TOSHIBA

No. 2B730-684E*L

OPERATION MANUAL

FOR

DIAGNOSTIC ULTRASOUND SYSTEM

Xario

MODEL SSA-660A

MEASUREMENTS VOLUME

(2B730-684E*L)

IMPORTANT!

Read and understand this manual before operating the equipment. After reading, keep this manual in an easily accessible place.

TOSHIBA MEDICAL SYSTEMS CORPORATION

Trademarks

Windows® and Excel are trademarks of Microsoft Corporation in the U.S.A. and other countries.

Xario, DYNAMIC FLOW, and Power Angio are trademarks of Toshiba Medical Systems Corporation.

This manual may contain trademarks of companies other than Toshiba.

Note that the trademark symbol "TM" and the registered trademark symbol "®" are not used in this manual.

No. 2B730-684E*L

Safety Precautions

1. Meaning of Signal Words

In this operation manual, the signal words **DANGER**, **WARNING**, and **CAUTION** 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.**
CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in property damage.

2. Meaning of Safety Symbols

Symbol	Description
	Type-B applied part * Type B when Type-B applied part is connected. The PCG sensor and pulse sensor that can be connected to this system are Type-B applied parts.
	Type-BF applied part * Type BF when Type-BF applied part is connected. The reference signal cable that can be connected to this system is Type-BF applied part.
	"Attention" (Refer to the operation manual.)

3. Safety Precautions

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

⚠WARNING: **This system is provided with a lossy data compression function for images. Although this function helps reduce the size of stored images, it can cause image deterioration. The amount of compression, therefore, must be limited so that the image quality is maintained at a level which does not adversely affect image viewing.**

⚠CAUTION:

1. Display the most suitable image and select the most suitable measurement tool for the intended measurement. The appropriate measurement methods and results must be determined by a specialist.

2. Patient ID registration

(1) Be sure to register and save the patient ID before starting an examination for a new patient. If measurement is performed for a new patient for whom the patient ID is not registered or saved, the measurement results and other data cannot be saved in the system. In addition, the data for the two patients are mixed together, which may result in incorrect diagnosis.

(2) Before starting an examination for a new patient, confirm that the patient ID matches the patent to be examined. Images can be recorded with an incorrect patient ID.

(3) Enter height, weight, LMP (Last Menstrual Period), IVF (In Vitro Fertilization date), and other information correctly. When the function for reusing the information entered for the immediately preceding examination is used, confirm that these data items are entered correctly. Otherwise, BSA and fetal growth data will be calculated incorrectly.

(4) Check the date format before entering the date of birth, LMP (Last Menstrual Period), or EDD (Estimated Date of Delivery).

(5) Do not enter a patient ID consisting of spaces only. Doing so will result in reading/writing of data to/from media and DICOM transfer to other systems being performed incorrectly.

⚠CAUTION: 3. **Press**  **to fix the data during measurement or during measurement modification.**
Note, however, that the following operations may also fix the measurement data.

-  **is pressed.**
- **One of the following measurement-related switches is pressed.**
  - **[Copy]**
  - **In TIC measurement, [Start], [Copy], [Move], [Drop], [1Frame Move], [Part Move], and [ROI A] to [ROI H]**
  - **Another measurement item switch (except [Velocity] in the basic measurements)**
  - **The switch for the current measurement item**

Confirm that the measurement is performed correctly.

4. **If the measurement data is not fixed for an application measurement, the measurement results are not displayed in the Report.**

5. **If [Delete] on the touch panel is pressed immediately after measurement data is fixed, the result for the item that has been measured most recently is deleted and the item is not displayed on the Report screen.**

6. **The basic measurement results are not displayed in the report.**

7. **Be sure to perform measurement within images. If the area outside an image is included in a measurement, incorrect diagnosis may result.**

8. **Display of heart rate values**

   (1) **In Dual display mode, the heart rate for the most recently frozen image is displayed. For example, when the image on the left is frozen most recently, the heart rate for that image is also displayed on the image on the right.**

   (2) **When a patient with an unstable heartbeat, such as a patient with atrial fibrillation, is to be examined, enter a heart rate value using the Manual Input screen.**

   (3) **The heart rate value displayed on the 2D (including color etc.) + PW/CW screen represents the heart rate obtained at the instant the PW/CW image is stopped.**

   For example, when the PW/CW image is stopped by pressing  **and then the 2D image is frozen, the displayed heart rate value represents the heart rate at the time the PW/CW image is stopped, not at the time the Freeze switch is pressed.**

⚠CAUTION:

(4) Confirm that the ECG waveform is displayed correctly. If the ECG waveform is not displayed correctly, an incorrect heart rate value may be displayed due to noise.

(5) When ECG is not used, turn OFF the ECG monitor. Otherwise, an incorrect heart rate value may be displayed due to noise from the ECG monitor.

9. Vascular measurements

The values obtained in Velocity measurement and Velocity Trace measurement can be deleted but cannot be changed to other values. In Velocity Trace measurement, more than one value is obtained in a single tracing procedure. If any one of these values is deleted by pressing the [Backspace] key followed by the [Enter] key, the values obtained together with the deleted value are also deleted.

10. TIC measurement

Exercise extreme care when managing data, especially when the files of two or more patients are stored on a single disk.

11. Precautions regarding ACT measurement

(1) ACT measurement can be performed only when the following conditions are met.

- **2D single display (except for R-wave synchronous images and images recorded in CHI mode)**
- **Cine playback images (including at least 3 frames)**

(2) The Modified Simpson method is used for volume measurement calculation. For this measurement, it is necessary to display a long-axis long-cross sectional image from the cardiac apex (two-chamber/four-chamber cross-sectional image). (Refer to subsection 7.2.1.)

(3) ACT measurement is assumed to be performed for evaluating the left ventricular contraction ability.

Depending on the application, perform appropriate setting for the image to be displayed and use the appropriate transducer.

(4) Noise near the cardiac apex may disable correct automatic tracing. After automatic tracing, correct the trace line if required.

(5) Under the influence of the valve and valve underneath structure, automatic tracing exceeding the target heart chamber may be performed. After automatic tracing, correct the trace line if required.

(6) If the frame rate is low, an end-diastole image and end-systole image may not be acquired within the start and end of measurement. It is recommended that the frame rate be set to 30 fps or more.

⚠CAUTION:

(7) If the valve ring, cardiac apex, and inner wall are not included in the displayed image, the contour may not be extracted correctly. Perform adjustment using the DEPTH/ZOOM dial, GAIN dial, STC volume, and each image quality setting function.

(8) In ACT measurement, the frame range to be measured is calculated from the heart rate. Obtain the patient's heart rate correctly from the ECG.

- *** If the heart rate is not input from the ECG, the calculations are performed with the heart rate fixed at 60 (bpm).**
- *** If the heart rate is not input from the ECG or the input heart rate is changed manually, an asterisk (*) is displayed at the upper right of the heart rate value and cardiac output value.**
- *** Confirm that the ECG waveform is displayed correctly. If the ECG waveform is not displayed correctly, an incorrect heart rate value may be displayed due to noise.**

(9) The difference between the R-R interval in the two-chamber cross-sectional image and that in the four-chamber cross-sectional image is displayed as "ED_ED Diff".

ED_ED Diff = |(R-R interval in the 2-chamber cross-sectional image) – (R-R interval in the 4-chamber cross-sectional image)| / (value of whichever R-R interval is longer) × 100 [%]

A caution message is displayed if the calculated value is greater than the preset "RR Interval Differential Time Limit".

The factory setting for "RR Interval Differential Time Limit" is 10%. The setting should be changed according to the objective of the examination.

If the ED_ED Diff value is extremely large, it may affect the EDV, ESV, and EF values that are calculated and displayed as the Biplane Volume results. The decision as to whether to accept these values or to perform measurement again should be based on the results for all of the other items.

12. Obstetric calculations

(1) Enter the correct data for LMP (last menstrual period), IVF (in vitro fertilization date), CLIN (current date and current gestational age), and PREV (date of previous examination and gestational age on that date). Incorrect entry of these parameters will result in incorrect EDD (estimated date of delivery) calculation.
The date and GA entered for CLIN or PREV are used to calculate LMP and GA, which are then used for measurement.

(2) Be sure to record the EDD (Estimated Date of Delivery) and the measurement data in the patient's medical records.
Although these data can be stored in the system together with the patient ID and name using the SAVE function, they should also be stored in the patient's medical records because data stored in the system may be lost if there is a system failure.

⚠CAUTION:

(3) Obstetric calculation data cannot be stored in the system or updated unless the patient ID is entered.

(4) Use the correct Exam Type (OB, Endo-Vaginal, or Fetal Heart) to perform the obstetric calculations. If an incorrect Exam Type is used, the obstetric calculation data cannot be stored in the system or updated.

(5) Do not reach a diagnosis based only on the current measured data and calculation results displayed on the report screen. The diagnosis must always be based on an overall clinical evaluation of the patient including past examination results recorded on the patient's medical record.

(6) When the system date is changed, be sure to enter the patient information again in the patient ID registration window. Otherwise, the gestational ages and the trend graphs cannot be displayed correctly.

(7) Measurements may be incorrect depending on the fetal position. Do not reach a diagnosis based only on the measured data and calculation results obtained using the measured data. The diagnosis must always be based on an overall clinical evaluation of the patient.

(8) Several fetal growth measurement methods are available. Select the most appropriate method for the patient based on the clinical judgment of a specialist.

(9) OB measurement for up to quadruplets is possible. Be careful not to confuse the fetuses when measuring the fetal growth.

(10) The Fetus ID is displayed in the measurement window, on the report screen, and on the Trend Graph. Confirm the fetus ID when performing diagnosis.

(11) For items that are calculated based on two or more measurement results, the item label and the calculation result are not displayed on the screen or in the report, unless all the items required for calculation are measured. The measurement items required for calculation and the calculation result display range of some items differ according to the author. Therefore, if another author is selected after measurement, the result may not be displayed.

(12) The results of the last three measurements are stored in the OB calculations. When more than three measurements have been executed, the oldest result is overwritten with the new one. These results can be checked using the report function.

(13) If "Mean of Measurements" is selected for the "Measurement Value Display Method" in Meas Report in Application Preset, the mean of the last three measurement is displayed in the report. If only one measurement has been executed, the result of the measurement is displayed in the Mean field.

⚠CAUTION:

(14) If "Most Recent Measurement" is selected for the "Measurement Value Display Method" in Meas Report in Application Preset, only the most recent measurement result is displayed in the report.

(15) When two or more measurements have been executed for a single item, be sure to check each measurement result using the report function. If an unexpected value is measured, it will affect the mean.

(16) Deviations from the normal values of the measurement results must be judged based on the trend graphs and literature.

(17) To calculate the gestational age and estimated fetal weight correctly from the measurement result, it is necessary to specify the author of the GA calculation method to be used and the EFW calculation method. Refer to section 2 "Setting the Presets" for details.
When performing OB measurement for multiple pregnancies, be sure to confirm the fetus ID on the touch panel, measurement window, Report screen, and Trend Graph to prevent confusion between fetuses.

(18) The maximum GA that can be handled by the system is 45 weeks and 0 days. If GA exceeds 45 weeks and 0 days, it is not displayed on the report or trend graph.

(19) CTAR measurement

<1> When the thoracic area is to be measured in CTAR measurement, set the measurement start point on the spine.
If measurement is performed with the start point set at a location other than the spine, correct measurement results cannot be obtained.

<2> Do not perform CTAR measurement using a horizontally flipped image. Correct measurement results cannot be obtained.

(20) When the "Weeks of Pregnancy" function is used, LMP is not calculated if GA has not been calculated in the most recent measurement.
If IVF etc. is entered as obstetrical date information, LMP is calculated based on the GA and the entered date is replaced with the calculated LMP.
EDD is calculated by adding 280 days to LMP. If GA exceeds 40 weeks and 0 days, EDD is displayed as a date earlier than the examination date.

⚠CAUTION:

(21) If a result for a measurement item is deleted in the report edit window with "Most Recent" selected, the result of the directly preceding measurement is displayed.
If all the results for a measurement item are deleted in the report edit window, the measurement item and the calculation results obtained using the measured value are all deleted automatically.
To redisplay the deleted values, the item must be measured again. Before saving the contents of the report edit window, confirm that the necessary data has not been deleted.

(22) Check the date format to be displayed on the report screen.

(23) If a result for a measurement item is deleted in the report edit window, the measurement item, the mean of the item, and the calculation results obtained using the measurement value (or mean) are all deleted automatically.
To redisplay these values, the item must be measured again. Before saving the contents of the report edit window, confirm that the necessary data has not been deleted.
When entering calculation items or editing the measurement data, be sure to enter the values and units correctly.

(24) The OB Doppler measurement results can be deleted using the [BS] and [Enter] keys but cannot be edited. Since more than one measurement value is obtained in a single tracing procedure, deleting a single value also deletes the values measured at the same time as the deleted one.

(25) If a result for a measurement item is deleted in the report edit window, the result of the directly preceding measurement is displayed.
If all the results for a measurement item are deleted in the report edit window, the measurement item and the calculation results obtained using the measured value are all deleted automatically.
To redisplay the deleted values, the item must be measured again. Before saving the contents of the report edit window, confirm that the necessary data has not been deleted.

(26) Measurement or calculation data cannot be saved unless a patient ID is registered for the patient. Be sure to register the patient ID before starting measurement.

(27) Make sure that no unexpected value is displayed on the report screen before saving the data.

(28) The measured value for some items displayed on the Report screen can be edited, provided that the examination has not yet been completed. Once the examination for the patient is completed, however, editing of measured values is impossible. Confirm the results on the report before saving the data. The values displayed in black in the gray boxes are editable.

(29) When data saving is repeated on the report screen for the same examination, the previously saved data is overwritten. Check the data before overwriting the previous data.

⚠CAUTION:

(30) If the patient information (patient ID, patient name, birth date, or sex) for previously saved exam data is changed, the system cannot identify the exam data for the patient and it displays a confirmation dialog before plotting the past exam data in the trend graph.
Confirm that the input data is correct before starting examination.

If it is obvious that the patient information has been edited, select [OK] to plot the data in the trend graph.
The exam data itself cannot be edited and this confirmation dialog will therefore appear each time an attempt is made to plot the exam data for which patient information has been changed in the trend graph.

(31) If the EFW calculation method used for the previous data is different from the EFW calculation method used for the current data, the previous data is not plotted on the graph.
Even though the previous data can be plotted by changing the author of the graph to match the author used for the previous data, the EFW for the current data is not plotted if this done.
Do not change the EFW calculation method in examinations for the same patient.

(32) Three curves are displayed on the Trend Graph screen for fetal growth measurement. The middle curve corresponds to the mean, while the other two curves represent ±percentiles or ±SD.
When five curves are displayed, the middle curve corresponds to the mean, while the other four curves represent ±SD.
When only one curve is displayed, it is the mean curve. The legend for the displayed curves is shown on the screen.

(33) When the report is displayed in Mean mode, the mean value is plotted for the current examination data (CURRENT).
When the report is displayed in Most Recent mode, the most recent value displayed in the report is plotted for the current examination data (CURRENT).

(34) When Mean mode is selected, the label "Averaged" is displayed below "CURRENT" in the legend for the plotted data. This label is not displayed in Most Recent mode.
Whether "Averaged" is displayed or not depends on the mode of the current examination. This label does not represent the mode in which the previous data (PREV) was saved.

13. User-registered measurement functions

(1) Toshiba shall not be held liable for results obtained with user-registered functions.

(2) The data registered in the user-programmed measurements will not be included in future upgraded systems or subsequent models.

(3) Use the user-registered measurements only after understanding the contents. Refer to subsection 13.4 for the procedure for checking the contents of the user-registered measurements.

⚠CAUTION: 14. OB measurement user chart registration

(1) Toshiba shall not be held liable for results obtained with the OB measurement user chart registration function.

(2) The data registered in the OB measurement user chart will not be included in future upgraded systems or subsequent models.

(3) Use the OB measurement packages only after understanding the registered data.

*** Refer to subsection 14.2 for details.**

(4) Use the OB measurement user charts only after understanding the registered data.

*** Refer to subsection 14.9 for details.**

15. Measurements on a stored image

(1) Display the most suitable image and select the most suitable measurement tool for the intended measurement. The appropriate measurement methods and results must be determined by a specialist.

(2) It is also possible to perform measurement using an image on which measurement has been performed during examination and to print the image with the results of the two measurements. In the case of black-and-white printing, the caliper and measurement results for the first measurement may be confused with those for the second measurement. To prevent such confusion in later image viewing on printed images, take appropriate measures such as placing an identification mark at the head of the results of the first measurement.

(3) Do not use 3D images or panoramic View images for measurement.

(4) In manual calibration, the information on the stored image is used to set the information required for measurement. Accordingly, the measurement results will depend on the values set on the stored image. Errors in the settings will affect the measurement results and the measurement accuracy is lower than in measurements using images acquired during examination. Accordingly, the accuracy of measurement results may be lower than that of standard measurements. In the worst case, the error after calibration can be ±5% for an object that is 100 mm in length in measurements using ER images and ±10% in measurements using images recorded in the video recording unit. For details, refer to subsection 15.6. Use the manual calibration function only after understanding its characteristics thoroughly.

⚠CAUTION:

(5) In manual calibration, the accuracy of the scale setting used for measurement affects the accuracy of the measurement results as described in (4) above. To increase the accuracy of the scale setting, the calibration marker should be set using the scale graduations as reference. For example, align the center lines of the calibration marker handles with the graduations.

(6) Do not perform measurements on images recorded in the video recording unit that were acquired with a system other than Xario.

(7) The scale and graduations may not be seen clearly depending on when the playback is paused. In this case, pause the playback again at a timing at which the scale and graduations are clearly seen and then start calibration.

(8) Confirm the unit before entering the value of the calibration marker.

16. Auto Range function for Doppler waveform tracing

The Doppler waveform tracing result may be unsatisfactory, depending on the conditions (for example, the Doppler waveform displayed on the monitor may not be stable or may contain significant noise).

Before pressing [SET] on the operating panel to accept the measurement results, confirm that Doppler waveform tracing has been performed correctly.

If the automatic trace results are not satisfactory, select [Range], specify the trace range, and perform measurement again. Or, select [Continuous Trace], trace the waveform manually, and perform measurement again.

CAUTION: 1. The user can record ID registration and user registrations (with a function to permit user-specific items such as the hospital name to be registered). Be sure to back up such information on external storage media. Data stored in the system may be lost due to improper operation or an accident.

2. Only some of the measurement results are displayed on the application measurement result screen. To display all of the measurement results including calculation results, use the report screen.

3. Display of measurement results obtained using the IMT tool or Thickness tool

   (1) When "Double Digits" is selected for Thickness [IMT] Precision in the preset menu and measurement is performed using the IMT tool or Thickness tool, the measurement value is displayed to two decimal places. However, it may not be possible to obtain a value that is accurate to two decimal places depending on the characteristics of the image.

   (2) Keeping the above point in mind, use the measurement and calculation values displayed to two decimal places only for reference purposes.

   (3) In the MDA, a single quotation mark (') is added to the measurement values and the calculation results obtained based on the measurement values.

   Limitations: Marks can be moved in steps of 1 pixel on the screen. Due to the resolution of ultrasound images, this does not correspond to an indicated value change of 0.01. Thus, the indicated value changes in increments of greater than 0.01 as a mark is moved.

4. Time Intensity Curve (TIC) measurements

   (1) If the measurement ROI is set including the area outside the image, the correct measurement result cannot be obtained.

   (2) When TIC measurement is performed in Dynamic Flow mode or Power Angio mode, only the intensity data for blood flow is used for calculation. The intensity data for tissue is not used for calculation.

   (3) To perform TIC measurement, it is necessary to specify the start and end frames for acquiring the intensity information of the cine image.

   If the number of cine image frames exceeds 1024, the message "Memory is insufficient to measure. Please measure within 1024 image frame." is displayed and TIC measurement cannot be performed. If the number of frames is 1024 or less but the volume of data corresponding to the specified frames exceeds the available system memory, the message "Memory allocate error" is displayed and TIC measurement cannot be performed.

   In these cases, reduce the number of frames for performing TIC measurement.

   The amount of memory available varies depending on the system status. When TIC measurement is performed for the first time, approximately 1000 frames can be set.

CAUTION:

(4) If the image is reduced after measurement, color image quality adjustment functions such as Power-DR are disabled. When ROI operation is started, the image returns to the normal display size and color image quality adjustment becomes possible.

When the color image quality has been adjusted, the intensity data is changed, and therefore measurement must be performed again by pressing [Start] on the touch panel.

(5) When the TIC measurement graph is output using a monochrome printer, it may be difficult to identify the TIC curve.

5. User-registered measurement functions

(1) Setting the unit here does not set the unit to be used for calculation. Set the unit when entering the calculation formula so that the unit to be used for calculation matches the displayed unit.

(2) A dialog is displayed during registration of a user-registered measurement. Do not operate the panel while this dialog is displayed.

(3) When an OB measurement user chart is registered to a 2D measurement item using a table and data is to be set on both the Type (FG) and Type (GA) pages, the same value must be set for the same GA. If the value for a GA differs between these two pages and the Week function is used to calculate GA based on the data set on the Type (GA) page, the calculated GA is not plotted at the Mean position on the trend graph that is created based on the data set on the Type (FG) page.

6. Saving of measurement data

(1) When [Send (DICOM)] is selected, the data is saved onto the HDD and at the same time can be transferred to the server or media.

(2) If data transfer fails, a warning message is displayed in a blue window on the monitor. In this case, transfer the data again using the Job Status function of the Patient Browser after the examination is completed.

(3) The patient ID must be entered to save the measurement data. Be sure to enter the patient ID on the Patient Information screen before starting examination.

(4) When measurement is performed on saved images (such as video images and Exam Review images), it is not possible to save the measurement data in the DICOM format.
In such cases, [Send (DICOM)] is not displayed on the Report screen.

7. When the measurement data is to be stored in the server as DICOM SR, leave the unit field blank or select one of the existing units in the Manual Input tool and also for the calculation items.
* Items for which an arbitrary unit is set cannot be stored in the server.

CAUTION: 8. Auto-IMT measurement display

(1) When Double Digits is selected for Auto IMT Precision in the preset menu and measurement is performed using the Auto-IMT tool, the measurement value is displayed to two decimal places. However, depending on the characteristics of the image, it may not be possible to obtain an accurate value within 1/100.

(2) When Three Digits is selected for Auto IMT Precision in the preset menu and measurement is performed using the Auto-IMT tool, the measurement value is displayed to three decimal places. However, depending on the characteristics of the image, it may not be possible to obtain an accurate value within 1/1000.

(3) Keeping the above points (1) and (2) in mind, use the measurement and calculation values only for reference purposes.

(4) In the MDA, a single quotation mark (') is added to the measurement values and calculation results obtained based on the measurement values.

Limitations: Marks can be moved in steps of 1 pixel on the screen. Due to the resolution of ultrasound images, this does not correspond to an indicated value change of 0.01/0.001. Thus, the indicated value changes in increments of greater than 0.01/0.001 as a mark is moved.

9. Read the precautions regarding the use of this system described in the <<Fundamentals>> and <<Applications>> volumes.

Intellectual Property

Availability of This Software and Related Documents is Restricted.

The software used for this system includes software owned by Toshiba Medical Systems Corporation and licensed to Toshiba Medical Systems Corporation by a Licensor.

(1) The software and related documents must be used only for this system.

(2) The intellectual property of this software and related documents is not assigned to you.

(3) You must not copy the software or documents, nor modify the software in whole or in part.

(4) You must not recompile or reassemble the software.

(5) You must not assign, disclose, transfer, or sublicense the software or documents to a third party.

(6) The software is subject to the U.S. and Japanese Export Administration Laws and Regulations and you must not export or re-export the software in whole or in part unless properly authorized by the U.S. or Japanese government.

(7) The information in the documents, or programs in the software are subject to change without notice.

Organization of the Operation Manuals

1. Notation Conventions

In this operation manual, the following word is used in addition to the signal words related to the safety precautions (refer to "Safety Precautions"). Please read this operation manual before using the system.

NOTE:	Indicates reference information that enables more efficient use of the equipment.

2. Operation Manuals

The basic operating procedures for this system are explained by a TOSHIBA service engineer or instructor at the time of installation of the system. Refer to the operation manuals before using the system in order to fully understand the detailed operating procedures, functions, and performance, as well as how to maintain the best system performance. The organization of the operation manuals related to this system is shown below.

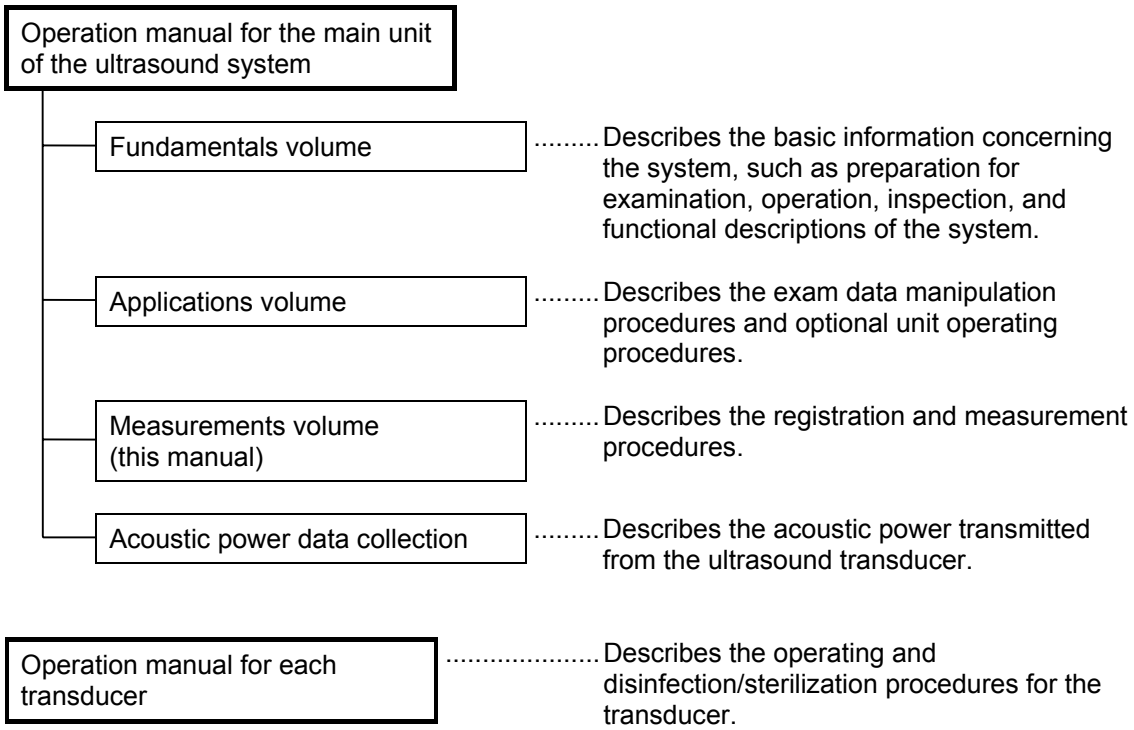


Table of Contents

Safety Precautions S-1

Intellectual Property L-1

Organization of the Operation Manuals U-1

1. Outline of Measurement Functions 1-1

1.1 Measurement Startup 1-1

1.2 Measurement Items 1-2

1.3 Fixing Measurement Data 1-4

1.4 Functions of the [NEXT] Switch During Measurement 1-5

1.4.1 During basic measurement 1-5

1.4.2 During application measurement 1-5

1.5 Modifying a Measurement Immediately After Completion 1-6

1.5.1 Modifying a measurement in which the start and end points are set 1-7

1.5.2 Modifying a Continuous Trace measurement 1-8

1.6 Deleting Application Measurement Data 1-9

1.7 Changing the MDA Layout 1-11

2. Setting the Presets 2-1

2.1 Changing the Preset Items 2-1

2.2 Details of Each Preset 2-3

2.2.1 Appl Meas. 2-3

2.2.2 Meas. Window 2-4

2.2.3 2D-Mode Meas. 2-6

2.2.4 D-Mode Meas. 2-7
2.2.5 D-Mode Meas. 2 2-19
2.2.6 Meas. Report 2-20
2.2.7 Meas. Report2 2-21
2.2.8 Meas. Marker 2-23
2.2.9 Meas. Marker2 2-24
2.2.10 Meas. Operation 2-25
2.2.11 Annotation 2-28
2.2.12 LV (2D) 2-29
2.2.13 LV (M) 2-30
2.2.14 Cardiac Doppler 2-31
2.2.15 LV Mass. 2-32
2.2.16 Carotid1 Meas. Tool 2-33
2.2.17 Carotid1 Doppler 2-34
2.2.18 Carotid1 Meas. Type 2-35
2.2.19 Carotid2 Meas. Type 2-36
2.2.20 Carotid2 Meas. Tool 2-37
2.2.21 Carotid2 Doppler 2-38
2.2.22 Auto-IMT 2-39
2.2.23 OB Meas. 2-40
2.2.24 OB Meas.2 2-41
2.2.25 OB Meas.3 2-45
2.2.26 D-OB Meas. 2-46
2.2.27 OB Calc. 2-47
2.2.28 OB Calc.2 2-51
2.2.29 D-OB Calc. 2-54
2.2.30 TIC 2-56

2.2.31 Body Mark 2-57

3. 2D-Mode Measurements 3-1

3.1 Distance Measurement (Distance) 3-2

3.2 Curved Line Distance Measurement (Trace Length) 3-4

3.2.1 Continuous Trace 3-5

3.2.2 Spline Trace 3-7

3.3 Angle Measurement (Angle) 3-9

3.4 Area/Circumference Measurement (Area) 3-11

3.4.1 Continuous Trace 3-12

3.4.2 Spline Trace 3-14

3.4.3 Ellipse 3-16

3.4.4 Cross 3-18

3.5 Volume Measurement (Volume) 3-20

3.6 Joint Measurement 3-22

3.7 Mean IMT Measurement 3-24

3.8 %Stenosis (Distance) Measurement 3-27

3.9 %Stenosis (Area) Measurement 3-28

4. M-Mode Measurements 4-1

4.1 M-Mode Distance Measurement (Distance) 4-2

4.2 Time Measurement (Time) 4-4

4.3 Slope Measurement (Slope) 4-6

4.4 Heart Rate Measurement (HR) 4-8

5. CDI-Mode Measurements 5-1

6. Doppler-Mode Measurements 6-1

6.1 Velocity Measurement (Velocity) 6-2

6.2 Acceleration Measurement (Accel) 6-3

6.3 Time Measurement (Time) 6-4

6.4 Heart Rate Measurement (HR) 6-4

6.5 Velocity Trace Measurement (Vel Trace) 6-5

6.5.1 Continuous Trace 6-7

6.5.2 Spline Trace 6-9

6.5.3 Line Trace 6-10

6.5.4 Range 6-11

6.5.5 Auto Range 6-14

6.6 PI Measurement (PI Trace) 6-17

6.7 RI Measurement 6-20

6.8 S/D Measurement 6-22

6.9 Flow Volume Trace Measurement (Flow Volume) 6-23

7. Application Measurement (Cardiac) 7-1

7.1 Introduction 7-1

7.1.1 Starting the application measurement 7-1

7.1.2 Modifying a measurement 7-1

7.1.3 Displaying the Report screen 7-1

7.1.4 Heart rate acquisition methods 7-2

7.1.5 BSA (body surface area) calculation methods 7-3

7.2 2D-Mode Measurements (Cardiac) 7-4

7.2.1 LV measurement LA measurement (MOD Simpson method) 7-4

7.2.2 LV measurement (Teichholz method) 7-10

7.2.3 LV measurement (Cube method) 7-15
7.2.4 LV measurement (Gibson method) 7-16
7.2.5 LV measurement (Single-Plane (aka Area-Length) method) 7-17
7.2.6 LV measurement (Biplane method) 7-19
7.2.7 LV measurement (Bullet method) 7-22
7.3 M-Mode Measurements (Cardiac) 7-24
7.3.1 Aortic valve measurement (Aortic Valve) 7-24
7.3.2 Mitral valve measurement (Mitral Valve) 7-26
7.3.3 LV measurement (Teichholz method) 7-28
7.3.4 LV measurement (Cube method) 7-33
7.3.5 LV measurement (Gibson method) 7-34
7.4 Doppler-Mode Measurements (Cardiac) 7-35
7.4.1 Aortic valve measurement (Aortic) 7-35
7.4.2 Mitral valve measurement (Mitral) 7-43
7.4.3 Pulmonary vein blood flow waveform measurement (Pulmo. Vein) 7-50
7.4.4 Tricuspid valve blood flow waveform measurement (Tricus.) 7-52
7.4.5 Pulmonary valve measurement (Pulmo.) 7-56
7.5 Extra Measurements 7-62
7.5.1 LV Mass AL (Area-Length) 7-62
7.5.2 LV Mass TE (Truncated Ellipsoid) 7-64
7.5.3 PISA 7-66
7.5.4 Coronary 7-68
8. Application Measurement (Vascular) 8-1
8.1 Carotid1 8-1
8.1.1 2D-mode measurement 8-1

8.1.2 Doppler-mode measurement 8-3
8.1.3 Report screen 8-8
8.2 Carotid2 8-10
8.2.1 Touch panel menu 8-10
8.2.2 Measurement method 8-11
8.2.3 Check of the measurement results 8-11
8.2.4 Items calculated based on the measurement results 8-13
8.2.5 Report screen 8-14
8.3 Carotid2 (Auto-IMT Measurement) 8-16
8.3.1 Touch panel menu 8-16
8.3.2 Measurement method 8-18
8.3.3 Report screen 8-20

9. Application Measurements (Abdomen) 9-1
9.1 Starting the Application Measurement (Abdomen) 9-1
9.2 Displaying the Report Screen 9-2
9.3 Region to Be Measured 9-3

10. Time Intensity Curve (TIC) Measurements 10-1
10.1 Features of the Time Intensity Curve (TIC) Measurement Function 10-1
10.2 Measurement Procedure 10-2
10.3 Touch Panel Display 10-4
10.4 Monitor Display 10-8
10.5 TIC Data File Output 10-11

11. ACT Measurement 11-1

11.1 ACT Measurement 11-1

11.2 Operating Methods 11-3

11.2.1 Operation in Routine mode 11-3

11.2.2 Operation in Advanced mode 11-6

11.3 Touch Panel Details 11-10

11.4 Report Screen 11-12

11.5 Arithmetic Operation Method for ACT Measurement 11-13

11.6 Presets for ACT Measurement 11-20

12. Obstetric Calculations (OB) 12-1

12.1 Outline of Obstetric Calculations 12-1

12.1.1 Abbreviations 12-2

12.1.2 Items measured 12-3

12.1.3 Items calculated 12-4

12.2 Outline of Operating Procedures 12-10

12.3 Author Data 12-11

12.4 OB Menu 12-19

12.4.1 OB-1 (Early) menu 12-20

12.4.2 OB-1 (JSUM) menu 12-21

12.4.3 OB-3 (Osaka) menu 12-23

12.4.4 OB-4 menu 12-24

12.4.5 OB-5 menu 12-25

12.4.6 Doppler menu 12-26

12.4.7 Result display 12-28

12.5 Obstetrical Date Information Entry and Calculation ... 12-30
12.6 Measurement Methods ... 12-31
12.6.1 Distance measurements ... 12-31
12.6.2 Area/Circumference measurements ... 12-31
12.6.3 Circle measurement (AFI, AFP) ... 12-31
12.6.4 Amniotic Fluid Index (AFI) measurement ... 12-34
12.6.5 Doppler measurements (Umb A, MCA, etc.) ... 12-35
12.6.6 Fetal Heart Rate (FHR) ... 12-35
12.6.7 NT measurement ... 12-35
12.6.8 CTAR measurement ... 12-36
12.6.9 Ductus Venosus measurement ... 12-36
12.6.10 Automatic startup of the next measurement item for EFW calculation ... 12-36
12.7 "Weeks of Pregnancy" Function ... 12-37
12.8 "GA Input" Function ... 12-38
12.9 OB Report ... 12-40
12.9.1 OB Report function ... 12-44
12.9.2 OB Doppler Report function ... 12-51
12.9.3 OB worksheet function ... 12-53
12.9.4 Data Save function ... 12-55
12.9.5 Anatomy function ... 12-56
12.9.6 Trend Graph function ... 12-62
12.10 OB Data List ... 12-68
12.10.1 Data List screen ... 12-69
12.10.2 Insert screen ... 12-71
12.10.3 Edit screen ... 12-73

12.10.4 Deleting data 12-74
12.11 References 12-75
12.11.1 Measurement item 12-84
12.11.2 Calculation item 12-173
12.11.3 Doppler item 12-183
12.11.4 Recommended Ratios 12-202
12.12 Customization of the Touch Panel 12-204
12.12.1 Displaying the OB SW Customize screen 12-204
12.12.2 Changing the switch settings on the touch panel 12-206
12.12.3 Registering the measurements to be started in sequence automatically by pressing [NEXT] 12-208
12.12.4 Closing the OB SW Customize screen 12-210
13. Registration of User-Programmed Measurements 13-1
13.1 Opening the Setup Screen 13-2
13.2 Registering a User-Programmed Measurement Package 13-4
13.2.1 Selecting an application preset and entering the tab name 13-4
13.2.2 Registering a measurement item (Meas. item) 13-6
13.2.3 Registering a calculation item (Calc. item) 13-8
13.2.4 Registering the Switch Layout (SW Layout) 13-14
13.2.5 Registering the measurement and calculation result display layout (MDA layout) 13-18
13.2.6 Registering the report screen layout (Report layout) 13-21
13.3 Editing a User-Registered Measurement Package 13-22
13.4 Importing a User-Programmed Measurement Package 13-23

13.5 Exporting a User-Registered Measurement Package 13-25

13.6 Registering DICOM Codes in Measurement Packages 13-26

13.7 Deleting a User-Registered Measurement Package 13-29

13.8 Deleting All Measurement Packages 13-29

13.9 Closing the Measurement Registration Screen 13-29

13.10 Measurement Tools and Output Items 13-30

13.11 Report Display of Calculation Items That Use a Max Function 13-38

13.12 Report Display When the Maximum Value Is To Be Displayed as the Central Value 13-39

14. Registration of User-Programmed OB Measurement Packages 14-1

14.1 Opening the Setup Screen 14-2

14.2 Registration of a User-Programmed OB Measurement Package 14-4

14.2.1 Starting up the registration screen 14-4

14.2.2 Registering a measurement item (Meas. item) 14-5

14.2.3 Registering a calculation item (Calc. item) 14-7

14.2.4 Display layout of the Report screen (Report Layout) 14-13

14.3 Saving a User-Registered OB Measurement Package 14-14

14.4 Editing a User-Registered OB Measurement Package 14-14

14.5 Importing a User-Programmed OB Measurement Package 14-15

14.6 Exporting a User-Registered OB Measurement Package 14-16

14.7 Registering DICOM Codes in the OB Measurement Package 14-17

14.8 Measurement Tools and Output Items 14-21

14.9 Registration of a New User Chart 14-25

14.9.1 Selecting a user chart and registration method 14-25

14.9.2 Registering a user chart to a 2D measurement item using a table 14-27

14.9.3 Registering a user chart to a 2D measurement item by entering an expression 14-29

14.9.4 Registering a user chart to EFW using a table 14-33

14.9.5 Registering a user chart to EFW by entering an expression 14-37

14.9.6 Registering a user chart to a Doppler calculation item (RI, PI) using a table 14-39

14.9.7 Registering a user chart to a Doppler calculation item (RI, PI) by entering an expression 14-41

14.10 Editing a User Chart 14-44

14.11 Deleting a User Chart 14-44

14.12 Exporting a User Chart 14-45

14.13 Exporting All User Charts 14-46

14.14 Importing a User Chart 14-47

14.15 Importing All the User Charts 14-48

14.16 Deleting All User Charts 14-49

14.17 Closing the OB Registration Screen 14-49

14.18 Using a User Chart 14-49

14.19 Measurement and Calculation Items to Which User Charts Can Be Registered 14-50

15. Measurements on a Stored Image 15-1

15.1 Measurements on ER Images 15-3

15.2 Measurements on ER Images that Require Manual Calibration 15-6

15.3 Measurements on Video Images 15-13

15.3.1 Daily checks for recording to the video recording unit 15-14

15.3.2 Measurement on a video image 15-16

15.4 Manual Calibration Required Before the Start of Each Measurement 15-22

15.5 Report Display 15-23

15.6 Accuracy of Measurement When Manual Calibration Is Used 15-24

16. Measurement Data Saving 16-1

16.1 Saving Measurement Data to Media 16-1

16.2 Saving Measurement Data Over a Network 16-3

16.3 Saving Measurement Data in the DICOM SR Format 16-5

16.3.1 Saving the data 16-5

16.3.2 Displaying the saved data 16-6

17. Confirmation of Automatic Measurement Start Item 17-1

17.1 Opening the Confirmation Screen 17-1

17.2 Entries in the Measurement Auto Active Screen 17-2

1. Outline of Measurement Functions

Measurements are performed on frozen images.

Measurements are categorized into two groups, basic measurements and application measurements.

The results of application measurements can be displayed on the Report screen.

1.1 Measurement Startup

(1) Basic measurement

When 

, 

, or 

is pressed, the marker for the basic measurement for the current display mode (2D, M, or Doppler) is displayed on the touch panel.

To perform another basic measurement, press the switch for the desired measurement on the touch panel.

	2D mode	M mode	PW/CW mode
 or 	Distance	Distance	Velocity
	Area	Slope	Vel Trace

(2) Application measurement

Select the region to be measured in advance on the Patient Information screen or in the Application Presets (hereinafter simply referred to as "preset").
When 

is pressed, the application measurement menu for the selected region is displayed on the touch panel.

Press the switch for the desired measurement item in the menu on the touch panel to display the corresponding measurement marker.

NOTE: 1. Selection of measurement start items
The measurements that start when 

, 

, 

, or 

is pressed can be selected from among several patterns.
For details, contact your Toshiba representative.

2. Presets

Refer to section 2 "Setting the Presets" for details of the presets (initial setting).

1.2 Measurement Items

Type of measurement	Basic measurement function	Application measurement function
2D mode	Distance measurement (Distance) Trace length measurement (Trace Length) • Continuous trace (Continuous Trace) • Spline trace (Spline Trace) Angle measurement (Angle) Area and circumference measurement (Area) • Continuous trace (Continuous Trace) • Spline trace (Spline Trace) • Elliptical approximation (Ellipse) • Cross (Cross) Volume measurement (Volume) %Stenosis (Dist) measurement %Stenosis (Area) measurement Mean IMT measurement Joint measurement	Cardiac measurement • LV measurement (MOD Simpson method)[*1] • LV measurement (Teichholz method) • Aortic valve measurement (Aortic Valve) • Mitral valve measurement (Mitral Valve) • Pulmonary valve measurement (Pulmonary Valve) • Aortic valve measurement (Aortic) • Mitral valve measurement (Mitral) • Pulmonary vein measurement (Pulmo. Vein) Vascular measurement Abdominal measurement Obstetric Calculations
M mode	Distance measurement in M-mode (Distance) Time measurement (Time) Slope measurement (Slope) Heart rate measurement (HR)	Cardiac measurement • Aortic valve measurement (Aortic Valve) • Mitral valve measurement (Mitral Valve) • LV measurement (Teichholz method)[*2]
Doppler mode	Velocity measurement (Velocity) Acceleration measurement (Accel) Time measurement (Time) Heart rate measurement (HR) Velocity trace measurement (Vel Trace) • Continuous trace • Spline trace • Line trace • Range (Auto Trace) • Auto range PI measurement • Continuous trace • Spline trace • Line trace • Range (Auto Trace) • Auto range	Cardiac measurement • Aortic valve measurement (Aortic) • Mitral valve measurement (Mitral) • Pulmonary vein measurement (Pulmo. Vein) • Tricuspid valve measurement (Tricus.) • Pulmonary valve measurement (Pulmo.) Vascular measurement Abdominal measurement Obstetric Calculations

Type of measurement	Basic measurement function	Application measurement function
	RI measurement S/D measurement Flow volume measurement • Continuous trace • Auto trace	
Extra	–	• LV Mass (AL)[*3] • PISA • Coronary

*1: It is possible to change the LV measurement method (Teich. Method) to that of another author (Cube, Gibson, Single Plane, Biplane, Bullet) through presetting.

*2: It is possible to change the LV measurement method (Teich. Method) to that of another author (Cube, Gibson) through presetting.

*3: LV Mass (AL) can be changed to LV Mass (TE) through presetting.

⚠CAUTION: The basic measurement results are not displayed in the report.

1.3 Fixing Measurement Data

To fix the data during measurement, press 

.

⚠CAUTION:

**1. Press 

to fix the data during measurement.**

Note, however, that the following operations may also fix the measurement data.

- 

is pressed.
- **One of the following measurement-related switches is pressed.**
  - **[Copy]**
  - **In TIC measurement, [Start], [Copy], [Move], [Drop], [1Frame Move], [Part Move], and [ROI A] to [ROI H]**
  - **Another measurement item switch (except [Velocity] in the basic measurements)**
  - **The switch for the current measurement item**

Confirm that the measurement is performed correctly.

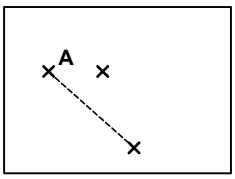
2. If the measurement data is not fixed for an application measurement, the measurement results are not displayed in the Report.

3. If [Delete] on the touch panel is pressed immediately after measurement data is fixed, the result for the item that has been measured most recently is deleted and the item is not displayed on the Report screen.

1.4 Functions of the [NEXT] Switch During Measurement

1.4.1 During basic measurement

When [NEXT] is pressed after the measurement data is fixed by pressing [SET], the next marker is displayed to allow the user to perform the same type of measurement again.



1.4.2 During application measurement

In some application measurements, the next measurement item can be selected by simply pressing [NEXT].

It is possible to preset the sequence of the next measurement items to be selected by pressing [NEXT].

Example: LV measurement (MOD Simpson method)

(1) Press [4ch Diast] on the touch panel and measure the LV volume at end diastole.

(2) Press [NEXT].

(3) [4ch Syst] on the touch panel lights and the marker for measuring the LV volume at end systole is displayed on the monitor.

1.5 Modifying a Measurement Immediately After Completion

A measurement data can be modified by pressing 

even after the measurement is completed and the measured value is displayed, provided that 

or another measurement switch has not been pressed. Note, however, that measurements made using the Spline Trace method cannot be modified by only pressing 

. To modify such a measurement, display the arrow by pressing [Caliper Edit] on the touch panel and move the marker using the arrow.

To fix the data during modification, press 

.

⚠CAUTION:

1. **Press 

to fix the data during measurement modification.**

   Note, however, that the following operations may also fix the measurement data.

   - 

is pressed.
   - **One of the following measurement-related switches is pressed.**
     - **[Copy]**
     - **In TIC measurement, [Start], [Copy], [Move], [Drop], [1Frame Move], [Part Move], and [ROI A] to [ROI H]**
     - **Another measurement item switch (except [Velocity] in the basic measurements)**
     - **The switch for the current measurement item**

   Confirm that the measurement is performed correctly.

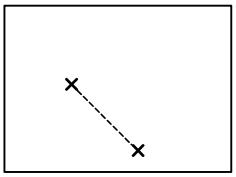
2. **If the measurement data is not fixed for an application measurement, the measurement results are not displayed in the Report.**

1.5.1 Modifying a measurement in which the start and end points are set

<<Example of distance measurement>>

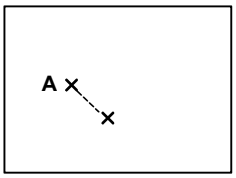
(1) Press 

. The start point (first point) changes to a marker. Use the trackball to move the marker to the desired position.



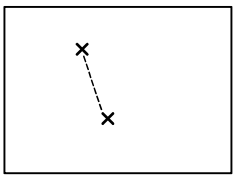
(2) Press 

. The start point is set and the newly measured data is fixed.



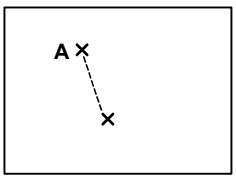
(3) Press 

again. The end point changes to a marker. Use the trackball to move the marker to the desired position.



(4) Press 

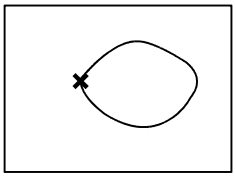
. The end point is set and the newly measured data is fixed.



1.5.2 Modifying a Continuous Trace measurement

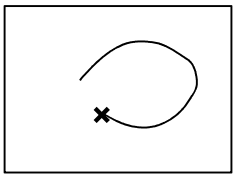
<<Example of distance measurement>>

(1) Press SET. The start point (the first point) changes to a marker.



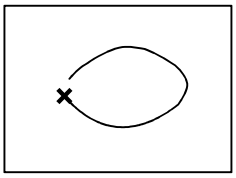
(2) Undo the trace by rotating the MEAS EDIT dial counterclockwise. If the trace is deleted more than desired, rotate the MEAS EDIT dial clockwise to restore the deleted portion.

The trace is deleted by the specified amount. MEAS EDIT The deleted portion of the trace is restored.

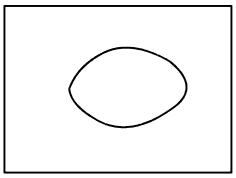


* In PW/CW mode, the trace can also be deleted by rotating the dial of the trackball counterclockwise. Rotating the dial clockwise restores the deleted portion in proportion to the amount of rotation.

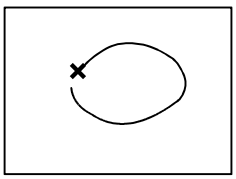
(3) Draw the trace again by moving the marker with the trackball.



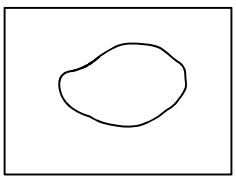
(4) Press SET. The newly measured value is displayed.



(5) Press SET again. The end point (last point) changes to a marker. Undo the trace by rotating the MEAS EDIT dial and then draw the trace again using the trackball.



(6) Press SET. The newly measured data is fixed.



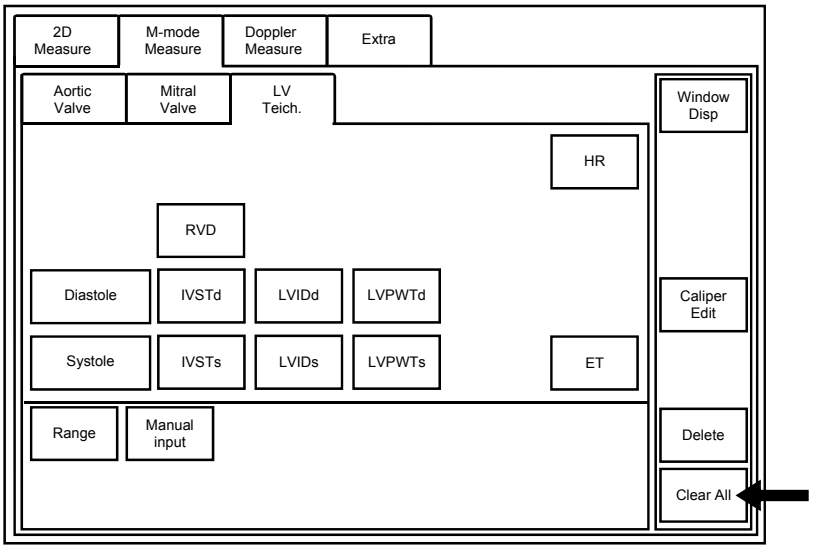
1.6 Deleting Application Measurement Data

For the application measurements, [Clear All] is displayed on the touch panel. When this switch is pressed and then [OK] is selected, the measurement data is deleted as described below.

(1) For application measurement (Cardiac)

Example: If [Clear All] is pressed during [LV Teich.] measurement

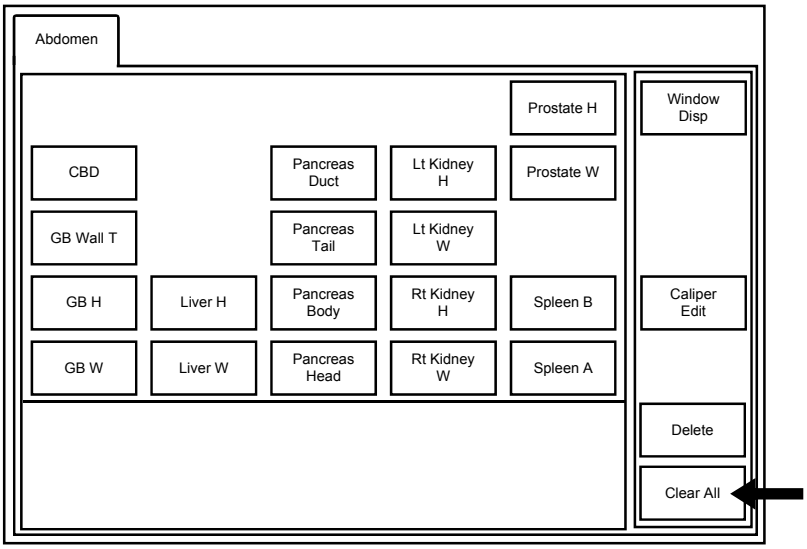
- The data acquired in [LV Teich.] measurement only is deleted. The measurement results for other tabs ([Mitral Valve] for example) are not deleted.



(2) For application measurement (Abdomen)

Example: If [Clear All] is pressed during [Liver H] measurement

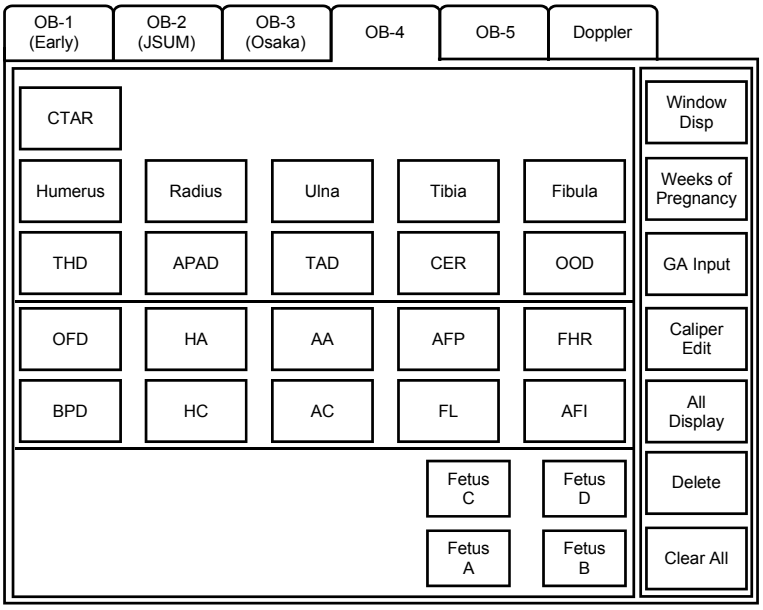
- In addition to the data acquired in [Liver H] measurement, the data acquired in all other Abdomen measurements ([Liver W] for example) is deleted.



(3) For OB measurement

Example: If [Clear All] is pressed during [FL] measurement selected on the [OB-4] page

- In addition to the data acquired in [FL] measurement, the data acquired in all other OB measurements ([AFI] for example) is deleted.
- The data acquired in measurements in other tabs ([OB-5] for example) is also deleted.
- The data for all authors is deleted.



NOTE:
1. The data acquired for other presets is not deleted even when [Clear All] is pressed.
2. The LMP, EDD, IVF, GA, and BSA values entered and calculated on the Patient Information screen, or in the Weeks of Pregnancy or GA Input windows of the OB Measurement screen are not deleted even when [Clear All] is pressed.
3. When [Clear All] is pressed during OB Doppler measurement (the [Doppler] tab is selected) after OB measurement, only the OB Doppler measurement data is cleared. The OB measurement data remains. Likewise, when [Clear All] is pressed during OB measurement (the tab other than [Doppler] is selected) after OB Doppler measurement, only the OB measurement data is cleared and the OB Doppler data remains.

1.7 Changing the MDA Layout

The [Window Position] switch is displayed on the touch panel during measurement. This switch is used to change the measurement and calculation result display layout (MDA layout).

(1) When Font Type is set to "Extended", the MDA layout is changed to single-column on the left → single-column on the right → three-column each time the [Window Position] switch is pressed.

(2) When Font Type is set to an option other than "Extended", the MDA layout is switched between single-column on the left and four-column each time the [Window Position] switch is pressed.

2. Setting the Presets

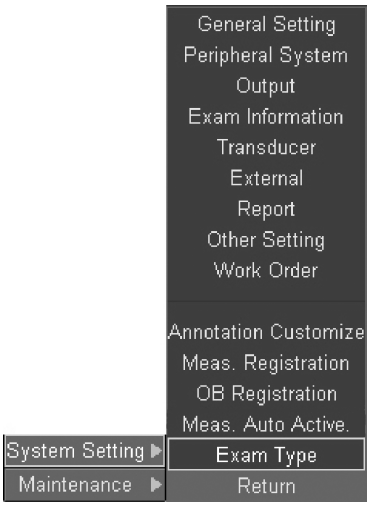
The default settings of this system vary depending on the initially selected presets.

It is possible to preset the application measurement menu, measurement methods, calculation formulas, etc. to be displayed when CALC is pressed.

2.1 Changing the Preset Items

(1) Press MENU.

(2) The pop-up menu is displayed on the monitor.

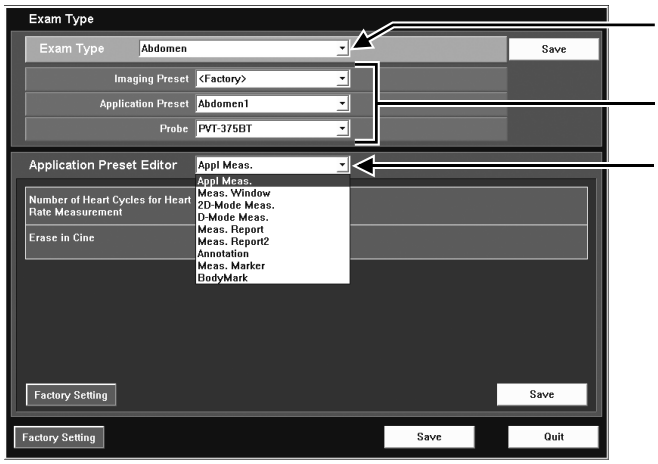


(3) Select "Exam Type" from "System Setting". The Exam Type Edit screen is displayed.

(4) On the Exam Type screen, select the desired exam type.

The Imaging Preset, Application Preset, and Probe settings corresponding to the selected exam type are selected and displayed automatically.

(5) Select the desired item from the Application Preset Editor pull-down menu. The menu items displayed in the pull-down menu differ depending on the application preset type.



Selecting the exam type

Selected automatically according to the exam type

The items to be displayed in the pull-down menu differ according to the Application Preset

(6) Press [Save] to save the settings.

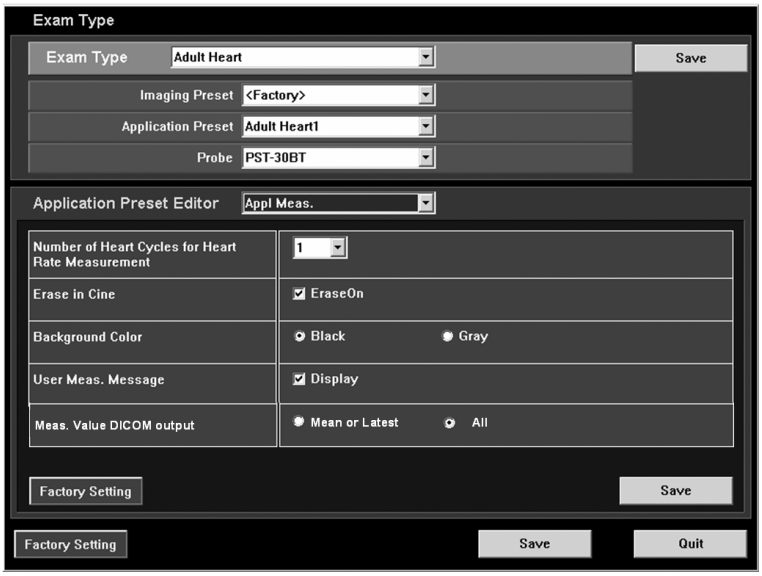
The settings for the item selected using Application Preset Editor are saved only to the preset currently selected on the Exam Type Edit screen.

NOTE: After presets are changed, be sure to turn the system power OFF and then ON again. Otherwise, the new presets do not become effective.

2.2 Details of Each Preset

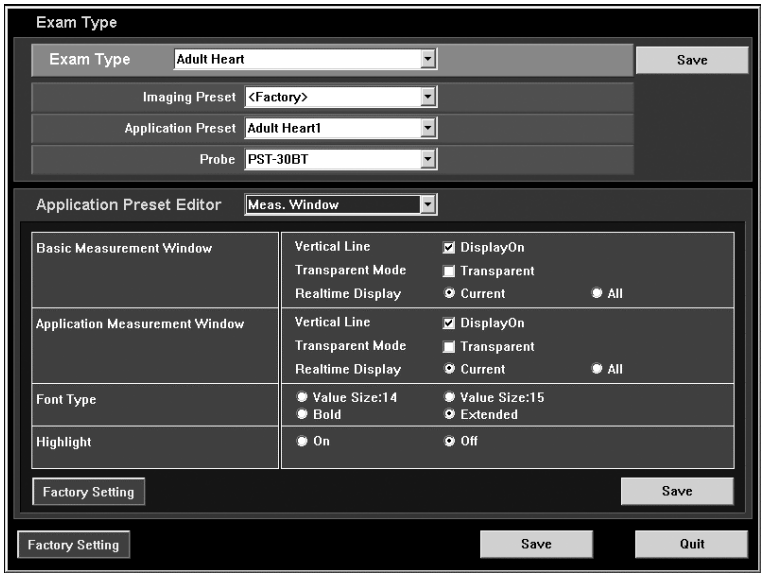
This subsection describes the details of the presets that can be selected and edited using the Application Preset Editor.

2.2.1 Appl Meas.



Title	Item	Description
Number of Heart Cycles for Heart Rate Measurement	1, 2, 3, 4, 5, 6, 7, 8	Specify the number of cardiac cycles in the measurement range for the heart rate measurement.
Erase in Cine	Erase On	Select whether the measurement marker is displayed or not during frame-advance or scroll playback. ☑ : Not displayed ☐ : Displayed
Background Color	Black Gray	Specify the background color of the measurement display window.
User Meas. Message	Display	Specify whether or not the message is displayed when a user-registered measurement is started. ☑ : Not displayed ☐ : Displayed
Meas. Value DICOM output	Mean or Latest All	Specify the data type for the measurement results to be output in the DICOM SR format. Mean or Latest : The mean or latest values are output. All : All the measurement data is output.

2.2.2 Meas. Window



Title	Item	Description
Basic Measurement Window	Vertical Line	Specify whether or not vertical lines are to be displayed in the measurement display window. ☑ : Displayed ☐ : Not displayed
	Transparent Mode	Specify whether the background of the measurement display window is transparent or not. ☑ : Transparent ☐ : Not transparent
	Realtime Display	Specify the display mode of the measurement display window. Current: All the acquired data is displayed in the measurement display window only after the measurement data is fixed. All : All the currently available data is displayed in the measurement display window.

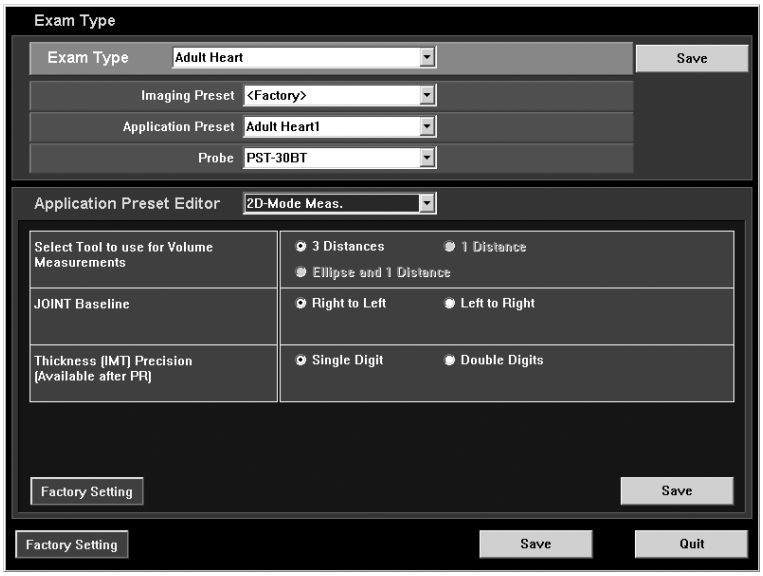
Title	Item	Description
Application Measurement Window	Vertical Line	Specify whether or not vertical lines are to be displayed in the measurement display window[*1]. ☑ : Displayed ☐ : Not displayed
	Transparent Mode	Specify whether the background of the measurement display window is transparent or not. ☑ : Transparent ☐ : Not transparent
	Realtime Display	Specify the display mode of the measurement display window. Current: All the acquired data is displayed in the measurement display window only after the measurement data is fixed[*2]. All : All the currently available data is displayed in the measurement display window[*3].
Font Type		Specify the font size used in the measurement display window.[*1] Value Size:14 : The measurement item and unit are 13 pixels and the data is 14 pixels. Value Size:15 : The measurement item and unit are 13 pixels and the data is 15 pixels. Bold : All the measurement items, units, and data are 13 pixels in bold. Extended : The measurement item and unit are 18 pixels and the data is 20 pixels.
Highlight	On/Off	Specify whether or not the measurement result for the last measured item (the item for which the measurement mark is displayed in the window) is highlighted. (The ACT and TIC measurement displays are not highlighted.)*[1]

*1: This can be set for each Application Preset.

*2: In vascular measurement, the system operates in "All" mode even when "Current" is selected.

*3: For OB measurement, the system operates with the "Current" setting even when "All" is selected.

2.2.3 2D-Mode Meas.



Title	Item	Description
Select Tool to use for Volume Measurements	3 Distances (fixed)	-
JOINT Baseline	Right to Left	The osseous acetabular angle (α) is displayed as viewed from the right with respect to the baseline, while the cartilaginous acetabular angle (β) is displayed as viewed from the left.
	Left to Right	The osseous acetabular angle (α) is displayed as viewed from the left with respect to the baseline, while the cartilaginous acetabular angle (β) is displayed as viewed from the right.
Thickness (IMT) Precision (Available after PR)	Single Digit	The measurement value obtained using the IMT tool or Thickness tool is displayed to one decimal place.
	Double Digits	The measurement value obtained using the IMT tool or Thickness tool is displayed to two decimal places for reference purposes.(*1, *2)

*1: In some cases, it may not be possible to obtain an accurate value to two decimal places, depending on the characteristics of the image.
This point must be kept in mind, and values displayed to two decimal places must be used only for reference purposes.

*2: Marks can be moved in steps of 1 pixel on the screen. Due to the resolution of ultrasound images, this does not correspond to an indicated value change of 0.01. Thus, the indicated value changes in increments of greater than 0.01 as a mark is moved.

2.2.4 D-Mode Meas.

- General (when an application preset other than Adult Heart or Carotid is selected)

Title	Item	Description
RI calc. method[*1]	Ved	RI is calculated using the Ved value.
	Vmin	RI is calculated using the Vmin value.
PI calc. method[*2]	Ved	PI is calculated using the Ved value.
	Vmin	PI is calculated using the Vmin value.
Flow Volume Tool[*3]	Range	[Range] (Range Trace) is set as the default when the Flow Volume or PI measurement is started. It is necessary to specify the trace range.
	Auto Range	[Auto Range] (Auto Range Trace) is set as the default when Flow Volume or PI measurement is started. Tracing is performed and the measurement result is displayed automatically by simply pressing the measurement switch.
	Continuous	[Continuous] (Freehand Trace) is set as the default when the Flow Volume or PI measurement is started.
Flow Volume Calculation	Vmean-peak	The flow volume is calculated using the time-average value obtained by tracing the peak points (border) of the Doppler waveform.
	Vmean-mean	The flow volume is calculated using the time-average value obtained by tracing the mean points (center of gravity) of the Doppler waveform.

Title	Item	Description
Vel Trace Tool[*4]	Continuous	[Continuous] (Freehand Trace) is set as the default when the Vel Trace measurement is started.
	Spline	[Spline] (Spline Trace) is set as the default when the Vel Trace measurement is started.
	Line	[Line] (Line Trace) is set as the default when the Vel Trace measurement is started.
	Range	[Range] (Range Trace) is set as the default when the Vel Trace measurement is started. It is necessary to specify the trace range.
	Auto Range	[Auto Range] (Auto Range Trace) is set as the default when the Vel Trace measurement is started. Tracing is performed and the measurement result is displayed automatically by simply pressing the measurement switch.
Velocity Value [Available after PR][*5]	Signed Value	The measured velocity values are output with plus/minus signs.
	Absolute Value	The measured velocity values are output as absolute values.

*1 : This setting is common to RI calculations in the velocity trace, RI trace, and flow volume measurements in the basic measurement mode.

*2 : This setting is common to PI calculations in the velocity trace, PI trace, and flow volume measurements in the basic measurement mode.

*3, *4 : "Range" is selected at the factory before shipment.

*5 : Measurement tool available for Velocity Value

Measurement Tool	Preset Setting Signed value	Preset Setting Absolute value	
Velocity (DvelocityTool)	Vel	Vel	= abs (Vel)
	PG	PG	
Accel measurement (DaccelerationTool)	Accel	Accel	
	Vel1	Vel1	= abs (Vel1)
	Vel2	Vel2	= abs (Vel2)
	Time	Time	
	PG1	PG1	
	PG2	PG2	
VelocityTrace (DsplineTool), (DtraceTool), (DlineTool), (DheartCycleTool)	Vmax	Vmax	= abs (Vmax)
	Vmin	Vmin	= abs (Vmin)
	Ved	Ved	= abs (Ved)
	Vm	Vm	= abs (Vm)
	Vm_peak	Vm_peak	= abs (Vm_peak)
	Vm_mean	Vm_mean	= abs (Vm_mean)
	PI	PI	
	RI	RI	
	S/D	S/D	
VelocityTrace (Cardiac) (DsplineTool), (DtraceTool), (DlineTool), (DheartCycleTool)	VP (Vmax)	VP (Vmax)	= abs (VP (Vmax))
	VM	VM	= abs (VM)
	VTI	VTI	= abs (VTI)
	PPG	PPG	
	MPG	MPG	
	HR (ECG)	HR (ECG)	
RI (DRITool)	RI	RI	
	Vmax	Vmax	= abs (Vmax)
	Vmin	Vmin	= abs (Vmin)
	Ved	Ved	= abs (Ved)
PI	PI	PI	
	Vmax	Vmax	= abs (Vmax)
	Vmin	Vmin	= abs (Vmin)
	Ved	Ved	= abs (Ved)
	Vm	Vm	= abs (Vm)
	Vm_peak	Vm_peak	= abs (Vm_peak)
S/D (DSDTool)	S/D	S/D	
	Vmax	Vmax	= abs (Vmax)
	Ved	Ved	= abs (Ved)
dP/dt measurement Tool	dP/dt	dP/dt	
	dt	dt	
	Vel1	Vel1	= abs (Vel1)
	Vel2	Vel2	= abs (Vel2)

Measurement Tool	Preset Setting Signed value	Preset Setting Absolute value	
dP/dt (-1, -3) measurement Tool	dP/dt	dP/dt	
	dt	dt	
	Vel1	Vel1	= abs (Vel1)
	Vel2	Vel2	= abs (Vel2)
DcT measurement Tool	Vel	Vel	= abs (Vel)
	Dct	Dct	
	PHT	PHT	
VelocityTrace with DcT measurement Tool	VP	VP	= abs (VP)
	VM	VM	= abs (VM)
	PPG	PPG	
	MPG	MPG	
	DcT	DcT	
	PHT	PHT	

- When the Carotid1 or Carotid2 application preset is selected

Title	Item	Description
RI calc. method[*1]	Ved	RI is calculated using the Ved value.
	Vmin	RI is calculated using the Vmin value.
PI calc. method[*2]	Ved	PI is calculated using the Ved value.
	Vmin	PI is calculated using the Vmin value.
Flow Volume Tool[*3]	Range	[Range] (Range Trace) is set as the default when the Flow Volume or PI measurement is started.
	Auto Range	[Auto Range] (Auto Range Trace) is set as the default when Flow Volume or PI measurement is started.
	Continuous	[Continuous] (Freehand Trace) is set as the default when the Flow Volume or PI measurement is started.
Flow Volume Calculation	Vmean-peak	The flow volume is calculated using the time-average value obtained by tracing the peak points (border) of the Doppler waveform.
	Vmean-mean	The flow volume is calculated using the time-average value obtained by tracing the mean points (center of gravity) of the Doppler waveform.

Title	Item	Description
Vel Trace Tool[*4]	Continuous	[Continuous] (Freehand Trace) is set as the default when the Vel Trace measurement is started.
	Spline	[Spline] (Spline Trace) is set as the default when the Vel Trace measurement is started.
	Line	[Line] (Line Trace) is set as the default when the Vel Trace measurement is started.
	Range	[Range] (Range Trace) is set as the default when the Vel Trace measurement is started.
	Auto Range	[Auto Range] (Auto Range Trace) is set as the default when the Vel Trace measurement is started.
Velocity Value [Available after PR][*5]	Signed Value	The measured velocity values are output with plus/minus signs.
	Absolute Value	The measured velocity values are output as absolute values.

*1 : This setting is common to RI calculations in the velocity trace, RI trace, and flow volume measurements in the basic measurement mode.

*2 : This setting is common to PI calculations in the velocity trace, PI trace, and flow volume measurements in the basic measurement mode.

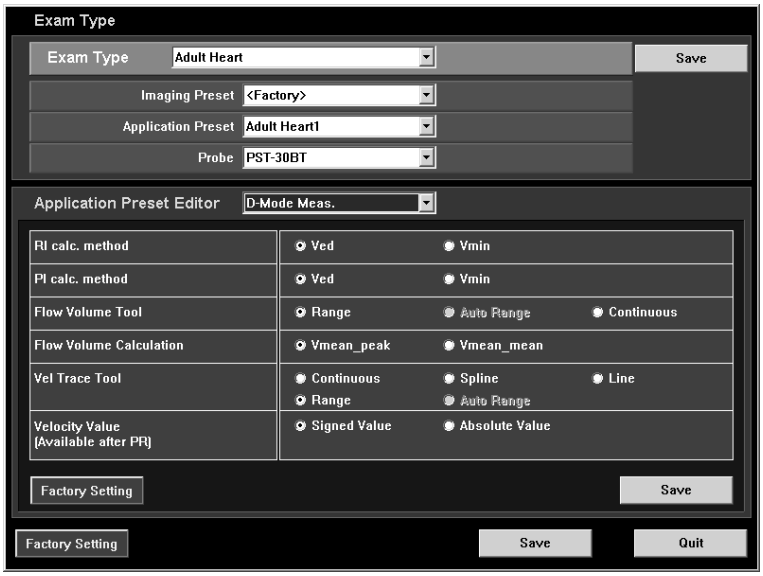
*3, *4 : "Auto Range" is selected at the factory before shipment.

*5 : Measurement tool available for Velocity Value

Measurement Tool	Preset Setting Signed value	Preset Setting Absolute value	
Velocity (DvelocityTool)	Vel	Vel	= abs (Vel)
	PG	PG	
Accel measurement (DaccelerationTool)	Accel	Accel	
	Vel1	Vel1	= abs (Vel1)
	Vel2	Vel2	= abs (Vel2)
	Time	Time	
	PG1	PG1	
	PG2	PG2	
VelocityTrace (DsplineTool), (DtraceTool), (DlineTool), (DheartCycleTool)	Vmax	Vmax	= abs (Vmax)
	Vmin	Vmin	= abs (Vmin)
	Ved	Ved	= abs (Ved)
	Vm	Vm	= abs (Vm)
	Vm_peak	Vm_peak	= abs (Vm_peak)
	Vm_mean	Vm_mean	= abs (Vm_mean)
	PI	PI	
	RI	RI	
	S/D	S/D	
VelocityTrace (Cardiac) (DsplineTool), (DtraceTool), (DlineTool), (DheartCycleTool)	VP (Vmax)	VP (Vmax)	= abs (VP (Vmax))
	VM	VM	= abs (VM)
	VTI	VTI	= abs (VTI)
	PPG	PPG	
	MPG	MPG	
	HR (ECG)	HR (ECG)	
RI (DRITool)	RI	RI	
	Vmax	Vmax	= abs (Vmax)
	Vmin	Vmin	= abs (Vmin)
	Ved	Ved	= abs (Ved)
PI	PI	PI	
	Vmax	Vmax	= abs (Vmax)
	Vmin	Vmin	= abs (Vmin)
	Ved	Ved	= abs (Ved)
	Vm	Vm	= abs (Vm)
	Vm_peak	Vm_peak	= abs (Vm_peak)
S/D (DSDTool)	S/D	S/D	
	Vmax	Vmax	= abs (Vmax)
	Ved	Ved	= abs (Ved)
dP/dt measurement Tool	dP/dt	dP/dt	
	dt	dt	
	Vel1	Vel1	= abs (Vel1)
	Vel2	Vel2	= abs (Vel2)

Measurement Tool	Preset Setting Signed value	Preset Setting Absolute value	
dP/dt (-1, -3) measurement Tool	dP/dt	dP/dt	
	dt	dt	
	Vel1	Vel1	= abs (Vel1)
	Vel2	Vel2	= abs (Vel2)
DcT measurement Tool	Vel	Vel	= abs (Vel)
	Dct	Dct	
	PHT	PHT	
VelocityTrace with DcT measurement Tool	VP	VP	= abs (VP)
	VM	VM	= abs (VM)
	PPG	PPG	
	MPG	MPG	
	DcT	DcT	
	PHT	PHT	

- When Adult Heart1, Adult Heart2, or Pediatric Heart is selected as an application preset



Title	Item	Description
RI calc. method[*1]	Ved	RI is calculated using the Ved value.
	Vmin	RI is calculated using the Vmin value.
PI calc. method[*2]	Ved	PI is calculated using the Ved value.
	Vmin	PI is calculated using the Vmin value.
Flow Volume Tool[*3]	Range	[Range] (Range Trace) is set as the default when the Flow Volume, Vel Trace, or PI measurement is started.
	Auto Range	Cannot be selected.
	Continuous	[Continuous] (Freehand Trace) is set as the default when the Flow Volume, Vel Trace, or PI measurement is started.
Flow Volume Calculation	Vmean-peak	The flow volume is calculated using the time-average value obtained by tracing the peak points (border) of the Doppler waveform.
	Vmean-mean	The flow volume is calculated using the time-average value obtained by tracing the mean points (center of gravity) of the Doppler waveform.

Title	Item	Description
Vel Trace Tool[*4]	Continuous	[Continuous] (Freehand Trace) is set as the default when the Vel Trace measurement is started.
	Spline	[Spline] (Spline Trace) is set as the default when the Vel Trace measurement is started.
	Line	[Line] (Line Trace) is set as the default when the Vel Trace measurement is started.
	Range	[Range] (Range Trace) is set as the default when the Vel Trace measurement is started.
	Auto Range	Cannot be selected.
Velocity Value [Available after PR][*5]	Signed Value	The measured velocity values are output with plus/minus signs.
	Absolute Value	The measured velocity values are output as absolute values.

*1 : This setting is common to RI calculations in the velocity trace, RI trace, and flow volume measurements in the basic measurement mode.

*2 : This setting is common to PI calculations in the velocity trace, PI trace, and flow volume measurements in the basic measurement mode.

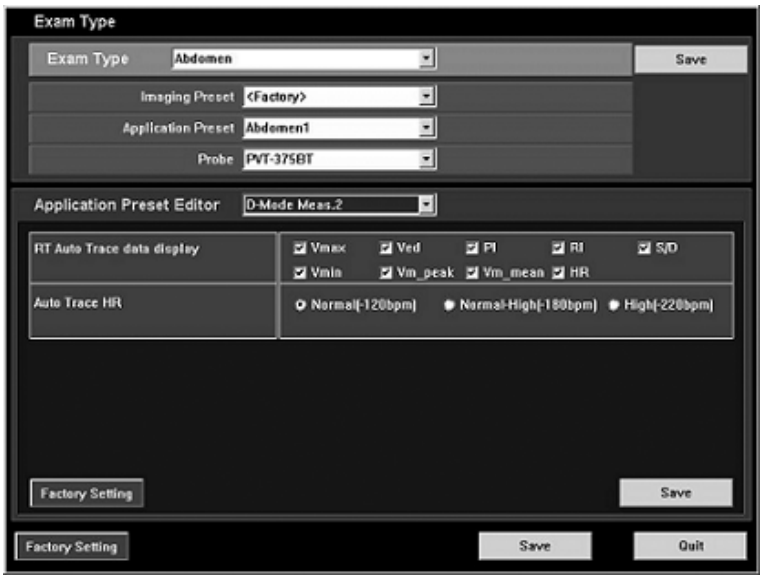
*3, *4 : "Range" is selected at the factory before shipment.

*5 : Measurement tool available for Velocity Value

Measurement Tool	Preset Setting Signed value	Preset Setting Absolute value	
Velocity (DvelocityTool)	Vel	Vel	= abs (Vel)
	PG	PG	
Accel measurement (DaccelerationTool)	Accel	Accel	
	Vel1	Vel1	= abs (Vel1)
	Vel2	Vel2	= abs (Vel2)
	Time	Time	
	PG1	PG1	
	PG2	PG2	
VelocityTrace (DsplineTool), (DtraceTool), (DlineTool), (DheartCycleTool)	Vmax	Vmax	= abs (Vmax)
	Vmin	Vmin	= abs (Vmin)
	Ved	Ved	= abs (Ved)
	Vm	Vm	= abs (Vm)
	Vm_peak	Vm_peak	= abs (Vm_peak)
	Vm_mean	Vm_mean	= abs (Vm_mean)
	PI	PI	
	RI	RI	
	S/D	S/D	
VelocityTrace (Cardiac) (DsplineTool), (DtraceTool), (DlineTool), (DheartCycleTool)	VP (Vmax)	VP (Vmax)	= abs (VP (Vmax))
	VM	VM	= abs (VM)
	VTI	VTI	= abs (VTI)
	PPG	PPG	
	MPG	MPG	
	HR (ECG)	HR (ECG)	
RI (DRITool)	RI	RI	
	Vmax	Vmax	= abs (Vmax)
	Vmin	Vmin	= abs (Vmin)
	Ved	Ved	= abs (Ved)
PI	PI	PI	
	Vmax	Vmax	= abs (Vmax)
	Vmin	Vmin	= abs (Vmin)
	Ved	Ved	= abs (Ved)
	Vm	Vm	= abs (Vm)
	Vm_peak	Vm_peak	= abs (Vm_peak)
S/D (DSDTool)	S/D	S/D	
	Vmax	Vmax	= abs (Vmax)
	Ved	Ved	= abs (Ved)
dP/dt measurement Tool	dP/dt	dP/dt	
	dt	dt	
	Vel1	Vel1	= abs (Vel1)
	Vel2	Vel2	= abs (Vel2)

Measurement Tool	Preset Setting Signed value	Preset Setting Absolute value	
dP/dt (-1, -3) measurement Tool	dP/dt	dP/dt	
	dt	dt	
	Vel1	Vel1	= abs (Vel1)
	Vel2	Vel2	= abs (Vel2)
DcT measurement Tool	Vel	Vel	= abs (Vel)
	Dct	Dct	
	PHT	PHT	
VelocityTrace with DcT measurement Tool	VP	VP	= abs (VP)
	VM	VM	= abs (VM)
	PPG	PPG	
	MPG	MPG	
	DcT	DcT	
	PHT	PHT	

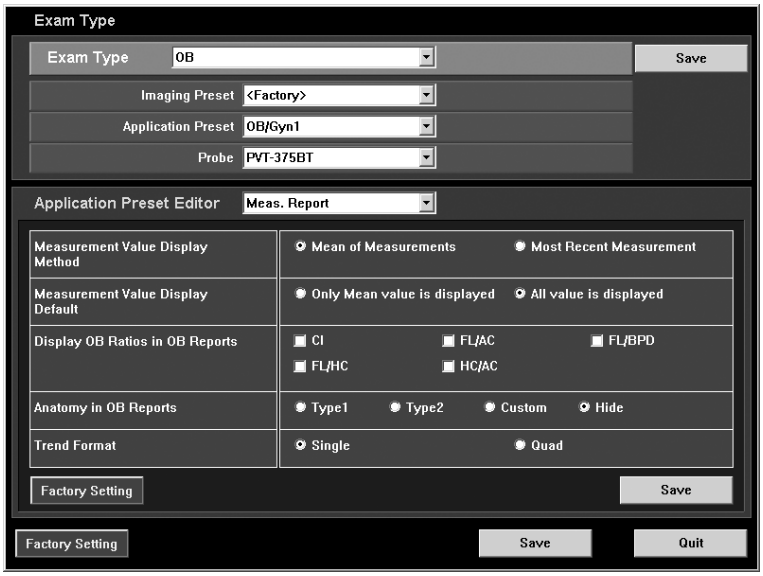
2.2.5 D-Mode Meas. 2



Title	Item	Description
RT Auto Trace data display*1	Vmax Ved PI RI S/D Vmin Vm_peak Vm_mean HR	Select the items to be displayed in real-time Doppler auto trace mode. ☑ : Displayed ☐ : Not displayed
Auto Trace HR	Normal (-120 bpm)	Select this when auto trace is performed for a patient whose heart rate is normal (adult).
	Normal-High (-180 bpm)	Select this when auto trace is performed for a patient whose heart rate is slightly faster than normal (adult).
	High (-220 bpm)	Select this when auto trace is performed for a patient whose heart rate is faster than normal (adult).

*1: If none of these parameters are selected (all items are set not to be displayed), no measurement or calculation values are displayed.

2.2.6 Meas. Report

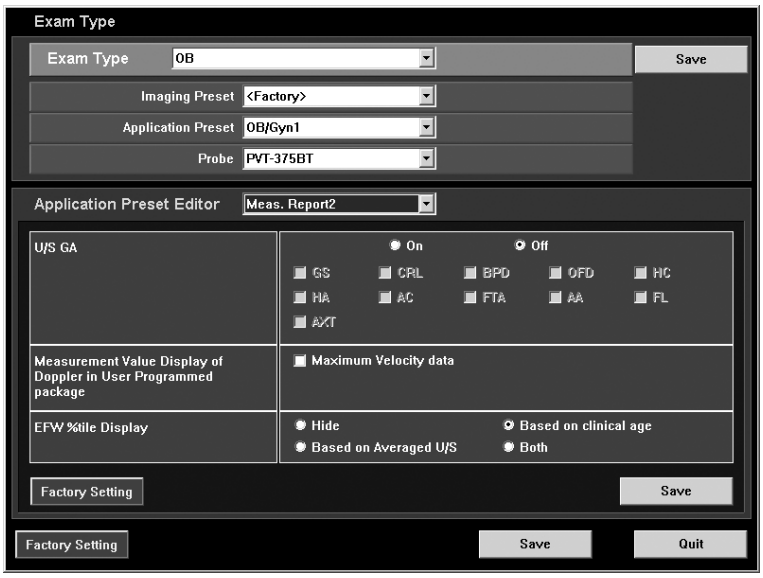


Title	Item	Description
Measurement Value Display Method	Mean of Measurements	The mean of the measurements is displayed as the result in the Report screen.
	Most Recent Measurement	The most recent measurement is displayed as the result in the Report screen.
Measurement Value Display Default	Only Mean value is displayed[*1]	Only the mean of the measurements is displayed when the Report screen is started.
	All value is displayed	All the measured values and their mean are displayed when the Report screen is started.
Display OB Ratios in OB Reports	CI	Specify whether the CI result is displayed or not on the Report screen.
	FL/AC	Specify whether the FL/AC result is displayed or not on the Report screen.
	FL/BPD	Specify whether the FL/BPD result is displayed or not on the Report screen.
	FL/HC	Specify whether the FL/HC result is displayed or not on the Report screen.
	HC/AC	Specify whether the HC/AC result is displayed or not on the Report screen.
Anatomy in OB Reports	Type 1	The anatomy button is displayed on the Report screen in the Type1 format.[*2]
	Type 2	The anatomy button is displayed on the Report screen in the Type2 format.[*2]
	Custom	The anatomy button is displayed on the Report screen in Custom format.
	Hide	The anatomy button is not displayed on the Report screen.
Trend Format	Single	The trend graph is displayed in the Single format.
	Quad	The trend graph is displayed in the Quad format.

*1: When Carotid 1 or Carotid 2 is selected for Application Preset, "Measurement Value Display Default" is fixed to "Only Mean value is displayed".

*2: For display of Type 1, Type 2, and custom, refer to subsection 12.9.5 "Anatomy function".

2.2.7 Meas. Report2



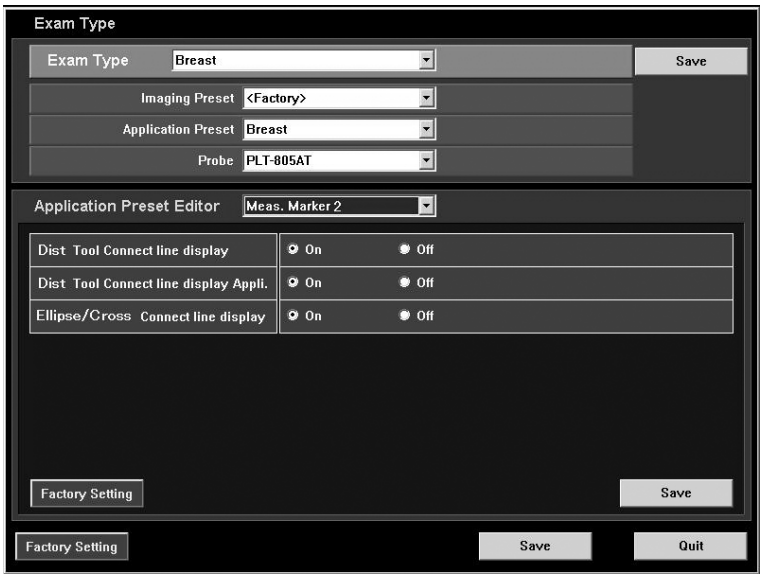
Title	Item	Description
U/S GA	On	U/S GA is calculated.
	Off	U/S GA is not calculated.
	GS	Select the items to be used for calculating U/S GA.
	CRL	
	BPD	
	OFD	
	HC	
	HA	
	AC	
	FTA	
	AA	
	FL	
	AXT	
Measurement Value Display of Doppler in User Programmed package	Maximum Velocity data	For user-registered Doppler measurement (Velocity, Vel Trace), the velocity values are set as shown below on the Report screen. ☑ : In velocity measurement, the velocity value (Vel) that is the highest in absolute value among several measurement values is selected and displayed as the central value. In Vel Trace measurement, the maximum velocity value (Vmax) that is the highest in absolute value among several measurement values is selected and displayed as the central value. ☐ : The Velocity measurement value and the Vel Trace measurement value are displayed according to the [Measurement Value Display Method] settings on the Meas. Report page of the preset menu.

Title	Item	Description
EFW %tile Display	Hide	The EFW percentile is not displayed on the Report screen.
	Based on clinical age	The EFW percentile based on the gestational age on the examination date is displayed on the Report screen.
	Based on Averaged U/S	The EFW percentile based on the averaged ultrasound measurement value for the gestational age is displayed on the Report screen.
	Both	The EFW percentile based on the gestational age on the examination date and that based on the averaged ultrasound measurement value for the gestational age are both displayed on the Report screen.

2.2.8 Meas. Marker

Title	Item	Description
Marker Size [2D]	Large, Middle, Small	Specify the default size of the marker for 2D measurement.
	Auto-change	Specify whether the marker is enlarged or not when the distance between the start point and end point exceeds a certain distance.
Marker Style [2D]	×, +, *	Specify the shape of the marker for 2D measurement.
Marker Size [M]	Large, Middle, Small	Specify the default size of the marker for M-mode measurement.
Marker Style [M]	×, +, *	Specify the shape of the marker for M-mode measurement.
Marker Size [Doppler]	Large, Middle, Small	Specify the default size of the marker for Doppler measurement.
Marker Style [Doppler]	×, +, *	Specify the shape of the marker for Doppler measurement.
Time/HR Tool Connect line display	On, Off	Specify whether or not the horizontal line connecting the paired vertical lines in time measurement or HR measurement is to be displayed.

2.2.9 Meas. Marker2



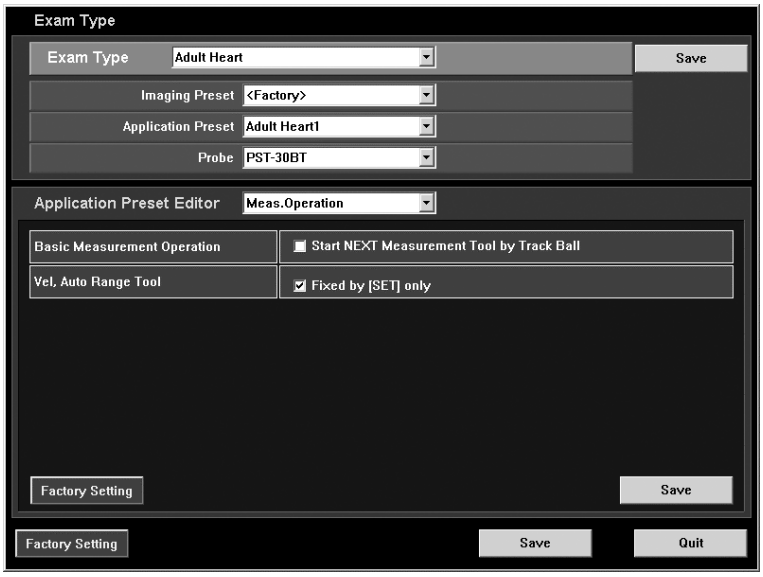
Title	Item	Description
Dist Tool Connect line display	On, Off	Select whether or not the line connecting the start point and end point of the distance measurement[*1] is displayed.
Dist Tool Connect line display Appli.	On, Off	Select whether or not the line connecting the start point and end point of the distance measurement[*2] is displayed.
Ellipse/Cross Connect line display	On, Off	Select whether or not the line connecting the start point and end point of the area measurement[*3] is displayed.

*1: Distance measurements in Basic Measurement mode (Distance, %Stenosis (Dist), Volume) and distance measurement tool in Mecha 4D mode

*2: Distance measurements in Application measurement mode (Distance, %Stenosis (Dist), Volume)

*3: Area measurements in Basic Measurement mode and Application Measurement mode (Area Ellipse, Area Cross)

2.2.10 Meas. Operation



Title	Item	Description
Basic Measurement Operation	Start NEXT Measurement Tool by Track Ball	Select whether or not the next measurement is started when the trackball is moved after the current measurement is completed. ☑ : The next measurement is started. ☐ : The next measurement is not started.
Vel, Auto Range Tool	Fixed by [SET] only	Select whether or not the measurement is set only when [SET] is pressed in velocity measurement mode or Auto Range measurement mode. ☑ : The measurement is set only when [SET] is pressed. ☐ : The measurement is set when [SET] is pressed or when the other measurement is started.

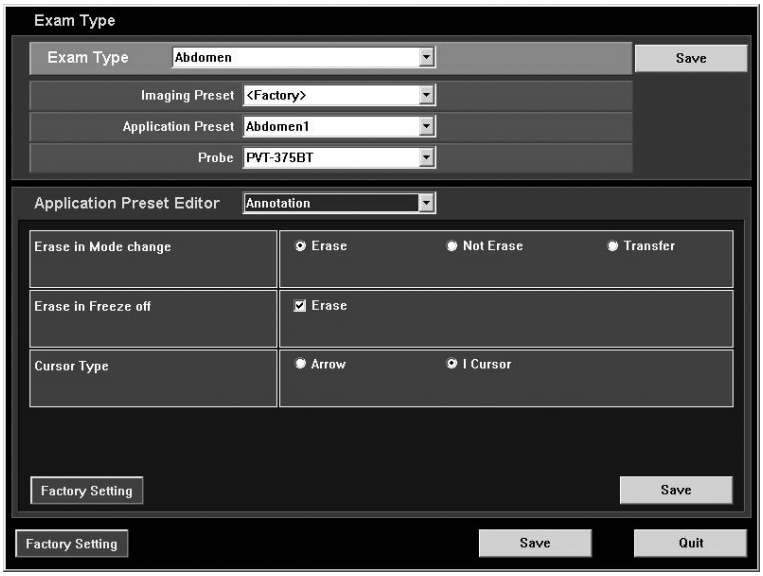
NOTE: Refer to the table on the next page for details regarding "Start NEXT Measurement Tool by Track Ball".

"Start NEXT Measurement Tool by Track Ball" is applicable to the following basic measurements.

Mode	Measurement Tool	Procedure
2D	Distance	After the measurement is set, the marker for the next measurement (of the same measurement item) is displayed by moving the trackball.
	Trace Length (Continuous Trace)	
	Trace Length (Spline Trace)	
	Angle	Once the two angle lines are set, the marker for the next measurement is not displayed even when the trackball is moved. (As before.)
	%Stenosis Distance	When the trackball is moved after the Dist 1 measurement is set, the marker for Dist 2 measurement is displayed. Once the Dist 2 measurement is set, the marker is not displayed even when the trackball is moved.
	%Stenosis Area	When the trackball is moved after the Lumen measurement is set, the marker for the Residual measurement is displayed. Once the Residual measurement is set, the marker is not displayed even when the trackball is moved.
	Area (Continuous Trace)	After the measurement is set, the marker for the next measurement (of the same measurement item) is displayed by moving the trackball.
	Area (Ellipse)	
	Area (Spline Trace)	
	Area (Cross)	
	Volume	When the trackball is moved after the Dist 1 measurement is set, the marker for Dist 2 measurement is displayed. When the trackball is moved after the Dist 2 measurement is set, the start point for Dist 3 measurement is displayed automatically. Once the Dist 3 measurement is set, the marker is not displayed even when the trackball is moved.
	Joint	Once the three lines are set, the marker is not displayed even when the trackball is moved. (As before.)
	meanIMT	As before
	Flow Volume	As before

Mode	Measurement Tool	Procedure
M	Distance	After the measurement is set, the marker for the next measurement (of the same measurement item) is displayed by moving the trackball.
	Slope	
	Time	
	HR	
Doppler	Velocity	After the measurement is set, the marker for the next measurement (of the same measurement item) is displayed by moving the trackball.
	Accel	
	Time	
	HR	
	Vel Trace (Continuous Trace)	
	Vel Trace (Line Trace)	
	Vel Trace (Spline Trace)	
	Vel Trace (Range)	
	PI (Continuous Trace)	
	PI Trace (Line Trace)	
	PI Trace (Spline Trace)	
	PI Trace (Range)	
	RI	When the trackball is moved after the maximum velocity position and minimum velocity position are set, the marker for the next measurement (of the same measurement item) is displayed.
	S/D	When the trackball is moved after the maximum velocity position and the end-diastole velocity position are set, the marker for the next measurement (of the same measurement item) is displayed.
	Flow Volume	As before

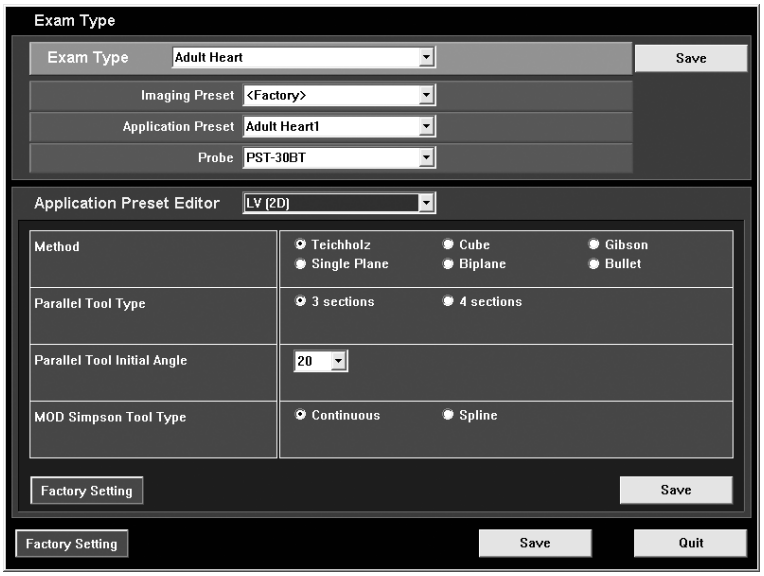
2.2.11 Annotation



Title	Item	Description
Erase in Mode change	Erase	The annotation is erased when another image mode is selected.
	Not Erase	The annotation is not erased when another image mode is selected.
	Transfer	When the image mode is changed, the annotation is displayed at the default position for the entered mode.
Erase in Freeze off	Erase	Specify whether or not the annotation is erased when image freezing is released. ☑ : The annotation is erased. ☐ : The annotation is displayed.
Cursor Type	Arrow	The arrow cursor is displayed when the annotation function is started.
	I Cursor	The I-beam cursor is displayed when the annotation function is started.

2.2.12 LV (2D)

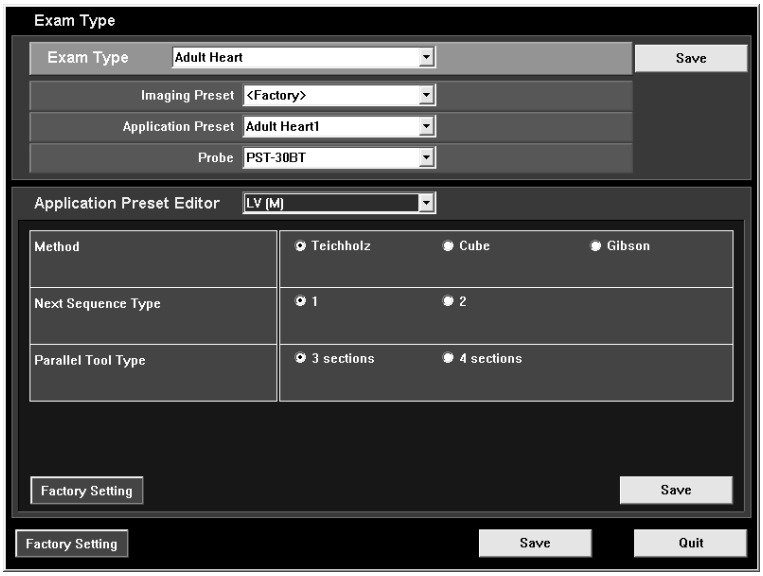
This menu is used to preset the measurement type and the measurement method to be used when 2D-mode LV measurement is started from the Cardiac measurement menu.



