

DP-6600/DP-6500

**Digital Ultrasonic Diagnostic
Imaging System**

Operator's Manual

[Advanced Volume]

Product Information:

Product Name: Digital Ultrasonic Diagnostic Imaging System

Model: DP-6600/DP-6500

Issued Date of this manual: 2007-10

Version: 1.4.

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Introduction

1. Notation Conventions

In this operator's manual, the following words are used in addition to the signal words related to the safety precautions (refer to "Safety Precautions"). Please read this operator's manual before using the system.

NOTE: Indicates information of interest to users of system as to exceptional conditions or operating procedures.

2. Operator's Manuals

A Mindray service person or instructor will explain the basic operating procedures for this system at the time of delivery. However, read this operator's manual carefully before using the system in order to understand the detailed operating procedures, functions, performance, and maintenance procedures. The organization of the documents supplied with this system is shown below:

Operator's manual of main unit	Describes detailed system information on preparation, operating procedures, maintenance checks, and functions.
Operator's manuals of transducers	Describe the operating and sterilization procedures for transducers.

NOTE: Before using, refer to the following manual:




- (Basic Volume)




3. Interface in This Operator's Manual

Depending on the software version, the actual interface may appear different from those shown in this manual.



Safety Precautions

1. Meaning of Signal Words

In this operator's manual, the signal words  **DANGER**,  **WARNING**,  **CAUTION** and **NOTE** are used regarding safety and other important instructions. The signal words and their meanings are defined as follows. Please understand their meanings clearly before reading this manual.

Signal word	Meaning
 DANGER	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
 WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
 CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.
NOTE	Indicates a potentially hazardous situation which, if not avoided, may result in property damage.

2. Meaning of Safety Symbols

Symbol	Description
	Type-BF applied part NOTE : All ultrasound transducers can be connected to this system are Type-BF applied part.
	"Attention" indicates the points requiring attention. Be sure to read the operator's manual concerning these points before using the equipment.

3. Safety Precautions

Please observe the following precautions to ensure patient and operator safety when using this system.

- ⚠CAUTION:**
1. Display the most suitable image and select the most suitable measurement mode for the intended measurement. The results must be determined by a specialist.
 2. The basic measurement results are not displayed in the exam report.
 3. Be sure to perform measurement within images. If the area is outside the image, incorrect diagnosis may result.
 4. The detailed precautions for each measurement are described in the corresponding section. Read and understand these precautions before performing the measurement.
 5. Data in temporary storage areas, such as the CINE memory, is deleted when the power supply is turned OFF or when the Patient switch is pressed. Such data may also occasionally be deleted due to accidents. To minimize the possibility of reexamination being required as a result of unintended data deletion, back up the required images on external storage media.
 6. Refer to the Operator's Manual (Basic Volume) for precautions regarding the use of this system.

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1 Preset

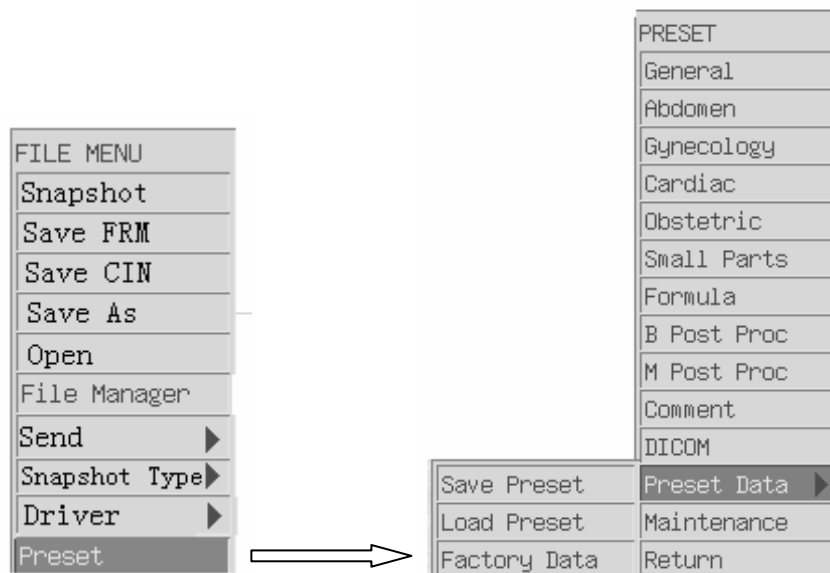
Preset function is used to set the system operating environment, status and the configuration parameters for each exam mode. The preset values are saved in the memory inside the system, which will not be lost if power-off occurs so as to ensure that the system operates in the user-desired status automatically after each start-up. This chapter gives detailed description about how to make system configuration through using the preset menu in Preset mode.

1.1 Access/Exit Preset Mode

Access the preset mode:

Press the 『File』 key on the control panel. The 『File』 lamp lights up. The FILE MENU appears on the right part of the screen. See figure below. Then select the preset item and press 『Set』 key. The system accesses the preset mode.

Select the item in the PRESET menu to preset the corresponding parameters.



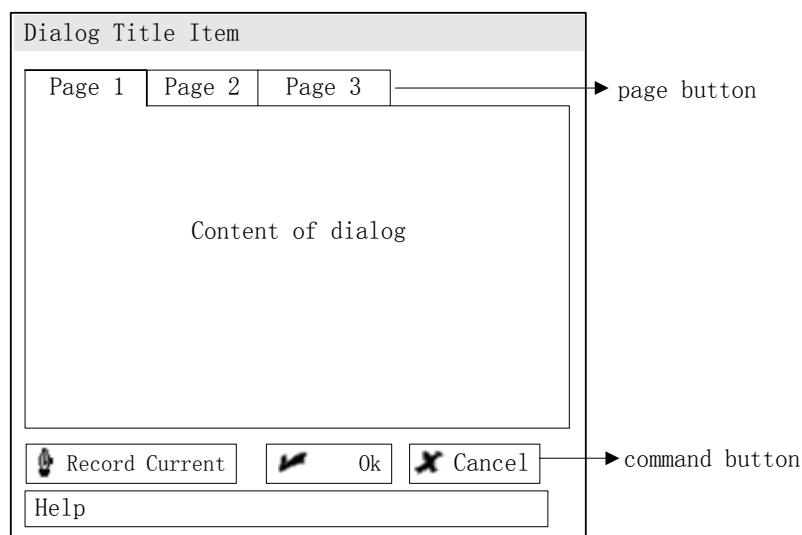
Exit Preset mode:

In Preset mode, move the cursor to the [Return] item of the menu and press the 『Set』 key to

close the PRESET menu. The system exits the preset mode and begins running according to the modified parameters.

1.2 Display/Modify Preset Information

To set up all the preset parameters and curves, the user should select the item in the PRESET menu to call up the preset dialog box. The general outline of the preset dialog box is as shown in the following figure.



Procedures to modify the preset parameters or curves:

1. Move the cursor to select the corresponding item in the PRESET menu and press the 『Set』 key to call up the corresponding preset dialog box.
2. If a dialog box having more than one page, first move the cursor to select the button of the desired page so as to open the corresponding preset page.
3. Move the cursor to the bar of the parameter to be adjusted and use the 『Set』 or the 『Back』 key to adjust the parameter. At this time, the operating information is displayed in the Help bar.
4. After setting the information in the current page, select the button of another page to set other parameters. After all the parameters have been set up, press the 『Set』 key on the 『Ok』 button to make these settings come into effect and be saved in the system, and at the same time to close the dialog box.
5. To cancel the modifications, just press the 『Set』 key on the 『Cancel』 button. This action at the same time closes the dialog box.
6. Move the cursor to the [Return] item of the PRESET menu and press the 『Set』 key to close the PRESET menu.

There are also some special buttons in the preset dialog box, whose functions are:

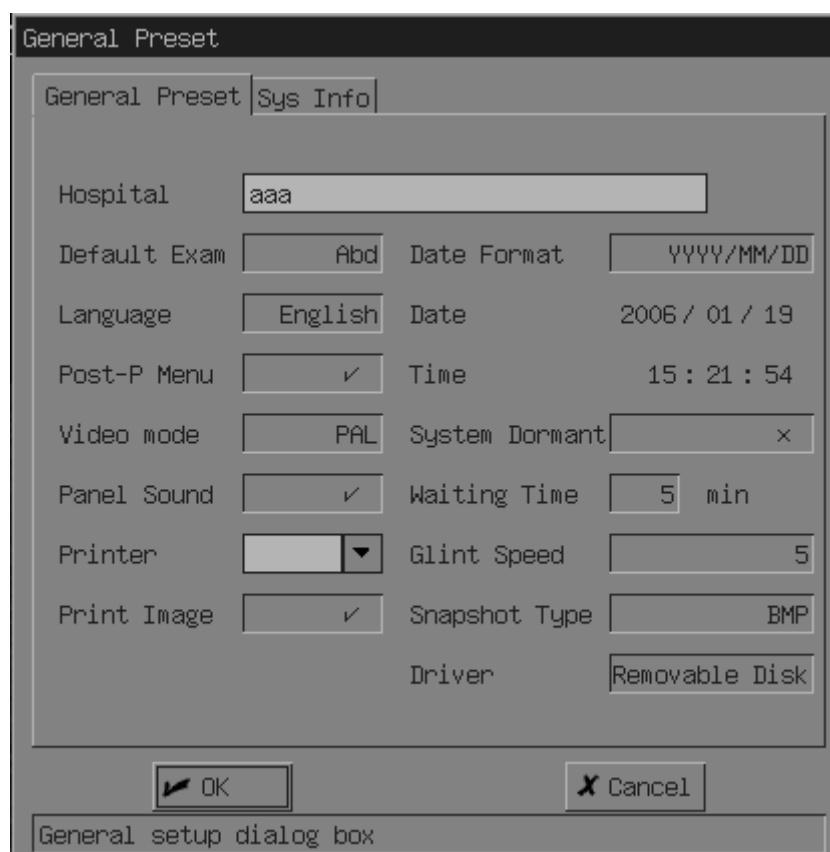
- 「Record Current」

Besides setting the parameters in the current page one by one, the user can also use the “record the current value” method to preset parameters. Press the 「Set」 key on the 「Record Current」 to set each parameter (curve) as the value (parameter or curve) used by the system before accessing the preset mode. That is to say to set up the current operating parameters of the system as the preset parameters.

NOTE: 「Record Current」 buttons are only valid in the current page.

1.3 General preset

Move the cursor to select the [General] item in the menu to call up the [General Preset] dialog box. See the following figure.



The table below is the description of the preset items in the dialog box, see table 1-1.

Table 1-1 Items in the General Preset dialog box

Item	Selections	Functional Description
Hospital	Entered by the user	To enter the hospital name displayed on the top left corner of the screen and in the diagnosis report.
Default Exam	Abd / Gyn / Car/Ob / Sml	To select the exam mode.
Language	English/Chinese	To select the language used by the system.
Post-P Menu	√ / ✕	To show/hide the Post-P submenu.
Video Mode	NTSC/PAL	Set the mode of image
Panel Sound	√ / ✕	Select the sound that the keys are pressed.
Printer	DJ9xx/ DJ9xxVIP/ DJGenericVIP/ LJMono	Select the printer type.(Generally use the system default).
Print Image	√ / ✕	To select print image or not.
Date format	YYYY/MM/DD MM/DD/YYYY DD/MM/YYYY or or	Set date format of the system
Date	Adjusted by the user	To enter the system date; Format: year/month/day Year range: 2000-2099.
Time	Adjusted by the user	To enter the system time; Format: hour/minute/second
System dormant	√ / ✕	Set the System dormant or not
Waiting Time	5~60 min	Set the System dormant waiting time
Glint speed	1~10	Set the System dormant mark move speed
Snapshot Type	JPG/BMP/DCM	To select the default snapshot type.
Driver	Local Disk/ Removable Disk	To select the default driver

1.4 Preset Parameters of Exam Mode

The system has five exam modes, which are abdomen (general), gynecology, cardiac, obstetric and small parts. Each exam mode has preset the most suitable operating environment. The preset contents of different exam modes are similar. Now use the obstetric exam as an example to illustrate how to preset the operating environment.

The preset dialog box of the obstetric exam has three pages, which are "Parameter", "B IP" and "M IP".

Parameter preset

1. Select the [Obstetric] item in the PRESET menu, the dialog box of "Ob Preset" pops up. The default is that Parameter page is opened. The dialog box is as shown in the following figure. The preset items are shown in table 1-2.
2. Move the cursor onto the adjustment button for the parameter item to be modified, and press the [Set] or [Back] key to modify the parameters. At this time the prompt information is displayed in the help information bar.

The screenshot shows the 'Ob Preset' dialog box with the 'Parameter' tab selected. The dialog box contains a grid of parameters, each with a text input field and a numeric input field. At the bottom, there are three buttons: 'Record Current', 'OK', and 'Cancel'. A status bar at the very bottom reads 'Press [Set] to increase or [Back] to decrease'.

Parameter	Value	Parameter	Value	Parameter	Value
Mode	B	Probe	65C15EA	B IP	5
Power	15	Frq	F2	M IP	5
Depth	11.9	H Rev	x	M Speed	2
Focuses	1	V Rev	x	B Gain	54
Scan Den	Hi Density	B Gray Map	Map1	M Gain	44
Angle	3	M Gray Map	Map1	TSI	Fluid

Buttons: Record Current, OK, Cancel

Status Bar: Press [Set] to increase or [Back] to decrease

Table 1-2 the preset items in the parameter page

Item	Selections	Description
Mode	B M B RT + B B + B RT M + B RT	To select the image mode.
Power	0~15	To set the acoustic power in 16 steps.
Depth	2.16—24.8cm	To set the scanning depth which has 20 steps for low-frequency probe. Scanning depth for high-frequency probe has 10 steps.
Focuses	1 / 2 / 3 / 4	To set the number of focuses
Scan Den	Hi Density / Hi Frm Rate	To select the scan density
Angle	0 / 1 / 2 / 3	To set the scan angle of the probe
Probe	All probes that the system supports.	To select the type of probe
Frq	F1, F2, F3	To set the probe frequency
H Rev	√ / ×	To set the attribute of the L/R flip
V Rev	√ / ×	To set the attribute of the U/D flip
B Gray Map	Map1/Map2/Map3/ Map4/Map5	To set the post processing effect of the B image.
M Gray Map	Map1/Map2/Map3/ Map4/Map5	To set the post processing effect of the M image.
B IP	1~8	To set the combination of parameters for B image processing in 8 steps.
M IP	1~8	To set the combination of parameters for M image processing in 8 steps.
M Speed	1 / 2 / 3 / 4	To set the M mode scanning speed.
B Gain	0~98	To set the B mode image gain in 49 steps.
M Gain	0~98	To set the M mode image gain in 49 steps.
TSI	General/Muscle/Fatty/Fluid	To set the characteristic of the tissue

B IP preset

1. Select the [B IP] preset page. See the dialog box below. The preset items are shown in table 1-3.
2. Move the cursor onto the adjustment button for the parameter item to be modified, and press the [Set] or [Back] key to modify the parameters. At this time the prompt information is displayed in the help information bar.

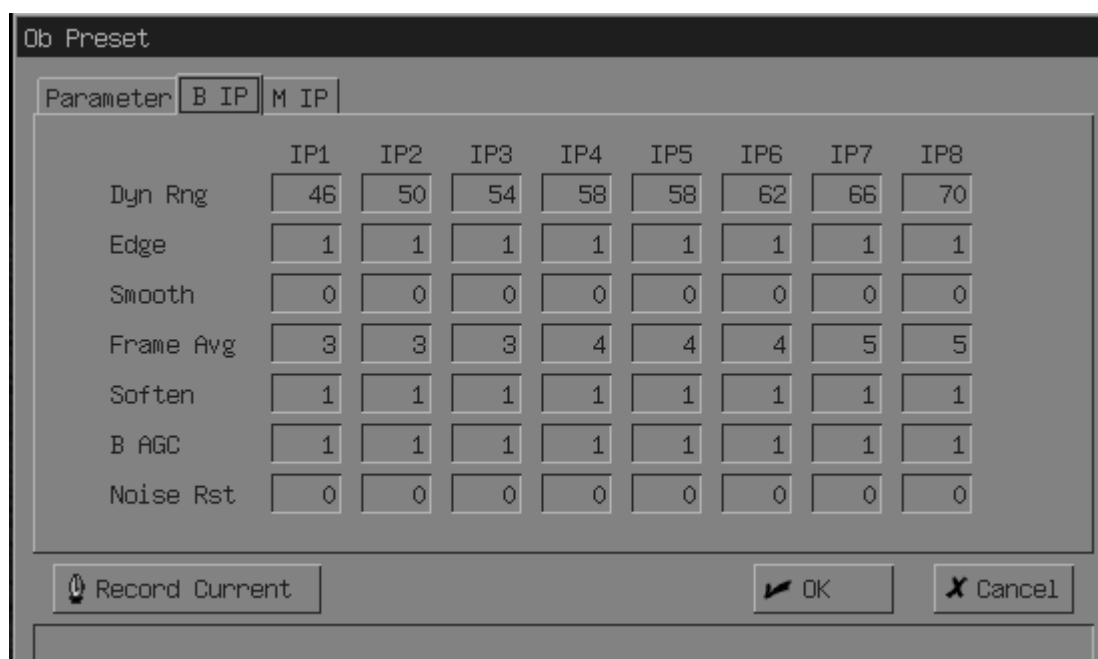


Table 1-3 the preset items in the B IP preset page

Item	Optional Item	Functional Description
Dyn Rng	30 ~ 90	To set dynamic range in 16 steps with the increment of 4.
Edge	0 ~ 3	To set edge enhancement in 4 steps.
Smooth	0 ~ 3	To set smooth processing in 4 steps.
Frame Avg	0 ~ 7	To set frame average in 8 steps.
Soften	0 ~ 3	To set image soften in 4 steps.
B AGC	0 ~ 3	To set B AGC in 4 steps.
Noise Rst	0 ~ 3	To set Noise Rst in 4 steps.

M IP preset

1. Select the [M IP] preset page. See the dialog box below. The preset items are shown in table 1-4.
2. Move the cursor onto the adjustment button for the parameter item to be modified, and press the 『Set』or『Back』key to modify the parameters. At this time the prompt information is displayed in the help information bar.

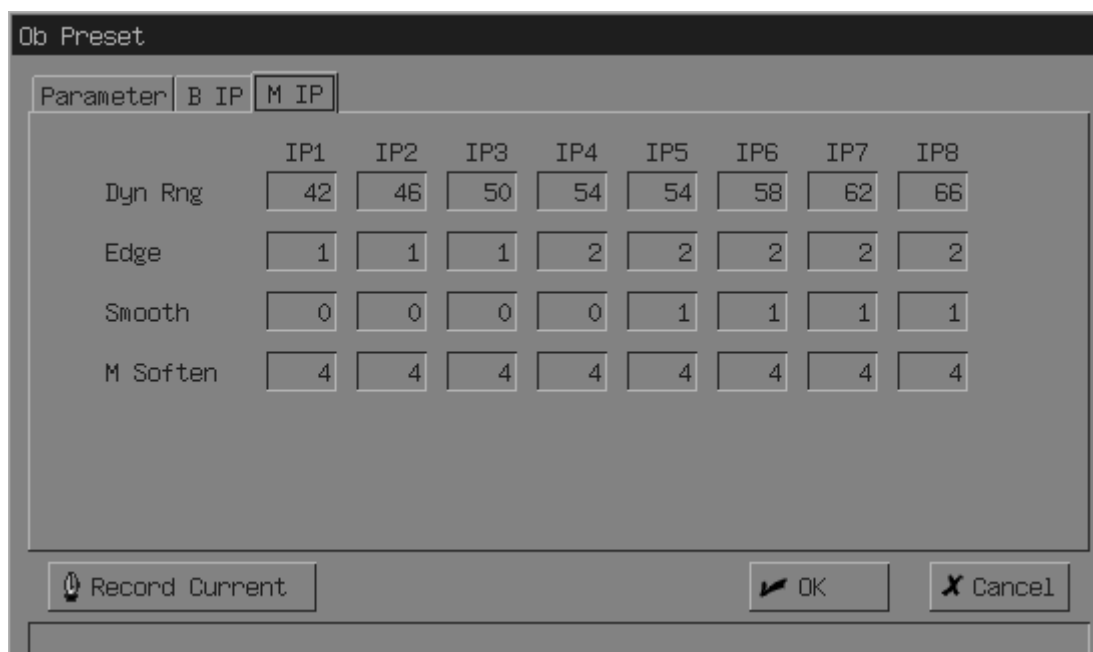


Table 1-4 the preset items in the M IP preset page

Item	Optional Item	Functional Description
Dyn Rng	30 ~ 90	To set dynamic range in 16 steps with the increment of 4.
Edge	0 ~ 3	To set edge enhancement in 4 steps.
Smooth	0 ~ 3	To set smooth processing in 4 steps.
M Soften	0 ~ 7	To set M image soften in 8 steps.

