
Steered Beam BW	Steered Beam BW	Steers the image in the B mode by 20° max.	Alternative choice function
B Image Size	B Image Size	Selects the image size in the B mode.	Alternative choice function

M mode menu

Display name	Format name	Main function	Classification
Echo Erase	Echo Erase	Erases the depth direction of an M mode image in 20 steps.	Rotary encoder
Focus (M)	Focus (M)	Adjusts the focus point in the M mode.	Sub-menu
M AGC	M AGC	Adjusts the contour enhancement in 16 steps.	Rotary encoder
M CONT	M Contrast	Adjusts the contrast in 16 steps.	Rotary encoder
M FTC	M FTC	Adjusts the contour enhancement in 2 steps.	Alternative choice function
M Relief	M Relief	Adjusts the contour enhancement in 4 steps.	Rotary encoder
M Sweep Speed	M Sweep Speed	Adjusts the M mode sweep speed in 7 steps.	Rotary encoder
M-Mode SMOOTH	M-Mode Smoothing	Performs M mode correlation.	Alternative choice function

D mode menu

Display name	Format name	Main function	Classification
D Sweep Speed	D Sweep Speed	Adjusts the D mode sweep speed in 7 steps.	Rotary encoder
DOP COMP	Doppler Compression	Adjusts the brightness characteristics in 8 steps.	Rotary encoder
DOP CONT	Doppler Contrast	Adjusts the contrast in 16 steps.	Rotary encoder
DOP Image Select	Doppler Image Select	Adjusts the image quality of the spectrum in 3 steps.	Sub-menu
DOP Filter	Doppler Filter	Adjusts the filter in the Auto mode in 12 steps.	Rotary encoder
DOP RESO	Doppler Resolution	Selects the spectrum resolution.	Alternative choice function
DOP SMOOTH	Doppler Smoothing	Adjusts the spectrum interpolation in 3 steps.	Sub-menu
Filter Control	Filter Control	Sets the filter to Auto.	Alternative choice function
Focus (D)	Focus (D)	Adjust the focus in the D mode.	Sub-menu
Image POLAR	Image Polarity	Reverses the brightness in the D mode.	Alternative choice function
M/D Mode	M/D Mode	Selects the M/D mode.	Alternative choice function
Sample Volume	Sample Volume	Adjusts the sample point in 0.5-mm steps.	Rotary encoder
SPECT Invert	Spectrum Invert	Reverses the polarity of the spectrum.	Alternative choice function
Steered Beam	Steered Beam	Steers the cursor by ±30° max.	Rotary encoder
SPECT SMOOTH	Spectrum Smoothing	Smoothes the pixel data of the spectrum.	Alternative choice function

Flow/Power mode menu

Display name	Format name	Main function	Classification
Anti Wall Motion	Anti Wall Motion	Smoothens the color pixels in order to reduce wall motion noise.	Sub-menu
B Refresh	B Refresh	B interrupt time during BF/MF simultaneous operation.	Rotary encoder
C. Image Select	Color Image Select	Adjusts the color sensitivity and resolution in 3 steps.	Sub-menu
C. Frame CORRE	Color Frame Correlation	Adjusts the correlation between frames in 8 steps.	Sub-menu
Capture Mode	Capture Mode	Holds a color pixel for a fixed period.	Alternative choice function
Capture Time	Capture Time	Adjusts the fixed holding period in 4 steps.	Sub-menu
Color Average	Color Average	Adjusts the color sensitivity and frame rate in 3 steps.	Sub-menu
Color BLS	Color Baseline Shift	Adjusts the zero level in the Flow mode.	Rotary encoder
Color Coding	Color Coding	Changes over the color according to the diagnostic field.	Sub-menu
Color POLAR	Color Polarity	Reverses the polarity in the Flow mode.	Alternative choice function
Color Reject	Color Reject	Rejects low brightness parts of a color display.	Rotary encoder
Color SMOOTH	Color Smoothing	Adjusts the color pixel interpolation in 7 steps.	Rotary encoder
DDD	D.D.D.(Compare)	Displays the B mode and Flow mode simultaneously.	Alternative choice function
Display PRIORI	Display Priority	Sets the B mode and color display sequence.	Sub-menu
F.R. ACCEL	Framerate Accelerator	Adjusts the smoothness between frames.	Alternative choice function
Flow Area	Flow Area	Adjusts the with of the flow area in 4 steps.	Sub-menu
Flow Filter	Flow Filter	Adjusts the MTI filter in 6 steps.	Rotary encoder
Focus (Flow)	Focus (Flow)	Adjusts the Flow/Power focus point.	Sub-menu
FR Rate Up	Frame Rate Up	Adjusts the frame rate over ±4 steps.	Rotary encoder
Line Density	Line Density	Adjusts the number of color scanning lines in 3 steps.	Sub-menu
M Sweep Speed	M Sweep Speed	Adjusts the sweep speed in the MF mode in 7 steps.	Rotary encoder
Motion Reject	Motion Reject	Adjusts the clutter signal rejection in 4 steps.	Sub-menu
Pixel Smooth	Pixel Smooth	Smoothens the color pixels in order to mark the color flow easy to see.	Sub-menu
POLAR Control	Polarity Control	When the Steered Beam function is pressed to slant the ultrasound beam.	Alternative choice function
Steered Beam	Steered Beam	Deflects the flow area by up to ±30° .	Rotary encoder
VAR Enhance	Var Enhance	The dispersion pixels are displayed in enhanced form.	Alternative choice function
TDI PF PreSTC	TDI PF PreSTC	Sets the PreSTC at TDI Power.	Sub-menu
C.Line CORRE	Color Line Correlation	Smoothes the color pixels in order to make the color flow easy to see.	Alternative choice function

Freeze menu

Display name	Format name	Main function	Classification
Cine Memory	Cine Memory	Sets the playback of images from the cine memory.	Sub-menu
Store Media	Store Media	Sets the location where an image is to be stored.	Sub-menu
Auto-T Control	Auto Trace Control	Sets the auto trace function.	Sub-menu
Flow Profile	Flow Profile	Performs the Flow Profile measurement.	Sub-menu
B Flow Hist	B Flow Histogram	Performs the B Flow Hist measurement.	Sub-menu
M Flow Profile	M Flow Profile	Performs the M Flow Profile measurement.	Sub-menu
M TDI Wall T	M TDI Wall Thickness	Performs the M TDI Wall T measurement.	Sub-menu
BF TDI Profile	B Flow TDI Profile	Performs the BF TDI Profile measurement.	Sub-menu
M Flow Trace	M Flow Trace	Performs the M Flow Trace measurement.	Sub-menu
A-SMA MEAS-H	A-SMA MEAS-Hist	Performs the A-SMA histogram measurement.	Alternative choice function
A-SMA MEAS-L	A-SMA MEAS-L.Graph	Performs the A-SMA line graph measurement.	Alternative choice function
SUBTRAC	Subtraction	Sets the subtraction function.	Sub-menu

Other menu

Display name	Format name	Main function	Classification
Area Lock	Area Lock	The flow area moves about the sample gate.	Alternative choice function
Chart Speed	Chart Speed	Adjusts the recording speed of the SCR recorder.	Sub-menu
DISPLAY Color	Displayed Color	Adjusts the color of an image in 4 steps.	Sub-menu
Display Data	Display Data	Adjusts various system data, such as time.	Sub-menu
DMS Coding	DMS Coding	Reads color data from the DMS.	Alternative choice function
ID Input	ID Input	Selects 1 of 4 kinds of patient data.	Sub-menu
MAINTE	Maintenance	(Cannot be used for servicing.)	Sub-menu
Post Process	Post Process	Adjusts the brightness characteristics.	Sub-menu
SCR Mode	SCR Mode	Sets the mode of the SCR recorder.	Alternative choice function
Thermal Index	Thermal Index	Switches over the power index.	Sub-menu
VCR Control	VCR Control	Remotely controls the VCR.	Sub-menu
View Gamma	View Gamma	Adjusts the brightness characteristics for the abdominal region or the cardiac region.	Sub-menu
Zoom Lock	Zoom Lock	Zooms the sample gate to the center.	Alternative choice function
TDI Flow	TDI Flow	Sets the TDI Flow mode.	Alternative choice function
TDI Power	TDI Power	Sets the TDI Power mode.	Alternative choice function
TDI PW	TDI PW	Sets the TDI PW mode.	Alternative choice function
Element Select	Element Select	Switches between the oscillators.	Alternative choice function
B Image Size	B Image Size	Sets the image size in the B mode.	Alternative choice function

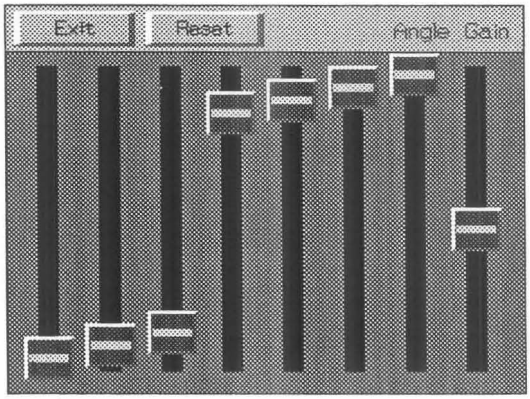
B mode menu

Angle Gain

This function corrects the gain at an arbitrary position in the scanning direction.

[Remark]

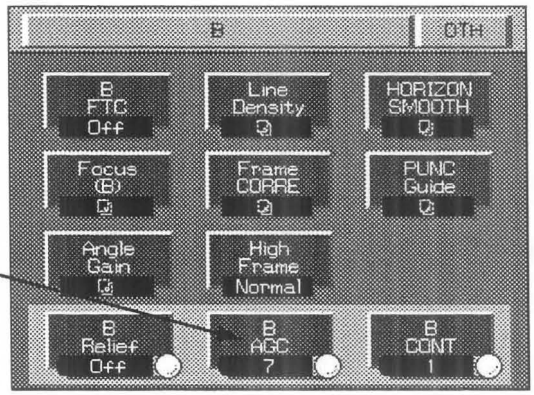
This function operates only when an electronic sector probe is used. The setting is held until it is power off.



B AGC

This function separately displays neighboring high intensity echoes in a B mode image.

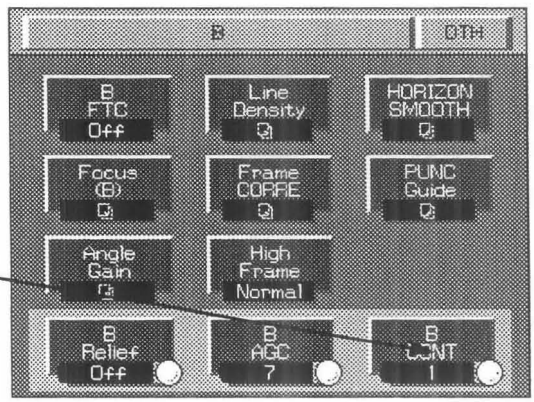
Adjust using the rotary encoder. The AGC can be changed in 16 steps.



B CONT

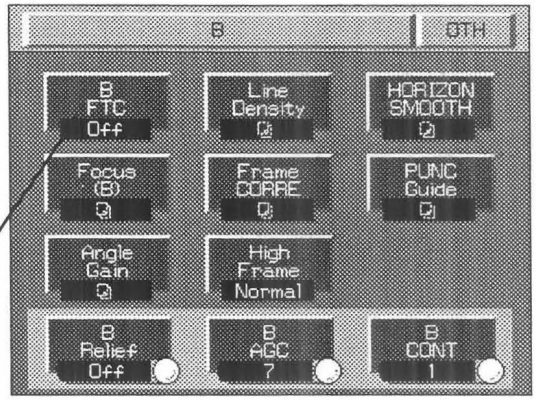
This function adjusts the contrast of a B mode image.

Adjust using the rotary encoder. The contrast can be changed in 16 steps.



B FTC

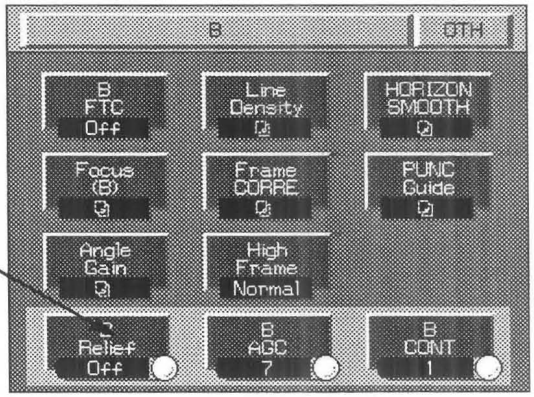
This function enhances the contours of a B mode image.



Set using the touch panel. B FTC can be set to either On or Off.

B Relief

This function enhances the contours of a B mode image.

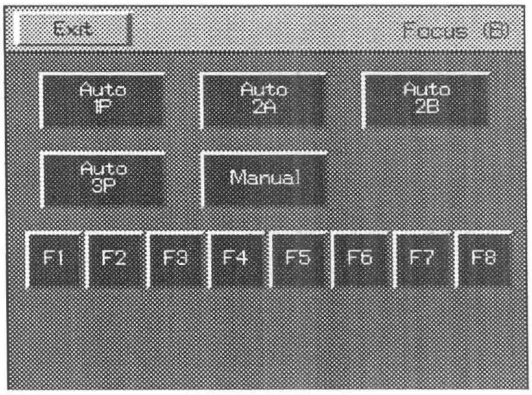


Adjust using the rotary encoder. B Relief can be changed in 4 steps.

Focus (B)

This function focuses the ultrasound beam, resulting in a clearer image. It enables you to change the focus points used when the ultrasound beam is emitted.

A B mode image has 8 focus points when an electronic sector probe is used, and 16 focus points when another kind of probe is used. You can set the focus at up to 4 of these points in succession.



Auto 1P	: Sets 1 focus point alone near the center of the image.
Auto 2P	: Sets 2 average focus points for the entire image.
Auto 2P (α)	: Sets 1 fixed point at the top of the image and 1 movable point at the center of the image.
Auto 3P	: Sets the focus at 3 points on the image.
Manual Focus	: You can set arbitrary focus points, however, the focus points are not automatically corrected if they move outside the display range.

[Remark]

You cannot turn OFF all of the focus points. One focus point always remains set.

In the case of "Auto **", if the display depth decreases and the focus points are set at positions where they are likely to move outside the display range, the set focus points are automatically displayed with reduced clearance between them so that they remain within the display range. Conversely, if the display depth increases, the clearance between the focus points automatically returns to the original clearance.

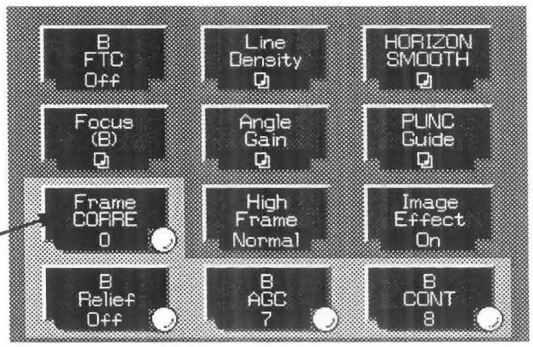
[Remark]
The system is set in such a way that if there are at least 2 focus points, the width of the focus beam is automatically reduced when the clearance between 2 points decreases.
If you wish to reduce the clearance between focus points arbitrarily, adjust the clearance using the rotary encoder alongside the trackball when the **FOCUS** switch is glowing orange. If the clearance increases, the beam pattern is automatically restored to the original pattern.

> **⚠ Note**
>
> If you set a large number of focus points, you will obtain a high resolution image, however the frame rate will fall and the acoustic power will change.
> Select the optimum setting for the region to be examined while observing the acoustic power index.

Frame CORRE

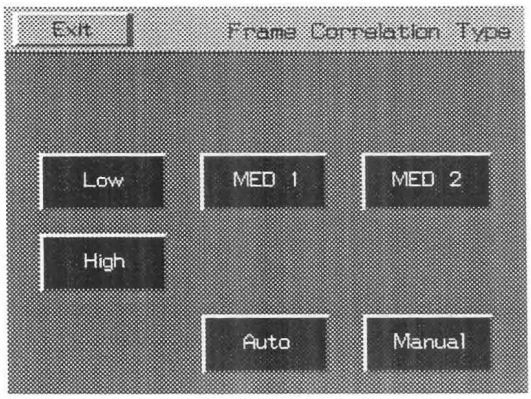
This function correlates adjacent frames to enable details to be displayed clearly.

Adjust using the rotary encoder. Frame CORRE can be changed in 16 steps.



Frame Correlation Type

This function is used to select the operation mode of the frame correlation function.

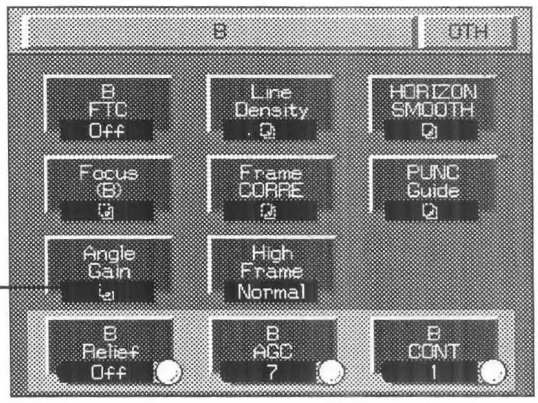


Low : Sets a low degree of correlation between adjacent frames.
MED1 : Sets a slightly higher degree of correlation than Low between adjacent frames.
MED2 : Sets a slightly lower degree of correlation than High between adjacent frames.
High : Sets a high degree of correlation between adjacent frames.
Auto : Sets a degree of correlation that corresponds to the frame rate.
Manual : Used to set the number of frames for frame correlation to a fixed value.

High Frame

In this system, a limit is automatically applied to the frame rate to prevent multiple echoes when the diagnostic range becomes shallow. The High Frame function removes this limit. It is particularly effective for performing diagnosis of the circulatory system.

Set using the touch panel. High Frame can be set to either Normal or High.



> **⚠ Note**
>
> When the frame rate rises, the power index also rises.
> Select the optimum setting for the region to be examined while observing the acoustic power index.

HORIZON SMOOTH

Horizontal Smoothing is the application of correlation between the lines of an ultrasound beam. When correlation is applied, the images are smoothed in the horizontal direction.

Off : Correlation is not applied.
Low : A low degree of inter-line correlation is set.
High : A high degree of inter-line correlation is set.

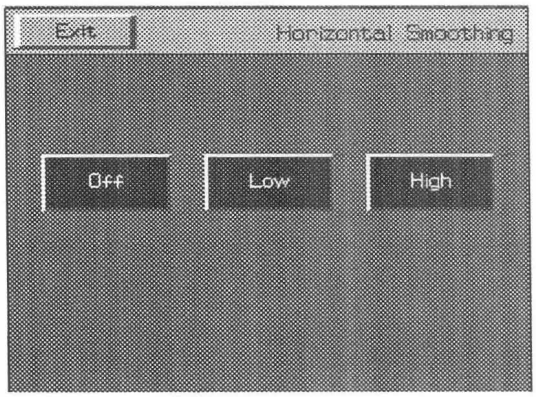


Image DIRECT

This function reverses a B mode image in the left-right direction. When an image is reversed, the marks (direction mark, cursor, etc.) that belong to the image are also reversed.

Set using the touch panel. Image DIRECT can be set to either → or ←.

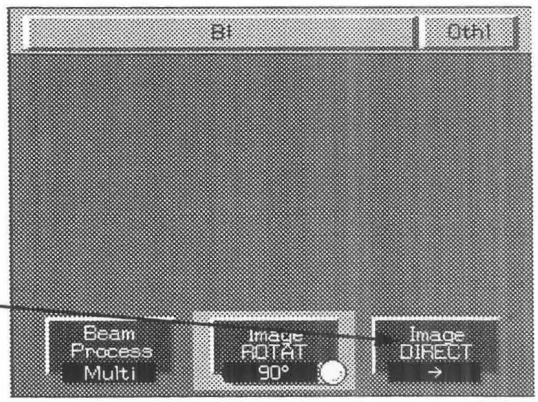
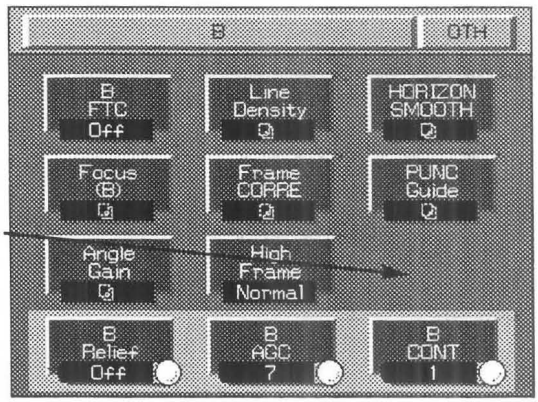


Image Effect

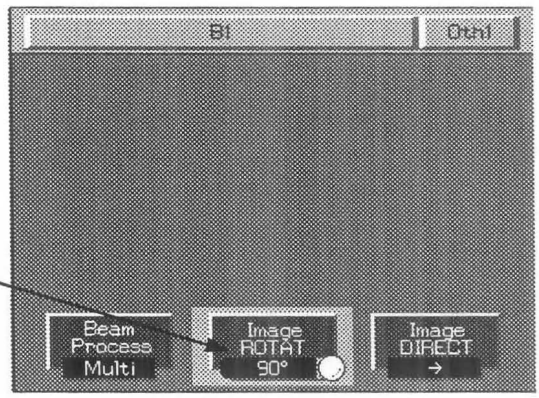
This function enhances or smooths the edges of echoes.



Set using the touch panel. Image Effect can be set to either On or Off.

Image ROTAT

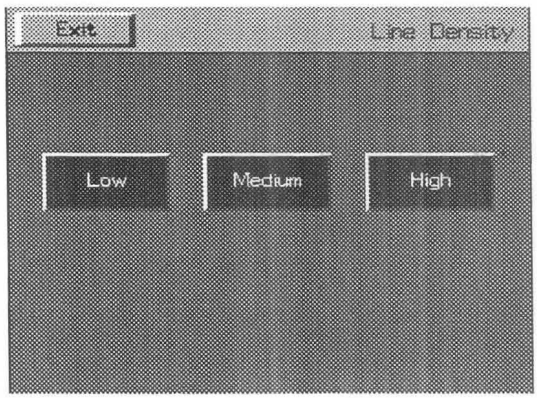
This function rotates a B mode image 90°. When an image is rotated, the marks (direction mark, cursor, etc.) that belong to the image are also rotated.



Adjust using the rotary encoder. Image ROTAT can be changed 0°, 90°, 180°, or 270°.

Line Density

If the line density is high, the image has good resolution. Conversely, if the line density is low, the frame rate is improved.



Low : Sets the line density to a low value.
Medium : Sets the line density to medium value.
High : Sets the line density to a high value.

⚠ Note

If the frame rate rises, the power index also rises.
Select the optimum setting for the region to be examined while observing the acoustic power index.

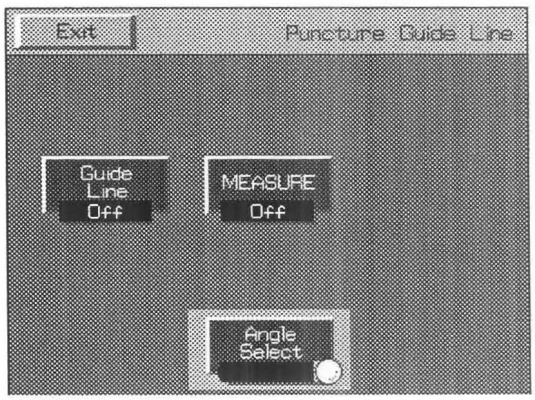
PUNCTURE

This function displays puncture guide lines on an image to enable you to perform a puncture while observing a B mode image.

The puncture guide lines are displayed as dots. The clearance between these dots is either 0.5 cm or 1.0 cm.

In addition, the clearance of 0.5 cm or 1.0 cm changes according to the change in the display depth or the zoom magnification.

If the display direction of the image is reversed, the puncture guide lines are also reversed.



MEASURE OFF : The depth is not displayed.
MEASURE ON : The depth to the target can be measured and displayed using the trackball.
ANGLE SELECT : If there are several puncture guide lines, select the puncture guide line to be displayed.

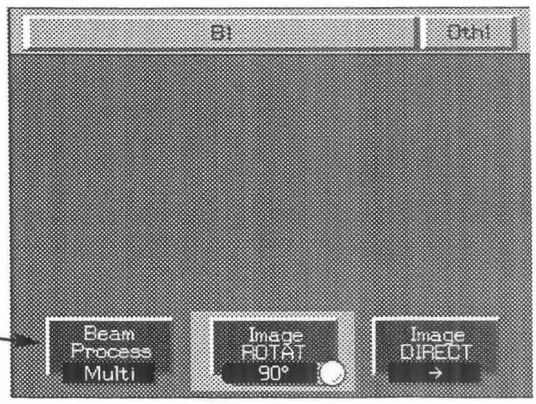
[Remark]
The PUNCTURE function operates regardless of whether freeze is ON or OFF.

[Remark]
If the trackball is used for another function (focus, etc.) when the depth is displayed, the puncture guide lines are not erased. The positions of the depth display arrows remain unchanged as well. (This excludes the case where the mode is changed.)
The depth display is held until you press **PUNCTURE** from the touch panel once again and select **MEASURE OFF**.

[Remark]
The depth display number is a rough guide. Before carrying out a puncture, check the error between this number and the distance to the needle tip using a water tank, for example.

Beam Process

This function creates several received beams per transmission in order to improve the frame rate.



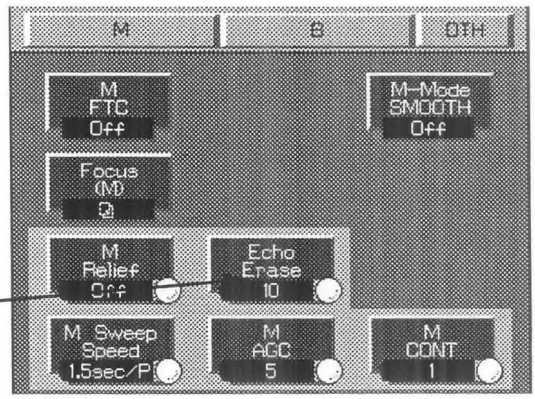
Set using the touch panel. Beam Process can be set to either Multi or Single.

M Mode Menu

Echo Erase

Sometimes a physiological signal is difficult to see because it occupies the same area as an M mode image. The Echo Erase function is used in such a case to erase the M mode image from the bottom until the physiological signal becomes readily visible.

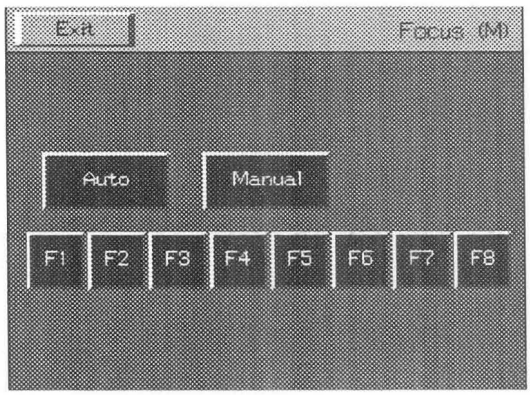
Adjust using the rotary encoder. Echo Erase can be changed in 20 steps.



Focus (M)

This function focuses the ultrasound beam, resulting in a clearer image. It enables you to change the focus points used when the ultrasound beam is emitted.

An M mode image has 8 focus points when an electronic sector probe is used, and 16 focus points when another kind of probe is used. You can set only 1 of these points.



Auto : Sets only 1 focus point near the center of the screen.

Manual Focus : You can set arbitrary focus points, however, the focus points are not automatically corrected if they move outside the display range.

[Remark]

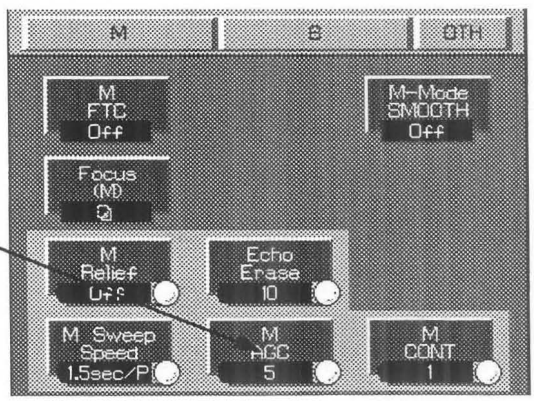
You cannot turn OFF all of the focus points. One focus point always remains set.

In the case of "Auto", if the display depth decreases and the focus points are set at positions where they are likely to move outside the display range, the set focus points are automatically displayed with reduced clearance between them so that they remain within the display range. Conversely, if the display depth increases, the clearance between the focus points automatically returns to the original clearance.

M AGC

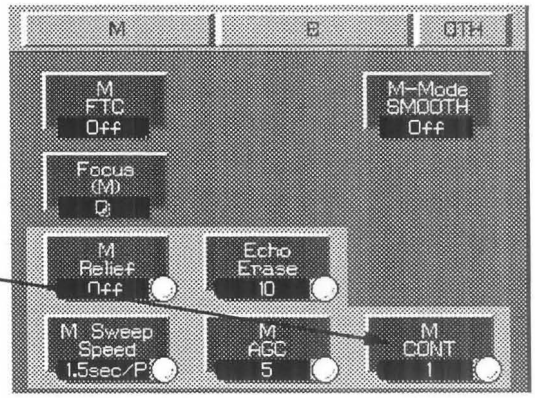
This function separately displays neighboring high intensity echoes in a B mode image.

Adjust using the rotary encoder. The AGC can be changed in 16 steps.



M CONT

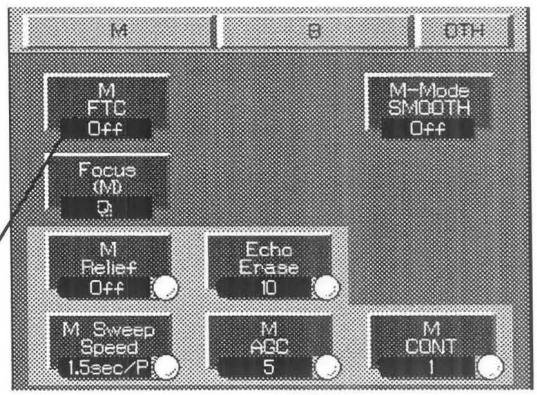
This function adjusts the contrast of an M mode image.



Adjust using the rotary encoder. The contrast can be changed in 16 steps.

M FTC

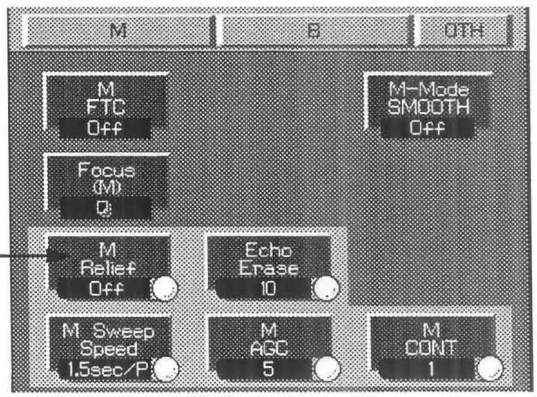
This function enhances the contours of an M mode image.



Set using the touch panel. M FTC can be set to either On or Off.

M Relief

This function enhances the contours of an M mode image.



Adjust using the rotary encoder. M Relief can be changed in 4 steps.

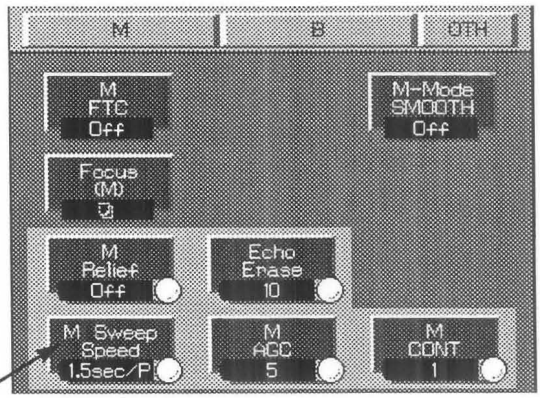
M Sweep Speed

This function sets the sweep speed used when an M mode image is displayed.

The sweep time from the right edge to the left edge of the image can be set to a value from 1, 1.5, 2, 3, 4, 6 and 8 seconds.

When B/M images are displayed, the sweep time is set to a value of about 2/3 that of an M mode image.

Marks are displayed at intervals of 0.5 seconds on an M mode image. However, in the case of a realtime display, these marks are displayed only at the top and bottom edges of the image, and when the image is frozen they are displayed at fixed intervals between the top and bottom edges.

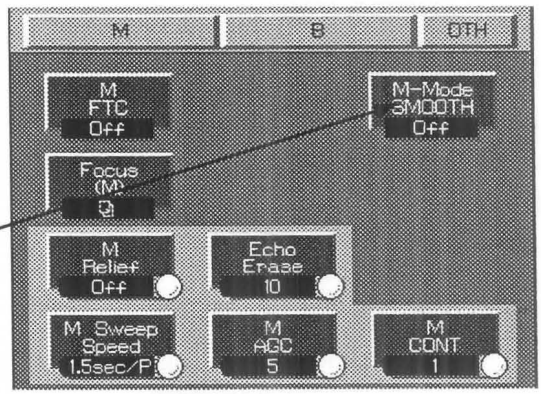


Adjust using the rotary encoder. M Sweep Speed can be changed in 7 steps.

M Mode SMOOTH

M Mode Smoothing is the application of correlation between M mode images in the distance direction and time direction.

When correlation is applied, the images are smoothed in the vertical and horizontal directions.



Set using the touch panel. M Mode SMOOTH can be set to either On or Off.

D Mode Menu

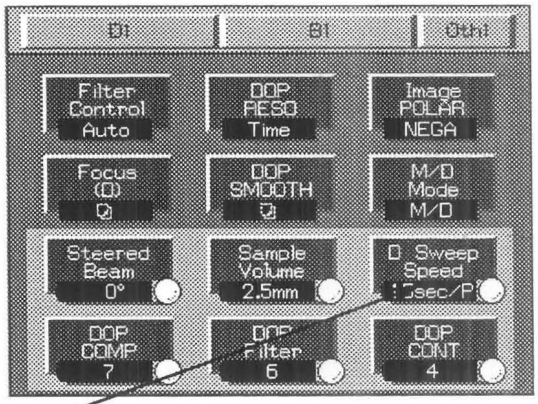
D Sweep Speed

This function sets the sweep speed used when a D mode image is displayed.

The sweep time from the right edge to the left edge of the image can be set to a value from 1, 1.5, 2, 3, 4, 6 and 8 seconds.

When B/D images are displayed, the sweep time is set to a value of about 2/3 that of a D mode image.

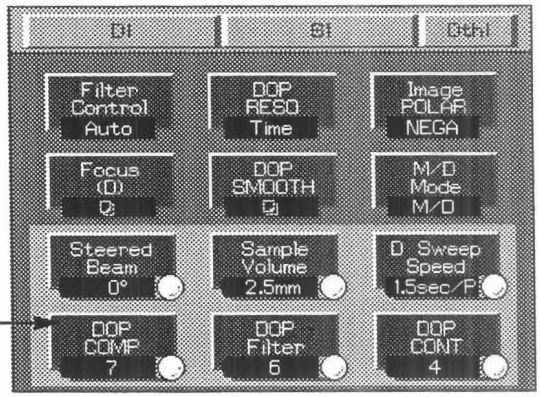
Marks are displayed at intervals of 0.5 seconds on a D mode image. However, in the case of a realtime display, these marks are displayed only at the top and bottom edges of the image, and when the image is frozen they are displayed at fixed intervals between the top and bottom edges.



Adjust using the rotary encoder. D Sweep Speed can be changed in 7 steps.

DOP COMP

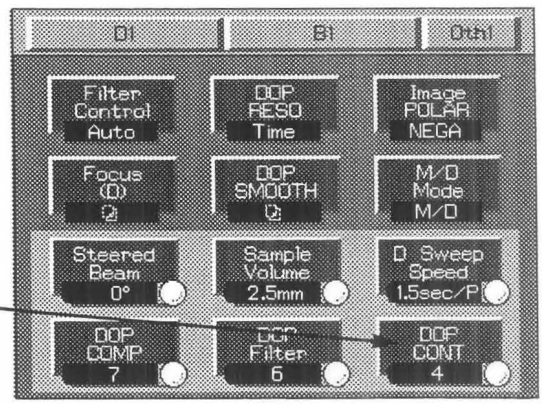
This function switches the brightness characteristics of the Doppler pattern. It suppresses weak signal levels, resulting in a clear Doppler pattern.



Adjust using the rotary encoder. DOP COMP can be changed in 8 steps.

DOP CONT

This function adjusts the contrast of the Doppler pattern.



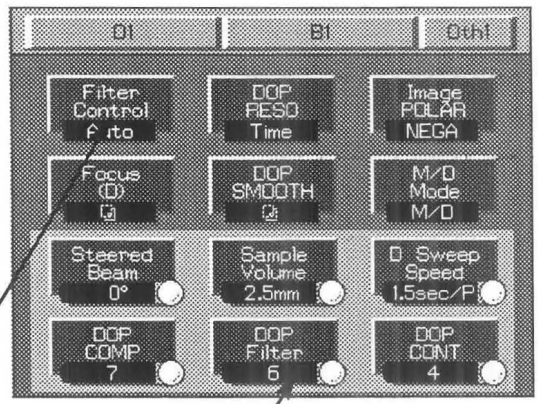
Adjust using the rotary encoder. D CONT can be changed in 16 steps.

DOP Filter

This function removes strong low frequency noise generated in the heart wall, for example. It is used when high frequency components of blood flow are suppressed, preventing a clear image from being displayed.

If you select "AUTO" using **Filter Control**, the filter value is automatically set to the optimum value from the flow range.

In the Auto mode, the filter can be set to one of 12 steps. In the Manual mode, it can be set to one of 6 steps, that is, 50 Hz, 100 Hz, 200 Hz, 400 Hz, 800 Hz, and 1600 Hz.



Set using the touch panel. Filter Control can be set to either Auto or Manual.

Adjust using the rotary encoder. DOP Filter can be set to one of 12 steps (6 steps in the case of Manual).

Auto

Manual

12 steps

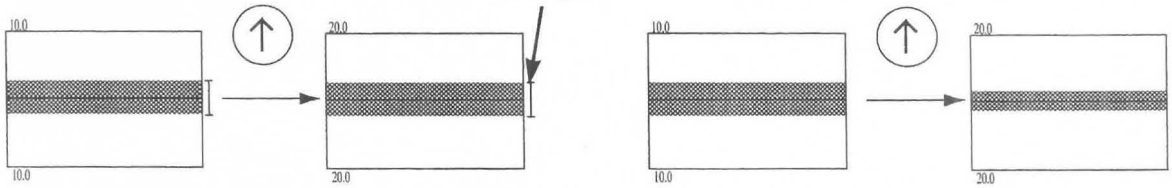
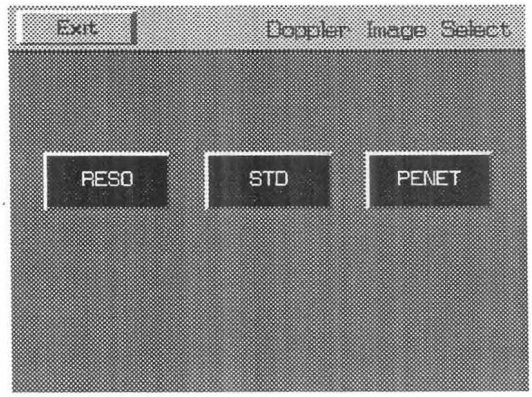


Fig. Filter

DOP Image Select

This function is used to set the image quality of a Doppler spectrum image to resolution priority, or sensitivity priority.

RESO : Displays an image with priority on resolution.
STD : This is the standard setting.
PENET : Displays an image with priority on sensitivity.

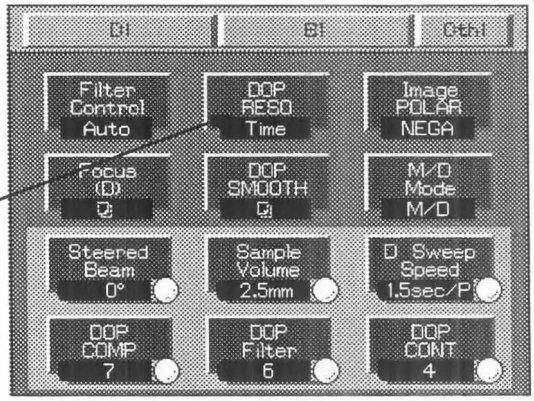


> ⚠ Note
>
> If you select RESO (resolution priority), the resolution is improved, but the sensitivity is reduced.
> If you select PENET (sensitivity priority), the sensitivity is improved, but the resolution is reduced.
> Select the optimum setting for the target examination position while observing the acoustic power index.

DOP RESO

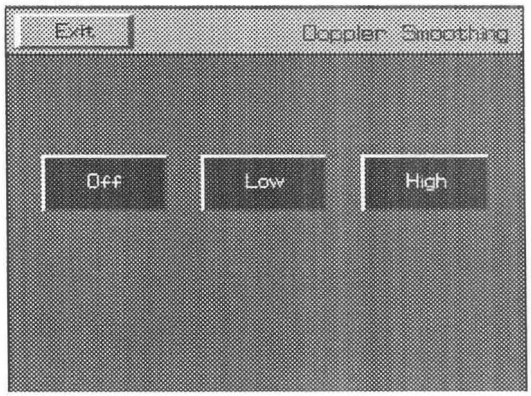
This function selects whether to improve the resolution of the Doppler spectrum in the frequency direction, or in the time direction.

Set using the touch panel. DOP RESO can be set to either Time or FREQ.



DOP SMOOTH

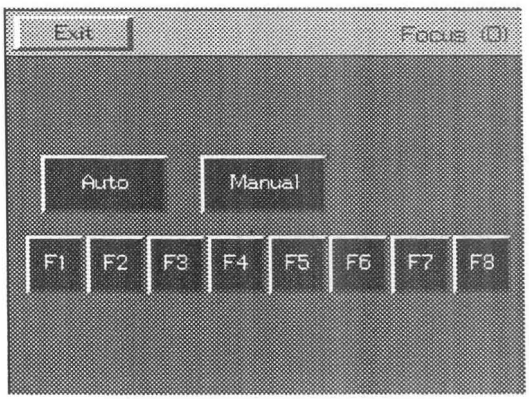
DOP SMOOTH is the application of correlation in the frequency direction and the time direction of the Doppler spectrum. When correlation is applied, images are smoothed in the vertical and horizontal directions.



Off : Correlation is not applied.
Low : A low degree of spectrum correlation is applied.
High : A high degree of spectrum correlation is applied.

Focus (D)

This function focuses the ultrasound beam, resulting in a clearer image. It enables you to change the focus points used when the ultrasound beam is emitted.
A D mode image has 8 focus points when an electronic sector probe is used, and 16 focus points when another kind of probe is used. You can set only 1 of these points.



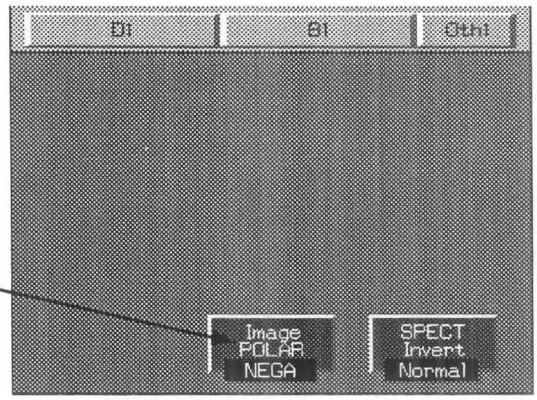
Auto : Sets only 1 focus point near the center of the sample volume.
Manual Focus : You can set arbitrary focus points, however, the focus points are not automatically corrected if they move outside the display range.

[Remark]
You cannot turn OFF all of the focus points. One focus point always remains set.
In the case of "Auto", if the focus is shifted to an arbitrary position, the focus position will automatically return to the vicinity of the center of the sample volume when the sample volume depth is changed.

Image POLAR

This function displays a Doppler spectrum with black and white reversed.
When a B/D mode image is displayed, only a D mode image is displayed in reverse.

Set using the touch panel. Image POLAR can be set to either Posi or Nega.

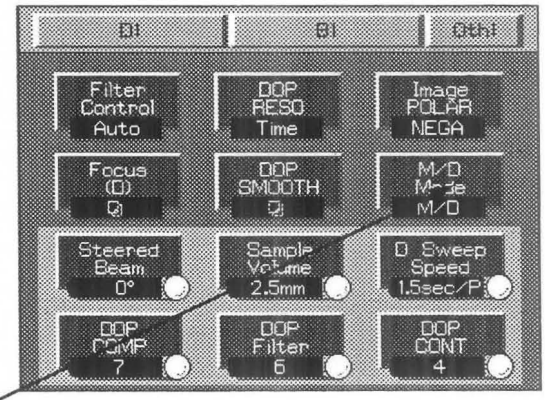


M/D Mode

This function displays the M mode and Doppler mode in the same time phase. This mode also enables you to add the Flow or Power mode to the M mode.

[Remark]
You cannot request the M mode and Doppler spectrum mode separately. Also, in some speed ranges, deep regions of the M mode image cannot be displayed.

Set using the touch panel. M/D Mode can be set to either M/D or D Only.

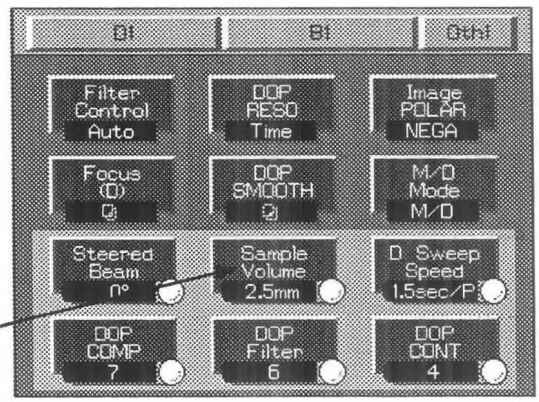


[Remark]
The velocity range that can be obtained in the M/D mode differs from that of the PW mode. The M/D mode reaches the maximum flow velocity quicker, however the velocity range does not increase any further.

Sample Volume

This function sets the sample volume. The sample volume is the size of the sample gate used to acquire signals from a B mode image when PW Doppler is used.

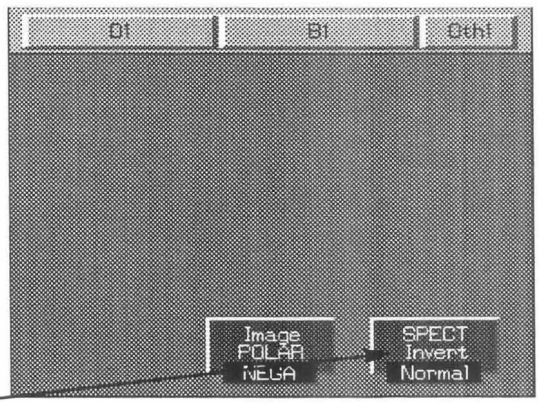
Adjust using the rotary encoder. Sample Volume can be changed in 20 steps (0.5 to 10 mm).



SPECT Invert

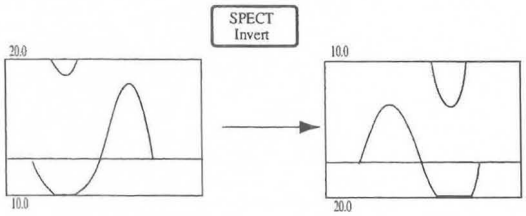
This function inverts a D mode image about the baseline, enabling the approaching and receding blood flow information to be displayed in reverse.

[Remark]
You can change over the method of inverting the spectrum, using a preset.



Set using the touch panel. SPECT Invert can be set to either Normal or Invert.

The inversion axis is the baseline.



The insertion axis is the center.

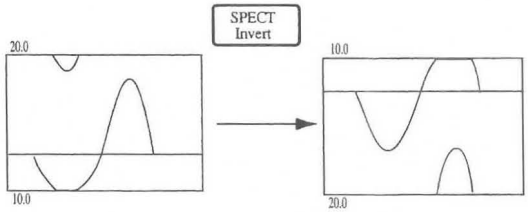
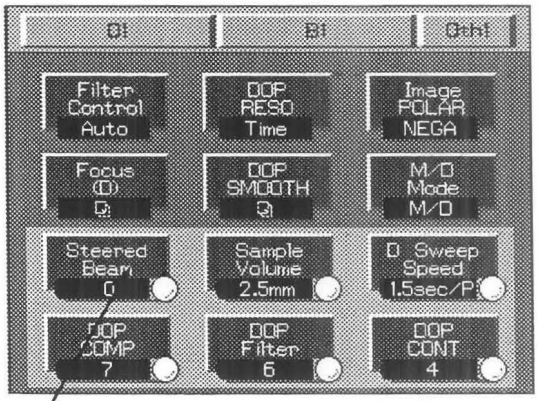


Fig. SPECT Invert

Steered Beam

When examining a pulsating blood flow in the carotid artery, for example, using an electronic linear probe, it is difficult to obtain data for a region where the ultrasound beam intersects the blood flow direction perpendicularly.
The steered beam function electronically bends the sending and received ultrasound beam in an oblique direction to enable information to be obtained for the region being examined.

[Remark]
Probes that enable the beam to be steered are limited to some linear probes. Also, the steering range of some probes is less than ±30°.

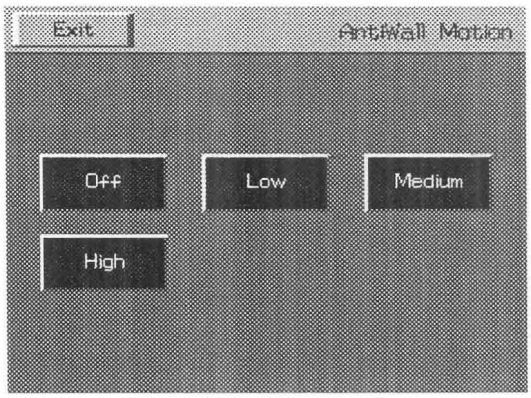


Adjust using the rotary encoder.

Flow Mode Menu (The Power mode also uses a common menu.)

Anti Wall Motion

This function smoothens the color pixel data in order to remove wall motion noise.

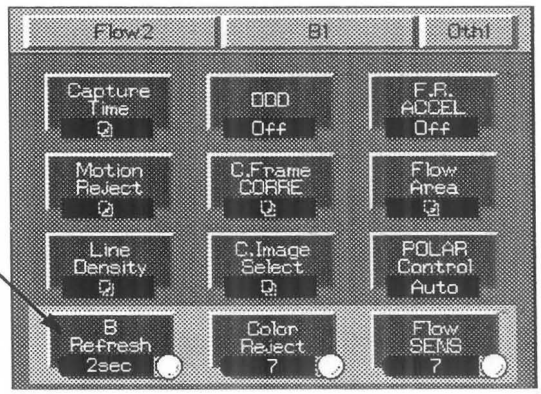


Off : Wall motion noise is not removed.
Low : Sets a low degree of noise removal.
Medium : Sets a medium degree of noise removal.
High : Sets a high degree of noise removal.

B Refresh

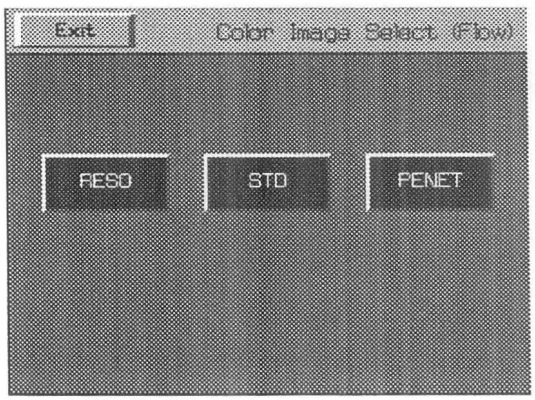
This function sets the time interval for refreshing the B mode image when the B Flow and M Flow modes are operating simultaneously.

Adjust using the rotary encoder. B Refresh can be changed in 6 steps.



C.Image Select

This function selects whether to set the quality of a color image to resolution priority or sensitivity priority when the flow or power flow mode is used.



RESO : Displays color with priority on resolution.
STD : Sets a standard color.
PENET : Displays color with priority on sensitivity.

⚠ Note

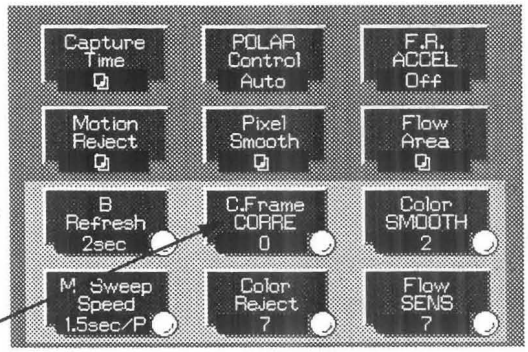
When RESO (resolution priority) is selected, the resolution increases, however the sensitivity falls.
When PENET (sensitivity priority) is selected, the sensitivity increases, however the resolution falls.
Select the optimum setting for the region to be examined while observing the acoustic power index.

C.Frame CORRE

Frame Correlation is the application of correlation between adjacent frames.

Increase the correlation when the frame rate is low, such as in the case of the blood blow in the abdominal region, or when you wish to smooth an image. Reduce the correlation when it is necessary to display a realtime image, such as that of the blood flow in the heart.

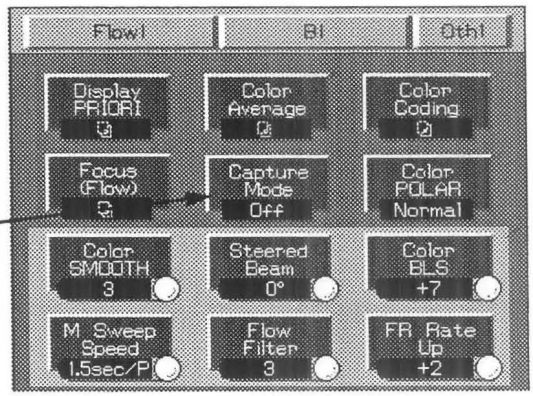
Adjust using the rotary encoder. Frame CORRE can be changed in 16 steps.



Capture Mode

This function displays color pixels continuously for a fixed period of time. It enables you to obtain an image in which color pixels are smoothed.

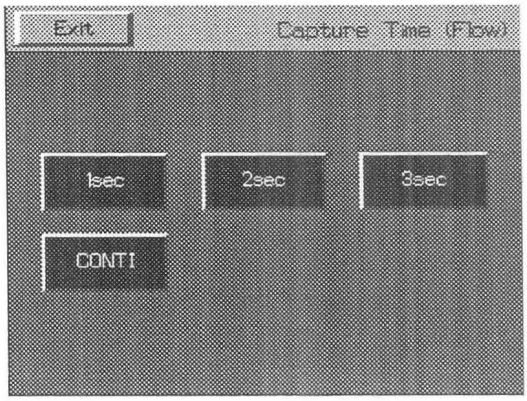
Set using the touch panel. Capture Mode can be set to either On or Off.



Capture Time

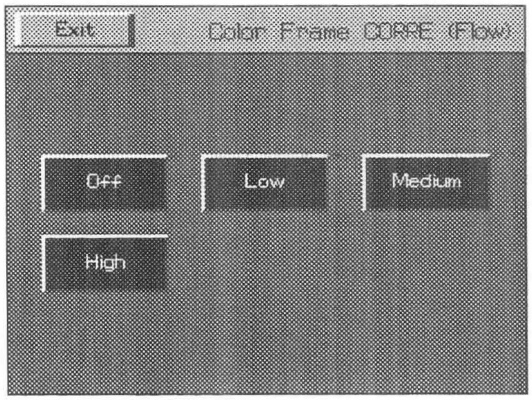
This function sets the period during which color pixels are displayed continuously in the **Capture Mode**. If this period is long, a smooth image is obtained. If it is short, the resolution is improved.

1sec : Color pixels are displayed continuously for 1 second.
2sec : Color pixels are displayed continuously for 2 seconds.
3sec : Color pixels are displayed continuously for 3 seconds.
CONT : Color pixels are displayed continuously until the image is frozen.



Color Average

This function sets the number of transmissions for displaying blood flow. If the number of transmission is large, the sensitivity is improved, but the frame rate is reduced.

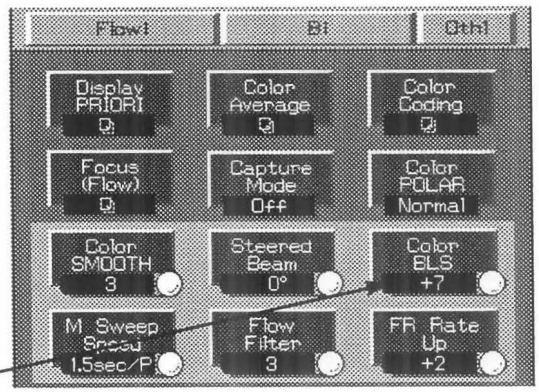


Low : Sets the number of transmissions to a low value.
Medium : Sets the number of transmissions to a medium value.
High : Sets the number of transmission to a high value.

> **⚠ Note**
>
> If you select Low, the frame rate is improved, but the sensitivity falls.
> If you select High, the sensitivity is improved, but the frame rate falls.
> Select the optimum setting for the region to be examined while observing the acoustic power index.

Color BLS

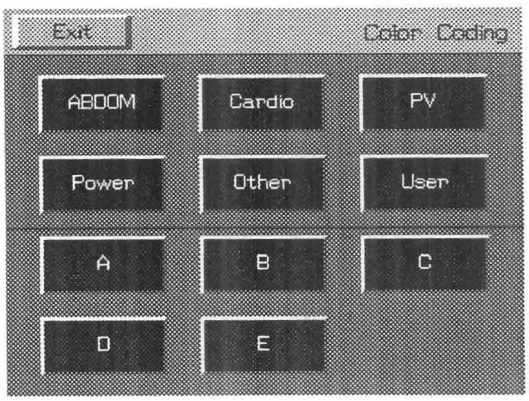
The function that shifts the reference level for a forward or reverse flow is called Color Base Line Shift.
When color is displayed in reverse, the reverse display can be eliminated by inverting the reference level.
[Remark]
This function operates only in the Flow mode. It can also be used after the image is frozen.



Adjust using the rotary encoder. Color BLS can be changed in ±32 steps.

Color Coding

This function changes the color of the color information (flow velocity and dispersion) on the screen, or changes the method of enhancing it. It can also be used after the image is frozen.



Upper half of touch panel (Used to select the application.)
ABDOM : Selects the colors used for the abdominal region.
Cardio : Selects the colors used for the cardiac region.
PV : Selects the colors used for the peripheral vessels.
Power : Selects colors that are suitable for Power Flow.
Other : (Not used at present.)

Lower half of touch panel (Selects color enhancement.)

(ABDOM, PV)

A to E : A displays dark colors and E displays bright colors.

(Cardio)

A : Basic coding in which positive is indicated in red tones, and negative in blue tones.

B : This setting is intended for cardiac measurements. It enhances the display of dispersion in particular.

C : This setting is intended for cardiac measurements. It indicates high velocity forward flow in yellow, and reverse flow in light blue.

D : This setting is intended for cardiac measurements. It enhances the display of high velocity blood flow and dispersion.

E : This setting is intended for cardiac measurements. It enhances the display of high velocity blood flow and dispersion in green.

(Power)

A : Power information changes from purple to red.

B : Power information changes from pink to yellow.

C : Power information changes from light red to red.

D : Power information changes from light blue to blue.

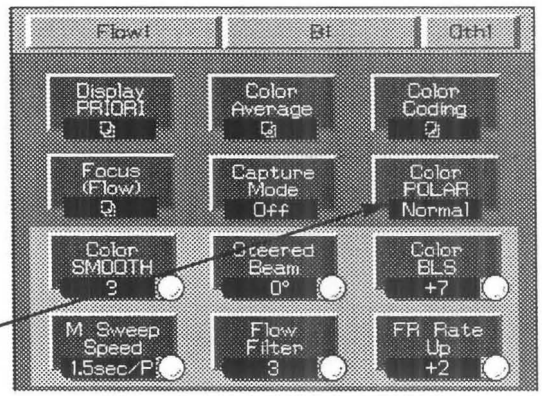
E : Power information changes from black to white.

Color POLAR

This function reverses the colors used to indicate forward flow/reverse flow (red tones for forward flow, and blue tones for reverse flow) in the Flow mode. It also inverts the color bar.

[Remark]

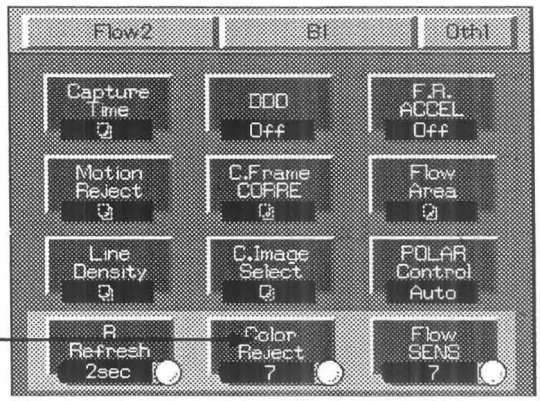
This function operates only in the Flow mode. It can also be used after the image is frozen.



Set using the touch panel. Color POLAR can be set to either Normal or Invert.

Color Reject

Color Reject is a kind of processing which removes low flow velocity components from color information. It is used when wall motion noise is noticeable, for example, in order to eliminate noise. (Note that in this case, low velocity blood flow will also be removed.) This function can also be used after the image is frozen.

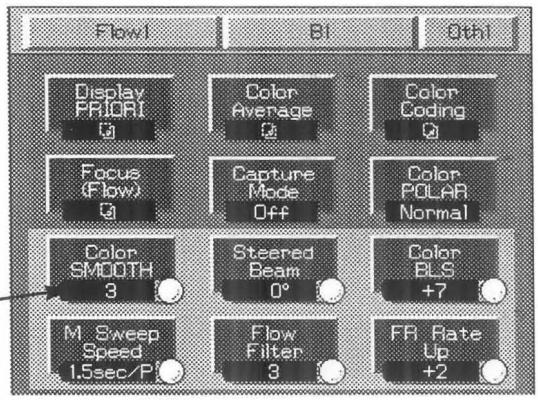


Adjust using the rotary encoder. Color Reject can be changed in ±32 steps

Color SMOOTH

Color Smoothing is the application of correlation between the lines of an ultrasound beam in the flow mode. When correlation is applied between lines, the color image is smoothed. Use this function when observing large blood vessels, for example, or when raising the degree of correlation in order to observe small blood vessels.

Adjust using the rotary encoder. Color SMOOTH can be changed in 7 steps



DDD

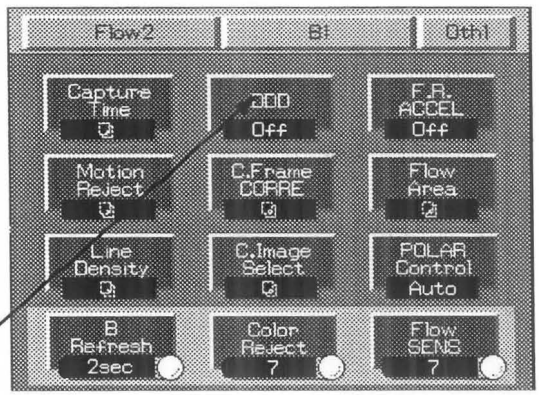
This function enables you to display B mode (black and white) and Flow mode images alongside each other in realtime. The B+Flow image is displayed on the right half of the screen, and the B mode image on the left half.

After freezing the images, you can switch the display to the 1B mode, and use the search function to display previous images.

[Remark]

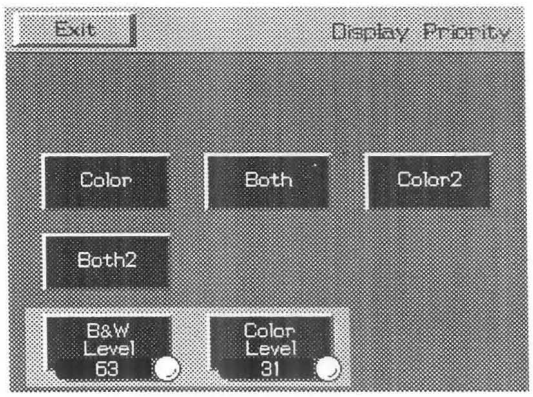
This function can be used in the Power mode as well. Also, you can freeze the images, then perform separate search operations on the images on the left and right halves of the screen.

Set using the touch panel. DDD can be set to either On or Off.



Display PRIORI

Display Priority is a function that sets the displayed information to be displayed preferentially if a black and white slice image coincides with a color flow display.



B/W Level: Sets the brightness level at which black and white information is to be displayed. If an echo has a higher intensity that the specified brightness, the black and white echo is displayed as it is. You can set the level between 0 and 63 using the rotary encoder.

Color Level: Sets the flow velocity level for displaying color information. If the flow velocity is higher than the specified value, color is displayed as it is. You can set the level between 0 and 32 using the rotary encoder.

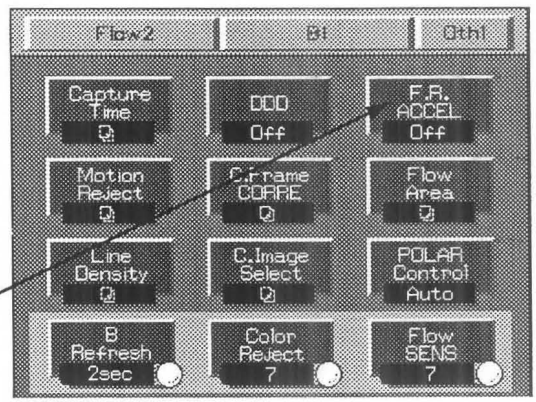
Color, Color2: Displays only color information when both black and white information and color information exists. This function is suitable for displaying fine blood flow.

Both, Both2: Displays both black and white information and color information when both kinds of information exist. This function is suitable for examining the heart, for example, when there is a lot of wall motion noise.

F.R. ACCEL

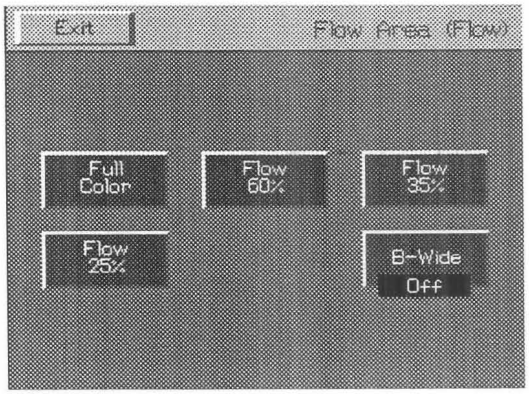
This function creates an image that has greater smoothness between frames. It is suitable for images of low frame rate, such as blood flow in the abdominal region. Turn it Off when you wish to display an image of the heart, for example, where high time resolution is necessary.

Set using the touch panel. FR ACCEL can be set to either On or Off.



Flow Area

Flow Area can be set to one of four steps. If desired, you can also set the flow area using the **SCAN AREA** switch and the trackball instead of the menu.



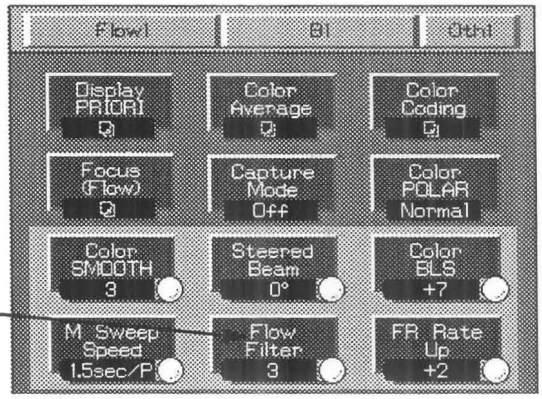
Full C. : Displays a flow over the same scanning range as a black and white image.
Flow60% : Displays a flow over a scanning angle of 60%.
Flow35% : Displays a flow over a scanning angle of 35%.
Flow25% : Displays a flow over a scanning angle of 25%
B-Wide : Displays the B mode display range set using a preset, when a flow is displayed.

[Remark]
When B-Wide is not selected, the B mode and flow (flow area) are displayed in a 1:1 ratio.
If the flow area is larger than the B mode display range set by the preset, the flow area takes precedence.

> **⚠ Note**
>
> When the frame rate rises, the power index also rises.
> Select the optimum setting for the region to be examined while observing the acoustic power index.

Flow Filter

This is a filter which removes low flow velocity components when the displayed clutter signal (wall motion noise) from the heart wall, for example, is prominent.

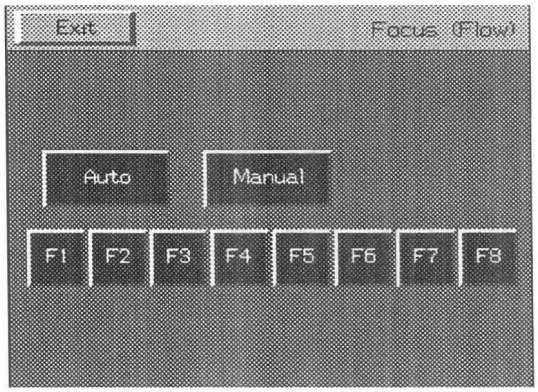


Adjust using the rotary encoder. Flow Filter can be changed in 6 steps.

Focus (Flow)

This function focuses the ultrasound beam, resulting in a clearer image. It enables you to change the focus points used when the ultrasound beam is emitted.

A Flow mode image has 8 focus points when an electronic sector probe is used, and 16 focus points when another kind of probe is used. You can set only 1 of these points.



Auto : Sets only 1 focus point near the center of the flow area.

Manual Focus : You can set arbitrary focus points, however, the focus points are not automatically corrected if they move outside the display range.

[Remark]

You cannot turn OFF all of the focus points. One focus point always remains set.

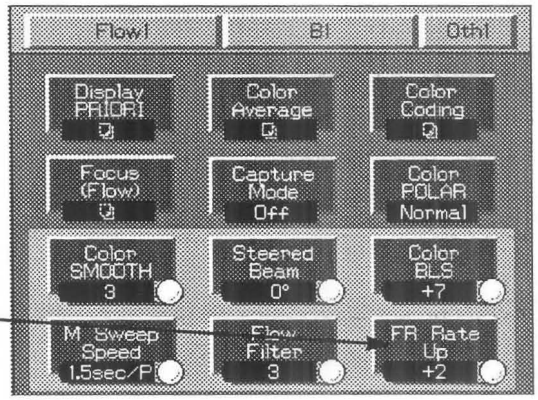
In the case of "Auto", if you shift the focus to an arbitrary position, it will automatically return to the vicinity of the center of the sample volume when you change the flow area.

FR Rate Up

This function automatically adjusts the frame rate in the Flow mode and Power Flow mode.

[Remark]

The electronic sector probe can be set to one of six steps.

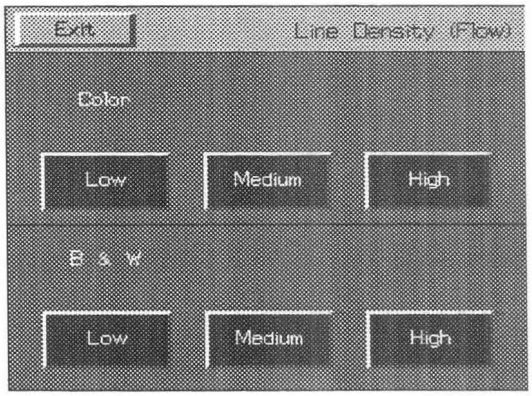


Adjust using the rotary encoder. FR Rate Up can be changed in 9 steps.

> **⚠ Note**
>
> When the frame rate rises, the power index also rises.
>
> Select the optimum setting for the region to be examined while observing the acoustic power index.

Line Density

If the line density is high, the image has good resolution. Conversely, if it is low, the frame rate is improved.



Upper half of touch panel (for B mode)

Low : Sets the line density to a low value.

Medium : Sets the line density to medium value.

High : Sets the line density to a high value.

Lower half of touch panel (for Flow/Power mode)

Low : Sets the color scanning line density to a low value.

Medium : Sets the color scanning line density to a medium value.

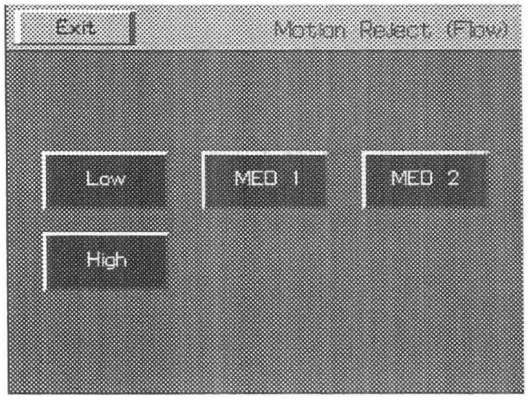
High : Sets the color scanning line density to a high value.

> **⚠ Note**
>
> When the frame rate rises, the power index also rises.
>
> Select the optimum setting for the region to be examined while observing the acoustic power index.

Motion Reject

This function rejects noise when clutter signals (wall motion noise) are prominent.

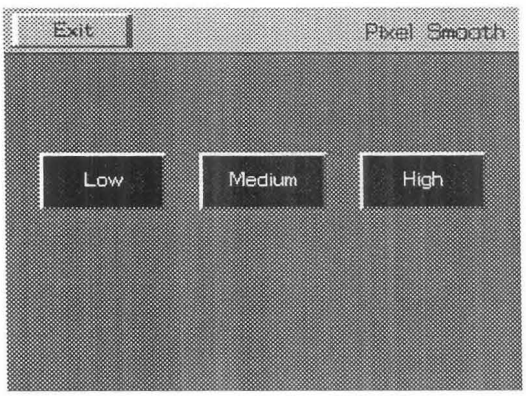
Low to High:
The switches reject an increasing amount of noise in the sequence Low to High.



Pixel Smooth

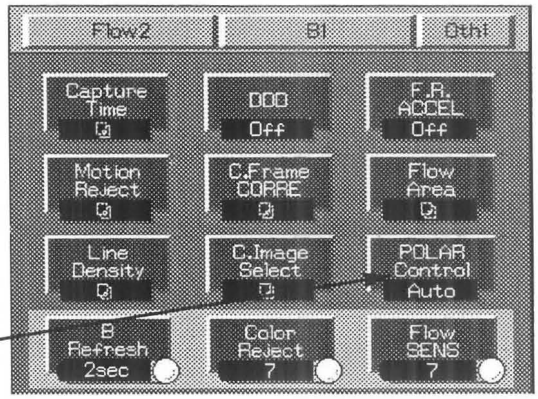
Smoothens the color pixels in order to make the color flow easy to see.

Low～High： The color pixels are smoothened to an increasing degree from Low to High.



POLAR Control

This function automatically reverses the polarity when the Doppler incident angle is changed to a different angle by the **STEERED BEAM** function. It enables you to display a flow image with the same colors for both the forward and reverse directions. (This function operates only when a probe that supports STEERED BEAM is connected.)

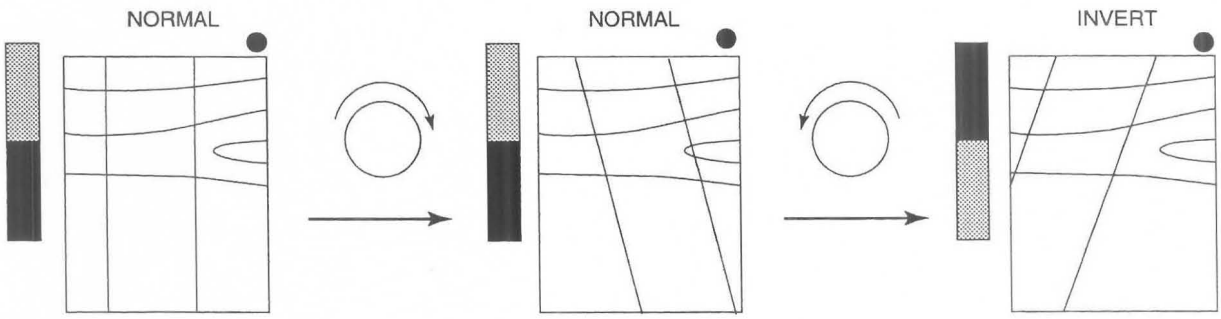


Set using the touch panel. POLAR Control can be set to either Auto or Manual.

In the case of Auto, when the beam is steered in the + direction the polarity is not reversed. When the beam is steered in the - direction, the polarity is reversed.

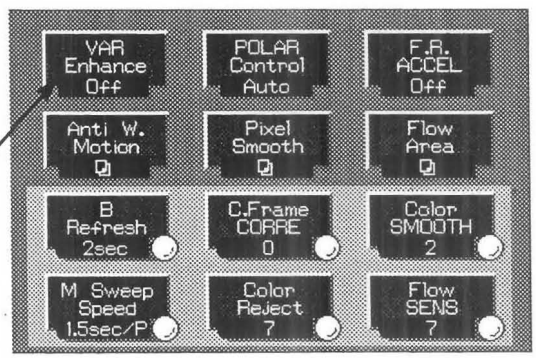
[Auto]

Red Blue



VAR Enhance

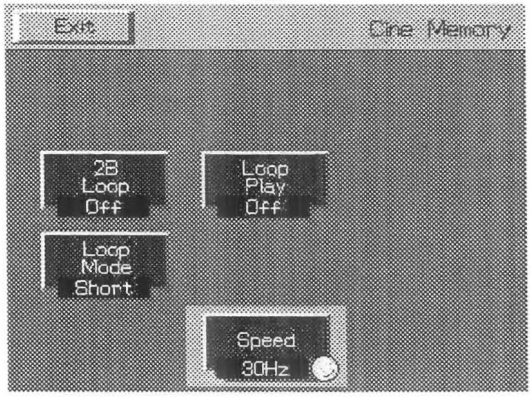
Displays the dispersion pixel data in enhanced form.



Set using the touch panel. VAR Enhance can be set to either On or Off.

Freeze Menu

Cine Memory



This function enables you to perform loop playback of images in the cine memory and observe them.

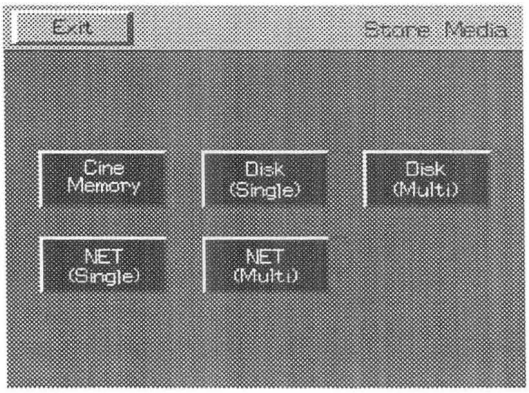
[Remark]

When an ECG is displayed, you can perform loop playback at R wave intervals, using a preset.

Loop Play : Sets Start or Stop.

Speed : Changes over the playback speed using an encoder.

Store Media



This function specifies the medium in which an image is stored when the **STORE** switch is pressed, when the DMS unit is connected.

[Remark]

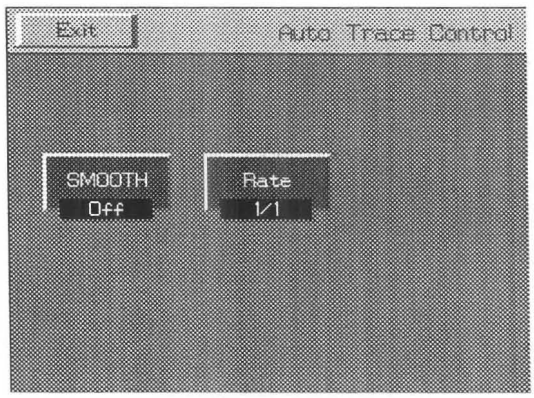
When you wish to store an image an external server using NET, you must first set the DMS for connection to a network.

Disk(Single/Multi):The DMS stores single or multi image in an MO disk, for example.

NET(Single/Multi): The DMS stores single or multi image in an external server.

Cine Memory : The image is stored in the memory of the system.

Auto-T Control



This function enables you to change the auto trace conditions (Smooth, Sample) and settings.

Smooth : Makes the trace line smooth. If you select [Yes], correlation is applied to adjacent spectrum waveforms, resulting in a smooth trace.

[Remark]

If you select [Yes], the image will be a less faithful reproduction of the actual data compared to when [No] is selected, hence the measurement accuracy will tend to fall.

Sample : Sets the trace speed. The trace speed increases in the sequence 1/1, 1/2.

[Remark]

If you select [1/2], the data sampling density will be reduced compared to [1/1], so the image will be a less faithful reproduction of the actual data. Consequently, the measurement accuracy and detection accuracy of the maximum point will tend to fall.

When measuring a pulsating Doppler waveform, it is recommended that you set the rate to [1/1].

Other Menu

Area Lock

This function causes the flow area to move up, down, left or right according to the direction in which the Doppler cursor is moved, ensuring that the sample volume remains roughly at the center of the flow area.

In the case of a B/M flow display, the flow area follows the motion of the M mode cursor.

Set using the touch panel. Area Lock can be set to either On or Off.

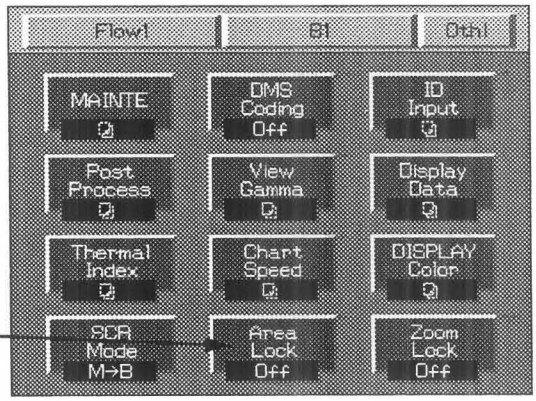
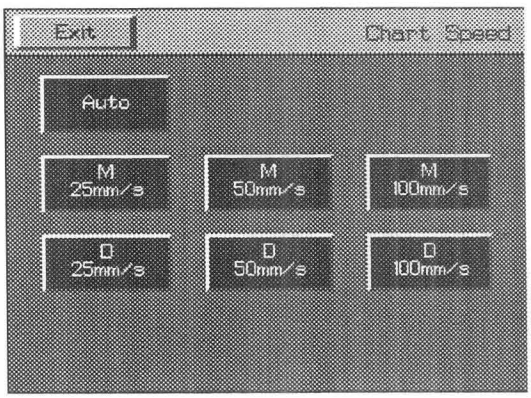


Chart Speed

This function sets the paper feed speed when recording an M or D mode image on a strip chart recorder.

25mm/s : The paper feed speed of the recorder is set to 25 mm/s.
50mm/s : The paper feed speed of the recorder is set to 50 mm/s.
100mm/s : The paper feed speed of the recorder is set to 100 mm/s.