Title	Item	Description
Method	Teichholz Cube Gibson Single Plane Biplane Bullet	Select the LV measurement method to be displayed in the application measurement (2D mode) menu.
Parallel Tool Type	3 sections	Three segments (interventricular septal thickness, LV endocardial diameter, and LV posterior wall thickness) are measured in parallel.
	4 sections	Four segments (RV diameter, interventricular septal thickness, LV endocardial diameter, and LV posterior wall thickness) are measured in parallel.
Parallel Tool Initial Angle	-90 to 90	The default angle of the measurement marker for parallel measurement can be specified in 10° increments.
MOD Simpson Tool Type	Continuous	The endocardium can be traced freehand for LV measurement (MOD Simpson method).
	Spline	The endocardium can be traced using the spline trace method for LV measurement (MOD Simpson method).

2.2.13 LV (M)

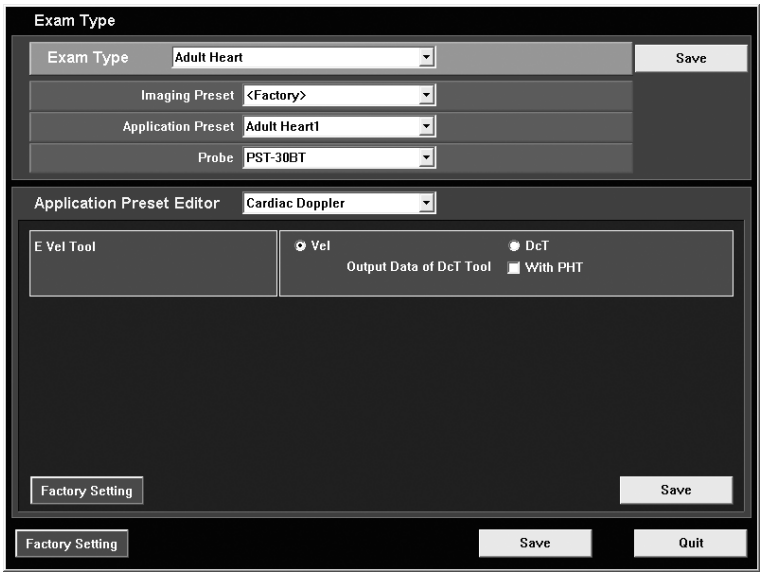
This menu is used to preset the measurement type and the measurement method to be used when M-mode LV measurement is started from the Cardiac measurement menu.



Title	Item	Description
Method	Teichholz Cube Gibson	Specify the LV measurement method to be displayed in the application measurement (M mode) menu.
Next Sequence Type	1	Each time NEXT is pressed in LV measurement, the item to be measured next is selected automatically in the range from the interventricular septum to the posterior wall both for end diastole and end systole.
	2	When NEXT is pressed in LV measurement, the endocardium only is selected as the item to be measured next for end systole.
Parallel Tool Type	3 sections	Three segments (interventricular septal thickness, LV endocardial diameter, and LV posterior wall thickness) are measured in parallel.
	4 sections	Four segments (RV diameter, interventricular septal thickness, LV endocardial diameter, and LV posterior wall thickness) are measured in parallel.

2.2.14 Cardiac Doppler

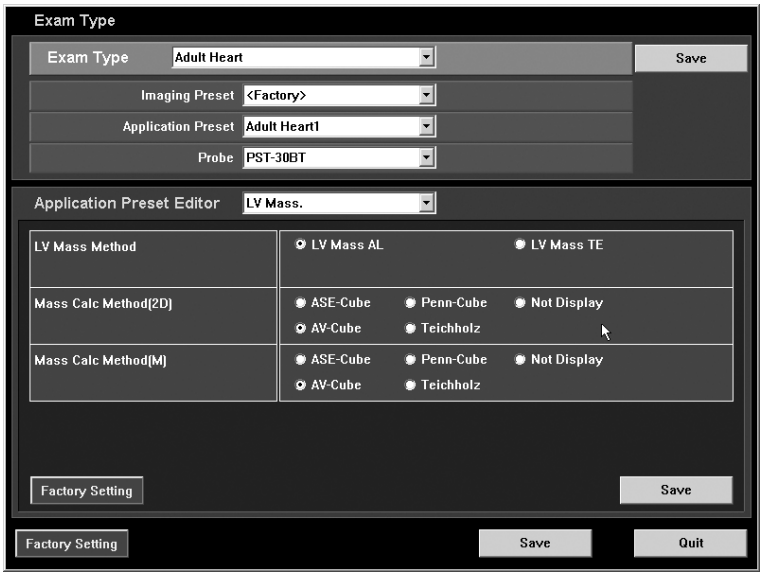
This menu is used to preset the measurement method etc, to be used when Doppler-mode measurement is started from the Cardiac measurement menu.



Title	Item	Description
E Vel Tool	Vel	The E wave of the LV inflow is measured using the velocity measurement method.
	DcT	E-wave measurement on the E-wave waveform for LV inflow is performed together with DcT measurement.
	Output Data of DcT Tool ☑ With PHT	Specify whether PHT is to be measured together with DcT. ☑ : PHT is measured together. ☐ : PHT is not measured together.

2.2.15 LV Mass.

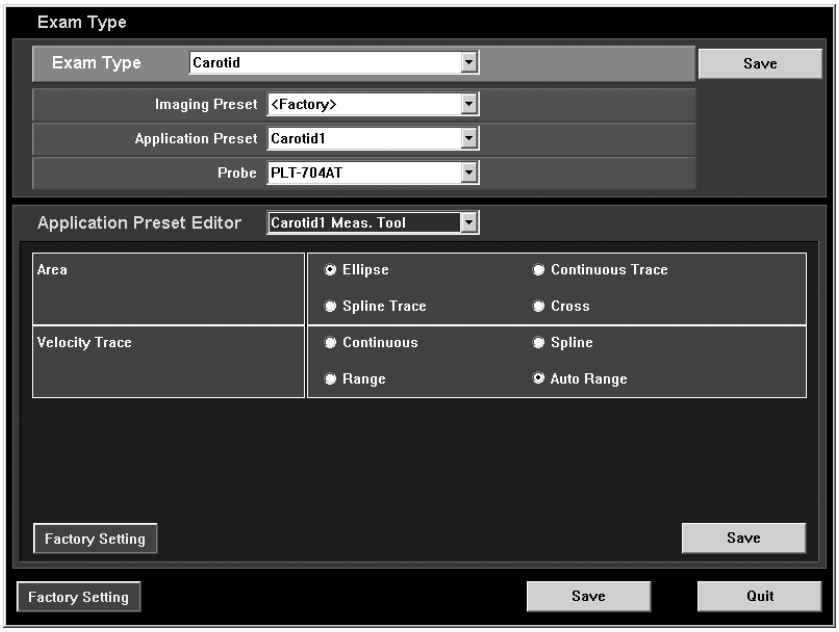
This menu is used to preset the measurement type and the measurement method to be used when LV Mass measurement is started from the Cardiac measurement menu.



Title	Item	Description
LV Mass Method	LV Mass AL LV Mass TE	Specify the LV Mass measurement method to be displayed in the application measurement menu (Extra).
Mass Calc Method [2D]	ASE-Cube Penn-Cube AV-Cube Teichholz	Specify the LV Mass calculation method to be used in the LV measurement (2D mode).
	Not Display	The LV Mass data is not displayed in the measurement display window or on the Report screen.
Mass Calc Method [M]	ASE-Cube Penn-Cube AV-Cube Teichholz	Specify the LV Mass calculation method to be used in the LV measurement (M mode).
	Not Display	The LV Mass data is not displayed in the measurement display window or on the Report screen.

2.2.16 Carotid1 Meas. Tool

This menu is used to preset the default measurement method to be started when the Area measurement switch or Velocity Trace measurement switch is pressed in the Carotid1 menu of Vascular measurement mode.



Title	Item	Description
Area[*1]	Ellipse	The area is measured using the Ellipse method.
	Continuous Trace	The area is measured using the Continuous Trace method.
	Spline Trace	The area is measured using the Spline trace method.
	Cross	The area is measured using the Cross method.
Velocity Trace[*2]	Continuous	The velocity is measured using the Continuous method.
	Spline	The velocity is measured using the Spline method.
	Range	The velocity is measured using the Range method with the range specified.
	Auto Range	The velocity is measured using the Auto Range method without specifying the range.

*1: "Ellipse" is selected at the factory before shipment.

*2: "Auto Range" is selected at the factory before shipment.

2.2.17 Carotid1 Doppler

This menu is used to preset the items for which results are to be displayed when Velocity Trace measurement is started from the Carotid1 menu of Vascular measurement mode.

Title		Item	Description
Display type of Velocity[*1]		Velocity	The velocity (cm/s) is displayed as the measurement result.
		Frequency	The frequency (kHz) is displayed as the measurement result.
Display items of Velocity Trace[*2]		Vmax [Fmax] Vmin [Fmin] Ved [Fed] Vmean [Fmean] PI RI S/D	Specify the items to be displayed as the results of Velocity Trace measurement. The settings for Vmax [Fmax], Vmin [Fmin], Ved [Fed], and Vmean [Fmean] are fixed to ☑ . ☑ : The item is displayed. ☐ : The item is not displayed.
RI calc. method[*3]		Ved	RI is calculated based on Ved.
		Vmin	RI is calculated based on Vmin.
PI calc. method[*4]		Ved	PI is calculated based on Ved.
		Vmin	PI is calculated based on Vmin.
Combinations of ICA/CCA	CCA	Prox Mid Dist ALL[*5]	Specify one of the CCA measurement regions for calculating ICA/CCA.
	ICA	Prox Mid Dist	Specify any number of the ICA measurement regions for calculating ICA/CCA.

*1: [Velocity] is selected as the default.

*2: All the items are set to ☑ (to be displayed) as the default.

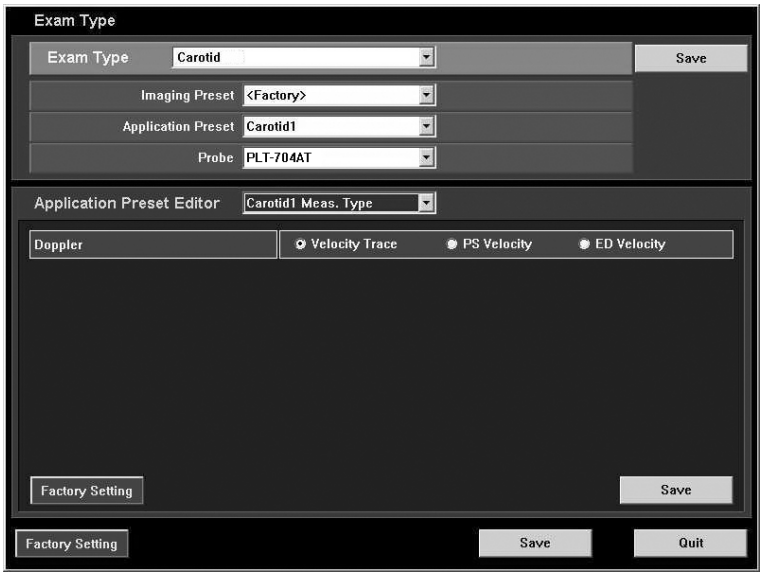
*3: [Ved] is selected as the default.

*4: [Vmin] is selected as the default.

*5: When "ALL" is selected, setting for ICA is not necessary. Combinations of "Prox-Prox", "Mid-Mid", and "Dist-Dist" are set automatically.

2.2.18 Carotid1 Meas. Type

This menu is used to preset the default measurement method when Doppler measurement is started from the Carotid1 menu of Vascular measurement.

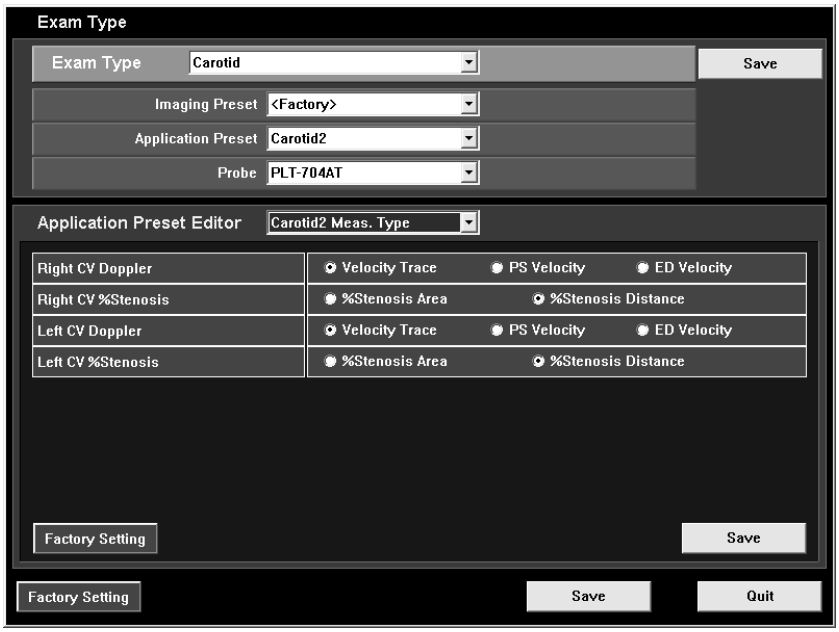


Title	Item	Description
Doppler*	Velocity Trace	Tracing is performed in the Velocity Trace mode.
	PS Velocity	The peak systolic velocity is measured in Velocity measurement mode.
	ED Velocity	The end-diastolic velocity is measured in Velocity measurement mode.

* "Velocity Trace" is selected as the default.

2.2.19 Carotid2 Meas. Type

This menu is used to preset the default measurement method to be started when the Doppler measurement switch or %Stenosis measurement switch is pressed in the Carotid2 menu of Vascular measurement mode.

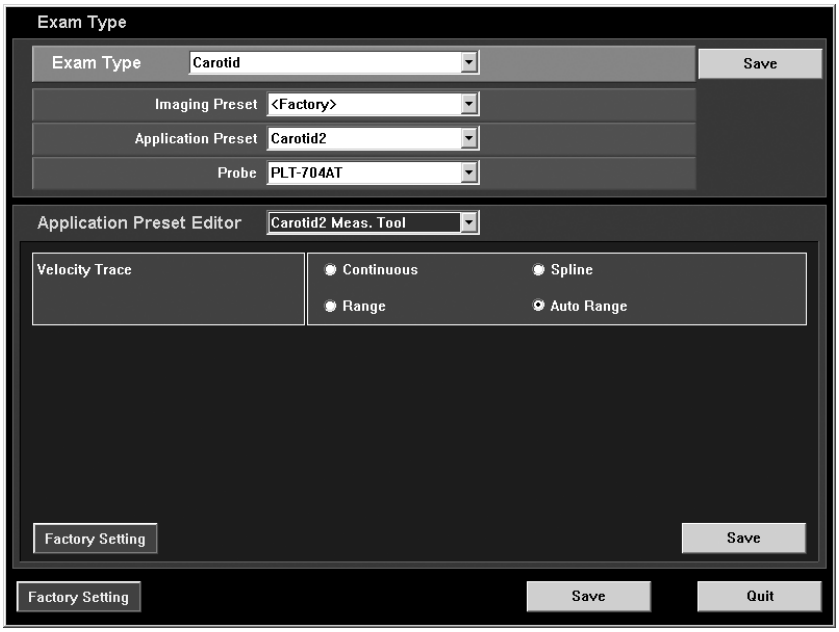


Title	Item	Description
Right CV Doppler*1	Velocity Trace	The velocity is traced using the Velocity Trace method.
	PS Velocity	The peak systolic velocity is measured using the Velocity measurement method.
	ED Velocity	The end diastolic velocity is measured using the Velocity measurement method.
Right CV %Stenosis*2	%Stenosis Area	The stenosis ratio is calculated using the %Stenosis Area method.
	%Stenosis Distance	The stenosis ratio is calculated using the %Stenosis Distance method.
Left CV Doppler*3	Velocity Trace	The velocity is traced using the Velocity Trace method.
	PS Velocity	The peak systolic velocity is measured using the Velocity measurement method.
	ED Velocity	The end diastolic velocity is measured using the Velocity measurement method.
Left CV %Stenosis*4	%Stenosis Area	The stenosis ratio is calculated using the %Stenosis Area method.
	%Stenosis Distance	The stenosis ratio is calculated using the %Stenosis Distance method.

*1: "Velocity Trace" is selected at the factory before shipment.
*2: "%Stenosis Distance" is selected at the factory before shipment.
*3: "Velocity Trace" is selected at the factory before shipment.
*4: "%Stenosis Distance" is selected at the factory before shipment.

2.2.20 Carotid2 Meas. Tool

This menu is used to preset the default measurement method to be started when the Velocity Trace measurement switch is pressed in the Carotid2 menu of Vascular measurement mode.

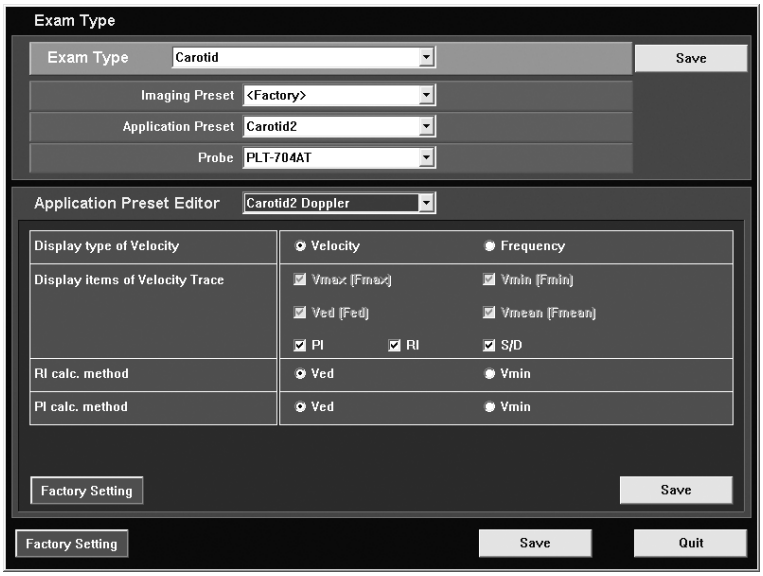


Title	Item	Description
Velocity Trace*1	Continuous	The area is measured using the Continuous method.
	Spline	The velocity is measured using the Spline method.
	Range	The velocity is measured using the Range method with the range specified.
	Auto Range	The velocity is measured using the Auto Range method without specifying the range.

*1: "Auto Range" is selected at the factory before shipment.

2.2.21 Carotid2 Doppler

This menu is used to preset the items for which results are to be displayed when Velocity Trace measurement is started from the Carotid2 menu of Vascular measurement mode.



Title	Item	Description
Display type of Velocity*1	Velocity	The velocity (cm/s) is displayed as the measurement result.
	Frequency	The frequency (kHz) is displayed as the measurement result.
Display items of Velocity Trace*2	Vmax [Fmax] Vmin [Fmin] Ved [Fed] Vmean [Fmean] PI RI S/D	Specify the items to be displayed as the results of Velocity Trace measurement. The settings for Vmax [Fmax], Vmin [Fmin], Ved [Fed], and Vmean [Fmean] are fixed to ☑. ☑ : The item is displayed. ☐ : The item is not displayed.
RI calc. method*3	Ved	RI is calculated based on Ved.
	Vmin	RI is calculated based on Vmin.
PI calc. method*4	Ved	PI is calculated based on Ved.
	Vmin	PI is calculated based on Vmin.

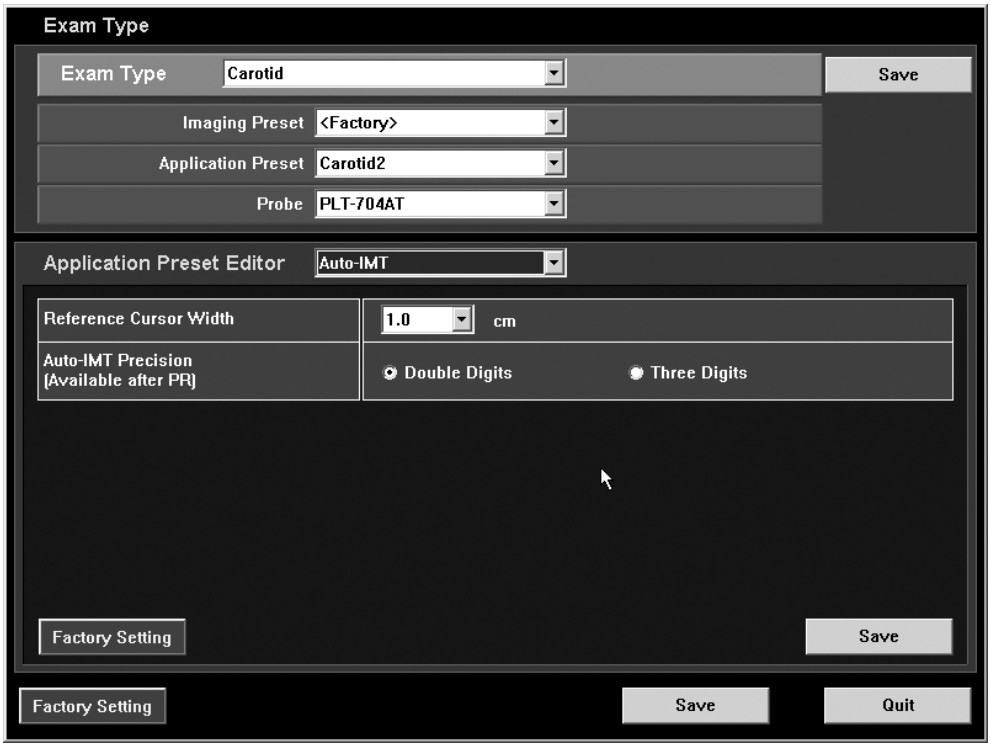
*1: [Velocity] is selected as the default.

*2: All the items are set to ☑ (to be displayed) as the default.

*3: [Ved] is selected as the default.

*4: [Ved] is selected as the default.

2.2.22 Auto-IMT



Title	Method	Description
Reference Cursor Width	0.5, 1.0, 1.5, 2.0	Selects the distance (cm) between two 2D Reference cursor bars.
Auto IMT Precision[*1]	Double digits, Three digits	Displays the Auto-IMT measurement result to 2 decimal places.[*1] Displays the Auto-IMT measurement result to 3 decimal places.[*2]

*1: Depending on the characteristics of the image, it may not be possible to obtain an accurate value within 1/100.

Keeping the above point in mind, use the measurement value displayed only for reference purposes.

*2: Depending on the characteristics of the image, it may not be possible to obtain an accurate value within 1/1000.

Keeping the above point in mind, use the measurement value displayed only for reference purposes.

2.2.23 OB Meas.

Title	Item	Description
Method of OB weeks	Mean of GA	The mean of the GA measurement results is used to calculate LMP and EDD.
	Current GA	The most recent GA measurement result is used to calculate LMP and EDD.
	U/S GA	U/S GA is used to calculate LMP and EDD.
Select Tool to use for OB Circumference Measurements	Ellipse	Select the tool for the area/circumference measurement (HC, HA, AC, FTA, AA, or TC measurement).
	Continuous Trace	
	Cross	
	Spline Trace	
Select Tool to use for OB Vel Trace Measurements	Continuous	Select the tool for the Vel Trace measurement (UmbA, MCA, Fetal Ao, Lt Uterin, or Rt Uterin measurement).
	Spline	
	Line	
	Range	
	Auto Range	
RI calc. method for OB	Ved	The Ved value for the measured item is used for RI calculation.
	Vmin	The Vmin value for the measured item is used for RI calculation.
PI calc. method for OB	Ved	The Ved value for the measured item is used for PI calculation.
	Vmin	The Vmin value for the measured item is used for PI calculation.
NT Tool (Available after PR)	Distance	Distance measurement is used for NT measurement.
	Thickness	Thickness (IMT) measurement is used for NT measurement.*1

*1: When "Thickness" is selected, it is possible to select either one or two decimal places by setting "Thickness (IMT) Precision (Available after PR)" as described in subsection 2.2.3.

2.2.24 OB Meas.2

Title	Item	Description
Method for AFI	4 Distances	AFI is displayed only after all the four distances are measured.
	< 4 Distances	AFI is displayed even before all the four distances are measured.
SD Display	On/Off	Specify whether or not the SD value is displayed in the OB measurement display window.
SD Display type	X. XXSD/%tile	The SD value is displayed as X.XXSD or XX%tile.
	±XwXd/±mm	The SD value is displayed as XwXd or ±X.Xmm.
AFI Tool [Available after PR]	Distance Circle	Select the type of measurement to be used for AFI measurement.
Circle Tool [Available after PR]	Balloon BothEnds	Select the method for Circle measurement.
GA Calculated by	Only GA Chart	If the data type is set to "GA" or "FG + GA", the GA value is calculated based on the GA data regardless of whether or not the clinical age is input. If the data type is set to "FG", the GA value is not calculated before the clinical age is input. Once the clinical age has been input, the GA value is calculated based on the FG data. If the data type is set to "Identical", the GA value is calculated based on the Identical data regardless of whether or not the clinical age is input. The trend graph is generated based on the FG data.

Title	Item	Description
GA Calculated by	FG Chart with Clinical Age	If the data type is set to "FG", the GA value is not calculated before the clinical age is input. Once the clinical age has been input, the GA value is calculated based on the FG data. If the data type is set to "GA", the GA value is calculated based on the GA data before the clinical age is input. When the clinical age has been input, the GA value is not calculated. If the data type is set to "FG + GA", the GA value is calculated based on the GA data before the clinical age is input. Once the clinical age has been input, the GA value is calculated based on the FG data. If the data type is set to "Identical", the GA value is calculated based on the Identical data regardless of whether or not the clinical age is input. The trend graph is generated based on the FG data.
Measurement TCS Display by Freeze	On, Off	Select whether or not the measurement TCS is to be displayed and the Auto EFW function is to be enabled at Freeze ON.
GA Display on Banner	On, Off	Select whether or not the GA is to be displayed on the banner.

NOTE: 1. Refer to the table on the next page for the calculation items and authors for which X.XXSD/%tile can be set.

2. It is possible to refer to the details of the two options for "GA Calculated by". Contact your Toshiba service representative for further information. Refer to subsection 12.3 "Author Data" for details concerning the data types and the GA calculation.

The table below shows details of the items for which X.XXSD/%tile can be set.

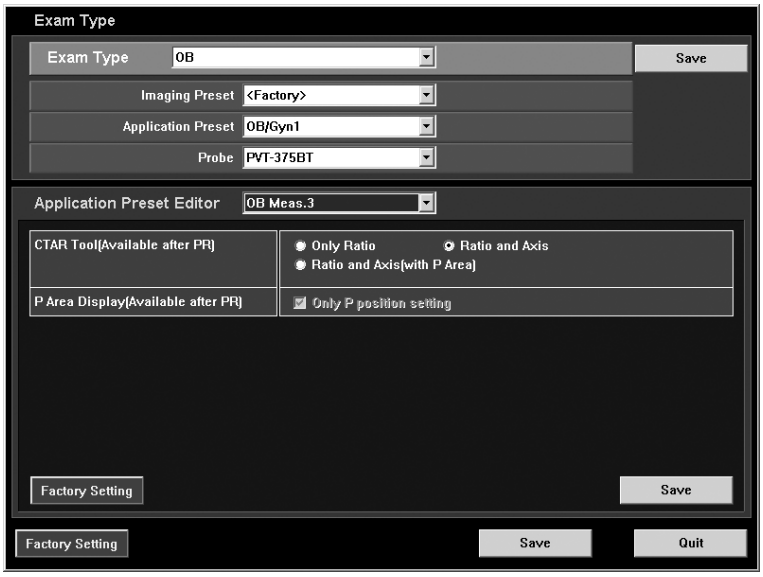
Item	Formal nomenclature	Author	SD Display type
BPD	Biparietal Diameter	CFEF	%tile
		Chitty (O-O)	%tile
		Chitty (O-I)	%tile
		Hadlock	%tile
		JSUM	X.XXSD
		Osaka[*1]	X.XXSD
		Tokyo	X.XXSD
OFD	Occipitofrontal Diameter	Chitty	%tile
HC	Head Circumference	CFEF	%tile
		Chitty (Pltd)	%tile
		Chitty (drvd)	%tile
		Hadlock	%tile
HA	Head Area	Chitty	%tile
AC	Abdominal Circumference	CFEF	%tile
		Chitty (pltd)	%tile
		Chitty (drvd)	%tile
		Hadlock	%tile
		JSUM	X.XXSD
		Tokyo	X.XXSD
FTA	Fetal Trunk Coss-Sectional Area	Osaka[*1]	X.XXSD
AA	Abdominal Area	Chitty	%tile

Item	Formal nomenclature	Author	SD Display type
TAD	Transverse Abdominal Diameter	CFEF	%tile
FL	Femur Length	CFEF	%tile
		Chitty	%tile
		Hadlock	%tile
		JSUM	X.XXSD
		Osaka[*1]	X.XXSD
		Tokyo	X.XXSD
Humerus	Humerus	Chitty[*2]	%tile
Radius	Radius	Chitty[*2]	%tile
Ulna	Ulna	Chitty[*2]	%tile
Tibia	Tibia	Chitty[*2]	%tile
Fibula	Fibula	Chitty[*2]	%tile
Foot	Foot Length	Chitty[*2]	%tile
Va	Cerebral Anterior Ventricle diameter	Nicolaides[*2]	%tile
Vp	Cerebral Posterior Ventricle diameter	Nicolaides[*2]	%tile
Hem	Cerebral Hemisphere	Nicolaides[*2]	%tile
Va/Hem	Va/Hem	Nicolaides[*2]	%tile
Vp/Hem	Vp/Hem	Nicolaides[*2]	%tile
AXT	APTD*TTD	Tokyo	X.XXSD
EFW	Estimated Fetal Weight	JSUM [BPD, AC, FL]	X.XXSD
		Tokyo [BPD, APTD, TTD, FL]	X.XXSD

*1: The SD value is represented as X.XXSD regardless of the setting for "SD Display type".

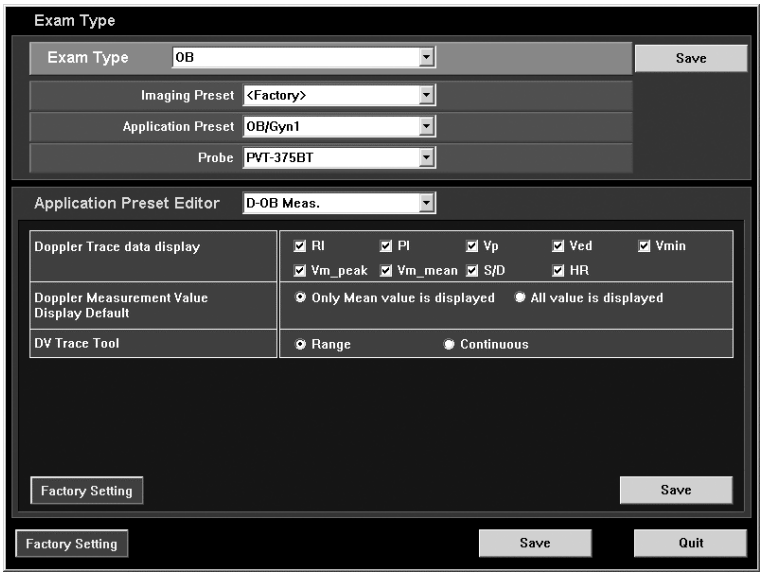
*2: The SD value is represented as a percentile regardless of the setting for "SD Display type".

2.2.25 OB Meas.3



Title	Item	Description
CTAR Tool (Available after PR)	Only Ratio	CTAR (cardiothoracic area ratio) is displayed in CTAR measurement mode.
	Ratio and Axis	CTAR (cardiothoracic area ratio) and the cardiac axis are displayed in CTAR measurement mode.
	Ratio and Axis (with P Area)	CTAR (cardiothoracic area ratio), the cardiac axis, and the normal range for the P point are displayed in CTAR measurement mode.
P Area Display (Available after PR)	Only P position setting	Select how long the normal range for P point setting is displayed. ☑ : Displayed only during setting of the P point. ☐ : Kept displayed even after the P point is set.

2.2.26 D-OB Meas.

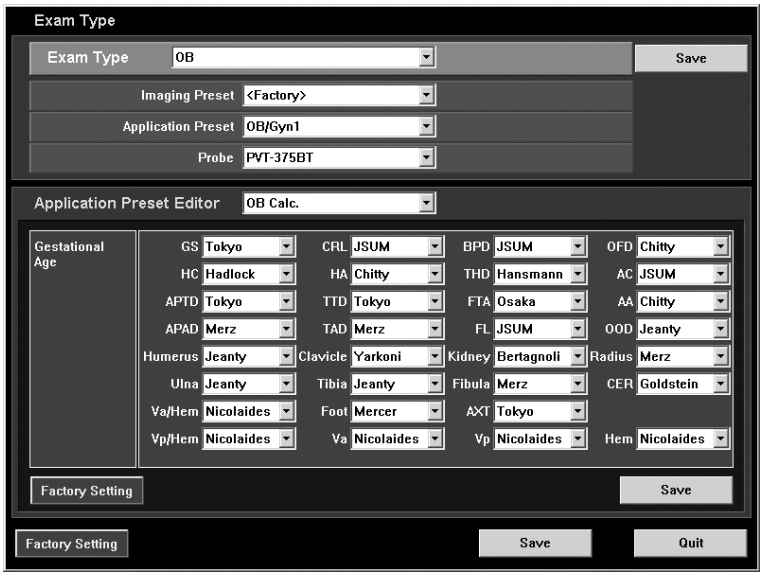


Title	Item	Description
Doppler Trace data display	RI PI Vp Ved Vmin Vm_peak Vm_mean S/D HR[*1]	Select the items to be displayed on the measurement value display area and on the Report screen. ☑ : Displayed ☐ : Not displayed
Doppler Measurement Value Display Default	Only Mean value is displayed	The measurement results are not displayed when the Doppler Report screen is started up.
	All value is displayed	All the measurement results are displayed when the Doppler Report screen is started up.
DV Trace Tool	Range Continuous	Select the tool to be used for DV measurement.

*1: Note that the HR value is not displayed for "Lt Uterin" and "Rt Uterin" even when "HR" is selected.

2.2.27 OB Calc.

For the OB measurement items for which two or more authors are registered, the author to be used can be selected from a pull-down menu.



Gestational Age : Specify the author of the formula to be used for calculating the gestational age. The specified author is also used as the default for generating the trend graph.

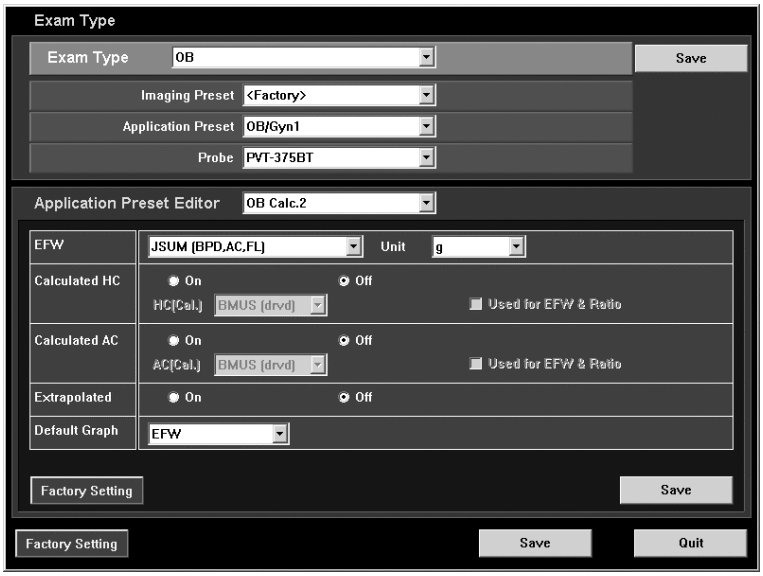
Title	Item	Formal nomenclature	Author
Gestational Age	GS	Gestational sac diameter	Hellman Rempen Tokyo
	CRL	Crown-rump length	ASUM-V1 ASUM-V2 BMUS Hadlock Hansmann JSUM Jeanty Nelson Osaka Rempen Robinson Tokyo
	BPD	Biparietal diameter	ASUM-V1 ASUM-V2 CFEF Chitty (0-0) Chitty (0-I) Hadlock[*1] Hansmann JSUM Jeanty Kurtz Merz Nicolaides Osaka[*1] Rempen Sabbagh Shepard Tokyo
	OFD	Occipitofrontal diameter	ASUM-V2 Chitty Hansmann Merz Nicolaides
	HC	Head circumference	ASUM-V1 ASUM-V2 CFEF Chitty (pltd) Chitty (drvd) Hadlock[*1] Hansmann Jeanty Merz
	HA	Head area	Chitty
	THD	Thoracic diameter	Hansmann

Title	Item	Formal nomenclature	Author
Gestational Age	AC	Abdominal circumference	ASUM-V1 ASUM-V2 CFEF Campbell Chitty (pltd) Chitty (drvd) Deter Hadlock[*1] JSUM Jeanty Merz Nicolaides Shepard Tokyo
	APTD	Anteroposterior trunk diameter	Tokyo
	TTD	Transverse trunk diameter	Tokyo
	FTA	Fetal trunk cross-sectional area	Osaka[*1]
	AA	Abdominal area	Chitty
	APAD	Anteroposterior abdominal diameter	Merz
	TAD	Transverse abdominal diameter	Merz CFEF
	FL	Femur length	ASUM-V1 ASUM-V2 CFEF Chitty Hadlock[*1] Hansmann Hohler JSUM Jeanty Merz Nicolaides O'Brien Osaka[*1] Tokyo Warda
	OOD	Outer orbital diameter	Jeanty Mayden
	Humerus	Humerus	ASUM-V2 Chitty Jeanty Merz
	Clavicle	Clavicle length	Yarkoni
	Kidney	Kidney length	Bertagnoli
	Radius	Radius	Chitty Merz

Title	Item	Formal nomenclature	Author
Gestational Age	Ulna	Ulna	Chitty Jeanty Merz
	Tibia	Tibia	Chitty Jeanty Merz
	Fibula	Fibula	Chitty Merz
	CER	Cerebellum	Goldstein Hill Nicolaides
	Foot	Foot length	Chitty Mercer
	Va	Cerebral anterior ventricle diameter	Nicolaides
	Vp	Cerebral posterior ventricle diameter	Nicolaides
	Hem	Cerebral hemisphere	Nicolaides
	Va/Hem	Va/Hem	Nicolaides
	Vp/Hem	Vp/Hem	Nicolaides
	AXT	APTD*TTD	Tokyo Tokyo-SD

*1: When the check box for "Extrapolated On" in the OB Calc. menu is selected, the age axis of the trend graph is extended up to 42.

2.2.28 OB Calc.2



Title	Item	Description
EFW	Campbell [AC] Hadlock1 [AC, FL][*1] Hadlock2 [BPD, AC, FL][*1] Hadlock3 [HC, AC, FL][*1] Hadlock4 [BPD, HC, AC, FL][*1] Hansman [BPD, THD] Merz1 [BPD, AC] Merz2 [AC] JSUM [BPD, AC, FL][*1] [*2] Shepard [BPD, AC] Tokyo [BPD, APTD, TTD, FL][*2] Osaka [BPD, FTA, FL][*1]	Select the author for calculating the estimated fetal weight.
Unit	g, lbs	Select the unit for the estimated fetal weight.
Calculated HC	On, Off	When On is selected, head circumference (HC) is calculated based on BPD and OFD. The calculated result is indicated as HC (Cal.) and displayed separately from the measured HC.
HC (Cal.)	ASUM, BMUS, Chitty, Hadlock, Jeanty, Merz, Nicolaides, Hansmann	Select the author of the formula to be used for calculating HC.
	Used for EFW & Ratio	Select this check box to use the HC (Cal.) result for calculating EFW and ratio. ☑ : Used ☐ : Not used

Title	Item	Description
Calculated AC	On, Off	When On is selected, abdominal circumference (AC) is calculated based on APAD and TAD. The calculated result is indicated as AC (Cal.) and displayed separately from the measured AC.
AC (Cal.)	BMUS, Chitty, Hadlock, Jeanty, Merz, Nicolaides	Select the author of the formula to be used for calculating AC.
	Used for EFW & Ratio	Select this check box to use the AC (Cal.) result for calculating EFW and ratio. ☑ : Used ☐ : Not used
Extrapolated	On, Off	When On is selected, the range for which EFW is displayed is expanded. The age axis of the trend graph is extended up to 42[*1].

The HC (Cal.) and AC (Cal.) results are displayed separately from the measured HC and AC results.

When "Used for EFW & Ratio" for HC (Cal.) or AC (Cal.) is selected, EFW or Ratio is not calculated if HC (Cal.) or AC (Cal.) result is not available, even if measured HC or AC result is available.

When "Used for EFW & Ratio" for HC (Cal.) or AC (Cal.) is not selected, EFW or Ratio is not calculated if HC or AC result is not available, even if HC (Cal.) or AC (Cal.) result is available.

When "Used for EFW & Ratio" is selected for HC (Cal.), CI is calculated based on BPD and OFD.

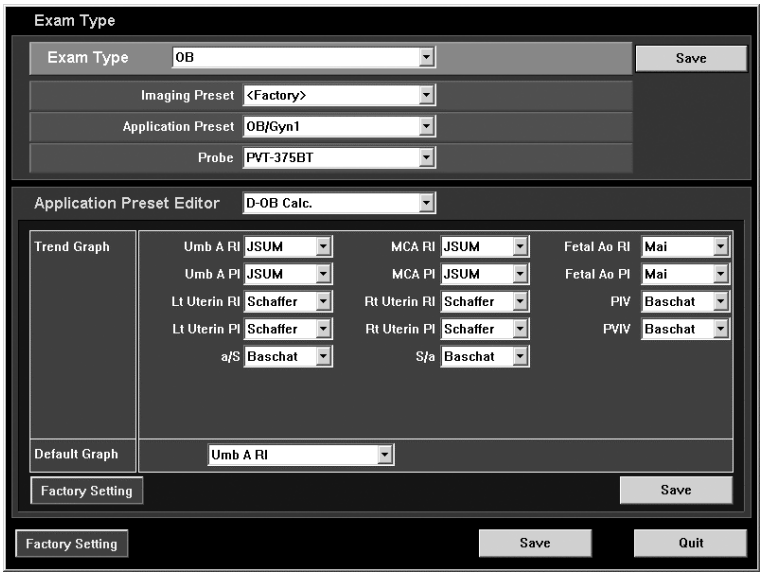
Title	Item	Description
Default Graph	AA AC APAD AXT BPD CER CRL Clavicle EFW FL FTA Fibula Foot GS HA HC HC (BPD, OFD) Humerus Kidney OFD Radius TAD THD Tibia Ulna	Select the items to be displayed by default when the trend graph is generated.

*1: When the check box for "Extrapolated On" in the OB Calc. menu is selected, the age axis of the trend graph is extended up to 42.

*2: When SD Display type is set to X.XXSD/%tile, the SD value is displayed as X.XXSD.

2.2.29 D-OB Calc.

This menu is used to specify the default author data to be displayed on the trend graph for Doppler OB measurement.



Trend Graph : Specify the author to be displayed as the default for trend graph creation.

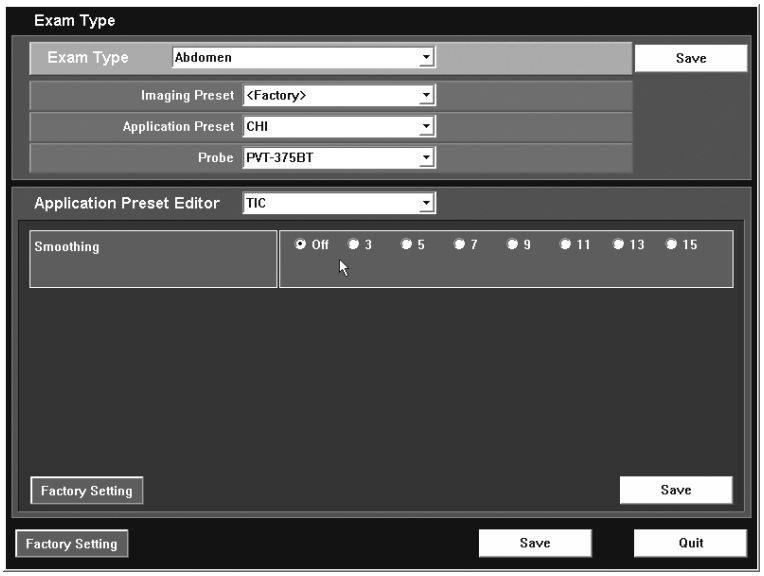
Default Graph : Specify the item to be displayed as the default for trend graph creation.

Title	Item	Formal nomenclature	Author
Trend Graph	Umb A RI	Umbilical artery RI	Mai JSUM[*1] Schaffer
	Umb A PI	Umbilical artery PI	Mai Harrington JSUM[*1] Schaffer
	MCA RI	Middle cerebral artery RI	Mai JSUM[*1] Schaffer
	MCA PI	Middle cerebral artery PI	Mai Harrington JSUM[*1] Schaffer

Title	Item	Formal nomenclature	Author
Trend Graph	Fetal Ao RI	Fetal aorta RI	Mai Schaffer
	Fetal Ao PI	Fetal aorta PI	Mai Harrington Schaffer
	Lt Uterin RI	Left uterine artery RI	Schaffer
	Lt Uterin PI	Left uterine artery PI	Schaffer
	Rt Uterin RI	Right uterine artery RI	Schaffer
	Rt Uterin PI	Right uterine artery PI	Schaffer
	PIV	Ductus Venosus Pulsatility Index	Baschat
	PVIV	Ductus Venosus Peak Velocity Index	Baschat
	a/S	Ductus Venosus Preload Index	Baschat
	S/a	Ductus Venosus S/a Ratio	Baschat
Default Graph	Default Graph	Measurement items of the default graph	Fetal Ao RI Fetal Ao PI Lt Uterin RI Lt Uterin PI MCA RI MCA PI PIV PVIV Rt Uterin RI Rt Uterin PI S/a Umb A RI Umb A PI a/S

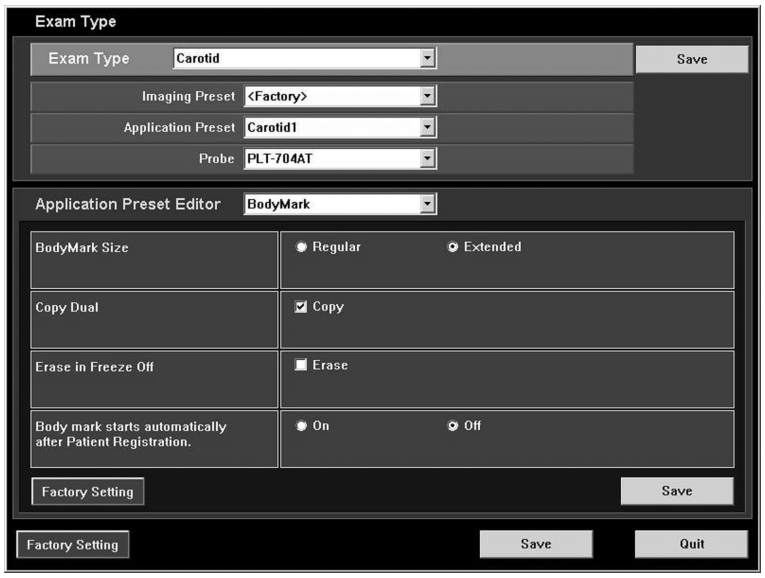
*1: When the check box for "Extrapolated on" in the OB Calc. menu is selected, the age axis of the trend graph is extended up to 42.

2.2.30 TIC



Title	Item	Description
Smoothing	Off, 3, 5, 7, 9, 11, 13, 15	Specify the smoothing of the graph line. Off : Smoothing is not performed. 3 to 15 : Smoothing is performed based on the specified number of points.

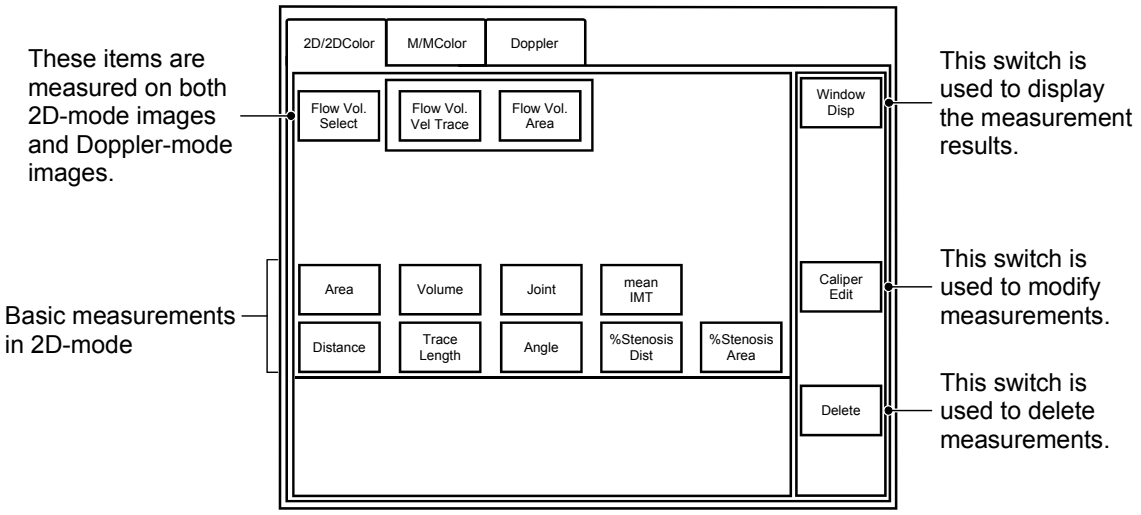
2.2.31 Body Mark



Title	Item	Description
BodyMark Size	Regular	Regular size
	Extended	1.5-times as large as the regular size
Copy Dual	Copy	Select whether or not the body mark remains displayed when another image mode is selected. ☑ : Displayed ☐ : Not displayed
Erase in Freeze Off	Erase	Specify whether the body mark is erased or not when the image is unfrozen. ☑ : The body mark is erased. ☐ : The body mark is not erased.
Body mark starts automatically after Patient Registration.	On	Body Mark mode is started automatically when a patient is registered and examination is started.
	Off	Body Mark mode is not started automatically when a patient is registered and examination is started.

3. 2D-Mode Measurements

<<2D-mode basic measurement menu>>



When one of the following switches is pressed in 2D mode, the 2D-mode basic measurement menu is displayed on the touch panel.

Switch	Function
CALIPER or CALIPER	Starts distance measurement. Distance measurement can be performed immediately.
TRACE	Starts area measurement (Continuous Trace). Area measurement (Continuous Trace) can be performed immediately.

To perform D-mode basic measurements other than the above, press the switch for the desired measurement item in the menu. The marker for the selected measurement item is displayed on the monitor.

The measurement to be started can be changed when CALIPER, CALIPER, TRACE, or CALC is pressed.

In this section, however, it is assumed that the above settings are active.

3.1 Distance Measurement (Distance)

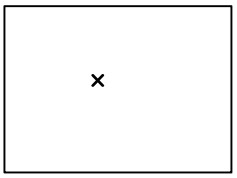
The straight-line distance between two points is measured by setting the start and end points on the 2D-mode image.

Distance: Dist A 999.9 (mm)

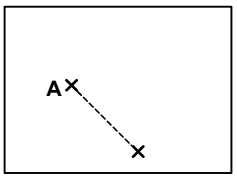
<<Measurement procedure>>

(1) Press CALIPER or CALIPER. The start point marker appears.

(2) Use the trackball to move the marker to the measurement start point. Press SET.

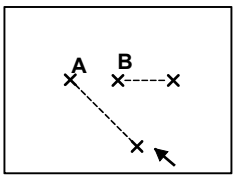


(3) Use the trackball to move the marker to the measurement end point.
Press SET. The channel identification mark "A" appears and the measurement result is displayed

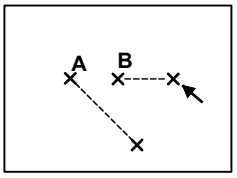


<<Modifying a measurement>>

(1) Press [Caliper Edit] on the touch panel.
An arrow is displayed.

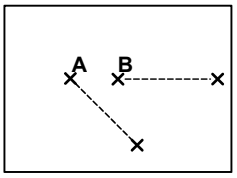


(2) Move the arrow near the marker to be moved. The marker color changes to red.



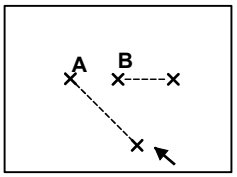
(3) Press SET.

(4) Move the marker to the desired position and press SET.

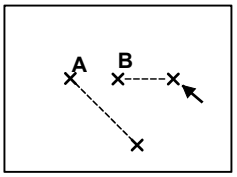


<<Deleting a measurement>>

(1) Press [Caliper Edit] on the touch panel.
An arrow is displayed.



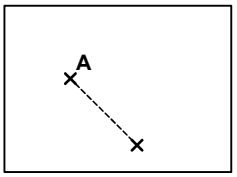
(2) Move the arrow near the marker for the measurement to be deleted.
The marker color changes to red.



(3) Press 

.

(4) Press [Delete] on the touch panel.
The measurement associated with the selected marker is deleted.



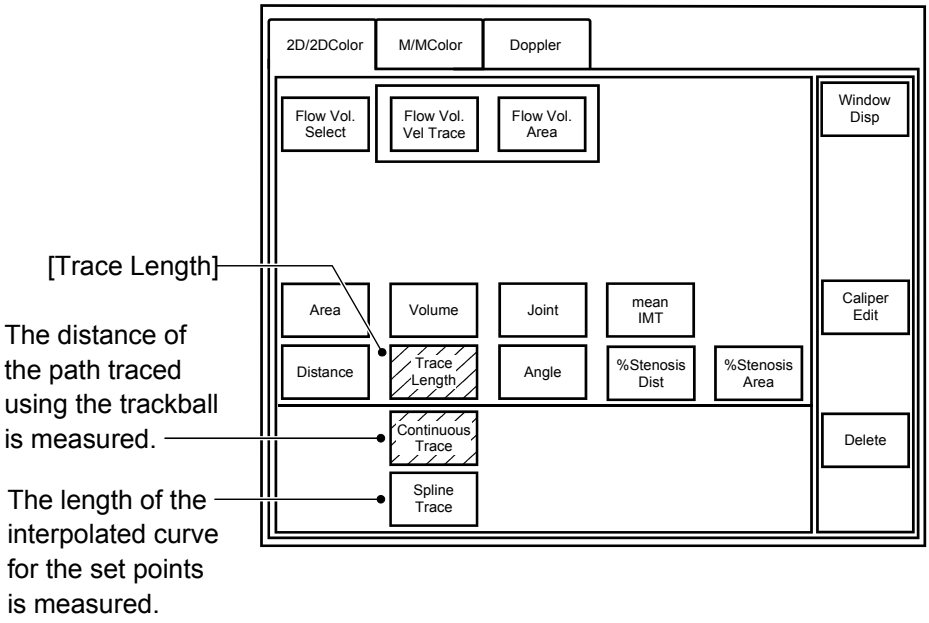
3.2 Curved Line Distance Measurement (Trace Length)

The length of a curved line is measured by tracing along the curved line.

Select [Trace Length] on the touch panel. [Continuous Trace] and [Spline Trace] are displayed on the touch panel.

The default is "Continuous Trace". To select "Spline Trace", press the corresponding switch on the touch panel.

<<Menu display on the touch panel>>



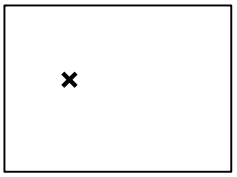
3.2.1 Continuous Trace

Distance: Dist A 999.9 (mm)

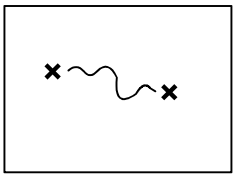
<<Measurement procedure>>

(1) Press [Trace Length] on the touch panel. The marker is displayed.

(2) Move the marker to the measurement start point and press SET.



(3) Move the marker gradually along the circumference of the target object using the trackball.

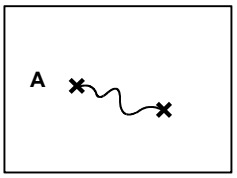


<<To correct the trace during tracing>>

Delete the trace using the MEAS EDIT dial and draw the trace again using the trackball.

The trace is deleted. MEAS EDIT The deleted portion of the trace is restored.

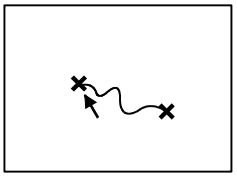
(4) Press SET to fix the measurement data.



<<Modifying a measurement>>

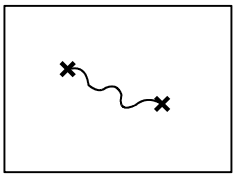
(1) Press [Caliper Edit] on the touch panel.
An arrow is displayed.

(2) Move the arrow near the marker to be moved.
The marker color changes to red.



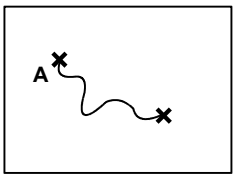
(3) Press SET.

(4) Undo the trace by rotating the MEAS EDIT dial counterclockwise. If the trace is deleted more than desired, rotate the MEAS EDIT dial clockwise to restore the deleted portion.



The trace is deleted. ↓ ↓ The deleted portion of the trace is restored.
MEAS EDIT

(5) Draw the trace again by moving the marker with the trackball.

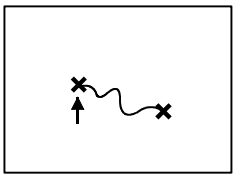


(6) Press SET to fix the measurement data.

<<Deleting a measurement>>

(1) Press [Caliper Edit] on the touch panel.
An arrow is displayed.

(2) Move the arrow near the start or end point.
The marker color changes to red.



(3) Press SET.

(4) Press [Delete] on the touch panel.

The measurement associated with the selected marker is deleted.

3.2.2 Spline Trace

Distance: Dist A 999.9 (mm)

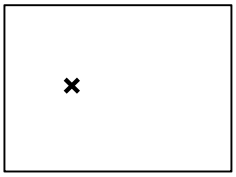
<<Measurement procedure>>

(1) Press [Trace Length] on the touch panel.

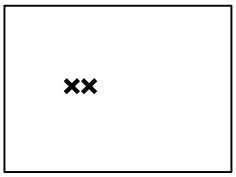
(2) Press [Spline Trace] on the touch panel.
The marker for the first point is displayed.

(3) Move the marker to the measurement start point and press 

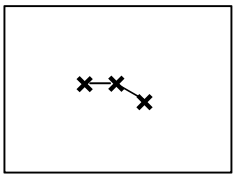
. The first point is set.



(4) Move the trackball. The marker for the second point appears.



(5) Set the second point. When the marker is moved, a line connecting the first and second points is displayed.

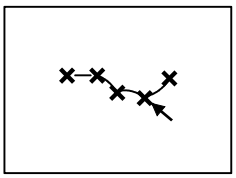


(6) Set the third and subsequent points.

<<To correct the trace during tracing>>
Undo the trace using the MEAS EDIT dial and draw the trace again using the trackball.

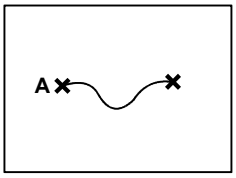
The trace is deleted. 

The deleted portion of the trace is restored.



(7) When 

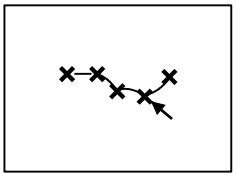
is pressed twice at the same point, the measurement data is fixed.



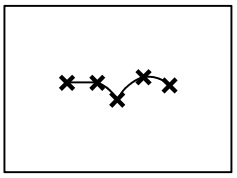
<<Modifying a measurement>>

(1) Press [Caliper Edit] on the touch panel.
An arrow is displayed.

(2) Move the arrow near the set point to be moved.
The marker color changes to red. Press SET.



(3) Move the selected marker to the desired position and press SET. The measurement data is fixed.

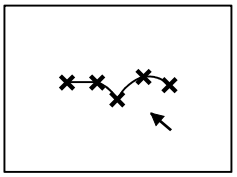


(4) To change the position of another marker, repeat steps (1) to (3).

<<Deleting a measurement>>

(1) Press [Caliper Edit] on the touch panel.
An arrow is displayed.

(2) Move the arrow near any of the set markers. Press SET to select the marker.



(3) Press [Delete] on the touch panel.
The measurement associated with the selected marker is deleted.

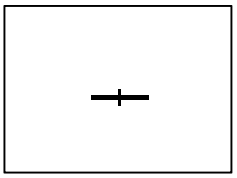
3.3 Angle Measurement (Angle)

The angle between two straight lines is measured. Both the acute and obtuse angles are displayed.

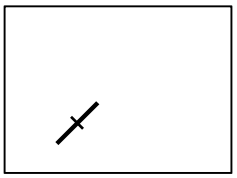
Obtuse angle :	Angle1 A	999 (deg)
Acute angle :	Angle2 A	99 (deg)

<<Measurement procedure>>

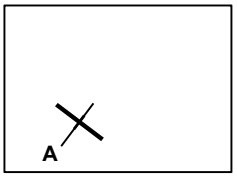
(1) Press [Angle] on the touch panel. The first marker is displayed.



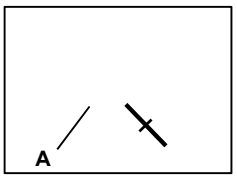
(2) Move the marker to the measurement point.
Rotate the marker using the MEAS EDIT dial.



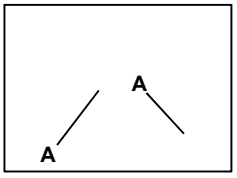
(3) Press SET to set the first marker.
A second marker perpendicular to the first marker is displayed.



(4) Move the marker to the measurement point.
Rotate the marker using the MEAS EDIT dial.



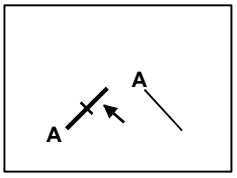
(5) Press SET to fix the measurement data.
The measurement result is displayed.



<<Modifying a measurement>>

(1) Press [Caliper Edit] on the touch panel.
An arrow is displayed.

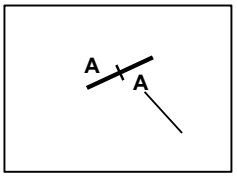
(2) Move the arrow near the marker to be modified.
The marker color changes to red.



(3) Press 

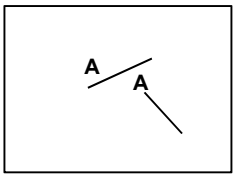
.

(4) Change the marker position and angle using the trackball and MEAS EDIT dial.



(5) Press 

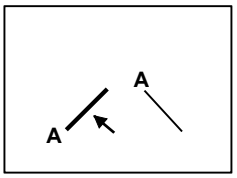
. The measurement data is fixed.



<<Deleting a measurement>>

(1) Press [Caliper Edit] on the touch panel.
An arrow is displayed.

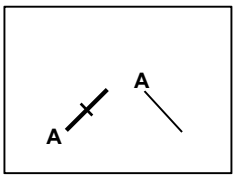
(2) Move the arrow near the marker to be deleted. The marker color changes to red.



(3) Press 

to select the marker.

(4) Press [Delete] on the touch panel.
The measurement associated with the selected marker is deleted.



3.4 Area/Circumference Measurement (Area)

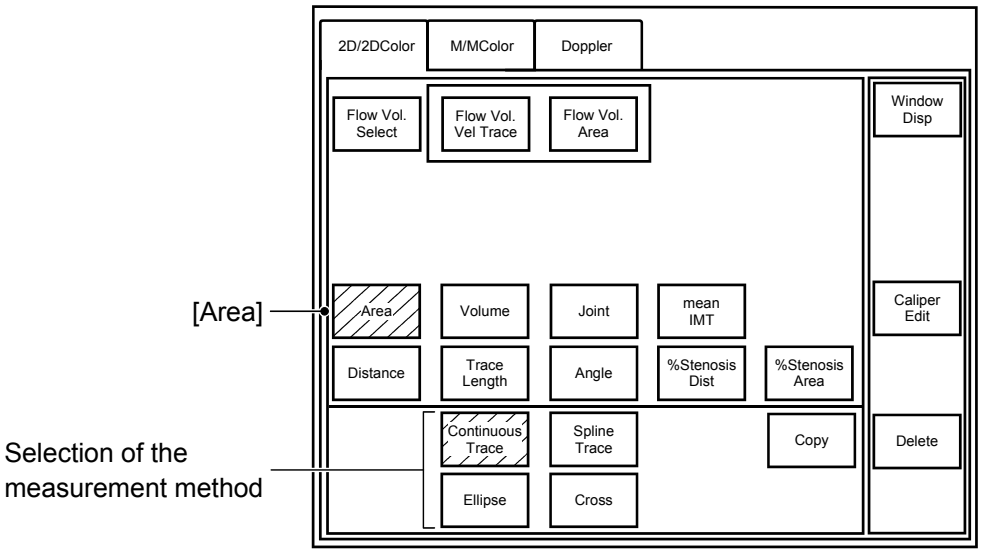
The area and circumference of a region are measured in 2D mode. The following four measurement methods are available for [Area] measurement.

Touch panel switch	Area measurement method
Continuous Trace	The path traced by operating the trackball along the circumference of the target object is used to calculate the approximate area/circumference.
Spline Trace	The interpolated curve for the set points is used to calculate the approximate area/circumference.
Ellipse	The elliptical approximation is used to calculate the approximate area/circumference.
Cross	Arcs are used to calculate the approximate area/circumference.

When 

is pressed, Continuous Trace is started as the default. To use another measurement method, press the corresponding switch on the touch panel.

<<Menu display on the touch panel>>

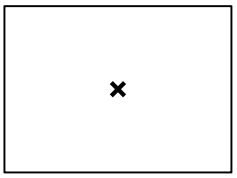


3.4.1 Continuous Trace

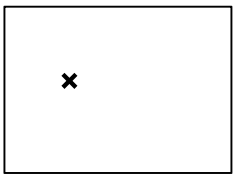
Area: Area A 999.99 (cm^2)	Circumference: Circ A 999.9 (mm)

<<Measurement procedure>>

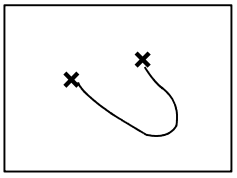
(1) Press TRACE. The marker is displayed.



(2) Move the marker to the measurement start point and press SET.



(3) Move the marker along the circumference of the target object using the trackball.



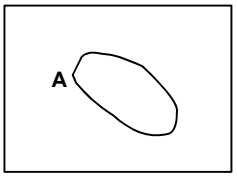
<<To correct the trace during tracing>>

Delete the trace using the MEAS EDIT dial and draw the trace again using the trackball.

The trace is deleted. MEAS EDIT The deleted portion of the trace is restored.

(4) Press SET.

The trace start point and end point are automatically connected by a line and the measurement data is fixed. When the marker is moved very close to the start point, the traced area is closed automatically even if SET is not pressed, and the measurement data is fixed.

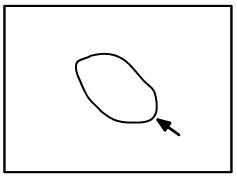


NOTE: 1. If [Copy] on the touch panel is pressed instead of SET in step (4), a duplicate of the trace is displayed as soon as the measurement data is fixed.
The duplicate trace can be moved using the trackball and rotated using the MEAS EDIT dial.

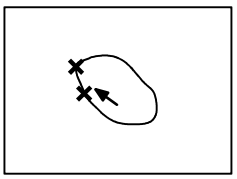
2. During the tracing procedure in Continuous Trace mode, the circumference and the area of the shape formed by the currently displayed trace and the line connecting the start and end points (this line is not visible until tracing is complete) are displayed.

<<Modifying a measurement>>

(1) Press [Caliper Edit] on the touch panel.
An arrow is displayed.

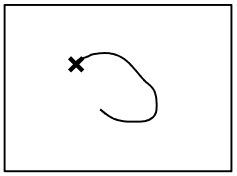


(2) Move the arrow near the start point or end point.
The color of the selected marker changes to red.
Press SET.

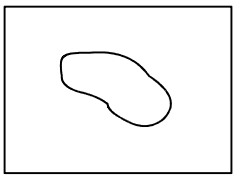


(3) Rotate the MEAS EDIT dial counterclockwise to undo the trace. If the trace is undone more than desired, rotate the MEAS EDIT dial clockwise to redo the trace.

The trace is deleted. ↓ MEAS EDIT ↓ The deleted portion of the trace is restored.



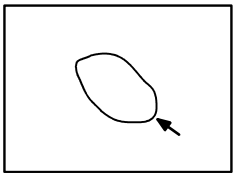
(4) Trace the target object by moving the marker using the trackball.



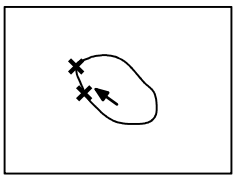
(5) Press SET to fix the measurement data.

<<Deleting a measurement>>

(1) Press [Caliper Edit] on the touch panel.
An arrow is displayed.



(2) Move the arrow near the start or end point.
The color of the selected marker changes to red.



(3) Press SET.

(4) Press [Delete] on the touch panel.
The measurement associated with the selected marker is deleted.

3.4.2 Spline Trace

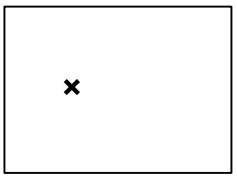
Area: Area A 999.99 (cm^2)	Circumference: Circ A 999.9 (mm)

<<Measurement procedure>>

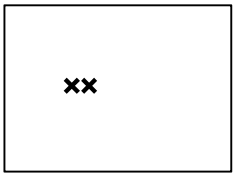
(1) Press TRACE.

(2) Press [Spline Trace] on the touch panel.
A marker is displayed.

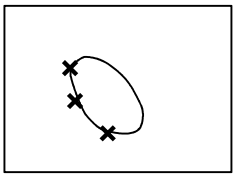
(3) Move the marker to the measurement start point and press SET. The first point is set.



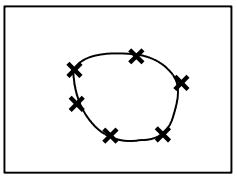
(4) Move the trackball. The second marker is displayed.
Move the second marker to the desired position and press SET to set the second point.



(5) When the marker is moved after the second point has been set, a line connecting the points is displayed.



(6) In the same manner, set the third and subsequent points.

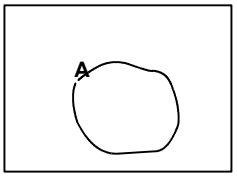


<<To correct the trace>>

Rotate the MEAS EDIT dial counterclockwise. The trace and the set points are deleted. Set the points again.

The trace is deleted. ← MEAS EDIT → The deleted portion of the trace is restored.

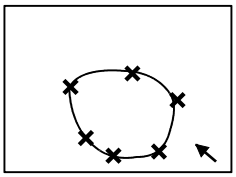
(7) When SET is pressed twice at the same point, the trace is set and the measurement data is fixed.



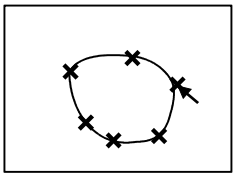
NOTE: When [Copy] on the touch panel is pressed instead of pressing SET in step (7), a duplicate of the trace is displayed as soon as the measurement data is fixed.
The duplicate trace can be moved using the trackball and rotated using the MEAS EDIT dial.

<<Modifying a measurement>>

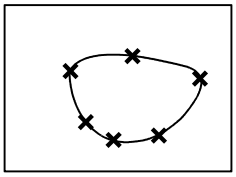
(1) Press [Caliper Edit] on the touch panel.
An arrow is displayed.



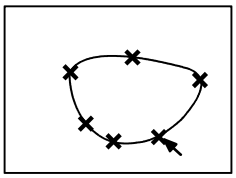
(2) Move the arrow near the set point to be moved.
The color of the selected marker changes to red.
Press SET. The point can now be moved.



(3) Move the selected marker to the desired position and press SET.
The measurement data is fixed and the new result is displayed.

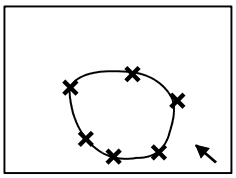


(4) To change the position of another marker, repeat steps (1) to (3).



<<Deleting a measurement>>

(1) Press [Caliper Edit] on the touch panel.
An arrow is displayed.



(2) Move the arrow near any of the set points and press SET.

(3) Press [Delete] on the touch panel.
The measurement associated with the selected set point is deleted.

3.4.3 Ellipse

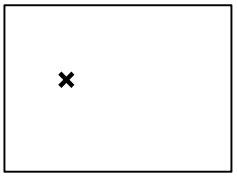
Area	: Area A	999.99 (cm^2)	Long-axis length	: Dist1 A	999.9 (mm)
Circumference	: Circ A	999.9 (mm)	Short-axis length	: Dist2 A	999.9 (mm)

<<Measurement procedure>>

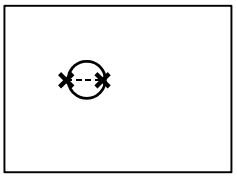
(1) Press TRACE.

(2) Press [Ellipse] on the touch panel. A marker is displayed.

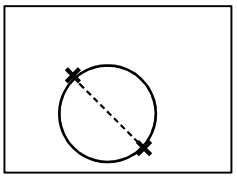
(3) Move the marker to the measurement start point and press SET. The first point is set.



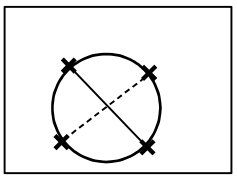
(4) Move the trackball. The marker for the second point appears and a circle whose diameter is the line connecting the first and second points is displayed.



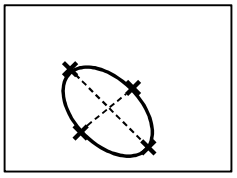
(5) Operate the trackball to adjust the diameter of the circle. The circle is resized as the diameter is changed.



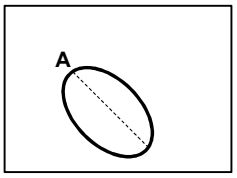
(6) Press SET. The length from the first point to the second point is set. A dotted line perpendicular to the line connecting the first point and the second point is displayed (together with markers) at the center of the line connecting the two points.



(7) Operate the trackball to change the length of the perpendicular line.



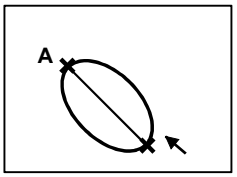
(8) When SET is pressed, the measurement data is fixed.



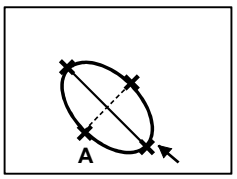
NOTE: If [Copy] on the touch panel is pressed instead of SET in step (8), a duplicate of the shape is displayed as soon as the measurement data is fixed. The duplicate trace can be moved using the trackball and rotated using the MEAS EDIT dial.

<<Modifying a measurement>>

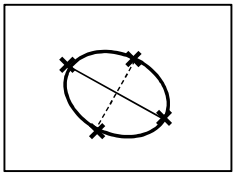
(1) Press [Caliper Edit] on the touch panel.
An arrow is displayed.



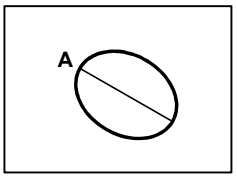
(2) Move the arrow near the ellipse. The four markers and the long and short axes of the ellipse are displayed.



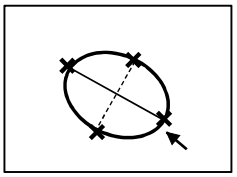
(3) Place the arrow on any of the four markers and press SET.
The position of the marker can be changed along the axis including the specified marker. The length of the other axis is retained.



(4) Move the selected marker to the desired position using the trackball and press SET to fix the measurement data.

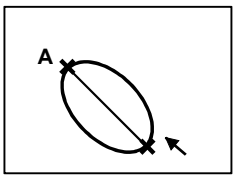


(5) To modify the length of the other axis, repeat steps (1) to (4).

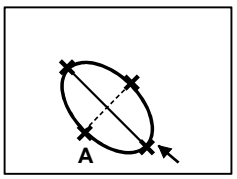


<<Deleting a measurement>>

(1) Press [Caliper Edit] on the touch panel.
An arrow is displayed.



(2) Move the arrow near the ellipse.
The four markers and the long and short axes of the ellipse are displayed.



(3) Place the arrow on any of the four markers and press SET.

(4) Press [Delete] on the touch panel.
The measurement associated with the selected marker is deleted.

3.4.4 Cross

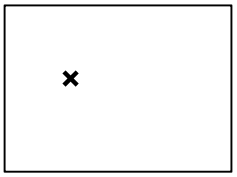
Area	: Area A	999.99 (cm^2)	Long-axis length	: Dist1 A	999.9 (mm)
Circumference	: Circ A	999.9 (mm)	Short-axis length	: Dist2 A	999.9 (mm)

<<Measurement procedure>>

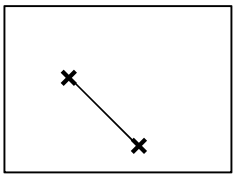
(1) Press TRACE.

(2) Press [Cross] on the touch panel. A marker is displayed.

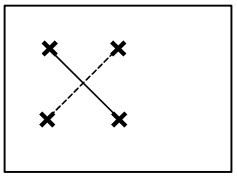
(3) Move the marker to the measurement start point and press SET. The first point is set.



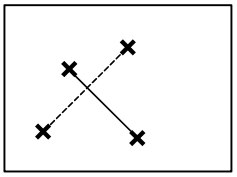
(4) Move the trackball. The marker for the second point appears and a line connecting the first and second points is displayed.



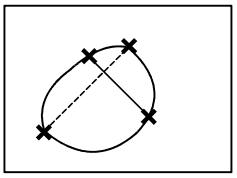
(5) Move the marker and press SET. The length from the first point to the second point is set. A dotted line perpendicular to the line connecting the first point and the second point is displayed together with markers.



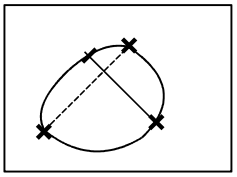
(6) Operate the trackball to adjust the position and length of the perpendicular line.



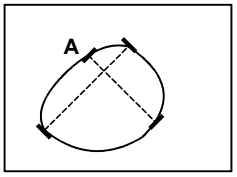
(7) Press SET. The start point of the perpendicular line is set.



(8) Use the trackball to adjust the end point position of the perpendicular line.



(9) Press SET. The measurement data is fixed and the results are displayed.

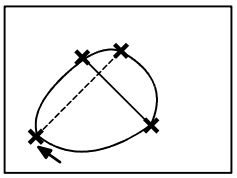


NOTE: If [Copy] on the touch panel is pressed instead of SET in step (9), a duplicate of the ellipse is displayed as soon as the measurement data is fixed. The duplicate trace can be moved using the trackball and rotated using the MEAS EDIT dial.

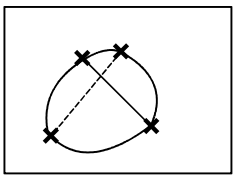
<<Modifying a measurement>>

(1) Press [Caliper Edit] on the touch panel.
An arrow is displayed.

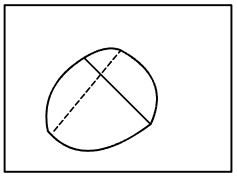
(2) Place the arrow on the point to be moved and press SET.



(3) Move the selected point to the desired position using the trackball.



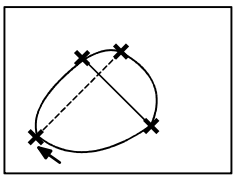
(4) Press SET to fix the measurement data.
To move another point, repeat steps (1) to (3).



<<Deleting a measurement>>

(1) Press [Caliper Edit] on the touch panel.
An arrow is displayed.

(2) Place the arrow on any of the markers and press SET.



(3) Press [Delete] on the touch panel.
The measurement associated with the selected marker is deleted.

3.5 Volume Measurement (Volume)

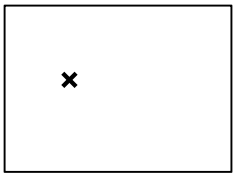
The volume is measured using the elliptical approximation with three axes set.

Volume : Volume A 999.9 (cm^3)	Axis : Dist1 A 999.9 (mm) Axis : Dist2 A 999.9 (mm) Axis : Dist3 A 999.9 (mm)

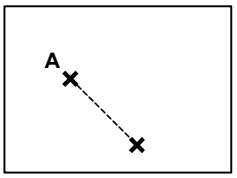
<<Measurement procedure>>

(1) Press [Volume] on the touch panel.
The marker for basic measurements is displayed.

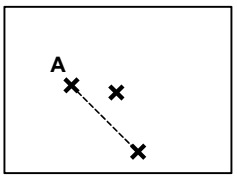
(2) Move the marker to the measurement start point and press SET. The first point is set.



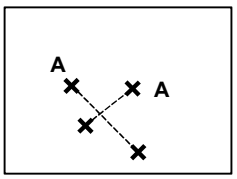
(3) Move the marker to the measurement end point and press SET.



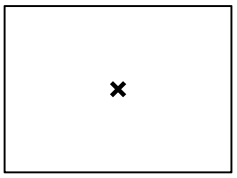
(4) Press NEXT.
The start point marker for the second line is displayed.



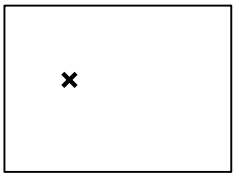
(5) Draw the second line in the same manner as the first line.



(6) A cross-sectional plane perpendicular to the plane on which steps (1) to (5) have been performed is displayed.



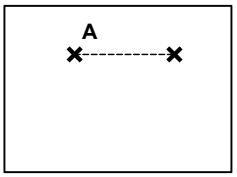
(7) Press [Volume] on the touch panel.
The start point marker for the third line is displayed.



(8) Move the marker to the start point and press SET.

(9) Move the marker to the end point using the trackball and press 

.
The measurement data is fixed and the result is displayed.



<<Modifying or deleting a measurement>>

A volume measurement can be modified or deleted using the same procedures as for distance measurement. Refer to subsection 3.1 "Distance Measurement (Distance)".

3.6 Joint Measurement

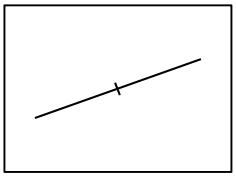
The angles between the base line and two lines (angles α and β) are measured.

Angle between the base line and the first line	:	Alpha A	999 (deg)
Angle between the base line and the second line	:	Beta A	999 (deg)

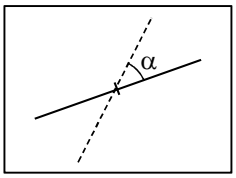
<<Measurement procedure>>

(1) Press [Joint] on the touch panel.
The base line is displayed with a marker on it. This marker represents the rotational center.

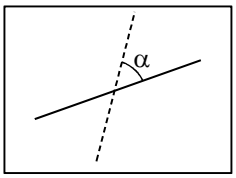
(2) Use the trackball to move the base line (the center marker is moved together). Use the MEAS EDIT dial to rotate the base line around the center marker.



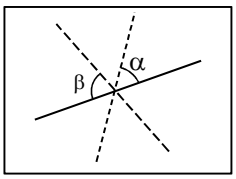
(3) Press SET. The second line is displayed with a center marker.



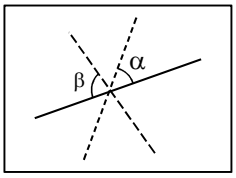
(4) Use the trackball and MEAS EDIT dial to move and rotate the second line.



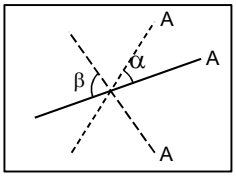
(5) Press SET. The second line changes to a dotted line and the third line is displayed with a center marker.



(6) Use the trackball and MEAS EDIT dial to move and rotate the third line.



(7) Press SET. The measurement data is fixed.

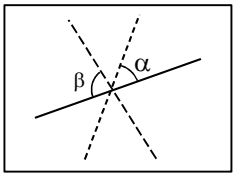


NOTE: The default display positions and angles of the first and second lines can be changed by changing the "2D-Mode Meas". preset. Refer to section 2 "Setting the Presets" for details.

<<Modifying a measurement>>

(1) Press [Caliper Edit] on the touch panel.
An arrow is displayed.

(2) Move the arrow near the line to be modified.
The color of the selected line changes to red.

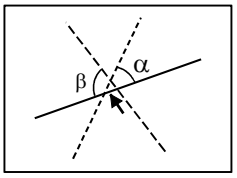


(3) Press 

.

(4) Use the trackball and MEAS EDIT dial to move and rotate the line.
Press 

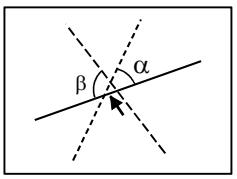
. The measurement data is fixed.



<<Deleting a measurement>>

(1) Press [Caliper Edit] on the touch panel.
An arrow is displayed.

(2) Move the arrow near the line to be deleted.
The color of the selected line changes to red.



(3) Press 

.

(4) Press [Delete] on the touch panel.
The measurement associated with the selected line is deleted.

3.7 Mean IMT Measurement

Three distance measurements are performed and the mean is calculated to determine the thickness of the intima-media complex of the carotid artery.

Mean value: mean IMT A 999.9 (mm)	Distance 1 : Dist1 A 999.9 (mm) Distance 2 : Dist2 A 999.9 (mm) Distance 3 : Dist3 A 999.9 (mm)

When "Double Digits" is selected for Thickness (IMT) Precision in the preset menu:

Mean value: mean IMT A '999.99 (mm)	Distance 1 : Dist1 A '999.99 (mm) Distance 2 : Dist2 A '999.99 (mm) Distance 3 : Dist3 A '999.99 (mm)

CAUTION: Result display for IMT measurement

1. When "Double Digits" is selected for Thickness [IMT] Precision on the 2D-Meas. Page of the preset menu, the IMT measurement value is displayed to two decimal places. However, it may not be possible to obtain an accurate value to two decimal places, depending on the characteristics of the image.

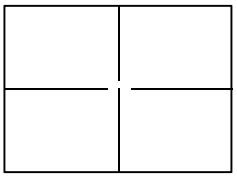
2. Keeping the above point in mind, use the measurement and calculation values displayed to two decimal places only for reference purposes.

3. In the MDA, a single quotation mark (') is added to the measurement values and the calculation results obtained based on the measurement values.

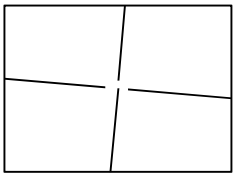
   Limitations: Marks can be moved in steps of 1 pixel on the screen. Due to the resolution of ultrasound images, this does not correspond to an indicated value change of 0.01. Thus, the indicated value changes in increments of greater than 0.01 as a mark is moved.

<<Measurement procedure>>

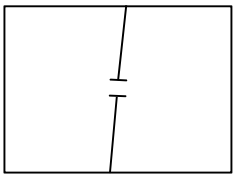
(1) Press [mean IMT] on the touch panel.
The marker for measuring the first distance is displayed.



(2) Use the trackball to move the marker to the measurement position.
Rotate the marker to the desired angle using the MEAS EDIT dial.

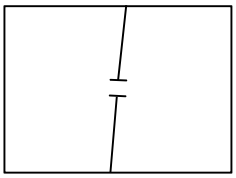


(3) Press SET. The lower marker position is set. Move the upper marker to the desired position using the trackball.

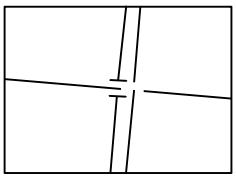


(4) Press SET. The distance set by the lower and upper markers is measured.

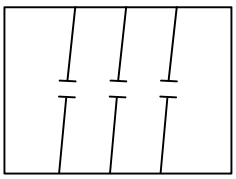
(5) Press NEXT. A second marker is displayed next to the first marker.



(6) Repeat steps (2) to (4) to measure the second and third distances.

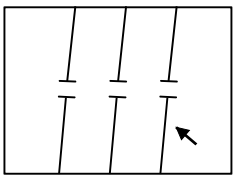


(7) After the three distances have been measured, press SET. The measurement data is fixed and the mean of the three distances is displayed.



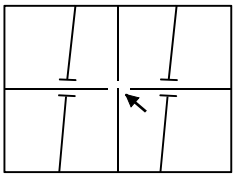
<<Modifying a measurement>>

(1) Press [Caliper Edit] on the touch panel.
An arrow is displayed.

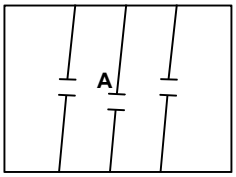


(2) Move the arrow near the marker to be modified. The color of the selected marker changes to red.

(3) Press SET.



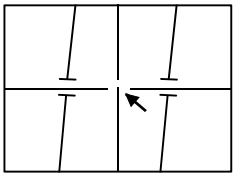
(4) Use the trackball and MEAS EDIT dial to move and rotate the marker.
Press SET. The measurement data is fixed.



<<Deleting a measurement>>

(1) Press [Caliper Edit] on the touch panel.
An arrow is displayed.

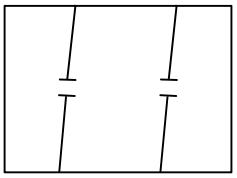
(2) Move the arrow near the marker to be deleted.
The color of the selected marker changes to red.



(3) Press 

.

(4) Press [Delete] on the touch panel.
The measurement associated with the selected marker (one of the three distance measurements) is deleted.



3.8 %Stenosis (Distance) Measurement

The stenosis ratio (%Stenosis) is calculated based on two distance measurements using the formulas below.

If Dist1 > Dist2

$$\%S\ Dist = (Dist1 - Dist2)/Dist1$$

If Dist1 < Dist2

$$\%S\ Dist = (Dist2 - Dist1)/Dist2$$

$$Area1 = \pi / 4 \times (Dist1)^2 \qquad Area2 = \pi / 4 \times (Dist2)^2$$

If Dist1 > Dist2

$$\%S\ Area = (Area1 - Area2)/Area1$$

If Dist1 < Dist2

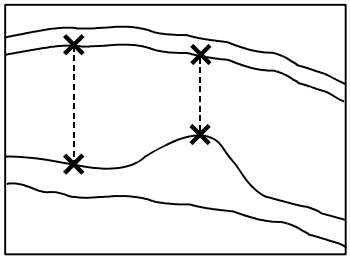
$$\%S\ Area = (Area2 - Area1)/Area2$$

%Stenosis: %S Dist A	99.9 (%)	Distance	: Dist1 A	999.9 (mm)
		Distance	: Dist2 A	999.9 (mm)
%Stenosis: %S Area A	99.9 (%)	Area	: Area1 A	9999.9 (mm^2)
		Area	: Area2 A	9999.9 (mm^2)

Select [%Stenosis Dist] on the touch panel.

Refer to subsection 3.1 "Distance Measurement" for the measurement, modification, and deletion procedures.

<<Measurement points>>



3.9 %Stenosis (Area) Measurement

The area of the lumen is calculated using the elliptical approximation method, and the residual area is calculated by tracing the inner surface of the lumen.

The stenosis ratio (%Stenosis) is calculated based on these two area measurements using the formula below.

If the residual area is larger than the area of the lumen, which is impossible in actual clinical examinations, the result is displayed as a negative value.

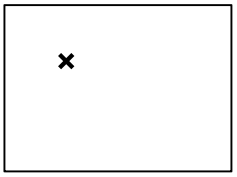
$$\%S\ Area\ A = (Lumen\ A - Residual\ A)/Lumen\ A$$

%Stenosis: %S Area A 99.9%	Cross-sectional area of vessel: Lumen A 999.9 mm^2 Residual cross-sectional area at the stenotic part: Residual A 999.9 mm^2

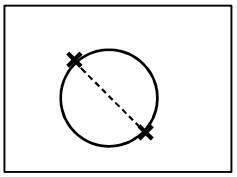
<<Measurement procedure>>

(1) Press [%Stenosis Area] on the touch panel. A marker is displayed.

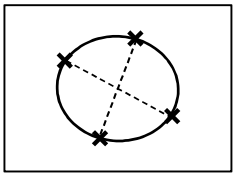
(2) Move the marker to the measurement start point and press SET.



(3) Move the trackball. A circle is displayed.
Operate the trackball to adjust the diameter of the circle.
The circle is resized as the diameter length is changed.



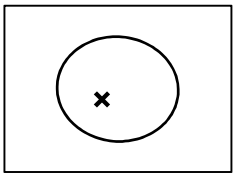
(4) Press SET. A line orthogonal to the diameter line is displayed. Adjust the line length using the trackball.



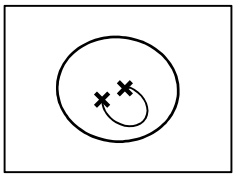
(5) Press SET. The lumen (maximum area) is fixed.

(6) Press NEXT. The marker for residual (minimum area) measurement is displayed.

(7) Move the marker to the trace start point and press SET.

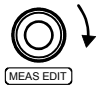


(8) Use the trackball to move the marker along the inner surface of the lumen.



<<To correct the trace during tracing>>

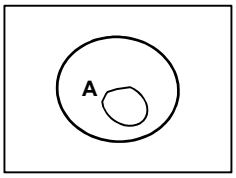
Delete the trace using the MEAS EDIT dial and draw the trace again using the trackball.

The trace is deleted. 

The deleted portion of the trace is restored.

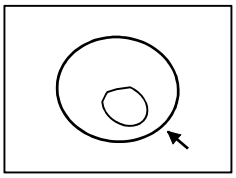
(9) Press 

. The trace start and end points are connected with a line. The residual (minimum area) is fixed and the value for %Stenosis (Area) is displayed.



<<Modifying a measurement>>

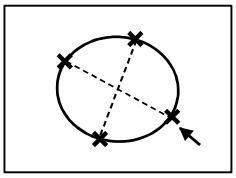
(1) Press [Caliper Edit] on the touch panel.
An arrow is displayed.



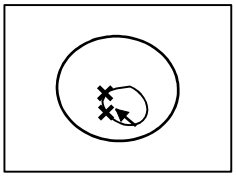
(2) Move the arrow to the marker to be moved and press 

.

(a) To modify the ellipse (outer shape), move the arrow near the ellipse. The four markers and the long and short axes of the ellipse are displayed.



(b) To modify the trace (inner shape), move the arrow near the trace. The start and end point markers are displayed.



(3) Select the marker to be moved, move it to the desired position, and press 

.

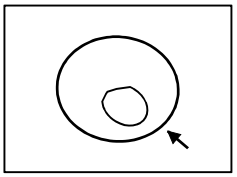
The measurement data is fixed.

(a) To modify the ellipse (outer shape), select the marker to be moved and move it to the desired position using the trackball.
Refer to subsection 3.4.3 "Ellipse" for details.

(b) To modify the trace (inner shape), delete the trace using the MEAS EDIT dial and redraw it using the trackball.
Refer to subsection 3.4.1 "Continuous Trace" for details.

<<Deleting a measurement>>

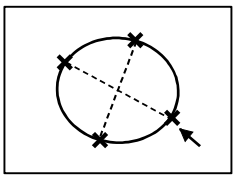
(1) Press [Caliper Edit] on the touch panel.
An arrow is displayed.



(2) Place the arrow on any of the markers for the measurement to be deleted.

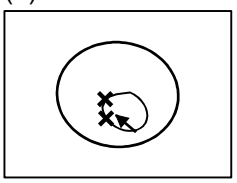
(a) When the arrow is moved close to the ellipse (outer shape), the four markers and the long and short axes of the ellipse are displayed.

(a)



(b) When the arrow is moved close to the trace (inner shape), the start and end markers are displayed.

(b)



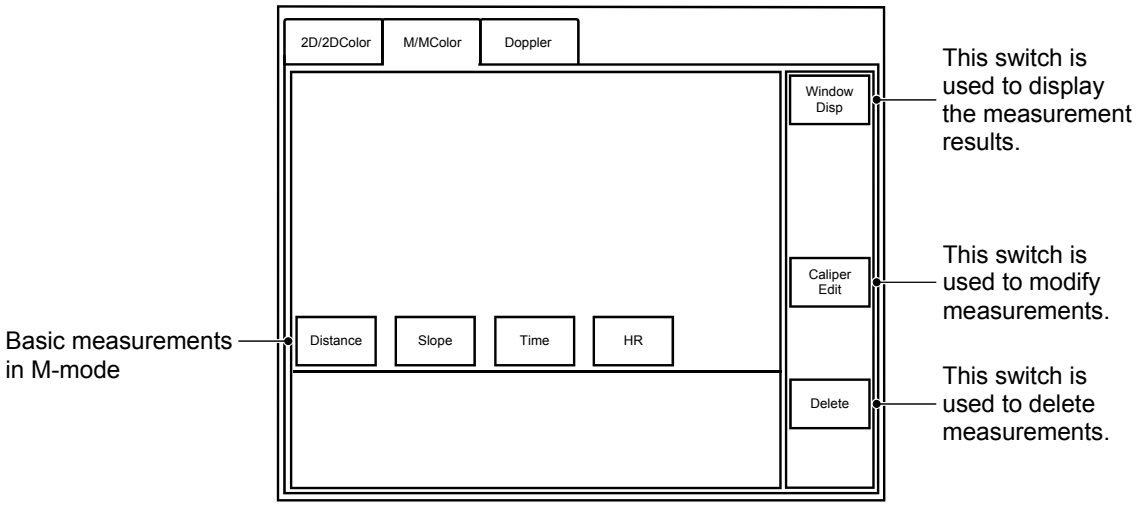
(3) Press 

to select the measurement to be deleted.

(4) Press [Delete] on the touch panel. The ellipse or trace is deleted.

4. M-Mode Measurements

<<M-mode basic measurement menu>>



When one of the following switches is pressed in M mode, the M-mode basic measurement menu is displayed on the touch panel.

Switch	Function
CALIPER or CALIPER	Starts distance measurement. Distance measurement can be performed immediately.
TRACE	Starts slope measurement. Slope measurement can be performed immediately.

To perform M-mode basic measurements other than the above, press the switch for the desired measurement item in the menu. The marker for the selected measurement item is displayed on the monitor.

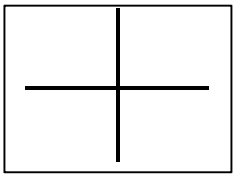
4.1 M-Mode Distance Measurement (Distance)

The distance between two points is measured on the M-mode image.

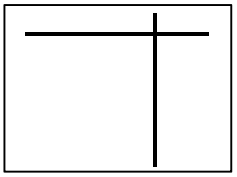
Distance: Dist A 9999.9 (mm)

<<Measurement procedure>>

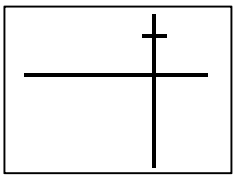
(1) Press CALIPER or CALIPER. The base line (vertical line) and the movable line (horizontal line) are displayed perpendicular to each other.



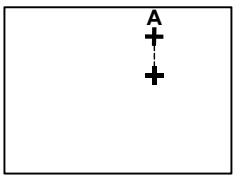
(2) Move the intersection point between the two lines to the desired position by moving the movable line, and press SET.



(3) Move the movable line to the second point.

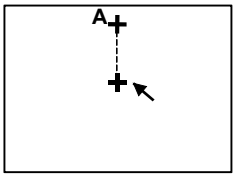


(4) Press SET. The measurement data is fixed.



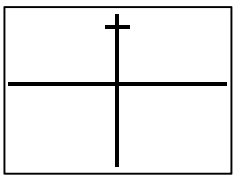
<<Modifying a measurement>>

(1) Press [Caliper Edit] in the touch panel menu.
An arrow is displayed.

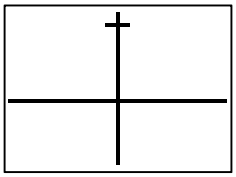


(2) Place the arrow on the point to be moved and press 

.

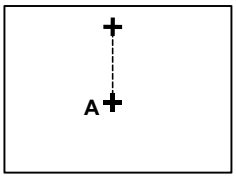


(3) Move the intersection point to the desired position.

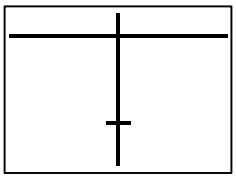


(4) Press 

to fix the measurement data.

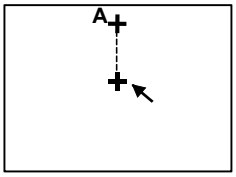


(5) To change the position of another point, repeat steps (1) to (4).



<<Deleting a measurement>>

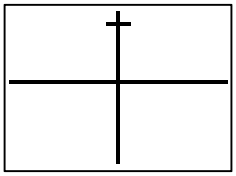
(1) Press [Caliper Edit] on the touch panel.
An arrow is displayed.



(2) Place the arrow on one of the markers and press 

.

(3) Press [Delete] on the touch panel.
The measurement associated with the selected marker is deleted.



4.2 Time Measurement (Time)

The time between two points is measured.

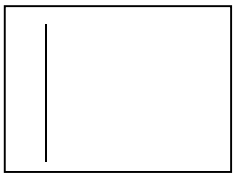
Time: Time A 9.999 (sec)

<<Measurement procedure>>

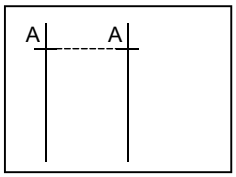
(1) Press CALIPER, CALIPER, or TRACE. The M-mode basic measurement menu is displayed.

(2) Press [Time] on the touch panel.

(3) Move the marker to the measurement start point and press SET.



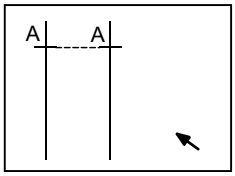
(4) When the trackball is moved slightly, the end point marker appears. Move the marker to the measurement end point. Press SET. The measurement data is fixed.



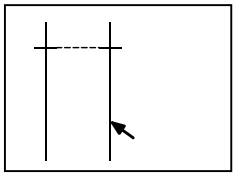
NOTE: It is possible to preset whether to show or hide the broken line connecting the time measurement markers (vertical bar cursors). Refer to section 2 "Setting the Presets" for details.

<<Modifying a measurement>>

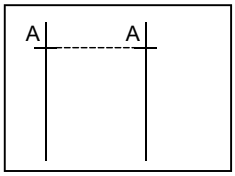
(1) Press [Caliper Edit] on the touch panel.
An arrow is displayed.



(2) Place the arrow on the marker to be moved and press SET.



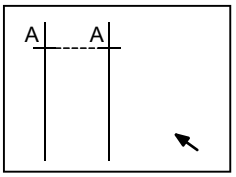
(3) Move the marker to the desired position and press SET.
The measurement data is fixed.



(4) To change the position of another marker, repeat steps (1) to (3).

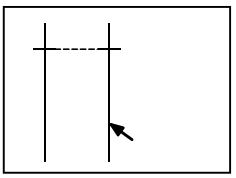
<<Deleting a measurement>>

(1) Press [Caliper Edit] on the touch panel.
An arrow is displayed.