After all the parameters are set, press the 『OK』 button, and all the settings become effective and be stored in the system. To cancel these settings, press the 『Cancel』 button

1.5 Preset Formula

Formula Presets define formulae including GS, CRL, BPD, HC, AC, FL, EFW, TAD, APAD, CER, FTA, HUM, OFD, THD, and BSA.

Select “Formula” item in PRESET menu to open “Formula Preset” page, shown in figure below.

Formula	Preset Option	Formula	Preset Option
GS	China	APAD	Merz
CRL	China	CER	Hill
BPD	China	FTA	Osaka
HC	Hadlock	HUM	Jeanty
AC	Hadlock	OFD	Hansmann
FL	China	THD	Hansmann
EFW	Hadlock4	BSA	Oriental
TAD	Merz		

Table 1- 5 gives us the description of the preset items in the dialog box.

Table 1-5 Preset calculation formulae

Preset items	Options	GA calculating data
GS	Tokyo, Hellman, Rempen, Hansmann; China	FG+GA FG FG+GA FG+GA GA
CRL	Tokyo, Jeanty, Hadlock, Nelson, Robinson, Rempen, Hansmann, Osaka, China;	FG+GA GA FG+GA GA FG+GA FG+GA FG+GA FG+GA GA

BPD	Tokyo, Hadlock, Jeanty, Kurtz, Sabbagha, Hansmann, Merz, Rempen, Osaka; China	FG+GA FG+GA GA FG FG FG+GA FG+GA FG+GA FG+GA GA
HC	Hadlock, Jeanty, Merz, Hansmann,	FG+GA GA FG FG+GA
AC	Hadlock, Jeanty, Merz,	FG+GA FG FG
FL	Tokyo, Hadlock, Jeanty, Hohler, Merz, Hansmann, O'Brien, Warda, Osaka; China	FG+GA FG+GA GA GA FG+GA FG+GA FG FG+GA FG+GA GA
EFW	Tokyo, Hadlock1, Hadlock2, Hadlock3, Hadlock4, Shepard, Campbell, Merz1, Merz2, Hansmann, Osaka;	/ / / / / / / / / / /
TAD	Merz;	FG
APAD	Merz;	FG
CER	Hill, Goldstein;	FG+GA FG
FTA	Osaka;	FG+GA
HUM	Jeanty, Merz;	GA FG
OFD	Merz, Hansmann,	FG FG+GA
THD	Hansmann;	FG+GA
BSA	Oriental, Occidental	/ /

FG and GA are used in these formulae. In formula preset, three situations are presented for each item. Some formulae are included in both FG and GA tables but others are exclusive for GA or FG table. Please select reasonable formula according to below information:

1. In the process of obstetric measurement, if the user does not enter LMP or BBT, GA table will be required for calculating GA. If the preset formula does not have corresponding GA table, the system will not display GA. If the user has entered LMP or BBT, FG table will then be required for calculating GA. If the preset formula does not have corresponding FG table, the system will not display GA. After the user has entered LMP or BBT, the system will calculate GA based on FG table for all obstetric measured items. And at the same time the result window and report will be refreshed.
2. Data of growth curve are all sourced from FG table. The user could select the formula in the pull-down list. The system will accordingly display the growth curve corresponding to the formula. The initial curve being displayed is decided by the preset formula. If the formula does not have corresponding FG table, fetal growth curve will not be displayed.

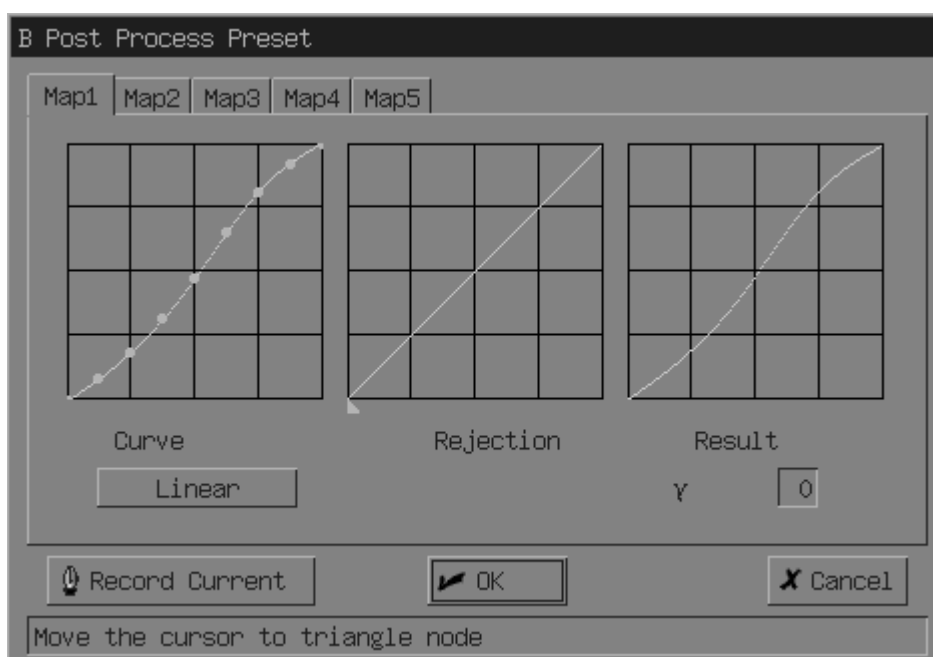
1.6 Preset Post Process Curve and Parameter

The post process preset is used to set parameters and curves for post process.

Preset items: gray transformation curve, gray rejection curve, γ correction.

The post process preset of B-mode and M-mode is realized via two dialog boxes. The preset procedures for the two modes are basically the same. Now we use B-mode post process preset as an example to illustrate the procedures.

Select the [B Post Proc] item in the PRESET menu. The B Post Process Preset dialog box pops up. See the following figure.



The B Post Process Preset dialog box has five pages representing 5 kinds of gray map. The preset items and preset method in these five pages are the same.

Now use the Map1 page as an example.

Note: The post process curves and parameters practically used by the system are set in the “Parameter” page of the preset dialog box of exam mode.

1.6.1 Gray Transformation Curve

Method:

There are nine “•” adjusting points on the gray transformation curve used to adjust the shape of the curve.

1. Press 『Set』 key on the “Map1” page button of the B Post Process Preset dialog box to select the “standard” gray map.

2. Move the cursor to an adjusting point on the curve, the cursor changes into a "↕". Press the 『Set』 key and roll the trackball to move the "•" so as to adjust the curve. After adjusting the curve, press the 『Set』 key again to finish the adjustment. Or press the 『Back』 key to cancel the operation, the "•" point will return to the original position. The system updates the "Result" curve. Use the same method to adjust other points.
3. Another way to set the gray transformation curve is adjusted by using the 「Record Current」 button. Actually, this method is a more practical one. Press the 『Set』 key on the 「Record Current」 to set the curve as the one currently used by the system and simultaneously to load the gray rejection curve and γ correction currently used by the system into the current page of the dialog box.
4. Press the 『Set』 key on the [Linear] button, the gray transformation curve will return to the factory default shape.
5. Press the 『Set』 key on the 「Ok」 button to save the modification or on the 「Cancel」 button to give up the modification and close the dialog box at the same time.

Note: The [Linear] button is only valid to the gray transformation curve. This button is invalid to gray rejection curve and γ correction.

1.6.2 Gray rejection curve

There is only one "▲" adjusting point on the gray rejection curve used to adjust the rejection gray of the curve. See the B Post Process Preset dialog box as before.

Method:

1. Press 『Set』 key on the [Map1] button in the dialog box to select the "Map1" gray map.
2. Move the cursor to the "▲" point on the curve, the cursor changes into a "↕". Press the 『Set』 key and roll the trackball to move the "▲" point so as to adjust the curve. After adjusting the curve, press the 『Set』 key again to finish the adjustment. Or press the 『Back』 key to cancel the operation, the "▲" point will return to the original position. The system updates the "Result" curve.
3. Or use the 「Record Current」 button to set the gray rejection curve. Press the 『Set』 key on the 「Record Current」 button to set the curve as the one currently used by the system and simultaneously to load the gray transformation curve and γ correction currently used by the system into the current page of the dialog box.
4. Press the 『Set』 key on the 「Ok」 button to save the modification or on the 「Cancel」 button to give up the modification and close the dialog box at the same time.

1.6.3 γ correction

γ correction has four 4 steps, which are 0, 1, 2 and 3 corresponding respectively to the factor 1.0, 1.1, 1.2 and 1.3. See the B Post Process Preset dialog box as before.

Method:

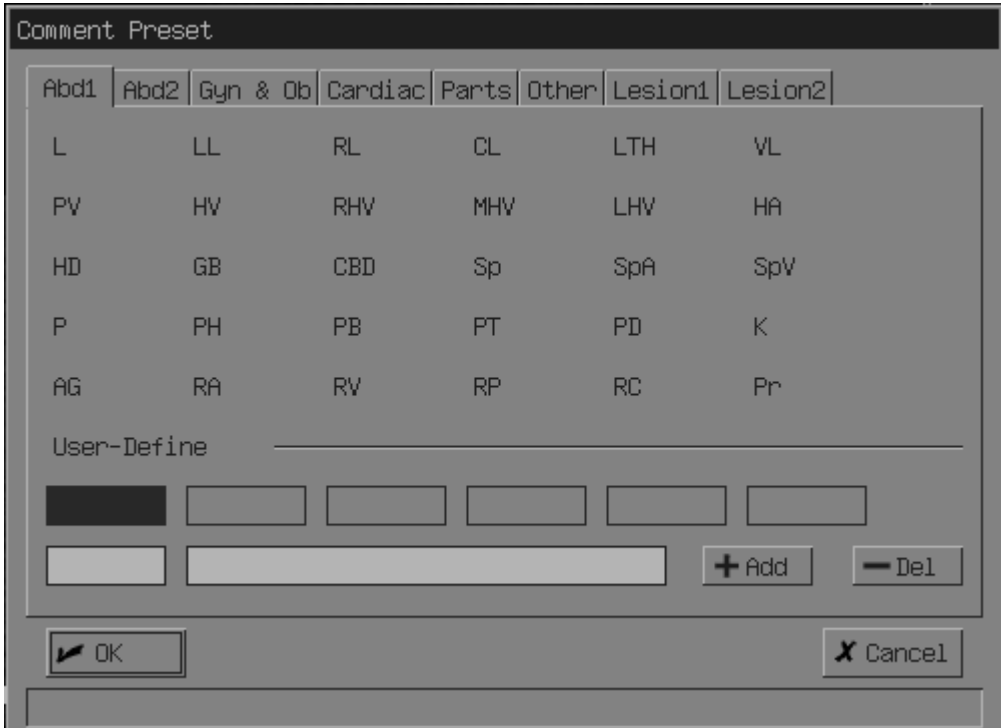
1. Press the [Map1] button in the dialog box to select the “Map1” gray map.
2. Move the cursor to the [γ] button and press the 『Set』 or the 『Back』 key to select an appropriate γ value. The system updates the “Result” curve.
3. Or use the 『Record Current』 button to set γ value. Press the 『Set』 key on the 『Record Current』 to set the γ value as the one currently used by the system and simultaneously to load the gray transformation curve and gray rejection curve currently used by the system into the current page of the dialog box.
4. Press the 『Set』 key on the 『Ok』 button to save the modification or on the 『Cancel』 button to give up the modification and close the dialog box at the same time.

1.7 Preset comment

Classification of comment preset:

There are 6 types: abdomen, gynecology and obstetrics, Cardiac, small parts, general, lesion. Each type has many pieces of factory default comments. Also the user-defined comment (maximum 6 pieces) are provided. The user can add, modify and delete these user-defined comments.

Select the [Comment] item in the PRESET menu. The dialog box of “Comment Preset” appears on the screen. See the following figure.




The method for adding, and deleting the user-defined comments is given below.

1.7.1 Adding Comment

Method:


Now use adding user-defined comments into the 「Parts」 page as an example to illustrate the process.

1. Press the 「Parts」 page button to open the “Small Parts” comment page.
2. Move the cursor to a piece of “User-Define” button, the cursor then changes into a . Press the 『Set』 key to highlight this piece of comment.
3. Move the cursor into the left edit bar of “User-Define” comment and press the 『Set』 key. Then the “|” cursor displays in the edit bar. Use the keyboard to enter the content of the user-defined comment.
4. Move the cursor into the right edit bar of the “User-Define” comment and press the 『Set』 key. Then the “|” cursor displays in this edit bar. Use the keyboard to enter the help or explanation information for this piece of user-defined comment. (If no help information is to be added, this step can be omitted.)
5. Press the 『Set』 key on the 「Add」 button. The entered comment is displayed in the item of the user-defined comment selected the step 2.
6. Press the 『Set』 key on the 「Ok」 button to save the modification or on the 「Cancel」 button to give up the modification and close the dialog box at the same time.

1.7.2 Deleting Comment

Method:

Use the deletion of the user-defined comment in the 「Parts」 page as an example to illustrate the process.

1. Press the 「Parts」 button to open the “Small Parts” comment page.
2. Move the cursor on the button of a piece of already existed “user-defined comment”, then the cursor changes into a . Press the 『Set』 key to highlight this piece of comment.
3. Move the cursor to the 「Del」 button and press the 『Set』 key. The selected piece of comment is then deleted.
4. Press the 『Set』 key on the 「Ok」 button to save the modification or on the 「Cancel」 button to give up the modification and close the dialog box at the same time.

1.8 Save/Load Preset Data

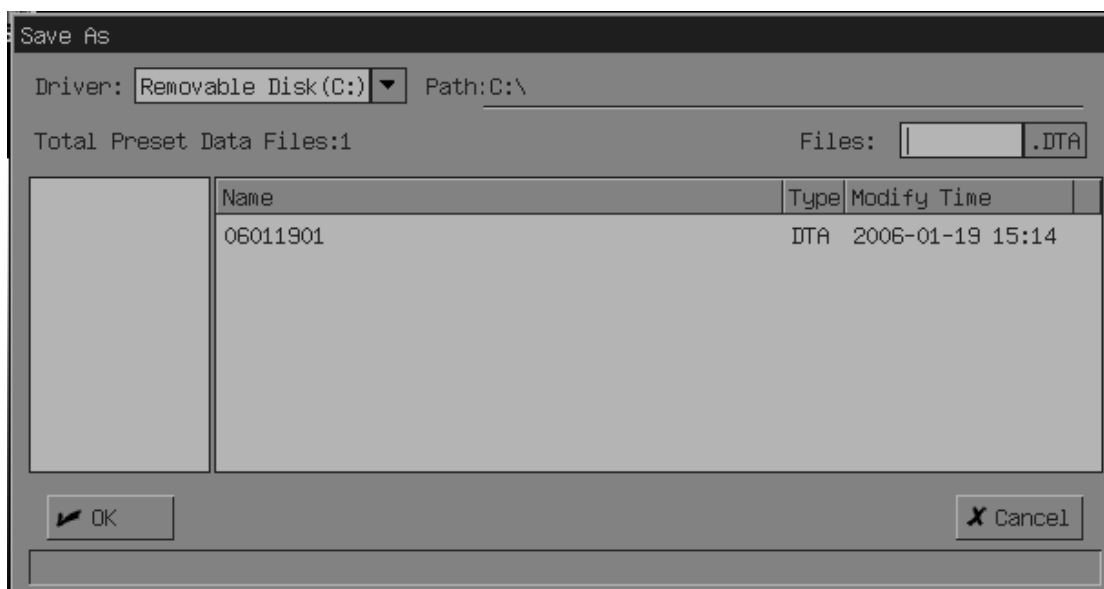
DTA file is used to store/load the preset data of the system.

1.8.1 Save Preset Data

The method is same as saving the image file, the expanded name of the file is DTA.

Method:

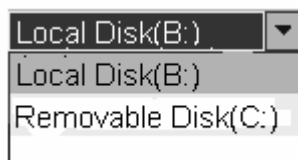
1. Move the cursor to the [Save Preset] item of the [Preset Data] submenu of PRESET Menu and press the 『Set』 key. The dialog box of Save As appears on the screen.



2. Select the drive:

Select the drive in a pull-down list.

- Move the cursor to the “▼” sign to the right of the drive. Press 『Set』 key, the list as shown in the figure appears. The list shows to us the disk drives applicable to the system.
- Move the cursor to select the drive to be opened and then press 『Set』 key to close the list. Then the selected drive becomes the current drive.



3. Change the disk path

Move the cursor to the directory item in the directory list. Double click the 『Set』 key to access the directory. To return to the upper directory, just move the cursor to the [·] item

and double press the 『Set』 key for consecutive two times.

4. Enter the file name

Anchor the cursor into the FILE bar and press the 『Set』 key. Enter the file name. The file type, i.e., the expanded name of the file “DTA”, cannot be modified.

To replace the existed file, just move the cursor to the corresponding file in the file list and press the 『Set』 key.

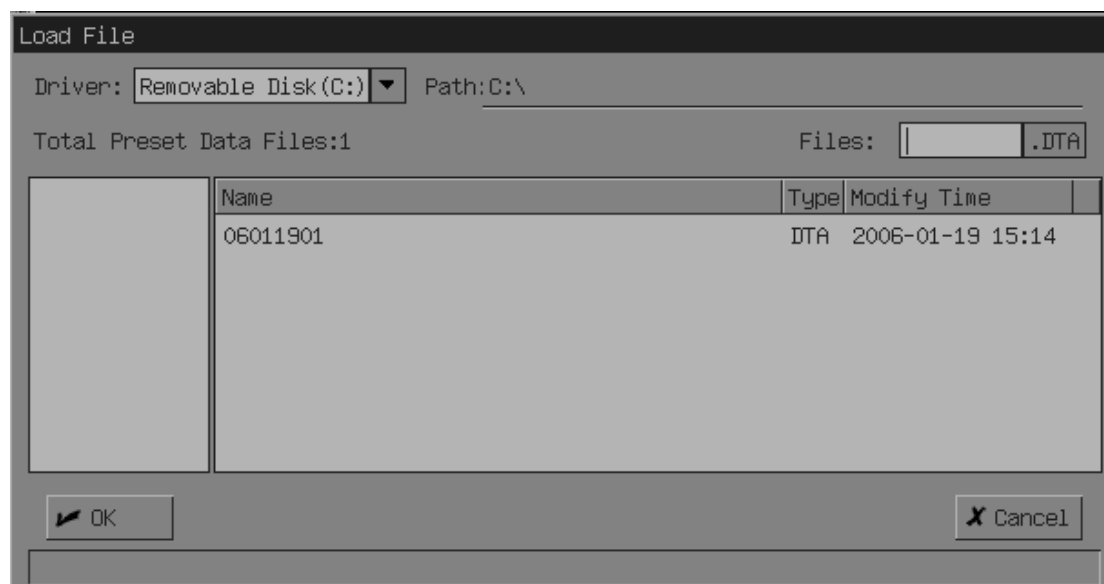
5. Press the 『Set』 key on the 『Ok』 button to close the dialog box. The system will automatically store the information displayed on the current screen into the specified file.

1.8.2 Load DTA file

Load the preset data in the DTA file into the preset data memory of the system and reset the system at the same time. Use the newly updated system preset data to organize and display the images.

The method is same as opening the image file.

1. Move the cursor to the [Load Preset] item of the [Preset Data] submenu and press the 『Set』 key. The “Load File” dialog box appears on the screen.
2. The operating procedures for selecting the drive and the disk directory are the same as those to save the file.

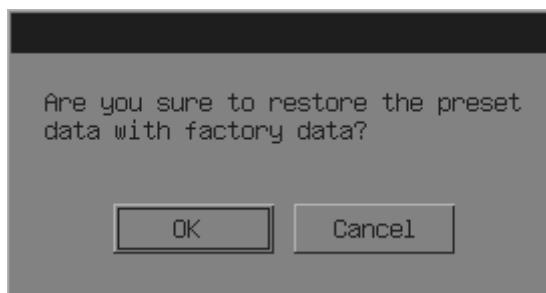


3. Move the cursor to the file to be opened in the list and press the 『Set』 key. The selected file is then highlighted.
4. Press the 『Set』 key on the 『Ok』 button or just press the 『Set』 key on the selected file to close the dialog box.

5. After opening the DTA file, exit the File status. The system then resets and displays the images based on the updated system preset data.

1.8.3 Factory Data

Move the cursor to the [Factory Data] item and press the 『Set』 key to pop up the dialog box, see figure1-13. Press the 『Set』 key on the 『Ok』 button to restore the preset data with factory data. Or Press the 『Set』 key on the 『Cancel』 button to cancel this setting.