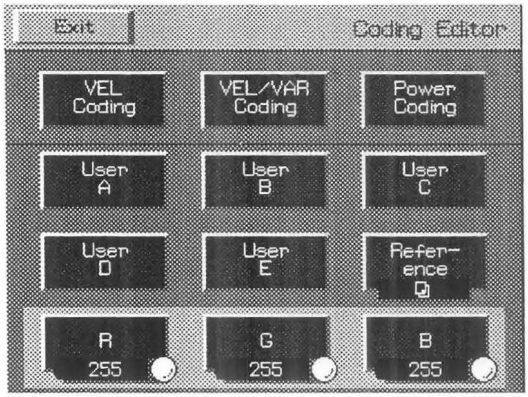
Auto:
The paper feed speed of the recorder is linked to SWEEP SPEED.

- → For SWEEP SPEED 1 or 2, the paper feed speed of the strip chart recorder is set to 100 mm/sec.
- → For SWEEP SPEED 3 or 4, the paper feed speed of the strip chart recorder is set to 50 mm/sec.
- → For SWEEP SPEED 6 to 8, the paper feed speed of the strip chart recorder is set to 25 mm/sec.

[Remark]
You can also set separate paper feed speeds for the M mode and D mode, using a preset.

Color Coding Editor

This function is used when editing, processing or storing Color Coding of Flow or Power Flow.



VEL Coding : Activates the function that edits 32 gradations that do not contain dispersion data.

VEL/VAR Coding : Activates the function that edits 32 gradations that contain dispersion data.

POWER Coding : Activates the function that edits 16 gradations that do not contain dispersion data.

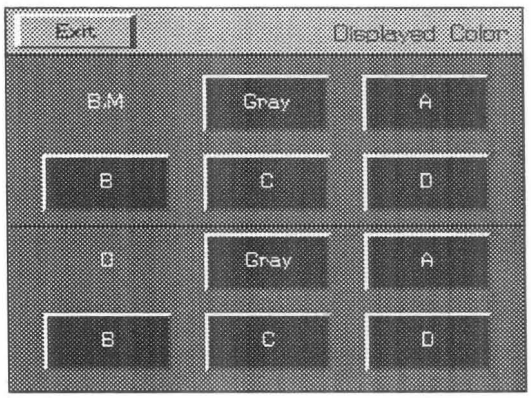
User A～E : This is the storage destination of the edited Coding data.

Reference : Overwritten on the Coding data loaded in the equipment.

R,G,B 0～255 : Adjusts the color hue.

DISPLAY Color

This function adds color to B mode, M mode and D mode images, making them easy to observe. (Both the upper and lower halves of the touch panel are identical settings.)



Gray : This corresponds to the normal brightness characteristics.

A : This corresponds to blue and orange brightness characteristics.

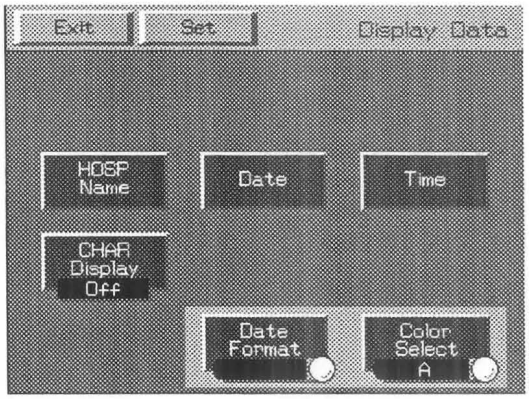
B : This corresponds to blue brightness characteristics.

C : This corresponds to brightness characteristics that are weaker than B.

D : This corresponds to orange brightness characteristics.

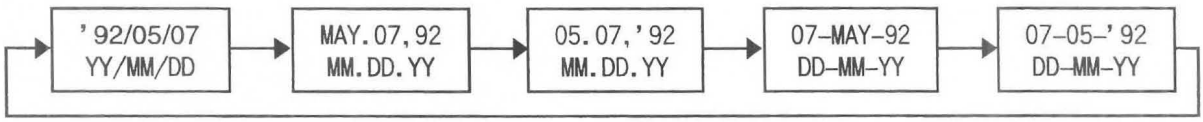
Display Data

This function is used to make the basic settings in the system, such as date, date format, time, hospital name, automatic display color, and automatic display On/Off.



[Remark]
The entered hospital name, date, time, and set date display format remain stored in the system by the backup function, even after the power is switched off.

HOSP Name : Enter the hospital name (12 characters x 2 lines).
Date : Enter the date.
Time : Enter the time.
CHARA Display : Turns the automatic display on the screen On or Off.
Format : Sets the date display format. The encoder causes the display to change as shown below.



Color Select : Sets the display colors of characters and graphics on the screen.

A : Both characters and graphics are displayed in white.
B : The boundary of the flow area is displayed in green, and characters and graphics are displayed in white.
C : Graphics are displayed in green, and characters are displayed in white.
D : Graphics are displayed in green, and characters are displayed in yellow.
E : The boundary of the flow area is displayed in green, graphics are displayed in red, and characters are displayed in yellow.
USER : Displays text and graphics on the screen in the display colors edited using Graphic Editor.

(1) Hospital name setting procedure

① Select **HOSP Name** from **Display Data** in the **Other menu**.

→ An underline cursor appears in the hospital name display area at top left of the screen.

② Enter the date from the keyboard according to the set display format using letters of the alphabet.

③ Select **Set**, or press the **SET** switch.

→ The entered date is finalized.

(2) Date setting procedure

① Select **Date** from **Display Data** in the **Other menu**.

→ An underline cursor appears in the date display area at top right of the screen.

② Enter the date from the keyboard according to the set display format.

[Remark]

When the cursor moves, it skips symbols (/, ., etc.) in the display format. When you wish to enter a single digit number, enter 0 in the second digit position. You can also enter the name of the month using the first three letters of the month.

③ Select **Set**, or press the **SET** switch.

→ The entered date is finalized.

(3) Time setting procedure

① Select **Time** from **Display Data** in the **Other menu**.

→ An underline cursor appears in the time display area at top right of the screen. At this point in time, the clock in the system stops.

② Enter the date from the keyboard.

[Remark]

When the cursor moves, it skips the symbol (:). Enter the time using the 24-hour system.

③ Select **Set**, or press the **SET** key.

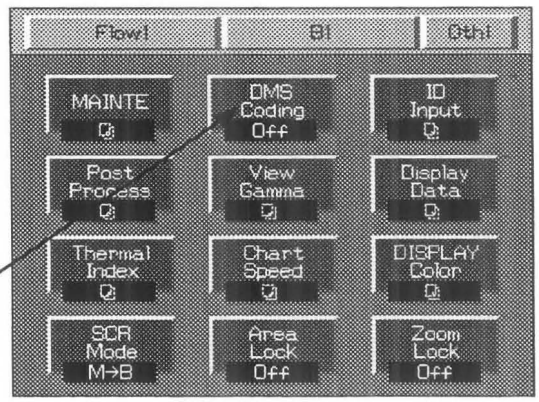
→ The entered time is finalized, and the system clock starts again.

DMS Coding

This function is used to convert data read from an external MO, for example, into coding data, when a DMS is connected.

[Remark]

You cannot use this function when the data is stored as RGB data.

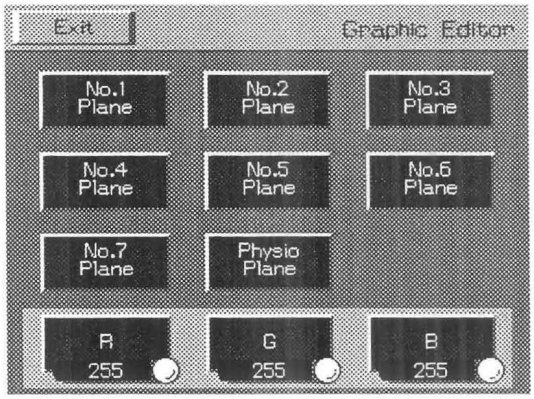


Set using the touch panel.

Graphic Editor

This function is used to edit, process and store the display colors of text and graphics displayed on the screen.

The display colors edited here can be displayed by selecting User of Color Select.

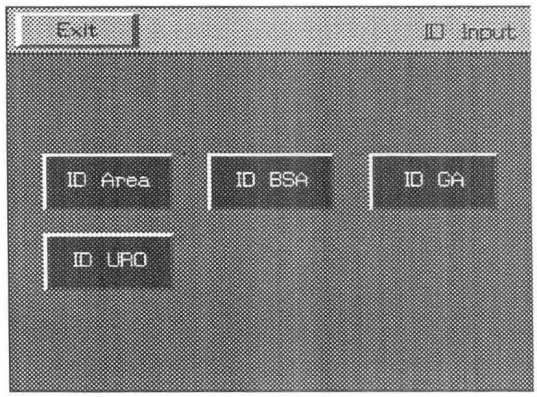


No.1～7, Physio Plane : Selects and displays each plane in which colors are to be set.

R,G,B 0～255 : Processes the display colors in each plane.

ID Input

You can enter an ID to this system using three methods. The menu item used to select one of these methods is called ID Input.



ID Area:

The underline cursor moves to the ID, NAME or other display area, enabling you to enter the ID.

ID BSA:

Enter the ID, then enter data according to the screen display, and the body surface area is automatically computed. Once you have entered all of the data, the result of computation appears on the screen.

ID GA:

Enter the ID, then enter data according to the screen display, and the gestational week is automatically computed. Once you have entered all of the data, the result of computation appears on the screen.

ID UROL:

Enter the ID, then enter the PSA to the screen display. Once you have entered this data, the result of computation appears on the screen.

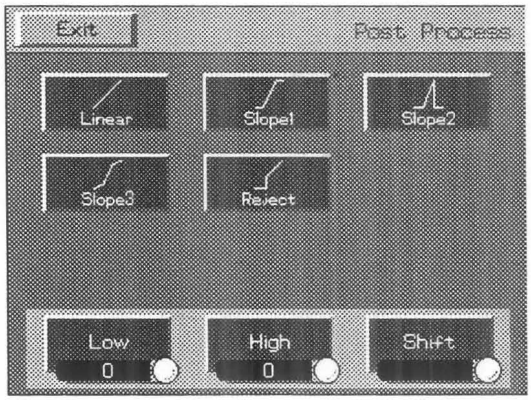
[Remark]

For details of entering the ID, refer to 10-1 "Method of Operating Switches".

Post Process

Post Process is a method of changing the display brightness characteristics of the observation monitor according to the echo intensity of a B mode image displayed on the monitor. It enables you to arbitrarily vary the tonality of a 64-step gray scale black and white image in order to suppress echo noise.

There are four correction curves. By selecting a curve and setting each level, you can vary the display brightness characteristics.



Linear : You cannot change the level.

Slope1 : Echoes that are lower than the zone in which the brightness is expanded are displayed at minimum brightness, and high echoes are displayed at maximum brightness.

Slope2 : Echoes that are lower than the zone in which the brightness is expanded and also high echoes are displayed at minimum brightness.

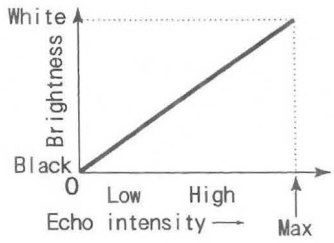
Slope3 : The change in the brightness of echoes that are lower than the zone in which the brightness is expanded and also high echoes is compressed to 1/4.

Reject : Echoes that are lower than the set level are displayed at the minimum brightness.

The characteristics of the correction curves are shown below.

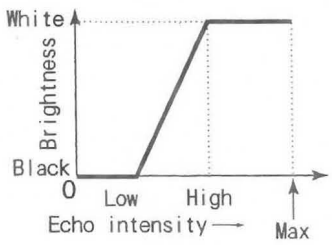
Linear

The levels are fully expanded. In other words, this is the state in which all 64 steps are used. All echoes are displayed at a brightness corresponding to their intensity.



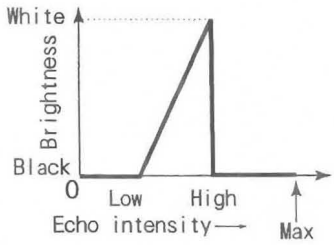
Slope 1

Echoes that are lower than the zone whose brightness you wish to expand are displayed at minimum brightness, and high echoes are displayed at maximum brightness.



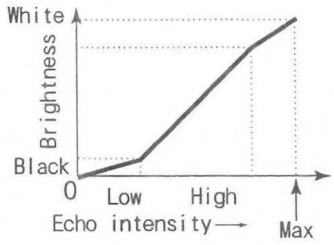
Slope 2

Echoes that are lower than the zone whose brightness you wish to expand and also high echoes are displayed at minimum brightness.



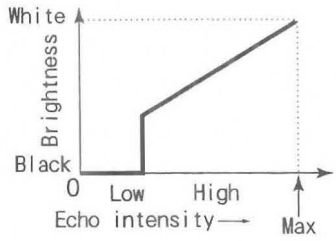
Slope 3

The change in brightness of echoes that are lower than the zone whose brightness you wish to expand and also high echoes is compressed to 1/4.

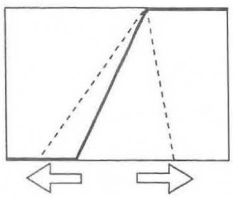


Reject

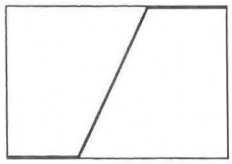
Echoes that are lower than a set level are displayed at minimum brightness.

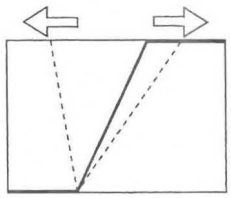


When **Slope 1, Slope 2** or **Slope 3** is selected

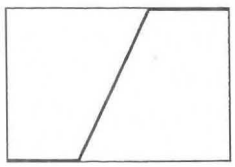


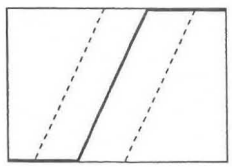
Adjust using the **Low** encoder.





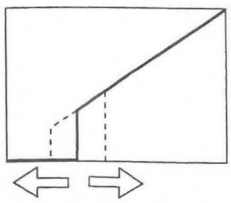
Adjust using the **High** encoder.





Adjust using the **Shift** encoder.

When **Reject** is selected



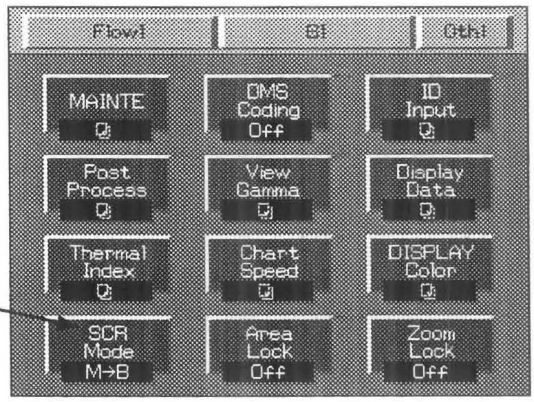
Adjust using the **Low** encoder.

SCR Mode

This function changes the recording format of a strip chart recorder.

[Remark]

For details, refer to 11-2 "Recording Images".



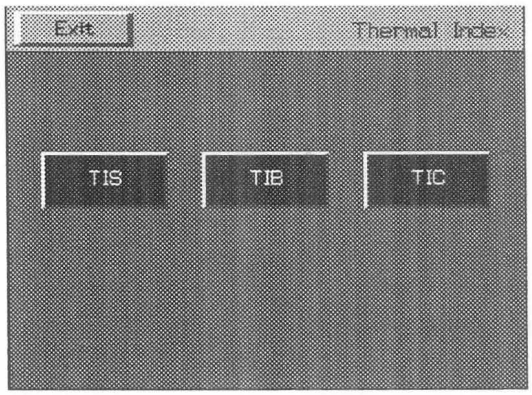
Set using the touch panel. SCR Mode can be set to either M or M→B.

Thermal Index

This function changes the acoustic power index.

[Remark]

For details, refer to 24. Appendix.



TIS : A thermal index for soft tissue is selected.

TIB : A thermal index for bone is selected.

TIC : A thermal index for the cranium is selected.

> **⚠ Note**
>
> Ultrasound energy is converted into heat in the body while being attenuated. Particularly, there is a possibility of heat being generated in bone and the cranium compared to soft tissue.
>
> Select the optimum setting for the region to be examined while observing the acoustic power index.

VCR Control

This function enables you to remotely control the SVO-9500MD4 from the system.

Stop : Stops the tape travel.

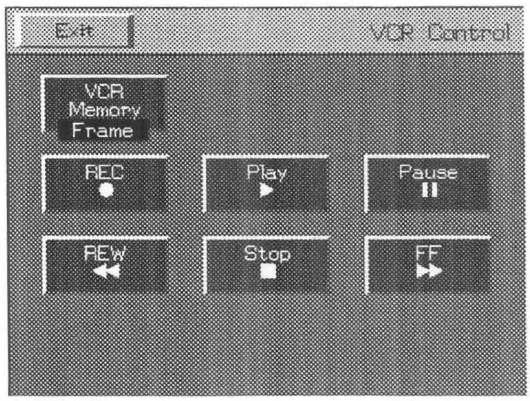
Play : Plays the tape.

REC : Records image on tape.

Pause : Momentarily stops the tape.

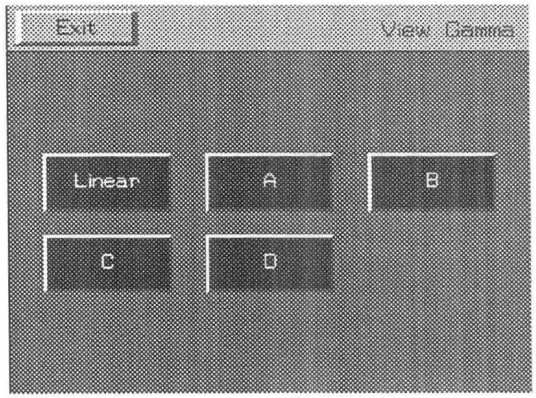
FF : Feeds the tape rapidly in the forward direction. By pressing this switch together with Play, tape playback takes place at high speed.

REW : Rewinds the tape. By pressing this switch together with Play, tape playback takes place in the rewind direction.



View Gamma

View Gamma adjusts the brightness characteristics of the image to match the brightness characteristics of the observation monitor, and also performs brightness correction to enable the data for each diagnostic region to be expressed effectively. View Gamma enables you to select one of five correction curves.



Linear : There is no change in the brightness characteristics.

A : Used for cardiac diagnosis. This curve has slightly weak brightness characteristics.

B : Used for cardiac diagnosis. This curve has slightly strong brightness characteristics.

C : Used for diagnosis in the abdominal region. This curve has slightly weak brightness characteristics.

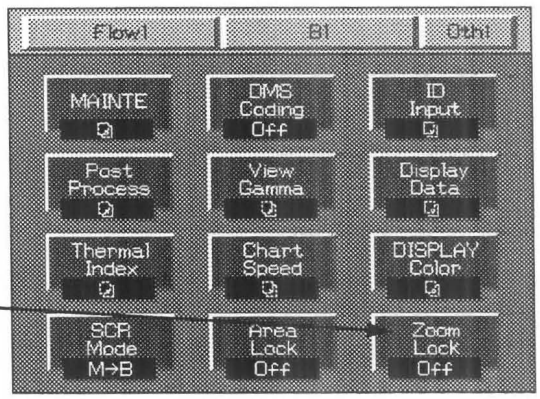
D : Used for diagnosis in the abdominal region. This curve has slightly strong brightness characteristics.

[Remark]
You can set a correction curve even after freezing an image.

Zoom Lock

This function enlarges a B mode image about the Doppler sample when the ZOOM switch is pressed.

Set using the touch panel. Zoom Lock can be set to either On or Off.



11-5. Preset

This function can store set conditions, and recall them as necessary. By using a preset, you can adjust and set the system using simple procedures, thus reducing the examination time.

The set values can be switched over according to the purpose of use, diagnostic region and differences between individual operators, or conversely can be unified. In addition, by storing settings in the system, you can avoid troublesome condition setting work and eliminate the risk of making incorrect condition settings.

This system has a total of 25 standard settings that are suitable for various diagnostic fields. These settings consist of four settings for the abdominal region (Abdomen, ABD H.F., ABD D.P., and INTES), six settings for obstetrical applications (OBST, OBST TV, F. Heart, F. Brain, PLACENT, and OBST VOL), two settings for gynecological applications (GYN, and GYN TV), four settings for the cardiac region (Cardiac, Cardiac D.P., P. Heart, and T.E.E.), three settings for the peripheral vessels (Carotid, Vein, and TCD), one setting for superficial organs (SP Part), two settings for the urethral organs (PROSTAT, and Kidney), and three settings for other regions (OPE, ORTHOPE, and Hip JNT).

The system is set at the factory so that when it is switched ON the ABDOM preset is automatically activated.

A preset is called when one of the following operations is performed.

1) When the **PRESET** switch is pressed

2) When the **PRESET** switch is not pressed, and

   2) - 1 NEW PATIENT or PROBE is switched over

   2) - 2 The system is switched ON

[Remark]

In order to call a preset using the method of 2), it is necessary to set ??the condition concerned?? in the Preset menu in advance.

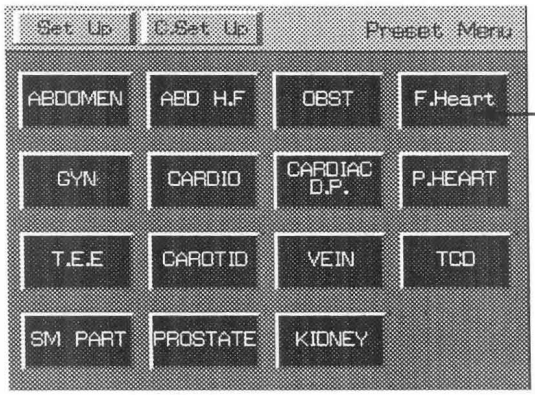
11-5-1. Setting procedure

There are two methods of setting a preset, a method in which the settings of the system is changed by using switches and a method in which the preset is automatically changed by the probe.

(1) Method of changing settings in the system using the PRESET switch

① Press the **PRESET** switch on the operation panel.

→ The following preset menu appears on the touch panel.



The user can register set conditions from 1 to 15. The names registered using Preset Name are displayed on the touch panel.

Fig. Preset menu

② Select a preset from the touch panel.

→ As an example, select **ABDOMEN**.

③ Press the switch.

→ The set conditions registered in **ABDOMEN** are activated.

(2) Method of automatically changing a preset using a probe

[Remark]

In order to use this function, it is necessary to register the probe in advance using **Probe** on **Preset Set Up**.

If you selected a probe that is registered in a preset, that preset will be automatically called.

① Press the **PROBE** switch.

→ The probe menu appears on the touch panel.

② Select the number of the probe that you wish to use.

→ The preset in which the probe is registered is automatically activated.

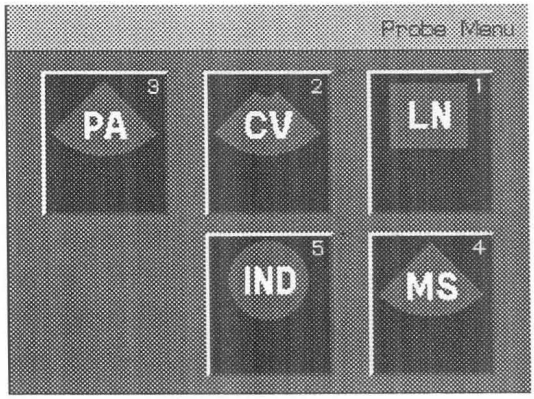


Fig. Probe menu

11-5-2. Registration procedure

(1) Preset Set up Menu

This is a page for setting the preset name, application (diagnostic region), probe, and so on.

① Press the **PRESET** switch.

→ The preset menu appears on the touch panel.

② Press **Set Up** on the touch panel.

→ The **Preset Set Up** menu is displayed.

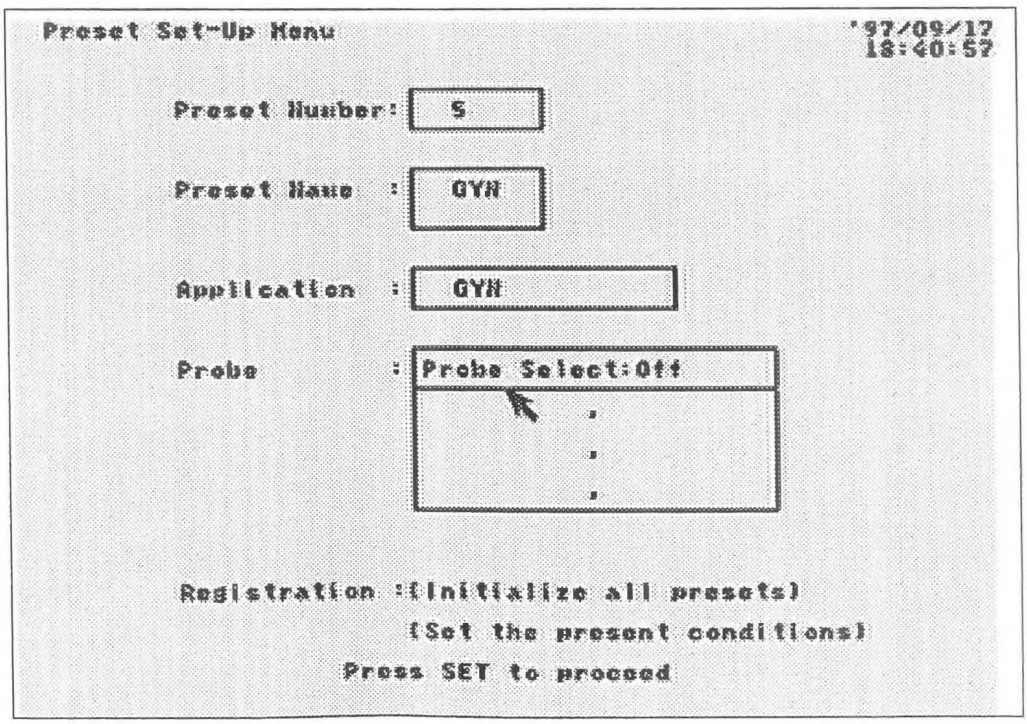


Fig. Preset setup menu

(Description of terms)

Preset Number : Indicates the registration number of a preset. (Corresponds to the number in the preset menu.)

Preset Name : The name of a preset can be registered or changed. It is entered from the keyboard.

Application : Used to select the diagnostic region. You can select one of 15 diagnostic regions.

Probe : You can register up to six probes to be connected to the system.

If you connect a probe that was registered by the automatic calling function, the preset in which the probe is registered will be called. If tthis function is **OFF**, the calling function does not operate.

Registration : Used to register together all of the conditions set using the menu.

To acquire the current status of the system, select "**Set the Preset Conditions**". To initialize all of the set conditions, select "**Initialize All Presets**".

Set Up Menu : This item displays the setup menu which is used to make settings concerning the display, image adjustment, options, measurement, body marks, annotations, Doppler and flow.

③ Move the arrow to the item whose registered contents you wish to change, and press the **SET** switch. A pop-up menu will appear, so carry out registration according to the messages on the screen.

[Remark]

There are two types of pop-up menus, one that permits characters and numbers to be entered from the keyboard, and one that permits a selection to be made from a displayed list.

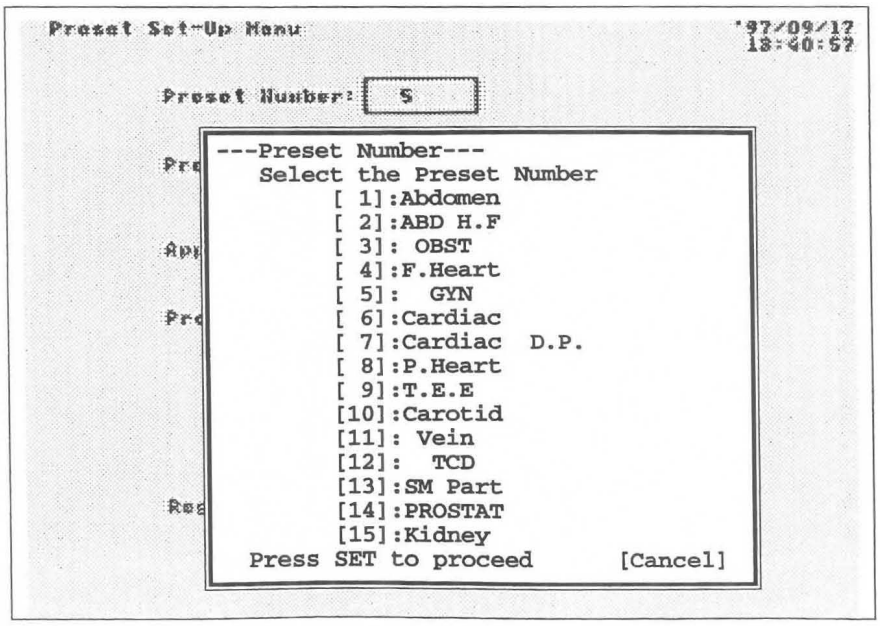
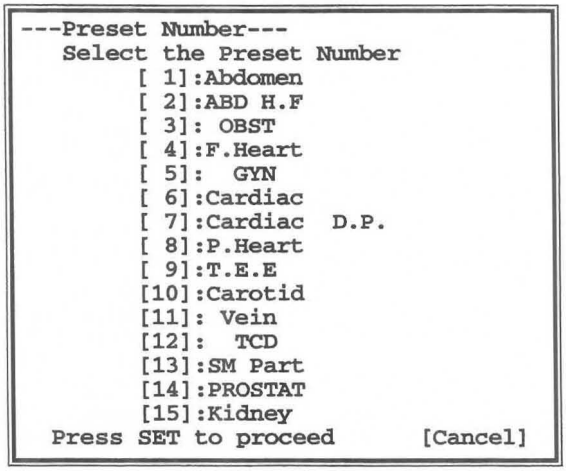


Fig. Preset pop-up menu

<Registering or changing a preset number>

① Move the arrow to the **Preset Number** item, then press the **SET** switch.

→ The 15 preset numbers appear in the pop-up menu.



[Remark]
The currently selected Preset Number is displayed in highlighted form.

② Move the arrow to the item that you wish to set, then press the **SET** switch.
→ The selected item is displayed in highlighted form.

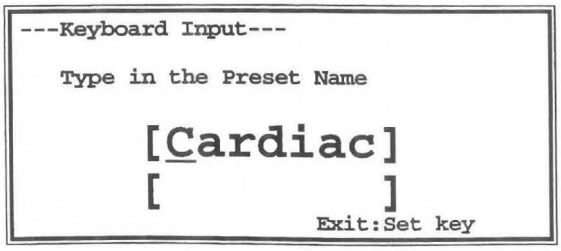
③ Move the arrow to Exit, then press the **SET** switch.
→ The pop-up menu closes.

[Remark]
If you change the **Preset Number**, the set values of the preset whose set conditions were all changed will be newly registered.

<Registering or changing a Preset Name>

① Move the arrow to **Preset Name**, then press the **SET** switch.

→ A pop-up menu appears.



② Enter the preset name.

→ Enter the preset name from the keyboard using up to 7 characters x 2 lines.

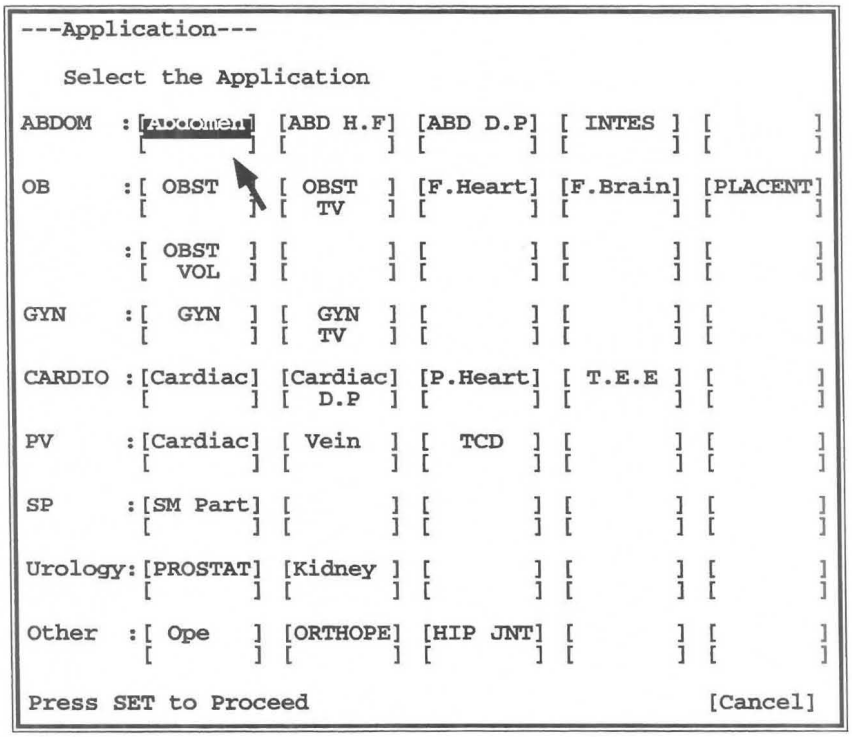
③ Once you have entered the preset name, press the **SET** switch.

→ The pop-up menu closes.

<Registering or changing an application>

① Move the arrow to the **Application** item, then press the **SET** switch.

→ 15 diagnostic regions appear on the pop-up menu.



[Remark]

The **Applications** registered in advance are displayed in highlighted form.

② Move the arrow to the item that you wish to set, then press the **SET** switch.

→ The selected item is displayed in highlighted form.

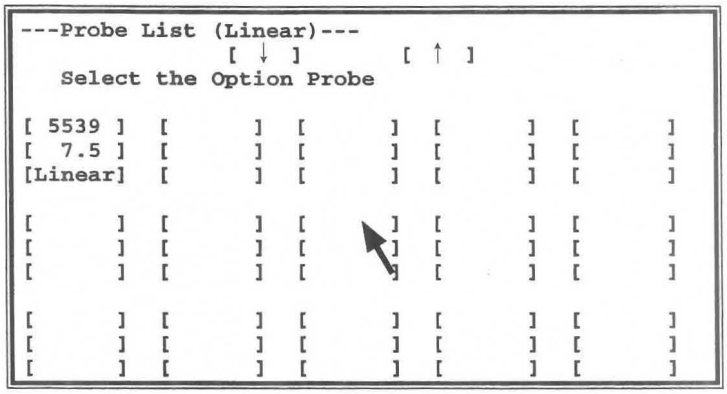
③ Move the arrow to Exit, then press the **SET** switch.

→ The pop-up menu closes.

<Registering or changing a probe>

① Move the arrow to the **Probe** item, then press the **SET** switch.

→ A list of probes that can be connected appears on the pop-up menu.



[Remark]

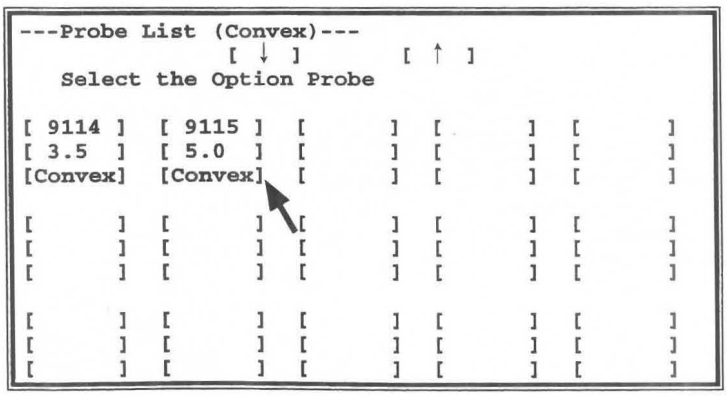
If a probe that has been registered in advance is connected to the system, the corresponding item will appear in highlighted form.

② Move the arrow to the item to be set, then press the **SET** switch.

→ The selected item appears in highlighted form.

[Remark]

You can register up to six probes. The Probe List consists of a total of three pages, so select [↑] or [↓] to feed the pages.



③ Move the arrow to Exit, then press the **SET** switch.

→ The pop-up menu closes.

[Remark]

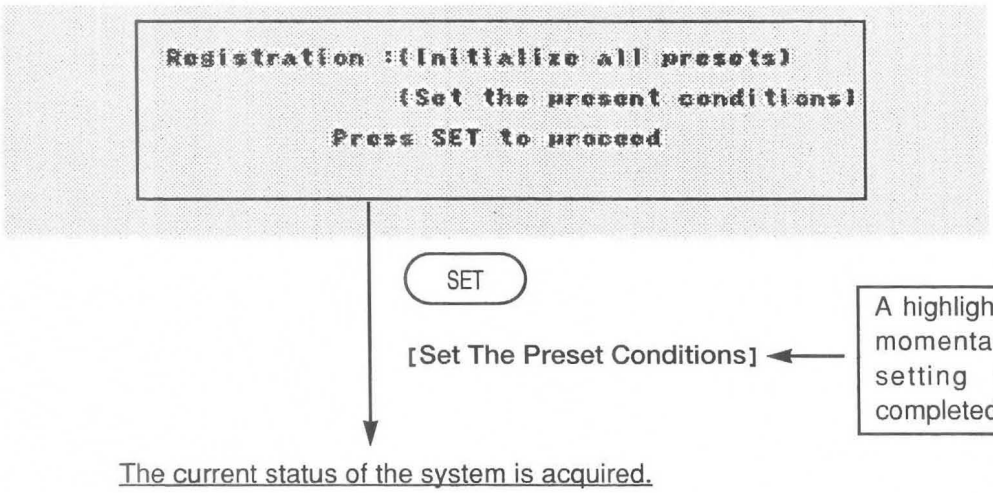
If you select a probe name that is displayed in highlighted form, then press the **SET** switch, the probe registration will be canceled.

<Registration setting>

You can either register together all of the conditions that have been set using the menu, or use all of the conditions that have been set in advance in the system.

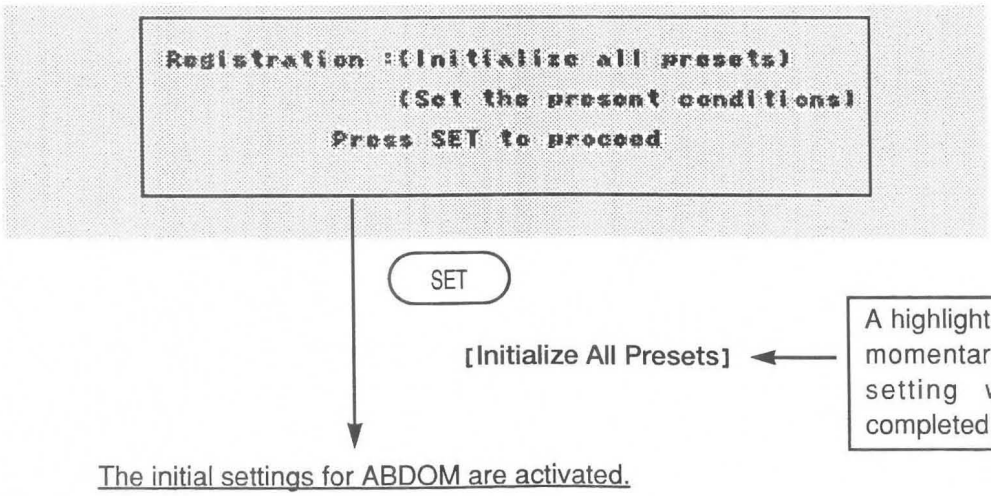
① Move the arrow to **[Set The Preset Conditions]** of **Registration**, then press the **SET** switch.

→ All of the conditions set using the menu are registered together.



② Move the arrow to **[Initialize All Presets]** of **Registration**, then press the **SET** switch.

→ All of the settings revert to the settings initially built into the system.



[Remark]

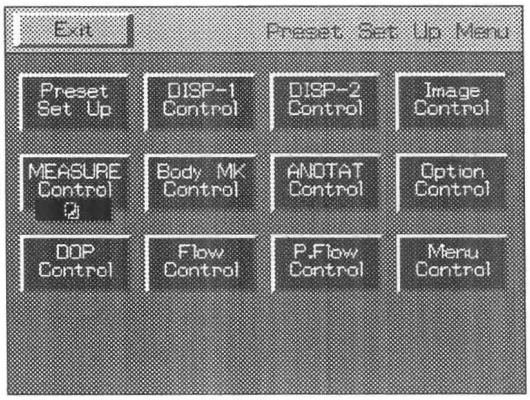
If, for example, Application is Abdomen, Initialize of Abdomen is set; if Application is OB/GYN, Initialize of OB/GYN is set.

(2) Set up Menu

This menu displays the Control screen which is used to make settings concerning the display, image adjustment, measurement, body marks, annotations, options, Doppler, flow, power flow, and menus.

① Press **Set Up**.

→ The menu items for the presets are displayed on the touch panel. The **Set Up Menu** screen appears first on the screen.



Set up Menu : Used to make settings concerning the method of registration.
Display 1 Control : Used to make settings concerning the display.
Display2 Control : Used to make settings concerning the display.
Image Control : Used to make settings concerning image adjustment.
MEASURE Control : Used to make settings concerning measurement.
BodyMK Control : Used to make settings concerning body marks.
ANNOTAT Control : Used to make settings concerning annotations.
Option Control : Used to make settings concerning options.
DOP Control : Used to make settings concerning Doppler.
Flow Control : Used to make setting concerning flow.
P.Flow Control : Used to make settings concerning power flow.
Menu Control : Used to make settings concerning menus.

② Press the desired Control item on the touch panel.

→ As an example, press Display 1 Control. The **Display 1 Control** screen appears on the screen.

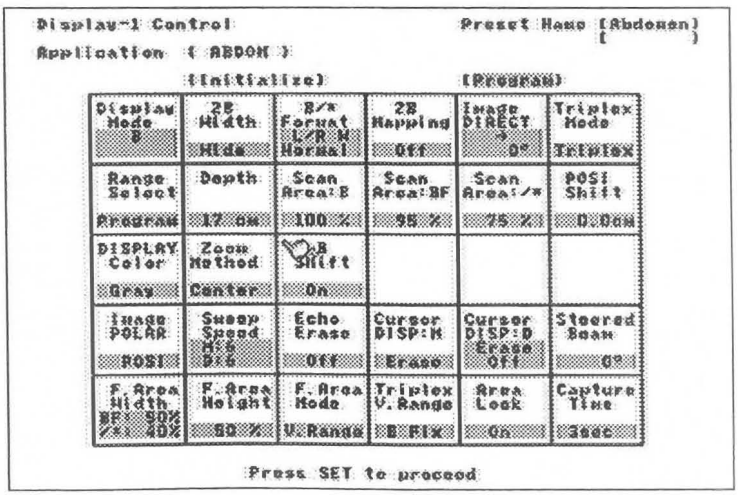


Fig. Display 1 Control

[Remark]
The 3rd and 4th lines of each item indicate the registration status, to enable the current settings to be readily known.

(3) Common Set up Menu

Register the set items that are common to the system. In this system, common settings, and settings concerning annotations and presets are displayed on the Control screen.

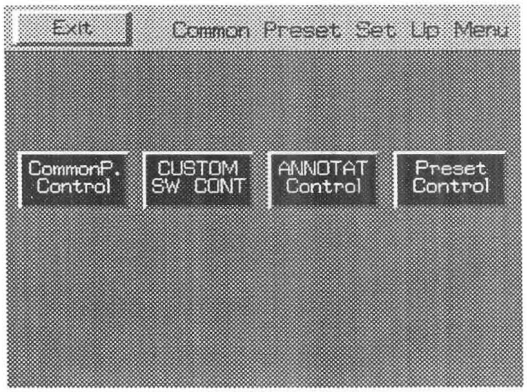
① Press **C. Set Up.**

→ Each menu item of the preset is displayed on the touch panel. The **Common Preset Control** screen appears first on the screen.

C.Preset Control : Used to perform settings concerning common settings.

ANNOTAT Control : Used to perform settings concerning annotations.

Preset Control : Used to perform settings concerning presets.



② Press the desired Control item on the touch panel.

[Remark]
The 3rd and 4th lines of each item indicate the registration status, to enable the current settings to be readily known.

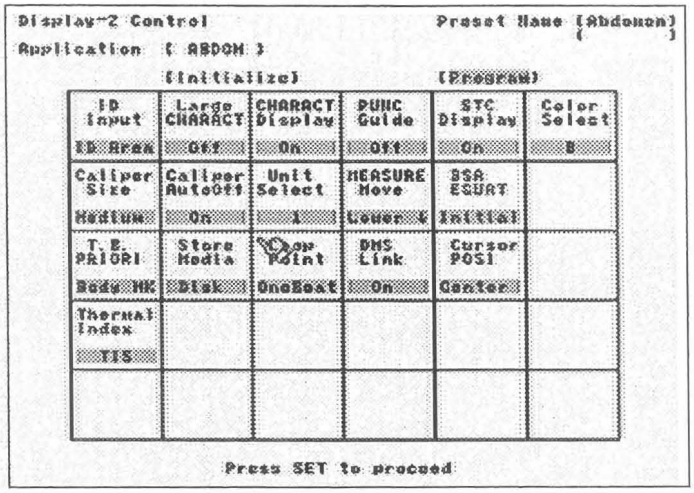
(4) Pop-up menu

Move the arrow to the item that you wish to set on the Control screen concerned, then press the **SET** switch and a pop-up menu appears.

Use the following method to register a setting on the pop-up menu.

① Move the arrow to the item that you wish to set on the Control screen concerned, then press the **SET** switch.

→ A pop-up menu appears on the Control screen.



② Move the arrow to the item to be set.

→ When the arrow enters the settable range, it changes to a mark.

③ If there are several selections, change the setting item using the rotary encoder.

→ The setting item can be selected.

④ Press the **SET** switch.

→ In the case of an alternative choice item, the pop-up menu closes. If it is necessary to make several settings, move the arrow to the **[OK]** or **[Exit]** position, then press the **SET** switch.

[Remark]

To initialize items on the overall Control screen, press **[Initialize]** at top left of the screen without opening the pop-up menu. To initialize the contents of the pop-up alone, press **MARK REF** when the hand mark is displayed, and register the initial values once again.

11-5-3. Display 1 Control

Name	Function	Setting
Display Mode	Sets the display mode. You can add Flow and Power to each mode.	B, 2B, B/M, B/D, Flow, Power
2B Width	Leaves a blank space of 10 characters to the right of each image of a left-right 2B mode display.	Normal
	Displays one image of a left-right 2B display over the entire screen.	Wide
B/* Format	Displays B/sweep mode images as a left-right display.	L/R N
	Displays the sweep mode image of a left-right display over the entire screen.	L/R W
	Displays B/sweep mode images as an upper-lower display.	U/L N
	Displays the B mode image of an upper-lower display at roughly half size.	U/L W
	Displays a Doppler spectrum at less than the vertical width of the sceen.	Normal
	Displays a Doppler spectrum over the entire vertical width.	Wide
2B Maping	Displays the B image of a 2B display on the left side, and leaves the right side blank, after the display is frozen.	Off
	Enables the B mode images of a 2B display to be displayed side by side after the display is frozen.	On
Image DIRECT	Sets the scanning direction.	→
	Sets the scanning direction.	←
	Displays an image without rotating it.	0°
	Displays an image after rotating it 90°.	90°
	Displays an image after rotating it 180°.	180°
	Displays an image after rotating it 270°.	270°
Triplex Mode	When the B/D mode is selected, both the B and D displays are active.	Triplex
	When the B/D mode is selected, a B realtime and D blank display appear.	B-Real
	When the B/D mode is selected, a B frozen and D realtime display appear.	D-Real
Range Select	Deep regions are displayed at a predetermined range interval.	Initial
	The range interval is set between 2 and 24 cm in 1-cm steps.	Program
Range Select (MS/RD)	Deep regions are displayed at a predetermined range interval.	Initial
	The range interval is set between 2 and 24 cm in 1-cm steps.	Program
Depth	Sets the display depth.	2～24cm
Scan Area : B	Sets the B mode scanning range.	25～100% (5%Step)
Scan Area : B(F)	Sets the B mode scanning range used in the B+Flow mode.	25～100% (5%Step)
Scan Area : B(F)/*	Sets the B mode scanning range used in the B+Flow/D mode.	25～100% (5%Step)
POSI Shift	Offsets the B mode in 0.1-mm steps.	-10.0～24.0c

Name	Function	Setting
DISPLAY Color	Displays a B mode or M mode image without adding color.	Gray
	Displays an image after adding a color between blue and orange.	A
	Displays an image after adding blue.	B
	Displays an image after adding a lighter blue than that added when B is selected.	C
	Displays an image after adding orange to it.	D
Zoom Method	When zoom is used, this item enlarges an image with reference to the center.	Center
	Displays a zoom box on the image, then enlarges the image.	Box
B Shift	B follows the shift of the cursor in the B/D mode.	Off
	B does not follow the shift of the cursor in the B/D mode.	On
B&W Steered	The Linear Probe not allows steering.	Off
	The Linear Probe allows steering of both the B mode and Flow mode.	On
Image POLAR	Displays a D mode image as a NEGA display.	NEGA
	Displays a D mode image as a POSI display.	POSI
Sweep Speed	Displays the sweep speed of a M mode image for about 1 sec on the screen.	1 s/p
	Displays the sweep speed of a M mode image for about 1.5 sec on the screen.	1.5 s/p
	Displays the sweep speed of a M mode image for about 2 sec on the screen.	2 s/p
	Displays the sweep speed of a M mode image for about 3 sec on the screen.	3 s/p
	Displays the sweep speed of a M mode image for about 4 sec on the screen.	4 s/p
	Displays the sweep speed of a M mode image for about 6 sec on the screen.	6 s/p
	Displays the sweep speed of a M mode image for about 8 sec on the screen.	8 s/p
Echo Erase	The Echo Erase function is not used.	Off
	Erases deep regions of a M mode image in steps of between 1 and 19 lines.	1～19
Cursor DISP : M	The cursor is erased when a B/M display reverts to a B image.	Erase
	The cursor remains when a B/M display reverts to a B image.	Remain
Cursor DISP : D	The cursor is erased when a B/D display reverts to a B image.	Erase
	The cursor remains when a B/D display reverts to a B image.	Remain
PW SOUND : ON	A PW operation does not take place when a cursor is displayed on a B image.	Off
	A PW operation takes place when a cursor is displayed on a B image.	On
Steered Beam	Sets the steering angle for a D mode display when a linear probe is used.	-30～30°
Sweep Method	Displays the Scroll sweep method at M mode and D mode image.	Scroll
	Displays the Movingbar sweep method at M mode and D mode image.	M bar
F. Area Width : B(F)	Sets the width of the flow area for a B+Flow mode display.	5～100% (5%Step)
F. Area Width : B(F)/*	Sets the width of the flow area for a B+Flow/D mode display. This setting can be made independently of that for the B+Flow mode.	5～100% (5%Step)

Name	Function	Setting
F. Area Mode	The velocity range does not change when the range is changed to permit observation of a deep region. The flow area sometimes becomes smaller in size.	V. Renge
	The velocity range is changed when the range is changed to permit observation of a deep region. The size of the flow area is maintained constant.	F. Area
Triplex V. Renge	The velocity range for a B+Flow/D simultaneous display is the same as that of a B+Flow display. When the velocity range is raused by pressing the range switch, both ranges rise in a 1 : 1 ratio.	Low
	The velocity range of a B+Flow/D simultanuous display is twice that of a B+Flow display. When the velocity range is raused by pressing the range switch, both ranges rise in a 1 : 2 ratio.	High
	In the case of a B+Flow/D simultaneous display, the B+Flow velocity range is constant, and only the velocity range of a D mode image rises.	B Fix
Area Lock	The Flow Area does not follow the sample volume.	Off
	The Flow Area follows the sample volume.	On
Capture Time	The pixel holding time in the capture mode is 1 second.	1sec
	The pixel holding time in the capture mode is 2 second.	2sec
	The pixel holding time in the capture mode is 3 second.	3sec
	The pixels are held in the capture mode until the image is frozen.	CONTI

11-5-4. Display 2 Control

Name	Function	Setting
ID Input	When the ID switch is pressed, an underline cursor appears on the screen.	ID Area
	When the ID switch is pressed, the screen changes to one that can display BSA.	ID BSA
	When the ID switch is pressed, the screen changes to one that can display GA.	ID GA
	When the ID switch is pressed, the screen changes to one that can display PSA.	ID UROL
Large CHARACT	The characters used in a comment are standard size.	Off
	The characters used in a comment are 4 times normal size.	On
CHARACT Display	Erases the automatic display in the image display area.	Off
	Displays the automatic display in the image display area.	On
PUNC Guide	Does not display puncture guide lines.	Off
	Display puncture guide lines.	On
STC Display	Does not display the set status of STC on the screen.	Off
	Display the set status of STC on the screen.	On
Color Select	Selects the color of characters and graphics on the screen.	A～E
Caliper Size	Small size measurement calipers are displayed.	Small
	Standard size measurement calipers are displayed.	Medium
	Large size measurement calipers are displayed.	Large
Caliper Auto Off	The calipers are not erased when the image is frozen.	Off
	The calipers are erased when the image is frozen.	On
Unit Select	Displays distance in cm, M velocity in cm/s, and D velocuty in cm/s.	1
	Displays distance in cm, M velocity in cm/s, and D velocuty in m/s.	2
	Displays distance in mm, M velocity in mm/s, and D velocuty in cm/s.	3
	Displays distance in mm, M velocity in mm/s, and D velocuty in m/s.	4
MEASURE Move	Displays the results of application measurements as a list in the upper direction.	Upper
	Displays the results of application measurements in the right direction.	Right
	Displays the results of application measurements as a list in the lower direction.	Lower
	Displays the results of application measurements in the left direction.	Left
	Distance the basic measurement results from bottom to top.	↑
	Distance the basic measurement results from top to bottom.	↓
BSA EQUAT	BSA is computed using the standard computation method in the system.	Initial
	BSA is computed using a method customized by the user.	Program Note3)
Back Gray	Does not displays gray background.	Off
	Displays gray background behind a result of measurement.	On

Name	Function	Setting
T.B. PRIORI	The trackball is linked to the Search function when an image is frozen.	Search
	The trackball is linked to the Body MK function.	Body MK
	The trackball is linked to the Comment function.	Comment
	The trackball is not linked to the function.	UNCHANGE
	When an image is frozen, the trackball is used for search operations, and the touch panel is used for measurement.	Search+Meas
Store Media	A frozen image can be recorded to a MO in the DMS using the STORE switch.	Disk (Single)
	A moving image can be recorded to a MO in the DMS using the STORE switch.	Disk (Multi)
	A frozen image can be recorded to an external server using the STORE switch.	NET (Single)
	A moving image can be recorded to an external server using the STORE switch.	NET (Multi)
	Images are recorded to the cine memory of the system when the STORE switch is pressed.	Memory
Loop Point	Time phase setting takes place automatically at the R wave interval.	One Beat
	Time phase setting takes place at the first and last frames.	Manual
DMS Link	DMS is not used with this preset.	Off
	DMS can be used with this preset.	On
Cursor POSI	When the cursor is displayed, it appears at the left side.	Left
	When the cursor is displayed, it appears at the center.	Center
	When the cursor is displayed, it appears at the right side.	Right
Thermal Index	The acoustic power index is displayed as a soft tissue coefficient.	TIS
	The acoustic power index is displayed as a bone coefficient.	TIB
	The acoustic power index is displayed as a cranium coefficient.	TIC

11-5-5. Image Control

Name	Function	Setting
DVA	Sets the sending power for the B, B/M and M modes.	0～100% (1%Step)
	Sets the sending power for modes other than the above.	0～100% (1%Step)
B, M Gain	Sets the gain for the B mode.	B : 30～90dB
	Sets the gain for the M mode. M sets the correction value of B.	M : -30～30dB
Auto F. Type	When auto focus is used, the positions of the focus points are held even if the range is changed.	Succeed
	When auto focus is used, the focus points return to the auto positions if the range is changed.	Reset
Focus B(CV/LN)	Displays a B mode image using 1-point auto focus.	Auto 1
	Displays a B mode image using 2-point auto focus.	Auto 2
	Displays a B mode image using special 2-point auto focus.	Auto 2(α)
	Displays a B mode image using 3-point auto focus.	Auto 3
	Focusing takes place at the positions set by the user.	Manual
Focus B(MS)	Displays a B mode image using 1-point auto focus.	Auto 1
	Displays a B mode image using 2-point auto focus.	Auto 2
	Focusing takes place at the positions set by the user.	Manual
Focus M(CV/LN)	Displays an M mode image using auto focus.	Auto
	Focusing takes place at the positions set by the user.	Manual
Focus M(MS)	Displays an M mode image using auto focus.	Auto
	Focusing takes place at the positions set by the user.	Manual
Focus D/Flow	Displays a D/Flow using auto focus.	Auto
	Focusing takes place at the positions set by the user.	Manual
Focus B(PA)	Displays a B mode image using 1-point auto focus. This setting is intended exclusively for an electronic sector probe.	Auto 1
	Displays a B mode image using 2-point auto focus.	Auto 2
	Displays a B mode image using special 2-point auto focus.	Auto 2(α)
	Displays a B mode image using 3-point auto focus.	Auto 3
	Focusing takes place at the positions set by the user.	Manual
Focus M(PA)	Displays an M mode image using auto focus.	Auto
	Focusing takes place at the positions set by the user.	Manual
Focus D/Flow	Displays a D/Flow using auto focus.	Auto
	Focusing takes place at the positions set by the user.	Manual
Line Density	Sets a low scanning line density for the B mode.	Low
	Sets a standard scanning line density for the B mode.	Medium
	Sets a high scanning line density for the B mode.	High
Line Density (MS/RD)	Sets a low scanning line density for the B mode.	Low
	Sets a standard scanning line density for the B mode.	Medium
	Sets a high scanning line density for the B mode.	High
High Frame	Limits the frame rate for short distances.	Off
	Does not limit the frame rate for short distances.	On

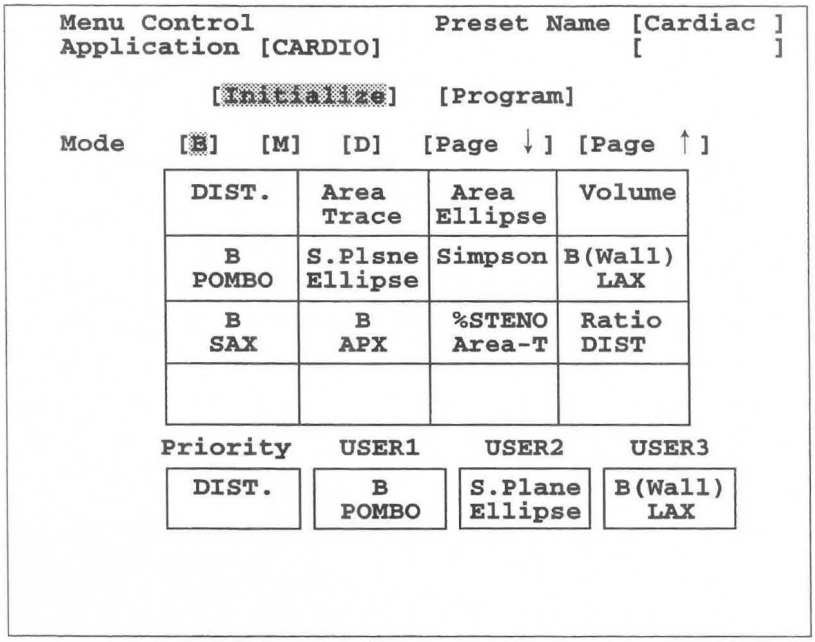
Name	Function	Setting
Image/F Select	The probe operates at a high frequency.	RESO
	The probe operates at a slightly high frequency.	STD 1
	The probe operates at a slightly low frequency.	STD 2
	The probe operates at a low frequency.	PENET
IP Select (B)	The frame correlation, B Contrast, B AGC and B Relief settings are registered in eight IP Select patterns.	1～8
IP Select (M)	M-SMOOTH, M Contrast, M AGC and M Relief settings are registered in eight IP Select patterns.	1～8
Post Process	The brightness characteristics of the display are not modified in any way.	Linear
	Echoes that are lower than the zone whose brightness is to be expanded are displayed at minimum brightness, and high echoes are displayed at maximum brightness.	Slope 1 (0～63)
	Echoes that are lower than the zone whose brightness is to be expanded and also high echoes are displayed at minimum brightness.	Slope 2 (0～63)
	The change in brightness of echoes that are lower than the zone whose brightness is to be expanded and also high echoes is compressed to 1/4.	Slope 3 (0～63)
	Echoes that are lower than the set level are displayed at the minimum brightness.	Reject (0～63)
View Gamma	The brightness characteristics of the display are not modified in any way.	Linear
	Used for cardiac diagnosis. This curve has slightly weak brightness characteristics.	A
	Used for cardiac diagnosis. This curve has slightly strong brightness characteristics.	B
	Used for performing diagnosis in the abdominal region. This curve has slightly weak brightness characteristics.	C
	Used for performing diagnosis in the abdominal region. This curve has slightly strong brightness characteristics.	D
HORIZON SMOOTH	Inter-line correlation is not applied.	Off
	Weak inter-line correlation is not applied.	Low
	Strong inter-line correlation is not applied.	High
TV Sync	Scanning is not set to the TV sync interval.	TV SYNC : Off
	Scanning is set to the TV sync interval.	TV SYNC : On
	The image data is continuously nenewed while scanning is taking place.	Ping Pong : Off
	The image data for one frame is renewed while scanning ends.	Ping Pong : On
FTC	A B mode image is not displayed with edge enhancement.	Off (Bモード用)
	A B mode image is displayed with edge enhancement.	On (Bモード用)
	A M mode image is not displayed with edge enhancement.	Off (Mモード用)
	A M mode image is displayed with edge enhancement.	On (Mモード用)
Image Effect	The smoothness of a B mode image is standard.	Off
	The smoothness of a B mode image is improved.	On
Beam Process	In the B mode, multiple beams are received simultaneously and used to from an image.	Multi
	Beam processing is not performed.	Single

11-5-6. MEASURE Control

MEASURE Control of MEASURE Control is an item that makes settings concerning measurement.

It changes the assignment of the measurement menu that is displayed when the **MEASUREMENT** switch is pressed.

When you press **MEASURE Control** on the touch panel, then select **Menu**, the following screen appears.



[Remark]

Standard settings for diagnostic fields set using **Application** in the **Preset Set up Menu** screen are assigned to the measurement item boxes.

[Remark]

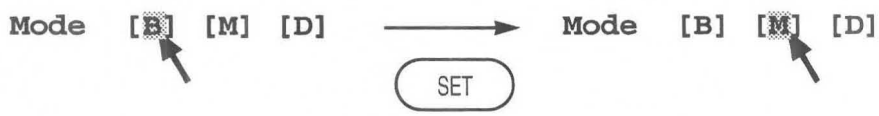
If you select **Exit** on the touch panel, the **Preset Set up Menu** screen re-appears.

Contents of Menu Control

(1) MODE

Assign the measurement menu for each mode. Move the arrow to [B], [M] or [D] of MODE, then press the SET switch. The menu assignment screen for the selected mode will appear.

For example, if you select [M], the screen will change as shown on the next page.



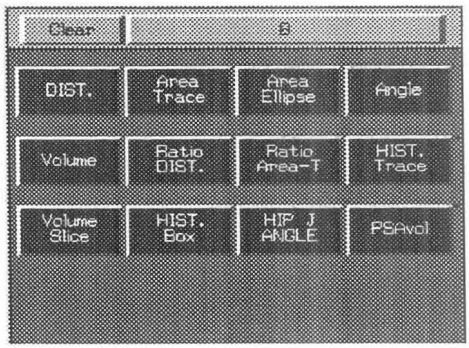
(2) Assigning a measurement menu

In the case of the B mode alone, you can register up to two screens for a measurement menu, and register a measurement at an arbitrary position on the touch panel.

(Menu Control)

DIST.	Area Trace	Area Ellipse	Angle
Volume	Ratio DIST	Ratio Area-T	HIST. Trace
Volume Slice	HIST. Box	HIP J ANGLE	PSAvol

MEASUREMENT (Measurement menu)

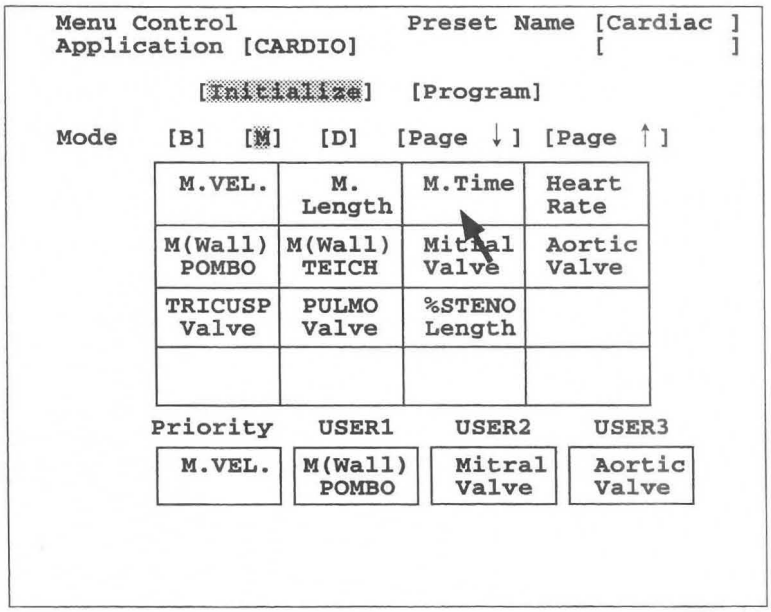


Corresponds to the measurement menu

＜Method of making or changing a registration＞

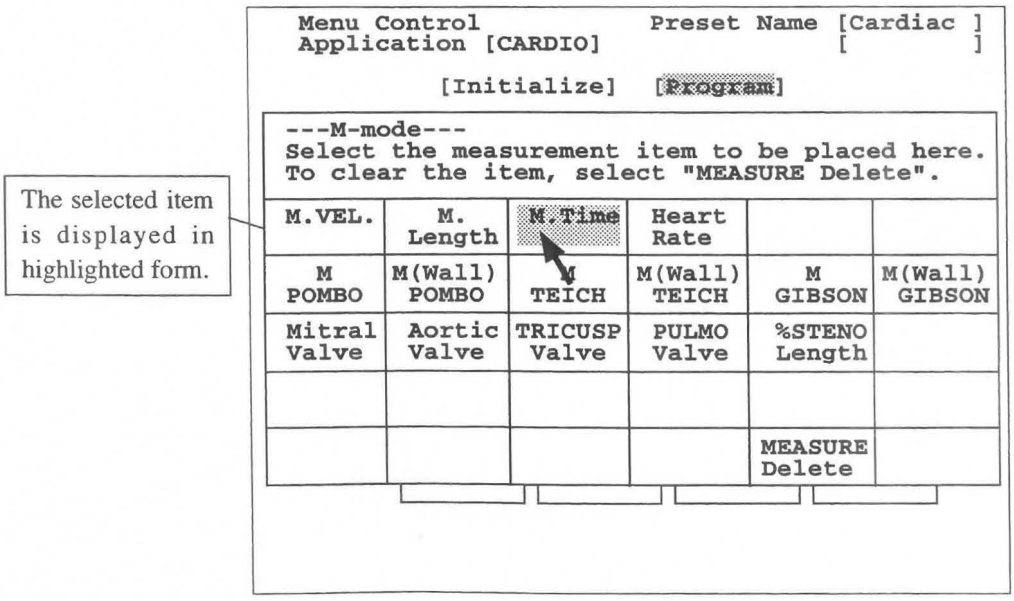
The following is the procedure for making or changing a registration, using the M mode measurement menu as an example.

① Using the trackball, move the arrow to the measurement item to be registered or changed.



② Press the **SET** switch.

→ A list of registerable items is displayed.



③ Move the arrow to the measurement item to be registered, then press the **SET** switch.

→ The list disappears, and the selected measurement item is registered. If you do not wish to register anything, select "**MEASURE DELETE**".

(3) Priority

The measurement item assigned to the leftmost position on the first line of measurement item box the **Menu Control** screen is called **Priority**. It is displayed at the leftmost position on the first page of the measurement menu. When you press a caliper mark switch, the item assigned to **Priority** starts.

<Method of making or changing a registration>

① Using the trackball, move the arrow to the left edge of the first line of the measurement item box, then press the **SET** switch.

→ The following list of registerable measurement items appears.

---M-mode--- Select the measurement to which priority is given.					
M.VEL.	M. Length	M.Time	Heart Rate		
M POMBO	M(Wall) POMBO	M TEICH	M(Wall) TEICH	M GIBSON	M(Wall) GIBSON
Mitral Valve	Aortic Valve	TRICUSP Valve	PULMO Valve	%STENO Length	

[Remark]

You cannot make **Priority** blank, so "**MEASURE DELETE**" is not displayed.

② Move the arrow to the measurement item that you wish to register, then press the **SET** switch.

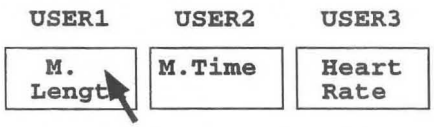
→ The list disappears, and the selected item is registered at the leftmost position of the first page of the measurement menu and also the **Priority** box.

(4) USER switch

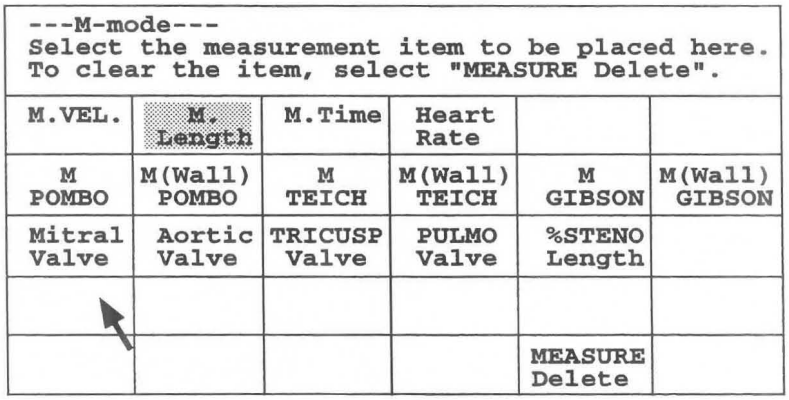
You can register one of the measurement items assigned to the measurement menu, in the **USER** switch. If you press the **USER 1**, **USER 2** or **USER 3** switch, the item assigned to that switch starts.

<Making or changing a registration>

① Using the trackball, move the arrow to the **USER** switch box that you wish to change, then press the **SET** switch.



→ The following list of registerable measurement items appears.



[Remark]

The measurement items that can be registered in the **USER** switch are limited to those that are assigned to the measurement menu in advance. Items that are not in the measurement menu are displayed.

② Move the arrow to the item to be registered, then press the **SET** switch.

→ The list of registerable items and the messages disappear, and the selected item is registered in the **USER** switch.

(5) Standard settings for each diagnostic field

Standard settings for the measurement menu are displayed in the sequence B, M and D mode, for each diagnostic field.

Standard settings for [ABDOM]

★B mode

DIST.	Area Trace	Area Ellipse	Angle
Volume	Ratio DIST	Ratio Area-T	

Priority	USER1	USER2	USER3
DIST.	Area Trace	Area Ellipse	Volume

★M mode

M.VEL.	M. Length	M.Time	Heart Rate

Priority	USER1	USER2	USER3
M.VEL.	M. Length	M.Time	Heart Rate

★D mode

D.VEL.	ACCEL.	Mean VEL.	D.Time
RESIST. IDX.	PULSA. IDX.	Flow Volume	SV/CO
Ratio Trace	Heart Rate		

Priority	USER1	USER2	USER3
D.VEL.	RESIST. IDX.	PULSA. IDX.	Flow Volume

Standard settings for [OB]

★B mode

DIST.	GS Tokyo U	CRL Tokyo U	BPD Tokyo U
FL Tokyo U	LV Tokyo U	F.W. Tokyo U	Area Trace
Area Ellipse	Angle	Volume	

Priority	USER1	USER2	USER3
DIST.	BPD Tokyo U	FL Tokyo U	F.W. Tokyo U

★M mode

M.VEL.	M. Length	M.Time	Heart Rate
M POMBO	M TEICH		

Priority	USER1	USER2	USER3
M.VEL.	M POMBO	M TEICH	Heart Rate

★D mode

D.VEL.	ACCEL.	Mean VEL.	D.Time
RESIST. IDX.	PULSA. IDX.	Ratio Trace	Heart Rate

Priority	USER1	USER2	USER3
D.VEL.	RESIST. IDX.	PULSA. IDX.	ACCEL.

Standard settings for [CARDIO]

★B mode

DIST.	Area Trace	Area Ellipse	Volume
B POMBO	S.Plane Ellipse	Simpson	B(Wall) LAX
B SAX	B APX	%STENO Area-T	Ratio DIST.

Priority	USER1	USER2	USER3
DIST.	B POMBO	S.Plane Ellipse	B(Wall) LAX

★M mode

M.VEL.	M. Length	M.Time	Heart Rate
M(Wall) POMBO	M(Wall) TEICH	Mitral Valve	Aortic Valve
TRICUSP Valve	PULMO Valve	%STENO Length	

Priority	USER1	USER2	USER3
M.VEL.	M(Wall) POMBO	Mitral Valve	Aortic Valve

★D mode

D.VEL.	P-GRAD.	P1/2T (VA)	Mean VEL.
ACCEL.	D.Time	RESIST. IDX.	PULSA. IDX.
LV IN Flow	LV EJ Flow-1	RV IN Flow	RV EJ Flow-1
Ratio Trace	SV/CO	Heart Rate	

Priority	USER1	USER2	USER3
D.VEL.	LV IN Flow	LV EJ Flow-1	RV EJ Flow-1

Standard settings for [PV]

★B mode

DIST.	Area Trace	Area Ellipse	Angle
Volume	Ratio Area-T	Ratio DIST.	
%STENO Area	%STENO Diam.		

Priority	USER1	USER2	USER3
DIST.	Ratio Area-T	%STENO Area	Ratio DIST.

★M mode

M.VEL.	M. Length	M.Time	Heart Rate
M POMBO	M TEICH	%STENO Length	

Priority	USER1	USER2	USER3
M.VEL.	%STENO Length	M Length	Heart Rate

★D mode

CCA	ICA	ECA	VERT.
S/D Ratio	Ratio D.VEL.	D.VEL.	ACCEL.
D.VEL. kHz	Flow Volume	Mean VEL.	
RESIST. IDX.	PULSA. IDX.		

Priority	USER1	USER2	USER3
CCA	ICA	ECA	S/D Ratio

Standard settings for [OTHER]

★B mode

DIST.	Area Trace	Area Ellipse	Angle
Volume	Ratio DIST.	Ratio Area-T	

Priority	USER1	USER2	USER3
DIST.	Area Trace	Area Ellipse	Volume

★M mode

M.VEL.	M. Length	M.Time	Heart Rate
M POMBO	M TEICH		

Priority	USER1	USER2	USER3
M.VEL.	M POMBO	M TEICH	Heart Rate

★D mode

D.VEL.	ACCEL.	Mean VEL.	D.Time
RESIST. IDX.	PULSA. IDX.	P-GRAD.	P1/2T (VA)
Flow Volume	SV/CO	D.VEL. kHz	

Priority	USER1	USER2	USER3
D.VEL.	RESIST. IDX.	PULSA. IDX.	Flow Volume

(6) List of registerable items

A list of registerable items and also messages are displayed for each mode.

★B mode
1st page

---B-mode--- Select the measurement item to be placed here. To clear the item, select "MEASURE Delete".					
DIST.	Area Trace	Area Ellipse	Volume	Volume Biplane	Angle
GS Tokyo U	CRL Tokyo U	BPD Tokyo U	FL Tokyo U	LV Tokyo U	F.W. Tokyo U
APTD	TTD	AC	FTA	AFI	
				MEASURE Delete	Next Page

[Remark]

GA-Table set using OB-PROG, the Fetal Weight formula, and parameters are displayed.

★B mode
2nd page

---B-mode--- Select the measurement item to be placed here. To clear the item, select "MEASURE Delete".					
DIST.	Area Trace	Area Ellipse	Volume	Volume Biplane	Angle
B POMBO	B(Wall) POMBO	B TEICH	B(Wall) TEICH	B Gibson	B(Wall) Gibson
S.Plane Ellipse	Biplane Ellipse	Bullet	MOD Simpson	Simpson	
B LAX	B(Wall) LAX	B SAX	B APX	%STENO DIST.	%STENO Area-T
Ratio DIST.	Ratio Ellipse	Ratio Area-T		MEASURE Delete	Next Page

★B mode
3rd page

---B-mode--- Select the measurement item to be placed here. To clear the item, select "MEASURE Delete".					
DIST.	Area Trace	Area Ellipse	Volume	Volume Biplane	Angle
%STENO Area	%STENO Diam				
				MEASURE Delete	Next Page

★B mode

4th page

---B-mode--- Select the measurement item to be placed here. To clear the item, select "MEASURE Delete".					
Volume Slice					
HIST. Trace	HIST. Box				
HIP-J ANGLE					
				MEASURE Delete	Next Page

★M mode

---M-mode--- Select the measurement item to be placed here. To clear the item, select "MEASURE Delete".					
M.VEL.	M. Length	M.Time	Heart Rate		
M POMBO	M(Wall) POMBO	M TEICH	M(Wall) TEICH	M Gibson	M(Wall) Gibson
Mitral Valve	Aortic Valve	TRICUSP Valve	PULMO Valve	%STENO Length	
				MEASURE Delete	Next Page

★D mode

1st page

---D-mode--- Select the measurement item to be placed here. To clear the item, select "MEASURE Delete".					
DIST.	ACCEL.	Mean VEL.	P1/2T (VA)	D.Time	P-GRAD.
RESIST. IDX.	PULSA. IDX.	D.VEL. kHz	Heart Rate		
LV IN FLOW	LV EJ Flow-1	LV EJ Flow-2	RV IN Flow	RV EJ Flow-1	RV EJ Flow-2
Ratio Trace	Ratio D.VEL.	SV/CO	Flow Volume		
				MEASURE Delete	Next Page

★D mode
2nd page

---D-mode--- Select the measurement item to be placed here. To clear the item, select "MEASURE Delete".					
D.VEL.	ACCEL.	Mean VEL.	P1/2T (VA)	D.Time	P-GRAD.
RESIST. IDX.	PULSA. IDX.	D.VEL. kHz	Heart Rate		
CCA	ICA	ECA	VERT.	S/D Ratio	
				MEASURE Delete	Next Page

[Remark]

The message that appears during a **Priority** change procedure is "Select the measurement to which priority is given".

(7) Setting Auto Trace

The measurement items that support auto trace are as follows:

Mean VEL., P. I, Ratio Trace, SV/CO, Flow Volume, LVIF, LVEF1, 2, RVIF, RVEF1, 2

When you select **MEASURE Control** in the Set Up Menu of Preset, a sub-menu appears, so select **D. Trace**.

```
[Doppler Auto Trace Program]
                        Preset Name  [Cardiac]
                                     [       ]
   Application [CARDIO]

              [Initialize]              [Program]

                  Method Position Level   SMOOTH Rate
Mean VEL.         [Auto] [Peak ] [-22dB] [No   ] [1/1]
PULSA. IDX.       [Auto]  Peak   [-22dB] [No   ] [1/1]
Ratio Trace       [Auto]  Peak   [-22dB] [No   ] [1/1]
SV/CO             [Auto]  Peak   [-22dB] [No   ] [1/1]
Flow Volume       [Auto] [Peak ] [-22dB] [No   ] [1/1]
LV IN Flow        [Auto]  Peak   [-22dB] [No   ] [1/1]
LV EJ Flow-1      [Auto]  Peak   [-22dB] [No   ] [1/1]
LV EJ Flow-2      [Auto]  Peak   [-22dB] [No   ] [1/1]
RV IN Flow        [Auto]  Peak   [-22dB] [No   ] [1/1]
RV EJ Flow-1      [Auto]  Peak   [-22dB] [No   ] [1/1]
RV EJ Flow-2      [Auto]  Peak   [-22dB] [No   ] [1/1]
LV AV STENO-1     [Auto]  Peak   [-22dB] [No   ] [1/1]
LV AV STENO-2     [Auto]  Peak   [-22dB] [No   ] [1/1]
RV AV STENO-1     [Auto]  Peak   [-22dB] [No   ] [1/1]
RV AV STENO-2     [Auto]  Peak   [-22dB] [No   ] [1/1]
D.Trace1          [Auto] [Peak ] [-22dB] [No   ] [1/1]
  [D.Trace1]
   [ Vp  ] [PGRAD] [Vmean] [MGRAD] [ VTI ] [ F-T ]
         Page[ ↓ ]    Page[ ↑ ]
 Use <TRACKBALL> and <SET> key for the Slection.
```

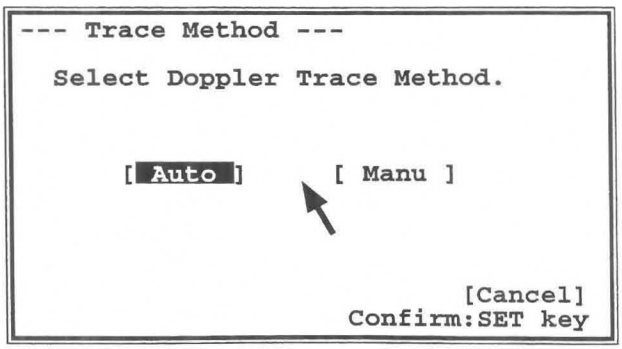
```
[Doppler Auto Trace Program]
                        Preset Name  [Cardiac]
                                     [       ]
   Application [CARDIO]

              [Initialize]              [Program]

                  Method Position Level   SMOOTH Rate
CCA               [Auto] [Peak ] [-22dB] [No   ] [1/1]
ICA               [Auto] [Peak ] [-22dB] [No   ] [1/1]
ECA               [Auto] [Peak ] [-22dB] [No   ] [1/1]
BIFUR.            [Auto] [Peak ] [-22dB] [No   ] [1/1]
VERT.             [Auto] [Peak ] [-22dB] [No   ] [1/1]
S/D RATIO         [Auto] [Peak ] [-22dB] [No   ] [1/1]
U/L EXTREM.       [Auto]  Peak   [-22dB] [No   ] [1/1]
Uterus            [Auto]  Peak   [-22dB] [No   ] [1/1]
Rt./Lt. Ovary     [Auto]  Peak   [-22dB] [No   ] [1/1]
GYN Other1        [Auto]  Peak   [-22dB] [No   ] [1/1]
GYN Other2        [Auto]  Peak   [-22dB] [No   ] [1/1]
GYN Other3        [Auto]  Peak   [-22dB] [No   ] [1/1]
Uterine           [Auto]  Peak   [-22dB] [No   ] [1/1]
Umbilical         [Auto]  Peak   [-22dB] [No   ] [1/1]
MCA               [Auto]  Peak   [-22dB] [No   ] [1/1]
Aortic            [Auto]  Peak   [-22dB] [No   ] [1/1]
OB Other1         [Auto]  Peak   [-22dB] [No   ] [1/1]
OB Other2         [Auto]  Peak   [-22dB] [No   ] [1/1]
         Page[ ↓ ]    Page[ ↑ ]
 Use <TRACKBALL> and <SET> key for the Slection.
```

<Setting the auto trace function (Method)>

Move the arrow to **[Method]** of the measurement item for which you wish to set the auto trace function, then press the **SET** switch, and the following pop-up menu appears.