(2) Place the arrow on one of the markers and press 

.



(3) Press [Delete] on the touch panel.
The measurement associated with the selected marker is deleted.

4.3 Slope Measurement (Slope)

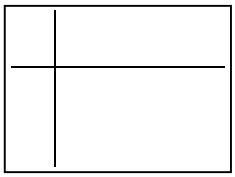
The slope between two points is measured.

Slope: Slope 999.9 (mm/s)	Time : Time A 9.999 (sec) Distance : Dist A 999.9 (mm)

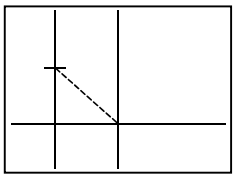
<<Measurement procedure>>

(1) Press TRACE. The marker (two perpendicular lines) is displayed.

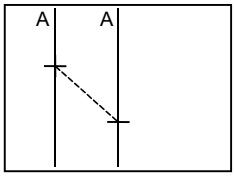
(2) Move the intersection to the measurement start point and press SET. The start point is set.



(3) Move the intersection to the measurement end point.



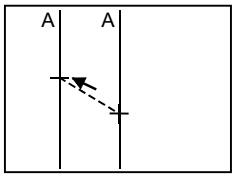
(4) Press SET. The end point is set and the measurement data is fixed. The slope is given by:



$$Slope = \left| \frac{(Distance)}{(Time)} \right|$$

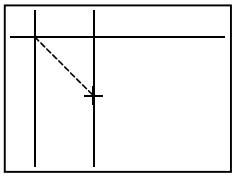
<<Modifying a measurement>>

(1) Press [Caliper Edit] on the touch panel.
An arrow is displayed.



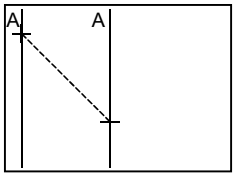
(2) Place the arrow on the point to be moved and press 

. The marker appears.

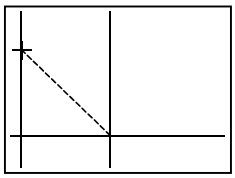


(3) Move the intersection point of the marker to the desired position.
Press 

. The measurement data is fixed.

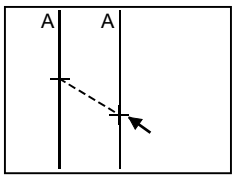


(4) To change the position of another point, repeat steps (1) to (3).



<<Deleting a measurement>>

(1) Press [Caliper Edit] on the touch panel.
An arrow is displayed.



(2) Place the arrow on one of the points. Press 

.

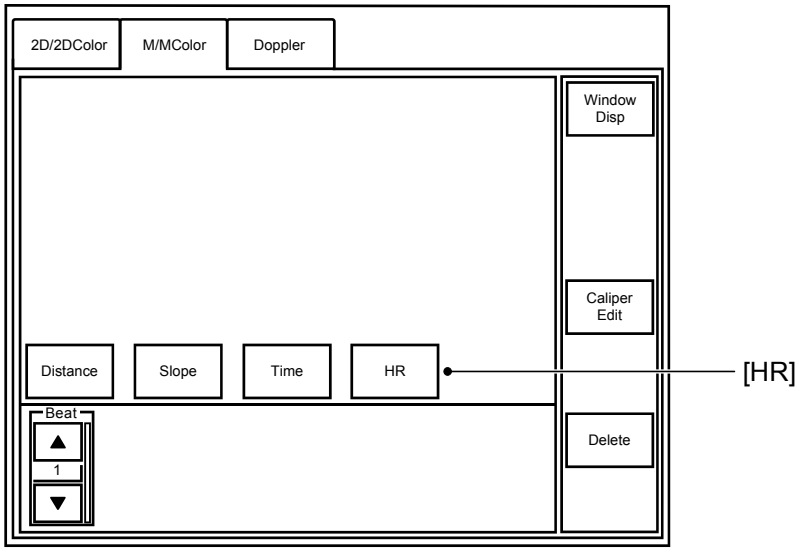
(3) Press [Delete] on the touch panel.
The measurement associated with the selected point is deleted.

4.4 Heart Rate Measurement (HR)

The heart rate (number of heartbeats per minute) is calculated on the basis of the heartbeats shown on the monitor.

Heart rate: HR 999.9 (bpm)	Number of beats : Beat A 9 Time : Time A 9.999 (sec)

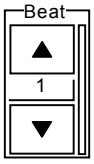
<<Menu display on the touch panel>>



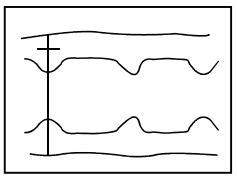
<<Measurement procedure>>

(1) Press CALIPER, CALIPER, or TRACE. The M-mode basic measurement menu is displayed.

(2) Press [HR] in the menu on the touch panel. The Beat switch is displayed on the touch panel.
Set the value for Beat according to the number of heart beats in the range to be measured. The default value can be changed through presetting (refer to section 2 "Setting the Presets" for details).

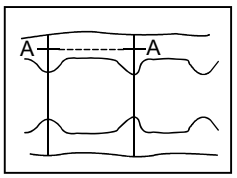


(3) Move the marker to the measurement start point and press SET.



(4) Move the marker to the measurement end point and press SET. The heart rate is given by:

HR = Number of heartbeats × 60/Time



NOTE:	It is possible to preset whether to show or hide the broken line connecting the HR measurement markers (vertical bar cursors). Refer to section 2 "Setting the Presets" for details.

<<Modifying or deleting a measurement>>

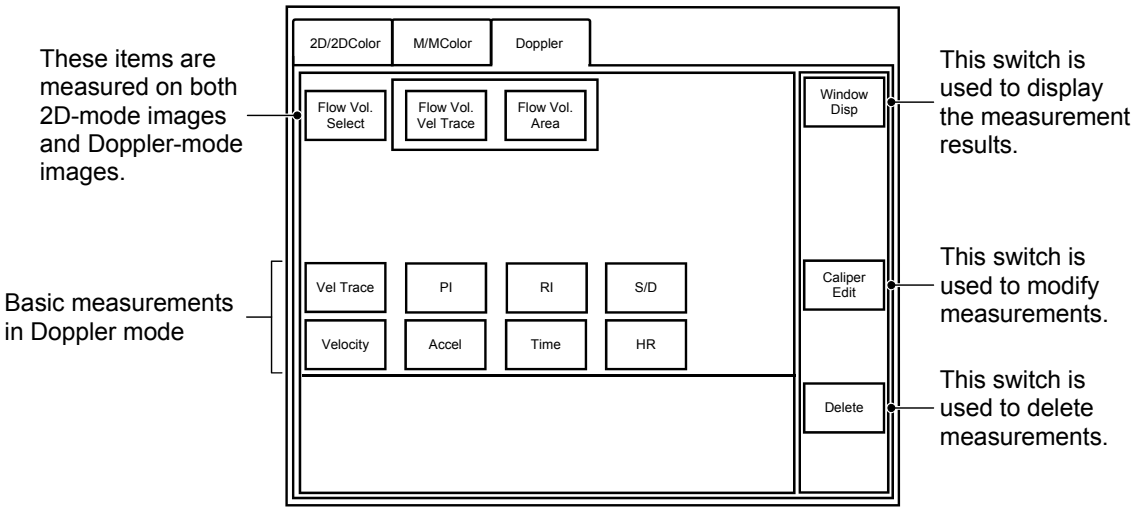
A heart rate measurement can be modified or deleted using the same procedure as for time measurement. Refer to subsection 4.2 "Time Measurement (Time)".

5. CDI-Mode Measurements

The same measurements as in 2D mode can be performed on frozen CDI-mode images.

6. Doppler-Mode Measurements

<<Doppler-mode basic measurement menu>>



When one of the following switches is pressed in Doppler mode, the Doppler-mode basic measurement menu is displayed on the touch panel.

Switch	Function
CALIPER or CALIPER	Starts velocity measurement. The velocity measurement can be performed immediately. To perform other Doppler-mode basic measurements, press CALIPER or CALIPER and then press the switch for the desired measurement item on the touch panel.
TRACE	Starts Vel Trace measurement. If Vel Trace [Range] is preset as the default, the parameters for [Range] are displayed overlapping the Doppler-mode basic measurement menu.

NOTE: The default for the Vel Trace measurement method can be changed through presetting (refer to section 2 "Setting the Presets").
If "Vel Trace" is selected for Flow Volume Tool on the D-Mode Meas. screen in Application Preset Editor, pressing TRACE starts the Vel Trace measurement in [Continuous Trace] (Freehand trace) mode. In this case, the Range parameters are not displayed on the touch panel.

6.1 Velocity Measurement (Velocity)

The velocity is measured on the Doppler-mode image.

<Standard>

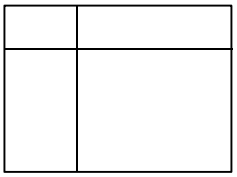
Velocity: VEL 999.9 (cm/s)

<When Adult-Heart is selected in the Application Presets>

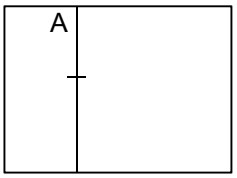
Velocity: Vel A 999.9 (cm/s)	Pressure gradient: PG A 999.9 (mmHg)

<<Measurement procedure>>

(1) Press CALIPER or CALIPER.
Two lines perpendicular to each other are displayed.



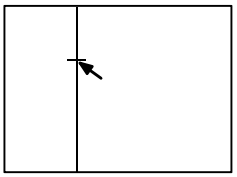
(2) Move the intersection point between the two lines to the measurement position and press SET. The marker is set and the corresponding channel is displayed. To move the marker, press SET again.



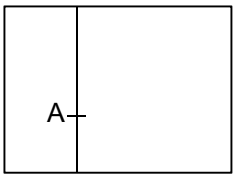
<<Modifying a measurement>>

(1) Press [Caliper Edit] on the touch panel.
An arrow is displayed.

(2) Place the arrow on the marker and press SET.



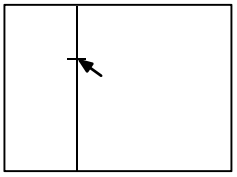
(3) Move the marker to the desired position.
Press SET. The measurement data is fixed.



<<Deleting a measurement>>

(1) Press [Caliper Edit] on the touch panel. An arrow is displayed.

(2) Place the arrow on the marker and press SET.



(3) Press [Delete] on the touch panel.
The measurement associated with the selected marker is deleted.

6.2 Acceleration Measurement (Accel)

The velocity slope (acceleration) between two points is measured on the Doppler-mode image.

<<Measurement result display>>

The result display varies according to the items selected in the Application Presets.

<Standard>

Acceleration	: Accel A	999.9 (cm/s^2)	Time	: Time A	9.999 (sec)
Velocity	: Vel1 A	999.9 (cm/s)			
Velocity	: Vel2 A	999.9 (cm/s)			

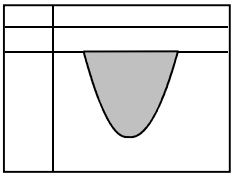
<When Adult-Heart is selected in the Application Presets>

Acceleration	: Accel A	999.9 (cm/s^2)	Time	: Time A	9.999 (sec)
Velocity	: Vel1 A	999.9 (cm/s)	Pressure gradient	: PG1 A	999.9 (mmHg)
Velocity	: Vel2 A	999.9 (cm/s)	Pressure gradient	: PG2 A	999.9 (mmHg)

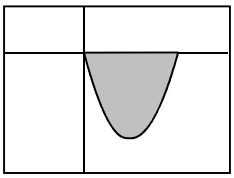
<<Measurement procedure>>

(1) Press TRACE. The Doppler-mode basic measurement menu is displayed.

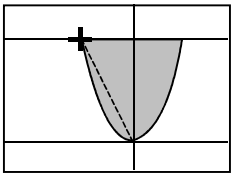
(2) Press [Accel] on the touch panel. A marker is displayed.



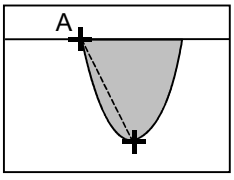
(3) Move the marker to the measurement start point and press SET.



(4) Move the marker to the measurement end point.



(5) Press SET. The measurement result is displayed.
When the velocity is measured in the direction away from the base line, "Accel" is displayed with the result. When the velocity is measured in the direction toward the base line, "Decel" is displayed with the result.



<<Modifying or deleting a measurement>>

An acceleration measurement can be modified or deleted using the same procedure as for an M-mode slope measurement. Refer to subsection 4.3 "Slope Measurement (Slope)".

6.3 Time Measurement (Time)

When [Time] in the Doppler-mode basic measurement menu is selected, a marker is displayed.

The measurement, modification, and deletion procedures are the same as for M-mode time measurement.

Refer to subsection 4.2 "Time Measurement (Time)".

6.4 Heart Rate Measurement (HR)

When [HR] in the Doppler-mode basic measurement menu is selected, a marker is displayed.

The measurement, modification, and deletion procedures are the same as for M-mode heart rate measurement.

Refer to subsection 4.4 "Heart Rate Measurement (HR)".

6.5 Velocity Trace Measurement (Vel Trace)

The velocity and other items are measured by tracing the Doppler waveform.

Pressing 

starts measurement using the default trace method.
The following trace methods are provided. Select the desired method by pressing the corresponding switch on the touch panel.

<When Adult Heart1, Adult Heart2, or Pediatric Heart is selected as an application preset>

Switch on the touch panel	Trace method
Continuous Trace	The user traces the Doppler waveform freehand from the specified start point to the end point using the trackball.
Spline Trace	The Doppler waveform within the specified range is traced by interpolating three or more user-specified points (including the start and end points) using a spline curve.
Line Trace	The user traces the Doppler waveform using straight line segments.
Range	The Doppler waveform in the specified range is traced automatically.

<General (other than Adult Heart)>

Switch on the touch panel	Trace method
Continuous Trace	The user traces the Doppler waveform freehand from the specified start point to the end point using the trackball.
Spline Trace	The Doppler waveform within the specified range is traced by interpolating three or more user-specified points (including the start and end points) using a spline curve.
Line Trace	The user traces the Doppler waveform using straight line segments.
Range	The Doppler waveform in the specified range is traced automatically.
Auto Range	The Doppler waveform is automatically traced by recognizing the Doppler heartbeat without specifying the range.

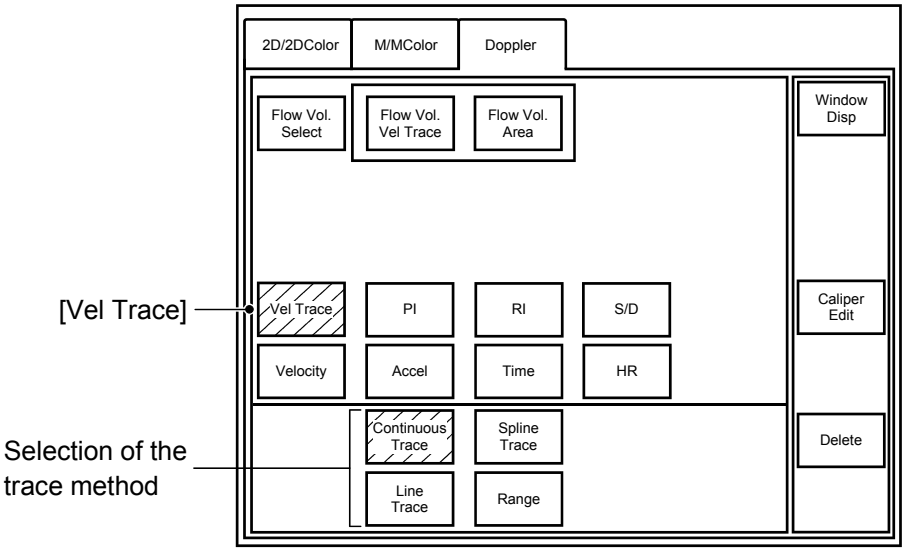
The default trace method can be changed through presetting. The calculation formulas can also be selected through presetting. Refer to section 2 "Setting the Presets" for the setting procedures.

When an application preset other than Adult Heart1, Adult Heart2, or Pediatric Heart is selected, set the trace range from an end diastolic velocity point to the next end diastolic velocity point.

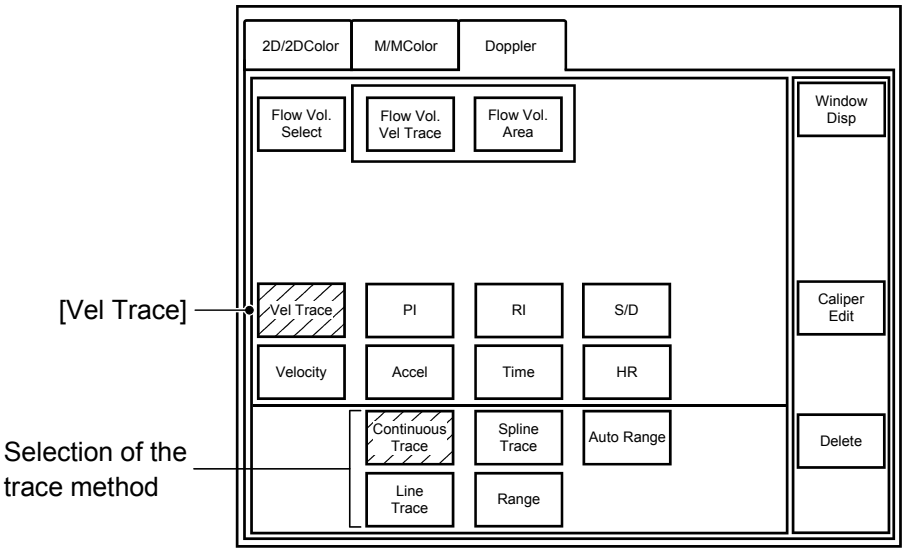
* It is also possible to include two or more cardiac cycles in the trace range for measurement.
* When Auto Range is selected, the number of waveforms to be recognized is the same as the number of heartbeats used in the last measurement.

<<Menu display on the touch panel>>

<When Adult Heart1, Adult Heart2, or Pediatric Heart is selected as an application preset>



<General (other than Adult Heart)>



6.5.1 Continuous Trace

The Doppler waveform can be traced freehand from the start point to the end point using the trackball.

<<Measurement result display>>

The result display varies according to the items selected in the presets.

<Standard (other than Adult-Heart)>

Maximum velocity	: Vmax A	999.9 (cm/s)	PI	: PI A	99.99*[1]
Minimum velocity	: Vmin A	999.9 (cm/s)	RI	: RI A	99.99*[1]
Velocity at end diastole	: Ved A	999.9 (cm/s)	S/D	: S/D A	99.99
Mean velocity	: Vm A	999.9 (cm/s)			

*1: Whether Vmin or Ved is used for calculating PI can be preset.

$$PI = (Vmax - Vmin)/Vm\_peak$$
$$PI = (Vmax - Ved)/Vm\_peak$$

*2: Whether Vmin or Ved is used for calculating RI can be preset.

$$RI = (Vmax - Vmin)/Vmax$$
$$RI = (Vmax - Ved)/Vmax$$

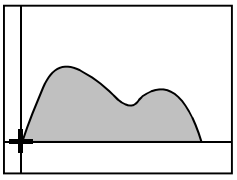
<When Adult-Heart is selected in the presets>

Velocity Time Integral	: VTI A	999.9	(cm)
Maximum velocity	: VP A	999.9	(cm/s)
Mean velocity	: VM A	999.9	(cm/s)
Maximum pressure gradient	: PPG A	999.9	(mmHg)
Mean pressure gradient	: MPG A	99.99	(mmHg)

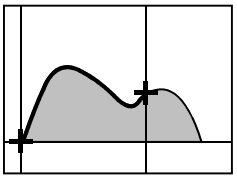
<<Measurement procedure>.

(1) Press [Continuous Trace] on the touch panel. A marker is displayed.

(2) Move the marker to the trace start point and press SET.



(3) Trace the waveform using the trackball.

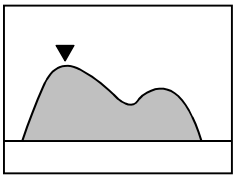


<<To correct the trace during tracing>>

Delete the trace by rotating the MEAS EDIT dial counterclockwise or by moving the trackball to the left.

The trace is deleted. ← MEAS EDIT → The deleted portion of the trace is restored.

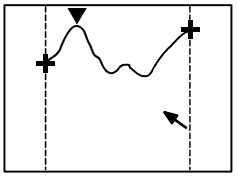
(4) Press SET.
The trace is completed and the measurement results are displayed.



<<Modifying a measurement>>

(1) Press [Caliper Edit] on the touch panel.
An arrow is displayed.

(2) Place the arrow on the trace at the position to be modified and press SET.



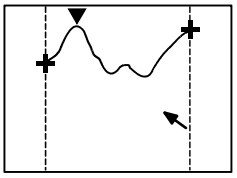
(3) Move the marker to the desired position and press SET to fix the measurement data.

(4) To modify the trace at another position, repeat steps (1) to (3).

<<Deleting a measurement>>

(1) Press [Caliper Edit] on the touch panel.
An arrow is displayed.

(2) Move the arrow near the set point to be deleted and press SET.



(3) Press [Delete] on the touch panel.
The measurement associated with the selected point is deleted.

6.5.2 Spline Trace

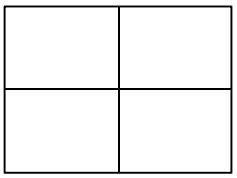
The Doppler waveform is traced by setting at least three points, including the start and end points, and connecting them with a spline curve.

<<Measurement result display>>

Same as for Continuous Trace

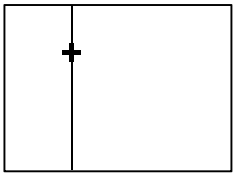
<<Measurement procedure>>

(1) Press [Spline Trace] on the touch panel.
A marker is displayed.



(2) Move the marker to the measurement start point and press 

.



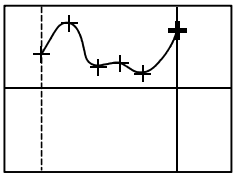
(3) Set the second and subsequent points using the same procedure as in step (2).

<To correct the line trace>

Rotate the MEAS EDIT dial counterclockwise. The line segments and set points are deleted. Set the points again.

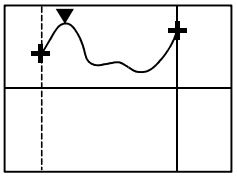
The trace is deleted. 

The deleted portion of the trace is restored.



(4) When 

is pressed twice at the same point, the measurement data is fixed.



<<Modifying a measurement>>

Refer to subsection 6.5.1 "Continuous Trace".

<<Deleting a measurement>>

Refer to subsection 6.5.1 "Continuous Trace".

6.5.3 Line Trace

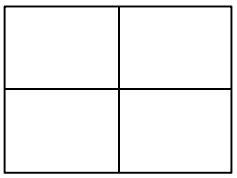
The Doppler waveform is traced by setting at least three points, including the start and end points, and connecting them with line segments.

<<Measurement result display>>

Same as for Continuous Trace.

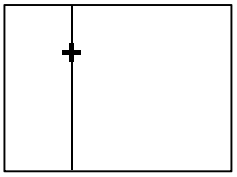
<<Measurement procedure>>

(1) Press [Line Trace] on the touch panel.
A marker is displayed.

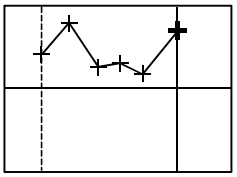


(2) Move the marker to the measurement start point and press 

.



(3) Set the second and subsequent points using the same procedure as in step (2).



<To correct the line trace>

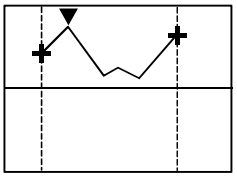
Rotate the MEAS EDIT dial counterclockwise. The line segments and set points are deleted. Set the points again.

The trace is deleted. 

The deleted portion of the trace is restored.

(4) When 

is pressed twice at the same point, the measurement data is fixed.



<<Modifying a measurement>>

Refer to subsection 6.5.1 "Continuous Trace".

<<Deleting a measurement>>

Refer to subsection 6.5.1 "Continuous Trace".

6.5.4 Range

The Doppler waveform in the specified range is traced automatically.

<<Measurement result display>>

The result display varies according to the items selected in the presets.

<Standard (other than Adult-Heart)>

Maximum velocity	:	Vmax A	999.9 (cm/s)
Minimum velocity	:	Vmin A	999.9 (cm/s)
Velocity at end diastole	:	Ved A	999.9 (cm/s)
Mean velocity	:	Vm A	999.9 (cm/s)
Mean velocity of peak trace	:	Vm_peak A	999.9 (cm/s)
Mean velocity of mean trace	:	Vm_mean A	999.9 (cm/s)
PI	:	PI A	99.99*[1]
RI	:	RI A	99.99*[1]
S/D	:	S/D A	99.99

*1: Whether Vmin or Ved is used for calculating PI can be preset.

$$PI = (Vmax - Vmin)/Vm\_peak$$
$$PI = (Vmax - Ved)/Vm\_peak$$

*2: Whether Vmin or Ved is used for calculating RI can be preset.

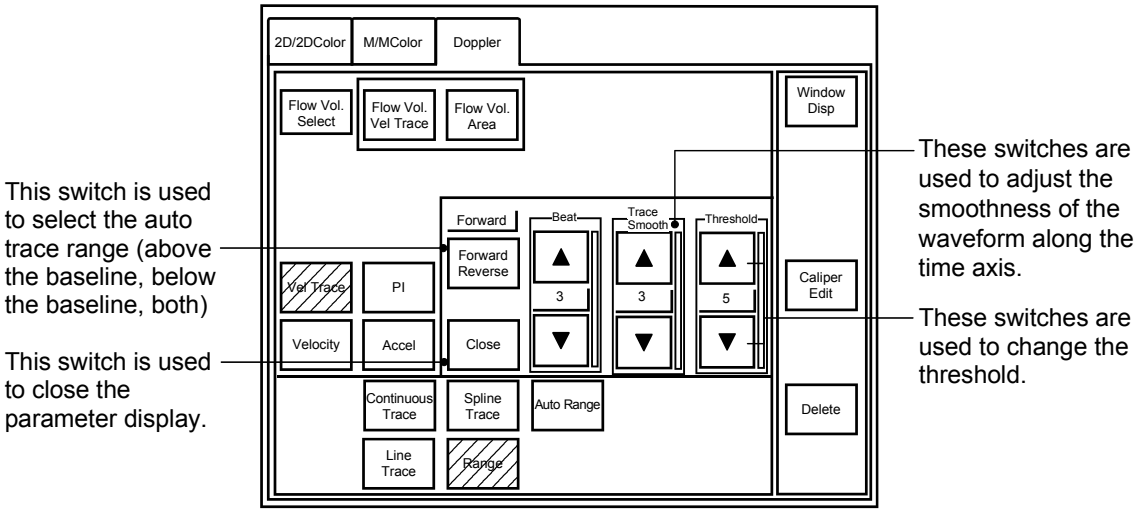
$$RI = (Vmax - Vmin)/Vmax$$
$$RI = (Vmax - Ved)/Vmax$$

<When Adult-Heart is selected in the presets>

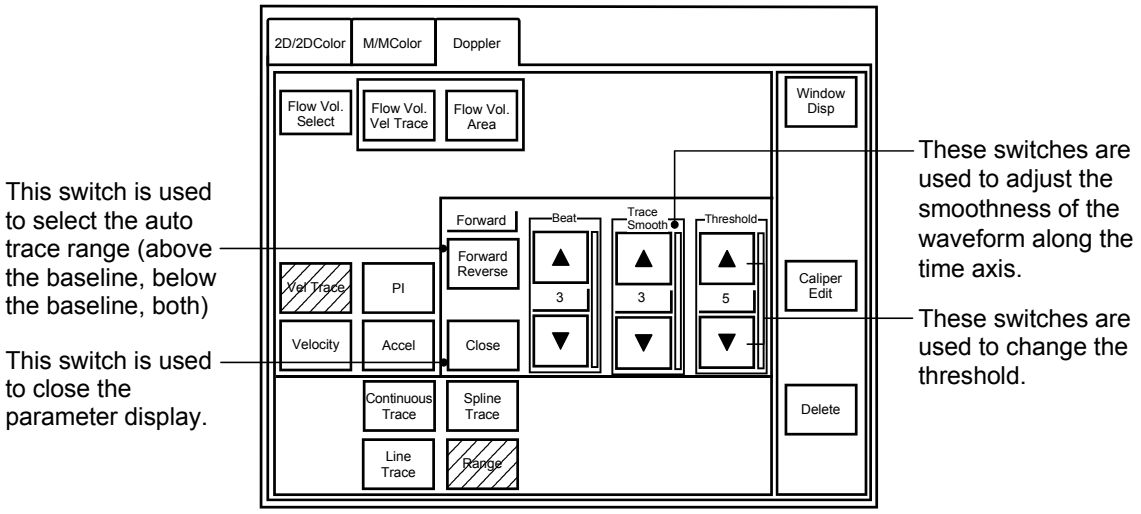
Velocity Time Integral	:	VTI A	999.9 (cm)
Maximum velocity	:	VP A	999.9 (cm/s)
Mean velocity	:	VM A	999.9 (cm/s)
Maximum pressure gradient	:	PPG A	999.9 (mmHg)
Mean pressure gradient	:	MPG A	99.99 (mmHg)

<<Measurement procedure>>

<General (other than Adult Heart)>



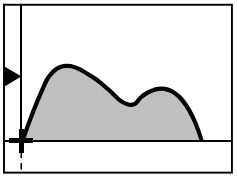
<When Adult Heart1, Adult Heart2, or Pediatric Heart is selected as an application preset>



(1) Press [Range] on the touch panel.
The parameters are displayed overlapping the basic measurement menu.

(2) Move the marker to the trace start point and press 

.



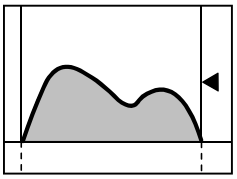
Display ▶ as a vertical line as the indicator.

- To display ▶ above the baseline: Forward (The vertical line above the base line is a solid line and that below the base line is a dotted line.)
- To display ▶ near the baseline: All (The entire vertical line is a solid line.)
- To display ▶ below the baseline: Reverse (The vertical line above the base line is a dotted line and that below the base line is a solid line.)

(3) Move the marker to the trace end point and press 

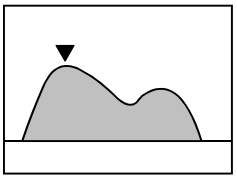
.

Auto-tracing is started.



(4) When auto tracing is completed, the measurement result is displayed.

* Adjust the trace line as required using the parameter switches.



<<Modifying a measurement>>

Refer to subsection 6.5.1 "Continuous Trace".

<<Deleting a measurement>>

Refer to subsection 6.5.1 "Continuous Trace".

6.5.5 Auto Range

The waveforms for the number of heartbeats are traced automatically without specifying the range.

<<Measurement result display>>

Maximum velocity	:	Vmax A	999.9 (cm/s)
Minimum velocity	:	Vmin A	999.9 (cm/s)
Velocity at end diastole	:	Ved A	999.9 (cm/s)
Mean velocity	:	Vm A	999.9 (cm/s)
Mean velocity of peak trace	:	Vm_peak A	999.9 (cm/s)
Mean velocity of mean trace	:	Vm_mean A	999.9 (cm/s)
PI	:	PI A	99.99*[1]
RI	:	RI A	99.99*[1]
S/D	:	S/D A	99.99

*1: Whether Vmin or Ved is used for calculating PI can be preset.

$$PI = (Vmax - Vmin)/Vm\_peak$$
$$PI = (Vmax - Ved)/Vm\_peak$$

*2: Whether Vmin or Ved is used for calculating RI can be preset.

$$RI = (Vmax - Vmin)/Vmax$$
$$RI = (Vmax - Ved)/Vmax$$

- The number of waveforms to be recognized can be selected from among 1, 2, 3, 4, 5, 6, 7, and 8.
- In this Auto Range measurement, when the number of waveforms that are displayed on the screen is fewer than that specified, the maximum number of available waveforms is recognized.

<Example>

If the number of heartbeats is set to "8" on the touch panel, but only five waveforms are displayed on the screen, auto-tracing is performed for the waveforms of the five heartbeats.

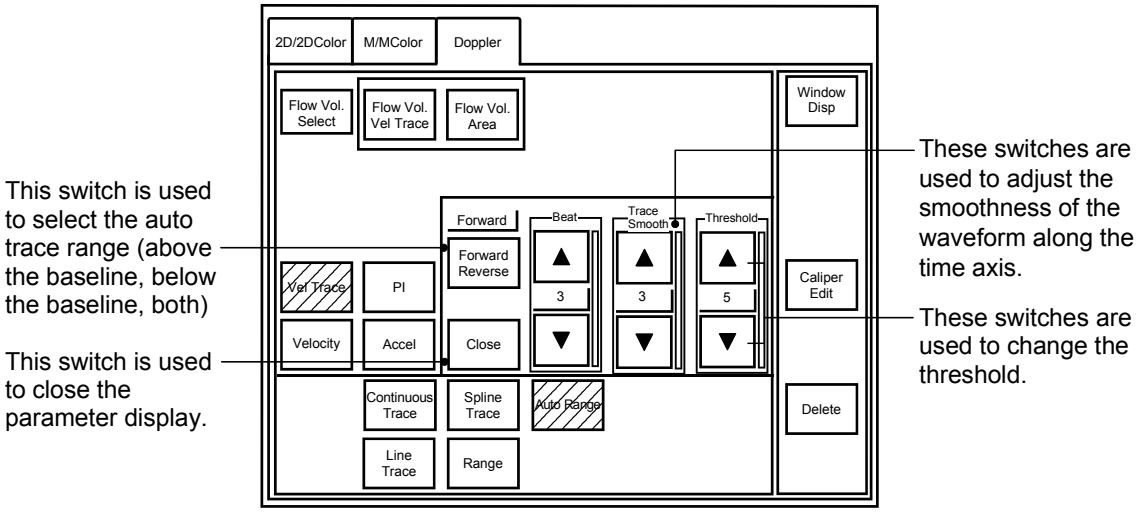
- When the number of heartbeats is changed by rotating the MEAS EDIT dial, the value set in [Beat] on the touch panel is updated accordingly.
- The number of heartbeats last set is saved for each application preset. The saved number of heartbeats is used the next time Auto Range measurement is started.
- If no waveform is recognized, the screen displays a marker for the trace start point as in Range measurement.

⚠CAUTION: **The Doppler waveform tracing result may be unsatisfactory, depending on the conditions (for example, the Doppler waveform displayed on the monitor may not be stable or may contain significant noise).**

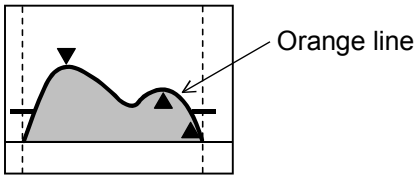
Before pressing [SET] on the operating panel to accept the measurement results, confirm that Doppler waveform tracing has been performed correctly.

If the automatic trace results are not satisfactory, select [Range], specify the trace range, and perform measurement again. Or, select [Continuous Trace], trace the waveform manually, and perform measurement again.

<<Measurement procedure>>



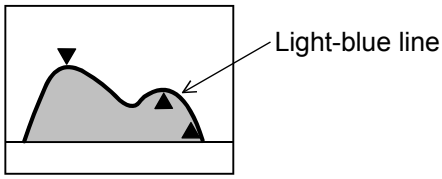
(1) Press [Auto Range] on the touch panel. The parameters are displayed on the touch panel. The Doppler heartbeat waveform is automatically recognized, and the trace line and measured value of the recognized waveform are displayed.



* Press the parameter switch to adjust the trace line as necessary.
* Use the trackball to move the waveform to be traced.
* Change the number of waveforms to be recognized using the MEAS EDIT dial. The number of waveforms to be recognized is increased by rotating the dial clockwise and decreased by rotating the dial counterclockwise.
* If no waveform is recognized, the same measurement is performed as in Range measurement.

(2) Press 

to set the trace.



* The number of heartbeats (value set in [Beat]) is saved for each application preset as the number of waveforms to be recognized. This is used the next time Auto Range measurement is started.

<<Modifying a measurement>>

Refer to subsection 6.5.1 "Continuous Trace".

<<Deleting a measurement>>

Refer to subsection 6.5.1 "Continuous Trace".

6.6 PI Measurement (PI Trace)

The PI and other items are measured by tracing the Doppler waveform.

Specify whether Vmin or Ved is used for calculating PI using the preset menu. Refer to section 2 "Setting the Presets" for the procedure.

* $PI = (Vmax - Vmin)/Vm\_peak$
* $PI = (Vmax - Ved)/Vm\_peak$

In the same way as for the velocity trace measurement (Vel Trace), the trace method can be selected from among the following four methods by pressing the corresponding switch on the touch panel. The default trace method can be changed through presetting.

<When Adult Heart1, Adult Heart2, or Pediatric Heart is selected as an application preset>

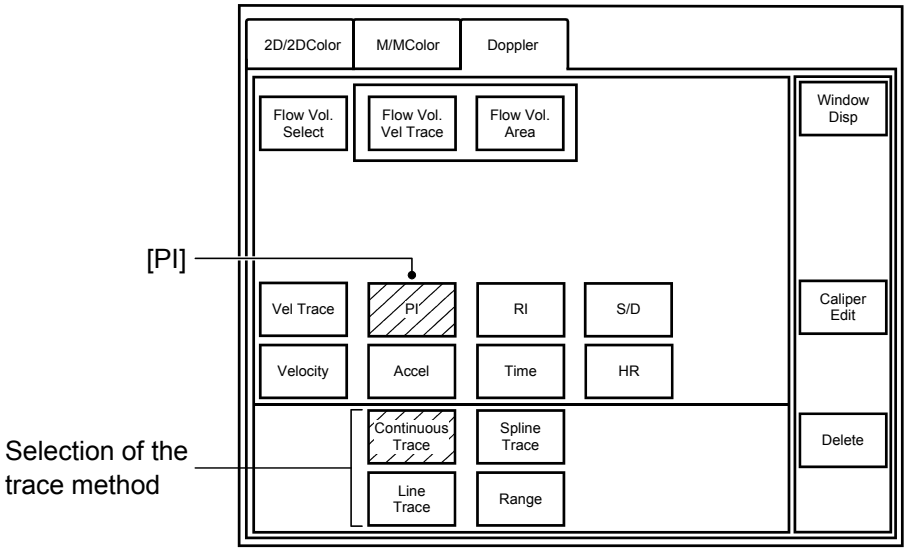
Switch on the touch panel	Trace method
Continuous Trace	The user traces the Doppler waveform freehand from the specified start point to the end point using the trackball.
Spline Trace	The Doppler waveform within the specified range is traced by interpolating three or more user-specified points (including the start and end points) using a spline curve.
Line Trace	The user traces the Doppler waveform using straight line segments.
Range	The Doppler waveform in the specified range is traced automatically.

<General (other than Adult Heart)>

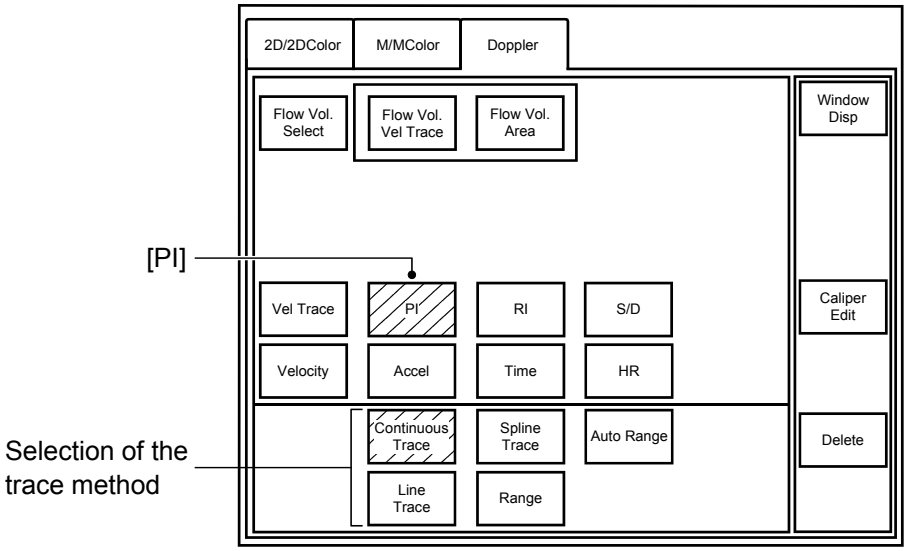
Switch on the touch panel	Trace method
Continuous Trace	The user traces the Doppler waveform freehand from the specified start point to the end point using the trackball.
Spline Trace	The Doppler waveform within the specified range is traced by interpolating three or more user-specified points (including the start and end points) using a spline curve.
Line Trace	The user traces the Doppler waveform using straight line segments.
Range	The Doppler waveform in the specified range is traced automatically.
Auto Range	The Doppler waveform is automatically traced by recognizing the Doppler heartbeat without specifying the range.

<<Menu display on the touch panel>>

<When Adult Heart1, Adult Heart2, or Pediatric Heart is selected as an application preset>



<General (other than Adult Heart)>



<<Measurement procedure>>

The measurement procedure is the same as for the velocity trace measurement (Vel Trace).

For details, refer to subsections 6.5.1 "Continuous Trace", 6.5.2 "Spline Trace", 6.5.3 "Line Trace", 6.5.4 "Range", and 6.5.5 "Auto Range".

<<Measurement result display>>

PI	: PI	9.99	
Maximum velocity	: Vmax A	999.9	(cm/s)
Minimum velocity	: Vmin A	999.9	(cm/s)
Velocity at end diastole	: Ved A	999.9	(cm/s)
Mean velocity	: Vm A	999.9	(cm/s) *1

*1: When [Range] (auto trace) or [Auto Range] is selected, the mean velocity is displayed in the following format:

Vm_peak 999.9 (cm/s)

6.7 RI Measurement

RI is calculated by measuring the velocity at two points.

Whether Vmin or Ved is used for calculating RI can be preset. For the setting procedure, refer to section 2 "Setting the Presets" for details.

* $RI = (Vmax - Vmin)/Vm\_peak$
* $RI = (Vmax - Ved)/Vm\_peak$

<<Measurement result display>>

The result display varies according to the items selected in the presets.

<When Vmin is selected>

RI	:	RI A	9.99
Maximum velocity	:	Vmax A	999.9 (cm/s)
Minimum velocity	:	Vmin A	999.9 (cm/s)

<When Ved is selected>

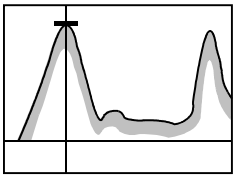
RI	:	RI A	9.99
Maximum velocity	:	Vmax A	999.9 (cm/s)
Velocity at end diastole	:	Ved A	999.9 (cm/s)

<<Measurement procedure>>

(1) Press [RI] on the touch panel. A marker is displayed.

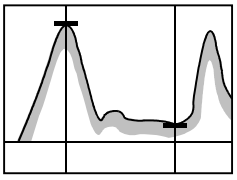
(2) Move the marker to the maximum velocity point and press 

.



(3) Move the marker to the minimum velocity point and press 

.
The measurement data is fixed and the results are displayed.

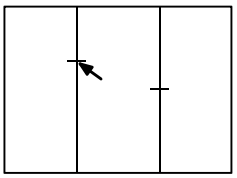


<<Modifying a measurement>>

(1) Press [Caliper Edit] on the touch panel. An arrow is displayed.

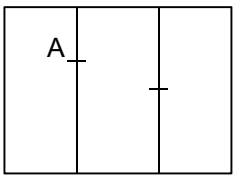
(2) Place the arrow on the marker to be moved and press 

.



(3) Move the marker to the desired position and press 

.

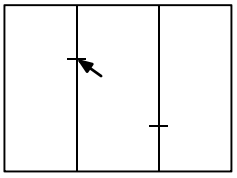


<<Deleting a measurement>>

(1) Press [Caliper Edit] on the touch panel. An arrow is displayed.

(2) Place the arrow on one of the markers and press 

.



(3) Press [Delete] on the touch panel.
The measurement associated with the selected marker is deleted.

6.8 S/D Measurement

S/D is calculated by measuring the velocity at two points.

$$S/D = Vmax/Ved$$

<<Measurement result display>>

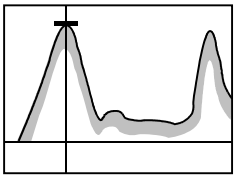
S/D	:	S/D A	9.99
Maximum velocity	:	Vmax A	999.9 (cm/s)
Velocity at end diastole	:	Ved A	999.9 (cm/s)

<<Measurement procedure>>

(1) Press [S/D] on the touch panel. A marker is displayed.

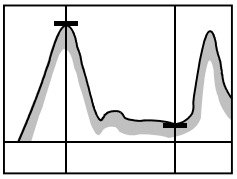
(2) Move the marker to the maximum velocity point and press 

.



(3) Move the marker to the end-diastole velocity point and press 

.
The measurement data is fixed and the results are displayed.



<<Modifying or deleting a measurement>>

S/D measurement can be modified or deleted using the same procedure as for RI measurement. Refer to subsection 6.7 "RI Measurement" for details.

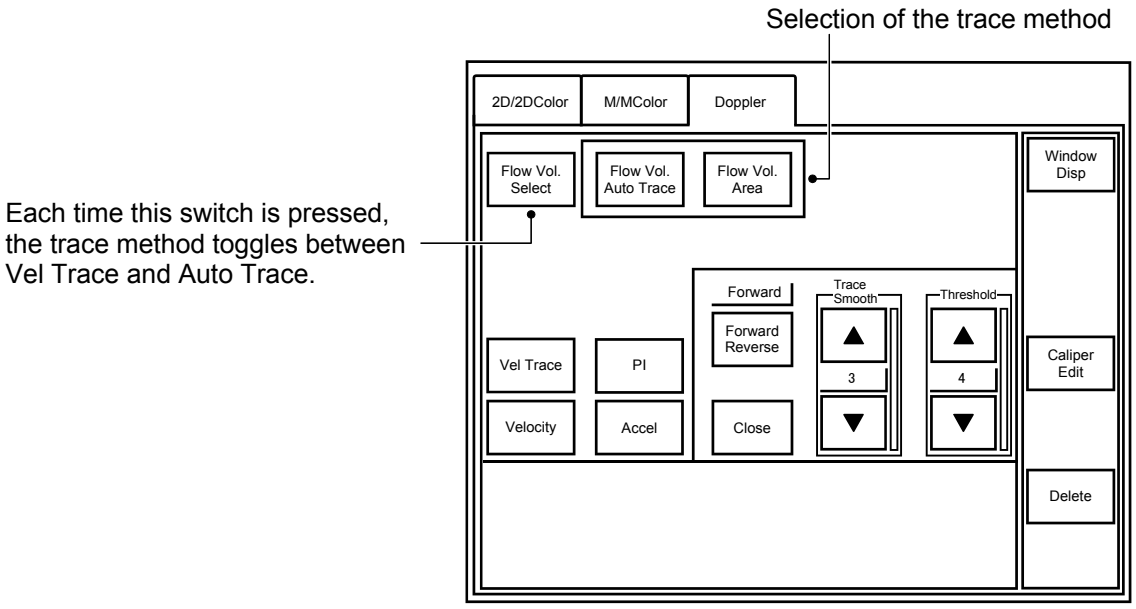
6.9 Flow Volume Trace Measurement (Flow Volume)

The flow velocity is measured by tracing the Doppler waveform in Doppler mode, and the elliptical area (blood vessel cross-sectional area) is obtained by measuring the lengths of the long axis and short axis of the vessel in 2D mode. Based on these measurement results, the flow volume is calculated.

The following two trace methods are provided. Each time [Flow Vol. Select] on the touch panel is pressed, the trace method toggles between Vel Trace and Auto Trace. The default trace method can be changed through presetting. The calculation formulas can also be selected through presetting. Refer to section 2 "Setting the Presets" for details.

Switch on the touch panel	Trace method
Flow Vol. Vel Trace	The user traces the Doppler waveform freehand from the specified start point to the end point using the trackball
Flow Vol. Auto Trace	The Doppler waveform in the specified range is traced automatically.

<<Menu display on the touch panel>>



<<Measurement result display>>

The result display varies according to the items selected in the Application Presets.

<Standard (other than Adult-Heart)>

Flow volume	: Flow Vol A	9.99 (L/min)	*1
Maximum velocity	: Vmax A	999.9 (cm/s)	
Minimum velocity	: Vmin A	999.9 (cm/s)	
Velocity at end diastole	: Ved A	999.9 (cm/s)	
Mean velocity for peak trace	: Vm_peak A	999.9 (cm/s)	
Mean velocity for mean trace	: Vm_mean A	999.9 (cm/s)	
PI	: PIA	9.99	*2
RI	: RIA	9.99	*3
S/D	: S/D A	9.99	*4
Elliptical area	: Area A	99.9 (mm^2)	
Length of the long axis of the vessel	: Dist1 A	99.9 (mm)	
Length of the short axis of the vessel	: Dist2 A	99.9 (mm)	

*1: Either of the following two methods can be preset to calculate the Flow Volume.

The trace for the item (Vm_peak or Vm_mean) to be used for calculating the flow volume is displayed light blue. The trace for the item not used for calculation is displayed dark blue.

- $Flow\ Vol\ (L/min) = Vm\_peak\ (cm/s) \times 60\ (s/min) \times Area\ (mm^2)/100/1000$
- $Flow\ Vol\ (L/min) = Vm\_mean\ (cm/s) \times 60\ (s/min) \times Area\ (mm^2)/100/1000$

*2: Whether Vmin or Ved is used for calculating PI can be preset.

- $PI = (Vmax - Vmin)/Vm\_peak$
- $PI = (Vmax - Ved)/Vm\_peak$

*3: Whether Vmin or Ved is used for calculating RI can be preset.

- $RI = (Vmax - Vmin)/Vmax$
- $RI = (Vmax - Ved)/Vmax$

*4: S/D calculation formula

- $S/D = Vmax/Ved$

<When Adult-Heart is selected in the Application Presets>

Stroke volume	: SV A	99.9 (mL)
Cardiac output	: CO A	9.99 (L/min)
Velocity Time Integral	: VTI	999.9 (cm/s)
Maximum velocity	: VP A	999.9 (cm/s)
Maximum pressure gradient	: PPG A	999.9 (mmHg)
Mean pressure gradient	: MPG A	999.9 (mmHg)
Elliptical area	: Area A	999.9 (mm^2)
Longer diameter of the vessel	: Dist1 A	99.9 (mm)
Shorter diameter of the vessel	: Dist2 A	99.9 (mm)

* When the optional ECG unit is used, the heart rate is displayed automatically when the flow volume measurement is determined.

<<Measurement procedure>>

(1) Measure the velocity by tracing the Doppler waveform in Doppler mode.

Each time [Flow Vol. Select] is pressed, the label of the switch on the right toggles between [Flow Vol. Vel Trace] and [Flow Vol. Auto Trace] and the trace method is changed accordingly.

(a) To perform freehand tracing

Press [Flow Vol. Vel Trace] on the touch panel and trace the Doppler waveform using the trackball.

For the detailed measurement procedure, refer to subsection 6.5.1 "Continuous Trace".

(b) To perform automatic tracing

For a measurement other than Carotid measurement, press [Flow Vol. Auto Trace] on the touch panel and specify the trace range.

For Carotid measurement, the trace range is set automatically by the Auto Range function when [Flow Vol. Auto Trace] is pressed.

For the detailed measurement procedure, refer to subsections 6.5.4 "Range" and 6.5.5 "Auto Range".

(2) Measure the cross-sectional area of the blood vessel using the elliptical approximation method.

For the detailed measurement procedure, refer to subsection 3.4.3 "Ellipse".

<<Modifying or deleting a measurement>>

For the modification and deletion procedures for Doppler trace measurement, refer to subsections 6.5.1 "Continuous trace", 6.5.4 "Range", and 6.5.5 "Auto Range". For the modification and deletion procedures for elliptical area measurement, refer to subsection 3.4.3 "Ellipse".

7. Application Measurement (Cardiac)

7.1 Introduction

7.1.1 Starting the application measurement

Select Adult Heart on the Patient Information screen or on the Application Preset screen. Press CALC. The menu for the application measurement is displayed on the touch panel. Press the switch for the desired measurement on the touch menu.

The application measurement menu to be displayed when CALC is pressed varies according to the presetting. The measurement marker settings can also be changed by presetting. Refer to section 2 "Setting the Presets" for details.

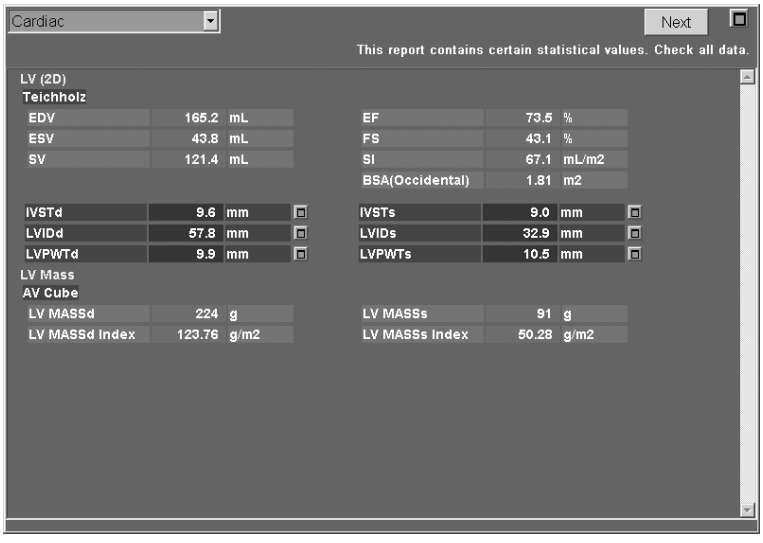
7.1.2 Modifying a measurement

A measurement can be modified after [Caliper Edit] on the touch panel is pressed. For the detailed procedure, refer to the section describing the corresponding basic measurement.

7.1.3 Displaying the Report screen

Press REPORT to display the Report screen.

On the Report screen, all the measurement and calculation results obtained in the application measurement are displayed.



<Example of Report screen for application measurement (Cardiac)>

7.1.4 Heart rate acquisition methods

The heart rate is measured during LV measurement, aortic valve measurement, mitral valve measurement, and pulmonary valve measurement.

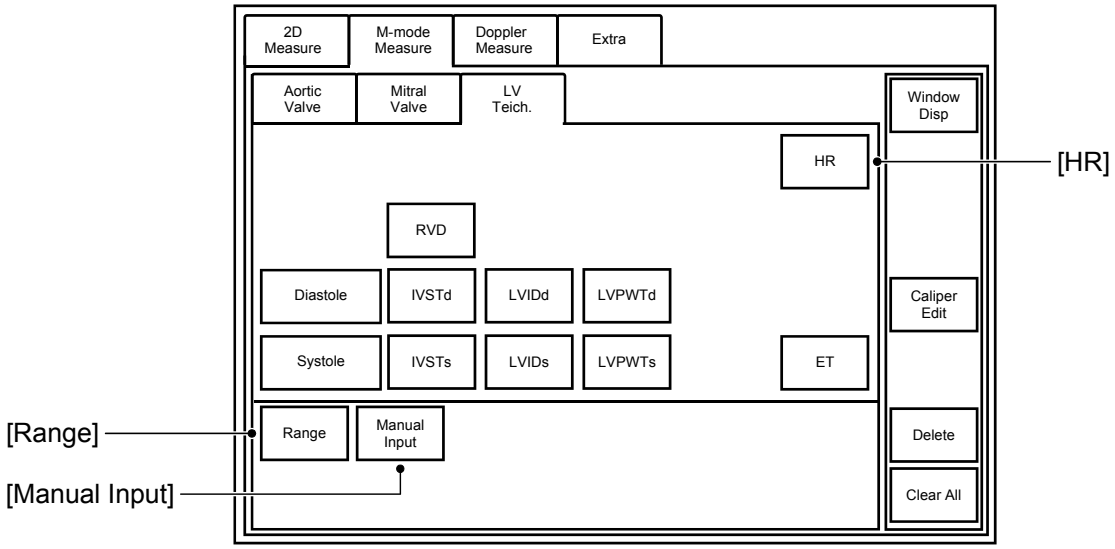
The heart rate can be obtained by the following three methods.

(1) The heart rate is acquired automatically from the ECG.

When the optional ECG unit is connected to the system and measurement is performed for an item requiring the heart rate, the heart rate is displayed automatically.

(2) The heart rate is calculated based on the Range measurement result (in M mode and Doppler mode).

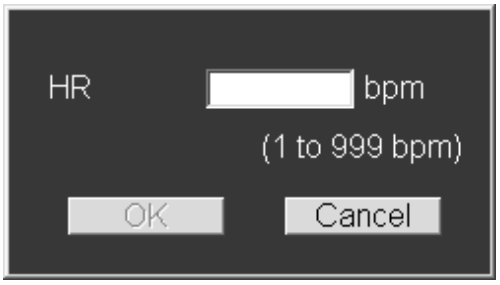
Pressing [HR] on the touch panel displays [Range] and [Manual Input] on the touch panel. When [Range] is pressed and the range corresponding to the number of cardiac cycles is specified, the heart rate is calculated. For details, refer to the section describing the heart rate measurement in the basic measurements (M mode/Doppler mode).



Measurement menu for M-mode LV measurement using the Teichholz method (example)

(3) The heart rate is entered manually.

When [Manual Input] on the touch panel is pressed, a dialog box is displayed on the monitor. Enter the desired value and press [OK].



⚠CAUTION:

1. **In Dual-display mode, the heart rate for the most recently frozen image is displayed. For example, when the image on the left has been frozen most recently, the heart rate for that image is also displayed on the image on the right.**
2. **When a patient with an unstable heartbeat, such as a patient with atrial fibrillation, is to be examined, enter a heart rate using the Manual Input dialog box.**
3. **The heart rate displayed on the 2D (including color etc.) + PW/CW screen represents the heart rate obtained at the instant the PW/CW image is stopped.**

   **For example, when the PW/CW image is stopped by pressing 

and then the 2D image is frozen, the displayed heart rate represents the heart rate at the time the PW/CW image is stopped, not at the time the Freeze switch is pressed.**
4. **Confirm that the ECG waveform is displayed correctly. If the ECG waveform is not displayed correctly, an incorrect heart rate value may be displayed due to noise.**
5. **When ECG is not used, turn OFF the ECG monitor. Otherwise, an incorrect heart rate value may be displayed due to noise from the ECG monitor.**

7.1.5 BSA (body surface area) calculation methods

BSA (m^2) is calculated when patient height (cm) and weight (kg) are entered on the Patient Information screen.

The following expressions are available for calculating BSA. The desired expression can be selected from a pull-down menu.

1. Occidental

   $BSA = 0.007184 \times Height^{0.725} \times Weight^{0.425}$
2. Oriental (Adult)

   $BSA = 0.007358 \times Height^{0.725} \times Weight^{0.425}$
3. Oriental (12-14)

   $BSA = 0.010265 \times Height^{0.651} \times Weight^{0.423}$
4. Oriental (6-11)

   $BSA = 0.008883 \times Height^{0.663} \times Weight^{0.444}$
5. Oriental (1-5)

   $BSA = 0.038189 \times Height^{0.362} \times Weight^{0.423}$
6. Oriental (0)

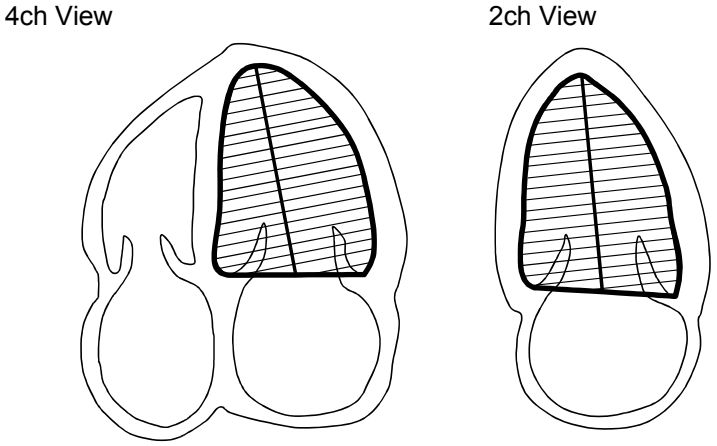
   $BSA = 0.009568 \times Height^{0.655} \times Weight^{0.473}$

7.2 2D-Mode Measurements (Cardiac)

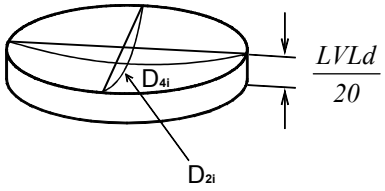
7.2.1 LV measurement LA measurement (MOD Simpson method)

The left ventricular long axis is specified by tracing the left ventricular endocardium on the apical long-axis cross-sectional images (two-chamber and four-chamber cross-sectional images) acquired in 2D mode. The LV volume is calculated as the sum of the volumes of 20 elliptic disks perpendicular to the LV long axis.

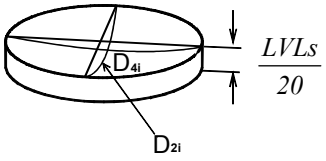
Calculation is also possible using only a two-chamber or four-chamber cross-sectional image. In this case, the LV volume is calculated as the sum of the volumes of revolution set on the corresponding images.



Volume of the i-th disk at end diastole



Volume of the i-th disk at end systole



<<Measurement items>>

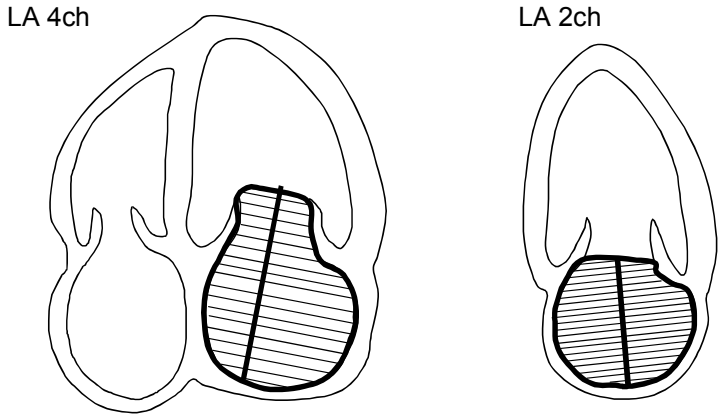
Touch panel switch	Measurement methods	Result display
2ch Diast	Tracing of the end-diastolic LV endocardium on the two-chamber cross-sectional image and setting of the LV long axis position	LVAd2 (cm^2) LVLd2 (mm) EDV2 (mL)
2ch Syst	Tracing of the end-systolic LV endocardium on the two-chamber cross-sectional image and setting of the LV long axis position	LVAs2 (cm^2) LVLs2 (mm) ESV2 (mL)
4ch Diast	Tracing of the end-diastolic LV endocardium on the four-chamber cross-sectional image and setting of the LV long axis position	LVAd4 (cm^2) LVLd4 (mm) EDV4 (mL)
4ch Syst	Tracing of the end-systolic LV endocardium on the four-chamber cross-sectional image and setting of the LV long axis position	LVAs4 (cm^2) LVLs4 (mm) ESV4 (mL)
HR	Heart rate	HR (bpm)

<<Calculation items>>

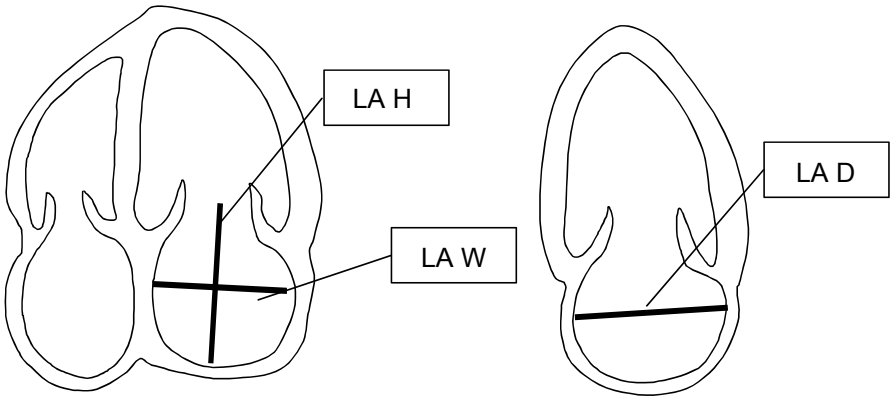
Calculation item	Calculation formula	Item to be calculated	Unit
EDV	$\frac{\pi}{4} \times \frac{LVLd}{20} \times \sum_{i=l}^{20} (Distance_{2i} \times Distance_{4i}) \times \frac{1}{1000}$ LVLd : The longer of the LV long axis lengths at end diastole in the two-chamber and four-chamber views. $Distance_{2i}$: Disk diameter in the two-chamber view $Distance_{4i}$: Disk diameter in the four-chamber view	End-diastolic LV volume	mL
ESV	$\frac{\pi}{4} \times \frac{LVLs}{20} \times \sum_{i=l}^{20} (Distance_{2i} \times Distance_{4i}) \times \frac{1}{1000}$ LVLs : The longer of the LV long axis lengths at end systole in the two-chamber and four-chamber views. $Distance_{2i}$: Disk diameter in the two-chamber view $Distance_{4i}$: Disk diameter in the four-chamber view	End-systolic LV volume	mL
SV	$EDV - ESV$	Stroke volume	mL
CO	$HR \times SV \times \frac{1}{1000}$	Cardiac output	L/min
EF	$100 \times (SV/EDV)$	Ejection fraction	%
SI	SV/BSA	SV Index	mL/m^2
CI	CO/BSA	CO Index	$L/min/m^2$
SV4	$EDV4 - ESV4$	–	mL
CO4	$HR \times SV4 \times \frac{1}{1000}$	–	L/min
EF4	$100 \times (SV4/EDV4)$	–	%
SI4	$SV4/BSA$	–	mL/m^2
CI4	$CO4/BSA$	–	$L/min/m^2$
SV2	$EDV2 - ESV2$	–	mL
CO2	$HR \times SV2 \times \frac{1}{1000}$	–	L/min
EF2	$100 \times (SV2/EDV2)$	–	%
SI2	$SV2/BSA$	–	mL/m^2
CI2	$CO2/BSA$	–	$L/min/m^2$
LVLd Diff	$\frac{100 \times (LVLd4 - LVLd2)}{LVLd2}$	End-diastolic LV long axis length difference	%
LVLs Diff	$\frac{100 \times (LVLs4 - LVLs2)}{LVLs2}$	End-systolic LV long axis length difference	%
BSA	Refer to subsection 7.1.5.	Body surface area	m^2

The left atrial long axis is specified by tracing the left atrial endocardium on the apical long-axis cross-sectional images (two-chamber and four-chamber cross-sectional images) acquired in 2D mode. The LA volume is calculated as the sum of the volumes of 20 elliptic disks perpendicular to the LA long axis.

Calculation is also possible using only a two-chamber or four-chamber cross-sectional image. In this case, the LA volume is calculated as the sum of the volumes of revolution set on the corresponding images.



The width and height of the left atrium are measured on the apical long-axis cross-sectional image (four-chamber cross-sectional image) acquired in 2D mode, and the depth of the left atrium is measured on the two-chamber cross-sectional image. Based on these three measurement values, the LA volume is calculated.



<<Measurement items>>

Switch	Measurement method	Result display
LA 4ch	The LA endocardium is traced on the four-chamber cross-sectional image and the LA long-axis position is set.	LAa4 (cm^2) LAd4 (mm) LAV4 (mL)
LA 2ch	The LA endocardium is traced on the two-chamber cross-sectional image and the LA long-axis position is set.	LAa2 (cm^2) LAd2 (mm) LAV2 (mL)
LA W	The LA width is measured.	LA W (mm)
LA H	The LA height is measured.	LA H (mm)
LA D	The LA depth is measured.	LA D (mm)

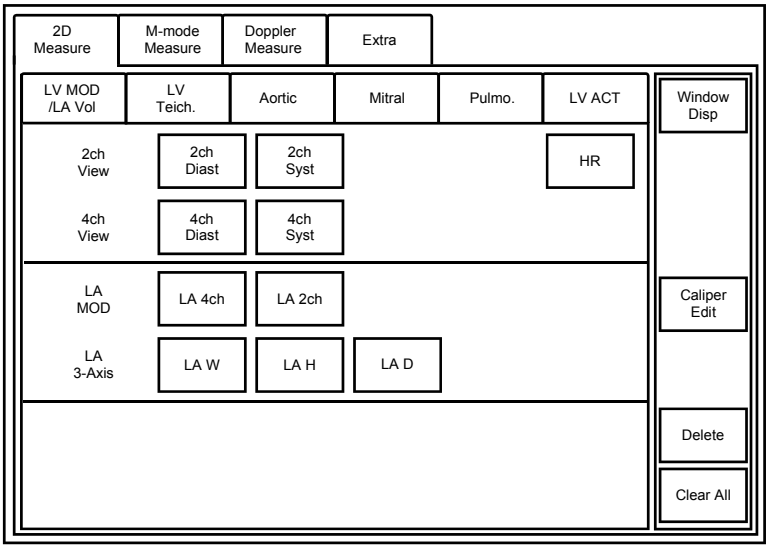
<<Calculation items>>

Calculation item	Calculation formula	Item to be calculated	Unit
LAV	$\frac{\pi}{4} \times \frac{LAL}{DiskCount} \times \sum_{i=1}^{DiskCount} \left(Distance_{2i} \times Distance_{4i} \right) \div 1000$ LAL : LA long-axis length measured on the four-chamber cross-sectional image or two-chamber cross-sectional image (longer of the two lengths) DiskCount : Number of divisions of the long axis 20 $Distance_{2i}$: Disk diameter in two-chamber view $Distance_{4i}$: Disk diameter in four-chamber view	LA volume	(mL)
LAVI	LAV/BSA	LAV Index	(mL/m^2)
LAVI2	LAV2/BSA	2ch View LAV Index	(mL/m^2)
LAVI4	LAV4/BSA	4ch View LAV Index	(mL/m^2)
LAV (AL)	8/3/PAI*LAa4*LAa2/ (L/10) L: shortest of LAd4 or LAd2	LV volume (Area-Length method)	(mL)
LAVI (AL)	LAV (AL)/BSA	LAV (AL) Index	(mL/m^2)
LA_Vol	PAI/6*LA W*LA H*LA D/1000	LA volume	(mL)
LA_VI	LA_Vol/BSA	LA_Vol Index	(mL/m^2)

<<Measurement procedure>>

(1) Display the end-diastolic LV four-chamber cross-sectional image.

(2) Press CALC. The menu shown below is displayed.



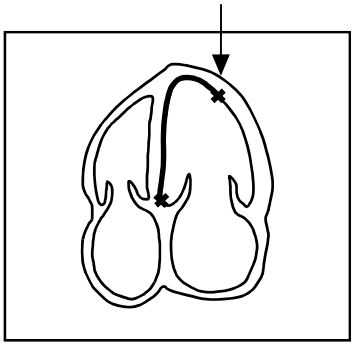
(3) Press [4ch Diast]. The marker is displayed.

(4) Follow steps (a) to (f) to measure the LV volume.

(a) Move the marker to the start point of the LV endocardium on the apical long-axis cross-sectional image, and press 

.

Example of continuous tracing
Spline tracing (setting points along the endocardium) is also possible.



(b) Trace the endocardium using the trackball.

<<To correct the trace during tracing>>

Undo the trace by rotating the MEAS EDIT dial and then draw the trace again.

The trace is deleted by the specified amount. 

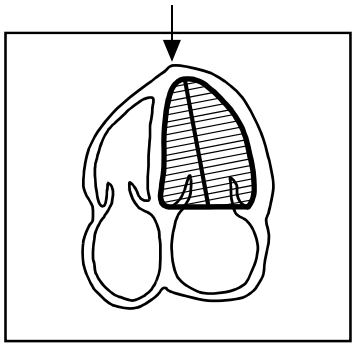
The deleted portion of the trace is restored.

(c) Press 

to conclude the measurement.

The system displays the LV long axis, which starts from the midpoint of the line connecting the start and end points, and also displays the lines dividing the LV long axis into 20 segments.

The LV long axis end point (apex) can be adjusted.



(d) If necessary, adjust the LV long axis end point (apex) position.

(e) Press 

to set the LV long axis and the segmentation lines. The LV volume is calculated as a sum of the volumes of 20 disks of revolution that are perpendicular to the LV long axis.

(f) The segmentation lines are deleted when the trackball is moved.

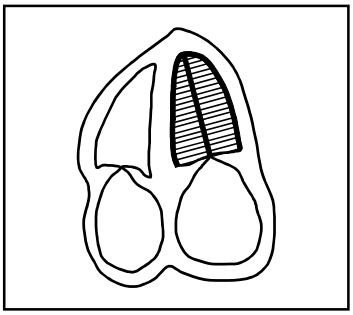
(5) Press the wheel of the trackball section to enter cine mode.

* The color of the  indicator at the bottom right of the monitor changes to orange.

(6) Use the trackball to display the end-systolic four-chamber cross-sectional image on the cine screen.

(7) Press [4ch Syst]. The marker is displayed.

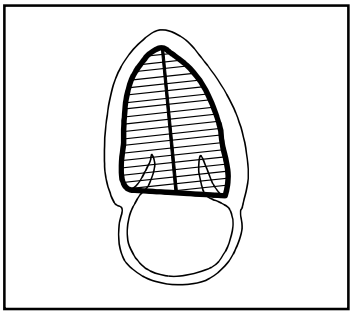
(8) Repeat steps (a) to (f) in (4) to measure the LV volume on the end-systolic four-chamber cross-sectional image.



(9) Display the end-diastolic two-chamber cross-sectional image.

(10) Press [2ch Diast]. The marker is displayed.

(11) Repeat steps (a) to (f) in (4) to measure the LV volume on the end-diastolic two-chamber cross-sectional image.

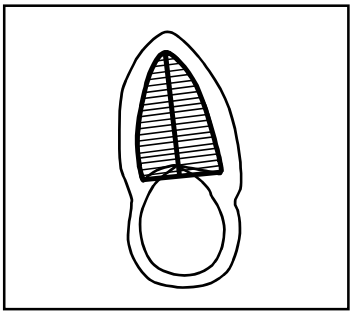


(12) Press the wheel of the trackball section to enter cine mode.

(13) Use the trackball to display the end-systolic two-chamber cross-sectional image on the cine screen.

(14) Press [2ch Syst]. The marker is displayed.

(15) Repeat steps (a) to (f) in (4) to measure the LV volume on the end-systolic two-chamber cross-sectional image.



(16) Based on the end-diastolic four-chamber and two-chamber cross-sectional images and the end-systolic four-chamber and two-chamber cross-sectional images, the LV volumes at end diastole and end systole are displayed as the sum of elliptic disks.

NOTE:
1. Continuous Trace or Spline Trace can be selected for tracing the LV endocardium. For the procedure for changing the tracing method, refer to section 2 "Setting the Presets".

2. Whether the measurement marker remains displayed on the images or not during frame-advance playback in cine mode can be set. For the procedure for changing the preset, refer to section 2 "Setting the Presets".

3. When the optional ECG unit is connected to the system, the heart rate is automatically calculated from the ECG and displayed when the 2ch or 4ch Diast measurement value is determined.
   It is also possible to enter the heart rate manually. For the manual entry procedure, refer to subsection 7.1.4 "Heart rate acquisition methods".

7.2.2 LV measurement (Teichholz method)

<<Measurement items>>

Touch panel switch		Item to be measured	Result display
Diastole	RVD	Right ventricular diameter	RVD (mm)
	IVSTd	Interventricular septal thickness at end diastole	IVSTd (mm)
	LVIDd	LV short-axis diameter at end diastole	LVIDd (mm)
	LVPWTd	LV posterior wall thickness at end diastole	LVPWTd (mm)
Systole	IVSTs	Interventricular septal thickness at end systole	IVSTs (mm)
	LVIDs	LV short-axis diameter at end systole	LVIDs (mm)
	LVPWTs	LV posterior wall thickness at end systole	LVPWTs (mm)
HR		Heart rate	HR (bpm)

<<Calculation items>>

Calculation item	Calculation formula	Item to be calculated	Unit
EDV	$(7 \times LVIDd^3/1000)/(2.4 + (LVIDd/10))$	LV volume at end diastole	mL
ESV	$(7 \times LVIDs^3/1000)/(2.4 + (LVIDs/10))$	LV volume at end systole	mL
SV	$EDV - ESV$	Stroke volume	mL
CO	$HR \times SV/1000$	Cardiac output	L/min
EF	$100 \times SV/EDV$	Ejection fraction	%
FS	$100 \times (LVIDd - LVIDs)/LVIDd$	Fractional shortening	%
SI	SV/BSA	SV Index	mL/m^2
CI	CO/BSA	CO Index	$L/min/m^2$
BSA	Refer to subsection 7.1.5.	Body surface area	m^2
*LV MASSd (ASE-Cube)	$1.04 \times ((LVIDd + IVSTd + LVPWTd)^3 - LVIDd^3)/1000$	LV myocardial mass at end diastole	g
LV MASSd (Penn-Cube)	$1.04 \times ((LVIDd + IVSTd + LVPWTd)^3 - LVIDd^3)/1000 - 13.6$	LV myocardial mass at end diastole	g
LV MASSd (Teichholz)	$1.04 \times \left[\frac{7.0 \times ((IVSTd + LVIDd + LVPWTd)/10)^3}{2.4 + IVSTd/10 + LVIDd/10 + LVPWTd/10} - \frac{7.0 \times (LVIDd/10)^3}{2.4 + LVIDd/10} \right]$	LV myocardial mass at end diastole	g
LV MASSd (AV-Cube)	$0.8 \times [1.04 \times ((LVIDd + IVSTd + LVPWTd)^3 - LVIDd^3)/1000] + 0.6$	LV myocardial mass at end diastole	g
*LV MASSs (ASE-Cube)	$1.04 \times ((LVIDs + IVSTs + LVPWTs)^3 - LVIDs^3)/1000$	LV myocardial mass at end systole	g
LV MASSs (Penn-Cube)	$1.04 \times ((LVIDs + IVSTs + LVPWTs)^3 - LVIDs^3)/1000 - 13.6$	LV myocardial mass at end systole	g
LV MASSs (Teichholz)	$1.04 \times \left[\frac{7.0 \times ((IVSTs + LVIDs + LVPWTs)/10)^3}{2.4 + IVSTs/10 + LVIDs/10 + LVPWTs/10} - \frac{7.0 \times (LVIDs/10)^3}{2.4 + LVIDs/10} \right]$	LV myocardial mass at end systole	g
LV MASSs (AV-Cube)	$0.8 \times [1.04 \times ((LVIDs + IVSTs + LVPWTs)^3 - LVIDs^3)/1000] + 0.6$	LV myocardial mass at end systole	g
LV MASSd Index	$LV\ MASSd/BSA$		g/m^2
LV MASSs Index	$LV\ MASSs/BSA$		g/m^2

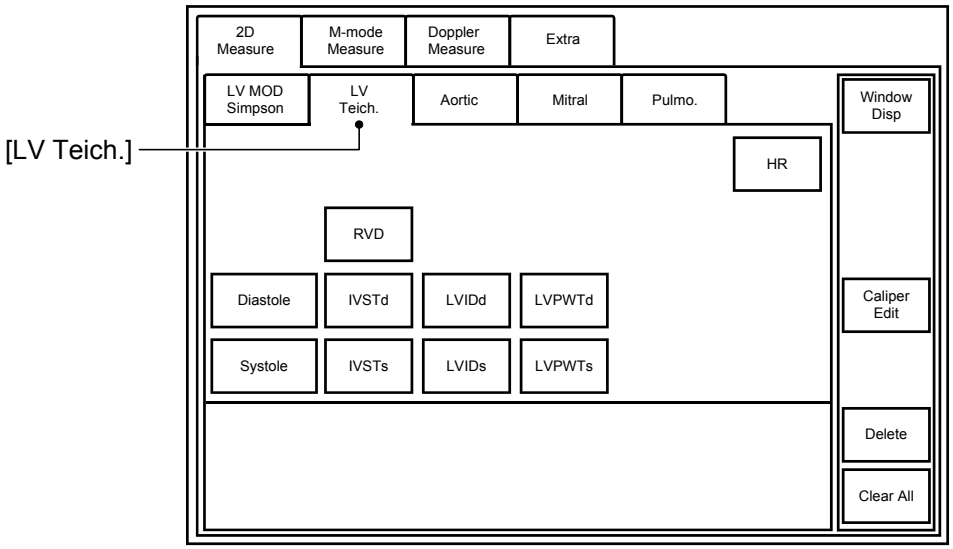
* The calculation methods for LV MASSd and LV MASSs can be selected and preset from among ASE-Cube, Penn-Cube, Teichholz, and AV-Cube. Refer to section 2 "Setting the Presets" for details.

<<Measurement procedure>>

(1) Display the end-diastolic LV cross-sectional image.

(2) Press CALC.

(3) Select [LV Teich.] from the application measurement menu. The menu shown below is displayed.



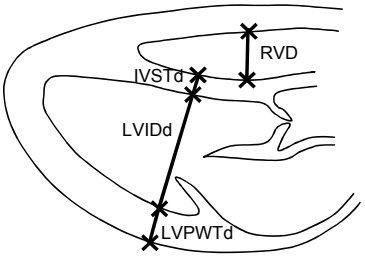
(4) Press [Diastole]. The measurement marker is displayed.

(5) Rotate the marker using the MEAS EDIT dial.

(6) Perform measurement in parallel using the 2D-mode distance measurement procedure.

* Either 4-segment (RVD-LVPWTd) or 3-segment (IVSTd-LVPWTd) can be set.

Diastole



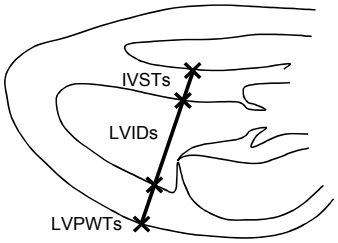
(7) Display the end-systolic LV cross-sectional image.

(8) Press [Systole]. The measurement marker is displayed.

(9) Rotate the marker using the MEAS EDIT dial.

(10) Perform measurement in parallel using the 2D-mode distance measurement procedure.

• Systole



NOTE: 1. Functions of the  switch

The LV measurement items set in a measurement sequence can be started one by one each time the  switch on the main panel is pressed, without pressing the corresponding measurement switch on the touch panel. The order of the items in the LV measurement sequence can be preset. Refer to section 2 "Setting the Presets" for details.

<Measurement start pattern>

(1) When Type 1 is selected for Next Sequence Type

The measurement changes cyclically in one of the following patterns depending on the item selected first.

- [Diastole] → [Systole]
- [RVD] → [IVSTd] → [LVIDd] → [LVPWTd] → [IVSTs] → [LVIDs] → [LVPWTs]

(2) When Type 2 is selected for Next Sequence Type

The measurement changes cyclically in one of the following patterns depending on the item selected first.

- [Diastole] → [LVIDs]
- [RVD] → [IVSTd] → [LVIDd] → [LVPWTd] → [LVIDs]
- [LVIDd] → [LVIDs]

2. Default angle of the measurement marker

The angle of the measurement marker to be displayed when [Diastole] is pressed can be preset. Refer to section 2 "Setting the Presets" for details.

3. Measurement items for Diastole

The segments to be measured in parallel after [Diastole] is pressed can be preset. Refer to section 2 "Setting the Presets" for details.

4. Acquisition of the heart rate

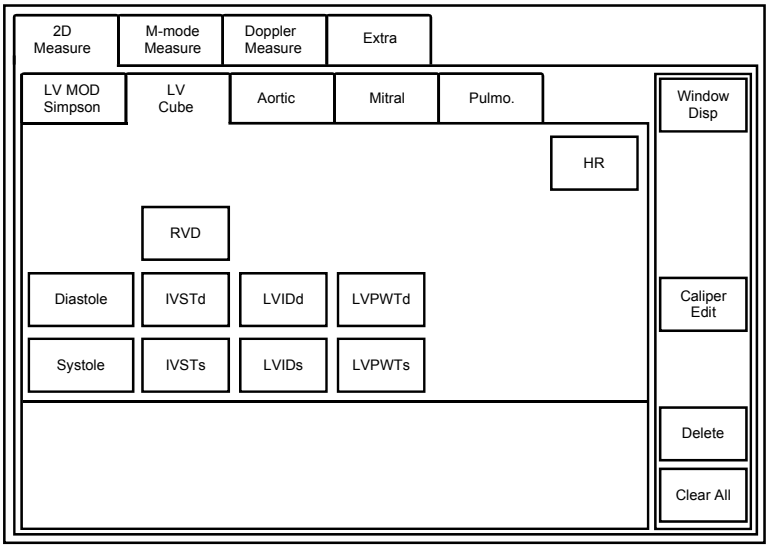
When the optional ECG unit is used, the heart rate is automatically calculated from the ECG and displayed when the LVIDd value is determined. It is also possible to enter the heart rate manually. For the manual entry procedure, refer to subsection 7.1.4 "Heart rate acquisition methods".

7.2.3 LV measurement (Cube method)

LV measurement (Cube method) can be preset instead of LV measurement (Teichholz method). Refer to section 2 "Setting the Presets" for the preset change procedures.

The measurement items, calculation items, measurement procedure, and measurement points are the same as for the Teichholz method (described in subsection 7.2.2). Only the LV volume calculation formula is different from that used in the Teichholz method.

<<Menu display on the touch panel>>



<<LV volume calculation formula>>

LV volume at end diastole

$$EDV = \left(\frac{LVIDd}{10} \right)^3$$

LV volume at end systole

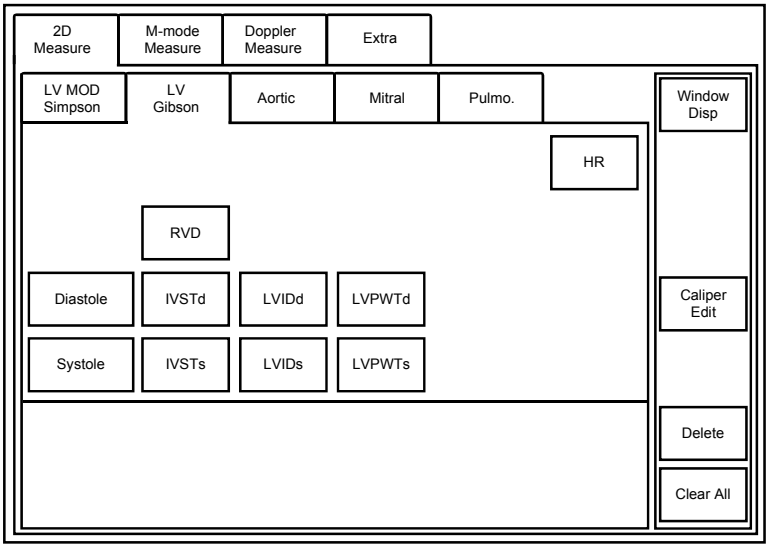
$$ESV = \left(\frac{LVIDs}{10} \right)^3$$

7.2.4 LV measurement (Gibson method)

LV measurement (Gibson method) can be preset instead of LV measurement (Teichholz method). Refer to section 2 "Setting the Presets" for the preset change procedure.

The measurement items, calculation items, measurement procedure, and measurement points are the same as for the Teichholz method (described in subsection 7.2.2). Only the LV volume calculation formula is different from that used in the Teichholz method.

<<Menu display on the touch panel>>



<<LV volume calculation formula>>

LV volume at end diastole

$$EDV = 0.52 \times \left(0.98 \times \frac{LVIDd}{10} + 5.90 \right) \times \left(\frac{LVIDd}{10} \right)^2$$

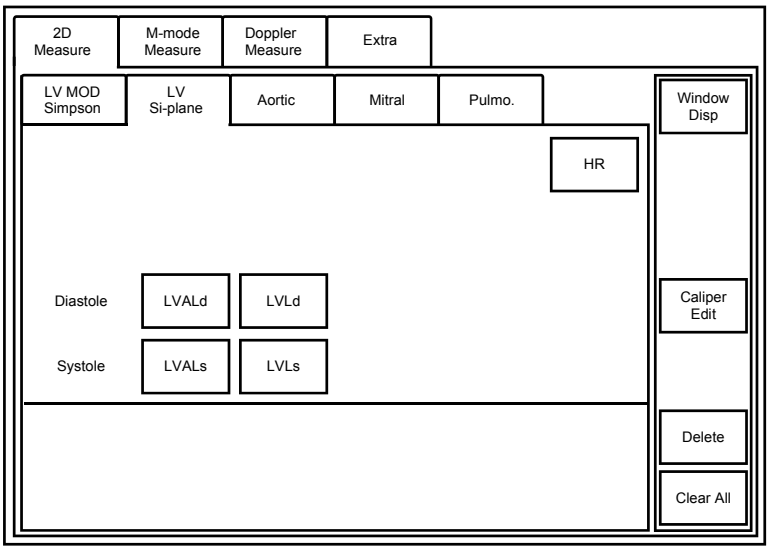
LV volume at end systole

$$ESV = 0.52 \times \left(1.14 \times \frac{LVIDs}{10} + 4.18 \right) \times \left(\frac{LVIDs}{10} \right)^2$$

7.2.5 LV measurement (Single-Plane (aka Area-Length) method)

LV measurement (Single-Plane (aka Area-Length) method) can be preset instead of LV measurement (Teichholz method). Refer to section 2 "Setting the Presets" for the preset change procedure.

<<Menu display on the touch panel>>



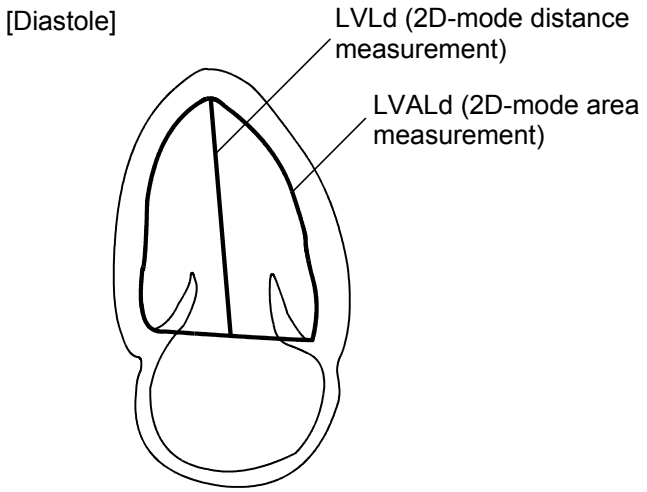
<<Measurement items>>

Touch panel switch	Measurement methods	Result display
LVALd	LV long-axis cross-sectional area at end diastole	LVALd (cm^2)
LVLd	LV long-axis length at end diastole	LVLd (mm)
LVALs	LV long-axis cross-sectional area at end systole	LVALs (cm^2)
LVLs	LV long-axis length at end systole	LVLs (mm)
HR	Heart rate	HR (bpm)

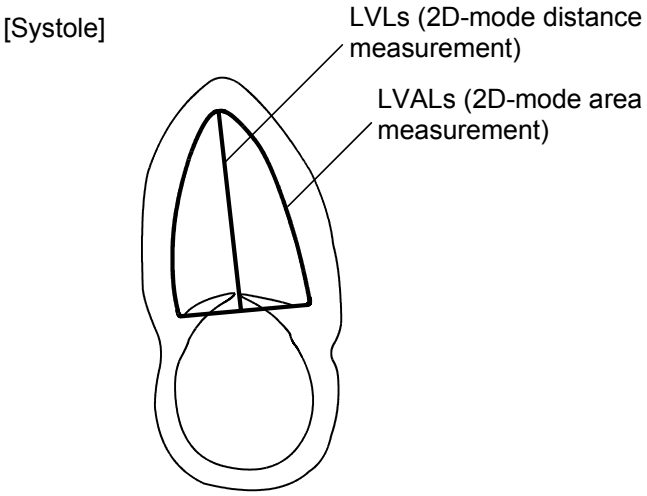
<<Calculation items>>

Calculation item	Calculation formula	Item to be calculated	Unit
EDV	$\frac{8}{3} \times \frac{(LVALd)^2}{\pi \times (LVLd/10)}$	LV volume at end diastole	mL
ESV	$\frac{8}{3} \times \frac{(LVALs)^2}{\pi \times (LVLs/10)}$	LV volume at end systole	mL
SV	$EDV - ESV$	Stroke volume	mL
CO	$HR \times SV/1000$	Cardiac output	L/min
EF	$100 \times SV/EDV$	Ejection fraction	%
SI	SV/BSA	SV Index	mL/m^2
CI	CO/BSA	CO Index	$L/min/m^2$
BSA	Refer to subsection 7.1.5.	Body surface area	m^2

<<Measurement points>>



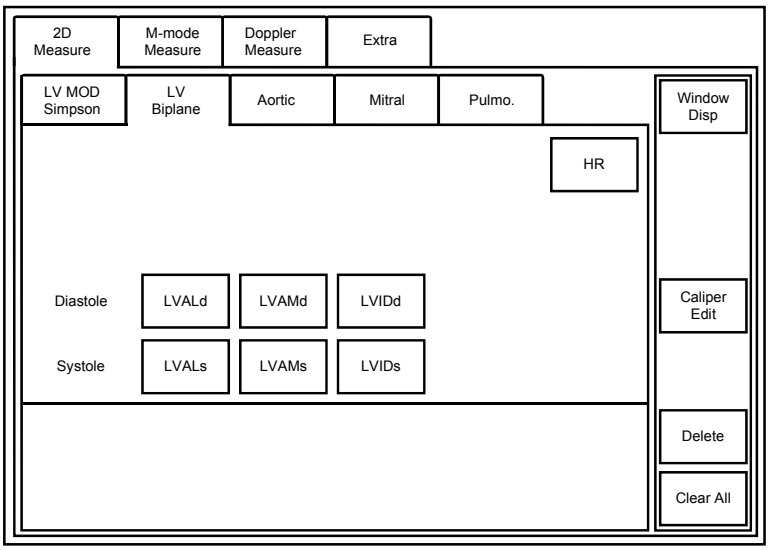
* When the optional ECG unit is used, the heart rate is automatically calculated from the ECG and displayed when the LVLd value is determined. It is also possible to enter the heart rate manually. For the manual entry procedure, refer to subsection 7.1.4 "Heart rate acquisition methods".



7.2.6 LV measurement (Biplane method)

LV measurement (Biplane method) can be preset instead of LV measurement (Teichholz method). Refer to section 2 "Setting the Presets" for the preset change procedure.

<<Menu display on the touch panel>>



<<Measurement items>>

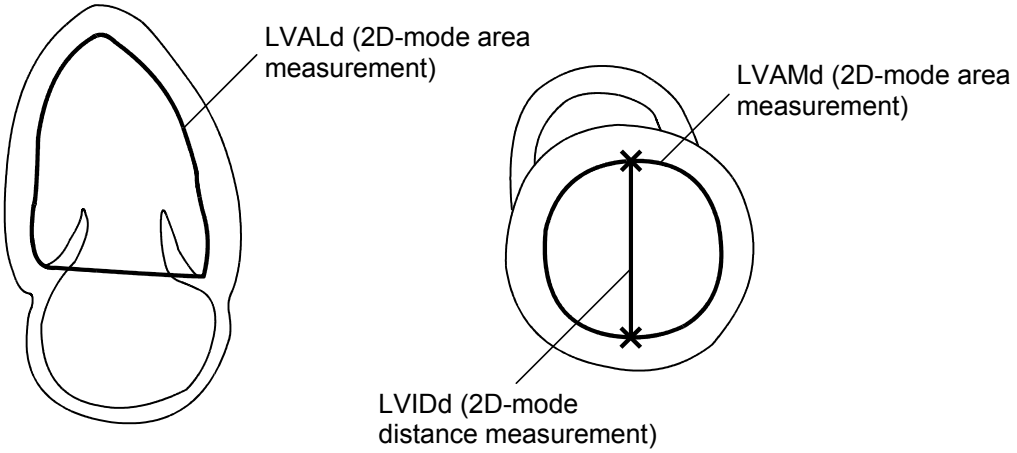
Touch panel switch	Measurement methods	Result display
LVALd	LV long-axis cross-sectional area at end diastole	LVALd (cm^2)
LVAMd	LV short-axis cross-sectional area at the mitral valve level at end diastole	LVAMd (cm^2)
LVIDd	LV short-axis diameter at end diastole	LVIDd (mm)
LVALs	LV long-axis cross-sectional area at end systole	LVALs (cm^2)
LVAMs	LV long-axis cross-sectional area at the mitral valve level at end systole	LVAMs (cm^2)
LVIDs	LV short-axis diameter at end systole	LVIDs (mm)
HR	Heart rate	HR (bpm)

<<Calculation items>>

Calculation item	Calculation formula	Item to be calculated	Unit
EDV	$\frac{8}{3} \times \frac{LVALd \times LVAMd}{\pi \times (LVIDd/10)}$	LV volume at end diastole	mL
ESV	$\frac{8}{3} \times \frac{LVALs \times LVAMs}{\pi \times (LVIDs/10)}$	LV volume at end systole	mL
SV	$EDV - ESV$	Stroke volume	mL
CO	$HR \times SV/1000$	Cardiac output	L/min
EF	$100 \times SV/EDV$	Ejection fraction	%
SI	SV/BSA	SV Index	mL/m^2
CI	CO/BSA	CO Index	$L/min/m^2$
BSA	Refer to subsection 7.1.5.	Body surface area	m^2

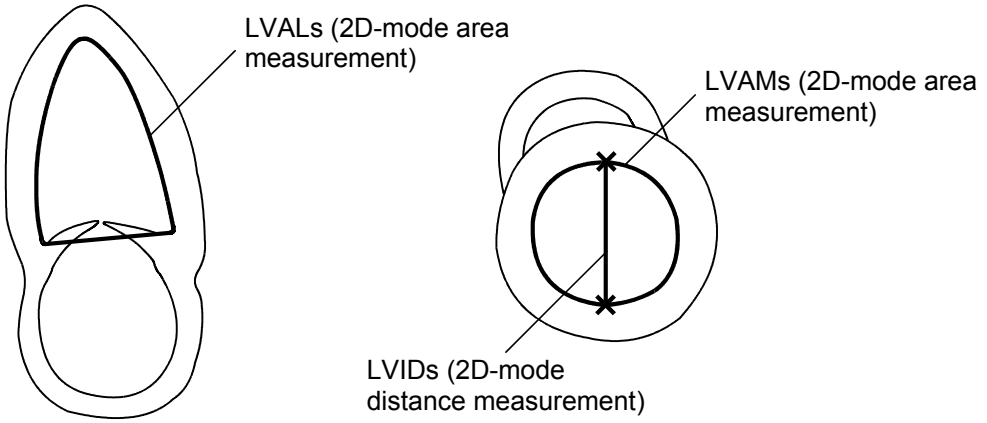
<<Measurement points>>

[Diastole]



* When the optional ECG unit is used, the heart rate is automatically calculated from the ECG and displayed when the LVLd value is determined. It is also possible to enter the heart rate manually. For the manual entry procedure, refer to subsection 7.1.4 "Heart rate acquisition methods".

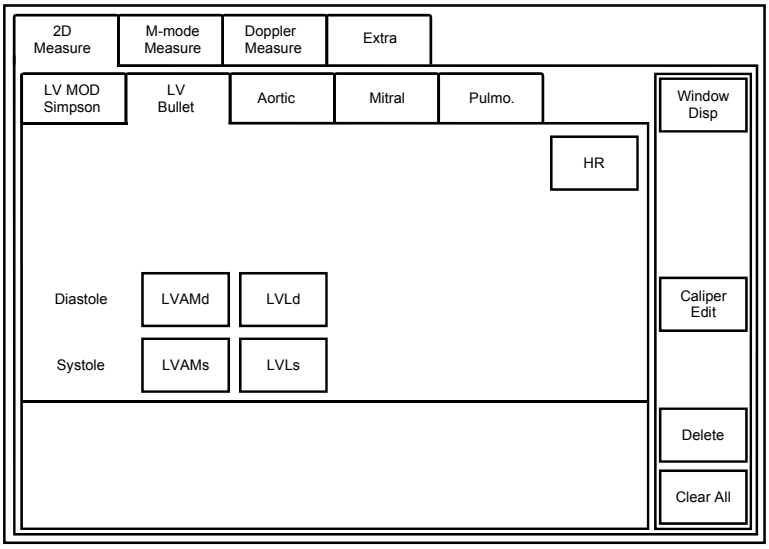
[Systole]



7.2.7 LV measurement (Bullet method)

LV measurement (Bullet method) can be preset instead of LV measurement (Teichholz method). Refer to section 2 "Setting the Presets" for the preset change procedure.

<<Menu display on the touch panel>>



<<Measurement item>>

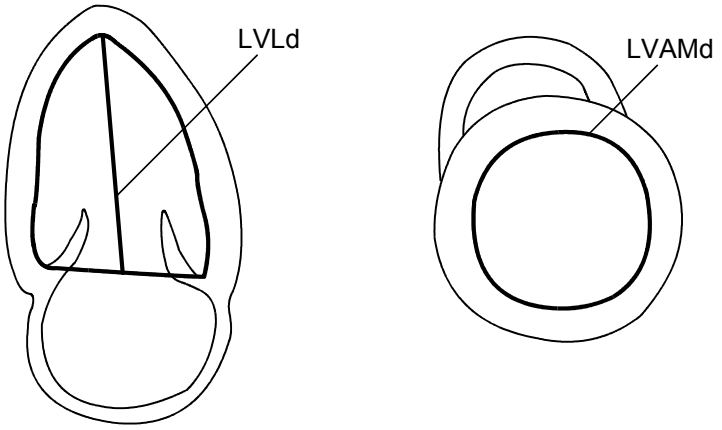
Touch panel switch	Measurement methods	Result display
LVAMd	LV short-axis cross-sectional area at the mitral valve level at end diastole	LVAMd (cm^2)
LVLd	LV long-axis length at end diastole	LVLd (mm)
LVAMs	LV short-axis cross-sectional area at the mitral valve level at end systole	LVAMs (cm^2)
LVLs	LV long-axis length at end systole	LVLs (mm)
HR	Heart rate	HR (bpm)

<<Calculation items>>

Calculation item	Calculation formula	Item to be calculated	Unit
EDV	$\frac{5}{6} \times LVAMd \times LVLd/10$	LV volume at end diastole	mL
ESV	$\frac{5}{6} \times LVAMs \times LVLs/10$	LV volume at end systole	mL
SV	$EDV - ESV$	Stroke volume	mL
CO	$HR \times SV/1000$	Cardiac output	L/min
EF	$100 \times SV/EDV$	Ejection fraction	%
SI	SV/BSA	SV Index	mL/m^2
CI	CO/BSA	CO Index	$L/min/m^2$
BSA	Refer to subsection 7.1.5.	Body surface area	m^2

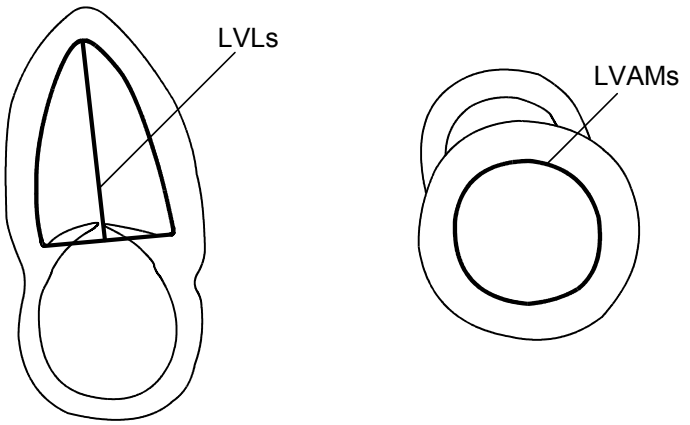
<<Measurement points>>

[Diastole]



* When the optional ECG unit is used, the heart rate is automatically calculated from the ECG and displayed when the LVLd value is determined. It is also possible to enter the heart rate manually. For the manual entry procedure, refer to subsection 7.1.4 "Heart rate acquisition methods".