1.9 Maintenance

The [Maintenance] item in PRESET menu is provided to update system software and realize special user requirement. If you want any special functions, please contact Mindray Company or its Local Office.

1.10 Preset DICOM

Move the cursor to the [DICOM] item and press the 『Set』 key to call up the [DICOM] dialog box. See the following figure.

DICOM							
System AE Title	unhn						
Institution Name	ugug						
	AE Title	Host Name	IP Address	Port	Alias	Packet Size	
Local	unhn	8h8h	192.168.2.2	2000	uugug	16384	
Server1	brnnh	hnh	192.168.2.3	104	nhn	16384	Verify
Server2				0		0	Verify
Current Server	Server1						
OK						Cancel	


The table below is the description of the preset items in the dialog box, see table 1-6.

Table 1-6 Items in the DICOM Preset dialog box

No.	Item name	Meaning	
1	System AE Title	The name that has been set in the AE Title field of "Local" preset column is displayed.	
2	Institution Name	Set the hospital name.	
3	Local	(1) AE Title	Set the AE title of the local system. This name is the same as that set in the System AE Title field.
		(2) Host Name	Set the host name of the local system.
		(3) IP Address	Set the IP address of the local system.
		(4) Port	Set the port number of the local system.
		(5) Alias	Set the alias of the local system.
		(6) Packet Size	Maximum PDU transmission size in bytes (does not need to be changed). This setting can be changed in the range from 4K to 64K. If a value more than 64K is entered, a value of 16K is set.
4	Server1/Server2	(1) AE Title	Set the AE title of the remote system.
		(2) Host Name	Set the host name of the remote system.
		(3) IP Address	Set the IP address of the remote system.
		(4) Port	Set the port number of the remote system.
		(5) Alias	Set the alias of Server1/Server2.
		(6) Packet Size	Maximum PDU reception size in bytes (does not need to be changed). This setting can be changed in the range from 4K to 64 K. If a value less than 4K or more than 64K is entered, a value of 16K is set.
5	Verify	After set the information of Server, click this button to verify the server is connected or not.	
6	Current Server	Select the current server.	
7	OK	When this button is clicked, the changed parameters are saved and the window is closed.	
8	Cancel	When this button is clicked, the window is closed without saving the changed parameters.	

2 Basic Operation of Measurements & Calculations


2.1 Select the Exam Mode

Press the  key on the control panel. The Exam Select menu is displayed on the right side of the screen. Move the cursor to select the corresponding item in the Exam Select menu and press the 『Set』 key to enter the corresponding exam mode.

Exam Select
Abd
Gyn
Car
Ob
Sml

The user can also switch to some measurement menu by selecting the menu item in [Others] submenu.

2.2 Accessing Measurement Status

Press the  key to access measurement status. The 『Measure』 lamp is on. The menu on the right side of the screen switches to Measurements and Calculations menu.

2.3 Measurement Menu

The measurement menu is displayed on the right part of the screen. If the menu is not displayed, press the 『Menu』 key.

There are seven menus for B mode measurements and calculations. See the following figure.

- B MEAS menu: used for general measurements and calculations of abdomen exam mode.
- B-OB MEAS and B-OB MEAS2 menus: used for calculations of GA, fetal weight and EDD when the system is in obstetric exam mode.
- B-CARDIAC menu: used for left ventricular function calculations of cardiac exam mode.

- B-GYN MEAS menu: used for gynecology measurements.
- B-SML MEAS menu: used for thyroid measurements.
- B-URO MEAS menu: used for RUV and PV, PPSA etc. measurements.
- B-ORTH MEAS menu: used for HIP measurements.

B MEAS	B-OB MEAS	B-OB MEAS2	B-CARDIAC
Distance	Distance	TAD	LV ▶
Cir/Area ▶	GS	APAD	RV
Volume ▶	CRL	CER	PA
Ratio	BPD	FTA ▶	Key In ▶
% Stenosis ▶	HC ▶	HUM	Report
Angle	AC ▶	OFD	Others ▶
Histogram ▶	FL	THD	
Profile	EFW	Others ▶	
Others ▶	AFI		
Print Report	Results ▶		
	Key In ▶		
	FBP ▶		
	Others ▶		

B-GYN MEAS	B-SML MEAS	B-URO MEAS	B-ORTH MEAS
Distance	Distance	Distance	Distance
UT	THY ▶	RUV	HIP
Endo	THY RPT	Prostate Volume	HIP RPT
OV_V ▶	Others ▶	Key In ▶	Others ▶
FO_D ▶		URO RPT	
CX_L		Others ▶	
UT_L/CX_L			
GYN RPT			
Others ▶			

All measurement menus in B mode

Menu of M measurement refers to the following figure.

- M MEAS menu: used for the general measurements on the M mode image, such as distance, heart rate, time and slope.
- M-CARDIAC menu: used for cardiac measurements and calculations in M mode image.

M MEAS	M-CARDIAC
Distance	LV ▶
Time	Mitral Meas ▶
Slope	Aorta Meas ▶
Heart Rate	Heart Rate
Others ▶	LVET
Print Report	LVMW
	Key In ▶
	Report
	Others ▶

Toggle among measurement menus:

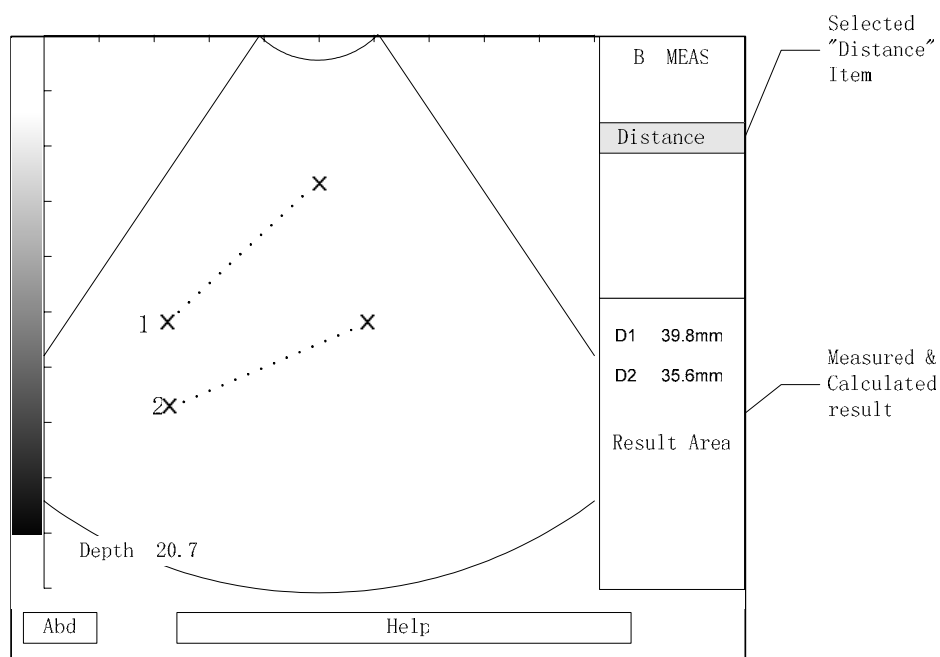
- The type of the displayed measurement menu depends on the current exam mode.
- The user can also select the menu item in [Others] submenu to enter other exam mode.

The details of measurement menus are explained in following description of measurements.

2.4 Measured Result and Help Information

The system displays and updates measured and calculated results in the Result Area located below the menu.

The prompt information for each step in the process of measurement and calculation is displayed in the Help Bar located at the bottom of the screen, see the following figure.



The menu, result and area of measurement

2.5 Keys Used during Measurement



The keys used during measurement are shown in the figure, which are to be used in conjunction with the trackball.

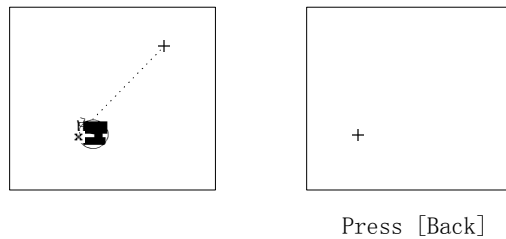
1. 『Set』 : used to start or end the measurement, or to anchor the two point of line measuring scale. The function of the key is to be described detailedly in following practice.
2. 『Back』 : this key has two functions: to return to the previous step during measurement; to delete the previous measurement.

- Return to the previous step

Before finishing a measurement, the user can use this key to go back to the previous step. To different measuring scale, the 『Back』 key has different functions, which are to be discussed below.

Distance scale:

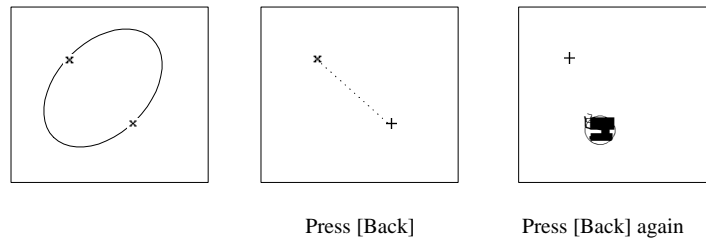
Before defining the end point, the result of pressing the 『Back』 key is shown in the following figure.



『Back』 key function of distance scale

Ellipse scale:

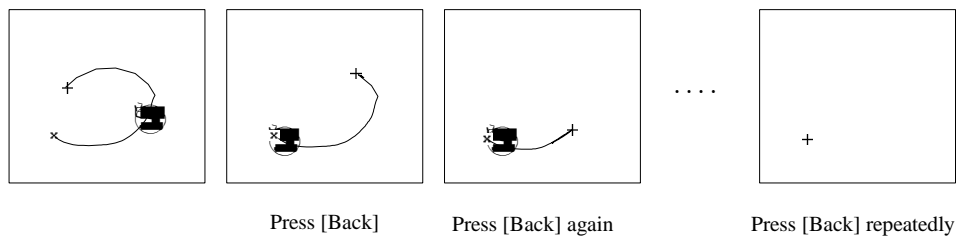
Before defining the active axis of the ellipse, the result of press the 『Back』 key is shown in the following figure.



『Back』 key function of ellipse scale

Trace scale:

Before the start point and the end point of the trace scale join together, the result of pressing the 『Back』 key is shown in the following figure.

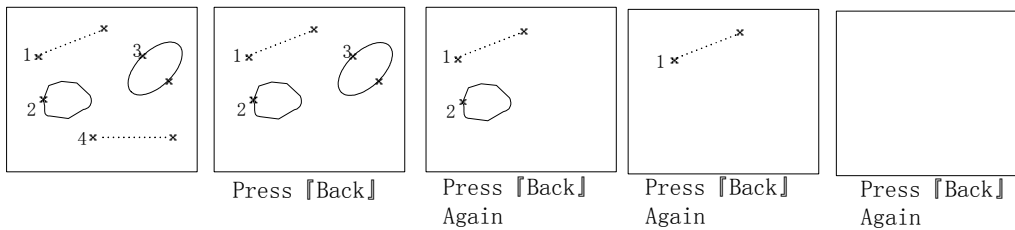


『Back』 key function of trace scale

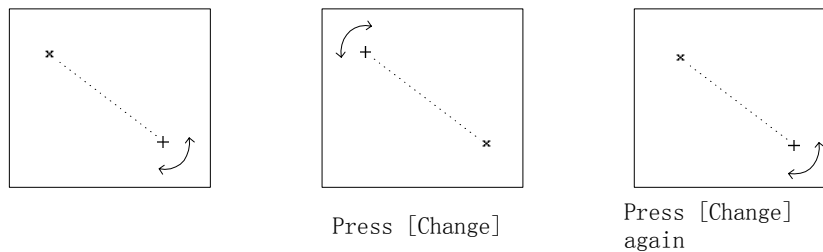
- Delete the previous measurement

After the completion of one or more measurements, press the 『Back』 key in the image window to delete the previous measurement and also to clear the corresponding

measured result in the Result Window. Press the [Back] key continuously to clear all the measuring scales. See the following figure.



3. [Change] : used to exchange the fixed end and the active end of the distance scale in the process of the measurement. See the following figure.



2.6 Classification of Measurements and Calculations

All measurement items in the menu are divided into two major categories: measurement and calculation.

- Measurement is only active in the current image mode. Switching the image mode will clear all the measurements and the displayed results in the current image window.
- Calculation consists of some measurements, which are organized based on a certain steps. According to each measured result, the system determines the calculated results using specific formula. Calculations can be made in different image windows. As long as the current measuring step of the calculation can be done in the new image window, the current step of the calculation can be performed.
- Up to four measurements can exist in each image window at the same time. But only one calculation can exist at the same time.

Lock the cursor into the image window:

During measurement, can not move the cursor out of the image window until after the completion of measurement.

Measurement can be performed on the magnified image, the CINE review image or the real-time image.

2.7 Attention

1. If measurement is to be done on a frozen image, unfreezing the image will clear up the basic measurements information. After open the CIN file or FRM file, unfreezing the image will clear up measurements, bodymarks and patient data.
2. The results are displayed as: "D1 XXXX, D2 XXXX, D3 XXXX..." If more than measurement channels are executed, the latest measuring result "D1 XXXX" will be displayed at bottom of Result Window while the earliest result "D1 XXXX" will be deleted.

D2	XXXX
D3	XXXX

D1	XXXX

3

B mode General Measurements & Calculations

Confirm that the [B MEAS] menu is displayed on the screen. If not, press the 『B』 key to access B mode.

Press the 『EXAM』 key on the control panel. The Exam Select menu is displayed on the right side of the screen. Move the cursor to the [Abd] item in the Exam Select menu and press the 『Set』 key to enter the General exam.

Exam Select
Abd
Gyn
Car
Ob
Sml

Then press the 『Measure』 key to access measurement status.

If the menu isn't displayed on the screen, press the 『Menu』 key to call up the B MEAS menu.

In measurement status, the cursor turns into a "+" in the image area.

After accessing the B mode B MEAS menu, the default is "Distance" measurement, i.e., if no measurement item is selected, the system will access the "Distance" measurement status automatically.

B MEAS	CIR/AREA	HISTOGRAM
Distance	Ellipse	Rectangle
Cir/Area ▶	Trace	Ellipse
Volume ▶		Trace
Ratio	VOLUME	
% Stenosis ▶	2-Axis	OTHERS
Angle	3-Axis	B-OB MEAS
Histogram ▶	% STENOSIS	B-OB MEAS2
Profile	Distance	B-CARDIAC
Others ▶	Area	B-GYN MEAS
Print Report		B-SML MEAS
		B-URO MEAS
		B-ORTH MEAS

B mode general measurements menu and submenu

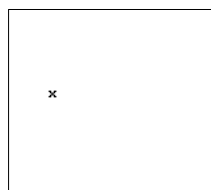
3.1 Distance

Function: to measure the distance between two points.

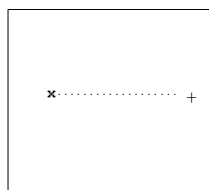
Measurement channels: 4

Measuring method:

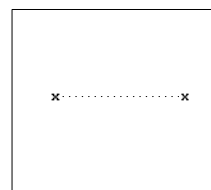
1. Move the cursor to the [Distance] item in the B MEAS menu and press the 『Set』 key.
2. Move the cursor into the image window, the cursor changes into a "+". Roll the trackball to move the cursor to the start point of the measurement. Press the 『Set』 key, the fixed mark "x" is displayed at the start point. The user can press the 『Back』 key to delete the start point determined just now.
3. Roll the trackball to move the cursor, the cursor "+" and the start mark "x" are always connected by a broken line. The system updates the measured result in the Result Window. At this time, press the 『Change』 key to exchange the fixed point and the active point of the measuring scale or press the 『Back』 key to delete the start point determined just now.
4. Roll the trackball to move the cursor "+" to the end point of the measurement. Press the 『Set』 key, the fixed mark "x" is displayed at the end point. The final result is determined and the measurement is completed.
5. Repeat the steps from 2 to 4 to perform a new measurement.



press [Set] to
anchor start
point



roll trackball
to move cursor
to end point



press [Set] to
anchor end point

3.2 Circumference and Area

Ellipse

Function: to measure the circumference and area of a close region

Measurement channels: 4

Measuring method:

1. Move the cursor to the [Cir/Area] item, and then the [Cir/Area] submenu pops up automatically. Move the cursor to the [Ellipse] item in this submenu and press the 『Set』 key, the cursor changes into a "+".
2. Move the cursor to the start point of the fixed axis of the region to be measured. Press the 『Set』 key, mark "x" is displayed at the start point of the fixed axis.

3. Move the cursor to the end point of the fixed axis. At this time press the 『Change』 key to exchange the start point and the end point of the fixed axis or press the 『Back』 key to return to the previous step. The cursor “+” and the start point “x” are always connected by a broken line. Press the 『Set』 key, the mark “x” is displayed at the end point of the fixed axis. An ellipse is displayed on the screen.
4. Roll the trackball to adjust the length of the changeable axis of the ellipse to make the ellipse rally with the region to be measured. Roll the trackball to left to shorten the changeable axis or to right to increase the changeable axis. At this time press the 『Back』 key to return to the previous step.
5. Press the 『Set』 key to confirm the ellipse region to be measured. The measured result is displayed in the Result Window. The measurement ends.
6. Press the 『Set』 key to start a new measurement.

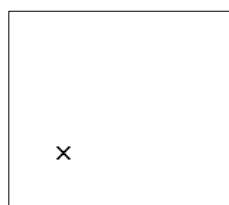
Trace

Function: to measure the circumference and area of a close region.

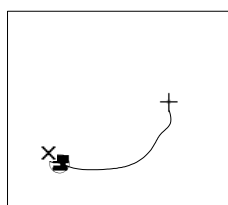
Measurement channels: 4

Measuring method:

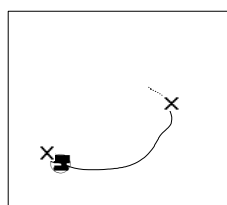
1. Move the cursor to the [Cir/Area] item and the [Cir/Area] submenu pops up automatically. Move the cursor then to the [Trace] item in the submenu, press the 『Set』 key and the cursor changes into a “+”.
2. Move the cursor to the start point of the measurement, press the 『Set』 key, then the fixed mark “x” is displayed at the start point.
3. Roll the trackball to move the cursor along the edge of the target region to be measured so as to draw out the trace line. To correct the trace line, press the 『Back』 key each time to remove the trace line of a certain number of pixels.
4. Press the 『Set』 key; a straight line connects the start point and the end point. Or when the cursor is very near to the start point of the trace line, the trace line automatically forms into a loop. The measured result is displayed in the Result Window. The measurement ends.
5. Press the 『Set』 key to start a new measurement.



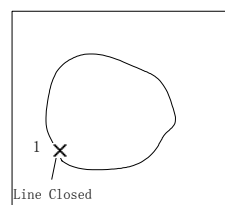
Move the cursor to start point and press [Set].



Move the cursor along the edge of the target region



press [Back] to remove the trace line of a certain number of pixels



Press [Set] to make curve closed

3.3 Volume

Function: to measure the volume of the target object.

Two methods are available to measure the volume: 2-axis, to measure the vertical profile of the target, and 3-axis, to measure both the vertical profile and the horizontal profile of the target.

The formula for 2-axis method:

$$V = (\pi/6) \times A \times B^2$$

In the formula, A is the long axis of the ellipse and B the short axis.

The formula for 3-axis method:

$$V = (\pi/6) \times A \times B \times M$$

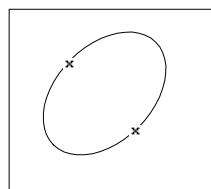
In the formula, M is the length of the third axis.

Measurement channels: 1 for 3-axis, 4 for 2-axis.

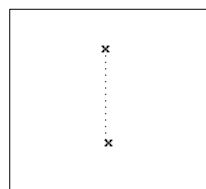
Measuring method:

3-axis method:

1. In B mode, scan and freeze the image.
2. Select the [3-Axis] item in the [Volume] submenu. Draw an ellipse on the screen to make it meet the size of the region to be measured.
3. Unfreeze the image, re-scan and display the profile perpendicular to the previous image. Freeze the image and measure the length of the third axis. The method is the same as that to measure the distance.
4. After the measurement, the measured result of the volume is displayed in the Result Window.
5. Repeat the step 1 through 4 to perform a new measurement.



Measure ellipse area
of vertical profile



Measure distance
of third axis

Volume measurement using 3-AXIS method

The steps of 2-axis measurement are the similar as those of the ellipse method for [Cir/Area] measurement.

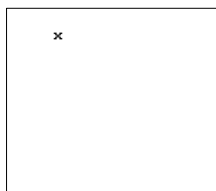
3.4 Ratio

Function: to measure and calculate the ratio between two measured distance values. The first measured value is used as the numerator and the second measured value is used as the denominator.