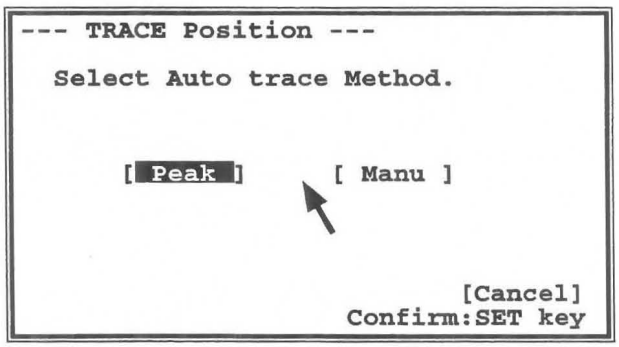


If you select **[Auto]**, the auto trace function is selected.
When you select a measurement item that supports the Auto Trace function, the auto trace function starts automatically. If you select **[Manu]**, the manual trace function is set.
In this case, the auto trace function does not start even if you select a measurement item that supports auto trace.
You can exit from the pop-up menu by pressing the **SET** switch.

[Remark]
If you wish to change over from auto trace to manual trace, press the caliper mark switch that lit when the auto trace function was activated, and the manual trace function is activated instead.

<Setting the trace mode (Position)>

Set the kind of auto trace that you wish to use.
Move the arrow to **[Position]** of the measurement item whose trace mode setting you wish to change, then press the **SET** switch, and the following pop-up menu appears.



If you select **[Peak]**, points corresponding to the flow velocity value that has the maximum power in one time phase, or the flow velocity value that has a power of *dB less than the maximum power, are traced.
If you select **[Mean]**, the computed mean values weighted by the power corresponding to the measured flow velocity are traced.

[Remark]
The measurement items on which you can use **[Mean]** are **Mean VEL.** and **Flow Volume.** Set other measurement items to "**Peak**".

[Remark]
If you change **Position**, the above trace point levels are initialized, and if you select **Mean**, the Level box display disappears.
You can exit from the pop-up menu by pressing the **SET** switch.

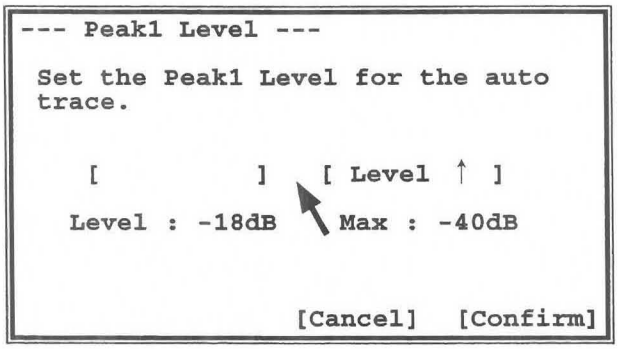
<Setting the trace level (Level)>

Set the trace level.

[Peak]

By using [Peak 1], you can change the trace level between 0 dB and -40 dB.

Move the arrow to the **[Peak 1]** box of the item whose trace level setting you wish to change, then press the **SET** switch, and the following pop-up menu appears.



To lower the level, move the arrow to [Level ↓], or to raise the level, move the arrow to [Level ↑], then press the **SET** switch.

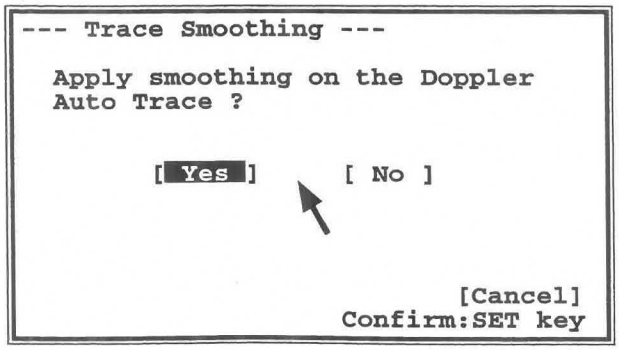
To exit from the pop-up menu, move the arrow to [Confirm], then press the **SET** switch.

<Setting smoothing (Smooth)>

Set the smoothness of the trace line.

Move the arrow to the **[Smooth]** box of the measurement item whose smoothing setting you wish to change, then press the **SET** switch, and the following pop-up menu appears.

If you move the arrow and select [Yes], correlation is applied to mutually adjacent spectrum waveforms, resulting in a smooth trace.



[Remark]

If you select [Yes], the image will be a less faithful representation of the actual data compared to when [No] is selected, and the measurement accuracy will tend to fall.

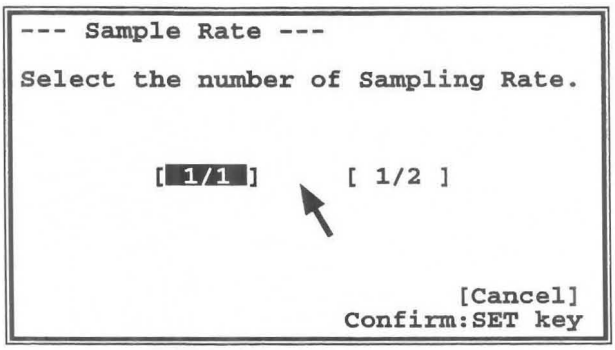
You can exit from the pop-up menu by pressing the **SET** switch.

<Setting the sample (Sample)>

You can set the trace speed.

Move the arrow to the **[Sample]** box of the measurement item whose sample setting you wish to change, then press the **SET** switch, and the following pop-up menu appears.

The sampling rate increases in the sequence [1/1], [1/2].



[Remark]

If you select [1/2], the sampling rate will be less than that when [1/1] is selected. Consequently, the image will be a less faithful representation of the actual data, and the measurement accuracy and also the detection accuracy of the peak points will tend to fall.

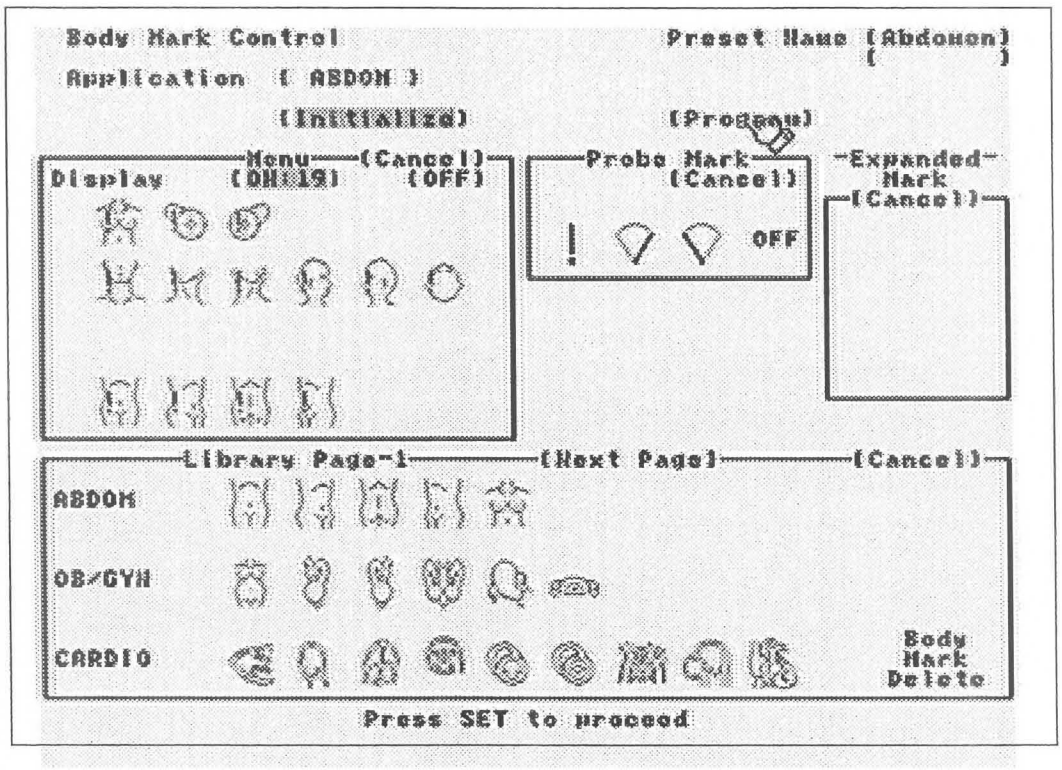
It is recommended that you set the sampling rate to [1/1] when measuring the Doppler waveform of a pulsating flow.

You can exit from the pop-up menu by pressing the **SET** switch.

11-5-7. Body MK Control

Body Mark Control is used to register or change settings related to body marks. For details, refer to 10-1 "Method of Operating Switches".

① When you select **BodyMK** from the touch panel, the following screen appears.



<Method of making or changing a registration>

② Using the trackball, move the arrow to **Program**, then press the **SET** switch.

→ The arrow moves to the **Menu** item.

③ Set Display to On or Off, then press the **SET** switch.

→ Set the body mark display to be registered. Select the mark by first selecting On then setting the numerical value with the rotary encoder. The numerical value is the same as the position of the touch panel. When the top left step is 1, the bottom right step is 24.

④ Move the arrow to the body mark to be registered or changed, then press the **SET** switch.

→ The position of the mark is the same as the position on the touch panel. Move the arrow to the **Library** item.

⑤ Move the body mark to be registered, then press the **SET** switch.

→ The selected body mark is displayed in the **Expand Mark** box at the same size as that when it is displayed in an image. Move the arrow to the **Probe Mark** item.

[Remark]

You can also display another mark using **Next Page** of **Library**. Marks made by the user are displayed on the last page of **Next Page**.

⑥ Move the arrow to the probe mark to be registered, then press the **SET** switch.

→ The arrow becomes a probe mark which moves into the **Expand Mark** box.

[Remark]

When you do not wish to display a probe mark, select the rightmost **OFF**.

⑦ Set the position and angle of the probe mark.

→ When you move the trackball, the position of the probe mark changes, and when you rotate the rotary encoder, the angle changes.

⑧ Set the probe mark to a suitable position and angle, and press the **SET** switch.

→ The registration function is terminated.

[Remark]

Press the **SET** switch to finalize the selection, even if you do not wish to display the probe mark.

⑨ If you move the arrow to the **Menu** item, then press the **SET** switch, you can register another probe mark or change an existing registration using steps 3 to 8.

[Remark]

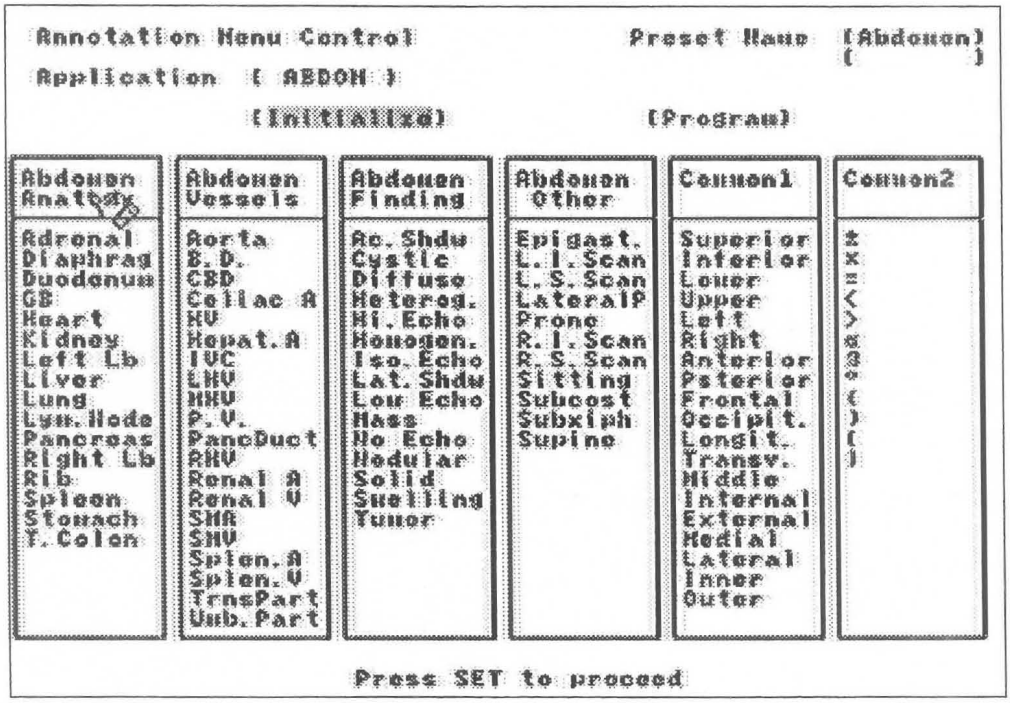
If you wish to display a standard set body mark instead of a body mark registered using **Program**, move the arrow to **[Initialize]**, then press the **SET** switch.

The body mark for the diagnostic field registered using the **Application** item on the **Preset Set up Menu** screen re-appears.

11-5-8. ANNOTAT Control

ANNOTAT Control is used to register or change annotations. For details, refer to 10-1 "Method of Operating Switches".

① If you select **ANNOTAT** from the touch panel, the following screen appears.



[Remark]

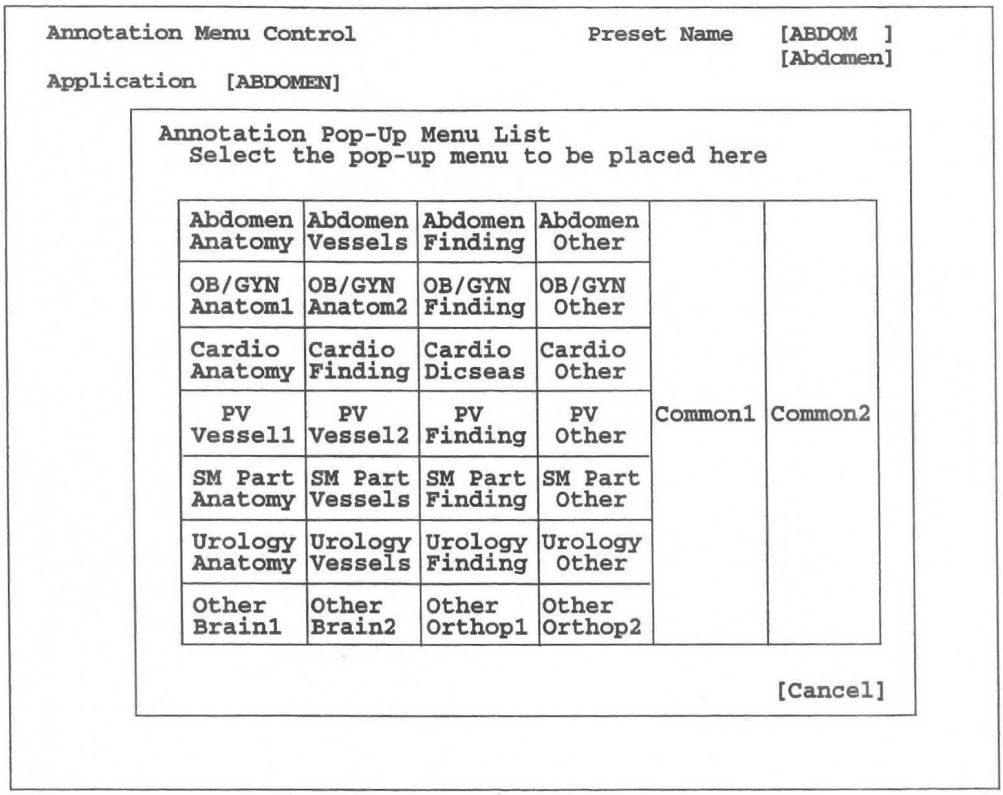
Word List contains standard settings for the diagnostic field made using the **Application** item in the **Preset Set up Menu** screen.

[Remark]

Words in **Word List** can be edited by the user. For details, refer to **Common Preset** of 11-5 "Preset".

② Move the arrow to the pop-up menu to be changed, then press the **SET** switch.

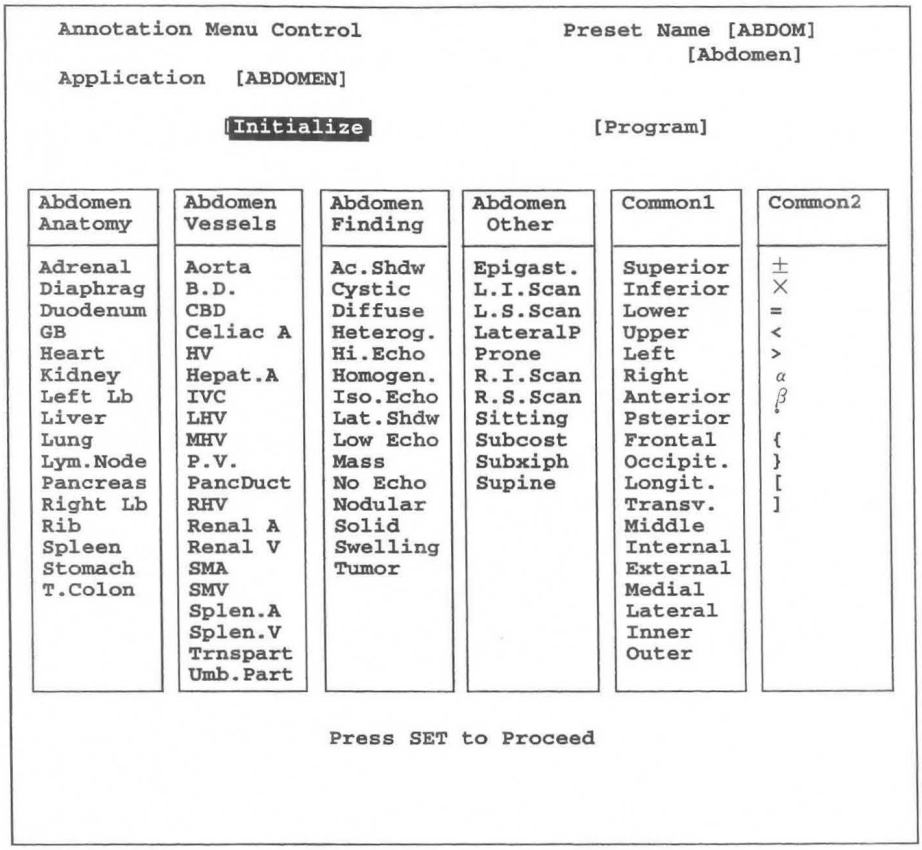
→ A sub-menu bearing the title of the pop-up menu appears.



③ Move the arrow to the title to be changed, then press the SET switch.

→ The sub-menu disappears, and the title changes.

(3) Word library for each diagnostic field


Annotation Menu Control
Preset Name [ABDOM]
[Abdomen]
Application [ABDOMEN]
[Initialize]
[Program]
Abdomen Anatomy
Adrenal
Diaphrag
Duodenum
GB
Heart
Kidney
Left Lb
Liver
Lung
Lym.Node
Pancreas
Right Lb
Rib
Spleen
Stomach
T.Colon
Abdomen Vessels
Aorta
B.D.
CBD
Celiac A
HV
Hepat.A
IVC
LHV
MHV
P.V.
PancDuct
RHV
Renal A
Renal V
SMA
SMV
Splen.A
Splen.V
Trnspart
Umb.Part
Abdomen Finding
Ac.Shdw
Cystic
Diffuse
Heterog.
Hi.Echo
Homogen.
Iso.Echo
Lat.Shdw
Low Echo
Mass
No Echo
Nodular
Solid
Swelling
Tumor
Abdomen Other
Epigast.
L.I.Scan
L.S.Scan
LateralP
Prone
R.I.Scan
R.S.Scan
Sitting
Subcost
Subxiph
Supine
Common1
Superior
Inferior
Lower
Upper
Left
Right
Anterior
Psterior
Frontal
Occipit.
Longit.
Transv.
Middle
Internal
External
Medial
Lateral
Inner
Outer
Common2
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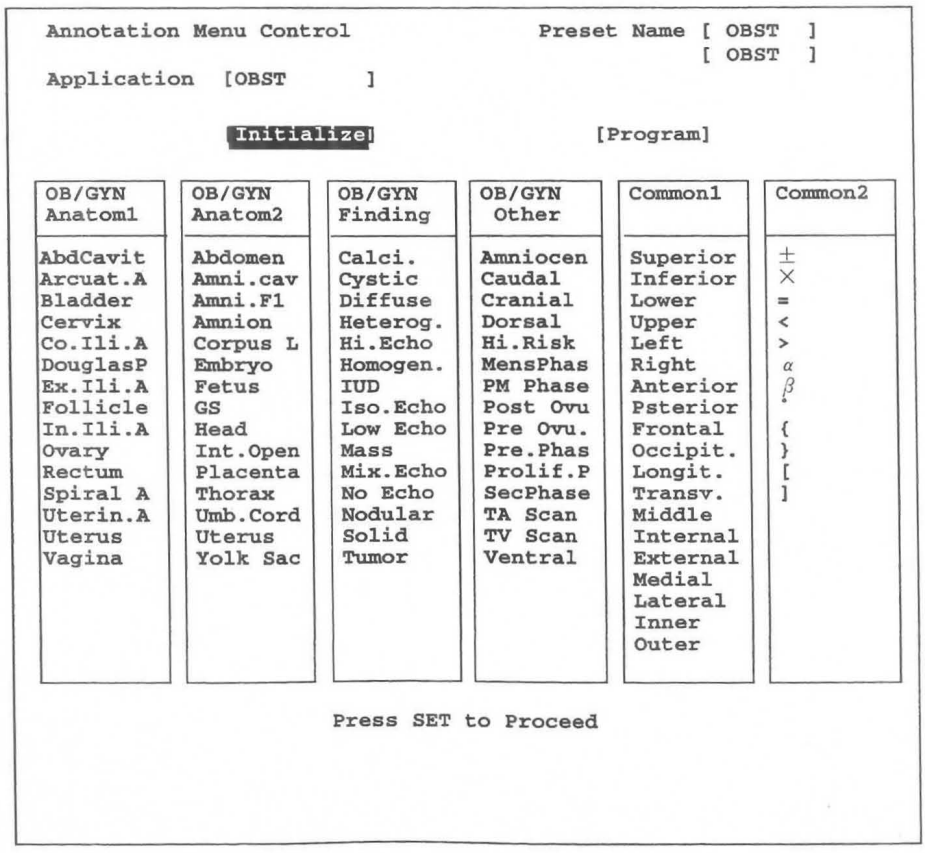
×
=
<
>
α
β
{
}
[
]
Press SET to Proceed


Annotation Menu Control
Preset Name [OBST]
[OBST]
Application [OBST]
[Initialize]
[Program]
OB/GYN Anatom1
AbdCavit
Arcuat.A
Bladder
Cervix
Co.Ili.A
DouglasP
Ex.Ili.A
Follicle
In.Ili.A
Ovary
Rectum
Spiral A
Uterin.A
Uterus
Vagina
OB/GYN Anatom2
Abdomen
Amni.cav
Amni.F1
Amnion
Corpus L
Embryo
Fetus
GS
Head
Int.Open
Placenta
Thorax
Umb.Cord
Uterus
Yolk Sac
OB/GYN Finding
Calci.
Cystic
Diffuse
Heterog.
Hi.Echo
Homogen.
IUD
Iso.Echo
Low Echo
Mass
Mix.Echo
No Echo
Nodular
Solid
Tumor
OB/GYN Other
Amniocen
Caudal
Cranial
Dorsal
Hi.Risk
MensPhas
PM Phase
Post Ovu
Pre Ovu.
Pre.Phas
Prolif.P
SecPhase
TA Scan
TV Scan
Ventral
Common1
Superior
Inferior
Lower
Upper
Left
Right
Anterior
Psterior
Frontal
Occipit.
Longit.
Transv.
Middle
Internal
External
Medial
Lateral
Inner
Outer
Common2
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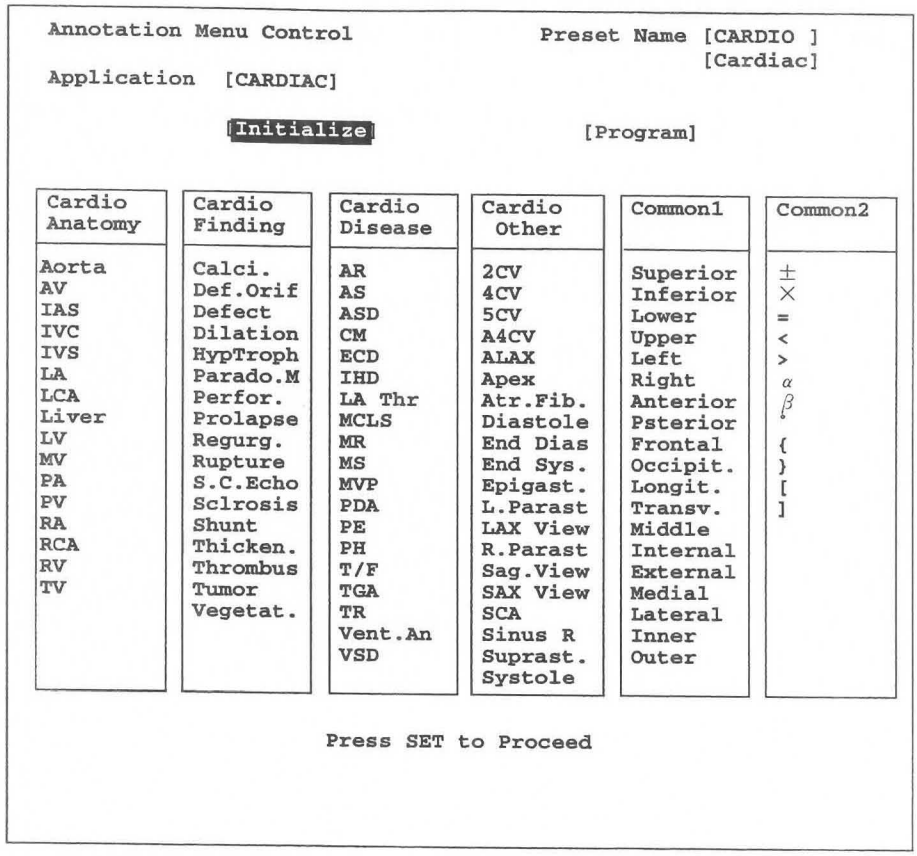
>
α
β
{
}
[
]
Press SET to Proceed


Annotation Menu Control
Preset Name [CARDIO]
[Cardiac]
Application [CARDIAC]
Initialize
[Program]
Cardio Anatomy
Aorta
AV
IAS
IVC
IVS
LA
LCA
Liver
LV
MV
PA
PV
RA
RCA
RV
TV
Cardio Finding
Calci.
Def.Orif
Defect
Dilation
HypTroph
Parado.M
Perfor.
Prolapse
Regurg.
Rupture
S.C.Echo
Sclrosis
Shunt
Thicken.
Thrombus
Tumor
Vegetat.
Cardio Disease
AR
AS
ASD
CM
ECD
IHD
LA Thr
MCLS
MR
MS
MVP
PDA
PE
PH
T/F
TGA
TR
Vent.An
VSD
Cardio Other
2CV
4CV
5CV
A4CV
ALAX
Apex
Atr.Fib.
Diastole
End Dias
End Sys.
Epigast.
L.Parast
LAX View
R.Parast
Sag.View
SAX View
SCA
Sinus R
Suprast.
Systole
Common1
Superior
Inferior
Lower
Upper
Left
Right
Anterior
Psterior
Frontal
Occipit.
Longit.
Transv.
Middle
Internal
External
Medial
Lateral
Inner
Outer
Common2
±
×
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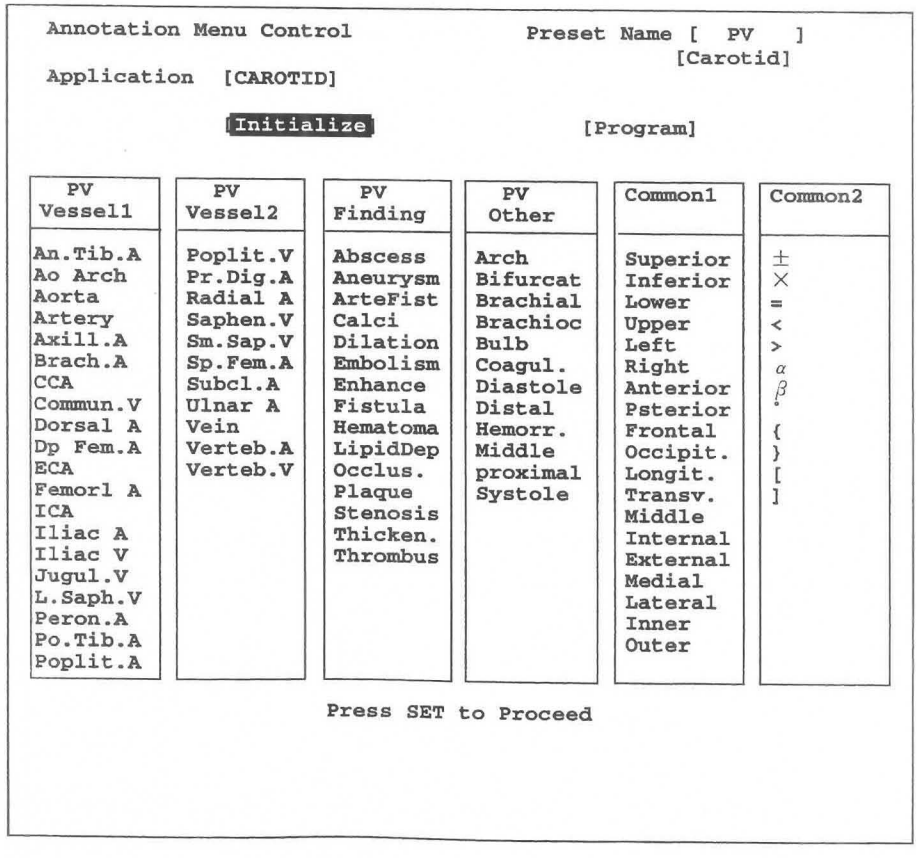
<
>
α
β
{
}
[
]
Press SET to Proceed


Annotation Menu Control
Preset Name [PV]
[Carotid]
Application [CAROTID]
Initialize
[Program]
PV Vessel1
An.Tib.A
Ao Arch
Aorta
Artery
Axill.A
Brach.A
CCA
Commun.V
Dorsal A
Dp Fem.A
ECA
Femorl A
ICA
Iliac A
Iliac V
Jugul.V
L.Saph.V
Peron.A
Po.Tib.A
Poplit.A
PV Vessel2
Poplit.V
Pr.Dig.A
Radial A
Saphen.V
Sm.Sap.V
Sp.Fem.A
Subcl.A
Ulnar A
Vein
Verteb.A
Verteb.V
PV Finding
Abscess
Aneurysm
ArteFist
Calci
Dilation
Embolism
Enhance
Fistula
Hematoma
LipidDep
Occlus.
Plaque
Stenosis
Thicken.
Thrombus
PV Other
Arch
Bifurcat
Brachial
Brachioc
Bulb
Coagul.
Diastole
Distal
Hemorr.
Middle
proximal
Systole
Common1
Superior
Inferior
Lower
Upper
Left
Right
Anterior
Psterior
Frontal
Occipit.
Longit.
Transv.
Middle
Internal
External
Medial
Lateral
Inner
Outer
Common2
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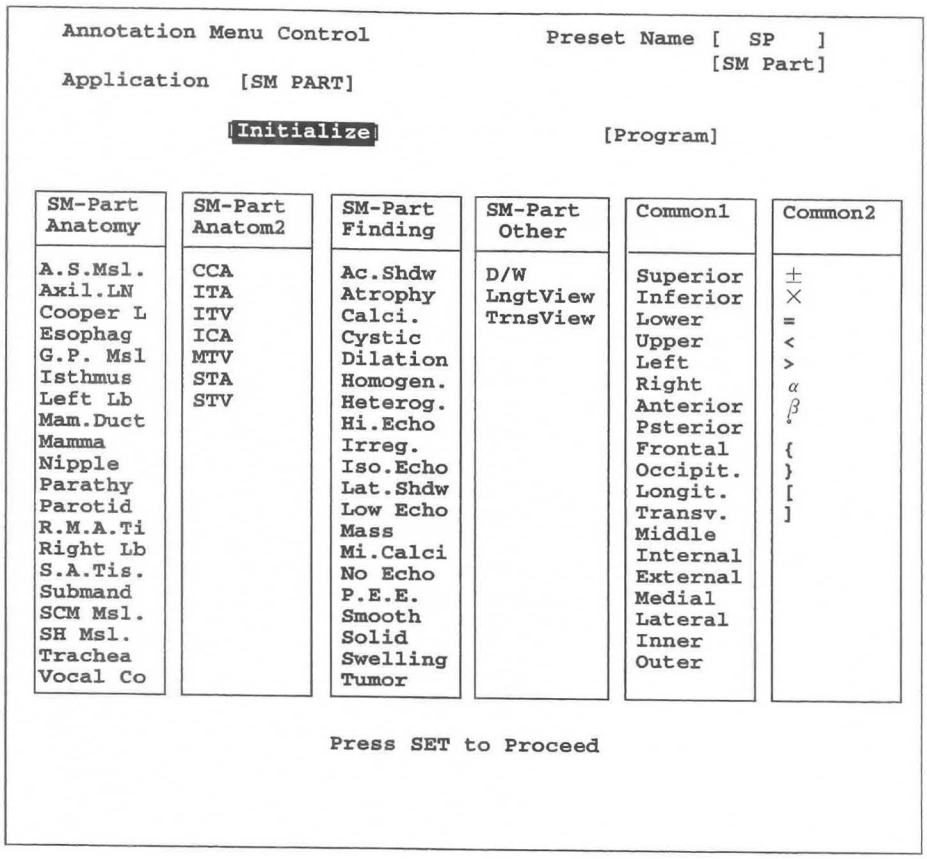
α
β
{
}
[
]
Press SET to Proceed


Annotation Menu Control
Preset Name [SP]
[SM Part]
Application [SM PART]
Initialize
[Program]
SM-Part Anatomy
A.S.Msl.
Axil.LN
Cooper L
Esophag
G.P. Msl
Isthmus
Left Lb
Mam.Duct
Mamma
Nipple
Parathy
Parotid
R.M.A.Ti
Right Lb
S.A.Tis.
Submand
SCM Msl.
SH Msl.
Trachea
Vocal Co
SM-Part Anatom2
CCA
ITA
ITV
ICA
MTV
STA
STV
SM-Part Finding
Ac.Shdw
Atrophy
Calci.
Cystic
Dilation
Homogen.
Heterog.
Hi.Echo
Irreg.
Iso.Echo
Lat.Shdw
Low Echo
Mass
Mi.Calci
No Echo
P.E.E.
Smooth
Solid
Swelling
Tumor
SM-Part Other
D/W
LngtView
TrnsView
Common1
Superior
Inferior
Lower
Upper
Left
Right
Anterior
Psterior
Frontal
Occipit.
Longit.
Transv.
Middle
Internal
External
Medial
Lateral
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Outer
Common2
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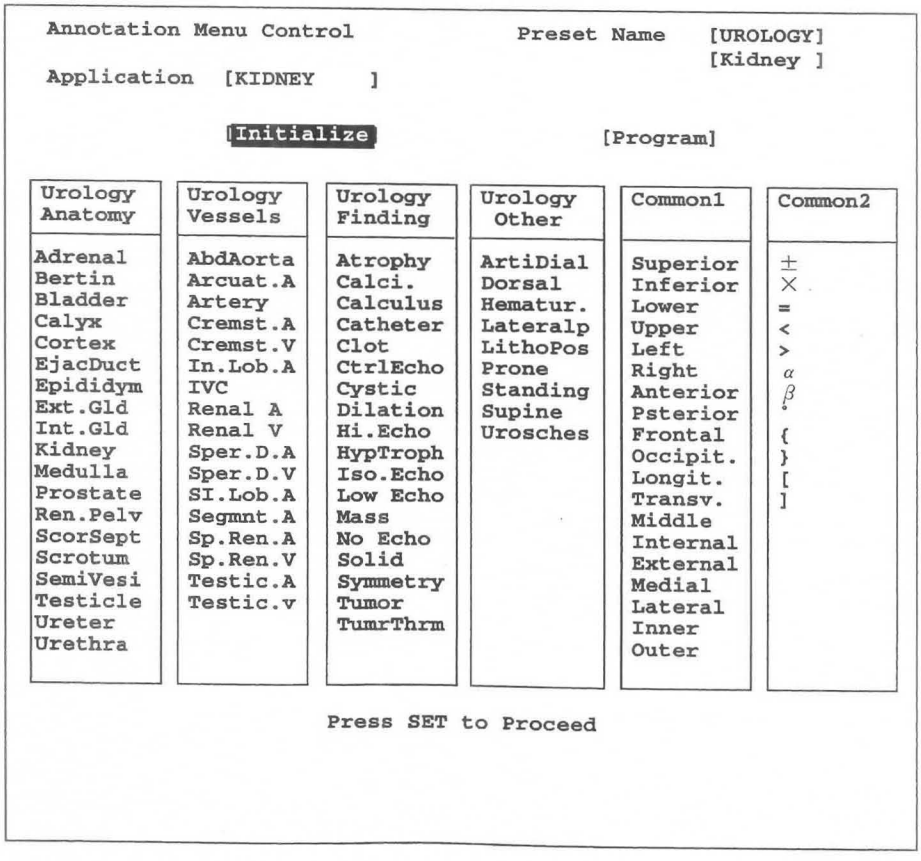
}
[
]
Press SET to Proceed


Annotation Menu Control
Preset Name [UROLOGY]
[Kidney]
Application [KIDNEY]
Initialize
[Program]
Urology Anatomy
Adrenal
Bertin
Bladder
Calyx
Cortex
EjacDuct
Epididym
Ext.Gld
Int.Gld
Kidney
Medulla
Prostate
Ren.Pelv
ScorSept
Scrotum
SemiVesi
Testicle
Ureter
Urethra
Urology Vessels
AbdAorta
Arcuat.A
Artery
Cremst.A
Cremst.V
In.Lob.A
IVC
Renal A
Renal V
Sper.D.A
Sper.D.V
SI.Lob.A
Segmnt.A
Sp.Ren.A
Sp.Ren.V
Testic.A
Testic.v
Urology Finding
Atrophy
Calci.
Calculus
Catheter
Clot
CtrlEcho
Cystic
Dilation
Hi.Echo
HypTroph
Iso.Echo
Low Echo
Mass
No Echo
Solid
Symmetry
Tumor
TumrThrm
Urology Other
ArtiDial
Dorsal
Hematur.
Lateralp
LithoPos
Prone
Standing
Supine
Urosches
Common1
Superior
Inferior
Lower
Upper
Left
Right
Anterior
Psterior
Frontal
Occipit.
Longit.
Transv.
Middle
Internal
External
Medial
Lateral
Inner
Outer
Common2
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}
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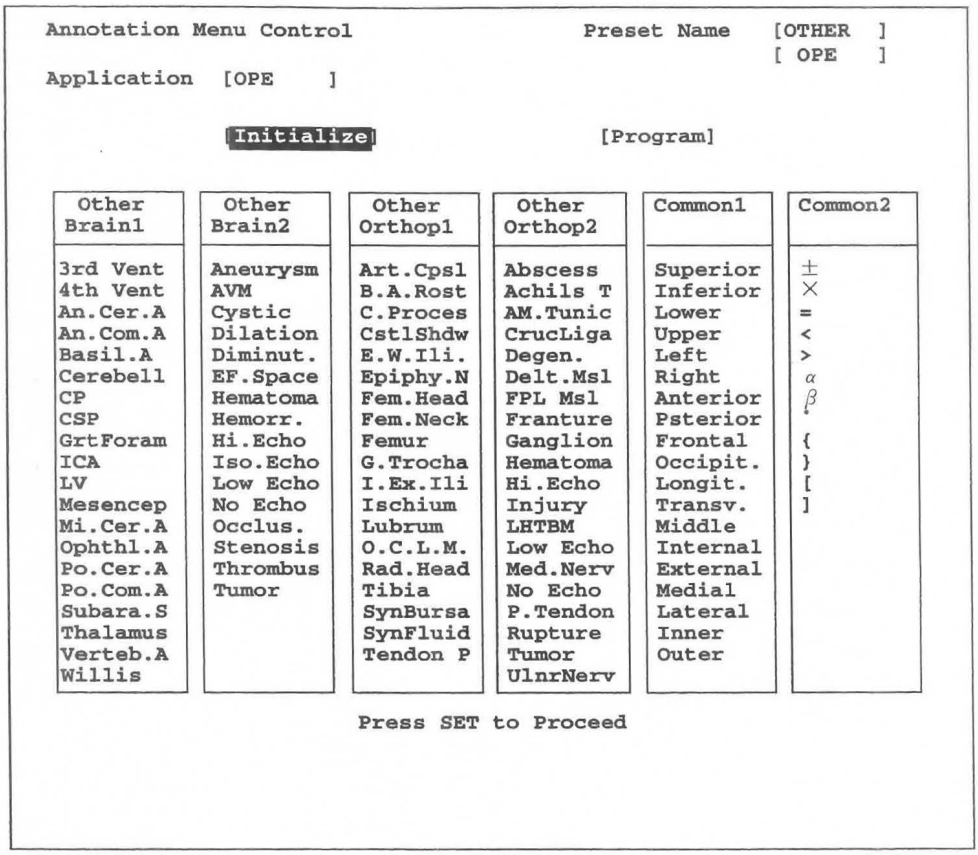
]
Press SET to Proceed


Annotation Menu Control
Preset Name [OTHER]
[OPE]
Application [OPE]
[Initialize]
[Program]
Other Brain1
3rd Vent
4th Vent
An.Cer.A
An.Com.A
Basil.A
Cerebell
CP
CSP
GrtForam
ICA
LV
Mesencep
Mi.Cer.A
Ophthl.A
Po.Cer.A
Po.Com.A
Subara.S
Thalamus
Verteb.A
Willis
Other Brain2
Aneurysm
AVM
Cystic
Dilation
Diminut.
EF.Space
Hematoma
Hemorr.
Hi.Echo
Iso.Echo
Low Echo
No Echo
Occlus.
Stenosis
Thrombus
Tumor
Other Orthop1
Art.Cpsl
B.A.Rost
C.Proces
CstlShdw
E.W.Ili.
Epiphy.N
Fem.Head
Fem.Neck
Femur
G.Trocha
I.Ex.Ili
Ischium
Lubrum
O.C.L.M.
Rad.Head
Tibia
SynBursa
SynFluid
Tendon P
Other Orthop2
Abscess
Achils T
AM.Tunic
CrucLiga
Degen.
Delt.Msl
FPL Msl
Franture
Ganglion
Hematoma
Hi.Echo
Injury
LHTBM
Low Echo
Med.Nerv
No Echo
P.Tendon
Rupture
Tumor
UlnrNerv
Common1
Superior
Inferior
Lower
Upper
Left
Right
Anterior
Psterior
Frontal
Occipit.
Longit.
Transv.
Middle
Internal
External
Medial
Lateral
Inner
Outer
Common2
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β
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[
]
Press SET to Proceed

11-5-9. Option Control

Name	Function	Setting
ECG Display	Does not display an ECG when a B mode image is displayed.	B : Off
	Displays an ECG when a B mode image is displayed.	B : On
	Does not display an ECG when a sweep mode image is displayed.	Sweep : Off
	Displays an ECG when a sweep mode image is displayed.	Sweep : On
ECG POSI	Displays an ECG at an arbitrary position on the screen. The display position is held in B mode and sweep mode images.	0～31 (1Step)
ECG SENS	Sets the initial value of the sensitivity of an ECG.	0～31 (1Step)
R Delay Time	Sets the time phase from the R wave used for synchronization.	0.00～2.55
R-Wave Beep	Does not output a beep when the R wave is detected.	Off
	Outputs a beep when the R wave is detected.	On
R-Wave Blink	Does not display a mark on the image when the R wave is detected.	Off
	Displays a mark on the image when the R wave is detected.	On
PCG Display	Does not display a PCG when a B mode image is displayed.	B : Off
	Displays a PCG when a B mode image is displayed.	B : On
	Does not display a PCG when a sweep mode image is displayed.	Sweep : Off
	Displays a PCG when a sweep mode image is displayed.	Sweep : On
PCG POSI	Displays a PCG at an arbitrary position on the screen. The display position is held in B mode and sweep mode images.	0～31
PCG SENS	Set the initial value of the sensitivity of a PCG.	0～31
	Sets the PCG filter to Low.	Filter : L
	Sets the PCG filter to M1.	Filter : M1
	Sets the PCG filter to M2.	Filter : M2
Pulse Display	Does not display a pulse when a B mode image is displayed.	B : Off
	Displays a pulse when a B mode image is displayed.	B : On
	Does not display a pulse when a sweep mode image is displayed.	Sweep : Off
	Displays a pulse when a sweep mode image is displayed.	Sweep : On
Pulse POSI	Displays a pulse at an arbitrary position on the screen. The display position is held in B mode and sweep mode image.	0～31
Pulse Sens	Sets the initial value of the sensitivity of a pulse display.	0～31
Biplane Label	A oscillator mark is not displayed in the biplane esophagus probe.	Off
	A oscillator mark is displayed in the biplane esophagus probe.	On
Biplane Line	Lines intersecting at a right angle are not displayed in the biplane esophagus probe.	Off
	Lines intersecting at a right angle are displayed in the biplane esophagus probe.	On
INTERM INTERVA	Sets the sending interval with ECG being ON with respect to R wave.	1～30
	Sets the sending interval with ECG being OFF.	0.1～30.0(s)
	Sets the number of scanning frames for each trigger.	1～30frames
	Sets a duration for intermittent transmission.	0～999sec
Dust & Scratch	Sets the size of the window that averages brightness when performing differential images.	3～9 (pixel)
	Sets a threshold value when performing differential images.	1～63

Name	Function	Setting
Rotary P Mark	A mark that indicates direction is not displayed.	Off
	A mark that indicates direction is displayed.	On
	The Angle is not displayed.	Off
	The Angle is displayed.	On
SCRdata Display	Does not activate an automatic display while a strip chart recorder is recording data.	Off
	Activates an automatic display while a strip chart recorder is recording data.	On
Chart Speed	Changes the paper feed speed of the recorder according to the sweep speed.	Auto
	Sets the paper feed speed independently for M and D. 25, 50, 100cm/s	Manual
SCR Mode	Recording takes place in a sweep mode only.	M
	Recording takes place in the B mode as well after sweep recording.	M→B

11-5-10. DOP Control

Name	Function	Setting
DOP Gain	Sets the value of the D mode gain.	0～60dB
DOP Filter : PW	Removes low frequency components in steps from 1 to 12 according to the velocity range.	1～12 (in Auto mode)
	Sets the filter to 50Hz.	50
	Sets the filter to 100Hz.	100
	Sets the filter to 200Hz.	200
	Sets the filter to 400Hz.	400
	Sets the filter to 800Hz.	800
	Sets the filter to 1600Hz.	1600
DOP Filter : CW	Removes low frequency components in steps from 1 to 12 according to the velocity range.	1～12 (in Auto mode)
	Sets the filter to 50Hz.	50
	Sets the filter to 100Hz.	100
	Sets the filter to 200Hz.	200
	Sets the filter to 400Hz.	400
	Sets the filter to 800Hz.	800
	Sets the filter to 1600Hz.	1600
IP Select	Registers the DOP CONT, DOP COMP, DOP SMOOTH, DOP RESO and DOP Image Select settings in eight IP select patterns.	1～8
DOP VEL Range	Sets the velocity range used when the PW mode is activated.	PW:6.22～318.8
DOP VEL Range	Sets the velocity range used when the CW mode is activated.	CW:6.22～796.2
Sample Volume	Sets the sample volume used when the PW mode is activated.	0.5～10mm (0.5mmStep)
Zoom Lock	Zoom does not follow the sample volume.	Off
	Zoom follows the sample volume.	On
Base Line	Sets the position of the baseline used when the D mode is activated.	-16～16 (1-line Step)
SPECT Invert	Displays forward flow in the upward direction when the D mode is activated.	Normal
	Displays forward flow in the downward direction when the D mode is activated.	Invert
	Inverts the spectrum about the baseline.	INVERT AXIS : B. line
	Inverts the spectrum about the center of the image.	INVERT AXIS : Center

Name	Function	Setting
DISPLAY Color	Displays a D mode image without adding color.	Gray
	Displays an image after adding a color between blue and orange.	A
	Displays an image after adding blue.	B
	Displays an image after adding a lighter blue than that added in B.	C
	Displays an image after adding orange to it.	D
M/D Mode	The M mode image is also displayed simultaneously when the D mode is activated.	M/D
	Only the D mode spectrum is displayed when the D mode is activated.	D Onky
B Refresh	Sets the refresh interval of B for a simultaneous B+Flow/M+Flow display. Refresh takes place every 1 second.	1
	Refresh takes place every 2 seconds.	2
	Refresh takes place every 4 seconds.	4
	Refresh takes place every 6 seconds.	6
	Refresh takes place every 8 seconds.	8
	The B mode image is re-written for each R wave.	R Wave
Angle Correct	Registers in advance the angle correction value used when the D mode is activated.	0～80 (1° Step)

11-5-11. Flow Control

Name	Function	Setting
Flow Gain	Sets the gain for the Flow mode.	0~32
Flow Filter	Sets the flow filter.	1~6
Image/F Select	The probe operates at a high frequency.	RESO
	The probe operates at a slightly high frequency.	STD 1
	The probe operates at a slightly low frequency.	STD 2
	The probe operates at a low frequency.	PENET
IP Select	Registers the Color Frame Correlaion, Color SMOOTH and Color Image Select setting in eight IP select patterns.	Flow : 1~8
C. Line Density	Sets the scanning line density of a B mode image when Flow is used to a low value.	B&W : Low
	Sets the scanning line density of a B mode image when Flow is used to a medium value.	B&W : MED
	Sets the scanning line density of a B mode image when Flow is used to a high value.	B&W : High
	Sets the scanning line density of a flow image when Flow is used to a low value.	COLOR : Low
	Sets the scanning line density of a flow image when Flow is used to a medium value.	COLOR : MED
	Sets the scanning line density of a flow image when Flow is used to a high value.	COLOR : High
Color Average	Sets the number of color transmissions to a low value.	Low
	Sets the number of color transmissions to a medium value.	Medium
	Sets the number of color transmissions to a high value.	High
Color VEL	Sets the velocity range when the Flow mode isactivated.	6.22~199.2
Flow SENS	Sets the correction value of the color sensitivity.	1~15
Motion Reject	Removes noise to an increasing degree from Low to High.	Low~High
Color Coding	Sets color coding that is suitable for the abdominal region.	ABDOM : A~E
	Sets color coding that is suitable for the cardiac region.	Cardio : A~E
	Sets color coding that is suitable for the peripheral vessels.	PV : A~E
	Sets color coding that is suitable for a power display.	Power : A~E
	Sets color coding only for dispersion.	Other : A~E
Display PRIORI	Sets a brightness level for displaying black and white information.	B&W : 0~63
	Sets a flow velocity level for displaying color information.	COLOR : 0~31
	Displays only color information when both black and white information and color information exists.	COLOR COLOR 2
	Displays both black and white information and color information when both kinds of information exists.	BOTH BOTH 2

Name	Function	Setting
Color POLAR	Displays the forward flow direction in red when the Flow mode is activated.	Normal
	Displays the forward flow direction in blue when the Flow mode is activated.	Invert
	The polarity does not change according to the direction of the steered beam.	Auto : Off
	The polarity is inverted according to the direction of the steered beam.	Auto : On
Color Reject	Low velocity components of a color image are cut.	0~15
F.R. ACCEL	A flow image without smoothing between frames is displayed.	Off
	An image with smoothing between frames is created.	On
Pixel SMOOTH	The degree of smoothing of pixel data is set to Low.	Low
	The degree of smoothing of pixel data is set to Medium.	Medium
	The degree of smoothing of pixel data is set to High.	High
VAR Enhance	The dispersion pixel data is displayed in enhanced form.	On
	The dispersion pixel data is not displayed in enhanced form.	Off
Anti Wall Motion	Wall motion noise removal is set to Off.	Off
	Wall motion noise removal is set to Low.	Low
	Wall motion noise removal is set to Medium.	Medium
	Wall motion noise removal is set to High.	High
C.Line CORRE	The function of smoothing of pixel data is set to Off.	Off
	The degree of smoothing of pixel data is set to Low.	Low
	The degree of smoothing of pixel data is set toHigh.	High

11-5-12. P.Flow Control

Name	Function	Setting
P. Flow Gain	Sets the gain for the Power Flow mode.	0~32
Flow Filter	Sets the flow filter.	1~6
Image/F Select	The probe operates at a high frequency.	RESO
	The probe operates at a slightly high frequency.	STD 1
	The probe operates at a slightly low frequency.	STD 2
	The probe operates at a low frequency.	PENET
IP Select	The Color Frame Correlaion, Color SMOOTH and Color Image Select settings are registered in eight IP Select patterns.	Flow : 1~8
C. Line Density	Sets the scanning line density of a B mode image when Flow is used to a low value.	B&W : Low
	Sets the scanning line density of a B mode image when Flow is used to a medium value.	B&W : MED
	Sets the scanning line density of a B mode image when Flow is used to a high value.	B&W : High
	Sets the scanning line density of a flow image when Flow is used to a low value.	COLOR : Low
	Sets the scanning line density of a flow image when Flow is used to a medium value.	COLOR : MED
	Sets the scanning line density of a flow image when Flow is used to a high value.	COLOR : High
Color Average	Sets the number of color transmissions to a low value.	Low
	Sets the number of color transmissions to a medium value.	Medium
	Sets the number of color transmissions to a high value.	High
PRF	Sets the velocity range when the Power Flow mode is activated.	6.22~199.2
Flow SENS	Sets the correction value of the color sensitivity.	1~15
Motion Reject	Removes noise to an increasing degree from Low to High.	Low~High
Color Coding	Sets color coding that is suitable for the abdominal region.	ABDOM : A~E
	Sets color coding that is suitable for the cardiac region.	Cardio : A~E
	Sets color coding that is suitable for the peripheral vessels.	PV : A~E
	Sets color coding that is suitable for a power display.	Power : A~E
	Sets color coding only for dispersion.	Other : A~E
Display PRIORI	Sets a brightness level for displaying black and white information.	B&W : 0~63
	Sets a flow velocity level for displaying color information.	COLOR : 0~31
	Displays only color information when both black and white information and color information exists.	COLOR
	Displays both black and white information and color information when both kinds of information exists.	BOTH
Color Reject	Cuts color from low velocity components.	0~15

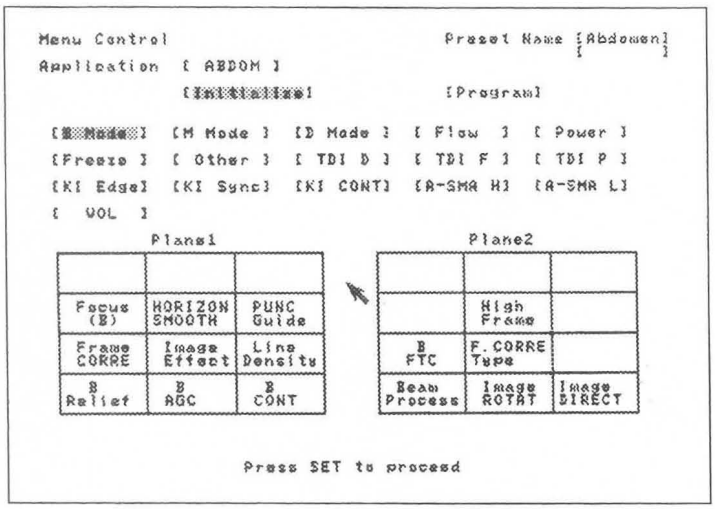
Name	Function	Setting
PF Display	Adds a background color to a Power Flow image.	PF A
	Does not add a background color to aPower Flow image.	PF B
F. R. ACCEL	A flow image without smoothing between frames is displayed.	Off
	An image with smoothing between frames is created.	On

11-5-13. Menu Control

(1) MODE

Assign the menu for each mode. Move the arrow to one of **[B1]** to **[Power 2]** of **MODE**, then press the **SET** switch. The menu assignment screen for that mode changes over.

If, for example, you select **[B1]**, the screen changes over as follows.



(2) Assigning a menu

You can assign a menu using one screen in the case of a frozen image, or up to two screens in other cases, and register menu items at arbitrary positions on the touch panel.

＜Making or changing a registration＞

The following is the operation menu described using the B mode menu as an example.

① Using the trackball, move the arrow to the menu item to be registered or changed.

② Press the **SET** switch.

→ A list of registerable items appears.

③ Move the arrow to the menu item to be registered, then press the **SET** switch. The list disappears, and the selected item is registered. If you do not want to register anything, select "**MENU DELETE**".

[Remark]

When nothing is registered on the second screen, you cannot select the second screen using the menu on the touch panel. Also, you cannot assign menu items belonging to another mode.

11-5-14. Common Preset Control

Name	Function	Setting
Timer Freeze	Auto freeze of the safety function does not take place.	Off
	The monitoring period during which a key input is not made can be set to between 1 and 20 minutes.	On (1～20)
Cursor PRIORI	Displays an underline cursor in the ID box when the ID switch is pressed.	ID
	Displays an underline cursor in the patient's name box.	Name
T.B. Speed	Raises the response speed of the trackball.	Fast
	Sets the response speed of the trackball to the standard speed.	STD
	Reduces the response speed of the trackball.	Slow
Comment POSI	Registers the coordinates of the home position in the comment mode.	X : 4～60, Y : 3～36
Color Burst	Does not output color signals to a VCR in the black and white mode.	Off
	Continuously outputs color signals to a VCR.	On
No. of Prints	Sets the number of prints to be made using the SSZ-307.	1, 2, 3, 4, 5
Foot SW (Left)	Registers a function in the left switch of the foot switch.	Note 1)
Foot SW (Cenetr)	Registers a function in the middle switch of the foot switch. This function operates in the case of a single switch type foot switch.	Note 1)
Foot SW (Right)	Registers a function in the right switch of the foot switch.	Note 1)
VCR Memory	The unit of the VCR memory is a field.	Field
	The unit of the VCR memory is a frame.	Frame
VCR Single	Displays the input signal from VCR IN.	COMPO
	Displays the input signal from S(Y/C) of VCR IN.	S(Y/C)
	Displays the input signal from RGB of VCR IN.	RGB
Warning Display	Displays a warning at the center of the screen.	Center
	Displays a warning at the bottom of the screen.	Bottom
Message Display	Displays some messages.	Off
	Displays all messages.	On
Sound Select	One of three sound sources can be selected to be output with a message, etc.	A, B, C
Beep at Message	Sound is not output with a message.	Off
	Sound is output with a message.	On
Panel Beep	Sound is output when a key on the main panel is pressed.	Panel
	Sound is output when a key on the keyboard is pressed.	Keybord
	Sound is output when a key on the touch panel is pressed.	LC
BodyMK Method	The touch panel and trackball are used to change over body marks.	Track B
	A body mark can only be changed over from the touch panel.	LC Only

Name	Function	Setting
Print SW	Assigns a function to the print switch.	Note 1)
REC1 SW (VCR)	Assigns a function to the REC1 switch.	Note 1)
REC2 SW (SCR)	Assigns a function to the REC2 switch.	Note 1)
REC3 SW (ACQUI)	Assigns a function to the REC3 switch.	Note 1)
DIRECT1 SW	Assigns a function to the DIRECT1 switch.	Note 1)
DIRECT2 SW	Assigns a function to the DIRECT2 switch.	Note 1)
DIRECT3 SW	Assigns a function to the DIRECT3 switch.	Note 1)
ASSIGN1 SW	Assigns a function to the ASSIGN1 of the rotary encorder.	Note 2)
ASSIGN2 SW	Assigns a function to the ASSIGN2 of the rotary encorder.	Note 2)
ASSIGN3 SW	Assigns a function to the ASSIGN3 of the rotary encorder.	Note 2)

Note 1: Assigning a function to a switch

You can assign a menu item to a switch on a specific panel or to a switch on the foot switch. You can assign alternative choice functions to these switches. In addition, you can assign a multi-step function to the rotary encoder or the **ASSIGN** switch.

＜Making or changing a registration＞

① Using the trackball, move the arrow to the switch item box to be registered or changed.

→ For example, if you want the SSZ-307 to start printing when you press the PRINT switch, move the arrow to **PRINT SW** of Common Preset Control.

② Press the **SET** switch.

→ A pop-up menu appears, enabling you to make a list of menu items using the rotary encoder. Display SSZ-307 from the selectable functions.

③ Change the name to the menu item to be registered, then press the **SET** switch.

→ The pop-up menu disappears, and the selected menu item is registered.

[Remark]

Be sure to register one menu item.

Menu items that can be assigned to each switch.

Function	Abbreviation
SSZ-108 print switch	SSZ-108
SSZ-203 print switch	SSZ-203
SSZ-307 print switch	SSZ-307
SSZ-707 print switch	SSZ-707
307+707 print (automatic switching)	307/707
REC/PAUSE function of VCR	VCR REC
SCR REC function	SCR REC
DMS ACQUIRE function	ACQUIRE
FREEZE	FREEZE
SELECT	SELECT
Image DIRECT	I DIRECT
High Frame	HIGH FR
M-Mode SMOOTH	M SMOOTH
M/D Mode	M/D MODE
SPECT Invert	SPECT INV
DOP COMPRESSION	DOP COMP
DOP RESO	DOP RESO
Filter Control	FIL CONT
Color POLAR	C POLAR
DDD	DDD
Capture Mode	CAPTURE
POLAR Control	POL CONT
DMS Coding	DMS CO
Zoom Lock	Z LOCK
Area Lock	A LOCK
SCR Mode	SCR MODE
Element Select	ELEMENT
B FTC	B FTC
M FTC	M FTC
F.R. ACCEL	FR ACCEL

Function	Abbreviation
Image POLAR	I POLAR
Tissue H.E.	TISSUE
FF	FF
Stop	STOP
REW	REW
Pause	PAUSE
Play	PLAY
VCR Memory	VCR MEM
ECG Signal	ECG
PCG Signal	PCG
Pulse Signal	PULSE
R Wave Beep	R BEEP
All FR Clear	ALL CLEAR
One FR Clear	ONE CLEAR
PROBE 1	PROBE 1
PROBE 2	PROBE 2
PROBE 3	PROBE 3
PROBE 4	PROBE 4
PROBE 5	PROBE 5
PRESET 1	PRESET 1
PRESET 2	PRESET 2
PRESET 3	PRESET 3
PRESET 4	PRESET 4
PRESET 5	PRESET 5
PRESET 6	PRESET 6
PRESET 7	PRESET 7
PRESET 8	PRESET 8
PRESET 9	PRESET 9
PRESET 10	PRESET 10
PRESET 11	PRESET 11
PRESET 12	PRESET 12
PRESET 13	PRESET 13
PRESET 14	PRESET 14
PRESET 15	PRESET 15

Note 2: Assigning a function to the rotary encoder

You can assign a function to the **ASSIGN** switch of the rotary encoder. You can assign a multi-step function to this switch.

＜Making or changing a registration＞

① Using the trackball, move the arrow to the **ASSIGN SW** box in which you wish to register or change a function.

→ For example, if you wish to rotate an image in 90° steps using the rotary encoder by pressing the ASSIGN 1 switch, move the arrow to **ASSIGN 1 SW** of Common Preset Control.

② Press the **SET** switch.

→ A pop-up menu appears, enabling you to make a list of menu items using the rotary encoder. Display I ROTAT from the selectable functions.

③ Change the name to the menu item that you wish to register, then press the **SET** switch.

→ The pop-up menu disappears, and the select menu item is registered.

[Remark]

Be sure to register one menu item.

Function	Abbreviation
B CONT	B CONT
B AGC	B AGC
B Relief	B RELIEF
Image ROTAT	I ROTAT
M CONT	M CONT
M AGC	M AGC
M Sweep Speed	M SPEED
Echo Erase	ECHO E
M Relief	M RELIEF
DOP COMP	D COMP
DOP CONT	D CONT
DOP Filter	D FILTER
D Sweep Speed	D SPEED
Steered Beam	STEERED
Sample Volume	SAMPLE V
Color BLS	C BLS
Color SMOOTH	CSMOOTH
Flow Filter	F FILTER
Flow SENS	F SENS
Color Reject	C REJECT
B Refresh	REF TIME
ECG SENS	ECG SENS
PCG SENS	PCG SENS
Pulse SENS	PUL SENS
ECG POSI	ECG POSI
PCG POSI	PCG POSI
Pulse POSI	PUL POSI

11-5-15. Annotation Control (Common Preset)

You can register or change the title of the pop-up menu, or a word as follows.

① Press the **PRESET** switch, and select **C. Set-up** from the touch panel.

→ Common Preset appears.

② Select **ANNOTAT Control** from the touch panel.

→ The following Annotation Control screen appears.

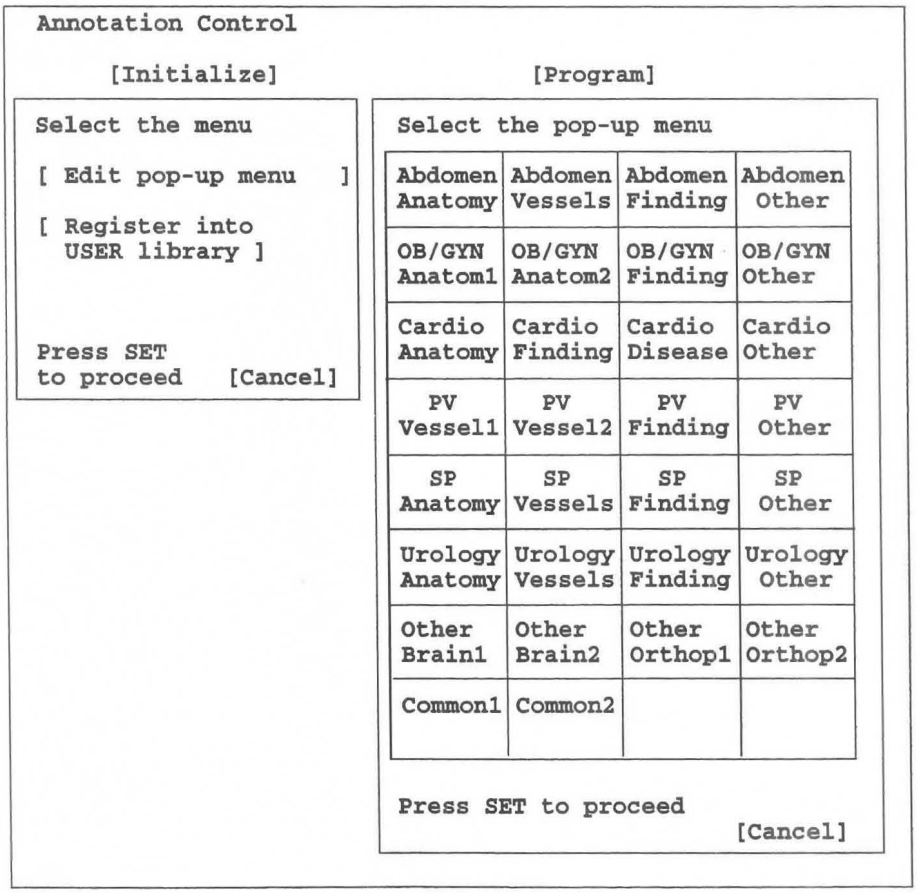


Fig. Annotation Control screen

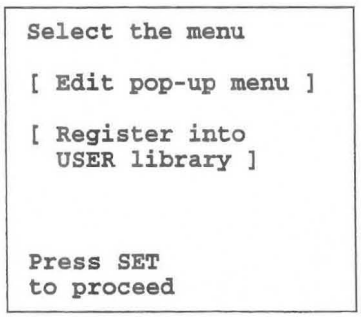
(2) -1. Editing and selecting a pop-up menu

① Move the arrow to **[Program]**, then press the **SET** switch.

→ The arrow moves to **Select the menu.**

② Move the arrow to **Edit pop-up menu**, then press the **SET** switch.

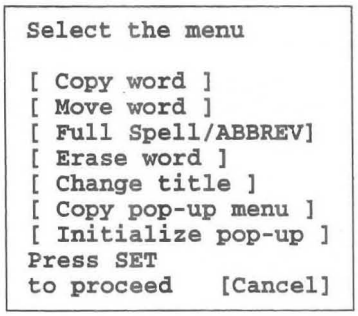
→ A menu for editing the pop-up menu appears at top left of the screen.



(1) Copying a word from a library

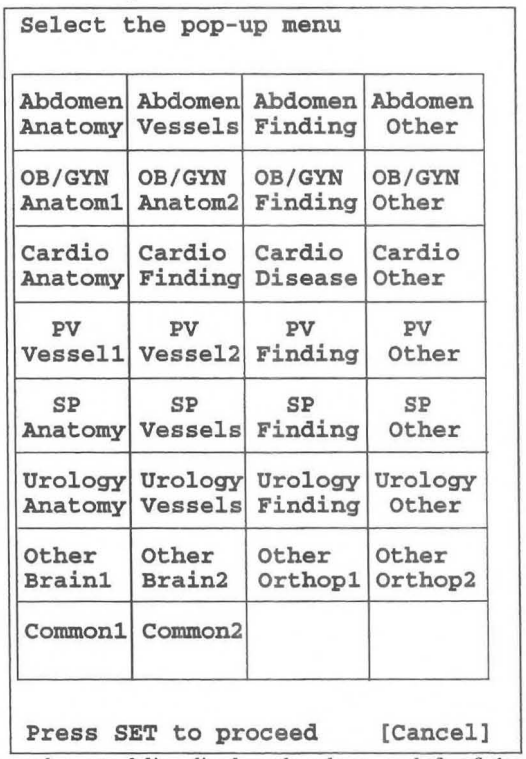
① Move the arrow to **Copy word**, then press the **SET** switch.

→ The arrow moves to **Select the pop-up menu** at the right of the screen.



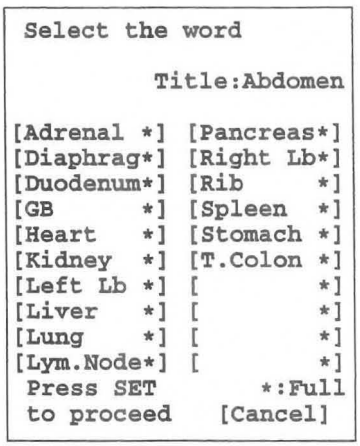
② Select the desired pop-up menu from the list at the right of the screen, then press the **SET** switch.

→ A list of words appears at bottom left of the screen.



③ Select the destination to which you wish to copy the word from the word list displayed at bottom left of the screen, then press the **SET** switch.

→ A library selection menu appears at top right of the screen.



④ Select the desired library, then press the **SET** switch.

→ The words on Page-1 appear. There are a total of 8 pages, and each page has 20 words.

```
Select the library

| ABDOM1   | ABDOM2   | OB/GYN1 | OB/GYN2 |
| CARDIO1  | CARDIO2  | PV      | SP      |
| UROLOGY  | OTHER    | USER    |         |

Press SET to proceed    [Cancel]
```

⑤ Select the word to be copied, then press the **SET** switch.

→ The word copy function is terminated.

```
Select the word [Page-1] [Page-5]
                [Page-2] [Page-6]
Library:ABDOM1  [Page-3] [Page-7]
                [Page-4] [Page-8]

[A.A.A.  ]:[Abdominal Aortic Ane]
[Act.Chol]:[Acute Cholecystitis ]
[Act.Gast]:[Acute Gastritis     ]
[Act.Hept]:[Acute Hepatitis     ]
[Act.Pncr]:[Acute Pancreatitis  ]

[Adenomyo]:[Adenomyomatosis     ]
[An.Int.B]:[Anterior Inferior Br]
[A.I.Seq ]:[Anterior Inferior Se]
[An.Sup.B]:[Anterior Superior Br]
[A.S.Seq ]:[Anterior Superior Se]

[Appendic]:[Appendicitis        ]
[Appendix]:[Appendix            ]
[A.Colon ]:[Ascending Colon     ]
[Ascites ]:[Ascites             ]
[B.D.    ]:[Bile Duct           ]

[B.D.Emph]:[Bile Duct Emphysema ]
[Blunting]:[Blunting            ]
[B.C.Synd]:[Budd-Chiari Syndrome]
[B.E.Sign]:[Bull' s-eye Sigh    ]
[Caudlobe]:[Caudate Lobe        ]

 Press SET to proceed   [Cancel]
```

(2) Moving a word

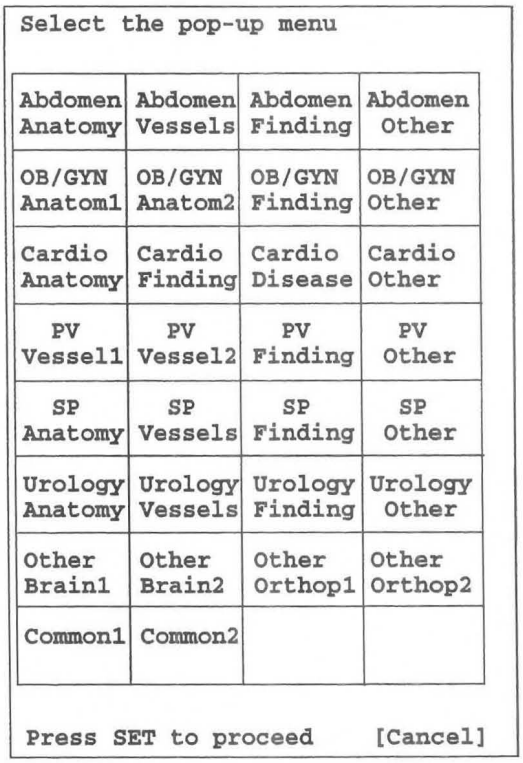
① Move the arrow to **Move word**, then press the **SET** switch.

→ The arrow moves to **Select the pop-up menu** at the right of the screen.

```
Select the menu

[ Copy word ]
[ Move word ]
[ Full Spell/ABBREV]
[ Erase word ]
[ Change title ]
[ Copy pop-up menu ]
[ Initialize pop-up ]
Press SET
to proceed   [Cancel]
```

② Select the desired pop-up menu from the list at the right of the screen, then press the **SET** switch.

→ A list of words appears at bottom left of the screen.

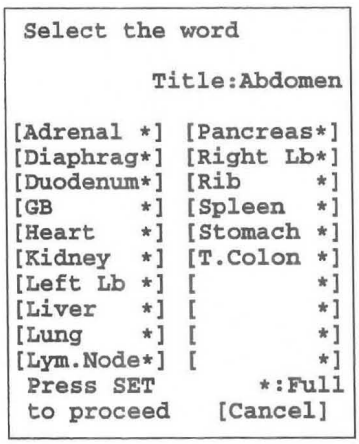


③ Select the desired word from the word list at bottom left of the screen, then press the **SET** switch.

→ The word appears in highlighted formed.

④ Select the destination to which you wish to move the word, then press the **SET** switch.

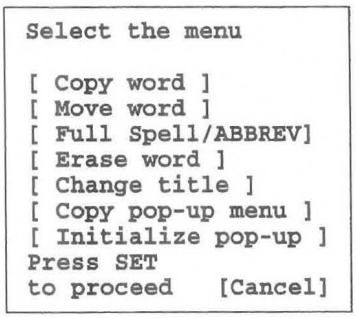
→ The word move function is terminated.



(3) Setting full spelling/abbreviation

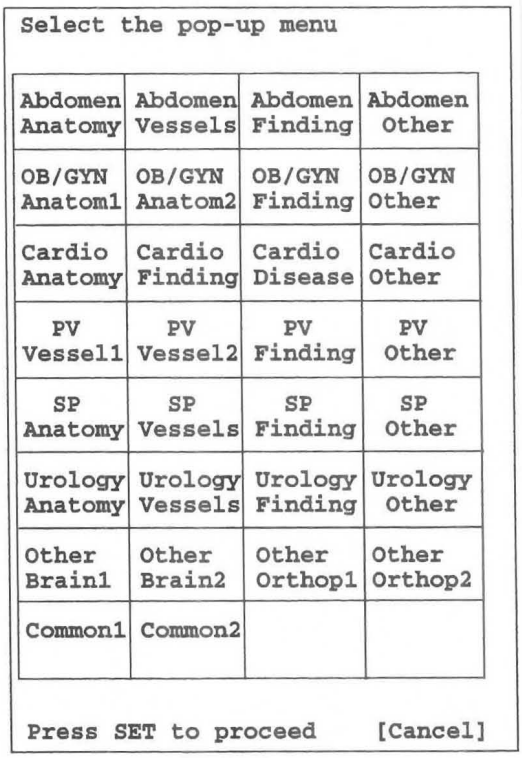
① Move the arrow to **Full Spell/ABBREV**, then press the **SET** switch.

→ The arrow moves to **Select the pop-up menu** at the right of the screen.



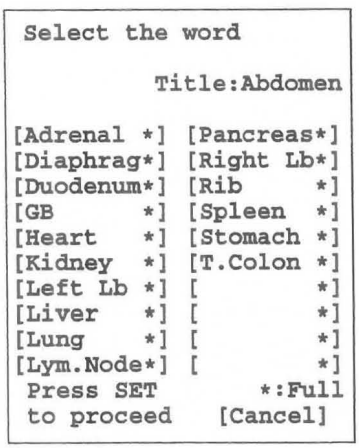
② Move the arrow to the desired pop-up menu in the list at the right of the screen, then press the **SET** switch.

→ The arrow moves to the word list at bottom left of the screen.



③ Select the desired word from the word list at bottom left of the screen, then press the **SET** switch.

→ A sub-menu for selecting full spelling/abbreviation appears.



④ Select **Full spelling** or **Abbreviation**, then press the **SET** switch.

→ The setting function is terminated.

```
--- Full Spelling / Abbreviation ---

 Select full spelling or abbreviation

 [ Full spelling ]
 : Diaphragm

 [ Abbreviation ]
 : Diaphrag

 Press SET to proceed                          [Cancel]
```

(4) Erasing a word

① Move the arrow to **Erase word**, then press the **SET** switch.

→ The arrow moves to **Select the pop-up menu** at the right of the screen.

```
Select the menu

[ Copy word ]
[ Move word ]
[ Full Spell/ABBREV]
[ Erase word ]
[ Change title ]
[ Copy pop-up menu ]
[ Initialize pop-up ]
Press SET
to proceed    [Cancel]
```

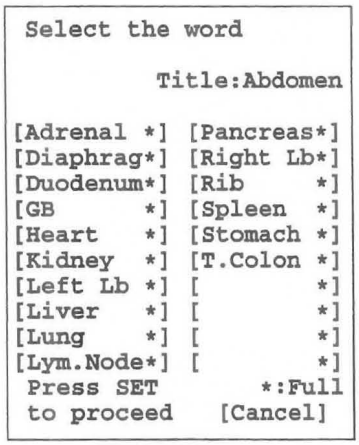
② Move the arrow to the desired pop-up menu in the list at the right of the screen, then press the **SET** switch.

→ The arrow moves to the list of words at bottom left of the screen.

```
Select the pop-up menu

| Abdomen Anatomy | Abdomen Vessels | Abdomen Finding | Abdomen Other |
|---|---|---|---|
| OB/GYN Anatom1 | OB/GYN Anatom2 | OB/GYN Finding | OB/GYN Other |
| Cardio Anatomy | Cardio Finding | Cardio Disease | Cardio Other |
| PV Vessel1 | PV Vessel2 | PV Finding | PV Other |
| SP Anatomy | SP Vessels | SP Finding | SP Other |
| Urology Anatomy | Urology Vessels | Urology Finding | Urology Other |
| Other Brain1 | Other Brain2 | Other Orthop1 | Other Orthop2 |
| Common1 | Common2 | | |

Press SET to proceed     [Cancel]
```

③ Select the word to be erased, then press the **SET** switch.

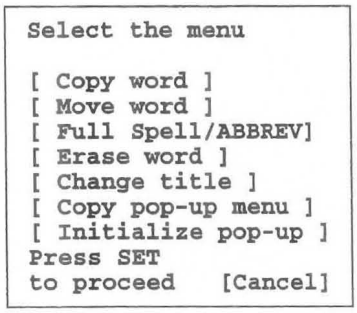
→ The word erasure function is terminated.



(5) Changing the title of a pop-up menu

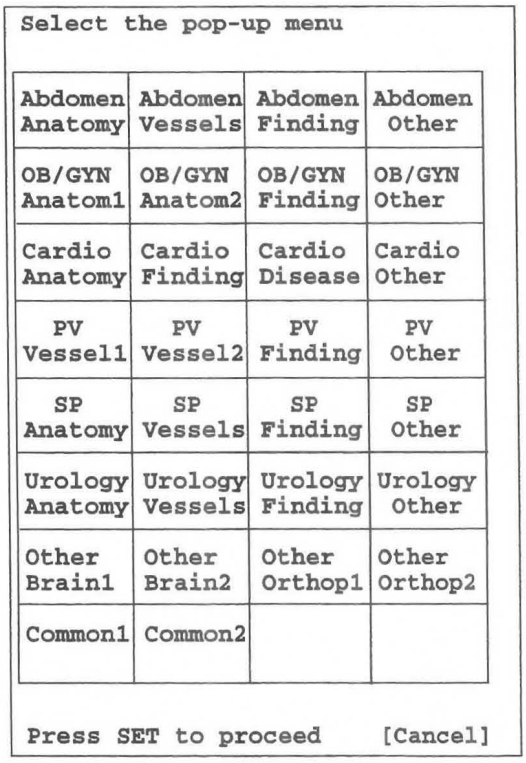
① Move the arrow to **Change title**, then press the **SET** switch.

→ The arrow moves to **Select the pop-up menu** at the right of the screen.



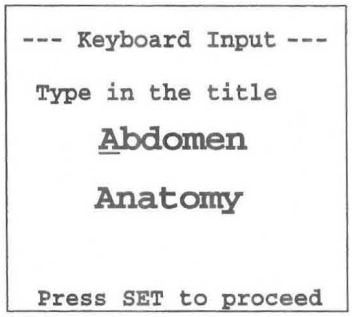
② Select the desired pop-up menu from the list at the right of the screen, then press the **SET** switch.

→ A sub-menu for entering a title appears at top left of the screen.



③ Enter the new title, then press the **SET** switch.

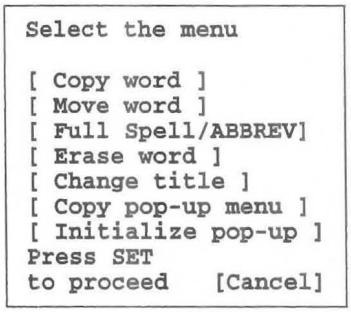
→ The title changes.