[Systole]

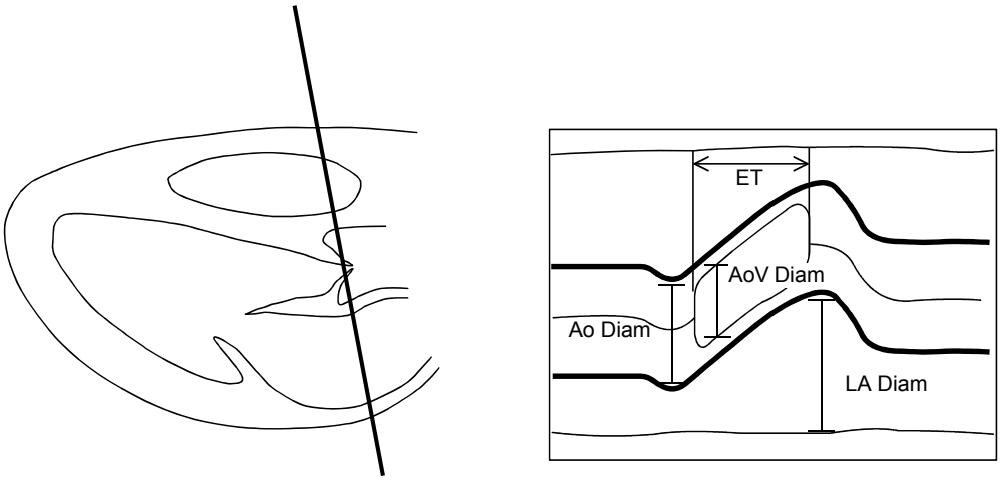


7.3 M-Mode Measurements (Cardiac)

7.3.1 Aortic valve measurement (Aortic Valve)

Aortic valve measurement is performed in M mode.

<<Measurement points>>



<<Measurement items>>

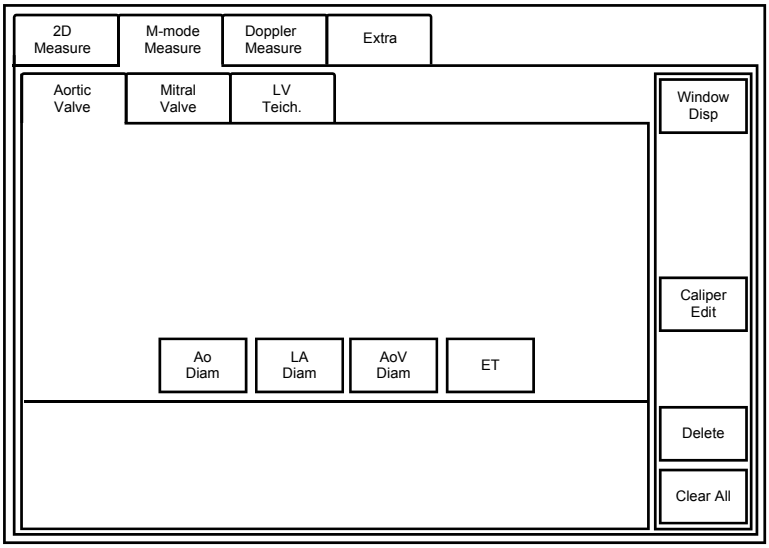
Touch panel switch	Item to be measured	Result display
Ao Diam	Aortic diameter	Ao Diam (mm)
LA Diam	Left atrial diameter	LA Diam (mm)
ET	Ejection time	ET (sec)
AoV Diam	Aortic valve diameter	AoV Diam (mm)

<<Calculation items>>

Item to be calculated	Calculation formula	Result display
LA/Ao	*LA Diam/Ao Diam*	LA/Ao

<<Measurement procedure>>

(1) Press CALC. The menu shown below is displayed.



(2) Press [Ao Diam]. The marker is displayed.

(3) Measure the aortic diameter using the M-mode distance measurement procedure.

(4) Press [LA Diam]. The marker is displayed.

(5) Measure the left atrial diameter using the M-mode distance measurement procedure.

(6) Press [AoV Diam]. The marker is displayed.

(7) Measure the aortic valve diameter using the M-mode distance measurement procedure.

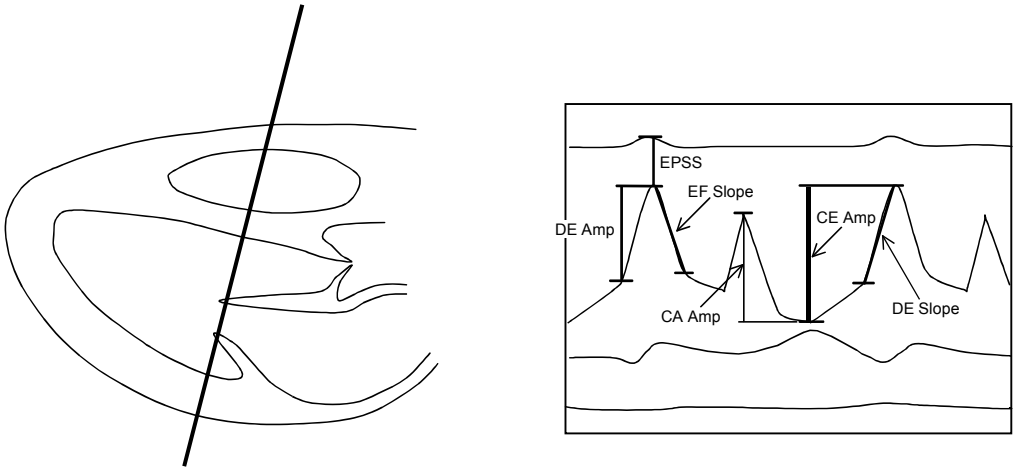
(8) Press [ET]. The marker is displayed.

(9) Measure the ejection time (time for which the aortic valve is open) using the M-mode time measurement procedure.

7.3.2 Mitral valve measurement (Mitral Valve)

Mitral valve measurement is performed in M mode.

<<Measurement points>>



<<Measurement items>>

Touch panel switch	Item to be measured	Unit
EPSS	Distance between the E-point and interventricular septum	EPSS (mm)
EF Slope	Diastolic descent rate of the mitral valve leaflets	EF Slope (mm/s)
CE Amp	E-wave amplitude	CE Amp (mm)
CA Amp	A-wave amplitude	CA Amp (mm)
DE Amp	DE-wave amplitude	DE Amp (mm)
DE Slope	Mitral valve opening rate	DE Slope (mm/s)

<<Calculation items>>

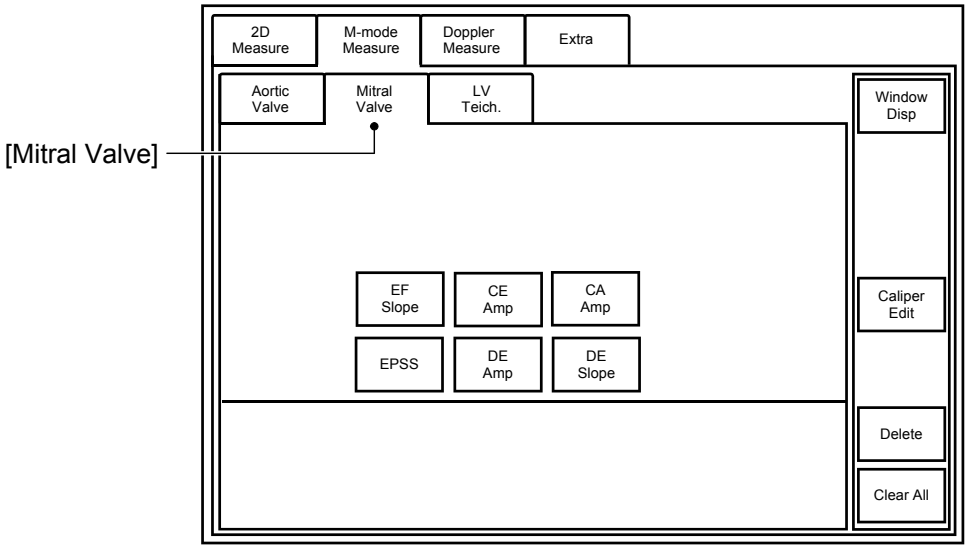
Item to be calculated	Calculation formula	Result display
CA/CE	*CA AMP/CE AMP*	CA/CE

<<Measurement procedure>>

(1) Press CALC.

(2) Select [Mitral Valve] from the application measurement menu.

The menu shown below is displayed on the touch panel.



(3) Press [EPSS] on the touch panel. The marker is displayed.

Measure the distance between the E-point and interventricular septum using the M-mode distance measurement procedure.

(4) Press [EF Slope]. The marker is displayed.

Measure the diastolic descent rate of the mitral valve leaflets using the M-mode slope measurement procedure.

(5) Press [CE Amp]. The marker is displayed.

Measure the E-wave amplitude using the M-mode distance measurement procedure.

(6) Press [CA Amp]. The marker is displayed.

Measure the A-wave amplitude using the M-mode distance measurement procedure.

(7) Press [DE Amp]. The marker is displayed.

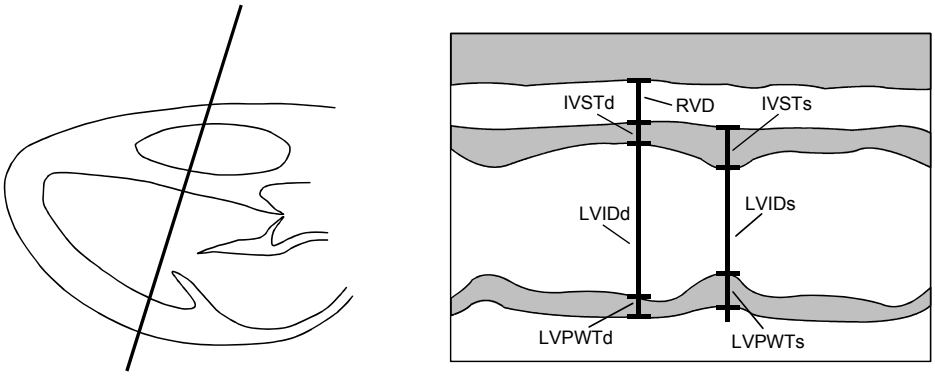
Measure the DE-wave amplitude using the M-mode distance measurement procedure.

(8) Press [DE Slope]. The marker is displayed.

Measure the mitral valve opening rate using the M-mode slope measurement procedure.

7.3.3 LV measurement (Teichholz method)

<<Measurement points>>



<<Measurement items>>

Touch panel switch		Item to be measured	Result display
Diastole	RVD	RV diameter	RVD (mm)
	IVSTd	Interventricular septal thickness at end diastole	IVSTd (mm)
	LVIDd	LV short-axis diameter at end diastole	LVIDd (mm)
	LVPWTd	LV posterior wall thickness at end diastole	LVPWTd (mm)
Systole	IVSTs	Interventricular septal thickness at end systole	IVSTs (mm)
	LVIDs	LV short-axis diameter at end systole	IVIDs (mm)
	LVPWTs	LV posterior wall thickness at end systole	LVPWTs (mm)
ET		Ejection time	ET (sec)
HR		Heart rate	HR (bpm)

<<Calculation items>>

Calculation item	Calculation formula	Item to be calculated	Unit
EDV	$(7 \times LVIDd^3/1000)/(2.4 + (LVIDd/10))$	LV volume at end diastole	mL
ESV	$(7 \times LVIDd^3/1000)/(2.4 + (LVIDs/10))$	LV volume at end systole	mL
SV	$EDV - ESV$	Stroke volume	mL
CO	$HR \times SV/1000$	Cardiac output	L/min
EF	$100 \times SV/EDV$	Ejection fraction	%
FS	$100 \times (LVIDd - LVIDs)/LVIDd$	Fractional shortening	%
SI	SV/BSA	SV Index	mL/m^2
CI	CO/BSA	CO Index	$L/min/m^2$
MVCF	$FS/100/ET$		
BSA	Refer to subsection 7.1.5.	Body surface area	m^2
*LV MASSd (ASE-Cube)	$1.04 \times ((LVIDd + IVSTd + LVPWTd)^3 - LVIDd^3)/1000$	LV myocardial mass at end diastole	g
LV MASSd (Penn-Cube)	$1.04 \times ((LVIDd + IVSTd + LVPWTd)^3 - LVIDd^3)/1000 - 13.6$	LV myocardial mass at end diastole	g
LV MASSd (Teichholz)	$1.04 \times \left[\frac{7.0 \times ((IVSTd + LVIDd + LVPWTd)/10)^3}{2.4 + IVSTd/10 + LVIDd/10 + LVPWTd/10} - \frac{7.0 \times (LVIDd/10)^3}{2.4 + LVIDd/10} \right]$	LV myocardial mass at end diastole	g
LV MASSd (AV-Cube)	$0.8 \times [1.04 \times ((LVIDd + IVSTd + LVPWTd)^3 - LVIDd^3)/1000] + 0.6$	LV myocardial mass at end diastole	g
*LV MASSs (ASE-Cube)	$1.04 \times ((LVIDs + IVSTs + LVPWTs)^3 - LVIDs^3)/1000$	LV myocardial mass at end systole	g
LV MASSs (Penn-Cube)	$1.04 \times ((LVIDs + IVSTs + LVPWTs)^3 - LVIDs^3)/1000 - 13.6$	LV myocardial mass at end systole	g
LV MASSs (Teichholz)	$1.04 \times \left[\frac{7.0 \times ((IVSTs + LVIDs + LVPWTs)/10)^3}{2.4 + IVSTs/10 + LVIDs/10 + LVPWTs/10} - \frac{7.0 \times (LVIDs/10)^3}{2.4 + LVIDs/10} \right]$	LV myocardial mass at end systole	g
LV MASSs (AV-Cube)	$0.8 \times [1.04 \times ((LVIDs + IVSTs + LVPWTs)^3 - LVIDs^3)/1000] + 0.6$	LV myocardial mass at end systole	g
LV MASSd Index	$LV\ MASSd/BSA$		g/m^2
LV MASSs Index	$LV\ MASSs/BSA$		g/m^2

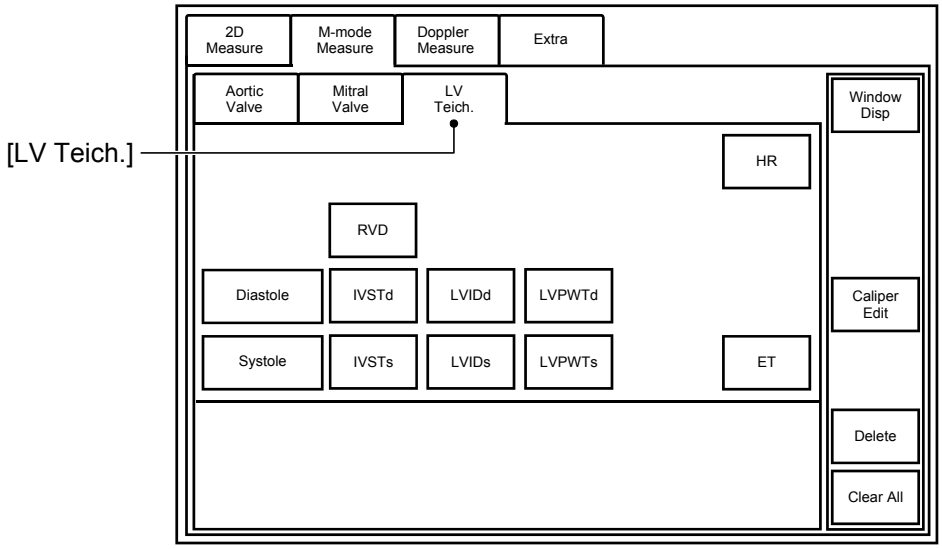
* The calculation formulas for LV MASSd and LV MASSs can be selected and preset from among ASE-Cube, Penn-Cube, Teichholz, and AV-Cube. Refer to section 2 "Setting the Presets" for details.

<<Measurement procedure>>

(1) Press CALC.

(2) Select [LV Teich.] from the application measurement menu.

The menu shown below is displayed.

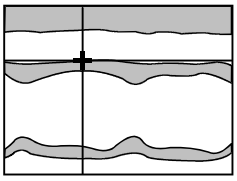


(3) Follow steps (a) to (e) to measure the cardiac lumen parameters (interventricular septal thickness, LV endocardial diameter, and LV posterior wall thickness) at end diastole.

* This procedure measures the three segments in the left ventricle (IVSTd-LVPWTd). It is also possible to preset the method for measuring the four segments (RVD-LVPWTd). Refer to section 2 "Setting the Presets" for details.

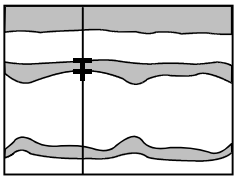
(a) Press [Diastole]. The marker (two perpendicular lines) is displayed.

(b) Move the marker to the right ventricle side of the interventricular septum at end diastole and then press SET.

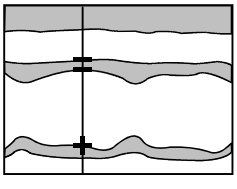


The vertical line is set.

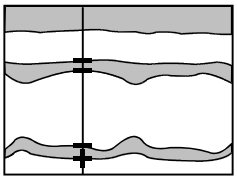
(c) Move the marker to the left ventricle side of the interventricular septum at end diastole and then press SET.



(d) Move the marker to the endocardium side of the LV posterior wall at end diastole and press SET.



(e) Move the marker to the epicardium side of the LV posterior wall at end diastole and press SET.



(4) The marker for measuring the cardiac lumen parameters at end systole is displayed.
Using the same procedure as in (3) above, measure the interventricular septal thickness, LV endocardial diameter, and LV posterior wall thickness at end systole.

(5) The LV volume, ejection fraction, etc. are calculated based on the measurement results and displayed.

NOTE: It is possible to proceed to the next LV measurement item by simply pressing SET or NEXT on the main panel instead of pressing the corresponding measurement switch on the touch panel. The measurement execution order can be changed through presetting. Refer to section 2 "Setting the Presets" for details.

(1) Starting the measurement items for the LV lumen in end diastole

When [Diastole] is pressed to start parallel measurement and then SET is pressed after the measurement data is fixed, the next measurement item is started automatically in the order shown below. The segments to be measured can be preset.

- When "3 sections" is preset

  [IVSTd] → [LVIDd] → [LVPWTd]
- When "4 sections" is preset

  [RVD] → [IVSTd] → [LVIDd] → [LVPWTd]

(2) Starting the next measurement item automatically by pressing SET

When the measurement data is fixed by pressing SET, the next measurement item is started automatically. The item started when SET is pressed depends on the preset. The first measurement item started when [Diastole] is pressed also depends on the preset described in (1).

- When Type 1 is preset

  [Diastole] → [Systole]
- When Type 2 is preset

  The measurement items are started in one of the following patterns depending on the item selected first.

  - [Diastole] → [LVIDs]
  - [LVIDd] → [LVIDs]

NOTE: (3) Starting the next measurement item automatically by pressing 

.

When measurement is started by pressing [RVD], the next measurement item is started automatically when 

is pressed.

The order of execution of measurement items depends on the preset.

- When Type 1 is preset

  [RVD] → [IVSTd] → [LVIDd] → [LVPWTd] → [IVSTs] → [LVIDs] → [LVPWTs]

- When Type 2 is preset

  [RVD] → [IVSTd] → [LVIDd] → [LVPWTd] → [LVIDs]

NOTE: Acquisition of the heart rate

The heart rate can be obtained by the following three methods. For details, refer to subsection 7.1.4 "Heart rate acquisition methods".

(1) When the optional ECG unit is used, the heart rate is automatically calculated from the ECG and displayed when the LVIDd value is determined.

(2) The heart rate is entered manually.

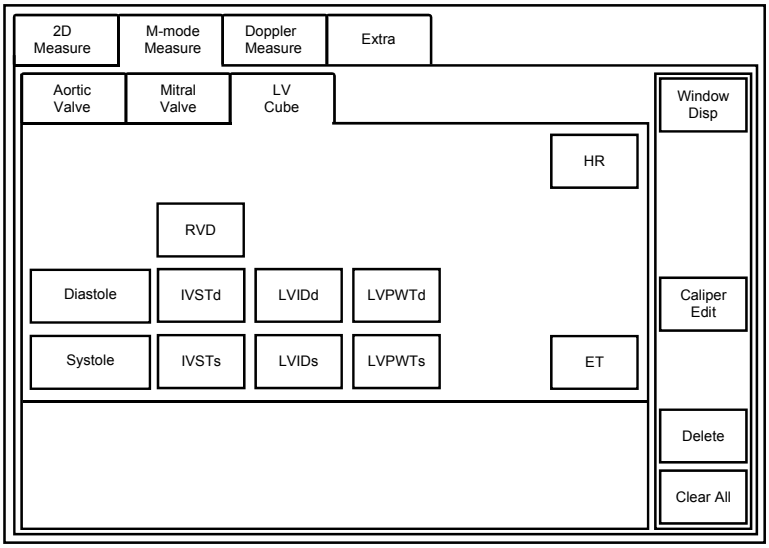
(3) The heart rate is calculated based on the Range measurement result that is obtained by pressing [HR].

7.3.4 LV measurement (Cube method)

LV measurement (Cube method) can be preset instead of LV measurement (Teichholz method). Refer to section 2 "Setting the Presets" for the preset change procedure.

The measurement items, calculation items, measurement procedure, and measurement points are the same as for the Teichholz method (described in subsection 7.3.3). Only the LV volume calculation formula is different from that used in the Teichholz method.

<<Menu display on the touch panel>>



<<LV volume calculation formula>>

LV volume at end diastole

$$EDV = \left(\frac{LVIDd}{10} \right)^3$$

LV volume at end systole

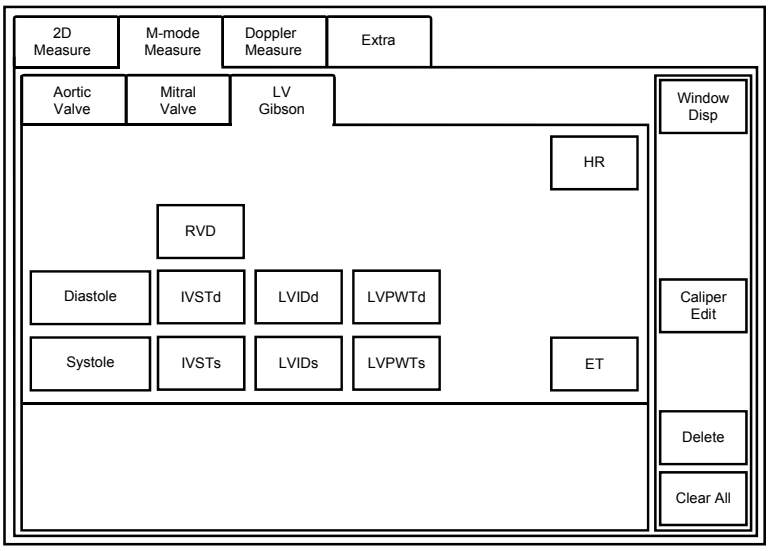
$$ESV = \left(\frac{LVIDs}{10} \right)^3$$

7.3.5 LV measurement (Gibson method)

LV measurement (Gibson method) can be preset instead of LV measurement (Teichholz method). Refer to section 2 "Setting the Presets" for the preset change procedure.

The measurement items, calculation items, measurement procedure, and measurement points are the same as for the Teichholz method (described in subsection 7.3.3). Only the LV volume calculation formula is different from that used in the Teichholz method.

<<Menu display on the touch panel>>



<<LV volume calculation formula>>

LV volume at end diastole

$$EDV = 0.52 \times \left(0.98 \times \frac{LVIDd}{10} + 5.90 \right) \times \left(\frac{LVIDd}{10} \right)^2$$

LV volume at end systole

$$ESV = 0.52 \times \left(1.14 \times \frac{LVIDs}{10} + 4.18 \right) \times \left(\frac{LVIDs}{10} \right)^2$$

7.4 Doppler-Mode Measurements (Cardiac)

7.4.1 Aortic valve measurement (Aortic)

Aortic valve function is measured based on the blood flow waveform.

<<Measurement items>>

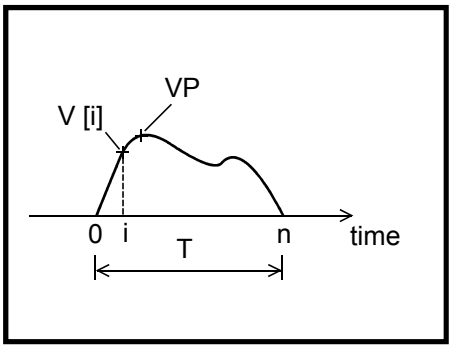
Touch panel switch	Item to be measured	Result display
AoV V Trace *	VTI on the aortic valve blood flow waveform	AoV VTI (cm)
	Mean velocity on the aortic valve blood flow waveform	AoV VM (cm/s)
	Maximum velocity on the aortic valve blood flow waveform	AoV VP (cm/s)
	Mean pressure gradient on the aortic valve blood flow waveform	AoV MPG (mmHg)
	Maximum pressure gradient on the aortic valve blood flow waveform	AoV PPG (mmHg)
LVOT V Trace *	VTI on the blood flow waveform for the LV outflow tract	LVOT VTI (cm)
	Mean velocity on the blood flow waveform for the LV outflow tract	LVOT VM (cm/s)
	Maximum velocity on the blood flow waveform for the LV outflow tract	LVOT VP (cm/s)
	Mean pressure gradient on the blood flow waveform for the LV outflow tract	LVOT MPG (mmHg)
	Maximum pressure gradient on the blood flow waveform for the LV outflow tract	LVOT PPG (mmHg)
LVOT Diam	LV outflow tract diameter	LVOT Diam (mm)
AcT	Acceleration time	AcT (sec)
ET	Ejection time	ET (sec)
AoV Vel	Velocity at the aortic valve	AoV Vel (cm/s)
	Pressure gradient at the aortic valve	AoV PG (mmHg)
LVOT Vel	Velocity in the LV outflow tract	LVOT Vel (cm/s)
	Pressure gradient in the LV outflow tract	LVOT PG (mmHg)
AR V Trace *	Mean velocity on the aortic valve regurgitation waveform	AR VM (cm/s)
	Maximum velocity on the aortic valve regurgitation waveform	AR VP (cm/s)
	Mean pressure gradient on the aortic valve regurgitation waveform	AR MPG (mmHg)
	Maximum pressure gradient on the aortic valve regurgitation waveform	AR PPG (mmHg)

<<Measurement items>> (continued)

Touch panel switch	Item to be measured	Result display
Decel Rate	Maximum velocity on the aortic valve regurgitation waveform	AR Vmax (cm/s)
	End-diastolic velocity on the aortic valve regurgitation waveform	AR Ved (cm/s)
	Duration of the aortic valve regurgitation waveform	Time (sec)
	Deceleration rate on the aortic valve regurgitation waveform	DecelRate (cm/s^2)
Ao Diam	Aortic valve diameter	Ao Diam (mm)
LA Diam	Left atrium diameter	LA Diam (mm)
HR	Heart rate	HR (bpm)

* Velocity trace measurement

When velocity trace measurement ([LVOT V Trace], [AV V Trace], or [AR V Trace]) is executed, calculation is performed using the following formula, and the calculated value is displayed.



$$VTI = \sum_{i=1}^{n} V[i]$$

$$VM = \frac{\sum_{i=1}^{n} V[i]}{T}$$

$$PPG = 4 \times VP^2$$

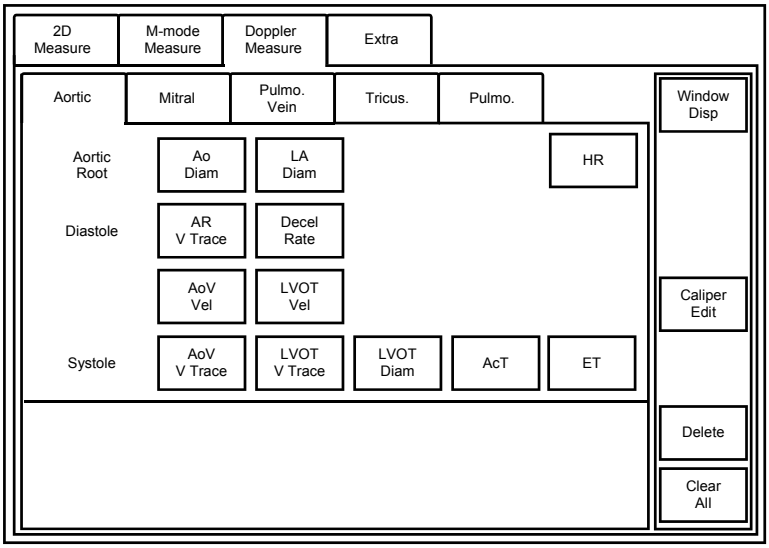
$$MPG = \frac{4 \times \sum_{i=1}^{n} V[i]^2}{n}$$

<<Calculation items>>

Calculation item	Calculation formula	Item to be calculated	Unit
LVOT SV	$\frac{\pi}{4}(LVOT\ Diam)^2 \times \lvert LVOT\ VTI \rvert / 100$	Stroke volume	mL
LVOT CO	$HR \times LVOT\ SV / 1000$	Cardiac output	L/min
LVOT SI	$LVOT\ SV / BSA$	SV Index	mL/m^2
LVOT CI	$LVOT\ CO / BSA$	CO Index	$L/min/m^2$
AoV Area	$\frac{\frac{\pi}{4} \times LVOT\ Diam^2 \times \lvert LVOT\ VTI \rvert}{\lvert AoV\ VTI \rvert \times 100}$	Aortic valve area (by equation of continuity)	cm^2
AoV Area Index	$\frac{AoV\ Area}{BSA}$	–	–
LA/Ao	$LA\ Diam / Ao\ Diam$	–	–
PHT	$\left(1 - \frac{1}{\sqrt{2}}\right) \times \left(\frac{ARV\ max}{ARV\ max\ -\ AR\ Ved}\right) \times Time$	Pressure Half Time	sec
Qp/Qs (SV)	$PV\ SV / LVOT\ SV$	–	–
Qp/Qs (CO)	$PV\ CO / LVOT\ CO$	–	–
AcT/ET	AcT / ET	–	–
BSA	Refer to subsection 7.1.5.	Body surface area	m^2
RF (**)	If MV SV > LVOT SV, the presence of MR is assumed. $RF\ (MV) = (MV\ SV - LVOT\ SV) / MV\ SV \times 100$ If MV SV < LVOT SV, the presence of AR is assumed. $RF\ (AoV) = (LVOT\ SV - AV\ SV) / LVOT\ SV \times 100$	Regurgitant fraction	%
R Vol (**)	MV SV > LVOT SV $R\ Vol\ (MV) = MV\ SV - LVOT\ SV$ MV SV < LVOT SV $R\ Vol\ (AoV) = LVOT\ SV - MV\ SV$	Regurgitation volume	mL
LVOT/AoV (VP)	$\frac{LVOT\ VP}{AoV\ VP}$	Maximum velocity in the LV outflow tract / Maximum velocity in the aortic valve	—
LVOT/AoV (VTI)	$\frac{LVOT\ VTI}{AoV\ VTI}$	VTI in the LV outflow tract / VTI in the aortic valve	—
LVOT/AoV (Vel)	$\frac{LVOT\ Vel}{AoV\ Vel}$	Velocity in the LV outflow tract / Velocity at the aortic valve	—

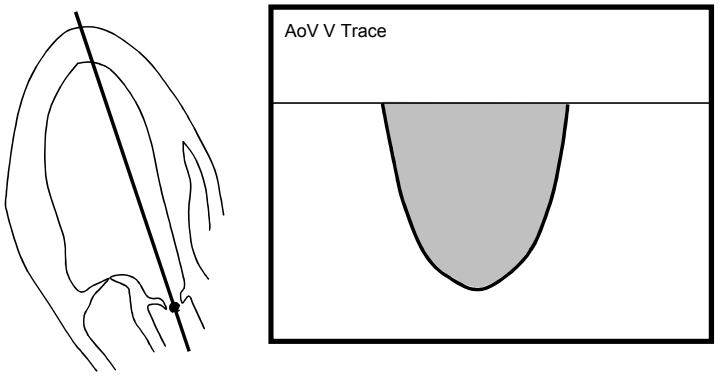
<<Measurement procedure>>

(1) Press CALC. The menu shown below is displayed on the touch panel.



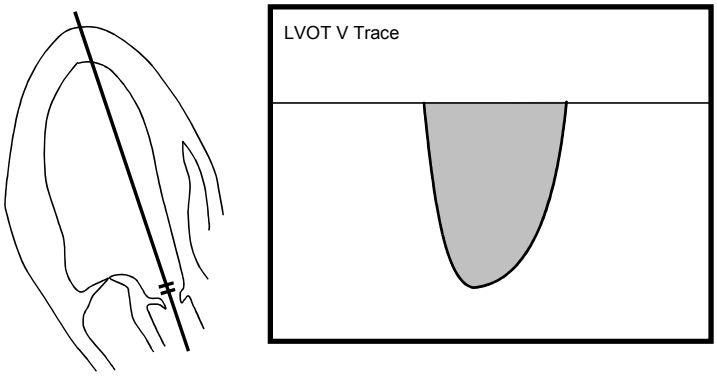
(2) Press [AoV V Trace] on the touch panel. The marker is displayed.

Measure the items programmed for [AoV V Trace] using the velocity trace measurement procedure.



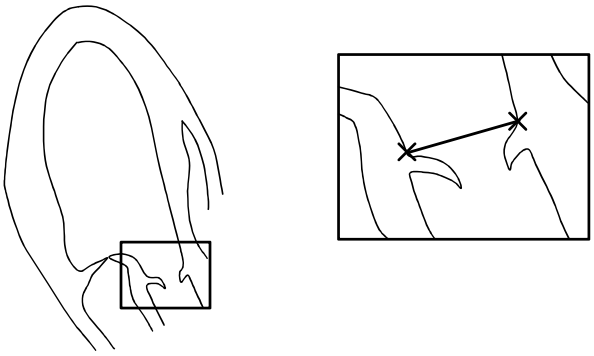
(3) Press [LVOT V Trace] on the touch panel. The marker is displayed.

Measure the items programmed for [LVOT V Trace] using the velocity trace measurement procedure.



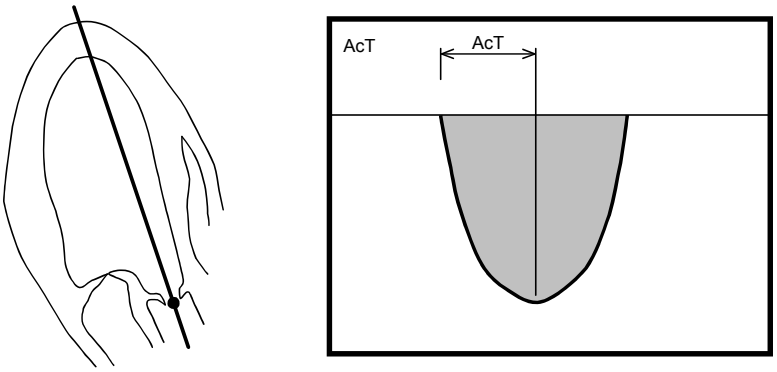
(4) Press [LVOT Diam] on the touch panel. The marker is displayed on the 2D-mode image.

Measure the LV outflow tract diameter using the 2D-mode distance measurement procedure.



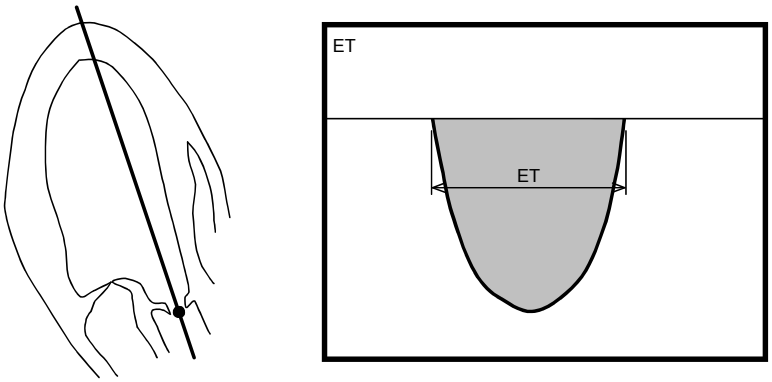
(5) Press [AcT] on the touch panel. The marker is displayed.

Measure the items programmed for [AcT] using the time measurement procedure.



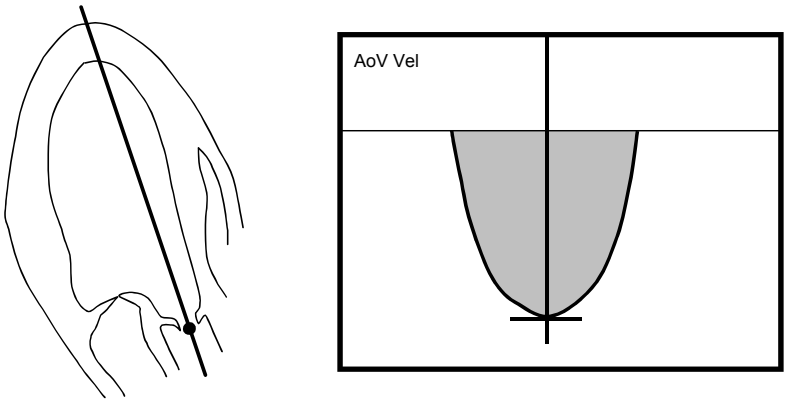
(6) Press [ET] on the touch panel. The marker is displayed.

Measure the items programmed for [ET] using the time measurement procedure.



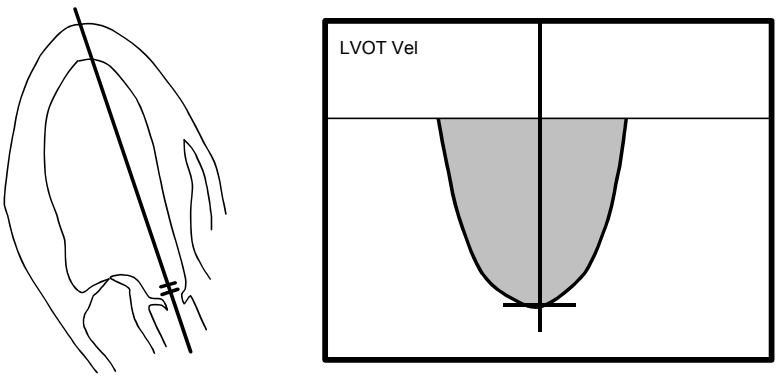
(7) Press [AoV Vel] on the touch panel. The marker is displayed.

Measure the items programmed for [AoV Vel] using the velocity measurement procedure.



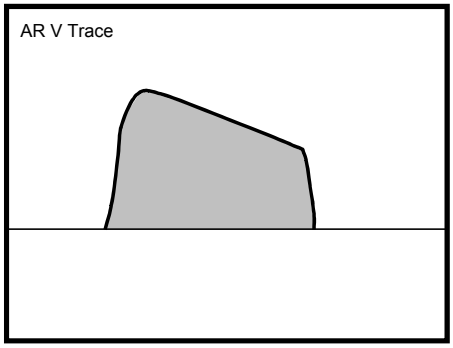
(8) Press [LVOT Vel] on the touch panel. The marker is displayed.

Measure the items programmed for [LVOT Vel] using the velocity measurement procedure.



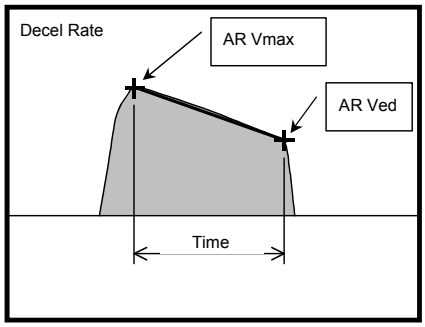
(9) Press [AR V Trace] on the touch panel. The marker is displayed.

Measure the items programmed for [AR V Trace] using the velocity trace measurement procedure.



(10) Press [Decel Rate] on the touch panel. The marker is displayed.

Measure the items programmed for [Decel Rate] using the Doppler-mode slope measurement procedure.



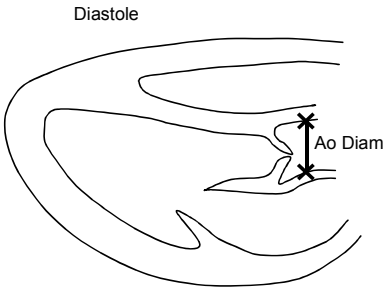
$$Decel\ Rate = \frac{AR\ Vmax - AR\ Ved}{Time}$$

$$AR\ PG\ max = 4 \times AR\ Vmax^2$$

$$AR\ PGed = 4 \times AR\ Ved^2$$

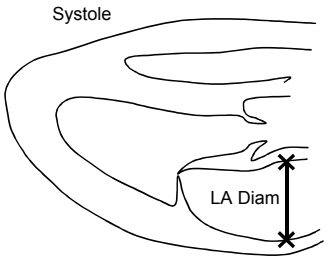
(11) Press [Ao Diam] on the touch panel. The marker is displayed.

Measure the aortic diameter using the 2D-mode distance measurement procedure.



(12) Press [LA Diam] on the touch panel. The marker is displayed.

Measure the left atrial diameter using the 2D-mode distance measurement procedure.



NOTE: Heart rate acquisition methods

The heart rate can be obtained by the following three methods. For details, refer to subsection 7.1.4 "Heart rate acquisition methods".

1. When the optional ECG unit is used, the heart rate is automatically calculated from the ECG and displayed when the LVOT V Trace value is determined.
2. The heart rate is entered manually.
3. The heart rate is calculated based on the Range measurement result that is obtained by pressing [HR].

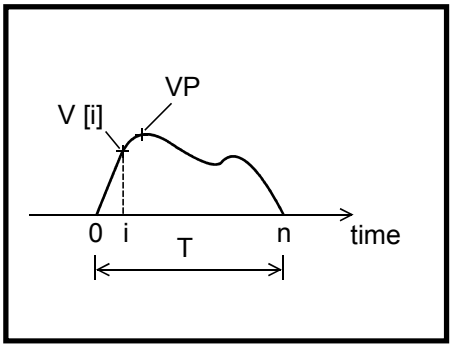
7.4.2 Mitral valve measurement (Mitral)

Mitral valve function is measured based on the blood flow waveform.

<<Measurement items>>

Touch panel switch	Item to be measured	Result display
E Vel	E-wave velocity	E Vel (cm/s)
A Vel	A-wave velocity	A Vel (cm/s)
Decel Time	Deceleration time	DcT (sec)
E' Vel sep	E'-wave velocity (at septum)	E' sep (cm/s)
A' Vel sep	A'-wave velocity (at septum)	A' sep (cm/s)
E' Vel lat	E'-wave velocity (at lateral wall)	E' lat (cm/s)
A' Vel lat	A'-wave velocity (at lateral wall)	A' lat (cm/s)
E Dur	E-wave duration	E Dur (sec)
A Dur	A-wave duration	A Dur (sec)
IVRT	Isovelocity relaxation time	IVRT (sec)
MV V Trace*	VTI on the mitral valve blood flow waveform Maximum velocity on the mitral valve blood flow waveform Mean velocity on the mitral valve blood flow waveform Maximum pressure gradient on the mitral valve blood flow waveform Mean pressure gradient on the mitral valve blood flow waveform	MV VTI (cm) MV VP (cm/s) MV VM (cm/s) MV PPG (mmHg) MV MPG (mmHg)
MV DistA	Mitral valve diameter A	MV DistA (mm)
MV DistB	Mitral valve diameter B	MV DistB (mm)
MV Area (2D)	Mitral valve area	MV Area (2D) (cm^2)
HR	Heart rate	HR (bpm)
MVA PHT	Pressure half time	PHT (sec)
dP/dt	Rate of LV pressure rise	dP/dt (mmHg/s) dt (sec) Vel 1 (cm/s) Vel 2 (cm/s)
dP/dt -1, -3m/s	Rate of LV pressure rise	dP/dt (mmHg/s) dt (sec) Vel 1 (cm/s) Vel 2 (cm/s)

*: Velocity trace measurement
When velocity trace measurement ([MV V Trace]) is executed, calculation is performed using the following formula, and the calculated value is displayed.



$$VTI = \sum_{i=1}^{n} V\,[i]$$

$$VM = \frac{\sum_{i=1}^{n} V\,[i]}{T}$$

$$PPG = 4 \times VP^2$$

$$MPG = \frac{4 \times \sum_{i=1}^{n} V\,[i]}{n}$$

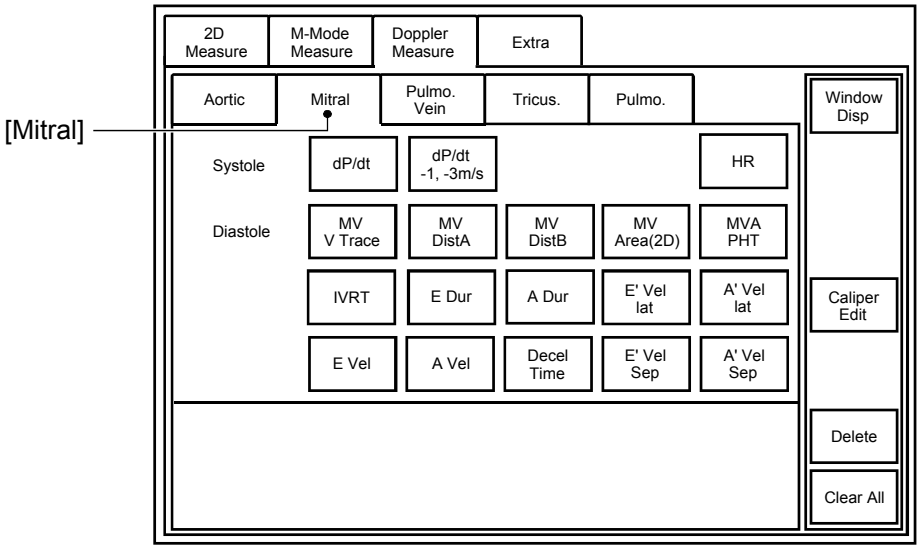
<<Calculation items>>

Calculation item	Calculation formula	Item to be calculated	Unit
E/A	$E\ Vel/A\ Vel$	–	–
A/E	$A\ Vel/E\ Vel$	–	–
E' Vel	(abs (E' sep) + abs (E' lat))/2	–	cm/s
E/E'	$abs\ (E\ Vel/E'\ Vel)$	–	–
E/E' sep	abs (E' Vel/E' sep)	–	–
E/E' lat	abs (E' Vel/E' lat)	–	–
A' Vel	(abs (A' sep) + abs (A' lat))/2	–	cm/s
SV	$\frac{\pi}{4} \times \frac{MV\ DistA}{10} \times \frac{MV\ DistB}{10} \times \lvert MVVTI \rvert$	Stroke volume	mL
CO	$HR \times SV/1000$	Cardiac output	L/min
SI	SV/BSA	SV Index	mL/m^2
CI	CO/BSA	CO Index	$L/min/m^2$
MV Area PHT	$220/(PHT \times 1000)$	Mitral valve area	cm^2
dP/dt	$4 \times ((Vel2^2 - Vel1^2)/dt/1000)$	Doppler Mr jet, rate of LV pressure rise	mmHg/s
BSA	Refer to subsection 7.1.5.	Body surface area	m^2
RF (**)	If MV SV > LVOT SV, the presence of MR is assumed. $RF\ (MV) = \frac{MVSV - LVOTSV}{MVSV} \times 100$ If MV SV < LVOT SV, the presence of AR is assumed. $RF\ (AoV) = \frac{LVOTSV - MVSV}{LVOTSV} \times 100$	Regurgitant fraction	%
R Vol (**)	MV SV > LVOT SV $R\ Vol\ (MV) = MV\ SV - LVOT\ SV$ MV SV < LVOT SV $R\ Vol\ (AoV) = LVOT\ SV - MV\ SV$	Regurgitation volume	mL
Diff A Dur	$A\ Dur\ (MV) - PVA\ Dur$		sec

<<Measurement procedure>>

(1) Press CALC.

(2) Press [Mitral]. The menu shown below is displayed.



(3) Press [E Vel]. The cross marker is displayed.

* It is possible to preset E-wave measurement so that [E Vel], [Decel Time], and [MVA PHT] are measured together. The following procedure is for measuring [E Vel] and [Decel Time] together. Refer to section 2 "Setting the Presets" for details.

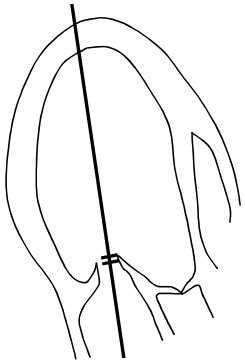
(a) Move the marker to the peak of the E-wave and then press 

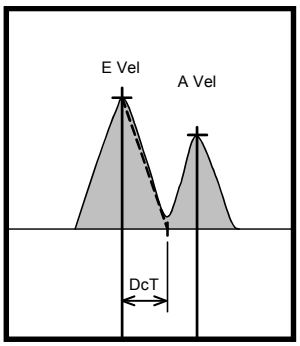
. A broken line is displayed.

(b) Move the marker so that the broken line overlaps the waveform. When the marker reaches the baseline, press 

.

- E Vel, A Vel, DcT



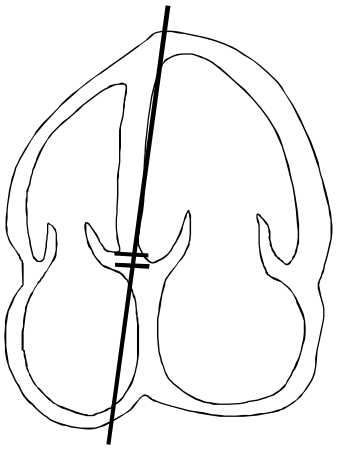


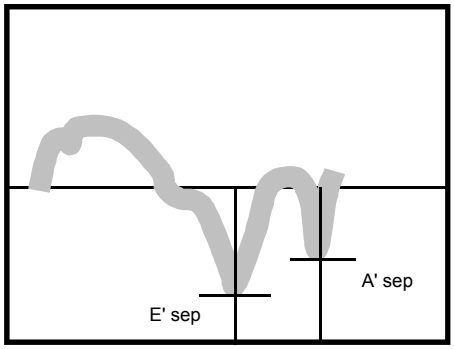
(4) The marker for [A Vel] measurement is displayed. Measure the A-wave velocity using the velocity measurement procedure.

(5) Press [E' Vel sep]. The marker is displayed. Measure the E-wave velocity at the septum using the velocity measurement procedure.

(6) Press [A' Vel sep]. The marker is displayed. Measure the A-wave velocity at the septum using the velocity measurement procedure.

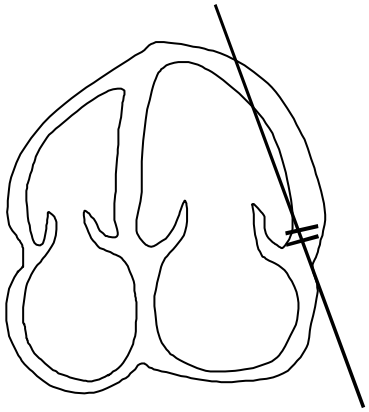
E' Vel sep, A' Vel sep

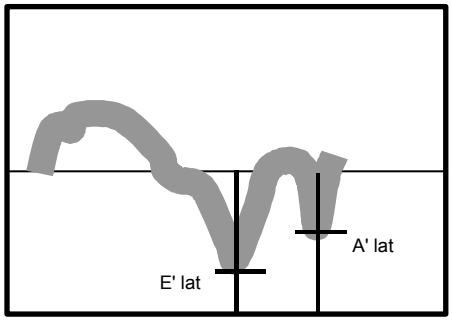




(7) Press [E' Vel lat]. The marker is displayed. Measure the E-wave velocity at the lateral wall using the velocity measurement procedure.

(8) Press [A' Vel lat]. The marker is displayed. Measure the A-wave velocity at the lateral wall using the velocity measurement procedure.





(9) Press [IVRT]. The marker is displayed.

Measure the isovelocity relaxation time using the time measurement procedure.

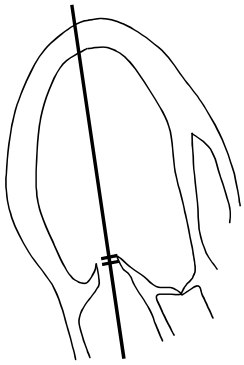
(10) Press [E Dur]. The marker is displayed.

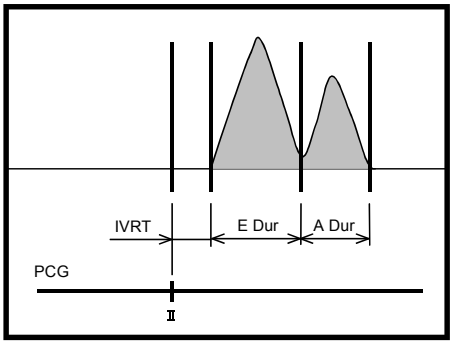
Measure the E-wave duration using the time measurement procedure.

(11) Press [A Dur]. The marker is displayed.

Measure the A-wave duration using the time measurement procedure.

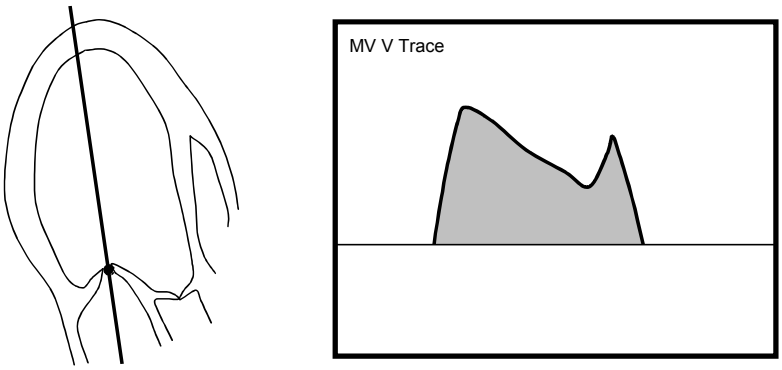
- IVRT, E Dur, A Dur





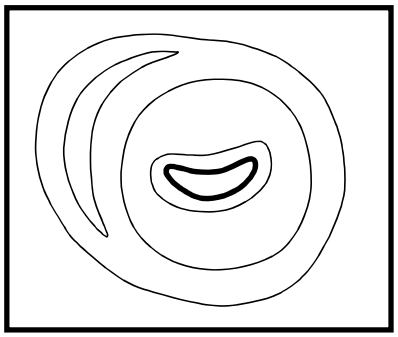
(12) Press [MV V Trace]. The marker is displayed.

Measure the items programmed for [MV V Trace] using the velocity trace measurement procedure.



(13) Press [MV Area (2D)]. The marker is displayed on the 2D-mode image.

Measure the mitral valve area using the 2D-mode area measurement procedure.



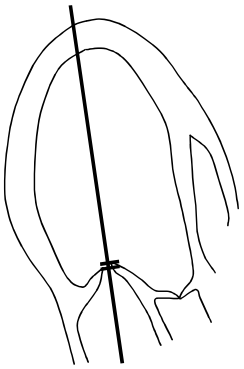
(14) Press [MVA PHT]. The marker is displayed.

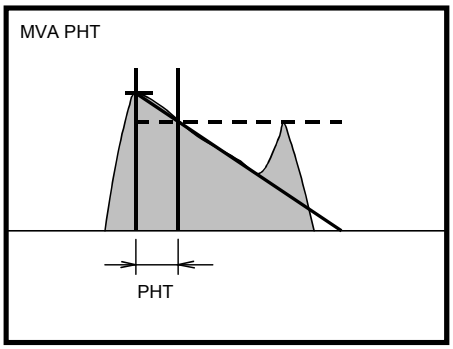
* If E-wave measurement is preset to perform PHT measurement together, PHT can be measured during [E Vel] measurement. Refer to section 2 "Setting the Presets" for details.

(a) Move the marker to the peak and then press SET.

The Vp value is determined, and the line indicating $Vp/\sqrt{2}$ and the second marker are displayed.

(b) Move the second marker so that the dotted line overlaps the Doppler waveform. Press SET.



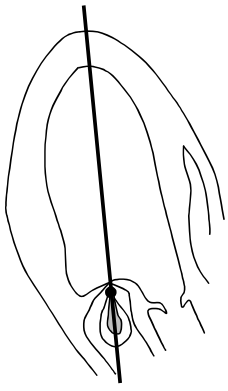


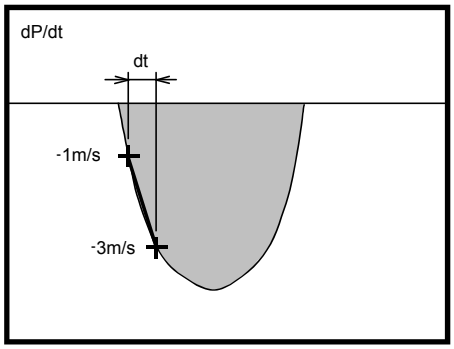
(15) Press [dP/dt] or [dP/dt -1, -3m/s].

- When [dP/dt] is pressed

(a) Move the marker to the -1 m/s velocity position on the Doppler waveform, and then press SET.

(b) Move the marker to the -3 m/s velocity position on the Doppler waveform, and then press SET.



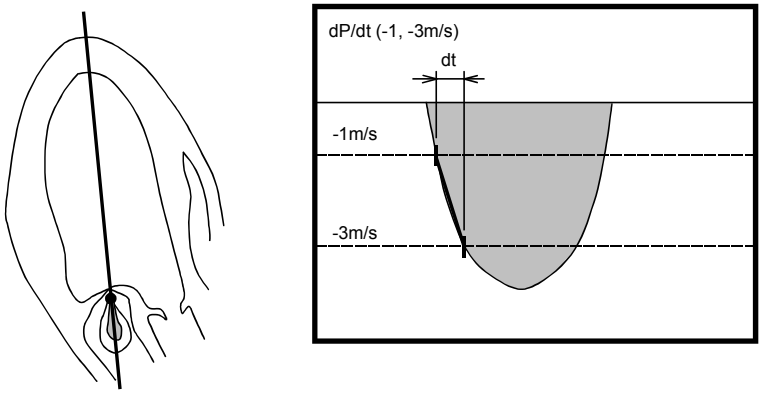


$$dP/dt = \frac{4 \times (Vel2^2 - Vel1^2)}{dt} \times \frac{1}{1000}$$

- When [dP/dt -1, -3m/s] is pressed

  (a) Move the marker to the intersection of the Doppler waveform and the -1 m/s velocity line, and then press SET.

  (b) Move the marker to the intersection of the Doppler waveform and the -3 m/s velocity line, and then press SET.



$$dP/dt\ (-1, -3\ m/s) = \frac{4 \times \{(-3)^2 - (-1)^2\}}{dt} \times \frac{1}{1000}$$

NOTE: The heart rate can be obtained by the following three methods. For details, refer to subsection 7.1.4 "Heart rate acquisition methods".

1. When the optional ECG unit is used, the heart rate is automatically calculated from the ECG and displayed when the MV V Trace value is determined.
2. The heart rate is entered manually.
3. The heart rate is calculated based on the Range measurement result that is obtained by pressing [HR].

7.4.3 Pulmonary vein blood flow waveform measurement (Pulmo. Vein)

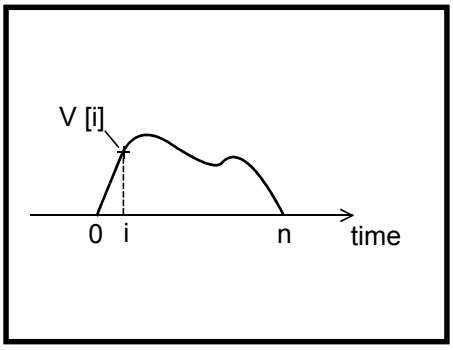
Measurements are performed based on the pulmonary vein blood flow waveform.

<<Measurement items>>

Touch panel switch	Item to be measured	Result display
S1 Vel	S1-warve velocity	S1 Vel (cm/s)
S2 Vel	S2-wave velocity	S2 Vel (cm/s)
D Vel	D-wave velocity	D Vel (cm/s)
Decel Time	Deceleration time	DcT (sec)
PVA Vel	AR-wave velocity	PVA Vel (cm/s)
PVA Dur	Atrium reversal duration	PVA Dur (sec)
S VTI	S-wave VTI	S VTI (cm)
D VTI	D-wave VTI	D VTI (cm)

* Velocity trace measurement

When velocity trace measurement ([S VTI], [D VTI]) is executed, calculation is performed using the following formula, and the calculated value is displayed.

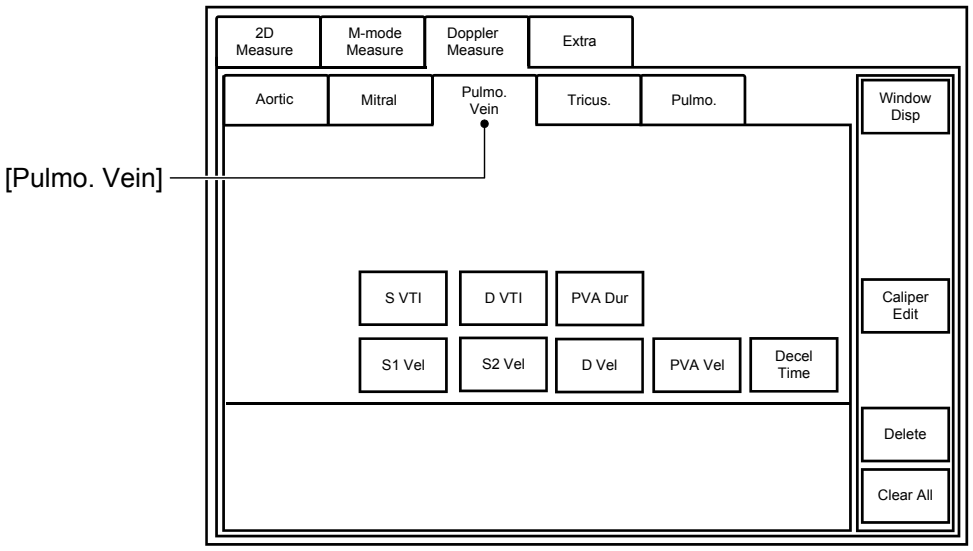


$$VTI = \sum_{i=1}^{n} V\,[i]$$

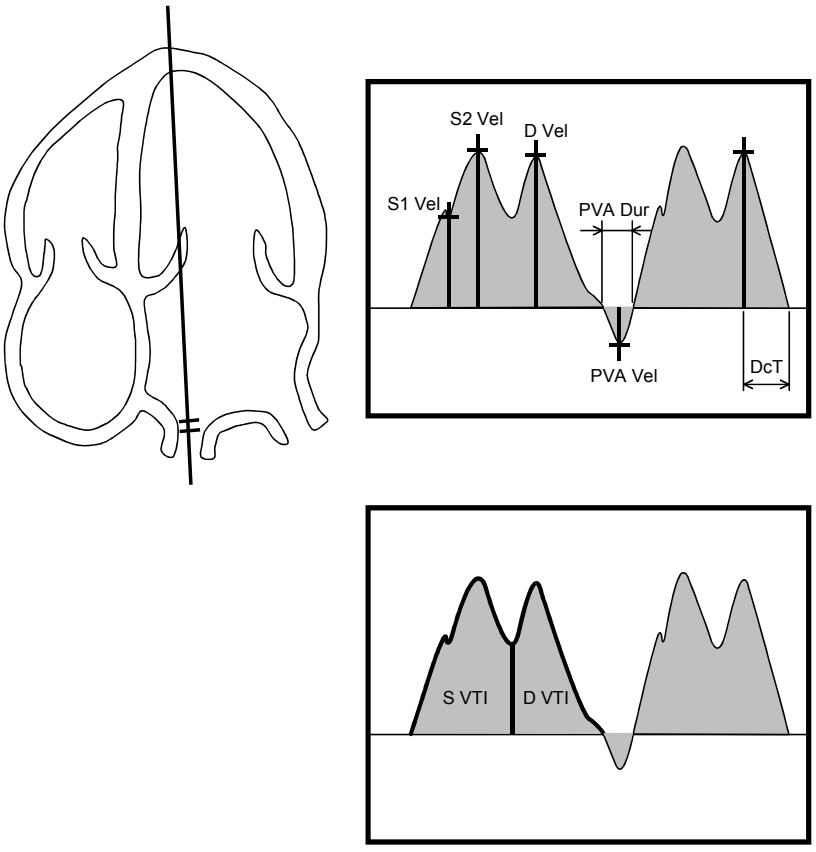
<<Calculation items>>

Calculation item	Calculation formula	Unit
S/D	*S Vel/D Vel* *S Vel = Larger data, abs (S1 Vel) or abs (S2 Vel)*	–
Sys. Fract.	*S VTI/(S VTI + D VTI)*	–
Diff A Dur	*A Dur (MV) − PVA Dur*	sec

<<Menu display on the touch panel>>



<<Measurement points>>



7.4.4 Tricuspid valve blood flow waveform measurement (Tricus.)

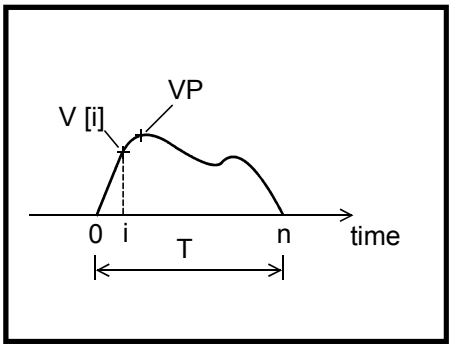
Measurements are performed based on the tricuspid valve blood flow waveform.

<<Measurement items>>

Touch panel switch	Item to be measured	Result display
TV E Vel	E-wave velocity	TV E Vel (cm/s)
TV A Vel	A-wave velocity	TV A Vel (cm/s)
TV DcT	Deceleration time	TV DcT (sec)
TV V Trace *	VTI on the tricuspid valve blood flow waveform	TV VTI (cm)
	Maximum velocity on the tricuspid valve blood flow waveform	TV VP (cm/s)
	Mean velocity on the tricuspid valve blood flow waveform	TV VM (cm/s)
	Maximum pressure gradient on the tricuspid valve blood flow waveform	TV PPG (mmHg)
	Mean pressure gradient on the tricuspid valve blood flow waveform	TV MPG (mmHg)
TR V Trace *	VTI on the tricuspid valve regurgitation waveform	TR VTI (cm)
	Maximum velocity on the tricuspid valve regurgitation waveform	TR VP (cm/s)
	Mean velocity on the tricuspid valve regurgitation waveform	TR VM (cm/s)
	Maximum pressure gradient on the tricuspid valve regurgitation waveform	TR PPG (mmHg)
	Mean pressure gradient on the tricuspid valve regurgitation waveform	TR MPG (mmHg)
TR Vmax	Maximum tricuspid valve regurgitation velocity	TR Vmax (cm/s)
	Maximum tricuspid valve regurgitation pressure gradient	TR PGmax (mmHg)
RA Press	Estimated right atrial pressure	RA Press (mmHg)

* Velocity trace measurement

When velocity trace measurement ([TV V Trace] or [TR V Trace]) is executed, calculation is performed using the following formula, and the calculated value is displayed.



$$VTI = \sum_{i=1}^{n} V[i]$$

$$VM = \frac{\sum_{i=1}^{n} V[i]}{T}$$

$$PPG = 4 \times VP^2$$

$$MPG = \frac{4 \times \sum_{i=1}^{n} V[i]^2}{n}$$

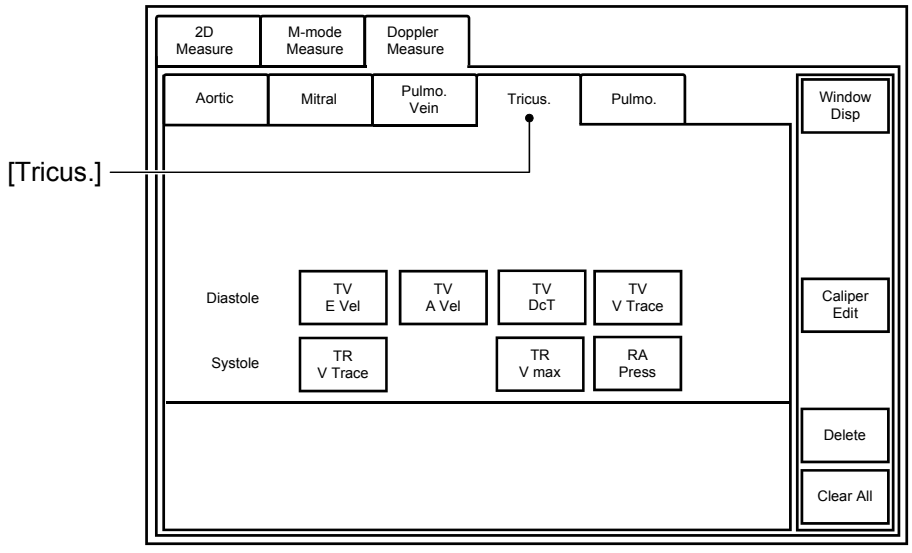
<<Calculation items>>

Calculation item	Calculation formula	Unit
RVs Press	*TR PGmax + RA Press*	mmHg
E/A	*E Vel/A Vel*	–
A/E	*A Vel/E Vel*	–

<<Measurement procedure>>

(1) Press CALC. The application measurement menu is displayed.

(2) Press [Tricus.]. The menu shown below is displayed.



(3) Press [TV E Vel]. The marker is displayed.

Move the marker to the peak of the E-wave and then press SET.

(4) Press [TV A Vel]. Move the marker to the peak of the A-wave and press 

.

(5) Press [TV DcT]. The marker is displayed.

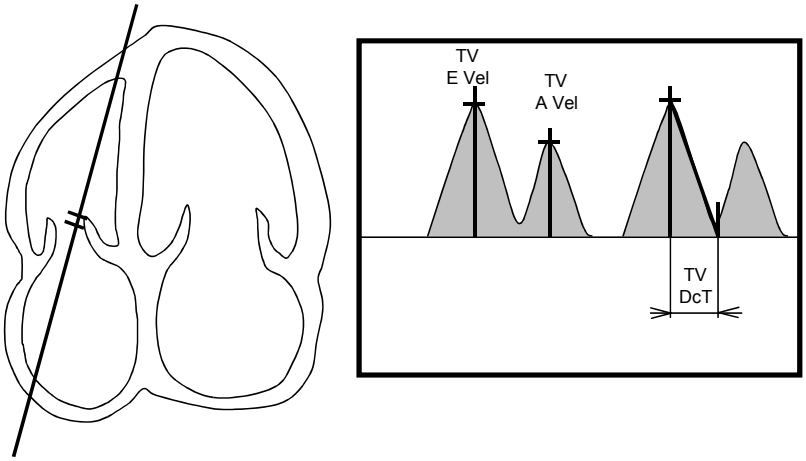
(a) Move the marker to the peak of the E-wave and press 

.

(b) Move the marker intersection point to the baseline so that the dotted line overlaps the Doppler waveform, and then press 

.

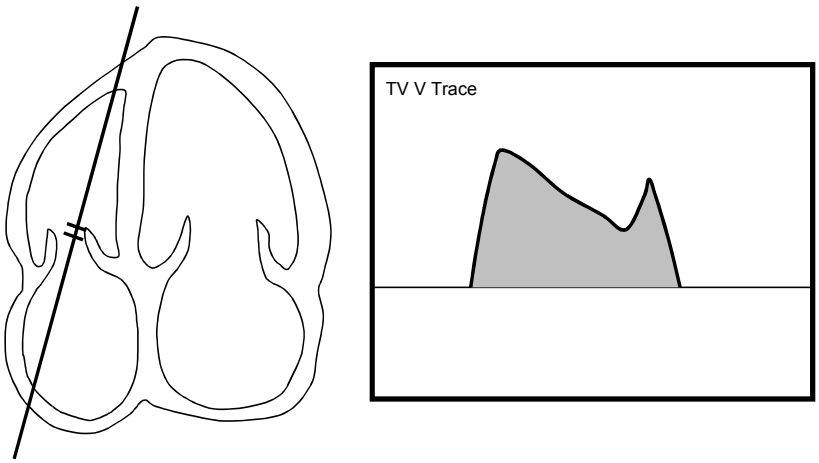
- TV E Vel, TV A Vel, TV DcT



(6) Press [TV V Trace]. The marker is displayed.

Measure the items programmed for [TV V Trace] using the velocity trace measurement procedure.

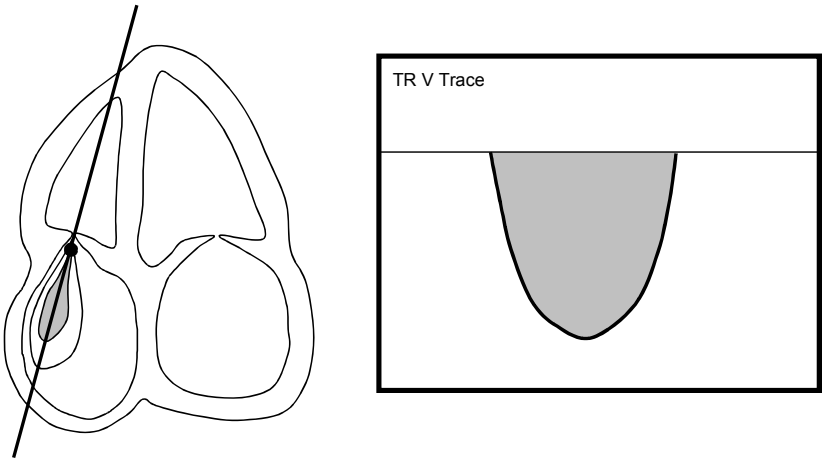
- TV V Trace



(7) Press [TR V Trace]. The marker is displayed.

Measure the items programmed for [TR V Trace] using the velocity trace measurement procedure.

- TR V Trace

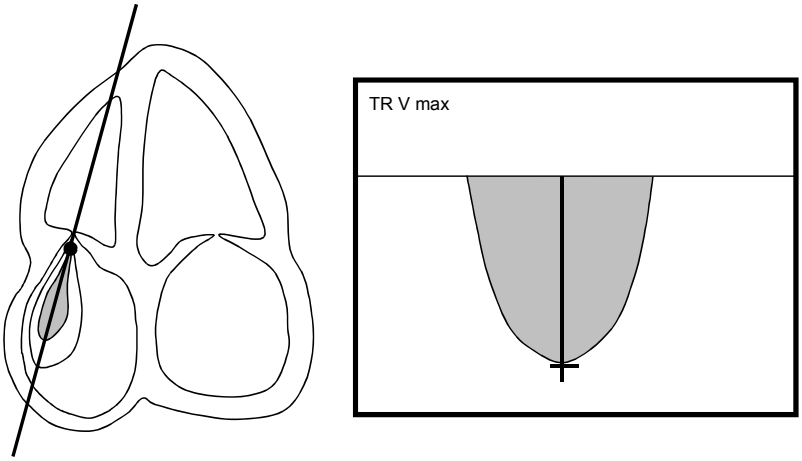


(8) Press [TR V max]. The marker is displayed.

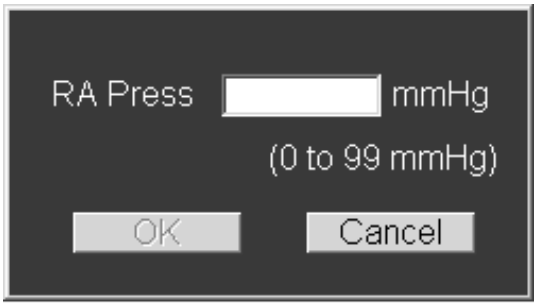
Move the marker to the peak velocity position and then press 

.

- TR V max



(9) Press [RA Press]. The dialog box shown below is displayed on the monitor. Enter a value from the keyboard and press [OK] to accept the value.



7.4.5 Pulmonary valve measurement (Pulmo.)

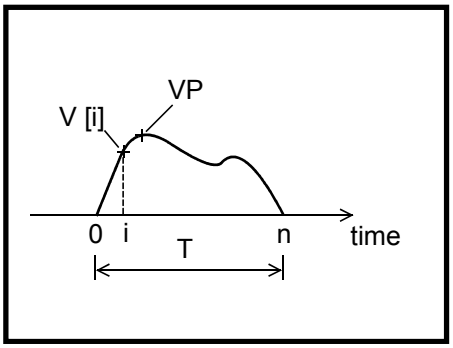
Measurements are performed based on the pulmonary valve blood flow waveform.

<<Measurement items>>

Touch panel switch	Item to be measured	Result display
PV V Trace *	VTI on the pulmonary valve blood flow waveform	PV VTI (cm)
	Maximum velocity on the pulmonary valve blood flow waveform	PV VP (cm/s)
	Mean velocity on the pulmonary valve blood flow waveform	PV VM (cm/s)
	Maximum pressure gradient on the pulmonary valve blood flow waveform	PV PPG (mmHg)
	Mean pressure gradient on the pulmonary valve blood flow waveform	PV MPG (mmHg)
PV Diam	2D-mode distance measurement	PV Diam (mm)
HR	Heart rate	HR (bpm)
RV PEP	Pre-ejection period	RV PEP (sec)
RV AcT	Acceleration time	RV AcT (sec)
RV ET	Ejection time	RV ET (sec)
PV Vmax	Maximum velocity on the pulmonary valve blood flow waveform	PV Vmax (cm/s)
	Maximum pressure gradient on the pulmonary valve blood flow waveform	PV PGmax (mmHg)
PR V Trace *	VTI on the pulmonary valve regurgitation waveform	PR VTI (cm)
	Maximum velocity on the pulmonary valve regurgitation waveform	PR VP (cm/s)
	Mean velocity on the pulmonary valve regurgitation waveform	PR VM (cm/s)
	Maximum pressure gradient on the pulmonary valve regurgitation waveform	PR PPG (mmHg)
	Mean pressure gradient on the pulmonary valve regurgitation waveform	PR MPG (mmHg)
PR Ved	Pulmonary valve regurgitation velocity at end diastole	PR Ved (cm/s)
		PR PGed (mmHg)
RA Press	Estimated right atrium pressure	RA Press (mmHg)

* Velocity trace measurement

When velocity trace measurement ([PV V Trace] or [PR V Trace]) is executed, calculation is performed using the following formula, and the calculated value is displayed.



$$VTI = \sum_{i=1}^{n} V\,[i]$$

$$VM = \frac{\sum_{i=1}^{n} V\,[i]}{T}$$

$$PPG = 4 \times VP^2$$

$$MPG = \frac{4 \times \sum_{i=1}^{n} V\,[i]^2}{n}$$

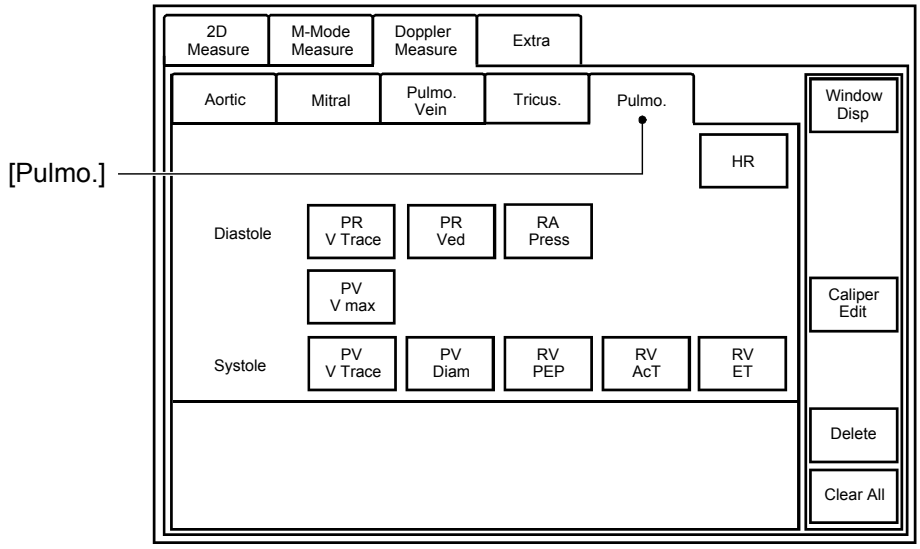
<<Calculation items>>

Calculation item	Calculation formula	Item to be calculated	Unit
AcT/ET	$RV\ AcT/RV\ ET$	–	–
STI	$RV\ PEP/RV\ ET$	–	–
PV SV	$\frac{\pi}{4}(PV\ Diam)^2 \times \lvert PV\ VTI \rvert /100$	Stroke volume	mL
PV CO	$HR \times PV\ SV/1000$	Cardiac output	L/min
PV SI	$PV\ SV/BSA$	SV Index	mL/m^2
PV CI	$PV\ CO/BSA$	Co Index	L/min/m^2
Qp/Qs (SV)	$PV\ SV/LVOT\ SV$	–	–
Qp/Qs (CO)	$PV\ CO/LVOT\ CO$	–	–
PAs Press	$4 \times PR\ Ved \times PR\ Ved/10000 + RA\ Press$	–	mmHg
BSA	Refer to subsection 7.1.5.	Body surface area	m^2

<<Measurement procedure>>

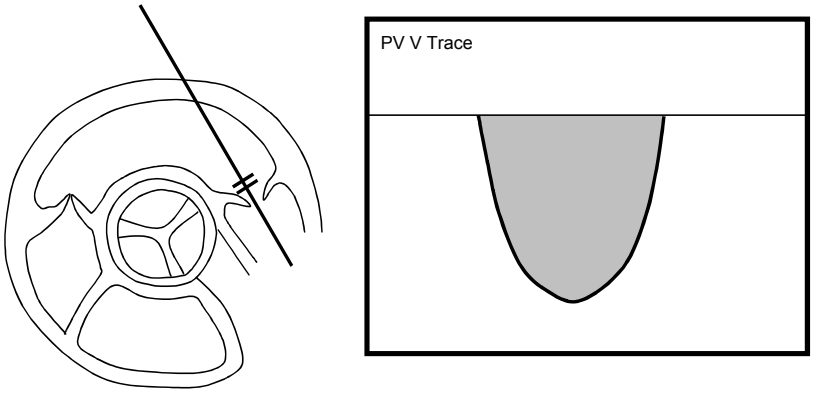
(1) Press CALC.

(2) Press [Pulmo.]. The menu shown below is displayed.



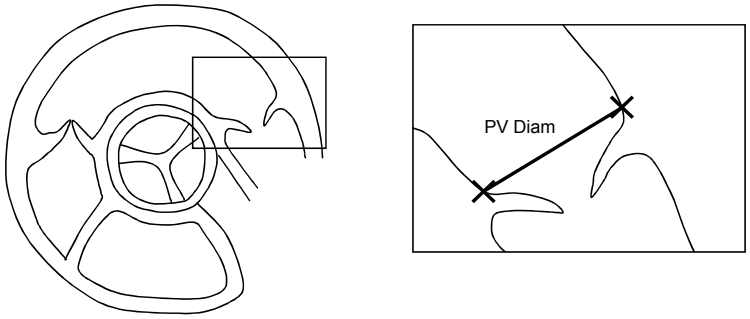
(3) Press [PV V Trace]. The marker is displayed.

Measure the items programmed for [PV V Trace] using the velocity trace measurement procedure.



(4) Press [PV Diam]. The marker is displayed on the 2D-mode image.

Measure the right ventricular outflow tract diameter using the 2D-mode distance measurement procedure.



(5) Press [RV PEP]. The marker is displayed.

Perform measurement using the time measurement procedure.

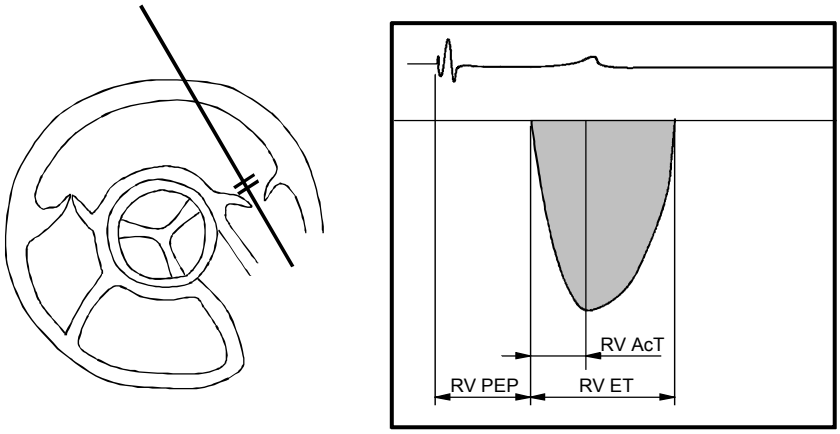
(6) Press [RV AcT]. The marker is displayed.

Perform measurement using the time measurement procedure.

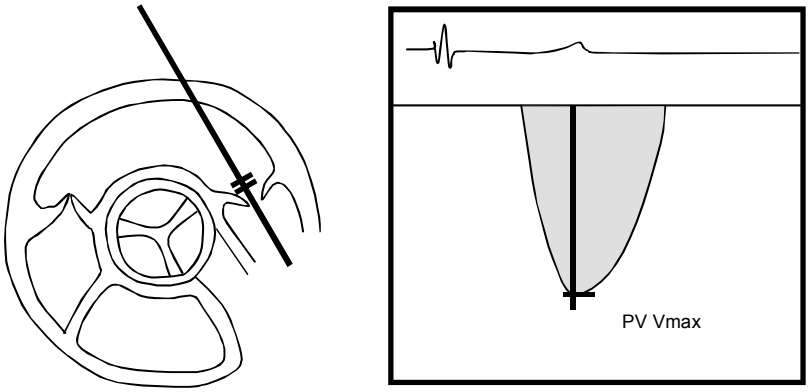
(7) Press [RV ET]. The marker is displayed

Perform measurement using the time measurement procedure.

- RV PEP, RV ET, RV AcT

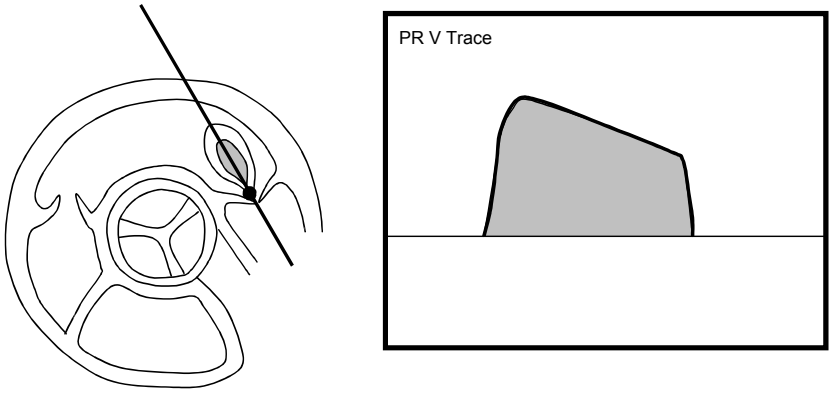


(8) Press [PV Vmax]. The marker is displayed. Measure the items programmed for [PV Vmax] using the velocity measurement procedure.



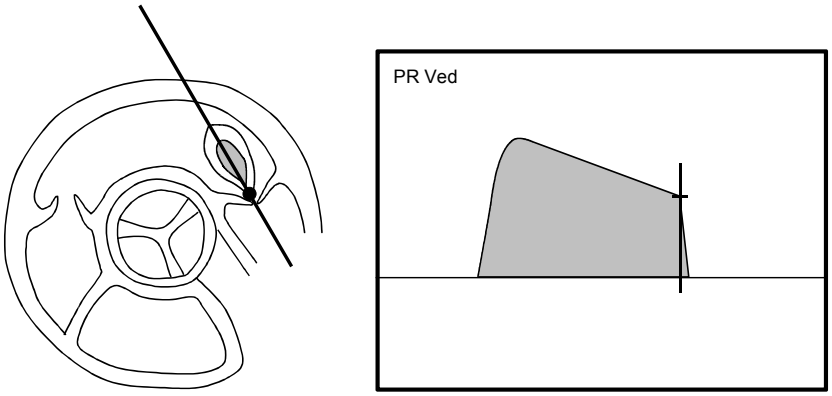
(9) Press [PR V Trace]. The marker is displayed.

Measure the items programmed for [PR V Trace] using the velocity trace measurement procedure.

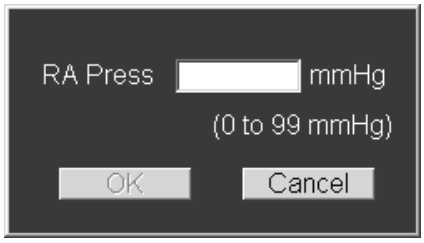


(10) Press [PR Ved].

The marker is displayed. Measure the items programmed for [PR Ved] using the velocity trace measurement procedure.



(11) Press [RA Press]. The dialog box shown below is displayed on the monitor. Enter a value from the keyboard and press [OK] to accept the value.



NOTE: Heart rate acquisition methods

The heart rate can be obtained by the following three methods. For details, refer to subsection 7.1.4 "Heart rate acquisition methods".

1. When the optional ECG unit is used, the heart rate is automatically calculated from the ECG and displayed when the PV V Trace value is determined.
2. The heart rate is entered manually.
3. The heart rate is calculated based on the Range measurement result.

7.5 Extra Measurements

7.5.1 LV Mass AL (Area-Length)

The weight of the myocardium is calculated.

<<Measurement items>>

Touch panel switch	Item to be measured	Result display
A epi	Area within the trace for the LV short-axis epicardium	A epi (cm^2)
A endo	Area within the trace for the LV short-axis endocardium	A endo (cm^2)
LVL	LV long axis length	LVL (mm)

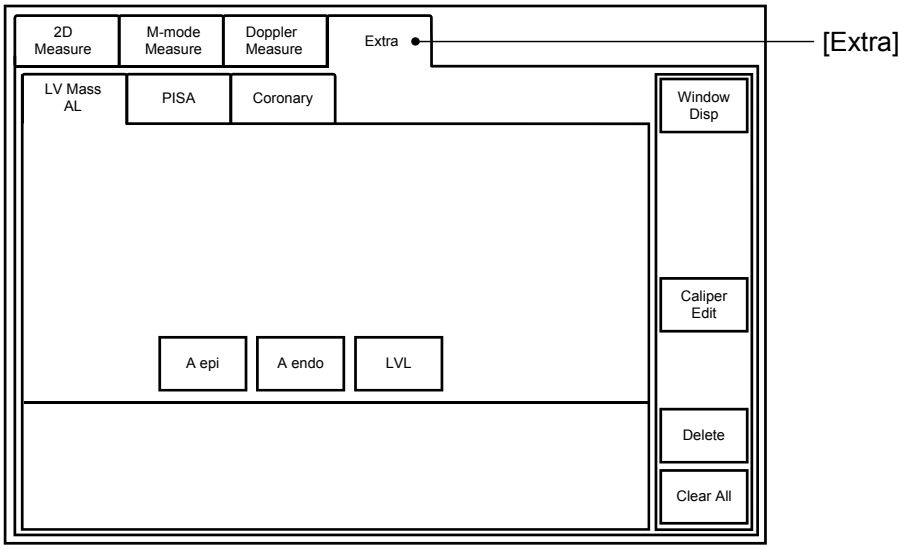
<<Calculation items>>

Calculation item	Calculation formula	Item to be calculated	Unit
t	$\sqrt{\frac{(Aepi \times 100)}{\pi}} - \sqrt{\frac{Aendo \times 100}{\pi}}$	LV myocardial thickness	mm
LV Mass	$1.05 \times \left(\frac{5}{6} Aepi \times (LVL + t)/10 - \frac{5}{6} \times Aendo \times LVL/10 \right)$	LV myocardial mass	g
MassIdx	$LV\ Mass/BSA$	–	g/m^2
BSA	Refer to subsection 7.1.5.	Body surface area	m^2

<<Measurement procedure>>

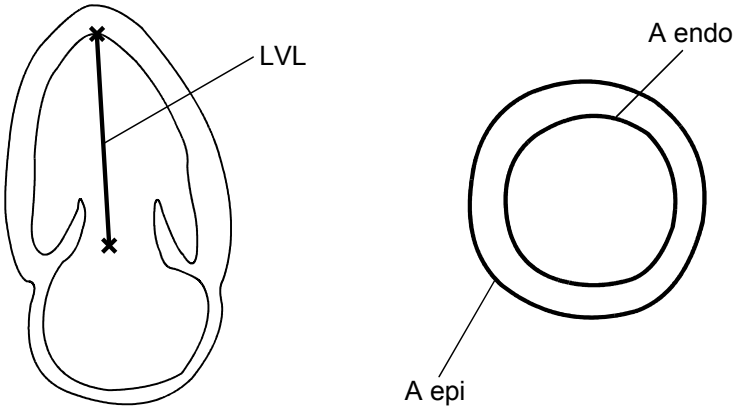
(1) Press CALC.

(2) Press [Extra] on the touch panel. The menu shown below is displayed.



(3) Press the switch for the desired item and perform measurement.

<<Measurement points>>



7.5.2 LV Mass TE (Truncated Ellipsoid)

LV Mass TE (Truncated Ellipsoid) measurement can be preset instead of LV Mass AL (Area-Length) measurement. Refer to section 2 "Setting the Presets" for the preset change procedure.

<<Measurement items>>

Touch panel switch	Item to be measured	Result display
A epi	Area within the trace for the LV short-axis epicardium	A epi (cm^2)
A endo	Area within the trace for the LV short-axis endocardium	A endo (cm^2)
a	Refer to the figure.	a (mm)
d	Refer to the figure.	d (mm)

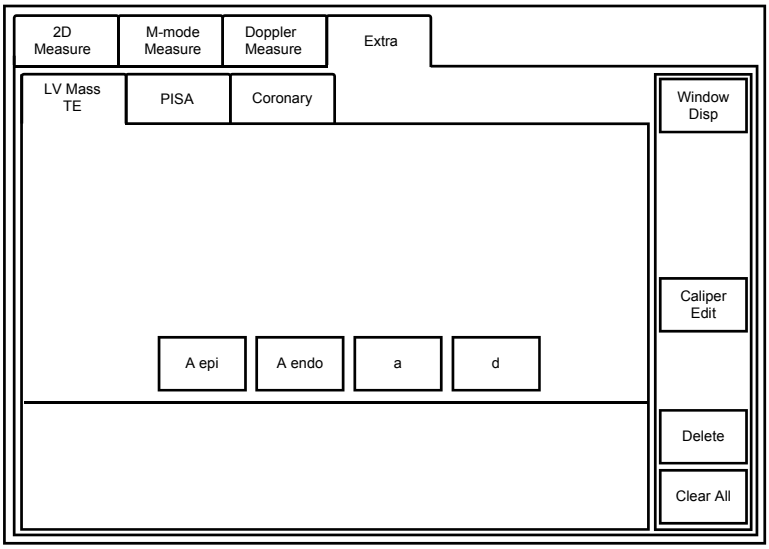
<<Calculation items>>

Calculation item	Calculation formula	Item to be calculated	Unit
t	$\sqrt{\frac{(Aepi\times 100)}{\pi}}-\sqrt{\frac{(Aendo\times 100)}{\pi}}$	LV myocardial thickness	mm
LV Mass	$1.05\pi\times\left[(\sqrt{\frac{Aendo}{\pi}}+\frac{t}{10})^2\times(\frac{2}{3}\times\frac{(a+t)}{10}+\frac{d}{10}-\frac{(\frac{d}{10})^3}{3\times\left(\frac{a+t}{10}\right)^2})-\frac{Aendo}{\pi}\times(\frac{2}{3}\times\frac{a}{10}+\frac{d}{10}-\frac{(\frac{d}{10})^3}{3\times\left(\frac{a}{10}\right)^2})\right]$	LV myocardial mass	g
MassIdx	$LV\ Mass/BSA$	–	g/m^2
BSA	Refer to subsection 7.1.5.	Body surface area	m^2

<<Measurement procedure>>

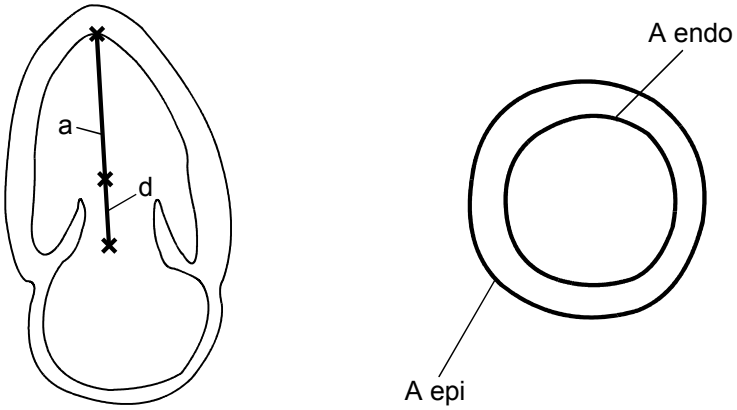
(1) Press CALC.

(2) Press [Extra] on the touch panel. The menu shown below is displayed.



(3) Press the switch for the desired item and perform measurement.

<<Measurement points>>



7.5.3 PISA

The flow volume is calculated using the PISA method.

NOTE: It is recommended that the measurement of [Radius] (PISA radius) and acquisition of [Alias Vel] (aliasing velocity) be performed in CDI (2D single) mode.

<<Measurement items>>

Touch panel switch	Item to be measured	Result display
Radius	PISA radius	Radius (mm)
Alias Vel	Alias velocity	Alias Vel (cm/s)
VEL Trace	Regurgitation velocity trace	VP (cm/s) VTI (cm) PPG (mmHg) MPG (mmHg)

<<Calculation items>>

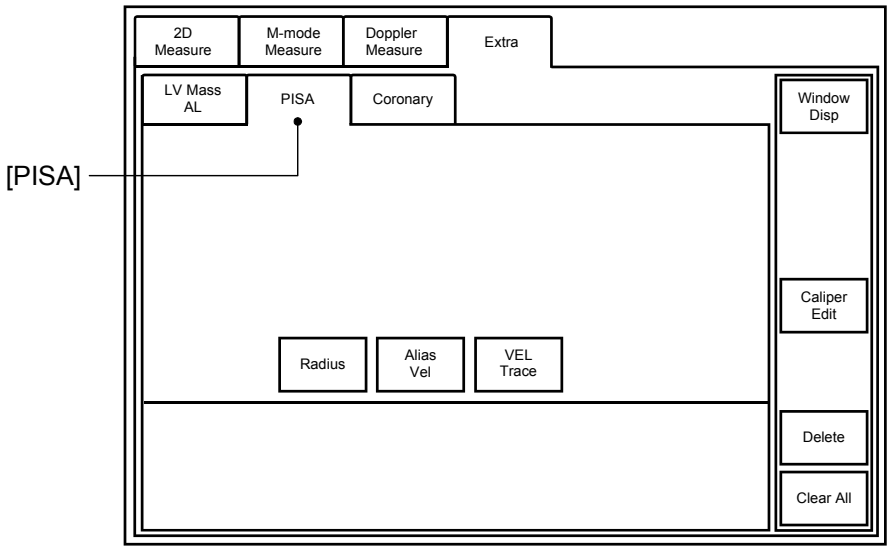
Calculation item	Calculation formula	Item to be calculated	Unit
Flow Rate	$2 \times PAI \times (Radius/10)^2 \times (Alias\ Vel)$	Instantaneous flow volume	mL/s
FOArea	$abs\ (Flow\ Rate/VP)$	Effective opening area	cm^2
FlowVol	$abs\ (EOArea \times VTI)$	Flow volume	mL

<<Measurement procedure>>

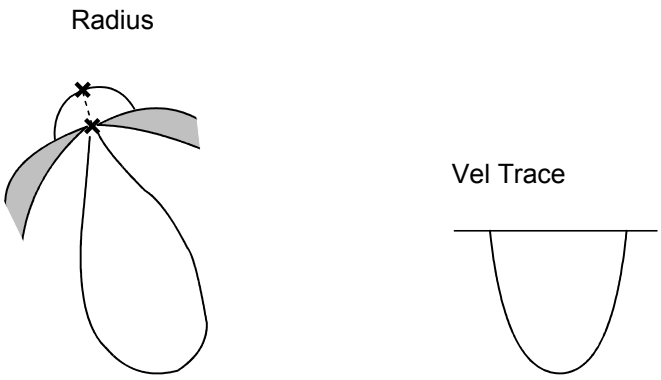
(1) Press CALC.

(2) Press [Extra] on the touch panel.

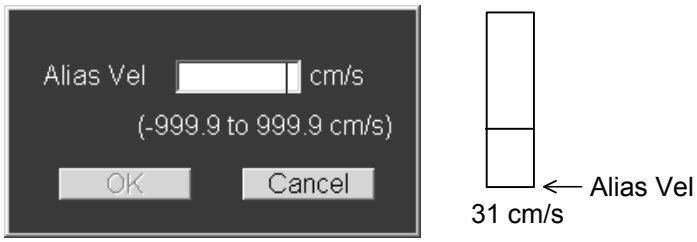
(3) Press [PISA] on the touch panel. The menu shown below is displayed.



(4) Press the switch for the desired item on the touch panel and perform measurement.



(5) Press [Alias Vel]. The dialog box shown below is displayed on the monitor. Enter a value for the color bar alias velocity from the keyboard and press [OK] to accept the value.