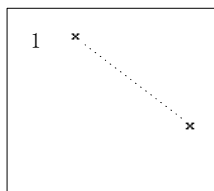
Measurement channels: 4

Measuring method:

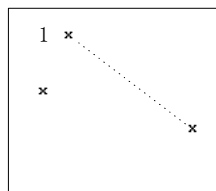
1. Move the cursor to the [Ratio] item, press the 『Set』 key. Move the cursor into the image window, the cursor changes into a “+”.
2. Measure the first distance D11. The method is the same as that to measure “Distance”.
3. Measure the second distance D12. Move the cursor into the image window, the cursor changes into a “+”. Roll the trackball to move the cursor to the start point of the measurement. Press the 『Set』 key, the fixed mark “x” is displayed at the start point. Roll the trackball to move the cursor, the cursor “+” and the start mark “x” are always connected by a broken line. The system updates the measured result in the Result Window. At this time, press the 『Change』 key to exchange the fixed point and the active point of the measuring scale Press 『Change』 key again to exchange the numerator and denominator .
4. After finishing the measurements, the final calculated result of ratio is displayed in the Result Window.
5. Press the 『Set』 key to start a new measurement and calculation.



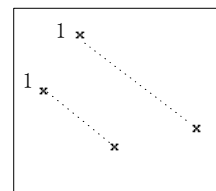
Press [Set] to set start point of first line



Press [Set] to set end point of first line.



Press [Set] to set start point of second line.



Press [Set] to set end point of second line.

3.5 Stenosis Ratio

Function: to measure and calculate the stenosis of the blood vessels. The stenosis distance ratio and the stenosis area ratio are to be calculated according to the distance and area respectively.

The formulae for stenosis ratio:

$$\%D = ((D1 - D2) \div D1) \times 100\%$$

$$\%A = ((A1 - A2) \div A1) \times 100\%$$

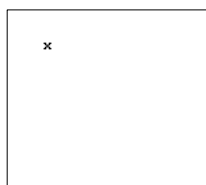
In the formulae, D1 and A1 respectively represent the distance and area at the non-stenosis position. D2 and A2 respectively represent the distance and area at the stenosis position.

Stenosis distance ratio measurement channels: 1

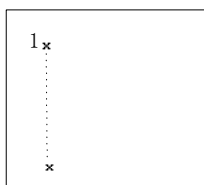
Stenosis area ratio measurement channels: 4

Method of measuring stenosis distance ratio:

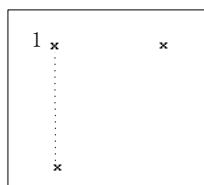
1. Move the cursor to the [Distance] item of the [% Stenosis] submenu, press the 『Set』 key, the cursor changes into a “+”.
2. Measure the distance D1 at the non-stenosis position. The method is the same as that to measure distance.
3. Measure the distance D2 at the stenosis position. The method is the same as that to Distance measure. After the measurements, the final calculated result of stenosis ratio (DSR) is displayed in the Result Window.
4. Press the 『Set』 key to start a new measurement.



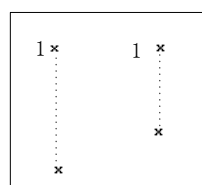
Press [Set] to set start point of distance of non-stenosis position



Press [Set] to set end point of distance of non-stenosis position



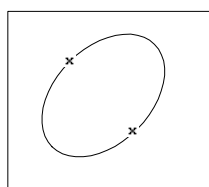
Press [Set] to set start point of distance of stenosis position



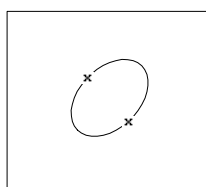
Press [Set] to set end point of distance of stenosis position

Method of measuring stenosis area ratio:

1. Move the cursor to the [Area] item of the [% Stenosis] submenu, press the 『Set』 key, the cursor changes into a “+”.
2. Measure the area A1 at the non-stenosis point. The method is the same as ellipse method of measuring “Circumference/Area”.
3. Measure the area A2 at the stenosis point. The method is the same as ellipse method of measuring “Circumference/Area”. After the measurements, the calculated value ASR of the stenosis area ratio is displayed in the Result Window.
4. Repeat the step 1 through 3 to do a new measurement.



Measure ellipse area of non-stenosis position



Measure ellipse area of non-stenosis position

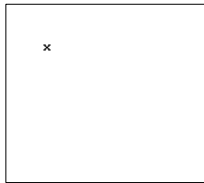
3.6 Angle

Function: to measure the angle between two straight lines (0~180°).

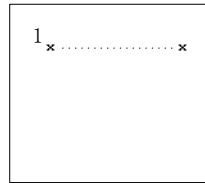
Measurement channels: 4

Measuring method:

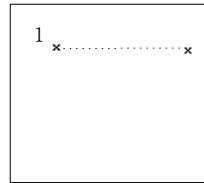
1. Move the cursor to the [Angle] item, press the 『Set』 key. Move the cursor into the image window, the cursor changes into a “+”.
2. First draw a segment along one edge of the angle. The method is the same as that to measure distance.
3. Draw a segment along the other edge of the angle. The method is the same as that to measure distance. After the measurements, the angle between two segments as well as their each length is displayed in the Result Window.
4. Press the 『Set』 key to start a new measurement.



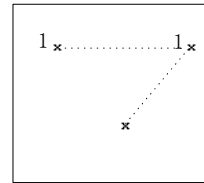
Press [Set] to set start point of first line



Press [Set] to set end point of first line



Press [Set] to set start point of second line



Press [Set] to set end point of second line

3.7 Histogram

Function: to calculate the gray distribution of the ultrasound echo signals within a specified region. Use the rectangle, ellipse or the trace to close the region to be measured. The result is shown in the form of histogram.

Histogram can be measured only on the frozen image.

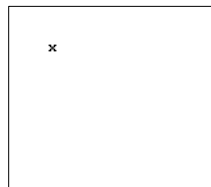
Measurement channels: 4

Measuring method:

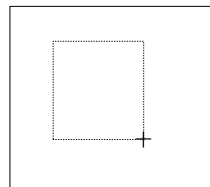
1. Freeze the image.
2. Move the cursor to the [Histogram] item, and then the [Histogram] submenu pops up. Move the cursor to the [Rectangle] item and press the 『Set』 key. Move the cursor into the image window, the cursor changes into a “+”.
3. First press the 『Set』 key to determine an apex of the rectangle.
4. Roll the trackball, a rectangle scale is displayed and updated with the move of trackball.
5. Press the 『Set』 key again to determine the apex of the across corner of the rectangle. In

this way the rectangle area to be measured is determined. The calculated result of the histogram is displayed in the image window.

6. Repeat the step 3 through 5 to do a new measurement. The calculated results are in turn displayed in the upper right corner, the upper left corner, lower left corner and lower right corner of the image window.



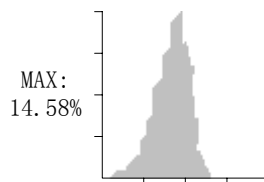
Press [Set] to
set apex of
rectangle



Press [Set] to
set apex of the
across corner

To measure the histogram using ellipse and trace methods, the method is the same as that to measure "circumference/area".

The measured result of the histogram is as shown in figure below, in which the X-axis represents the gray scale of the image ranging from 0 to 255 and the Y-axis represents the distribution ratio of each gray scale. The maximum value on the left represents the percentage of the maximally distributed gray in the whole gray distribution.



3.8 Profile

Function: to measure the gray distribution of the ultrasound signals on a profile in the vertical or horizontal direction.

Profile can be measured only on the frozen image.

Measurement channels: 4

Measuring method:

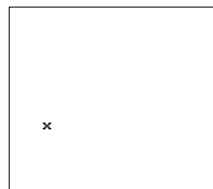
1. Freeze the image.
2. Move the cursor to the [Profile] item and press the [Set] key. Move the cursor into the image window, the cursor changes into a "+".
3. Draw a straight line at the measuring position. Refer to the method to measure distance.

4. The profile is displayed in the window. See figure a below, in which,
 Horizontal axis----the projection of the profile line on the horizontal direction.
 Vertical axis----the gray distribution of the corresponding points on the profile line. The range is 0 to 255.

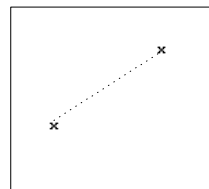
When the angle between the straight line and the horizontal direction is above 45°, the profile is displayed as shown in figure b below, in which:

- Vertical axis ---- the projection of the profile line on the vertical direction.
 Horizontal axis ---- the gray distribution of the corresponding points on the profile line.
 The range is 0 to 255.

5. Press the [Set] key to start a new measurement.

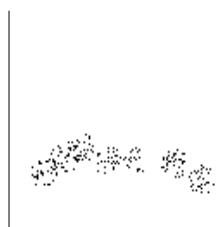


Press [Set] to set start point

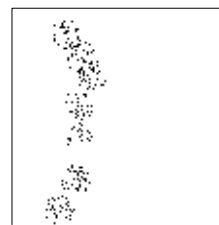


Press [Set] to set end point

Measure profile



a



b

Measured result of profile

3.9 Other Measurements

Select the [Others] item in the [B MEAS] menu to access other modes.

3.10 Print General Report

After connected with the printer supported by system, the system can output a General Report in A4 style. This General Report has three parts: basic hospital and patient information; an image having the same size as the original one displayed on the screen; an area for the doctor to fill in his examining results and diagnosis. See the following figure. The date format

is YYYY/MM/DD.

Either in B-mode Measurement menu, M-mode Measurement menu or in B-mode Freeze menu, after the [Print Report] item being selected, the system will output a General Report onto the connected printer. Let's take the printing operation in B-mode Measurement mode as an example.

General Ultrasound Report				
Hosp:	RENMIN HOSPITAL			
Name:	ZHANGSAN	ID:	ZS1234	Age: 28 Sex:Male
SN 1:	345	SN 2:	678	Ref Md:

Image

Exam:

Diagnosis:

Siganture (Seal)
/ /

Procedures:

1. Check if there is paper in the paper box of the printer and if the printer is in normal state.

Indication of normal state: when only the green lamp above the power button of the printer is on and does not flash, the printer is in normal state.

Indication of abnormal state: When the indicator lamp of the ink box or the indicator lamp of “Restore” button is light on, or the indicator lamp of “Power” button is flashing, the printer is in abnormal state.

The user can use the printer only when printer is in normal status. For the detailed information, refer to the manual of the HP printer.

2. Click the [Print Report] item in the B-mode Measurement menu, the system is processing the printed data.
3. The printer starts printing out the report. Waiting until the dialog box closes; the user can perform other operations.
4. The printer feeds out the paper and then printing process ends.

<p>⚠WARNING: Strictly prohibit plug in/out the power cable and the signal cable of the printer when the power is still on, otherwise the system and the printer will be damaged.</p>

4

M Mode General Measurements & Calculations

Confirm that the [M MEAS] menu is displayed on the screen. If not, press the 『M』 key to access M mode, then press the 『Measure』 key to call up the M MEAS menu.

M MEAS	OTHERS
Distance	M-CARDIAC
Time	
Slope	
Heart Rate	
Others ▶	
Print Report	

4.1 Distance

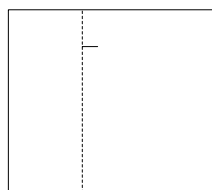
Function: To measure the distance between two points on the M mode image.

Measurement channels: 4

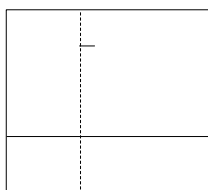
Method:

1. Move the cursor to the [Distance] item of the [M MEAS] menu and press the 『Set』 key. Move the cursor into the image window, the cursor changes into a big “+”.
2. Move the cursor to the start point of the measurement. Press the 『Set』 key, then the fixed mark “—” is displayed at the start point. Press the 『Back』 key to delete the start point determined just now.
3. Roll the trackball to move the cursor, the big “+” can only be moved along the vertical direction. The system updates the measured value in the Result Window. The user can press the 『Change』 key to exchange the fixed end and the active end of the measuring scale or press the 『Back』 key to delete the start point determined just now.
4. Roll the trackball to move the big “+” to the end point of the measurement. Press the 『Set』 key, the fixed mark “—” is displayed at the end point. The measured result is finally determined. The measurement ends.
5. Repeat the steps from 2 to 4 to do a new measurement.

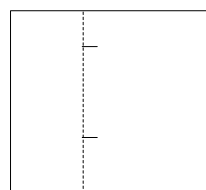
See figure as following:



Press [Set] to
set start point



Move cursor to
end point



Press [Set] to
set end point

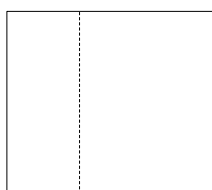
4.2 Time

Function: to measure the time interval between two points on the M mode image.

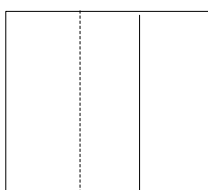
Measurement channels: 4

Measuring method:

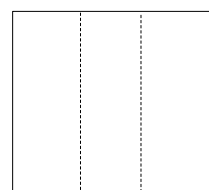
1. Move the cursor to the [Time] item of the [M MEAS] menu, and press the [Set] key. Move the cursor into the image window, the cursor changes into a big "+".
2. Move the cursor to the start point of the measurement. Press the [Set] key, the fixed mark of big "┆" is displayed at the start point. Press the [Back] key to delete the start point determined just now.
3. Roll the trackball to move the cursor, the big "+" can only be moved along the horizontal direction. The system updates the measured value in the Result Window. Now user can press the [Change] key to exchange the fixed end and the active end of the scale or press the [Back] key to delete the start point determined just now.
4. Roll the trackball to move the big "+" to the end point of the measurement. Press the [Set] key, the fixed mark "┆" is displayed at the end point. The measured result is finally determined. The measurement ends.
5. Repeat the steps from 2 to 4 to do a new measurement.



Press [Set] to
set start point



Move Cursor to
end point



Press [Set] to
set end point

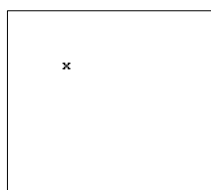
4.3 Slope

Function: to measure the slope (speed) between two points and also distance and time between two points.

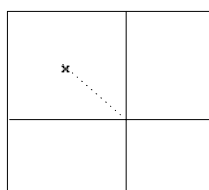
Measurement channels: 4

Measuring method:

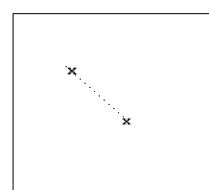
1. Move the cursor to the [Slope] item of the [M MEAS] menu, and press the 『Set』 key. Move the cursor into the image window. The cursor changes into a big “+”.
2. Move the cursor to the start point of the measurement, press the 『Set』 key, the fixed mark “x” is displayed at the start point. Now can press the 『Back』 key to delete the start point determined just now.
3. Roll the trackball to move the cursor, the big “+” and the start point “x” are always connected by a broken line. The system updates the measured value in the Result Window. Press the 『Change』 key to exchange the fixed end and the active end of the scale or press the 『Back』 key to delete the start point determined just now.
4. Roll the trackball to move the big “+” to the end point of the measurement. Press the 『Set』 key, the fixed mark “x” is displayed at the end point. The measured results are determined. The measurement ends.
5. Repeat the steps from 2 to 4 to do a new measurement.



Press [Set] to
set start point



Move cursor to
end point



Press [Set] to
set end point

4.4 Heart Rate

Function: to calculate the number of heart beats per minute on the cardiac image. This function is available only in M/B and M mode.

Measurement channels: 4

Measuring method:

1. Move the cursor to the [Heart Rate] item, press the 『Set』 key. Move the cursor into the image window. The cursor changes into a big “+”.
2. The default is to measure the time of two cardiac cycles. The procedures of measurement are the same as those to measure M mode time.
3. After the measurement, the calculated HR result is displayed in the Result Window.

Press the 『Set』 key to start a new measurement.

5 Obstetric Measurements & Calculations

Obstetric calculations are usually performed on B mode image.

Press the 『EXAM』 key on the control panel. The Exam Select menu is displayed on the right side of the screen. Move the cursor to the [Ob] item in the Exam Select menu and press the 『Set』 key to enter the Obstetric exam mode.

Exam Select
Abd
Gyn
Car
Ob
Sml

Press the 『Measure』 key to access the Measurement mode.

Confirm that the [B-OB MEAS] menu is displayed on the right part of the screen. If not, press the 『Menu』 key.

The system accesses the Obstetric mode automatically. The default is “Distance” measurement in [B-OB MEAS] menu. “TAD” measurement is the default measurement in [B-OB MEAS2] menu.

B-OB MEAS	HC	FBP
Distance	Ellipse	Key In
GS	Trace	AF
CRL		
BPD		
HC ▶	AC	Others
AC ▶	Ellipse	B MEAS
FL	Trace	B-OB MEAS2
EFW		B-CARDIAC
AFI	Results	B-GYN MEAS
Results ▶	Growth Curve	B-SML MEAS
Key In ▶	Report	B-URO MEAS
FBP ▶	FBP Report	B-ORTH MEAS
Others ▶		
	Key In	
	LMP	
	BBT	

B-OB MEAS2	FTA	Others
TAD	Ellipse	B MEAS
APAD	Trace	B-OB MEAS
CER		B-CARDIAC
FTA ▶		B-GYN MEAS
HUM		B-SML MEAS
OFD		B-URO MEAS
THD		B-ORTH MEAS
Others ▶		

5.1 Abbreviations used

The following abbreviations are used in this operator's manual and on the monitor display:

- EDD (estimated date of delivery)
- GA (gestational age)
- LMP (last menstrual period)
- BBT(Basal Body Temperature)
- EFW (estimated fetal body weight)

5.2 Measurement items

1. Items measured

- AC (abdominal circumference)
- AFI (amniotic fluid index)
- AF(amniotic fluid)
- APAD (anteroposterior abdominal diameter)
- BPD (biparietal diameter)
- CER (cerebellum)
- CRL (crown rump length)
- FL (femur length)
- FTA (fetal trunk cross-sectional area)
- GS (gestational sac diameter)
- HC (head circumference)
- HUM (humerus length)
- OFD (occipitofrontal diameter)
- TAD (transverse abdominal diameter)
- THD (thoracic diameter)

2. Items calculated
 - EFW (estimated fetal weight)
 - GA (diagnosed gestational age or clinical gestational age)
3. Items key in
 - LMP (last menstrual period)
 - BBT(Basal Body Temperature)
 - FBP(fetus Biophysical profile)

5.3 Fetal Growth Measurements

The parameters given below are general indexes used to evaluate the fetal growth. After measuring each parameter, the system will automatically calculate the GA based on the measured results.

NOTE:

1. The GA here means diagnosed gestational age.
2. The formula that used in every measured item can be preset. Please refer to “1.5 Preset Formula”.
3. Every measurement must be measured in the effect image area.

5.3.1 GS

Measurement Channels: 1

Use maximum diameter method to measure GS.

Method:

1. Move the cursor to the [GS] item, press the 『Set』 key and move the cursor into the image window. The cursor changes into a “+”.
2. To measure GS, refer to the “Distance” measurement in B mode general measurements.
3. The measured result of GS is displayed in the Result Window. Whether GA is displayed in the result window or not lies on the formula preset and whether LMP or BBT has been entered or not before the measurement (Please refer to the details in the section “Preset Formula”).
4. Repeat the steps from 1 to 3 to do a new GS measurement.

5.3.2 CRL

Measurement Channels: 1

Method:

1. Move the cursor to the [CRL] item. Press the 『Set』 key and move the cursor into the image window. The cursor changes into a “+”.
2. To measure CRL, refer to the “Distance” measurement in B mode general measurements.
3. The measured result of CRL is displayed in the Result Window. Whether GA is displayed in the result window or not lies on whether LMP or BBT has been entered or not before the measurement (Please refer to the details in the section “Preset Formula”).
4. Repeat the steps from 1 to 3 to do a new CRL measurement.

5.3.3 BPD

Measurement Channels: 1

Method:

1. Move the cursor to [BPD] item. Press the 『Set』 key and move the cursor into the image window. The cursor changes into a “+”.
2. To measure BPD, refer to the “Distance” measurement in B mode general measurements.
3. The measured result of BPD is displayed in the Result Window. Whether GA is displayed in the result window or not lies on the formula preset and whether LMP or BBT has been entered or not before the measurement (Please refer to the details in the section “Preset Formula”).
4. Repeat the steps from 1 to 3 to do a new BPD measurement.

5.3.4 HC

Two methods are available to measure HC. They are Ellipse method and Trace method.

Measurement Channels: 1

Method:

1. Move the cursor to the [HC] item. The [HC] submenu pops up. Move the cursor to [Ellipse] or [Trace] in this submenu. Press the 『Set』 key, the cursor changes into a “+”.