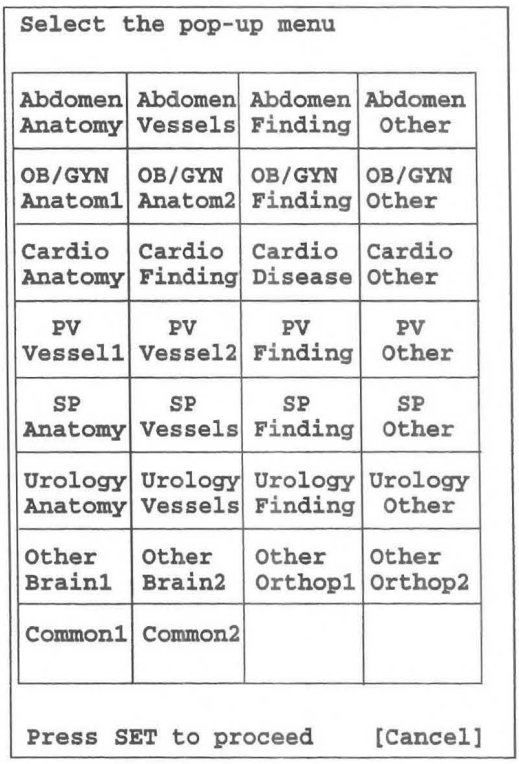
(6) Copying a pop-up menu

① Move the arrow to **Copy pop-up menu**, then press the **SET** switch.

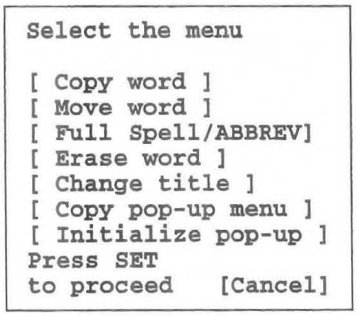
→ A sub-menu for checking the contents to be copied appears at top left of the screen.



② Select the title of the pop-up menu to which the source pop-up menu is to be copied, from the list at the right of the screen, then press the **SET** switch.

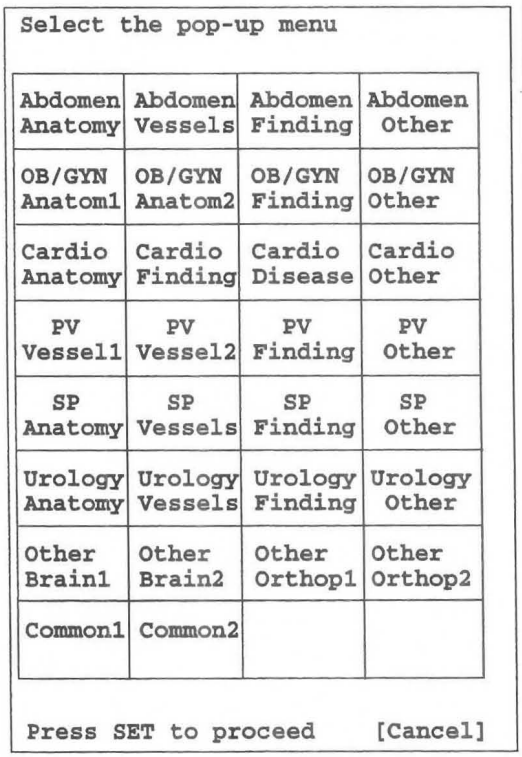


③ Display the pop-up menu of the selected copy destination, in the **DESTINATION** box of the sub-menu for entering the title displayed at top left of the screen.



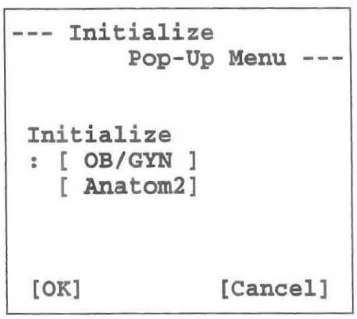
④ Select the copy source pop-up menu from the list at the right of the screen, then press the **SET** switch.

→ The title of the selected copy source pop-up menu appears in the **SOURCE** box of the sub-menu.



⑤ Move the arrow to **OK** in the sub-menu, then press the **SET** switch.

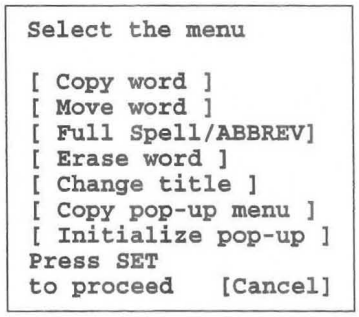
→ The copy function is terminated.



(7) Initializing a pop-up menu

① Move the arrow to **Initialize pop-up**, then press the **SET** switch.

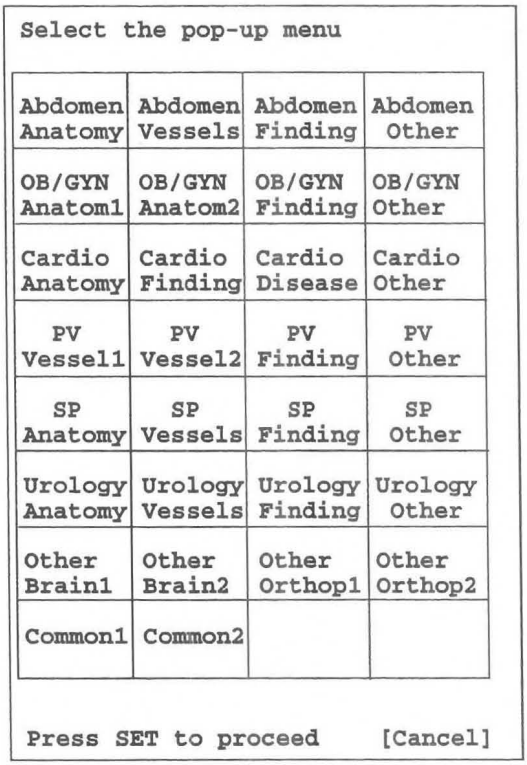
→ The arrow moves to **Select the pop-up menu** at the right of the screen.



② Select the pop-up menu to be initialized, from the list at the right of the screen, then press the **SET** switch.

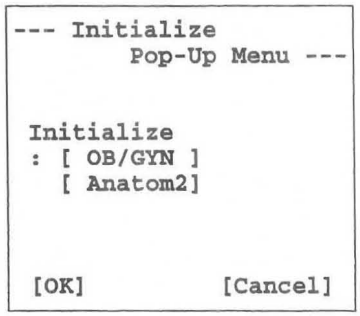
→ A sub-menu from checking initialization appears at top left of the screen.

→ The selected pop-up menu name appears in the sub-menu.



③ Move the sub-menu to **OK**, then press the **SET** switch.

→ The initialization function is terminated.



(2) -2. Registering/canceling the user library

(1) Registration

① Move the arrow to **Register into USER library** of Select the menu, then press the **SET** switch.

→ A sub-menu for selecting the user library editing function appears.

```
Select the menu

[ Edit pop-up menu ]

[ Register into
  USER library ]


Press SET
to proceed
```

② Move the arrow to **Keyboard Input,** then press the **SET** switch.

→ A sub-menu for making a keyboard input appears.

```
Select the menu

[ Keyboard Input ]

[ Cancel
  Registration ]


Press SET
to proceed    [Cancel]
```

③ Enter characters in the full spelling box, then press the **SET** switch.

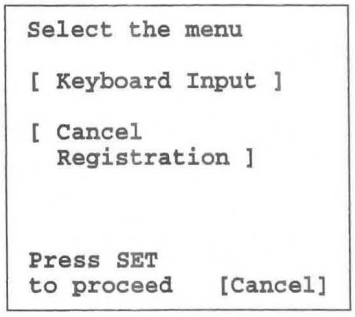
→ The arrow moves to the abbreviation input box. Enter an abbreviation, then press the **SET** switch. The registration function is terminated.

```
--- Keyboard Input ---

Type in the word

Word
:[-                ]

Abbreviation
:[                 ]

Press SET to proceed
```

(2) Canceling a registration

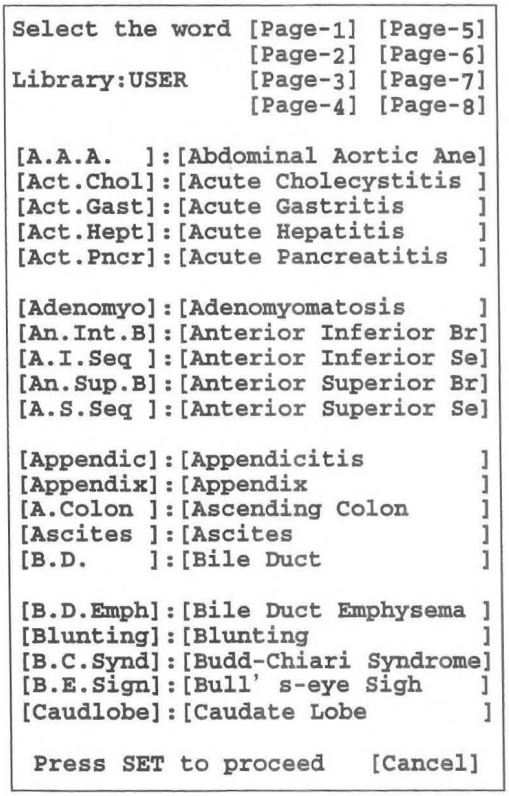
① Move the arrow to **Cancel Registration**, then press the **SET** switch.

→ A list of words is displayed at the right of the screen.



② Select the word that you wish to cancel from the word list at the right of the screen, then press the **SET** switch.

→ The arrow moves to **OK**. When you press the **SET** switch, the word is canceled.



11-5-16. Preset Control

You can copy or print a preset as follows.

① Press the **PRESET** switch, and select **C.Set-up** from the touch panel.

→ Common Preset appears.

② Select **Preset Control** from the touch panel.

→ The following Preset Control screen appears.

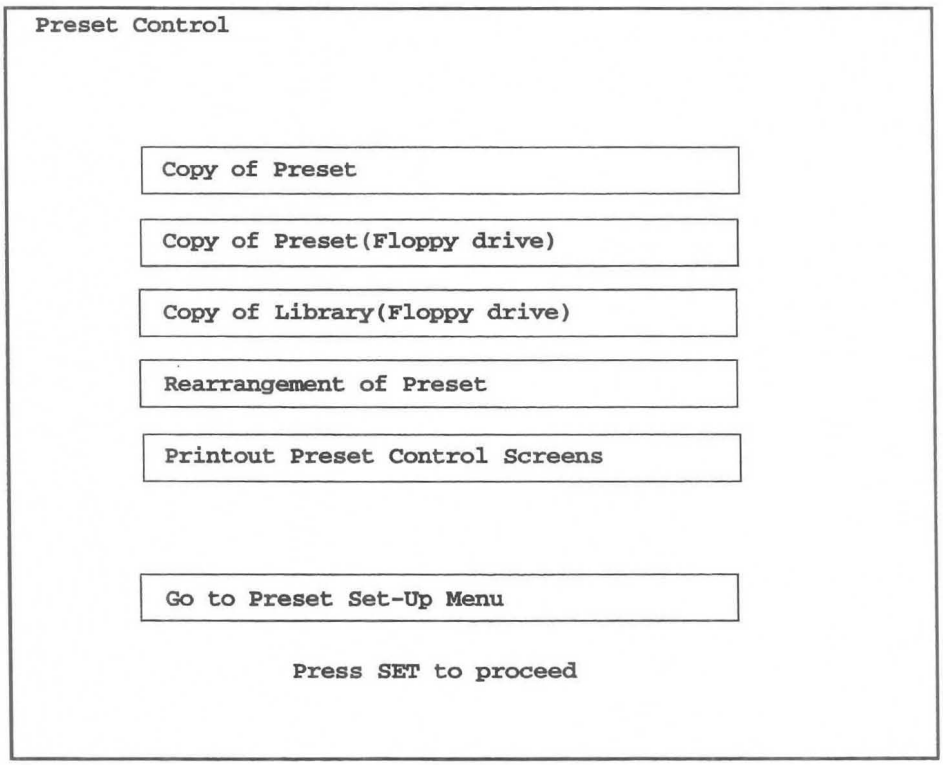


Fig. Preset Control screen

(1) Copying a preset

You can copy a preset as follows.

① Move the arrow to **Copy of Preset** on the Preset Control screen, then press the **SET** switch.

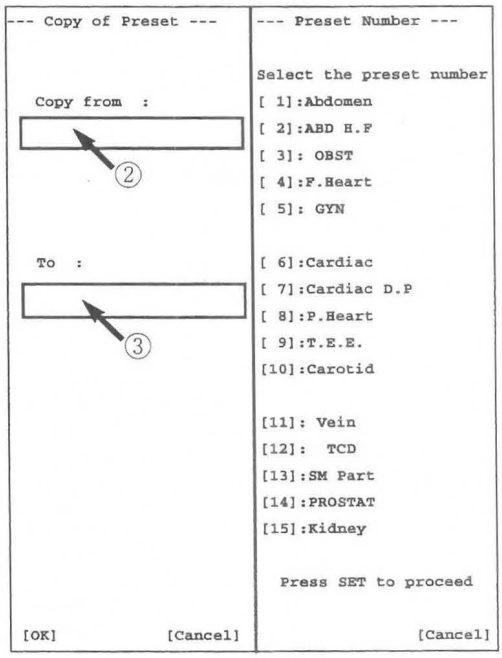
→ A pop-up menu appears.

② Select the number of the preset that you wish to copy, then press the **SET** switch.

→ The arrow moves to **Preset Number** at the right. Move the arrow to the preset that you wish to copy, then press the **SET** switch.

③ Select the number of the copy destination preset, then press the **SET** switch.

→ The arrow moves to **Preset Number** at the right. Move the arrow to the copy destination preset, then press the **SET** switch.



④ Move the arrow to **[OK]**, then press the **SET** switch.

→ The preset is copied to the copy destination.

(2) Copying a preset (using an FD drive)

You can copy a preset from a floppy disk to the system as follows.

[Remark]

Use as 3.5-inch 2HD floppy disk. The system does not have a formatting function, so use a floppy disk formatted in either the DOS/V or MS-DOS format.

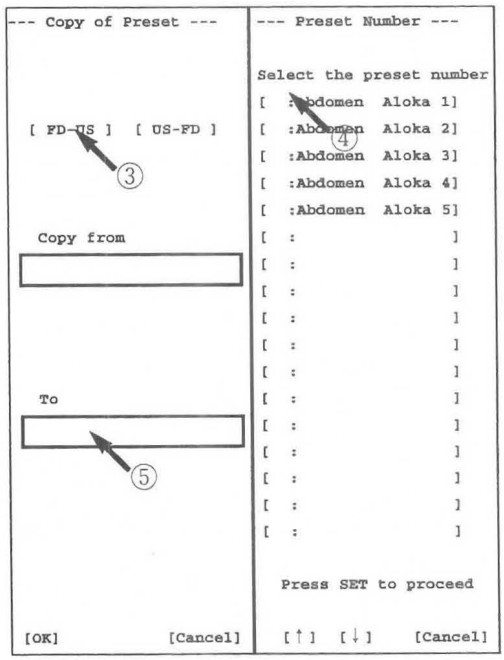
① Move the arrow to **Copy of Preset (Floppy drive)** on the Preset Control screen, then press the **SET** switch.

→ A pop-up menu appears.

② Insert the floppy disk containing the copied preset data.

③ Move the arrow to **FD→US**, then press the **SET** switch.

→ The presets in the floppy disk appear at the right of the screen.



[Remark]

NEVER press the eject button while the drive LED is lit.

If there is no disk in the drive, an error message will appear.

④ Move the arrow to the preset that you wish to copy, then press the **SET** switch.

→ The same name as that of the preset selected from the floppy disk appears at the left of the screen.

[Remark]

If there are many presets in the floppy disk, select [↑] or [↓] using the arrow.

⑤ Select the number of the copy destination preset, then press the **SET** switch.

→ The arrow moves to **Preset Number** at the right. Move the arrow to the copy destination preset, then press the **SET** switch.

⑥ Select **[OK]**, then press the **SET** switch.

→ The preset is copied to the copy destination.

(3) Copying a preset (using an FD drive)

You can copy a preset from the system to a floppy disk as follows.

[Remark]

Use as 3.5-inch 2HD floppy disk. The system does not have a formatting function, so use a floppy disk formatted in either the DOS/V or MS-DOS format.

① Move the arrow to **Copy of Preset (Floppy drive)** on the Preset Control screen, then press the **SET** switch.

→ A pop-up menu appears.

② Insert an empty or partially filled floppy disk in the floppy disk drive.

③ Move the arrow to **US→FD**, then press the **SET** switch.

→ The presets in the system appear at the right of the screen.

④ Move the arrow to the preset that you wish to copy, then press the **SET** switch.

→ The same name as that of the preset selected from the system appears at the left of the screen.

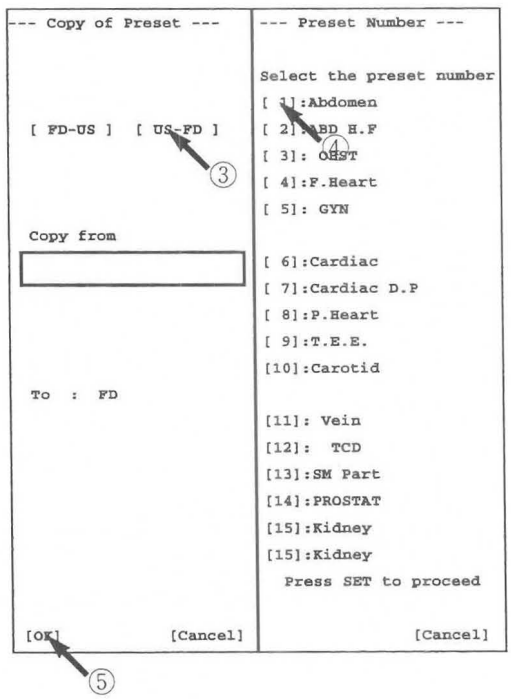
⑤ Select **[OK]**, then press the **SET** switch.

→ The preset is copied to the floppy disk.

[Remark]

NEVER press the eject button while the drive LED is lit.

If there is no disk in the drive, an error message will appear.



(4) Copying a library (using an FD drive)

You can copy a floppy disk containing marks and annotations (called a library) made by the user, to the system.

[Remark]

Use as 3.5-inch 2HD floppy disk. The system does not have a formatting function, so use a floppy disk formatted in either the DOS/V or MS-DOS format.

You can create body marks by means of Aloka's "Body Mark Editor" software. Use this function to install user-created body marks in the system.

① Move the arrow to **Copy of Library (Floppy drive)** on the Preset Control screen, then press the **SET** switch.

→ A pop-up menu appears.

② Insert the floppy disk containing the copied library data, in the floppy disk drive.

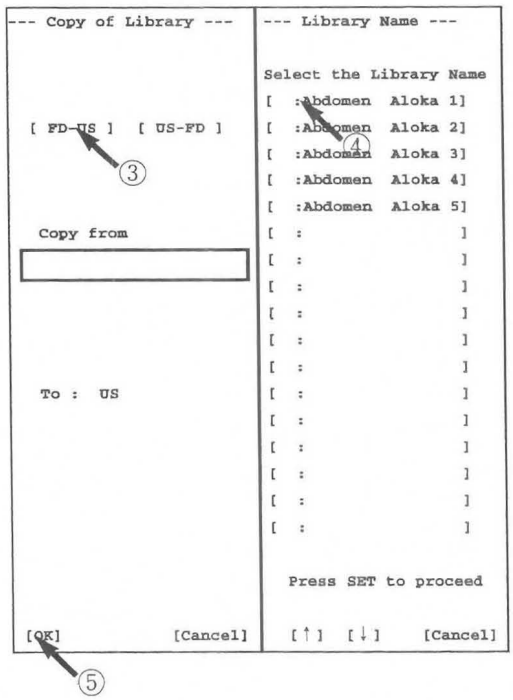
③ Move the arrow to **FD→US**, then press the **SET** switch.

→ The libraries in the floppy disk appear at the right.

[Remark]

NEVER press the eject button while the drive LED is lit.

If there is no disk in the drive, an error message will appear.



④ Move the arrow to the library that you wish to copy, then press the **SET** switch.

→ The same name as that of the library selected from the floppy disk appears.

[Remark]

If there are many libraries in the floppy disk, select [↑] or [↓] using the arrow.

⑤ Select **[OK]**, then press the **SET** switch.

→ The preset is copied to the copy destination.

(5) Copying a library (using the FD drive)

You can copy a library from the system to a floppy disk as follows.

[Remark]

Use as 3.5-inch 2HD floppy disk. The system does not have a formatting function, so use a floppy disk formatted in either the DOS/V or MS-DOS format.

① Move the arrow to **Copy of Library (Floppy drive)** on the Preset Control screen, then press the **SET** switch.

→ A pop-up menu appears.

② Insert an empty or partially filled floppy disk in the floppy disk drive.

③ Move the arrow to **US→FD**, then press the **SET** switch.

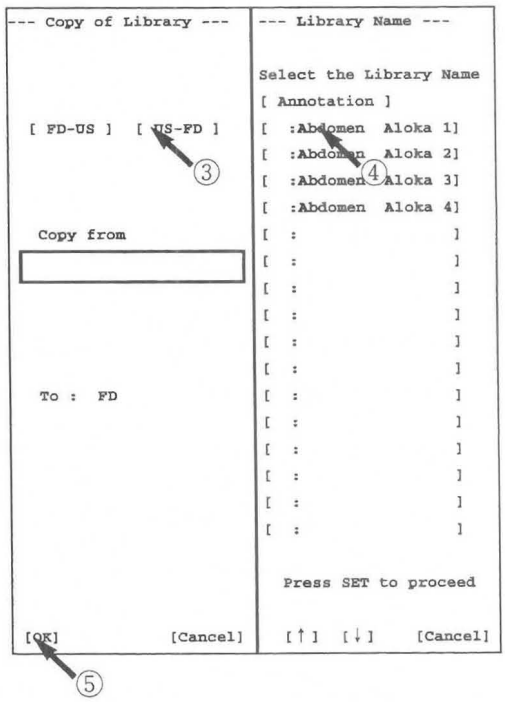
→ The libraries in the system appear at the right.

④ Move the arrow to the library that you wish to copy, then press the **SET** switch.

→ The same name as that of the kind of body marks in the library selected from the system appears at the left.

[Remark]

All of the pages of the Annotation library edited by the user are copied. The name "Annotation" cannot be changed.



⑤ Select **[OK]**, then press the **SET** switch.

→ The library is copied to the floppy disk.

[Remark]

NEVER press the eject button while the drive LED is lit.
If there is no disk in the drive, an error message will appear.

(6) Rearranging presets

① Move the arrow to **Rearrangement of Preset** on the Preset Control screen, then press the **SET** switch.

→ A pop-up menu appears.

② Select the number of the preset that you wish to move, then press the **SET** switch.

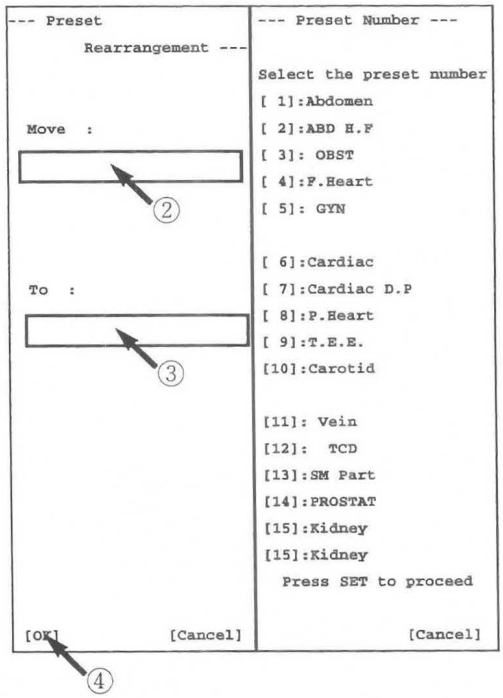
→ The arrow moves to **Preset Number** at the right. Move the arrow to the preset that you wish to move, then press the **SET** switch.

③ Select the number of the preset at the move destination, then press the **SET** switch.

→ The arrow moves to **Preset Number** at the right. Move the arrow to the preset at the move destination, then press the **SET** switch.

④ Move the arrow to **[OK]**, then press the **SET** switch.

→ The preset moves to the move destination.



(7) Printing a preset registration screen

① Move the arrow to **Printout Preset Control Screen** on the Preset Control screen, then press the **SET** switch.

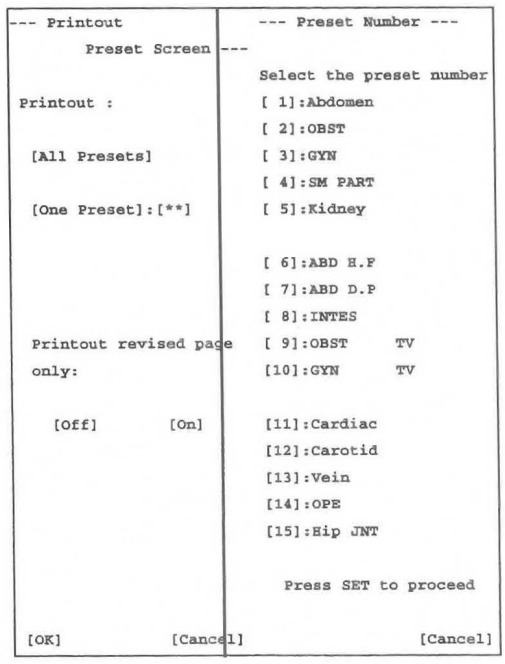
→ A pop-up menu appears.

② Select **[All Preset]** or **[One Preset]** of Printout, then press the **SET** switch.

→ If you select **[All Preset]**, you can print the registration screen for all presets. If you select **[One Preset]**, you can the registration screen for a specified preset.

③ Select **[Off]** or **[On]** of Printout revised page only, then press the **SET** switch.

→ If you select **[On]**, only the page whose setting was changed is printed. If you select **[Off]**, all pages are printed.



11-6. Using a DMS (when the optional DMS-5500 is connected)

[Remark]

When you wish to use a DMS, connect the optional DMS-5500.

11-6-1. DMS (Data Management Subsystem)

A DMS is a data management unit which acquires ultrasound images and patient data.

The acquired images consist of digital signals, hence there is no image deterioration.

The DMS-5500 conforms to the DICOM (Digital Imaging Communications in Medicine) 3.0 standard.

It takes a longer time than the equipment for the DMS unit to start after the power is switched ON.

After turning ON the power switch, wait until the DMS lamp on the panel goes out, then press the NEW PATIENT switch.

11-6-2. Before starting operation

(1) Set DMS LINK to ON using the DISPLAY CONTROL2 preset.

(2) Set STORE MEDIA to DISK or NET using the DISPLAY CONTROL2 preset.

11-6-3. Operation procedure

① Press the NEW PATIENT switch.

→The NEW PATIENT screen of the DMS appears.

Enter patient data such as the patient's ID, then either select [SCAN] or press the DMS switch.

[Remark]

ID and NAME are used when searching for DMS data, so enter them correctly.

[Remark]

If the NEW PATIENT screen does not appear, it means that the DMS has not started up.

Once the DMS lamp stops flashing, press the NEW PATIENT switch once again.

＜Acquiring a realtime image to the DMS＞

① Display an image.

② Once the image that you wish to acquire appears, press the acquire switch.

→The image is acquired to the DMS.

In the case of the B or 2B mode, you can acquire an image to the DMS without any need to freeze the image.

In the case of the M or D mode, freeze the image before acquiring it.

＜Displaying a DMS image＞

① Press the DMS switch.

→The image acquired to the DMS is displayed.

[Remark]

For details of the 4-screen display function, simultaneous playback function, and so on, refer to the instruction manual for the DMS.

＜Storing a displayed frozen image＞

① Press the FREEZE switch to freeze the image.

→The DMS stops automatic image acquisition.

② Display a body mark, enter comments, perform measurement, and so on.

③ Switch STORE MEDIA in the menu to DISK or NET.

→You can assign the STORE switch in advance to DISK or NET. For details, refer to 11-7 "Preset".

④ Press the STORE switch.

→Store the data in the store destination set by STORE MEDIA.

[Remark]

You can store an image using the STORE switch even after you switch the display to the DMS screen. In this case, however, the image that is stored will be the data acquired to the DMS.

[Remark]

Unless you correctly set the network for the DMS, you will be unable to send data to a server, for example. For details, refer to the DMS instruction manual.

12. MEASUREMENT FUNCTION

The various mode and measurement switches are set out below.

Switch \ Mode	B	M	D
MEASUREMENT (USER1～3) (+, ×, ⁘, ⁙)	Basic Measurement	Basic Measurement	Basic Measurement
	DIST. Area Trace Area Ellipse Volume Volume Biplane Angle %STENO DIST %STENO Area-T Ratio DIST Ratio Area-T Ratio Ellipse Histogram	M.Length M.VEL. M.Time Heart Rate %STENO Length	D.VEL. ACCEL. Mean VEL. P1/2T(VA) P-GRAD. D.VEL.kHz Heart Rate D.time P.I. R.I. Ratio Trace Ratio D.VEL dP/dt D.Trace1
	Application measurements	Application measurements	Application measurements
	CARDIAC OB PV Slice Volume HIP JOINT ANGLE PSA Volume B Flow Historram Flow Profile B TDI Profile	CARDIAC M TDI Wall Thickness Measurement M Flow Profile M Flow Trace	CARDIAC PV
	VCR Playback Measurement		

For details of each kind of measurement, see the corresponding section indicated below.

This section consists of 18 pages.

12-1. Function for Presetting

You can set the following five functions in a preset before performing measurement, in order to facilitate measurement work.

12-1-1. Allocation Function for MEASUREMENT menu and USER switch.

The following pre-settings are available:

1. With **MEASUREMENT** switch pushed, the order in the displayed menu is changed.
2. Registration of measurement items allocated to **USER** switch.

For details, refer to "MEASURE Control" of 11-5 "Preset".

12-1-2. Caliper Auto Off function

This function erases all measurement results and caliper marks displayed on the screen when the freeze is released. (Set as standard.)

Note that for application measurements, this function is supported only by some measurements.

For details, refer to "Caliper Auto Off of Disp-2 Control" of 11-5 "Preset".

12-1-3. Measurement unit selection function

This function switches the measurement unit between cm and mm.

(Changeover between cm and mm, between mm/s and cm/s, and between cm/s and m/s for Doppler flow velocity)

For details, refer to "Unit Selection of Disp-2 Control" of 11-5 "Preset".

12-1-4. Measurement result display unit changeover function

This function enables you to select the position in which to display an application measurement, from top, bottom, left and right of the screen, for each preset number. For details, refer to "MEASURE Move of Display Control" in 11-5 "Preset", and also the method of carrying out each application measurement.

12-1-5. Setting the Doppler auto trace

When performing Doppler measurement, you can set whether or not to use an auto trace, and also set the appearance and speed of the auto trace line, and so on. For details, refer to "D. Trace of MEASURE Control" in 11-5 "Preset", and also 12-4 "Auto Trace".

12-1-6. Select a D.Trace 1 measurement item

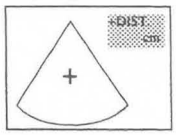
When performing measurement using D.Trace 1, you can select the items of the measurement results to be displayed.

For details, refer to 11-5 "MEASURE Control" of Preset.

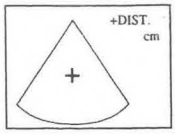
12-1-7. Gray display of measurement results

You can make a setting to display or not display a gray background for themeasurement results.

Select this function when the image and the measurement results overlap each other, making the measurement results difficult to see. You can set basic measurements and application measurements separately.



(within gray display)



(without gray display)

For details, refer to"Back Gray of Display Control-2" of 11-5 "Preset".

12-2. Number of Display Digits in the Measurement Results

The number of display digits in the measurement results in this system is as follows.

	Unit / Display depth	Display when centimeter is preset.	Display when millimeter is preset.
1	≦9 cm	0.01 cm	0.1 mm
2	9cm<	0.1 cm	1 mm

(This applies only to distance measurement and not to area, volume, velocity or time intervals.)

[Remark] When the measurement result exceeds 10.0cm,the display precision is as shown in row "2".

12-3. Basic Operation Procedure for Measurement

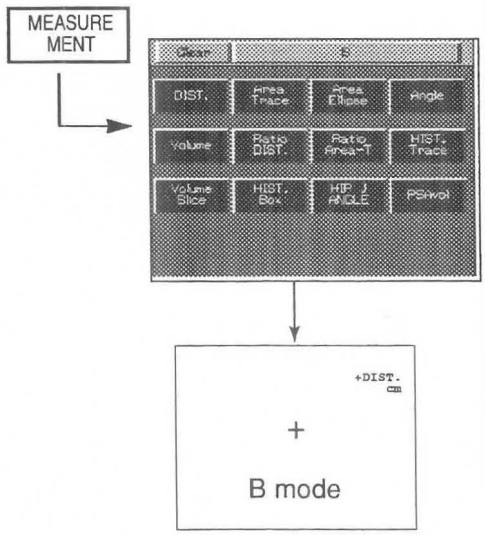
There are three methods of starting measurement, starting from the **MEASUREMENT** switch, and starting directly from the caliper switch, **USER** switch.

12-3-1. Method of selecting measurement using the MEASUREMENT switch

Pressing the **MEASUREMENT** switch displays a measurement menu on the touch panel.

Pressing a measurement item on the touch panel starts that measurement.

Example: Activate **DIST.** measurement.



① Press the **MEASUREMENT** switch.

→ The measurement name corresponding to the display mode appears on the touch panel.

② You wish to perform distance measurement, so press DIST.

→ **DIST.** starts.

12-3-2. Method of a selecting measurement using a caliper mark

Press one of the caliper marks, and the first measurement item in the measurement menu starts.

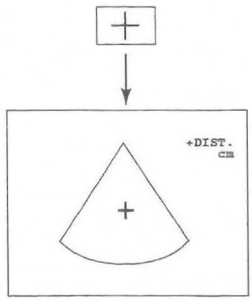
This is an example of the INITIALIZE state of the B mode.

Switch				
B mode	DIST.			

(Example) Press the + switch to start measurement.

① Press the + switch.

→ The measurement menu is displayed on the touch panel, and **DIST.** measurement starts.

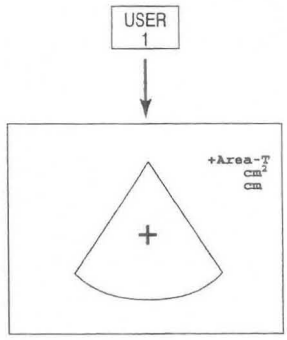


12-3-3. Using the USER switches

Pressing one of the **USER** switches (USER 1 to 3) immediately activates the measurement assigned to the switch.
This is an example of the standard setting for ABDOM.

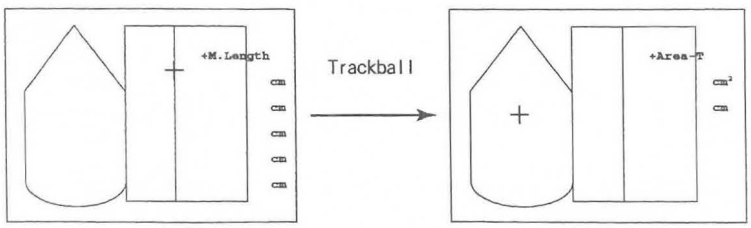
Switch	USER 1	USER 2	USER 3
Measurement	Area Trace	Area Ellipse	Volume

(Example)
In B-mode with the ABDOM setting, pressing the **USER 1** switch activates Area Trace measurement.



[Remarks]
If you started measurement by pressing the USER switch or the caliper mark switch, and are using multiple modes, measurement will start in the sequence D → M → B.
In this case, you can move the display caliper marks from one mode to another with the trackball. However, you cannot do this if you started measurement by pressing the **MEASUREMENT** switch.

(Example) When **USER1** switch has been pressed:



However, with direct starting through use of Caliper Mark switch, mode shifting is available only for the first time.
It is not available for 2nd time on.

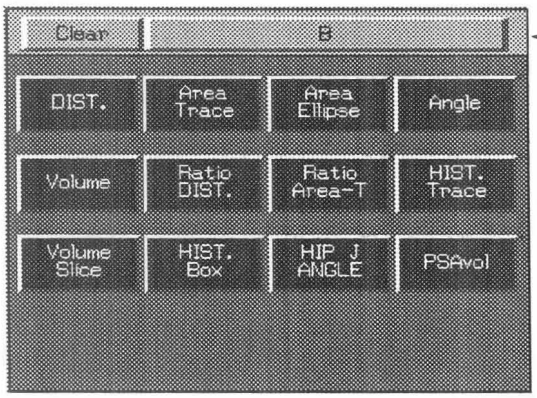
12-3-4. Measurement menu

If you press the MEASUREMENT switch, USER switch or caliper mark switch to start the measurement function, the measurement menu corresponding to the mode used appears on the touch panel.
The displayed measurement menu differs depending upon the settings made using the Preset function. (For details, refer to 11-5 "MEASURE Control".)

If you are using multiple modes, and press a mode title, the measurement menu corresponding to that mode appears. To select a measurement, press one of the displayed items.

<Display example>

Example of B mode measurement menu



Mode title

The mode title changes depending upon the displayed mode. The example shown here is for the B mode.
If the B mode menu consists of two or more pages, B1 and B2 are displayed.
If multiple modes are used, all of the mode names are displayed.

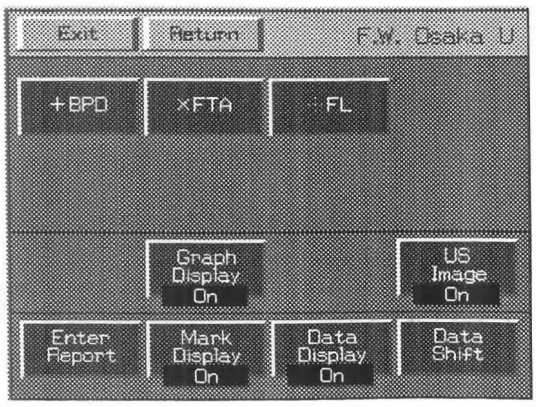
Measurement item

List of measurement items that can be selected

If you start some of the basic measurements (RATIO, %STENO measurement, etc.), or an application measurement (cardiac function measurement, obstetrical measurement, etc.), a sub-menu like that shown below will appear.

<Display example>

Example of obstetrical measurement sub-menu



Measurement title

Measurement items assigned to a caliper mark

Sub-menus common to each measurement
Exit, US Image, Enter Report, Mark Display, Data Display, Data Shift

(Sub-menus such as Return and Graph Display shown in the example are not displayed in the case of other application measurements.)

12-4. Auto Trace

12-4-1. Auto trace function

The auto trace function is used to automatically detect and trace the edge of the spectrum waveform instead of performing a manual trace using the trackball.

To start the auto trace function automatically, set it using a **preset**. The auto trace function can be used with the following measurement items.

Mean VEL., P.I, Ratio Trace, SV/CO, Flow Volume, LVIF, LVEF1,2, RVIF, RVEF1,2, LV AV STENO1,2 , RV PV STENO1,2

12-4-2. Presetting auto trace

Some parts of an auto trace setting can be preset in advance. Preset these items using **D. Trace** of **Measurement Set Up Menu** of the Preset function. You can set five items, **Method, Position, Level, SMOOTH**, and **Sample**.

Method :

You can make a setting that automatically activates the auto trace function (Auto), or one that enables you to perform a manual trace (Manu).

If you make the setting that automatically activates the auto trace function, you can change over to manual tracing if desired by pressing the switch corresponding to the caliper mark that lights when the auto trace starts.

If you made a manual trace setting, you cannot change over to auto tracing. If you wish to use auto tracing, set the auto tracing function using the Preset function.

Position, Level :

The tracing method is determined by the Position item, and the tracing position by the Level item.

There are two tracing methods, a Peak method in which the *dB low position is traced from the flow velocity value that has the maximum power in one time phase, and a Mean method which traces the mean value computed with a weighting factor corresponding to the power at the measured flow velocity. (Note that when using the Mean method, you can only select Mean VEL. and Flow Volume.)

When using the Peak method, you can select a trace level between 0 and -40 dB.

Smooth, Sample :

These items enable you to smoothen the trace line, and also to set the trace speed.

The Smooth item is used to set the degree of smoothness, and the Sample item to set the trace speed.

As an alternative to using the Preset function, you can also set the above items using **"AUTO-T Control"** of the Doppler/flow menu.

For details of the above, refer to 11-5 "Preset".

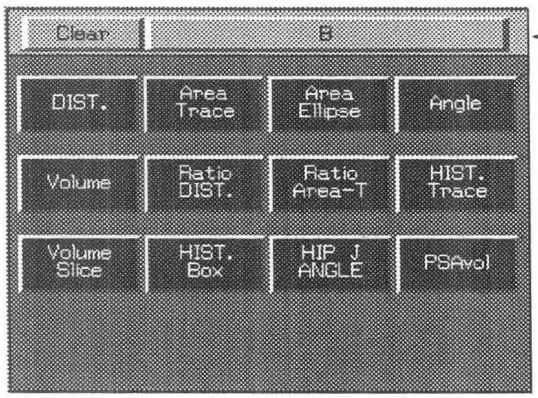
12-3-4. Measurement menu

If you press the MEASUREMENT switch, USER switch or caliper mark switch to start the measurement function, the measurement menu corresponding to the mode used appears on the touch panel.
The displayed measurement menu differs depending upon the settings made using the Preset function. (For details, refer to 11-5 "MEASURE Control".)

If you are using multiple modes, and press a mode title, the measurement menu corresponding to that mode appears. To select a measurement, press one of the displayed items.

<Display example>

Example of B mode measurement menu



Mode title

The mode title changes depending upon the displayed mode. The example shown here is for the B mode.
If the B mode menu consists of two or more pages, B1 and B2 are displayed.
If multiple modes are used, all of the mode names are displayed.

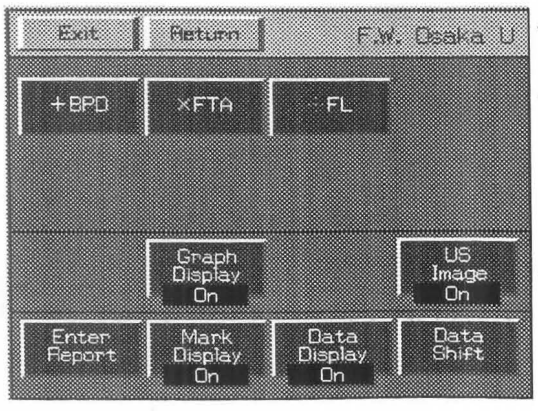
Measurement item

List of measurement items that can be selected

If you start some of the basic measurements (RATIO, %STENO measurement, etc.), or an application measurement (cardiac function measurement, obstetrical measurement, etc.), a sub-menu like that shown below will appear.

<Display example>

Example of obstetrical measurement sub-menu



Measurement title

Measurement items assigned to a caliper mark

Sub-menus common to each measurement
Exit, US Image, Enter Report, Mark Display, Data Display, Data Shift

(Sub-menus such as Return and Graph Display shown in the example are not displayed in the case of other application measurements.)

12-4-3. Basic Method of Using the Auto Trace Function

Display a satisfactory Doppler waveform.

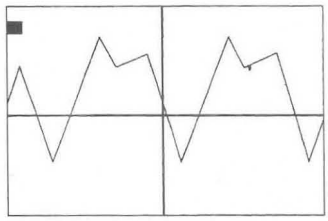
[Remark]

If aliasing occurs, perform adjustment using the base line shift function. Also, if part of the waveform is above the ■ mark alongside the flow velocity scale, perform adjustment using the Vel Range function, for example, so that the entire waveform is below the ■ mark.

If you use the auto trace function without performing this adjustment, the tracing accuracy will be reduced.

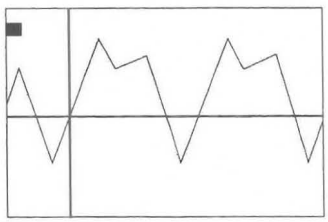
① Start measurement.

→ A solid line cursor (cursor that determines the range of the trace) appears at the center of the spectrum display area.

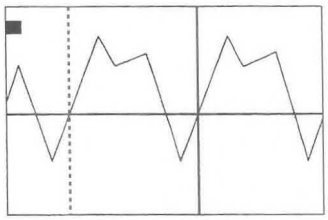


② Set the range of measurement.

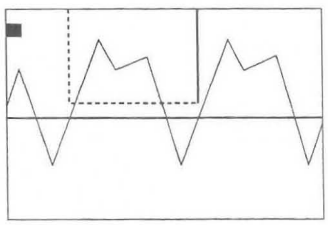
→ Using the trackball, move the solid line cursor to the starting point of the trace, then press the **MARK REF** switch.



③ Once again, move the solid line cursor to the trace end position using the trackball.

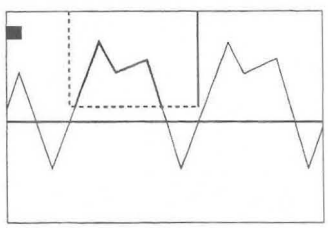


④ If you then roll the trackball in the upward direction, measurement takes place only a bore the base line. Conversely, if you roll the trackball in the downward direction, measurement takes place only below the base line.

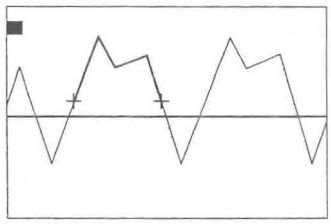


⑤ Once you have specified the trace range, press the **MARK REF** switch.

→ The tracing operation starts.



⑥ When tracing is completed, the measured results are displayed.



[Remark]
If the trace line does not match the height of the waveform, you can change the trace level between 0 dB and -40 dB by turning the rotary switch. (Peak method only)

⑦ If the auto trace data is not suitable, you can carry out a manual trace. Press the caliper switch (+ mark), and the manual trace operation starts.

[Remark]
However, that once you start a manual trace operation, you cannot return to an auto trace operation.

[Remark]
If you switch over to a manual trace operation upon completion of an auto trace operation, all of the measured data obtained from the auto trace operation is deleted.

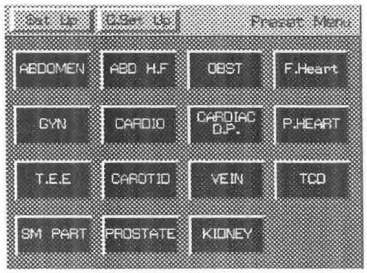
12-5. User's Calculation Function

12-5-1. Meaning of User's Calculation function

This is a function that enables you to freely create calculation formulas, and create a measurement package. You can create up to six formulas using this function.

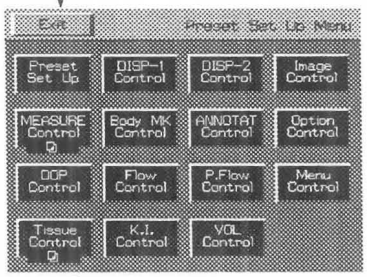
Activate the User's Calculation function using the following procedure.

① Press the **PRESET** switch, select the Preset No. of the preset that you wish to change, then select **Set Up.**



PRESET No.+ Set up

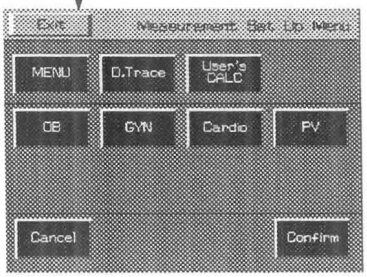
② Select **MEASURE Control.**



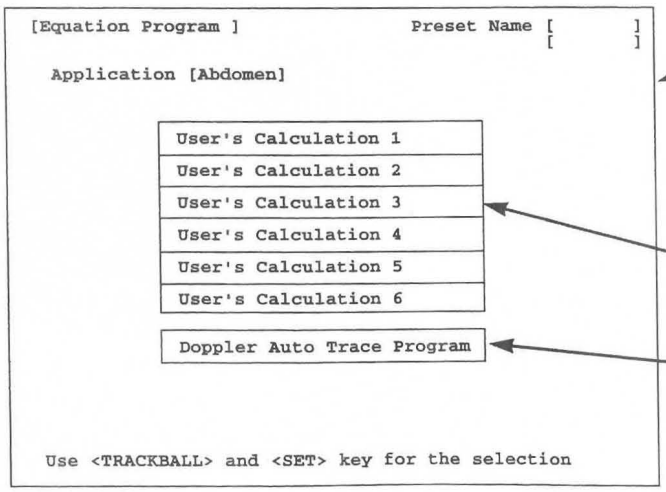
MEASURE Control

③ To change the OB-Program, select **User's CALC**.

→ The screen changes to the Equation Program page.



User's CALC



Select when you wish to set a calculation formula. There are a total of six pages.

Select and set this item when you wish to create a calculation formula that uses the Doppler Auto Trace method.

④ Move the arrow to one of the [ ] items, and press the **SET** switch.

→ A screen corresponding to the selected item appears. (See screens at top of next page.)

User's Calculation selection

```
[User's Calculation 1]
   Calculation Name : [       ]
              =
              =
              =
              =
    [ EXAM & EVAL ]
Maximum Variables range is 4 digits or less.
Use <TRACKBALL & Rotary> and <SET> key for the selection
```

Doppler Auto Trace Program selection

```
[Doppler Auto Trace Program]
          [Initialize]        [Program]

          CALC Name Method Position  Level  SMOOTH Rate
U-Calcu 1[        ] [Auto]  [Peak]  [-22dB] [No  ] [1/1]
U-Calcu 2[        ] [Auto]  [Peak]  [-22dB] [No  ] [1/1]
U-Calcu 3[        ] [Auto]  [Peak]  [-22dB] [No  ] [1/1]
U-Calcu 4[        ] [Auto]  [Peak]  [-22dB] [No  ] [1/1]
U-Calcu 5[        ] [Auto]  [Peak]  [-22dB] [No  ] [1/1]
U-Calcu 6[        ] [Auto]  [Peak]  [-22dB] [No  ] [1/1]

Use <TRACKBALL> and <SET> key for the Selection.
```

[Remark]

User's Calculation consists of six pages.

12-5-2. Setting User's Calculation

＜Setting procedure＞ Example: Setting Flow Volume calculation

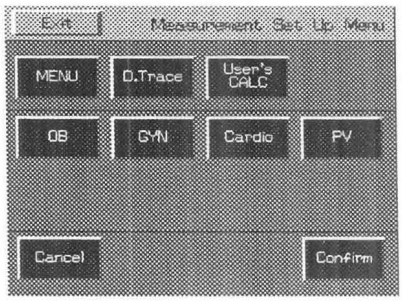
① **Select User's Calculation.**

(The operation method for User's Calculation 1～6 is the same.)

→The screen changes as shown below, and Calculation Name appears in highlighted form.

```
[User's Calculation 1]
   Calculation Name : [▒▒▒▒▒▒▒▒]
              =
              =
              =
              =
    [ EXAM & EVAL ]
Maximum Variables range is 4 digits or less.
Use <TRACKBALL & Rotary> and <SET> key for the selection
```

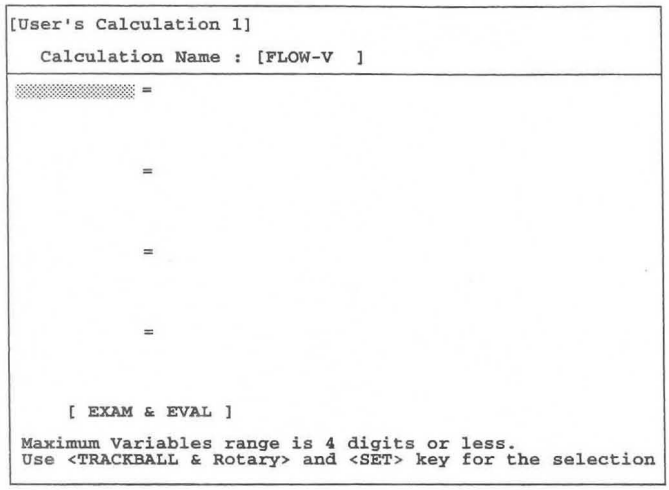
Contents of measurement menu on touch panel



Exit : Return to the Preset Set Up screen.
Cancel : Return to the previous screen.
Confirm : Register settings.

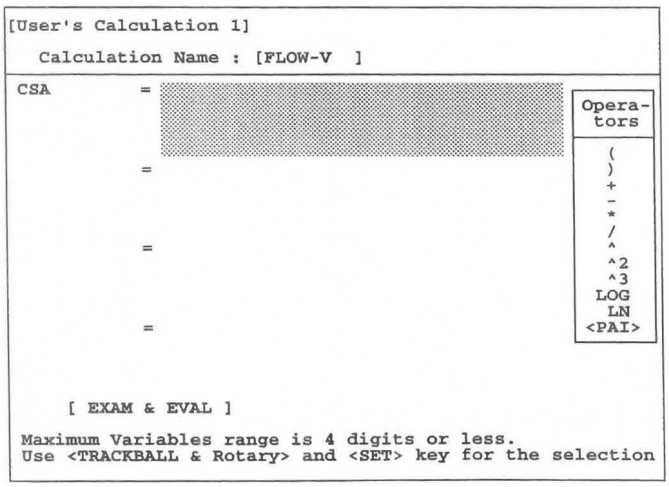
② Enter the calculation name from the keyboard, and then press the **SET** switch.

→ The highlight display moves to the left side of the screen.



③ Enter the solution variables at the left side, and then press the **SET** switch.

→ The highlight display moves to the right side of the screen, enabling you to enter the calculation formula.



④ Enter the calculation formula from the keyboard.

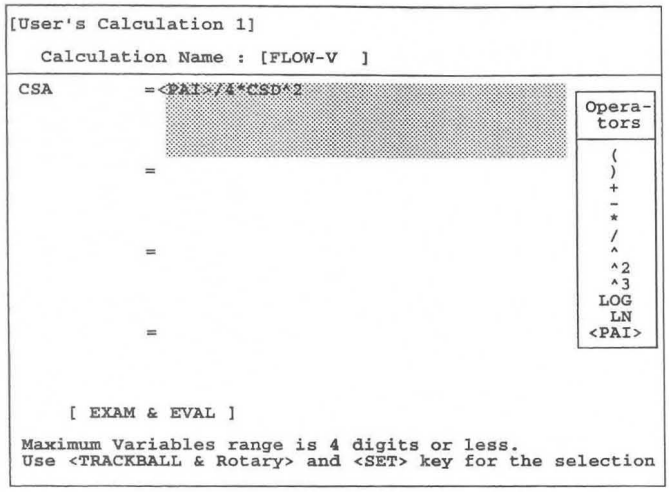
The necessary symbols for the calculation equation appear on the right side of the screen, so if necessary select symbols using the rotary encoder, and press the **SET** switch.

[Remark]

If you inadvertently move the trackball while entering the calculation formula, the highlight display will move. In this case, the entered calculation formula is not registered, so you must return the highlight display to its initial position and enter the calculation formula once again.

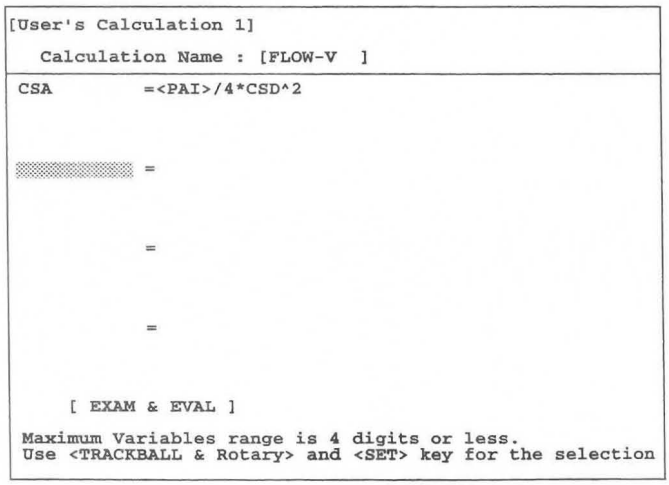
[Remark]

When entering the solution variables, surround them with < >.



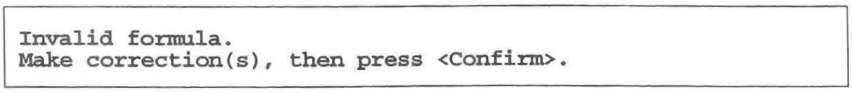
⑤ Once you have entered the calculation formula, press the **Confirm** button on the touch panel.

→ The calculation equation is registered, and the highlight display moves to the second formula.

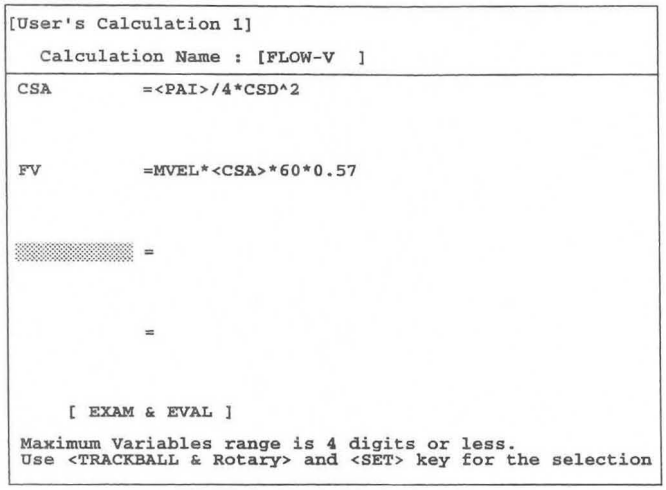


[Remark]

When you press the **Confirm** button, a syntax check starts. If there is an error, a message appears, and you are prevented from proceeding to the next step.



⑥ Register the second and subsequent calculation formulas using the same procedure.

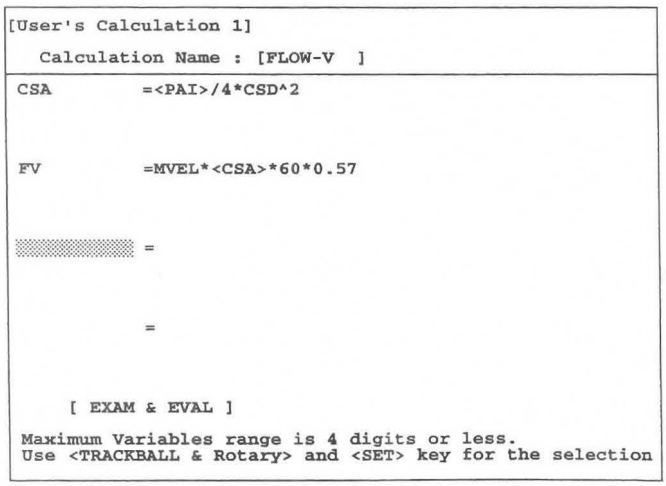


⑦ Once you have entered the formula, press the **Confirm** button on the touch panel.

→ The calculation formula is registered.

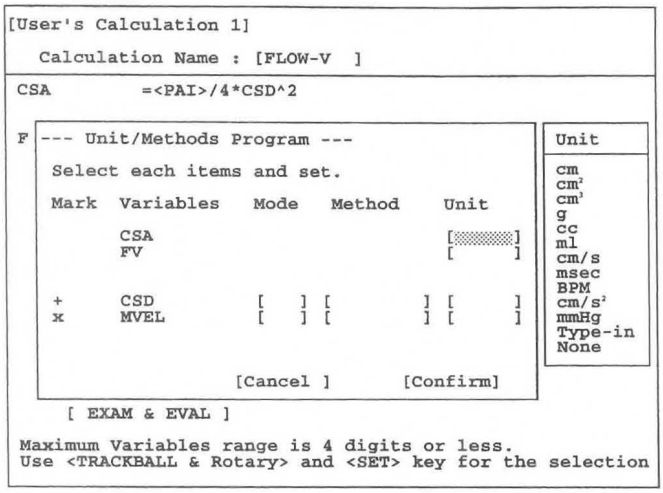
[Remark]

When you press the **Confirm** button, a syntax check starts. If there is an error, a message appears, and you are prevented from proceeding to the next step. So you need to enter the formula correctly.



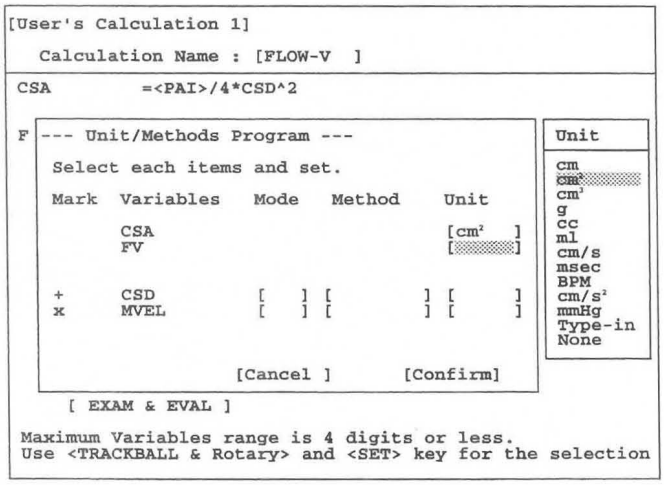
⑧ Once you have entered the formula, press the **Confirm** button on the touch panel.

→ The calculation formula registration screen closes and **Unit/Methods Program** appears.



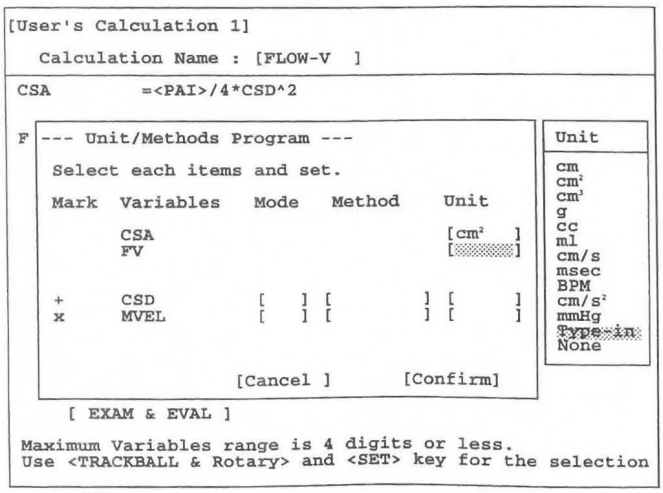
⑨ Select the unit using the rotary encoder, and press the **SET** switch.

→ The unit of **CSA** is registered.

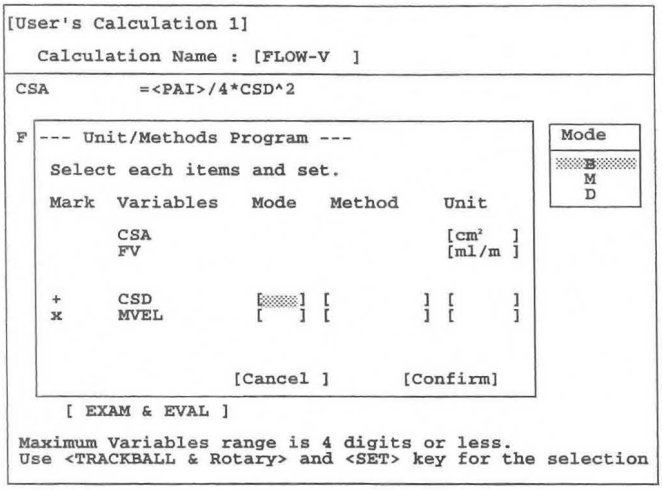


⑩ Next, enter the unit of FV. If the unit that you wish to select does not exist, select Type-in using the rotary encoder, and press the **SET** switch.

→ You can enter the unit from the keyboard.



⑪ Once you have entered the unit from the keyboard, press the **SET** switch.

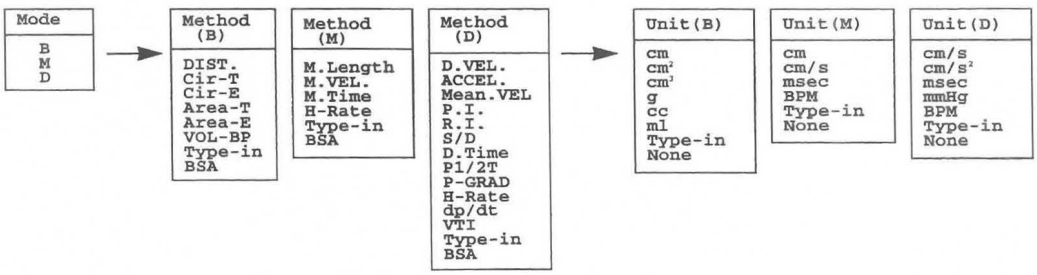


⑫ Next, select the mode.

If you select the mode using the rotary encoder and press the **SET** switch, the mode of **CSD** is registered.

Next, register the method and unit.

→ If you select B in Mode, pop-up menus Method (B) and Unit (B) appear.



[Remark]

You can select the highlight display in the pop-up menu using the rotary encoder.

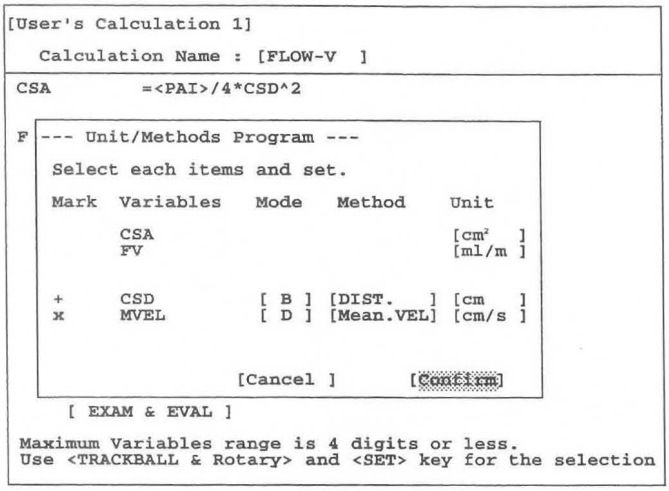
If you inadvertently move the trackball, the highlight display moves without the selected item being registered.

[Remark]

If the mode is not specified, the highlight display will not move to the Method and Unit pop-up menus.

⑬ When setting work is completed, the highlight display moves to Confirm.

When you press the **SET** switch or **Confirm** on the touch panel, the settings are registered.

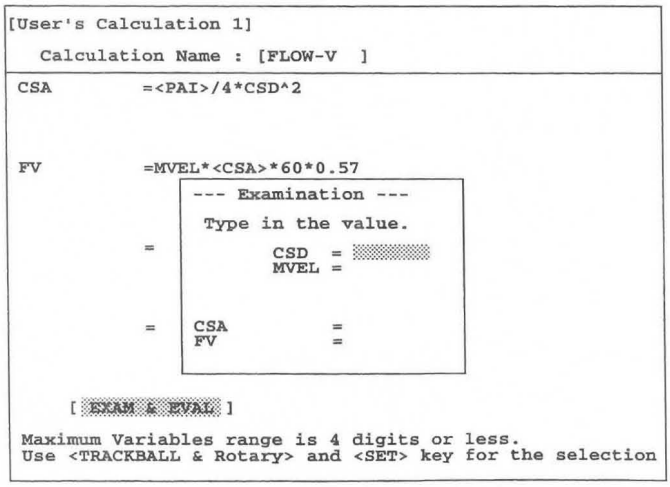


[Remark]

At this point in time, registration of the calculation formula is completed.

⑭ When registration of Method and Unit is completed, the highlight display moves to [EVAL&EXAM].

You can check the calculation formula by pressing the **SET** switch.



⑮ You can check the calculation equation by entering the numerical value at the position of the highlight display, then pressing the **SET** switch or the **Return key.**

[Remark]

In the case where you are using a registered calculation equation, assign it to a menu.

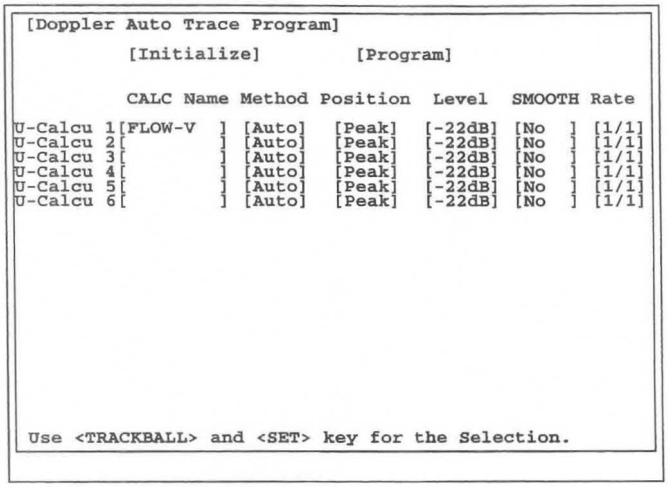
For details of menu assignment, refer to 11-5-6. "MEASURE Control".

12-5-3. Setting Doppler Auto Trace Program

You can set auto trace for a user-registered formula.

For details of auto trace, refer to 12-4. "Auto Trace".

① Select **Doppler Auto Trace Program.**



→ The screen changes as shown below.

② Settings for Doppler measurement can be done for all calculation formulas registered using User's Calculation.

Move the arrow cursor to an item, and press the **SET** switch.

→ A pop-up menu that shows each setting item appears.

For details of the setting method, refer to (7) "Setting Auto Trace" of 11-5-6. "MEASURE Control".

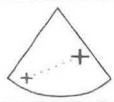
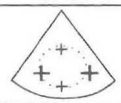
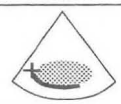
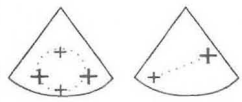
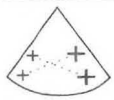
13. BASIC MEASUREMENTS

13-1. Introduction

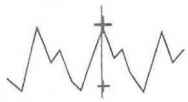
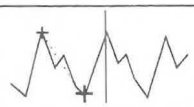
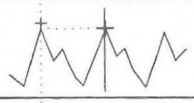
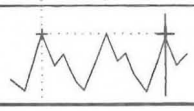
The basic measurements consist of the following measurement items for each mode.

You can perform basic measurements by using the **MEASUREMENT** switch, or by using the **USER1**, **USER2** and **USER3** switches, the caliper mark switch, the **MARK REF** switch, the touch panel menu, the trackball, the rotary encoder, and so on.

<B-mode>

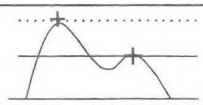
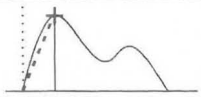
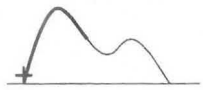
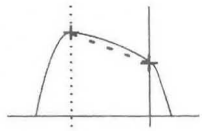
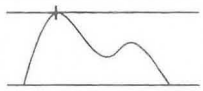
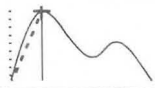
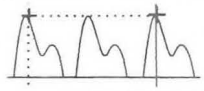
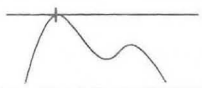
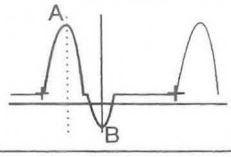
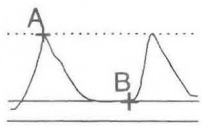
Menu item	Contents	Measurement pattern
DIST.	The distance between two caliper marks "+ ... +" is measured.	
Area Ellipse	The long axis and short axis lengths, circumference length, and area of the displayed ellipse are measured.	
Area Trace	The traveled distance of the mark and the area enclosed by the mark are measured.	
Volume	The volume of ellipsoid of revolution is calculated based on the ellipse measured.	
Volume Biplane	The same operation as Volume measurement is performed, then the third axis is measured, enabling the volume to be calculated to a greater degree of accuracy.	
Angle	Measures and displays the prescribed angle using two sets of the same caliper marks.	

<M-mode>

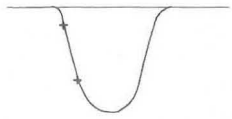
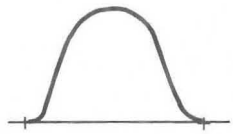
Menu item	Contents	Measurement pattern
M. Length	Distances between marks at the same instant are measured.	
M. VEL.	Velocity, distance and time interval between two marks are measured.	
M. Time	Time interval between two marks is measured.	
Heart Rate	Heart rate is calculated from the time interval between two cardiac cycles.	

This section consists of 48 pages.

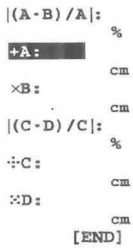
<D-mode>

Menu item	Contents	Measurement pattern
D. VEL.	Measures two velocities specified by marks, and computes and displays the ratio of the measured values. Ratio = Solid line/Broken line	
ACCEL.	Acceleration and time interval between two marks are measured. $ACC=\frac{Vb - Va}{Tb - Ta}$	
Mean VEL.	Mean velocity, mean pressure gradient, and time interval are measured and the velocity time integral*1 is calculated. $m.V=\{\int_{Ta}^{Tb} V(t)\cdot dt\}/(Tb-Ta)$ $m.P=\{\int_{Ta}^{Tb} 4[V(t)]^2 dt\}/(Tb-Ta)$	
P1/2T(VA)	Pressure half time is calculated. $P1/2t=\frac{(Vmax/\sqrt{2})-Vmax}{(Vb-Va)/(Tb-Ta)}$ where Vmax=Va Valve orifice area (VA) is calculated from the pressure half time. VA=220/(P1/2t)	
P-GRAD.	Velocity is measured and pressure gradient is calculated. $grd=4\times(max)^2$	
D. Time	Time interval between two marks is measured.	
Heart Rate	Heart rate is calculated from the time interval between two cardiac cycles.	
D. VEL. kHz	Doppler shift frequency is measured.	
Pulsatility Index	Rate of stenosis is obtained with velocity measurements of the peripheral vessel. P.I.= | (A - B) / AV | (AV: average)	
Resistance Index	Rate of stenosis is obtained with velocity measurements of the peripheral vessel. R.I.= | (A - B) / A |	

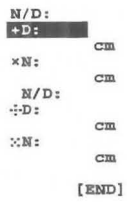
*1 Velocity time interval : VTI (cm)= $\int_{Ta}^{Tb} Vt\, dt$

dP/dt	This function is used during mitral valve regurgitation flow with continuous Doppler (CW Doppler) to measure the period from when the flow velocity at startup is **1m/sec(4mmHg)** until it reaches **3m/sec(36mmHg)** (**Δt msec**), and compute dP/dt (time differential value of the pressure inside the left ventricle) which is the one of hte index of systolicity of the left ventricle.	
D.Trace1	This function calculates **Peak Velocity, Peak Pressure Gradient, Mean Pressure Velocity, Mean Gradient, VTI, Flow Time,** and so on, from the doppler waveform. You can select the item that you wish to measure using a preset.	

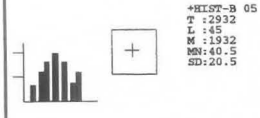
<% Stenosis measurement >

Menu item	Description of measurement	Displayed results
%STENO DIST %STENO Area-T %STENO Length	The normal blood vessel diameter (or area) and the diameter (or area) at a constriction are measured in the B mode or M mode, then the % stenosis of the blood vessel is computed. %STENO = | (A-B)/A | x 100 (%) %STENO = | (C-D)/C | x 100 (%) (A,C: Normal blood vessel diameter, area B,D: Diameter, area of constriction) %STENO DIST : Obtained by distance measurement in the B mode. %STENO Area-T : Obtained by trace measurement in the B mode. %STENO Length : Obtained by distance measurement in the M mode.	

<Ratio measurement >

Menu item	Description of measurement	Displayed results
Ratio DIST. Ratio Area-T Ratio Area-E Ratio Trace	Compares two measured values, and computes the ratio between them. RATIO = N /D (N:Numerator, D:Denominator) Ratio DIST.: The ratio between two distances is computed in the B mode. Ratio Area : The ratio between two areas is computed by a trace in the B mode. Ratio Ellipse : The ratio between two areas obtained by Ellipse is computed in the B mode. Ratio Trace : The ratio is computed from two VT1 in the D mode.	

<Histogram measurement >

Menu item	Description of measurement	Displayed results
HIST. Box HIST. Trace	The echo intensity distribution in the ROI of a slice image is displayed using a histogram. HIST. Box : The ROI is enclosed by a box cursor. HIST. Trace : The ROI is enclosed by a trace.	

<Method of performing basic measurements>

Here, the method of performing basic measurements in each mode is described.

To select a measurement item, either press the **MEASUREMENT** switch and make a selection from the touch panel menu, or press the **USER** switch, or caliper mark switch. (Refer to 12-3 "Basic Operation Procedure for Measurement".)

13-2. B-mode

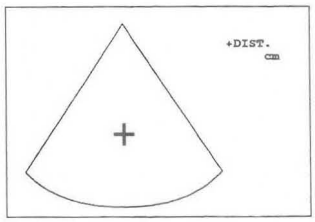
DIST. (Distance)

This function calculates and displays the distance between the two caliper marks "+·····+".

<Operation method>

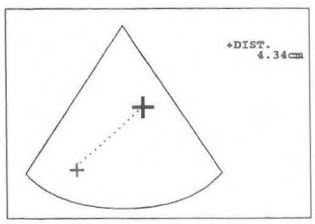
① Select **DIST.**

→ A "+" mark appears at the center of the screen, so move it to the starting point of measurement using the trackball.



② Press the **MARK REF** switch.

→ The measurement starting point mark is fixed, so move the separated mark to the end point of measurement using the trackball.



[Remark]

If you wish to change over the movable mark, press **MARK REF** switch.

③ Upon completion of measurement, select **Clear** from the touch panel menu or press the **MEASUREMENT** switch.

→ The measurement marks and all measurement results are erased.

[Remark]

You can use four kinds of marks, +, ×, ⁘, and ⁖. To delete only one mark and the corresponding results, press the switch corresponding to the mark to be deleted so that the lamp in the switch lights, then press the same switch again.

[Remark]

If you change the display mode or the display magnification during measurement, the caliper marks are erased. The measurement results remain being displayed.

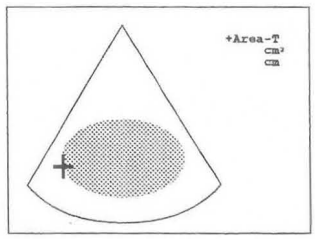
<DIST. measurement display examples>

```
+DIST.
  3.3cm          ← Distance between marks
```

[Remark] This is an example in which the display unit is cm.

Area Trace

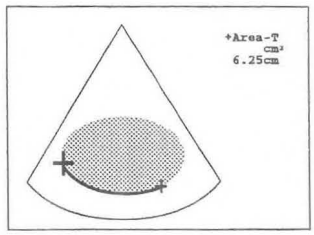
This function calculates and displays the length of the locus described by the caliper mark and also the area of the part enclosed by the locus.



＜Operation method＞

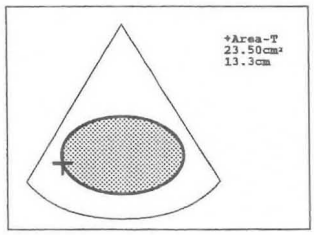
① Select **Area Trace.**

→ A "+" mark appears at the center of the screen, so move it to the starting point of measurement using the trackball.



② Press the **MARK REF** switch.

→ The measurement starting point mark is fixed, so using the trackball move the separated mark so as to enclose the measurement region in which the area is to be computed.



③ Press the **MARK REF** switch.

→ The value of the enclosed area is displayed in cm^2.

[Remark]

Turning rotary encoder half a turn in a clockwise direction causes the bright line to be gradually erased to correct the trace. If the line is erased too much, turn rotary encoder in a clockwise direction to cause the line to be displayed again.

To restart the measurement, press the **MARK REF** switch twice and start from step ①.

④ Upon completion of measurement, select **Clear** from the touch panel menu or press the **MEASUREMENT** switch.

→ The measurement marks and all measurement results are erased.

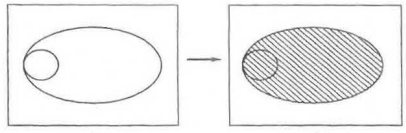
[Remark]

You can use four kinds of marks, +, ×, ⁘, and ∴. To delete only one mark and the corresponding results, press the switch corresponding to the mark to be deleted so that the lamp in the switch lights, then press the same switch again.

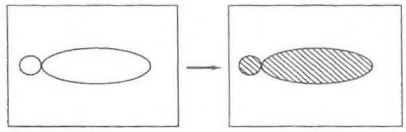
[Remark]

If you change the display mode or the display magnification during measurement, the caliper marks are erased. The measurement results remain being displayed.

[Remark]
If there are several parts enclosed by bright lines,the total area enclosed by the outermost line is calculated.
The area of the shaded part is calculated,as shown in the figure at right.



The circumference is the total length of the displayed locus.



<Area Trace measurement display examples>

```
+Area-T
  23.50cm²    ← The area enclosed by the mark.
   13.3cm     ← The traveling distance of the mark.
```

[Remark] This is an example in which the display unit is cm.

Area Ellipse

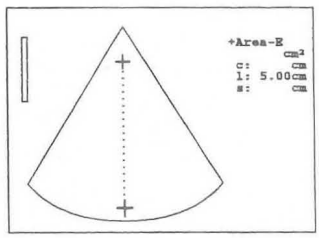
This function calculates and displays the length of the major(l) and minor axes(s) and also the circumference of the displayed ellipse and the area enclosed by it.

Area	Area= π /4×l×s
Circumference	Circ= $\pi\sqrt{2\ (a^2+b^2)}$ (a≠b)
	Where, a and b are radii (a = 1/2, b = s/2)

＜Operation method＞

① Select **Area Ellipse.**

→ A "+" mark appears at the center of the screen, so using the trackball move the mark to one end of the long axis of the region to be measured.

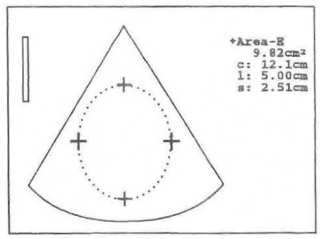


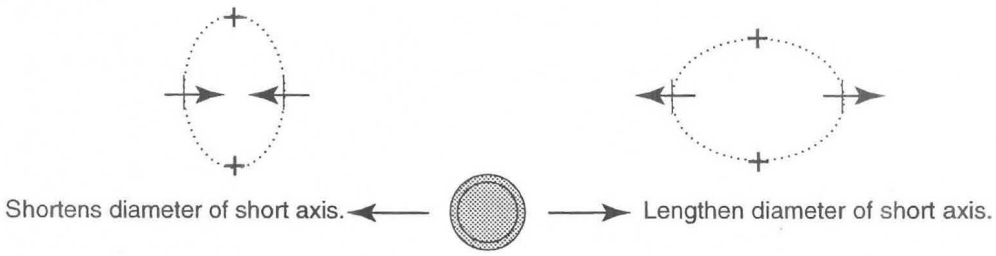
② Press the **MARK REF** switch.

→ The measurement end point mark is fixed, so using the trackball move the separated mark to the point corresponding to the length of the long axis of the ellipse.