7.5.4 Coronary

<<Measurement items>>

Touch panel switch	Item to be measured	Result display
Base Vel	Flow velocity before loading	Vel base (cm/s)
Hyper Vel	Flow velocity after loading	Vel Hyper (cm/s)
Base V Trace	Flow velocity trace before loading	VP base (cm/s) VM base (cm/s) DcT base (sec) PHT base (sec)
Hyper V Trace	Flow velocity trace after loading	VP hyper (cm/s) VM hyper(cm/s) DcT hyper (sec) PHT hyper (sec)

<<Calculation items>>

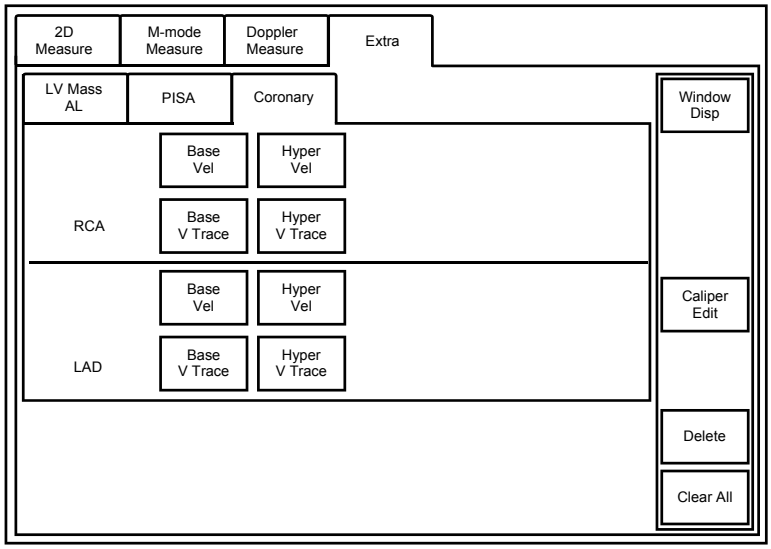
Calculation item	Calculation formula	Item to be calculated
CFR Vel	Vel hyper/Vel base	Coronary blood flow reserve (velocity)
CFR VP	VP hyper/VP base	Coronary blood flow reserve (maximum velocity)
CFR VM	VM hyper/VM base	Coronary blood flow reserve (mean velocity)

<<Measurement procedure>>

(1) Press CALC.

(2) Press [Extra] on the touch panel.

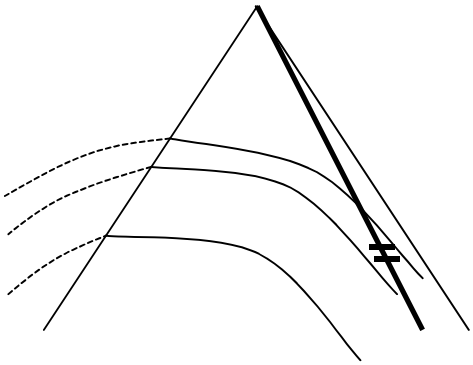
(3) Press [Coronary] on the couch panel. The menu shown below is displayed.

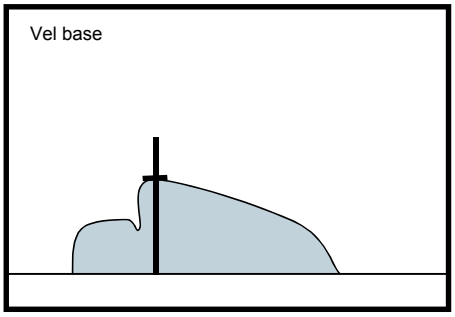


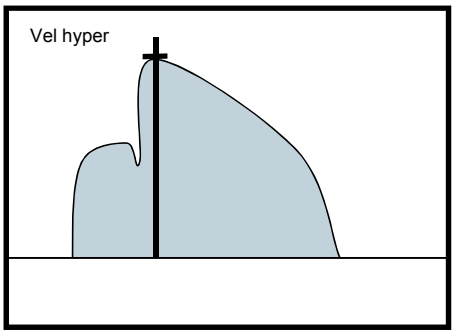
(4) Press the switch for the desired item on the touch panel and perform measurement.

Coronary

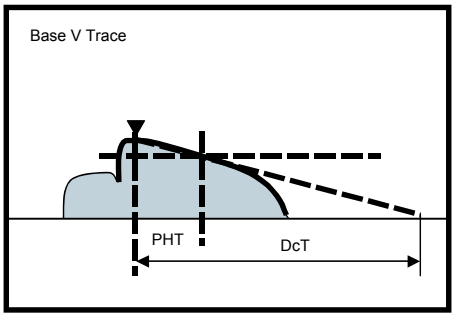
[LAD Vel]/[RCA Vel]

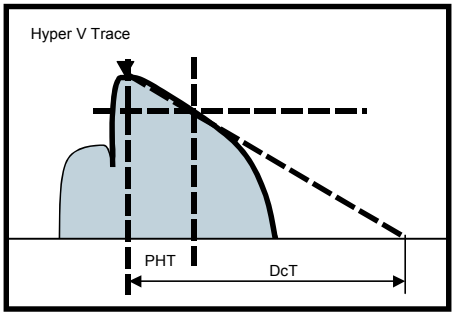






[LAD V Trace]/[RCA V Trace]

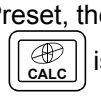




8. Application Measurement (Vascular)

The sizes and velocity of the carotid artery are measured in 2D mode and Doppler mode.

8.1 Carotid1

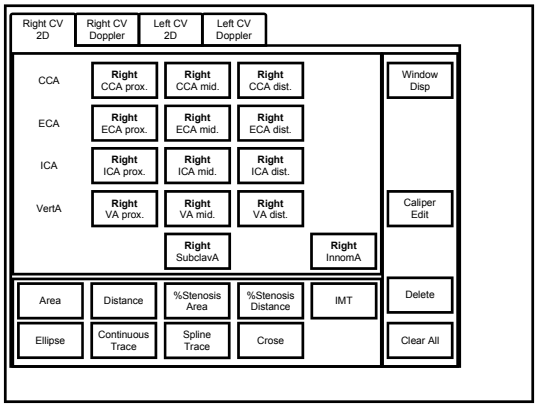
When Carotid1 is selected for Application Preset, the Carotid1 application measurement menu is displayed on the touch panel when 

is pressed.

8.1.1 2D-mode measurement

(1) Displaying the touch panel menus

The menus for the right/left regions are displayed by pressing the corresponding tabs (Right CV 2D/Left CV 2D).



Target vessel	Right/Left	Region	2D-mode measurement types
CCA: Common Carotid Artery	Right/Left	prox./mid./dist.	Area/Distance/%Stenosis Area/ %Stenosis Distance/IMT
ECA: External Carotid Artery	Right/Left	prox./mid./dist.	Area/Distance/%Stenosis Area/ %Stenosis Distance/IMT
ICA: Internal Carotid Artery	Right/Left	prox./mid./dist.	Area/Distance/%Stenosis Area/ %Stenosis Distance/IMT
Vert A: Vertebral Artery	Right/Left	prox./mid./dist.	Area/Distance/%Stenosis Area/ %Stenosis Distance/IMT
Subclav A: Subclavian Artery	Right/Left	–	Area/Distance/%Stenosis Area/ %Stenosis Distance/IMT
Innom A: Innominate Artery	Right only	–	Area/Distance/%Stenosis Area/ %Stenosis Distance/IMT

CAUTION: Result display for IMT measurement

1. When "Double Digits" is selected for Thickness [IMT] Precision on the 2D-Meas. Page of the preset menu, the IMT measurement value is displayed to two decimal places. However, it may not be possible to obtain an accurate value to two decimal places, depending on the characteristics of the image.

2. Keeping the above point in mind, use the measurement and calculation values displayed to two decimal places only for reference purposes.

3. In the MDA, a single quotation mark (') is added to the measurement values and the calculation results obtained based on the measurement values.

   Limitations: Marks can be moved in steps of 1 pixel on the screen. Due to the resolution of ultrasound images, this does not correspond to an indicated value change of 0.01. Thus, the indicated value changes in increments of greater than 0.01 as a mark is moved.

(2) Performing measurement

Select the desired measurement type, such as [Area]*, from the bottom of the touch panel. Select the measurement position, such as [Right CCA prox], from the top of the touch panel. Then, start measurement.

* The default measurement method for [Area] is preset but can be changed by pressing [Ellipse], [Continuous Trace], [Spline Trace], or [Cross] on the touch panel.
Refer to section 2 "Setting the Presets" for details.

- Use of 

  When [Area] or [Distance] is selected as the measurement type from the bottom of the touch panel, it is possible to proceed to the next step (selection of the measurement position) by pressing 

without pressing the desired measurement position switch each time from the top of the touch panel. The measurement position selection order is the same as on the touch panel (given below).

  Even when 

is pressed and another image is selected in the same mode, the measurement position can be selected in sequence by pressing 

.

  [CCA prox.] → [CCA mid.] → [CCA dist.]
→ [ECA prox.] → [ECA mid.] → [ECA dist.]
→ [ICA prox.] → [ICA mid.] → [ICA dist.]
→ [VA prox.] → [VA mid.] → [VA dist.]
→ [SubclavA] → [InnomA] (right only)

(3) Checking the measurement results

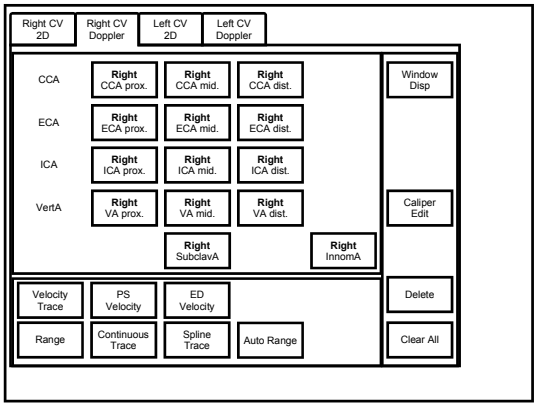
The measurement results are displayed together on the screen for each measurement position.

Region name

8.1.2 Doppler-mode measurement

(1) Displaying touch panel menus

The menus for the right/left regions are displayed by pressing the corresponding tabs (Right CV Doppler/Left CV Doppler).



Target vessel	Right/Left	Region	Doppler-mode measurement types
CCA: Common Carotid Artery	Right/Left	prox./mid./dist.	Velocity Trace/PS Velocity/ED Velocity
ECA: External Carotid Artery	Right/Left	prox./mid./dist.	Velocity Trace/PS Velocity/ED Velocity
ICA: Internal Carotid Artery	Right/Left	prox./mid./dist.	Velocity Trace/PS Velocity/ED Velocity
Vert A: Vertebral Artery	Right/Left	prox./mid./dist.	Velocity Trace/PS Velocity/ED Velocity
Subclav A: Subclavian Artery	Right/Left	–	Velocity Trace/PS Velocity/ED Velocity
Innom A: Innominate Artery	Right only	–	Velocity Trace/PS Velocity/ED Velocity

(2) Performing measurement

Select the desired measurement type, such as [Velocity Trace]*, from the bottom of the touch panel. Select the measurement position, such as [Right CCA prox], from the top of the touch panel. Then, start measurement.

* It is possible to select the measurement method by pressing the corresponding switch at the bottom of the touch panel. The measurement method switches to be displayed at the bottom of the touch panel can be changed if desired. Refer to section 2 "Setting the Presets" for details.

- Use of 

  When [Velocity Trace] or [PS Velocity] is selected as the measurement type from the bottom of the touch panel, it is possible to proceed to the next step (selection of the measurement position) by pressing 

without pressing the desired measurement position switch each time from the top of the touch panel. The measurement position selection order is the same as on the touch panel (given below).

  In the Velocity measurement, after the measurement of PS Velocity, it is possible to measure the ED Velocity at the same measurement position by pressing 

.

  Even when 

is pressed and another image is selected in the same mode, the measurement position can be selected in sequence by pressing 

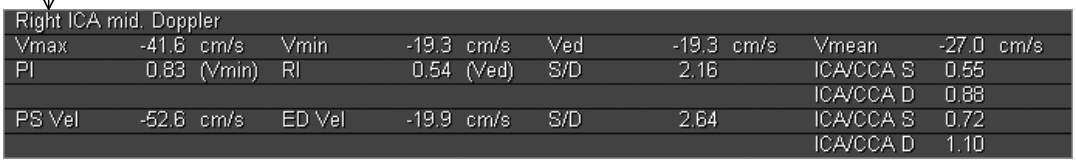
.

  [CCA prox.] → [CCA mid.] → [CCA dist.]
  → [ECA prox.] → [ECA mid.] → [ECA dist.]
  → [ICA prox.] → [ICA mid.] → [ICA dist.]
  → [VA prox.] → [VA mid.] → [VA dist.]
  → [SubclavA] → [InnomA] (right only)

(3) Checking the measurement results

When measurement results are fixed, the measurement results and the calculation results based on the measurement results are displayed on the screen for each region.

Region name



- In some measurement results, the display items and calculation formula differ depending on the initially selected presets. For the setting procedures, refer to section 2 "Setting the Presets".

(a) Display of Velocity (cm/s) and Frequency (kHz)

The measurement result display used in Doppler mode can be selected.

Display items when Velocity (cm/s) is selected		Display items when Frequency (kHz) is selected	
Vmax (cm/s)	Maximum velocity	Fmax (kHz)	Maximum frequency
Vmin (cm/s)	Minimum velocity	Fmin (kHz)	Minimum frequency
Ved (cm/s)	Velocity at end diastole	Fed (kHz)	Frequency at end diastole
Vmean (cm/s)	Time-averaged maximum velocity	Fmean (kHz)	Time-averaged frequency
PI	Pulsatility index	…	…
RI	Resistance index	…	…
S/D	Ratio between Vmax and Ved	…	…
PS Vel (cm/s)	Peak systolic velocity	PS Freq (kHz)	Peak systolic frequency
ED Vel (cm/s)	End diastolic velocity	ED Freq (kHz)	End diastolic frequency

(b) Selection of display/non-display of PI, RI, and S/D

When Velocity (cm/s) is selected in step (a) above, whether or not the results obtained in Velocity Trace measurement (PI (Pulsatility Index), RI (Resistance Index), and S/D (ratio of peak systolic velocity to end diastolic velocity)) are displayed can be selected.

(c) Selection of the calculation formula for PI and RI

If PI (Pulsatility Index) and RI (Resistance Index) are selected for display in (b) above, whether Ved or Vmin is to be used in the PI and RI calculations must be selected.

	RI calc. method	PI calc. method
For Ved	$RI\ (Ved) = \lvert(Vmax - Ved)/Vmax\rvert$	$PI\ (Ved) = \lvert(Vmax - Ved)/Vmean\rvert$
For Vmin	$RI\ (Vmin) = \lvert(Vmax - Vmin)/Vmax\rvert$	$PI\ (Vmin) = \lvert(Vmax - Vmin)/Vmean\rvert$

(4) Items calculated based on the measurement results

Various items can be calculated based on the measurement results.
When both Velocity Trace measurement and Velocity measurement are performed in Doppler-mode measurement, ICA/CCA S, ICA/CCA D, and S/D are calculated for each measurement and the calculation results for both measurements are displayed.
In addition, Flow Volume (L/min) can be checked on the report screen.

Calculation item	Description
ICA/CCA S [*1]	Ratio between the systolic velocity in the ICA and that in the CCA • For Velocity measurement $ICA/CCA = \left\lvert \frac{ICA\ PS\ Velocity}{CCA\ PS\ Velocity} \right\rvert$ • For Velocity Trace measurement $ICA/CCA = \left\lvert \frac{ICA\ Vmax}{CCA\ Vmax} \right\rvert$
ICA/CCA D [*1]	Ratio between the end-diastolic velocity in the ICA and that in the CCA • For Velocity measurement $ICA/CCA = \left\lvert \frac{ICA\ ED\ Velocity}{CCA\ ED\ Velocity} \right\rvert$ • For Velocity Trace measurement $ICA/CCA = \left\lvert \frac{ICA\ Ved}{CCA\ Ved} \right\rvert$
S/D	Ratio between the peak systolic velocity and end-diastolic velocity for each measurement position • For Velocity measurement $S/D = \frac{PS\ \ Veloity}{ED\ Velocity}$ • For Velocity Trace measurement The measured value is displayed by tracing.
Flow Vol (L/min)	When both Velocity Trace measurement and Distance measurement are performed for a region, the flow volume is calculated automatically. $\lvert Vmean\ (cm/s) \times 60\ (s/cm) \times \pi/4 \times Distance^2(mm^2)/100/1000 \rvert$

*1 The displayed calculation items differ depending on the preset.

Preset the measurement regions for CCA and ICA based on the ICA/CCA S and ICA/CCA D calculations to be performed.

For CCA, one of Prox, Mid, Dist, and ALL can be preset. For ICA, any number of items can be preset from among Prox, Mid, and Dist. When the measurement results for the specified regions are fixed, the calculation items are calculated and displayed as shown below. Refer to section 2 "Setting the Presets" for details.

Example)
- ICp/CCm S (ICA: Prox/CCA: Mid)
- ICm/CCd D (ICA: Mid/CCA: Dist)
- ICA/CCA S (ICA: ALL[*2])
- ICA/CCA D (ICA: ALL[*2])

S: Systole, D: Diastole

*2 When "ALL" is preset for ICA, the ratios are calculated in the combinations below.
(ICA: Prox/CCA: Prox, ICA: Mid/CCA: Mid, ICA: Prox/CCA: Dist)

8.1.3 Report screen

(1) Display screen

Press REPORT to display the report screen.

The report screen shows all the measured values and the calculation results obtained based on the measured values.

The measurement results to be displayed for Vascular measurement and Velocity Trace measurement can be changed through presetting.

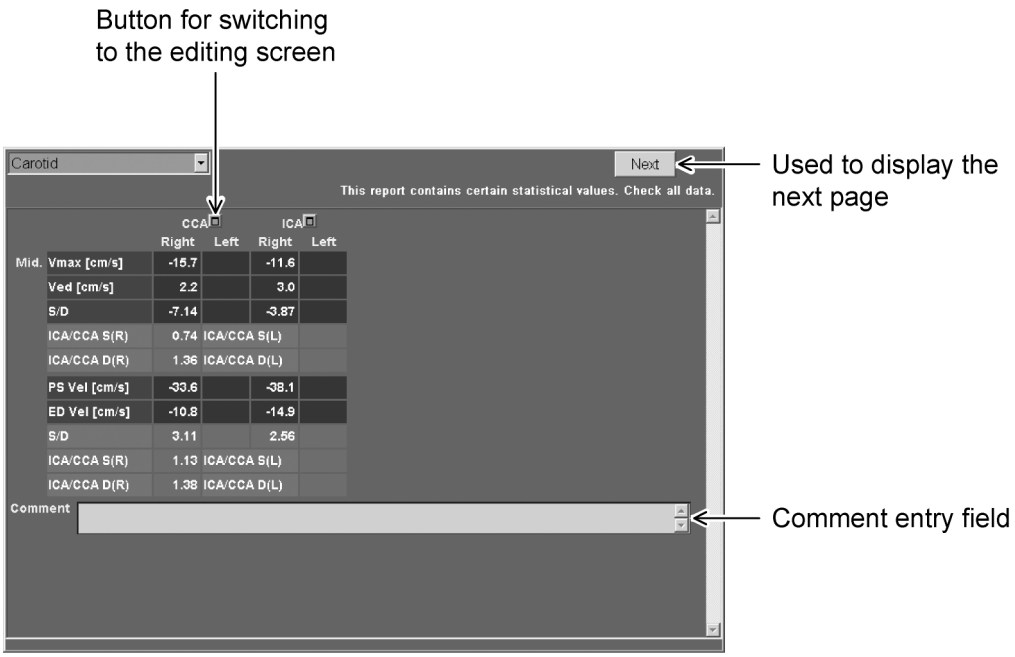
It is also possible to preset whether the mean or the most recent value is displayed on the report screen. Refer to section 2 "Setting the Presets" for details of the display change procedures.

When "Double Digits" is selected for Thickness (IMT) Precision (Available after PR) on the 2D-Meas. Page of the preset menu, the IMT measurement value is displayed to two decimal places.
A single quotation mark (') is displayed before the value to indicate that the value should be used for reference purposes only.

The report screen contains three pages. Use Prev or Next to display another page. If all the items on a page cannot be seen on a screen, scroll the page.

Comment entry is possible on the main page.

- Example of the report screen for Carotid1 Velocity (cm/s) in display mode



(2) Editing screen

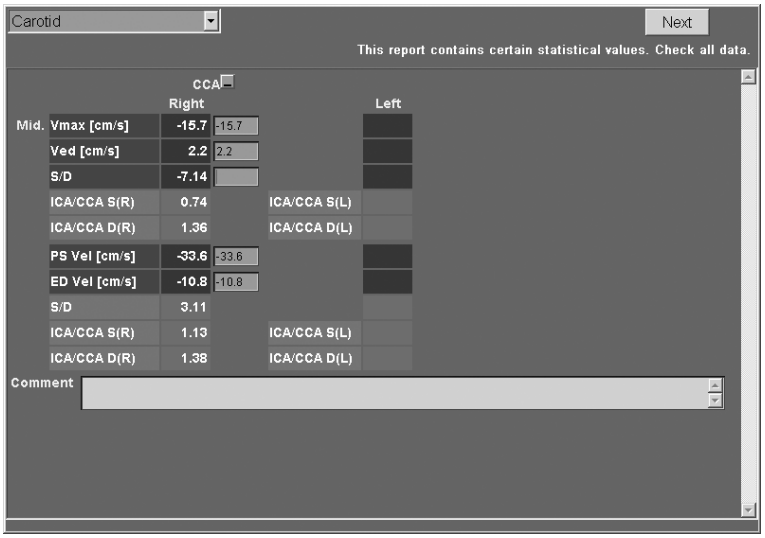
Press the button to the right of the vessel name to display the editing screen for the vessel.

Up to the three most recent measurement values and the mean or the latest of the three values are displayed for each measurement item.

The displayed values can be edited using the keyboard. An asterisk (*) is added to the edited values. An asterisk is also added to a mean value calculated using an edited value and to any values calculated based on such a mean value. Note, however, that the values obtained in Velocity measurement and Velocity Trace measurement cannot be changed to other values, but they can be deleted by pressing the [Backspace] key on the keyboard. If the [Backspace] key is pressed accidentally, the value can restored by pressing the [Esc] key before the [Enter] key is pressed. If any of the values obtained in Velocity Trace measurement is deleted, all the other values obtained in the same tracing procedure are also deleted.

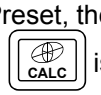
When "Double Digits" is selected for Thickness (IMT) Precision (Available after PR) on the 2D-Meas. Page of the preset menu, the IMT measurement value is displayed to two decimal places.
A single quotation mark (') is displayed before the value to indicate that the value should be used for reference purposes only.

- Example of the report screen for Carotid1 Velocity (cm/s) in edit mode



⚠CAUTION: The values obtained in Velocity measurement and Velocity Trace measurement can be deleted but cannot be changed to other values. In Velocity Trace measurement, more than one value is obtained in a single tracing procedure. If any one of these values is deleted by pressing the [Backspace] key followed by the [Enter] key, the values obtained together with the deleted value are also deleted.

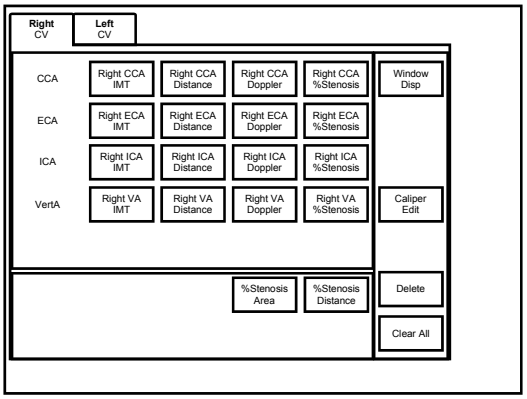
8.2 Carotid2

When Carotid2 is selected for Application Preset, the Carotid2 application measurement menu is displayed on the touch panel when 

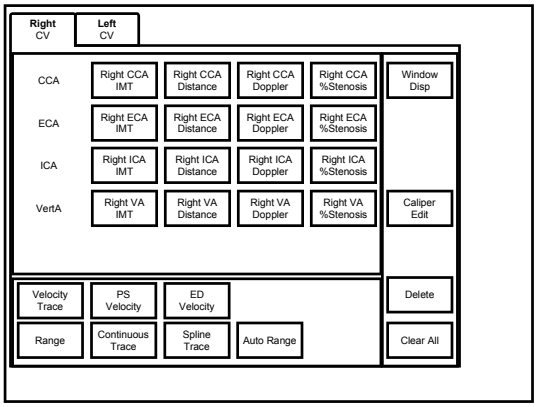
is pressed.

8.2.1 Touch panel menu

Press the Right CV tab or Left CV tab to display the right or left menu. Press the desired switch for %Stenosis measurement or Doppler measurement. The additional switches are displayed at the bottom of the touch panel as shown below.



<A> Additional switches when a %Stenosis measurement is selected



<B> Additional switches when a Doppler measurement is selected

Target vessel	Right/Left	Measurement types
CCA : Common Carotid Artery	Right/Left	IMT/Distance/Doppler/%Stenosis
ECA : External Carotid Artery	Right/Left	IMT/Distance/Doppler/%Stenosis
ICA : Internal Carotid Artery	Right/Left	IMT/Distance/Doppler/%Stenosis
Vert A: Vertebral Artery	Right/Left	IMT/Distance/Doppler/%Stenosis

CAUTION: Result display for IMT measurement

1. When "Double Digits" is selected for Thickness [IMT] Precision on the 2D-Meas. Page of the preset menu, the IMT measurement value is displayed to two decimal places. However, it may not be possible to obtain an accurate value to two decimal places, depending on the characteristics of the image.
2. Keeping the above point in mind, use the measurement and calculation values displayed to two decimal places only for reference purposes.
3. In the MDA, a single quotation mark (') is added to the measurement values and the calculation results obtained based on the measurement values.

   Limitations: Marks can be moved in steps of 1 pixel on the screen. Due to the resolution of ultrasound images, this does not correspond to an indicated value change of 0.01. Thus, the indicated value changes in increments of greater than 0.01 as a mark is moved.

8.2.2 Measurement method

Select the desired measurement item, such as [Right CCA IMT], from the top of the touch panel. Then, start measurement.

In the measurements described below, when the measurement item is selected, the measurement method switches are displayed at the bottom of the touch panel.

The default measurement method is preset but can be changed by selecting one of these switches. For details of the procedures for changing the presets, refer to section 2 "Setting the Presets".

- When a %Stenosis measurement, such as [Right CCA %Stenosis], is selected

  [%Stenosis Area] and [%Stenosis Distance] are displayed at the bottom of the touch panel.

- When a Doppler-mode measurement, such as [Right CCA Doppler], is selected

  [Velocity Trace], [PS Velocity], and [ED Velocity] are displayed at the bottom of the touch panel.

- When Velocity Trace measurement is selected

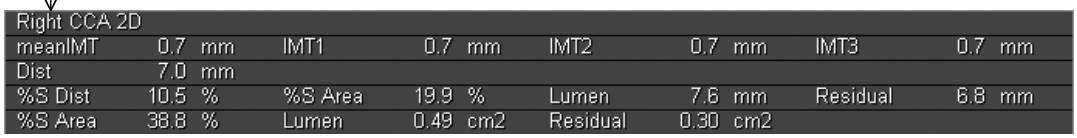
  [Range], [Continuous Trace], and [Spline Trace] are displayed at the bottom of the touch panel.

8.2.3 Check of the measurement results

The measurement results are displayed together on the screen for each region.

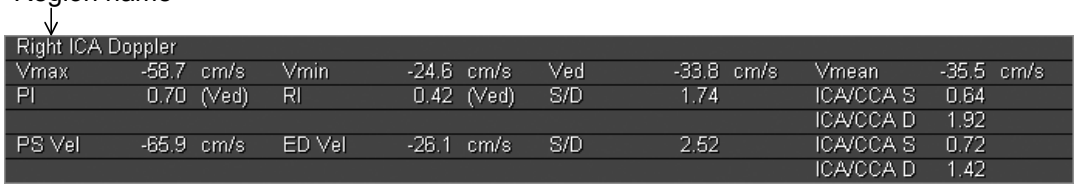
(1) 2D mode

Region name



(2) Doppler mode

Region name



- In some measurement results, the display items and calculation formula differ depending on the initially selected presets. For the setting procedures, refer to section 2 "Setting the Presets".

(a) Display of Velocity (cm/s) and Frequency (kHz)

The measurement result display used in Doppler mode can be preset.

Display items when Velocity (cm/s) is selected		Display items when Frequency (kHz) is selected	
Vmax (cm/s)	Maximum velocity	Fmax (kHz)	Maximum frequency
Vmin (cm/s)	Minimum velocity	Fmin (kHz)	Minimum frequency
Ved (cm/s)	Velocity at end diastole	Fed (kHz)	Frequency at end diastole
Vmean (cm/s)	Time-averaged maximum velocity	Fmean (kHz)	Time-averaged frequency
PI	Pulsatility index	…	…
RI	Resistance index	…	…
S/D	Ratio between Vmax and Ved	…	…
PS Vel (cm/s)	Peak systolic velocity	PS Freq (kHz)	Peak systolic frequency
ED Vel (cm/s)	End diastolic velocity	ED Freq (kHz)	End diastolic frequency

(b) Selection of display/non-display of PI, RI, and S/D

When Velocity (cm/s) is selected in step (a) above, whether or not the results obtained in Velocity Trace measurement (PI (Pulsatility Index), RI (Resistance Index), and S/D (ratio of peak systolic velocity to end diastolic velocity)) are displayed can be selected.

(c) Selection of the calculation formula for PI and RI

If PI (Pulsatility Index) and RI (Resistance Index) are selected for display in (b) above, whether Ved or Vmin is to be used in the PI and RI calculations must be selected.

	RI calc. method	PI calc. method
For Ved	$RI\ (Ved) = \lvert(Vmax - Ved)/Vmax\rvert$	$PI\ (Ved) = \lvert(Vmax - Ved)/Vmean\rvert$
For Vmin	$RI\ (Vmin) = \lvert(Vmax - Vmin)/Vmax\rvert$	$PI\ (Vmin) = \lvert(Vmax - Vmin)/Vmean\rvert$

8.2.4 Items calculated based on the measurement results

The following items can be calculated based on the measurement results.

When both Velocity Trace measurement and Velocity measurement are performed in Doppler-mode measurement, ICA/CCA S, ICA/CCA D, and S/D are calculated for each measurement and the calculation results for both measurements are displayed.

In addition, Flow Volume (L/min) can be checked on the report screen.

Calculation item	Description
ICA/CCA S	Ratio between the systolic velocity in the ICA and that in the CCA for each measurement position • For Velocity measurement $ICA/CCA = \left\| \frac{ICA\ PS\ Velocity}{CCA\ PS\ Velocity} \right\|$ • For Velocity Trace measurement $ICA/CCA = \left\| \frac{ICA\ Vmax}{CCA\ Vmax} \right\|$
ICA/CCA D	Ratio between the end-diastolic velocity in the ICA and that in the CCA for each measurement position • For Velocity measurement $ICA/CCA = \left\| \frac{ICA\ ED\ Velocity}{CCA\ ED\ Velocity} \right\|$ • For Velocity Trace measurement $ICA/CCA = \left\| \frac{ICA\ Ved}{CCA\ Ved} \right\|$
S/D	Ratio between the peak systolic velocity and end diastolic velocity for each measurement position • For Velocity measurement $S/D = \frac{PS\ \ Veloity}{ED\ Velocity}$ • For Velocity Trace measurement The measured value is displayed by tracing.
Flow Vol (L/min)	When both Velocity Trace measurement and Distance measurement are performed for a region, the flow volume is calculated automatically. $\left\| Vmean\ (cm/s) \times 60\ (s/cm) \times \pi/4 \times Distance^2(mm^2)/100/1000 \right\|$

8.2.5 Report screen

(1) Display screen

Press 

to display the report screen.

The report screen shows all the measured values and the calculation results obtained based on the measured values.

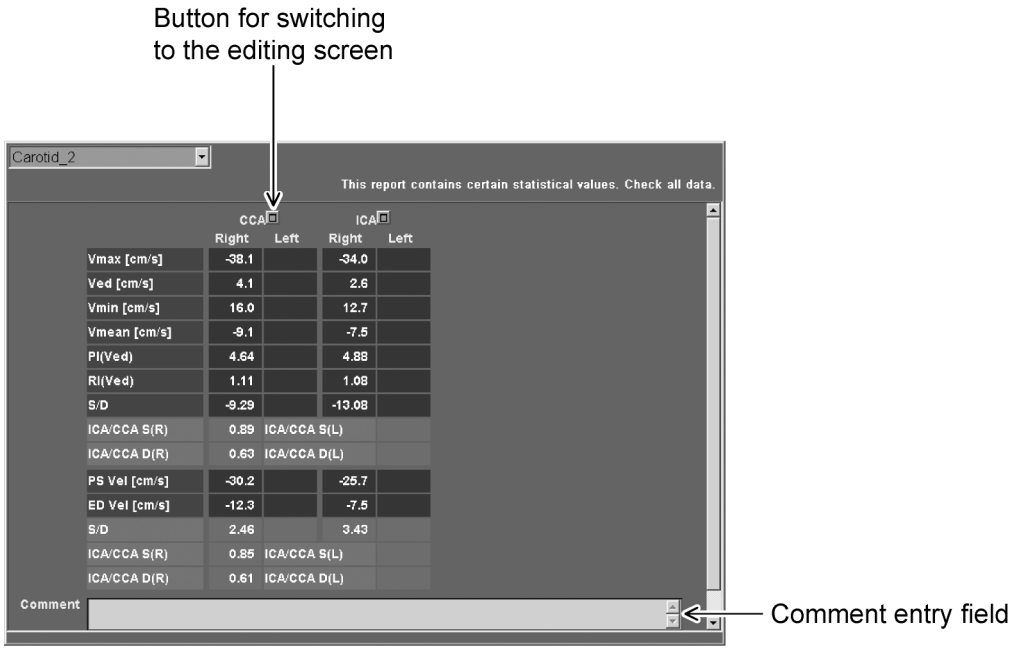
The measurement results to be displayed for Vascular measurement and Velocity Trace measurement can be changed through presetting.

It is also possible to preset whether the mean or the most recent value is displayed on the report screen. Refer to section 2 "Setting the Presets" for details of the display change procedures.

On the report screen for Vascular measurement, comment entry is also possible. If all the items on a page cannot be seen on a screen, scroll the page.

When "Double Digits" is selected for Thickness (IMT) Precision (Available after PR) on the 2D-Meas. Page of the preset menu, the IMT measurement value is displayed to two decimal places.
A single quotation mark (') is displayed before the value to indicate that the value should be used for reference purposes only.

- Example of the report screen for Carotid2 Velocity (cm/s) in display mode



(2) Editing screen

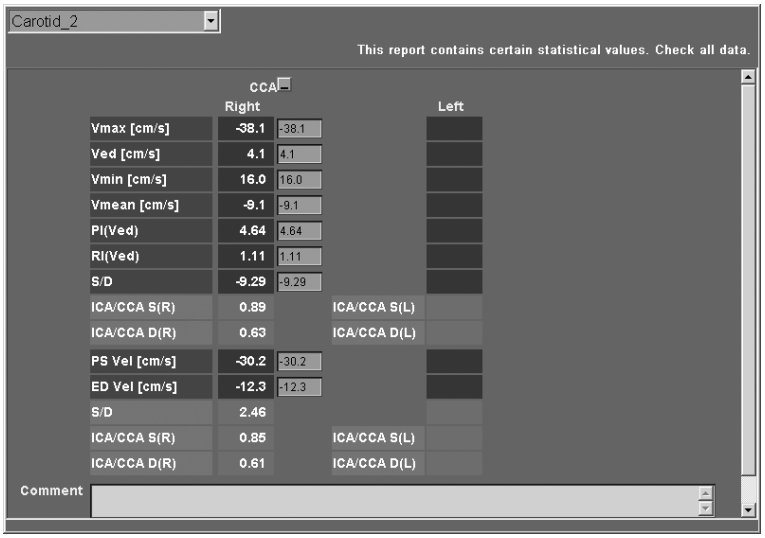
Press the button to the right of the vessel name to display the editing screen for the vessel.

Up to the three most recent measurement values and the mean or the latest of the three values are displayed for each measurement item.

The displayed values can be edited using the keyboard. An asterisk (*) is added to the edited values. An asterisk is also added to a mean value calculated using an edited value and to any values calculated based on such a mean value. Note, however, that the values obtained in Velocity measurement and Velocity Trace measurement cannot be changed to other values, but they can be deleted by pressing the [Backspace] key on the keyboard. If the [Backspace] key is pressed accidentally, the value can restored by pressing the [Esc] key before the [Enter] key pressed. If any of the values obtained in Velocity Trace measurement is deleted, all the other values obtained in the same tracing procedure are also deleted.

When "Double Digits" is selected for Thickness (IMT) Precision (Available after PR) on the 2D-Meas. Page of the preset menu, the IMT measurement value is displayed to two decimal places.
A single quotation mark (') is displayed before the value to indicate that the value should be used for reference purposes only.

- Example of the report screen for Carotid2 Velocity (cm/s) in edit mode



⚠CAUTION: The values obtained in Velocity measurement and Velocity Trace measurement can be deleted but cannot be changed to other values. In Velocity Trace measurement, more than one value is obtained in a single tracing procedure. If any one of these values is deleted by pressing the [Backspace] key followed by the [Enter] key, the values obtained together with the deleted value are also deleted.

8.3 Carotid2 (Auto-IMT Measurement)

Auto-IMT measurement is a function that performs automatic tracing and measurement within the specified ROI and displays the results.

* Auto-IMT measurement is available when the system is used together with optional USAI-790A.

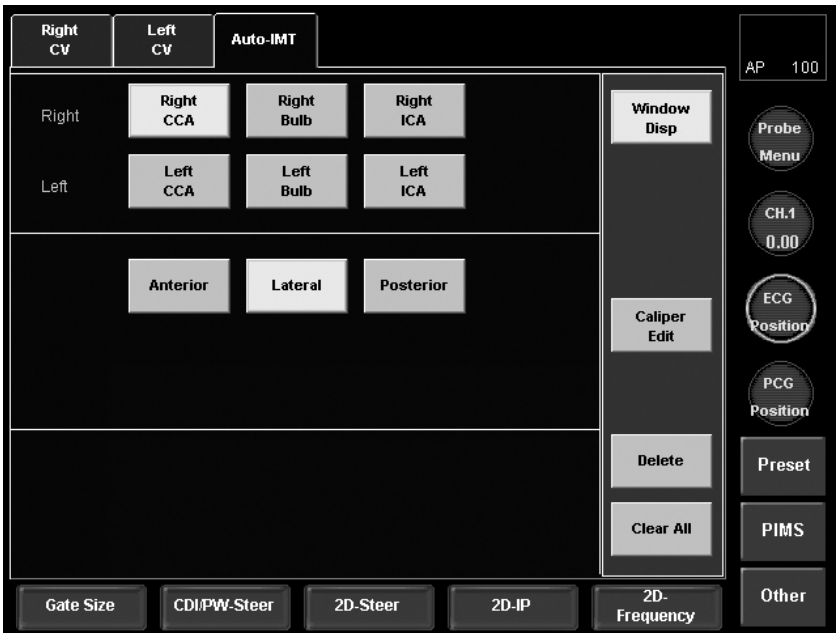
When the Application Preset is Carotid2, pressing 

displays the application measurement (Carotid2) menu on the touch panel. The measurement menu that starts up when 

is pressed can be specified. For details, refer to section 17 "Confirmation of Automatic Measurement Start Item".

8.3.1 Touch panel menu

When Auto-IMT is selected, the following menu is displayed.



Switch name	Description
Right CCA	Right Common Carotid Artery
Right Bulb	Right Carotid Bulb
Right ICA	Right Internal Carotid Artery
Left CCA	Left Common Carotid Artery
Left Bulb	Left Carotid Bulb
Left ICA	Left Internal Carotid Artery
Anterior	Approach from front
Lateral	Approach from side
Posterior	Approach from back

CAUTION: Auto-IMT measurement display

1. When Double Digits is selected for Auto IMT Precision in the preset menu and measurement is performed using the Auto-IMT tool, the measurement value is displayed to two decimal places. However, depending on the characteristics of the image, it may not be possible to obtain an accurate value within 1/100.

2. When Three Digits is selected for Auto IMT Precision in the preset menu and measurement is performed using the Auto-IMT tool, the measurement value is displayed to three decimal places. However, depending on the characteristics of the image, it may not be possible to obtain an accurate value within 1/1000.

3. Keeping the above points (1) and (2) in mind, use the measurement and calculation values only for reference purposes.

4. In the MDA, a single quotation mark (') is added to the measurement values and calculation results obtained based on the measurement values.

   Limitations: Marks can be moved in steps of 1 pixel on the screen. Due to the resolution of ultrasound images, this does not correspond to an indicated value change of 0.01/0.001. Thus, the indicated value changes in increments of greater than 0.01/0.001 as a mark is moved.

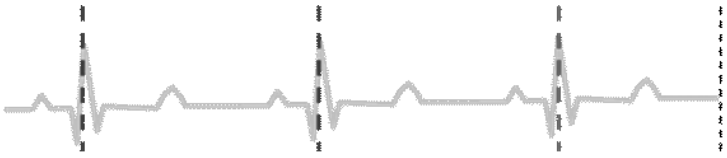
8.3.2 Measurement method

(1) Display an image of the carotid artery in 2D mode.

Pressing [2D Reference] on the 2D page on the touch panel displays the reference cursor.
The MEAS EDIT dial can be used to move the reference cursor to the left or right. Use this for reference when the distance from a specific position is used as the measurement position.

(2) Freeze the image.

When the measurement is performed using the R wave phase, rotate the Angle Correct dial to display the frame image near an arbitrary R wave.
The trackball can be used to perform fine adjustment of the frame (Cine frame feeding).

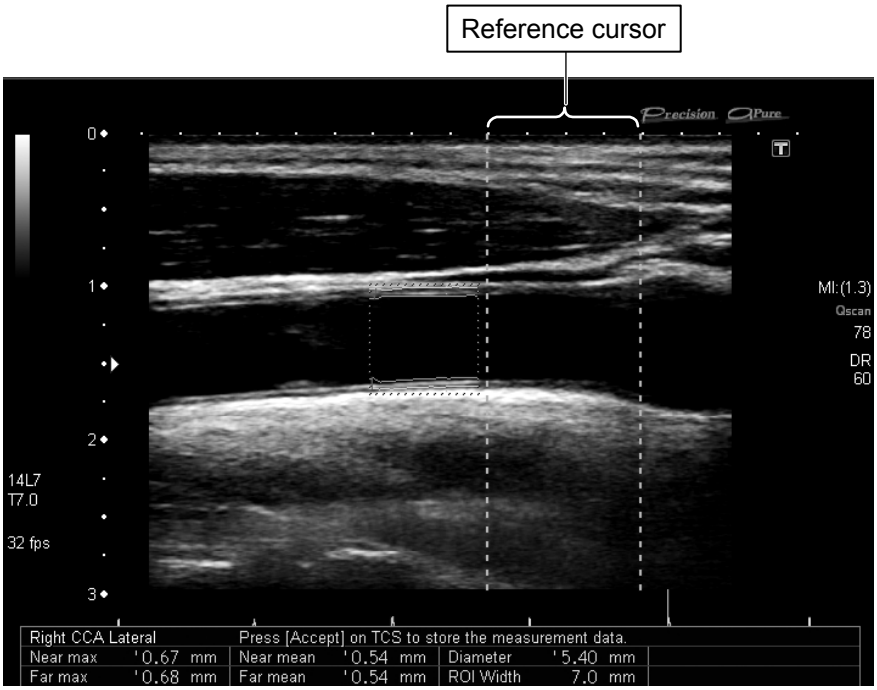


(C) (B) Latest R wave (A) Freeze

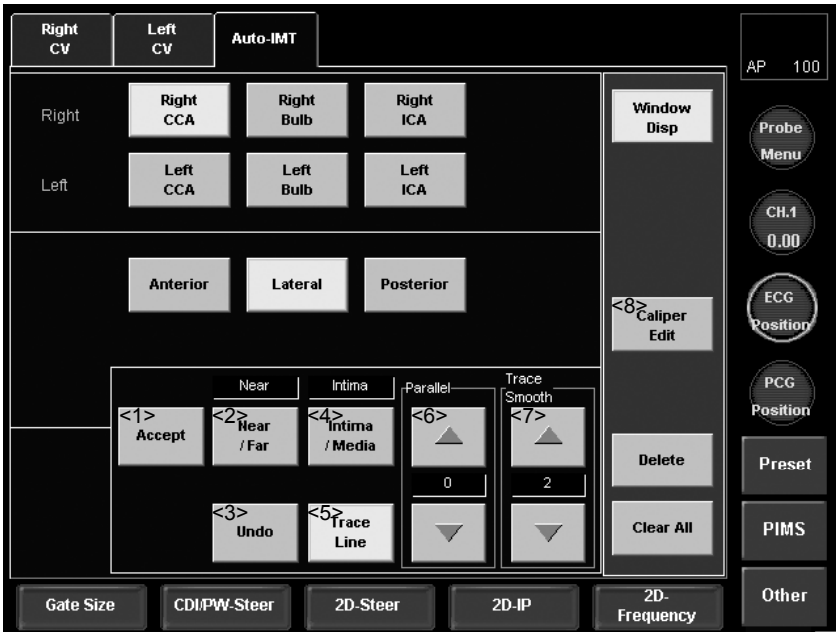
(3) Select a measurement item such as [Right CCA] from the upper pane of the touch panel, and then select an approach for the measurement section such as [Anterior] from the lower pane of the touch panel.
The ROI for trace is displayed.

(4) Specify the start and end points using the trackball and 

to designate the ROI position. The ROI is automatically traced, and the trace results are displayed.



(5) When the trace line is displayed, the [Undo] and [Accept] switches are displayed in the lower pane of the touch panel.



	Switch name	Description
<1>	Accept	Defines the trace results, and sends them to the report. The message in the MDA title area reads "Accepted". Trace lines can be modified until this switch is pressed.
<2>	Near/Far	Specifies which line (near to or far from the wall side) is to be modified.
<3>	Undo	Undoes the previous operation.
<4>	Intima/Madia	Specifies which line (on the intima or media side) is to be modified.
<5>	Trace Line	Displays/hides the trace line.
<6>	Parallel	Moves the trace line horizontally.
<7>	Trace Smooth	Adjusts the smoothness of the trace line.
<8>	Caliper Edit	Displays the arrow cursor. Place the trackball on the area to be modified, modify the trace line, and press  to set the modification.

8.3.3 Report screen

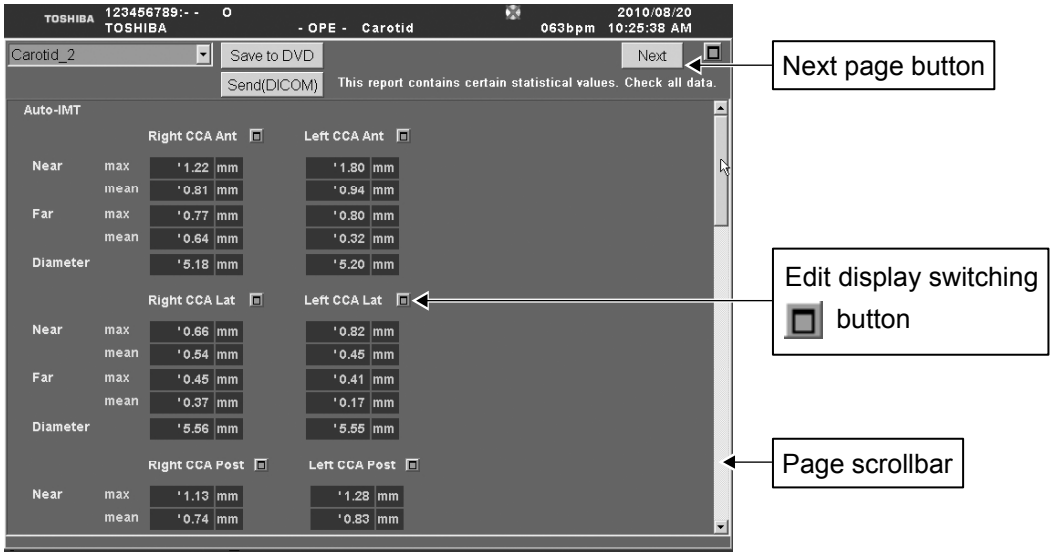
Pressing 

displays the report screen.

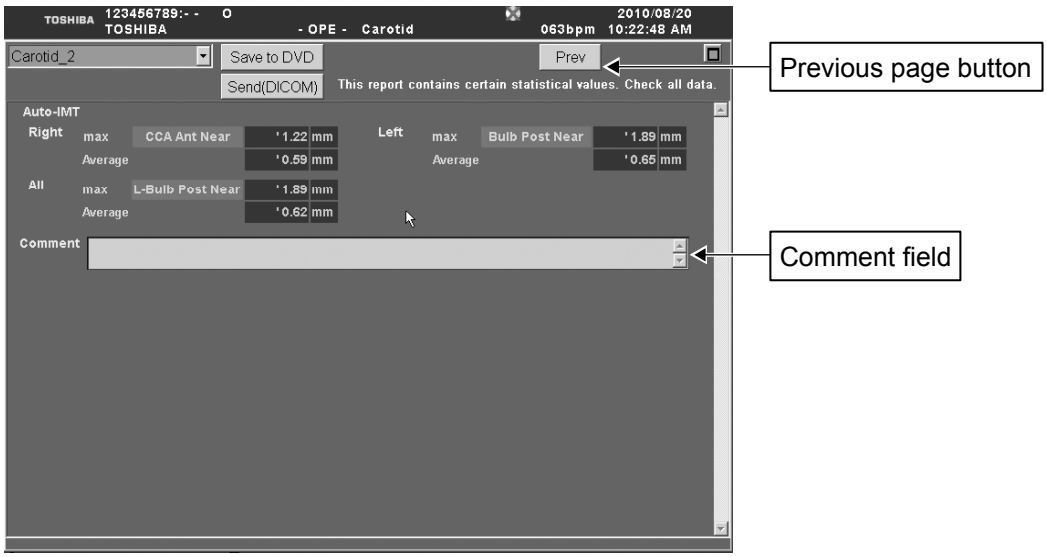
In the report screen, all of the measurement values and calculation results obtained based on the measurement values are displayed. For details of changing the display, refer to section 2 "Setting the Presets".

From the second page of the report, the representative values for each region are displayed. The highest value of the maximum values for a region is shown as "max", and the average value of the mean values for a region is shown as "Average. For example, for Right CCA, the highest value of the max values measured for each region in Right CCA is displayed as "max", and the average value of the mean values measured for each region in Right CCA is displayed as "Average".

• Example of Carotid2 Auto-IMT display (page 1)



• Example of Carotid2 Auto-IMT display (last page)



9. Application Measurements (Abdomen)

9.1 Starting the Application Measurement (Abdomen)

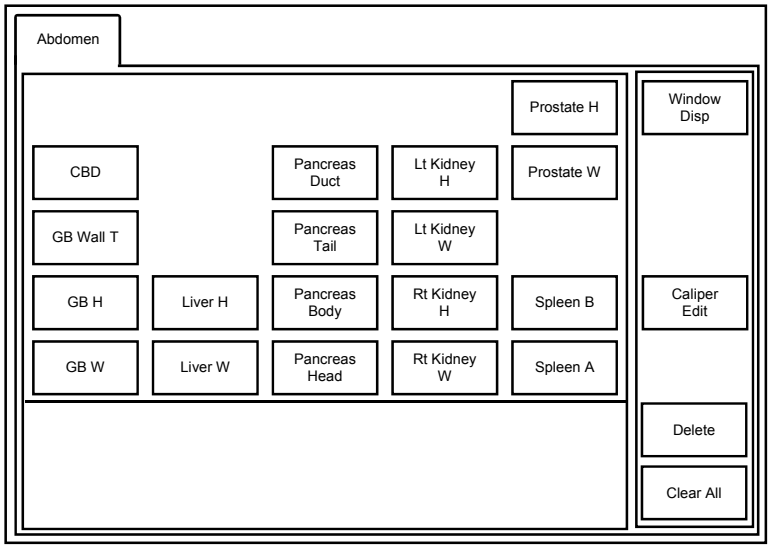
(1) Select Abdomen in the patient ID registration window or from the Application Preset.

(2) Press 

. The following touch panel menu is displayed.

(3) Select the measurement item to perform distance measurement in 2D-mode.

<<Menu display on the touch panel>>

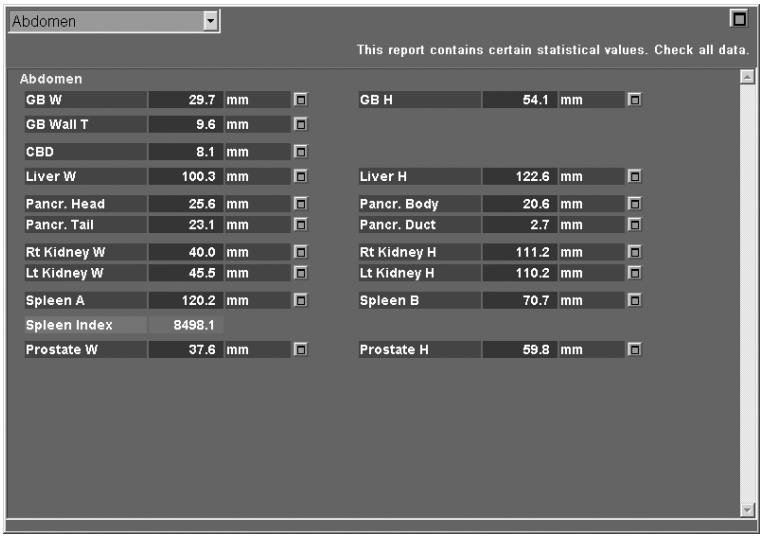


9.2 Displaying the Report Screen

When 

is pressed in application measurement mode, the Report screen is displayed on the monitor.

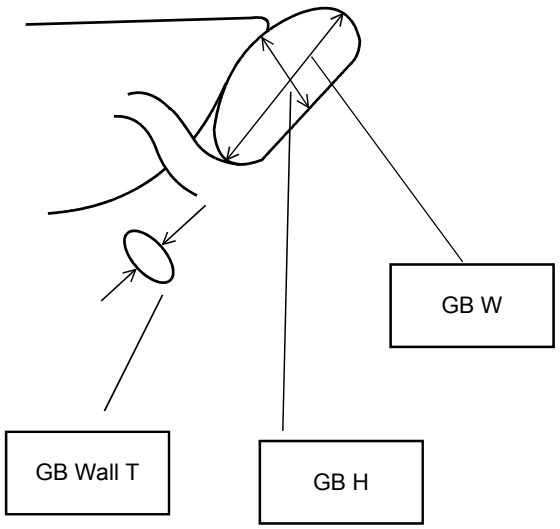
On the Report screen, all of the measurement and calculation results obtained in the application measurement are displayed.



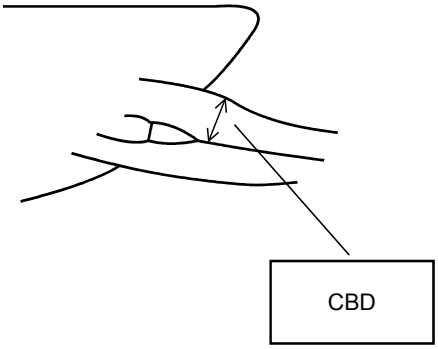
CAUTION:	Only some of the measurement results are displayed on the application measurement result screen. To display all of the measurement results including calculation results, use the report screen.

9.3 Region to Be Measured

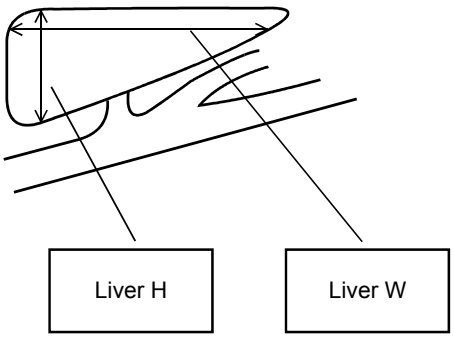
(1) Gallbladder



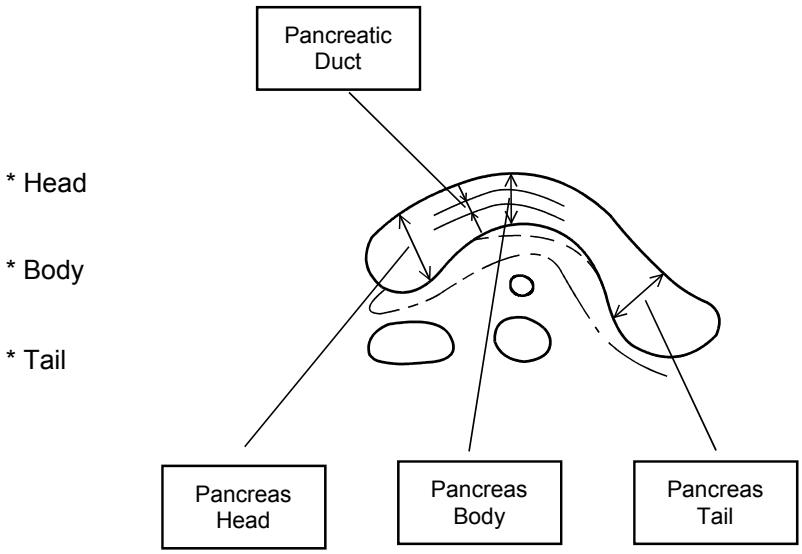
(2) Common bile duct



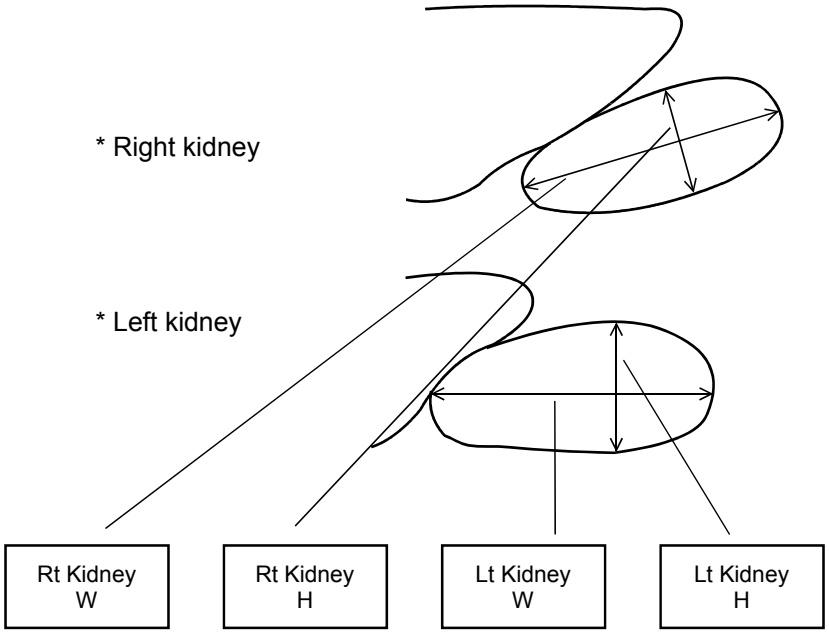
(3) Liver



(4) Pancreas

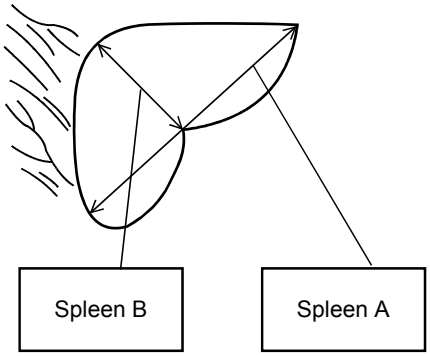


(5) Kidney

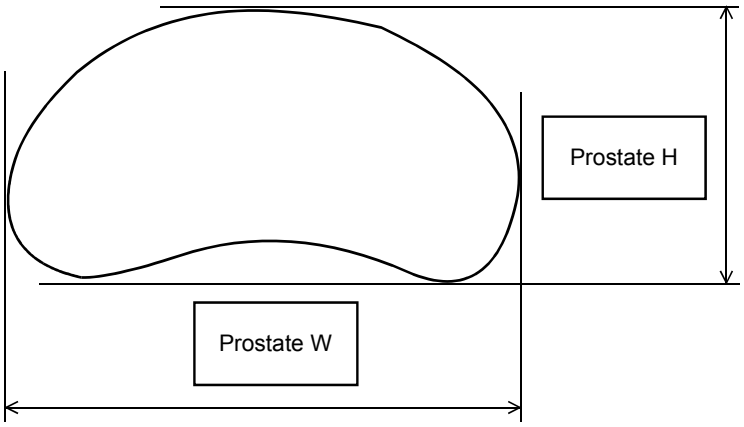


(6) Spleen

* The calculation result for Spleen Index (Spleen A × Spleen B) is displayed on the report screen.



(7) Prostate



10. Time Intensity Curve (TIC) Measurements

10.1 Features of the Time Intensity Curve (TIC) Measurement Function

Histogram measurement can be performed for multiple images acquired in the cine memory. It is also possible to display the data sets for these multiple images in a graph or a list.
TIC measurement is enabled by selecting CHI in the Application presets.

- Measurement is possible for a maximum of eight channels.
- TIC measurement can be performed for a maximum of 1024 cine images. Note that the maximum number of cine images may vary depending on the transducer used and the image quality settings.
- The report function can be used.
- A file containing the measurement data can be output to external devices.

CAUTION:

1. If the measurement ROI is set including the area outside the image, the correct measurement result cannot be obtained.
2. When TIC measurement is performed in Dynamic Flow or Power Angio mode, only the intensity data for blood flow is used for calculation. The intensity data for tissue is not used for calculation.
3. To perform TIC measurement, it is necessary to specify the start and end frames for acquiring the intensity information of the cine image.

   If the number of cine image frames exceeds 1024, the message "Memory is insufficient to measure. Please measure within 1024 image frame." is displayed and TIC measurement cannot be performed. If the number of frames is 1024 or less but the volume of data corresponding to the specified frames exceeds the available system memory, the message "Memory allocate error" is displayed and TIC measurement cannot be performed.

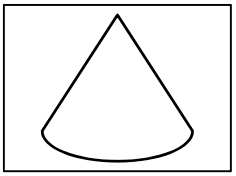
   In these cases, reduce the number of frames for performing TIC measurement.

   The amount of memory available varies depending on the system status. When TIC measurement is performed for the first time, approximately 1000 frames can be set.
4. If the image is reduced after measurement, color image quality adjustment functions such as Power-DR are disabled. When ROI operation is started, the image returns to normal display size and color image quality adjustment becomes possible.
   When color image quality has been adjusted, the intensity data is changed and therefore TIC measurement must be performed again by pressing [Start] on the touch panel.
5. When the TIC measurement graph is output using a monochrome printer, it may be difficult to identify the TIC curve.

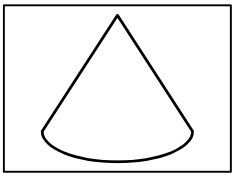
10.2 Measurement Procedure

(1) Select [CHI] from the Application Presets menu.

(2) Extract the cine image optimal for measurement.

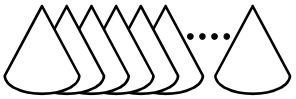


(3) Press the FRZ to stop cine recording.



For FEI: Record the predetermined images in the cine memory.

(4) Using the trackball, specify the start and end points of the measurement range.

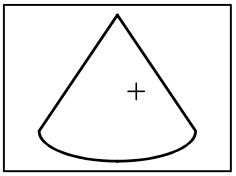


(a) Play back the cine memory in the reverse direction and select the start point. Then press SET.

(b) Play back the cine memory in the forward direction and select the end point. Then press SET.

If these steps are skipped, the first image is set as the start point and the last image is set as the end point automatically.

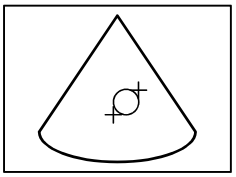
(5) Press CALC. TIC measurement is started.



(6) Press an ROI switch (ROI A to ROI H) on the touch panel.

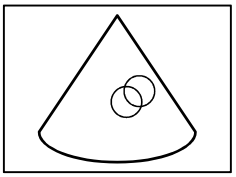
The measurement cursor is displayed on the screen.

(7) Draw an ROI using the trackball and then press SET to set the ROI.

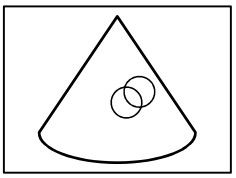


The area, long-axis length, and short-axis length of the ellipse are displayed in real time.

(8) If necessary, set an ROI for another channel using either of the procedures below.



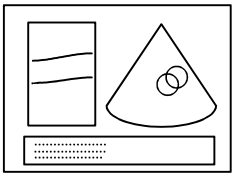
(a) Press [Copy] on the touch panel. A duplicate of the existing ROI is displayed. Move the second ROI using the trackball and then press SET.



(b) Press the ROI switch on the touch panel or NEXT on the main panel. The cursor is displayed. Set the second ROI using the trackball and SET.

(9) Press [Start] on the touch panel. Cine image frame-advance playback and calculation are started.

(10) When calculation is completed, the reduced-sized reference image, the TIC graph, and the measurement values are displayed.



(11) When the trackball is moved, the frame is updated in frame-advance playback mode and the vertical line on the graph is moved. The measurement values for the new frame are displayed.

(12) Press REPORT. The Report screen is displayed. When REPORT is pressed again, the screen returns to graph display.

To store the measurement result in a Windows cache, press [Save CSV] on the Report screen.

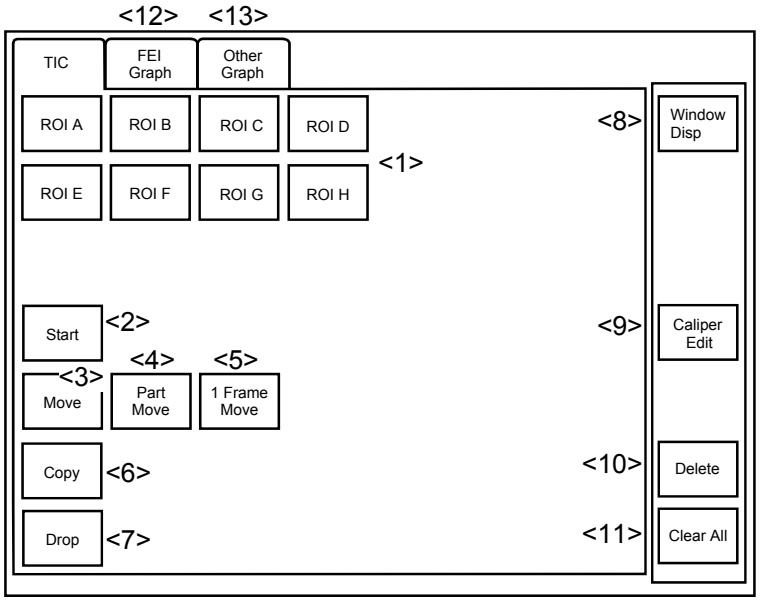
* If no patient ID is entered, the message "Operation cannot be performed. Register patient before saving measurement data" is displayed and the measurement result cannot be stored.

(13) To terminate TIC measurement, press CALC.

10.3 Touch Panel Display

(1) TIC measurement control menu

When CALC is pressed and TIC measurement is started, the menu shown below is displayed on the touch panel.

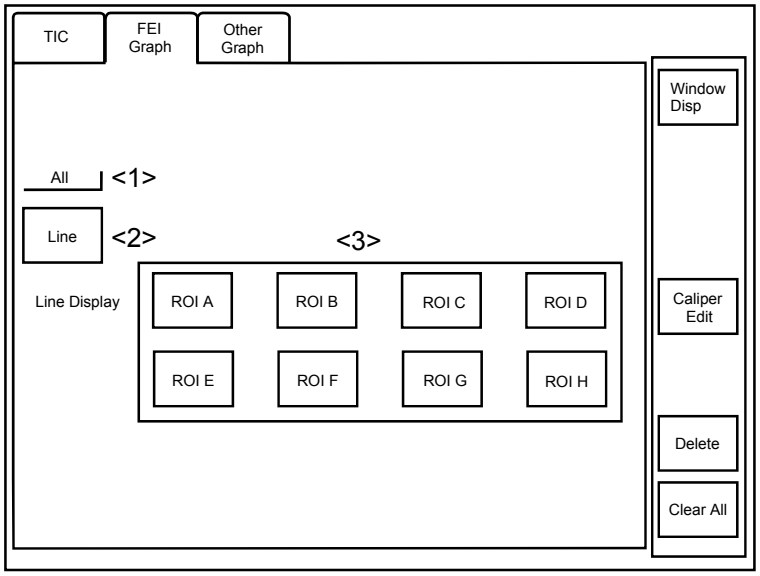


Example of the TIC measurement menu

No.	Switch	Function
<1>	[ROI A] to [ROI H]	The marker for drawing an ROI is displayed. Draw and set an ROI using the trackball and  . When the switch corresponding to a created ROI is pressed, the ROI becomes editable.
<2>	[Start]	The measurement is started.
<3>	[Move]	The ROIs in all frames in the specified range are moved.
<4>	[Part Move]	The ROI position is moved in the current and the subsequence frames.
<5>	[1 Frame Move]	The ROI in the currently displayed frame only is moved.
<6>	[Copy]	A duplicate of the previously created ROI is displayed for the next channel. This function is disabled when all of ROI A to ROI H are set.
<7>	[Drop]	The measurement result for the selected channel is eliminated from the currently displayed frame.
<8>	[Window Disp]	Each time this switch is pressed, the screen display of the measurement results is toggled between ON and OFF.
<9>	Caliper Edit	The arrow marker is displayed to allow the user to modify the existing ROI. When the start or end point is selected with the marker, the ROI size or position can be changed by operating the trackball and  .
<10>	Delete	The ROI data and graph for the selected channel are deleted in every frame in the specified range.
<11>	[Clear All]	All the measurement data is deleted.
<12>	FEI Graph	The FEI graph menu is displayed.
<13>	[Other Graph]	The Other graph menu is displayed.

(2) FEI Graph menu

When [FEI Graph] is pressed on the touch panel menu, the menu shown below is displayed.



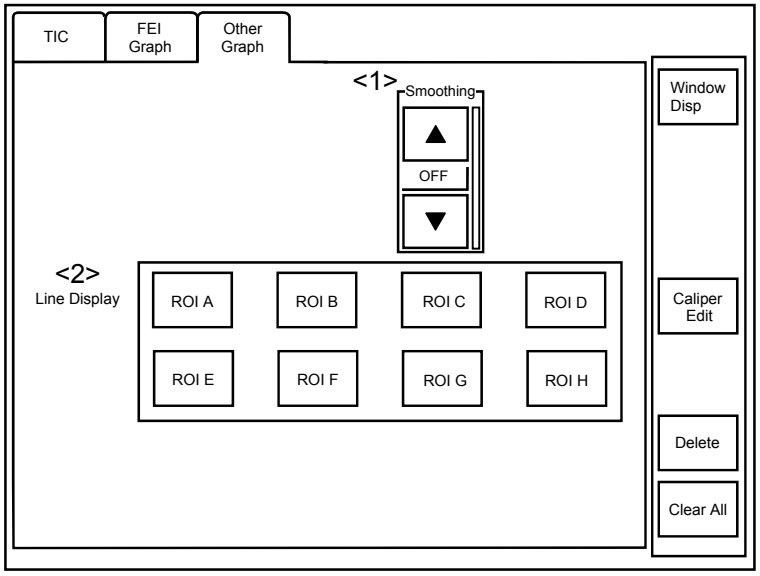
Example of TIC graph window display ([All] is selected)

Each time [Line] is pressed on the touch panel menu, the graph window display method changes.

No.	Display	Meaning
<1>	[All]	A curve connecting the data in every frame is displayed.
	[1st Flash]	A curve connecting the data in each of the first frames of the cine frames captured using the Flash function is displayed. On the graph, dots (•) are displayed for the first frames only.
<2>	[Line]	The graph display method is selected. Graph operations for the FEI images become possible.
<3>	[Line Display] [ROI A] to [ROI H]	The graph line display for the corresponding ROI is turned ON/OFF. Graph operations for the FEI images become possible.

(3) Other Graph menu

When [Other Graph] on the touch panel is pressed, the menu below is displayed. This menu is used to perform operations related to graph display for continuous images (CHI, Conventional images, etc.).

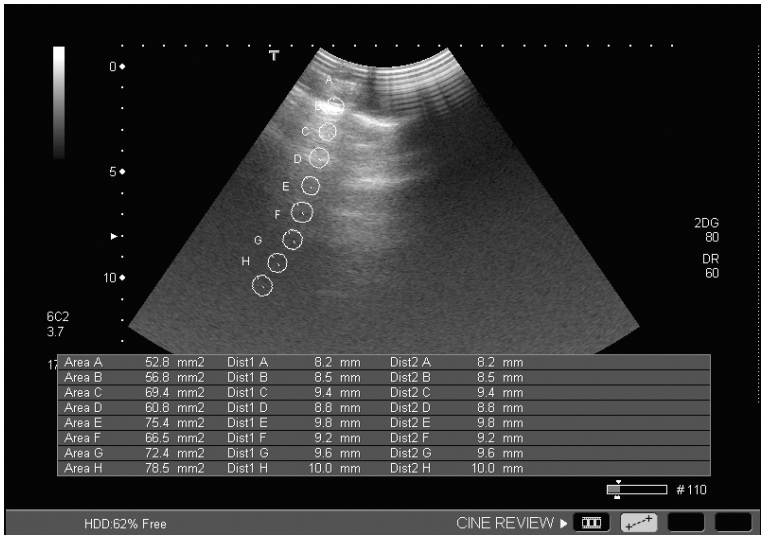


No.	Display	Meaning
<1>	[Smoothing]	The graph line is smoothed using the specified number of points. • [OFF] : No smoothing • [15] : Smoothing with 15 points * This switch is disabled for the FEI images.
<2>	[Line Display] [ROI A] to [ROI H]	The graph line display for the corresponding ROI is turned ON/OFF.

10.4 Monitor Display

(1) TIC ROI window

When an ROI is set, the window shown below is displayed.

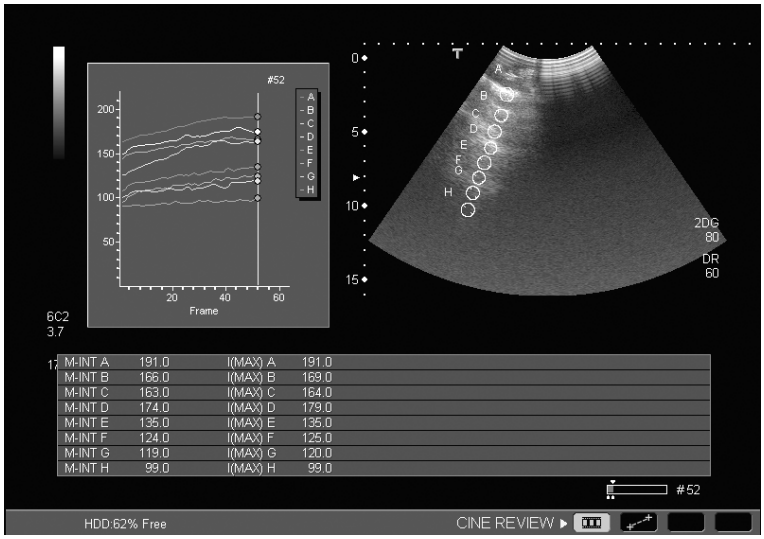


Example of TIC graph window display

Display	Meaning
Area	ROI area
Dist1	Main axis length
Dist2	Perpendicular axis length

(2) TIC graph window

When the ROI is set and [Start] on the touch panel is pressed, calculation is executed and the window shown below is displayed.



Example of TIC graph window display

Display	Meaning
M-INT	Mean intensity value for each channel in the currently displayed frame
I (MAX)	Maximum intensity value for each channel in the frames in the specified range

* If [Line] is set to "1st Flash" for an FEI image, the intensity is calculated using the data for the first frame in each flash.

(3) Report screen

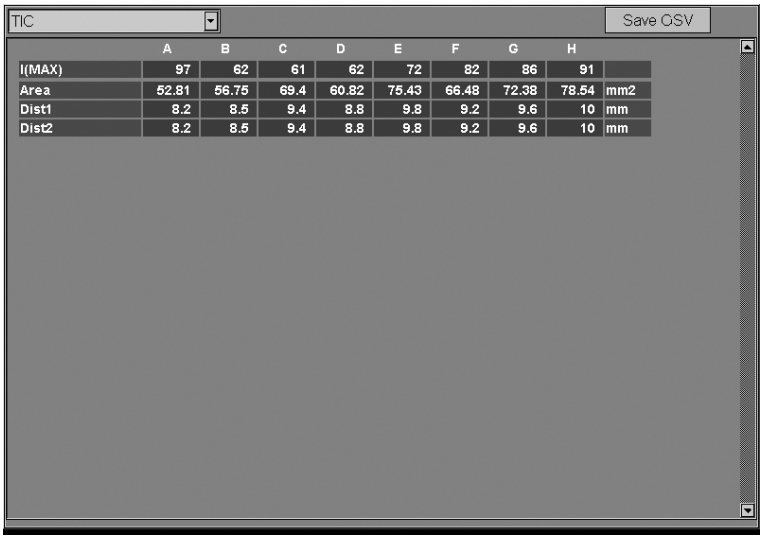
When 

is pressed after the TIC graph window is displayed, the screen shown below is displayed.

On the Report screen, the maximum intensity value in each channel (I(MAX)), the ROI area (Area), the main axis length (Dist1), and the perpendicular axis length (Dist2) are displayed.

* After ROI setting, if 

is pressed before pressing [Start], I(MAX) is not displayed.



Example of Report screen display

10.5 TIC Data File Output

TIC measurement data can be output to a text file (CSV format).

This file can be opened in Microsoft Excel, etc.

(1) To store the measurement result in a Windows cache, press [Save CSV] on the Report screen.

(2) If no patient ID is entered, the message "Operation cannot be performed. Register patient before saving measurement data." is displayed and the measurement result cannot be stored.

A directory whose name consists of the patient ID and the date of saving is created. The time of saving is used as the file name for each of the files in the directory.

⚠CAUTION: Exercise extreme care when managing data, especially when the files of two or more patients are stored on a single disk.

11. ACT Measurement

* To perform ACT measurement, the optional USAT-790A is required.

11.1 ACT Measurement

In automated contour tracking (ACT) measurement, the inner wall and valve contour of the left ventricular are automatically traced, enabling easy calculation of the cross-sectional area and of the ejection fraction from the volume value.

⚠CAUTION:

1. **ACT measurement can be performed only when the following conditions are met.**
   - **2D single display (except for R-wave synchronous images and CHI recording images)**
   - **Cine frame-advance playback mode**
2. **The Modified Simpson method is used for volume measurement calculation. For this measurement, it is necessary to display a long-axis long-cross sectional image from the cardiac apex (two-chamber/four-chamber cross-sectional image). (Refer to subsection 7.2.1.)**
3. **ACT measurement is assumed to be performed for evaluating the left ventricular contraction ability.**

   Depending on the application, perform appropriate setting for the image to be displayed and use the appropriate transducer.
4. **Noise near the cardiac apex may disable correct automatic tracing. After automatic tracing, correct the trace line if required.**
5. **Under the influence of the valve and valve underneath structure, automatic tracing exceeding the target heart chamber may be performed. After automatic tracing, correct the trace line if required.**
6. **If the frame rate is low, an end-diastole image and end-systole image may not be acquired within the start and end of measurement. It is recommended that the frame rate be set to 30 fps or more.**
7. **If the valve ring, cardiac apex, and inner wall are not included in the displayed image, the measurement marker may not be set or the contour may not be extracted correctly. Adjust the DEPTH/ZOOM dial, GAIN dial, STC sliders, or other image quality controls so that these structures are included in the image.**

⚠CAUTION: **8. In ACT measurement, the frame range to be measured is calculated from the heart rate. Obtain the patient's heart rate correctly from the ECG.**

- *** If the heart rate is not input from the ECG, the calculations are performed with the heart rate fixed at 60 (bpm).**
- *** If the heart rate is not input from the ECG or the input heart rate is changed manually, an asterisk (*) is displayed at the upper right of the heart rate value and cardiac output value.**
- *** Confirm that the ECG waveform is displayed correctly. If the ECG waveform is not displayed correctly, an incorrect heart rate value may be displayed due to noise.**

11.2 Operating Methods

Two operating methods are provided for ACT measurement.

- Routine mode : Used to measure the left ventricular contraction ability (EF, in particular).
- Advanced mode : Used to measure valve ring motion.

NOTE: 1. To enter Advanced mode, set the "Annular Tracking (Advance)" preset to "Enable".

2. If graph display has been preset, the graph and measurement results are displayed immediately after tracing starts.

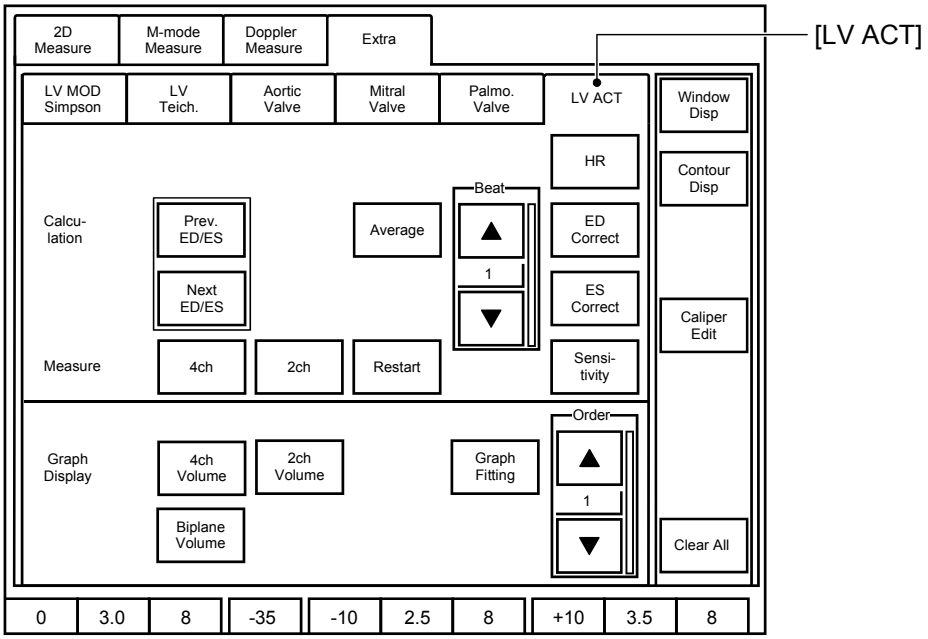
11.2.1 Operation in Routine mode

(1) In 2D Single mode, display a cross-sectional image appropriate for ACT measurement. Then press the [Freeze] switch to stop image recording to the Cine memory. The image must not include the papillary muscle.

(2) Rotate the trackball to display the frame from which measurement starts. Select a frame at end diastole or a frame that precedes the frame at end diastole by several frames and clearly shows the endocardium and mitral valve. To perform auto trace successfully, it is recommended that the image acquired at the time the valve closes be set as the start frame.

(3) Press CALC. The application measurement menu is displayed on the touch panel.

(4) Press [LV ACT] on the touch panel. ACT measurement starts and the screen switches to the ACT measurement menu.



(5) Pressing [4 ch] (or [2 ch]) on the touch panel displays the measurement marker on the image.

NOTE: If the message "Can not measure in this image mode" is displayed after [4ch] or [2ch] on the touch panel is pressed, check the following and take appropriate measures.

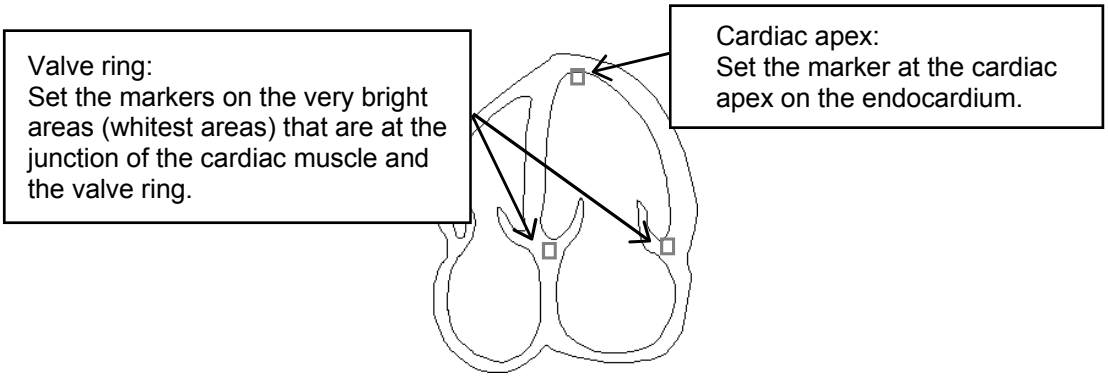
<1> Confirm that at least 3 frames are selected for measurement.
<2> Confirm that cine loop playback mode is not set.
<3> Check whether DUAL or SINGLE has been pressed after freezing the image.

* In the cases of <1> and <2>, press the Cine Review switch after the message disappears to enter Cine mode and set the image for measurement again.

(6) Move the measurement marker to the cardiac apex on the image using the trackball and press SET .

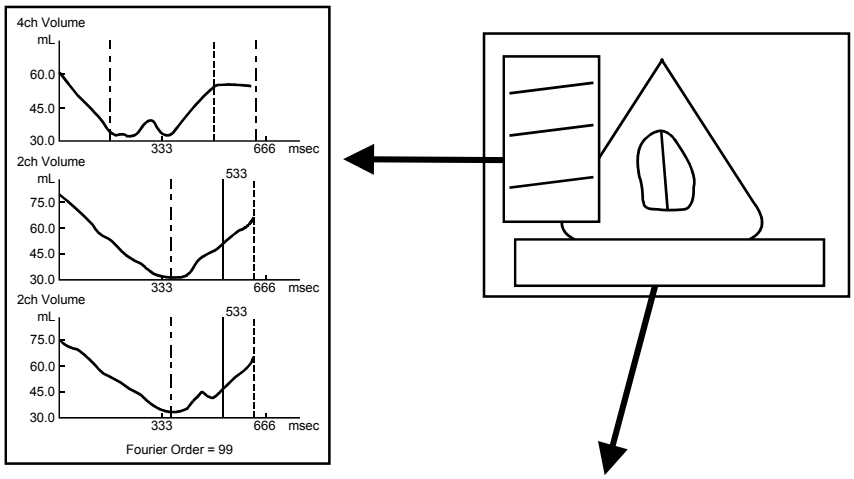
After the measurement marker is displayed again, move the marker to the valve ring and press SET .

Set two markers on the valve ring.



(7) After markers are set on 3 locations, tracking starts automatically with the trace line connecting 3 locations.

Tracking completes after tracking the last image in the Cine memory or tracking with the number of cardiac cycles set using [Beat] on the touch panel. The measurement values and graphs are displayed on the screen.



LV Volume							
EDV4	99.9 mL	LVLd4	99.9 mm	ESV4	99.9 mL	LVLs4	99.9 mm
EF4	99.9 %	SV4	99.9 mL	CO4	9.9 L/min		
EDV2	99.9 mL	LVLd2	99.9 mm	ESV2	99.9 mL	LVLs2	99.9 mm
EF2	99.9 %	SV2	99.9 mL	CO2	9.9 L/min		
ED_ED Diff	99 %			LVLd Diff	99.9 %	LVLs Diff	99.9 %
EDV	99.9 mL	ESV	99.9 mL				
EF	99.9 %	SV	99.9 mL	CO	9.9 L/min	HR	999 bpm

⚠CAUTION: The difference between the R-R interval in the two-chamber cross-sectional image and that in the four-chamber cross-sectional image is displayed as "ED_ED Diff".

ED_ED Diff = |(R-R interval in the 2-chamber cross-sectional image) – (R-R interval in the 4-chamber cross-sectional image)| / (value of whichever R-R interval is longer) × 100 [%]

A caution message is displayed if the calculated value is greater than the preset "RR Interval Differential Time Limit".

The factory setting for "RR Interval Differential Time Limit" is 10%. The setting should be changed according to the objective of the examination.

If the ED_ED Diff value is extremely large, it may affect the EDV, ESV, and EF values that are calculated and displayed as the Biplane Volume results. The decision as to whether to accept these values or to perform measurement again should be based on the results for all of the other items.

(8) After checking the tracing status of the end-diastole and end-systole by [Prev. ED/ES] and [Next ED/ES], perform correction using [Caliper Edit], [ES Correct], or [ED Correct] if required.

(9) Display the report screen and perform printing if required.

(10) Terminate ACT measurement.

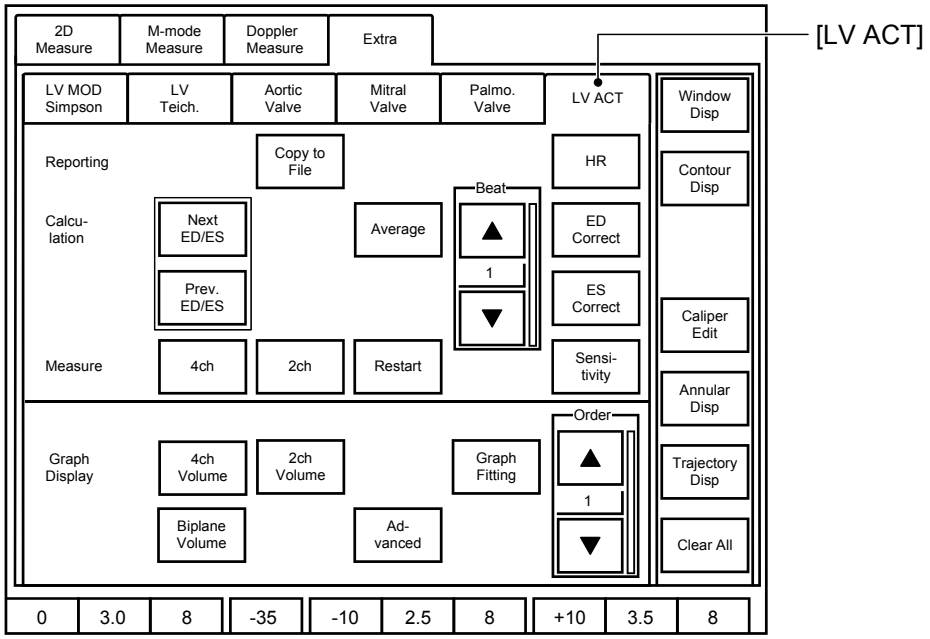
11.2.2 Operation in Advanced mode

(1) Display the cross-sectional image for ACT measurement in 2D Single mode. Then press the [Freeze] switch to stop recording to the Cine memory.

(2) Rotate the trackball to display the frame from which measurement starts. Select a frame at end diastole or a frame that precedes the frame at end systole by several frames and clearly shows the endocardium and mitral valve. To perform auto trace successfully, it is recommended that the image acquired at the time the valve closes be set as the start frame.

(3) Press CALC. The application measurement menu is displayed on the touch panel.

(4) Press [LV ACT] on the touch panel. ACT measurement starts and the screen switches to the ACT measurement menu.



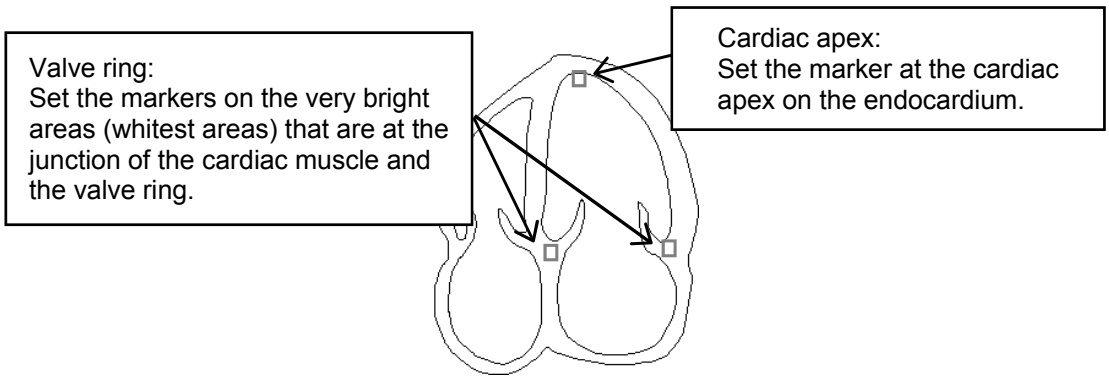
(4) Press [LV ACT] on the touch panel. ACT measurement starts and the screen switches to the ACT measurement dedicated menu.

(5) Pressing [4 ch] (or [2 ch]) on the touch panel displays the measurement marker on the image.

(6) Move the measurement marker to the cardiac apex on the image using the trackball and press SET .

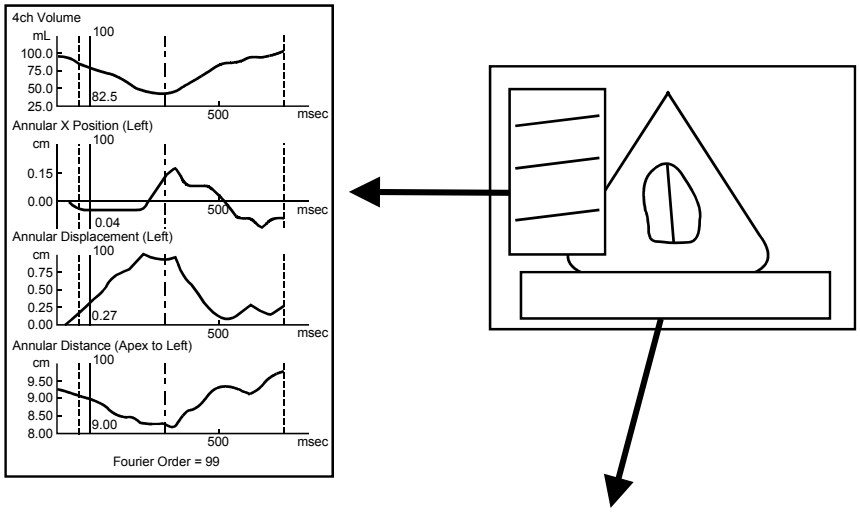
After the measurement marker is displayed again, move the marker to the mitral valve ring and press SET .

Set two markers on the valve ring.



(7) After markers are set on 3 locations, tracking starts automatically with the trace line connecting 3 locations.

Tracking completes after tracking the last image in the Cine memory or tracking with the number of cardiac cycles set using [Beat] on the touch panel. The measurement values and graphs are displayed on the screen.

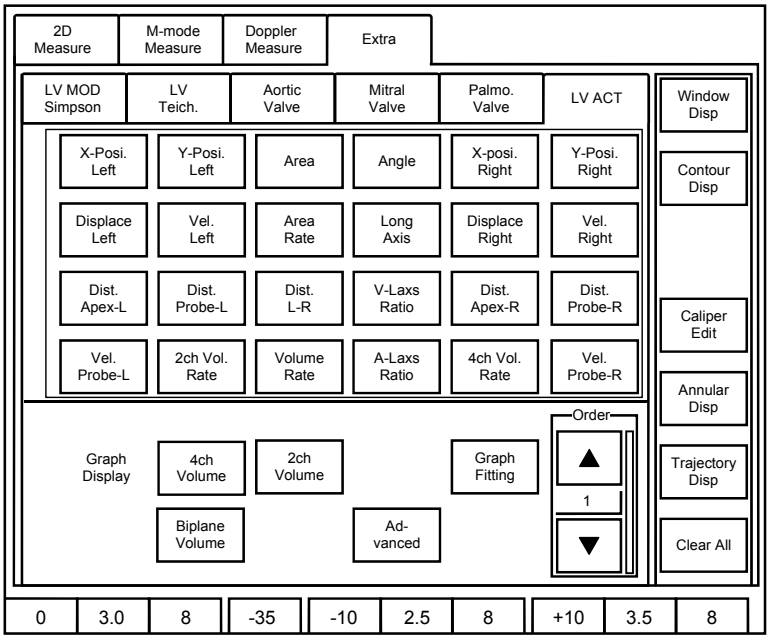


LV Volume							
EDV4	99.9 mL	LVLd4	99.9 mm	ESV4	99.9 mL	LVLs4	99.9 mm
EF4	99.9 %	SV4	99.9 mL	CO4	9.9 L/min	HR	999 bpm
Annular X Position (Left)							
Max.4	9.99 cm	Min.4	9.99 cm				
Annular Displacement (Left)							
Max.4	9.99 cm	Min.4	9.99 cm				
Annular Distance (Apex to Left)							
Max.4	9.99 cm	Min.4	9.99 cm				

(8) After checking the tracing status of the end-diastole and end-systole by [Prev. ED/ES] and [Next ED/ES], perform correction using [Caliper Edit], [ES Correct], or [ED Correct] if required.

(9) Press [Advanced] on the touch panel.

(10) From the displayed dialog, 4ch Volume, 2ch Volume, and Biplane Volume, select graph display (comparison display) items. Up to four items can be selected.



NOTE:	The measurement results of [Biplane Volume] and [Volume Rate] are displayed only when measurement was performed on both two-chamber cross-sectional images and four-chamber cross-sectional images. For the other measurement results, the results acquired by the currently-displayed image are displayed.

(11) Set [Graph Fitting] to ON to display the approximation curve if required.

(12) Change [Order] and adjust the approximation corresponding to the heart rate and degree of change if required.

(13) Press [Copy to File] and output the measurement result to the Windows cache.

(14) Display and print the report screen if required.

(15) Terminate ACT measurement.

NOTE: Fourier approximation is used for graph fitting.

When the frame number is K, the frame rate is T, and the total number of frames is N, an approximate expression can be obtained using the formula below.

$$f_n(KT) = A_o + \sum_{n-1} \{a_n \times \cos(2\pi nK/N + b_n \cdot \sin(2\pi nK/N)\}$$

From this expression, A_o, a_n, and b_n can be obtained as follows:

$$Ao = \left(\frac{2}{N}\right) \sum_{k=1}^{N}$$ (Actual measurement value for frame number K)

$$An = \left(\frac{2}{N}\right) \sum_{k=1}^{N}$$ {(Actual measurement value for frame number K) × cos (2πnK/N)}

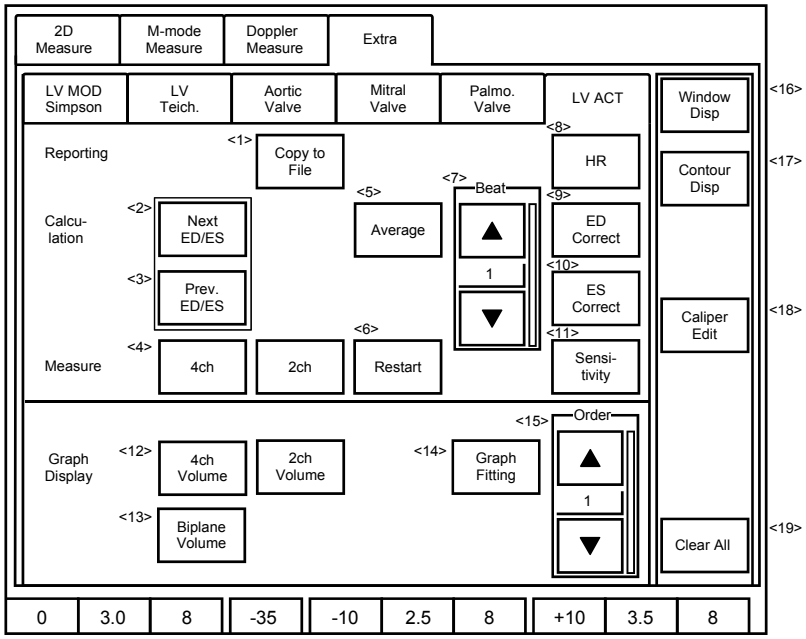
$$Bn = \left(\frac{2}{N}\right) \sum_{k=1}^{N}$$ {(Actual measurement value for frame number K) × sin (2πnK/N)}

In this Fourier approximation, calculation is performed assuming the specified period as a cardiac cycle. For more correct Fourier approximation, specify the cine loop range between two end-diastolic points as described in subsection 11.2.

11.3 Touch Panel Details

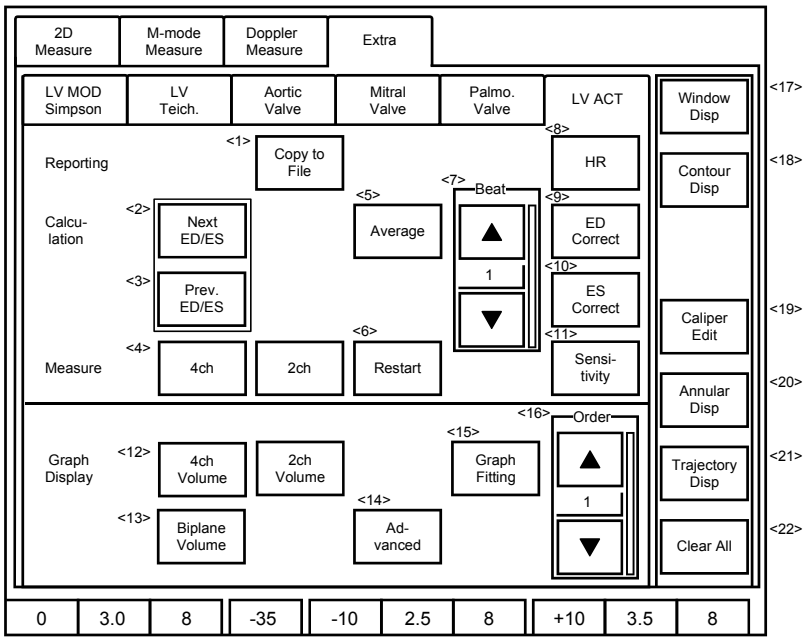
This subsection describes the switches on the touch panel used for ACT measurement.

(1) Switches for Routine mode



No.	Switch	Function
<1>	Copy to File	Outputs the measurement results to the Windows cache.
<2>	Next ED/ES	Moves to the ED/ES after the currently displayed image.
<3>	Prev. ED/ES	Moves to the ED/ES preceding the currently displayed image.
<4>	2ch, 4ch	Starts up the measurement marker for left-ventricular two-chamber/four-chamber images.
<5>	Average	Selects the mean value of measurement results with several heart rates within the measurement range.
<6>	Restart	Interrupts/restarts tracking.
<7>	Beat	Sets the heart rate for which tracking is performed.
<8>	HR	Enables manual input of the heart rate value.
<9>	ED Correct	Enables manual correction of the frame indicating the end diastole.
<10>	ES Correct	Enables manual correction of the frame indicating the end systole.
<11>	Sensitivity	Adjusts the trace sensitivity.
<12>	2ch (4ch) Volume	Displays the arithmetic operation result for the traced area using the Modified Simpson method (Single Plane).
<13>	Biplane Volume	Displays the arithmetic operation result for the traced area using the Modified Simpson method (Biplane).
<14>	Graph Fitting	Displays the Fourier approximation curve.
<15>	Order	Adjusts the approximation curve (valid when Graph Fitting is ON). As the order decreases, the curve becomes smoother. As the order increases, the curve nears the original curve (non-approximated curve). (The order must be 1/2 of the number of frames, with an upper limit of 50.)
<16>	Window Disp	Switches display/non-display of the measurement value window/graph.
<17>	Contour Disp	Switches display/non-display of the trace line.
<18>	Caliper Edit	Enables manual correction of the measurement marker.
<19>	Clear All	Deletes all measurement results. (Even if [Cancel] is selected in the confirmation dialog, the graphs and traced line are deleted.)