2. To measure HC, refer to the “Circumference and Area” measurement in B mode general measurements.
3. The measured result of HC is displayed in the Result Window. Whether GA is displayed in the result window or not lies on the formula preset and whether LMP or BBT has been entered or not before the measurement (Please refer to the details in the section “Preset Formula”).
4. Repeat the steps from 1 to 3 to do a new HC measurement.

5.3.5 AC

Two methods are available to measure AC. They are Ellipse method and Trace method.

Measurement Channels: 1

Method:

1. Move the cursor to the [AC] item. The [AC] submenu pops up. Move the cursor to [Ellipse] or [Trace] item in this submenu. Press the 『Set』 key, the cursor changes into a “+”.
2. To measure AC, refer to the “Circumference and Area” measurement in B mode general measurements.
3. The measured result of AC is displayed in the Result Window. Whether GA is displayed in the result window or not lies on the formula preset and whether LMP or BBT has been entered or not before the measurement (Please refer to the details in the section “Preset Formula”).
4. Repeat the steps from 1 to 3 to do a new AC measurement.

5.3.6 FL

Measurement Channels: 1

Method:

1. Move the cursor to the [FL] item. Press the 『Set』 key and move the cursor into the image window. The cursor changes into a “+”.
2. To measure FL, refer to the “Distance” measurement in B mode general measurements.
3. The measured result of FL is displayed in the Result Window. Whether GA is displayed in the result window or not lies on the formula preset and whether LMP or BBT has been entered or not before the measurement (Please refer to the details in the section “Preset Formula”).
4. Repeat the steps from 1 to 3 to do a new FL measurement.

5.3.7 AFI

Measurement channels: 1

Procedure:

1. Move the cursor onto [AFI] item in [B-OB MEAS] menu. Press 『Set』 key to enter AFI measurement.
2. The details of measurement operation are the same as to measure “Distance”.
3. When measured the forth length, result of AFI displays on screen automatically. See figure below:

AF1	40.69mm
AF2	49.62mm
AF3	38.38mm
AF4	22.31mm
AFI	151.00mm

4. Select [AFI] item in [B-OB MEAS] menu again, the next AFI measurement will begin. Or the system will go back to default measurement mode “Distance”.

5.3.8 TAD

Measurement channels: 1

Procedure:

1. Select [TAD] item from [B-OB MEAS2] menu; press 『Set』 to enter measurement status.
2. Method to measure TAD is the same as that to measure “Distance” in B-mode.
3. After measurement, TAD result will be displayed in the Result Window. Whether GA is displayed in the result window or not lies on whether LMP or BBT has been entered or not before the measurement (Please refer to the details in the section “Preset Formula”).
4. Select [TAD] item again and repeat above steps to measure another TAD.

5.3.9 APAD

Measurement channels: 1

Procedure:

1. Select [APAD] item from [B-OB MEAS2] menu and press 『Set』 key to enter measurement status.

2. Method to measure APAD is the same as that to measure “Distance” in B-mode.
3. After measurement, APAD result will be displayed in the Result Window. Whether GA is displayed in the result window or not lies on whether LMP or BBT has been entered or not before the measurement (Please refer to the details in the section “Preset Formula”).
4. Select [APAD] item again and repeat above steps to measure another APAD. Otherwise; the system will return to the default measurement item, i.e., TAD measurement.

5.3.10 CER

Measurement channels: 1

Procedure:

1. Select [CER] item from [B-OB MEAS2] menu and press [Set] key to enter measurement status.
2. Method to measure CER is the same as that to measure “Distance” in B-mode.
3. After measurement, CER result will be displayed in the Result Window. Whether GA is displayed in the result window or not lies on the formula preset and whether LMP or BBT has been entered or not before the measurement (Please refer to the details in the section “Preset Formula”).
4. Select [CER] item again and repeat above steps to measure another CER. Otherwise; the system will return to the default measurement item, i.e., TAD measurement.

5.3.11 FTA

There are two methods to measure FTA: Ellipse and Trace.

Measurement channels: 1

Procedure:

1. Select [Ellipse] or [Trace] item of [FTA] submenu from [B-OB MEAS2] menu; press [Set] key to enter measurement status.
2. Method to measure FTA is the same as that to measure “Circumference/Area” in B-mode.
3. After measurement, FTA result will be displayed in the result window. Whether GA is displayed in the result window or not lies on whether LMP or BBT has been entered or not before the measurement (Please refer to the details in the section “Preset Formula”).
4. Select [FTA] item again and repeat above steps to measure another FTA. Otherwise; the system will return to the default measurement item, i.e., TAD measurement.

5.3.12 HUM

Measurement channels: 1

Procedure:

1. Select [HUM] item from [B-OB MEAS2] menu and press 『Set』 key to enter measurement status.
2. Method to measure HUM is the same as that to measure “Distance” in B-mode.
3. After measurement, HUM result will be displayed in the Result Window. Whether GA is displayed in the result window or not lies on the formula preset and whether LMP or BBT has been entered or not before the measurement (Please refer to the details in the section “Preset Formula”).
4. Select [HUM] item again and repeat above steps to measure another HUM. Otherwise; the system will return to the default measurement item, i.e., TAD measurement.

5.3.13 OFD

Measurement channels: 1

Procedure:

1. Select [OFD] item from [B-OB MEAS2] menu and press 『Set』 key to enter measurement status.
2. Method to measure OFD is the same as that to measure “Distance” in B-mode.
3. After measurement, OFD result will be displayed in the Result Window. Whether GA is displayed in the result window or not lies on the formula preset and whether LMP or BBT has been entered or not before the measurement (Please refer to the details in the section “Preset Formula”).
4. Select [OFD] item again and repeat above steps to measure another OFD. Otherwise; the system will return to the default measurement item, i.e., TAD measurement.

5.3.14 THD

Measurement channels: 1

Procedure:

1. Select [THD] item from [B-OB MEAS2] menu and press 『Set』 key to enter measurement status.
2. Method to measure THD is the same as that to measure “Distance” in B-mode.
3. After measurement, THD result will be displayed in the Result Window. Whether GA is displayed in the result window or not lies on whether LMP or BBT has been entered or not before the measurement (Please refer to the details in the section “Preset Formula”).
4. Select [THD] item again and repeat above steps to measure another THD. Otherwise; the system will return to the default measurement item, i.e., TAD measurement.

5.4 EDD

5.4.1 Calculating the EDD according to LMP

Method:

1. Move the cursor to the [Key In] item, and then the [Key In] submenu pops up. Move the cursor to the [LMP] item of the submenu. Press the 『Set』 key, the dialog box of [Enter LMP] pops up.
2. Enter the date of LMP into the edit bar according to the date format which displays in the dialog box.
3. Move the cursor to the 「Ok」 item and press the 『Set』 key. The result of EDD is displayed in the Result Window. Or move the cursor to the 「Cancel」 item and press the 『Set』 key to give up the input and the result of EDD will not be displayed.

The full name of LMP is: Last Menstrual Period.

The screenshot shows a dialog box titled "Enter LMP". At the top, there is a text input field with a vertical cursor and the format "(YYYY/MM/DD)" to its right. Below this are two buttons: "OK" with a checkmark icon and "Cancel" with an 'X' icon. At the bottom of the dialog is a "Help" button.

5.4.2 Calculating the EDD according to BBT

Method:

1. Move the cursor to the [Key In] item, and then the [Key In] submenu pops up. Move the cursor to the [BBT] item of the submenu. Press the 『Set』 key, the dialog box of [Enter BBT] pops up.
2. Enter the date of last BBT into the dialog box according to the date format which displays in the dialog box.
3. Move the cursor to the 「Ok」 item and press the 『Set』 key. The result of EDD is displayed in the Result Window. Or move the cursor to the 「Cancel」 item and press the 『Set』 key to give up the input and the result of EDD will not be displayed.

The full name of BBT is: Basal Body Temperature.

The screenshot shows a dialog box titled "Enter BBT". At the top, there is a text input field with a vertical cursor and the format "(YYYY/MM/DD)" to its right. Below this are two buttons: "OK" with a checkmark icon and "Cancel" with an 'X' icon. At the bottom of the dialog is a text input field containing the text "Enter the date".

5.5 EFW

The system can calculate EFW based on the measured data of some fetal growth indexes.

5.5.1 Formulae

Formula to be used to calculate EFW must be set in advance in PRESET menu. There are eleven formulae to calculate EFW, listed below:

- **Tokyo University formula:**

$$EFW = (1.07 * (BPD^3)) + (3.42 * APTD * TTD * FL)$$

In which, APTD is anteroposterior abdominal diameter; TTD is transverse trunk diameter. The EFW unit is g, and the unit of measurement items is cm.

- **Osaka University formula:**

$$EFW = 1.25674 * (BPD^3) + 3.50665 * FTA * FL + 6.3$$

In which, FTA is fetal trunk cross-sectional area. The EFW unit is g, and the unit of measurement items except FTA is cm. FTA unit is cm².

- **HADLOCK1 formula:**

$$EFW = 10^{(1.304 + (0.05281 * AC) + (0.1938 * FL) - (0.004 * FL * AC))}$$

- **HADLOCK2 formula:**

$$EFW = 10^{(1.335 - (0.0034 * AC * FL) + (0.0316 * BPD) + (0.0457 * AC) + (0.1623 * FL))}$$

- **HADLOCK3 formula:**

$$EFW = 10^{(1.326 - (0.00326 * AC * FL) + (0.0107 * HC) + (0.0438 * AC) + (0.158 * FL))}$$

- **HADLOCK4 formula:**

$$EFW = 10^{(1.3596 - (0.00386 * AC * FL) + (0.0064 * HC) + (0.00061 * BPD * AC) + (0.0424 * AC) + (0.174 * FL))}$$

In formulae of HADLOCK1 to HADLOCK4, the EFW unit is g, and the unit of measurement items is cm.

- **Shepard formula:**

$$EFW(Kg) = 10^{(-1.7492 + (0.166 * BPD) + (0.046 * AC) - (2.646 * AC * BPD / 1000))}$$

The EFW unit is kg, and the unit of measurement items is cm.

- **Merz1 formula:**

$$EFW = -3200.40479 + (157.07186 * AC) + (15.90391 * (BPD^2))$$

The EFW unit is g, and the unit of measurement items is cm.

- **Merz2 formula:**

$$EFW = 0.1 * (AC^3)$$

The EFW unit is g, and the unit of measurement items is cm.

- **Hansmann formula:**

$$\text{EFW (Kg)} = (-1.05775 \cdot \text{BPD}) + 0.0930707 \cdot (\text{BPD}^2) + (0.649145 \cdot \text{THD}) - 0.020562 \cdot (\text{THD}^2) + 0.515263$$

The EFW unit is kg, and the unit of measurement items is cm.

- **Campbell formula:**

$$\text{EFW (Kg)} = \text{EXP}(-4.564 + (0.282 \cdot \text{AC}) - (0.00331 \cdot (\text{AC}^2)))$$

The EFW unit is kg, and the unit of measurement items is cm.

5.5.2 Measurement items

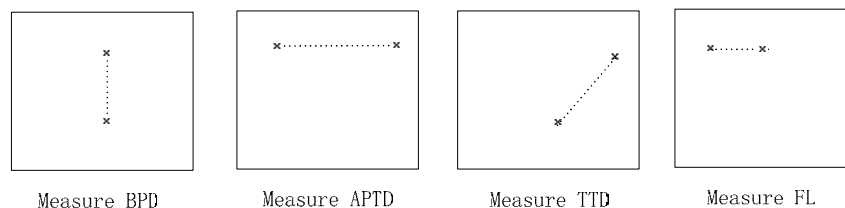
When users select different formula, there are different items to be measured. So user can evaluate EFW according to real measurement items in applications.

5.5.3 Sample

Following uses “Tokyo University” formula as an example to explain how to calculate EFW.

1. Move the cursor onto [EFW] menu item and press 『Set』 key. Move the cursor into Image Window, the cursor will turn into a “+”.
2. Method to measure BPD is the same as that to measure “Distance” in B-mode.
3. Follow the step to measure APTD.
4. Follow the step to measure TTD.
5. Follow the step to measure FL. After finishing all measurements, the system will calculate EFW value and display it in the Result Window.

The procedure is detailed in following figures:



5.6 Results

5.6.1 Growth Curves Comparison

Function: “growth curve comparison” means to compare the measured data of the fetus with the normal growth curve in order to determine if the fetus grows normally.

Procedure:

1. Measure one or more items of fetal growth indexes (including GS, CRL, BPD, FL, AC,

HC, APAD, TAD, CER,FTA, HUM, OFD, THD).

2. Enter LMP or BBT. For the detailed procedure, please refer to section 5.4.1 and 5.4.2.
3. Move the cursor onto [Results] menu item; the [Results] submenu will pop up automatically. Then move the cursor onto [Growth Curve] submenu item and press 『Set』 key. The screen will display “Obstetric Growth Curve” dialog.
4. The default page “GS” is opened in the dialog. The formula displayed on the right is the one based on which the current growth curve is generated. Move the cursor onto other Formula button and press 『Set』 key; the screen will display the normal growth curve of this Formula in order to determine the growth situation of the fetus.
5. Move the cursor onto the button for other page and press 『Set』 key; the growth curve of other exam item and the corresponding position of the measured parameter value on the growth curve will be displayed.
6. Now use the BPD page as an example to illustrate the BPD growth curve, see the following figure a. In which the BPD growth curve and the corresponding position of measured BPD value (marked using “+”) on the growth curve are displayed. The current growth curve is based on Tokyo formula.
7. Move the cursor onto [Close] button and press 『Set』. The dialog will disappear and the screen restores original display.
8. User can select “Single” or “Quad” mode in exam report. See the figures as follows.

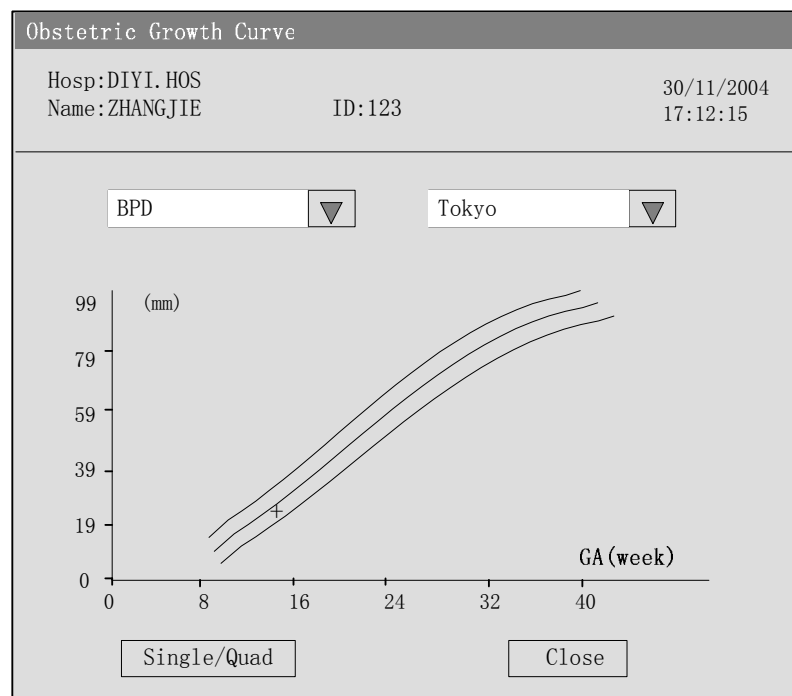


Figure a Dialog box of growth curve for obstetric exam (Single)

Press 『Single/Quad』 in above figure. User can get the figure as follow.

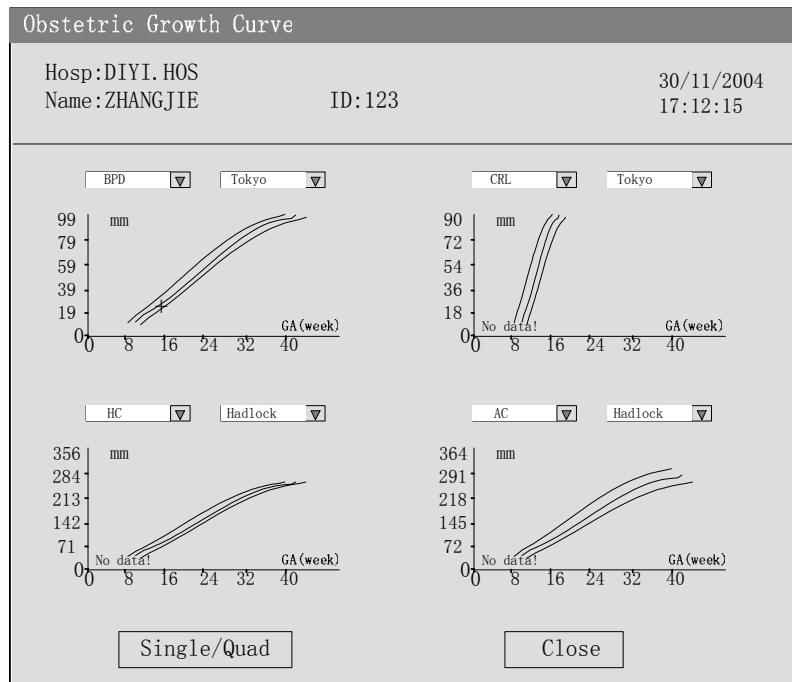


Figure b Dialog box of growth curve for obstetric exam (Quad)

5.6.2 Fetal Biophysical Profile

Fetal Biophysical Profile means to first obtain a few indexes related to fetal growth through the way of experiment or measurement and then evaluate the hazardous situation that the fetus is facing by grading these indexes respectively. The result scores can be used as guidance to clinical treatment.

There are 6 indexes to be obtained at the help of experiment or measurement:

- Stress fetal heart rate acceleration (FHR)
- Fetal movement (FM)
- Fetal breathing movement (FBM)
- Fetal tension (FT)
- Amniotic fluid (AF)
- Placenta level (PL)

Of these 6 indexes, AF is obtained through measuring the depth of amniotic fluid. Placenta level means to divide the growing period of the fetus into four levels based on the placenta images of different stages. The four levels are 0, I, II and III.

Other indexes are obtained through fetal stress experiment, which requires about 20 to 30 minutes.

5.6.2.1 Measure the depth of amniotic fluid

Scale number: 1

Measure method:

1. Move the cursor to the [FBP] item in the menu, the [AF] submenu pops up automatically. Move the cursor to the [AF] item and press 『Set』 key, the cursor then moves into the image window and displays as a “+”.
2. Measure the depth of amniotic fluid. Refer to the method of “Distance” measurement in B-mode Measurement.
3. After measurement, the depth of amniotic fluid will be displayed in the Result window. If the scores of the fetal stress experiment have been entered, the total scores of fetal biophysical profile will then be displayed in the Result window.

FBP grading criteria:

- 2 scores: max. amniotic fluid depth > 2 cm;
- 1 score: max. amniotic fluid depth is 1 to 2cm;
- 0: max. amniotic fluid depth < 1 cm.

5.6.2.2 Enter scores for each index based on fetal stress experiment and placenta level

FBP grading criteria:

1. FHR

Examining time: 20 minutes

FBP grading criteria:

- 2 scores: Condition is during fetal movements, FHR acceleration ≥ 15 times/minute and lasting time ≥ 15 S. It is 2 scores if the appearance of the situation meeting the condition ≥ 5 times within 20 minutes;
- 1 score: Condition is during fetal movements, FHR acceleration ≥ 15 times/minute and lasting time ≥ 15 s. It is 1 score if the appearance of the situation meeting the condition is 1~4 times within 20 minutes;
- 0 score: during fetal movements, FHR acceleration ≤ 1 times within 20 minutes

2. FM

- Examining time: 30 minutes
- FBP grading criteria:
 - 2 scores: fetal movements ≥ 3 times within 30 minutes;
 - 1 score: fetal movements is 1~2 times within 30 minutes;

- 0 score: no fetal movements within 30 minutes.

3. FBM

- Examining time: 30 minutes
- FBP grading criteria:
- 2 scores: FBM \geq 1, lasting time \geq 60s;
- 1 score: FBM \geq 1, lasting time is 30-60s;
- 0 score: no FBM or lasting time \leq 30s.

4. FT

- Examining time: 30 minutes
- FBP grading criteria:
- 2 scores: limbs and spine stretch-and-bend movements \geq 1 within 30 minutes;
- 1 score: limbs or spine stretch-and-bend movements \geq 1 within 30 minutes;
- 0 score: limbs only stretch , no bend, and fingers loose within 30 minutes

5. PL

- FBP grading criteria:
- 2 scores: placental level \leq II ;
- 1 score: placenta is on the posterior wall, therefore difficult to estimate placental level;
- 0 score: placental level is III.