③ Press the **MARK REF** switch.

→ An ellipse mark appears.
Use the trackball to adjust the short axis length of the mark.
The area, circumference (c), short axis (s), and long axis (l), of the ellipse are computed and displayed.





④ Correct the setting of the ellipse.
→ Press the **MARK REF** switch.
You can now reset the diameter and end point of the major axis.

⑤ Once again, press the **MARK REF** switch.
→ You can now reset the diameter and starting point of the major axis.

[Remark]
By pressing the **MARK REF** switch, the function of the trackball switches through ③→④→⑤→③... .

⑥ Upon completion of measurement, select **Clear** from the touch panel menu or press the **MEASUREMENT** switch.
→ The measurement marks and all measurement results are erased.

[Remark]
You can use four kinds of marks, +, ×, ⁘, and ⁙. To delete only one mark and the corresponding results, press the switch corresponding to the mark to be deleted so that the lamp in the switch lights, then press the same switch again.

[Remark]
If you change the display mode or the display magnification during measurement, the caliper marks are erased. The measurement results remain being displayed.

<Area Ellipse measurement display examples>

`+Area-E`		
`9.82cm²`	←	The area enclosed by the mark.
`c:12.1cm`	←	Circumference
`l:5.00cm`	←	Long Axis length
`s:2.51cm`	←	Short Axis length

[Remark] This is an example in which the display unit is cm.

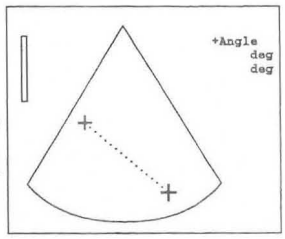
Angle

This function measures and displays the prescribed angle using two sets of large and small "+" caliper marks.

<Operation method>

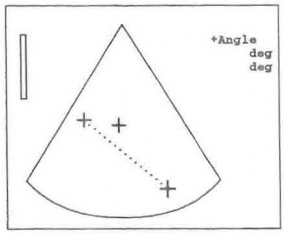
① Select **Angle**.

→ A "+" mark appears at the center of the screen, so using the same method as that for distance measurement set the starting point and end point marks along one side of the angle to be measured.



② Press the **MARK REF** switch again.

→ Another + mark is displayed.

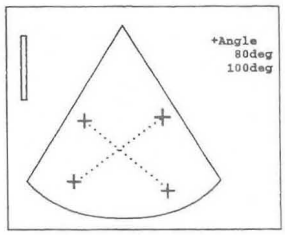


③ Same operation as for distance measurement. Measures the other side of the angle for measurement.

→ There is display of the angle created by the two lines.

[Remark]

If you wish to change over the movable mark, press **MARK REF** switch.



④ Upon completion of measurement, select **Clear** from the touch panel menu or press the **MEASUREMENT** switch.

→ The measurement marks and all measurement results are erased.

[Remark]

You can use four kinds of marks, +, ×, ⁘, and ⁙. To delete only one mark and the corresponding results, press the switch corresponding to the mark to be deleted so that the lamp in the switch lights, then press the same switch again.

[Remark]

If you change the display mode or the display magnification during measurement, the caliper marks are erased. The measurement results remain being displayed.

<Angle measurement display examples>

```
+Angle
  80deg      ← Measurement of the narrower angle.
 100deg      ← Measurement of the wider angle.
```

Volume

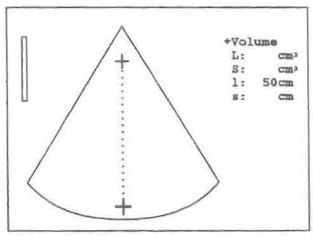
This function calculates a volume by treating it as an ellipsoid created by rotating an ellipse obtained using the same procedure as elliptical area measurement about its major axis.

Volume	$L = \pi/6 \times l \times s^2$	If the axis is the long axis (l) of the ellipse
	$S = \pi/6 \times l^2 \times s$	If the axis is the short axis (s) of the ellipse

<Operation method>

① Select **VOLUME** .

→ A "+" mark appears at the center of the screen, so using the trackball move the mark to one end of the long axis of the region to be measured.

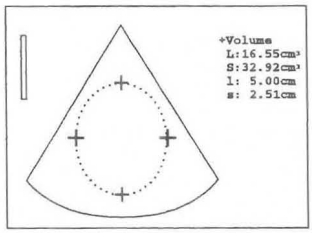


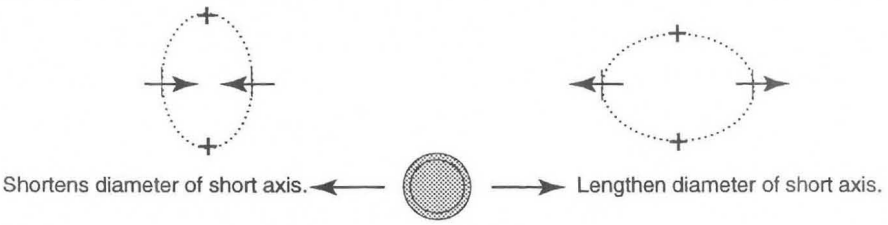
② Press the **MARK REF** switch.

→ The measurement starting point mark is fixed, so using the trackball move the separated mark to the point corresponding to the length of the long axis of the ellipse.

③ Press the **MARK REF** switch.

→ An elliptical mark appears.
Use the trackball to adjust the short axis of the ellipse.
The area, short axis (s), and long axis (l), of the ellipse are computed and displayed.





④ Correct the setting of the ellipse.

→ Press the **MARK REF** switch.
You can now reset the diameter and end point of the major axis.

⑤ Once again, press the **MARK REF** switch.

→ You can now reset the diameter and starting point of the major axis.

[Remark]
By pressing the **MARK REF** switch, the function of the trackball switches through ③→④→⑤→③ ... .

⑥ Upon completion of measurement, select **Clear** from the touch panel menu or press the **MEASUREMENT** switch.

→ The measurement marks and all measurement results are erased.

[Remark]

You can use four kinds of marks, +, ×, ⁘, and ⁙. To delete only one mark and the corresponding results, press the switch corresponding to the mark to be deleted so that the lamp in the switch lights, then press the same switch again.

[Remark]

If you change the display mode or the display magnification during measurement, the caliper marks are erased. The measurement results remain being displayed.

<Volume measurement display examples>

```
+Volume
  L:16.55cm³  ← Volume generated by rotating the ellipse about the long axis (long axis volume)
  S:32.92cm³  ← Volume generated by rotating the ellipse about the short axis (short axis volume)
  l: 5.00cm   ← Long diameter of the ellipse (long axis length)
  s: 2.51cm   ← Short diameter of the ellipse (short axis length)
```

[Remark] This is an example in which the display unit is cm.

Volume Biplane

Obtain three diameters (major diameter L, maximum cross-sectional diameter S in the major axis direction, and the maximum cross-sectional diameter M in the direction perpendicular to the major axis (=intermediate axis diameter) from the image of two orthogonally intersecting cross-sectional planes, and compute the volume of the rotating ellipsoid.

$$\text{Volume} = (S \times L \times M)\,\pi\ /6$$

S: Short axis of ellipse, L: Long axis of ellipse, M: Middle axis

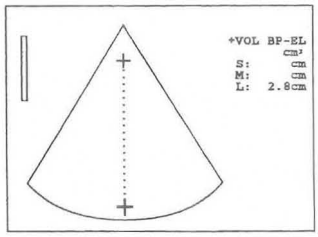
<Operation method>

① Select **Volume Biplane** .

→ A "+" mark appears at the center of the screen, so using the trackball move the mark to one end of the long axis of the region to be measured.

② Press the **MARK REF** switch.

→ The measurement starting point mark is fixed, so using the trackball move the separated mark to the point corresponding to the length of the long axis of the ellipse.

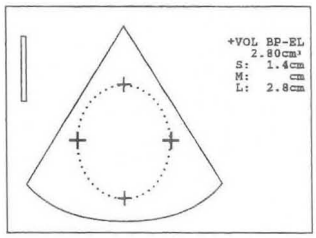


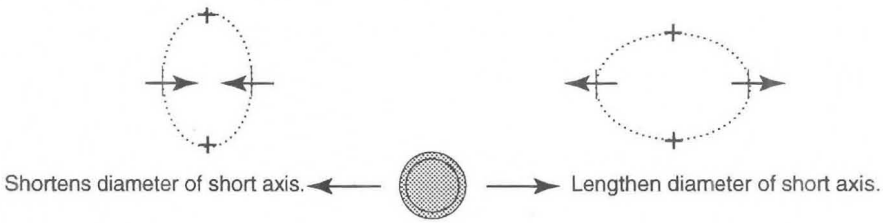
④ Press the **MARK REF** switch.

→ An ellipse mark appears.

Use the trackball to adjust the short axis length of the mark.

The area, short axis (S), and long axis (L), of the ellipse are computed and displayed.





⑤ Correct the setting of the ellipse.

→ Press the **MARK REF** switch.

You can now reset the diameter and end point of the major axis.

⑥ Once again, press the **MARK REF** switch.

→ You can now reset the diameter and starting point of the major axis.

[Remark]

By pressing the **MARK REF** switch, the function of the trackball switches through ④→⑤→⑥→④.....

⑦ Redisplay the B-mode image showing the orthogonal cross-section through which the short axis of the first specified ellipse passes.

⑧ Press the + switch again.

→ The + mark appears in the middle of the screen at the third axis.

⑨ Measure the middle axis using the same method as that for distance measurement.

When the middle axis is measured, the volume is computed once again and the result displayed.

⑩ To redo the measurements, press the + switch and start over from item ②.

⑪ Upon completion of measurement, select **Clear** from the touch panel menu or press the **MEASUREMENT** switch.

→ The measurement marks and all measurement results are erased.

[Remark]

You can use four kinds of marks, +, ×, ⁘, and ⁙. To delete only one mark and the corresponding results, press the switch corresponding to the mark to be deleted so that the lamp in the switch lights, then press the same switch again.

[Remark]

If you change the display mode or the display magnification during measurement, the caliper marks are erased. The measurement results remain being displayed.

<Volume Biplane measurement display examples>

```
+VOL BP-EL
  : 2.80cm³   ← Volume enclosed by ellipse
 S:  1.4cm    ← Diameter of short axis of ellipse (short axis length)
 M:  1.4cm    ← Middle axis diameter (Maximum diameter of the cross-sectional plane that intersects
                                      the major ax is orthogonally.)
 L:  2.8cm    ← Diameter of long axis of ellipse (long axis length)
```

13-3. M-mode Measurements

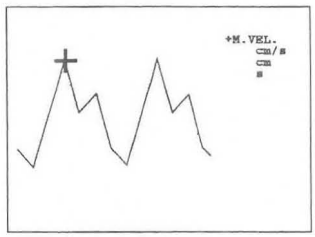
M.VEL.

This function measures and displays velocity, distance and time between two caliper marks.

<Operation method>

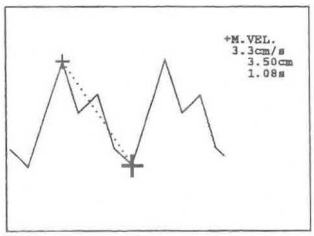
① Select **M.VEL.**

→ A "+" mark appears at the center of the screen, so move it to the starting point of measurement using the trackball.



② Press the **MARK REF** switch.

→ The measurement starting point mark is fixed, so move the separated mark to the end point of measurement using the trackball.



[Remark]

If you wish to change over the movable mark, press **MARK REF** switch.

③ Upon completion of measurement, select **Clear** from the touch panel menu or press the **MEASUREMENT** switch.

→ The measurement marks and all measurement results are erased.

[Remark]

You can use four kinds of marks, +, ×, ⁘, and ⁙.

To delete only one mark and the corresponding results, press the switch corresponding to the mark to be deleted so that the lamp in the switch lights, then press the same switch again.

[Remark]

If you change the display mode or the display magnification during measurement, the caliper marks are erased. The measurement results remain being displayed.

<M.VEL. measurement display examples>

```
+M.VEL.
 3.3cm/s      ← Velocity between marks
 3.50cm       ← Distance between marks
 1.08s        ← Time between marks
```

[Remark]

This is an example in which the display units are cm and cm/s.

- The displayed unit of time is automatically switched over according to the length of time: For less than 1.00 second, it is "ms", and for 1.00 second or more, it is "s".

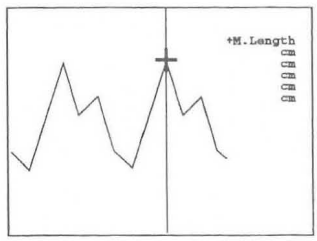
M.Length

This function continuously measures and displays the distance between the caliper marks in the axis depth direction at the same point in time.

<Operation method>

① Select **M.Length** .

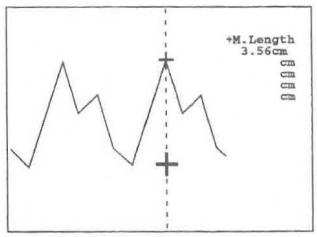
→ A "+" mark appears at the center of the screen, so move it to the starting point of measurement using the trackball.



② Press the **MARK REF** switch.

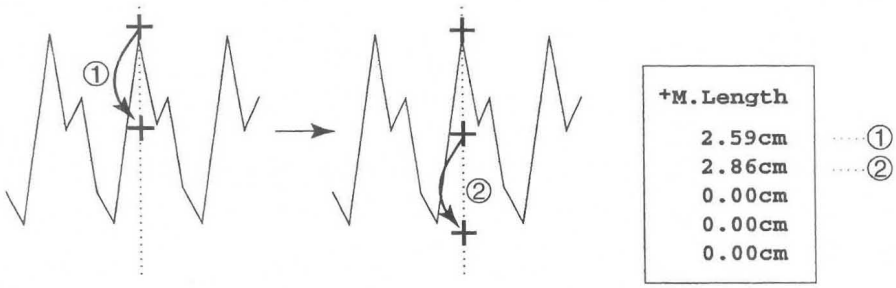
→ The line mark becomes a broken line, and the measurement starting point mark is fixed, so move the separated mark using the trackball.

The distance between the marks is displayed on the screen.



[Remark]

Each time the **MARK REF** switch is pressed there is display of the distance between marks (maximum of 5)
Starting with the second measurement, the end point of the former measurement becomes the starting point.

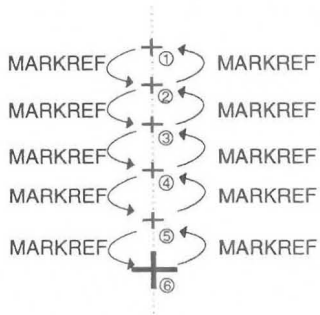


[Remark]

Each time the **MARK REF** switch is pressed (up to 5 times), a new distance measurement starts from the last mark. (See figure below.)

[Remark]

Each time you press the **MARK REF** switch, the shift mark switches over in the reverse sequence ⑥→⑤→④→③→②→①→②...



Switchover of shift mark

③ Upon completion of measurement, select **Clear** from the touch panel menu or press the **MEASUREMENT** switch.

→ The measurement marks and all measurement results are erased.

[Remark]

You can use four kinds of marks, +, ×, ⁘, and ⁙.

To delete only one mark and the corresponding results, press the switch corresponding to the mark to be deleted so that the lamp in the switch lights, then press the same switch again.

[Remark]

If you change the display mode or the display magnification during measurement, the caliper marks are erased. The measurement results remain being displayed.

<M.Length measurement display examples>

```
+M.Length
 3.91cm      ← Distance 1 between marks
 2.05cm      ← Distance 2 between marks
 1.90cm      ← Distance 3 between marks
 2.10cm      ← Distance 4 between marks
 2.25cm      ← Distance 5 between marks
```

[Remark] This is an example in which the display unit is cm.

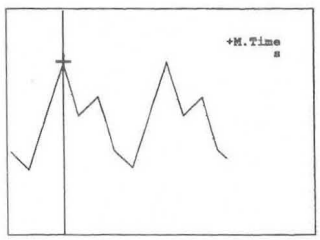
M.Time

This function measure and display time between two caliper marks.

＜Operation method＞

① Select **M.Time**.

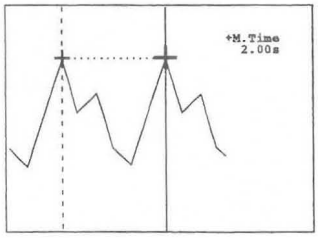
→ A "+" mark appears at the center of the screen, so move it to the starting point of measurement using the trackball.



② Press the **MARK REF** switch.

→ The measurement starting point mark is fixed, so move the separated line mark to the end point of measurement using the trackball.

→ The time between the two marks is displayed on the screen.



[Remark]

Pressing the **MARK REF** switch interchanges the solid line and dotted line.

③ Upon completion of measurement, select **Clear** from the touch panel menu or press the **MEASUREMENT** switch.

→ The measurement marks and all measurement results are erased.

[Remark]

You can use four kinds of marks, +, ×, ⁘, and ⁙.

To delete only one mark and the corresponding results, press the switch corresponding to the mark to be deleted so that the lamp in the switch lights, then press the same switch again.

[Remark]

If you change the display mode or the display magnification during measurement, the caliper marks are erased. The measurement results remain being displayed.

<M.Time measurement display examples>

```
+M.Time
 1.02 s      ← Time between marks
```

[Remark]

The unit automatically changes in the following way:

The ms (millisecond) for time up to 1.00 sec and the s (second) for longer time.

Heart Rate

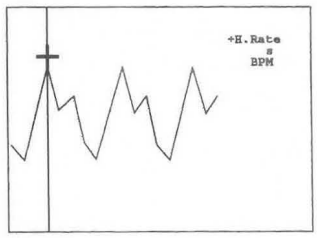
This function measures the time between two heart beats, and calculates and displays the heart rate.

Heart Rate	HR = (2×60) / T (T: Time between two heartbeats)

＜Operation method＞

① Select **Heart Rate.**

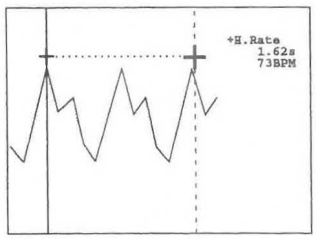
→ A "+" mark appears at the center of the screen, so move it to the starting point of measurement using the trackball.



② Press the **MARK REF** switch.

→ The measurement starting point mark is fixed, so move the separated mark to the end point of measurement using the trackball.

The measurement end point is the position corresponding to two heartbeats from the starting point.



[Remark]

Pressing the **MARK REF** switch interchanges the solid line and dotted line. You can move only the solid line.

③ Upon completion of measurement, select **Clear** from the touch panel menu or press the **MEASUREMENT** switch.

→ The measurement marks and all measurement results are erased.

[Remark]

You can use four kinds of marks, +, ×, ⁘, and ⁙.

To delete only one mark and the corresponding results, press the switch corresponding to the mark to be deleted so that the lamp in the switch lights, then press the same switch again.

[Remark]

If you change the display mode or the display magnification during measurement, the caliper marks are erased. The measurement results remain being displayed.

<Heart Rate measurement display examples>

```
+H-Rate
  1.62s      ← Interval between two heartbeats
    73BPM    ← Heart Rate
```

[Remark]

The unit automatically changes in the following way:

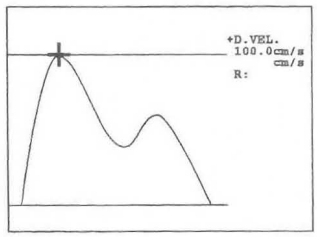
The ms (millisecond) for time up to 1.00 sec and the s (second) for longer time.

13-4. D-mode Measurements

D.VEL.

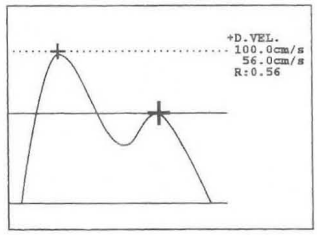
This function measures the flow velocity at a point specified by a mark. It also measures two flow velocities simultaneously, and computes the ratio of the measured values.

<Operation method>



① Select **D. VEL.**

→ A "+" mark superimposed on the measurement line mark appears at the center of the baseline, so move it to the measurement position using the trackball.
The flow velocity value is displayed.



② Press the **MARK REF** switch.

→ The line mark is fixed, so move the separated line mark to the second measurement position using the trackball. The second flow velocity value and the ratio between the first and second flow values are displayed.

[Remark]
Press the **MARK REF** switch for changing the mark that can be moved.
The denominator and numerator are exchanged at the same time.
Because there is calculation with a solid line/dotted line, the measurement values also change.

[Remark]
When an angle is compensated, the velocity measurement values displayed on the screen automatically change according to the angle.

④ Upon completion of measurement, select **Clear** from the touch panel menu or press the **MEASUREMENT** switch.

→ The measurement marks and all measurement results are erased.

[Remark]
You can use four kinds of marks, +, ×, ⁘, and ⁙. If you want to erase only one set of calipers and measurement results, turn on the appropriate caliper switch, then press it again.

[Remark]
If you change the display mode or the display magnification during measurement, the caliper marks are erased. The measurement results remain being displayed.

< D.VEL. measurement display examples>

`+D.VEL.`		
`52.3cm/s`	←	Velocity value of the solid line
`100.2cm/s`	←	Velocity value of the dotted line (This example is for the case where the display unit is cm/s.)
`R:0.525`	←	Ratio (Solid line flow velocity value/Broken line flow velocity value)

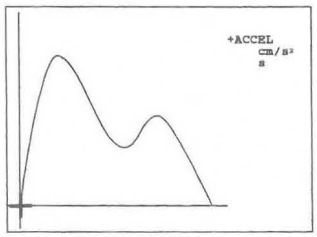
ACCEL.

There is measurement and display of the difference in the acceleration and time between the 2 caliper marks.

Acceleration $ACC = \frac{Vb-Va}{Tb-Ta}$ (V: Flow velocity value, T: Time, a: Starting point, b: End point)

① Select **ACCEL**.

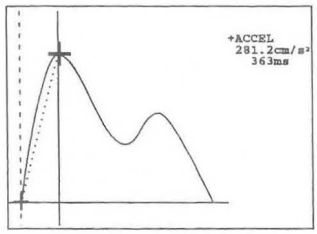
→ A "+" mark superimposed on the measurement line mark appears at the center of the baseline, so move it to the measurement starting point using the trackball.



② Press the **MARK REF** switch.

→ The mark at the measurement starting point is fixed, so move the separated mark to the end point of measurement using the trackball.

The acceleration and time difference are displayed.



[Remark]
Pressing the **MARK REF** switch interchanges the solid line and dotted line. You can move only the solid line.

[Remark]
When an angle is compensated, the velocity measurement values displayed on the screen automatically change according to the angle.

③ Upon completion of measurement, select **Clear** from the touch panel menu or press the **MEASUREMENT** switch.

→ The measurement marks and all measurement results are erased.

[Remark]
You can use four kinds of marks, +, ×, ⁘, and ⁖.
If you want to erase only one set of calipers and measurement results, turn on the appropriate caliper switch, then press it again.

[Remark]
If you change the display mode or the display magnification during measurement, the caliper marks are erased. The measurement results remain being displayed.

< Acceleration measurement display examples>

```
+ACCEL.
 137.5cm/s²     ← Acceleration between marks (Acceleration)
 175ms          ← Time between marks (Acceleration time)
```

When there is a deceleration between caliper marks, it is indicated as shown bellow.

```
+ACCEL.
 -137.5cm/s²    ← Deceleration between marks (Deceleration)
 175ms          ← Time between marks ( Deceleration time)
```

[Remark]

This is an example in which the display unit is cm.
The unit automatically changes in the following way:
The ms (millisecond) for time up to 1.00 sec and the s (second) for longer time.

Mean.VEL.

There is display of the average flow velocity, average pressure range, blood flow time, and velocity-time-integral. You can start measurement from either auto trace or manual trace.

Mean Velocity $m.V=\{\int_{Ta}^{Tb} V(t).dt\} / (Tb-Ta)$

Mean Gradient $m.P=\{\int_{Ta}^{Tb} 4[V(t)]^2.dt\} / (Tb-Ta)$

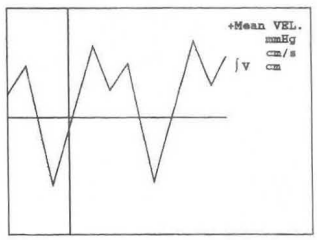
(V: Flow velocity value, T: Time, a: Starting point, b: End point)

<When using the auto trace function>

＜Operation method＞

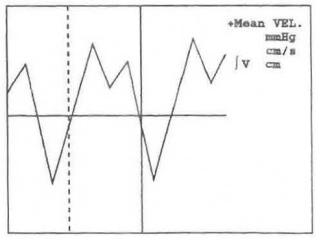
① Select **Mean.VEL.**

→ A solid line cursor for determining the trace range appears at the center of the screen.



② Using the trackball, move the solid line cursor to the starting point of the trace, then press the **MARK REF** switch.

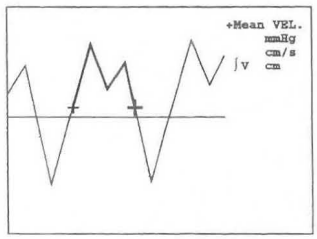
③ Using the trackball, move the separated solid line cursor to the end point of the trace.



[Remark]

You cannot shift the solid line cursor to the left of the dotted line cursor.

④ Once you have specified the trace range, press the **MARK REF** switch.
→ The trace operation starts.



⑤ Upon completion of the trace operation, the measurement results are displayed.

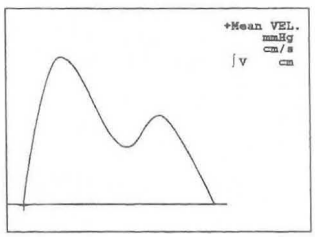
[Remark]
For details of the method of using auto trace, and also the precautions and various settings, refer to 12-4-3 "Basic Method ofUsing the Auto Trace Function".

[Remark]
If the auto trace data is not suitable, you can carry out a manual trace. Press the caliper switch (+ mark), and the manual trace operation starts. Also, all of the displayed auto trace data is erased.

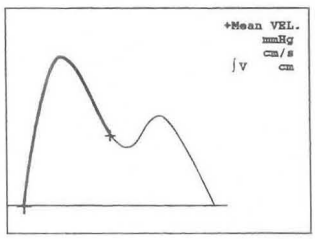
For the method of performing manual trace measurement, see <When using manual trace> below.

<When using a manual trace>

① Press the caliper mark switch (+ mark).
(If AUTO TRACE is set to OFF using the Preset function, select **Mean VEL** from the measurement menu.)
→ A "+" mark appears at the center of the base line.
Using the trackball, move the "+" mark to the starting point of the trace.



② Press the **MARK REF** switch.
→ The starting point mark is fixed. If now you move the trackball, a bright line appears, and can be moved.
Trace a spectrum pattern using the trackball.



[Remark]
Turning rotary encoder half a turn in a clockwise direction causes the bright line to be gradually erased to correct the trace. If the line is erased too much, turn rotary encoder in a clockwise direction to cause the line to be displayed again. To restart the measurement, press the **MARK REF** switch twice and start from step ①.

③ Press the **MARK REF** switch momentarily.
→ The measurement result is displayed.

[Remark]
When an angle is compensated, the velocity measurement values displayed on the screen automatically change according to the angle.

④ Upon completion of measurement, select **Clear** from the touch panel menu or press the **MEASUREMENT** switch.
→ The measurement marks and all measurement results are erased.

[Remark]
You can use four kinds of marks, +, ×, ⁘, and ⁙.
If you want to erase only one set of calipers and measurement results, turn on the appropriate caliper switch, then press it again.

[Remark]
If you change the display mode or the display magnification during measurement, the caliper marks are erased. The measurement results remain being displayed.

< Mean VEL. measurement display examples >

```
+Mean VEL.
   2.0mmHg   ← mean Pressure gradient
  66.4cm/s   ← mean Velocity
∫V93.2cm     ← Velocity time integral
  1.40s      ← Flow Time
```

[Remark]
This is an example in which the display unit is cm.
The unit automatically changes in the following way:
The ms (millisecond) for time up to 1.00 sec and the s (second) for longer time.

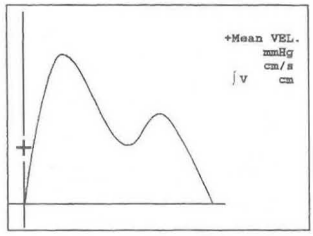
D.Time

Measures and displays the distance between the two caliper marks.

＜Operation method＞

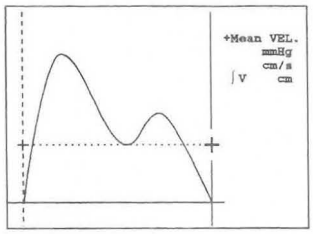
① Select **D. Time.**

→ A "+" mark superimposed on the measurement line mark appears at the center of the baseline, so move it to the measurement starting point using the trackball.



② Press the **MARK REF** switch.

→ The measurement starting point mark is fixed, so move the separated mark to the end point of measurement using the trackball.



[Remark]

Pressing the **MARK REF** switch interchanges the solid line and dotted line. You can move only the solid line.

④ Upon completion of measurement, select **Clear** from the touch panel menu or press the **MEASUREMENT** switch.

→ The measurement marks and all measurement results are erased.

[Remark]

You can use four kinds of marks, +, ×, ⁘, and ⁙. If you want to erase only one set of calipers and measurement results, turn on the appropriate caliper switch, then press it again.

[Remark]

If you change the display mode or the display magnification during measurement, the caliper marks are erased. The measurement results remain being displayed.

< D.Time measurement display examples>

```
+D.Time
 1.02 s          ← Time between marks
```

[Remark]

The unit automatically changes in the following way:

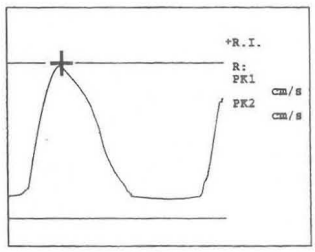
The ms (millisecond) for time up to 1.00 sec and the s (second) for longer time.

Resistance Index

Obtain the Resistance Index (RI) and th Ratio (R) from the two peaks(pk1,pk2) on the blood waveform.

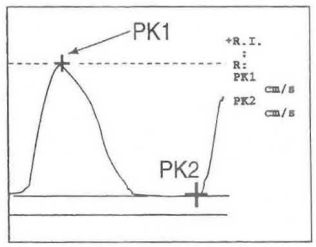
$$\text{Resistance Index} \quad R.I. = \frac{|\,Peak1 - Peak2\,|}{|\,Peak1\,|} \qquad \text{Ratio} \quad R = \frac{|\,Peak1\,|}{|\,Peak2\,|}$$

(Peak1,Peak2 :Peak velocity)



① Select **RESIST IDX.**

→ A "+" mark superimposed on the measurement line mark appears at the center of the baseline, so move it to the maximum flow velocity point using the trackball.



② Press the **MARK REF** switch.

→ The measurement starting point mark is fixed, so move the separated line mark to the minimum flow velocity point using the trackball.
The value of RI and also the ratio between peaks are computed.

[Remark]
Pressing the **MARK REF** switch interchanges the solid line and dotted line. You can move only the solid line.

[Remark]
When an angle is compensated, the velocity measurement values displayed on the screen automatically change according to the angle.

③ Upon completion of measurement, select **Clear** from the touch panel menu or press the **MEASUREMENT** switch.

→ The measurement marks and all measurement results are erased.

[Remark]
You can use four kinds of marks, +, ×, ⁘, and ⁙. If you want to erase only one set of calipers and measurement results, turn on the appropriate caliper switch, then press it again.

[Remark]
If you change the display mode or the display magnification during measurement, the caliper marks are erased. The measurement results remain being displayed.

< Resistance Index measurement display examples>

```
+R.I.
     2.057          ← Resistance index
  R:5.133           ← Ratio
  PK1
   132.8cm/s        ← Velocity of the first peak
  PK2
   22.8cm/s         ← Velocity of the second peak
```

[Remark] This is an example in which the display unit is cm.

Pulsatility Index

Obtain the Pulsatility Index (PI) and the Ratio (R) from the two peaks (pk1, pk2) of the average flow velocity of the traced blood waveforms.

You can start measurement from either auto trace or manual trace.

$$\text{Pulsatility Index} \quad P.I. = \frac{|\,Peak1 - Peak2\,|}{|\,avg\,|}$$

$$\text{Resistance Index} \quad R.I. = \frac{|\,Peak1 - Peak2\,|}{|\,Peak1\,|} \qquad \text{Ratio} \quad R = \frac{|\,Peak1\,|}{|\,Peak2\,|}$$

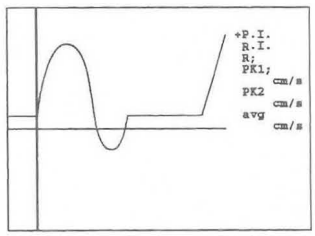
(Peak1, Peak2: Peak Velocity, avg:average)

<When using the auto trace function>

<Operation method>

① Select **RESIST IDX.**

→ A solid line cursor for determining the trace range appears at the center of the screen.



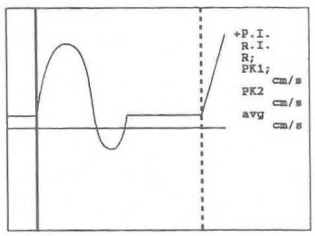
② Using the trackball, move the solid line cursor to the starting point of the trace, then press the **MARK REF** switch.

→ The solid line cursor is displayed as a dotted line, and also a movable solid line is displayed.

③ Using the trackball, move the separated solid line cursor to the end point of the trace.

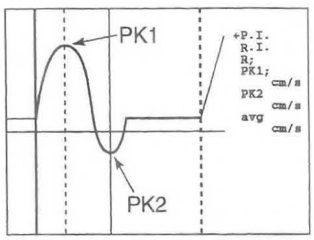
[Remark]

You cannot shift the solid line cursor to the left of the dotted line cursor.



④ Once you have specified the trace range, press the **MARK REF** switch.

→ The trace operation starts. Upon completion of the trace operation, the measurement results are displayed. Also, the Peak Lines that indicates Peak 1 and Peak 2 appear.



[Remark]

Sometimes a peak detection error occurs. In such a case, adjust the position of the peak line using the trackball.

[Remark]

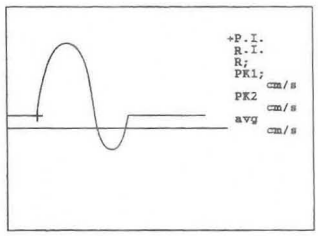
For details of the method of using auto trace, and also the precautions and various settings, refer to 12-3 "Basic Method of Using the Auto Trace Function".

[Remark]
If the auto trace data is not suitable, you can carry out a manual trace. Press the caliper switch (+ mark), and the manual trace operation starts. Also, all of the displayed auto trace data is erased.

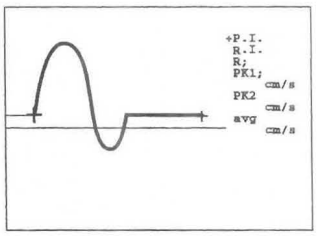
For the method of performing manual trace measurement, see <When using manual trace> below.

<When using a manual trace>

① Press the caliper mark switch (+ mark).
(If AUTO TRACE is set to OFF using the Preset function, select **PULSA IDX.** from the measurement menu.)
→ A "+" mark appears at the center of the base line.
Using the trackball, move the "+" mark to the starting point of the trace.



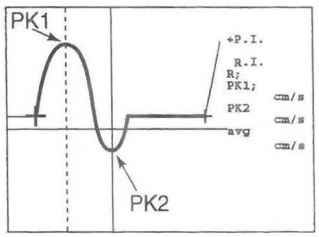
② Press the **MARK REF** switch.
→ The starting point mark is fixed. If now you move the trackball, a bright line appears, and can be moved.
Trace a spectrum pattern using the trackball.



[Remark]
Turning rotary encoder half a turn in a clockwise direction causes the bright line to be gradually erased to correct the trace. If the line is erased too much, turn rotary encoder in a clockwise direction to cause the line to be displayed again. To restart the measurement, press the **MARK REF** switch twice and start from step ①.

③ Press the **MARK REF** switch.
Peak lines that indicate Peak 1 and Peak 2, respectively, appear.

④ Using the trackball, set Peak 1 and Peak 2.
→ The solid lines can be moved. You can change them over by pressing the **MARK REF** switch.



[Remark]
The movement range of the peak line is from the starting point of trace to the ending point.

[Remark]
When an angle is compensated, the velocity measurement values displayed on the screen automatically change according to the angle.

⑤ Upon completion of measurement, select **Clear** from the touch panel menu or press the **MEASUREMENT** switch.

→ The measurement marks and all measurement results are erased.

[Remark]

You can use four kinds of marks, +, ×, ⁘, and ⁙. If you want to erase only one set of calipers and measurement results, turn on the appropriate caliper switch, then press it again.

[Remark]

If you change the display mode or the display magnification during measurement, the caliper marks are erased. The measurement results remain being displayed.

< Pulsatility Index measurement display examples>

```
+P.I.
    3.355        ← Pulsatility index
 R.I.
    1.195        ← Resistance index
 R:5.133         ← Ratio(PK1/PK2)
 PK1
   95.9cm/s      ← Velocity of first peak
 PK2
   18.7cm/s      ← Velocity of the second peak
 avg
   34.1cm/s      ← Mean Velocity
```

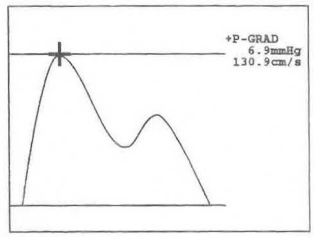
[Remark] This is an example in which the display unit is cm.

P-GRAD.

Measures and displays the flow velocity and pressure range of the caliper mark position.

$$P\text{-}GRAD = 4\ v^2 \qquad (v: \text{Flow velocity})$$

<Operation method>



① Select **P-GRAD.**

→ A "+" mark superimposed on the measurement line mark appears at the center of the baseline.

② Move the mark to the position to be measured by rolling the trackball. The pressure gradient of the point is calculated and displayed.

[Remark]
When an angle is compensated, the velocity measurement values displayed on the screen automatically change according to the angle.

③ Upon completion of measurement, select **Clear** from the touch panel menu or press the **MEASUREMENT** switch.

→ The measurement marks and all measurement results are erased.

[Remark]
You can use four kinds of marks, +, ×, ⁘, and ∴. If you want to erase only one set of calipers and measurement results, turn on the appropriate caliper switch, then press it again.

[Remark]
If you change the display mode or the display magnification during measurement, the caliper marks are erased. The measurement results remain being displayed.

< P-GRAD. measurement display examples>

```
+P-GRAD
  6.9mmHg      ← Peak Pressure gradient
  131.8cm/s    ← Velocity
```

[Remark] This is an example in which the display unit is cm.

P1/2T(VA)

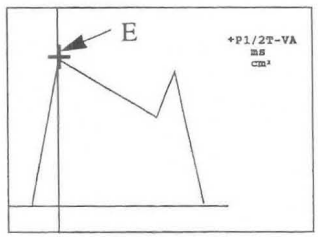
Derives the pressure half time to calculate the valve area

Valve Area VA= 220/$p_{1/2}t$ ($p_{1/2}t$: Pressure half time)

＜Operation method＞

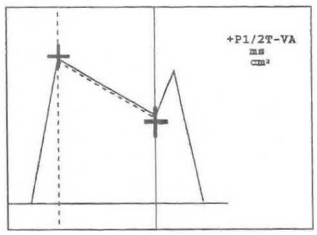
① Select **P1/2T (VA)**.

→ A "+" mark superimposed on the measurement line mark appears at the center of the screen, so move it to the measurement starting point (peak of E wave) using the trackball.



② Press the **MARK REF** switch.

→ The measurement starting point mark is fixed, so move the trackball so that the slope of the straight line joining the markers coincides with the E wave deceleration slope.



[Remark]

Pressing the **MARK REF** switch interchanges the solid line and dotted line. You can move only the solid line.

③ Upon completion of measurement, select **Clear** from the touch panel menu or press the **MEASUREMENT** switch.

→ The measurement marks and all measurement results are erased.

[Remark]

You can use four kinds of marks, +, ×, ⁘, and ⁖. If you want to erase only one set of calipers and measurement results, turn on the appropriate caliper switch, then press it again.

[Remark]

If you change the display mode or the display magnification during measurement, the caliper marks are erased. The measurement results remain being displayed.

< P1/2T(VA) measurement display examples>

```
+P1/2T(VA)
  P1/2T:1.00s   ← Pressure Half Time
  VA:0.22cm²    ← Valve Area
```

[Remark]

The unit automatically changes in the following way:

The ms (millisecond) for time up to 1.00 sec and the s (second) for longer time.

Heart Rate

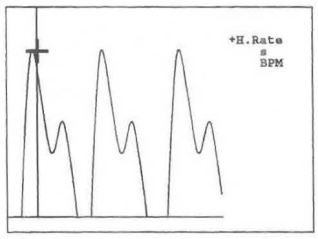
This function measures the time between two heart beats, and calculates and displays the heart rate.

> **Heart Rate HR = (2×60) / T (T: Time between two heartbeats)**

<Operation method>

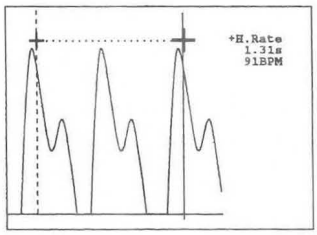
① Select **Heart Rate**.

→ A "+" mark appears at the center of the screen, so move it to the starting point of measurement using the trackball.



② Press the **MARK REF** switch.

→ The measurement starting point mark is fixed, so move the separated mark to the end point of measurement using the trackball.
The measurement end point is the position corresponding to two heartbeats from the starting point.



[Remark]
Pressing the **MARK REF** switch interchanges the solid line and dotted line. You can move only the solid line.

③ Upon completion of measurement, select **Clear** from the touch panel menu or press the **MEASUREMENT** switch.

→ The measurement marks and all measurement results are erased.

[Remark]
You can use four kinds of marks, +, ×, ⁘, and ⁙.
To delete only one mark and the corresponding results, press the switch corresponding to the mark to be deleted so that the lamp in the switch lights, then press the same switch again.

[Remark]
If you change the display mode or the display magnification during measurement, the caliper marks are erased. The measurement results remain being displayed.

<Heart Rate measurement display examples>

```
+H-Rate
 1.62s      ← Interval between two heartbeats
   73BPM    ← Heart Rate
```

[Remark]
The unit automatically changes in the following way:
The ms (millisecond) for time up to 1.00 sec and the s (second) for longer time.

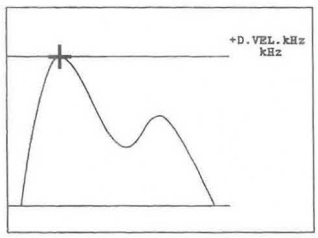
D.VEL. kHz

There is computation and display of the Doppler shift frequency of the marker position.

＜Operation method＞

① Select **D. VEL. KHZ**.

→ A measurement "+" mark appears at the center of the baseline.



② Using the trackball , move the line to the starting point of the measurement. The Doppler shift frequency is displayed in kHz.

[Remark]

When an angle is compensated, the velocity measurement values displayed on the screen automatically change according to the angle.

③ Upon completion of measurement, select **Clear** from the touch panel menu or press the **MEASUREMENT** switch.

→ The measurement marks and all measurement results are erased.

[Remark]

You can use four kinds of marks, +, ×, ⁘, and ⁙.

To delete only one mark and the corresponding results, press the switch corresponding to the mark to be deleted so that the lamp in the switch lights, then press the same switch again.

[Remark]

If you change the display mode or the display magnification during measurement, the caliper marks are erased. The measurement results remain being displayed.

<Heart Rate measurement display examples>

```
+D.VEL.kHz
 32.8kHz        ← Doppler Shift Frequency
```

dP/dt

This function is used during mitral valve regurgitation flow with continuous Doppler (CW Doppler) to measure the period from when the flow velocity at startup is **1m/sec(4mmHg)** until it reaches **3m/sec(36mmHg)** (**Δt msec**), and compute dP/dt (time differential value of the pressure inside the left ventricle) which is the one of hte index of systolicity of the left ventricle.

[Remark]

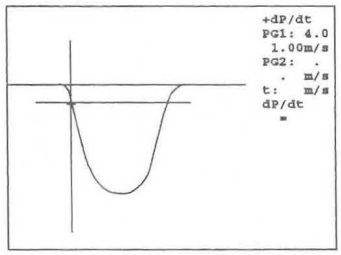
The number in parenthesis indicates the value of the pressure gradient ($P=4V^2$) with respect to the flow .

＜Operation method＞

① Select **dP/dt**

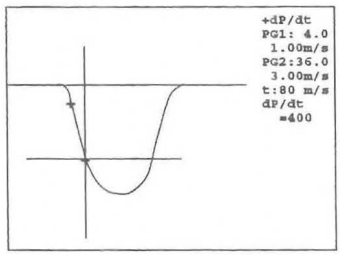
→The "+" line mark for measurement appears at the center of the screen.

While observing the value of PG1: . m/s in the measurement result display area, roll the trackball so as to move the mark to the position corresponding to a flow velocity of 1.00 m/s for the mitral valve regurgitation flow (MR flow).

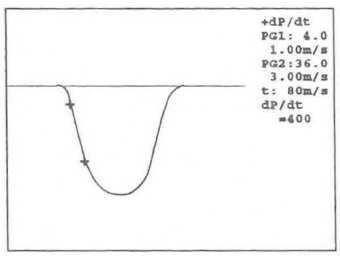


③ Press the **MARK REF** switch.

→ The "+" line mark appears, and the starting point mark becomes "+" alone.



④ While observing the value of PG2: . m/s in the measurement result display area, roll the trackball so as to move the mark to the position corresponding to a flow velocity of 3.00 m/s for the mitral valve regurgitation flow (MR flow).



⑤ Upon completion of measurement, press the **SET** switch.

→ The line mark disappears.

[Remark]

You can use four kinds of marks, +, ×, ⁘, and ⁙.

To delete only one mark and the corresponding results, press the switch corresponding to the mark to be deleted so that the lamp in the switch lights, then press the same switch again.

[Remark]

If you change the display mode or the display magnification during measurement, the caliper marks are erased. The measurement results remain being displayed.

<dP/dt measurement display examples>

+dP/dt		
PG1: 4.0	←	Pressure gradient at the first measurement position
1.00m/s	←	Flow velocity value at the first measurement position
PG2:36.0	←	Pressure gradient at the second measurement position
3.00m/s	←	Flow velocity value at the second measurement position
t: 80ms	←	Time between two points
dP/dt	←	Computed dP/dt
=400		

Dop Trace1

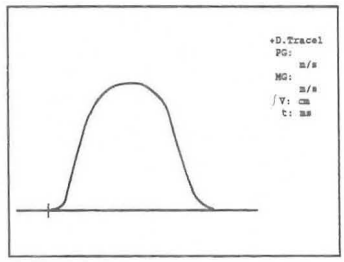
This function calculates **Peak Velocity, Peak Pressure Gradient, Mean Pressure Velocity, Mean Gradient, VTI, Flow Time,** and so on, from the doppler waveform.

You can select the item that you wish to measure using a preset.

[Remark]

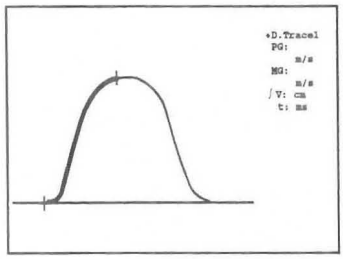
When performing this measurement, be sure to carry it out using a single peak doppler waveform.

＜Operation method＞



① Select **Dop Trace 1** .

→A "+" mark appears at the center of the screen.Using the trackball, move the "+" mark to the starting point of the trace.



② Press the **MARK REF** switch.

→ The "+" mark is fixed at the starting point, and when you move the trackball a movable bright lines appears.

Using the trackball, trace the spectrum pattern.

[Remark]

When you turn rotary encoder 3 counterclockwise, the bright line disappears a little at a time, enabling you to correct the trace. If you accidentally erase too much of the trace, you can redisplay the erased portion by turning rotary encoder clockwise.

When you wish to repeat measurement from the beginning, press the **MARK REF** switch twice, then proceed from step e.

③ Using the trackball, draw the bright line to the end point of the trace, then press the **MARK REF** switch.

→ The measurement results are automatically displayed.[Remark]

You can perform angle correction both before and after measurement. In this case, the measurement results are automatically redisplayed as angle-corrected values. (when the image is frozen)

⑤ Upon completion of measurement, select **Clear** from the touch panel menu or press the **MEASUREMENT** switch.

→ The measurement marks and all measurement results are erased.

<D Trace1 measurement display examples >

```
+D.Trace1
PG: 4.0          ← Pressure gradient at the peak point
 1.00m/s         ← Flow velocity at the peak point
MG:2.56          ← Mean Pressure gradient
 0.50m/s         ← Mean Velocity
∫V:   . cm       ← Velocity time integral
```

13-5. % Stenosis Measurement

In % stenosis measurement, the extent of a constriction is expressed numerically from the diameter or cross-sectional area of a normal blood vessel and that of the constricted blood vessel. This function measures the diameter or area of a normal blood vessel and that of a constricted blood vessel, in the B mode or the M mode, and compares the measured values with each other.

The system provides the following three measurement methods:

%Stenosis Distance: calculates the stenotic rate from distances measured in B-mode

%Stenosis Area-Trace: calculates the stenotic rate from area measurements

%Stenosis Length: calculates the stenotic rate from distances measured in M-mode.

Each method allows you to make two sets of measurements on one screen.

System 1 % Stenosis = | (A - B) / A | x100 (%)

% Stenosis : Stenotic rate calculation

A : Measured value for normal blood vessel

B : Stenotic region measurement

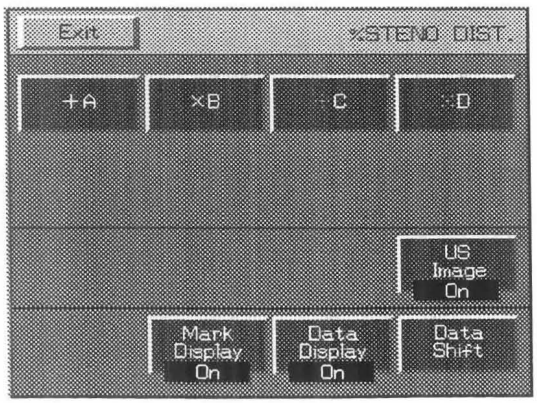
System 2 % Stenosis = | (C - D) / C | x100 (%)

% Stenosis : Stenotic rate calculation

C : Measured value for normal blood vessel

D : Stenotic region measurement

Also, if you select % stenosis measurement, a menu like that shown below appears on the touch panel.



[Remark]
You can select items using the touch panel menu, caliper mark switch, or the SET switch.

Exit : Terminates % stenosis measurement.

US Image : Temporarily erases an ultrasound image.

Mark Display : Temporarily erases everything except the marks used in the current measurement.

Data Display : Temporarily erases the measurement results.

Data Shift : Moves the measurement result area up, down, left or right.

(You can turn US Image, Mark Display, and Data Display On or Off.)

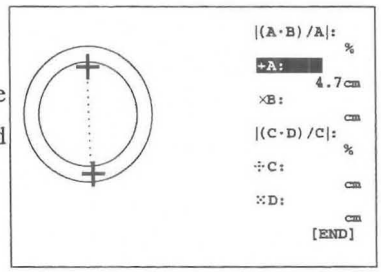
When %STENO DIST is selected

The %Stenosis Distance method calculates the stenotic rate from distances measured on a B-mode image.

<Operation method>

① Select % **STENO DIST**.

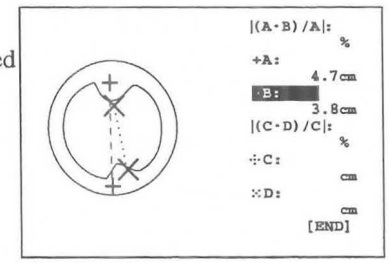
→ A "+" mark appears at the center of the screen.
(A menu for % STENO DIST appears on the touch panel.)



② Using the same procedure as that for DIST measurement, obtain the diameter of a normal blood vessel with the **MARK REF** switch and the trackball.

③ Select × **N**.

→ An "x" mark appears, so obtain the diameter of the constricted blood vessel using the same procedure as that of ②.
The % stenosis is computed.



[Remark]
When performing a different stenosis measurement, select ⁜C or ⁙D . The method of operation is the same. To make a correction, press the relevant item name or caliper mark (+, ×, ⁜, ⁙) on the touch panel menu, then repeat the measurement.

④ After completing the measurements, select **Exit** of the touch panel menu or press the **MEASUREMENT** switch. The system clears all measurement marks and measurement results.

<Measurement result display for %STENO DIST>

```
|(A-B)/A|:
          %
+A:
          cm
×B:
          cm
|(C-D)/C|:
          %
⁜C:
          cm
⁙D:
          cm
          [END]
```

The layout for a horizontal display is as follows:

```
|(A-B)/A|:      %
+A:          cm
×B:          cm
|(C-D)/C|:     %
⁜C:          cm
⁙D:          cm
          [END]
```

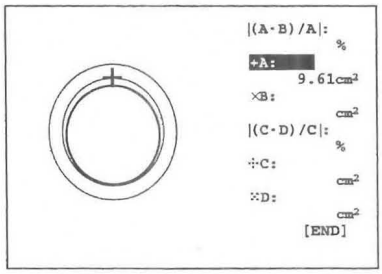
When %Steno Area-T is selected

The %Stenosis Area-Trace method calculates the stenotic rate from areas measured on a B-mode image.

<Operation method>

① Select **%STENO Area-T**.
→ A "+" mark appears at the center of the screen.
(The menu for %STENO Area-T appears on the touch panel.)

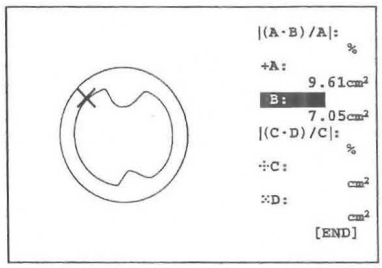
② Using the same procedure as that for Area Trace measurement, trace the I.D. of a normal blood vessel with the **MARK REF** switch and the trackball. (I.D.:Internal Diameter)



[Remark]
To correct the trace line, turn the rotary encoder counterclockwise. To redisplay an erased trace line, turn the rotary switch clockwise.

③ Press the **MARK REF** switch.
→ The trace will be closed, and the system will calculate the area.

④ Select × B, then using the "x" mark, obtain the area of the I.D. of the constricted blood vessel in the same way as ②.
→ The % stenosis is computed.



[Remark]
When performing a different stenosis measurement, select ⁘C or ⁙D . The method of operation is the same. To make a correction, press the relevant item name or caliper mark (+, ×, ⁘, ⁙) on the touch panel menu, then repeat the measurement.

⑤ After completing the measurements, select **Exit** of the touch panel menu or press the **MEASUREMENT** switch. The system clears all measurement marks and measurement results.

<Measurement result display for %STENO Area-T>

```
|(A-B)/A|:
          %
+A:
          cm²
×B:
          cm²
|(C-D)/C|:
          %
⁘C:
                cm²
⁙D:
                cm²
          [END]
```

The layout for a horizontal display is as follows:

```
|(A-B)/A|:      %
+A:          cm²
×B:          cm²
|(C-D)/C|:     %
⁘C:          cm²
⁙D:          cm²
          [END]
```

%Stenosis Length method

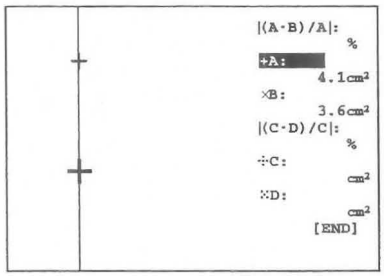
The %Stenosis Length method calculates the stenotic rate from distances measured on an M-mode image.

<Operation method>

① Select **%STENO Length**.

→ A "+" mark superimposed on the measurement line mark appears at the center of the screen. (The %STENO Length menu appears on the touch panel.)

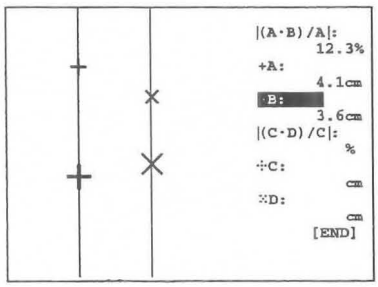
② Using the same procedure as that for M. Length measurement, move the "+" mark to the starting point of the normal blood vessel with the trackball, then press the **MARK REF** switch.



③ Next, move the separated "+" mark to the end point using the trackball.

④ Select ×B.

→ An "x" mark superimposed on the measurement line mark appears at the center of the screen, so measure the diameter of the constricted blood vessel in the same way as ②. The % stenosis is computed.



[Remark]

When performing a different stenosis measurement, select ⁘C or ⁙D . The method of operation is the same. To make a correction, press the relevant item name or caliper mark (+, ×, ⁘, ⁙) on the touch panel menu, then repeat the measurement.

⑤ After completing the measurements, select **Exit** of the touch panel menu or press the **MEASUREMENT** switch. The system clears all measurement marks and measurement results.

<Measurement result display for %STENO Length>

```
|(A-B)/A|:
          %
+A:
          cm
×B:
          cm
|(C-D)/C|:
          %
⁘C:
                cm
⁙D:
                cm
          [END]
```

The layout for a horizontal display is as follows:

```
|(A-B)/A|:      %
+A:          cm
×B:          cm
|(C-D)/C|:     %
⁘C:          cm
⁙D:          cm
          [END]
```

13-6. Ratio Calculations

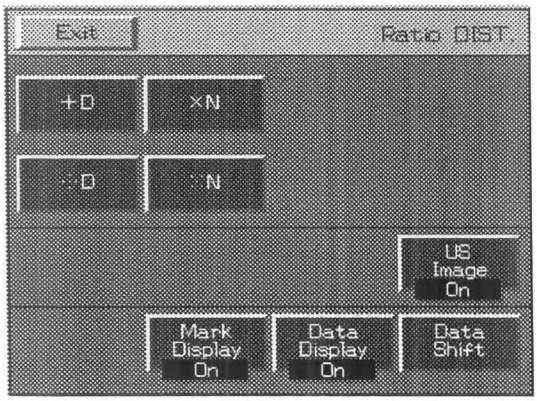
In ratio calculation, the system compares two measure values and calculates the ratio between the two values.

There are five calculation methods: In B-mode, **Ratio DIST.** is calculated from the distance measurements, and **Ratio Area-Trace** and **Ratio Ellipse** are calculated from the area measurements. In D-mode, **Ratio Trace** is calculated from the trace measurements, and Ratio **D VEL.** is calculated from the velocity measurements.

Each method allows you to make two sets of measurements on one screen.

Ratio calculation : RATIO = N (Numerator) / D (Denominator)

Also, if you select ratio measurement, the following menu appears on the touch panel.



[Remark]
You can select items using the touch panel menu, caliper mark switch, or the SET switch.

Exit : Terminates ratio measurement.
US Image : Temporarily erases an ultrasound image.
Mark.Display : Temporarily erases everything except the marks used in the current measurement.
Data Display : Temporarily erases the measurement results.
Data.Shift : Moves the measurement result area up, down, left or right.
(You can turn US Image, Mark Display, and Data Display On or Off.)

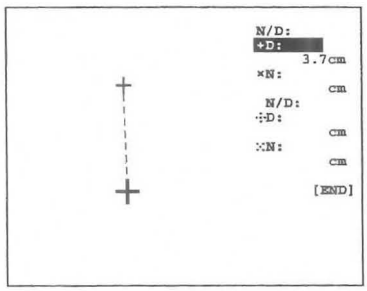
When Ratio Dist is selected

The Ratio Dist method calculates the ratio of distances measured on a B-mode image.

<Operation method>

① Select **Ratio DIST**.

→ A "+" mark for denominator measurement appears at the center of the screen. (The RATIO DIST menu appears on the touch panel.)

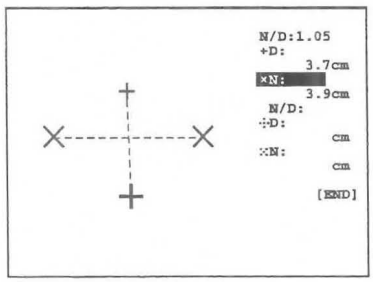


② Using the same procedure as that for DIST. measurement, move mark to the measurement position with the **MARK REF** switch and the trackball.

③ Select **×N.**

→ An "x" mark for denominator measurement appears at the center of the screen, so carry out measurement in the same way as ②.

→ The ratio is computed.



[Remark]
When performing a different ratio measurement, select ∴D or ∵N . The method of operation is the same. To make a correction, press the relevant item name or caliper mark (+, ×, ∴, ∵) on the touch panel menu, then repeat the measurement.

④ After completing the measurements, select **Exit** of the touch panel menu or press the **MEASUREMENT** switch. The system clears all measurement marks and measurement results.

<Measurement result display for Ratio DIST>

```
 N/D:
+D:
            cm
×N:
            cm
 N/D:
÷D:
            cm
∴N:
            cm
           [END]
```

The layout for a horizontal display is as follows:

```
 N/D:
+D:          cm
×N:          cm
 N/D:
÷D:          cm
        ∴N:          cm
          [END]
```

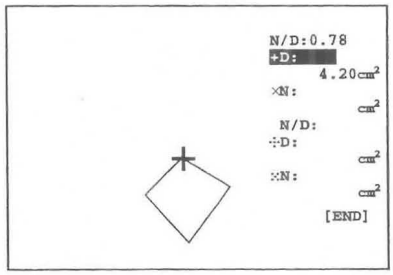
Ratio Area-T method

The Ratio Area-T method calculates the ratio of areas measured on a B-mode image.

<Operation method>

① Select **Ratio Area-T**.

→ A "+" mark for denominator measurement appears at the center of the screen. (The RATIO DIST menu appears on the touch panel.)

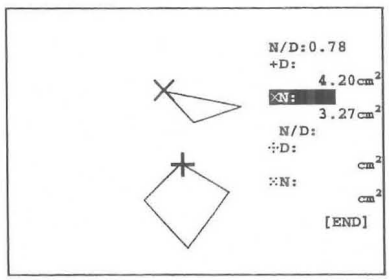


② Using the same procedure as that for Area Trace, trace the measurement position with the **MARK REF** switch and the trackball.

[Remark]
To correct the trace line, turn the rotary encoder counterclockwise.
To redisplay an erased trade line, turn the rotary switch clockwise.

③ Press the **MARK REF** switch.

→ The trace will be closed, and the system will calculate the area.



④ Select **×N**.

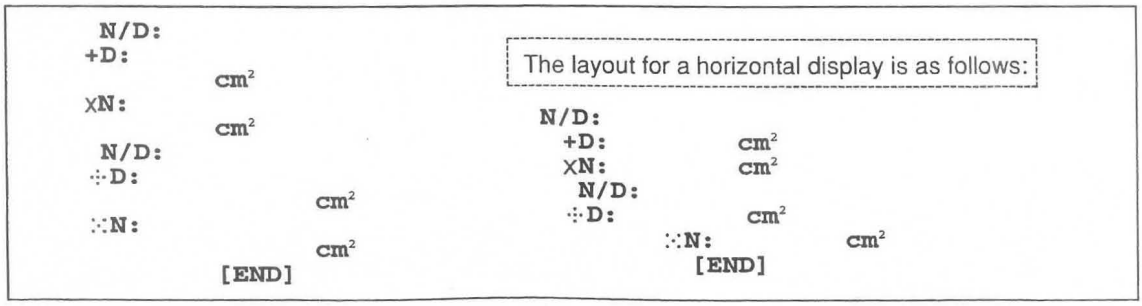
→ An "x" mark for denominator measurement appears at the center of the screen, so carry out measurement in the same way as ②.

→ The ratio is computed.

[Remark]
When performing a different ratio measurement, select ∴D or ∴N . The method of operation is the same. To make a correction, press the relevant item name or caliper mark (+, ×, ∴, ∴) on the touch panel menu, then repeat the measurement.

⑤ After completing the measurements, select **Exit** of the touch panel menu or press the **MEASUREMENT** switch. The system clears all measurement marks and measurement results.

<Measurement result display for Ratio Area-T>



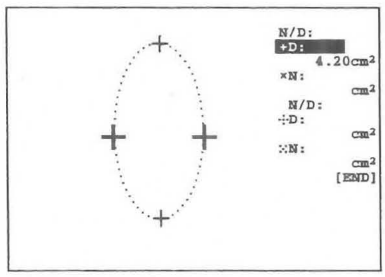
Ratio Ellipse method

The Ratio Ellipse method calculates the ratio of areas enclosed by ellipses, on a B-mode image.

＜Operation method＞

① Select **Ratio Ellipse**.

→ A "+" mark for denominator measurement appears at the center of the screen.

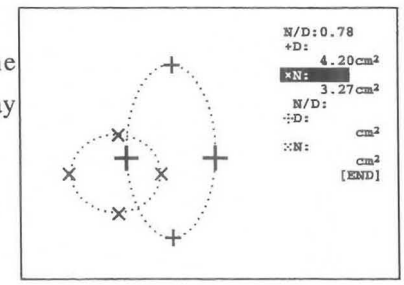


Using the same procedure as that for Area Ellipse measurement, move the ellipse to the measurement position with the **MARK REF** switch and the trackball.

② Select **×N**.

→ An "x" mark for denominator measurement appears at the center of the screen, so carry out measurement in the same way as ①.

→ The ratio is computed.



[Remark]

When performing a different ratio measurement, select ⁜D or ⁜N . The method of operation is the same. To make a correction, press the relevant item name or caliper mark (+, ×, ⁜, ⁜) on the touch panel menu, then repeat the measurement.

③ After completing the measurements, select **Exit** of the touch panel menu or press the **MEASUREMENT** switch. The system clears all measurement marks and measurement results.

<Measurement result display for Ratio Ellipse>

```
 N/D:
+D:
          cm²
×N:
          cm²
 N/D:
⁜D:
          cm²
⁜N:
          cm²
          [END]
```

The layout for a horizontal display is as follows:

```
 N/D:
+D:          cm²
×N:          cm²
 N/D:
⁜D:          cm²
⁜N:          cm²
          [END]
```

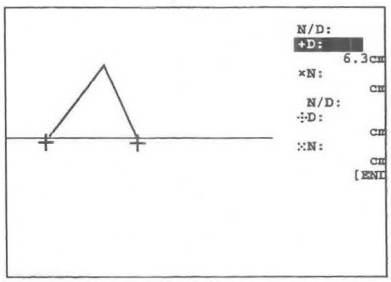
Ratio Trace method

This function uses trace measurement on a D mode image to compute VTI and obtain the ratio between the computed VTI values.

<Operation method>

① Select **Ratio Trace**.

→ A "+" mark for denominator measurement appears at the of the screen. (The Ratio Trace menu appears on the touch panel.)

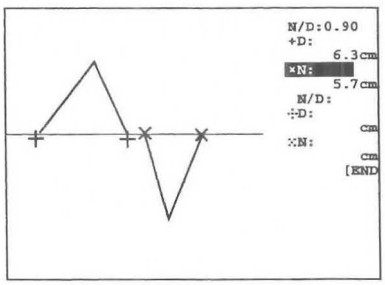


② Using the same procedure as that for Mean VEL measurement, trace the waveform to be measured with the **MARK REF** switch and the trackball.

[Remark]
To correct the trace line, turn the rotary encoder counterclockwise.
To redisplay an erased trace line, turn the rotary switch clockwise.

③ Press the **MARK REF** switch.

→ The trace will be closed, and the system will calculate the area.



④ Select ×N.

→ An "x" mark for denominator measurement appears at the center of the screen, so carry out measurement in the same way as ②.

→ The ratio is computed.

[備考]
When performing a different ratio measurement, select ∴D or ∵N . The method of operation is the same. To make a correction, press the relevant item name or caliper mark (+, ×, ∴, ∵) on the touch panel menu, then repeat the measurement.

⑤ After completing the measurements, select **Exit** of the touch panel menu or press the **MEASUREMENT** switch. The system clears all measurement marks and measurement results.

<Measurement result display for Ratio Trace>

```
 N/D:
+D:
          cm
×N:
          cm
 N/D:
∴D:
                cm
∵N:
                cm
          [END]
```

The layout for a horizontal display is as follows:

```
 N/D:
+D:          cm
×N:          cm
 N/D:
∴D:          cm
          ∵N:          cm
            [END]
```

When Ratio D.VEL is selected

The system uses the velocity measurements to calculate the flow velocity ratio for different Doppler waves.

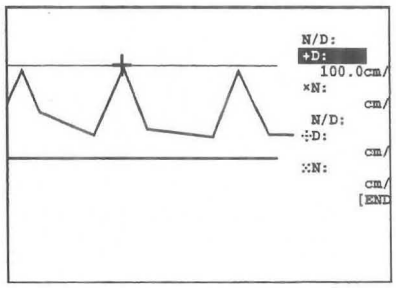
<Operation method>

① Select **Ratio D. VEL**.

→ A "+" mark superimposed on the denominator measurement line mark appears at the center of the baseline. (The Ratio D. VEL menu appears on the touch panel.)

② Using the same procedure as that for D. VEL measurement, move the mark to the measurement position with the trackball.

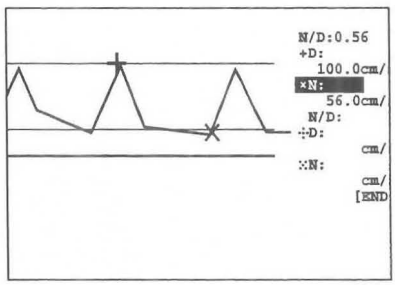
→ The flow velocity value is computed as the mark is moved.



③ Select **×N**.

→ An "x" mark superimposed on the denominator measurement line mark appears at the center of the baseline, so move the mark to the measurement position with the trackball.

→ The ratio is computed.



[備考]

When performing a different ratio measurement, select ⁖D or ⁙N. The method of operation is the same. To make a correction, press the relevant item name or caliper mark (+, ×, ⁖, ⁙) on the touch panel menu, then repeat the measurement.

④ After completing the measurements, select **Exit** of the touch panel menu or press the **MEASUREMENT** switch. The system clears all measurement marks and measurement results.

<Example of measurement result display for Ratio D.VEL>

```
 N/D:
+D:
          cm
×N:
          cm
 N/D:
÷D:
          cm
⁙N:
          cm
          [END]
```

The layout for a horizontal display is as follows:

```
 N/D:
+D:          cm
×N:          cm
 N/D:
÷D:          cm
⁙N:          cm
          [END]
```

13-7. HIST (histogram measurement)

A histogram displays the distribution of the echo intensity in the ROI enclosed by a box cursor or trace.
(The size of the box cursor can be varied from 1 mm to 99 mm.)

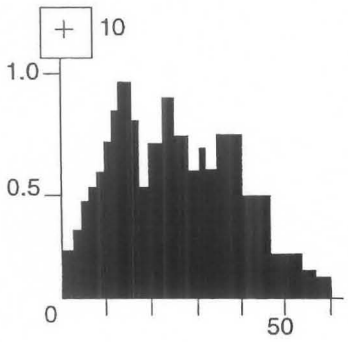
The horizontal axis in the figure below indicates intensity levels between 0 and 63, and the vertical axis i ndicates the occurrence of each intensity level, where the number of pixels corresponding to the greatest number of occurrences of a certain intensity in an arbitrary area is 100%.

Calculation equation

$$\text{Mean (MEAN)} = \left(\sum_{i=0}^{63} \cdot Xi \cdot fi\right)/n$$

$$\text{Standard deviation (SD)} = \left(\left(\sum_{i=0}^{63} (xi\text{-MEAN})2 \cdot fi\right)/n\right)^{1/2}$$

Where,
- n : The total number of pixels in an arbitrary area
- x : Intensity level
- f : Number of pixels corresponding to that intensity level



Histogram measurement display examples

HIST BOX

```
HIST-B 10
 +T:  684
  L:    6
  M:   72
 MN: 8.1
 SD: 3.1
```

HIST Trace

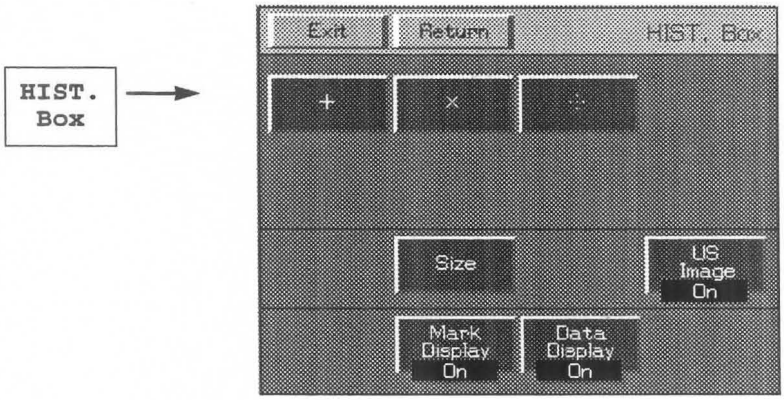
```
HIST-T
 +T:  684
  L:    6
  M:   72
 MN: 8.1
 SD: 3.1
```

T is the total number of pixels in an arbitrary area or a fixed area.
L is the intensity level that occurs most frequently in the specified area.
M is the number of pixels corresponding to the intensity level that occurs most frequently in the specified area.
(It is indicated as 100% on the graph.)
MN is the mean intensity level in the specified area.
SD is the standard deviation of the intensity distribution in the specified area.

13-7-1. Method of Measuring Histogram

In histogram measurement, the ROI is specified by a box cursor or trace, then measurement is performed in this ROI.

If you select "**HIST BOX**" or "**HIST Trace**", a menu like that shown below appears on the touch panel.



Exit : Terminates histogram measurement.

Return : Exits histogram measurement while leaving the results displayed.

Size : When size is selected, the size of the box cursor changes from 1 mm to 99 mm. Size is not displayed, however, if you selected HIST Trace.

US Image : Temporarily erases an ultrasound image.

Mark Display : Erases everything except marks used in the current measurement.

Data Display : Temporarily erases the histogram.

(You can turn US Image, Mark Display, and Data Display On or Off.)

[Remark]

There is no Data. Shift function in Histogram measurement.

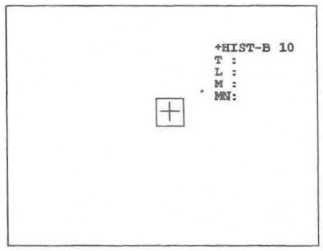
(1) Histogram with fixed ROI (Histogram box)

＜Operation method＞

① Select **HIST BOX.**

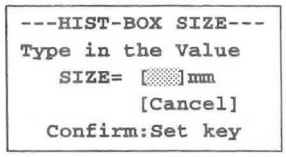
→ The box cursor for histogram measurement (10 mm square) is displayed at the center of the screen, and also the + switch lights.

(The default size of the box cursor is 10 mm square.)

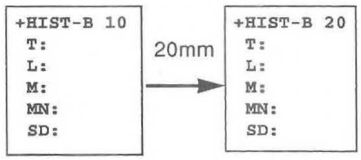


[Remark]

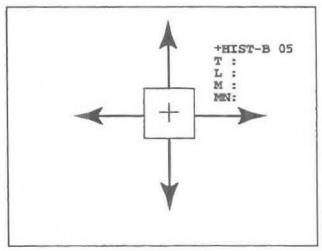
If you wish to change the size of the box cursor, select **Size** of the touch panel menu, and the sub-menu shown at right appears. Next, enter the size from the keyboard, and press the **SET** switch.



If you wish to erase the sub-menu, move the highlighted display to Cancel with the trackball, and press the **SET** switch. The size appears on the result display.

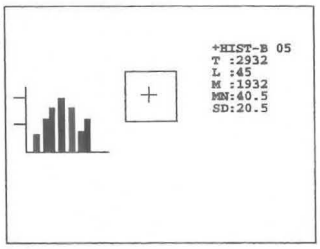


② Using the trackball, move the box cursor to the place where you wish to display the histogram.



③ Press the **MARK REF** switch.

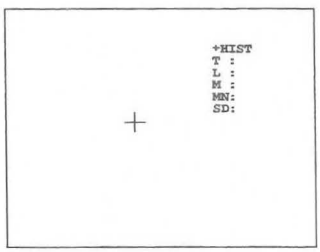
→ The histogram and numerical values inside the box cursor are calculated, and displayed. (While calculation is taking place, the word "Processing" is displayed.)



(2) Histogram with arbitrary ROI (Histogram Trace)

① Select **HIST.Trace.**

→ A "+" mark for histogram measurement appears at the center of the screen, so perform a trace using the **MARK REF** switch and the trackball. (Same procedure as that for Area Trace.)



[Remark]

To correct the trace line, turn the rotary encoder counterclockwise.

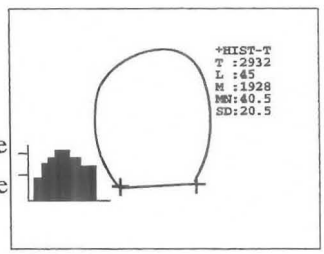
To redisplay an erased trace line, turn the rotary switch clockwise.

② Press the **MARK REF** switch.

→ The trace will be closed, and the system will calculate the area.

③ Press the **MARK REF** switch.

→ The histogram and numerical value of the part enclosed by the bright line are calculated, and displayed. (While calculation is taking place, the word "Processing" is displayed.)



[Remark]

If the area of the part enclosed by the bright line is large, a long period is required for the system to carry out calculation.

④ After measurement is completed, then you select **Exit** of the touch panel menu or press the **MEASUREMENT** switch once again, all of the measurement marks and the measured results are erased.

[Remark]
You can use up to three kinds of histogram measurements (+, x, and ⁘).

<Example of displaying measured results>

HIST BOX	HIST Trace		
HIST-B 10	HIST-T		(in the specified ROI)
+T:	+T:	←	Total number of pixels
L:	L:	←	Intensity level that has the greatest number of pixels
M:	M:	←	Number of pixels at the intensity level that has the greatest number of pixels
MN:	MN:	←	Mean intensity level
SD:	SD:	←	Standard deviation of intensity distribution

14. CARDIAC CALCULATIONS

The system can be used to determine the following cardiac calculations:

1. Left ventricular measurements

M-mode : M Pombo, M (Wall) Pombo
M Teichholz, M (Wall) Teichholz
M Gibson, M (Wall) Gibson

B-mode : B Pombo, B (Wall) Pombo
B Teichholz, B (Wall) Teichholz
B Gibson, B (Wall) Gibson
Single Plane Ellipse
Bi-plane Ellipse
Bullet
Modified Simpson
Simpson

2. B-mode measurements

: B Long Axis View (B-LAX)
B Long Axis View with Wall Thickness (B (Wall) LAX)
B Short Axis View (B-SAX)
B Apex View (B-APX)

3. M-mode measurements

: Mitral Valve
Aortic Valve
Tricuspid Valve
Pulmonic Valve

4. D-mode measurement

: D-mode LV IN Flow Study
D-mode LV Ejection Flow Study1, 2
D-mode RV IN Flow Study
D-mode RV Ejection Flow Study1, 2
SV/CO
Flow Volume
D-mode LV AV Stenosis Study1,2
D-mode RV PV Stenosis Study1,2

You can use the Preset function to select measurement items from the above to measure or display. You can also output the measurement results in the form of a report. (except for SV/CO and Flow Volume)

This section consists of 90 pages.

14-1. Explanation of measurement items and indexes

The cardiac function measurement items that are stored in this system are listed in the following tables.