(2) Switches for Advanced mode



No.	Switch	Function
<1>	Copy to File	Outputs the measurement results to the Windows cache.
<2>	Next ED/ES	Moves to the ED/ES after the currently displayed image.
<3>	Prev. ED/ES	Moves to the ED/ES preceding the currently displayed image.
<4>	2ch, 4ch	Starts up the measurement marker for left-ventricular two-chamber images/four-chamber images.
<5>	Average	Selects the mean value of measurement results with several heart rates within the measurement range.
<6>	Restart	Interrupts/restarts tracking.
<7>	Beat	Sets the heart rate for which tracking is performed.
<8>	HR	Enables manual input of the heart rate value.
<9>	ED Correct	Enables manual correction of the frame indicating the end diastole.
<10>	ES Correct	Enables manual correction of the frame indicating the end systole.
<11>	Sensitivity	Adjusts the trace sensitivity.
<12>	2ch (4ch) Volume	Displays the arithmetic operation result for the traced area using the Modified Simpson method (Single Plane).
<13>	Biplane Volume	Displays the arithmetic operation result for the traced area using the Modified Simpson method (Biplane).
<14>	Advanced	Switches ON/OFF Advanced mode.
<15>	Graph Fitting	Displays the Fourier approximation curve.
<16>	Order	Adjusts the approximation curve (valid when Graph Fitting is ON). As the order decreases, the curve becomes smooth. As the order increases, the curve nears the original curve (non-approximation curve). (The order must be 1/2 of the number of frames, with an upper limit of 50.)
<17>	Window Disp	Switches display/non-display of the measurement value window/graph.
<18>	Contour Disp	Switches display/non-display of the trace line.
<19>	Caliper Edit	Enables manual correction of the measurement marker.
<20>	Annular Disp	Switches display/non-display of the valve ring position mark during tracking and after tracking.
<21>	Trajectory Disp	Switches display/non-display of the tracking of both valve rings within the measurement range (frame range).
<22>	Clear All	Deletes all measurement results. (Even if [Cancel] is selected in the confirmation dialog, the graphs and traced line are deleted.)

11.4 Report Screen

NOTE: After displaying the Report screen, press REPORT to close the Report screen before proceeding to the subsequent procedure.

After ACT measurement is performed, pressing REPORT displays the following screen.

Example of the report screen display

NOTE:
1. Measurement values cannot be edited on the ACT measurement report screen.
2. The contents displayed on the report screen may differ depending on the measurement values displayed during ACT measurement or the selected graph display type.

11.5 Arithmetic Operation Method for ACT Measurement

In ACT measurement, up to 4 graphs can be selected from the volume measurement graphs from (1) to (3) and the graphs shown in (4) based on valve ring tracking.

Graphs other than the Biplane Volume graph and Volume Rate graph can be displayed only when measurement is applied to either two-chamber cross-sectional images or four-chamber cross-sectional images.

(1) 2ch Volume

Refer to subsection 7.2.1 "LV measurement (MOD Simpson method)".

(2) 4ch Volume

Refer to subsection 7.2.1 "LV measurement (MOD Simpson method)".

(3) Biplane Volume

(a) After measurements for two-chamber and four-chamber cross-sectional images are completed, volume arithmetic operation based on the Modified Simpson Method (Biplane) is performed. The results are then displayed in the graph (unit: mL).

(b) When graph display has been preset and measurement for a two-chamber or four-chamber cross-sectional image is not completed, the graph axes are displayed but the graph area remains blank. On the measurement result screen, the measurement items are displayed but the result fields remain blank.

(c) For details, refer to subsection 7.2.1 "LV measurement (MOD Simpson method)".

(d) When [Biplane Volume] is pressed on the touch panel, phase matching is performed for the measurement results for the two-chamber and four-chamber cross-sectional images.

<1> The difference between the time from an end diastole to the next end diastole in the 2-channel data and in the 4-channel data is calculated.

In the measured value display fields for Biplane Volume, the measurement results are always displayed.

NOTE:

1. If the heart rate of the two graphs used for volume arithmetical operation differ, the graph with the higher heart rate is adjusted to match the graph with the lower heart rate. Cardiac phase matching is performed using the latest frame in the graph as the start frame.

2. The following data is not used for phase matching.

   - Data from the measurement start frame to the frame in which the end diastole is first recognized
   - Data from the frame in which the end diastole or end systole is last recognized to the measurement end frame

   These frames are not displayed in the phase-matched graph.

3. For the graph display in Advanced mode (subsection 11.5 (4)), the Max and Min values are displayed when the measurement is completed for a single cardiac cycle from an end diastole to the next end diastole.

4. The scale of the Biplane Volume graph matches the scale that was used for 4-channel or 2-channel measurement, whichever is currently selected.

(4) Graph display in Advanced mode

(a) X-Posi. Left: Degree of change of the valve ring position in the X-coordinate direction, left valve ring on the monitor

<1> The degree of change on the X-coordinate from the measurement start frame position is calculated using the following formula.

Degree of change in the X direction at the nth frame [unit: cm]

= (X position at the nth frame - X position at the measurement start frame)

For display codes, positive (+) is used when the frame is switched toward the right, and negative (-) is used when the frame is switched toward the left.

(b) Y-Posi. Left: Degree of change of the valve ring position in the Y-coordinate direction, left valve ring on the monitor

<1> The degree of change on the X-coordinate from the measurement start frame position is calculated using the following formula.

Degree of change in the Y direction at the nth frame [unit: cm]

= (Y position at the nth frame - Y position at the measurement start frame)

For display codes, positive (+) is used when the frame is switched toward the right, and negative (-) is used when the frame is switched toward the left.

(c) X-Posi. Right: Degree of change of the valve ring position in the X-coordinate direction, right valve ring on the monitor

<1> The degree of change on the X-coordinate from the measurement start frame position is calculated using the following formula.

Degree of change in the X direction at the nth frame [unit: cm]

= (X position at the nth frame - X position at the measurement start frame)

For display codes, positive (+) is used when the frame is switched toward the right, and negative (-) is used when the frame is switched toward the left.

(d) Y-Posi. Right: Degree of change in the Y-coordinate direction of the valve ring position, right valve ring on the monitor

<1> The degree of change on the Y-coordinate from the measurement start frame position is calculated using the following formula.

Degree of change in the X direction at the nth frame [unit: cm]

= (Y position at the nth frame - Y position at the measurement start frame)

For display codes, positive (+) is used when the frame is switched toward the right, and negative (-) is used when the frame is switched toward the left.

(e) Displace Left: Valve ring position movement distance, left valve ring on the monitor

The absolute transformation amount from the measurement start frame is calculated using the following formula.

Transformation amount at the nth frame [unit: cm]

$= \sqrt{\ }$ {(X position at the nth frame - X position at the measurement start frame)^2 + (Y position at the nth frame - Y position at the measurement start frame)^2}

(f) Displace Right: Valve ring position movement distance, right valve ring on the monitor

The absolute transformation amount from the measurement start frame is calculated using the following formula.

Transformation amount at the nth frame [unit: cm]

$= \sqrt{\ }$ {(X position at the nth frame - X position at the measurement start frame)^2 + (Y position at the nth frame - Y position at the measurement start frame)^2}

(g) Vel. Left: Valve ring position movement speed, left valve on the monitor

<1> Left valve movement amount divided by the frame rate. The valve movement speed is calculated using the following formula.

Movement speed at the nth frame [unit: cm/s]

= (Movement amount at the nth frame - Movement amount at the "n-1" frame)/Frame rate

<2> Based on the above formula, the first frame value is not determined.

(h) Vel. Right: Valve ring position movement speed, right valve on the monitor

<1> Right valve movement amount divided by the frame rate. The valve movement speed is calculated using the following formula.

Movement speed at the nth frame [unit: cm/s]

= (Movement amount at the nth frame - Movement amount at the "n-1" frame)/Frame rate

<2> Based on the above formula, the first frame value is not determined.

(i) Dist. L-R: Distance between the left/right valve rings

<1> Distance calculated from the X/Y-coordinate data of the left/right valve rings. The value is calculated using the following formula.

Distance between the left/right valve rings at the nth frame [unit: cm/s]

$= \sqrt{}$ {(X position of the right valve ring at the nth frame - X position of the left valve ring at the nth frame)^2 + (Y position of the right valve ring at the nth frame - Y position of the left valve ring at the nth frame)^2}

(j) Dist. Apex-L: Distance between the cardiac apex and valve ring, left valve ring on the monitor

<1> Distance calculated from the X/Y-coordinate data of the left valve ring and cardiac apex. The value is calculated using the following formula.

Distance between the cardiac apex and valve ring at the nth frame [unit: cm]

$= \sqrt{}$ {(X position of the left valve ring at the nth frame - X position of the cardiac apex at the nth frame)^2 + (Y position of the left valve ring at the nth frame - Y position of the cardiac apex at the nth frame)^2}

(k) Dist. Apex-R: Distance between the cardiac apex and valve ring, right valve ring on the monitor

<1> Distance calculated from the X/Y-coordinate data of the right valve ring and cardiac apex. The value is calculated using the following formula.

$= \sqrt{}$ {(X position of the right valve ring at the nth frame - X position of the cardiac apex at the nth frame)^2 + (Y position of the right valve ring at the nth frame - Y position of the cardiac apex at the nth frame)^2}

(l) Dist. Probe-L: Distance between the transducer original point and valve ring, left valve ring on the monitor

<1> Distance calculated from the X/Y-coordinate data of the left valve ring and cardiac apex. The value is calculated using the following formula.

Distance between the cardiac apex and valve ring at the nth frame [unit: cm]

$= \sqrt{\{(\text{X position of the left valve ring at the nth frame} - \text{X position of the transducer at the nth frame})^2 + (\text{Y position of the left valve ring at the nth frame} - \text{Y position of the transducer at the nth frame})^2\}}$

<2> The transducer original point is the central position data of the element which scans on the transducer body contact surface.

(m) Dist. Probe-R: Distance between the transducer original point and valve ring, right valve ring on the monitor

<1> Distance calculated from the X/Y-coordinate data of the right valve ring and cardiac apex. The value is calculated using the following formula.

Distance between the cardiac apex and valve ring at the nth frame [unit: cm]

$= \sqrt{\{(\text{X position of the right valve ring at the nth frame} - \text{X position of the transducer at the nth frame})^2 + (\text{Y position of the right valve ring at the nth frame} - \text{Y position of the transducer at the nth frame})^2\}}$

<2> The transducer original point is the central position data of the element which scans on the transducer body contact surface.

(n) Vel. Probe-L: Movement speed between the transducer original point and the valve ring, left valve ring on the monitor

<1> Distance between the transducer original point and left valve ring divided by the frame rate. The valve ring movement speed is calculated using the following formula.

Movement speed at the nth frame [unit: cm/s]

= (Movement distance at the nth frame - Movement distance at the "n-1" frame)/Frame rate

<2> Based on the above formula, the first frame value is not determined.

(o) Vel. Probe-R: Distance between the transducer original point and right valve ring divided by the frame rate.

<1> The valve ring movement speed is calculated using the following formula.

Movement speed at the nth frame [unit: cm/s]

= (Movement distance at the nth frame - Movement distance at the "n-1" frame)/Frame rate

<2> Based on the above formula, the first frame value is not determined.

(p) Angle: Angle made by the left-ventricular long axis and mitral valve

<1> Angle made by the center point of the line between the left/right valve rings and the line between the center point and the cardiac apex at the endocardium (left-ventricular long axis). The angle made by the center point at the right valve ring and cardiac apex is displayed [unit: deg (abbreviation of degree)].

(q) Long Axis: Change in the long-axis length

<1> Angle made by the center point of the line between the left/right valve rings and the line between the center point and the cardiac apex at the endocardium (left-ventricular long axis). The value is calculated using the following formula.

Long-axis length at the nth frame [unit: cm]

$= \sqrt{\ }$ {(X position of the center point at the nth frame - X position of the cardiac apex at the nth frame)^2 + (Y position of the center point at the nth frame - Y position of the cardiac apex at the nth frame)^2}

(r) V-Laxs Ratio: Ratio between the volume and the long-axis length

<1> Volume calculated value divided by the long-axis length. The value is calculated using the following formula.

Ratio between the volume and long-axis length at the nth frame [unit: not displayed]

= Volume at the nth frame/Long-axis length at the nth frame

(s) A-Laxs Ratio: Ratio between the area and the long-axis length

<1> Area calculated value divided by the long-axis length. The value is calculated using the following formula.

Ratio between the area and long-axis length at the nth frame [unit: not displayed]

= Area at the nth frame/Long-axis length at the nth frame

(t) 2ch Vol. Rate: Time differentiation value of the two-chamber cross-sectional image volume

<1> Volume (calculated using the two-chamber cross-sectional image) divided by the frame rate. The time-rate-of-change of the volume is displayed.

Volume change rate at the nth frame [unit: mL/s]

= (Volume value at the nth frame - Volume rate at the "n-1" frame)/Frame rate

<2> Based on the above formula, the first frame value is not determined.

(u) 4ch Vol. Rate: Time differentiation value of the four-chamber cross-sectional image volume

<1> Volume (calculated using the four-chamber cross-sectional image) divided by the frame rate. The time-rate-of-change of the volume is displayed.

Volume change rate at the nth frame [unit: mL/s]

= (Volume value at the nth frame - Volume rate at the "n-1" frame)/Frame rate

<2> Based on the above formula, the first frame value is not determined.

(v) Volume Rate: Time differentiation value in Biplane

<1> Biplane volume calculation result divided by the frame rate. The time-rate-of-change of the volume is displayed.

Volume change rate at the nth frame [unit: mL/s]

= (Volume value at the nth frame - Volume rate at the "n-1" frame)/Frame rate

<2> Based on the above formula, the first frame value is not determined.

(w) Area: Area of the traced area

<1> Arithmetical area operation is performed for the traced area and the result is displayed by the graph [unit: cm^2].

(x) Area Rate: Time differentiation for the area of the traced area

<1> Area divided by the frame rate. The time-rate-of-change of the area is displayed.

Area change rate at the nth frame [unit: cm^2/s]

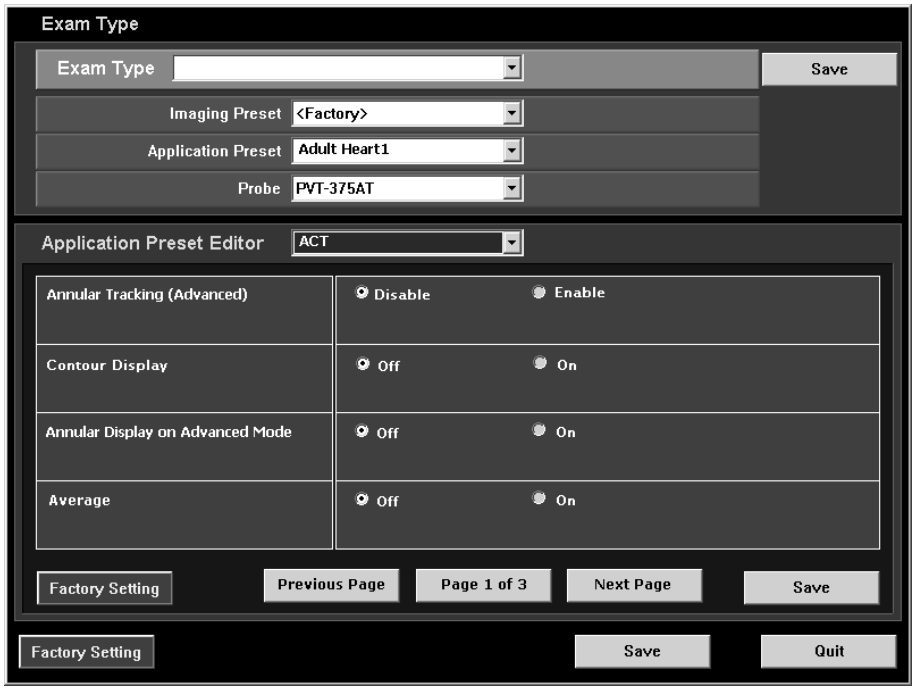
= (Area value at the nth frame - Area rate at the "n-1" frame)/Frame rate

<2> Based on the above formula, the first frame value is not determined.

11.6 Presets for ACT Measurement

If the optional ACT measurement program is installed, defaults for ACT measurement can be preset. The Exam Type screen is used for presetting. On this screen, 3 pages are provided for ACT measurement. Refer to section 2 "Setting the Presets" for details.

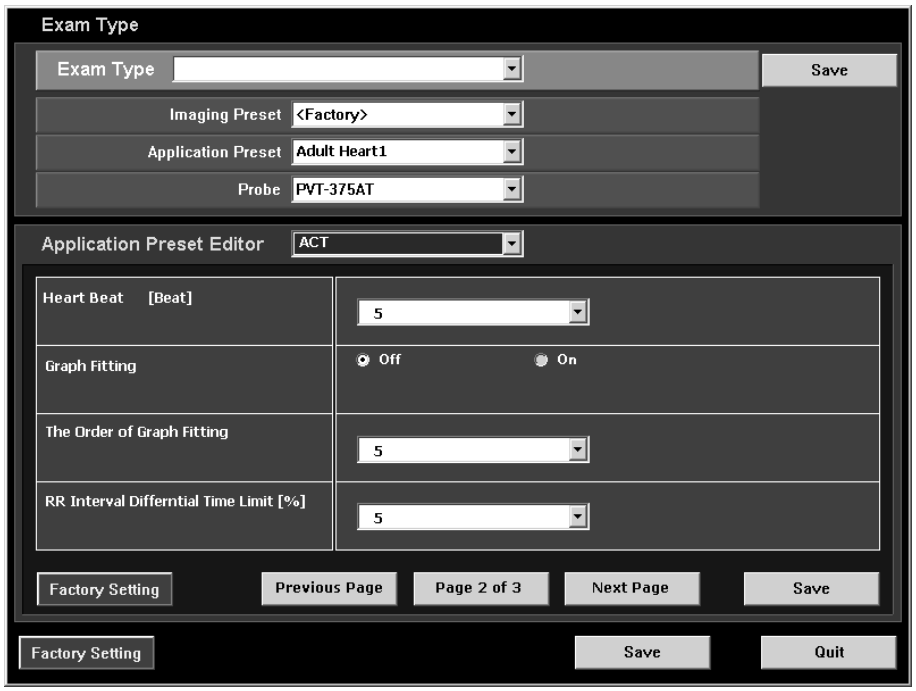
(1) Page 1



Item	Setting	Function
Annular Tracking (Advanced)	Disable	Disables the annular tracking assessment function during ACT measurement.
	Enable	Enables the annular tracking assessment function during ACT measurement. [Advanced], [Copy to File], [Annular Disp.], and [Trajectory Disp.] are displayed on the touch panel for LV ACT.
Contour Display	Off	Turns OFF the contour display.
	On	Turns ON the contour display.
Annular Display on Advanced mode*1	Off	Turns OFF display of the annular position mark.
	On	Turns ON display of the annular position mark.
Average	Off	Specifies the measurement and calculation methods for LV functions. The LV functions are measured and calculated using the data for only the cardiac cycle (between two successive end diastoles) containing the currently displayed frame.
	On	Specifies the measurement and calculation methods for LV functions. The LV functions are measured and calculated by averaging the data for the specified number of cardiac cycles.

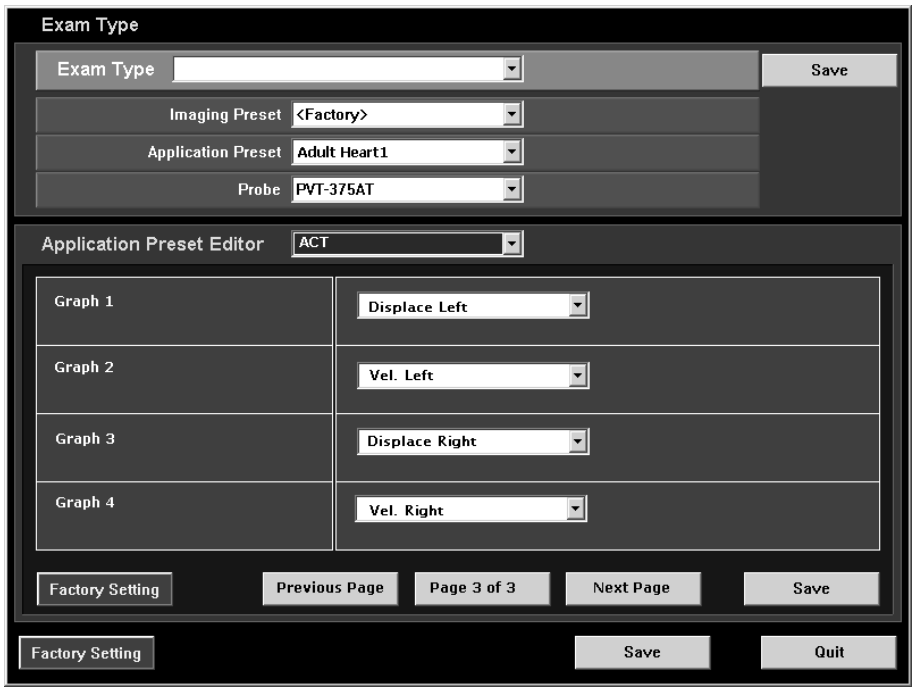
*1: This item is enabled only when "Annular Tracking" is set to "Enable".

(2) Page 2



Item	Setting	Function
Heart Beat [Beat]	1 to 5	Sets the number of cardiac cycles to be measured, starting from the measurement start frame.
Graph Fitting	Off	Turns OFF graph fitting using the Fourier approximation.
	On	Turns ON graph fitting using the Fourier approximation.
The Order of Graph Fitting	1 to 50	Specifies the order of the Fourier approximation when "Graph fitting" is set to "On".
RR Interval Differential Time Limit [%]	0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50	Sets the acceptable time difference between the R-R intervals in the two-chamber and four-chamber cross-sectional images in Biplane Volume measurement. * Refer to the precautions in subsection 11.2 "Operating Methods".

(3) Page 3



Item	Setting	Function
Graph 1 to Graph 4	X-Pos. Left etc.*1	Specifies the types of graphs and measurement results to be displayed on the screen. It is also possible to select not to display graphs or measurement results. If the same graph type is selected for more than one of "Graph 1" to "Graph 4", only a single graph of the selected type is displayed. The graphs are displayed in a row at the top of the screen, with Graph 1 located at the leftmost position.

*1: Refer to subsection 11.5 "Arithmetic Operation Method for ACT Measurement".

12. Obstetric Calculations (OB)

12.1 Outline of Obstetric Calculations

This function provides data for determining fetal growth based on the fetal size measured by the ultrasound system. The measured value is calculated on the basis of previously obtained statistical clinical data (measurement charts from authors) available in the system and is then displayed.

Measurement charts from several authors are registered in this diagnostic ultrasound system. Each of these charts is based on the calculation formula derived statistically from the data acquired by the individual author. Accordingly, even if the same fetal measurement value is input, the calculation result may differ depending on the selected author.

It is recommended that mixing of measurement charts from different authors (facilities) be avoided. As far as possible, only one author should be selected.

In addition, the author to be used should be selected based on the clinical judgment of a specialist.

⚠CAUTION:

1. **Enter the correct data for LMP (last menstrual period), IVF (in vitro fertilization date), CLIN (current date and current gestational age), and PREV (date of previous examination and gestational age on that date). Incorrect entry of these parameters will result in incorrect EDD (estimated date of delivery) calculation.**
   The date and GA entered for CLIN or PREV are used to calculate LMP and GA, which are then used for measurement. This GA value can be displayed on the banner by performing setting accordingly in the preset menu.

2. **Be sure to record the EDD (Estimated Date of Delivery) and the measurement data in the patient's medical records. Although these data can be stored in the system together with the patient ID and name using the SAVE function, they should also be stored in the patient's medical records because data stored in the system may be lost if there is a system failure.**

3. **Obstetric calculation data cannot be stored in the system or updated unless the patient ID is entered.**

4. **Use the correct Exam Type (OB, Endo-Vaginal, or Fetal Heart) to perform the obstetric calculations. If an incorrect Exam Type is used, the obstetric calculation data cannot be stored in the system or updated.**

5. **Do not reach a diagnosis based only on the current measured data and calculation results displayed on the report screen. The diagnosis must always be based on an overall clinical evaluation of the patient including past examination results recorded on the patient's medical record.**

⚠CAUTION:

6. **When the system date is changed, be sure to enter the patient information again in the patient ID registration window. Otherwise, the gestational ages and the trend graphs cannot be displayed correctly.**
7. **Measurements may be incorrect depending on the fetal position. Do not reach a diagnosis based only on the measured data and calculation results obtained using the measured data. The diagnosis must always be based on an overall clinical evaluation of the patient.**
8. **Several fetal growth measurement methods are available. Select the most appropriate method for the patient based on the clinical judgment of a specialist.**
9. **OB measurement for up to quadruplets is possible. Be careful not to confuse the fetuses when measuring the fetal growth.**
10. **The Fetus ID is displayed in the measurement window, on the report screen, and on the Trend Graph. Confirm the fetus ID when performing diagnosis.**
11. **For items that are calculated based on two or more measurement results, the item label and the calculation result are not displayed on the screen or in the report, unless all the items required for calculation are measured. The measurement items required for calculation and the calculation result display range of some items differ according to the author. Therefore, if another author is selected after measurement, the result may not be displayed.**

NOTE: Clinical statistical data is cited and registered based on the references listed in subsection 12.11 "References". Note that the data may vary depending on the author, and the data used is therefore identified by the author's name in this manual.

12.1.1 Abbreviations

The following abbreviations are used in this operation manual and on the monitor display.

- EDD : Estimated date of delivery
- GA : Gestational age
- LMP : Last menstrual period
- EFW : Estimated fetal weight
- PREV (previous date) : Date of the previous examination
- CLIN (clinical date) : Date of the current examination
- GR : Gravida (pregnancy number)
- P : Para
- IVF : In vitro fertilization (date)

12.1.2 Items measured

The items to be measured are listed in subsection 12.3.

⚠CAUTION:

1. **The results of the last three measurements are stored in the OB calculations. When more than three measurements have been executed, the oldest result is overwritten with the new one. These results can be checked using the report function.**
2. **If "Mean of Measurements" is selected for the "Measurement Value Display Method" in Meas Report in Application Preset, the mean of the last three measurement is displayed in the report. If only one measurement has been executed, the result of the measurement is displayed in the Mean field.**
3. **If "Most Recent Measurement" is selected for the "Measurement Value Display Method" in Meas Report in Application Preset, only the most recent measurement result is displayed in the report.**
4. **When two or more measurements have been executed for a single item, be sure to check each measurement result using the report function. If an unexpected value is measured, it will affect the mean.**
5. **Deviations from the normal values of the measurement results must be judged based on the trend graphs and literature.**

12.1.3 Items calculated

CAUTION:
- It is possible to preset whether the measured values (HC, AC) or calculated values (HC <Cal.>, AC <Cal.>) are used as the head circumference and abdominal circumference for calculation.
- If the system is preset to use the calculated values, EFW or Ratio is not calculated if HC (Cal.) or AC (Cal.) result is not available, even if HC or AC result is available.
- If the system is preset to use the measured values, EFW or Ratio is not calculated if HC or AC result is not available, even if HC (Cal.) or AC (Cal.) result is available.

(1) EFW (Estimated Fetal Weight)

EFW is calculated from the measured values for the fetal regions and is then displayed.

The following EFW calculation methods are available for selection. The measurement items required for calculation differ according to the calculation method. EFW will not be calculated or displayed if the measurement items required for the selected calculation method have not yet been obtained.

If the calculation result is outside the range specified by the author, "***" is displayed next to the value.

When the check box "Extrapolated on" in the OB Calc. page is checked, the EFW can be displayed as a reference value in the range of 26 g ≤ EFW ≤ 6500 g which is outside the range specified by the author.

In the measurement window, the "^" mark (representing "Extrapolated") is displayed at the top of the EFW. To explain this mark "^: Extrapolated" is displayed at the right of the fetal information.

On the Report screen, the "^" mark (representing "Extrapolated") is displayed at the top of the EFW. To explain this mark "^: EFW is Extrapolated." is displayed at the right of the EFW title.

On the Trend Graph screen, the annotation "Extrapolated" is displayed and × is displayed overlapping each fetus mark on the trend graph.

If the EFW exceeds the upper limit of the range specified by the author, the Y axis is displayed so that the maximum value of its range is 6500 g.

Campbell	:	Campbell method [AC]
Hadlock	:	Hadlock1 method [AC, FL]
	:	Hadlock2 method [BPD, AC, FL]
	:	Hadlock3 method [HC, AC, FL]
	:	Hadlock4 method [BPD, AC, HC, FL]
Hansmann	:	Hansmann method [BPD, THD]
JSUM	:	JSUM method [BPD, AC, FL]
Merz1	:	Merz1 method [BPD, AC]
Merz2	:	Merz2 method [AC]
Osaka	:	Osaka University method [BPD, FTA, FL]
Shepard	:	Shepard method [BPD, AC]
Tokyo	:	Tokyo University method [BPD, APTD, TTD, FL]

NOTE: The EFW value display range differs depending on the selected calculation method.

Example for the Hadlock method

- When GA is calculated based on BPD, HC, AC, and/or FL and the result exceeds 42 weeks, the EFW result is not displayed.
- The upper EFW value display limit is approximately 4.5 kg.

  This value applies when "Extrapolated" is set to OFF in the preset menu. Refer to section 8 "OB Report/Worksheet" for the Extrapolated option.
- The measurement item to be used for calculating EFW differs depending on the type of the Hadlock method.

  For example, the EFW value calculated using Hadlock1 (AC, FL) does not reflect the head size.

(2) GA (Gestational Age)

GA is calculated from the measured values for the fetal sections.

(3) HC/AC

HC/AC is calculated and displayed only when both HC and AC measurement results are available.

However, the following conditions apply.

- "NOT VALID" is displayed if the gestational age calculated from the HC/AC measurement result is outside the range from 13 to 40 weeks.
- A question mark "?" is shown before the measurement result if the measurement result is outside the range specified for the gestational age.

(4) FL/AC

FL/AC is calculated and displayed only when both FL and AC measurement results are available.

The following conditions apply:

- The ratio range is not displayed if the gestational age calculated from the FL/AC value is between 14 and 21 weeks.
- "NOT VALID" is displayed if the gestational age calculated from the FL/AC value is outside the range from 22 to 42 weeks.
- An asterisk is added to the result if the calculation result (ratio) is outside the range from 20% to 24%.

(5) FL/BPD

FL/BPD is calculated and displayed only when both FL and BPD measurement results are available.

The following conditions apply:

- "NOT VALID" is displayed if the gestational age calculated from the FL/AC value is outside the range from 23 to 40 weeks.
- An asterisk is added to the result if the calculation result (ratio) is outside the range from 71% to 87%.

(6) CI (Cephalic Index)

CI = (Short axis/long axis) $\times$ 100

CI is displayed when "Ellipse" or "Cross" is used for HC measurement.

The following conditions apply:

- "NOT VALID" is displayed if the gestational age calculated from the CI value is outside the range from 14 to 40 weeks.
- An asterisk is added to the result if the calculation result (ratio) is outside the range from 70% to 86%.
- When the system is preset to use the head circumference obtained by calculation (HC <Cal.>) for calculating CI, CI is calculated based on BPD and OFD.

(7) FL/HC

FL/HC is calculated and displayed only when both FL and HC measurement results are available.

However, the following conditions apply.

- "NOT VALID" is displayed if the gestational age calculated from the FL/HC measurement result is outside the range from 15 to 42 weeks.
- A question mark "?" is shown before the measurement result if the measurement result is outside the range specified for the gestational age.

(8) HC (BPD, OFD)

HC (BPD, OFD) = 3.14 × (BPD + OFD)/2

This is calculated and displayed when the author is Nicolaides for both BPD and OFD.
If the calculation result is outside the range 98.1 mm ≤ HC (BPD, OFD) ≤ 359.4 mm, "*****" is displayed.

(9) AXT

AXT = APTD × TTD

This is calculated and displayed only when APTD and TTD are measured.

(10) AFI

AFI = Q1 + Q2 + Q3 + Q4

The AFI value is displayed as the sum of the four distances: Q1, Q2, Q3, and Q4.

One of two methods can be preset for [Method for AFI] on the OB Meas. page of the presets; one displays the AFI value only after all the four distances are measured (4 Distances), while the other displays the AFI value even before all the four distances have been measured (< 4 Distances).

(a) When "4 Distances" is selected

When AFI measurement is selected for the first time, the field for the AFI value appears blank.

Even if AFI measurement is discontinued by canceling the Freeze status, the measurement can be resumed by selecting AFI measurement again. If AFI is selected after Q4 has been measured, the measurement for Q1 is started again automatically and Q2 to Q4 must be measured again.

(b) When "< 4 Distances" is selected

When AFI measurement is selected for the first time, the field for the AFI value appears blank.

When at least one of the four distances is measured, the AFI value is displayed.

Even if AFI measurement is discontinued by canceling the Freeze status, the measurement can be resumed by selecting AFI measurement again. If AFI is selected after Q4 has been measured, the measurement for Q1 is started again automatically.

NOTE: If the setting of [Method for AFI] on the OB Meas. page of the presets is changed before the measurement of the four distances is completed and then the AFI measurement is selected, the measurement is started from Q1.

(11) U/S GA

Use [U/S GA] on the Meas. Report 2 page to specify whether U/S GA is calculated or not and to specify the item to be used to calculate U/S GA.

- When U/S GA is preset to On, the U/S GA value is displayed on the Report screen.
- U/S GA is calculated by simple-averaging of the GA values for all the specified measurement items.
- The data for the items for which the GA value is not displayed (because the result is out of the range specified by the author or the author's chart data is not available) is not used to calculate the U/S GA value.
- The number of days ±8% of the U/S GA value is displayed as the deviation together with the U/S GA value only when all the selected items have been calculated using the Hadlock method and the results of at least two items are valid.
- It is possible to display the measurement items to be used for U/S GA calculation and the corresponding check boxes on the Report screen to allow the operator to reselect the measurement items for U/S GA calculation on the Report screen.
- The U/S GA value is recalculated by reselecting the measurement items used for U/S GA calculation on the Report screen.
- Reselection of the measurement items used for U/S GA calculation on the Report screen is possible until the New Patient switch is pressed.
- Reselection of the measurement items used for U/S GA calculation on the Report screen is possible until the items preset for U/S GA on the Meas. Report 2 page of the presets are changed.

NOTE: The items not used for U/S GA calculation are grayed out on the Report screen.

(12) U/S EDD

The estimated delivery date calculated based on U/S GA is displayed.

(13) RI (Resistance Index), PI (Pulsatility Index)

RI and PI are calculated by the following formulas according to the settings for [RI Calc. method for OB] and [PI Calc. Method for OB] on the OB Meas. page of the preset. It is possible to set [RI Calc. Method for OB] and [PI Calc. Method for OB] independently. Refer to section 2 "Setting the Presets" for details.

- When Ved is selected for the calculation method

$$RI:\ Resistance\ Index = \left|(Vmax - Ved)/Vmax\right|$$
$$PI:\ Pulsatility\ Index = \left|(Vmax - Ved)/Vmean\right|$$

- When Vmin is selected for the calculation method

$$RI:\ Resistance\ Index = \left|(Vmax - Vmin)/Vmax\right|$$
$$PI:\ Pulsatility\ Index = \left|(Vmax - Vmin)/Vmean\right|$$

(14) HC (Cal.)

When [Calculated HC] on the OB Calc. 2 page of the preset menu is set to ON, HC is calculated based on BPD and OFD, and the result is displayed with the label HC (Cal.). The HC (Cal.) value can be used for calculating EFW and Ratio by selecting the check box for "Used for EFW & Ratio" on the same page.

(15) AC (Cal.)

When [Calculated AC] on the OB Calc. 2 page of the preset menu is set to ON, AC is calculated based on APAD and TAD and the result is displayed with the label AC (Cal.). The AC (Cal.) value can be used for calculating EFW and Ratio by selecting the check box for "Used for EFW & Ratio" on the same page.

(16) PIV PIV = |S-a|/|Vm_peak|

This item is calculated and displayed only when the measurement results for S, a, and Vm_peak in DV measurement are available.

(17) PVIV PVIV = |S-a|/|D|

This item is calculated and displayed only when the measurement results for S, a, and D in DV measurement are available.

(18) a/S

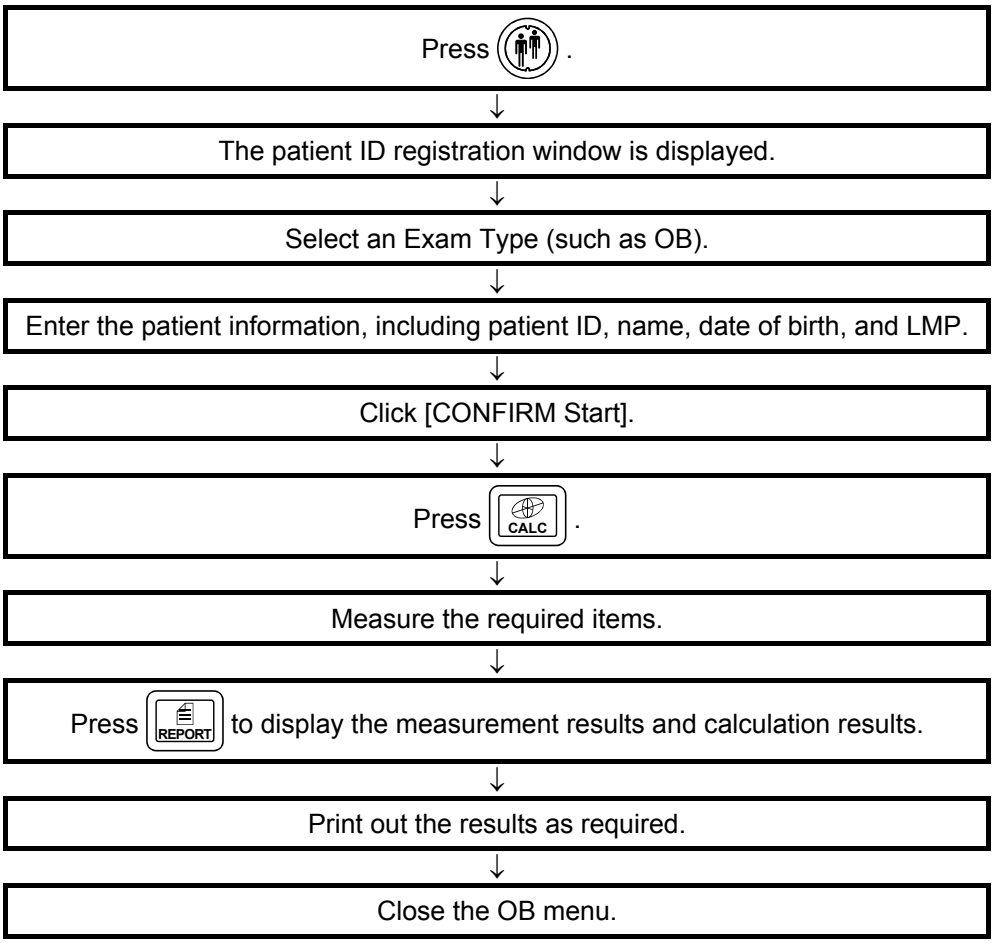
This item is calculated and displayed only when the measurement results for S and a in DV measurement are available.

(19) S/a

This item is calculated and displayed only when the measurement results for S and a in DV measurement are available.

12.2 Outline of Operating Procedures

The main operating procedures are shown below.



NOTE:
1. Be sure to enter LMP, IVF, EDD, PREV, or CLIN in the patient ID registration window. Otherwise, EFW is not calculated and the measurement results are not displayed on the trend graph.
2. The author for GA and Ratio to be displayed on the OB report screen can be set using the preset.
3. The growth curve is displayed on the report screen together with the measurement results and calculation results. It is also possible to display these data for another author.
4. OB measurement for up to quadruplets is possible. Fetus A is selected automatically when OB measurement is started.

12.3 Author Data

As shown in the following table, authors have been registered for each of the measurement items to be used for calculating GA (gestational age). It is recommended that mixing of measurement charts from different facilities (authors) be avoided. If possible, only one facility should be selected.

The gestational age is displayed based on the date curve when the clinical age is not input and is based on the growth curve when the clinical age is input.

Some authors provide only the data to be used when the clinical age is not available (data type GA), some provide only the data to be used when the clinical age is available (data type FG), some provide the data to be used both when the clinical age is available and is not available (data type FG + GA), and some do not take into consideration whether or not the clinical age is input (data type Identical).

In this system, the GA value is calculated as shown below.

When [GA Calculated by] is set to "FG Chart with Clinical Age" for OB Meas. 2 in the preset menu

Data type	Clinical age is not input	Clinical age is input
FG	The GA value corresponding to the measured value is not calculated.	The GA value corresponding to the measured value is calculated based on the FG data that is provided for use when the clinical age is input.
GA	The GA value corresponding to the measured value is calculated based on the GA data that is provided for use when the clinical age is not input.	The GA value corresponding to the measured value is not calculated.
FG + GA	The GA value corresponding to the measured value is calculated based on the GA data that is provided for use when the clinical age is not input.	The GA value corresponding to the measured value is calculated based on the FG data that is provided for use when the clinical age is input.
Identical	The GA value corresponding to the measured value is calculated based on the Identical data that does not take into consideration whether or not the clinical age is input.	The GA value corresponding to the measured value is calculated based on the Identical data that does not take into consideration whether or not the clinical age is input.

When [GA Calculated by] is set to "Only GA Chart" for OB Meas. 2 in the preset menu

Data type	Clinical age is not input	Clinical age is input
FG	The GA value corresponding to the measured value is not calculated.	The GA value corresponding to the measured value is calculated based on the FG data that is provided for use when the clinical age is input.
GA	The GA value corresponding to the measured value is calculated based on the GA data that is provided for use when the clinical age is not input.	The GA value corresponding to the measured value is calculated based on the GA data that is provided for use when the clinical age is not input.
FG + GA	The GA value corresponding to the measured value is calculated based on the GA data that is provided for use when the clinical age is not input.	The GA value corresponding to the measured value is calculated based on the GA data that is provided for use when the clinical age is not input.
Identical	The GA value corresponding to the measured value is calculated based on the Identical data that does not take into consideration whether or not the clinical age is input.	The GA value corresponding to the measured value is calculated based on the Identical data that does not take into consideration whether or not the clinical age is input.

Item name	Formal name	Author name	Data name	Data type
GS	Gestational sac diameter	Hellman	Hellman	FG
		Rempen	Rempen	FG + GA
		Tokyo	Tokyo	FG + GA
CRL	Crown-rump length	Hadlock	Hadlock	FG + GA
		Robinson	Robinson	FG + GA
		Rempen	Rempen	FG + GA
		Hansmann	Hansmann	FG + GA
		Tokyo	Tokyo	FG + GA
		Osaka (*3)	Osaka	Identical
		ASUM-V1	ASUM-V1	GA
		ASUM-V2	ASUM-V2	FG + GA
		JSUM	JSUM	FG + GA
		Jeanty	Jeanty	GA
		Nelson	Nelson	GA
		BMUS	BMUS	GA
BPD	Biparietal diameter	Hadlock(*1) (*2)	Hadlock	FG+GA
			Hadlock-%tile	Identical
		Kurtz	Kurtz	FG
		Sabbagh	Sabbagh	FG
		Merz	Merz	FG+GA
		Hansmann	Hansmann	FG+GA
		Rempen	Rempen	FG+GA
		Chitty (O-O) (*1)	Chitty(O-O)	FG+GA
			Chitty(O-O)-%tile	Identical
		Chitty(O-I)(*1)	Chitty(O-I)	FG+GA
			Chitty(O-I)-%tile	Identical
		Tokyo (*1)	Tokyo	FG+GA
			Tokyo-SD	Identical
		Osaka (*2), (*3)	Osaka	Identical
		ASUM-V1	ASUM-V1	FG+GA
		ASUM-V2	ASUM-V2	FG+GA
		JSUM(*1)	JSUM	FG+GA
			JSUM-SD	Identical
		CFEF (*1)	CFEF	FG
			CFEF-%tile	Identical
		Jeanty	Jeanty	GA
		Shepard	Shepard	-
		Nicolaides	Nicolaides	Identical

Item name	Formal name	Author name	Data name	Data type
OFD	Occipitofrontal diameter	Merz Hansmann	Merz Hansmann	FG Identical
		Chitty(*1)	Chitty Chitty-%tile	FG Identical
		ASUM-V2 Nicolaides	ASUM-V2 Nicolaides	FG+GA Identical
HC	Head circumference	Hadlock (*1) (*2)	Hadlock Hadlock-%tile	FG+GA Identical
		Merz Hansmann	Merz Hansmann	FG+GA Identical
		Chitty (Pltd) (*1)	Chitty (Pltd) Chitty (Pltd)-%tile	FG+GA Identical
		Chitty (drvd) (*1)	Chitty (drvd) Chitty (drvd)-%tile	FG+GA Identical
		ASUM-V1 ASUM-V2	ASUM-V1 ASUM-V2	FG FG+GA
		CFEF(*1)	CFEF CFEF-%tile	FG Identical
		Jeanty	Jeanty	GA
HA	Head area	Chitty(*1)	Chitty Chitty-%tile	FG+GA Identical
THD	Thoracic diameter	Hansmann	Hansmann	Identical
AC	Abdominal circumference	Jeanty	Jeanty	FG
		Hadlock (*1) (*2)	Hadlock Hadlock-%tile	FG+GA Identical
		Merz Deter	Merz Deter	FG+GA FG
		Chitty (pltd) (*1)	Chitty(pltd) Chitty(pltd)-%tile	FG Identical
		Chitty (drvd) (*1)	Chitty(drvd) Chitty(drvd)-%tile	FG Identical
		Tokyo (*1)	Tokyo Tokyo-SD	FG+GA Identical
		ASUM-V1 ASUM-V2	ASUM-V1 ASUM-V2	FG FG+GA
		JSUM (*1)	JSUM JSUM-SD	FG+GA Identical
		CFEF (*1)	CFEF CFEF-%tile	FG Identical
		Shepard Campbell Nicolaides	Shepard Campbell Nicolaides	- - Identical

Item name	Formal name	Author name	Data name	Data type
APTD	Anteroposterior trunk diameter	Tokyo	Tokyo	-
TTD	Transverse trunk diameter	Tokyo	Tokyo	-
FTA	Fetal trunk cross-sectional area	Osaka (*2), (*3)	Osaka	Identical
AA	Abdominal area	Chitty (*1)	Chitty Chitty-%tile	FG Identical
APAD	Anteroposterior abdominal diameter	Merz	Merz	FG
TAD	Transverse abdominal diameter	Merz	Merz	FG
		CFEF (*1)	CFEF CFEF-%tile	FG Identical
FL	Femur length	Jeanty	Jeanty	FG+GA
		Hadlock (*1), (*2)	Hadlock (*2) Hadlock-%tile	FG+GA Identical
		Merz Hansmann O'Brien Warda	Merz Hansmann O'Brien Warda	FG+GA Identical FG FG+GA
		Chitty (*1)	Chitty Chitty-%tile	FG+GA Identical
		Tokyo (*1)	Tokyo Tokyo-SD	FG+GA Identical
		Osaka(*2), (*3) ASUM-V1 ASUM-V2	Osaka ASUM-V1 ASUM-V2	Identical GA FG+GA
		JSUM (*1)	JSUM JSUM-SD	FG+GA Identical
		CFEF (*1)	CFEF CFEF-%tile	FG Identical
		Hohler Nicolaides	Hohler Nicolaides	GA Identical
OOD	Outer orbital diameter	Jeanty Mayden	Jeanty Mayden	GA GA
Humerus	Humerus	Jeanty Merz ASUM-V2	Jeanty Merz ASUM-V2	GA FG FG+GA
		Chitty	Chitty-%tile	Identical
Clavicle	Clavicle length	Yarkoni	Yarkoni	FG+GA

Item name	Formal name	Author name	Data name	Data type
Kidney	Kidney length	Bertagnoli	Bertagnoli	FG
Radius	Radius	Merz Chitty	Merz Chitty-%tile	FG Identical
Ulna	Ulna	Jeanty Merz Chitty	Jeanty Merz Chitty-%tile	GA FG Identical
Tibia	Tibia	Jeanty Merz Chitty	Jeanty Merz Chitty-%tile	GA FG Identical
Fibula	Fibula	Merz Chitty	Merz Chitty-%tile	FG Identical
CER	Cerebellum	Goldstein Hill Nicolaides	Goldstein Hill Nicolaides	FG FG+GA Identical
Va	Cerebral anterior ventricle diameter	Nicolaides	Nicolaides-%tile	Identical
Vp	Cerebral posterior ventricle diameter	Nicolaides	Nicolaides-%tile	Identical
Hem	Cerebral hemisphere	Nicolaides	Nicolaides-%tile	Identical
Foot	Foot length	Mercer Chitty	Mercer Chitty-%tile	FG+GA Identical
NT	Nuchal translucency	-	-	-
Yolk Sac	Yolk sac	-	-	-
TC	Thoracic circumference	-	-	-
Ocular D	Ocular diameter	-	-	-
Cist. magna	Cisterna magna	-	-	-
Cervix Len	Cervical length	-	-	-
Umb VD	Umbilical vein diameter	-	-	-
Nasal bone	Nasal bone	-	-	-
AFI	Amniotic fluid index	-	-	-
AFP	Amniotic fluid pocket	-	-	-
CTAR A	Thoracic area	-	-	-
CTAR B	Cardiac area	-	-	-
CARD-Axis	Cardiac axis	-	-	-
CTAR	Cardiothoracic area ratio	-	-	-

Item name	Formal name	Author name	Data name	Data type
Va/Hem	Va/Hem	Nicolaides	Nicolaides-%tile	Identical
Vp/Hem	Vp/Hem	Nicolaides	Nicolaides-%tile	Identical
HC (BPD, OFD)	3.14x(BPD+OFD)/2	Nicolaides	Nicolaides	Identical
HC (Cal.)	(BPD + OFD) × π/2	Hadlock, Chitty, BMUS, Nicolaides	-	-
	(BPD + OFD) × 1.62	Jeanty	-	-
	(BPD + OFD) × 1.57	ASUM	-	-
	2.325 × $\sqrt{\ }$ (BPD^2 + OFD^2)	Merz, Hansmann	-	-
AC (Cal.)	(APAD + TAD) × π/2	Hadlock, Chitty, BMUS, Nicolaides	-	-
	(APAD + TAD) × 1.57	Jeanty	-	-
	(APAD + TAD) × 1.571	Merz	-	-
AXT	APTD*TTD	Tokyo (*1)	Tokyo	FG+GA
			Tokyo-SD	Identical
FHR	Fetal heart rate	-	-	-
EFW	Estimated fetal weight	Hadlock1 [AC, FL] (*2)	Hadlock1 [AC, FL]	FG
		Hadlock2 [BPD, AC, FL] (*2)	Hadlock2 [BPD, AC, FL]	FG
		Hadlock3 [HC, AC, FL] (*2)	Hadlock3 [HC, AC, FL]	FG
		Hadlock4 [BPD, HC, AC, FL] (*2)	Hadlock4 [BPD, HC, AC, FL] (*2)	FG
		Shepard [BPD, AC]	Shepard [BPD, AC]	-
		Tokyo [BPD, APTD, TTD, FL] (*1)	Tokyo [BPD, APTD, TTD, FL]	FG+GA
			Tokyo-SD [BPD, APTD, TTD, FL]	Identical
		Osaka [BPD, FTA, FL] (*2), (*3)	Osaka [BPD, FTA, FL]	Identical
		JSUM [BPD, AC, FL] (*1), (*2)	JSUM [BPD, AC, FL]	FG+GA
			JSUM-SD [BPD, AC, FL]	Identical
		Hansmann [BPD, THD]	Hansmann [BPD, THD]	FG
		Campbell [AC]	Campbell [AC]	-
		Merz1 [BPD, AC]	Merz1 [BPD, AC]	-
		Merz2 [AC]	Merz2 [AC]	-

*1: The table below shows the relationship between the author and the data to be used according to the setting for "SD Display type" on the OB Meas. 2 page of the preset menu.

Data for author name - SD:

If the OB date information has not been entered, the SD value is not displayed.
When Tokyo-SD is selected, three curves, mean, and ±1.5SD, are displayed in the trend graph.
When JSUM-SD is selected, five curves, mean, ±1.5SD, and ±2SD, are displayed in the trend graph.

Data for author name - %tile:

If the obstetrical date information has been entered, the SD value is displayed as XX%tile.
If the obstetrical date information has not been entered, the SD value is not displayed.

Selected or displayed author	Setting for "SD Display type" on the OB Meas. 2 page of the preset menu	
	X. XXSD/%tile	±XwXd/±mm
Tokyo	Tokyo-SD	Tokyo
JSUM	JSUM-SD	JSUM
Hadlock	Hadlock-%tile	Hadlock
Chitty	Chitty-%tile	Chitty
Chitty (O-O)	Chitty (O-O)-%tile	Chitty (O-O)
Chitty (O-I)	Chitty (O-I)-%tile	Chitty (O-I)
Chitty (pltd)	Chitty (pltd)-%tile	Chitty (pltd)
Chitty (drvd)	Chitty (drvd)-%tile	Chitty (drvd)
CFEF	CFEF-%tile	CFEF

*2: When the check box for "Extrapolated on" on the OB Calc. page of the preset menu is selected, the age axis of the trend graph is extended up to 42.

*3: When Osaka is selected, five curves, mean, ±1.5SD, and ±2SD, are displayed in the trend graph.

NOTE: The author data to be used can be selected by setting "SD Display type" on the OB Meas. 2 page of the preset menu. For an author for which only one of the two data types is available, the available data is used regardless of the setting of this parameter.

The table below shows the authors that include data for generating a graph. Note that GA (gestational age) is not calculated in OB Doppler measurements.

Item name	Formal name	Author name
Umb A RI	Umbilical artery RI	Mai Schaffer JSUM (*1)
Umb A PI	Umbilical artery PI	Mai Schaffer Harrington JSUM (*1)
MCA RI	Middle cerebral artery RI	Mai Schaffer JSUM (*1)
MCA PI	Middle cerebral artery PI	Mai Schaffer Harrington JSUM (*1)
Fetal Ao RI	Fetal aorta RI	Mai Schaffer
Fetal Ao PI	Fetal aorta PI	Mai Schaffer Harrington
Lt Uterin RI	Left uterine artery RI	Schaffer
Lt Uterin PI	Left uterine artery PI	Schaffer
Rt Uterin RI	Right uterine artery RI	Schaffer
Rt Uterin PI	Right uterine artery PI	Schaffer
PIV	Ductus Venosus Pulsatility Index	Baschat
PVIV	Ductus Venosus Peak Velocity Index	Baschat
a/S	Ductus Venosus Preload Index	Baschat
S/a	Ductus Venosus S/a Ratio	Baschat

*1: When the check box for "Extrapolated on" on the OB Calc. page of the preset menu is selected, the age axis of the trend graph is extended up to 42.

12.4 OB Menu

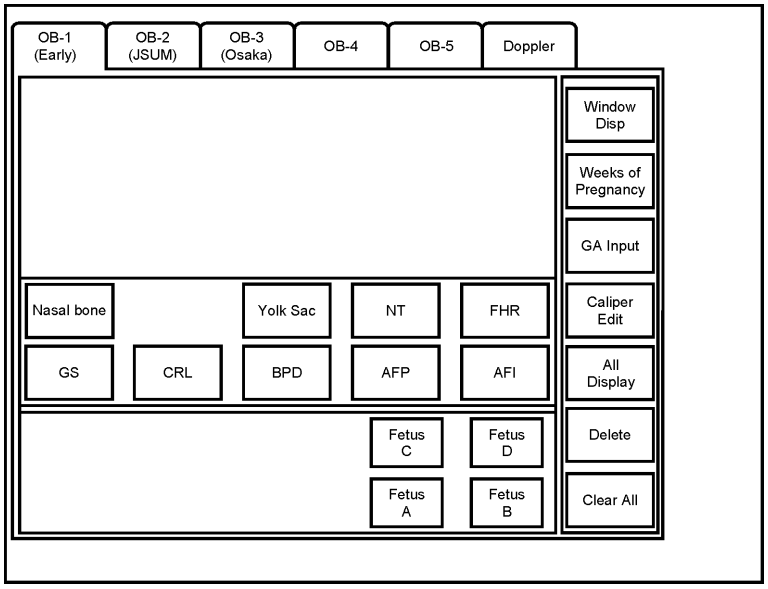
Select OB for Exam Type on the Patient Information screen.

Press 

to display the OB menu on the touch panel. Press the tab for the desired menu. On the touch panel specialized for OB measurement, the switch assignments and other details can be customized. Refer to subsection 12.12 for details.

12.4.1 OB-1 (Early) menu

This menu provides the group of switches to be used for examinations for early pregnancy.

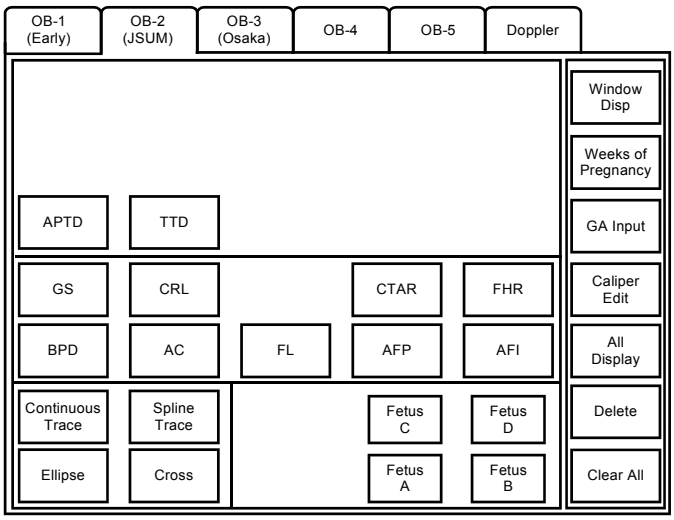


Switch	Function
[GS], [CRL], ...	The corresponding measurement is started.
Window Disp	Display of the measurement results can be turned ON/OFF.
Weeks of Pregnancy	LMP and EDD are calculated based on GA, and the patient data is updated. (A confirmation dialog is displayed.)
GA Input	The obstetric date data can be entered.
Caliper Edit	The position of the measurement marker can be changed.
All Display	Each time this switch is pressed, the measurement result display is switched between All display mode and Latest display mode (effective only for 2D measurement items).
Delete	A completed measurement is deleted. (The most recently operated measurement marker and the measurement result associated with the marker are deleted.)
Clear All	The measurement results are cleared. (The date data for LMP, EDD, and GA are not cleared.)
Fetus A, B, C, D	A fetus is selected (in multiple pregnancies).

⚠CAUTION: To calculate the gestational age and estimated fetal weight correctly from the measurement result, it is necessary to specify the author of the GA calculation method to be used and the EFW calculation method. Refer to section 2 "Setting the Presets" for details.
When performing OB measurement for multiple pregnancies, be sure to confirm the fetus ID on the touch panel, measurement window, Report screen, and Trend Graph to prevent confusion between fetuses.

12.4.2 OB-1 (JSUM) menu

This menu provides the group of switches to be used for the JSUM method.



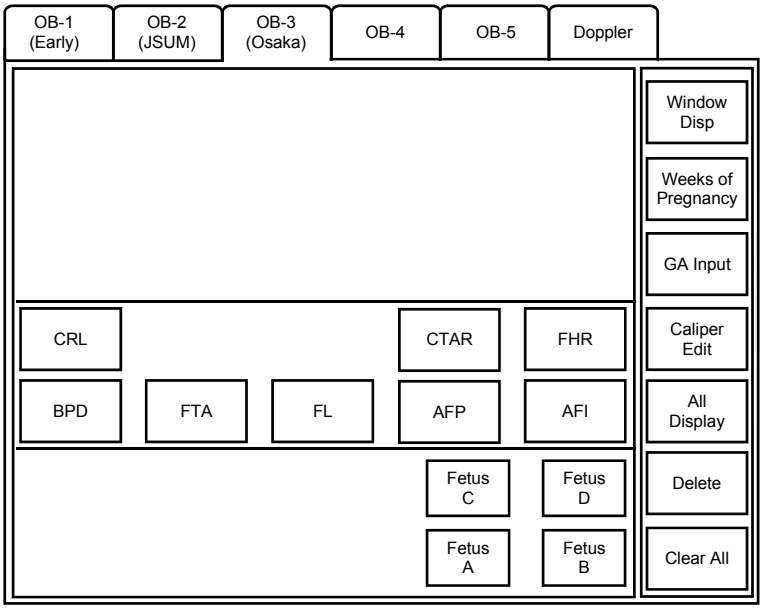
Switch	Function
[BPD], [AC], ...	The corresponding measurement is started.
Window Disp	Display of the measurement results can be turned ON/OFF.
Weeks of Pregnancy	LMP and EDD are calculated based on GA and the patient data is updated. (The confirmation dialog is displayed.)
GA Input	The obstetric date data can be entered.
Caliper Edit	The position of the measurement marker can be changed.
All Display	Each time this switch is pressed, the measurement result display is switched between All display mode and Latest display mode (effective only for 2D measurement items).
Delete	A completed measurement is deleted. (The most recently operated measurement marker and the measurement result associated with the marker are deleted.)
Clear All	The measurement results are cleared. (The date data for LMP, EDD, and GA are not cleared.)
[Continuous Trace] [Spline Trace] [Ellipse] [Cross]	The method for circumference and area measurements is selected. (The default can be set using the Application Preset Editor.) Refer to subsection 3.4 "Area/Circumference Measurement (Area)" for the operating procedures for each method.
Fetus A, B, C, D	A fetus is selected (in multiple pregnancies).

⚠CAUTION: **To calculate the gestational age and estimated fetal weight correctly from the measurement result, it is necessary to specify the author of the GA calculation method to be used and the EFW calculation method. Refer to section 2 "Setting the Presets" for details.**
When performing OB measurement for multiple pregnancies, be sure to confirm the fetus ID on the touch panel, measurement window, Report screen, and Trend Graph to prevent confusion between fetuses.

NOTE: The circumference and area measurement methods selected for each measurement item and fetus are stored in the system until  pressed.

12.4.3 OB-3 (Osaka) menu

This menu provides the group of switches to be used for the Osaka University method.

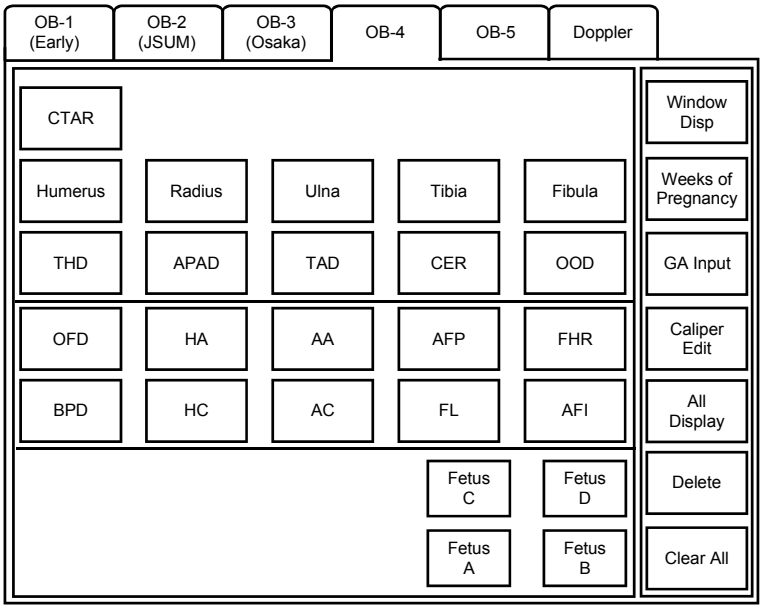


Switch	Function
[BPD], [FTA], ...	The corresponding measurement is started.
Window Disp	Display of the measurement results can be turned ON/OFF.
Weeks of Pregnancy	LMP and EDD are calculated based on GA and the patient data is updated. (The confirmation dialog is displayed.)
GA Input	The obstetric date data can be entered.
Caliper Edit	The position of the measurement marker can be changed.
All Display	Each time this switch is pressed, the measurement result display is switched between All display mode and Latest display mode (effective only for 2D measurement items).
Delete	A completed measurement is deleted. (The most recently operated measurement marker and the measurement result associated with the marker are deleted.)
Clear All	The measurement results are cleared. (The date data for LMP, EDD, and GA are not cleared.)
Fetus A, B, C, D	A fetus is selected (in multiple pregnancies).

⚠CAUTION: To calculate the gestational age and estimated fetal weight correctly from the measurement result, it is necessary to specify the author of the GA calculation method to be used and the EFW calculation method. Refer to section 2 "Setting the Presets" for details.
When performing OB measurement for multiple pregnancies, be sure to confirm the fetus ID on the touch panel, measurement window, Report screen, and Trend Graph to prevent confusion between fetuses.

12.4.4 OB-4 menu

This menu provides the group of switches to be used mainly for examinations in the midtrimester or later stages.

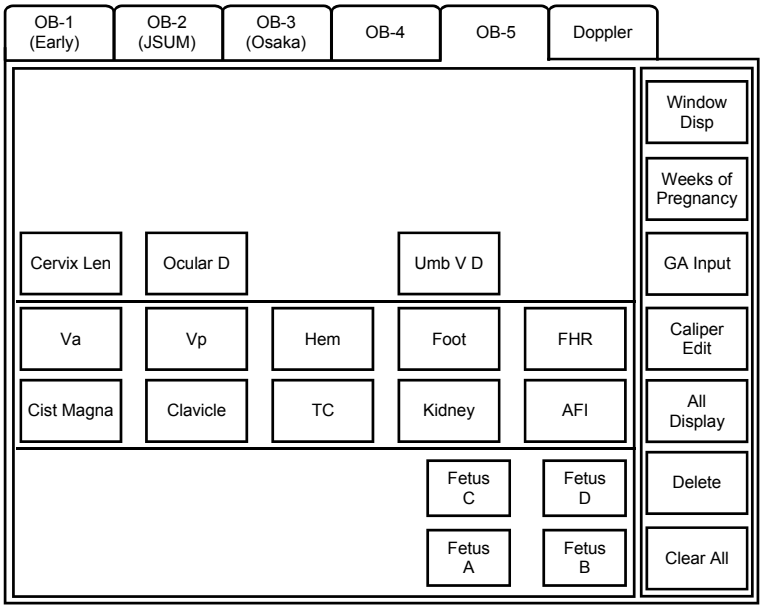


Switch	Function
[BPD], [HC], ...	The corresponding measurement is started.
Window Disp	Display of the measurement results can be turned ON/OFF.
Weeks of Pregnancy	LMP and EDD are calculated based on GA and the patient data is updated. (The confirmation dialog is displayed.)
GA Input	The obstetric date data can be entered.
Caliper Edit	The position of the measurement marker can be changed.
All Display	Each time this switch is pressed, the measurement result display is switched between All display mode and Latest display mode (effective only for 2D measurement items).
Delete	A completed measurement is deleted. (The most recently operated measurement marker and the measurement result associated with the marker are deleted.)
Clear All	The measurement results are cleared. (The date data for LMP, EDD, and GA are not cleared.)
Fetus A, B, C, D	A fetus is selected (in multiple pregnancies).

⚠CAUTION: To calculate the gestational age and estimated fetal weight correctly from the measurement result, it is necessary to specify the author of the GA calculation method to be used and the EFW calculation method. Refer to section 2 "Setting the Presets" for details.
When performing OB measurement for multiple pregnancies, be sure to confirm the fetus ID on the touch panel, measurement window, Report screen, and Trend Graph to prevent confusion between fetuses.

12.4.5 OB-5 menu

This menu provides the group of switches to be used mainly for examinations in the midtrimester or later stages.



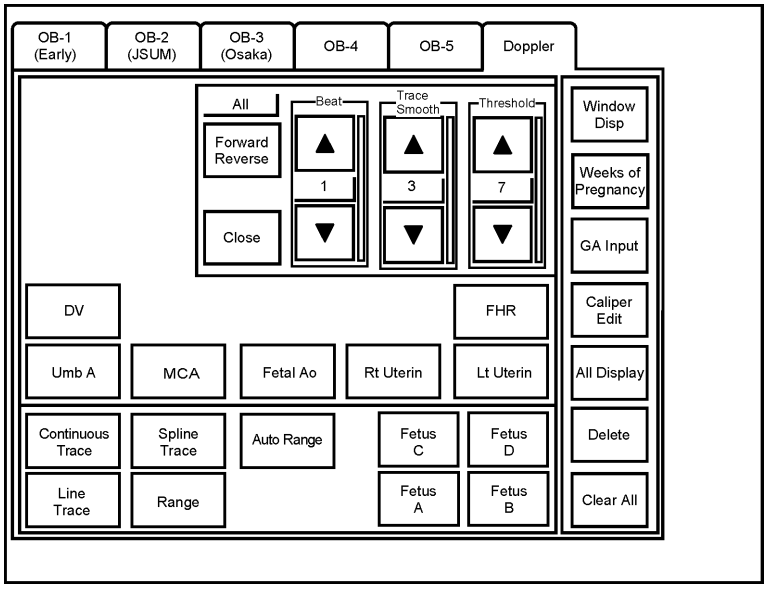
Switch	Function
[Cist Magna], [Clavicle], ...	The corresponding measurement is started.
Window Disp	Display of the measurement results can be turned ON/OFF.
Weeks of Pregnancy	LMP and EDD are calculated based on GA and the patient data is updated. (The confirmation dialog is displayed.)
GA Input	The obstetric date data can be entered.
Caliper Edit	The position of the measurement marker can be changed.
All Display	Each time this switch is pressed, the measurement result display is switched between All display mode and Latest display mode (effective only for 2D measurement items).
Delete	A completed measurement is deleted. (The most recently operated measurement marker and the measurement result associated with the marker are deleted.)
Clear All	The measurement results are cleared. (The date data for LMP, EDD, and GA are not cleared.)
Fetus A, B, C, D	A fetus is selected (in multiple pregnancies).

⚠CAUTION: To calculate the gestational age and estimated fetal weight correctly from the measurement result, it is necessary to specify the author of the GA calculation method to be used and the EFW calculation method. Refer to section 2 "Setting the Presets" for details.
When performing OB measurement for multiple pregnancies, be sure to confirm the fetus ID on the touch panel, measurement window, Report screen, and Trend Graph to prevent confusion between fetuses.

12.4.6 Doppler menu

This menu provides the group of switches to be used for Doppler measurements.

On the preset screen, this menu is displayed as "OB-6".



Switch	Function
[Forward/Reverse]	Selects the trace range for Doppler auto trace. Forward : The Doppler waveform above the baseline is traced. Reverse : The Doppler waveform below the baseline is traced. All : The entire Doppler waveform is traced.
[Beat]	Selects the number of heartbeats.
[Trace Smooth]	Adjusts the smoothness of the Doppler auto trace in the temporal direction.
[Threshold]	Sets the threshold for the Doppler auto trace line with respect to the waveform. A higher threshold generates a trace closer to the baseline.
[Umb A], [MCA], ...	The corresponding measurement is started.
Window Disp	Display of the measurement results can be turned ON/OFF.
Weeks of Pregnancy	LMP and EDD are calculated based on GA and the patient data is updated. (The confirmation dialog is displayed.)
GA Input	The obstetric date data can be entered.
Caliper Edit	The position of the measurement marker can be changed.
All Display	Each time this switch is pressed, the measurement result display is switched between All display mode and Latest display mode (effective only for 2D measurement items).
Delete	A completed measurement is deleted. (The most recently operated measurement marker and the measurement result associated with the marker are deleted.)
Clear All	The measurement results are cleared. (The date data for LMP, EDD, and GA are not cleared.)

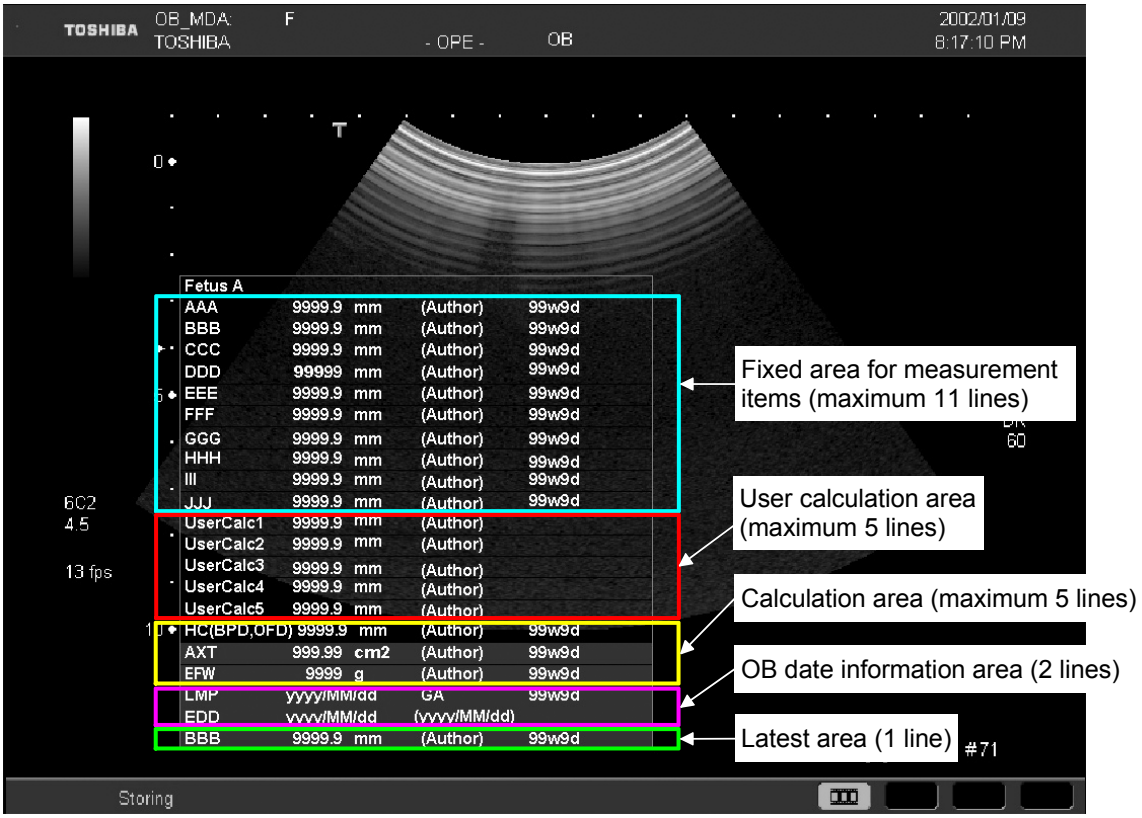
Switch	Function
[Continuous Trace] [Spline Trace] [Line Trace] [Range] [Auto Range]	The trace method is selected. (The default can be set using the Preset.) Refer to subsection 6.5 "Velocity Trace Measurement (Vel Trace)" for the operating procedures for each method.
Fetus A, B, C, D	A fetus is selected (in multiple pregnancies).

⚠CAUTION: When performing OB measurement for multiple pregnancies, be sure to confirm the fetus ID on the touch panel, measurement window, report screen, and trend graph to prevent confusion between fetuses.

NOTE: The trace methods selected for each measurement item and fetus are stored in the system until  is pressed.

12.4.7 Result display

The 2D measurement results are displayed as shown below.

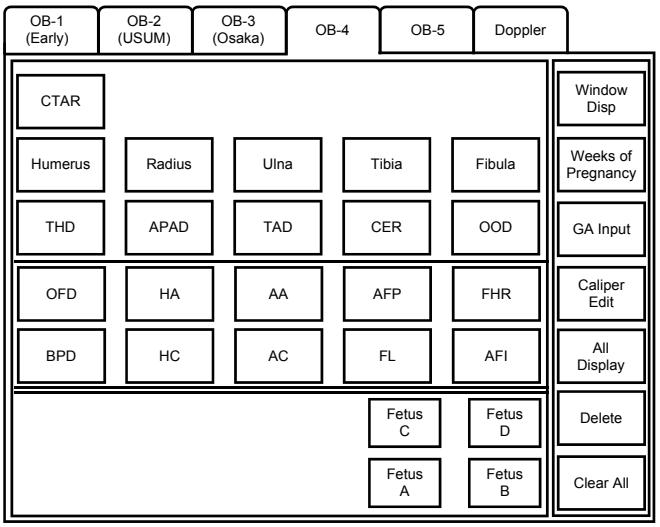


Area	Function
Fixed area for measurement items	Displayed only when [All Display] is set to ON.
User calculation area	Displayed regardless of whether [All Display] is ON/OFF.
Calculation area	Displayed regardless of whether [All Display] is ON/OFF.
OB date information area	Displayed regardless of whether [All Display] is ON/OFF.
Latest area	Displayed regardless of whether [All Display] is ON/OFF.

In the fixed area, the measurement results for the items that are registered to the switches on the two rows closest to the user on the touch panel are displayed. For details, refer to subsection 12.11.

The result display order changes according to the switch layout on the selected tab page.

The measurement results for the items registered to these switches are displayed in the fixed area.



Example: OB-4 menu

12.5 Obstetrical Date Information Entry and Calculation

Display	Date entered and calculated data	Calculation method
LMP (the start date of the last menstrual period)	When LMP is entered, EDD and GA are calculated.	EDD = LMP + 280 days GA = System date – LMP
IVF (date of in-vitro fertilization)	When IVF is entered, EDD and GA are calculated.	LMP = IVF – 14 days EDD = IVF + 266 days GA = System date – LMP
EDD (estimated date of delivery)	When EDD is entered, LMP and GA are calculated.	LMP = EDD - 280 days GA = System date - LMP
PREV (date of previous examination)	When PREV and GA on PREV are entered, LMP, EDD, and GA are calculated	LMP = PREV – GA on PREV EDD = LMP + 280 days GA = System date – LMP
CLIN (date of current examination)	When GA on CLIN is entered, LMP and EDD are calculated.	LMP = System date – GA EDD = LMP + 280 days

These data can be entered only in the patient ID registration window and the GA Input window.
For details, refer to the operation manual <<Applications>>.

⚠CAUTION: The maximum GA that can be handled by the system is 45 weeks and 0 days. If GA exceeds 45 weeks and 0 days, it is not displayed on the report or trend graph.

12.6 Measurement Methods

12.6.1 Distance measurements

BPD, FL, CRL, and other distance measurement items.

The distance and GA (gestational age) are displayed according to the measurement result.

For the measurement and modification procedures, refer to subsection 3.1 "Distance Measurement (Distance)".

The distance is displayed in mm.

12.6.2 Area/Circumference measurements

(HC, HA, AC, FTA, AA, TC)

The area, circumference, and GA (gestational age) are displayed based on the measurement results for these items.

The calculation method can be selected on the touch panel. The default calculation method can be set using the Application Preset Editor. For the measurement and modification procedures, refer to subsection 3.4 "Area/Circumference Measurement (Area)".

The area is displayed in cm^2 and circumference is displayed in mm.

12.6.3 Circle measurement (AFI, AFP)

The diameter is displayed based on the measurement result.

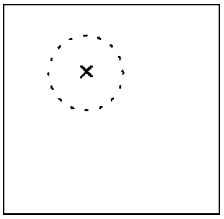
For circle measurement for AFI, refer to subsection 12.6.4 "Amniotic Fluid Index (AFI) measurement".

Two measurement types are available. Select one of them in the preset menu.

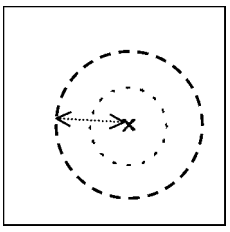
12.6.3.1 Balloon measurement

<<Measurement procedure>>

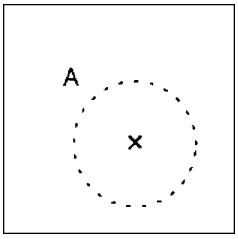
(1) Press [AFI] or [AFP] on the touch panel. A circle is displayed.



(2) Operate the trackball to move the center of the circle to the desired point.
Rotate the rotary encoder or palm switch counterclockwise or clockwise to reduce or increase the radius correspondingly.

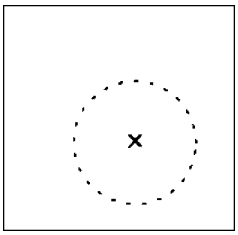


(3) Press △SET. The position of the center point and size of the circle are determined and the measurement is set.



<<Modifying a measurement by pressing △SET after the measurement is set>>

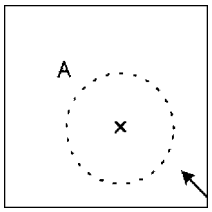
(1) Press △SET after the measurement is set.
The color of the center point and the circumference is changed to orange, indicating that they can be moved.



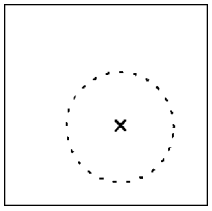
(2) Change the center point and/or size in the same manner described in steps (2) and (3) of <<Measurement procedure>>.

<<Modifying a measurement using Caliper Edit>>

(1) Press [Caliper Edit] on the touch panel.
An arrow is displayed.
Move the arrow to the circle. The color of the center point and circumference is changed to red.



(2) Press △SET.
The color of the center point and the circumference is changed to orange, indicating that they can be moved.

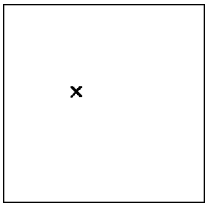


(3) Change the center point and/or size in the same manner described in steps (2) and (3) of <<Measurement procedure>>.

12.6.3.2 Both Ends measurement

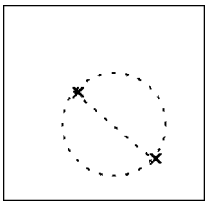
<<Measurement procedure>>

(1) Press [AFI] or [AFP] on the touch panel.
The marker (orange) is displayed.

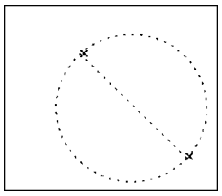


(2) Move the marker to the measurement start point and press SET. The first point is set.

(3) Move the trackball. The marker for the second point appears and a circle whose diameter is the line connecting the first and second points is displayed. Operate the trackball to adjust the diameter of the circle (position of the second point).

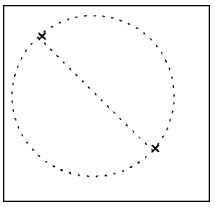


(4) Press SET. The distance between the first and second points (diameter of the circle) is determined and the measurement is set.



<<Modifying a measurement by pressing SET after the measurement is set>>

(1) Press SET after the measurement is set.
The color of the start point marker is changed to orange, indicating that the marker can be moved.



(2) Move the marker to the desired position by operating the trackball.

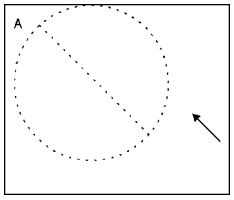
(3) Press SET to set the measurement.

(4) To change the position of the end point marker, press SET again. The color of the marker is changed to orange, indicating that the marker can be moved.

(5) Repeat above steps (2) and (3).

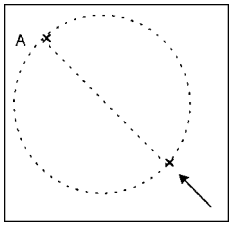
<<Modifying a measurement using Caliper Edit>>

(1) Press [Caliper Edit] on the touch panel.
An arrow is displayed.
Move the arrow to the circle. The two point markers are displayed. The active marker is displayed red and the other marker and the line are displayed white.



(2) Move the arrow onto one of the markers and press 

.
The color of the marker is changed to orange, indicating that the marker can be moved.



(3) Move the marker to the desired position by operating the trackball.

(4) Press 

to set the measurement.

12.6.4 Amniotic Fluid Index (AFI) measurement

<<Measurement procedure>>

(1) Select [AFI] on the touch panel. The start point marker is displayed on the monitor.

(2) Measure the distance using the trackball. For the measurement and modification procedures, refer to subsection 12.6.3 "Circle measurement (AFI, AFP)" or 3.1 "Distance Measurement (Distance)".

Even if the operation is discontinued by canceling the Freeze status, AFI measurement can be resumed by starting AFI measurement again.

(3) Repeat step (2) above to measure the four distances.

The distances are displayed in mm.

(4) When the four distances have been measured, AFI is calculated automatically. The result is displayed in cm.

NOTE: 1. The sum of the four data sets is displayed in the measurement window as the AFI value.
The AFI value remains blank until the four distances have been measured.

2. The AFI calculation method varies depending on the preset. Refer to (10) of subsection 12.1.3.

12.6.5 Doppler measurements (Umb A, MCA, etc.)

The items to be displayed during measurement can be selected for "Doppler Trace data display" on the D-OB Meas. page of the preset menu. Note that the HR value is not displayed for "Lt Uterin" and "Rt Uterin" on the Report screen or in the MDA even when "HR" is selected.

The measurement method can be selected on the touch panel. The default measurement method can be set using the preset. Refer to section 6 for the measurement and modification procedures.

The RI and PI values are given without units.

12.6.6 Fetal Heart Rate (FHR)

Refer to subsection 4.4 "Heart Rate Measurement (HR)" for the measurement and modification procedures. This method allows measurement of the heart rate of each fetus. The obtained values are used both in OB measurement and OB Doppler measurement. The measurement results are displayed in bpm.

12.6.7 NT measurement

The [Distance] or [Thickness] measurement tools can be selected for "NT Tool (Available after PR)" on the OB Meas. page of the preset menu.
The measurement and modification procedures of the Thickness tool are the same as for meanIMT measurement. Unlike meanIMT measurement, however, measurement is performed at only one position with the Thickness tool. The measurement result is displayed in mm.

When [Double Digits] is selected for "Thickness (IMT) Precision" on the 2D-Mode Meas. page of the preset menu, the Thickness measurement value is displayed to two decimal places.
A single quotation mark (') is displayed before the NT value to indicate that the value should be used for reference purposes only.

CAUTION:
1. Depending on the characteristics of the image, it may not be possible to obtain an accurate value to two decimal places even when the Thickness measurement value is displayed to two decimal places.
2. Keeping the above point in mind, use the measurement and calculation values displayed to two decimal places only for reference purposes.
3. In the MDA, a single quotation mark (') is added to the measurement values and the calculation results obtained based on the measurement values.

   Limitations: Marks can be moved in steps of 1 pixel on the screen. Due to the resolution of ultrasound images, this does not correspond to an indicated value change of 0.01. Thus, the indicated value changes in increments of greater than 0.01 as a mark is moved.

12.6.8 CTAR measurement

In CTAR measurement, the ratio of the areas of two ellipses (cardiac area / thoracic area × 100 (%)) and the angle between the axes of the ellipses (cardiac axis) are obtained.

The items to be output and the display during measurement can be preset by "CTAR Tool (Available after PR)" on the OB Meas. 3 page of the preset menu. In CTAR measurement, first measure the thoracic area and then measure the cardiac area.

⚠CAUTION:

1. **When the thoracic area is to be measured in CTAR measurement, set the measurement start point on the spine. If measurement is performed with the start point set at a location other than the spine, correct measurement results cannot be obtained.**
2. **Do not perform CTAR measurement using a horizontally flipped image. Correct measurement results cannot be obtained.**

12.6.9 Ductus Venosus measurement

[Range] or [Continuous] can be selected for "DV Trace Tool" on the D-OB Meas. page of the preset menu. When an interval of the Doppler waveform is measured using the selected tool, the maximum velocity in diastole, maximum velocity in systole, maximum velocity in atrial systole, maximum velocity in the interval, and HR are measured automatically. At the same time, PIV, PVIV, a/S, and S/a are calculated.

The results of automatic measurements can be edited manually.

12.6.10 Automatic startup of the next measurement item for EFW calculation

When "Measurement TCS Display by Freeze" is set to On on the OB Meas. 2 page of the preset menu, the caliper for the next measurement item to be used for EFW calculation is started up automatically by unfreezing and freezing the image after measurement of an item to be used for EFW calculation is completed. (The caliper for the first item must be started by pressing the appropriate measurement switch.)

12.7 "Weeks of Pregnancy" Function

It is possible to calculate LMP and EDD based on the GA calculated from the measurement result. The obtained LMP value can be used as the patient's LMP and also can be used for calculating EDD.

<<Operating procedure>>

(1) After executing a measurement in which GA is calculated, press [Weeks of Pregnancy] on the touch panel.

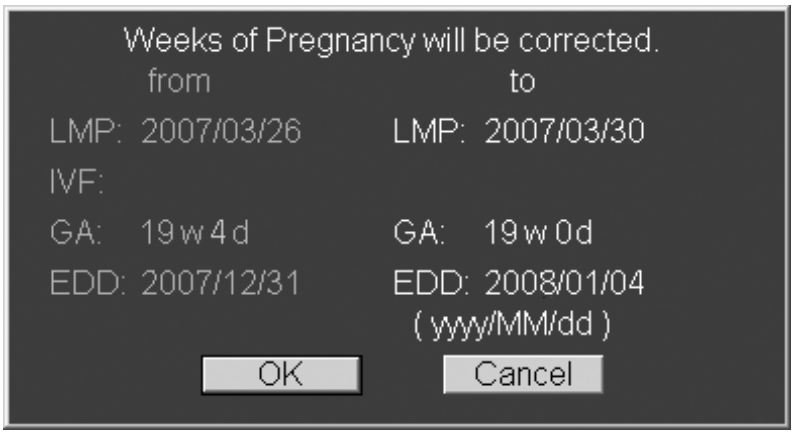
(2) Check the result displayed in the dialog and select [OK] or [Cancel].

- If "Current GA" is selected for "Method of OB Weeks" on the OB Meas. page of the presets, LMP is calculated based on the latest of the GA values obtained in the most recent measurement.

  If "Mean of GA" is selected for "Method of OB Weeks", LMP is calculated based on the mean of the GA values obtained in the most recent measurement. In this case, the description "(Averaged)" is added to the GA value.

  When U/S GA is selected, LMP is calculated based on the U/S GA value. If "Mean of Measurements" is selected for "Measurement Value Display Method" on the Meas. Report page of the presets, "GA Based on Averaged" is displayed followed by the measurement items used for calculation on the line below the date format. If "Most Recent Measurement" is selected for "Measurement Value Display Method" on the Meas. Report page of the presets, "GA Based on" is displayed followed by the measurement items used for calculation on the line below the date format.

- Note that even if "Mean of GA" is selected for "Method of OB Weeks", the latest GA value is used for LMP calculation if "Most Recent Measurement" is selected for "Measurement Value Display Method" on the Meas. Report page of the presets.



The "from" column displays the current GA and other obstetrical date information. The "to" column displays the new GA and date information, which will overwrite the current data.

⚠CAUTION: **LMP is not calculated if GA is not calculated in the most recent measurement.**
If IVF is entered as the obstetrical date, LMP is calculated based on GA and the IVF date is replaced with the calculated LMP.
EDD is calculated by adding 280 days to LMP. If GA exceeds 40 weeks and 0 days, EDD is displayed as a date earlier than the examination date.

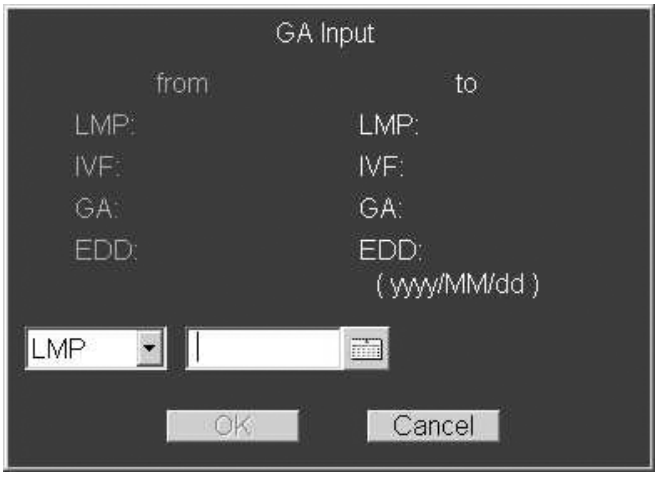
12.8 "GA Input" Function

The GA Input function is used to input/edit the obstetric date data and calculate LMP and EDD, or IVF and EDD, based on the input/edited date.

<Operating procedure>

(1) Press [GA Input] on the touch panel.

(2) Select the input item from the drop-down menu and input the data appropriate for the selected item in the field on the right.



- The OB date data can be entered for one of the five items: LMP, EDD, PREV, CLIN, and IVF.
- When the OB date data is not entered in the Patient Registration screen, the date and the number of weeks are not displayed in the "from" column. The item currently selected on the Patient Registration screen is displayed as the default in the selection field.
- When the OB date data is already set, the data is displayed in the "from" column and the item used for the data is displayed as the default in the selection field.
- The OB dates can be entered directly from the keyboard or from the calendar.
- The date should be entered in the format indicated by the guide display (example: yyyy/MM/dd).

- The GA value (XXwXd) can be entered directly from the keyboard or selected from the pull-down menu. The input ranges are as follows.

  XXw : 0 to 45
  Xd : 0 to 6

- When CLIN is selected, the current date is displayed. The displayed date cannot be changed and the calendar cannot be displayed.

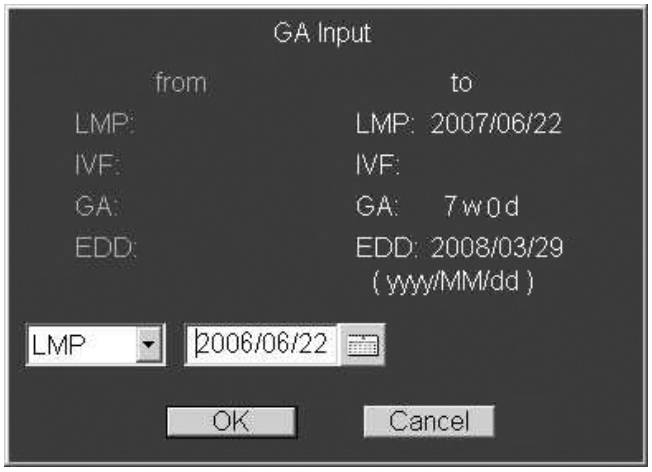
- When LMP is selected and the calendar is started, the calendar for the two previous months is displayed. When IVF, EDD, or PREV is selected, the calendar corresponding to the current date is displayed.

- When LMP or EDD is selected and the date is entered, LMP, EDD, and GA are calculated and displayed in the "to" column.

- When PREV or CLIN is selected and the date and then GA (XXwXd) are entered, LMP, EDD, and GA are calculated and displayed in the "to" column.

- When IVF is selected and the date is entered, IVF, EDD, and GA are calculated and displayed in the "to" column.

(3) Check the displayed results and select [OK] or [Cancel].



The current GA and date are displayed below "from" and the GA and date to be set after the update are displayed below "to".

NOTE: If the GA calculation result based on the entered date is outside the range from 0w1d to 45w0d, [OK] is disabled.

12.9 OB Report

- OB Report and Worksheet are functions for displaying the OB measurement and calculation results on the monitor.

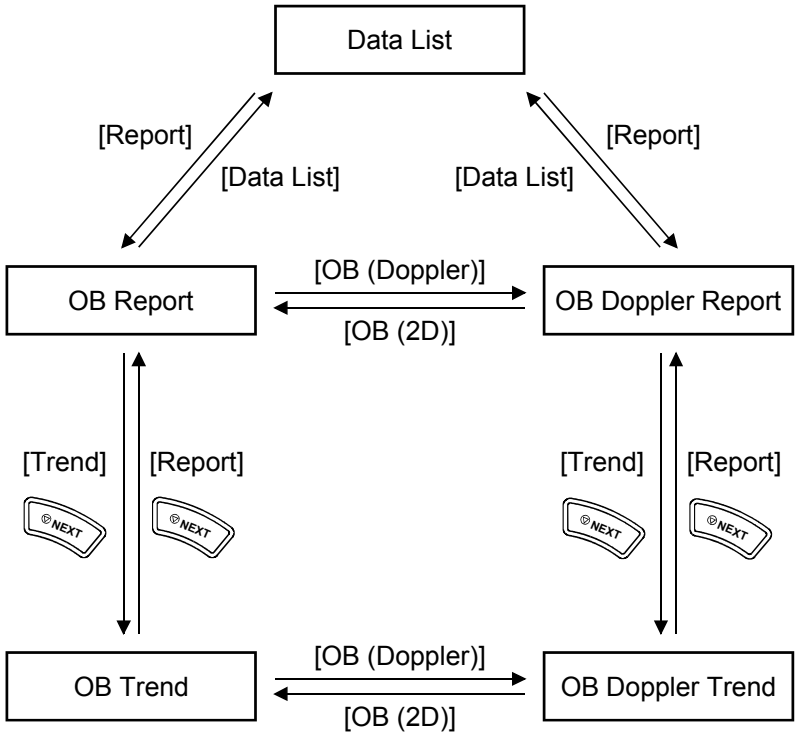
- The trend graph is a function for plotting the current values and the values stored in the system to display growth curve data. When Trend Graph is started, the initial display is either in the Single format or the Quad format according to the setting of "Trend Format" on the Meas. Report page of the presets.

- Pressing [Anatomy] displays the Anatomy screen on the monitor. This switch is effective only when "Display" is selected for "Anatomy Button in OB Reports" on the Meas. Report page of the presets.

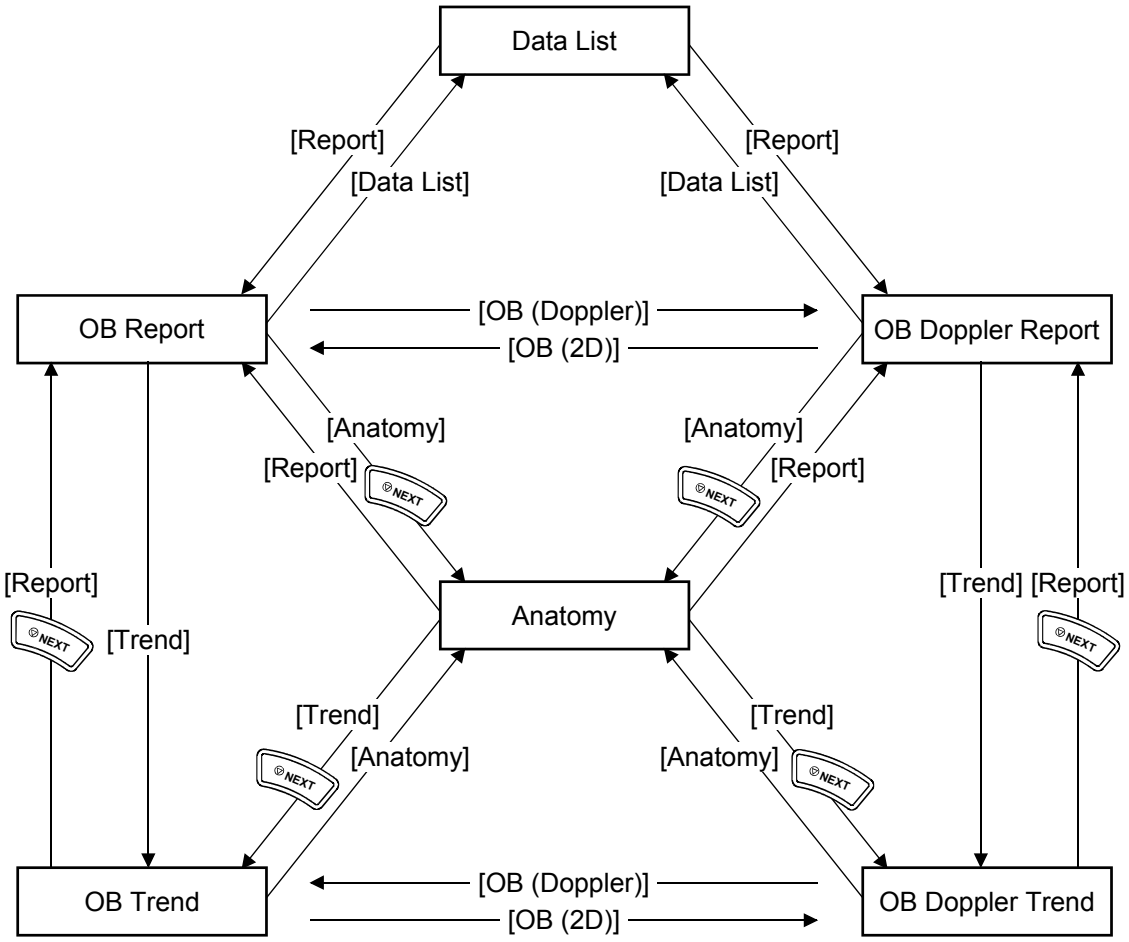
- The screen changes as shown in (1) to (4) by selecting the switch at the top of the Report, Anatomy, or Trend screens, or by pressing [NEXT].
  If an item from the Doppler menu is the most recently measured item, the OB Doppler Report screen is displayed first when 

is pressed.