Enter scores for each index:

1. Move the cursor to [FBP] item, the [Key In] submenu pops up automatically. Move the cursor to the [Key In] item in the submenu and press 『Set』 key, the dialog box of “Fetal Biophysical Profile” pops up as shown in the figure below.

Fetal Biophysical Profile		
FHR:	<input type="text" value="2"/>	<input type="text" value="FHR=15 times/m, time=15s, =5times"/>
FM:	<input type="text" value="2"/>	<input type="text" value="FM=3times"/>
FBM:	<input type="text" value="1"/>	<input type="text" value="FBM=1times, time=30~60s"/>
FT:	<input type="text" value="1"/>	<input type="text" value="Limbs or spine stretch-bend=1times"/>
PL:	<input type="text" value="2"/>	<input type="text" value="Placental grade=2"/>
<input type="button" value="Ok"/>		<input type="button" value="Cancel"/>
<input type="text" value="Help"/>		

2. Based on the results of fetal stress experiment, set up the scores for each fetal index: Move the cursor to one of the buttons used to adjust the scores of indexes, use 『Set』 key or 『Back』key to change the value. The fetal stress experiment information corresponding to the value is displayed in the Information bar on the right side.
3. After giving all indexes scores, press 『Set』 key on the 『Ok』 button to make the setups into effect and close the dialog box at the same time. If the AF value has been set up, the total value of FBP will then be displayed in the Result window.
4. Or just press 『Set』 key on the 『Cancel』 button to give up these setups and close the dialog box at the same time.

5.6.3 FBP Report

After the depth of amniotic fluid being measured and the scores of fetal stress experiment and the placenta level being entered, the system can automatically form FBP Report based on the specified formula.

Formula: Vintzileos formula.

The data displayed in the report include:

- Fetal growing state based on individual index:

Scores of individual index	Growing condition
2 scores:	Normal
1 score:	Slight Abnormity
0 score:	Obvious Abnormity
- Total scores and general fetal growing condition

Total scores	Growing condition
7-12 scores	Normal fetus, chronic asphyxia's risk is low.
3-6 scores	Fetus chronic asphyxia's risk is suspicious.
0-2 scores	Fetus chronic asphyxia's risk is highly suspicious.

FBP Report

Operating method:

Move the cursor to the [FBP Report] item in the [Result] menu and press 『Set』 key to open the dialog box of "Fetal Biophysical Profile Report" as shown in the figure below.

Fetal Biophysical Profile Report		
Formula: Vintzileos		
FHR:	<input type="text" value="2"/>	<input type="text" value="Normal"/>
FM:	<input type="text" value="2"/>	<input type="text" value="Normal"/>
FBM:	<input type="text" value="2"/>	<input type="text" value="Normal"/>
FT:	<input type="text" value="2"/>	<input type="text" value="Normal"/>
AF:	<input type="text" value="2"/>	<input type="text" value="Normal"/>
PL:	<input type="text" value="2"/>	<input type="text" value="Normal"/>
Total: <input type="text" value="12"/>		
Diagnosis:	<input type="text" value="Normal, chronic asphyxia risk low"/>	
<input type="button" value="Close"/>		
<input type="text" value="Help"/>		

5.6.4 Obstetric Exam Report

After finishing the obstetric exam, the system can automatically generate the obstetrics report.

The data in the obstetrics report include:

- Hospital Name
- General Data of the Patient
- Exam Date
- Measured Values and Calculated Results
- Calculation Formula
- Doctor's Diagnosis
- Printout Report

After one of more measurements and calculations of obstetric exam, move the cursor to the [Report] item of the [Results] submenu, press the [Set] key to open the dialog box of [Obstetric Exam Report]. See figure below.

Obstetric Exam Report

Hosp: SN 1: SN 2: 05/11/2004
 Name: Age: 11:33:08
 ID: Ref MD:

ObstData

	GS	CRL	BPD	HC	AC	FL
Measured:	<input type="text" value="58.8 mm"/>	<input type="text" value="27.7 mm"/>	<input type="text" value="81 mm"/>	<input type="text" value="15.8 mm"/>	<input type="text" value="110 mm"/>	<input type="text" value="83.2 mm"/>
DGA:	<input type="text" value="11W 1D"/>	<input type="text" value="14W 2D"/>	<input type="text" value="14W 6D"/>	<input type="text" value="15W 3D"/>	<input type="text" value="15W 2D"/>	<input type="text" value="14W 3D"/>
Formula:	<input type="text" value="China"/>	<input type="text" value="China"/>	<input type="text" value="China"/>	<input type="text" value="Hadlock"/>	<input type="text" value="Hadlock"/>	<input type="text" value="China"/>
EDD:	<input type="text" value="10/12/04"/>	<input type="text" value="15/10/04"/>	<input type="text" value="05/12/04"/>	<input type="text" value="08/10/04"/>	<input type="text" value="20/10/04"/>	<input type="text" value="01/10/04"/>

Average GA Average EDD
 BBT GA EDD
 EFW Formula AFI

Diagnosis:

Obstetric exam report

- All the measuring items and calculating indexes are displayed in the report. Also all the measured data and calculated results are displayed in the report. Those values and results that have not measured or still not completed are not displayed.
- If the doctor’s diagnosis needs to be added into the report, just anchor the cursor into the Edit Bar of “Diagnosis”, then press the [Set] key. When the annotation cursor “|” appears in the Edit Bar, the user can start entering the diagnosing information.
- Press the [Print] button, the corresponding report is then printed out. The details refer to the following section.

During the process of or after finishing the measurements and calculations, the report can be generated at any time for the user to view the measuring process. Then use the cursor to select [Ok] or [Cancel] button to close the report and continue the measurement.

5.6.5 Printing Obstetric Report

The Obstetric Report generated by the system can be printed out in A4 paper size. Besides the information in the dialog box, the report also contains an image as the same as the image displayed on the screen.

.Procedures:

1. Check if there is paper in the paper box of the printer and if the printer is in normal state.

The user can use the printer only when printer is in normal status. For the detailed information, refer to the instructions of the printer.

2. Open the dialog box of Obstetric Exam Report. Refer to chapter 5.6.4.
3. Click the [Print] button in the dialog box, some information would appear indicating that the system is processing the printed data, please wait.

NOTE: After clicking the [Print] button, the entered data in the dialog box is then accepted by the system, i.e. the function of clicking the [Print] button is the same as clicking the [Ok] button, and then print.

4. The printer starts printing out the report. Waiting until the dialog box closes; the user can perform other operations.
5. The printer feeds out the paper and then printing process ends.

⚠WARNING: strictly prohibit plug in/out the power cable and the signal cable of the printer when the power is still on, otherwise the system and the printer will be damaged.

5.7 Others

Users can enter other application measurements through [Others] item from the [B-OB MEAS] or [B-OB MEAS2] menu. Select corresponding item referring to the following figure and press [Set] key to switch it.

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Fetal Growth Chart Using the Ultrasonotomographic Technique

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Revision 3 (September 1983)

Studies on Fetal Growth and Functional Developments

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6 Cardiac Measurements & Calculations

The cardiac exam and measurements are generally performed in M mode or M/B mode.

6.1 M Mode Measurements

Confirm that the system is in Cardiac Exam mode. If not, press the 『EXAM』 key on the control panel. The Exam Select menu is displayed on the right side of the screen. Move the cursor to the [Car] item in the Exam Select menu and press the 『Set』 key to enter the Cardiac exam mode.

Exam Select
Abd
Gyn
Car
Ob
Sml

Press the 『M』 key to access the M mode.

Press the 『Measure』 key to access the Measurement mode.

Confirm that the [M-CARDIAC] menu is displayed on the right part of the screen. If not, press the 『Menu』 key.

The system will automatically access the M mode Cardiac Exam status. The default measurement is the measurement of left ventricular function using Teichholz formula.

M-CARDIAC
LV ▶
Mitral Meas ▶
Aorta Meas ▶
Heart Rate
LVET
LVMW
Key In ▶
Report
Others ▶

LV
Teichholz
CUBE

MITRAL MEAS
EF Slope
ACV
A/E
Valve Volume

AORTA MEAS
LAD/AOD
Valve Volume

KEY IN
Heart Rate
LVET
H & W

OTHERS
M MEAS

The items of cardiac exam in M mode are included in the following table:

1. Cube

Item Abb.	Description	Formula or operation	Unit
LVIDd	Left ventricular short-axis diameter at end diastole	Distance measurement in M mode	mm or cm
LVIDs	Left ventricular short-axis diameter at end systole	Distance measurement in M mode	mm or cm
LVET	Ejection time	Time measurement in M mode	ms or s
HR	Heart rate	Measure in M mode or Key In	bpm
EDV	End-diastolic left ventricular volume	$EDV [mL] = LVIDd^3 [mm]^3 / 1000$	mL
ESV	End-systolic left ventricular volume	$ESV [mL] = LVIDs^3 [mm]^3 / 1000$	mL
SV	Stroke volume	$SV [mL] = EDV [mL] - ESV [mL]$	mL
CO	Cardiac output	$CO [L/min] = SV [mL] \times HR [bpm] / 1000$	L/min
EF	Ejection fraction	$EF [No unit] = (SV [mL] / EDV [mL]) \times 100\%$	no unit
FS	Fractional shortening	$FS [No unit] = ((LVIDd [mm] - LVIDs [mm]) / LVIDd [mm]) \times 100\%$	no unit
SI	SV Index	$SI [No unit] = SV [mL] / BSA [m^2]$	no unit
CI	CO Index	$CI [No unit] = CO [L/min] / BSA [m^2]$	no unit
MVCF	Mean velocity of circumferential fiber shortening	$MVCF [No unit] = (LVIDd [mm] - LVIDs [mm]) / (LVIDd [mm] \times ET [ms] / 1000)$	no unit
BSA	Body surface area	Calculated by selecting formula.	m ²

BSA formula:

Oriental: $BSA = WT^{0.425} * HT^{0.725} * 73.58 / 10000$

Occidental : $BSA = WT^{0.425} * HT^{0.725} * 71.84 / 10000$

HT: height, unit cm;

WT: weight, unit kg;

BSA: area of body surface, unit m²。

2. Teichholz

Abb.	Description	Formula or operation	Unit
LVIDd	Left ventricular short-axis diameter at end diastole	Distance measurement in M mode	mm or cm
LVIDs	Left ventricular short-axis diameter at end systole	Distance measurement in M mode	mm or cm
LVET	Ejection time	Time measurement in M mode	ms or s
HR	Heart rate	Measure in M mode or Key In	bpm
EDV	End-diastolic left ventricular volume	$EDV[mL] = \frac{7 \times LVIDd^3 [cm]^3}{2.4 + LVIDd[cm]}$	mL
ESV	End-systolic left ventricular volume	$ESV[mL] = \frac{7 \times LVIDs^3 [cm]^3}{2.4 + LVIDs[cm]}$	mL
SV	Stroke volume	SV [mL] = EDV [mL] - ESV [mL]	mL
CO	Cardiac output	CO [L/min] = SV [mL] × HR [bpm] / 1000	L/min
EF	Ejection fraction	EF [No unit] = (SV [mL] / EDV [mL]) × 100%	no unit
FS	Fractional shortening	FS [No unit] = ((LVIDd [mm] – LVIDs [mm]) / LVIDd [mm]) × 100%	no unit
SI	SV Index	SI[No unit]= SV [mL] / BSA [m ²]	no unit
CI	CO Index	CI [No unit] = CO [L/min] / BSA [m ²]	no unit
MVCF	Mean velocity of circumferential fiber shortening	MVCF[No unit] = (LVIDd [mm] – LVIDs [mm]) / (LVIDd [mm] × ET [ms] / 1000)	no unit
BSA	Body surface area	Calculated by selecting formula.	m ²

3. Other measurement items

Abb.	Description	Formula or operation	Unit
AOD	The diameter of the aorta	Distance measurement in M mode	mm or cm
LAD	The diameter of the left atrium	Distance measurement in M mode	mm or cm
CA	Amplitude of the A wave	Distance measurement in M mode	mm or cm
CE	Amplitude of the E wave	Distance measurement in M mode	mm or cm
EF SLP	Mitral valve closing speed	Slope measurement in M mode	mm/s or cm/s
ACV	AC descending speed	Slope measurement in M mode	mm/s or cm/s
DEV	Mitral valve openingspeed	Slope measurement in M mode	mm/s or cm/s
DCT	Mitral valve opening time	Time measurement in M mode	s
MAVO1	The opening diameter of that the aorta valve at the beginning	Distance measurement in M mode	mm/s cm/s
MAVO2	The opening diameter of that the aorta valve at the end.	Distance measurement in M mode	mm/s cm/s
AA	The amplitude of the aorta posterior wall	Distance measurement in M mode	mm or cm
LVMW	Left ventricle muscle weight	$LVMW[g]=1.04*[(IVSTd[cm]+LVIDd[cm]+LVPWd[cm])^3 - LVIDd^3[cm]^3]-13.6$	g
LVMWI	Left ventricle muscle weight index	$LVMWI[no\ unit]=LVMW/BSA$	no unit
A/E	A/E ratio	$A/E[no\ unit]=CAAMP[mm]/CEAMP[mm]$	no unit
LAD/AOD	Ratio of left atrium to aortic OD	$LAD/AOD[no\ unit]=LAD[mm]/AOD[mm]$	no unit
AVSV	Aortic valve volume	$AVSV[ml] = (MAVO1[cm]+MAVO2[cm])*ET[s]*50+AA[cm]$	ml
QMV	Mitral valve volume	$QMV=4*DEV*DCT$	ml

4. Calculations items

Abb.	Description	Formula or operation	Unit
EDV	End-diastolic left ventricular volume	$EDV [mL] = LVIDd^3[mm]^3 / 1000$ (CUBE formula)	mL
ESV	End-systolic left ventricular volume	$ESV [mL] = LVIDs^3[mm]^3 / 1000$ (CUBE formula)	mL
SV	Stroke volume	$SV [mL] = EDV [mL] - ESV [mL]$	mL
CO	Cardiac output	$CO [L/min] = SV [mL] \times HR [bpm] / 1000$	L/min
EF	Ejection fraction	$EF [No unit] = (SV [mL] / EDV [mL]) \times 100\%$	no unit
FS	Fractional shortening	$FS [No unit] = ((LVIDd [mm] - LVIDs [mm]) / LVIDd [mm]) \times 100\%$	no unit
SI	SV Index	$SI [No unit] = SV [mL] / BSA [m^2]$	no unit
CI	CO Index	$CI [No unit] = CO [L/min] / BSA [m^2]$	no unit
MVCF	Mean velocity of circumferential fiber shortening	$MVCF = (LVIDd [mm] - LVIDs [mm]) / (LVIDd [mm] \times ET [ms] / 1000)$	no unit
BSA	Body surface area	Calculated by selecting formula.	m ²
LVMW	Left ventricle muscle weight	$LVMW[g] = 1.04 * [(IVSTd[cm] + LVIDd[cm] + LVPWd [cm])^3 - LVIDd^3[cm]^3] - 13.6$	g
LVMWI	Left ventricle muscle weight index	$LVMWI[no unit] = LVMW/BSA$	no unit
A/E	A/E ratio[no unit]	$A/E[no unit] = A [mm]/E[mm]$	no unit
LAD/AOD	Ratio of left atrium to aortic	$LAD/AOD[no unit] = LAD[mm]/AOD[mm]$	no unit
AVSV	Aortic valve volume	$AVSV[ml] = (MAVO1[cm] + MAVO2[cm]) * ET[s] * 50 + AA[cm]$	ml
QMV	Mitral valve volume	$QMV = 4 * DEV * DCT$	ml

6.1.1 LV

The LV measurement on M-mode image is performed based on the EDV and ESV values calculated by left ventricular systolic and diastolic shorten-axis diameter.

Measurement items regarding left ventricular function include LVIDd and LVIDs. The physiological parameters that can be calculated are SV, EF, FS, CO, MVCF, CI and SI.

There are two formulae available to calculate Cardiac Volume in M-mode. They are Teichholz and CUBE.

- **Teichholz formula:**

$$EDV[mL] = \frac{7 \times LVIDd^3 [cm]^3}{2.4 + LVIDd[cm]}$$

$$ESV[mL] = \frac{7 \times LVIDs^3 [cm]^3}{2.4 + LVIDs[cm]}$$

- **CUBE formula:**

$$EDV [mL] = LVIDd^3 [mm]^3 / 1000$$

$$ESV [mL] = LVIDs^3 [mm]^3 / 1000$$

Teichholz and CUBE formulae adopt same measuring process. Detailed measuring methods are to be introduced in the coming sections.

NOTE:

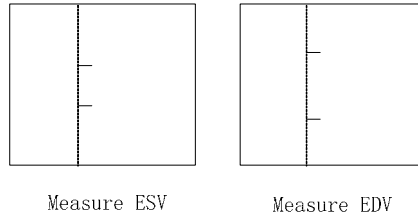
LVIDd > LVIDs must be met in order to ensure correct measurement. Otherwise; measurement and calculation cannot be performed correctly.

6.1.2 SV, EF, FS

Calculations of SV, EF and FS on M-mode image are performed based on the ESV AND EDV values calculated according to the measuring results of left ventricular systolic and diastolic shorten-axis diameter.

Procedure:

1. Move the cursor onto [LV] item; the [LV] submenu will pop up. Move the cursor onto [Teichholz] or [CUBE] submenu item and press 『Set』 key. The cursor will turn into a big “+”.
2. Move the cursor to measure LVIDs at end of left ventricular systole. The method is the same as that to measure “Distance” in “M MEAS” menu. The measured LVIDs value and calculated ESV result will be displayed in the Result Window.
3. Move the cursor to measure LVIDd at end of left ventricular diastole. The method is the same as that to measure “Distance” in “M MEAS” menu. The measured LVIDd value and calculated EDV result will be displayed in the Result Window. See figure below:



4. After measuring LVIDd, the system will simultaneously calculate SV, EF and FS and display their values in the Result Window. See figure below.

LVIDs	43.9 mm
ESV	87 ml
LVIDd	45.8 mm
EDV	96.5 ml
SV	9.47 ml
FS	4.3%
EF	9.81%

6.1.3 CO

After measuring left ventricular function, the system can further calculate CO based on the measured HR value or input HR value.


Measuring HR:

1. Move the cursor onto [Heart Rate] item and press 『Set』 key. Move the cursor into Image Window, the cursor will turn into a big “+”.
2. Measure HR by using the same method as that to measure HR in “M MEAS” menu.
3. After measuring HR, the Result Window will display measured HR value and calculated CO value.

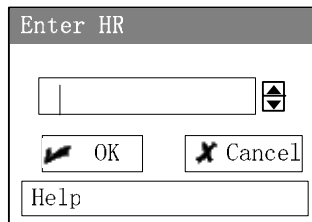
HR	75 bpm
CO	28.4 l/min

Entering HR value directly using keyboard:

Procedure:

1. Move the cursor onto [Key In] item. The [Key In] submenu will pop up. Move the cursor onto [Heart Rate] item and press 『Set』 key. The “Enter HR” dialog will appear on the center of the screen.
2. Enter the correct HR value (beats/min) or user can select the value through “

6-7



3. Press 『Set』 key on [√ OK] button to confirm the input value. The calculated CO value will be displayed in the Result Window.

6.1.4 MVCF

After measuring left ventricular function, the system can further calculate MVCF based on the measured LVET value or input LVET value.


Measuring LVET:

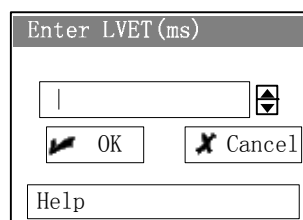
1. Move the cursor onto [LVET] item and press 『Set』 key. Move the cursor into Image Window, the cursor will turn into a “+”.
2. Measure LVET using the same method as that to measure “Time” in “M MEAS” menu.
3. After measuring LVET, LVET and MVCF values will be displayed in the Result Window.

LVET	134 ms
MVCF	4.42

Entering LVET time directly using keyboard:

Procedure:

1. Move the cursor onto [Key In] item. The [Key In] submenu will pop up. Move the cursor onto [LVET] item and press 『Set』 key. The “Enter LVET (ms)” dialog will appear on the center of the screen.
2. Enter LVET value (ms) or select the value through “” key. The range of LVET is 10~300ms.



3. Press 『Set』 key on [√ OK] button to confirm the input value. The MVCF value will be displayed in the Cardiac Exam Report.

6.1.5 CI, SI

After measuring left ventricular function and HR, the system can further calculate CI and SI based on the input height and weight values.