■B-mode measurements

Menu name	Meaning	Displayed report page
B POMBO	Left ventricular function measurement, Pombo method	B/M-Mode LV Function Data Page
B (Wall) POMBO	Left ventricular function measurement, Pombo method (wall thickness evaluation)	〃
B TEICH.	Left ventricular function measurement, Teichholz method	〃
B (Wall) TEICH.	Left ventricular function measurement, Teichholz method (wall thickness evaluation)	〃
B GIBSON	Left ventricular function measurement, Gibson method	〃
B (Wall) GIBSON	Left ventricular function measurement, Gibson method (wall thickness evaluation)	〃
S. Plane Ellipse	Left ventricular function measurement, Single Plane Ellipsoid method	〃
Biplane Ellipse	Left ventricular function measurement, Bi-plane Ellipsoid method	〃
Bullet	Left ventricular function measurement, Bullet method	〃
MOD Simpson	Left ventricular function measurement, Modified Simpson method	〃
Simpson	Left ventricular function calculation, Simpson method	〃
B LAX	Left ventricular long axis view measurement	B/M-Mode LV Measurement Data Page
B (Wall) LAX	Left ventricular long axis view measurement (wall thickness evaluation)	〃
B SAX	Left ventricular short axis view measurement	〃
B APX	Left ventricular apex view measurement	〃

■M-Mode measurements

Menu name	Meaning	Displayed report page
M POMBO	Left ventricular measurement, Pombo method	B/M-Mode LV Function Data Page
M (Wall) POMBO	Left ventricular measurement, Pombo method (wall thickness evaluation)	〃
M TEICH.	Left ventricular measurement, Teichholz method	〃
M (Wall) TEICH.	Left ventricular measurement, Teichholz method (wall thickness evaluation)	〃
M GIBSON	Left ventricular measurement, Gibson method	〃
M (Wall) GIBSON	Left ventricular measurement, Gibson method (wall thickness evaluation)	〃
Mitral Valve	Mitral valve measurement	M-Mode Valve Function Data Page
Aortic Valve	Aortic valve measurement	〃
TRICUSP Valve	Tricuspid valve measurement	〃
PULMO Valve	Pulmonary valve measurement	〃

■D-Mode measurements

Menu name	Meaning	Displayed report page
LV IN Flow	Left ventricular blood in flow study	D-Mode LV In Flow Study Page
LV EJ Flow-1	Left ventricular blood ejection flow study 1	D-Mode LV Ejection Flow Study Page
LV EJ Flow-2	Left ventricular blood ejection flow study 2	〃
RV IN Flow	Right ventricular blood in flow study	D-Mode RV In Flow Study Page
RV EJ Flow-1	Right ventricular blood ejection flow study 1	D-Mode RV Ejection Flow Study Page
RV EJ Flow-2	Right ventricular blood ejection flow study 2	〃
LV AV STENO-1	Aortic valve stenosis measurement 1	D-Mode AV Stenosis Study Page
LV AV STENO-2	Aortic valve stenosis measurement 2	〃
RV PV STENO-1	Pulmonary valve stenosis measurement 1	D-Mode RV Stenosis Study Page
RV PV STENO-2	Pulmonary valve stenosis measurement 2	〃
SV/CO	Stroke volume/cardiac output measurement	Not displayed
Flow Volume	Flow volume measurement	Not displayed

<Calculated parameters and calculation equations>

■B/M-mode measurements

Parameter	Meaning of parameters	Calculation equation	Measurement menu name including the item at left	Report page including the item at left
EDV ESV	**Left ventricular end diastolic volume** (End Diastolic Volume) **Left ventricular end systolic volume** (End Systolic Volume)	**Pombo** EDV(End Diastolic Volume) = $(LVIDd)^3$ ESV(End Systolic Volume) = $(LVIDs)^3$	B POMBO B(Wall)POMBO M POMBO M(Wall)POMBO	B/M-Mode LV/Function Data * The Pombo, Teichholz, and Gibson equations are displayed in the report.
		Teichholz EDV = $\{7.0\times(LVIDd)^3\} / (2.4 + LVIDd)$ ESV = $\{7.0\times(LVIDs)^3\} / (2.4 + LVIDs)$	B TEICH B(Wall) TEICH M TEICH M(Wall) TEICH	
		Gibson EDV = $(\pi/6)\times(LVIDd)^2\times(0.98\times LVIDd + 5.90)$ ESV = $(\pi/6)\times(LVIDs)^2\times(1.14\times LVIDs + 4.18)$	B GIBSON B(Wall)GIBSON M GIBSON M(Wall)GIBSON	
		S.plane - Ellipse EDV = $\{8.0\times(LVLAd)^2\} / (3\pi\times LVLd)$ ESV = $\{8.0\times(LVLAs)^2\} / (3\pi\times LVLs)$	S.plane Ellipse	
		Biplane - Ellipse EDV= $(8.0\times LVLAd\times LVSAMVd) / (3\pi\times LVSLMVd)$ ESV= $(8.0\times LVLAs\times LVSAMVs) / (3\pi\times LVSLMVs)$	Biplane Ellipse	
		Bullet EDV = $(5\times LVSAPMd\times LVLd) / 6$ ESV = $(5\times LVSAPMs\times LVLs) / 6$	Bullet	
		MOD. Simpson EDV= $(LVLd/9)\times\{4\times LVSAMVd+ 2\times LVSAPMd + (LVSAMVd\times LVSAPMd)^{1/2}\}$ ESV= $(LVLs/9)\times\{4\times LVSAMVs+2\times LVSAPMs + (LVSAMVs\times LVSAPMs)^{1/2}\}$	MOD. Simpson	
		Simpson $EDV= (\pi/4)\sum_{i=1}^{n}(ai\times bi)\times L/n$ $ESV= (\pi/4)\sum_{i=1}^{n}(ai\times bi)\times L/n$ (If you measure one plane.) $EDV= (\pi/4)\sum_{i=1}^{n}(ai)^2\times L/n$ $ESV= (\pi/4)\sum_{i=1}^{n}(ai)^2\times L/n$ H : Slice width = L/20 L = LAX i : 1, 2, 3, ..., 20 n : Number of slices (n=20 constant)	Simpson	

Parameter	Meaning of parameters	Calculation equation	Measurement menu name including the item at left	Report page including the item at left
EF	Ejection Fraction	EF = SV/EDV×100 (%)	B, M POMBO, TEICH, GIBSON	
SV	(Stroke Volume)	SV = EDV - ESV	B, M (Wall) POMBO, TEICH, GIBSON, Bullet	
SVI		SVI = SV / BSA		
CO	(Cardiac Output)	CO = (SV×HR)/1000	S.Plane-Ellipse Biplane Ellipse Bullet MOD Simpson	
COI	CO Index	COI = CO / BSA		
%IVSTF	Inter-ventricular septal thickness fraction	%IVSTF= {(IVSs-IVSd)/IVSd}×100	B, M (Wall) POMBO, TEICH GIBSON B (Wall) LAX	B/M-Mode LV Function Data
%PWTF	Left ventricular posterior wall thickness fraction	%PWTF = {(IVPWs-IVPWd)/IVPWd}×100		
IVS/ LVPW	IVS / LVPW Ratio	IVS/LVPW = LVSd/LVPWd		
FS	Fractional shortening	FS = {(LVIDd-LVIDs)/LVIDd}×100(%)	M POMBO, TEICH, GIBSON B, M (Wall) POMBO, TEICH, GIBSON	
MVCF	Mean velocity of circumferential fiber shortening	MVCF = (LVIDd-LVIDs)/(LVIDd×LVET)	M POMBO, TEICH, GIBSON	
area EF	Area ejection fraction	area EF = (LVSAMVd - LVSAMVs)/LVSAMVd area EF = (LVLAd - LVLAs)/LVLAd	B-SAX B-APX	B/M-Mode LV Measurement Data
LA/AO	LA/AO ratio	LADs/AODd	B LAX	
A/E	A/E ratio	A/E	Aortic Valve Mitral Valve TRICUSP Valve	M-Mode Valve Function Data
BSA	Body Surface Area	BSA = $0.007184 \times W^{0.425} \times H^{0.725}$		B/M-Mode LV Function Data
HR	Heart Rate			
LVM	LV mass*	LVM = $1.04 \times \{(IVSd + LVIDd + LVPWd)^3 - LVIDd^3\} - 13.6$	B, M(Wall) POMBO, TEICH, GIBSON	B/M-Mode LV Function Data
LVM/ BSA	LVM/BSA ratio	LVM/BSA = LVM/BSA		

* Devereux Equation

■D-Mode measurements

Parameter	Meaning of parameters	Calculation equation	Measurement menu name including the item at left	Report page including the item at left
CSA	**Cross-Sectional Area**	CSA = π / 4×(CSD)^2	LV IN Flow LV EJ Flow-1 LV EJ Flow-2 RV IN Flow RV EJ Flow-1 RV EJ Flow-2	D-Mode LV Ejection Flow Study D-Mode RV Ejection Flow Study
avSV (pvSV)	Aortic Valve Stroke Volume (Pulmonic valve)	SV = CSA×VTI	LV EJ Flow-1 LV EJ Flow-2	D-Mode LV Ejection Flow Study
avCO (pvCO)	Aortic Valve Cardiac Output (Pulmonic valve)	CO = (SV×HR) / 1000	RV EJ Flow-1 RV EJ Flow-2	D-Mode RV Ejection Flow Study
MVA	**Mitral Valve Area**	MVA = 220 / (P1/2T)	LV IN Flow	D-Mode LV In Flow Study
AVA	**Aortic Valve Area**	AVA= (CSA×PVEL) / Vmax (continuity equation) AVA= (CSA×VTI) / VTImax(continuity equation)	LV EJ Flow-1 LV EJ Flow-2	D-Mode LV Ejection Flow Study
		AVA = (CSAxPVEL) / Vmax(continuity equation) AVA= (CSAx VTImax) / VTI (continuity equation)	LV AV STENO-1 LV AV STENO-2	D-Mode AV Stenosis Study
TVA	**Tricuspid Valve Area**	TVA = 220 / (P1/2T)	RV IN Flow	D-Mode RV In Flow Study
PVA	**Pulmonic Valve Area**	PVA= (CSA×PVEL) / Vmax (continuity equation) PVA= (CSA×VTI) / VTImax(continuity equation)	RV EJ Flow-1 RV EJ Flow-2	D-Mode RV Ejection Flow Study
		PVA= (CSAx pRVOT) / pPV(continuity equation) PVA= (CSAx VTImax) / VTI(continuity equation)	RV PV STENO-1 RV PV STENO-2	D-Mode PV Stenosis Study
E / A	E / A ratio	E-VEL / A-VEL	LV IN Flow RV IN Flow	D-Mode LV In Flow Study D-Mode RV In Flow Study
Qp/Qs	Qp/Qs Ratio	pvSV/avSV	Not displayed	D-Mode RV Ejection Flow Study
SV	Stroke Volume	SV = CSA×VTI	SV/CO Flow Volume	Not displayed
FV	Flow Volume	FV = MVEL×CSA×60sec×k		

■ Parameters to be measured

Parameter	Meaning	Measurement menu displayed parameter	Report page including the item at left	Edit page displayed parameter
LVIDd LVIDs	Left ventricular internal diameter (diastole) Left ventricular internal diameter (systole)	B, M POMBO, TEICH, GIBSON B, M (Wall) POMBO, TEICH, GIBSON B LAX	B/M-Mode LV Function data	
LVPWd LVPWs	Left ventricular posterior wall thickness (diastole) Left ventricular posterior wall thickness (systole)	B, M (Wall) POMBO, TEICH		
IVSd IVSs	Inter-ventricular septal thickness (diastole) Inter-ventricular septal thickness (systole)	GIBSON B (Wall) LAX		
LVSLMVd LVSLMVs	Left ventricular short-axis length at mitral valve (diastole) Left ventricular short-axis length at mitral valve (systole)	Biplane Ellipse B-SAX		
LVSAMVd LVSAMVs	Left ventricular short-axis area at mitral valve (diastole) Left ventricular short-axis area at mitral valve (systole)	Biplane Ellipse MOD Simpson B-SAX	B/M-Mode LV Measurement data	B/M-Mode LV Measurement data
LVSAPMd LVSAPMs	Left ventricular short-axis area at papillary muscle (diastole) Left ventricular short-axis area at papillary muscle (systole)	Bullet MOD Simpson		
LVLd LVLs	Left ventricular long-axis length (diastole) Left ventricular long-axis length (systole)	S.Plane-Ellipse Bullet MOD Simpson B-APX		
LVLAd LVLAs	Left ventricular long-axis area (diastole) Left ventricular long-axis area (systole)	S.Plane-Ellipse Biplane Ellipse B-APX		
LADd LADs	Left atrial diameter (diastole) Left atrial diameter (systole)	B LAX		
AODd AODs	Aortic root diameter (diastole) Aortic root diameter (systole)	B LAX	(M-Mode Valve Function Data)	(M-Mode Aortic Valve Measurement Data)
MVA	Mitral valve area	B-SAX		
HR LVET	Heart rate Left ventricular ejection time			

Parameter	Meanings	Measurement menu name including the item at left	Report page including the item at left	Edit page displayed parameter
C-E	Mitral valve C-E amplitude	Mitral Valve	M-Mode Valve Function data	M-Mode Mitral Valve Measurement data
C-A	Mitral valve C-A amplitude			
E-F SLP	Mitral valve receding speed (DDR)			
EPSS	Septal separation from E-point			
LVOTD	Left ventricular output tract diameter			
LADd	Left atrial diameter (diastole)		M-Mode Valve Function Data	M-Mode Aortic Valve Measurement data
LADs	Left atrial diameter (systole)			
AODd	Aortic root diameter (diastole)	Aortic Valve	(B/M-Mode LV Measurement data)	(B/M-Mode LV Measurement data)
AODs	Aortic root diameter (systole)			
AVD	Aortic valve diameter			
RVOTDd	Right ventricular outflow tract diameter (diastole)			
RVOTDs	Right ventricular outflow tract diameter (systole)			
E-F SLP	Tricuspid valve receding speed	Tricuspid Valve	M-Mode Valve Function data	M-Mode Tricuspid Valve measurement data
C-E	Tricuspid valve C-E amplitude			
C-A	Tricuspid valve C-A amplitude			
D-E SLP	Tricuspid valve release speed			
D-E	Tricuspid valve D-E amplitude			
AWAVE	Pulmonic valve A wave amplitude	Pulmonic Valve	M-Mode Valve Function data	M-Mode Pulmonic Valve Measurement data
e-f SLP	Pulmonic valve release speed			
b-c SLP	Pulmonic valve receding speed			
b-c	Pulmonic valve b-c wave amplitude			
LAXL4d	Long axis length in 4-chamber view (diastole)			B-Mode Simpson's rule diastole, systole data
LAXL4s	Long axis length in 4-chamber view (systole)			
LAXL2d	Long axis length in 2-chamber view (diastole)			
LAXL2s	Long axis length in 2-chamber view (systole)			

Parameter	Meaning	Measurement menu name including the item at left	Report page including the item at left	Edit page displayed parameter
E-VEL	E-point peak velocity	LV IN Flow RV IN Flow	D-Mode LV In Flow Study	D-Mode LV In Flow Measurement data
E-GRAD	E-point peak pressure gradient		D-Mode RV In Flow Study	
A-VEL	A-point peak velocity			D-Mode RV In Flow Measurement data
A-GRAD	A-point peak pressure gradient			
P1/2T	Pressure half time	LV IN Flow		
pAO	Peak Aortic Valve Velocity	LV AV STENO-1 LV AV STENO-2	D-Mode AV Stenosis Study	D-Mode AV Stenosis Measurement data
dLVOT	LVOT diameter			
pLVOT	LVOT peak velocity			
pPV	Peak Pulmonary Valve velocity	RV PV STENO-1 RV PV STENO-2	D-Mode PV stenosis study	D-Mode PV stenosis Measurement data
dRVOT	RVOT diameter			
pRVOT	RVOT peak velocity			
ACC	Acceleration	LV IN Flow LV EJ Flow-1 LV EJ Flow-2 RV IN Flow RV EJ Flow-1 RV EJ Flow-2 LV AV STENO-1 LV AV STENO-2 RV PV STENO-1 RV PV STENO-2	D-Mode LV In Flow Study D-Mode LV Ejection Flow Study D-Mode RV In Flow Study D-Mode RV Ejection Flow Study D-Mode AV Stenosis Study D-Mode PV stenosis study	D-Mode LV In Flow Measurement data D-Mode RV In Flow Measurement data D-Mode LV Ejection Flow Measurement data D-Mode RV Ejection Flow Measurement data D-Mode AV Stenosis Measurement data D-Mode PV stenosis Measurement data
MVEL	Mean velocity			
MGRAD	Mean pressure gradient			
AT	Acceleration time			
ET	Ejection time			
VTI	Velocity time integral			
CSD	Cross-sectional diameter			
Vmax	Maximum velocity			
VTImax	Velocity time integral (from maximum velocity)			

14-2. PRESET set-Up (Cardio-Program)

The Preset function enables you to display computation formulas, computation items, the method of entering comments, and reports. It also enables you to perform various setting such as assignment of measurement menues.
Settings are made using Cardio-Program and Menu Control of the Preset function.

Menu Control enables you to set measurement menus that can be called with the MEASUREMENT switch, and also to register USER switches. For details of the setting method, refer to "MEASURE Control" of 11-5 "Preset".

The following is a description of Cardio Program.

The following parameters can be set:

1 **Select formula of Measurement Package** : Selection of parameters to be displayed in the measurement results (set page)
(See page 14-13 for details.)
LV Function Package, B-mode Package,
M-valve Package, D-LV In/Ejection Flow Package,
D-RV In/Ejection Flow Package, Other Package
D-AV,PV Stenosis Package

2 **Select formula of Report** : Selection of parameters to be displayed in the report (set page)
(See page 14-18 for details.)
LV Volume formula, LV Parameters,
M-valve Parameters, D-LV In/Ejection Flow Parameters,
D-RV In/Ejection Flow Parameters
D-AV,PV Stenosis Parameters

3 **Formed Comment** : Registration of titles and comments displayed in the report
(See page 14-24 for details.)

[Remark]
Formed Comment is the function used to register the comment list and the titles for each remark column item in the patient information page of the report.
The comment list is very handy for registering remarks that are frequently entered in patient charts.
The comment list can also be used to register items other than comments.

14-2-1. Cardio-Program

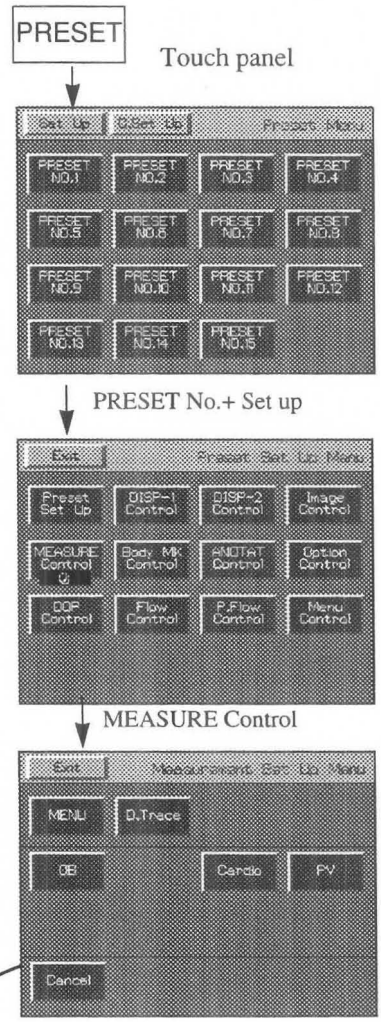
Cardio-Program is used to select parameters used for measurement, and also to select parameters to be displayed in a report.

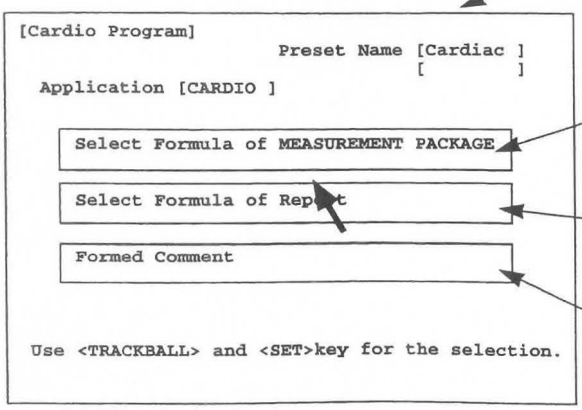
You can enter the Cardio-Program by carrying out the following procedure.

① Press the **PRESET** switch, select the Preset number to be changed, then select **Set-Up** .

② Select **MEASURE Control.**

③ To change the Cardio-Program, select **Cardio.**
→ The screen changes to the Cardio-Program page.





Select this item to select items to be displayed in the measurement results.

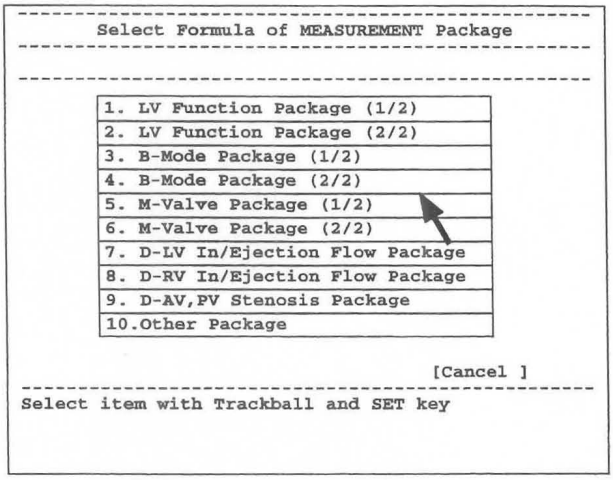
Select this item to select measurement items to be displayed in the report.

Select this item to change the Formed Comment contents.

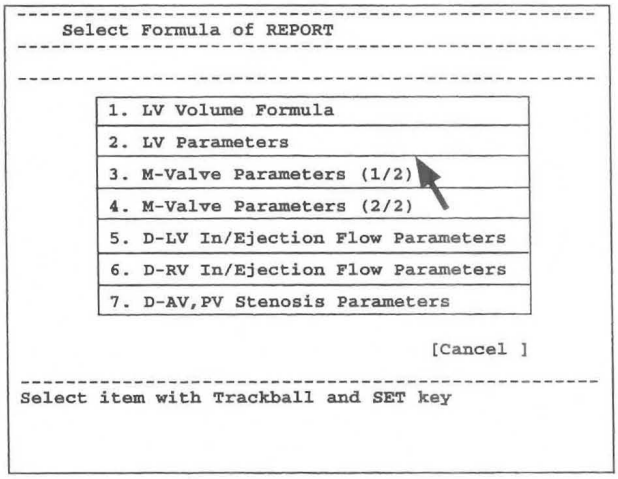
④ Move the arrow to Select Formula of MEASUREMENT Package, Select Formula of REPORT, or Formed Comment, then press the **SET** switch.

→ For each selection, the Cardio-Program page changes to one of the following screens:

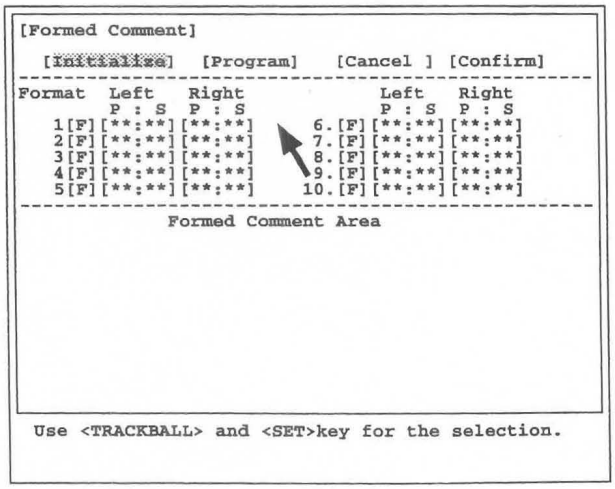
When Select Formula of MEASUREMENT Package is selected



When Select Formula of REPORT is selected



When Formed Comment is selected.



14-2-2. Setting with Select formula of MEASUREMENT Package

The Select formula of MEASUREMENT Package allows you to change measurement and calculation items. You can delete items that are not measured so that they are not displayed on the screen.

[Remark]

Each measurement has different items that can be deleted. The data for the deleted measurement items is not transferred to the report.

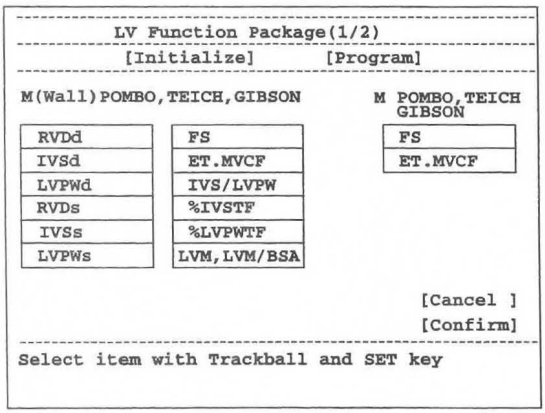
(1) Selections in the Select formula of MEASUREMENT Package

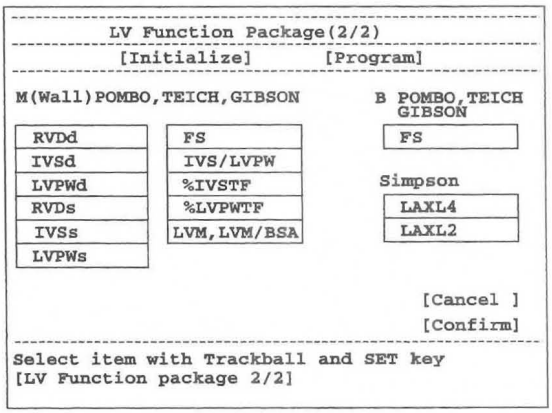
When you select each page, the setting page is displayed.

Items that can be changed are the items displayed in [ ].

1. LV Function Package(1/2),(2/2)

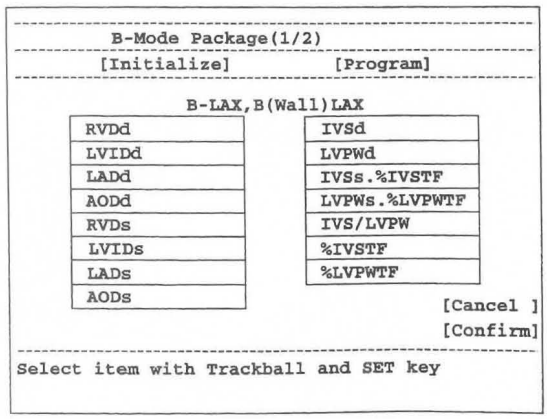
The LV Function Package allows you to change display items in the measurement package that use the Pombo, Teichholz, and Gibson formulas for the B-mode and M-mode left ventricular measurements.

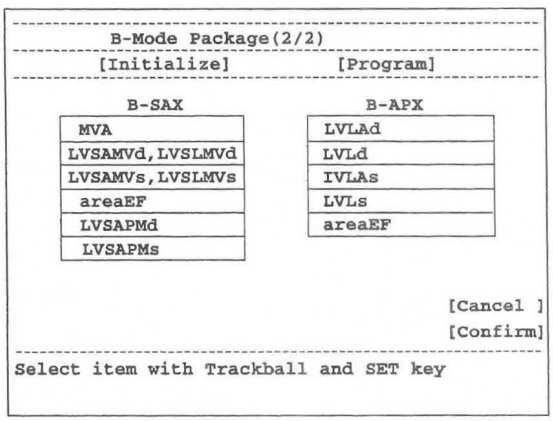




2. B - Mode Package

The B-Mode Package allows you to change display items for the B(Wall)-LAX, B-SAX, and B-APX measurements in the B-mode measurements.

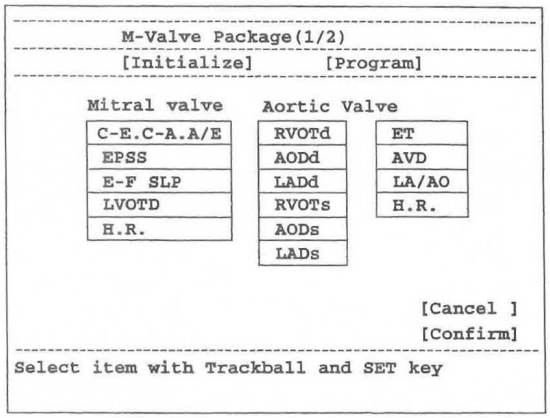


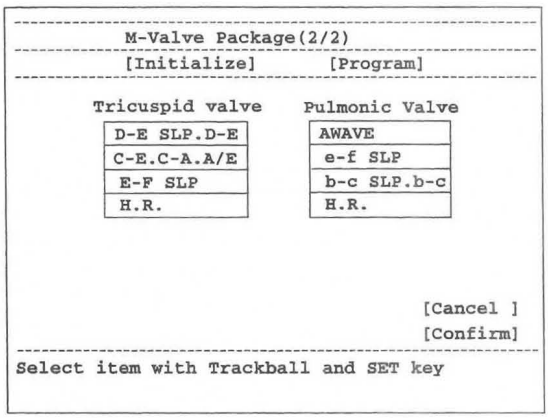


* : If LVSAMV(d, s) is not selected, area EF is not displayed.

3. M - Valve Package (1/2),(2/2)

The M-Mode Package allows you to change display items for the Mitral Valve, Aortic Valve, Tricuspid Valve, and Pulmonic Valve measurements in the M-mode measurements.

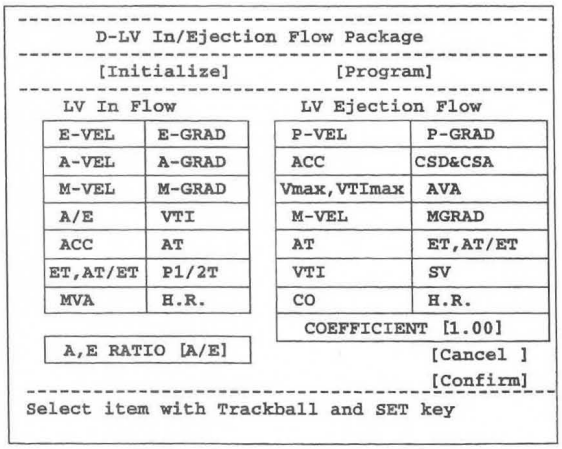


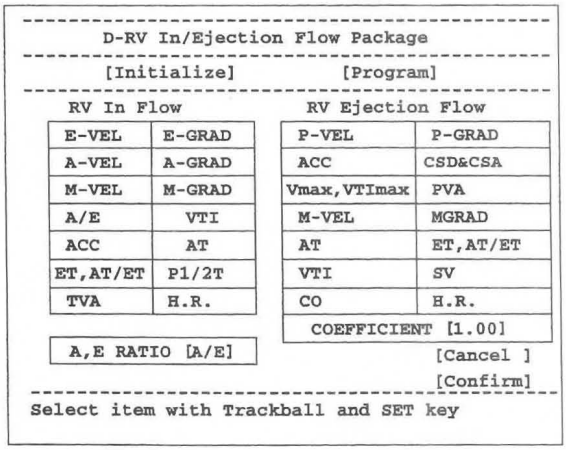


* : If EPSS is not deleted, only C-E is measured.

4. D - LV In/Ejection Flow Package, D-RV In/Ejection Flow Package

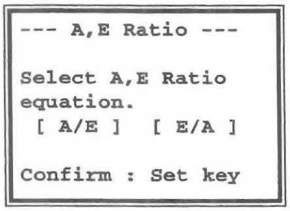
The D-Mode Package allows you to change display items for the LV IN FLOW, LV EJECTION FLOW, RV IN FLOW, and RV EJECTION FLOW measurements in the D-mode measurements.



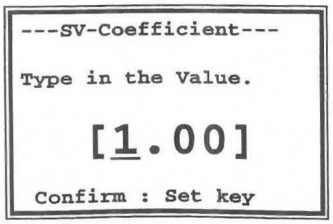


* E-VEL and E-GRAD are automatically selected when A-VEL and A/E are selected.
* SV is not displayed unless CSD & CSA is selected, and CO is not displayed unless CSD & CSA and H.R are selected.

Select A.E Ratio



Select Coefficient

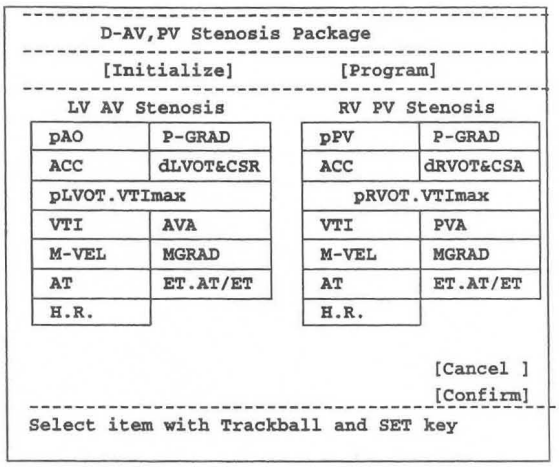


*: This item is selected automatically if A-VEL & A/E is selected

*: In the SV calculation formula SV=VTI×CSA×C, the allowed input values for C are 0.01 to 1.00.

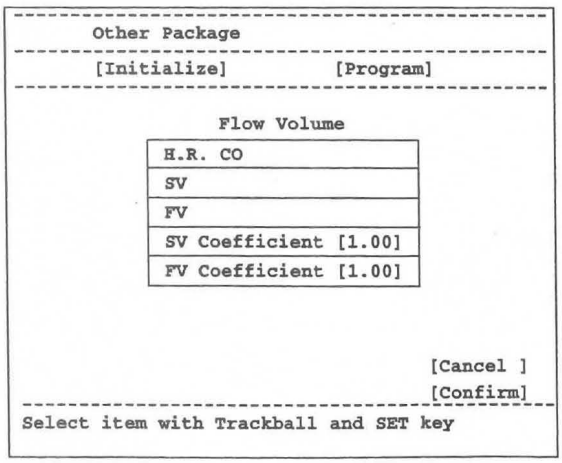
5. D - AV, PV Stenosis Package

The D-Mode Package allows you to change display items for the LV AV Stenosis, RV PV Stenosis measurements in the D-mode measurements.



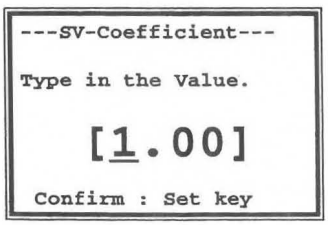
6. Other Package

The Other Package allows you to change display items for the flow volume measurements (SV/CO and Flow Volume).

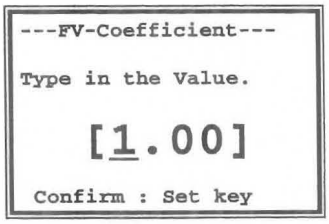


*7 : In the SV and FV calculation formulas SV=VTI×CSA×C, the allowed input values for C are 0.01 to 1.00.

Select SV Coefficient



Select FV Coefficient

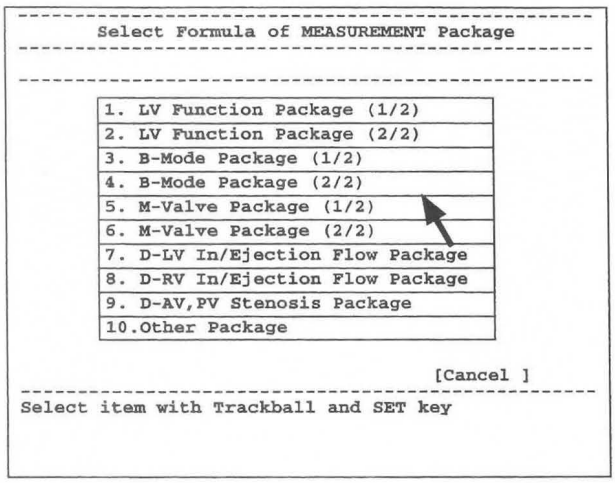


<Setting Procedure>

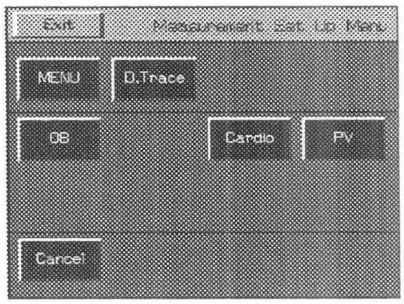
As an example, this section explains how to select display items for the D-LV In/Ejection Flow Package.

① When **Select formula of MEASUREMENT Package** is selected.

→ The screen changes as follows.



Contents of the measurement menu on the touch panel

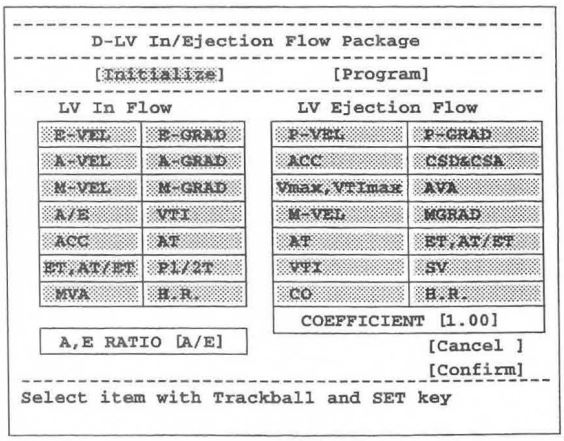


Exit :
The Preset Set Up screen re-appears.

Cancel :
The immediately previous screen re-appears.

② Move the arrow to **5.D-LV In/Ejection Flow Package**, and press the **SET** switch.

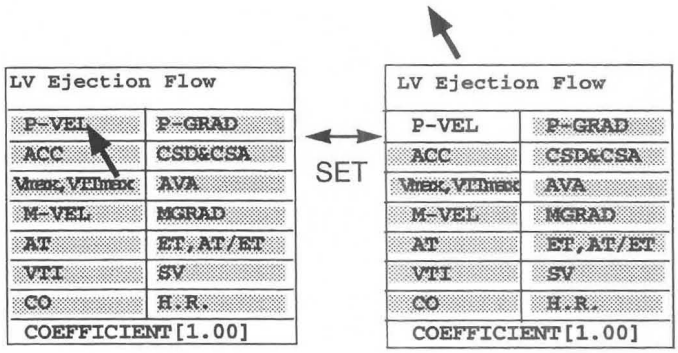
→ The screen changes to the LV In/Ejection Flow Package.
The highlighted item is the item in which the measurement result is currently displayed.



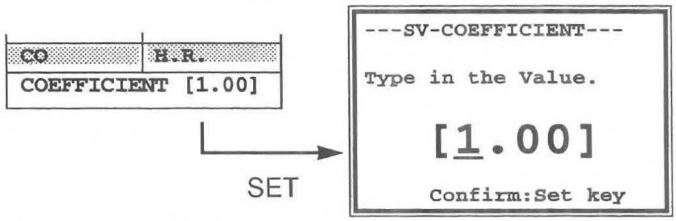
[Remark]
You can set the items displayed on this page so that they are not displayed.
Items that are not displayed cannot be deleted.
These operations are valid only in the measurement packages that display the items shown in the figure.

③ Move the arrow to each item, and press the **SET** switch.
For an item in which one or more sub-menus is displayed, carry out registration according to the messages on the screen.

④ To delete an item from the measurement results, move the arrow to that item and press the **SET** switch.
→ The item is no longer highlighted and is removed from the measurement results. If you press the **SET** switch again, the item is again highlighted.



⑤ Move the arrow to the **COEFFICIENT** area, then press the **SET** switch.
→ The sub-menu shown at right appears.



⑥ Enter the coefficient from the keyboard, then press the **SET** switch.
→ The registered sub-menu disappears.

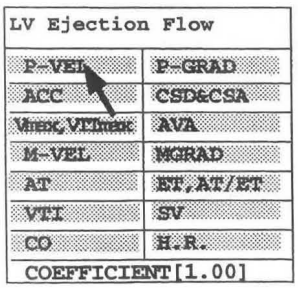
Note: The allowed input values for the coefficient are 0.01 to 1.00.

⑦ To return to the previous screen without changing any settings, select **Cancel**, or move the arrow to **[Cancel]** and press the **SET** switch.

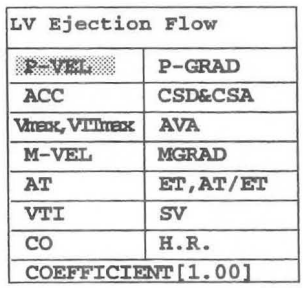
⑧ To terminated registration, move the arrow to **[Confirm]** and press the **SET** switch.
→ The screen changes to the Select formula of MEASUREMENT Package page, and registration ends.

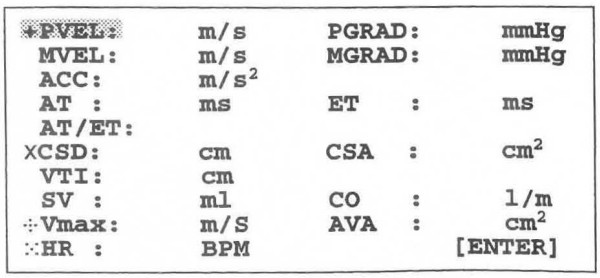
Measurement result example for LV Ejection Flow 1

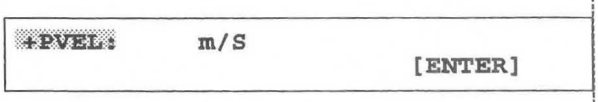
[Display all]



[Delete all]
(excect pVEL)







14-2-3. Setting the Select formula of Report

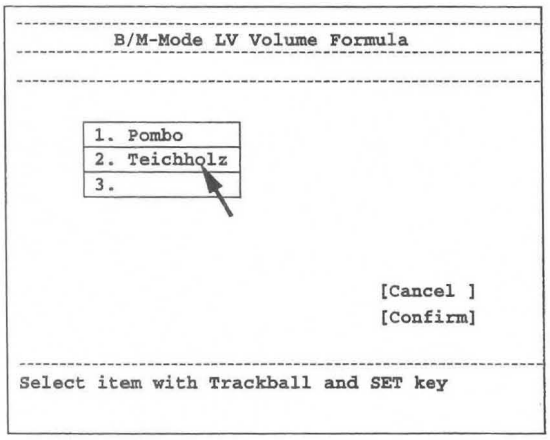
Select formula of Report allows you to change measurement items, indexes (calculation items), and left ventricular calculation formulas that are displayed in the report. You can delete unnecessary display results so that they are not displayed on the report screen.

(1) Selections in Select formula of Report

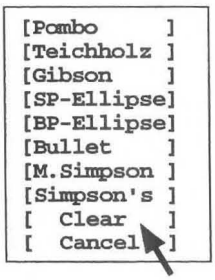
When you select each page, the setting page is displayed.
Items that can be changed are the items displayed in [ ].

1. LV Volume Formula

You can select up to three of the B and M mode left ventricle function measurement calculation formulas displayed in the repor (B/M LV Function Data page).



Registerable computation formulas



For a description of the computation formula, refer to P14-4.

When you select a formula, the calculation values (EDV, ESV, EF, SV, SVI, CO, COI, and H.R.) for left ventricular measurements are displayed in the report.

The Pombo and Teichholz formulas are registered as the initial device settings.

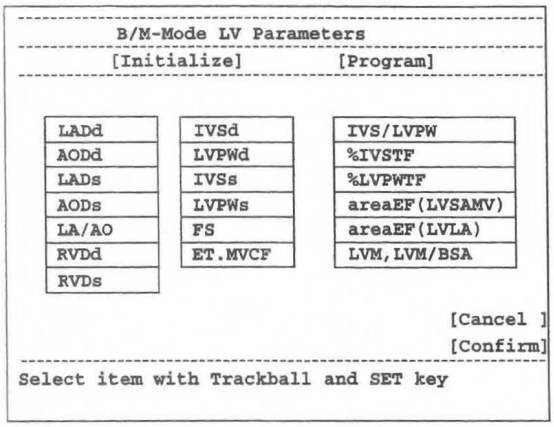
The following items are automatically displayed if the following calculation formulas are selected with **1. LV Volume Formula**. (These items are not displayed for other calculation formulas.)

Measurement name	Automatically displayed items
S.Plane Ellipse	LVL(d, s), LVLA(d, s)
Bi-Plane Ellipse	LVSLMV(d, s), LVSAMV(d, s), LVLA(d, s)
Bullet	LVSAPM(d, s), LVL(d, s)
MOD Simpson	LVSAMV(d, s), LVSAPM(d, s), LVL(d, s)

2. B/M-Mode LV Parameters

LV Parameters allows you to select calculation formulas and items that are displayed in the report(B/M-Mode LV Function DataPage and B/M-Mode LV Measurement Databpage).

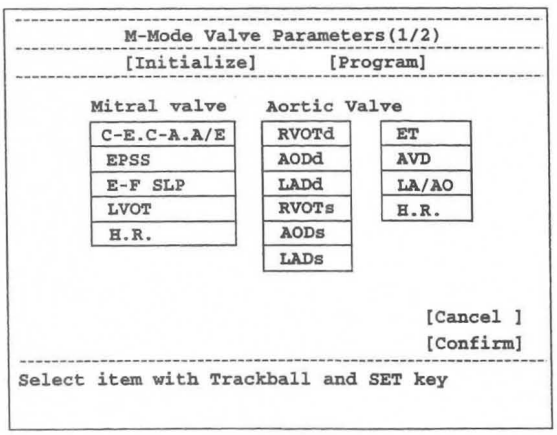
The selected formulas and items are for B-mode and M-mode left ventricular measurement.

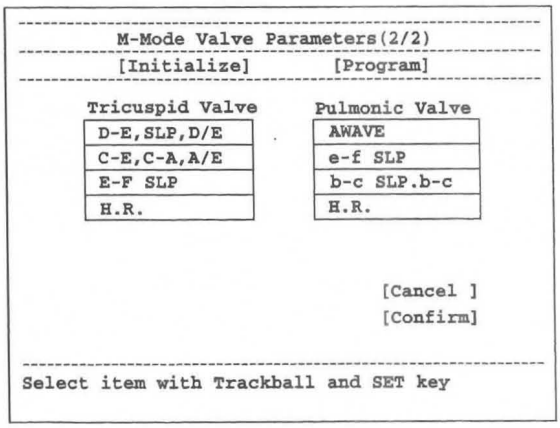


*: area EF and LA/AO can be selected individually. However, if the measurement data necessary for calculation is not selected, these items are not displayed.
LA/AO is displayed when AOD and LAD are selected. area EF is displayed when LVSAMV (d, s) or LVLA (d, s) is selected.

3. M-VALVE Parameters(1/2),(2/2)

M-Valve Parameters allows you to change report display items for Mitral Valve, Aortic Valve, Tricuspid Valve, Pulmonic Valve measurements in the M-mode measurements.

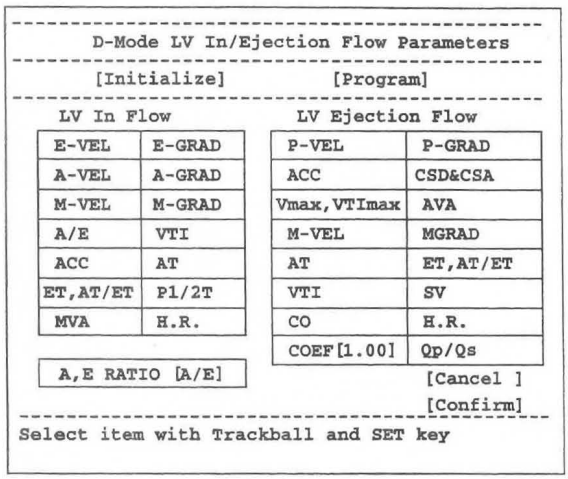


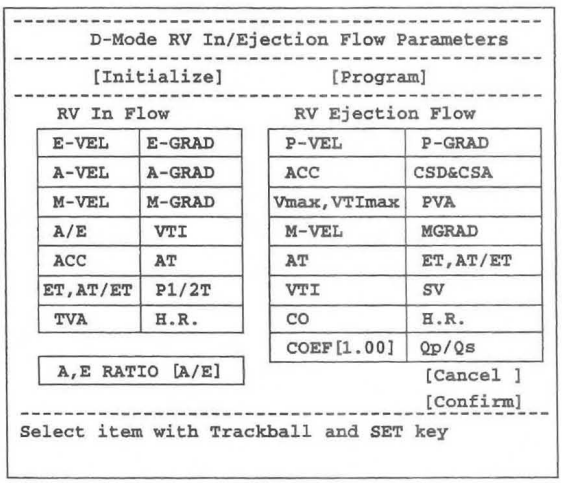


*: If EPSS is deleted, only C-E is measured.

4. D-LV In/Ejection Flow Parameters, D-RV In/Ejection Flow Parameters

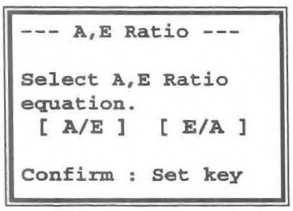
D-LV (or D-RV) In/Ejection Flow Parameters allows you to change report display items for the LV IN FLOW, LV EJECTION FLOW, RV IN FLOW, and RV EJECTION FLOW measurements in the D-mode measurements. (* & * can be selected as a combination.)



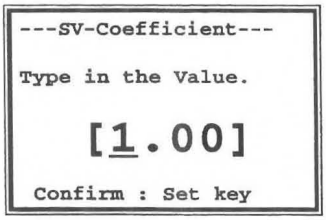


* E-VEL and E-GRAD are automatically selected when A-VEL and A/E are selected.
* SV is not displayed unless CSD & CSA is selected, and CO is not displayed unless CSD & CSA and H.R are selected.

Select A, E Ratio



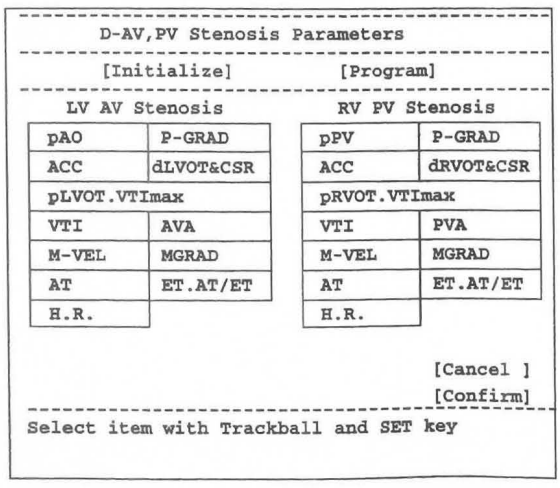
Select Coefficient



*: This item is selected automatically if A-VEL & A/E is selected
*: In the SV calculation formula SV=VTI×CSA×C, the allowed input values for C are 0.01 to 1.00.

5. D-AV,PV Stenosis Parameters

D-AV,PV Stenosis Parameters allows you to change report display items for the LV AV Stenosis, RV PV Stenosis measurements in the D-mode measurements. (* & * can be selected as a combination.)



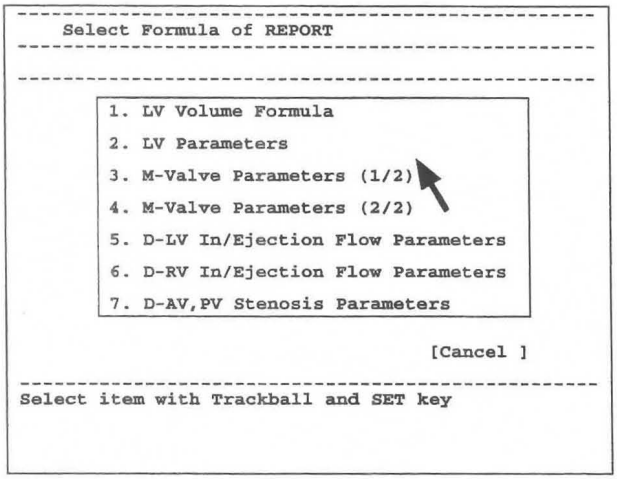
<Setting Procedure>

As an example, this section explains how to select display items for LV Volume Formula and D-LV In/Ejection Flow Parameters.

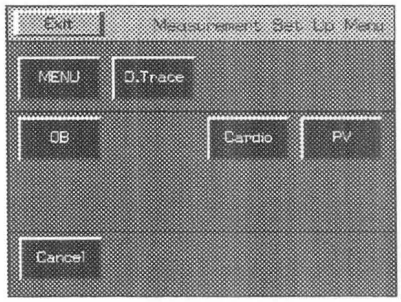
Example of setting LV Volume Formula

① When **Select Formula of REPORT** is selected.

→ The screen changes as follows.



Contents of the measurement menu on the touch panel



Exit :
The Preset Set Up screen re-appears.

Cancel :
The immediately previous screen re-appears.

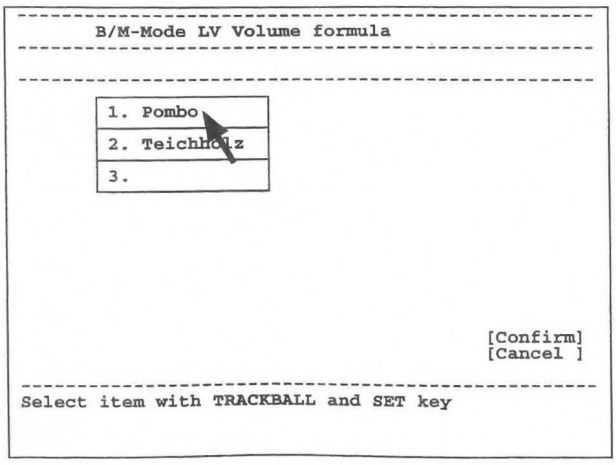
Setting example for LV Volume Formula

② Move the arrow to **1. LV Volume Formula**, and press the **SET** switch.

→ The screen changes to B/M-Mode LV Volume Formula.
The currently selected left ventricular formulas are displayed.

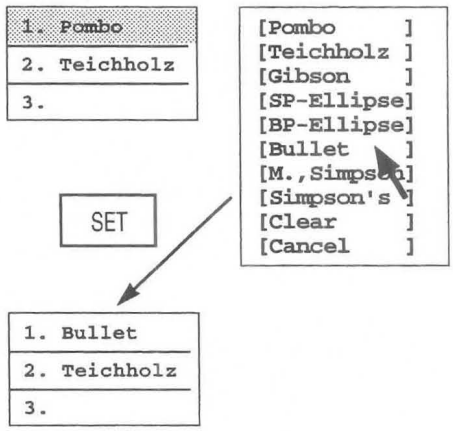
③ Move the arrow to the part to be changed, and press the **SET** switch.

→ The selection item is highlighted and a submenu is displayed.



④ Move the arrow to the calculation formula you wish to register, and press the **SET** switch.

→ The selected formula will be registered to the highlighted area.



[Remark]
To delete the formula in the highlighted area, select **[Clear]**.
To return to the previous screen without setting any formulas, select **Cancel**, or move the arrow to **[Cancel]** and press the **SET** switch.

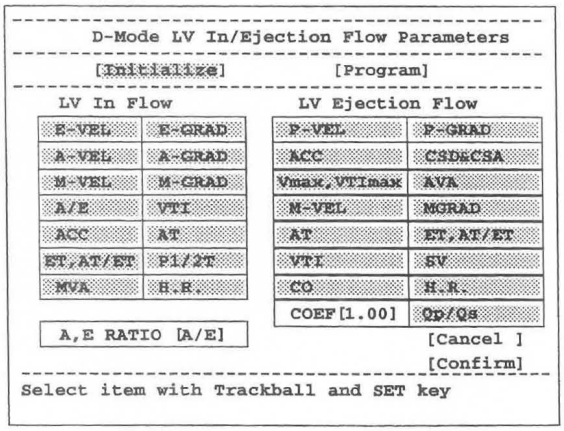
⑤ After completing the setup, move the arrow to **[Confirm]** and press the **SET** switch.

→ The screen returns to the Select formula of Report page, and registration ends.

Setting example for D-LV In/Ejection Flow Parameters

⑥ Move the arrow to D-LV In/Ejection Flow Parameters, then press the **SET** switch.

→ The screen changes to the D-LV In/Ejection Flow Parameters page.
The highlighted item is the item in which the measurement result is currently displayed.

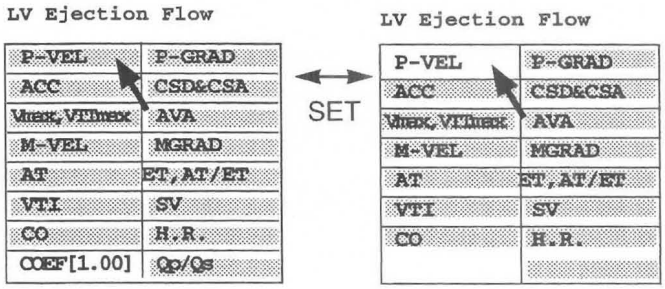


[Remark]
The items displayed on this page can be deleted from the report.

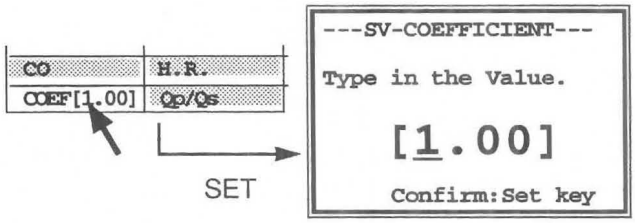
Items that are not displayed cannot be deleted.

⑦ Move the arrow to each item, and press the **SET** switch.
For an item in which one or more sub-menus is displayed, carry out registration according to the messages on the screen.

⑧ To delete an item from the measurement results, move the arrow to that item and press the **SET** switch.
→ The item is no longer highlighted and is removed from the measurement results. If you press the **SET** switch again, the item is again highlighted.



⑨ Move the arrow to **COEFFICIENT,** then press the **SET** switch.
→ The sub-menu shown at right is displayed.



⑩ To register an coefficient, enter a value for the keyboard and press the **SET** switch.
→ The submenu closes.

Note: The allowed input values for the coefficient are 0.01 to 1.00.

⑪ To return to the previous screen without changing any settings, select **Cancel**, or move the arrow to **[Cancel]** and press the **SET** switch.

⑫ To terminate registration, move the arrow to **[Confirm]** and press the **SET** switch.
→ The screen changes to the Select formula of Report page, and registration ends.

Report example for LV Ejection Flow

[Display all]

LV Ejection Flow

P-VEL	P-GRAD
ACC	CSD&CSA
Vmax, VTImax	AVA
M-VEL	MGRAD
AT	ET, AT/ET
VTI	SV
CO	H.R.
COEF[1.00]	Qp/Qs

[Delete all]
(except P-VEL)

LV Ejection Flow

P-VEL	P-GRAD
ACC	CSD&CSA
Vmax, VTImax	AVA
M-VEL	MGRAD
AT	ET, AT/ET
VTI	SV
CO	H.R.
COEF[1.00]	Qp/Qs

D-Mode LV EJECTION FLOW study

PVEL:	cm/s	PGRAD:	mmHg
MVEL:	cm	MGRAD:	mmHg
ACC:	m/s^2		
AT:	ms		
ET:	ms		
AT/ET:			
		FLOW VOLUME	
CSD:	cm	VTI:	cm
CSA:	cm^2	avSV	ml
		avSVI	ml/m^2
Vmax:	m/s	avCO	l/min
AVA:	cm^2	avSVI	$l/min/m^2$
HR:	BPM		
BSA	m^2		

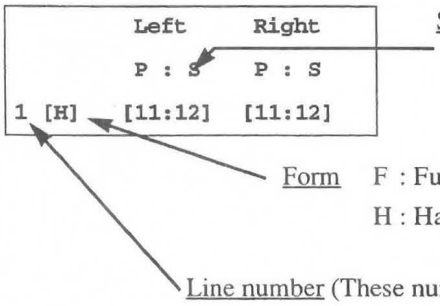
D-Mode LV EJECTION FLOW study

PVEL	cm/s	PGRAD	mmHg
MVEL	cm/s	MGRAD	mmHg
ET	ms		
BSA	m^2		
		FLOW VOLUME	
		VTI	cm

14-2-4. Formed Comment Settings

The Formed Comment screen allows you to register format setting, titles, and comments for the Formed Comment area.

You can use the following clauses during Formed Comment setup:



Size area
P : Permanent Size : Formed comment that is always displayed
S : Selectable Size : Selectable formed comment

Form F : Full (up to 23 input characters)
H : Half (up to 11 or 12 input characters)

Line number (These numbers are not displayed in the report.)

[Remark]

The form entry sets the number of input characters allowed for a permanent title or a selectable comment.

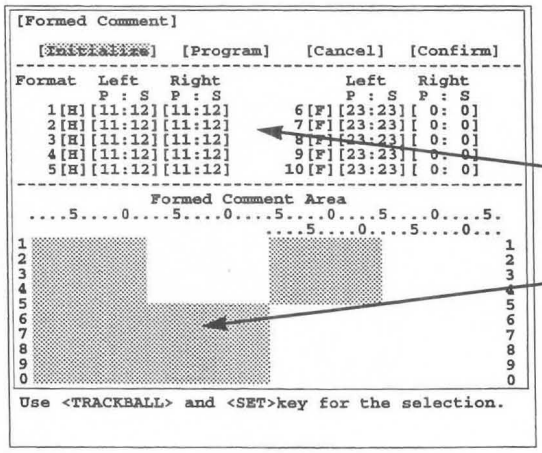
[H] Half : Two comment items (23 characters each) can be entered on one line.

[F] Full : One command item (46 characters) can be entered on one line.

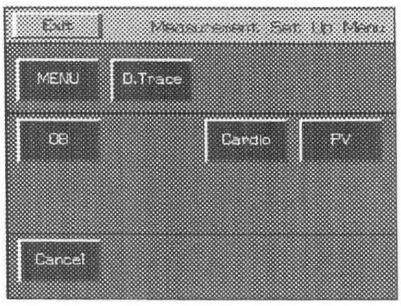
<Setting procedure>

① At the Cardio-Program screen, select **Formed Comment**.

→ The display changes to the Formed Comment screen.



As initial setting, [H] is set for lines 1 to 5. [F] is set for lines 6 to 10. The shaded areas are for permanent titles. The unshaded areas are for selectable comments.



Contents of the measurement menu on the touche panel

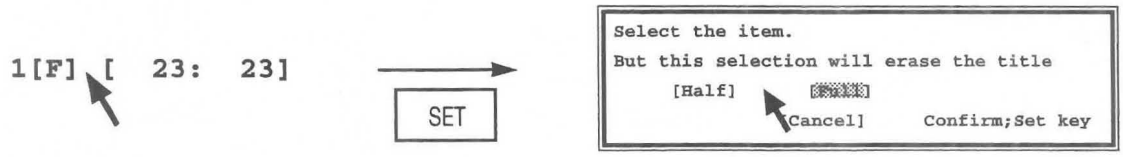
Exit :
The Preset Set Up screen re-appears.

Cancel :
The immediately previous screen re-appears.

Changing the form area ([F] or [H])

② Using the trackball, move the arrow to the Form column ([F] or [H]), then press the **SET** switch.

→ A sub-menu appears.
Select [Full] or [Half].



Changing the size area

③ Move the arrow to the size area (**[23:23]**) and press the **SET** switch.

→ The numerical value in the Size column changes.
Roll the trackball to the left or right to increase or decrease the numbers.

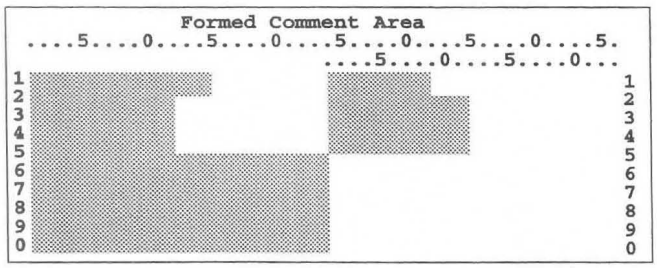
④ Press the **SET** switch.

→ The numerical value in the Size column is finalized, and the input space is displayed in gray in the Formed Comment Area.

<Example>

For example, setting row 1 to the numbers shown in the figure to the right defines the input space for **permanent titles** and **selectable comments** as shown in the figure below.

	LEFT	RIGHT
	p : s	p : s
1 [H]	[15:8]	[10:13]



Input area for permanent titles

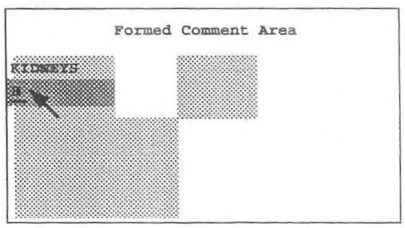
Input area for selectable comments

Registering a permanent title

Registered titles are displayed in the patient information page (Report Page 1) of the report.

⑤ Move the arrow to the shaded display area in which data is to be entered, then press the **SET** switch.

→ A highlighted display with an underline cursor appears in the space for entering permanent titles.



⑥ From the keyboard, enter a title.

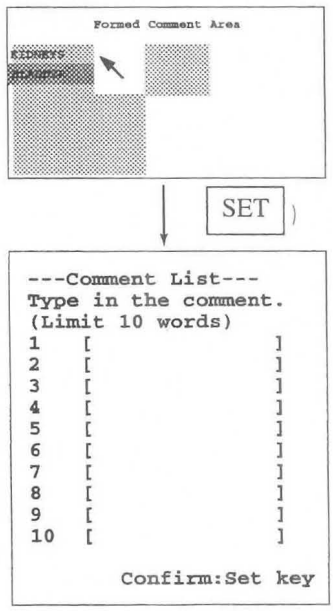
⑦ After completing the entry, press the **SET** switch.

Registering a selectable comment

Registered comments are displayed in the patient information page (Report Page 1) of the report.

⑧ Move the arrow to the selectable comment area, then press the **SET** switch.

→ A sub-menu for entering selectable comments appears, and you can enter characters from the keyboard.
The cursor moves between items 1 and 10.



⑨ Enter the comments form the keyboard.

→ You can enter up to 10 items (10 lines).

⑩ Press the **SET** switch.

→ The system clears the Comment List submenu and sets the entered characters as selectable comments.

[Remark]
After completing the entire setup, be sure to move the arrow to **[Confirm]** and press the **SET** switch to set the data.
If you do not perform this operation, the previous data will remain.

14-3 . Measurement Area

Measurement area is a function which measures the measurement items of cardiac function measurement in the B, M or D mode. By transferring the measurement results to a report, you can memorize results for up to three measurements, and display the mean values.

The cardiac function enables you to measure various items concerning the heart and display the results on the screen.

Initially, the system displays the + mark, which corresponds to the topmost item. You can then press the caliper switches to randomly select any item. You can also press the **SET** switch to select the items in sequence from the top item.

You can freely select an item by pressing the caliper mark switch or an item name on the touch panel menu.

You can also press the **SET** switch to select the items in sequence from the top item.

[Remark]

Once you release the freeze state and change the mode or display depth, you may be unable to select an item by pressing the **SET** switch.

In this case, make a select using the caliper switch.

Display example

+LVIDd :		cm		
×LVIDs :		cm		
⁘ HR	BPM	BSA:		m2
EDV:	ml	ESV:		ml
SV:	ml	SVI:		
CO:	ml	COI:		
EF:	%			
FS:	%			[ENTER]

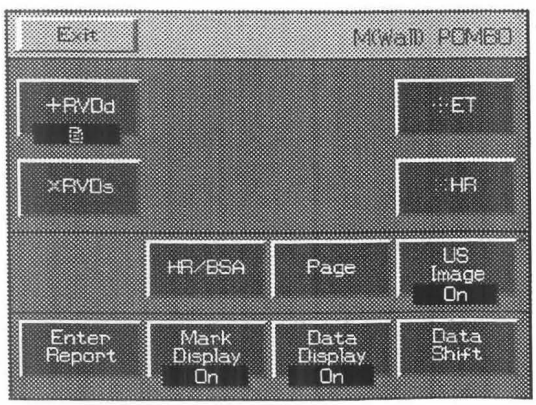
In this display example, you can measure LVIDd by pressing the + switch and measure LVIDs by pressing the × switch.

For HR measurement, press the ⁘ switch when an M mode image is displayed.

14-3-1. Measurement menu

If you select cardiac function measurement, sub-menus for cardiac function measurement appear on the touch panel.

Each sub-menu (hereafter called "touch panel menu") has the following functions.



←Measurement title

←Measurement items assigned to a caliper mark

The mark is appended to items transferred to a report.

←Sub-menus common to each measurement
Exit, US Image, Enter Report
Mark Display, Data Display, Data Shift

■■■ ;The current status (On or Off) is displayed.

Exit : Erases all measurement results and caliper marks, and terminates cardiac function measurement.

+***, ×***,
⁘***, ⁙*** : This item indicates the names of measurement items that support a caliper mark. It enables you to select a measurement item in the same way as by pressing the caliper mark switch.

HR/BSA : Select when entering the heart rate (HR) or height and weight (for computing BSA) from the keyboard.

Page : If there are many measurement parameters, the measurement results are displayed over two pages. This item is used to select a page. (It functions only for a vertical display.)

Mark Display : You can switch **On/Off** the display of caliper marks other than the marks used for the ongoing measurement.

Data Display : You can switch **On/Off** the function that temporarily erases the measurement results.

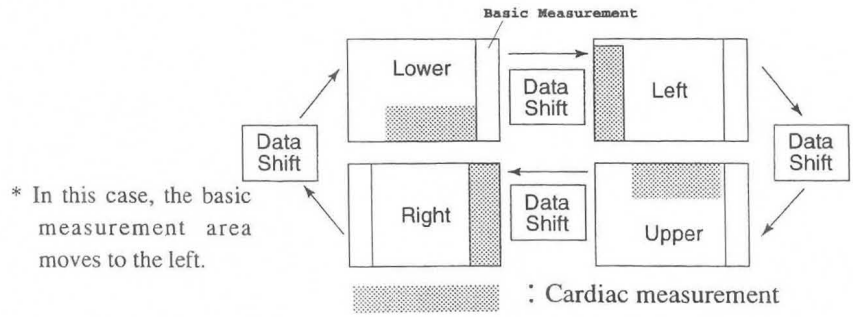
Data.Shift : You can move the measurement result area left, right, up or down.

US Image : Enables you to switch **On/Off** the function that temporarily erases an ultrasound image.

Enter Report : The measurement results generated up to that point in time are transferred to a report, then measurement is terminated, even if all measurement items have not been completed. The mark is appended to items transferred to the report.

[Remark]
Mark Off and Data shift maintain their status until the power is turned off.
(Data Shift returns to its original status as a result of a New Patient or Preset change.)

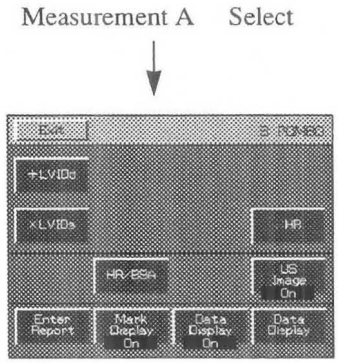
[Remark]
Result display positions for **Data Shift**



You can use the MEASURE Move function in the Display Control screen of PRESET to set the initial display positions for the cardiac measurement results.
For details, see Chapter 11-7 "Preset".

14-4. Basic procedure for cardio measurements

Here, a description is given of the operation method that is common to all cardiac measurements.

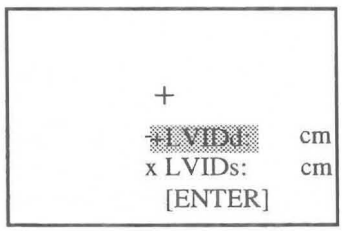


① Press the **MEASUREMENT** switch,then select the measurement name from the measurement menu of the touch panel.

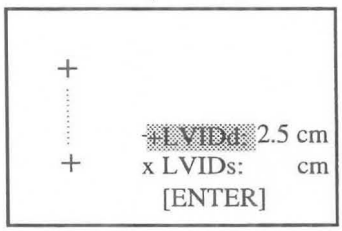
→The touch panel menu changes according to the selected measurement.

Also, the measurement item is displayed in highlighted from on the screen.

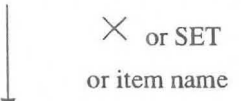
② A caliper mark (+) is displayed simultaneously , so move it to the measurement position using the trackball and **MARKREF**switch.

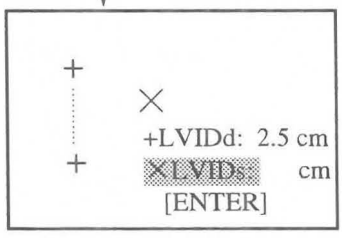


The method of operation using the **Trackball** and **MARKREF** switch is the same as that for basic measurements.
Basic measurement names are indicated in the measurement description of each item, so refer to the operaqtion methods for the following basic operations.



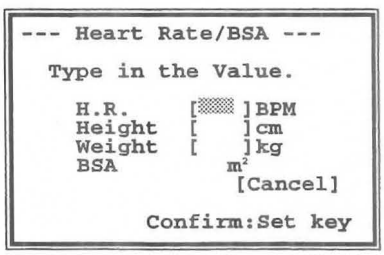
	Reference page
<DIST.>	p13-4
<Area Trace>	p13-5
<M.VEL>	p13-13
<M.Length>	p13-14
<M.Time>	p13-15
<Heart Rate>	p13-16
<D.VEL>	p13-18
<Mean VEL>	p13-20
<D.Time>	p13-22





③ To measure the next item, press either the **SET** switch or the caliper mark switch, and select the desired item name from the touch panel menu.

→ A new caliper mark appears, so perform measurement in the same way as above using the **Trackball** and **MARK REF** switch.



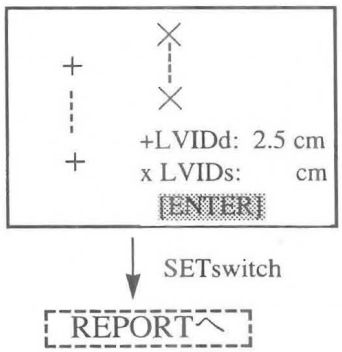
④ If the heart rate (HR) is not displayed, or if you wish to enter the height and weight in order to compute the body surface area (BSA), select **HR/BSA** on the touch panel menu.

⑤ To make a correction, press the caliper mark switch once again, then carry out measurement again.

⑥ If you wish to erase the displayed results during measurement, set **Data Display** of the touch panel menu to **Off.** To erase an ultrasound image, set **US Image** to **Off**;to move the displayed results, press **Data.Shift;** to display only the caliper marks used in the last measurement, set **Mark Display** to **Off.**

⑦ After completing the measurements, press the **SET**switch. The highlighted display moves to **[ENTER].** If you press the **SET** switch under this condition, the system performs a batch transfer of the measurement results on the screen to the report.

If you select **Enter Report** in the touch panel menu, the measurement results generated up to that point in time are transferred to a report, then measurement is terminated, even if all measurement items have not been completed.



⑧ Upon completion of measurement, select **Exit** from the touch panel, or press the **MEASUREMENT** switch.
→The measurement marks and measurement results are all erased.

14-5. Measurement Procedure

14-5-1. Left ventricular measurements

This system incorporates the following calculation equations for left ventricular measurements:
Pombo method, Teichholz method, Gibson method (measurements in B-mode or M-mode), Single plane ellipse method, Bi-plane ellipse method, Bullet method, Modified Simpson method, and Simpson method (measurements in B-mode)
[Remark]
The LV Function report calculates and displays measurements in Pombo method, Teichholz method, and Gibson method.

Pombo methods, Teichholz method, and Gibson method

When using the Pombo, Teichholz, or Gibson method to take left ventricular measurements, you can select from the following: M. POMBO, M. TEICH, and M. GIBSON for measurements in M mode; B.POMBO, B. TEICH, and B. GIBSON for measurements in B mode; and M (Wall) POMBO, M (Wall) TEICH, M (Wall) GIBSON, B (Wall) POMBO, B (Wall) TEICH, and B (Wall) GIBSON for measurements that include wall thickness evaluation.

The calculation equations and measured section for each method are as follows:

Pombo method	EDV(End Diastolic Volume)=$(LVIDd)^3$
	ESV(End Systolic Volume)=$(LVIDs)^3$
Teichholz method	EDV=$\{7.0\times(LVIDd)^3\} / (2.4+LVIDd)$
	ESV=$\{7.0\times(LVIDs)^3\} / (2.4+LVIDs)$
Gibson method	EDV=$(\pi/6)\times(LVIDd)^2\times(0.98\times LVIDd+5.90)$
	ESV=$(\pi/6)\times(LVIDs)^2\times(1.14\times LVIDs+4.18)$

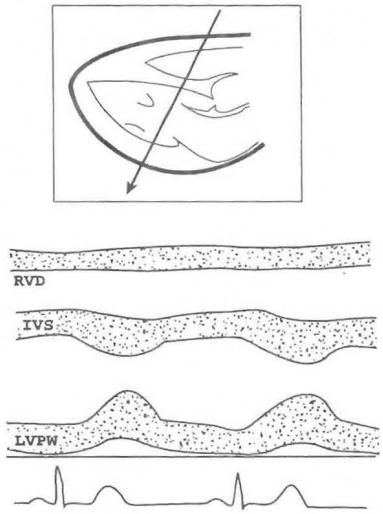
<Measurement method>

All three measurement methods use the M-mode or B-mode to measure the LVIDd (left ventricular internal diameter [diastole]) and the LVIDs (left ventricular internal diameter [systole]) to calculate the left ventricular volume.

For M (Wall) POMBO, M (Wall) TEICH, and M (Wall) GIBSON, measure the RVDd (right ventricular diameter [diastole]), the RVDs (right ventricular diameter[systole]), IVSd (inter ventricular septal thickness [diastole]), the IVSs (inter ventricular septal thickness [systole]), the LVPWd (left ventricular posterior wall thickness [diastole]), and the LVPWs (left ventricular posterior wall thickness [systole]) at the same time.

(You can delete items that you do not wish to measure. Refer to P14-14.)

<Measurement part>

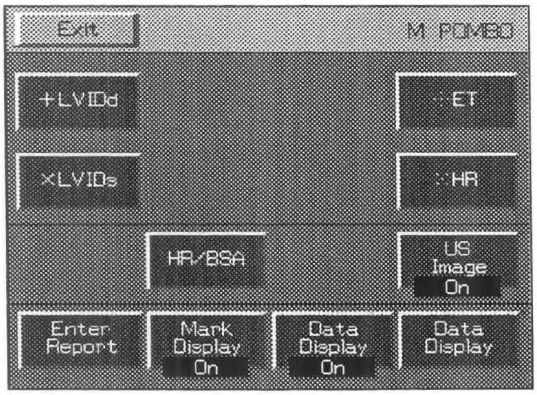


<Touch panel menu>

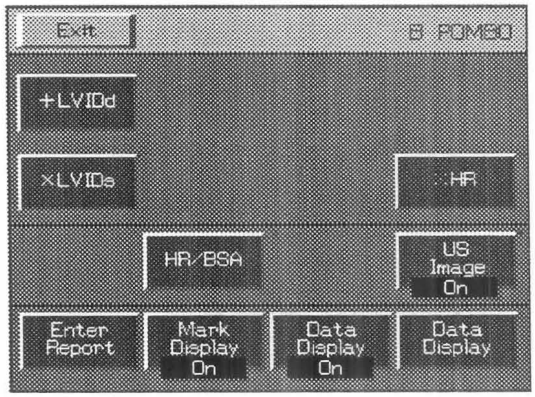
When you select a measurement, the corresponding touch panel menu appears, as shown below.

(POMBO is sometimes displayed instead of TEICH and GIBSON, depending upon the selected name.)

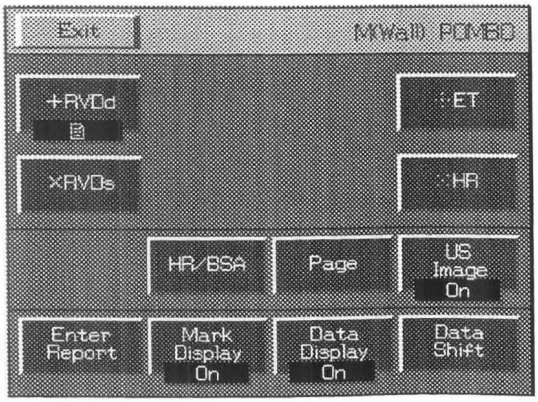
M.POMBO、M. TEICH、M. GIBSON



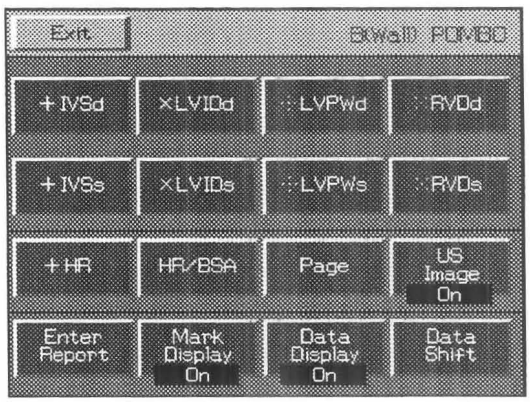
B.POMBO、B. TEICH、B. GIBSON



M(Wall) POMBO、M(Wall)TEICH、M(Wall) GIBSON



B(Wall) POMBO、B(Wall)TEICH、B(Wall) GIBSON



<Measurement procedure>

For M. POMBO, M. TEICH, and M. GIBSON

[Remark]

The operation method is the same for M. POMBO, M. TEICH, and M. GIBSON.

You can select each item by using the touch panel menu, caliper mark switch or the **SET** switch.

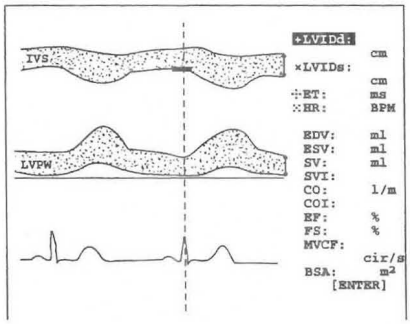
The operation method is explained using M. POMBO as an example.

① Select **M POMBO** .

② Move the displayed "+" mark to the end-diastolic point, and measure **LVIDd** (using the same procedure as that for M. Length).

→ The system calculates LVIDd and EDV.

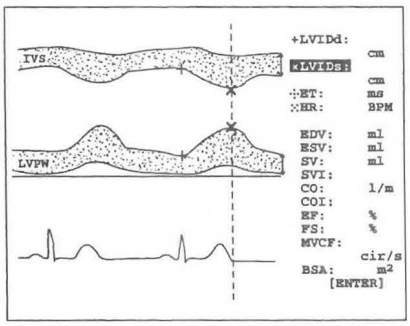
→ The measurement position for the left ventricular internal diameter is the R-wave position on the ECG.



③ Select ×**LVIDs**.

→ Move the displayed "x" mark to the end-systolic point, and measure **LVIDs** in the same way as ②.

→ After LVIDs is measured, the system calculates ESV, SV, EF, and FS.



④ If you wish to measure ET, select ∴ET, then perform measurement (using the same procedure as that for M. Time).

⑤ If ECG is not displayed, select ∴HR from the touch panel menu, then measure the heart rate (using the same procedure as that for Heart Rate).

The subsequent procedure is the same as steps ④ to ⑧ of 14-4 "Basic Procedure for Cardiac Function Measurement" (P.14-29 and 30).

(Measurement tools)

LVIDd,LVIDs	:	Same procedure as that for M. Length
ET	:	Same procedure as that for M. Time
HR	:	Same procedure as that for Heart Rate

<Example of measurement result display for M. POMBO, M. TEICH, and M. GIBSON>

+LVIDd: ← Left ventricular internal diameter (diastole)
cm
xLVIDs: ← Left ventricular internal diameter (systole)
cm
∻ET: ms ← Ejection time
∵HR: BPM ← Heart rate
EDV: ml ← Left ventricular end diastolic volume
ESV: ml ← Left ventricular end systolic volume
SV: ml ← Stroke volume
SVI: ← SV Index (SV/BSA)
CO: ← Cardiac output
1/m
COI: ← CO Index (CO/BSA)
EF : % ← Ejection fraction
FS : % ← Fractional shortening
MVCF: ← Mean velocity of circumferential
cir/s fiber shortening
BSA: m² ← Body surface area
[ENTER]

The layout for a horizontal display is as follows:

+LVIDd:	cm		
xLVIDs:	cm		
∻ET:	ms		
∵HR:	BPM	BSA:	m²
EDV:	ml	ESV:	ml
SV :	ml	SVI:	
CO :	1/m	COI:	
EF :	%		
FS :	%	MVCF:	cir/s
			[ENTER]

For B POMBO, BTEICH, and B GIBSON

[Remark]

The operation method is the same for B. POMBO, B. TEICH, and B. GIBSON.

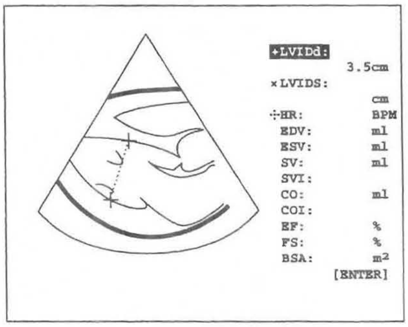
The operation method is explained using B. POMBO as an example.

[Remark]

If Caliper Auto is set to Off, use the cine memory or 2B.

① Display an end-diastolic LV long axis image, then select **M POMBO**.

② Measure **LVIDd** using the displayed "+" mark (using the same procedure as that for DIST.).



③ Display an end-systolic image, then select **×LVIDs**.

→ Measure LVIDs in the same way as ②, using the displayed "x" mark.

→ The system calculates ESV,SV,ET and FS.

The subsequent procedure is the same as steps ④ to ⑧ of 14-4 "Basic Procedure for Cardiac Function Measurement" (P.14-29 and 30).

(Measurement tools)

LVIDd,LVIDs : Same procedure as that for DIST.