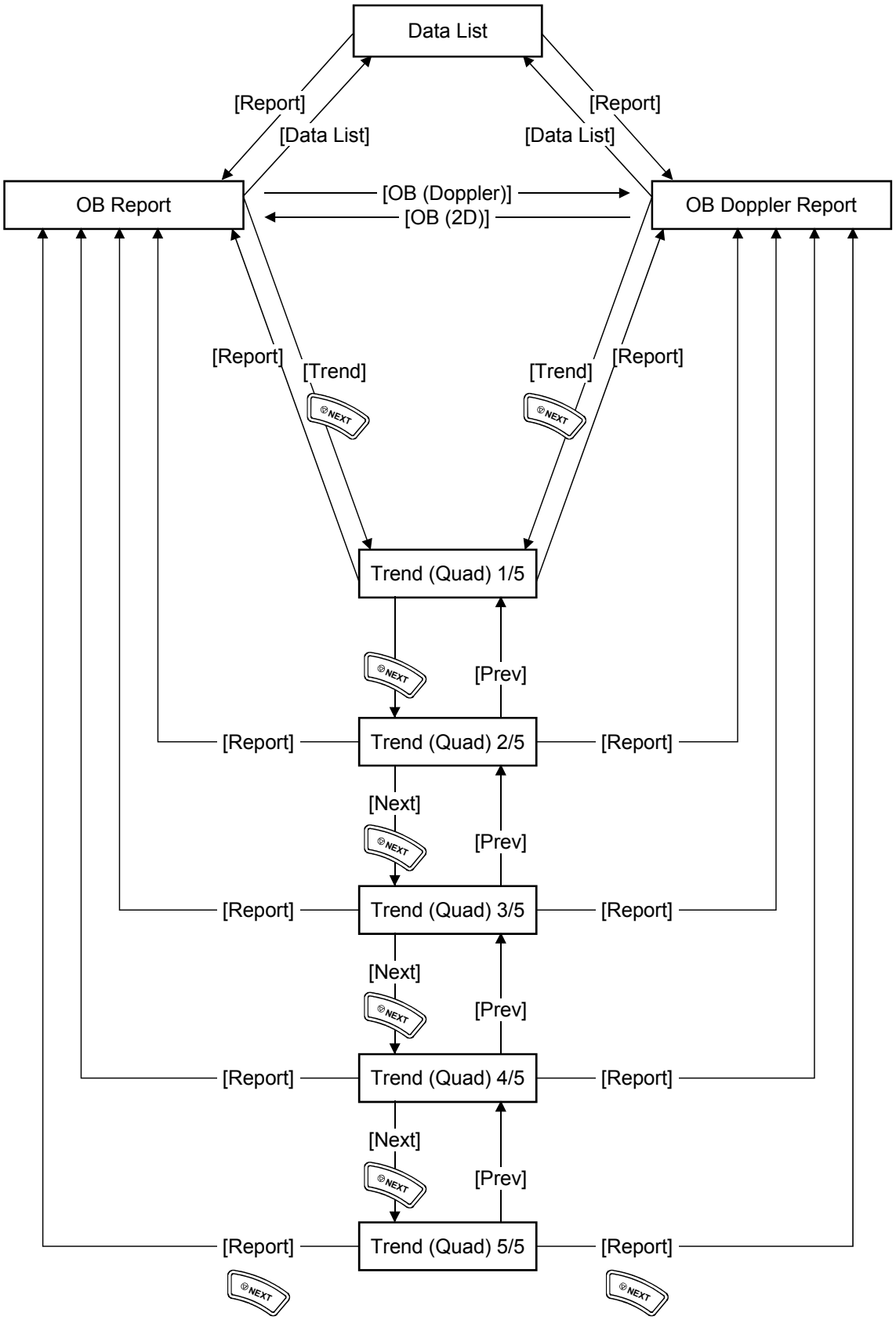
  (1) Anatomy: Not display, Trend Format: Single



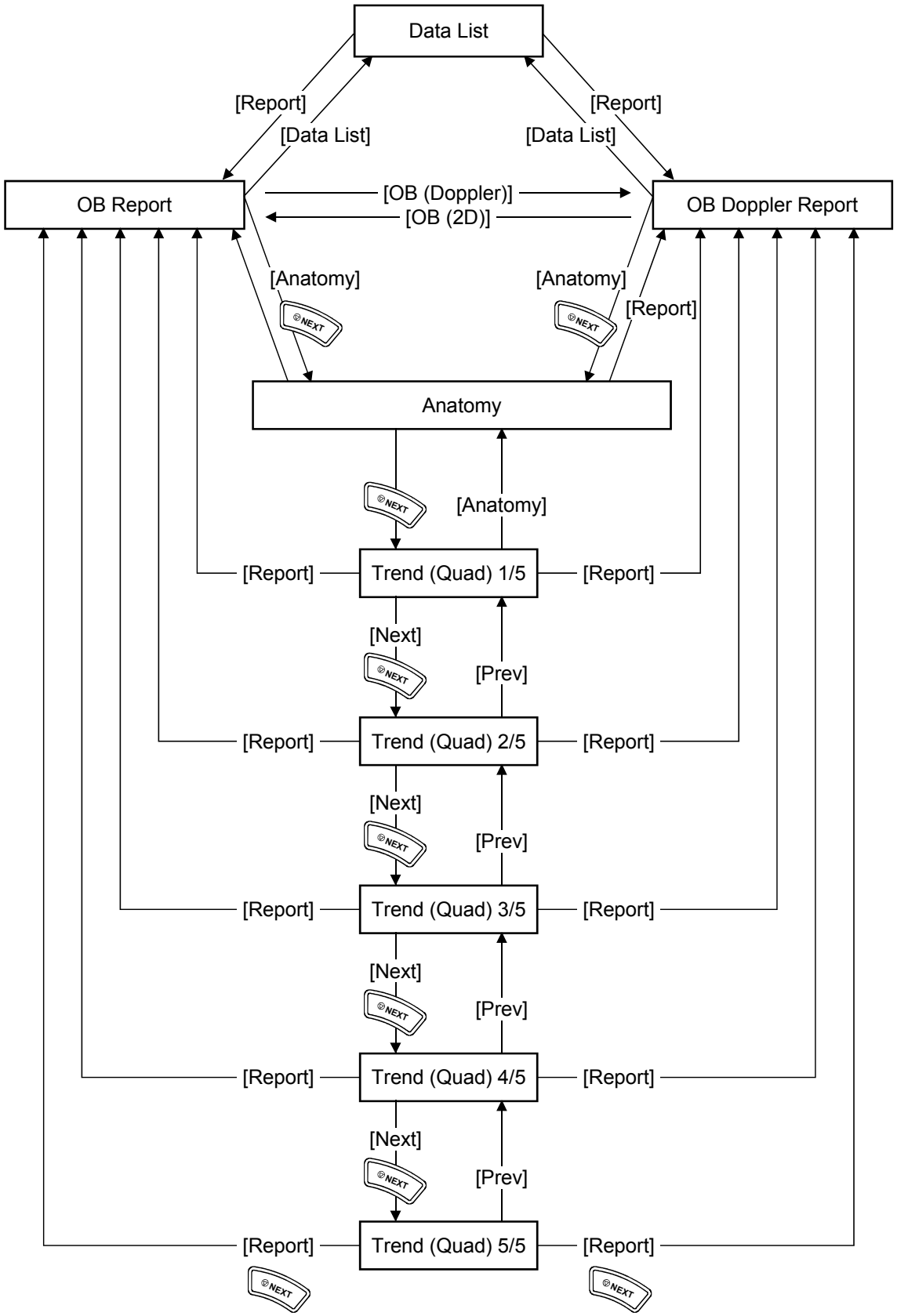
(2) Anatomy: Display, Trend Format: Single



(3) Anatomy: Not display, Trend Format: Quad



(4) Anatomy: Display, Trend Format: Quad



12.9.1 OB Report function

When 

is pressed after the OB measurements are executed, the report screen for OB measurements is displayed.

On the OB Report screen, the results for the measured items are displayed.

With regard to the calculation items, results are displayed for the items that are calculated from the measurement results and for the calculation items selected through presetting. In the standard setting, all the measurement results and mean values are displayed on the OB Report screen for 2D measurements and only the mean values are displayed on the OB Report screen for Doppler measurements.

Example of OB Report screen when the mean value display is selected

<<Display of calculation items>>

- The item label names, author names, measured values, units, gestational ages, and SD are displayed.
- Items that have not been measured are not displayed.
- If a calculated item or calculated gestational age is outside the range specified by the author, "***" is displayed next to the value.

Refer to subsection 12.1.3 for detailed information on the calculation items.

- On the OB Report screen for 2D measurements, the results of the last three measurements and their mean are displayed when [Mean of Measurements] is selected for "Measurement Value Display Method" on the Meas. Report page of the preset menu. When [Most Recent Measurement] is selected, only the most recent value is displayed.

- On the OB Report screen for Doppler measurements, if [Mean of Measurements] is selected for "Measurement Value Display Method" on the Meas. Report page, the results are displayed according to the setting for "Doppler Measurement Value Display Default" on the D-OB Meas. page of the preset menu.

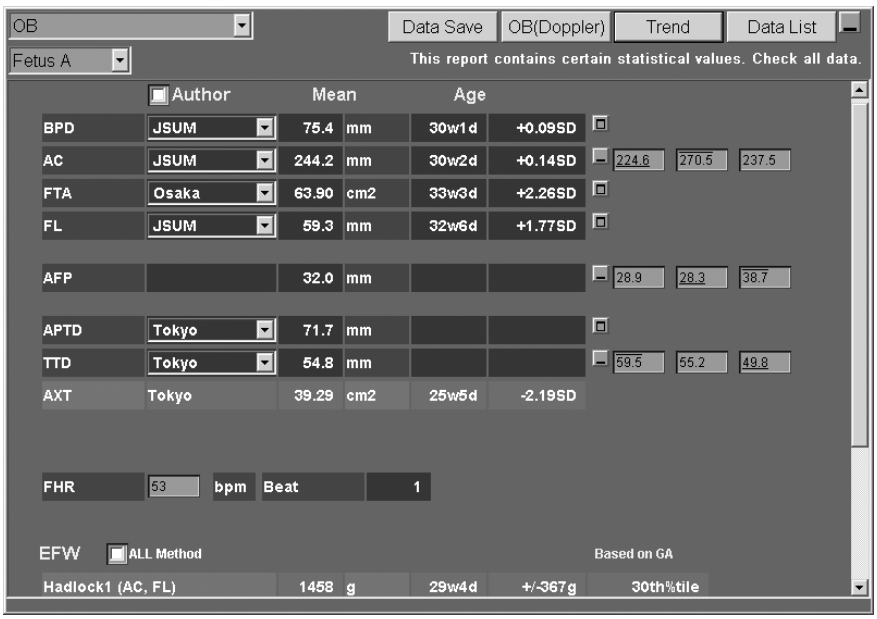
  - [Only Mean value is displayed] : Only the mean of the last three measurements is displayed.
  - [All value is displayed] : The results of the last three measurements and their mean are displayed.

  If [Most Recent Measurement] is selected for "Measurement Value Display Method", only the most recent value is displayed.

- If the author is changed, the gestational age is recalculated according to the new author and the result is displayed.
- If the EFW author is one of Hadlock1, 2, 3, or 4, the percentile of the calculated EFW relative to both the obstetrical date information and the U/S GA is displayed on the Report screen.

The author for each calculation item can be changed using the Author pull-down menu.

The changed authors are maintained while the Report screen is active.

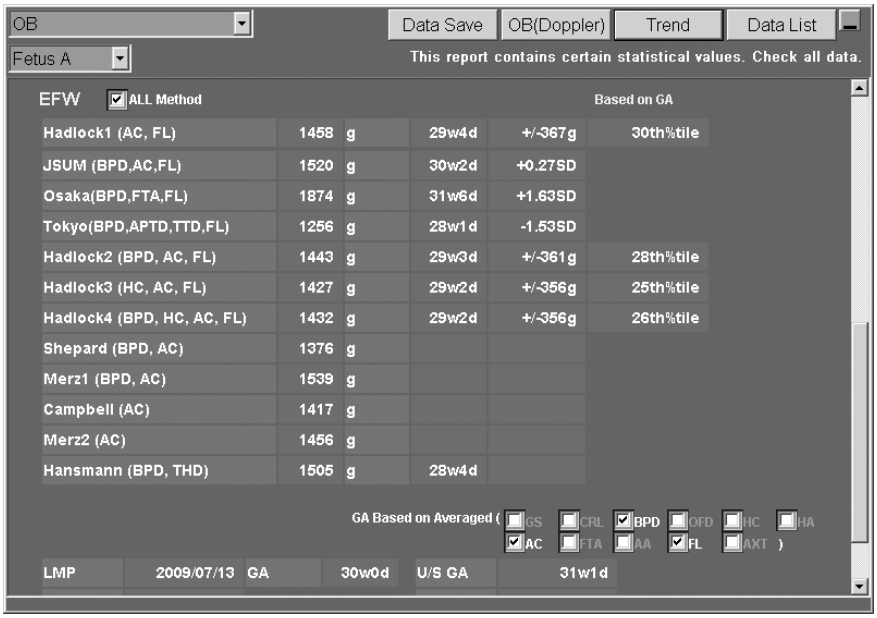


"Author" check box:

- When this check box is selected and the author for a calculation item is changed, the new author is set for all the other calculation items for which data calculated according to the author exists. The previous author remains selected for the calculation items for which no data obtained according to the author exists.
- When this check box is not selected, the author is changed only for the corresponding calculation item.

NOTE: 1. Press [Data Save] to save the data with the currently displayed authors.

2. Press [Data List] to start up Data List with the currently displayed authors.

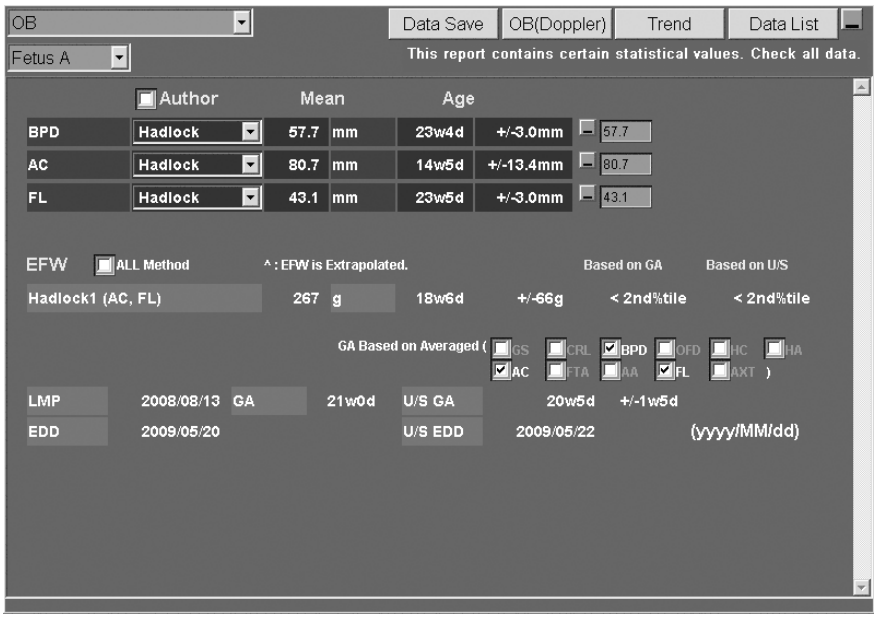


Example of OB Report screen when EFW values are obtained by multiple calculation methods (authors) using the ALL Method function

<<Display of measurement items>>

ALL Method

- Select this check box to display all the calculated EFW values.
- Deselect this check box to display only the EFW value obtained by the calculation method (author) specified in the preset menu.



Example of OB Report screen when the "Extrapolated on" check box is checked

<<Display of calculation items>>

Explanation concerning Extrapolated:

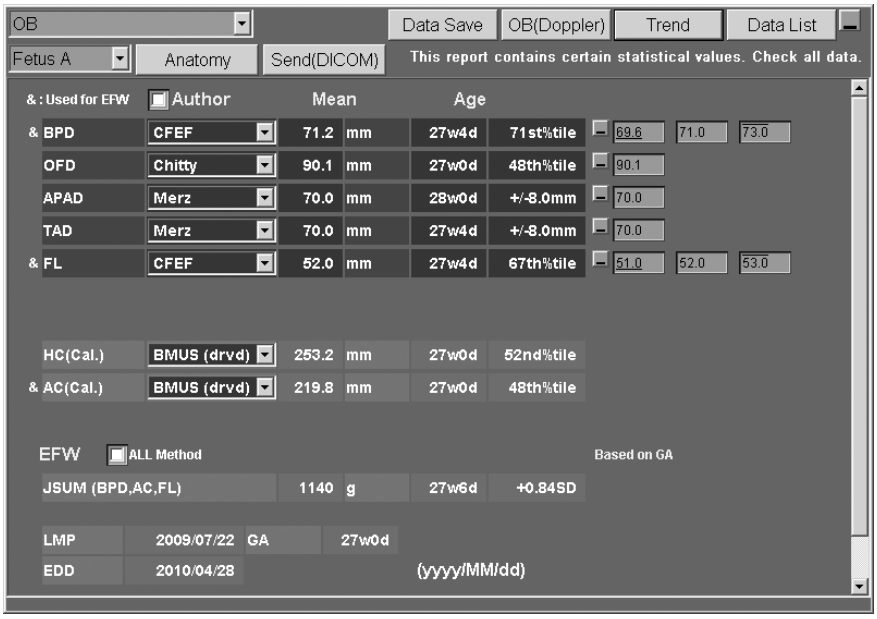
- "^: EFW is Extrapolated." is displayed at the right of the EFW title.
- "^" (representing "Extrapolated") is displayed at the top of the EFW.

<<Display of measurement items>>

Explanation concerning HC (Cal.) and AC (Cal.):

- When the system is preset to obtain HC or AC by calculation using the Preset Editor, the HC obtained by calculation is displayed as HC (Cal.) and the AC obtained by calculation is displayed as AC (Cal.).

- When the system is preset to obtain HC or AC by calculation using the Preset Editor, "&" is displayed in front of the measurement items that are used for calculating EFW in the result display for EFW.



⚠CAUTION:

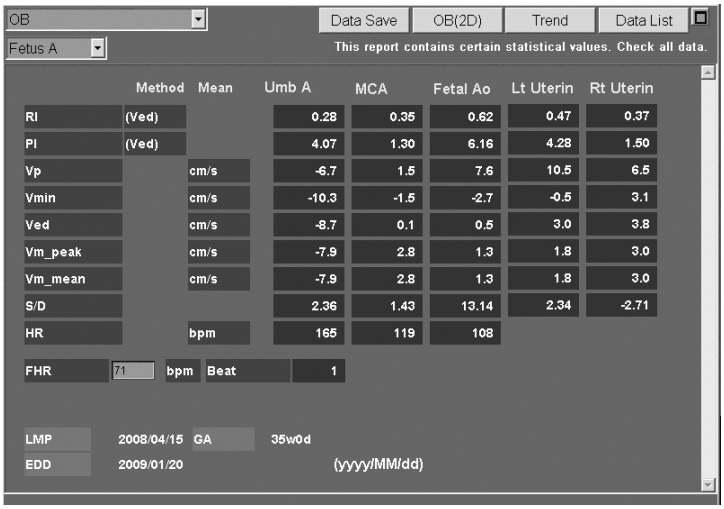
1. **When two or more measurements have been executed for a single item, be sure to check each measurement result using the report function. If an unexpected value is measured, it will affect the mean.**

2. **If a result for a measurement item is deleted in the report edit window with "Most Recent" selected, the result of the directly preceding measurement is displayed.**
   If all the results for a measurement item are deleted in the report edit window, the measurement item and the calculation results obtained using the measured value are all deleted automatically.
   To redisplay the deleted values, the item must be measured again. Before saving the contents of the report edit window, confirm that the necessary data has not been deleted.

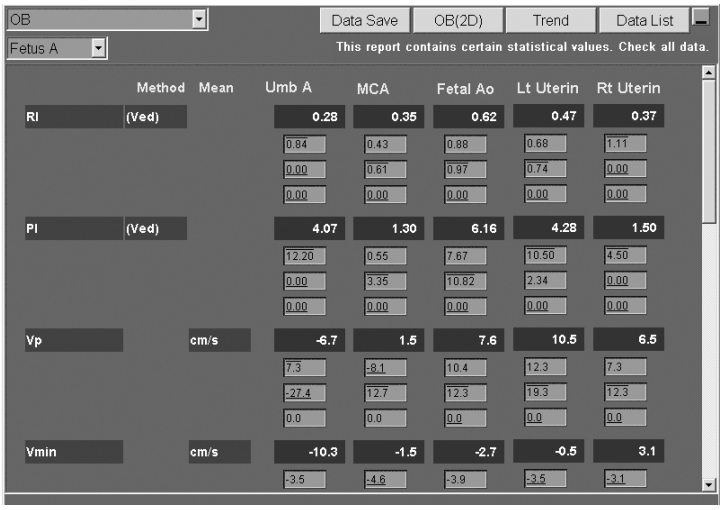
3. **Check the date format to be displayed on the report screen.**

4. **The values for U/S GA and U/S EDD displayed on the Report screen are obtained by averaging the GA values that are calculated based on the measured values and the chart. Accordingly, it is recommended that the charts of different authors not be used together, and that the data sets measured at different facilities not be used together.**
   If U/S GA or U/S EDD is calculated using the data from two or more facilities (authors), the message "U/S GA, U/S EDD are averaged from data of different Authors" is displayed.

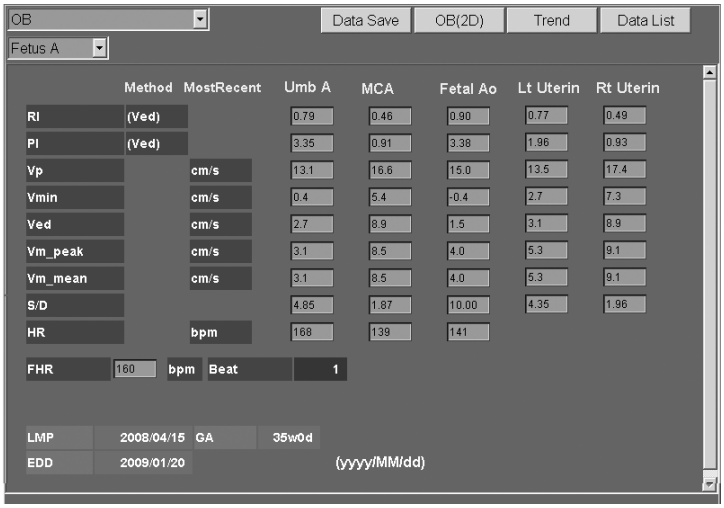
12.9.2 OB Doppler Report function



Example of mean value display



Example of all measurement value display



Example of most recent value display

<<Data deletion>>

- To delete a measured value, move the cursor to the box showing the value to be deleted and press SET.

  Use the [BS] key to clear the value and then press the [Enter] key. The selected value and the values measured at the same time as the value are deleted together. If the [Esc] key is pressed instead of the [Enter] key, the value cleared using the [BS] key is restored.

- When a measured value is deleted, the mean is re-calculated using the remaining values.

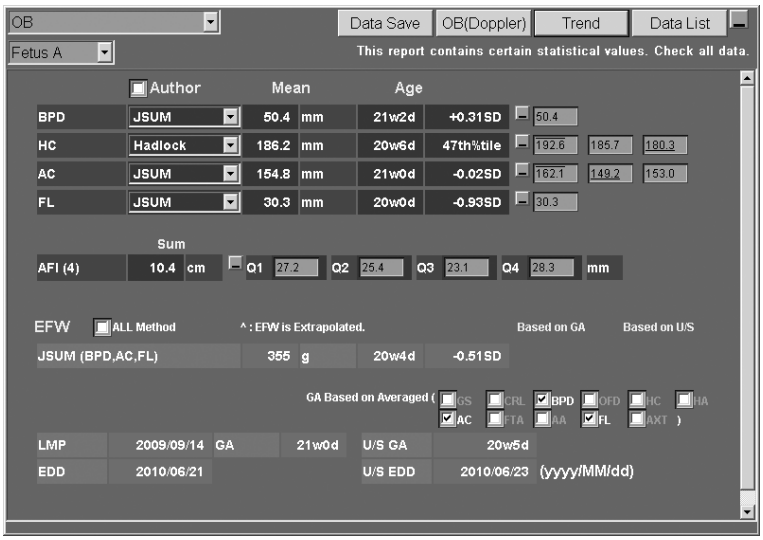
⚠CAUTION:

1. **If a result for a measurement item is deleted in the report edit window, the measurement item, the mean of the item, and the calculation results obtained using the measurement value (or mean) are all deleted automatically.**
   To redisplay these values, the item must be measured again.
   Before saving the contents of the report edit window, confirm that the necessary data has not been deleted.

2. **The OB Doppler measurement results can be deleted using the [BS] and [Enter] keys but cannot be edited. Since more than one measurement value is obtained in a single tracing procedure, deleting a single value also deletes the values measured at the same time as the deleted one.**

12.9.3 OB worksheet function

Pressing the button for each measurement item toggles the display of the measured values for the item between ON and OFF.
Pressing the button at the top right of the Report screen toggles the display of all the measured values on the screen between ON and OFF.



Example of OB worksheet when mean value display is selected

<<Data edit>>

- Move the cursor to the box showing a measured value and press SET. The data can then be edited.
  When a measured value is changed and set by pressing [Enter], the mean value and the items calculated using the measurement result are recalculated and then displayed.
  If [Esc] is pressed without setting the change, the value before the change was made is restored.

- When a measurement result is edited, an edit mark "*" is added to the edited value, the mean value, and the calculation items that are based the edited measurement result.

- If the result for one of the measurements is deleted, the mean is re-calculated using the remaining two results.

⚠CAUTION: If a result for a measurement item is deleted in the report edit window, the measurement item, the mean of the item, and the calculation results obtained using the measurement value (or mean) are all deleted automatically.
To redisplay these values, the item must be measured again.
Before saving the contents of the report edit window, confirm that the necessary data has not been deleted.
When entering calculation items or editing the measurement data, be sure to enter the values and units correctly.

Example of OB worksheet when latest value display is selected

⚠CAUTION: If a result for a measurement item is deleted in the report edit window, the result of the directly preceding measurement is displayed.
If all the results for a measurement item are deleted in the report edit window, the measurement item and the calculation results obtained using the measured value are all deleted automatically.
To redisplay the deleted values, the item must be measured again. Before saving the contents of the report edit window, confirm that the necessary data has not been deleted.

12.9.4 Data Save function

The measurement and calculation results can be stored in the system and can then be output to trend graphs (refer to subsection 12.9.5) as previous data.

<<Operating procedure>>

(1) Move the cursor to [Data Save] on the report screen and then press 

.

(2) Select [OK] in the confirmation dialog to save the data.

* When data saving is repeated on the report screen for the same examination, a dialog is displayed to inform the user that the previously saved data will be overwritten. If [OK] is selected in this dialog, the previously saved data is overwritten with the currently displayed data.

* Example of data saving for multiple pregnancies

  If [Fetus A] is selected to save the data for fetus A and measurement is performed again for fetus A, and then [Fetus B] is selected and measurement is performed for fetus B, the data for fetus A is overwritten with the data for fetus B.

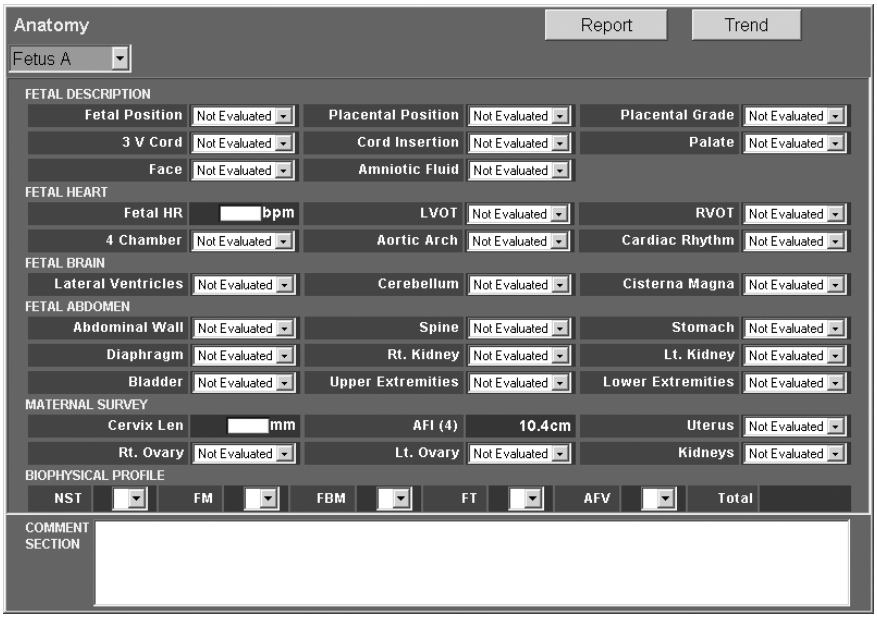
⚠CAUTION:

1. **Measurement or calculation data cannot be saved unless a patient ID is registered for the patient. Be sure to register the patient ID before starting measurement.**
2. **Make sure that no unexpected value is displayed on the report screen before saving the data.**
3. **The measured value for some items displayed on the Report screen can be edited, provided that the examination has not yet been completed. Once the examination for the patient is completed, however, editing of measured values is impossible. Confirm the results on the report before saving the data. The values displayed in black in the gray boxes are editable.**
4. **When data saving is repeated on the report screen for the same examination, the previously saved data is overwritten. Check the data before overwriting the previous data.**

12.9.5 Anatomy function

The preset Anatomy screen is displayed.

(1) Type 1

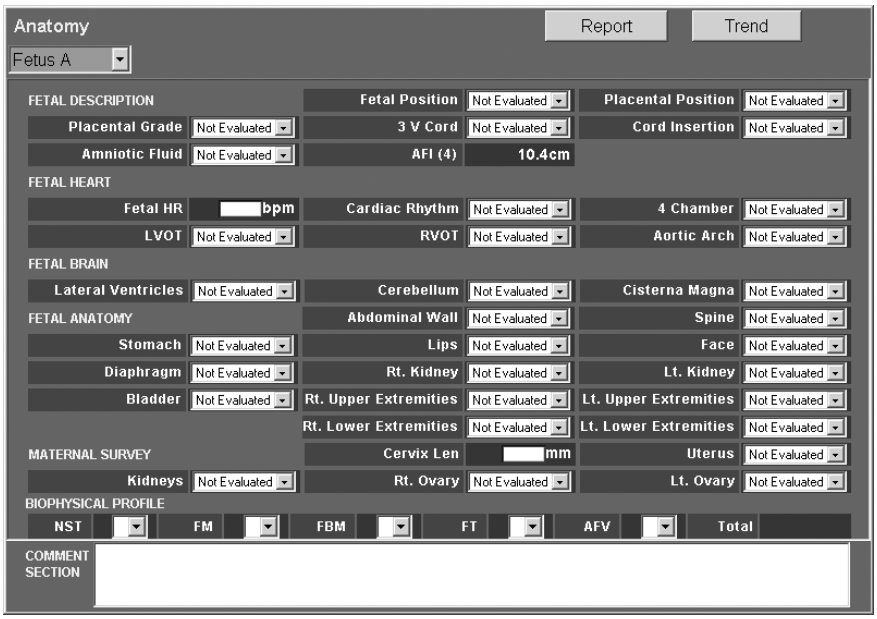


The finding can be selected from the pull-down menu. The table below shows the items and corresponding options.

Item	Default	Options
FETAL DESCRIPTION		
Fetal Position	Not Evaluated	Not Evaluated/Vertex/Breech
Placental Position	Not Evaluated	Not Evaluated/Anterior/Posterior/Fundal
Placental Grade	Not Evaluated	Not Evaluated/0/1/2/3
3 V Cord	Not Evaluated	Not Evaluated/Seen/Not Seen
Cord Insertion	Not Evaluated	Not Evaluated/Seen/Not Seen
Palate	Not Evaluated	Not Evaluated/Seen/Not Seen
Face	Not Evaluated	Not Evaluated/Seen/Not Seen
Amniotic Fluid	Not Evaluated	Not Evaluated/Normal/Oligo/Poly
FETAL HEART		
Fetal HR	Measured value	None
LVOT	Not Evaluated	Not Evaluated/Seen/Not Seen
RVOT	Not Evaluated	Not Evaluated/Seen/Not Seen
4 Chamber	Not Evaluated	Not Evaluated/Seen/Not Seen
Aortic Arch	Not Evaluated	Not Evaluated/Seen/Not Seen
Cardiac Rhythm	Not Evaluated	Not Evaluated/Normal/Abnormal

Item	Default	Options
FETAL BRAIN		
Lateral Ventricles	Not Evaluated	Not Evaluated/Seen/Not Seen
Cerebellum	Not Evaluated	Not Evaluated/Seen/Not Seen
Cisterna Magna	Not Evaluated	Not Evaluated/Seen/Not Seen
FETAL ABDOMEN		
Abdominal Wall	Not Evaluated	Not Evaluated/Normal/Abnormal
Spine	Not Evaluated	Not Evaluated/Normal/Abnormal
Stomach	Not Evaluated	Not Evaluated/Seen/Not Seen
Diaphragm	Not Evaluated	Not Evaluated/Seen/Not Seen
Rt. Kidney	Not Evaluated	Not Evaluated/Seen/Not Seen
Lt. Kidney	Not Evaluated	Not Evaluated/Seen/Not Seen
Bladder	Not Evaluated	Not Evaluated/Seen/Not Seen
Upper Extremities	Not Evaluated	Not Evaluated/Seen/Not Seen
Lower Extremities	Not Evaluated	Not Evaluated/Seen/Not Seen
MATERNAL SURVEY		
Cervix Len	Measured value	None
AFI	Measured value	None
Uterus	Not Evaluated	Not Evaluated/Anteverted/Retroverted/ Normal
Rt. Ovary	Not Evaluated	Not Evaluated/Seen/Not Seen
Lt. Ovary	Not Evaluated	Not Evaluated/S een/Not Seen
Kidneys	Not Evaluated	Not Evaluated/Seen/Not Seen
BIOPHYSICAL PROFILE		
NST	Blank	0/2
FM	Blank	0/2
FBM	Blank	0/2
FT	Blank	0/2
AFV	Blank	0/2
Total	Blank	None

(2) Type 2



The finding can be selected from the pull-down menu. The table below shows the items and corresponding options.

Item	Default	Options
FETAL DESCRIPTION		
Fetal position	Not Evaluated	Not Evaluated/Vertex/Breech/Trans
Placental Position	Not Evaluated	Not Evaluated/Anterior/Posterior/Fundal/ Low/Praevia
Placental Grade	Not Evaluated	Not Evaluated/0/1/2/3
3 V Cord	Not Evaluated	Not Evaluated/Seen/Not Seen
Cord Insertion	Not Evaluated	Not Evaluated/Seen/Not Seen
Amniotic Fluid	Not Evaluated	Not Evaluated/Normal/Oligo/Poly
AFI	Measured value	None
FETAL HEART		
Fetal HR	Measured value	None
Cardiac Rhythm	Not Evaluated	Not Evaluated/Normal/Abnormal/Irregular
4 Chamber	Not Evaluated	Not Evaluated/Normal/Abnormal
LVOT	Not Evaluated	Not Evaluated/Seen/Not Seen
RVOT	Not Evaluated	Not Evaluated/Seen/Not Seen
Aortic Arch	Not Evaluated	Not Evaluated/Seen/Not Seen
FETAL BRAIN		
Lateral Ventricles	Not Evaluated	Not Evaluated/Normal/Abnormal
Cerebellum	Not Evaluated	Not Evaluated/Normal/Abnormal
Cisterna Magna	Not Evaluated	Not Evaluated/Seen/Not Seen

NOTE:
1. The items for MATERNAL SURVEY are common to the fetuses. The other items are specific for each fetus.
2. The FHR, Cervix, and AFI values are displayed automatically if they have been measured. For AFI, the number of measurement distances is also displayed.

<<Data input>>

- If FHR, Cervix, or AFI is not measured, the desired value can be entered for these items on the Anatomy screen. An asterisk (*) is added to the entered values. However, the values entered on this screen are not added to the Report page.

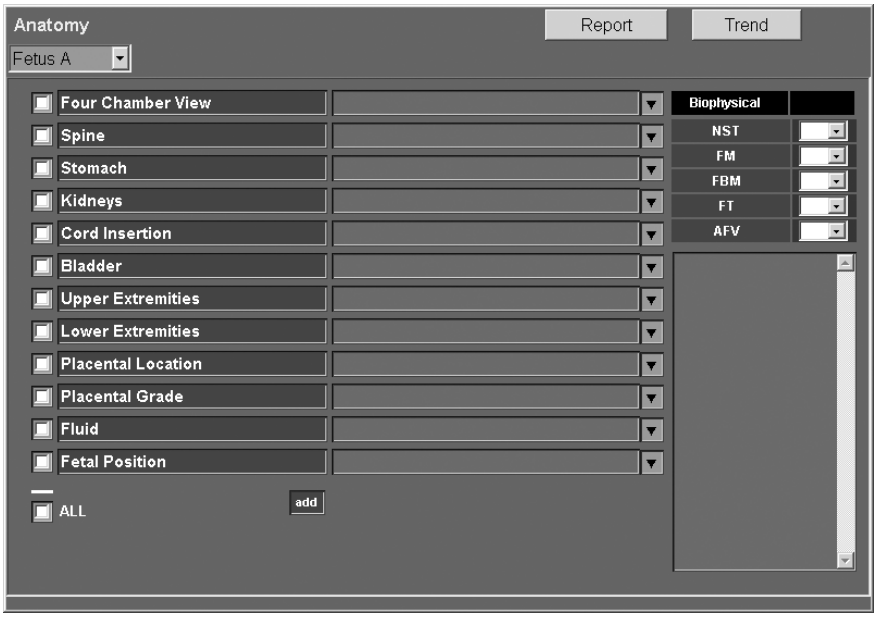
- Although the FHR, Cervix, and AFI values entered on the Anatomy screen can be edited or deleted on the Anatomy screen, the FHR, Cervix, and AFI values edited on the Report screen cannot be edited or deleted on the Anatomy screen.

- When the FHR, Cervix, or AFI value is entered on the Anatomy screen and then the corresponding measurement is performed, the current value is overwritten by the new measurement value.

Item	Default	Options
FETAL ANATOMY		
Abdominal Wall	Not Evaluated	Not Evaluated/Normal/Abdominal
Spine	Not Evaluated	Not Evaluated/Normal/Abdominal
Stomach	Not Evaluated	Not Evaluated/Seen/Not Seen
Lips	Not Evaluated	Not Evaluated/Normal/Abdominal
Face	Not Evaluated	Not Evaluated/Normal/Abdominal
Diaphragm	Not Evaluated	Not Evaluated/Seen/Not Seen
Rt. Kidney	Not Evaluated	Not Evaluated/Normal/Abdominal
Lt. Kidney	Not Evaluated	Not Evaluated/Normal/Abdominal
Bladder	Not Evaluated	Not Evaluated/Seen/Not Seen
Rt. Upper Extremities	Not Evaluated	Not Evaluated/Normal/Abdominal
Lt. Upper Extremities	Not Evaluated	Not Evaluated/Normal/Abdominal
Rt. Lower Extremities	Not Evaluated	Not Evaluated/Normal/Abdominal
Lt. Lower Extremities	Not Evaluated	Not Evaluated/Normal/Abdominal
MATERNAL SURVEY		
Cervix Len	Measured value	None
Uterus	Not Evaluated	Not Evaluated/Antevert/Retrovert/Normal
Kidneys	Not Evaluated	Not Evaluated/Seen/Not Seen
Rt. Ovary	Not Evaluated	Not Evaluated/Seen/Not Seen
Lt. Ovary	Not Evaluated	Not Evaluated/Seen/Not Seen
BIOPHYSICAL PROFILE		
NST	Blank	0/2
FM	Blank	0/2
FBM	Blank	0/2
FT	Blank	0/2
AFV	Blank	0/2
Total	Blank	None

(3) Custom

The measurement/calculation items and findings registered by the user are displayed.



Display example

(a) Entry of items

- To enter an item name

  Place the cursor in an item field, press SET, and enter a character string.

  Then, press [Enter] or SET.

- To add a blank row

  Click [add].

- To delete a row

  To delete a row, delete all the character strings in the entry fields of the row.

(b) Entry of findings

Enter a finding directly or select one from the drop-down list. Then, press [Enter] or SET.

- To add a finding to the drop-down list

  Enter a character string in the findings field and double-click the findings field to display [Add].

  Click [Add] to add the character string in the field to the bottom of the list.

- To specify the default finding

  Double-click the field containing the finding to be displayed by default and select [Initial]. The finding is displayed as the default for the next and subsequent patients.

- To delete a finding from the drop-down list

  Place the cursor on the finding to be deleted in the drop-down list and double-click it to display the menu. Click [Delete] in the menu to delete the selected finding from the drop-down list.

(c) Biophysical

When the biophysical items are displayed, click [Biophysical] to hide them.

To redisplay the biophysical items, click [Biophysical] again.

Changes made on the Anatomy Custom page (measurement/calculation items, contents of the findings drop-down list, show/hide setting for Biophysical items) are retained and are applied when the Anatomy Custom page is opened the next time.

NOTE:
1. The Anatomy screen is controlled for each fetus and the data input on this screen is maintained until End Exam is selected.
2. The Anatomy screen cannot be output electronically. It should be printed if necessary.
3. When values are set for all the five items in the BIOPHYSICAL PROFILE area, the total score is calculated automatically and displayed in the "Total" field.

12.9.6 Trend Graph function

Growth curves can be displayed and the measurement and calculation data can be plotted using this function.

12.9.6.1 Single format

<<Item selection menu>>

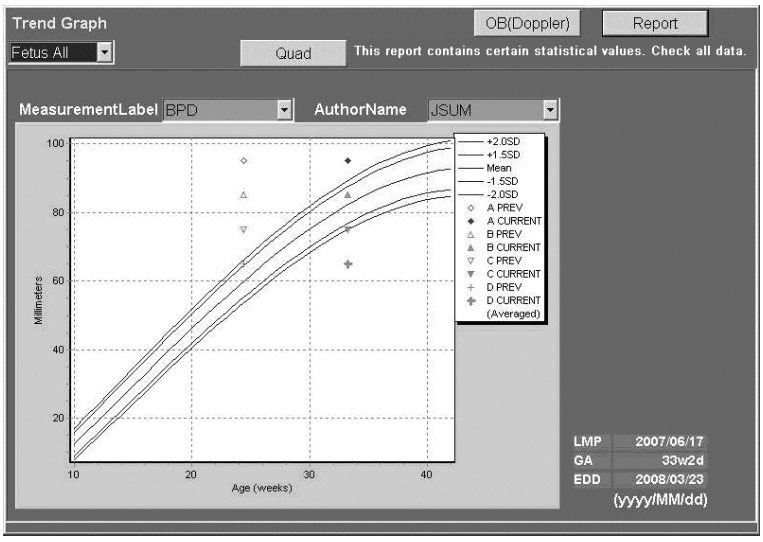
The items to be displayed and the authors to be used can be selected from the corresponding pull-down menus. From the fetus selection pull-down menu, "Fetus All" can be selected in addition to Fetus A to D for which measurement data exists. When "Fetus All" is selected, measurement datasets for all fetuses for which measurement data exists are plotted on a single graph.

<<Data plotting>>

When GA has been calculated based on the entered LMP or IVF value, the measurement and calculation results are plotted.

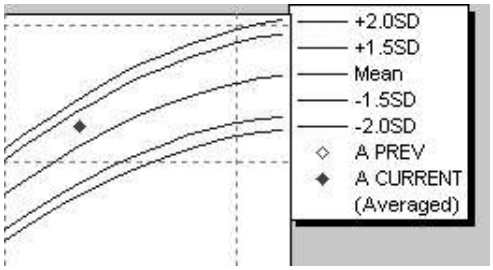
Different marks are used for different fetuses. The datasets obtained during examination are plotted using ◆, ▲, ▼, and ✚ (CURRENT).

If the previous datasets have been saved using the Data Save function (refer to subsection 12.9.4), they are plotted using ◇, △, ▽, and + (PREV).

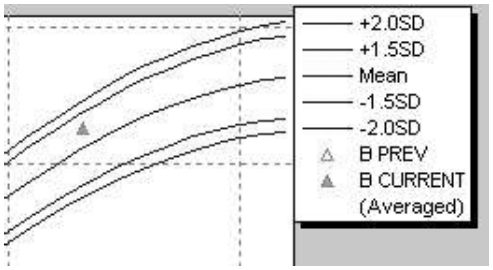


<<Fetus and corresponding marks>>

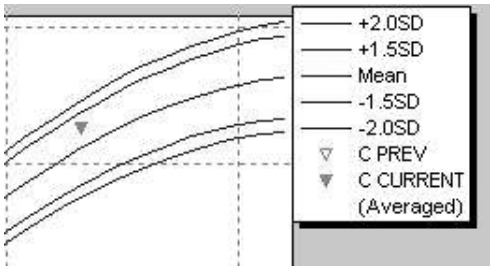
Fetus A: ◆, ◇ (dark blue)



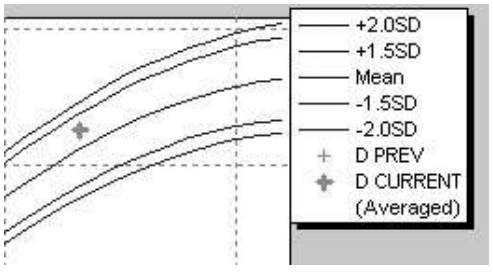
Fetus B: ▲, △ (yellowish green)



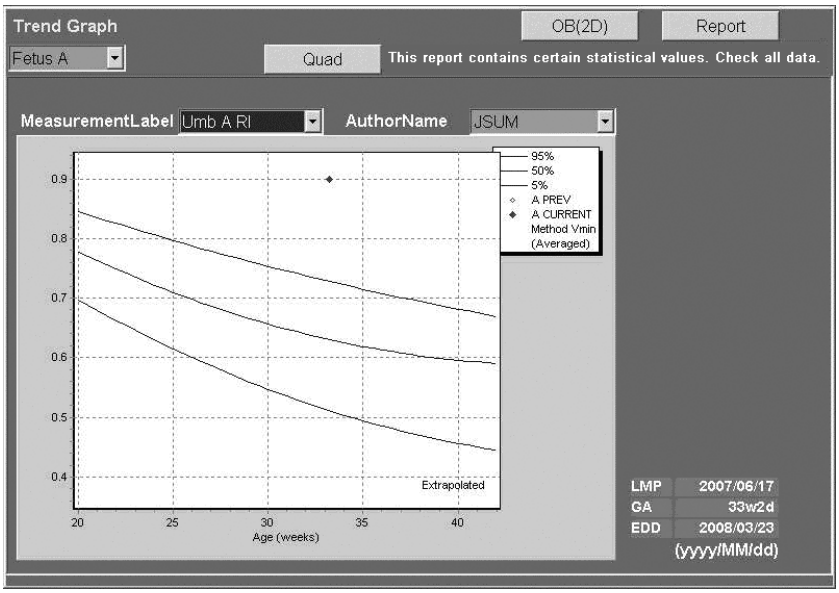
Fetus C: ▼, ▽ (pale blue)



Fetus D: ✚, + (orange)



To display the Doppler trend graph, press [OB (Doppler)] at the top of the screen. For the Doppler trend graph, the PI or RI calculation method (Method Ved or Method Vmin) is displayed in the legend.



⚠CAUTION:

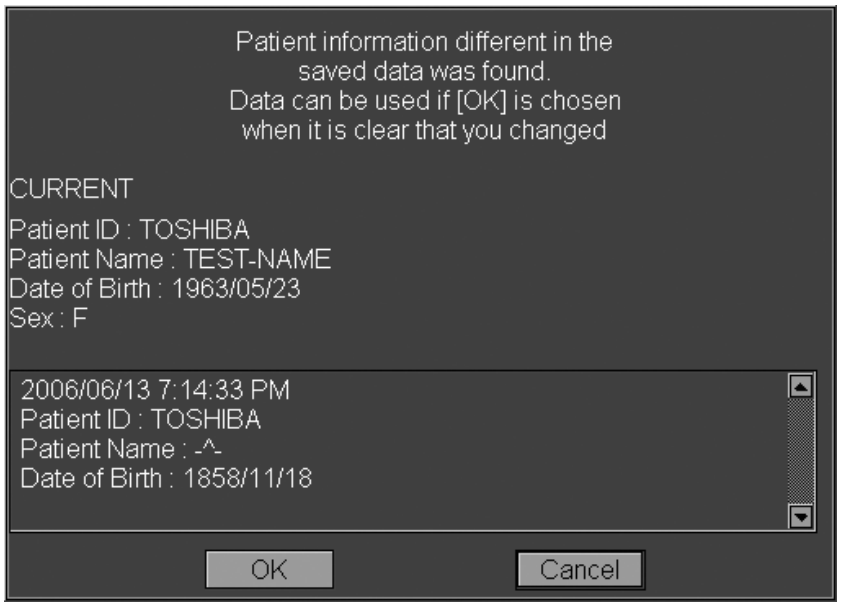
1. **If the EFW calculation method used for the previous data is different from the EFW calculation method used for the current data, the previous data is not plotted on the graph. Even though the previous data can be plotted by changing the author of the graph to match the author used for the previous data, the EFW for the current date is not plotted if this done.**
   Do not change the EFW calculation method in examinations for the same patient.

2. **Three curves are displayed on the Trend Graph screen for fetal growth measurement. The middle curve corresponds to the mean, while the other two curves represent ±percentiles or ±SD. When five curves are displayed, the middle curve corresponds to the mean, while the other four curves represent ±SD. When only one curve is displayed, it is the mean curve. The legend for the displayed curves is shown on the screen.**

3. **When the report is displayed in Mean mode, the mean value is plotted for the current examination data (CURRENT). When the report is displayed in Most Recent mode, the most recent value displayed in the report is plotted for the current examination data (CURRENT).**

4. **When Mean mode is selected, the label "Averaged" is displayed below "CURRENT" in the legend for the plotted data. This label is not displayed in Most Recent mode. Whether "Averaged" is displayed or not depends on the mode of the current examination. This label does not represent the mode in which the previous data (PREV) was saved.**

⚠CAUTION: **5. If the patient information (patient ID, patient name, birth date, or sex) for previously saved exam data is changed, the system cannot identify the exam data for the patient and it displays the confirmation dialog shown below before plotting the past exam data in the trend graph.**



Confirm that the input data is correct before starting examination.
If it is obvious that the patient information has been edited, select [OK] to plot the data in the trend graph.
The exam data itself cannot be edited and this confirmation dialog will therefore appear each time an attempt is made to plot the exam data for which patient information has been changed in the trend graph.

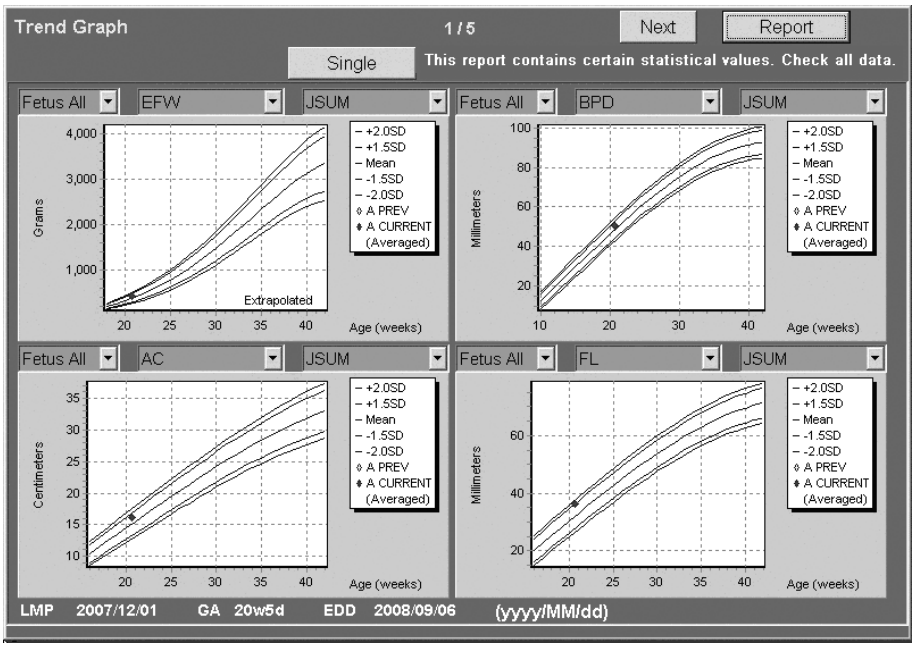
12.9.6.2 Quad format

The display area of the Trend Graph screen is divided into four frames and a graph is displayed in each frame. In Quad frame mode, the Trend Graph screen consists of five pages.

<<Item selection menu>>

The fetus, items to be displayed, and the authors to be used can be selected from the corresponding pull-down menus for each frame. The 2D items and Doppler items are contained in the item drop-down list.

It is possible to display graphs for 2D items and Doppler items on the same screen. It is also possible to display the trend graphs for more than one fetus on the same screen.



<<Data plotting>>

Same as for the Single format.

NOTE:

1. When the Quad format display is started first time after the Quad display function is installed, nothing is selected in the frames on the five pages (all the frames look like the bottom-right frame in the figure above). Each subsequent time Quad display is started, the final screen before Quad display was closed the previous time is displayed as the initial screen.

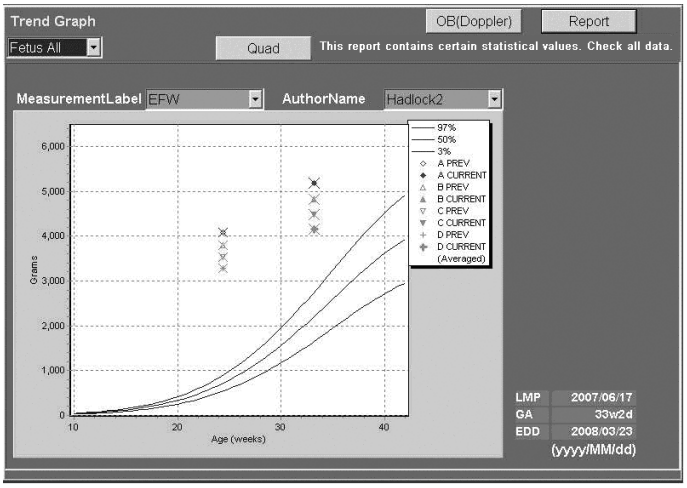
2. If a fetus other than Fetus A is set in a frame and the corresponding fetus is not included in the current measurement, the list box appears blank.

12.9.6.3 Extrapolated display

<<If EFW is outside the range specified by the author>>

When the "Extrapolated on" check box in the OB Calc. page is checked, if the EFW is within the range of 26 g ≤ EFW ≤ 6500 g and is outside the range specified by the author, × is displayed overlapping the fetus marks in the trend graph.

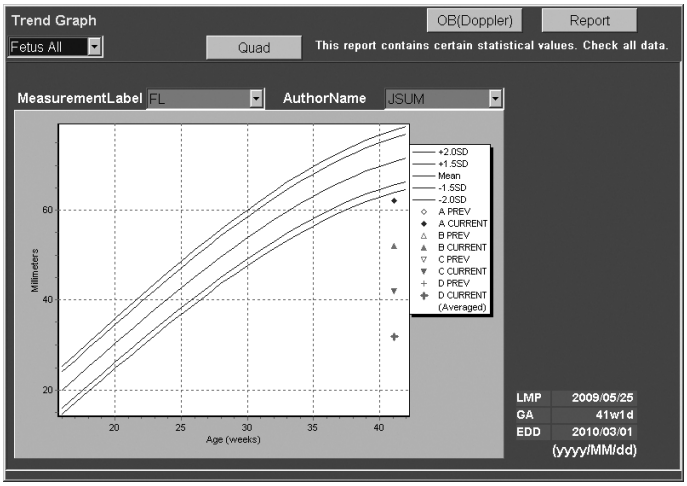
If the EFW exceeds the upper limit of the range specified by the author, the Y axis is displayed so that the maximum value of its range is 6500 g.



<<Display of extrapolated gestational age (weeks)>>

When the "Extrapolated on" check box in the OB Cal. page of the preset menu is selected, the gestational age is extrapolated up to 42 weeks for some authors (refer to subsection 12.3 "Author Data"). In this case, "Extrapolated" is displayed on the trend graph.

The same plot marks used in the normal range are used also in the extrapolated area (from first day of 40th week to 42nd week).



12.10 OB Data List

The OB Data List function allows the stored OB measurement data to be displayed, edited, and deleted. In addition, OB measurement data for past exam dates can be entered manually.

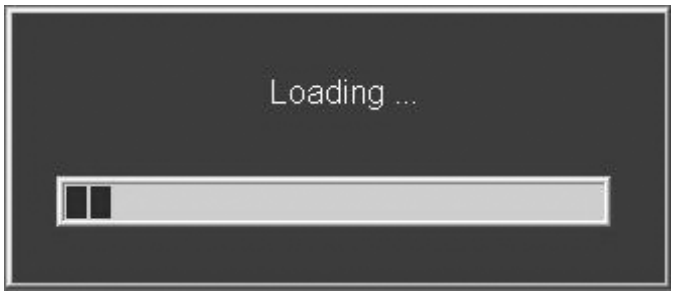
The previous exam data may have been calculated using an author other than the author currently selected in the system. In this case, even if the measurement data for the same fetus is entered using this function, the output calculation results may differ from those obtained on the previous exam date.

For a calculation item that uses the results of more than one measurement item, the item label and calculation results will not be displayed on the screen or in the report if any one of the required measurement items has not been measured. If the previous measurement data does not include the measurement items that are required for calculation by the currently selected author, the calculation results may not be displayed.

<<To start the Data List screen>>

Press [Data List] on the Report screen. Loading of the Data List screen is started.

The progress bar shown below is displayed during loading.

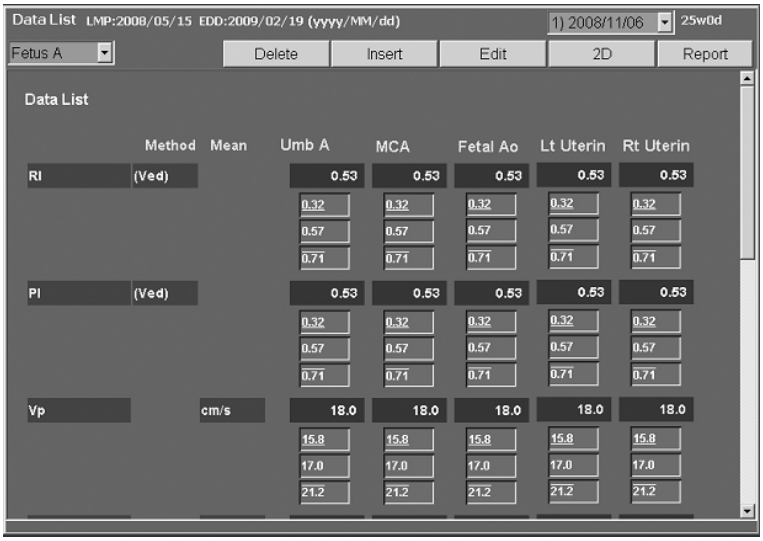


12.10.1 Data List screen

If the Data List screen is started from the 2D Report screen, the 2D measurement data list is displayed first.

If the Data List screen is started from the Doppler Report screen, the Doppler measurement data list is displayed first.

Example of 2D measurement data list



Example of Doppler measurement data list

<<Functions of switches>>

Switch	Function
[Prev]	Displays the OB measurement data for the exam date preceding the currently selected date.
[Next]	Displays the OB measurement data for the exam date following the currently selected date.
[Insert]	Displays the Insert screen. On the Insert screen, OB measurement data for past exam dates can be entered manually. Refer to subsection 12.10.2 for details.
[Edit]	Displays the OB measurement data for the currently selected date on the Edit screen for editing. Refer to subsection 12.10.3 for details.
[Delete]	Deletes the OB measurement data for the currently selected date. Refer to subsection 12.10.4 for details.
[2D/Doppler]	Selects the OB measurement data items, 2D items, or Doppler items.
[Report]	Closes the Data List screen and displays the Report screen again.

<<Display items>>

- 2D-mode data list : The measurement items and calculation items are displayed.
- Doppler-mode data list : The calculation items are displayed.
  It is possible to refer to the measurement values used for calculation by selecting the check box. However, this is not possible for edited or manually entered calculation values.
- The item labels, author names, measurement values, units, GA values, and SD values are also displayed.

NOTE: 1. Whether the mean values or the most recent values are displayed is determined according to the current preset (Mean/Most Recent).

2. The values for the calculation items are recalculated according to the currently preset method.

3. The currently report authors are displayed.

<<Display of EFW data (in 2D mode only)>>

- The selected author name and the estimated fetal weight are displayed.
- If "Extrapolated" is set to ON in the preset, the message "^Extrapolated" is displayed when the EFW value is between 26 g and 6500 g (26 g ≤ EFW ≤ 6500 g) but outside the author-specified range.

  Note that in this case, the EFW value is displayed for reference only.

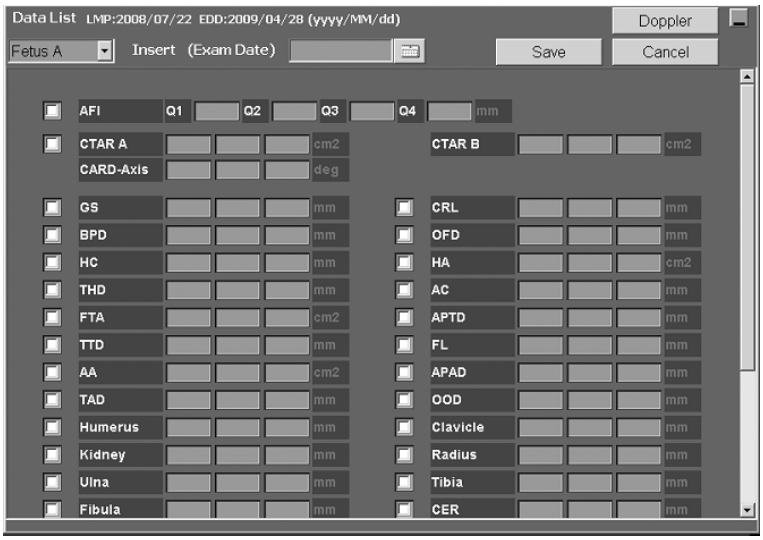
12.10.2 Insert screen

Press [Insert] on the Data List screen to display the Insert screen. On the Insert screen, past OB measurement data can be entered.

NOTE:	If past data has already been entered for 18 exam dates, an error dialog is displayed and the Insert screen is not started.

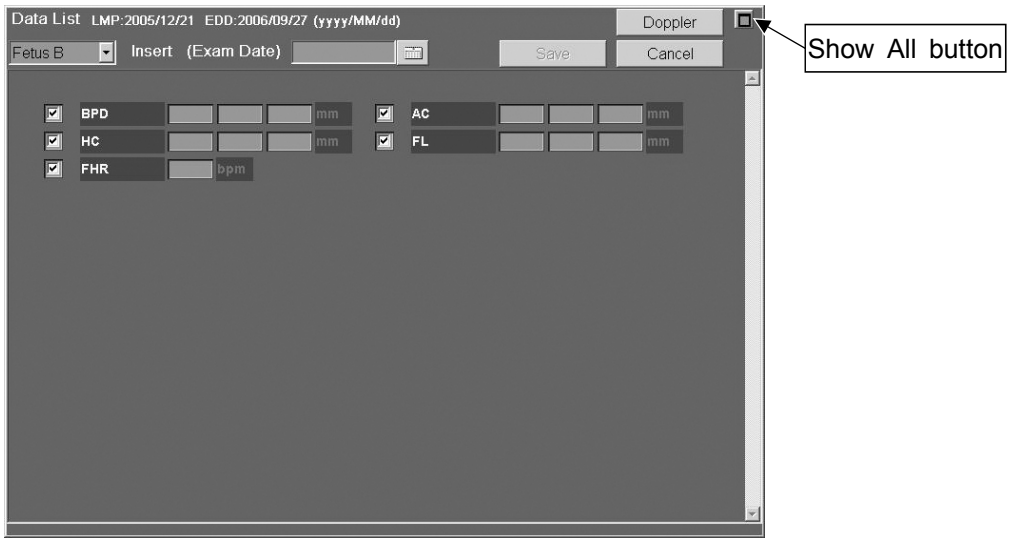
<<2D Insert screen>>

If no data (OB measurement and/or calculation values) exists in the system for the specified patient, the screen below is displayed when the Insert screen is started.

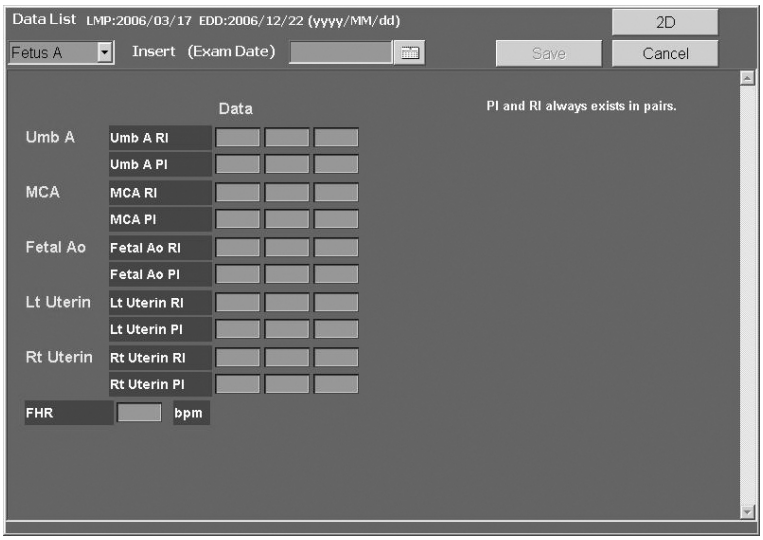


If data (OB measurement and/or calculation values) exists in the system for the specified patient, the screen below is displayed when the Insert screen is started.

To display all the item labels, press the Show All button.



<<Doppler Insert screen>>



- Once data has been saved for an exam date, data cannot be entered even for a different fetus or different mode (2D/Doppler). Use the Edit screen to enter data for another fetus or mode.
- Up to three measurement values can be entered per item. Be sure to use the leftmost box, then the middle box, and then the rightmost box.

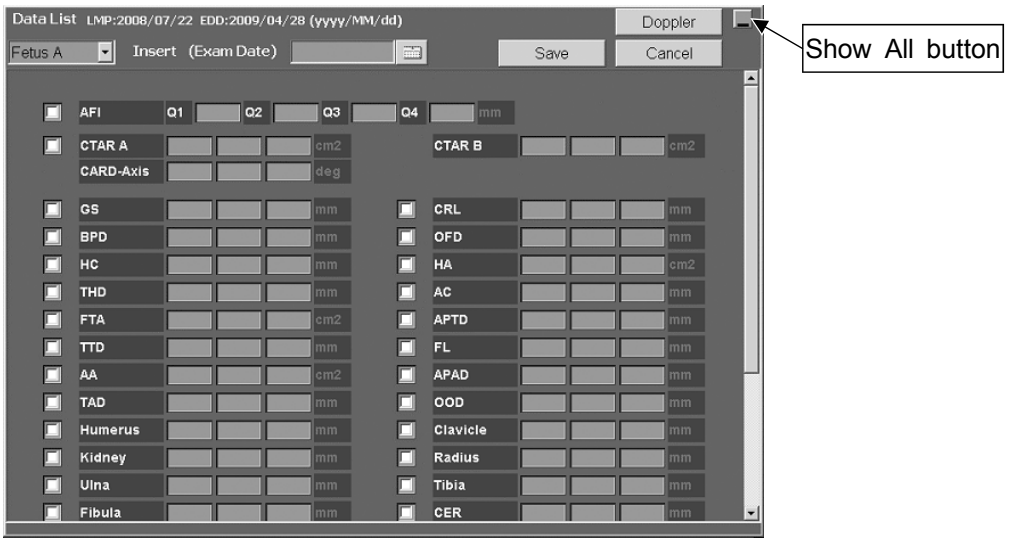
12.10.3 Edit screen

To access the Edit screen, display the data for the desired exam date on the Data List screen and press [Edit].

<<Edit screen for 2D data>>

Only the specified items (for which the check box is selected) are displayed.

To display all the items, press the Show All button.



<<Edit screen for Doppler data>>

- This screen cannot be used to display or edit the measurement values (Vp, Ved, Vmin, Vmen) measured and saved by the system.
- If either the RI or PI value calculated by the system is deleted using this screen, the value of the other item is also deleted automatically. The measurement values (Vp, Ved, Vmin, Vmen) used for calculating the RI and PI values are also deleted.
- If either the RI or PI value calculated by the system is edited using this screen, an asterisk (*) is displayed for the edited value and for the data for the other item. In addition, the measurement values (Vp, Ved, Vmin, Vmen) used for calculating the RI and PI values are deleted.
- If either of the manually entered RI and PI values or either of the edited RI and PI values (for which an asterisk is displayed) is deleted using this screen, the value for the other item is not deleted.

12.10.4 Deleting data

Display the data list for the desired exam date on the Data List screen and press [Delete]. A confirmation message is displayed. Select [OK] to delete the data for the specified exam date.

NOTE:	It is not possible to specify only the exam date or only the fetus for which the data is to be deleted. Specify both the exam date and the fetus for which the data is to be deleted, and also select whether 2D or Doppler images are to be deleted.

12.11 References

This subsection includes lists of the OB measurement chart data sets installed in the system.

Although these data are based on the literature, the data may be interpolated or include rounding errors in measurements after they are installed in the system.

The OB measurement chart data is divided into the following three categories.

GA	:	Chart data for calculating the GA value when the clinical age is not available
FG	:	Chart data for calculating the GA value when the clinical age is available
Identical	:	Chart data for calculating the GA value whether or not the clinical age is available.

Item Page

12.11.1 Measurement item 12-84

(1) AA 12-84

(a) AA Chitty FG 12-84
(b) AA Chitty-%tile Identical 12-84

(2) AC 12-85

(a) AC ASUM-V1 FG 12-85
(b) AC ASUM-V2 GA 12-85
(c) AC ASUM-V2 FG 12-86
(d) AC Campbell no charts 12-86
(e) AC CFEF FG 12-86
(f) AC CFEF-%tile Identical 12-87
(g) AC Chitty (drvd) FG 12-87
(h) AC Chitty (drvd)-%tile Identical 12-88
(i) AC Chitty (Pltd) FG 12-88
(j) AC Chitty (Pltd)-%tile Identical 12-89
(k) AC Deter FG 12-89
(l) AC Hadlock GA 12-90
(m) AC Hadlock FG 12-90
(n) AC Hadlock-%tile Identical 12-91
(o) AC Jeanty FG 12-91
(p) AC JSUM GA 12-92
(q) AC JSUM FG 12-92
(r) AC JSUM-SD Identical 12-93
(s) AC Merz GA 12-93
(t) AC Merz FG 12-94
(u) AC Nicolaides Identical 12-94
(v) AC Shepard no charts 12-94
(w) AC Tokyo GA 12-95
(x) AC Tokyo FG 12-95
(y) AC Tokyo-SD Identical 12-96

(3) APAD 12-97

(a) APAD Merz FG 12-97

(4) BPD 12-98

(a) BPD ASUM-V1 GA 12-98
(b) BPD ASUM-V1 FG 12-98

(c) BPD ASUM-V2 GA 12-99
(d) BPD ASUM-V2 FG 12-99
(e) BPD CFEF FG 12-100
(f) BPD CFEF-%tile Identical 12-100
(g) BPD Chitty (O-I) GA 12-101
(h) BPD Chitty (O-I) FG 12-101
(i) BPD Chitty (O-I)-%tile Identical 12-102
(j) BPD Chitty (O-O) GA 12-102
(k) BPD Chitty (O-O) FG 12-103
(l) BPD Chitty (O-O)-%tile Idenctical 12-103
(m) BPD Hadlock GA 12-104
(n) BPD Hadlock FG 12-104
(o) BPD Hadlock-%tile Identical 12-105
(p) BPD Hansmann GA 12-105
(q) BPD Hansmann FG 12-106
(r) BPD Jeanty GA 12-106
(s) BPD JSUM GA 12-107
(t) BPD JSUM FG 12-107
(u) BPD JSUM-SD Identical 12-108
(v) BPD Kurz FG 12-108
(w) BPD Merz GA 12-109
(x) BPD Merz FG 12-109
(y) BPD Nicolaides Identical 12-110
(z) BPD Osaka Identical 12-110
(aa) BPD Rempen GA 12-111
(ab) BPD Rempen FG 12-111
(ac) BPD Sabbagh FG 12-111
(ad) BPD Shepard no charts 12-111
(ae) BPD Tokyo GA 12-112
(af) BPD Tokyo FG 12-112
(ag) BPD Tokyo-SD Identical 12-113

(5) CER 12-114

(a) CER Goldstein FG 12-114
(b) CER Hill GA 12-114
(c) CER Hill FG 12-115
(d) CER Nicolaides Identical 12-115

(6) Clavicle 12-116

(a) Clavicle Yarkoni GA 12-116

(b) Clavicle Yarkoni FG 12-116

(7) CRL 12-117

(a) CRL ASUM-V1 GA 12-117
(b) CRL ASUM-V2 GA 12-117
(c) CRL ASUM-V2 FG 12-117
(d) CRL BMUS GA 12-117
(e) CRL Hadlock GA 12-118
(f) CRL Hadlock FG 12-118
(g) CRL Hansmann GA 12-118
(h) CRL Hansmann FG 12-118
(i) CRL Jeanty GA 12-119
(j) CRL JSUM GA 12-119
(k) CRL JSUM FG 12-119
(l) CRL Nelson GA 12-119
(m) CRL Osaka Identical 12-119
(n) CRL Rempen GA 12-120
(o) CRL Rempen FG 12-120
(p) CRL Robinson GA 12-120
(q) CRL Robinson FG 12-120
(r) CRL Tokyo GA 12-121
(s) CRL Tokyo FG 12-121

(8) Fibula 12-122

(a) Fibula Merz FG 12-122
(b) Fibula Chitty-%tile Identical 12-122

(9) FL 12-123

(a) FL ASUM-V1 GA 12-123
(b) FL ASUM-V2 GA 12-123
(c) FL ASUM-V2 FG 12-124
(d) FL CFEF FG 12-124
(e) FL CFEF-%tile Identical 12-125
(f) FL Chitty GA 12-125
(g) FL Chitty FG 12-126
(h) FL Chitty-%tile Identical 12-126
(i) FL Hadlock GA 12-127
(j) FL Hadlock FG 12-127
(k) FL Hadlock-%tile Identical 12-128
(l) FL Hansmann Identical 12-128

(m) FL Hohler GA 12-129
(n) FL Jeanty GA 12-129
(o) FL Jeanty FG 12-130
(p) FL JSUM GA 12-130
(q) FL JSUM FG 12-131
(r) FL JSUM-SD Identical 12-131
(s) FL Merz GA 12-132
(t) FL Merz FG 12-132
(u) FL Nicolaides Identical 12-133
(v) FL O'Brien FG 12-133
(w) FL Osaka Identical 12-134
(x) FL Tokyo GA 12-134
(y) FL Tokyo FG 12-135
(z) FL Tokyo-SD Identical 12-135
(aa) FL Warda GA 12-136
(ab) FL Warda FG 12-136

(10) Foot 12-137

(a) Foot Mercer GA 12-137
(b) Foot Mercer FG 12-137
(c) Foot Chitty-%tile Identical 12-138

(11) FTA 12-139

(a) FTA Osaka Identical 12-139

(12) GS 12-140

(a) GS Hellman FG 12-140
(b) GS Rempen GA 12-140
(c) GS Rempen FG 12-140
(d) GS Tokyo GA 12-140
(e) GS Tokyo FG 12-141

(13) HA 12-142

(a) HA Chitty GA 12-142
(b) HA Chitty FG 12-142
(c) HA Chitty-%tile Identical 12-143

(14) HC 12-144

(a) HC ASUM-V1 FG 12-144
(b) HC ASUM-V2 GA 12-144
(c) HC ASUM-V2 FG 12-145

(d) HC CFEF FG 12-145
(e) HC CFEF-%tile Idenctical 12-146
(f) HC Chitty (drvd) GA 12-146
(g) HC Chitty (drvd) FG 12-147
(h) HC Chitty (drvd)-%tile Identical 12-147
(i) HC Chitty (Pltd) GA 12-148
(j) HC Chitty (Pltd) FG 12-148
(k) HC Chitty (Pltd)-%tile Identical 12-149
(l) HC Hadlock GA 12-149
(m) HC Hadlock FG 12-150
(n) HC Hadlock-%tile Identical 12-150
(o) HC Hansmann Identical 12-151
(p) HC Jeanty GA 12-151
(q) HC Merz GA 12-152
(r) HC Merz FG 12-152

(15) Humerus 12-153

(a) Humerus ASUM-V2 GA 12-153
(b) Humerus ASUM-V2 FG 12-153
(c) Humerus Chitty-% tile Identical 12-154
(d) Humerus Jeanty GA 12-154
(e) Humerus Merz FG 12-155

(16) Kidney 12-156

(a) Kidney Bertagnoli FG 12-156

(17) OFD 12-157

(a) OFD ASUM-V2 GA 12-157
(b) OFD ASUM-V2 FG 12-157
(c) OFD Chitty FG 12-158
(d) OFD Chitty-%tile Identical 12-158
(e) OFD Hansmann Identical 12-159
(f) OFD Merz FG 12-159
(g) OFD Nicolaides Identical 12-160

(18) OOD 12-161

(a) OOD Jeanty GA 12-161
(b) OOD Mayden GA 12-161

(19) Radius 12-162

(a) Radius Merz FG 12-162

(b) Radius Chitty-%tile Identical 12-162
(20) TAD 12-163
(a) TAD CFEF FG 12-163
(b) TAD CFEF-%tile Identical 12-163
(c) TAD Merz FG 12-164
(21) THD 12-165
(a) THD Hansmann Identical 12-165
(22) Tibia 12-166
(a) Tibia Jeanty GA 12-166
(b) Tibia Merz FG 12-166
(c) Tibia Chitty-%tile Identical 12-167
(23) Ulna 12-168
(a) Ulna Jeanty GA 12-168
(b) Ulna Merz FG 12-168
(c) Ulna Chitty-%tileI dentical 12-169
(24) Va 12-170
(a) Va Nicolaides-%tile Identical 12-170
(25) Vp 12-171
(a) Vp Nicolaides-%tile Identical 12-171
(26) Hem 12-172
(a) Hem Nicolaides-%tile Identical 12-172
12.11.2 Calculation item 12-173
(1) AXT 12-173
(a) AXT Tokyo GA 12-173
(b) AXT Tokyo FG 12-173
(c) AXT Tokyo-SD Identical 12-174
(2) EFW 12-175
(a) EFW Campbell [AC] no charts 12-175
(b) EFW Hadlock FG 12-175
(c) EFW Hansmann [BPD, THD] FG 12-176
(d) EFW JSUM [BPD, AC, FL] GA 12-176
(e) EFW JSUM [BPD, AC, FL] FG 12-177
(f) EFW JSUM-SD [BPD, AC, FL] Identical 12-177

(g) EFW Merz1 [BPD, AC] no charts 12-178
(h) EFW Merz2 [AC] no charts 12-178
(i) EFW Osaka [BPD, FTA, FL] Identical 12-178
(j) EFW Shepard [BPD, AC] no charts 12-179
(k) EFW Tokyo [BPD, APTD, TTD, FL] GA 12-179
(l) EFW Tokyo [BPD, APTD, TTD, FL] FG 12-179
(m) EFW Tokyo-SD [BPD, APTD, TTD, FL] Identical 12-180
(3) HC (BPD,OFD) 12-181
(a) HC (BPD, OFD) Nicolaides Identical 12-181
(4) Va/Hem 12-182
(a) Va/Hem Nicolaides-%tile Identical 12-182
12.11.3 Doppler item. 12-183
(1) Fetal Ao RI 12-183
(a) Fetal Ao RI Mai FG 12-183
(b) Fetal Ao RI Schaffer FG 12-183
(2) Fetal Ao PI 12-184
(a) Fetal Ao PI Harrington FG 12-184
(b) Fetal Ao PI Mai FG 12-184
(c) Fetal Ao PI Schaffer FG 12-185
(3) MCA RI 12-186
(a) MCA RI JSUM FG 12-186
(b) MCA RI Mai FG 12-186
(c) MCA RI Schaffer FG 12-187
(4) MCA PI 12-188
(a) MCA PI Harrington FG 12-188
(b) MCA PI JSUM FG 12-188
(c) MCA PI Mai FG 12-189
(d) MCA PI Schaffer FG 12-189
(5) Umb A RI 12-190
(a) Umb A RI JSUM FG 12-190
(b) Umb A RI Mai FG 12-190
(c) Umb A RI Schaffer FG 12-191
(6) Umb A PI 12-192
(a) Umb A PI Harrington FG 12-192

(b) Umb A PI JSUM FG 12-192
(c) Umb A PI Mai FG 12-193
(d) Umb A PI Schaffer FG 12-193
(7) Lt Uterin RI 12-194
(a) Lt Uterin RI Schaffer FG 12-194
(8) Lt Uterin PI 12-195
(a) Lt Uterin PI Schaffer FG 12-195
(9) Rt Uterin RI 12-196
(a) Rt Uterin RI Schaffer FG 12-196
(10) Rt Uterin PI 12-197
(a) Rt Uterin PI Schaffer FG 12-197
(11) PIV 12-198
(a) Baschat 12-198
(12) PVIV 12-199
(a) Baschat 12-199
(13) a/S 12-200
(a) Baschat 12-200
(14) S/a 12-201
(a) Baschat 12-201
12.11.4 Recommended Ratios 12-202

12.11.1 Measurement item

(1) AA

(a) AA Chitty FG

Chitty, L.S., Altman, D.G.
"Charts of Fetal Size: 3. Abdominal Measurements"
British Journal of Obstetrics & Gynaecology, February 1994, vol. 101, pp. 129

Age	3% (cm^2)	50% (cm^2)	97% (cm^2)
12w0d	3.7	5.0	6.5
13w0d	5.4	7.2	9.3
14w0d	7.5	9.9	12.6
15w0d	9.9	13.0	16.4
16w0d	12.6	16.4	20.7
17w0d	15.7	20.2	25.4
18w0d	19.0	24.4	30.6
19w0d	22.6	29.0	36.2
20w0d	26.5	33.9	42.2
21w0d	30.7	39.2	48.7
22w0d	35.1	44.7	55.5
23w0d	39.7	50.6	62.8
24w0d	44.6	56.8	70.4
25w0d	49.7	63.3	78.4
26w0d	55.1	70.0	86.7
27w0d	60.6	77.0	95.3
28w0d	66.3	84.2	104.3
29w0d	72.2	91.7	113.5
30w0d	78.2	99.3	123.0
31w0d	84.3	107.2	132.8
32w0d	90.6	115.2	142.8
33w0d	97.0	123.4	153.0
34w0d	103.5	131.7	163.4
35w0d	110.0	140.2	173.9
36w0d	116.7	148.7	184.7
37w0d	123.3	157.3	195.5
38w0d	130.0	166.0	206.5
39w0d	136.7	174.8	217.6
40w0d	143.4	183.6	228.7
41w0d	150.0	192.3	239.9
42w0d	156.7	201.1	251.1

(b) AA Chitty-%tile Identical

Chitty, L.S., Altman, D.G.
"Charts of Fetal Size: 3. Abdominal Measurements"
British Journal of Obstetrics & Gynaecology, February 1994, vol. 101, pp. 129

Week	1SD (cm^2)	3% (cm^2)	50% (cm^2)	97% (cm^2)
12.0	0.80	3.7	5.0	6.5
13.0	1.12	5.4	7.2	9.3
14.0	1.44	7.5	9.9	12.6
15.0	1.81	9.9	13.0	16.4
16.0	2.29	12.6	16.4	20.7
17.0	2.77	15.7	20.2	25.4
18.0	3.30	19.0	24.4	30.6
19.0	3.83	22.6	29.0	36.2
20.0	4.41	26.5	33.9	42.2
21.0	5.05	30.7	39.2	48.7
22.0	5.74	35.1	44.7	55.5
23.0	6.49	39.7	50.6	62.8
24.0	7.23	44.6	56.8	70.4
25.0	8.03	49.7	63.3	78.4
26.0	8.88	55.1	70.0	86.7
27.0	9.73	60.6	77.0	95.3
28.0	10.69	66.3	84.2	104.3
29.0	11.60	72.2	91.7	113.5
30.0	12.61	78.2	99.3	123.0
31.0	13.62	84.3	107.2	132.8
32.0	14.68	90.6	115.2	142.8
33.0	15.74	97.0	123.4	153.0
34.0	16.86	103.5	131.7	163.4
35.0	17.93	110.0	140.2	173.9
36.0	19.15	116.7	148.7	184.7
37.0	20.32	123.3	157.3	195.5
38.0	21.54	130.0	166.0	206.5
39.0	22.77	136.7	174.8	217.6
40.0	23.99	143.4	183.6	228.7
41.0	25.32	150.0	192.3	239.9
42.0	26.60	156.7	201.1	251.1

(2) AC

(a) AC ASUM-V1 FG

POLICY ON OBSTETRIC EXAMINATIONS
NORMAL ULTRASONIC FETAL MEASUREMENTS JUNE 1991

Age	-2SD (mm)	Mean (mm)	+2SD (mm)
10w0d	—	34.6	—
11w0d	—	46.0	—
12w0d	—	57.4	—
13w0d	—	68.8	—
14w0d	66.2	80.2	94.2
15w0d	77.4	91.6	105.8
16w0d	88.6	103.0	117.4
17w0d	99.8	114.4	129.0
18w0d	111.1	125.9	140.7
19w0d	122.3	137.3	152.3
20w0d	133.2	148.7	164.2
21w0d	144.1	160.1	176.1
22w0d	154.5	171.5	188.5
23w0d	164.9	182.9	200.9
24w0d	175.3	194.3	213.3
25w0d	185.7	205.7	225.7
26w0d	197.1	217.1	237.1
27w0d	207.5	228.5	249.5
28w0d	217.9	239.9	261.9
29w0d	228.3	251.3	274.3
30w0d	238.7	262.7	286.7
31w0d	249.1	274.1	299.1
32w0d	258.5	285.5	312.5
33w0d	268.9	296.9	324.9
34w0d	279.3	308.3	337.3
35w0d	289.7	319.7	349.7
36w0d	299.1	331.1	363.1
37w0d	309.5	342.5	375.5
38w0d	319.9	353.9	387.9
39w0d	330.3	365.3	400.3
40w0d	340.7	376.7	412.7

(b) AC ASUM-V2 GA

Australian Society of Ultrasound Medicine (ASUM) - Policy statement Statement on normal ultrasonics fetal measurements
(Revised May 2001) P28 to P31

Value (mm)	Age
42.0	10w3d
48.0	11w0d
60.0	12w0d
72.0	13w0d
84.0	13w6d
96.0	14w6d
108.0	16w0d
120.0	17w0d
132.0	18w0d
143.0	19w0d
154.0	19w6d
166.0	21w0d
177.0	22w0d
188.0	23w0d
199.0	24w0d
210.0	25w0d
220.0	26w0d
231.0	26w6d
242.0	28w0d
252.0	29w0d
263.0	30w0w
273.0	31w0d
283.0	32w0d
293.0	33w0d
303.0	34w0d
313.0	35w0d
323.0	36w0d
333.0	37w0d
343.0	38w0d
353.0	39w0d
362.0	40w0d
372.0	41w0d
382.0	42w0d
391.0	43w0d
401.0	44w0d
402.0	44w1d

(c) AC ASUM-V2 FG

Australian Society of Ultrasound Medicine (ASUM) - Policy statement Statement on normal ultrasonics fetal measurements
(Revised May 2001) P28 to P31

Age	-2SD (mm)	Mean (mm)	+2SD (mm)
11w0d	42.0	52.0	62.0
12w0d	53.0	63.0	73.0
13w0d	64.0	74.0	84.0
14w0d	74.0	84.0	94.0
15w0d	86.0	96.0	106.0
16w0d	96.0	106.0	116.0
17w0d	105.0	120.0	135.0
18w0d	116.0	131.0	146.0
19w0d	125.0	140.0	155.0
20w0d	136.0	151.0	166.0
21w0d	144.0	164.0	184.0
22w0d	156.0	176.0	196.0
23w0d	166.0	186.0	206.0
24w0d	181.0	201.0	221.0
25w0d	192.0	212.0	232.0
26w0d	198.0	223.0	248.0
27w0d	205.0	230.0	255.0
28w0d	217.0	242.0	267.0
29w0d	234.0	259.0	284.0
30w0d	237.0	262.0	287.0
31w0d	242.0	272.0	302.0
32w0d	253.0	283.0	313.0
33w0d	264.0	294.0	324.0
34w0d	275.0	305.0	335.0
35w0d	285.0	315.0	345.0
36w0d	290.0	325.0	360.0
37w0d	298.0	333.0	368.0
38w0d	307.0	342.0	377.0
39w0d	321.0	356.0	391.0
40w0d	327.0	362.0	397.0
41w0d	332.0	367.0	402.0

(d) AC Campbell no charts

(e) AC CFEF FG

French fetal biometry: reference equations and comparison with other charts
L. J. SALOMON, M. DUYME, J. CREQUAT, G. BRODATY, C. TALMANT, N. FRIES and M. ALTHUSER
CFEF - Collège Français d'Echographie Foetale, Paris, France
Ultrasound Obstet Gynecol (in press) published online in Wiley InterScience (www.interscience.wiley.com).
DOI: 10.1002/uog.2733

Age	5% (mm)	50% (mm)	95% (mm)
15w0d	90.5	102.5	114.6
16w0d	98.6	111.7	124.8
17w0d	107.1	121.2	135.4
18w0d	115.9	131.1	146.3
19w0d	124.9	141.2	157.5
20w0d	134.3	151.6	169.0
21w0d	143.7	162.2	180.6
22w0d	153.4	172.9	192.3
23w0d	163.1	183.6	204.2
24w0d	172.8	194.5	216.1
25w0d	182.6	205.3	227.9
26w0d	192.3	216.0	239.7
27w0d	201.9	226.7	251.5
28w0d	211.3	237.1	263.0
29w0d	220.5	247.4	274.4
30w0d	229.5	257.5	285.5
31w0d	238.2	267.2	296.3
32w0d	246.5	276.6	306.7
33w0d	254.5	285.6	316.8
34w0d	262.0	294.2	326.4
35w0d	269.0	302.3	335.6
36w0d	275.5	309.8	344.2
37w0d	281.4	316.8	352.2
38w0d	286.6	323.1	359.6
39w0d	291.2	328.7	366.3
40w0d	295.0	333.7	372.3

(f) AC CFEF-%tile Identical

French fetal biometry: reference equations and comparison with other charts
L. J. SALOMON, M. DUYME, J. CREQUAT, G. BRODATY, C. TALMANT, N. FRIES and M. ALTHUSER
CFEF - Collège Français d'Echographie Foetale, Paris, France
Ultrasound Obstet Gynecol (in press) published online in Wiley InterScience (www.interscience.wiley.com).
DOI: 10.1002/uog.2733

Age	1SD (mm)	5% (mm)	50% (mm)	95% (mm)
15w0d	7.3	90.5	102.5	114.6
16w0d	8.0	98.6	111.7	124.8
17w0d	8.6	107.1	121.2	135.4
18w0d	9.3	115.9	131.1	146.3
19w0d	9.9	124.9	141.2	157.5
20w0d	10.6	134.3	151.6	169.0
21w0d	11.2	143.7	162.2	180.6
22w0d	11.8	153.4	172.9	192.3
23w0d	12.5	163.1	183.6	204.2
24w0d	13.1	172.8	194.5	216.1
25w0d	13.8	182.6	205.3	227.9
26w0d	14.4	192.3	216.0	239.7
27w0d	15.1	201.9	226.7	251.5
28w0d	15.7	211.3	237.1	263.0
29w0d	16.4	220.5	247.4	274.4
30w0d	17.0	229.5	257.5	285.5
31w0d	17.7	238.2	267.2	296.3
32w0d	18.3	246.5	276.6	306.7
33w0d	18.9	254.5	285.6	316.8
34w0d	19.6	262.0	294.2	326.4
35w0d	20.2	269.0	302.3	335.6
36w0d	20.9	275.5	309.8	344.2
37w0d	21.5	281.4	316.8	352.2
38w0d	22.2	286.6	323.1	359.6
39w0d	22.8	291.2	328.7	366.3
40w0d	23.5	295.0	333.7	372.3

(g) AC Chitty (drvd) FG

Chitty, L.S., Altman, D.G.
"Charts of Fetal Size: 3. Abdominal Measurements"
British Journal of Obstetrics & Gynaecology, Jan. 1994, vol. 101, P. 125-131

Age	3% (mm)	50% (mm)	97% (mm)
12w0d	48.0	55.8	63.6
13w0d	58.5	67.4	76.3
14w0d	68.8	78.9	88.9
15w0d	79.1	90.3	101.5
16w0d	89.3	101.6	114.0
17w0d	99.5	112.9	126.4
18w0d	109.5	124.1	138.7
19w0d	119.5	135.2	150.9
20w0d	129.4	146.2	163.1
21w0d	139.2	157.2	175.1
22w0d	148.9	168.0	187.1
23w0d	158.5	178.7	198.9
24w0d	168.0	189.3	210.7
25w0d	177.3	199.8	222.3
26w0d	186.6	210.2	233.8
27w0d	195.7	220.4	245.2
28w0d	204.7	230.6	256.5
29w0d	213.5	240.6	267.6
30w0d	222.3	250.4	278.6
31w0d	230.9	260.1	289.4
32w0d	239.3	269.7	300.1
33w0d	247.6	279.1	310.7
34w0d	255.7	288.4	321.1
35w0d	263.7	297.5	331.3
36w0d	271.5	306.4	341.4
37w0d	279.1	315.2	351.2
38w0d	286.6	323.8	361.0
39w0d	293.8	332.2	370.5
40w0d	300.9	340.4	379.9
41w0d	307.8	348.4	389.0
42w0d	314.5	356.3	398.0

(h) AC Chitty (drvd)-%tile Identical

Chitty, L.S., Altman, D.G.
"Charts of Fetal Size: 3. Abdominal Measurements"
British Journal of Obstetrics & Gynaecology, Jan. 1994, vol. 101, P. 125-131

Age	1SD (mm)	3% (mm)	50% (mm)	97% (mm)
12w0d	4.1	48.0	55.8	63.6
13w0d	4.7	58.5	67.4	76.3
14w0d	5.3	68.8	78.9	88.9
15w0d	5.9	79.1	90.3	101.5
16w0d	6.5	89.3	101.6	114.0
17w0d	7.2	99.5	112.9	126.4
18w0d	7.8	109.5	124.1	138.7
19w0d	8.4	119.5	135.2	150.9
20w0d	9.0	129.4	146.2	163.1
21w0d	9.6	139.2	157.2	175.1
22w0d	10.2	148.9	168.0	187.1
23w0d	10.8	158.5	178.7	198.9
24w0d	11.4	168.0	189.3	210.7
25w0d	12.0	177.3	199.8	222.3
26w0d	12.6	186.6	210.2	233.8
27w0d	13.2	195.7	220.4	245.2
28w0d	13.8	204.7	230.6	256.5
29w0d	14.4	213.5	240.6	267.6
30w0d	15.0	222.3	250.4	278.6
31w0d	15.6	230.9	260.1	289.4
32w0d	16.2	239.3	269.7	300.1
33w0d	16.8	247.6	279.1	310.7
34w0d	17.4	255.7	288.4	321.1
35w0d	18.0	263.7	297.5	331.3
36w0d	18.6	271.5	306.4	341.4
37w0d	19.2	279.1	315.2	351.2
38w0d	19.8	286.6	323.8	361.0
39w0d	20.4	293.8	332.2	370.5
40w0d	21.0	300.9	340.4	379.9
41w0d	21.6	307.8	348.4	389.0
42w0d	22.2	314.5	356.3	398.0

(i) AC Chitty (Pltd) FG

Chitty, L.S., Altman, D.G.
"Charts of Fetal Size: 3. Abdominal Measurements"
British Journal of Obstetrics & Gynaecology, Jan. 1994, vol. 101, P. 125-131

Age	3% (mm)	50% (mm)	97% (mm)
12w0d	47.7	58.9	70.2
13w0d	58.7	70.8	82.9
14w0d	69.7	82.7	95.6
15w0d	80.6	94.4	108.3
16w0d	91.4	106.1	120.8
17w0d	102.2	117.7	133.3
18w0d	112.9	129.3	145.7
19w0d	123.5	140.7	158.0
20w0d	133.9	152.1	170.2
21w0d	144.3	163.3	182.3
22w0d	154.6	174.5	194.4
23w0d	164.8	185.5	206.3
24w0d	174.9	196.5	218.1
25w0d	184.9	207.3	229.7
26w0d	194.7	218.0	241.3
27w0d	204.4	228.6	252.7
28w0d	214.0	239.0	264.1
29w0d	223.5	249.3	275.2
30w0d	232.8	259.5	286.2
31w0d	241.9	269.5	297.1
32w0d	251.0	279.4	307.9
33w0d	259.8	289.1	318.4
34w0d	268.5	298.7	328.9
35w0d	277.0	308.1	339.1
36w0d	285.4	317.3	349.2
37w0d	293.6	326.3	359.1
38w0d	301.6	335.2	368.8
39w0d	309.4	343.9	378.4
40w0d	317.0	352.4	387.7
41w0d	324.5	360.7	396.9
42w0d	331.7	368.8	405.8

(j) AC Chitty (Pltd)-%tile Identical

Chitty, L.S., Altman, D.G.
"Charts of Fetal Size: 3. Abdominal Measurements"
British Journal of Obstetrics & Gynaecology, Jan. 1994, vol. 101, P. 125-131

Age	1SD (mm)	3% (mm)	50% (mm)	97% (mm)
12w0d	6.0	47.7	58.9	70.2
13w0d	6.4	58.7	70.8	82.9
14w0d	6.9	69.7	82.7	95.6
15w0d	7.4	80.6	94.4	108.3
16w0d	7.8	91.4	106.1	120.8
17w0d	8.3	102.2	117.7	133.3
18w0d	8.7	112.9	129.3	145.7
19w0d	9.2	123.5	140.7	158.0
20w0d	9.6	133.9	152.1	170.2
21w0d	10.1	144.3	163.3	182.3
22w0d	10.6	154.6	174.5	194.4
23w0d	11.0	164.8	185.5	206.3
24w0d	11.5	174.9	196.5	218.1
25w0d	11.9	184.9	207.3	229.7
26w0d	12.4	194.7	218.0	241.3
27w0d	12.8	204.4	228.6	252.7
28w0d	13.3	214.0	239.0	264.1
29w0d	13.8	223.5	249.3	275.2
30w0d	14.2	232.8	259.5	286.2
31w0d	14.7	241.9	269.5	297.1
32w0d	15.1	251.0	279.4	307.9
33w0d	15.6	259.8	289.1	318.4
34w0d	16.1	268.5	298.7	328.9
35w0d	16.5	277.0	308.1	339.1
36w0d	17.0	285.4	317.3	349.2
37w0d	17.4	293.6	326.3	359.1
38w0d	17.9	301.6	335.2	368.8
39w0d	18.3	309.4	343.9	378.4
40w0d	18.8	317.0	352.4	387.7
41w0d	19.3	324.5	360.7	396.9
42w0d	19.7	331.7	368.8	405.8

(k) AC Deter FG

Deter, R.L., Harrist, R.B., Hadlock, F.P., Carpenter, R.J.
"Fetal Head and Abdominal Circumferences: II. A Critical Reevaluation of the Relationship to Menstrual Age"
Journal Clinical Ultrasound, Oct. 1982, 10: P. 365-372

Age	-1SD (mm)	Mean (mm)	+1SD (mm)
12w0d	54.4	62.5	70.6
13w0d	63.9	73.5	83.1
14w0d	73.5	84.5	95.5
15w0d	83.1	95.5	107.9
16w0d	92.6	106.5	120.3
17w0d	102.2	117.4	132.7
18w0d	111.7	128.4	145.1
19w0d	121.3	139.4	157.5
20w0d	130.8	150.4	170.0
21w0d	140.4	161.4	182.4
22w0d	150.0	172.4	194.8
23w0d	159.5	183.4	207.2
24w0d	169.1	194.3	219.6
25w0d	178.6	205.3	232.0
26w0d	188.2	216.3	244.4
27w0d	197.7	227.3	256.8
28w0d	207.3	238.3	269.3
29w0d	216.9	249.3	281.7
30w0d	226.4	260.3	294.1
31w0d	236.0	271.2	306.5
32w0d	245.5	282.2	318.9
33w0d	255.1	293.2	331.3
34w0d	264.6	304.2	343.7
35w0d	274.2	315.2	356.1
36w0d	283.8	326.2	368.6
37w0d	293.3	337.1	381.0
38w0d	302.9	348.1	393.4
39w0d	312.4	359.1	405.8
40w0d	322.0	370.1	418.2

(l) AC Hadlock GA

Hadlock FP, Deter RL, Harrist RB, Park SK:
"Estimating fetal age: Computer-assisted analysis of multiple fetal growth parameters"
Radiology 1984; 152: 497-502.

Value (mm)	Age	2SD (days)
50.1	12w0d	12
62.0	13w0d	12
75.0	14w0d	12
87.0	15w0d	12
99.0	15w6d	12
111.0	17w0d	12
123.0	18w0d	14
135.0	19w0d	14
147.0	20w0d	14
158.0	21w0d	14
170.0	22w0d	14
181.0	23w0d	14
193.0	24w0d	15
204.0	25w0d	15
215.0	26w0d	15
226.0	27w0d	15
237.0	28w0d	15
247.0	29w0d	15
258.0	30w0d	21
269.0	31w0d	21
279.0	31w6d	21
290.0	33w0d	21
300.0	34w0d	21
310.0	35w0d	21
321.0	36w1d	21
331.0	37w0d	21
341.0	38w0d	21
351.0	39w0d	21
361.0	40w0d	21
370.0	41w0d	21
380.0	42w0d	21
380.5	42w0d	21

(m) AC Hadlock FG

Hadlock FP, Deter RL, Harrist RB, Park SK:
"Estimating fetal age: Computer-assisted analysis of multiple fetal growth parameters"
Radiology 1984; 152: 497-502.

Age	-1SD (mm)	Mean (mm)	+1SD (mm)
12w0d	32.0	46.0	59.0
13w0d	46.0	59.0	73.0
14w0d	59.0	73.0	86.0
15w0d	73.0	86.0	99.0
16w0d	86.0	99.0	112.0
17w0d	98.0	112.0	125.0
18w0d	111.0	124.0	138.0
19w0d	123.0	137.0	150.0
20w0d	136.0	149.0	162.0
21w0d	148.0	161.0	174.0
22w0d	159.0	173.0	186.0
23w0d	171.0	185.0	198.0
24w0d	183.0	196.0	209.0
25w0d	194.0	207.0	221.0
26w0d	205.0	218.0	232.0
27w0d	216.0	229.0	242.0
28w0d	226.0	240.0	253.0
29w0d	237.0	250.0	263.0
30w0d	247.0	260.0	274.0
31w0d	257.0	270.0	284.0
32w0d	267.0	280.0	293.0
33w0d	276.0	290.0	303.0
34w0d	286.0	299.0	312.0
35w0d	295.0	308.0	322.0
36w0d	304.0	317.0	331.0
37w0d	313.0	326.0	339.0
38w0d	321.0	335.0	348.0
39w0d	330.0	343.0	357.0
40w0d	338.0	351.0	365.0
41w0d*	346.0	359.0	373.0
42w0d*	354.0	367.0	381.0

*: Data for extrapolated gestational age (weeks) when Extrapolate is set to ON

(n) AC Hadlock-%tile Identical

Hadlock FP, Deter RL, Harrist RB, Park SK:
"Estimating fetal age: Computer-assisted analysis of multiple fetal growth parameters"
Radiology 1984; 152: 497-502.