Entering height and weight:

1. Move the cursor onto [Key In] item. The [Key In] submenu will pop up. Move the cursor onto [H & W] item and press 『Set』 key. The “Height & Weight” dialog will appear on the center of the screen.
2. Enter height (cm) and weight (kg) values. The range of height is 20~300 cm; the weight range is 1~150 kg.

3. Press 『Set』 key on [√ OK] button to confirm the input value. The BSA, CI and SI values will be displayed in the Result Window.

SI	217
CI	16.3
BSA	1.75 m ²

6.1.6 Measuring all parameters of LV simultaneous

The calculating items introduced above can be measured and calculated on the same image window by following the procedure below.

Procedure:

1. Enter or measure HR value.
2. Enter or measure LVET time.
3. Enter patient height and weight.
4. Measure LV function.
5. The parameter values mentioned above will then be obtained. They will be displayed in the Result Window.

See figure below.

LVIDs	43.9 mm
ESV	87 ml
LVIDd	45.8 mm
EDV	96.5 ml
SV	9.47 ml
FS	4.3%
EF	9.81%
CO	0.74 l/min
MVCF	0.48
SI	5.46
CI	0.07

6.1.7 LVMW and LVMWI

After measuring the left ventricular function and HR, the system can calculate LVMW using the measured values of LVPWd (left ventricular posterior wall thickness at end diastole) , IVSTd (inter-ventricular septum thickness at end diastole) and LVIDd. If the height and weight are entered, the system can also calculate LVMWI.

Calculation formulae:

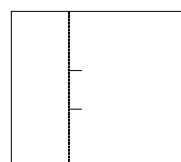
$$\text{LVMW[g]} = 1.04 * [(\text{IVSTd[cm]} + \text{LVIDd[cm]} + \text{LVPWd [cm]})^3 - \text{LVIDd}^3[\text{cm}^3]] - 13.6$$

$$\text{LVMWI [no unit]} = \text{LVMW/BSA}$$

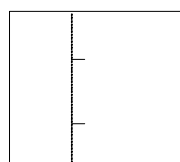
Method of calculating the LVMW:

1. Move the cursor to the [LVMW] item and press the 『Set』 key. Move the cursor into the image window, the cursor changes into a big “+”.
2. Measure the LVPWd.
3. Measure the IVSTd and LVIDd.
4. After the measurements, the calculated values of LVMW is displayed in the Result Window.

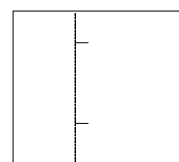
See the figure below:



MEASURE LVPWd



MEASURE IVSTd



MEASURE LVIDd

6.1.8 Mitral measurement

Move the cursor to the [Mitral Meas] item, and then the submenu pops up as shown in the figure below:

Mitral Meas	▶	EF Slope
		ACV
		A/E
		Valve Volume

- The method of measuring EF SLP, ACV and A/E:
 1. Move the cursor to the [Mitral Meas] item, and then the submenu pops up. Move the cursor to the [EF SLP], [ACV] or the [A/E] item of the submenu and press the 『Set』 key. The cursor changes into a big “+”.
 2. Measure EF SLOPE. The method is the same as the “Slope” measurement of M mode general measurements.
 3. Measure ACV. The method is the same as the “Slope” measurement of M mode general measurements.
 4. Measure A/E. Respectively measures the amplitude of peak A to C and peak E to C. The method is the same as the “Distance” measurement of M mode general measurements. After the measurements, the calculated values are displayed in the Result Window.

- Calculating QMV:

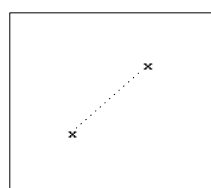
Calculation formula:

$$QMV = 4 * DEV * DCT$$

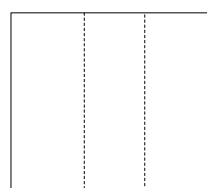
Method:

1. Move the cursor to the [Mitral Meas] item, and then the submenu pops up. Move the cursor to the [Valve Volume] item and press the 『Set』 key. The cursor changes into a “+”.
2. First measure DEV. The Method is the same as the “Slope” measurement of M mode general measurements”.
3. Then measure DCT, the method is the same as the “Time” measurement of M mode general measurements”.
4. The calculated QMV result is displayed in the Result Window.

See the figure below:



Measure DEV



Measure DCT

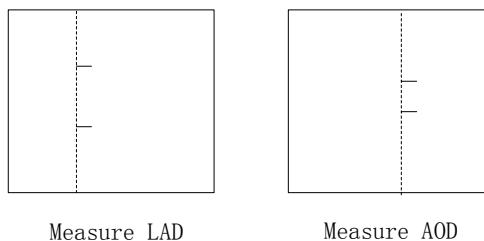
6.1.9 Aorta measurement

Aorta measurements contains: Ratio of left atrium dimension and aortic root dimension (LAD/AOD) and aorta valve volume (AVSV).

- Calculating LAD/AOD:

1. Move the cursor to the [AORTA MEAS] item, the submenu pops up. Move the cursor to the [LAD/AOD] item of the submenu. Press the 『Set』 key, the cursor changes into a big “+”.
2. Respectively measure LAD and AOD, the method is the same as the “Distance” measurement of M mode general measurements.
3. After the measurements, the calculated results of LAD/AOD are displayed in the Result Window.

See the figure below:



- Calculating AVSV:

Only after ET is measured or entered, the system can calculate AVSV.

Calculation formula:

$$\text{AVSV}[\text{ml}] = (\text{MAVO1}[\text{cm}] + \text{MAVO2}[\text{cm}]) * \text{ET}[\text{s}] * 50 + \text{AA}[\text{cm}]$$

In this formula:

MAVO1: The opening diameter of that the aorta valve at the beginning.

MAVO2: The opening diameter of that the aorta valve at the end.

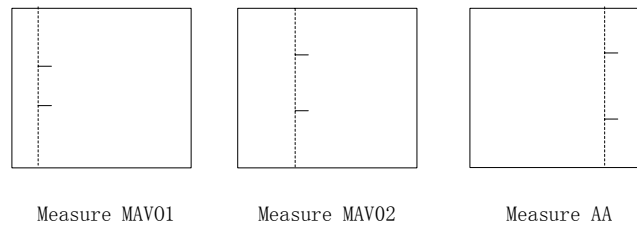
AA: the amplitude of aorta posterior wall.

Method:

1. Move the cursor to the [Aorta Meas] item, the submenu pops up. Move the cursor to the [Valve Volume] item and press the 『Set』 key. The cursor changes into a big “+”.
2. First measure MAVO1. The method is the same as the “Distance” measurement of M mode general measurements.
3. Then measure MAVO2. The method is the same as the “Distance” measurement of M mode general measurements.
4. Thirdly measure AA. The method is the same as the “Distance” measurement of M mode general measurements.

5. After finishing these measurements, the calculated AVSV value is displayed in the Result Window.

See the figure below:



6.2 B Mode Measurements

It is relatively more accurate to measure the left ventricular volume on a two-dimensional echocardiography, especially on M/B mode image, on which both the end systolic two-dimensional echocardiography and the end diastolic two-dimensional echocardiography can be easily and accurately obtained. Moreover, the calculated result is more accurate, too. Therefore, it is recommended to perform cardiac measurements and calculations on M/B mode image.

Confirm that the system is in the Cardiac Exam mode. If not, press the 『EXAM』 key on the control panel. The Exam Select menu is displayed on the right side of the screen. Move the cursor to the [Car] item in the Exam Select menu and press the 『Set』 key to enter the Cardiac exam mode.

Exam Select
Abd
Gyn
Car
Ob
Sml

Press the 『B』 key or 『M/B』 key to access B or M/B mode.

Press the 『Measure』 key to access the Measurement mode.

Confirm that the menu is displayed on the right part of the screen. If not, press the 『Menu』 key.

If in B mode, the system will automatically access the B mode Cardiac Exam status. If in M/B mode, the M-CARDIAC menu will display in the screen. Move the cursor to the [Others] item in the M-CARDIAC menu and select the [B-MEAS] item, then press the 『Set』 key to enter the B Cardiac exam mode.

The default measurement is the left ventricular function measurements using “single-plane ellipse formula”.

B-CARDIAC	LV	Others
LV ▶	S-P Ellipse	B MEAS
RV	B-P Ellipse	B-OB MEAS
PA	Bullet	B OB MEAS2
Key In ▶	Mod. Simpson	B-GYN MEAS
Report		B-SML MEAS
Others ▶		B-URO MEAS
	KEY IN	
	Heart Rate	
	LVET	
	H & W	

The items of cardiac exam in B mode are included in the following table:

1. S-P Ellipse

Abb.	Description	Formula or operation	Unit
LVLd	Left ventricular long-axis length at end diastole	Distance measurement in B mode	mm or cm
LVALd	Left ventricular long-axis area at end diastole	Ellipse of Cir/Area measurement in B mode	mm ² or cm ²
LVLs	Left ventricular long-axis length at end systole	Distance measurement in B mode	mm or cm
LVALs	Left ventricular long-axis area at end systole	Ellipse of Cir/Area measurement in B mode	mm ² or cm ²
HR	Heart rate	Key In	bpm
EDV	End-diastolic left ventricular volume	$EDV [mL] = (8/3/\pi) \times (LVALd[mm^2])^2 / LVLd [mm] / 1000$	mL
ESV	End-systolic left ventricular volume	$ESV [mL] = (8/3/\pi) \times (LVALs[mm^2])^2 / LVLs [mm] / 1000$	mL
SV	Stroke volume	$SV [mL] = EDV [mL] - ESV [mL]$	mL
CO	Cardiac output	$CO [L/min] = SV [mL] \times HR [bpm] / 1000$	L/min
EF	Ejection fraction	$EF [No unit] = (SV [mL] / EDV [mL]) \times 100\%$	No unit
SI	SV Index	$SI[No unit]= SV [mL] / BSA [m^2]$	No unit
CI	CO Index	$CI [No unit] = CO [L/min] / BSA [m^2]$	No unit
BSA	Body surface area	Calculated by selecting formula	m ²

2. B-P Ellipse

Abb.	Description	Formula or operation	Unit
LVALd	Left ventricular long-axis area at end diastole	Ellipse of Cir/Area measurement in B mode	mm ² or cm ²
LVAMd	Left ventricular short-axis area at the level of the Mitral valve at end diastole	Ellipse of Cir/Area measurement in B mode	mm ² or cm ²
LVIDd	Left ventricular short-axis diameter at end diastole	Distance measurement in B mode	mm or cm
LVALs	Left ventricular long-axis area at end systole	Ellipse of Cir/Area measurement in B mode	[mm ² or cm ²]
LVAMs	Left ventricular short-axis area at the level of the Mitral valve at end systole	Ellipse of Cir/Area measurement in B mode	[mm ² or cm ²]
LVIDs	Left ventricular short-axis diameter at end systole	Distance measurement in B mode	mm or cm
HR	Heart rate	Key In	bpm
EDV	End-diastolic left ventricular volume	$EDV [mL] = (8/3/\pi) \times LVALd [mm^2] \times LVAMd [mm^2] / LVIDd [mm] / 1000$	mL
ESV	End-systolic left ventricular volume	$ESV [mL] = (8/3/\pi) \times LVALs [mm^2] \times LVAMs [mm^2] / LVIDs [mm] / 1000$	mL
SV	Stroke volume	$SV [mL] = EDV [mL] - ESV [mL]$	mL
CO	Cardiac output	$CO [L/min] = SV [mL] \times HR [bpm] / 1000$	L/min
EF	Ejection fraction	$EF [No unit] = (SV [mL] / EDV [mL]) \times 100\%$	No unit
SI	SV Index	$SI [No unit] = SV [mL] / BSA [m^2]$	No unit
CI	CO Index	$CI [No unit] = CO [L/min] / BSA [m^2]$	No unit
BSA	Body surface area	Calculated by selecting formula	m ²

3. Bullet

Abb.	Description	Formula or operation	Unit
LVAMd	Left ventricular short-axis area at the level of the Mitral valve at end diastole	Ellipse of Cir/Area measurement in B mode	mm ² or cm ²
LVLd	Left ventricular long-axis length at end diastole	Distance measurement in B mode	mm or cm
LVAMs	Left ventricular short-axis area at the level of the Mitral valve at end systole	Ellipse of Cir/Area measurement in B mode	mm ² or cm ²
LVLs	Left ventricular long-axis length at end systole	Distance measurement in B mode	mm or cm
HR	Heart rate	Key In	bpm
EDV	End-diastolic left ventricular volume	$EDV [mL] = (5/6) \times LVLd [mm] \times LVAMd [mm^2] / 1000$	mL
ESV	End-systolic left ventricular volume	$ESV [mL] = (5/6) \times LVLs [mm] \times LVAMs [mm^2] / 1000$	mL
SV	Stroke volume	$SV [mL] = EDV [mL] - ESV [mL]$	mL
CO	Cardiac output	$CO [L/min] = SV [mL] \times HR [bpm] / 1000$	L/min
EF	Ejection fraction	$EF [No unit] = (SV [mL] / EDV [mL]) \times 100\%$	No unit
SI	SV Index	$SI [No unit] = SV [mL] / BSA [m^2]$	No unit
CI	CO Index	$CI [No unit] = CO [L/min] / BSA [m^2]$	No unit
BSA	Body surface area	Calculated by selecting formula.	m ²

4. Mod. simpson

Abb.	Description	Formula or operation	Unit
LVAMd	Left ventricular short-axis area at the level of the Mitral valve at end diastole	Ellipse of Cir/Area measurement in B mode	mm ² or cm ²
LVLd	Left ventricular long-axis length at end diastole	Distance measurement in B mode	mm or cm
LVAPd	Left ventricular short-axis area at the level of the papillary muscle at end diastole	Ellipse of Cir/Area measurement in B mode	mm ² or cm ²
LVAMs	Left ventricular short-axis area at the level of the Mitral valve at end systole	Ellipse of Cir/Area measurement in B mode	mm ² or cm ²
LVLs	Left ventricular long-axis length at end systole	Distance measurement in B mode	mm or cm
LVAPs	Left ventricular short-axis area at the level of the papillary muscle at end systole	Ellipse of Cir/Area measurement in B mode	mm ² or cm ²
HR	Heart rate	Key In	bpm
EDV	End-diastolic left ventricular volume	*1	mL
ESV	End-systolic left ventricular volume	*1	mL
SV	Stroke volume	SV [mL] = EDV [mL] – ESV [mL]	mL
CO	Cardiac output	CO [L/min] = SV [mL] × HR [bpm] / 1000	L/min
EF	Ejection fraction	EF [No unit] = (SV [mL] / EDV [mL]) × 100%	No unit
SI	SV Index	SI[No unit]= SV [mL] / BSA [m ²]	No unit
CI	CO Index	CI [No unit] = CO [L/min] / BSA [m ²]	No unit
BSA	Body surface area	Calculated by selecting formula.	m ²

$$*1 \quad EDV[mL] = \frac{LVLd[mm]}{9} \times \left(4 \times LVAMd[mm^2] + 2 \times LVAPd[mm^2] + \sqrt{LVAMd[mm^2] \times LVAPd[mm^2]} \right) / 1000$$

$$ESV[mL] = \frac{LVLs[mm]}{9} \times \left(4 \times LVAMs[mm^2] + 2 \times LVAPs[mm^2] + \sqrt{LVAMs[mm^2] \times LVAPs[mm^2]} \right) / 1000$$

5. Other measurements and calculations in B mode

Abb.	Description	Formula or operation	Unit
LVET	Ejection time	key in [ms]	ms
FS	ractional shortening	FS [No unit] = ((LVIDd [mm] – LVIDs [mm]) / LVIDd [mm]) × 100%	No unit
MVCF	Mean velocity of circumferential fiber shortening	MVCF[No unit]= (LVIDd [mm] – LVIDs [mm]) / (LVIDd [mm] × ET [ms] / 1000)	No unit

6.2.1 LV measurement using Single Plane Ellipse method

Procedure:

1. Move the cursor onto [LV] menu item. The “LV” submenu will pop up. Move the cursor onto [S-P Ellipse] submenu item and press 『Set』 key. The cursor will turn into a “+”.

2. At left ventricular end systolic, measurement following parameters:

LVLs: using the same method as that to measure “Distance” in “B MEAS” menu.

LVALs: using the same method as that to measure “Circumference/Area” in “B MEAS” menu by means of Ellipse method.

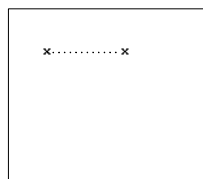
The ESV value will be calculated.

3. At left ventricular end diastolic, measure following parameters:

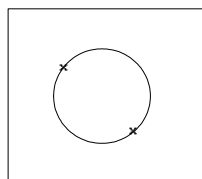
LVLd: using the same method as that to measure “Distance” in “B MEAS” menu.

LVALd: using the same method as that to measure “Circumference/Area” in “B MEAS” menu by means of Ellipse method.

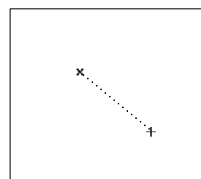
The EDV value will be calculated.



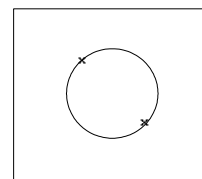
Measure LVLs



Measure LVALs



Measure LVLd



Measure LVALd

4. After measuring LVALd, the system will calculate SV and EF values and at the same time display them in the same way as M mode Cardiac Measurement Results.

6.2.2 Others measurement method for LV

Other measurement methods are similar to Single Plane Ellipse method. The measuring procedure is the same as that for the corresponding item in “B MEAS” menu. You can proceed with the operation by following the message given in HELP bar.

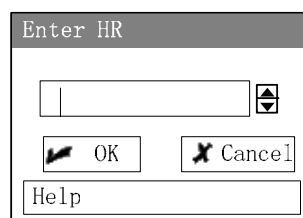
NOTE: As you measure the left ventricle using Mod. simpson method, be sure to keep the 4-chamber profile and 2-chamber profile perpendicular. Otherwise the measure result will be incorrect.

6.2.3 CO

After measuring left ventricular function, the system can further calculate CO according to the HR value entered by the user.

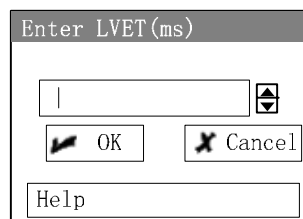
Entering HR value directly from keyboard:

1. Move the cursor onto [Key In] item. The [Key In] submenu will pop up. Move the cursor onto [Heart Rate] submenu item and press 『Set』 key. The “Enter HR” dialog will appear on the center of the screen.
2. Enter HR value (beats/min). The range of HR is 30~180 bpm.
3. Press 『Set』 key on [√ OK] button to confirm the input value. The calculated CO value will be displayed in the Result Window.



6.2.4 Entering LVET

1. Move the cursor onto [Key In] item. The [Key In] submenu will pop up. Move the cursor onto [LVET] submenu item and press 『Set』 key. The “Enter LVET (ms)” dialog will appear on the center of the screen.
2. Enter LVET value (ms). The range of LVET is 10~300 ms. See figure below.
3. Press 『Set』 key on [√ OK] button to confirm the input value.
4. If FS has been measured, the calculated MVCF value will be displayed in the Cardiac Exam Report.



6.2.5 CI, SI

After measuring left ventricular function and HR, the system can further calculate CI and SI based on the input height and weight values.

Entering patient height and weight:

1. Move the cursor onto [Key In] item. The [Key In] submenu will pop up. Move the cursor onto [H & W] submenu item and press 『Set』 key. The “Height & Weight” dialog will appear

on the center of the screen.

2. Enter height (cm) and weight (kg) values. Height range: 20~300 cm; weight range: 1~150 kg.
3. Press 『Set』 key on [√/OK] button to confirm the input value. The BSA, CI and SI values will be displayed in the Result Window.

6.2.6 RV

Procedure:

1. Move the cursor to the [RV] item. Press the 『Set』 key and move the cursor into the image window. The cursor changes into a “+”.
2. To measure RV, refer to the “Distance” measurement in B mode general measurements.
3. The measured result of RV is displayed in the Result Window.
4. Repeat the steps from 1 to 3 to do a new RV measurement.

6.2.7 PA

Procedure:

1. Move the cursor to the [PA] item. Press the 『Set』 key and move the cursor into the image window. The cursor changes into a “+”.
2. To measure PA, refer to the “Distance” measurement in B mode general measurements.
3. The measured result of PA is displayed in the Result Window.
4. Repeat the steps from 1 to 3 to do a new PA measurement.

6.2.8 Other Parameters

To measure other parameters of cardiology, the user may access the M mode image.

6.3 Cardiac Exam Report

After finishing the cardiac exam, the system can automatically generate the Cardiac Exam Report.