HR : Same procedure as that for Heart Rate

<Example of measurement result display for B. POMBO, B. TEICH, and B. GIBSON>

```
+LVIDd:          ← Left ventricular internal diameter (diastole)
      cm
xLVIDs:          ← Left ventricular internal diameter (systole)
      cm
-+-ET:    ms     ← Ejection time
-:-HR:    BPM    ← Heart rate

 EDV:     ml     ← Left ventricular end diastolic volume
 ESV:     ml     ← Left ventricular end systolic volume
 SV:      ml     ← Stroke volume
 SVI:            ← SV Index (SV/BSA)
 CO:             ← Cardiac output
     l/m
 COI:            ← CO Index (CO/BSA)
 EF :     %      ← Ejection fraction
 FS :     %      ← Fractional shortening
 [ENTER]
```

The layout for a horizontal display is as follows:

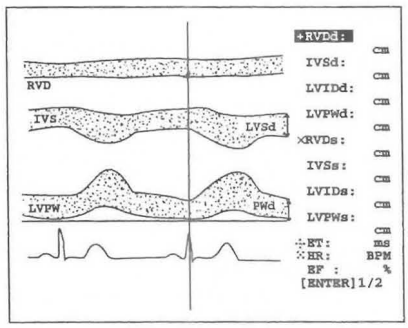
```
+LVIDd:   cm
xLVIDs:   cm
-+-ET:    ms
-:-HR:    BPM   BSA:    m²

EDV:      ml    ESV:    ml
SV :      ml    SVI:
CO :      l/m   COI:
EF :      %
FS :      %
                        [ENTER]
```

For M (Wall) POMBO, M (Wall) TEICH, and M (Wall) GIBSON

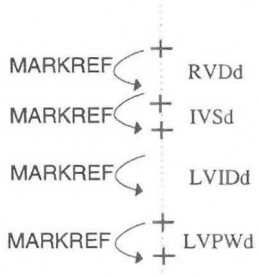
[Remark]
The operation method is the same for M (Wall) POMBO, M (Wall) TEICH, and M (Wall) GIBSON.
The operation method is explained using M (Wall) POMBO as an example.

① Select **M(wall) POMBO** .

② Move the displayed "+" mark to the **RVDd** starting position.
→ The measurement position for the left ventricular internal diameter is the R-wave position on the ECG.



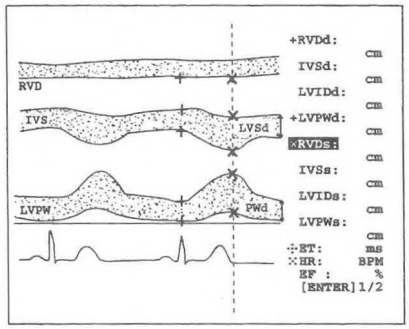
③ Press the **MARK REF** switch, then separate the "+" mark and move it to the IVSd starting position. Similarly, move the mark to the LVIDd starting position , the LVPWd starting position and the LVPWd end position (using the same procedure as that for M. Length).
→ The system calculates EDV. (The EDV value is on the second page. To check the EDV value, press **Page** and look at the second page.)



④ Select ×RVDs.

→ Move the displayed "x" mark to the end-systolic point, then measure RVDs, IVSs, LVIDs and LVPWs in the same way as steps ② and ③.

→ The system calculates ESV,SV,ET and FS.



⑤ If you wish to measure ET, select ⁘ ET, then perform measurement (using the same procedure as that for M. Time).

The subsequent procedure is the same as steps ④ to ⑧ of 14-4 "Basic Procedure for Cardiac Function Measurement" (P.14-29 and 30).

(Measurement tools)

IVSd, IVSs, LVIDd, LVIDs, LVPWd, LVPWs : Same procedure as that for M. Length

ET : Same procedure as that for M. Time

HR : Same procedure as that for Heart Rate

<Example of measurement result display for M(Wall). POMBO, M(Wall). TEICH, and M(Wall). GIBSON>

```
+RVDd:          ← Right ventricular diameter(diastole)
     cm
 IVSd:          ← Inter ventricular septal thickness (diastole)
     cm
 LVIDd:         ← Left ventricular internal diameter (diastole)
     cm
 LVPWd:         ← Left ventricular posterior wall thickness (diastole)
     cm
×RVDs:          ← Right ventricular diameter(systole)
     cm
 IVSs:          ← Inter ventricular septal thickness (systole)
     cm
 LVIDs:         ← Left ventricular internal diameter (systole)
     cm
 LVPWs:         ← Left ventricular posterior wall thickness (systole)
     cm
⁘ET:  ms        ← Ejection time
⁙HR: BPM        ← Heart rate
 LVM : g        ← LV mass
[ENTER]1/2      ← Press the SET switch to transfer the results to the report and to go to page 2.
```

[Remark]

LVM and LVM/BSA are computed when you measure LVIDd, IVSd and LVPWd. However, LVM and LVM/BSA are not displayed if they are not specified as display items in a preset.

Devereux equation

$LVM=1.04\times\{(IVSD+LVIDd+LVPWd)^3-LVIDd^3\}-13.6$

Page

```
EDV:      ml    ← Left ventricular end diastolic volume
ESV:      ml    ←Left ventricular end systolic volume
SV:       ml    ←Stroke volume
SVI:            ← SV Index(SV/BSA)
CO:             ← Cardiac output
        1/m
COI :           ← CO Index(CO/BSA)
EF  :     %     ← Ejection fraction
FS  :     %     ← Fractional shortening
MVCF:
     Cir/s      ← Mean velocity of circumference fiber shortening
IVS/LVPW:       ← IVS/LVPW Ratio

%IVSTF:         ← Inter ventricular posterior wall thickness fraction
          %
%LVPWTF:
          %     ← Left Ventricular posterior wall thickness fraction
BSA:      m²    ←Body surface area
LVM/BSA:        ← LVM/BSA Ratio
        2/2
```

The layout for a horizontal display is as follows:

```
+RVDd:   cm  ×RVDs :   cm
IVSd:    cm   IVSs :   cm
LVIDd:   cm   LVIDs:   cm
LVPWd:   cm   LVPWs:   cm
⁘ET:     ms
⁙HR:     BPM  BSA:     m²
LVM:     g    LVM/BSA:
EDV:     ml   ESV :    ml
SV :     ml   SVI :
CO :     l/m  COI :
EF :     %    FS  :    %
IVS/LVPW:     MVCF:    cir/s
%IVSTF:  %    %LVPWTF:  %
                        [ENTER]
```

For B (Wall) POMBO, B (Wall) TEICH, and B (Wall) GIBSON

[Remark]

The operation method is the same for B (Wall) POMBO, B (Wall) TEICH, and B (Wall) GIBSON.

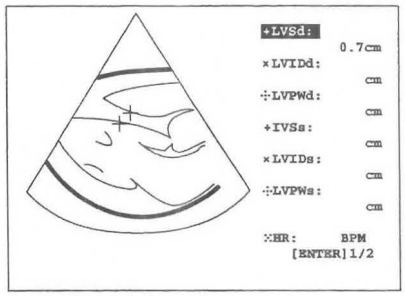
The operation method is explained using B (Wall) POMBO as an example.

[Remark]

If Caliper Auto is set to Off, use the cine memory or 2B.

① Display an end-diastolic LV long axis image, then select **B(Wall) POMBO**.

② Measure **IVSd** using the displayed "+" mark.
(For steps ③ to ⑦, carry out the same procedure as that for DIST.)



③ Select **×LVIDd.**
→ Measure LVIDd using the displayed "×" mark.

④ Select **⁘ LVPWd.**
→ Measure LVPWd using the displayed "⁘" mark.

⑤ Select **⁙ RVDd.**
→Measure RVDd using the displayed "⁙" mark.

⑥ Display an end-systolic image, then select **+IVSs** (when making this selection with the [+] switch, press the switch twice).
→ Measure IVSs using the "+" mark.

⑦ Select **×LVIDs** (when making this selection with the [×] switch, press the switch twice).
→ Measure LVIDs using the "×" mark.

⑧ Select **⁘ LVPWs** (when making this selection with the ⁘ switch, press the switch twice).
→ Measure LVPWs using the "⁘" mark.

⑨ Select **⁙ RVDsを選択** (when making this selection with the ⁙ switch, press the switch twice).
→Measure RVDs using the "⁙" mark.

The subsequent procedure is the same as steps ④ to ⑧ of 14-4 "Basic Procedure for Cardiac Function Measurement" (P.14-29 and 30).

(Measurement tools)

IVSd, IVSs,LVPWd, LVPWs : Same procedure as that for DIST.

<Example of measurement result display for B(Wall). POMBO, B(Wall). TEICH, and B(Wall). GIBSON>

```
+IVSd:          ← Inter ventricular septal thickness (diastole)
      cm
 LVIDd:         ← Left ventricular internal diameter (diastole)
      cm
 LVPWd:         ← Left ventricular posterior wall thickness (diastole)
      cm
:·:RVDd:        ← Right ventricular diameter(diastole)
      cm
xIVSs:          ← Inter ventricular septal thickness (systole)
      cm
 LVIDs:         ← Left ventricular internal diameter (systole)
      cm
 LVPWs:         ← Left ventricular posterior wall thickness (systole)
      cm
:·:RVDs:        ← Right ventricular diameter(systole)
      cm
·+·ET:  ms      ← Ejection time
:·:HR: BPM      ← Heart rate
 LVM : g        ← LV mass
[ENTER]1/2      ← Press the SET switch to transfer the results to the report and to go to page 2.
```

Page

```
EDV:      ml    ← Left ventricular end diastolic volume
ESV:      ml    ←Left ventricular end systolic volume
SV:       ml    ←Stroke volume
SVI:            ← SV Index(SV/BSA)
CO:             ← Cardiac output
        1/m
COI :           ← CO Index(CO/BSA)
EF  :     %     ← Ejection fraction
FS  :     %     ← Fractional shortening
IVS/LVPW:       ← IVS/LVPW Ratio

%IVSTF:         ← Inter ventricular posterior wall thickness fraction
          %
%LVPWTF:
          %     ← Left Ventricular posterior wall thickness fraction
BSA:      m²    ←Body surface area
LVM/BSA:        ← LVM/BSA Ratio
        2/2
```

[Remark]

LVM and LVM/BSA are computed when you measure LVIDd, IVSd and LVPWd. However, LVM and LVM/BSA are not displayed if they are not specified as display items in a preset.

Devereux equation

$LVM=1.04\times\{(IVSD+LVIDd+LVPWd)^3-LVIDd^3\}-13.6$

The layout for a horizontal display is as follows:

```
+IVSd:      cm  +IVSs:      cm
×LVIDd:     cm  × LVIDs:    cm
·+·LVPWd:   cm  ·+·LVPWs:   cm
:·:RVDd:    cm  :·:RVDs:    m²
+HR:        BPM   BSA:      m²
 LVM:       g   LVM/BSA:    ml
 EDV:       ml    ESV:      ml
 SV :       ml    SVI:
 CO :       l/m  COI:
 EF :       %     FS :      %
 IVS/LVPW:
 %IVSTF:    %     %LVPWTF:      %
                        [ENTER]
```

S.Plane Ellipse Method

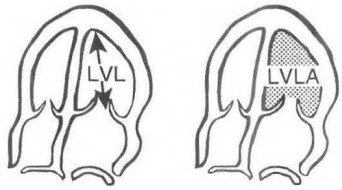
When the single plane ellipse method is used to take left ventricular measurements, the measurements are taken in **B mode**. The calculation equations and measurement part are as follows:

S. ·Plane Ellipse method EDV={8.0×(LVLAd)2} / (3 π ×LVLd)
ESV={8.0×(LVLAs)2} / (3 π ×LVLs)

<Measurement method>

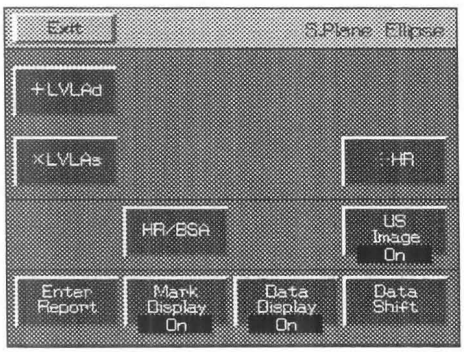
Trace the endocardium of the left ventricle to calculate the left ventricular long-axis area (LVLA). The system calculates the left ventricular area using the distance between the heart apex and the mitral valve as the left ventricular long-axis length (LVL).

<Measurement part>



4 Chamber View or 2 Chamber View

<Touch panel menu>



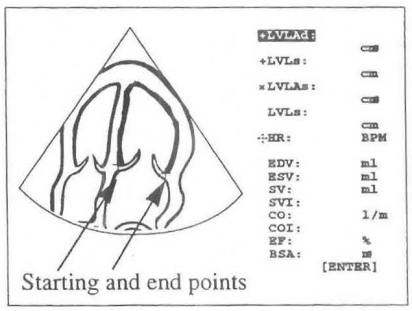
[Remark]
You can select an item using the touch panel menu, caliper mark switch or **SET** switch.

<Measurement procedure>

[Remark] If Caliper Auto is set to Off, use the cine memory or 2B.

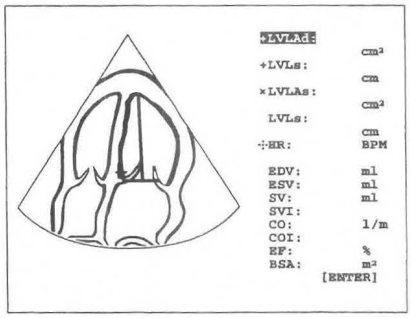
① Display an end-diastolic image, then select **S. Plane Ellipse**.
→ Trace the intima of the left ventricle using the "+" mark.

[Remark]
Perform the trace using the same procedure as that for Area Trace.
Set the starting and end points of the trace to the positions indicated by the arrows.



② Press the **MARK REF** switch.
→ When the trace starts, the long axis line (LVLd) appears, and LVLAd, LVLd and EDV are computed.

[Remark] You can also move the long axis line using the trackball.



③ Display an end-systolic image, then select **×LVLAs**.
→ Perform the trace with the "×" mark, using the same procedure as that for LVLAd.

④ If ECG is not displayed, select ∴HR using the touch panel menu in the M or D mode, then measure the heart rate (using the same procedure as that for Heart Rate).

The subsequent procedure is the same as steps ④ to ⑧ of 14-4 "Basic Procedure for Cardiac Function Measurement" (P.14-29 and 30).

(Measurement tools)

LVLAd, LVLAs : Same procedure as that for Area-T
LVLs,LVLs : Automatic display (The position can be moved using the trackball.)
HR : Same procedure as that for Heart Rate

<Example of measurement result display for S.Plane Ellipse>

```
+LVLAd:        ← Left ventricular long-axis area(diastolic)
      cm²
 LVLd:         ← Left ventricular long-axis diameter(diastolic)
      cm
xLVLAs:        ← Left ventricular long-axis area(systolic)
      cm²
 LVLs:         ← Left ventricular long-axis diameter(systolic)
      cm
∴HR:  BPM      ← Heart Rate

 EDV:  ml      ← Left ventricular end diastolic volume
 ESV:  ml      ← Left ventricular end systolic volume
 SV:   ml      ← Stroke Volume
 SVI:          ← SV Index (SV/BSA)
 CO:           ← Cardiac Output
       l/m
 COI:          ← CO Index (CO/BSA)
 EF:   %       ← Ejection fraction
  BSA: m²      ← Body surface area
[ENTER]
```

The layout for a horizontal display is as follows:

```
+IVLAd:   cm²   IVLd:   cm
+LVLAs:   cm    LVLs:   cm
∴HR:      BPM   BSA:    m²

 EDV:     ml    ESV:    ml
 SV :     ml    SVI
 CO :     l/m   COI:
 EF :     %               [ENTER]
```

Biplane Ellipse method

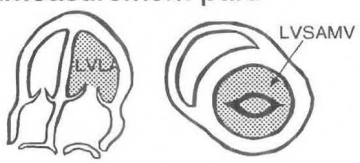
When the biplane ellipse method is used to take left ventricular measurements, the measurements are taken in **B mode**. The calculation equations and measurement part are as follows:

Biplane - ELLIPSE method EDV=(8.0×LVLAd×LVSAMVd) / (3 π ×LVSLMVd)
ESV=(8.0×LVLAs×LVSAMVs) / (3 π ×LVSLMVs)

<Measurement method>

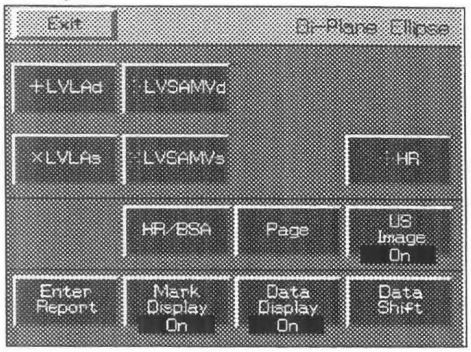
Trace the endocardium of the left ventricle to calculate the left ventricular long-axis area (LVLA). From the short-axis image at the mitral valve level, trace the left ventricular short-axis area at mitral valve. The system calculates the left ventricular short-axis length at mitral valve (LVSLMV) and the left ventricular volume.

<Measurement part>



4 Chamber View or
2 Chamber View

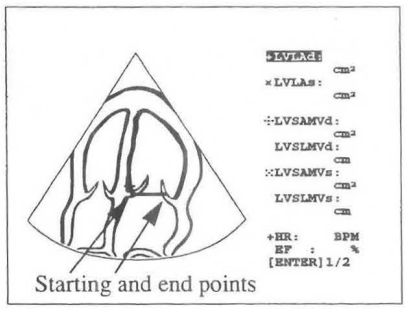
<Touch panel menu>



[Remark]
You can select an item using the touch panel menu, caliper mark switch or **SET** switch.

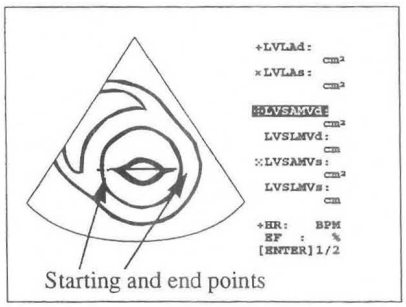
<Measurement procedure>

① Display an end-diastolic image, then select **Bi-Plane Ellipse**.
→ Trace the intima of the left ventricle using the "+" mark.
(Set the starting and end points of the trace to the positions indicated by the arrows.)
Perform the trace using the same procedure as that for S. Plane Ellipse.



② Display an end-systolic image, then select **×LVLAs**.
→ Perform the trace with the "×" mark, using the same procedure as that for LVLAd.

③ Display an end-diastolic image of the mitral valve level left ventricular short axis, then select **∴ LVSAMVd**.
→ Using the "∴" mark, trace LVSAMVd using the same procedure as that of ①. When the trace closes, the short axis line (LVSLMV) appears on the screen.
→ The system calculates LVSAMVd and LVSLMVd.



④ Display an end-systolic image, then select **∴ LVSAMVs**.
→ Perform the trace with the "∴" mark, using the same procedure as that for LVSAMVd.
→ The system calculates LSAMVs, LVSLMVs, ESV, SV, CO and EF.

⑤ If ECG is not displayed, select **+HR** from the touch panel menu in the M or D mode (to perform this selection with the [+] switch, press the mark twice), then measure the heart rate.
(Same procedure as that for Heart Rate)

The subsequent procedure is the same as steps ④ to ⑧ of 14-4 "Basic Procedure for Cardiac Function Measurement" (P.14-29 and 30).

(Measurement tools)

LVLAd, LVLAs,LVSAMVd, LVSAMVs : Same procedure as that for Area-T
LVSLMVs,LVSLMVs : Automatic display (The position can be moved using the trackball.)
HR : Same procedure as that for Heart Rate

<Example of measurement result display for Biplane Ellipse>

+LVLAd:	cm²	← Left Ventricular long-axis area(diastole)
xLVLAs:	cm²	← Left Ventricular long-axis area(systole)
·:·LVSAMVd:	cm²	← Left Ventricular short-axis area at mitral valve(diastole)
LVSLMVd:	cm	← Left Ventricular short-axis length at mitral valve(diastole)
·:·LVSAMVs:	cm²	← Left Ventricular short-axis area at mitral valve(systole)
LVSLMVs:	cm	← Left Ventricular short-axis length at mitral valve(systole)
+HR:	BPM	← Heart Rate
[ENTER] 1/2		← Press the SET switch to transfer the results to the report and to go to page2.
↕ Page		
EDV:	ml	← Left Ventricular end diastole volume
ESV:	ml	← Left Ventricular end sysstole volume
SV:	ml	← Stroke Volume
SVI:		← SV Index (SV/BSA)
CO:	l/m	← Cardiac Output
COI:		← CO Index (CO/BSA)
EF:	%	← Ejection Fraction
BSA:	m²	← Body surface area
	2/2	

The layout for a horizontal display is as follows:

+LVLAd:	cm²		
xLVLAs:	cm²		
·:·LVSAMVd:	cm²		
LVSLMVd:	cm		
·:·LVSAMVs:	cm²		
LVSLMVs:	cm		
+HR:	BPM	BSA:	m²
EDV:	ml	ESV:	ml
SV :	ml	SVI:	
CO :	l/m	COI:	
EF :	%		[ENTER]

Bullet method

When the bullet method is used to take left ventricular measurements, the measurements are taken in B mode. The calculation equations and measurement part are as follows:

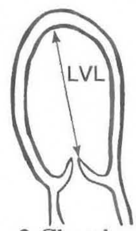
Bullet method EDV=(5×LVSAPMd×LVLd) / 6
ESV=(5×LVSAPMs×LVLs) / 6

<Measurement method>

From the short-axis image at the papillary muscle level, trace the left ventricular short-axis area papillary muscle (LVSAPM). Next, from the 4-chamber view or the 2-chamber view, measure the left ventricular length (LVL) from the cardiac apex to the midpoint of the mitral valve to calculate the left ventricular volume.

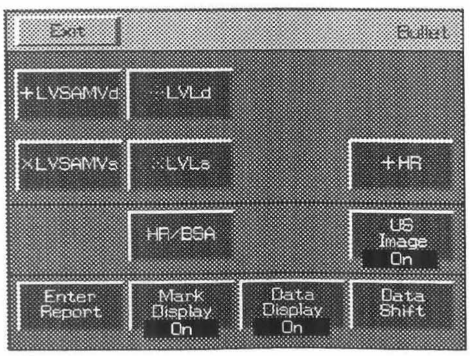
<Measurement part>

Papillary muscle level



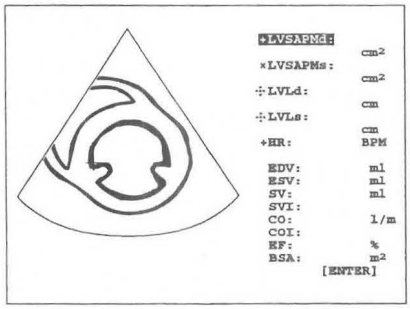
2 Chamber View (or 4 Chamber View)

<Touch panel menu>



[Remark]
You can select an item using the touch panel menu, caliper mark switch or SET switch.

<Measurement procedure>



① Display an end-diastolic image of the papillary muscle level short axis image, then select **Bullet**.

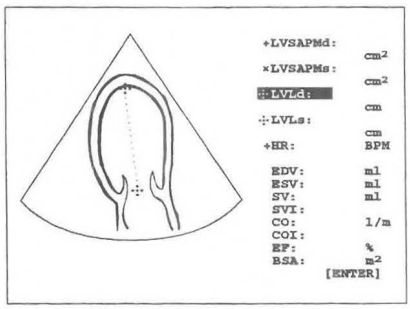
→ Trace the intima of the left ventricle (LVSAPMd) using the "+" mark.

[Remark]

Perform the trace using the same procedure as that for Area Trace.

② Display an end-systolic image, then select **×LVSAPMs**.

→ Perform the trace with the "×" mark, using the same procedure as that for LVSAPMd.



③ Display an end-diastolic image of the apex cordis of the left ventricle, then select **LVLd**.

→ Using the "⁘" mark, measure the long diameter (LVLd) between the mid-point of the mitral valve and the apex cordis (using the same procedure as that for DIST.).

④ Display an end-systolic image, then select **LVLs**.

→ Measure LVLs using the "⁙" mark in the same way as for LVLDd.

⑤ If ECG is not displayed, select **+HR** from the touch panel menu in the M or D mode (to perform this selection with the [+] switch, press the mark twice), then measure the heart rate.

(Same procedure as that for Heart Rate)

The subsequent procedure is the same as steps ④ to ⑧ of 14-4 "Basic Procedure for Cardiac Function Measurement" (P.14-29 and 30).

(Measurement tools)

LVSAMVd, LVSAMVs	:	Same procedure as that for Area-T
LVLs,LVLs	:	Same procedure as that for DIST.
HR	:	Same procedure as that for Heart Rate

<Example of measurement result display for Bullet>

```
+LVSAPMd:          ← Left ventricular short-axis area at papillary muscle (diastole)
        cm
×LVSLPMs:          ← Left ventricular short-axis area at papillary muscle (systole)
        cm
LVLd:              ← Left ventricular short-axis length(diastole)
        cm²
LVLs:              ← Left ventricular short-axis length (systole)
        cm

+HR:      BPM      ← Heart Rate

 EDV:     ml       ← Left ventricular end diastolic volume
 ESV:     ml       ← Left ventricular end systolic volume
 SV:      ml       ← Stroke Volume
 SVI:              ← SV Index (SV/BSA)
 CO:               ← Cardiac Output
          l/m
 COI:              ← CO Index (CO/BSA)
 EF:      %        ← Ejection Fraction

 BSA:     m²       ← Body surface area
   [ENTER]
```

The layout for a horizontal display is as follows:

```
+LVSAPMd:   cm
×LVSAPMs:   cm
LVLd:       cm
LVLs:       cm
+HR:        BPM     BSA:        m²

 EDV:       ml      ESV:        ml
 SV :       ml      SVI
 CO :       l/m     COI:
 EF :       %                   [ENTER]
```

MOD Simpson method

When the modified Simpson method is used to take left ventricular measurements, the measurements are taken in **B mode**. The calculation equations and measurement part are as follows:

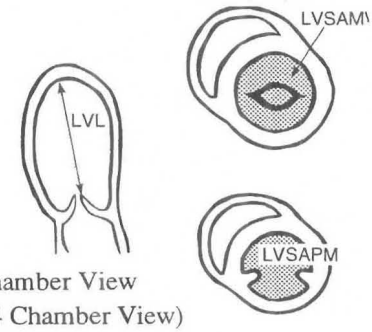
Modified Simpson method

$$EDV=(LVLd / 9)\times\{4\times LVSAMVd + 2\times LVSAPMd + (LVSAMVd\times LVSAPMd)^{1/2}\}$$
$$ESV=(LVLs / 9)\times\{4\times LVSAMVs + 2\times LVSAPMs + (LVSAMVs\times LVSAPMs)^{1/2}\}$$

<Measurement method>

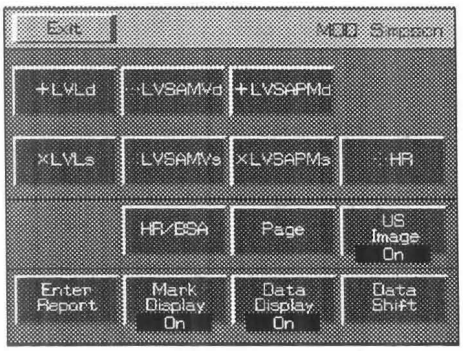
From the 4-chamber view or the 2-chamber view, measure the left ventricular length from the cardiac apex to the midpoint of the mitral valve to determine the left ventricular long-axis length (LVL).
Then from the short-axis image, trace the left ventricular short-axis area at mitral valve (LVSAMV) and the left ventricular short-axis area at papillary muscle (LVSAPM) to calculate the left ventricle volume.

<Measurement part>



2 Chamber View
(or 4 Chamber View)

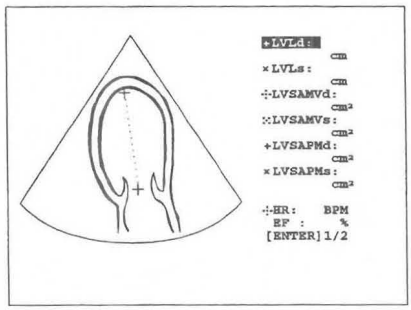
<Touch panel menu>



[Remark]
You can select an item using the touch panel menu, caliper mark switch or **SET** switch.

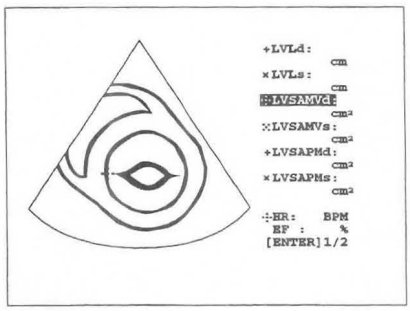
<Measurement procedure>

① Display an end-diastolic image of a 4-chamber view or a 2-chamber view, then select **MOD Simpson**.
→ Using the "+" mark, measure the long diameter (LVLd) between the mid-point of the mitral valve and the apex cordis (using the same procedure as that for DIST.).

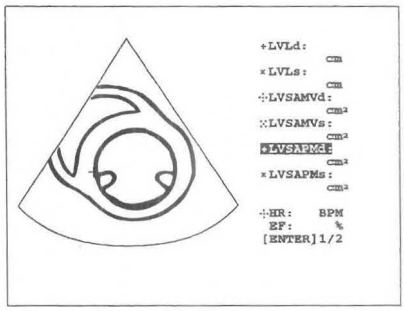


② Display an end-systolic image, then select **×LVLs**.
→Measure LVLs using the "×" mark in the same way as for LVLd.

③ Display an end-diastolic image of the mitral valve level left ventricular short axis, then select **LVSAMVd**.
→ Using the "" mark, trace the intima of the left ventricle (LVSAMVd) (using the same procedure as that for Area Trace). (Same procedure as that for AreaTrace)



④ Display an end-systolic image, then select ⁖ **LVSAMVs**.
→ Perform the trace with the " ⁖ " mark, using the same procedure as that for LVSAPMd.



⑤ Display an end-diastolic image of a papillary muscle level short axis image, then select **+LVSAPMd** (to perform this selection with the [+] switch, press the mark twice).
→ Trace the intima of the left ventricle (LVSAPMd) using the "+" mark. (Same procedure as that for Area Trace)

⑥ Display an end-systolic image, then select **×LVAPMs** (to perform this selection with the [×] switch, press the mark twice).
→ Perform the trace with the "×" mark, using the same procedure as that for LVSAPMd.
→ The system calculates EDV ESV, SV, CO and EF.
In a horizontal display, the values are displayed on the same page. In a vertical display, the values are displayed next page.

⑦ If ECG is not displayed, select **⁜ HR** from the touch panel menu in the M or D mode (to perform this selection with the ⁜ switch, press the mark twice), then measure the heart rate.
(Same procedure as that for Heart Rate)

The subsequent procedure is the same as steps ④ to ⑧ of 14-4 "Basic Procedure for Cardiac Function Measurement" (P.14-29 and 30).

(Measurement tools)
LVSAMVd, LVSAMVs、LVSAPMd, LVSAPMs : Same procedure as that for Area-T
LVLs,LVLs : Same procedure as that for DIST.
HR : Same procedure as that for Heart Rate

<Example of measurement result display for MOD Simpson>

```
+LVLd:          ← Left ventricular long-axis length (diastole)
      cm
×LVLs:          ← Left ventricular long-axis length (systole)
      cm
⁜LVSAMVd:       ← Left ventricular short-axis area at mitral valve (diastole)
      cm²
⁖LVSLMVs:       ← Left ventricular short-axis area at mitral valve (systole)
     cm²
+LVSAPMd:       ← Left ventricular short-axis area at papillary muscle (diastole)
      cm²
×LVSAPMs:       ← Left ventricular short-axis area at papillary muscle (systole)
      cm²
⁜HR:     BPM    ← Heart Rate
  [ENTER]1/2 ← Press the SET switch to transfer the results to
               the report and to go to page2.
```

The layout for a horizontal display is as follows:

```
+LVLd:     cm
×LVLs:     cm
⁜LVSAMVd:  cm²
⁖LVSAMVs:  cm²
+LVSAPMs:  cm²
×LVSLPMs:  cm²
+HR:       BPM     BSA:      m²

 EDV:      ml      ESV:      ml
 SV :      ml      SVI:
```

```
      Page
EDV:    ml   ← Left ventricular end diastole volume
ESV:    ml   ← Left ventricular end systolic volume
SV:     ml   ← Stroke Volume
SVI:         ← SV Index (SV/BSA)
CO:          ← Cardiac Output
        l/m
COI:         ← CO Index (CO/BSA)
EF:     %    ← Ejection Fraction

BSA:    m²   ← Body surface area
        2/2
```

Simpson (Modified) Method

When the Simpson method is used for left ventricular measurements, the measurements are taken in **B mode**. The calculation equations and the measurement part are as follows:

$$EDV = (\pi/4) \sum_{i=1}^{n} (ai \times bi) \times Ld/n$$

$$ESV = (\pi/4) \sum_{i=1}^{n} (ai \times bi) \times Ls/n$$

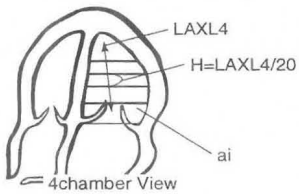
★1

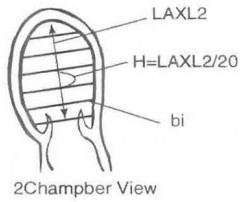
H : Slice width = L/20
L = LAX (Ld:DiastoleLAX , Ls:Systole LAX)
i : 1,2,3,....., 20
n : Number of slices (n is fixed at 20)

<Measurement method>

Specify the LV area by tracing the endocardium of the left ventricle in both the 4-chamber view and the 2-chamber view.
Once the LV area is set, LAXL4 or LAXL2 (the longest length within the trace) is displayed automatically. If the position is incorrect, specify and set the area again.
After LAXL4 or LAXL2 is set, the ai or bi lines (lines that are perpendicular to long-axis length line and inside the traced area) are displayed automatically.
When the traces for the 4-chamber view and the 2-chamber view produce long axes of different lengths, the longer of the two is used to calculate the volume.

<Measurement part>





[Remark]
If you measure either the 4-chamber view or 2-chamber view, EDV and ESV are calculated by means of the following formulas.

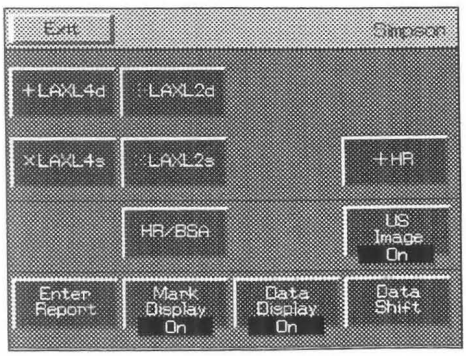
$$EDV = (\pi/4) \sum_{i=1}^{n} (ai)^2 \times Ld/n \quad \text{(or bi)}$$

$$ESV = (\pi/4) \sum_{i=1}^{n} (ai)^2 \times Ls/n \quad \text{(or bi)}$$

★2

If you measure both views, EDV and ESV are calculated by means of the formulas of ★1 .

<Touch panel menu>

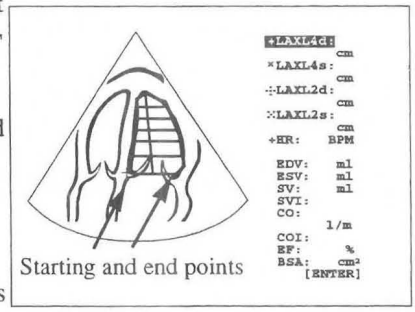


[Remark]
You can select an item using the touch panel menu, caliper mark switch or **SET** switch.

<Measurement procedure>

[Remark] If Caliper Auto is set to Off, use the cine memory or 2B.

① Display an end-diastolic image of a 4-chamber view, select **Simpson**, then trace the intima of the left ventricle using the "+" mark. (Same procedure as that for Area Trace)
(Set the starting and end points of the trace to the positions indicated by the arrows.)

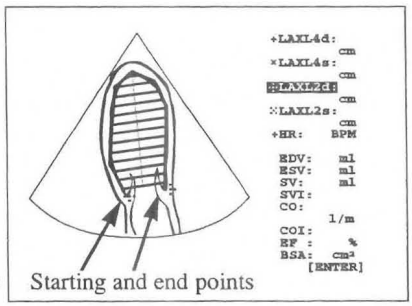


② Press the **MARK REF** switch.
→ The system closes the trace and displays the long-axis line(LAXL4d) and the 20 perpendicular division lines.

③ To correct the long-axis line, roll the trackball. The line moves along the trace line.(The perpendicular lines will be cleared temporarity.)
→ To set LAXL4d, press the **MARK REF** switch again. The perpendicular lines will be displayed.

④ Display an end-systolic image, then select **×LAXL4s**.
→ Perform the trace with the "×" mark, using the same procedure as that for LAXL4d. ESV, SV, CO and EF are calculated.

⑤ Display an end-diastolic image of a 4-chamber view, then select **⁘ LAXL2d**.
→ Move the "⁘" mark to the trace start point on the endocardium of the left ventricle. (Set the starting and end points of the trace to the positions indicated by the arrows.)



⑥ Press the **MARK REF** switch.
→ The system closes the trace and displays the long-axis line (LAXL2d) and the 20 perpendicular division lines.

⑦ To correct the long-axis line, roll the trackball. The line moves along the trace line.(The perpendicular lines will be cleared temporarity.)
→ To set LAXL2d, press the **MARK REF** switch again. The perpendicular lines will be displayed.

⑧ Display an end-systolic image, then select **⁙ LAXL2s**.
→ Perform the trace with the "⁙" mark, using the same procedure as that for LAXL2d. ESV, SV, CO and EF are calculated.

⑨ If ECG is not displayed, select **+HR** from the touch panel menu in the M or D mode (to perform this selection with the [+] switch, press the mark twice), then measure the heart rate.
(Same procedure as that for Heart Rate)

The subsequent procedure is the same as steps ④ to ⑧ of 14-4 "Basic Procedure for Cardiac Function

(Measurement tools)

LAXL4d,LAXL4s,LAXL2d,LAXL2s ： Same procedure as that for Area-T

HR ： Same procedure as that for Heart Rate

<Example of Simpson calculation result display>

```
+LAXL4d:          ← LAX length at 4 chamber view (diastole)
        cm
xLAXL4s:          ← LAX length at 4 chamber view (systole)
        cm
⊹LAXL2d:          ← LAX length at2 chamber view (diastole)
        cm
⁙LAXL2s:          ← LAX length at 2 chamber view (systole)
        cm

+HR:     BPM      ←Heart Rate

 EDV:    ml       ← Left ventricular end diastolic volume
 ESV:    ml       ← Left ventricular end diastolic volume
 SV:     ml       ← Stroke Volume
 SVI:             ← SV Index (SV/BSA)
 CO:              ← Cardiac Output
         l/m
 COI:             ← CO Index (CO/BSA)
 EF:     %        ← Ejection Fraction

 BSA:    m²       ← Body surface area
   [ENTER]
```

The layout for a horizontal display is as follows:

```
+LAXL4d:   cm    +LAXL4s:   cm
⊹LAXL2d:   cm    ⁙LAXL2s:   cm
+HR:       BPM   BSA:       m²

 EDV:      ml    ESV:       ml
 SV :      ml    SVI
 CO :      l/m   COI:
 EF :      %           [ENTER]
```

14-5-2. B-mode measurements

The four B-mode measurements are classified according to the measurement part:

B LAX: Measures items in a left ventricular long-axis image.
B (Wall) LAX: Measures the wall thickness in a left ventricular long-axis image.
B SAX: Measures items in a left ventricular short-axis image.
B APX: Measures items in a left ventricular apex image.

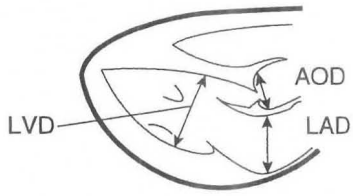
B LAX

Measure the left ventricular diameter, aortic root diameter, and left atrial diameter to calculate the ratio (LA/AO ratio) between the left atrial diameter (systolic) and aortic root diameter (diastolic).

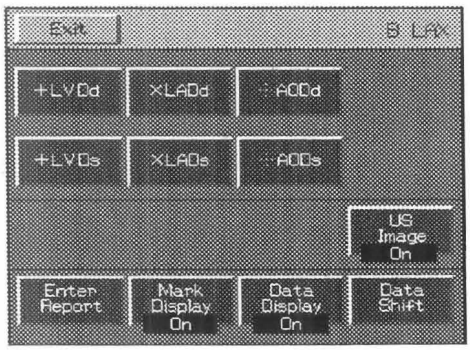
<Measurement method>

For B-LAX measurement, measure items from the left ventricular long-axis image in B-mode. Measure LVDd (left ventricular diameter [diastole]), LVDs (left ventricular diameter [systole]), LADd (left atrial diameter [diastole]), LADs (left atrial diameter [systole], AODd (aortic root diameter [diastole]), and AODs (aortic root diameter [systole]).

<Measurement part>



<Touch panel menu>



[Remark]
You can select an item using the touch panel menu, caliper mark switch or **SET** switch.

<Measurement procedure>

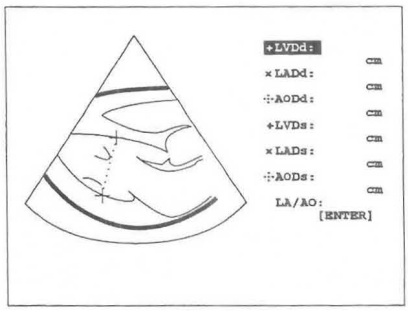
[Remark] If Caliper Auto is set to Off, use the cine memory or 2B.

① Display an end-diastolic LV long axis image, then select **B LAX**.

② Measure **LVDd** using the displayed "+" mark.
(For steps ② to ⑦, carry out the same procedure as that for DIST.)

③ Select **×LADd.**
→Measure LADd using the displayed "×" mark.

④ Select **∴AODd.**
→Measure LADd using the displayed "∴" mark.



⑤ Display an end-systolic image, then select **+LVDs** (to perform this selection with the [+] switch, press the mark twice).
→ Measure LVDs using the displayed "+" mark.

⑥ Select **×LADs** (to perform this selection with the [×] switch, press the mark twice).
→Measure LADs using the displayed "×" mark.
→ The system calculates LA/AO.

⑦ Select **⁘AOD** (to perform this selection with the [×] switch, press the mark twice).
→Measure AODs using the displayed "⁘" mark.

The subsequent procedure is the same as steps ④ to ⑧ of 14-4 "Basic Procedure for Cardiac Function Measurement" (P.14-29 and 30).

(Measurement tools)
LVIDd, LVIDs、LADd, LADs ,AODd,AODs : Same procedure as that for DIST.

<Example of measurement result display for B LAX>

```
+LVDd:        ← Left ventricular diameter (diastole)
      cm
×LADd:        ← Left atrial diameter (diastole)
      cm
⁘AODd:        ← Aortic root diameter (diastole)
      cm
+LVDs:        ← Left ventricular diameter (systole)
      cm
×LADs:        ← Left atrial diameter (systole)
      cm
⁘AODs:        ← Aortic root diameter (systole)
      cm
 LA/AO:       ← LA/AO Ratio

 [ENTER]      ← Press the SET switch to transfer the results to the report.
```

The layout for a horizontal display is as follows:

```
+LVDd:   cm   +LVDs:   cm
×LADd:   cm   ×LADs:   cm
⁘AODd:   cm   ⁘AODs:   cm
 LA/AO:                [ENTER]
```

B (Wall) LAX

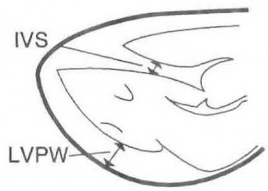
Measure the thicknesses of the inter ventricular septum and left ventricular posterior wall to calculate the following:

IVS/LVPW ratio	IVS / LVPW= IVSd / LVPWd
Inter ventricular septal thickness fraction	%IVSTF = {(IVSs - IVSd) / IVSd}×100
Left ventricular posterior wall thickness fraction	%PWTF= {(LVPWs - LVPWd) / LVPWd}×100

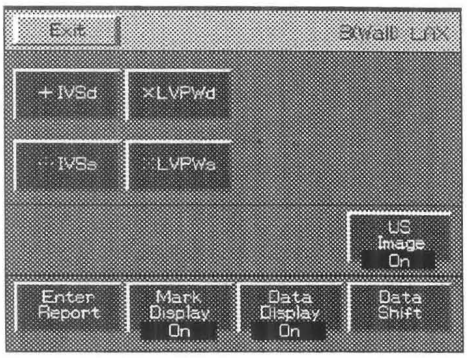
<Measurement method>

For B (Wall) LAX measurements, measure items from the left ventricular long-axis image in B-mode. Measure IVSd (inter ventricular septal thickness [diastole]), IVSs (inter ventricular septal thickness [systole]), LVPWd (left ventricular posterior wall thickness [diastole]), and LVPWs (left ventricular posterior wall thickness [systole]).

<Measurement part>



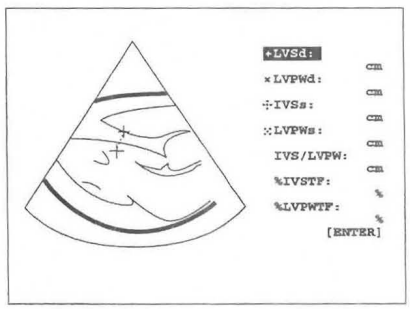
<Touch panel menu>



[Remark]
You can select an item using the touch panel menu, caliper mark switch or **SET** switch.

<Measurement procedure>

[Remark] If Caliper Auto is set to Off, use the cine memory or 2B.



① Display an end-diastolic LV long axis image, then select .**B(Wall) LAX**.

② Measure **IVSd** using the displayed "+" mark.
(For steps ② to ⑤, carry out the same procedure as that for DIST.)

③ Select **×LVPWd.**
→ Measure LVPWd using the displayed "×" mark.

④ Display an end-systolic image, then select **·:· IVSs.**
→ Measure IVSs using the displayed "·:·" mark.

⑤ Select **:: LVPWs.**
→ Measure LVPWs using the displayed "::" mark.
→ The system calculates IVS/LVPW, %IVSTF and %LVPWTF.

The subsequent procedure is the same as steps ④ to ⑧ of 14-4 "Basic Procedure for Cardiac Function Measurement" (P.14-29 and 30).

(Measurement tools)
IVSd, IVSs、LVPWd, LVPWs : Same procedure as that for DIST.

<Example of measurement result display for B LAX>

```
+IVSd:          ← Inter ventricular septal thickness (diastole)
     cm
×LVPWd:         ← Left ventricular posterior wall thickness (diastole)
     cm
·:·IVSs:        ← Inter ventricular septal thickness (systole)
     cm
::LVPWs:        ← Left ventricular posterior wall thickness (systole)
     cm
 IVS/LVPW:      ← IVS/LVPW Ratio
 %IVSTF:        ← Inter ventricular septal thickness fraction
      %
 %LVPWTF:       ← Left ventricular posterior wall thickness fraction
      %
   [ENTER]
```

The layout for a horizontal display is as follows:

```
+IVSd:    cm    ·:·LVSs:    cm
×LVPWd:   cm    ::LVPWs:    cm
 IVS/LVPW:
 %LVSTF:   %
 %LVPWTF:  %
                        [ENTER]
```

B SAX

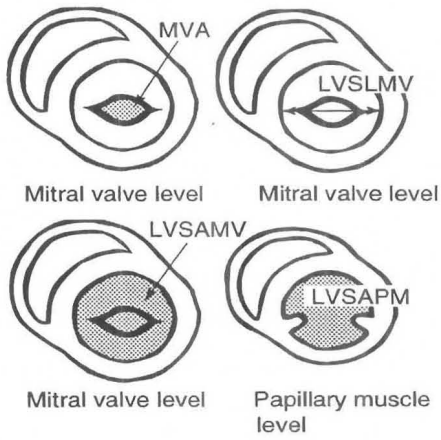
From a B-mode left ventricular short-axis image, measure the mitral valve area and the left ventricular area (at the mitral valve and papillary muscle levels). The system calculates the ejection fraction (area-EF) from the left ventricular short-axis area.

area EF = (LVSAMVd - LVSAMVs)/LVSAMVd

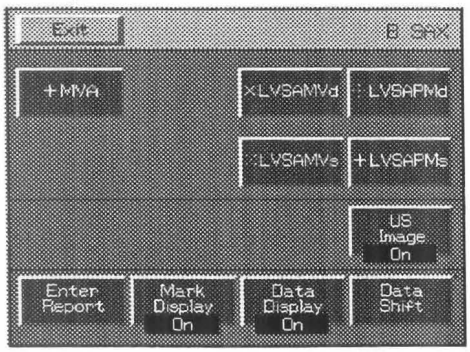
<Measurement method>

For B-SAX measurements, measure items from a B-mode left ventricular short-axis image.
Trace the mitral valve area (MVA). Next, from the short-axis image at the mitral valve level, trace the left ventricular short axis area at mitral valve (LVSAMV) and determine the left ventricular short-axis length at mitral valve (LVSLMV).
In addition, from a short-axis image at the papillary muscle level, calculate the left ventricular short-axis area at papillary muscle (LVSAPM).

<Measurement part>



<Touch panel menu>

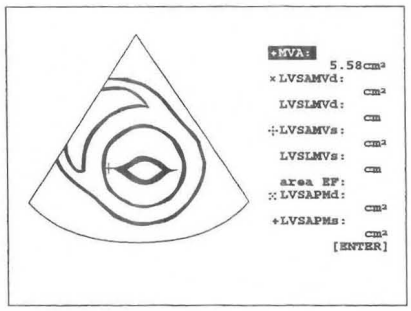


[Remark]
You can select an item using the touch panel menu, caliper mark switch or **SET** switch.

<Measurement procedure>

① Select **B SAX.**

→ Trace the mitral valve opening using the "+" mark.



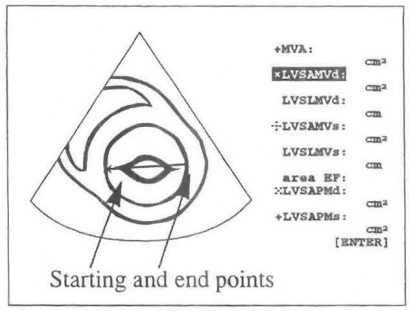
[Remark]
Perform the trace using the same procedure as that for Area Trace.

② Press the **MARK REF** switch.

→ The system closes the trace and calculates MVA.

③ Display an end-diastolic image of the mitral valve level left ventricular short axis, then select ✕**LVSAMVd**.

→ Perform the trace with the "✕" mark, using the same procedure as that for MVA.
(Set the starting and end points of the trace to the positions indicated by the arrows.)



④ Press the **MARK REF** switch.

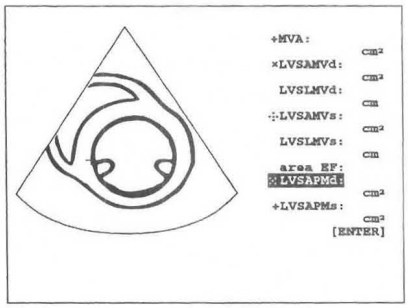
→ When the trace closes, the short axis line (LVSLMV) appears on the screen.

⑤ Display an end-systolic image, then select ⁘ **LVSAMVs**.

→ Perform the trace with the "⁘" mark, using the same procedure as that for LVSAMV d.

⑥ Display an end-diastolic image of the papillary muscle level short axis image, then select ⁙ **LVSAPMd**.

→ Perform the trace with the "⁙" mark, using the same procedure as that for LVSAMV d.



⑦ Display an end-systolic image, then select ＋**LVSAPMs** (to perform this selection with the [+] switch, press the mark twice).

→ Perform the trace with the "+" mark, using the same procedure as that for LVSAMV d.

The subsequent procedure is the same as steps ④ to ⑧ of 14-4 "Basic Procedure for Cardiac Function Measurement" (P.14-29 and 30).

(Measurement tools)

MVA,LVSAMVd,LVSAMVs,LVSAPMd,LVSAPMs : Same procedure as that for Area-T

<Example of measurement result display for B SAX>

+MVA: cm²	← Mitral valve area
×LVSAMVd: cm²²	← Left ventricular short-axis area at mitral valve (diastole)
LVSLMVd: cm	← Left ventricular short-axis length at mitral valve (diastole)
⁘LVSAMVs: cm²	← Left ventricular short-axis area at mitral valve (systole)
LVSLMVs: cm	← Left ventricular short-axis length at mitral valve (systole)
area EF:	← Ejection Fraction from area
⁙LVSAPMd: cm²	← Left ventricular short-axis area at papillary muscle (diastole)
+LVSAPMs: cm² [ENTER]	← Left ventricular short-axis area at papillary muscle (systole)

The layout for a horizontal display is as follows:

+MVA: cm² ×LVSAMVd: cm² LVSLMVd: cm ⁘LVSAMVs: cm² LVSLMVs: cm area EF: ⁙LVSAPMd: cm² +LVSAPMs: cm² [ENTER]

B APX

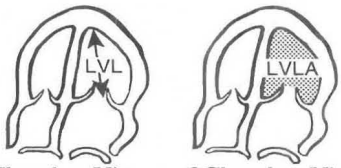
From a B-mode apex image, measure the left ventricular long-axis area (LVLA) and the left ventricular long-axis length (LVL). The system calculates the ejection fraction (area-EF) from the left ventricular long-axis area.

area EF = (LVLAd - LVLAs)/LVLAd

<Measurement method>

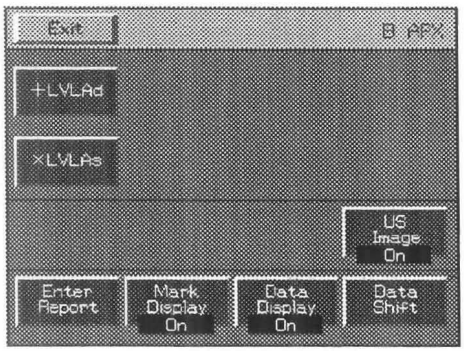
Trace the endocardium of the left ventricle to calculate the left ventricular long-axis area (LVLA).
Measure the distance from the cardiac apex to the midpoint of the mitral valve to determine the left ventricular long-axis length (LVL).

<Measurement part>



4Chamber View or 2Chamber View

<Touch panel menu>



[Remark]
You can select an item using the touch panel menu, caliper mark switch or **SET** switch.

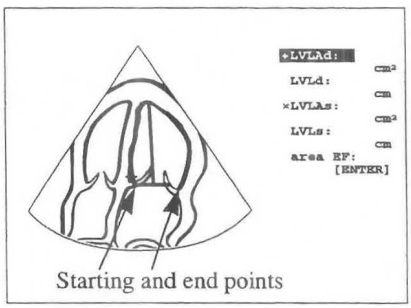
<Measurement procedure>

[Remark] If Caliper Auto is set to Off, use the cine memory or 2B.

① Display an apex diastolic image, then select **B-APX** .

② Trace the **LVLAd** using the "+" mark.

[Remark]
Perform the trace using the same procedure as that for Area Trace.
(Set the starting and end points of the trace to the positions indicated by the arrows.)



③ Press the **MARK REF** switch.
→ The system closes the trace and displays the long axis line(LAXL4d).

③ Display an end-systolic image, then select **×LVLAs**.
→Measure LVLAs using the "×" mark in the same way as for LVLDd.

The subsequent procedure is the same as steps ④ to ⑧ of 14-4 "Basic Procedure for Cardiac Function Measurement" (P.14-29 and 30).

(Measurement tools) LVLAd,LVLAs : Same procedure as that for DIST.

<Example of measurement result display for B APX>

+LVLAd: cm²	← Left ventricular long-axis area (diastole)
LVLd: cm	← Left ventricular long-axis length (diastole)
×LVLAs: cm²	← Left ventricular long-axis area (systole)
LVLs: cm	← Left ventricular long-axis length (systole)
areaEF: [ENTER]	← Ejection flow from area

The layout for a horizontal display is as follows:

+LVLAd:	cm²	LVLd:	cm
×LVLAs:	cm²	LVLs:	cm
areaEF:		[ENTER]	

14-5-3. M-mode Measurements

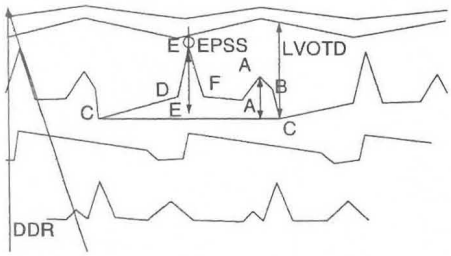
The four M-mode measurements are classified according to the measurement part:

MV: Measures the function of the mitral valve.
AO: Measures the function of the aortic valve.
TV: Measures the function of the tricuspid valve.
PV: Measures the function of the pulmonary valve.

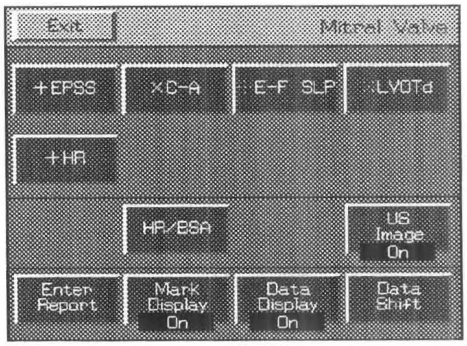
Mitral valve

<Measurement method and measurement part>

The parts to be measured are shown in the figure.



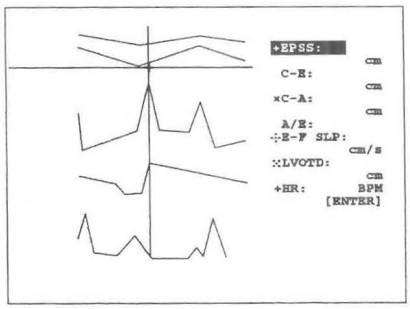
<Touch panel menu>



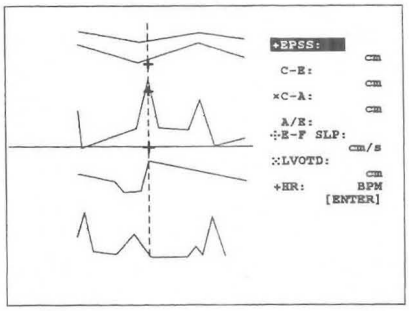
<Measurement procedure>

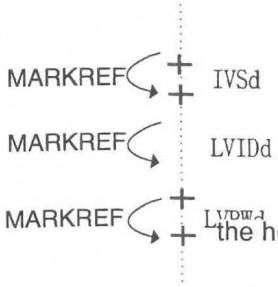
You can select an item using the touch panel menu, caliper mark switch or **SET** switch.

① Select **Mitral Valve**.
→ Move the displayed "+" mark to the ventricular septum above point E.



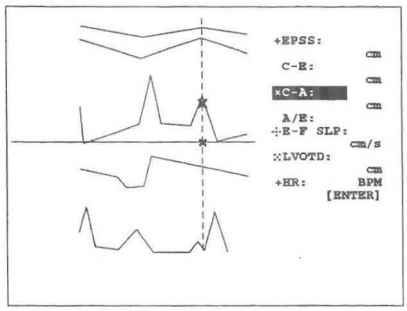
② Press the **MARK REF** switch, separate the "+" mark, move it to point E, then measure EPSS. Similarly, align the "+" mark with the horizontal line extending from point C (using the same procedure as that for M. Length).





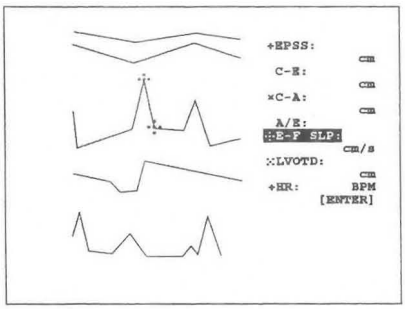
the horizontal line extending from point C

The following is the explanation in the situation when **Mark Display Off** is selected to temporarily erase all caliper marks except the one being used.



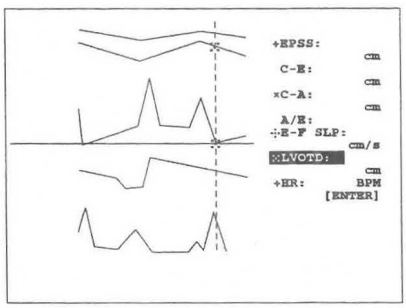
③ Select **×C-A**.

→ Using the same procedure as that for C-E measurement, move the "+" line to point A, and measure the distance between points A and C (C-A) on the horizontal line extending from point C.



④ Select **E-F SLP**.

→ Using the " " mark, measure the distance between points E and F (E-F SLP).



⑤ Select **LVOTD**.

→ Move the " " line to point C, then measure the distance between the ventricular septum and point C (LVOTD) using the " " mark.

⑥ If ECG is not displayed, select **+HR** from the touch panel menu (to perform this selection with the [+] switch, press the mark twice), then measure the heart rate. (Same procedure as that for Heart Rate)

The subsequent procedure is the same as steps ④ to ⑧ of 14-4 "Basic Procedure for Cardiac Function Measurement" (P.14-29 and 30).

(Measurement tools)

EPSS,C-E,C-A,LVOTD	:	Same procedure as that for M.Length
E-F SLP	:	Same procedure as that for M.VEL.
HR	:	Same procedure as that for Heart Rate

<Example of measurement result display for Mitral valve>

```
+EPSS:          ←EPSS
      cm
 C-E:           ← C-E amplitude
      cm
×C-A:           ← C-A amplitude
      cm
 A/E:           ← A wave : E wave ratio
      cm
 E-F SLP:       ← E-F SLP
      cm/s
 LVOTD:         ← Left ventricular outflow tract diameter
      cm
+HR:            ← Heart Rate
      BPM
   [ENTER]
```

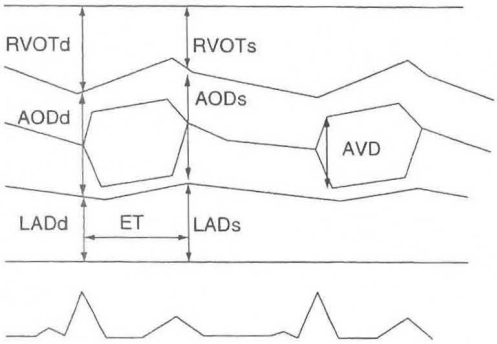
The layout for a horizontal display is as follows:

```
+EPSS:    cm
 C-E:     cm
×C-A:     cm     A/E:
 E-F SLP: cm/s
 LVOTD:   cm
+HR:      cm
                 [ENTER]
```

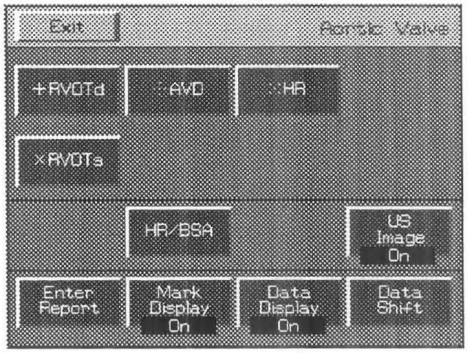
Aortic Valve

<Measurement method and measurement part>

The parts to be measured are shown in the figure.



<Touch panel menu>

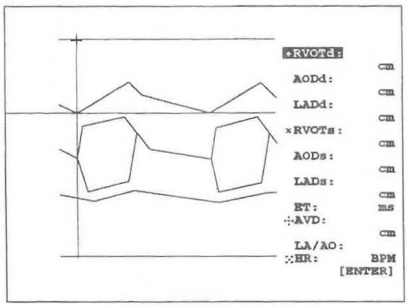


<Measurement procedure>

You can select an item using the touch panel menu, caliper mark switch or **SET** switch.

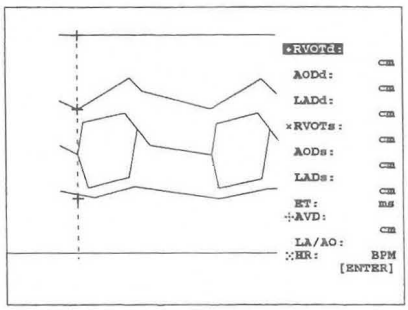
① Select **Aortic Valve**.

→ Move the displayed "+" mark to the starting point of RVOT.

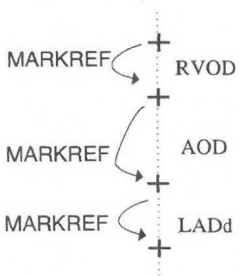


② Press the **MARK REF** switch, separate the "+" mark, then move it to the RVOT end point (starting point of AODd).

Similarly, move the "+" mark to the AODd end point (LADd starting point), and the LADs end point.



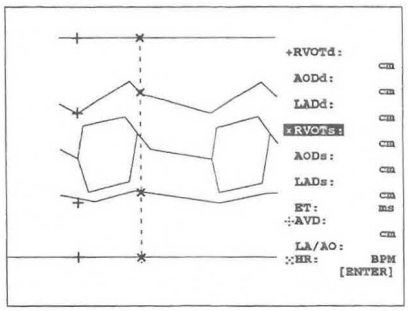
(Same procedure as that for M.Length)



③ Select **×RVOTs**.

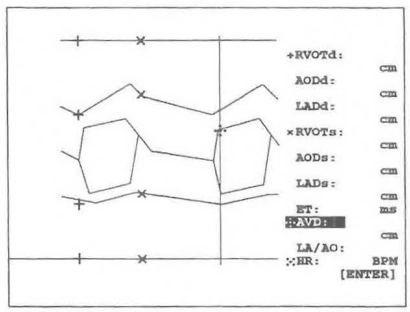
→ An "x" line appears, so measure RVOTs, AODs, and LADs using the same procedure as that for RVOTs, AODd, and LADd.

→ ET (time between the "+" line and the "x" line) and LA/AO (ratio between LADs and AODd) are computed.



④ Select ⁘ AVD.

→ A "⁘" line appears, so measure AVD.



⑤ If ECG is not displayed, select **+HR** from the touch panel menu (to perform this selection with the [+] switch, press the mark twice), then measure the heart rate. (Same procedure as that for Heart Rate)

The subsequent procedure is the same as steps ④ to ⑧ of 14-4 "Basic Procedure for Cardiac Function Measurement" (P.14-29 and 30).

(Measurement tools)
RVOTd,RVOTs,AODd,AODs,LADd,LADs,AVD : Same procedure as that for M.Length
HR : Same procedure as that for Heart Rate

<Example of measurement result display for Aortic Valve>

```
+RVOTd:          ← Right ventricular outflow tract diameter (diastole)
      cm
 AODd:           ← Aortic root diameter (diastole)
      cm
 LADd:           ← Left atrial diameter (diastole)
      cm
×RVOTs:          ← Right ventricular outflow tract diameter (systole)
      cm
 AODs:           ← Aortic root diameter (systole)
      cm
 LADs:           ← Left atrial diameter (systole)
      cm
 ET:    ms       ← Ejection time
⁘AVD:            ← Aortic valve diameter
      cm
 LA/AO:          ← LA/AO ratio
⁘HR:   BPM       ← Heart Rate
    [ENTER]
```

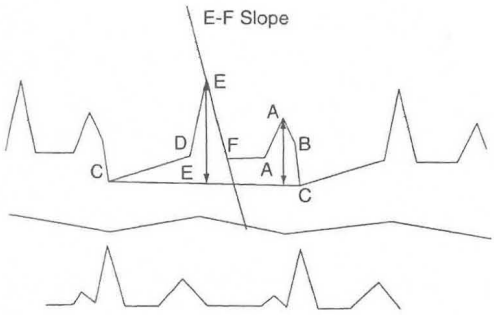
The layout for a horizontal display is as follows:

```
+RVOTd:   cm   ×RVOTs:   cm
 AODd:    cm    AODs:    cm
 LADd:    cm    LADs:    cm
 ET:      ms
 LA/AO:
⁘AVD:
⁘HR:     BPM             [ENTER]
```

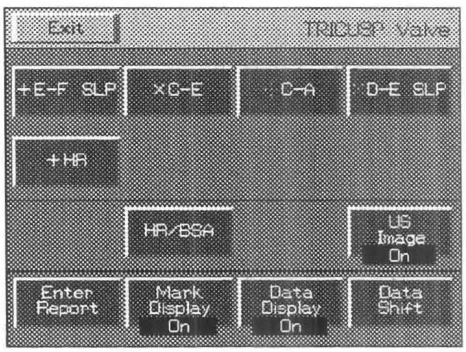
TRICUSP Valve

<Measurement method and measurement part>

The parts to be measured are shown in the figure.



<Touch panel menu>

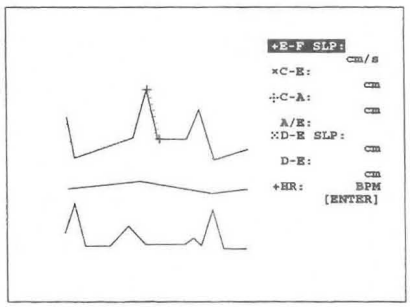


<Measurement procedure>

You can select an item using the touch panel menu, caliper mark switch or **SET** switch.

① Select **TRICUSP Valve**.

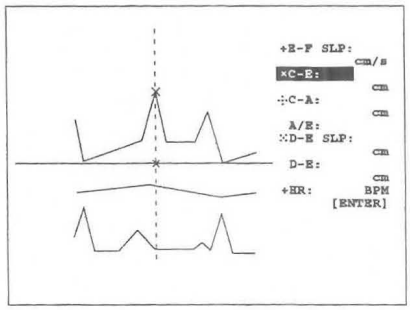
→ Using the "+" mark, measure the distance between points E and F (E-F SLP) (using the same procedure as that for M. VEL.).



The following is the explanation in the situation when **Mark Display Off** is selected to temporarily erase all caliper marks except the one being used.

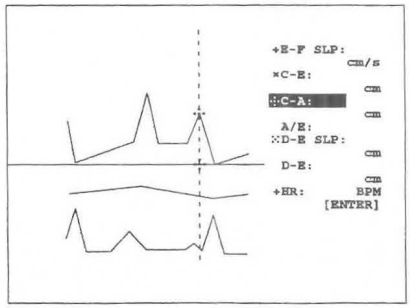
② Select **×C-E**.

→ Using the "x" line, measure the distance between points E and C (C-E) (using the same procedure as that for M. Length).



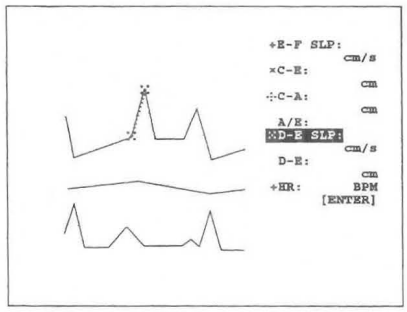
③ Select **⁘C-A**.

→ Using the "⁘" line, measure the distance between points A and C (C-A) on the horizontal line extending from point C (using the same procedure as that for M. Length).



④ Select ⁙ D-E SLP.

→ Using the " ⁙ " mark, measure the distance between points D and E (D-E SLP) (using the same procedure as that for M. VEL.).



⑤ If ECG is not displayed, select **+HR** from the touch panel menu (to perform this selection with the [+] switch, press the mark twice), then measure the heart rate. (Same procedure as that for Heart Rate)

The subsequent procedure is the same as steps ④ to ⑧ of 14-4 "Basic Procedure for Cardiac Function Measurement" (P.14-29 and 30).

(Measurement tools)

C-E,C-A,D-E	:	Same procedure as that for M.Length
E-F SLP ,D-E SLP	:	Same procedure as that for M.VEL.
HR	:	Same procedure as that for Heart Rate

<Example of measurement result display for TRICUSP Valve >

```
+E-F SLP:          ← E-F SLP
      cm/s
×C-E:              ← C-E amplitude
      cm
+C-A:              ← C-A amplitude
      cm
 A/E:              ← Awave E wave ratio
⁙D-E SLP:          ← D-E SLP
      cm/s
 D-E:              ← D-E amplitude
      cm
+HR:   BPM         ←Heart Rate
     [ENTER]
```

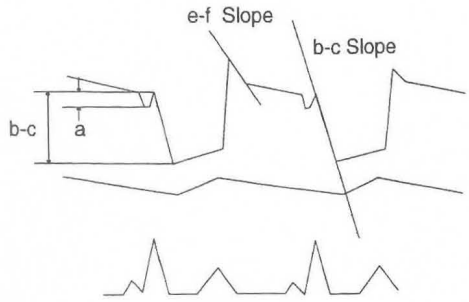
The layout for a horizontal display is as follows:

```
+E-F SLP:  cm/s
×C-E:      cm
+C-A:      cm      AE:
⁙D-E SLP:  cm/s
 D-E:      cm
+HR:       BPM                 [ENTER]
```

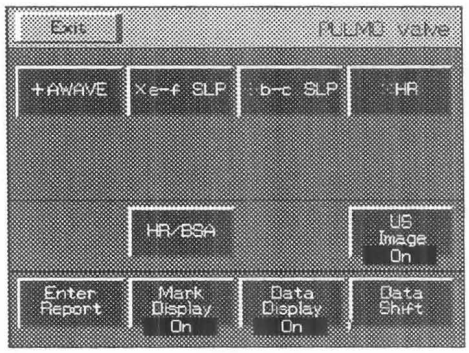
PULMO Valve

<Measurement method and measurement part>

The parts to be measured are show in the figure.



<Touch panel menu>

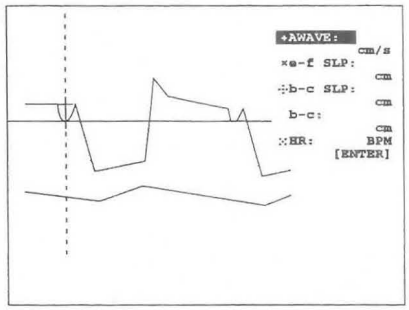


<Measurement procedure>

You can select an item using the touch panel menu, caliper mark switch or **SET** switch.

① Select **PULMO Valve**.

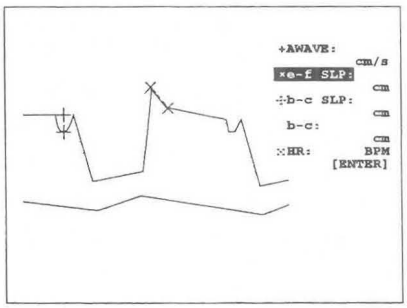
→ Move the "+" line to the AWAVE measurement starting position.



② Press the **MARK REF** switch, then move the separated "+" mark to the end point (using the same procedure as that for M. Length).

③ Select **×e-f SLP**.

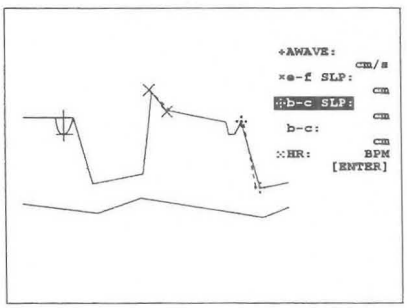
→ Using the "x" mark, measure the distance between points e and f (e-f SLP) (using the same procedure as that for M. VEL).



④ Select **⁘b-c SLP**.

→ Using the "⁘" mark, measure the distance between points b and c (b-c SLP) (using the same procedure as that for M. VEL.).

The b-c amplitude is also displayed simultaneously.



⑤ If ECG is not displayed, select **⁙HR** from the touch panel menu (to perform this selection with the ⁙ switch, press the mark twice), then measure the heart rate. (Same procedure as that for Heart Rate)

The subsequent procedure is the same as steps ④ to ⑧ of 14-4 "Basic Procedure for Cardiac Function Measurement" (P.14-29 and 30).

(Measurement tools)

A-WAVE	:	Same procedure as that for M.Length
e-f SLP,b-c SLP	:	Same procedure as that for M.VEL.
HR	:	Same procedure as that for Heart Rate

<Example of measurement result display for PULMO Valve>

```
+AWAVE:          ← A wave amplitude
      cm
xe-f SLP:        ← e-f SLP
      cm/s
⁘b-c SLP:        ← b-c SLP
      cm/s
 b-c:            ← b-c amplitude

⁙HR:   BPM       ← Heart Rate
    [ENTER]
```

The layout for a horizontal display is as follows:

```
+AWAVE:     cm
xe-f SLP:   cm/s
⁘b-c SLP:   cm/s
 b-c:       cm
⁙HR:        BPM
                  [ENTER]
```

14-5-4. D-mode measurements

The D-mode measurements include six measurements for different measurement parts and two flow measurements that can be shared:

LV IN Flow	: Left ventricular in flow measurement		
RV IN Flow	: Right ventricular in flow measurement		
LV EJ Flow-1	: Left ventricular ejection flow measurement 1	AV Stenosis-1	: Aortic valve stenosis measurement 1
RV EJ Flow-1	: Right ventricular ejection flow measurement 1	AV Stenosis-2	: Aortic valve stenosis measurement 2
LV EJ Flow-2	: Left ventricular ejection flow measurement 2	PV Stenosis-1	: Pulmonary valve stenosis measurement 1
RV EJ Flow-2	: Right ventricular ejection flow measurement 2	PV Stenosis-2	: Pulmonary valve stenosis measurement 2
		* The measurement tools for 1 and 2 are different to each other.	
SV/CO	: Flow measurement 1		
FLOW VOLUME	: Flow measurement 2		

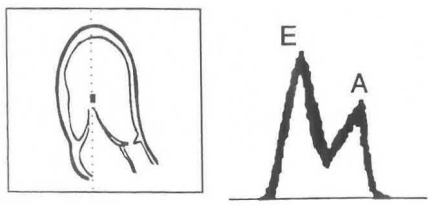
LV IN Flow and RV IN Flow

Trace the Doppler waveform of the left ventricular inflow tract and the right ventricular inflow tract to determine the velocity, the pressure gradient, and the mitral valve area.

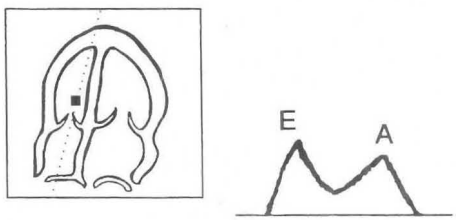
<Measurement method and measurement part>

The parts to be measured are shown in the figure.

LV IN FLOW



RV IN FLOW



The calculation equation used are:

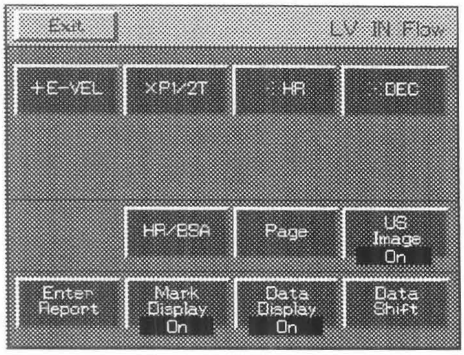
Point E pressure gradient	$E\text{-}GRAD=4 \times (E\text{-}VEL)^2$
Point A pressure gradient	$A\text{-}GRAD=4 \times (A\text{-}VEL)^2$
Mitral valve area	$MVA=220 / (P1/2T)$
Tricuspid valve area	$TVA=220 / (P1/2T)$

[Remark]

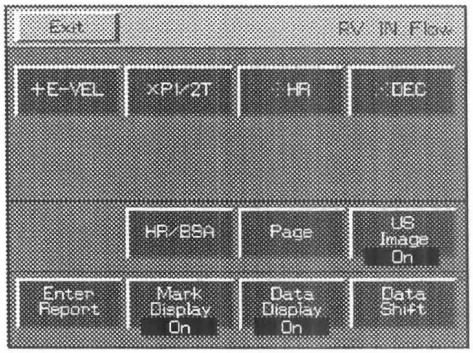
The operation method is the same for LV IN Flow and RV IN Flow.

<Touch panel menu>

LV IN FLOW



RV IN FLOW



<Measurement procedure>

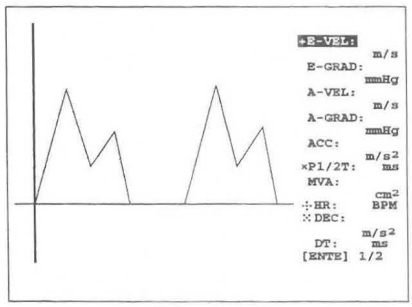
The operation method is explained using LV IN Flow as an example.

You can select an item using the touch panel menu, caliper mark switch or **SET** switch.

<When using the auto trace function>

① Select **LV IN Flow.**

→ A solid line cursor for determining the trace range appears at the center of the screen.

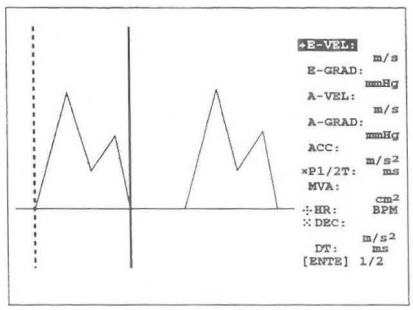


② Using the trackball, move the solid line cursor to the starting point of the trace, then press the **MARK REF**switch.

③ Using the trackball, move the separated solid line cursor to the end point of the trace.

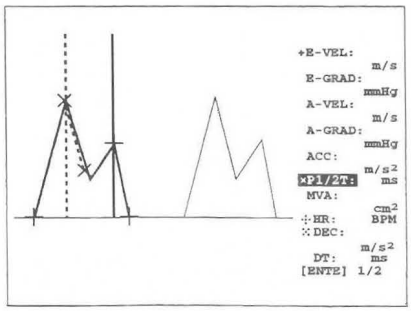
Once you have specified the trace range, press the **MARK REF** switch.

→ The trace operation starts.



④ Upon completion of the trace operation, The + mark that indicates the E peak point and the A peak point are displayed.

→ Also, P1/2T, MVA, DEC and DT are calculated, and the results are displayed.



[Remark]

One or more of the + marks that indicate the E peak point and the A peak point sometimes fails to appear at a peak point. (If the inclination of the dotted line joining the + marks that represent the E and A peak points is small, an error will occur.)

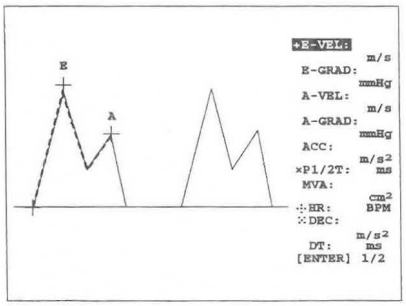
If the + mark is not in the correct position, perform measurement using a manual trace.

[Remark]
P1/2T is computed after the slope of the E peak point deceleration curve is detected. It does not necessary coincide with the starting point of the E peak point. If the value of P1/2T is inappropriate, press the "x" mark, then repeat the measurement.
[Remark]
For details of the method of using auto trace,and also the precautions and various settings, refer to 12-4-3."Basic Method of using the Auto Trace Function".

⑤ If the auto trace data is not suitable, you can carry out a manual trace. Press the caliper switch (+ mark), and the manual trace operation starts. Also, all of the displayed auto trace data is erased.
Note that once you start a manual trace operation, you cannot return to an auto trace operation.

<When using a manual trace>

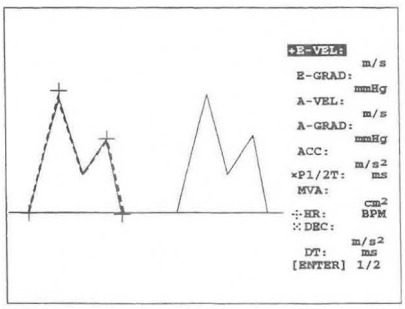
① Press the caliper mark switch (+ mark). (If AUTO TRACE is set to OFF using the Preset function, select **LV IN Flow** .)



② Using the trackball, move the "+" mark to the starting position, then perform a trace (using the same procedure as that for Mean VEL).