The cardiac Exam Report contains following information:

- Hospital Name
- General Data of the Patient
- Exam Date
- Measured Values and Calculated Results
- Doctor's Diagnosis
- Print out Report

After one or more measurements have been completed or in the process of measurements and calculations of cardiac exam, move the cursor to the [Report] item of either the [B-CARDIAC] menu or the [M-CARDIAC] menu and press the 『Set』 key to call up the dialog box of Cardiac Exam Report as shown in figure below. The indexes in the report contain the measured data and evaluating indexes of the cardiac pumping and contracting function as well as the measured data and evaluating indexes of the left ventricular systolic function.

Cardiac Exam Report

Hosp: SN 1: SN 2: 2004/11/29
 Name: Age: Sex: 17:13:16
 ID: Ref MD:

Height: Weight: HR: BSA:

Measures

AOD: <input type="text"/>	LAD/AOD: <input type="text"/>
LAD: <input type="text"/>	LVPWd: <input type="text"/>
IVSTd: <input type="text"/>	LVIDs: <input type="text"/>
LVIDd: <input type="text"/>	RV: <input type="text"/>
AA: <input type="text"/>	PA: <input type="text"/>

Diagnosis:

Cardiac exam report

Cardiac Exam Report

Hosp: SN 1: SN 2: 2004/11/29
 Name: Age: Sex: 17:13:16
 ID: Ref MD:

Height: Weight: HR: BSA:

Measures Analysis

EF:	<input type="text"/>	FS:	<input type="text"/>
EF SLP:	<input type="text"/>	ACV:	<input type="text"/>
CA/CE:	<input type="text"/>	ET:	<input type="text"/>
MVCF:	<input type="text"/>	SV:	<input type="text"/>
CO:	<input type="text"/>	SI:	<input type="text"/>
CI:	<input type="text"/>	LVMW:	<input type="text"/>
LVMWI:	<input type="text"/>	QMV:	<input type="text"/>
AVSV:	<input type="text"/>		

Diagnosis:

Cardiac Exam Report

- All the measuring items and calculating indexes are displayed in the report. Also all the measured data and calculated results are displayed in the report.
- If the doctor's diagnosis needs to be added into the report, just anchor the cursor into the Edit Bar of "Diagnosis", then press the 『Set』 key. When the annotation cursor "|" appears in the Edit Bar, the user can start entering the diagnosing information.
- Press the 『Print』 button, the corresponding report is then printed out. The method of printing the report is the same as printing Obstetric Exam Report.

During the process of or after finishing the measurements and calculations, the report can be generated at any time for the user to view the measuring process. Then use the cursor to select the 『Ok』 or the 『Cancel』 to close the report and continue the measurement.

7 Gynecology Measurements & Calculations

Gynecology measurements and calculations are usually performed on B mode image.

Press the 『EXAM』 key on the control panel. The Exam Select menu is displayed on the right side of the screen. Move the cursor to the [Gyn] item in the Exam Select menu and press the 『Set』 key to enter the Gynecology exam mode.

Exam Select
Abd
Gyn
Car
Ob
Sml

Press the 『Measure』 key to access the Measurement mode.

Confirm that the [B-GYN MEAS] menu is displayed on the right part of the screen. If not, press the 『Menu』 key. The system accesses the gynecology mode. The default is “Distance” measurement.

The whole menu of gynecology measurements details as below:

B GYN MEAS	OV-V	Others
Distance	L. OV-V	B MEAS
UT	R. OV-V	B-OB MEAS
Endo		B OB MEAS2
OV-V ▶	FO-D	B-CARDIAC
FO-D ▶	L. FO	B-SML MEAS
CX-L	R. FO	B-URO MEAS
UT-L/CX-L		B-ORTH MEAS
GYN RPT		
Others ▶		

The measurement & calculations items of gynecology exam are included in the following table:

Abb.	Description	Formula or operation	Unit
UT	Uterus Diameter	$UT[mm]=UT-L[mm]+ UT-W[mm]+ UT-H[mm]$	mm or cm
UT-L	Uterus length	Distance measurement	mm or cm
UT-W	Uterus width	Distance measurement	mm or cm
UT-H	Uterus height	Distance measurement	mm or cm
Endo	Endometrium	Distance measurement	mm or cm
L.OV-V	Left Ovary Volume	$L.OV-V=0.523\times L.OV-L[mm]\times L.OV-W[mm]\times L.OV-H[mm]/1000$	mm ³ /ml
L.OV-L	Left Ovary Length	Distance measurement	mm or cm
L.OV-W	Left Ovary Width	Distance measurement	mm or cm
L.OV-H	Left Ovary Height	Distance measurement	mm or cm
R.OV-V	Right Ovary Volume	$R.OV-V=0.523\times R.OV-L[mm]\times R.OV-W[mm]\times R.OV-H[mm]/1000$	mm ³ /ml
R.OV-L	Right Ovary Length	Distance measurement	mm or cm
R.OV-W	Right Ovary Width	Distance measurement	mm or cm
R.OV-H	Right Ovary Height	Distance measurement	mm or cm
L.FO-L	Left Follicle Length	Distance measurement	mm or cm
L.FO-W	Left Follicle Width	Distance measurement	mm or cm
R.FO-L	Right Follicle Length	Distance measurement	mm or cm
R.FO-W	Right Follicle Width	Distance measurement	mm or cm
CX-L	Uterine cervix length	Distance measurement	mm or cm
UT-L/CX-L	Uterine body / cervix	Ratio of UT-L / CX-L	No unit

7.1 UT (Uterine body)

Channels: 1

Method:

1. Select the [UT] item from the [B-GYN MEAS] menu and press 『Set』 key. The system would enter into UT measurement mode.
2. The detail operations are the same as “Distance measurement” in B general measurement mode. Please refer to it.
3. When user completed the measurement of UT-L, UT-W and UT-H items with leading of help information. The value of Uterus Diameter displays in result window as follows.

UT-L	59.6mm
UT-W	12.4mm
UT-H	19.5mm
UT	91.6mm

7.2 Endo (Endometrium)

Channels: 1

Method:

1. Select the [Endo] item from the [B-GYN MEAS] menu and press 『Set』 key. The system would enter into ENDO measurement mode.
2. The detail operations are the same as “Distance measurement” in B general measurement mode. Please refer to it.
3. When user completed the measurement. The value of “Endo” displays in result area.

7.3 OV-V (Ovary Volume)

7.3.1 L.OV-V

Channels: 1

Method:

1. Select the [L.OV-V] item in [OV-V] submenu from the [B-GYN MEAS] menu and press

〔Set〕 key. The system would enter into corresponding measurement mode.

- The detail operations are the same as “Distance measurement” in B general measurement mode. Please refer to it.
- When user completed the measurement of L.OV-L, L.OV-W and L.OV-H items with leading of help information. The value of L.OV-V displays in result window as follows.

L. OV-L	35mm
L. OV-W	35.5mm
L. OV-H	30.6mm
L. OV-V	19.9ml

7.3.2 R.OV-V

Channels: 1

Method:

The details of operations are the same as L.OV-V items. Please refer to it.

7.4 FO-D (Dominant Follicle)

7.4.1 L.FO

Channels: 1

Method:

- Select the [L.FO] item in [FO-D] submenu from the [B-GYN MEAS] menu and press 〔Set〕 key. The system would enter into corresponding measurement mode.
- The detail operations are the same as “Distance measurement” in B general measurement mode. Please refer to it.
- When user completed the measurement of L.FO-L and L.FO-W items with leading of help information. The values display in result window as follows.

L. FO-L	37.5mm
L. FO-W	22.6mm

7.4.2 R.FO

Channels: 1

Method:

The details of operations are the same as L.FO items. Please refer to it.

7.5 CX-L (Uterine Cervix Length)

Channels: 1

Method:

1. Select the [CX-L] item from the [B-GYN MEAS] menu and press 『Set』 key. The system would enter into “CX-L” measurement mode.
2. The detail operations are the same as “Distance measurement” in B general measurement mode. Please refer to it.
3. When user completed the measurement. The value of “CX-L” displays in result area. If user has already measured UT/L before this measurement, the ratio of UT-L/CX-L displays automatically.

7.6 UT-L/CX-L (Uterine body / cervix)

Channels: 1

Method:

1. Select the [UT-L/CX-L] item from the [B-GYN MEAS] menu and press 『Set』 key. The system would enter into the corresponding measurement mode.
2. The detail operations are the same as “Distance measurement” in B general measurement mode. Please refer to it.
3. When user completed the measurement of “UT-L” and “CX-L”. The value of “UT-L/CX-L” displays in result area.
4. If user has already measured UT/L or CX/L, the ratio of UT-L/CX-L displays automatically when the other item is measured.

7.7 Others

Users can enter other application measurements through [Others] item from the [B-GYN MEAS] menu. Select corresponding item referring to the following figure and press 『Set』 key

to switch it.

Others
B MEAS
B-OB MEAS
B OB MEAS2
B-CARDIAC
B-SML MEAS
B-URO MEAS
B-ORTH MEAS

Others menu

7.8 Gynecology Exam Report

The gynecology examination report has three pages: uterine, ovary, dominant follicle.

The application measurement values would display in report automatically.

Gynecology Exam Report

Hosp: SN 1: SN 2: 15/11/2004
 Name: Age: 11:33:08
 ID: Ref MD:

uterine | ovary | dominant follicle

UT	<input type="text"/>
CX-L	<input type="text"/>
UT-L/CX-L	<input type="text"/>
Endo	<input type="text"/>

Diagnosis:

Gynecology exam report

Gynecology Exam Report

Hosp: SN 1: SN 2: 15/11/2004
 Name: Age: 11:33:08
 ID: Ref MD:

Left ovary		right ovary	
L. OV-L	<input type="text"/>	R. OV-L	<input type="text"/>
L. OV-W	<input type="text"/>	R. OV-W	<input type="text"/>
L. OV-H	<input type="text"/>	R. OV-H	<input type="text"/>
L. OV-V	<input type="text"/>	R. OV-V	<input type="text"/>

Diagnosis:

Gynecology exam report

Gynecology Exam Report

Hosp: SN 1: SN 2: 15/11/2004
 Name: Age: 11:33:08
 ID: Ref MD:

Left follicle		right follicle	
L. FO-L	<input type="text"/>	R. FO-L	<input type="text"/>
L. FO-W	<input type="text"/>	R. FO-W	<input type="text"/>

Diagnosis:

Gynecology exam report

The method of printing the report is the same as printing Obstetric Exam Report.

8 Small parts Measurements & Calculations

Small parts measurements and calculations are usually performed on B mode image.

Press the 『EXAM』 key on the control panel. The Exam Select menu is displayed on the right side of the screen. Move the cursor to the [Sml] item in the Exam Select menu and press the 『Set』 key to enter the Small parts exam mode.

Exam Select
Abd
Gyn
Car
Ob
Sml

Press the 『Measure』 key to access the Measurement mode.

Confirm that the [B-SML MEAS] menu is displayed on the right part of the screen. If not, press the 『Menu』 key. The system accesses the small parts measurement mode. The default is “Distance” measurement.

The whole menu of small parts measurements details as below:

B-SML MEAS
Distance
THY ▶
THY RPT
Others ▶

THY
L. THY-V
R. THY-V

Others
B MEAS
B-OB MEAS
B-OB MEAS2
B-CARDIAC
B-GYN MEAS
B-URO MEAS
B-ORTH MEAS

The measurement & calculation items of small parts exam are included in the following table:

Abb.	Description	Formula or operation	Unit
THY	Thyroid	/	/
L.THY-V	Left Thyroid Volume	$L.THY-V [mm^3] = 0.497 \times L.THY-L [mm] \times L.THY-W [mm] \times L.THY-H [mm]$	mm ³
L.THY-L	Left Thyroid Length	Distance measurement	mm or cm
L.THY-W	Left Thyroid Width	Distance measurement	mm or cm
L.THY-H	Left Thyroid Height	Distance measurement	mm or cm
R.THY-V	Right Thyroid Volume	$R.THY-V [mm^3] = 0.497 \times R.THY-L [mm] \times R.THY-W [mm] \times R.THY-H [mm]$	mm ³
R.THY-L	Right Thyroid Length	Distance measurement	mm or cm
R.THY-W	Right Thyroid Width	Distance measurement	mm or cm
R.THY-H	Right Thyroid Height	Distance measurement	mm or cm

8.1 THY (Thyroid)

8.1.1 L.THY-V

Channels: 1

Method:

1. Select the [L.THY-V] item in [THY] submenu from the [B-SML MEAS] menu and press [Set] key. The system would enter into corresponding measurement mode.
2. The detail operations are the same as "Distance measurement" in B general measurement mode. Please refer to it.
3. When user completed the measurement of L.THY-L, L.THY-W and L.THY-H items with leading of help information. The value of L.THY-V displays in result window as follows.

L. THY-L	37.3mm
L. THY-W	28.1mm
L. THY-H	24.6mm
L. THY-V	12.8ml

8.1.2 R.THY-V

Channels: 1

Method:

The details of operations are the same as L.THY-V items. Please refer to it.

8.2 THY RPT

THY RPT means the report of thyroid examination.

Thyroid Exam Report

Hosp: SN 1: SN 2: 15/11/2004
 Name: Age : Sex : 11:33:08
 ID: Ref MD:

left thyroid	right thyroid
L. THY-L <input type="text"/>	R. THY-L <input type="text"/>
L. THY-W <input type="text"/>	R. THY-W <input type="text"/>
L. THY-H <input type="text"/>	R. THY-H <input type="text"/>
L. THY-V <input type="text"/>	R. THY-V <input type="text"/>

Diagnosis:

Thyroid exam report

Thyroid Exam Report

The method of printing the report is the same as printing Obstetric Exam Report.

8.3 Others

Users can enter other application measurements through [Others] item from the [B-SML MEAS] menu. Select corresponding item referring to the following figure and press 『Set』 key to switch it.

Others
B MEAS
B-OB MEAS
B-OB MEAS2
B-CARDIAC
B-GYN MEAS
B-URO MEAS
B-ORTH MEAS

Others menu

9 Urology Measurements & Calculations

Urology measurements and calculations are usually performed on B mode image.

Select [B-URO MEAS] in [Others] submenu from [B MEAS] or other application measurement menus.

The system accesses the urology mode. The default is “Distance” measurement.

The whole menu of urology measurements details as below:

B-URO MEAS	Key In	Others
Distance	SPSA	B MEAS
RUV		B-OB MEAS
Prostate Volume		B-OB MEAS2
Key In ▶		B-CARDIAC
URO RPT		B-GYN MEAS
Others ▶		B-SML MEAS
		B-ORTH MEAS

The measurement & calculations items of urology exam are included in the following table:

Abb.	Description	Formula or operation	Unit
RUV	Residual volume	$RUV[ml] = 0.7 \times RUV-L[cm] \times RUV-W[cm] \times RUV-H[cm]$	ml
RUV-L	RUV Length	Distance measurement	mm or cm
RUV-W	RUV Width	Distance measurement	mm or cm
RUV-H	RUV Height	Distance measurement	mm or cm
PV	Prostate volume	$PV[ml] = 0.52 \times PV-L[mm] \times PV-W[mm] \times PV-H[mm] / 1000$	ml
PV-L	Prostate Length	Distance measurement	mm or cm
PV-W	Prostate Width	Distance measurement	mm or cm
PV-H	Prostate Height	Distance measurement	mm or cm
PPSA	Prediction of the Prostate Special Antigen Density	$PPSA = 0.12 \times PV$	ng/ml
SPSA	Serum Prostate Special Antigen	Key in	ng/ml
PSAD	Prostate Special Antigen Density	$PSAD = SPSA[ng/ml] / PV[ml]$ ($0.01ng/ml \leq SPSA \leq 100ng/ml$)	/

9.1 RUV

Channels: 1

Method:

1. Select the [RUV] item from the [B-URO MEAS] menu and press 『Set』 key. The system would enter into RUV measurement status.
2. The detail operations are the same as “Distance measurement” in B general measurement mode. Please refer to it.
3. When user completed the measurement of RUV-L, RUV -W and RUV-H items with leading of help information. The value of RUV displays in result window as follows.

RUV-L	31.5mm
RUV-W	19.3mm
RUV -H	25.5mm
RUV	11.3ml

9.2 Prostate Volume

Channels: 1

Method:

1. Select the [Prostate Volume] item from the [B-URO MEAS] menu and press 『Set』 key. The system would enter into Prostate Volume measurement mode.
2. The detail operations are the same as “Distance measurement” in B general measurement mode.
3. When user completed the measurement of PV-L, PV-W and PV-H items with leading of help information. The value of PV and PPSA display in result window.
4. If user key in the SPSA before measuring PV, the value of PSAD also displays.

PV-L	41.1mm
PV-W	23.2mm
PV-H	32.9mm
PV	16.3ml
PPSA	1.96ng/ml

9.3 PSAD

Channels: 1

Method:

1. Key in SPSA before PV measurement. When PV measurements completed, the value of PSAD displays in result area automatically.
2. If user don't key in SPSA before PV measurement, the PSAD value can't display automatically. When PV measurements completed and SPSA is keyed in, the PSAD value can be calculated.

9.4 Urology Exam Report

The application measurement values would display in report automatically.

Urology Exam Report			
Hosp:	<input type="text" value="DIYL.Hos"/>	SN 1:	<input type="text"/>
Name:	<input type="text"/>	Age:	<input type="text"/>
ID:	<input type="text"/>	Ref MD:	<input type="text"/>
		SN 2:	<input type="text"/>
		Sex:	<input type="text" value="M"/>
			15/11/2004
			11:33:08

bladder		prostate	
RUV-L	<input type="text"/>	PV-L	<input type="text"/>
RUV-W	<input type="text"/>	PV-W	<input type="text"/>
RUV-H	<input type="text"/>	PV-H	<input type="text"/>
RUV	<input type="text"/>	PV	<input type="text"/>

PPSA	<input type="text"/>
SPSA	<input type="text"/>
PSAD	<input type="text"/>

Diagnosis:

Urology exam report

Urology Exam Report

The method of printing the report is the same as printing Obstetric Exam Report.

9.5 Others

Users can enter other application measurements through [Others] item from the [B-URO MEAS] menu. Select corresponding item referring to the following figure and press 『Set』 key to switch it.

10 Orthopedics Measurements & Calculations

Orthopedics measurements and calculations are usually performed on B mode image.

Select [B-ORTH MEAS] in [Others] submenu from [B MEAS] or other application measurement menus.

The system accesses the orthopedics mode. The default is “Distance” measurement.

The menu of orthopedics measurements details as below:

B-ORTH MEAS	Others
Distance	B MEAS
HIP	B-OB MEAS
HIP RPT	B-OB MEAS2
Others ▶	B-CARDIAC
	B-GYN MEAS
	B-SML MEAS
	B-URO MEAS

The B-ORTH MEAS menu

The measurement & calculation items of orthopedics exam are included in the following table:

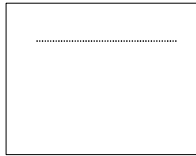
Abb.	Description	Formula or operation	Unit
HIP	/	/	/
α	Angle of BL and ARL	Angle measurement	°
β	Angle of BL and IL	Angle measurement	°

10.1 HIP

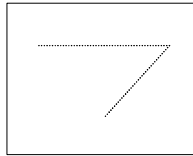
Measurement Channels: 1

Method:

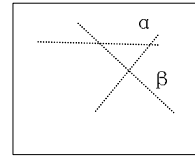
1. Select [HIP] item from “B-ORTH MEAS” menu, and press 『Set』 key to enter in the measurement mode.
2. A line appears on screen and its orientation can be adjusted. The light of the functional knob is on. Turn the knob to adjust orientation of the line to real position, then press 『Set』 key to affirm.
3. And the second line appears. User can adjust its orientation as the first line. At the same time, the value of “Angle α ” displays on screen synchronously. Press 『Set』 key to affirm the second line.
4. Then the third line appears. All of the operation is the same as step 3. When the third line is affirmed, the value of “Angle β ” displays on screen synchronously. The procedure can be expressed as follows:



Turn the functional knob and press [set] key to set the first line.



Make the operation as the first line to affirm the second line



Make the operation as the first line to affirm the third line

10.2 HIP RPT

HIP RPT means the report of HIP examination.

HIP Exam Report

Hosp: <input type="text" value="DIYI.Hos"/>	SN 1: <input type="text"/>	SN 2: <input type="text"/>	15/11/2004
Name: <input type="text"/>	Age: <input type="text"/>	Sex: <input type="text" value="M"/>	11:33:08
ID: <input type="text"/>	Ref MD: <input type="text"/>		

a

β

Diagnosis:

HIP exam report

The method of printing the report is the same as printing Obstetric Exam Report.

10.3 Others

Users can enter other application measurements through [Others] item from the [B-ORTH MEAS] menu. Select corresponding item referring to the following figure and press 『Set』 key to switch it.