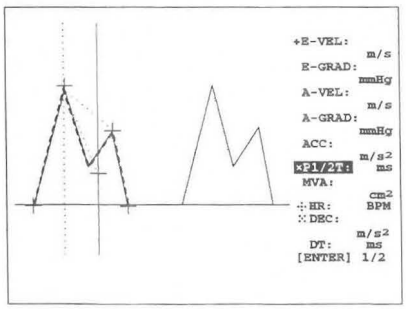
Press the **MARK REF** switch at the E peak point and A peak point.

③ When you reach the end position, press the **MARK REF** switch.
→ E-VEL, E-PGRAD, A-VEL, A-GRAD, and ACC are computed.



④ Select **×P1/2T**, then measure P1/P2 with the "×" mark (using the same procedure as that for D. VEL or R1/2T(VA)).
→ P1/2T and MVA are computed, and the results displayed.

⑤ If ECG is not displayed, select **⁘HR** from the touch panel menu (to perform this selection with the ⁘ switch, press the mark twice), then measure the heart rate. (Same procedure as that for Heart Rate)



⑥ Select **⁙DEC**, then measure DEC with the "⁙" mark (using the same procedure as that for ACCEL).
→ DEC and DT are computed, and the results displayed.

The subsequent procedure is the same as steps ④ to ⑧ of 14-4 "Basic Procedure for Cardiac Function Measurement" (P.14-29 and 30).

(Measurement tools)

E-VEL,E-GRAD,ACC,A-VEL,A-GRAD : Same procedure as that for Mean VEL.

P1/2T : Same procedure as that for P1/2T

HR : Same procedure as that for Heart Rate

<Example of measurement result display for LV IN Flow>

```
+E-VEL:          ← E peak point velocity
        m/s
 E-GRAD:         ← E peak pressure gradient
        mmHg
 A-VEL:          ← A peak point velocity
        m/s
 A-GRAD:         ← A peak pressure gradient
        mmHg
 ACC:            ← Acceleration
        m/s²
xP1/2T: ms       ← Pressure half time
 MVA:            ← Mitral valve area
        cm²
 HR: BPM         ← Heart rate
 DEC:            ← Deceleration
       cm/s²
 DT:    ms       ← Deceleration Time
  [ENTER] 1/2    ←Press the SET switch to transfer the results
                   to the and to go to page2.
   Page
A/E:             ← A/E Ratio
MVEL:            ← Mean velocity
        m/s
MGRAD:           ← Mean pressure gradient
        mmHg
AT:     ms       ← Acceleration
FT:     ms       ←Flow time
AT/ET:           ← AT/ET Ratio
VTI:    cm       ← velocity time integral
          2/2
```

The layout for a horizontal display is as follows:

```
+E-VEL:    m/s    GRAD:    mmHg
 A-VEL:    cm     GRAD:    mmHg
 A/E:
 MVEL:     cm/s   MGRAD:   mmHg
 ACC:      cm/s
 AT:       ms     ET:      ms
 AT/ET:
 VTI:      cm
xP1/2T:    ms     MVA:     cm²
 HR:       BPM
 DEC:      cm/s²  DT:      ms
                            [ENTER]
```

<Example of measurement result display for RV IN Flow>

```
+E-VEL:          ← E peak point velocity
        m/s
 E-GRAD:         ← E peak pressure gradient
        mmHg
 A-VEL:          ← A peak point velocity
        m/s
 A-GRAD:         ← A peak pressure gradient
        mmHg
 ACC:            ← Acceleration
        m/s²
xP1/2T: ms       ← Pressure half time
 MVA:            ← Mitral valve area
        cm²
 HR: BPM         ← Heart rate
 DEC:            ← Deceleration
       cm/s²
 DT:    ms       ← Deceleration Time
  [ENTER] 1/2    ←Press the SET switch to transfer the results
                   to the and to go to page2.
   Page
A/E:             ← A/E Ratio
MVEL:            ← Mean velocity
        m/s
MGRAD:           ← Mean pressure gradient
        mmHg
AT:     ms       ← Acceleration
FT:     ms       ←Flow time
AT/ET:           ← AT/ET Ratio
VTI:    cm       ← velocity time integral
          2/2
```

The layout for a horizontal display is as follows:

```
+E-VEL:    m/s    GRAD:    mmHg
 A-VEL:    cm     GRAD:    mmHg
 A/E:
 MVEL:     cm/s   MGRAD:   mmHg
 ACC:      cm/s
 AT:       ms     ET:      ms
 AT/ET:
 VTI:      cm
xP1/2T:    ms     TVA:     cm²
 HR:       BPM
 DEC:      cm/s²  DT:      ms
                            [ENTER]
```

LV Ejection Flow1,2 and RV Ejection Flow1,2

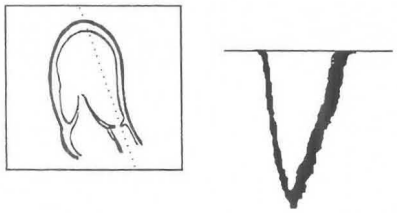
Trace the Doppler waveform of the left ventricular ejection flow tract and the right ventricular ejection flow tract, then measure the cross sectional diameter to determine the velocity, the pressure gradient, and the flow volume.

<Measurement method and measurement part>

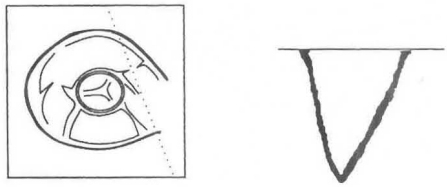
The parts to be measured are shown in the figure.

LV Ejection Flow 1 and LV Ejection Flow 2 calculate the same calculation results but use different measurement methods.

LV Ejection FLOW



RV Ejection FLOW



When the CW doppler is used to determine the maximum volume Vmax, LV Ejection Flow 1 uses a measurement bar like D.VEL.

LV Ejection Flow 2 uses a trace.

The same conditions apply to RV Ejection Flow 1 and RV Ejection Flow 2.

The calculation equation used are:

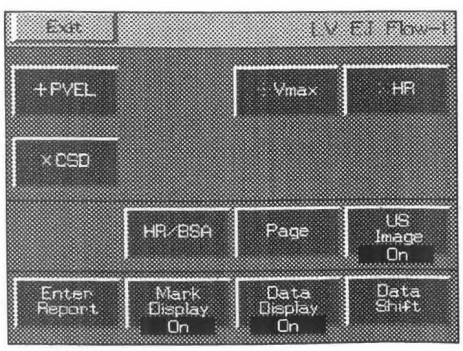
Peak pressure gradient	PGRAD=4×(PVEL)²
Cross-sectional area	CSA= π /4×(CSD)²
Stroke volume	SV=CSA×VTI
Cardiac output	CO=(SV×HR) / 1000
Aortic valve area	AVA=(CSA×PVEL) / Vmax (at LV EJ Flow 1 activation)
	AVA=(CSA×VTI) / VTImax (at LV EJ Flow 2 activation)
Pulmonary valve area	PVA=(CSA×PVEL) / Vmax (at RV EJ Flow 1 activation)
	PVA=(CSA×VTI) / VTImax (at RV EJ Flow 2 activation)

[Remark]

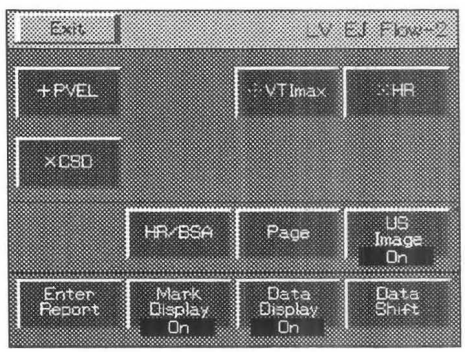
The operation method is basically the same for LV Ejection Flow 1, LV Ejection Flow 2, RV Ejection Flow 1, and RV Ejection Flow 2.

<Touch panel menu>

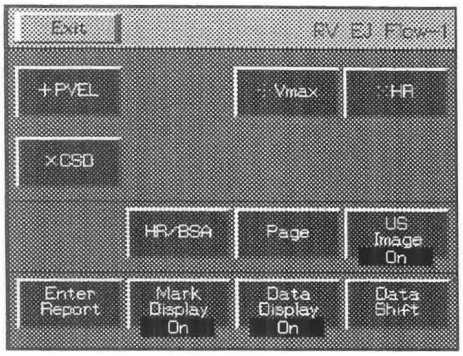
LV EJ FLOW-1



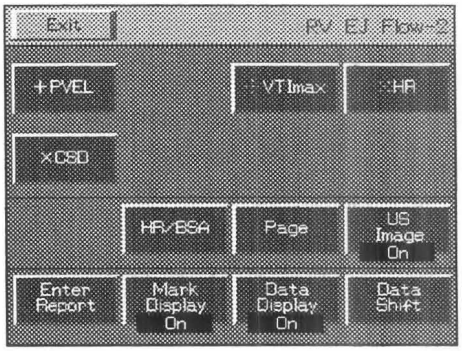
LV EJ FLOW-2



RV EJ FLOW-1



RV EJ FLOW-2



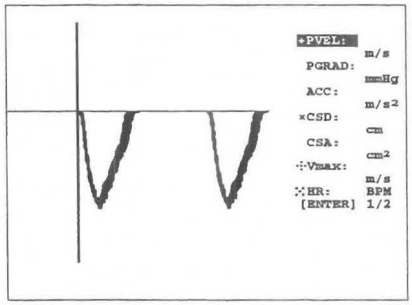
<Measurement procedure>

The operation method is explained using LV Ejection Flow 1 as an example.
You can select an item using the touch panel menu, caliper mark switch or **SET** switch.

<When using the auto trace function>

① Select **LV EJ Flow1**.

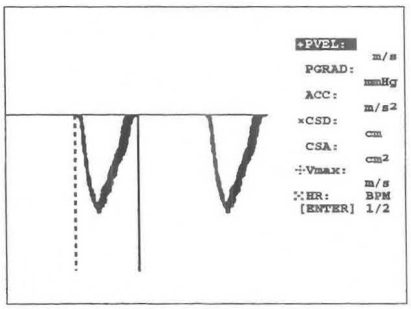
→ A solid line cursor for determining the trace range appears at the center of the screen.



② Using the trackball, move the solid line cursor to the starting point of the trace, then press the **MARK REF** switch.

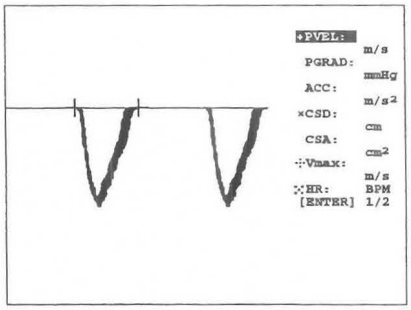
③ Using the trackball, move the separated solid line cursor to the end point of the trace.
Once you have specified the trace range, press the **MARK REF** switch.

→ The trace operation starts.



④ Upon completion of the trace operation, the measurement results are displayed.

[Remark]
For details of the method of using auto trace,and also the precautions and various settings, refer to 12-4-3."Basic Method of using the Auto Trace Function".



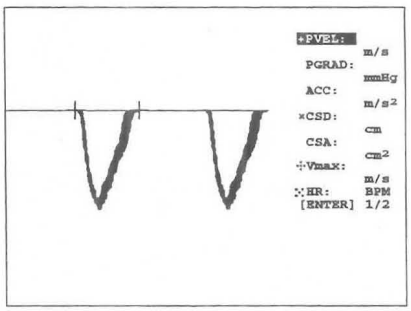
⑤ If the auto trace data is not suitable, you can carry out a manual trace.

→ Press the caliper switch (+ mark), and the manual trace operation starts. Also, all of the displayed auto trace data is erased.
Note that once you start a manual trace operation, you cannot return to an auto trace operation.

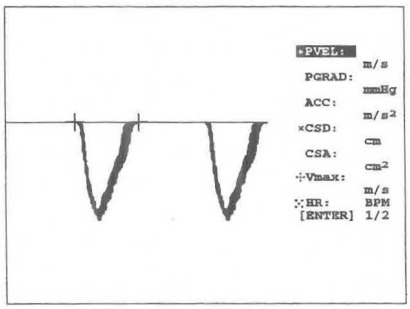
<When using a manual trace>

① Press the caliper mark switch (+ mark). (If AUTO TRACE is set to OFF using the Preset function, select **LV EJ Flow1** .)
→ A "+" mark appears at the center of the screen.

Using the trackball, move the "+" mark to the starting position, then perform a trace (using the same procedure as that for Mean VEL).



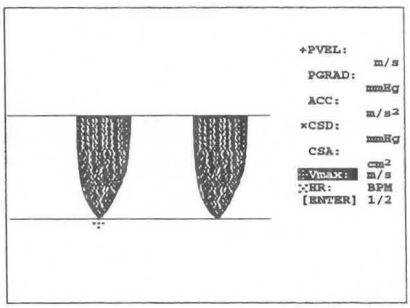
② When you reach the end position, press the **MARK REF** switch.
→ P-VEL, P-PGRAD, and ACC are computed.



③ Next, display a B mode or M mode image, and select **×CSD (left ventricle outflow path diameter)**.
→ The "×" mark appears at the center of the screen, so measure CSD.

④ Then,using the CW doppler, measure the maximum velocity of the left ventricular outflow tract.
Display a CW image, and select **⁙Vmax**.
→ The system displays a "⁙" bar. Move the "⁙" bar to the maximum velocity position.

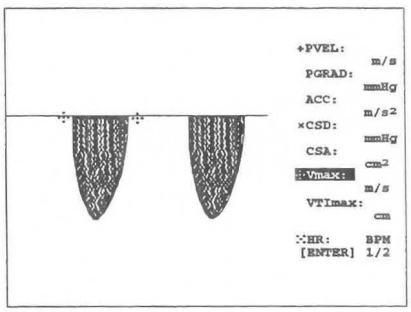
(The same applies if RV IN Flow 1 is activated.)



(When LV Ejection Flow 2 or RV IN Flow 2measurement is activated)

The system displays the "⁙" mark for tracing. Trace the spectrum pattern.

At the trace end point, press the **MARK REF**switch once.



⑤ If ECG is not displayed, select **⁙HR** from the touch panel menu (to perform this selection with the ⁙ switch, press the mark twice), then measure the heart rate. (Same procedure as that for Heart Rate)

The subsequent procedure is the same as steps ④ to ⑧ of 14-4 "Basic Procedure for Cardiac Function Measurement" (P.14-29 and 30).

(Measurement tools)

P-VEL,PGRAD,ACC	:	Same procedure as that for Mean VEL
Vmax	:	Same procedure as that for D.VEL
VTImax	:	Same procedure as that for Mean VEL.
CSD	:	Bmode(Same procedure as that for DIST.)、Mmode(Same procedure as that for M.Length)
HR	:	Same procedure as that for Heart Rate

<Example of measurement result display for LV Ejection Flow 1>

```
+PVEL:          ← Peak velocity
      m/s
 PGRAD:         ← Peak pressure gradient
      mmHg
 ACC:           ← Acceleration
      m/s²
xCSD:           ← Cross-sectional diameter of the outflow tract
      cm
 CSA:           ← Cross-sectional area of the outflow tract
      cm²
+Vmax:          ← Maximum velocity
      m/s
 HR:   BPM      ← Heart Rate
  [ENTER] 1/2   ← Press the SET switch to go to page2.
```

Page

```
 MVEL:          ← Mean velocity
      m/s
 MGRAD:         ← Mean Pressure Gradient
      mmHg
 AT:   ms       ← Acceleration time
 ET:   ms       ← Ejection time
 AT/ET:         ← AT/ET Ratio
 VTI:  cm       ← Velocity time integral
 SV:   ml       ← Stroke Volume
 CO:            ← Cardiac output
      l/m
 AVA:
      cm²       ← Aortic valve area
       2/2
```

The layout for a horizontal display is as follows:

```
+PVEL:    m/s    PGRAD:    mmHg
 MVEL:    cm     MGRAD:    mmHg
 ACC:     m/s²
 AT:      ms     ET:       ms
 AT/ET:
xCSD:     cm     CSA:      cm²
 VTI:     cm
 SV:      ml     CO:       cm
+Vmax:    m/s    AVA:      cm²
 HR:    BPM
                          [ENTER]
```

<Example of measurement result display for RV Ejection Flow 1>

```
+PVEL:          ← Peak velocity
      m/s
 PGRAD:         ← Peak pressure gradient
      mmHg
 ACC:           ← Acceleration
      m/s²
xCSD:           ← Cross-sectional diameter of the outflow tract
      cm
 CSA:           ← Cross-sectional area of the outflow tract
      cm²
+Vmax:          ← Maximum velocity
      m/s
 HR:   BPM      ← Heart Rate
  [ENTER] 1/2   ← Press the SET switch to go to page2.
```

Page

```
 MVEL:          ← Mean velocity
      m/s
 MGRAD:         ← Mean Pressure Gradient
      mmHg
 AT:   ms       ← Acceleration time
 ET:   ms       ← Ejection time
 AT/ET:         ← AT/ET Ratio
 VTI:  cm       ← Velocity time integral
 SV:   ml       ← Stroke Volume
 CO:            ← Cardiac output
      l/m
 PVA:
      cm²       ←Pulmonic valve area
       2/2
```

The layout for a horizontal display is as follows:

```
+PVEL:    m/s    PGRAD:    mmHg
 MVEL:    cm     MGRAD:    mmHg
 ACC:     m/s²
 AT:      ms     ET:       ms
 AT/ET:
xCSD:     cm     CSA:      cm²
 VTI:     cm
 SV:      ml     CO:       cm
+Vmax:    m/s    PVA:      cm²
 HR:    BPM
                          [ENTER]
```

<Example of measurement result display for LV Ejection Flow 2>

```
+PVEL:          ← Peak velocity
      m/s
 PGRAD:         ← Peak pressure gradient
      mmHg
 ACC:           ← Acceleration
      m/s²
xCSD:           ← Cross-sectional diameter of the outflow tract
      cm
 CSA:           ← Cross-sectional area of the outflow tract
      cm²
-:-Vmax:        ← Maximum velocity
      m/s
VTImax:         ←Velocity time integral(at maximum velocity)
      cm

:-:HR:   BPM    ← Heart Rate
 [ENTER] 1/2    ← Press the SET switch to go to page2.
```

Page

```
MVEL:           ← Mean velocity
      m/s
MGRAD:          ← Mean Pressure Gradient
      mmHg
AT:      ms     ← Acceleration time
ET:      ms     ← Ejection time
AT/ET:          ← AT/ET Ratio
VTI:     cm     ← Velocity time integral
SV:      ml     ← Stroke Volume
CO:             ← Cardiac output
      l/m
AVA:
      cm²       ← Aortic valve area
       2/2
```

The layout for a horizontal display is as follows:

```
+PVEL:    m/s    PGRAD:    mmHg
 MVEL:    cm     MGRAD:    mmHg
 ACC:     m/s²
 AT:      ms     ET:       ms
 AT/ET:
xCSD:     cm     CSA:      cm²
 VTI:     cm
 SV:      ml     CO:       cm
-:-Vmax:  m/s    AVA:      cm²
 VTImax:  cm
:-:HR:    BPM
                          [ENTER]
```

<Example of measurement result display for RV Ejection Flow 2>

```
+PVEL:          ← Peak velocity
      m/s
 PGRAD:         ← Peak pressure gradient
      mmHg
 ACC:           ← Acceleration
      m/s²
xCSD:           ← Cross-sectional diameter of the outflow tract
      cm
 CSA:           ← Cross-sectional area of the outflow tract
      cm²
-:-Vmax:        ← Maximum velocity
      m/s
VTImax:         ← Velocity time integral(at maximum velocity)
      cm

:-:HR:   BPM    ← Heart Rate
 [ENTER] 1/2    ← Press the SET switch to go to page2.
```

Page

```
MVEL:           ← Mean velocity
      m/s
MGRAD:          ← Mean Pressure Gradient
      mmHg
AT:      ms     ← Acceleration time
ET:      ms     ← Ejection time
AT/ET:          ← AT/ET Ratio
VTI:     cm     ← Velocity time integral
SV:      ml     ← Stroke Volume
CO:             ← Cardiac output
      l/m
PVA:
      cm²       ← Pulmonic valve area
       2/2
```

The layout for a horizontal display is as follows:

```
+PVEL:    m/s    PGRAD:    mmHg
 MVEL:    cm     MGRAD:    mmHg
 ACC:     m/s²
 AT:      ms     ET:       ms
 AT/ET:
xCSD:     cm     CSA:      cm²
 VTI:     cm
 SV:      ml     CO:       cm
-:-Vmax:  m/s    PVA:      cm²
 VTImax:  cm
:-:HR:    BPM
                          [ENTER]
```

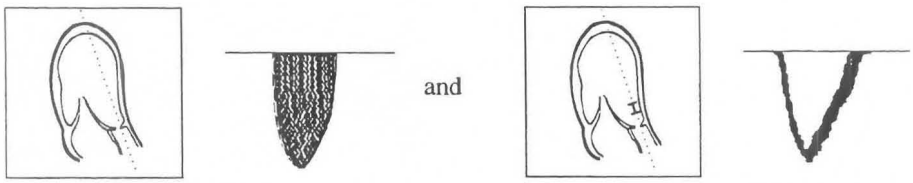
AV Stenosis 1 and 2, and PV Stenosis 1 and 2

The following calculation method is intended for calculating the valve area in the case of a stenosis of the aortic valve or pulmonary valve stenosis.

<Measurement method and measurement position>

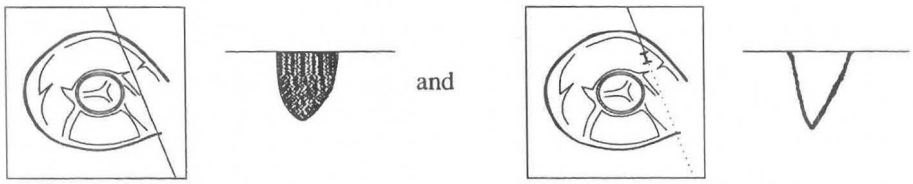
The measurement positions are shown in the figures below. The peak aortic (pulmonic) passage blood flow is measured using the CW Doppler waveform, and the blood flow at the left ventricle (right ventricle) outflow tract is measured using the PW Doppler waveform.

AV Stenosis Flow



(CW Doppler) (PWDoppler)

PV Stenosis Flow



(CW Doppler) (PWDoppler)

The measurement results obtained using AV Stenosis 1 and AV Stenosis 2 are identical, however the measurement methods are different. When calculating the blood flow at the left ventricle (right ventricle) outflow tract using PW Doppler, use a measurement bar such as D.Vel in the case of AV Stenosis 1, or use a trace in the case of AV Stenosis 2.

The above also applies to RV Stenosis 1 and RV Stenosis 2.

The pertinent calculation formulas are as follows.

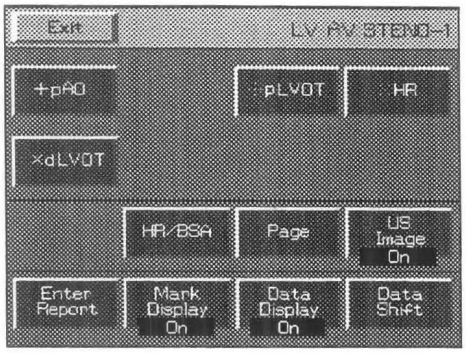
Peak pressure gradient	$PGRAD = 4 \times (PAO)^2$ or $4 \times (PPA)^2$
Diameter cross-sectional area:	$CSA = \pi /4 \times (dLVOT)^2$ or (dRVOT)
Aortic valve area:	AVA = (CSA × PLVOT)/pAO (when LV AV STENO1 is started)
	AVA = (CSA × VTImax)/VTI (when LV AV STENO2 is started)
Pulmonary valve area:	PVA = (CSA × pRVOT)/pPV (when RV PV STENO1 is started)
	PVA = (CSA × VTImax)/VTI (when RV PV STENO2 is started)

[Remark]

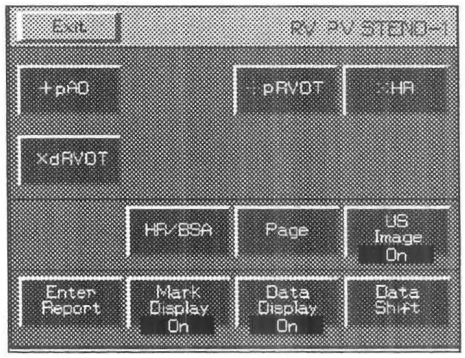
The basic operation methods of calculating AV Stenosis 1, AV Stenosis 2, PV Stenosis 1, and PV Stenosis 2 are identical.

<Touch panel menu>

LV AV STENO-1,2



RV PV STENO-1,2

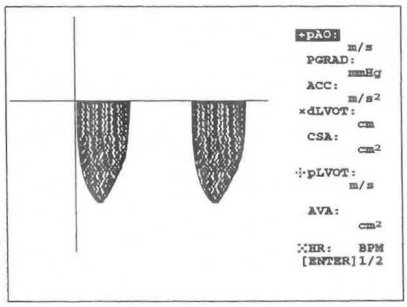


[Remark]
The display of the LV AV (RV PV) STENO-1 and -2 LCD menus is the same. The * part of STENO-* switches between 1 and 2.

<Measurement procedure>

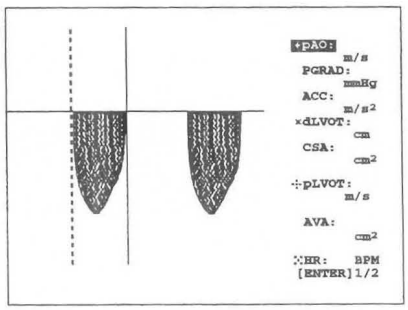
The operation method is explained using LV AV STENO-1 as an example.
You can select an item using the touch panel menu, caliper mark switch or **SET** switch.

<When using the auto trace function>

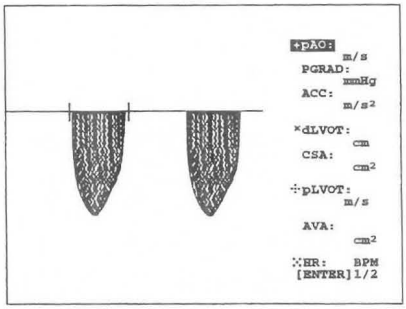


① Select **LV AV STENO-1**.
→ A solid line cursor for determining the trace range appears at the center of the screen.

② Using the trackball, move the solid line cursor to the starting point of the trace, then press the **MARK REF** switch.



③ Using the trackball, move the separated solid line cursor to the end point of the trace.
Once you have specified the trace range, press the **MARK REF** switch.
→ The trace operation starts.



④ Upon completion of the trace operation, the measurement results are displayed.

[Remark]
For details of the method of using auto trace,and also the precautions and various settings, refer to 12-4-3."Basic Method of using the Auto Trace Function".

⑤ If the auto trace data is not suitable, you can carry out a manual trace.

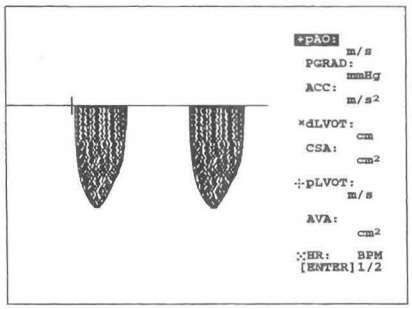
→ Press the caliper switch (+ mark), and the manual trace operation starts. Also, all of the displayed auto trace data is erased.

Note that once you start a manual trace operation, you cannot return to an auto trace operation.

<When using a manual trace>

① Press the caliper mark switch (+ mark). (If AUTO TRACE is set to OFF using the Preset function, select **LV AV STENO-1** .)

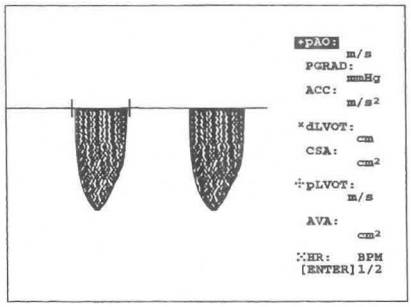
→ A "+" mark appears at the center of the screen.



Using the trackball, move the "+" mark to the starting position, then perform a trace (using the same procedure as that for Mean VEL).

② When you reach the end position, press the **MARK REF** switch.

→ pAO, PGRAD, and ACC are computed.



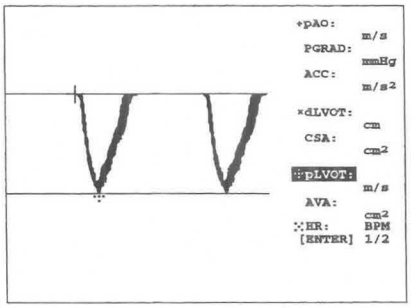
③ Next, .display a B-mode or M-mode image, and select **dLVOT.**

→ The × mark appears at the center of the screen, so measure dLVOT.

④ Next, measure the flow velocity at the left ventricle outflow tract (pLVOT).

Trace the PW image, then press the ⁘ switch.

→ The ⁘ bar appears, so move it to the peak of the flow velocity at the left ventricle outflow tract.

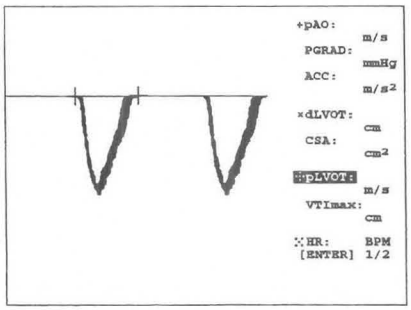


(The same applies if RV PV STENO-1 is activated.)

(If LV AV STENO-2 or RV PV STENO-2 measurement has been started)

The system displays the ⁘ mark for tracing. Trace the spectrum pattern.

At the trace end point, press the **MARK REF** switch once.



⑤ If ECG is not displayed, select ⁙ **HR** from the touch panel menu (to perform this selection with the ⁙ switch, press the mark twice), then measure the heart rate. (Same procedure as that for Heart Rate)

The subsequent procedure is the same as steps ④ to ⑧ of 14-4 "Basic Procedure for Cardiac Function Measurement" (P.14-29 and 30).

(Measurement tools)

pAO(pPV),PGRAD,ACC : Same procedure as that for Mean VEL

pLVOT(pRVOT) :Same procedure as that for D.VEL

pLVOT(pRVOT) : Same procedure as that for Mean VEL.

dLVOT(dRVOT) : Bmode(Same procedure as that for DIST.)、Mmode(Same procedure as that for M.Length)

HR : Same procedure as that for Heart Rate

(

<Example of measurement result display forLV AV STENO-1 >

```
+pAO:          ← Peak flow velocity at the aortic valve
      m/s
PGRAD:         ← Peak pressure gradient
      mmHg
 ACC:          ← Acceleration
      m/s²
xdLVOT:        ← Diameter of left ventricle outflow tract
      cm
 CSA:          ← Cross sectional area
      cm²
+pLVOT:        ← Peak flow velocity at the left ventricle outflow tract
      m/s
 AVA:          ← Aortic valve area
      cm²

HR:   BPM      ← Heart rate
[ENTER] 1/2    ← Press the SET switch to advance to Page 2.
```

Page

```
MVEL:          ← Mean velocity
      m/s
MGRAD:         ← Mean pressure gradient
      mmHg
AT:   ms       ← Acceleration time
ET:   ms       ← Ejection time
AT/ET:         ← AT/ET Ratio

VTI:
      cm       ← Velocity time integral
       2/2
```

The layout for a horizontal display is as follows:

```
          m/s    PGRAD:    mmHg
MVEL:     m/s    MGRAD:    mmHg
ACC:      m/s²
AT:       ms     ET :      ms
AT/ET:           AVA:      cm²
VTI:      cm
xdLVOT:   cm     CSA:      cm²
+pLVOT:   m/s
HR:       BPM          [ENTER]
```

<Example of measurement result display for RV PV STENO-1 >

```
+pPV:          ← Peak flow velocity at the pulmonic valve
      m/s
 PGRAD:        ← Peak pressure gradient
      mmHg
 ACC:          ← Acceleration
      m/s²
xdRVOT:        ← Diameter of right ventricle outflow tract
      cm
 CSA:          ← Cross sectional area
      cm²
+pRVOT:        ← Peak flow velocity at the right ventricle outflow tract
     m/s
  PVA:         ← Pulmonic valve area
      cm²
HR:   BPM      ← Heart rate
[ENTER] 1/2    ← Press the SET switch to advance to Page 2.
```

Page

```
MVEL:          ← Mean velocity
      m/s
MGRAD:         ← Mean pressure gradient
      mmHg
AT:   ms       ← Acceleration time
ET:   ms       ← Ejection time
AT/ET:         ← AT/ET Ratio

VTI:  cm       ← Velocity time integral
      2/2
```

The layout for a horizontal display is as follows:

```
          m/s    PGRAD:    mmHg
MVEL:     m/s    MGRAD:    mmHg
ACC:      m/s²
AT:       ms     ET :      ms
AT/ET:           PVA:      cm²
VTI:      cm
xdRVOT:   cm     CSA:      cm²
+pRVOT:   m/s
HR:       BPM          [ENTER]
```

<Example of measurement result display for LV AV STENO-2>

```
+pAO:          ← Peak flow velocity at the aortic valve
      m/s
PGRAD:         ← Peak pressure gradient
      mmHg
 ACC:          ← Acceleration
      m/s²
xdLVOT:        ← Diameter of left ventricle outflow tract
      cm
 CSA:          ← Cross sectional area
      cm²
÷pLVOT:        ← Peak flow velocity at the left ventricle outflow tract
      m/s
VTImax:        ← Velocity time integral (at maximum velocity)
      cm
:HR:   BPM     ← Heart rate
[ENTER] 1/2    ← Press the SET switch to advance to Page 2.
```

Page

```
MVEL:          ← Mean velocity
      m/s
MGRAD:         ← Mean pressure gradient
      mmHg
AT:    ms      ← Acceleration time
ET:    ms      ← Ejection time
AT/ET:         ← AT/ET Ratio
VTI:
       cm      ← Velocity time integral
AVA:           ← Aortic valve area
       cm²
       2/2
```

The layout for a horizontal display is as follows:

	m/s	PGRAD:	mmHg
MVEL:	m/s	MGRAD:	mmHg
ACC:	m/s²		
AT:	ms	ET :	ms
AT/ET:		AVA:	cm²
VTI:	cm		
xdLVOT:	cm	CSA:	cm²
÷pLVOT:	m/s		
VTImax:	cm		
:HR:	BPM	[ENTER]	

<Example of measurement result display for RV PV STENO-2>

```
+pPV:          ← Peak flow velocity at the pulmonic valve
      m/s
 PGRAD:        ← Peak pressure gradient
      mmHg
 ACC:          ← Acceleration
      m/s²
xdRVOT:        ← Diameter of right ventricle outflow tract
      cm
 CSA:          ← Cross sectional area
      cm²
÷pRVOT:        ← Peak flow velocity at the right ventricle outflow tract
      m/s
 VTImax:       ← Velocity time integral (at maximum velocity)
      cm
:HR:   BPM     ← Heart rate
[ENTER] 1/2    ← Press the SET switch to advance to Page 2.
```

Page

```
MVEL:          ← Mean velocity
      m/s
MGRAD:         ← Mean pressure gradient
      mmHg
AT:    ms      ← Acceleration time
ET:    ms      ← Ejection time
AT/ET:         ← AT/ET Ratio
VTI:   cm      ← Velocity time integral
PVA:           ← Pulmonary valve area
       cm²
       2/2
```

The layout for a horizontal display is as follows:

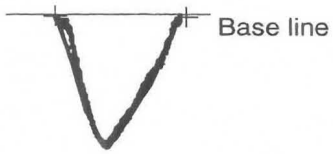
	m/s	PGRAD:	mmHg
MVEL:	m/s	MGRAD:	mmHg
ACC:	m/s²		
AT:	ms	ET :	ms
AT/ET:		PVA:	cm²
VTI:	cm		
xdRVOT:	cm	CSA:	cm²
÷pRVOT:	m/s		
VTImax:	cm		
:HR:	BPM	[ENTER]	

Flow volume measurements SV/CO and Flow Volume

For the flow volume measurements, two measurement methods are possible; tracing the Doppler waveform (SV/CO) and measuring the speed of a Doppler waveform, such as a constant flow, that has a fixed velocity (Flow Volume).
These measurements do not support a report function.

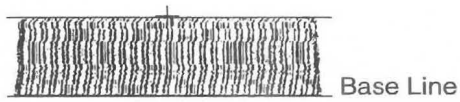
<Measurement method and measurement part>

SV/CO



VTI and mean velocity (MVEL) are measured by tracing method

Flow Volume



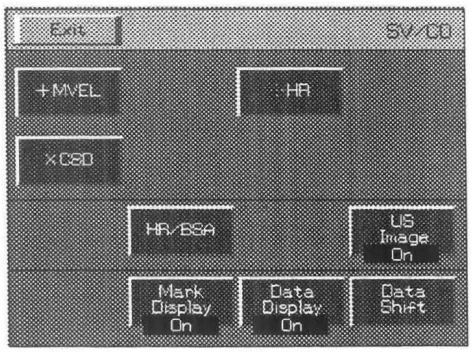
Mean velocity (MVEL) is measured with a velocity bar

The parts to be measured and the calculation equation equations are shown below.

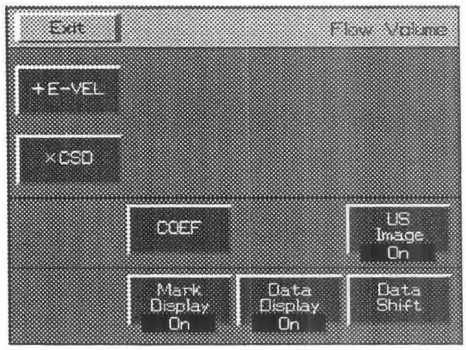
Stroke volume	SV=CSA × VTI	
Cardiac output	CO=SV × HR / 1000	
Flow Volume	FV=MVEL × CSA × 60sec × k	K=coefficient (currently K=1)

<Touch panel menu>

SV/CO



FLOW VOLUME



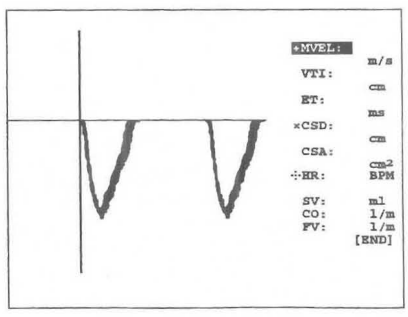
<Measurement procedure>

For SV/CO (Register SV/CO in advance in the menu using a preset.)
You can select an item using the touch panel menu, caliper mark switch or **SET** switch.

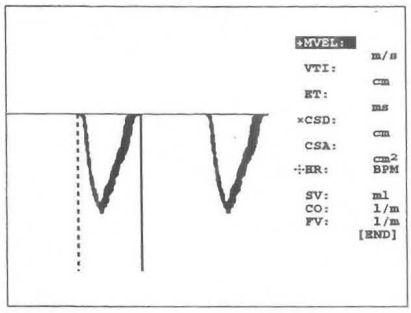
<When using the auto trace function>

① Select **SV/CO**.
→ A solid line cursor for determining the trace range appears at the center of the screen.

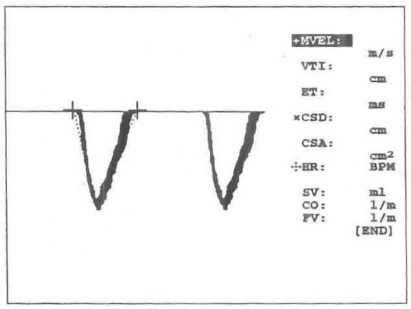
② Using the trackball, move the solid line cursor to the starting point of the trace, then press the **MARK REF** switch.



③ Using the trackball, move the separated solid line cursor to the end point of the trace.
Once you have specified the trace range, press the **MARK REF** switch.
→ The trace operation starts.



④ Upon completion of the trace operation, the measurement results are displayed.



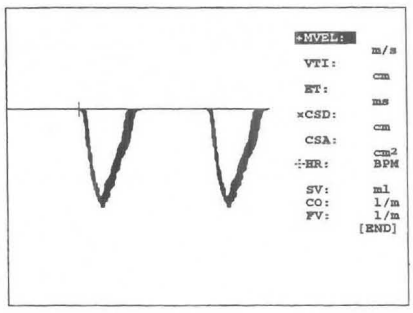
[Remark]
For details of the method of using auto trace,and also the precautions and various settings, refer to 12-4-3."Basic Method of using the Auto Trace Function".

⑤ If the auto trace data is not suitable, you can carry out a manual trace.
→ Press the caliper switch (+ mark), and the manual trace operation starts. Also, all of the displayed auto trace data is erased.
Note that once you start a manual trace operation, you cannot return to an auto trace operation.

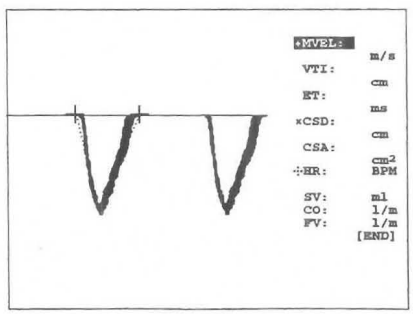
[Remark]
If you press the ×switch upon completion of the auto trace operation, the system proceeds to CSD measurement.
→ In this case, the trace line is held. If however the image conditions are different because of a change of mode, for example, the trace line disappears, and only the results are displayed.

<When using a manual trace>

① Press the caliper mark switch (+ mark). (If AUTO TRACE is set to OFF using the Preset function, select **SV/CO** .)
→ A + mark appears in the middle of the screen.
Using the trackball, move the "+" mark to the starting position, then perform a trace (using the same procedure as that for Mean VEL).



② When you reach the end position, press the **MARK REF** switch.
→ The system calculates MVEL and VTI,ET.



③ Next, display a B mode or M mode image, and select ✕**CSD (left ventricle outflow path diameter)**.
→ The "×" mark appears at the center of the screen, so measure CSD.

When CSD is measured, the system calculates and displays SV,CO (When an ECG is displayed), and FV.

④ If ECG is not displayed, select ⁖ **HR** from the touch panel menu, then measure the heart rate. (Same procedure as that for Heart Rate)

The subsequent procedure is the same as steps ④ to ⑧ of 14-4 "Basic Procedure for Cardiac Function Measurement" (P.14-29 and 30).

(Measurement tools)

M.VEL. : Same procedure as that for Mean VEL.
CSD : Bmode(Same procedure as that for DIST.)、Mmode(Same procedure as that for M.Length)
HR : Same procedure as that for Heart Rate

<Example of measurement result display for SV/CO>

```
+MVEL:          ← Mean velocity
      m/s
VTI:            ← Velocity time integral
      cm
ET:   ms        ← Ejection time
xCSD:           ← Cross-sectional diameter of the outflow tract
      cm
CSA:            ← Cross-sectional area of the outflow tract
      cm²
⁖HR:  BPM       ←Heart rate
SV:   ml        ← Stroke Volume
CO:             ← Cardiac Output
      l/m
FV:             ← Flow Volume(Presetで設定した場合)
      l/m
[END]
```

The layout for a horizontal display is as follows:

```
+MVEL:  m/s   VTI:   cm
ET:     ms
xCSD:   cm    CSA:   cm²
⁖HR:
SV:     ml    CO:    l/m
FV:     l/m
                     [END]
```

For Flow Volume

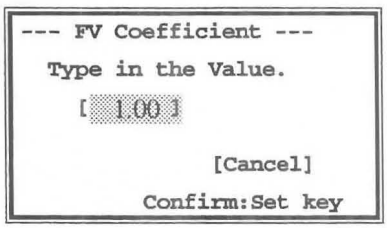
You can select an item using the touch panel menu, caliper mark switch or **SET** switch.

<Using auto trace function>

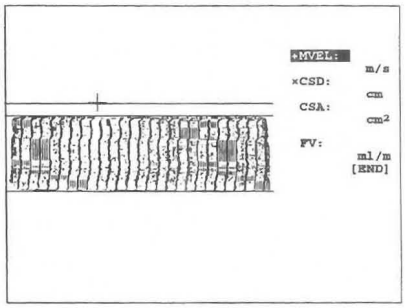
[Remark]
When performing Flow Volume measurement, set the trace mode to **Mean**.

[Remark]
You can change the coefficient (k) of the Flow Volume calculation equation.

Select **COEF** from the touch panel menu. The pop-up menu shown in the figure at right appears.
Enter the numerical value (coefficient: k) from the keyboard.

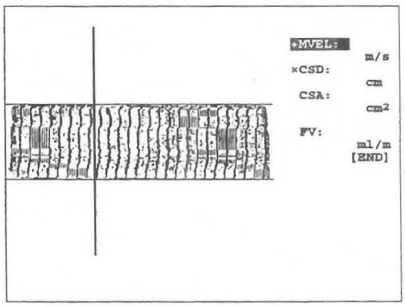


① Select **Flow Volume**.
→ The + bar appears at the center of the screen.

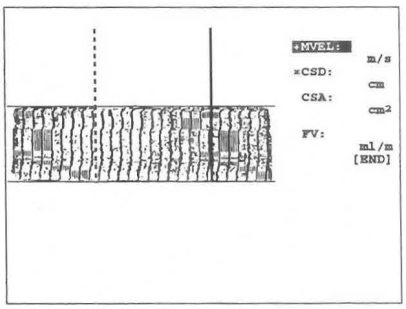


② To measure the flow velocity using auto trace, press the "+" switch.
→ The + bar disappears, and a solid line cursor for determining the trace range appears.

Using the trackball, move the solid line cursor to the starting point of the trace, then press the **MARK REF** switch.

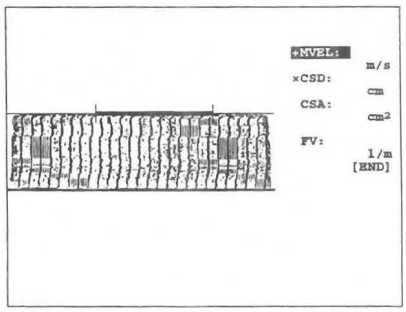


③ Using the trackball, move the separated solid line cursor to the end point of the trace.
Once you have specified the trace range, press the **MARK REF** switch.
→ The trace operation starts.



④ = Upon completion of the trace operation, the measurement results are displayed.

[Remark]
For details of the method of using auto trace,and also the precautions and various settings, refer to 12-4-3."Basic Method of using the Auto Trace Function".



⑤ If you press the × switch upon completion of the auto trace operation, the system proceeds to CSD measurement.

→ In this case, the trace line is held. If, however, the image conditions are different because a freeze state was canceled or the mode was changed, for example, the trace line disappears, and only the results are displayed.

⑥ If the auto trace data is not suitable, you can carry out a manual trace.

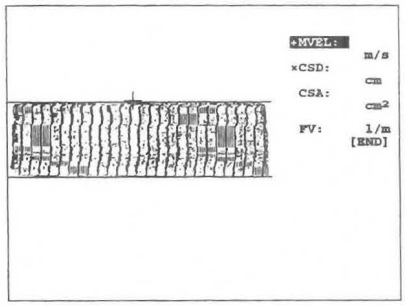
→ Press the caliper switch (+ mark), and the manual trace operation starts. Also, all of the displayed auto trace data is erased.

Note that once you start a manual trace operation, you cannot return to an auto trace operation.

<When using a manual trace>

① Press the caliper mark switch (+ mark) . (If AUTO TRACE is set to OFF using the Preset function, select **Flow Volume** and press the + mark twice.)

→ A "+" bar appears in the middle of the screen.



Using the trackball, move the "+" mark to the starting position, then perform a trace (using the same procedure as that for Mean VEL).

② When you reach the end position, press the **MARK REF** switch.

→ MVEL is computed.

③ Next, measure CSD.

Display a B mode or M mode image, then press the × switch.

→ "×" mark appears in the middle of the screen. Measure CSD in the same manner as the SV/CO measurement.

The following steps are the same as for SV/CO measurement.

<Example of measurement result display for Flow Volume>

```
+MVEL:          ← Mean Velocity
        m/s
×CSD:           ← Cross-Sectional diameter
        cm
 CSA:           ← Cross-sectional are
        cm²
 FV:            ← Flow Volume
        l/m
      [END]
```

The layout for a horizontal display is as follows:

```
+MVEL:   m/s
×CSD:    cm     CSA:    cm²
 FV:     l/m
                 [END]
```

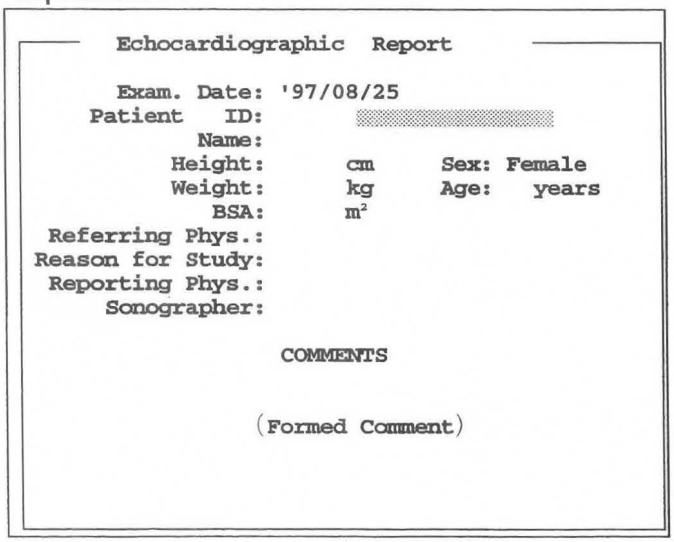
14-6. Report

The Report function arranges and displays on the monitor screen each index value and mean value for cardiac function measurement, together with related patient information.

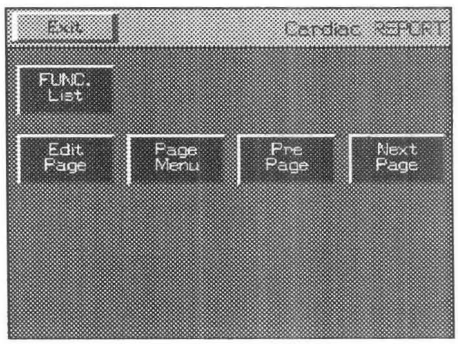
You can view the contents of the REPORT area at any time, simply press the **REPORT** switch.
When you press the **REPORT** switch, the system displays a patient information page like the one shown below.

[Remark]
When you press the **REPORT** switch while a cardiac measurement is activated, the system displays the page corresponding to that measurement.

< Menu explanation >



Report menu



FUNC List: In the cardiac measurement report mode, select this item to view the contents of the obstetrical measurement report. This contains Application Change item.

Edit Page: The system displays the measurement value for each measurement (for the past three measurements) and also the average value. You can erase or correct the data.
If you select **Edit Page**, the menu item changes to Report Page.

Page Menu: The report pages consists of a patient information page , 10 result display pages, and 11 edit pages. Select this item to display a list of the report pages. During Edit display, select this item to display a list of the edit pages. This item allows you to directly call the page you require.

Pre Page: The system returns to the immediately previous page.

Next Page: The system advances one page at a time.

14-6-1. Explanation of the report pages

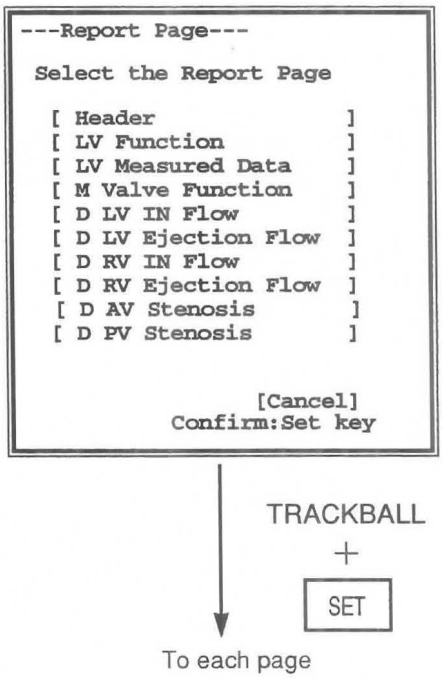
The report pages consist of the following ten pages :

Header	: Patient information page
B/M-Mode LV Function Data	: Report for left ventricular function measurement in B- and M-modes
B/M-Mode LV Measurement Data	: Report for measurements in B- and M-modes
M-Mode Valve Function	: Report for valve measurements in M mode
D-Mode LV IN Flow	: Report for left ventricular inflow measurements in D-mode
D-Mode LV Ejection Flow	: Report for left ventricular ejection flow measurements in D-mode
D-Mode RV IN Flow	: Report for right ventricular inflow measurements in D-mode
D-Mode RV Ejection Flow	: Report for right ventricular ejection flow measurements in D-mode
D-Mode AV Stenosis	: D mode aortic valve stenosis report
D-Mode PV Stenosis	: D mode pulmonic valve stenosis report

<Selection procedure>

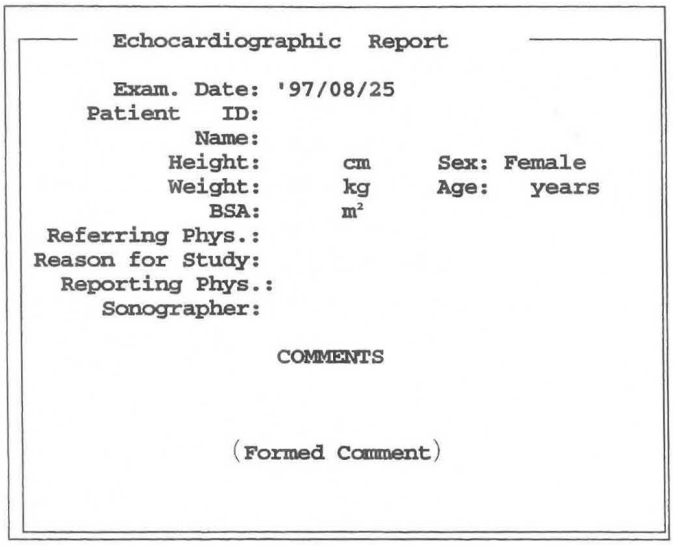
① Select **Page Menu** on the report menu.
→ The sub-menu shown at right appears on the screen. Using the trackball, move the highlighted display to the report page that you wish to display, then press the **SET** switch.

② If you wish to select one page at a time, select **Pre Page** or **Next Page** on the touch panel menu.



<Entering patient information>

You can pre-enter patient information in the report area.



Select **[Header]** to display the patient information page.

This page is used to display and enter the following items :

1. Exam. Date : The system timer automatically enters the current date. You can also enter the date manually for a VTR playback image.
2. Patient ID : Enter the patient's ID number. (*1)
3. Name : Enter the patient's name. (*1)
4. Height, Weight : Enter the patient's height and weight. (*1)
5. Sex : Enter the patient's sex. (*1)
6. AGE : Enter the patient's age. (*1)
7. Referring Phys. : Enter the name of the referring physician.
8. Reason for Study : Enter the reason for the examination.
9. Reporting Phys. : Enter the name of the physician who created the report.
10. Sonographer : Enter the name of the person conducting the examination.
11. COMMENTS : Enter comments from the keyboard.
    (You can enter up to four lines of 46 characters each.)

[Remark]
Items 2, 3, 4, 5, and 6 can be inherited from the ID information entered by the **NEW PATIENT** and **ID** switches and do not need to be re-entered. The ID information entered in this page is inherited when the **ID** switch is pressed.

<Entry procedure>

When you move the highlighted display to an item that you wish to change , an underline cursor appears, so enter a value from the keyboard, then press the return key or the **SET** switch.

To delete the highlighted display, press the **MARKREF** switch.

(2) Input for [Formed Comment]

The system displays several comment items for the predetermined titles. To create a comment statement, select one of the items.

The **FORMED COMMENT** area consists of ten lines of 46 characters each.

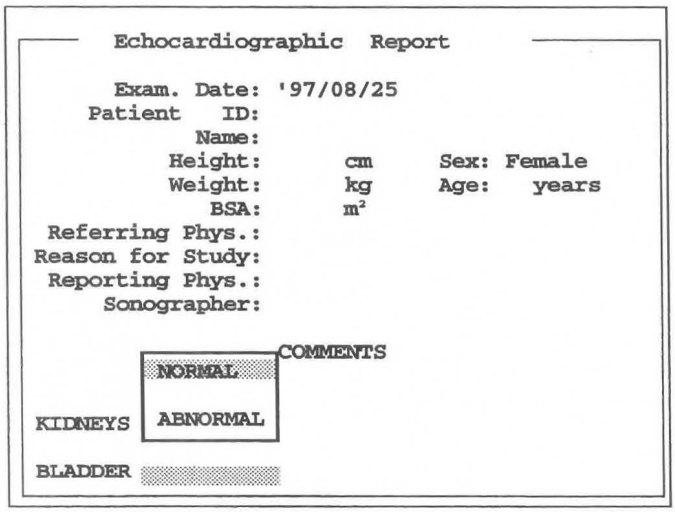
① Move the highlighted display to the **FORMED COMMENT** area.

② Press the **SET** switch

→ Selectable Comment registered by Formed Comment of Cardio-Program is displayed.

[Remark]

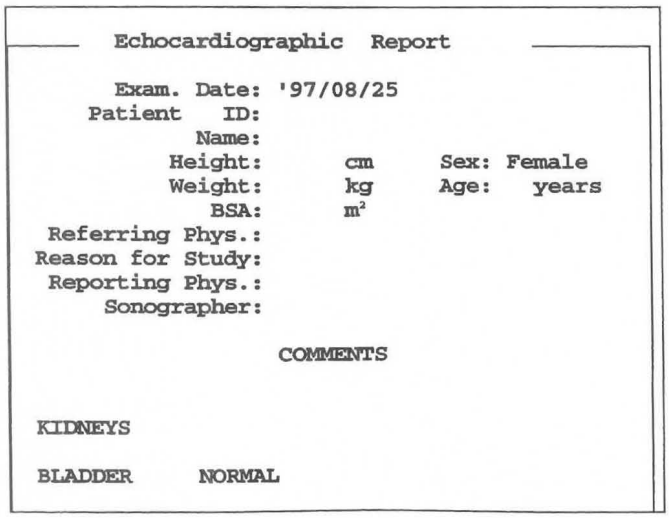
If no comments were registered, **[Cancel]** is displayed. Press the **SET** switch and enter comments from the keyboard. You can also enter comments from the keyboard even when comments are registered.



※ Example when "**NORMAL**" and"**ABNORMAL**" were registered in the preset

③ Move the highlighted cursor to the comment that you wish to select, then press the **SET** switch.

→ The comment is called.



<Page displays>

Header

Displays the patient information page.

```
Echocardiographic Report
Exam. Date: '97/06/26
Patient ID:
Name:
Height:        cm      Sex: Female
Weight:        kg      Age:     years
BSA:           m²
Referring Phys.:
Reason for Study:
Reporting Phys.:
Sonographer:

COMMENTS
```

B/M-Mode LV Function Data

Displays the results of the left ventricular function calculations in B- and M-modes.

```
Echocardiographic Report
Exam. Date: '97/08/25
Patient ID:
Name:
B/M-Mode LV Function Data
                Pombo       Teichholz

EDV (ml)
ESV (ml)
SV  (ml)
SVI (ml/m²)
CO  (l/min)
COI (l/min/m²)
EF  (%)

H.R.            BPM
BSA             m²

FS              %
MVCF            cir/s       ET              ms

                Diastole    Systole     %Change
LVID                cm          cm          %
IVS                 cm          cm          %
LVPW                cm          cm          %
IVS/LVPW
```

B/M-Mode LV Measurement Data

Displays the results of the left ventricular function measurement in B- and M-modes.

```
Echocardiographic Report
Exam. Date: '97/08/25
Patient ID:
Name:
B/M-Mode LV Measurement data
View                Diastole    Systole     %Change

B-LAX   AOD             cm          cm          %
        LAD             cm          cm          %
        LVD             cm          cm          %

B-SAX   LVSLMV          cm          cm          %
        LVSAMV          cm          cm          %
        LVSAPM          cm          cm          %

B-APX   LVL             cm          cm          %
        LVLA cm         cm          %

  LA/AO
  areaEF        (LVSAMV)
                (LVLA)
```

M-Mode VALVE Function Data

Displays the results of the valve measurements in M mode.

```
Echocardiographic Report
Exam. Date: '97/08/25
Patient ID:
Name:
M-Mode VALVE Function Data
   MITRAL VALVE                AORTIC VALVE

  C-E           cm          AVD         cm
  C-A           cm          AODd        cm
  A/E                       AODs        cm
  E-F SLP       cm/s        LADs        cm
  EPSS          cm          LADd        cm
  LVOTD         cm          LA/AO
  H.R.          BPM         RVOTd       cm
                            RVOTs       cm
                            ET          ms
                            H.R.        BPM

   TRICUSPID VALVE            PULMONIC VALVE

  E-F SLP       cm/s        AWAVE       cm
  C-E           cm          e-f SLP     cm/s
  C-A           cm          b-c SLP     cm/s
  A-E                       b-c         cm
  D-E SLP       cm/s        H.R.        BPM
  D-E           cm
  H.R.          BPM
```

D-Mode LV IN FLOW study

Displays the results of the left ventricular inflow measurements in D-mode.

```
Echocardiographic Report
Exam. Date: '97/08/25
Patient ID:
Name:
D-Mode LV IN FLOW study

  E-VEL         m/s         E-GRAD      mmHg
  A-VEL         m/s         A-GRAD      mmHg
  A/E
  MVEL          m/s         MGRAD       mmHg

  ACC           m/s²
  AT            ms
  ET            ms
  AT/ET

  VTI           cm

  PI/2T         ms
  MVA           cm²         B-MVA       cm²

  H.R.          BPM
```

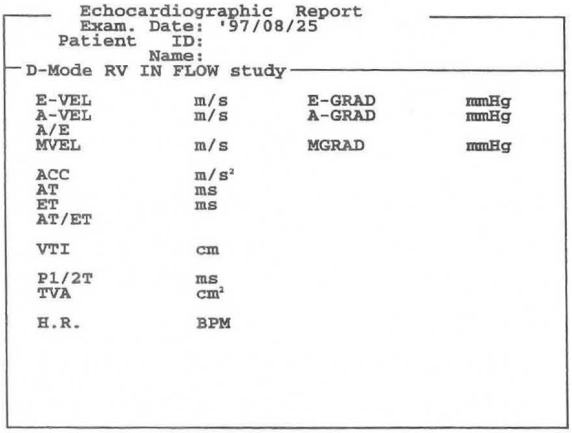
D-Mode LV EJECTION FLOW study

Displays the results of the left ventricular ejection flow measurements in D-mode.

```
Echocardiographic Report
Exam. Date: '97/08/25
Patient ID:
Name:
D-Mode LV EJECTION FLOW study

  PVEL          m/s         PGRAD       mmHg
  MVEL          m/s         MGRAD       mmHg

  ACC           m/s²
  AT            ms
  ET            ms
  AT/ET                       FLOW VOLUME

  CSD           cm          VTI         cm
  CSA           cm²         avSV        ml
                            avSVI       ml/m²
  Vmax          m/s         avCO        l/min
  AVA           cm²         avCOI       l/min/m²

  VTImax        cm          Qp/Qs
  AVA           cm²

  H.R.          BPM
  BSA           m²
```

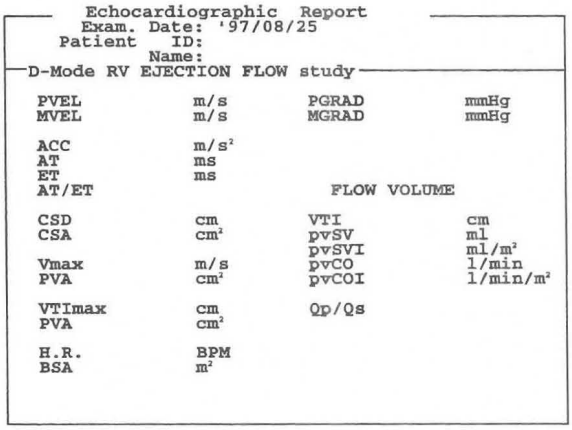
D-Mode RV EJECTION FLOW study

Displays the results of the right ventricular inflow measurements in D-mode.



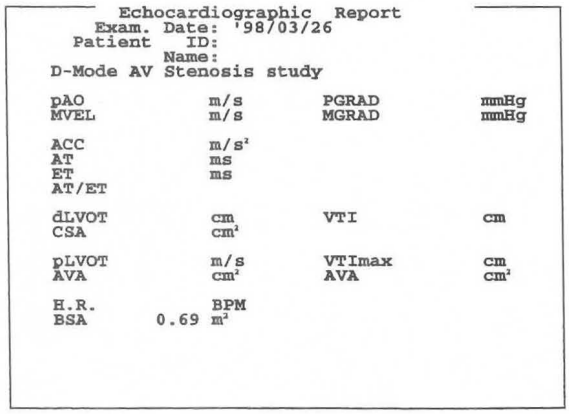
D-Mode RV EJECTION FLOW study

Displays the results of the right ventricular ejection flow measurements in D-mode.



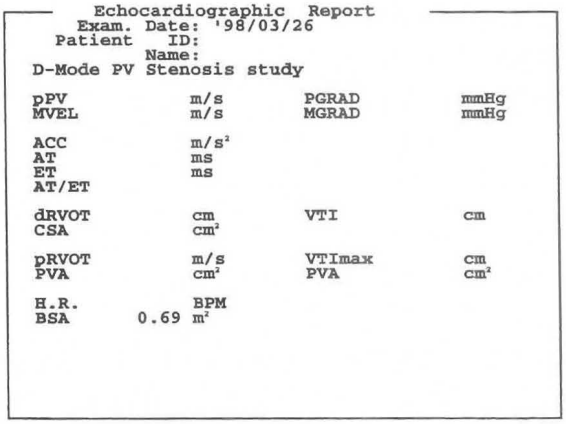
D-Mode AV Stenosis study

This page displays the results of three AV stenosis measurements performed in the D mode.



D-Mode PV Stenosis study

This page displays the results of three PV stenosis measurements performed in the D mode.



14-6-2. Explanation of the Edit pages

The Edit Page displays the measurement values for each measurement (up to three trials) and the average values. The Edit pages can be used to delete or correct measured data.
To display the Edit pages, select **Edit Page** from the REPORT menu.
To end the editing operation, press another function switch or press the **REPORT** switch.

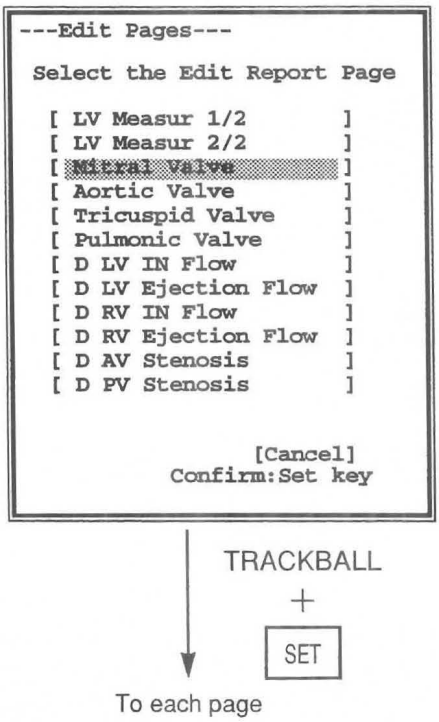
The edit pages consist of 13 pages:

B/M-Mode LV Measurement Data1/2	: Editing of B- and M-mode measurements, page 1
B/M-Mode LV Measurement Data2/2	: Editing of B- and M-mode measurements, page 2
B/M-Mode Simpson's rule Data	: Editing of B-mode Simpson's rule measurements
M-Mode MITRAL VALVE Measurement Data	: Editing of M-mode mitral valve measurements
M-Mode AORTIC VALVE Measurement Data	: Editing of M-mode aortic valve measurements
M-Mode TRICUSPID VALVE Measurement Data	: Editing of M-mode tricuspid valve measurements
M-Mode PULMONIC VALVE Measurement Data	: Editing of M-mode pulmonary valve measurements
D-Mode LV IN FLOW Measurement Data	: Editing of D-mode left ventricular in flow measurements
D-Mode LV EJECTION FLOW Measurement Data	: Editing of D-mode left ventricular ejection flow measurements
D-Mode RV IN FLOW Measurement Data	: Editing of D-mode right ventricular in flow measurements
D-Mode RV EJECTION FLOW Measurement Data	: Editing of D-mode right ventricular ejection flow measurements
D-Mode AV Stenosis Measurement Data	D mode AV stenosis measurement Edit page
D-Mode PV Stenosis Measurement Data	D mode PV stenosis measurement Edit page

<Setting procedure>

① Select **Edit Page** of the report menu, then select **Page Menu.**
→ The sub-menu shown at right appears on the screen. Using the trackball, move the highlighted display to the Edit page that you wish to display, then press the **SET** switch.

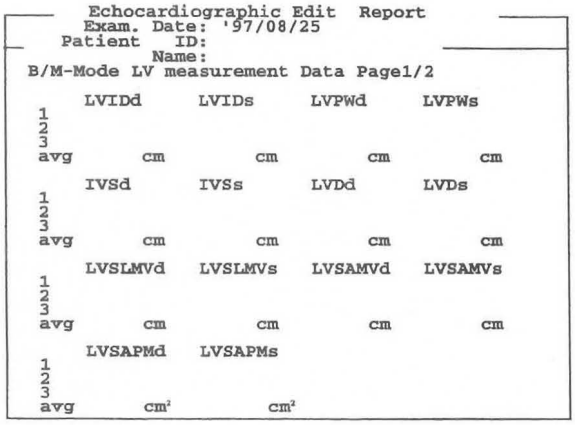
② Use menu selections **Pre Page** and **Next Page** to turn the pages one by one.



<Page displays>

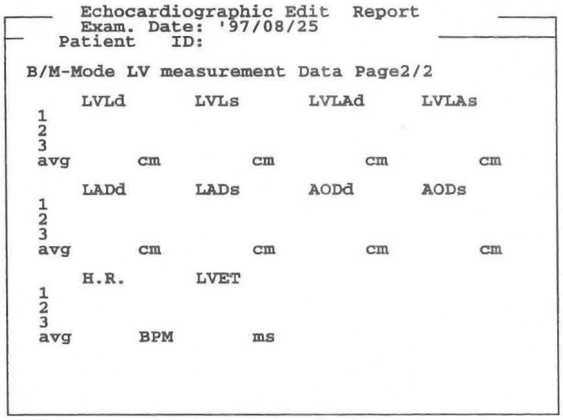
B/M-Mode Measurement Data 1/2

Displays up to three measurement results for items measured in B- and M-modes.



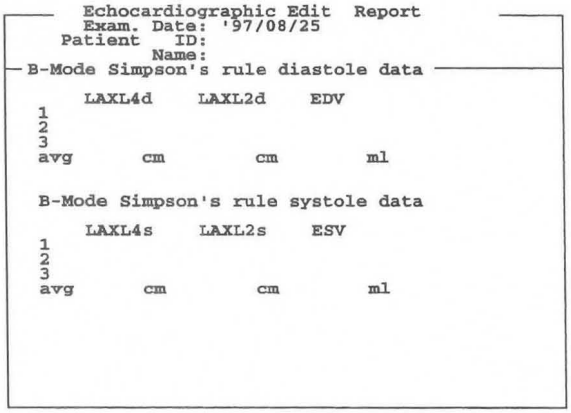
B/M-Mode Measurement Data 2/2

Displays up to three measurement results for items measured in B- and M-modes.



B-Mode Simpson's rule data

This page displays up to three sets of LAXL4 and LAXL2 values that were calculated by the Simpson method.

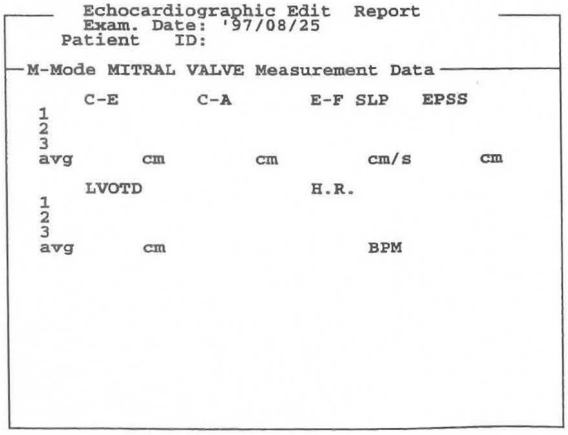


[Remark]

(You cannot correct the data displayed on this page. If you delete the EDV and ESV data, the LAXL4 and LAXL2 data is also deleted.)

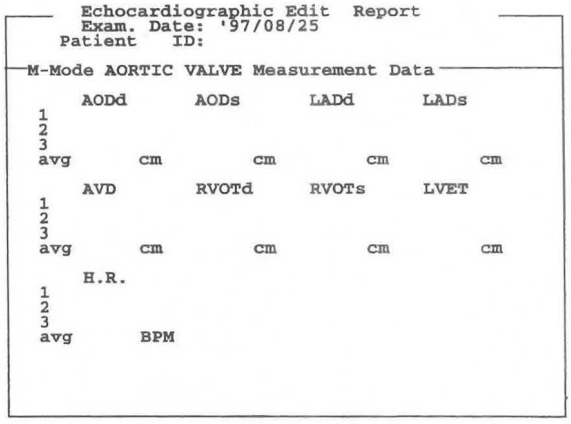
M-Mode MITRAL VALVE Measurement Data

Displays up to three measurement results for mitral valve measurements measured in M-mode.



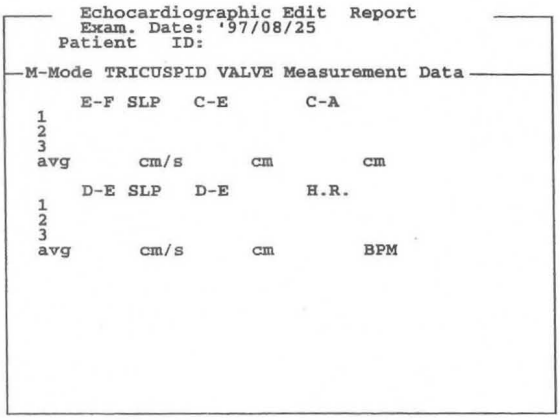
M-Mode AORTIC VALVE Measurement Data

Displays up to three measurement results for aortic valve measurements measured in M-mode.



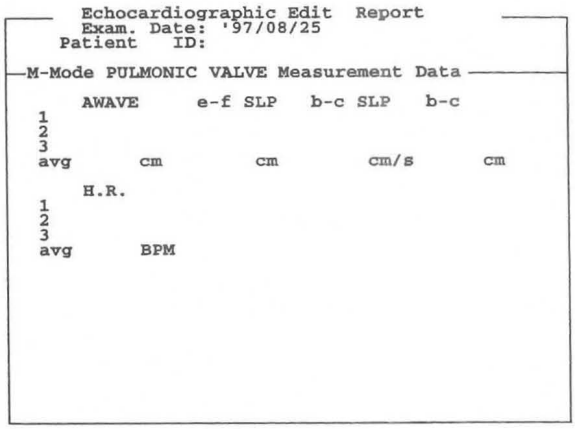
M-Mode TRICUSPID VALVE Measurement Data

Displays up to three measurement results for tricuspid valve measurements measured in M-mode.



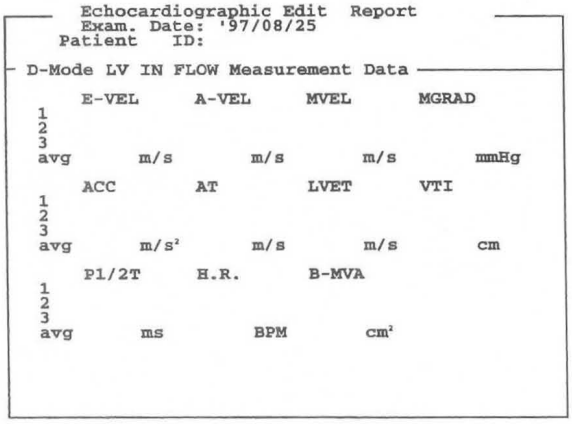
M-Mode PULMONIC VALVE Measurement Data

Displays up to three measurement results for pulmonary valve measurements measured in M-mode.



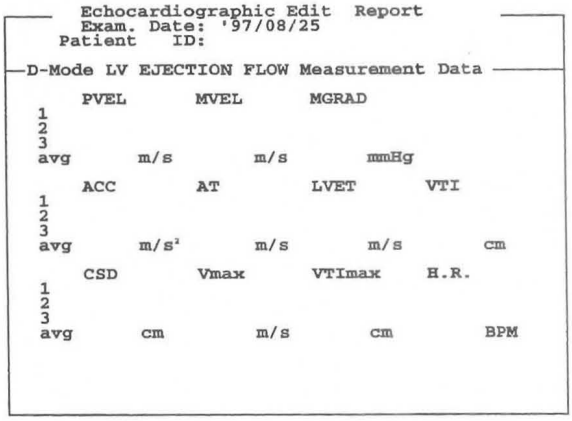
D-Mode LV IN FLOW Measurement Data

Displays up to three measurement results for left ventricular inflow measurements measured in D-mode.



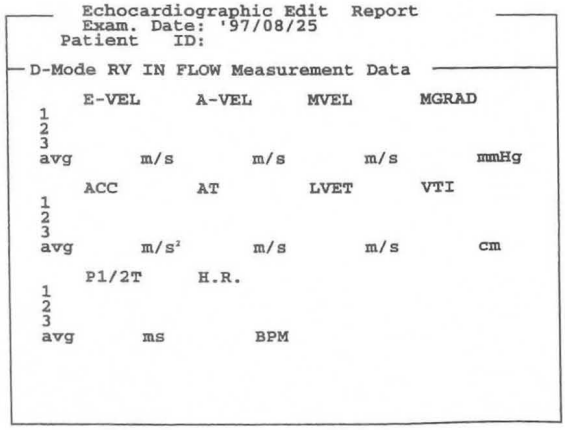
D-Mode LV EJECTION FLOW Measurement Data

Displays up to three measurement results for left ventricular ejection flow measurements measured in D-mode.



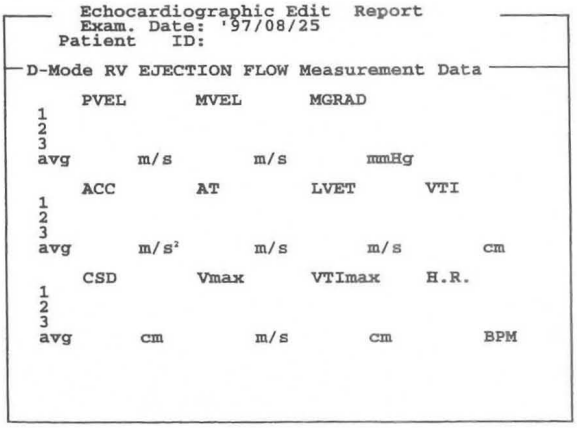
D-Mode RV IN FLOW Measurement Data

Displays up to three measurement results for right ventricular ventricularinflow measurements measured in D-mode.



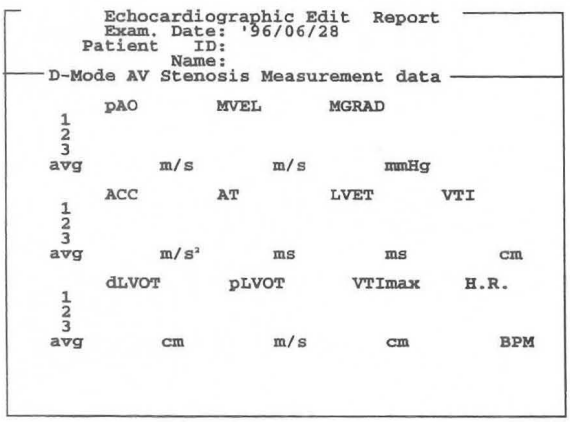
D-Mode RV EJECTION FLOW Measurement Data

Displays up to three measurement results for right ejection flow measurements measured in D-mode.



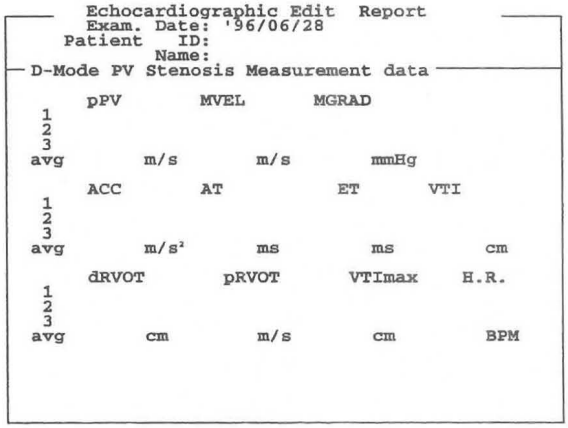
D-Mode AV Stenosis Measurement Data

This page displays the results of three AV stenosis measurements performed in the D mode.



D-Mode PV Stenosis Measurement Data

This page displays the results of three PV stenosis measurements performed in the D mode.



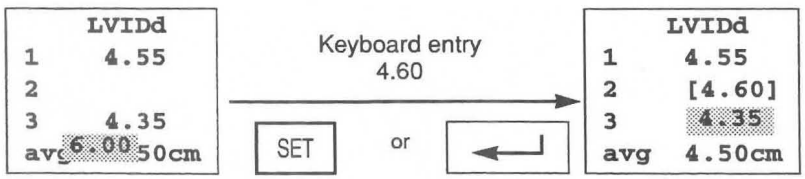
<Operation>

[Deleting registered data]

When you move the highlighted display, the system automatically displays a cursor. To delete an unwanted number, press the **CLEAR** switch on the keyboard. If you then press the **SET** switch or the RETURN key, the system closes the space.

[Changing registered data]

To change a number, enter a number at the cursor from the keyboard, then press the **SET** switch or the RETURN key.



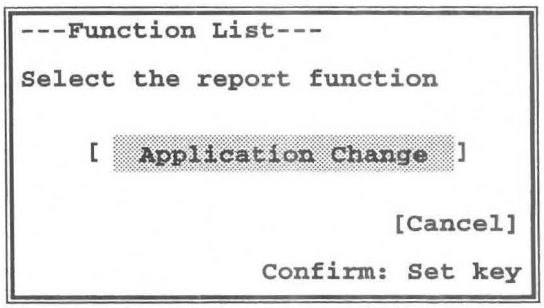
Remark]
The system encloses the corrected value within brackets.

Explanation of FUNC LIST

When OB and CARDIO are assigned to the same preset measurement menu, the system creates two application reports.
Select FUNC LIST to view the contents of the CARDIO measurement report during the OB measurement report mode. You can select **FUNC. List** to change the application of the report display even during the Edit display.

<Operation>

① When you select **1. FUNC LIST**, the sub-menu shown at right appears.
The highlighted display is at [Application Change], so press the **SET** switch.



② The system displays the "Report Application Change" submenu, which lists the installed report types. Move the highlighted display, then press the **SET** switch.
The system simultaneously changes all items in the report page, including the patient information items, the report, and the edit format, to those for the selected application.