Age	1SD (mm)	-2SD (mm)	Mean (mm)	+2SD (mm)
12w0d	13.4	23.3	50.1	76.9
13w0d	13.4	35.9	62.7	89.5
14w0d	13.4	48.4	75.2	102.0
15w0d	13.4	60.7	87.5	114.3
16w0d	13.4	72.9	99.7	126.5
17w0d	13.4	84.9	111.7	138.5
18w0d	13.4	96.9	123.7	150.5
19w0d	13.4	108.7	135.5	162.3
20w0d	13.4	120.4	147.2	174.0
21w0d	13.4	132.0	158.8	185.6
22w0d	13.4	143.5	170.3	197.1
23w0d	13.4	154.8	181.6	208.4
24w0d	13.4	166.1	192.9	219.7
25w0d	13.4	177.3	204.1	230.9
26w0d	13.4	188.3	215.1	241.9
27w0d	13.4	199.3	226.1	252.9
28w0d	13.4	210.2	237.0	263.8
29w0d	13.4	220.9	247.7	274.5
30w0d	13.4	231.6	258.4	285.2
31w0d	13.4	242.2	269.0	295.8
32w0d	13.4	252.8	279.6	306.4
33w0d	13.4	263.2	290.0	316.8
34w0d	13.4	273.6	300.4	327.2
35w0d	13.4	283.8	310.6	337.4
36w0d	13.4	294.0	320.8	347.6
37w0d	13.4	304.2	331.0	357.8
38w0d	13.4	314.2	341.0	367.8
39w0d	13.4	324.2	351.0	377.8
40w0d	13.4	334.1	360.9	387.7
41w0d	13.4	343.9	370.7	397.5
42w0d	13.4	353.7	380.5	407.3

(o) AC Jeanty FG

Jeanty P, Cousaert E. Cantraine F
"Normal growth of the abdominal perimeter"
Am J Perinatal 1:179, 1984

Age	5% (mm)	50% (mm)	95% (mm)
12w0d	35.0	57.0	80.0
13w0d	45.0	67.0	90.0
14w0d	55.0	77.0	100.0
15w0d	65.0	88.0	110.0
16w0d	76.0	98.0	120.0
17w0d	86.0	109.0	131.0
18w0d	97.0	119.0	142.0
19w0d	108.0	130.0	152.0
20w0d	119.0	141.0	163.0
21w0d	129.0	152.0	174.0
22w0d	140.0	163.0	185.0
23w0d	151.0	173.0	196.0
24w0d	162.0	184.0	206.0
25w0d	172.0	195.0	217.0
26w0d	183.0	205.0	227.0
27w0d	193.0	215.0	238.0
28w0d	203.0	225.0	248.0
29w0d	213.0	235.0	257.0
30w0d	222.0	244.0	267.0
31w0d	231.0	254.0	276.0
32w0d	240.0	262.0	285.0
33w0d	248.0	271.0	293.0
34w0d	256.0	279.0	301.0
35w0d	264.0	286.0	309.0
36w0d	271.0	293.0	316.0
37w0d	278.0	300.0	322.0
38w0d	283.0	306.0	328.0
39w0d	289.0	311.0	333.0
40w0d	294.0	316.0	338.0

(p) AC JSUM GA

Standardization of ultrasonic fetal biometry and Japanese reference values
J Med Ultrasonics Vol. 30 No. 3 (2003)
J415-J440

Value (mm)	Age	1SD (day)
100.0	15w3d	8
105.0	16w0d	8
115.0	17w0d	8
125.0	18w0d	9
135.0	19w0d	9
145.0	20w0d	9
155.0	21w0d	10
165.0	22w0d	10
176.3	23w0d	10
186.3	24w0d	11
196.3	25w0d	11
206.3	26w0d	11
215.0	27w0d	12
225.0	28w0d	12
235.0	29w0d	12
243.8	30w0d	13
252.5	31w0d	13
261.3	32w0d	13
269.0	33w0d	13
277.5	34w0d	14
285.0	35w0d	14
293.0	36w0d	14
300.0	37w0d	14
307.5	38w0d	14
315.0	39w0d	15
321.0	40w0d	15
325.0	40w4d	15

(q) AC JSUM FG

Standardization of ultrasonic fetal biometry and Japanese reference values
J Med Ultrasonics Vol. 30 No. 3 (2003)
J415-J440

Age	-2SD (mm)	Mean (mm)	+2SD (mm)
16w0d	85.0	104.0	123.0
17w0d	94.0	114.0	134.0
18w0d	104.0	125.0	146.0
19w0d	113.0	135.0	157.0
20w0d	122.0	145.0	168.0
21w0d	132.0	155.0	179.0
22w0d	141.0	165.0	190.0
23w0d	150.0	175.0	201.0
24w0d	159.0	185.0	212.0
25w0d	168.0	195.0	223.0
26w0d	176.0	205.0	233.0
27w0d	185.0	214.0	244.0
28w0d	193.0	224.0	254.0
29w0d	202.0	233.0	264.0
30w0d	210.0	242.0	274.0
31w0d	218.0	251.0	284.0
32w0d	225.0	259.0	294.0
33w0d	233.0	268.0	303.0
34w0d	240.0	276.0	312.0
35w0d	247.0	284.0	321.0
36w0d	254.0	292.0	330.0
37w0d	260.0	299.0	338.0
38w0d	266.0	306.0	346.0
39w0d	272.0	313.0	354.0
40w0d	277.0	319.0	361.0
41w0d	282.0	325.0	368.0
42w0d	287.0	331.0	375.0

(r) AC JSUM-SD Identical

Standardization of ultrasonic fetal biometry and Japanese reference values
J Med Ultrasonics Vol. 30 No. 3 (2003) J415-J440

Age	-2SD (cm)	-1.5SD (cm)	Mean (cm)	+1.5SD (cm)	+2SD (cm)
16w0d	8.5	9.0	10.4	11.8	12.3
17w0d	9.4	9.9	11.4	12.9	13.4
18w0d	10.4	11.0	12.5	14.0	14.6
19w0d	11.3	11.9	13.5	15.1	15.7
20w0d	12.2	12.8	14.5	16.2	16.8
21w0d	13.2	13.7	15.5	17.3	17.9
22w0d	14.1	14.6	16.5	18.4	19.0
23w0d	15.0	15.5	17.5	19.5	20.1
24w0d	15.9	16.5	18.5	20.5	21.2
25w0d	16.8	17.4	19.5	21.6	22.3
26w0d	17.6	18.4	20.5	22.6	23.3
27w0d	18.5	19.2	21.4	23.6	24.4
28w0d	19.3	20.1	22.4	24.7	25.4
29w0d	20.2	21.0	23.3	25.6	26.4
30w0d	21.0	21.8	24.2	26.6	27.4
31w0d	21.8	22.6	25.1	27.6	28.4
32w0d	22.5	23.3	25.9	28.5	29.4
33w0d	23.3	24.2	26.8	29.4	30.3
34w0d	24.0	24.9	27.6	30.3	31.2
35w0d	24.7	25.6	28.4	31.2	32.1
36w0d	25.4	26.4	29.2	32.0	33.0
37w0d	26.0	27.0	29.9	32.8	33.8
38w0d	26.6	27.6	30.6	33.6	34.6
39w0d	27.2	28.3	31.3	34.3	35.4
40w0d	27.7	28.7	31.9	35.1	36.1
41w0d	28.2	29.3	32.5	35.7	36.8
42w0d	28.7	29.8	33.1	36.4	37.5

(s) AC Merz GA

Merz E:
"Ultrasound in Gynecology and Obstetrics"
Stuttgart, New York, Thieme Medical Publishers, Inc. 1991 P. 326

Value (mm)	Age	5%, 95% (days)
56.0	12w1d	8
65.0	13w0d	9
76.0	14w0d	9
86.0	15w0d	9
97.0	16w0d	10
107.0	17w0d	10
118.0	18w0d	10
128.0	19w0d	10
139.0	20w0d	11
149.0	21w0d	11
160.0	22w0d	11
170.0	23w0d	11
181.0	24w0d	12
192.0	25w0d	13
202.0	26w0d	13
212.0	27w0d	12
223.0	28w0d	13
234.0	29w0d	13
244.0	30w0d	13
255.0	31w0d	14
266.0	32w1d	14
276.0	33w0d	15
286.0	34w0d	15
297.0	35w0d	15
307.0	36w0d	15
318.0	37w0d	15
328.0	38w0d	15
339.0	39w0d	16
348.0	39w6d	16

(t) AC Merz FG

Merz E:
"Ultrasound in Gynecology and Obstetrics"
Stuttgart, New York, Thieme Medical Publishers, Inc. 1991; P. 312

Age	5% (mm)	50% (mm)	95% (mm)
12w0d	40.0	58.0	76.0
13w0d	50.0	68.0	87.0
14w0d	60.0	79.0	98.0
15w0d	69.0	89.0	109.0
16w0d	79.0	99.0	119.0
17w0d	89.0	110.0	130.0
18w0d	99.0	120.0	141.0
19w0d	108.0	130.0	152.0
20w0d	118.0	140.0	162.0
21w0d	128.0	151.0	173.0
22w0d	138.0	161.0	184.0
23w0d	148.0	171.0	195.0
24w0d	158.0	182.0	205.0
25w0d	167.0	192.0	216.0
26w0d	177.0	202.0	227.0
27w0d	187.0	212.0	238.0
28w0d	197.0	223.0	248.0
29w0d	207.0	233.0	259.0
30w0d	217.0	243.0	270.0
31w0d	227.0	253.0	280.0
32w0d	237.0	264.0	291.0
33w0d	246.0	274.0	302.0
34w0d	256.0	284.0	312.0
35w0d	266.0	295.0	323.0
36w0d	276.0	305.0	334.0
37w0d	286.0	315.0	344.0
38w0d	296.0	325.0	355.0
39w0d	306.0	336.0	365.0
40w0d	316.0	346.0	376.0

(u) AC Nicolaides Identical

Nicolaides
"Fetal biometry at 14-40 week's gestation"
Ultrasound in Obstetrics and Gynecology 4 1994: P34 to 48

Age	5% (mm)	Median (mm)	95% (mm)
14+0 - 14+6	80.0	90.0	102.0
15+0 - 15+6	88.0	99.0	112.0
16+0 - 16+6	96.0	108.0	122.0
17+0 - 17+6	105.0	118.0	133.0
18+0 - 18+6	114.0	128.0	144.0
19+0 - 19+6	123.0	139.0	156.0
20+0 - 20+6	133.0	149.0	168.0
21+0 - 21+6	143.0	161.0	181.0
22+0 - 22+6	153.0	172.0	193.0
23+0 - 23+6	163.0	183.0	206.0
24+0 - 24+6	174.0	195.0	219.0
25+0 - 25+6	184.0	207.0	233.0
26+0 - 26+6	195.0	219.0	246.0
27+0 - 27+6	205.0	231.0	259.0
28+0 - 28+6	216.0	243.0	272.0
29+0 - 29+6	226.0	254.0	285.0
30+0 - 30+6	237.0	266.0	298.0
31+0 - 31+6	246.0	277.0	310.0
32+0 - 32+6	256.0	287.0	322.0
33+0 - 33+6	265.0	297.0	334.0
34+0 - 34+6	274.0	307.0	345.0
35+0 - 35+6	282.0	316.0	355.0
36+0 - 36+6	289.0	324.0	364.0
37+0 - 37+6	295.0	332.0	372.0
38+0 - 38+6	302.0	339.0	380.0
39+0 - 39+6	307.0	345.0	387.0

(v) AC Shepard no charts

(w) AC Tokyo GA

Norio Shinozuka, Haruo Masuda, Hidenori Kagawa, Yuji Taketani
Standard Values of Ultrasonographic Fetal Biometry
Jpn Med Ultrasonics Vol. 23 No. 12 (1996) P 877-888

Value (mm)	Age	5%, 95% (days)
100.0	15w3d	13
105.0	16w0d	13
115.0	17w0d	14
124.0	17w6d	15
135.0	19w0d	15
145.0	20w0d	16
155.0	21w0d	16
165.0	22w0d	17
176.0	23w0d	17
186.0	24w0d	18
196.0	25w0d	18
206.0	26w0d	19
216.0	27w0d	19
225.0	28w0d	20
235.0	29w0d	20
244.0	30w0d	21
252.0	31w0d	21
261.0	32w0d	22
270.0	33w0d	22
278.0	34w0d	23
286.0	35w0d	23
293.0	36w0d	23
301.0	37w0d	24
308.0	38w0d	24
315.0	39w0d	24
322.0	40w0d	25
328.0	41w0d	25
330.0	41w2d	25

(x) AC Tokyo FG

Norio Shinozuka, Haruo Masuda, Hidenori Kagawa, Yuji Taketani
Standard Values of Ultrasonographic Fetal Biometry
Jpn Med Ultrasonics Vol. 23 No. 12 (1996) P 877-888

Age	5% (mm)	50% (mm)	95% (mm)
16w0d	93.0	109.0	125.0
17w0d	103.0	120.0	136.0
18w0d	112.0	130.0	147.0
19w0d	122.0	140.0	158.0
20w0d	131.0	151.0	169.0
21w0d	140.0	161.0	180.0
22w0d	150.0	171.0	191.0
23w0d	159.0	181.0	202.0
24w0d	168.0	191.0	212.0
25w0d	177.0	201.0	223.0
26w0d	186.0	210.0	233.0
27w0d	195.0	220.0	244.0
28w0d	203.0	229.0	254.0
29w0d	211.0	238.0	264.0
30w0d	220.0	247.0	273.0
31w0d	228.0	256.0	283.0
32w0d	235.0	265.0	292.0
33w0d	243.0	273.0	301.0
34w0d	250.0	281.0	310.0
35w0d	257.0	289.0	319.0
36w0d	264.0	297.0	327.0
37w0d	270.0	304.0	335.0
38w0d	276.0	311.0	343.0
39w0d	282.0	318.0	350.0
40w0d	288.0	324.0	357.0
41w0d	293.0	330.0	364.0
42w0d	297.0	336.0	370.0

(y) AC Tokyo-SD Identical

Norio Shinozuka, Haruo Masuda, Hidenori Kagawa, Yuji Taketani
Standard Values of Ultrasonographic Fetal Biometry
Jpn Med Ultrasonics Vol. 23 No. 12 (1996) P 877-888

Age	-1.5SD (cm)	Mean (cm)	+1.5SD (cm)
16w0d	9.4	10.9	12.4
17w0d	10.7	12.0	13.3
18w0d	11.7	13.0	14.3
19w0d	12.6	14.0	15.4
20w0d	13.7	15.1	16.5
21w0d	14.6	16.1	17.6
22w0d	15.6	17.1	18.6
23w0d	16.5	18.1	19.7
24w0d	17.4	19.1	20.8
25w0d	18.4	20.1	21.8
26w0d	19.2	21.0	22.8
27w0d	20.2	22.0	23.8
28w0d	21.0	22.9	24.8
29w0d	21.8	23.8	25.8
30w0d	22.7	24.7	26.7
31w0d	23.5	25.6	27.7
32w0d	24.4	26.5	28.6
33w0d	25.1	27.3	29.5
34w0d	25.9	28.1	30.3
35w0d	26.6	28.9	31.2
36w0d	27.4	29.7	32.0
37w0d	28.0	30.4	32.8
38w0d	28.7	31.1	33.5
39w0d	29.4	31.8	34.2
40w0d	29.9	32.4	34.9
41w0d	30.4	33.0	35.6
42w0d	31.0	33.6	36.2

(3) APAD

(a) APAD Merz FG

Merz E:
"Ultrasound in Gynecology and Obstetrics"
Stuttgart, New York, Thieme Medical Publishers, Inc. 1991; P. 312

Age	5% (mm)	50% (mm)	95% (mm)
12w0d	12.0	18.0	24.0
13w0d	15.0	21.0	27.0
14w0d	18.0	24.0	30.0
15w0d	21.0	28.0	34.0
16w0d	24.0	31.0	37.0
17w0d	28.0	34.0	41.0
18w0d	31.0	37.0	44.0
19w0d	34.0	41.0	48.0
20w0d	37.0	44.0	51.0
21w0d	40.0	47.0	54.0
22w0d	43.0	50.0	58.0
23w0d	46.0	54.0	61.0
24w0d	49.0	57.0	65.0
25w0d	53.0	60.0	68.0
26w0d	56.0	64.0	71.0
27w0d	59.0	67.0	75.0
28w0d	62.0	70.0	78.0
29w0d	65.0	73.0	82.0
30w0d	68.0	77.0	85.0
31w0d	71.0	80.0	88.0
32w0d	74.0	83.0	92.0
33w0d	78.0	86.0	95.0
34w0d	81.0	90.0	98.0
35w0d	84.0	93.0	102.0
36w0d	87.0	96.0	105.0
37w0d	90.0	99.0	109.0
38w0d	93.0	103.0	112.0
39w0d	97.0	106.0	115.0
40w0d	100.0	109.0	119.0

(4) BPD

(a) BPD ASUM-V1 GA

POLICY ON OBSTETRIC EXAMINATIONS
ASUM STANDARD BPD CHART
August 1990

Value (mm)	Age	2SD (days)
20.0	12w0d	4
23.5	13w0d	4
27.5	14w0d	5
31.0	15w0d	6
34.5	16w0d	7
38.0	17w0d	8
41.0	18w0d	9
44.5	19w0d	9
47.5	20w0d	10
51.0	21w0d	11
54.0	22w0d	12
57.0	23w0d	12
59.7	24w0d	13
62.7	25w0d	13
65.5	26w0d	14
68.3	27w0d	15
71.0	28w0d	16
73.7	29w0d	16
76.3	30w0d	17
79.0	31w0d	17
81.7	32w0d	18
84.0	33w0d	19

(b) BPD ASUM-V1 FG

POLICY ON OBSTETRIC EXAMINATIONS
ASUM STANDARD BPD CHART
August 1990

Age	-2SD (mm)	Mean (mm)	+2SD (mm)
33w3d	78.1	85.0	91.9
34w0d	79.4	86.3	93.2
35w0d	81.4	88.3	95.2
36w0d	83.4	90.3	97.2
37w0d	85.1	92.0	98.9
38w0d	86.5	93.4	100.3
39w0d	87.6	94.5	101.4
40w0d	88.5	95.5	102.5
41w0d	89.4	96.4	103.4
42w0d	90.2	97.2	104.2
43w0d	91.0	98.0	105.0

(c) BPD ASUM-V2 GA

Australian Society of Ultrasound Medicine (ASUM) - Policy statement Statement on normal ultrasonics fetal measurements
(Revised May 2001) P 28 to P 31

Value (mm)	Age
14.0	10w0d
17.0	11w0d
20.5	12w0d
23.7	13w0d
27.0	14w0d
30.5	15w0d
34.0	16w0d
37.5	17w0d
41.0	18w0d
44.5	19w0d
48.0	20w0d
51.3	21w0d
54.5	22w0d
57.7	23w0d
60.7	24w0d
63.7	25w0d
66.5	26w0d
69.3	27w0d
72.0	28w0d
74.3	29w0d
76.7	30w0d
79.0	31w0d
81.3	32w0d
83.7	33w0d
85.7	34w0d
87.7	35w0d
89.7	36w0d
91.5	37w0d
93.3	38w0d
95.0	39w0d
96.8	40w0d
98.5	41w0d
100.2	42w0d
101.8	43w0d
103.3	44w0d
104.8	45w0d
106.0	45w6d

(d) BPD ASUM-V2 FG

Australian Society of Ultrasound Medicine (ASUM) - Policy statement Statement on normal ultrasonics fetal measurements
(Revised May 2001) P 28 to P 31

Age	-2SD (mm)	Mean (mm)	+2SD (mm)
11w0d	14.0	16.0	18.0
12w0d	16.0	20.0	24.0
13w0d	20.0	24.0	28.0
14w0d	24.0	28.0	32.0
15w0d	27.0	31.0	35.0
16w0d	31.0	36.0	41.0
17w0d	34.0	39.0	44.0
18w0d	38.0	42.0	46.0
19w0d	40.0	45.0	50.0
20w0d	43.0	47.0	51.0
21w0d	45.0	49.0	53.0
22w0d	47.0	52.0	57.0
23w0d	52.0	57.0	62.0
24w0d	54.0	60.0	66.0
25w0d	58.0	64.0	70.0
26w0d	63.0	67.0	71.0
27w0d	63.0	68.0	73.0
28w0d	68.0	72.0	76.0
29w0d	71.0	75.0	79.0
30w0d	72.0	76.0	80.0
31w0d	74.0	80.0	86.0
32w0d	77.0	81.0	85.0
33w0d	78.0	84.0	90.0
34w0d	80.0	86.0	92.0
35w0d	81.5	88.0	94.5
36w0d	84.0	90.0	96.0
37w0d	85.5	92.0	98.5
38w0d	87.0	93.0	99.0
39w0d	87.0	95.0	103.0
40w0d	88.0	96.0	104.0
41w0d	90.0	98.0	106.0

(e) BPD CFEF FG

French fetal biometry: reference equations and comparison with other charts
L. J. SALOMON, M. DUYME, J. CREQUAT, G. BRODATY, C. TALMANT, N. FRIES and M. ALTHUSER
CFEF - Collège Français d'Echographie Foetale, Paris, France
Ultrasound Obstet Gynecol (in press) published online in Wiley InterScience (www.interscience.wiley.com).
DOI: 10.1002/uog.2733

Age	5% (mm)	50% (mm)	95% (mm)
15w0d	30.0	34.0	38.1
16w0d	32.4	36.5	40.7
17w0d	34.9	39.2	43.4
18w0d	37.6	41.9	46.3
19w0d	40.4	44.8	49.3
20w0d	43.2	47.8	52.4
21w0d	46.2	50.8	55.5
22w0d	49.2	53.9	58.7
23w0d	52.2	57.1	62.0
24w0d	55.2	60.2	65.2
25w0d	58.2	63.3	68.4
26w0d	61.2	66.4	71.6
27w0d	64.1	69.4	74.7
28w0d	67.0	72.4	77.8
29w0d	69.7	75.2	80.7
30w0d	72.3	77.9	83.5
31w0d	74.7	80.4	86.1
32w0d	77.0	82.8	88.6
33w0d	79.1	85.0	90.9
34w0d	80.9	86.9	93.0
35w0d	82.5	88.7	94.8
36w0d	83.9	90.1	96.4
37w0d	85.0	91.3	97.6
38w0d	85.7	92.2	98.6
39w0d	86.2	92.7	99.3
40w0d	86.2	92.9	99.6

(f) BPD CFEF-%tile Identical

French fetal biometry: reference equations and comparison with other charts
L. J. SALOMON, M. DUYME, J. CREQUAT, G. BRODATY, C. TALMANT, N. FRIES and M. ALTHUSER
CFEF - Collège Français d'Echographie Foetale, Paris, France
Ultrasound Obstet Gynecol (in press) published online in Wiley InterScience (www.interscience.wiley.com).
DOI: 10.1002/uog.2733

Age	1SD (mm)	5% (mm)	50% (mm)	95% (mm)
15w0d	2.5	30.0	34.0	38.1
16w0d	2.5	32.4	36.5	40.7
17w0d	2.6	34.9	39.2	43.4
18w0d	2.6	37.6	41.9	46.3
19w0d	2.7	40.4	44.8	49.3
20w0d	2.8	43.2	47.8	52.4
21w0d	2.8	46.2	50.8	55.5
22w0d	2.9	49.2	53.9	58.7
23w0d	3.0	52.2	57.1	62.0
24w0d	3.0	55.2	60.2	65.2
25w0d	3.1	58.2	63.3	68.4
26w0d	3.2	61.2	66.4	71.6
27w0d	3.2	64.1	69.4	74.7
28w0d	3.3	67.0	72.4	77.8
29w0d	3.3	69.7	75.2	80.7
30w0d	3.4	72.3	77.9	83.5
31w0d	3.5	74.7	80.4	86.1
32w0d	3.5	77.0	82.8	88.6
33w0d	3.6	79.1	85.0	90.9
34w0d	3.7	80.9	86.9	93.0
35w0d	3.7	82.5	88.7	94.8
36w0d	3.8	83.9	90.1	96.4
37w0d	3.9	85.0	91.3	97.6
38w0d	3.9	85.7	92.2	98.6
39w0d	4.0	86.2	92.7	99.3
40w0d	4.0	86.2	92.9	99.6

(g) BPD Chitty (O-I) GA

Altman, D.G., and Chitty, L.S.
"New charts for ultrasound dating of pregnancy"
Ultrasound Obstet. Gynecol. 10 (1997) 174-191

Value (mm)	Age	5%, 95% (days)
21.0	12w5d	7
22.0	13w0d	7
25.5	14w0d	7
29.5	15w0d	8
33.0	16w0d	9
36.5	17w0d	10
39.5	18w0d	10
43.0	19w0d	11
46.3	20w0d	12
49.5	21w0d	13
52.5	22w0d	14
55.5	23w0d	15
58.5	24w0d	16
61.3	25w0d	16
64.0	26w0d	17
67.0	27w0d	18
69.7	28w0d	19
72.3	29w0d	20
75.0	30w0d	21
77.7	31w0d	22
80.3	32w0d	23
82.7	33w0d	24
85.3	34w0d	25
87.7	35w0d	26
89.0	35w4d	27

(h) BPD Chitty (O-I) FG

Chitty, L.S., Altman, D.G.
"Charts of Fetal Size: 2. Head Measurements"
British Journal of Obstetrics & Gynaecology, Jan. 1994, vol. 101, P. 35-43

Age	3% (mm)	50% (mm)	97% (mm)
12w0d	14.4	18.3	22.1
13w0d	18.0	22.0	26.0
14w0d	21.5	25.7	29.8
15w0d	25.0	29.3	33.5
16w0d	28.5	32.8	37.2
17w0d	31.9	36.4	40.9
18w0d	35.2	39.8	44.4
19w0d	38.4	43.2	48.0
20w0d	41.7	46.5	51.4
21w0d	44.8	49.8	54.8
22w0d	47.9	53.0	58.2
23w0d	50.9	56.1	61.4
24w0d	53.8	59.2	64.6
25w0d	56.6	62.2	67.7
26w0d	59.4	65.0	70.7
27w0d	62.0	67.8	73.6
28w0d	64.6	70.5	76.5
29w0d	67.1	73.2	79.2
30w0d	69.5	75.7	81.9
31w0d	71.8	78.1	84.4
32w0d	74.0	80.4	86.9
33w0d	76.1	82.6	89.2
34w0d	78.0	84.7	91.4
35w0d	79.9	86.7	93.6
36w0d	81.6	88.6	95.6
37w0d	83.3	90.3	97.4
38w0d	84.8	92.0	99.2
39w0d	86.1	93.5	100.8
40w0d	87.4	94.8	102.3
41w0d	88.5	96.1	103.7
42w0d	89.4	97.2	104.9

(i) BPD Chitty (O-I)-%tile Identical

Chitty, L.S., Altman, D.G.
"Charts of Fetal Size: 2. Head Measurements"
British Journal of Obstetrics & Gynaecology, Jan. 1994, vol. 101, P. 35-43

Age	1SD (mm)	3% (mm)	50% (mm)	97% (mm)
12w0d	2.1	14.4	18.3	22.1
13w0d	2.1	18.0	22.0	26.0
14w0d	2.2	21.5	25.7	29.8
15w0d	2.3	25.0	29.3	33.5
16w0d	2.3	28.5	32.8	37.2
17w0d	2.4	31.9	36.4	40.9
18w0d	2.5	35.2	39.8	44.4
19w0d	2.5	38.4	43.2	48.0
20w0d	2.6	41.7	46.5	51.4
21w0d	2.7	44.8	49.8	54.8
22w0d	2.7	47.9	53.0	58.2
23w0d	2.8	50.9	56.1	61.4
24w0d	2.9	53.8	59.2	64.6
25w0d	2.9	56.6	62.2	67.7
26w0d	3.0	59.4	65.0	70.7
27w0d	3.1	62.0	67.8	73.6
28w0d	3.2	64.6	70.5	76.5
29w0d	3.2	67.1	73.2	79.2
30w0d	3.3	69.5	75.7	81.9
31w0d	3.4	71.8	78.1	84.4
32w0d	3.4	74.0	80.4	86.9
33w0d	3.5	76.1	82.6	89.2
34w0d	3.6	78.0	84.7	91.4
35w0d	3.6	79.9	86.7	93.6
36w0d	3.7	81.6	88.6	95.6
37w0d	3.8	83.3	90.3	97.4
38w0d	3.8	84.8	92.0	99.2
39w0d	3.9	86.1	93.5	100.8
40w0d	4.0	87.4	94.8	102.3
41w0d	4.0	88.5	96.1	103.7
42w0d	4.1	89.4	97.2	104.9

(j) BPD Chitty (O-O) GA

Altman, D.G., and Chitty, L.S.
"New charts for ultrasound dating of pregnancy "
Ultrasound Obstet. Gynecol. 10 (1997) 174-191

Value (mm)	Age	5%, 95% (days)
22.0	12w4d	7
23.5	13w0d	7
27.5	14w0d	8
31.0	15w0d	8
35.0	16w0d	9
38.5	17w0d	10
42.0	18w0d	11
45.0	19w0d	11
48.5	20w0d	13
51.7	21w0d	13
55.0	22w0d	14
58.0	23w0d	15
61.0	24w0d	16
64.0	25w0d	17
67.0	26w0d	18
69.7	27w0d	19
72.5	28w0d	20
75.3	29w0d	21
78.0	30w0d	22
80.7	31w0d	23
83.3	32w0d	24
85.7	33w0d	25
88.3	34w0d	26
90.7	35w0d	27
91.0	35w1d	27

(k) BPD Chitty (O-O) FG

Chitty, L.S., Altman, D.G.
"Charts of Fetal Size: 2. Head Measurements",
British Journal of Obstetrics & Gynaecology, Jan. 1994, vol. 101, P. 35-43

Age	3% (mm)	50% (mm)	97% (mm)
12w0d	15.5	19.7	23.9
13w0d	19.2	23.5	27.8
14w0d	22.9	27.3	31.7
15w0d	26.5	31.0	35.6
16w0d	30.1	34.7	39.4
17w0d	33.6	38.3	43.1
18w0d	37.0	41.9	46.8
19w0d	40.4	45.4	50.4
20w0d	43.7	48.8	53.9
21w0d	47.0	52.2	57.4
22w0d	50.2	55.5	60.8
23w0d	53.2	58.7	64.1
24w0d	56.3	61.8	67.3
25w0d	59.2	64.8	70.4
26w0d	62.0	67.8	73.5
27w0d	64.7	70.6	76.5
28w0d	67.4	73.4	79.3
29w0d	69.9	76.0	82.1
30w0d	72.4	78.6	84.7
31w0d	74.7	81.0	87.3
32w0d	76.9	83.3	89.7
33w0d	79.0	85.5	92.0
34w0d	81.0	87.6	94.3
35w0d	82.9	89.6	96.3
36w0d	84.6	91.4	98.3
37w0d	86.2	93.2	100.1
38w0d	87.7	94.7	101.8
39w0d	89.0	96.2	103.4
40w0d	90.2	97.5	104.8
41w0d	91.3	98.7	106.1
42w0d	92.2	99.7	107.2

(l) BPD Chitty (O-O)-%tile Identical

Chitty, L.S., Altman, D.G.
"Charts of Fetal Size: 2. Head Measurements",
British Journal of Obstetrics & Gynaecology, Jan. 1994, vol. 101, P. 35-43

Age	1SD (mm)	3% (mm)	50% (mm)	97% (mm)
12w0d	2.2	15.5	19.7	23.9
13w0d	2.3	19.2	23.5	27.8
14w0d	2.3	22.9	27.3	31.7
15w0d	2.4	26.5	31.0	35.6
16w0d	2.5	30.1	34.7	39.4
17w0d	2.5	33.6	38.3	43.1
18w0d	2.6	37.0	41.9	46.8
19w0d	2.6	40.4	45.4	50.4
20w0d	2.7	43.7	48.8	53.9
21w0d	2.8	47.0	52.2	57.4
22w0d	2.8	50.2	55.5	60.8
23w0d	2.9	53.2	58.7	64.1
24w0d	2.9	56.3	61.8	67.3
25w0d	3.0	59.2	64.8	70.4
26w0d	3.1	62.0	67.8	73.5
27w0d	3.1	64.7	70.6	76.5
28w0d	3.2	67.4	73.4	79.3
29w0d	3.2	69.9	76.0	82.1
30w0d	3.3	72.4	78.6	84.7
31w0d	3.3	74.7	81.0	87.3
32w0d	3.4	76.9	83.3	89.7
33w0d	3.5	79.0	85.5	92.0
34w0d	3.5	81.0	87.6	94.3
35w0d	3.6	82.9	89.6	96.3
36w0d	3.6	84.6	91.4	98.3
37w0d	3.7	86.2	93.2	100.1
38w0d	3.8	87.7	94.7	101.8
39w0d	3.8	89.0	96.2	103.4
40w0d	3.9	90.2	97.5	104.8
41w0d	3.9	91.3	98.7	106.1
42w0d	4.0	92.2	99.7	107.2

(m) BPD Hadlock GA

Hadlock FP, Deter RL, Harrist RB, Park SK:
"Estimating fetal age: Computer-assisted analysis of multiple fetal growth parameters"
Radiology 1984; 152: 497-502.

Value (mm)	Age	2SD (days)
14.0	12w0d	8
19.0	13w0d	8
24.0	14w0d	8
28.0	15w0d	8
32.0	16w0d	8
36.0	17w0d	8
39.5	18w0d	12
43.0	19w0d	12
46.5	20w0d	12
49.5	21w0d	12
52.7	22w0d	12
55.7	23w0d	12
58.7	24w0d	15
61.5	25w0d	15
64.3	26w0d	15
67.0	27w0d	15
69.7	28w0d	15
72.3	29w0d	15
74.7	30w0d	22
77.3	31w0d	22
79.7	32w0d	22
82.0	33w0d	22
84.3	34w0d	22
86.7	35w0d	22
89.0	36w0d	22
91.3	37w0d	22
93.3	38w0d	22
95.7	39w0d	22
97.7	40w0d	22
99.8	41w0d	22
101.9	42w0d	22

(n) BPD Hadlock FG

Hadlock FP, Deter RL, Harrist RB, Park SK:
"Estimating fetal age: Computer-assisted analysis of multiple fetal growth parameters"
Radiology 1984; 152: 497-502.

Age	-1SD (mm)	Mean (mm)	+1SD (mm)
12w0d	14.3	17.3	20.3
13w0d	18.2	21.2	24.2
14w0d	21.9	24.9	27.9
15w0d	25.6	28.6	31.6
16w0d	29.3	32.3	35.3
17w0d	32.9	35.9	38.9
18w0d	36.4	39.4	42.4
19w0d	39.9	42.9	45.9
20w0d	43.3	46.3	49.3
21w0d	46.7	49.7	52.7
22w0d	49.9	52.9	55.9
23w0d	53.1	56.1	59.1
24w0d	56.2	59.2	62.2
25w0d	59.2	62.2	65.2
26w0d	62.1	65.1	68.1
27w0d	64.9	67.9	70.9
28w0d	67.6	70.6	73.6
29w0d	70.2	73.2	76.2
30w0d	72.7	75.7	78.7
31w0d	75.1	78.1	81.1
32w0d	77.4	80.4	83.4
33w0d	79.6	82.6	85.6
34w0d	81.6	84.6	87.6
35w0d	83.5	86.5	89.5
36w0d	85.3	88.3	91.3
37w0d	87.0	90.0	93.0
38w0d	88.5	91.5	94.5
39w0d	89.9	92.9	95.9
40w0d	91.2	94.2	97.2
41w0d*	92.3	95.3	98.3
42w0d*	93.2	96.2	99.2

*: Data for extrapolated gestational age (weeks) when Extrapolate is set to ON

(o) BPD Hadlock-%tile Identical

Hadlock FP, Deter RL, Harrist RB, Park SK:
"Estimating fetal age: Computer-assisted analysis of multiple fetal growth parameters" Radiology 1984: 152: 497-502.

Age	1SD (mm)	-2SD (mm)	Mean (mm)	+2SD (mm)
12w0d	3.0	8.0	14.0	20.0
13w0d	3.0	13.0	19.0	25.0
14w0d	3.0	18.0	24.0	30.0
15w0d	3.0	22.0	28.0	34.0
16w0d	3.0	26.0	32.0	38.0
17w0d	3.0	30.0	36.0	42.0
18w0d	3.0	33.5	39.5	45.5
19w0d	3.0	37.0	43.0	49.0
20w0d	3.0	40.5	46.5	52.5
21w0d	3.0	43.5	49.5	55.5
22w0d	3.0	46.7	52.7	58.7
23w0d	3.0	79.7	55.7	61.7
24w0d	3.0	52.7	58.7	64.7
25w0d	3.0	55.5	61.5	67.5
26w0d	3.0	58.3	64.3	70.3
27w0d	3.0	61.0	67.0	73.0
28w0d	3.0	63.7	69.7	75.7
29w0d	3.0	66.3	72.3	78.3
30w0d	3.0	68.7	74.7	80.7
31w0d	3.0	71.3	77.3	83.03
32w0d	3.0	73.7	79.7	85.7
33w0d	3.0	76.0	82.0	88.0
34w0d	3.0	78.3	84.3	90.3
35w0d	3.0	80.7	86.7	92.7
36w0d	3.0	83.0	89.0	95.0
37w0d	3.0	85.3	91.3	97.3
38w0d	3.0	87.3	93.3	99.3
39w0d	3.0	89.7	95.7	101.7
40w0d	3.0	91.7	97.7	103.7
41w0d	3.0	93.8	99.8	105.8
42w0d	3.0	95.9	101.9	107.9

(p) BPD Hansmann GA

Hansmann H, Hackeloer B., Staudach A.
"Ultrasound Diagnosis in Obstetrics and Gynecology"
New York, Springer Verlag, 1986, English Edition (ISBN 0-387-15384-9); P 432

Value (mm)	Age	5%, 95% (days)
29.0	13w2d	7
31.5	14w0d	8
34.5	15w0d	9
37.5	16w0d	9
40.5	17w0d	9
44.0	18w0d	9
47.0	19w0d	10
50.3	20w0d	9
53.3	21w0d	11
56.5	22w0d	9
59.5	23w0d	10
62.5	24w0d	10
66.0	25w0d	11
69.0	26w0d	10
72.0	27w0d	10
75.0	28w0d	12
77.7	29w0d	14
80.3	30w0d	15
82.5	31w0d	16
84.7	32w0d	16
86.8	33w0d	19
88.8	34w0d	19
91.0	35w0d	25
92.3	36w0d	23
93.6	37w0d	20
94.7	38w0d	18
97.5	39w0d	20
104.0	40w0d	15
105.0	40w1d	14

(q) BPD Hansmann FG

Hansmann H, Hackeloer B.,
Staudach A.
"Ultrasound Diagnosis in Obstetrics and Gynecology"
New York, Springer Verlag, 1986,
English Edition
(ISBN 0-387-15384-9); P. 440-441

Age	5% (mm)	50% (mm)	95% (mm)
10w0d	9.0	14.0	18.0
11w0d	13.0	17.0	22.0
12w0d	16.0	21.0	25.0
13w0d	20.0	24.0	29.0
14w0d	23.0	28.0	32.0
15w0d	27.0	31.0	36.0
16w0d	30.0	35.0	39.0
17w0d	34.0	38.0	43.0
18w0d	37.0	42.0	46.0
19w0d	40.0	45.0	49.0
20w0d	44.0	48.0	53.0
21w0d	47.0	51.0	56.0
22w0d	50.0	55.0	59.0
23w0d	53.0	58.0	62.0
24w0d	56.0	61.0	65.0
25w0d	59.0	64.0	68.0
26w0d	62.0	67.0	71.0
27w0d	65.0	70.0	74.0
28w0d	68.0	72.0	77.0
29w0d	70.0	75.0	79.0
30w0d	73.0	77.0	82.0
31w0d	75.0	79.0	84.0
32w0d	77.0	82.0	86.0
33w0d	79.0	84.0	88.0
34w0d	81.0	86.0	90.0
35w0d	83.0	87.0	92.0
36w0d	84.0	89.0	93.0
37w0d	86.0	90.0	95.0
38w0d	87.0	91.0	96.0
39w0d	88.0	93.0	97.0
40w0d	89.0	93.0	98.0

(r) BPD Jeanty GA

Jeanty P
"Fetal Biometry"
Ultrasonography in Obstetrics and Gynecology: P 93 to 108

Value (mm)	Age	5%, 95% (days)
10.0	10w1d	21
14.5	11w0d	22
19.0	12w0d	21
23.5	13w0d	22
27.5	14w0d	22
31.5	15w0d	22
35.0	16w0d	21
38.5	17w0d	21
42.0	18w0d	21
45.5	19w0d	21
48.7	20w0d	21
52.0	21w0d	22
55.0	22w0d	22
57.7	23w0d	21
60.5	24w0d	21
63.3	25w0d	21
66.0	26w0d	21
68.7	27w0d	21
71.3	28w0d	21
74.0	29w0d	22
76.3	30w0d	21
78.7	31w0d	21
81.3	32w0d	22
83.7	33w0d	22
86.0	34w0d	22
88.0	35w0d	21
90.3	36w0d	21
92.7	37w0d	22
94.7	38w0d	21
97.0	39w0d	22
99.0	40w0d	21

(s) BPD JSUM GA

Standardization of ultrasonic fetal biometry and Japanese reference values
J Med Ultrasonics Vol. 30 No. 3 (2003)
J415-J440

Value (mm)	Age	2SD (days)
13.0	10w1d	4
16.0	11w0d	4
19.5	12w0d	4
22.5	13w0d	4
26.0	14w0d	5
29.5	15w0d	5
33.0	16w0d	5
36.5	17w0d	6
39.5	18w0d	6
43.0	19w0d	6
46.0	20w0d	7
49.5	21w0d	7
52.5	22w0d	7
55.7	23w0d	8
58.7	24w0d	8
61.7	25w0d	9
64.7	26w0d	9
67.3	27w0d	10
70.0	28w0d	10
72.7	29w0d	11
75.0	30w0d	11
77.3	31w0d	12
79.7	32w0d	12
81.7	33w0d	12
83.5	34w0d	13
85.3	35w0d	13
87.0	36w0d	14
88.3	37w0d	14
89.5	38w0d	14
90.0	38w3d	15

(t) BPD JSUM FG

Standardization of ultrasonic fetal biometry and Japanese reference values
J Med Ultrasonics Vol. 30 No. 3 (2003)
J415-J440

Age	-2SD (mm)	Mean (mm)	+2SD (mm)
10w0d	8.0	12.6	17.1
11w0d	11.3	15.9	20.6
12w0d	14.5	19.3	24.1
13w0d	17.8	22.7	27.6
14w0d	21.1	26.1	31.2
15w0d	24.4	29.5	34.7
16w0d	27.7	32.9	38.2
17w0d	30.9	36.3	41.7
18w0d	34.2	39.6	45.1
19w0d	37.4	43.0	48.5
20w0d	40.6	46.2	51.9
21w0d	43.7	49.5	55.3
22w0d	46.7	52.6	58.5
23w0d	49.7	55.7	61.8
24w0d	52.6	58.8	64.9
25w0d	55.5	61.7	68.0
26w0d	58.3	64.6	71.0
27w0d	60.9	67.4	73.9
28w0d	63.5	70.1	76.6
29w0d	65.9	72.6	79.3
30w0d	68.3	75.1	81.9
31w0d	70.5	77.4	84.3
32w0d	72.6	79.6	86.6
33w0d	74.5	81.7	88.8
34w0d	76.3	83.6	90.8
35w0d	78.0	85.3	92.7
36w0d	79.4	86.9	94.4
37w0d	80.7	88.3	95.9
38w0d	81.9	89.6	97.3
39w0d	82.8	90.6	98.4
40w0d	83.6	91.5	99.4
41w0d	84.1	92.2	100.2
42w0d	84.5	92.6	100.7

(u) BPD JSUM-SD Identical

Standardization of ultrasonic fetal biometry and Japanese reference values
J Med Ultrasonics Vol. 30 No. 3 (2003) J415-J440

Age	-2SD (mm)	-1.5SD (mm)	Mean (mm)	+1.5SD (mm)	+2SD (mm)
10w0d	8.0	9.1	12.6	16.0	17.1
11w0d	11.3	12.4	15.9	19.5	20.6
12w0d	14.5	15.7	19.3	22.9	24.1
13w0d	17.8	19.0	22.7	26.4	27.6
14w0d	21.1	22.4	26.1	29.9	31.2
15w0d	24.4	25.7	29.5	33.4	34.7
16w0d	27.7	29.0	32.9	36.9	38.2
17w0d	30.9	32.3	36.3	40.3	41.7
18w0d	34.2	35.5	39.6	43.7	45.1
19w0d	37.4	38.8	43.0	47.1	48.5
20w0d	40.6	42.0	46.2	50.5	51.9
21w0d	43.7	45.1	49.5	53.8	55.3
22w0d	46.7	48.2	52.6	57.1	58.5
23w0d	49.7	51.2	55.7	60.3	61.8
24w0d	52.6	54.2	58.8	63.4	64.9
25w0d	55.5	57.0	61.7	66.4	68.0
26w0d	58.3	59.8	64.6	69.4	71.0
27w0d	60.9	62.5	67.4	72.2	73.9
28w0d	63.5	65.2	70.1	75.0	76.6
29w0d	65.9	67.6	72.6	77.7	79.3
30w0d	68.3	70.0	75.1	80.2	81.9
31w0d	70.5	72.2	77.4	82.6	84.3
32w0d	72.6	74.3	79.6	84.9	86.6
33w0d	74.5	76.3	81.7	87.0	88.8
34w0d	76.3	78.2	83.6	89.0	90.8
35w0d	78.0	79.8	85.3	90.8	92.7
36w0d	79.4	81.3	86.9	92.5	94.4
37w0d	80.7	82.6	88.3	94.0	95.9
38w0d	81.9	83.8	89.6	95.3	97.3
39w0d	82.8	84.7	90.6	96.5	98.4
40w0d	83.6	85.6	91.5	97.4	99.4
41w0d	84.1	86.2	92.2	98.2	100.2
42w0d	84.5	86.5	92.6	98.7	100.7

(v) BPD Kurz FG

Kurtz AB, Wapner RJ, Kurtz RJ, et al. "Analysis of biparietal diameter as an accurate indicator of gestational age." J Clin Ultrasound 1980: 8; 319-326

Age	—	Mean (mm)	—
12w0d	—	19.3	—
13w0d	—	23.2	—
14w0d	—	27.0	—
15w0d	—	30.7	—
16w0d	—	34.4	—
17w0d	—	38.0	—
18w0d	—	41.4	—
19w0d	—	44.8	—
20w0d	—	48.1	—
21w0d	—	51.3	—
22w0d	—	54.4	—
23w0d	—	57.5	—
24w0d	—	60.4	—
25w0d	—	63.3	—
26w0d	—	66.0	—
27w0d	—	68.7	—
28w0d	—	71.3	—
29w0d	—	73.8	—
30w0d	—	76.2	—
31w0d	—	78.5	—
32w0d	—	80.8	—
33w0d	—	82.9	—
34w0d	—	85.0	—
35w0d	—	87.0	—
36w0d	—	88.8	—
37w0d	—	90.6	—
38w0d	—	92.3	—
39w0d	—	94.0	—
40w0d	—	95.5	—
41w0d	—	96.9	—
42w0d	—	98.3	—

(w) BPD Merz GA

Merz E:
"Ultrasound in Gynecology and Obstetrics"
Stuttgart, New York, Thieme Medical Publishers, Inc. 1991; 326-327

Value (mm)	Age	5%, 95% (days)
21.0	12w1d	11
24.0	13w0d	11
27.5	14w0d	11
31.5	15w0d	12
35.0	16w0d	12
38.5	17w0d	12
42.0	18w0d	13
45.5	19w0d	13
49.0	20w0d	13
52.0	21w0d	13
55.5	22w0d	14
58.5	23w0d	14
61.5	24w0d	14
64.5	25w0d	14
67.5	26w0d	15
70.5	27w0d	15
73.3	28w0d	15
76.0	29w0d	15
78.5	30w0d	15
81.3	31w0d	16
83.7	32w0d	15
86.3	33w0d	16
88.5	34w0d	17
90.8	35w0d	16
93.3	36w0d	16
95.3	37w0d	17
97.3	38w0d	16
99.3	39w0d	17
101.3	40w0d	17
102.0	40w2d	18

(x) BPD Merz FG

Merz E:
"Ultrasound in Gynecology and Obstetrics"
Stuttgart, New York, Thieme Medical Publishers, Inc. 1991; 312

Age	5% (mm)	50% (mm)	95% (mm)
12w0d	15.0	20.0	24.0
13w0d	19.0	24.0	28.0
14w0d	23.0	28.0	32.0
15w0d	27.0	31.0	36.0
16w0d	30.0	35.0	40.0
17w0d	34.0	39.0	44.0
18w0d	38.0	43.0	48.0
19w0d	41.0	46.0	51.0
20w0d	45.0	50.0	55.0
21w0d	48.0	53.0	58.0
22w0d	51.0	56.0	62.0
23w0d	54.0	60.0	65.0
24w0d	57.0	63.0	68.0
25w0d	60.0	66.0	71.0
26w0d	63.0	69.0	74.0
27w0d	66.0	72.0	77.0
28w0d	69.0	74.0	80.0
29w0d	71.0	77.0	83.0
30w0d	74.0	79.0	85.0
31w0d	76.0	82.0	88.0
32w0d	78.0	84.0	90.0
33w0d	80.0	86.0	92.0
34w0d	82.0	89.0	95.0
35w0d	84.0	91.0	97.0
36w0d	86.0	93.0	99.0
37w0d	88.0	94.0	101.0
38w0d	90.0	96.0	103.0
39w0d	91.0	98.0	104.0
40w0d	93.0	99.0	106.0

(y) BPD Nicolaides Identical

Nicolaides
"Fetal biometry at 14-40 week's gestation"
Ultrasound in Obstetrics and Gynecology 4 1994: P 34 to 48

Age	5% (mm)	Median (mm)	95% (mm)
14+0 - 14+6	28.0	31.0	34.0
15+0 - 15+6	31.0	34.0	37.0
16+0 - 16+6	34.0	37.0	40.0
17+0 - 17+6	36.0	40.0	43.0
18+0 - 18+6	39.0	43.0	47.0
19+0 - 19+6	42.0	46.0	50.0
20+0 - 20+6	45.0	49.0	54.0
21+0 - 21+6	48.0	52.0	57.0
22+0 - 22+6	51.0	56.0	61.0
23+0 - 23+6	54.0	59.0	64.0
24+0 - 24+6	57.0	62.0	68.0
25+0 - 25+6	60.0	66.0	71.0
26+0 - 26+6	63.0	69.0	75.0
27+0 - 27+6	66.0	72.0	78.0
28+0 - 28+6	69.0	75.0	81.0
29+0 - 29+6	72.0	78.0	85.0
30+0 - 30+6	74.0	81.0	88.0
31+0 - 31+6	77.0	83.0	90.0
32+0 - 32+6	79.0	86.0	93.0
33+0 - 33+6	81.0	88.0	96.0
34+0 - 34+6	83.0	90.0	98.0
35+0 - 35+6	85.0	92.0	100.0
36+0 - 36+6	86.0	94.0	102.0
37+0 - 37+6	87.0	95.0	103.0
38+0 - 38+6	88.0	96.0	104.0
39+0 - 39+6	89.0	97.0	105.0

(z) BPD Osaka Identical

Mineo Aoki, Motohiro Yamada
Evaluation of fetal growth
Obstetrics and gynecological treatment
Vol. 47 No. 5 (1983: 11)

Age	-2SD (mm)	-1.5SD (mm)	Mean (mm)	+1.5SD (mm)	+2SD (mm)
10w0d	9.5	10.4	13.3	16.2	17.1
11w0d	13.2	14.2	17.2	20.2	21.2
12w0d	16.7	17.7	20.9	24.1	25.1
13w0d	20.2	21.3	24.6	27.9	29.0
14w0d	23.6	24.7	28.2	31.7	32.8
15w0d	27.0	28.2	31.8	35.4	36.6
16w0d	30.2	31.4	35.2	39.0	40.2
17w0d	33.4	34.7	38.6	42.5	43.8
18w0d	36.6	37.9	42.0	46.1	47.4
19w0d	39.7	41.1	45.3	49.5	50.9
20w0d	42.7	44.1	48.5	52.9	54.3
21w0d	45.9	47.3	51.7	56.1	57.5
22w0d	48.8	50.3	54.8	59.3	60.8
23w0d	51.7	53.2	57.9	62.6	64.1
24w0d	54.5	56.1	60.9	65.7	67.3
25w0d	57.5	59.1	63.9	68.7	70.3
26w0d	60.1	61.7	66.7	71.7	73.3
27w0d	62.7	64.4	69.5	74.6	76.3
28w0d	65.5	67.2	72.3	77.4	79.1
29w0d	67.9	69.6	74.9	80.2	81.9
30w0d	70.4	72.1	77.4	82.7	84.4
31w0d	72.6	74.4	79.8	85.2	87.0
32w0d	74.9	76.7	82.1	87.5	89.3
33w0d	76.9	78.7	84.3	89.9	91.7
34w0d	78.8	80.6	86.2	91.8	93.6
35w0d	80.6	82.4	88.0	93.6	95.4
36w0d	82.0	83.9	89.6	95.3	97.2
37w0d	83.4	85.3	91.0	96.7	98.6
38w0d	84.5	86.4	92.1	97.8	99.7
39w0d	85.2	87.1	93.0	98.9	100.8
40w0d	85.8	87.7	93.6	99.5	101.4
41w0d*	86.0	87.9	93.8	99.7	101.6
42w0d*	86.1	88.0	93.9	99.8	101.7

*: Data for extrapolated gestational age (weeks) when Extrapolate is set to ON

(aa) BPD Rempen GA

Rempen A:
"Biometrie in der fruehgravitaet (l. trimenon)"
Der Frauenarzt 32/1991: 425-430

Value (mm)	Age	5%, 95% (days)
3.0	6w6d	8
3.5	7w0d	8
7.0	8w0d	8
10.5	9w0d	8
14.0	10w0d	8
17.5	11w0d	8
21.0	12w0d	8
24.5	13w0d	8
27.0	13w5d	8

(ab) BPD Rempen FG

Rempen A:
"Biometrie in der fruehgravitaet (l. trimenon)"
Der Frauenarzt 32/1991: 425-430

Age	5% (mm)	50% (mm)	95% (mm)
6w2d	-	2.0	5.7
7w0d	0.6	4.3	8.0
8w0d	3.9	7.6	11.3
9w0d	7.0	10.7	14.4
10w0d	10.2	13.9	17.6
11w0d	13.3	17.0	20.7
12w0d	16.3	20.0	23.7
13w0d	19.4	23.1	26.8
13w2d	20.2	23.9	27.6

(ac) BPD Sabbagh FG

UDY E. SABBAGHA, MD
"Stanardization of sonar cephalometry and gestational age."
Obstetrics and Gynaecology October 1978; 52; 402-406

Age	—	Mean (mm)	—
16w0d	—	37.0	—
17w0d	—	40.0	—
18w0d	—	43.0	—
19w0d	—	45.0	—
20w0d	—	47.0	—
21w0d	—	50.0	—
22w0d	—	53.0	—
23w0d	—	56.0	—
24w0d	—	59.0	—
25w0d	—	62.0	—
26w0d	—	66.0	—
27w0d	—	69.0	—
28w0d	—	72.0	—
29w0d	—	75.0	—
30w0d	—	78.0	—
31w0d	—	80.0	—
32w0d	—	83.0	—
33w0d	—	85.0	—
34w0d	—	87.0	—
35w0d	—	88.0	—
36w0d	—	90.0	—
37w0d	—	92.0	—
38w0d	—	93.0	—
39w0d	—	94.0	—
40w0d	—	95.0	—

(ad) BPD Shepard no charts

(ae) BPD Tokyo GA

Norio Shinozuka, Haruo Masuda, Hidenori Kagawa, Yuji Taketani
Standard Values of Ultrasonographic Fetal Biometry
Jpn Med Ultrasonics Vol. 23 No. 12 (1996) P 877-888

Value (mm)	Age	5%, 95% (days)
13.0	11w0d	7
17.5	12w0d	8
22.0	13w0d	8
26.0	14w0d	9
29.5	15w0d	9
33.5	16w0d	10
37.0	17w0d	10
40.0	18w0d	11
43.5	19w0d	11
46.5	20w0d	12
49.7	21w0d	13
52.7	22w0d	13
55.7	23w0d	14
58.5	24w0d	15
61.3	25w0d	15
64.0	26w0d	16
66.7	27w0d	17
69.3	28w0d	17
71.7	29w0d	18
74.3	30w0d	19
76.7	31w0d	20
79.0	32w0d	21
81.3	33w0d	21
83.7	34w0d	22
86.0	35w0d	23
88.3	36w0d	24
90.0	36w5d	25

(af) BPD Tokyo FG

Norio Shinozuka, Haruo Masuda, Hidenori Kagawa, Yuji Taketani
Standard Values of Ultrasonographic Fetal Biometry
Jpn Med Ultrasonics Vol. 23 No. 12 (1996) P 877-888

Age	5% (mm)	50% (mm)	95% (mm)
10w0d	10.5	14.3	18.1
11w0d	13.7	17.6	21.5
12w0d	17.0	21.0	25.0
13w0d	20.3	24.4	28.5
14w0d	23.6	27.8	32.0
15w0d	26.9	31.2	35.5
16w0d	30.2	34.6	39.0
17w0d	33.5	38.0	42.4
18w0d	36.8	41.3	45.8
19w0d	40.0	44.6	49.2
20w0d	43.2	47.9	52.6
21w0d	46.3	51.1	55.9
22w0d	49.3	54.2	59.1
23w0d	52.3	57.3	62.3
24w0d	55.2	60.3	65.3
25w0d	58.0	63.2	68.4
26w0d	60.7	66.0	71.3
27w0d	63.3	68.7	74.1
28w0d	65.9	71.4	76.9
29w0d	68.3	73.9	79.4
30w0d	70.6	76.3	81.9
31w0d	72.8	78.5	84.2
32w0d	74.7	80.6	86.5
33w0d	76.7	82.6	88.5
34w0d	78.5	84.5	90.4
35w0d	80.0	86.1	92.2
36w0d	81.4	87.6	93.8
37w0d	82.7	89.0	95.2
38w0d	83.7	90.1	96.5
39w0d	84.6	91.1	97.5
40w0d	85.2	91.8	98.4
41w0d	85.8	92.4	99.0
42w0d	86.0	92.8	99.5

(ag) BPD Tokyo-SD Identical

Norio Shinozuka, Haruo Masuda, Hidenori Kagawa, Yuji Taketani
Standard Values of Ultrasonographic Fetal Biometry
Jpn Med Ultrasonics Vol. 23 No. 12 (1996) P 877-888

Age	-1.5SD (mm)	Mean (mm)	+1.5SD (mm)
10w0d	10.9	14.3	17.7
11w0d	14.0	17.6	21.2
12w0d	17.3	21.0	24.7
13w0d	20.6	24.4	28.2
14w0d	24.0	27.8	31.6
15w0d	27.3	31.2	35.1
16w0d	30.6	34.6	38.6
17w0d	34.0	38.0	42.0
18w0d	37.1	41.3	45.5
19w0d	40.4	44.6	48.8
20w0d	43.6	47.9	52.2
21w0d	46.7	51.1	55.5
22w0d	49.7	54.2	58.7
23w0d	52.8	57.3	61.8
24w0d	55.7	60.3	64.9
25w0d	58.5	63.2	67.9
26w0d	61.2	66.0	70.8
27w0d	63.8	68.7	73.6
28w0d	66.5	71.4	76.3
29w0d	68.9	73.9	78.9
30w0d	71.2	76.3	81.4
31w0d	73.2	78.5	83.8
32w0d	75.2	80.6	86.0
33w0d	77.2	82.6	88.0
34w0d	79.1	84.5	89.9
35w0d	80.5	86.1	91.7
36w0d	81.9	87.6	93.3
37w0d	83.3	89.0	94.7
38w0d	84.3	90.1	95.9
39w0d	85.2	91.1	97.0
40w0d	85.8	91.8	97.8
41w0d	86.3	92.4	98.5
42w0d	86.7	92.8	98.9

(5) CER

(a) CER Goldstein FG

Israel Goldstein, M.D.
"Cerebellar measurements with ultrasonography in the evalution of fetal growth and development."
Am J Obstet Gynecol 1987; 156: 1065-1069

Age	10% (mm)	50% (mm)	90% (mm)
15w0d	10.0	14.0	16.0
16w0d	14.0	16.0	17.0
17w0d	16.0	17.0	18.0
18w0d	17.0	18.0	19.0
19w0d	18.0	19.0	22.0
20w0d	18.0	20.0	22.0
21w0d	19.0	22.0	24.0
22w0d	21.0	23.0	24.0
23w0d	22.0	24.0	26.0
24w0d	22.0	25.0	28.0
25w0d	23.0	28.0	29.0
26w0d	25.0	29.0	32.0
27w0d	26.0	30.0	32.0
28w0d	27.0	31.0	34.0
29w0d	29.0	34.0	38.0
30w0d	31.0	35.0	40.0
31w0d	32.0	38.0	43.0
32w0d	33.0	38.0	42.0
33w0d	32.0	40.0	44.0
34w0d	33.0	40.0	44.0
35w0d	31.0	40.5	47.0
36w0d	36.0	43.0	55.0
37w0d	37.0	45.0	55.0
38w0d	40.0	48.5	55.0
39w0d	52.0	52.0	55.0

(b) CER Hill GA

LYNDON M. HILL, MD
"The transverse cerebellar diameter in estimating gestational age in the large for gestational age fetus."
Obstet Gynecol 1990; 75: 981-985

Value (mm)	Age	2SD (day)
14.0	15w1d	7
15.3	16w0d	7
16.8	17w0d	7
18.2	18w0d	7
19.6	19w0d	13
21.0	20w0d	13
22.6	21w0d	13
24.0	22w0d	13
25.4	23w0d	13
26.8	24w0d	13
28.4	25w0d	14
29.8	26w0d	14
31.4	27w0d	14
33.0	28w0d	14
34.6	29w0d	14
36.3	30w0d	17
38.0	31w0d	17
39.8	32w0d	17
41.7	33w0d	17
43.7	34w0d	17
46.0	35w0d	17
48.3	36w0d	22
51.0	37w0d	22
55.0	38w0d	22
56.0	38w2d	22

(c) CER Hill FG

LYNDON M. HILL, MD
"The transverse cerebellar diameter in estimating gestational age in the large for gestational age fetus."
Obstet Gynecol 1990; 75: 981-985

Age	-2SD (mm)	Mean (mm)	+2SD (mm)
15w0d	12.0	15.0	18.0
16w0d	14.0	16.0	18.0
17w0d	15.0	17.0	19.0
18w0d	16.0	18.0	20.0
19w0d	18.0	20.0	22.0
20w0d	17.0	20.0	23.0
21w0d	19.0	22.0	25.0
22w0d	20.0	23.0	26.0
23w0d	21.0	24.0	27.0
24w0d	22.0	26.0	30.0
25w0d	24.0	28.0	32.0
26w0d	26.0	30.0	34.0
27w0d	26.0	30.0	34.0
28w0d	29.0	33.0	37.0
29w0d	30.0	34.0	38.0
30w0d	33.0	37.0	41.0
31w0d	35.0	39.0	43.0
32w0d	36.0	41.0	46.0
33w0d	38.0	43.0	48.0
34w0d	37.0	46.0	55.0
35w0d	40.0	47.0	54.0
36w0d	40.0	49.0	58.0
37w0d	40.0	51.0	62.0
38w0d	39.0	51.0	63.0
39w0d	42.0	52.0	62.0
40w0d	44.0	52.0	60.0

(d) CER Nicolaides Identical

Nicolaides
"Fetal biometry at 14-40 week's gestation"
Ultrasound in Obstetrics and Gynecology 4 1994: P34 to 48

Age	5% (mm)	Median (mm)	95% (mm)
14+0 - 14+6	12.0	14.0	15.0
15+0 - 15+6	13.0	15.0	17.0
16+0 - 16+6	14.0	16.0	18.0
17+0 - 17+6	15.0	17.0	19.0
18+0 - 18+6	16.0	18.0	21.0
19+0 - 19+6	17.0	20.0	22.0
20+0 - 20+6	19.0	21.0	24.0
21+0 - 21+6	20.0	22.0	25.0
22+0 - 22+6	21.0	24.0	27.0
23+0 - 23+6	22.0	25.0	28.0
24+0 - 24+6	24.0	26.0	30.0
25+0 - 25+6	25.0	28.0	31.0
26+0 - 26+6	26.0	29.0	33.0
27+0 - 27+6	27.0	31.0	34.0
28+0 - 28+6	29.0	32.0	36.0
29+0 - 29+6	30.0	33.0	37.0
30+0 - 30+6	31.0	35.0	39.0
31+0 - 31+6	32.0	36.0	40.0
32+0 - 32+6	34.0	37.0	42.0
33+0 - 33+6	35.0	39.0	43.0
34+0 - 34+6	36.0	40.0	44.0
35+0 - 35+6	37.0	41.0	46.0
36+0 - 36+6	38.0	42.0	47.0
37+0 - 37+6	39.0	43.0	48.0
38+0 - 38+6	40.0	44.0	49.0
39+0 - 39+6	41.0	45.0	51.0

(6) Clavicle

(a) Clavicle Yarkoni GA

Yarkoni S, Schmidt W, Jeanty P, et al "Clavicular measurement: A new biometric parameter for fetal evaluation" J Ultrasound Med. 4: 467-470, 1985.

Value (mm)	Age	5%, 95% (days)
11.0	13w6d	24
11.2	14w0d	24
13.7	15w0d	38
14.8	16w0d	38
16.0	17w0d	31
16.6	18w0d	27
17.3	19w0d	25
19.7	20w0d	38
20.8	21w0d	38
21.5	22w0d	31
22.2	23w0d	24
23.3	24w0d	24
25.8	25w0d	39
27.0	26w0d	31
27.5	27w0d	28
28.2	28w0d	24
29.3	29w0d	26
31.8	30w0d	38
33.0	31w0d	31
33.5	32w0d	24
34.2	33w0d	24
36.7	34w0d	38
37.8	35w0d	38
38.5	36w1d	31
39.0	37w0d	24
40.2	38w0d	24
42.7	39w0d	38
43.8	40w0d	38
45.0	41w6d	25

(b) Clavicle Yarkoni FG

Yarkoni S, Schmidt W, Jeanty P, et al "Clavicular measurement: A new biometric parameter for fetal evaluation" J Ultrasound Med. 4: 467-470, 1985.

Age	5% (mm)	50% (mm)	95% (mm)
15w0d	11.0	15.8	20.6
16w0d	12.0	16.8	21.6
17w0d	13.0	17.8	22.6
18w0d	13.9	18.7	23.5
19w0d	14.9	19.7	24.5
20w0d	15.9	20.7	25.5
21w0d	16.9	21.7	26.5
22w0d	17.9	22.7	27.5
23w0d	18.8	23.6	28.4
24w0d	19.8	24.6	29.4
25w0d	20.8	25.6	30.4
26w0d	21.8	26.6	31.4
27w0d	22.7	27.5	32.3
28w0d	23.7	28.5	33.3
29w0d	24.7	29.5	34.3
30w0d	25.7	30.5	35.3
31w0d	26.7	31.5	36.3
32w0d	27.6	32.4	37.2
33w0d	28.6	33.4	38.2
34w0d	29.6	34.4	39.2
35w0d	30.6	35.4	40.2
36w0d	31.6	36.4	41.2
37w0d	32.5	37.3	42.1
38w0d	33.5	38.3	43.1
39w0d	34.5	39.3	44.1
40w0d	35.5	40.3	45.1

(7) CRL

(a) CRL ASUM-V1 GA

POLICY ON OBSTETRIC EXAMINATIONS
NORMAL ULTRASONIC FETAL MEASUREMENTS JUNE 1991

Value (mm)	Age
2.0	6w0d
9.0	7w0d
16.0	8w0d
24.0	9w0d
33.0	10w0d
43.0	11w0d
55.0	12w0d
68.0	13w0d
82.0	14w0d

(b) CRL ASUM-V2 GA

Australian Society of Ultrasound Medicine (ASUM) - Policy statement
Statement on normal ultrasonics fetal measurements
(Revised May 2001) P 28-P 31

Value (mm)	Age
1.0	5w3d
5.0	6w0d
11.0	7w0d
19.0	8w0d
26.0	9w0d
35.0	10w0d
45.0	11w0d
56.0	12w0d
70.0	13w0d
84.0	13w5d
87.0	13w5d

(c) CRL ASUM-V2 FG

Australian Society of Ultrasound Medicine (ASUM) - Policy statement
Statement on normal ultrasonics fetal measurements
(Revised May 2001) P 28-P 31

Age	—	Mean (mm)	—
5w2d	—	1.0	—
5w6d	—	4.0	—
7w0d	—	11.0	—
8w0d	—	17.0	—
9w0d	—	23.0	—
10w0d	—	34.0	—
11w0d	—	44.0	—
12w0d	—	57.0	—
13w0d	—	68.0	—
14w0d	—	81.0	—
14w4d	—	87.0	—

(d) CRL BMUS GA

BMUS
Fetal size & dating: Charts recommended for clinical obstetric practice
February 2007

Value (mm)	Age	5% (day)	95% (day)
4	6w0d	38	46
10	7w2d	47	55
16	8w2d	54	61
22	9w0d	58	67
32	10w1d	66	75
42	11w0d	72	81
54	12w1d	80	88
66	13w0d	87	95
80	14w2d	96	103

(e) CRL Hadlock GA

Hadlock FP, Shah YP, Kanon DJ, Lindsey JV:
"Fetal crown-rump length: Reevaluation of relation to menstrual age (5-18 weeks) with high-resolution real-time US",
Radiology 1992; 182: 501-505

Value (mm)	Age	1SD (days)
2.0	5w5d	2
3.5	6w0d	2
10.0	7w0d	2
16.0	8w0d	2
23.0	9w0d	3
31.0	10w0d	3
41.0	11w0d	3
53.0	12w0d	4
67.0	13w0d	4
80.0	14w0d	4
91.0	15w0d	5
101.0	16w0d	5
111.0	17w0d	5
121.0	18w0d	6

(f) CRL Hadlock FG

Hadlock FP, Shah YP, Kanon DJ, Lindsey JV:
"Fetal crown-rump length: Reevaluation of relation to menstrual age (5-18 weeks) with high-resolution real-time US",
Radiology 1992;182: 501-505

Age	-1SD (mm)	Mean (mm)	+1SD (mm)
5w5d	3.3	3.8	4.3
6w0d	4.0	4.6	5.2
7w0d	7.4	8.5	9.6
8w0d	12.6	14.5	16.4
9w0d	19.6	22.6	25.6
10w0d	28.3	32.6	36.9
11w0d	38.2	44.1	49.9
12w0d	48.8	56.2	63.6
13w0d	59.3	68.3	77.3
14w0d	69.3	79.8	90.3
15w0d	78.5	90.5	102.4
16w0d	87.1	100.3	113.5
17w0d	95.3	109.8	124.3
18w0d	104.0	119.8	135.6

(g) CRL Hansmann GA

Hansmann H, Hackeloer B., Staudach A.
"Ultrasound Diagnosis in Obstetrics and Gynecology"
New York, Springer Verlag, 1986, English Edition
(ISBN 0-387-15384-9); P 439

Value (mm)	Age	2SD (days)
6.0	6w0d	6
10.5	7w0d	7
15.5	8w0d	7
22.0	9w0d	7
29.0	10w0d	8
38.0	11w0d	8
50.0	12w0d	9
64.5	13w0d	10
80.0	14w0d	11
93.0	15w0d	12
104.5	16w0d	13
114.5	17w0d	14
124.5	18w0d	14
133.0	19w0d	15
141.0	20w0d	16
150.0	21w2d	16

(h) CRL Hansmann FG

Hansmann H, Hackeloer B., Staudach A.
"Ultrasound Diagnosis in Obstetrics and Gynecology"
New York, Springer Verlag, 1986, English Edition
(ISBN 0-387-15384-9); P 438

Age	-2SD (mm)	Mean (mm)	+2SD (mm)
6w0d	2.3	6.9	11.5
7w0d	5.0	11.4	17.8
8w0d	8.0	16.2	24.4
9w0d	12.5	22.6	32.6
10w0d	19.2	31.0	42.8
11w0d	27.9	41.6	55.2
12w0d	38.4	53.8	69.2
13w0d	49.7	66.9	84.1
14w0d	60.9	80.0	99.0
15w0d	71.4	92.2	113.0
16w0d	80.3	103.0	125.6
17w0d	87.4	111.8	136.2
18w0d	92.8	119.1	145.3
19w0d	97.5	125.5	153.6
20w0d	102.9	132.8	162.6
20w1d	104.0	134.0	164.1

(i) CRL Jeanty GA

Jeanty P
"Fetal Biometry"
Ultrasonography in Obstetrics and Gynecology:P93 to 108

Value (mm)	Age	5%, 95% (days)
10.0	7w3d	4
13.0	8w0d	4
20.0	9w0d	5
27.0	10w0d	5
36.0	11w0d	5
46.0	12w0d	5
49.0	12w2d	5

(j) CRL JSUM GA

Standardization of ultrasonic fetal biometry and Japanese reference values
J Med Ultrasonics Vol.30 No.3 (2003) J415-J440

Value (mm)	Age	10%, 90% (days)
13	8w0d	7
20	9w0d	6
28	10w0d	5
38	11w0d	5
43	11w3d	4

(k) CRL JSUM FG

Standardization of ultrasonic fetal biometry and Japanese reference values
J Med Ultrasonics Vol.30 No.3 (2003) J415-J440

Age	5% (mm)	50% (mm)	95% (mm)
7w0d	5.7	10.1	17.2
8w0d	7.7	13.3	18.4
9w0d	11.7	20.0	27.0
10w0d	18.2	29.0	39.0
11w0d	26.7	38.4	49.8
11w3d	32.7	43.3	53.8

(l) CRL Nelson GA

Nelson
"Comparison of Methods for Determining Crown-Rump Measurement by Real-Time Ultrasound"
J Clin Ultrasound 9: 67-70, Februart 1981: P 702 to P710

Value (mm)	Age
15.0	8w4d
20.0	9w0d
31.0	10w0d
43.0	11w0d
55.0	12w0d
66.0	13w0d
78.0	14w0d
90.0	15w0d

(m) CRL Osaka Identical

Mineo Aoki, Motohiro Yamada
Evaluation of fetal growth
Obstetrics and gynecological treatment
Vol. 47 No. 5 (1983:11)

Age	-2SD (mm)	-1.5SD (mm)	Mean (mm)	+1.5SD (mm)	+2SD (mm)
7w0d	5.5	6.3	8.7	11.1	11.9
8w0d	7.8	9.1	13.0	16.9	18.2
9w0d	13.0	14.8	20.4	26.0	27.8
10w0d	20.4	22.8	30.0	37.2	39.6
11w0d	29.6	32.5	41.2	49.9	52.8
12w0d	39.2	42.6	53.0	63.4	66.8
12w6d	47.6	51.5	63.2	74.9	78.8

(n) CRL Rempen GA

Rempen A:
"Biometrie in der fruehgravitaet (l. trimenon)"
Der Frauenarzt 32/1991:425-430

Value (mm)	Age	5%, 95% (days)
2.0	6w0d	6
9.0	7w0d	6
17.0	8w0d	6
25.0	9w0d	6
34.0	10w0d	6
43.0	11w0d	6
54.0	12w0d	6
67.0	13w0d	6
78.0	13w5d	6

(o) CRL Rempen FG

Rempen A:
"Biometrie in der fruehgravitaet (l. trimenon)"
Der Frauenarzt 32/1991: 425-430

Age	5%(mm)	50% (mm)	95% (mm)
5w5d	—	1.2	9.0
6w0d	—	3.0	10.8
7w0d	1.7	9.5	17.3
8w0d	8.9	16.7	24.5
9w0d	16.8	24.6	32.4
10w0d	25.5	33.3	41.1
11w0d	34.8	42.6	50.4
12w0d	44.9	52.7	60.5
13w0d	55.7	63.5	71.3
13w2d	58.9	66.7	74.5

(p) CRL Robinson GA

H.P. Robinson, Honorary Senior Registrar
"A critical evaluation of sonar crown-rump length measurements"
British Journal of Obstetrics and Gynaecology September 1975 82: 702-710

Value (mm)	Age	5%, 95% (days)
6.7	6w3d	5
10.0	7w0d	5
16.0	8w0d	5
24.0	9w0d	5
33.0	10w0d	5
44.0	11w0d	5
56.0	12w0d	5
70.0	13w0d	5
82.4	13w6d	5

(q) CRL Robinson FG

H.P. Robinson, Honorary Senior Registrar
"A critical evaluation of sonar crown-rump length measurements"
British Journal of Obstetrics and Gynaecology September 1975 82: 702-710

Age	-2SD (mm)	Mean (mm)	+2SD (mm)
6w2d	3.9	6.8	9.8
7w0d	6.6	10.3	13.9
8w0d	11.7	16.4	21.0
9w0d	18.2	23.9	29.5
10w0d	26.1	32.7	39.3
11w0d	35.5	43.1	50.7
12w0d	46.2	54.8	63.3
13w0d	58.4	67.9	77.4
14w0d	71.9	82.4	92.9

(r) CRL Tokyo GA

Takashi Okai Department of Obstetrics and Gynecology, Faculty of Medicine, University of Tokyo
Studies on Fetal Growth and Functional Developments
Official Journal of the Japan Society of Obstetrics and Gynecology
ACTA OBST GYNEC JPN Vol. 38, No. 8, pp. 1209-1217, 1986

Value (mm)	Age	2SD (days)
15.0	8w0d	7
20.0	9w0d	7
28.0	10w0d	5
37.0	11w0d	5
47.0	12w0d	5
58.0	13w0d	6
70.0	14w0d	7

(s) CRL Tokyo FG

Takashi Okai Department of Obstetrics and Gynecology, Faculty of Medicine, University of Tokyo
Studies on Fetal Growth and Functional Developments
Official Journal of the Japan Society of Obstetrics and Gynecology
ACTA OBST GYNEC JPN Vol. 38, No. 8, pp. 1209-1217, 1986

Age	5% (mm)	50% (mm)	95% (mm)
7w6d	9.5	14.6	20.5
8w0d	9.6	15.3	20.7
9w0d	13.7	20.2	25.4
10w0d	19.3	27.8	33.3
11w0d	26.4	36.6	43.7
12w0d	35.6	46.8	56.7
13w0d	45.0	57.9	71.5
14w0d	56.5	70.3	90.1

(8) Fibula

(a) Fibula Merz FG

Merz E:
"Ultrasound in Gynecology and Obstetrics"
Stuttgart, New York, Thieme Medical Publishers, Inc. 1991; 312

Age	5% (mm)	50% (mm)	95% (mm)
12w0d	2.0	5.0	8.0
13w0d	5.0	8.0	11.0
14w0d	8.0	11.0	14.0
15w0d	11.0	14.0	17.0
16w0d	14.0	17.0	20.0
17w0d	16.0	19.0	22.0
18w0d	19.0	22.0	25.0
19w0d	21.0	25.0	28.0
20w0d	24.0	27.0	30.0
21w0d	26.0	30.0	33.0
22w0d	29.0	32.0	35.0
23w0d	31.0	35.0	38.0
24w0d	33.0	37.0	40.0
25w0d	36.0	39.0	42.0
26w0d	38.0	41.0	45.0
27w0d	40.0	43.0	47.0
28w0d	42.0	45.0	49.0
29w0d	43.0	47.0	51.0
30w0d	45.0	49.0	52.0
31w0d	47.0	51.0	54.0
32w0d	48.0	52.0	56.0
33w0d	50.0	54.0	58.0
34w0d	51.0	55.0	59.0
35w0d	53.0	57.0	60.0
36w0d	54.0	58.0	62.0
37w0d	55.0	59.0	63.0
38w0d	56.0	60.0	64.0
39w0d	57.0	61.0	66.0
40w0d	59.0	63.0	67.0

(b) Fibula Chitty-%tile Identical

Chitty
Charts of fetal size: limb bones
BJOG: an International Journal of Obstetrics and Gynaecology
August 2002, Vol.109, pp.919-929

Age	1SD (mm)	3% (mm)	50% (mm)	97% (mm)
12w0d	1.7	3.6	6.8	10.0
13w0d	1.7	5.2	8.5	11.8
14w0d	1.8	7.4	10.8	14.2
15w0d	1.9	10.0	13.5	17.0
16w0d	1.9	12.8	16.4	20.0
17w0d	2.0	15.6	19.3	23.0
18w0d	2.0	18.4	22.2	26.0
19w0d	2.1	21.2	25.1	29.0
20w0d	2.1	23.9	27.9	31.8
21w0d	2.2	26.4	30.5	34.6
22w0d	2.2	28.9	33.1	37.3
23w0d	2.3	31.2	35.5	39.8
24w0d	2.3	33.5	37.9	42.3
25w0d	2.4	35.6	40.1	44.6
26w0d	2.4	37.6	42.2	46.8
27w0d	2.5	39.6	44.3	49.0
28w0d	2.6	41.4	46.2	51.0
29w0d	2.6	43.1	48.0	52.9
30w0d	2.7	44.8	49.8	54.8
31w0d	2.7	46.4	51.5	56.6
32w0d	2.8	47.9	53.1	58.3
33w0d	2.8	49.3	54.6	59.9
34w0d	2.9	50.7	56.1	61.5
35w0d	2.9	52.0	57.5	63.0
36w0d	3.0	53.2	58.8	64.4
37w0d	3.0	54.4	60.1	65.8
38w0d	3.1	55.5	61.3	67.1
39w0d	3.1	56.6	62.5	68.4
40w0d	3.2	57.6	63.6	69.6
41w0d	3.3	58.6	64.7	70.8
42w0d	3.3	59.5	65.8	72.0

(9) FL

(a) FL ASUM-V1 GA

POLICY ON OBSTETRIC EXAMINATIONS
NORMAL ULTRASONIC FETAL MEASUREMENTS JUNE 1991

Value (mm)	Age	5%, 95% (Days)
10.0	12w6d	10
10.5	13w0d	10
14.5	14w0d	10
17.7	15w0d	10
21.0	16w0d	10
24.3	17w0d	10
27.3	18w0d	10
30.3	19w0d	10
33.0	20w0d	10
36.0	21w0d	10
38.7	22w0d	10
41.3	23w0d	22
43.7	24w0d	22
46.3	25w0d	22
48.7	26w0d	22
51.0	27w0d	22
53.3	28w0d	22
55.7	29w0d	22
58.0	30w0d	22
60.0	31w0d	22
62.3	32w0d	22
64.3	33w0d	22
66.5	34w0d	22
68.5	35w0d	22
70.5	36w0d	22
72.5	37w0d	22
74.5	38w0d	22
76.5	39w0d	22
78.2	40w0d	22
79.0	40w3d	22

(b) FL ASUM-V2 GA

Australian Society of Ultrasound Medicine (ASUM) - Policy statement Statement on normal ultrasonics fetal measurements
(Revised May 2001) P 28-P 31

Value (mm)	Age
6.0	10w5d
7.0	11w0d
9.7	12w0d
12.5	13w0d
15.3	14w0d
18.0	15w0d
21.0	16w0d
24.0	17w0d
27.0	18w0d
30.0	19w0d
32.7	20w0d
35.7	21w0d
38.3	22w0d
41.0	23w0d
43.7	24w0d
46.3	25w0d
49.0	26w0d
51.3	27w0d
53.7	28w0d
55.8	29w0d
58.0	30w0d
60.0	31w0d
62.0	32w0d
64.0	33w0d
66.0	34w0d
67.8	35w0d
69.5	36w0d
71.3	37w0d
72.8	38w0d
74.4	39w0d
76.0	40w0d
77.5	41w0d
79.0	42w0d
80.4	43w0d
81.8	44w0d
82.0	44w1d

(c) FL ASUM-V2 FG

Australian Society of Ultrasound Medicine (ASUM) - Policy statement Statement on normal ultrasonics fetal measurements
(Revised May 2001) P 28-P 31

Age	-2SD (mm)	Mean (mm)	+2SD (mm)
11w0d	6.0	8.0	10.0
12w0d	7.5	10.0	12.5
13w0d	8.5	11.0	13.5
14w0d	12.0	15.0	18.0
15w0d	13.5	17.0	20.5
16w0d	18.0	22.0	26.0
17w0d	21.0	25.0	29.0
18w0d	23.0	28.0	33.0
19w0d	25.0	30.0	35.0
20w0d	26.0	32.0	38.0
21w0d	28.0	34.0	40.0
22w0d	32.0	37.0	42.0
23w0d	38.0	43.0	48.0
24w0d	41.0	45.0	49.0
25w0d	43.0	48.0	53.0
26w0d	44.0	49.0	54.0
27w0d	45.0	50.0	55.0
28w0d	50.0	54.0	58.0
29w0d	49.5	55.0	60.5
30w0d	52.0	58.0	64.0
31w0d	53.5	59.0	64.5
32w0d	56.0	62.0	68.0
33w0d	61.0	65.0	69.0
34w0d	62.0	66.0	70.0
35w0d	61.0	67.0	73.0
36w0d	63.0	69.0	75.0
37w0d	67.0	72.0	77.0
38w0d	67.5	73.0	78.5
39w0d	69.0	75.0	81.0
40w0d	72.0	76.0	80.0
41w0d	72.0	77.0	82.0

(d) FL CFEF FG

French fetal biometry: reference equations and comparison with other charts
L. J. SALOMON, M. DUYME, J. CREQUAT, G. BRODATY, C. TALMANT, N. FRIES and M. ALTHUSER
CFEF - Collège Français d'Echographie Foetale, Paris, France
Ultrasound Obstet Gynecol (in press) published online in Wiley InterScience (www.interscience.wiley.com).
DOI: 10.1002/uog.2733

Age	5% (mm)	50% (mm)	95% (mm)
15w0d	14.8	18.1	21.3
16w0d	17.6	21.0	24.4
17w0d	20.4	23.9	27.4
18w0d	23.2	26.8	30.4
19w0d	26.0	29.7	33.3
20w0d	28.7	32.5	36.3
21w0d	31.4	35.3	39.1
22w0d	34.0	38.0	42.0
23w0d	36.6	40.7	44.7
24w0d	39.1	43.3	47.5
25w0d	41.6	45.8	50.1
26w0d	44.0	48.4	52.7
27w0d	46.3	50.8	55.3
28w0d	48.6	53.2	57.8
29w0d	50.8	55.5	60.2
30w0d	52.9	57.7	62.5
31w0d	55.0	59.9	64.7
32w0d	56.9	61.9	66.9
33w0d	58.8	63.9	69.0
34w0d	60.6	65.8	71.0
35w0d	62.3	67.6	72.9
36w0d	63.9	69.3	74.7
37w0d	65.4	70.9	76.4
38w0d	66.8	72.4	78.0
39w0d	68.1	73.8	79.5
40w0d	69.3	75.1	80.9

(e) FL CFEF-%tile Identical

French fetal biometry: reference equations and comparison with other charts
L. J. SALOMON, M. DUYME, J. CREQUAT, G. BRODATY, C. TALMANT, N. FRIES and M. ALTHUSER
CFEF - Collège Français d'Echographie Foetale, Paris, France
Ultrasound Obstet Gynecol (in press) published online in Wiley InterScience (www.interscience.wiley.com).
DOI: 10.1002/uog.2733

Age	1SD (mm)	5% (mm)	50% (mm)	95% (mm)
15w0d	2.0	14.8	18.1	21.3
16w0d	2.1	17.6	21.0	24.4
17w0d	2.1	20.4	23.9	27.4
18w0d	2.2	23.2	26.8	30.4
19w0d	2.2	26.0	29.7	33.3
20w0d	2.3	28.7	32.5	36.3
21w0d	2.4	31.4	35.3	39.1
22w0d	2.4	34.0	38.0	42.0
23w0d	2.5	36.6	40.7	44.7
24w0d	2.5	39.1	43.3	47.5
25w0d	2.6	41.6	45.8	50.1
26w0d	2.7	44.0	48.4	52.7
27w0d	2.7	46.3	50.8	55.3
28w0d	2.8	48.6	53.2	57.8
29w0d	2.8	50.8	55.5	60.2
30w0d	2.9	52.9	57.7	62.5
31w0d	3.0	55.0	59.9	64.7
32w0d	3.0	56.9	61.9	66.9
33w0d	3.1	58.8	63.9	69.0
34w0d	3.2	60.6	65.8	71.0
35w0d	3.2	62.3	67.6	72.9
36w0d	3.3	63.9	69.3	74.7
37w0d	3.3	65.4	70.9	76.4
38w0d	3.4	66.8	72.4	78.0
39w0d	3.5	68.1	73.8	79.5
40w0d	3.5	69.3	75.1	80.9

(f) FL Chitty GA

Altman, D.G., and Chitty, L.S.
New charts for ultrasound dating of pregnancy
Ultrasound Obstet. 10 (1997) 174-191

Value (mm)	Age	5%, 95% (days)
10.0	13w0d	6
13.5	14w0d	7
17.0	15w0d	8
20.0	16w0d	8
23.3	17w0d	9
26.3	18w0d	10
29.3	19w0d	11
32.0	20w0d	11
35.0	21w0d	12
37.7	22w0d	13
40.3	23w0d	14
42.7	24w0d	14
45.3	25w0d	16
47.7	26w0d	17
50.0	27w0d	17
52.3	28w0d	18
54.5	29w0d	19
56.7	30w0d	20
58.8	31w0d	21
60.8	32w0d	21
62.8	33w0d	22
64.8	34w0d	23
66.8	35w0d	25
67.0	35w1d	25

(g) FL Chitty FG

Chitty, L.S., Altman, D.G.
"Charts of Fetal Size: 4. Femur Length"
British Journal of Obstetrics & Gynaecology, Jan. 1994, vol. 101, P. 132-135

Age	3% (mm)	50% (mm)	97% (mm)
12w0d	4.4	7.7	11.0
13w0d	7.5	10.9	14.3
14w0d	10.6	14.1	17.6
15w0d	13.6	17.2	20.8
16w0d	16.5	20.3	24.0
17w0d	19.4	23.3	27.1
18w0d	22.3	26.3	30.2
19w0d	25.1	29.2	33.3
20w0d	27.9	32.1	36.2
21w0d	30.6	34.9	39.2
22w0d	33.2	37.6	42.0
23w0d	35.8	40.3	44.8
24w0d	38.3	42.9	47.6
25w0d	40.7	45.5	50.2
26w0d	43.1	48.0	52.8
27w0d	45.4	50.4	55.3
28w0d	47.6	52.7	57.8
29w0d	49.8	54.9	60.1
30w0d	51.8	57.1	62.4
31w0d	53.8	59.2	64.6
32w0d	55.7	61.2	66.7
33w0d	57.5	63.1	68.7
34w0d	59.2	64.9	70.6
35w0d	60.8	66.6	72.4
36w0d	62.3	68.2	74.1
37w0d	63.6	69.7	75.7
38w0d	64.9	71.1	77.2
39w0d	66.1	72.4	78.6
40w0d	67.2	73.5	79.9
41w0d	68.1	74.6	81.1
42w0d	68.9	75.5	82.1

(h) FL Chitty-%tile Identical

Chitty, L.S., Altman, D.G.
"Charts of Fetal Size: 4. Femur Length"
British Journal of Obstetrics & Gynaecology, Jan. 1994, vol. 101, P. 132-135

Age	1SD (mm)	3% (mm)	50% (mm)	97% (mm)
12w0d	1.8	4.4	7.7	11.0
13w0d	1.8	7.5	10.9	14.3
14w0d	1.9	10.6	14.1	17.6
15w0d	1.9	13.6	17.2	20.8
16w0d	2.0	16.5	20.3	24.0
17w0d	2.1	19.4	23.3	27.1
18w0d	2.1	22.3	26.3	30.2
19w0d	2.2	25.1	29.2	33.3
20w0d	2.2	27.9	32.1	36.2
21w0d	2.3	30.6	34.9	39.2
22w0d	2.3	33.2	37.6	42.0
23w0d	2.4	35.8	40.3	44.8
24w0d	2.5	38.3	42.9	47.6
25w0d	2.5	40.7	45.5	50.2
26w0d	2.6	43.1	48.0	52.8
27w0d	2.6	45.4	50.4	55.3
28w0d	2.7	47.6	52.7	57.8
29w0d	2.8	49.8	54.9	60.1
30w0d	2.8	51.8	57.1	62.4
31w0d	2.9	53.8	59.2	64.6
32w0d	2.9	55.7	61.2	66.7
33w0d	3.0	57.5	63.1	68.7
34w0d	3.0	59.2	64.9	70.6
35w0d	3.1	60.8	66.6	72.4
36w0d	3.2	62.3	68.2	74.1
37w0d	3.2	63.6	69.7	75.7
38w0d	3.3	64.9	71.1	77.2
39w0d	3.3	66.1	72.4	78.6
40w0d	3.4	67.2	73.5	79.9
41w0d	3.5	68.1	74.6	81.1
42w0d	3.5	68.9	75.5	82.1

(i) FL Hadlock GA

Hadlock FP, Deter RL, Harrist RB, Park SK:
"Estimating fetal age: Computer-assisted analysis of multiple fetal growth parameters"
Radiology 1984; 152: 497-502.

Value (mm)	Age	2SD (days)
6.4	12w0d	10
10.0	13w0d	10
13.5	14w0d	10
17.0	15w0d	10
20.0	16w0d	10
23.3	17w0d	10
26.3	18w0d	13
29.3	19w0d	13
32.0	20w0d	13
35.0	21w0d	13
37.7	22w0d	13
40.3	23w0d	13
43.0	24w0d	15
45.3	25w0d	15
47.7	26w0d	15
50.3	27w0d	15
52.7	28w0d	15
55.0	29w0d	15
57.2	30w0d	21
59.5	31w0d	21
61.7	32w0d	21
64.0	33w0d	21
66.0	34w0d	21
68.0	35w0d	21
70.2	36w0d	22
72.3	37w0d	22
74.3	38w0d	22
76.3	39w0d	22
78.2	40w0d	22
80.2	41w0d	22
82.0	42w0d	22
82.1	42w0d	22

(j) FL Hadlock FG

Hadlock FP, Deter RL, Harrist RB, Park SK:
"Estimating fetal age: Computer-assisted analysis of multiple fetal growth parameters"
Radiology 1984; 152: 497-502.

Age	-1SD (mm)	Mean (mm)	+1SD (mm)
12w0d	4.2	7.2	10.2
13w0d	7.7	10.7	13.7
14w0d	11.0	14.0	17.0
15w0d	14.3	17.3	20.3
16w0d	17.5	20.5	23.5
17w0d	20.7	23.7	26.7
18w0d	23.7	26.7	29.7
19w0d	26.8	29.8	32.8
20w0d	29.7	32.7	35.7
21w0d	32.6	35.6	38.6
22w0d	35.4	38.4	41.4
23w0d	38.1	41.1	44.1
24w0d	40.8	43.8	46.8
25w0d	43.4	46.4	49.4
26w0d	45.9	48.9	51.9
27w0d	48.4	51.4	54.4
28w0d	50.8	53.8	56.8
29w0d	53.1	56.1	59.1
30w0d	55.4	58.4	61.4
31w0d	57.6	60.6	63.6
32w0d	59.7	62.7	65.7
33w0d	61.8	64.8	67.8
34w0d	63.8	66.8	69.8
35w0d	65.7	68.7	71.7
36w0d	67.6	70.6	73.6
37w0d	69.3	72.3	75.3
38w0d	71.1	74.1	77.1
39w0d	72.7	75.7	78.7
40w0d	74.3	77.3	80.3
41w0d*	75.8	78.8	81.8
42w0d*	77.3	80.3	83.3

*: Data for extrapolated gestational age (weeks) when Extrapolate is set to ON

(k) FL Hadlock-%tile Identical

Hadlock FP, Deter RL, Harrist RB, Park SK:
"Estimating fetal age: Computer-assisted analysis of multiple fetal growth parameters"
Radiology 1984; 152: 497-502.

Age	1SD (mm)	-2SD (mm)	Mean (mm)	+2SD (mm)
12w0d	3.0	1.0	7.0	13.0
13w0d	3.0	4.0	10.0	16.0
14w0d	3.0	7.5	13.5	19.5
15w0d	3.0	11.0	17.0	23.0
16w0d	3.0	14.0	20.0	26.0
17w0d	3.0	17.3	23.3	29.3
18w0d	3.0	20.3	26.3	32.3
19w0d	3.0	23.3	29.3	35.3
20w0d	3.0	26.0	32.0	38.0
21w0d	3.0	29.0	35.0	41.0
22w0d	3.0	31.7	37.7	43.7
23w0d	3.0	34.3	40.3	46.3
24w0d	3.0	37.0	43.0	49.0
25w0d	3.0	39.3	45.3	51.3
26w0d	3.0	41.7	47.7	53.7
27w0d	3.0	44.3	50.3	56.3
28w0d	3.0	46.7	52.7	58.7
29w0d	3.0	49.0	55.0	61.0
30w0d	3.0	51.3	57.3	63.3
31w0d	3.0	53.5	59.5	65.5
32w0d	3.0	55.7	61.7	67.7
33w0d	3.0	58.0	64.0	70.0
34w0d	3.0	60.0	66.0	72.0
35w0d	3.0	62.0	68.0	74.0
36w0d	3.0	64.3	70.3	76.3
37w0d	3.0	66.3	72.3	78.3
38w0d	3.0	68.3	74.3	80.3
39w0d	3.0	70.3	76.3	82.3
40w0d	3.0	72.3	78.3	84.3
41w0d	3.0	74.3	80.3	86.3
42w0d	3.0	76.1	82.1	88.1

(l) FL Hansmann Identical

Hansmann H, Hackeloer B., Staudach A.
"Ultrasound Diagnosis in Obstetrics and Gynecology"
New York, Springer Verlag, 1986, English Edition (ISBN 0-387-15384-9); P 431

Value (mm)	Age
10.0	13w0d
12.0	14w0d
16.0	15w0d
18.0	16w0d
22.0	17w0d
25.0	18w0d
28.0	19w0d
31.0	20w0d
34.0	21w0d
36.0	22w0d
39.0	23w0d
41.0	24w0d
44.0	25w0d
47.0	26w0d
49.0	27w0d
51.0	28w0d
54.0	29w0d
56.0	30w0d
59.0	31w0d
61.0	32w0d
63.0	33w0d
65.0	34w0d
67.0	35w0d
69.0	36w0d
71.0	37w0d
73.0	38w0d
74.0	39w0d
75.0	40w0d

(m) FL Hohler GA

CHARLES W. HOHLER, M.D.
Fetal femur length:Equations for computer calculation of gestational age from ultrasound measurements.
American Journal of Obstetrics and Gynecology June 15, 1982; 143 (No. 4): P 497 to 481

Value (mm)	Age
10.0	12w0d
13.3	13w0d
16.5	14w0d
19.5	15w0d
22.5	16w0d
25.5	17w0d
28.3	18w0d
31.0	19w0d
33.7	20w0d
36.3	21w0d
39.0	22w0d
41.3	23w0d
44.0	24w0d
46.3	25w0d
48.7	26w0d
51.0	27w0d
53.3	28w0d
55.7	29w0d
58.0	30w0d
60.0	31w0d
62.3	32w0d
64.3	33w0d
66.5	34w0d
68.5	35w0d
70.7	36w0d
72.7	37w0d
74.8	38w0d
76.5	39w0d
78.5	40w0d
80.0	40w5d

(n) FL Jeanty GA

Jeanty P, Rodesch F, Delbeke D, Dumont JE
"Estimation of gestational age from measurements of fetal long bones"
J Ultrasound Med 3: 75-79. 1984.

Value (mm)	Age	5%, 95% (Days)
10.0	12w4d	16
11.0	12w6d	16
14.3	14w0d	16
17.3	15w0d	16
20.3	16w0d	16
23.0	16w6d	16
26.0	17w6d	16
29.0	19w0d	16
32.0	20w0d	16
34.3	21w0d	15
37.0	22w0d	16
40.0	23w0d	16
42.3	24w0d	15
45.0	25w0d	16
47.7	26w0d	16
50.0	27w0d	15
52.7	28w0d	16
55.0	29w0d	16
57.3	30w0d	15
59.7	31w0d	15
62.0	31w6d	16
64.7	33w0d	16
66.7	34w0d	15
69.0	35w0d	15
71.3	36w0d	16
73.7	37w0d	16
75.7	38w0d	15
77.8	39w0d	16
80.0	40w0d	15

(o) FL Jeanty FG

Jeanty P, Dramaix-Wilmet M, van Kerkem J, Petroons P, Schwers J. "Ultrasound Evaluation of Fetal Limb Growth, Part II." Radiology 1982; 143: 751-754

Age	5% (mm)	50% (mm)	95% (mm)
12w0d	4.0	8.0	13.0
13w0d	6.0	11.0	16.0
14w0d	9.0	14.0	18.0
15w0d	12.0	17.0	21.0
16w0d	15.0	20.0	24.0
17w0d	18.0	23.0	27.0
18w0d	21.0	25.0	30.0
19w0d	24.0	28.0	33.0
20w0d	26.0	31.0	36.0
21w0d	29.0	34.0	38.0
22w0d	32.0	36.0	41.0
23w0d	35.0	39.0	44.0
24w0d	37.0	42.0	46.0
25w0d	40.0	44.0	49.0
26w0d	42.0	47.0	51.0
27w0d	45.0	49.0	54.0
28w0d	47.0	52.0	56.0
29w0d	50.0	54.0	59.0
30w0d	52.0	56.0	61.0
31w0d	54.0	59.0	63.0
32w0d	56.0	61.0	65.0
33w0d	58.0	63.0	67.0
34w0d	60.0	65.0	69.0
35w0d	62.0	67.0	71.0
36w0d	64.0	68.0	73.0
37w0d	65.0	70.0	74.0
38w0d	67.0	71.0	76.0
39w0d	68.0	73.0	77.0
40w0d	70.0	74.0	79.0

(p) FL JSUM GA

Standardization of ultrasonic fetal biometry and Japanese reference values
J Med Ultrasonics Vol. 30 No. 3 (2003) J415-J440

Value (mm)	Age	2SD (days)
20.0	16w1d	6
22.5	17w0d	6
25.5	18w0d	7
28.5	19w0d	7
31.0	20w0d	8
33.7	21w0d	8
36.3	22w0d	8
38.7	23w0d	9
41.0	24w0d	9
43.3	25w0d	9
45.3	26w0d	10
47.5	27w0d	10
49.5	28w0d	10
51.5	29w0d	10
53.5	30w0d	11
55.5	31w0d	11
57.3	32w0d	11
59.0	33w0d	12
61.0	34w0d	12
62.8	35w0d	12
64.5	36w0d	12
66.0	37w0d	12
67.8	38w0d	13
69.4	39w0d	13
70.0	39w3d	13

(q) FL JSUM FG

Standardization of ultrasonic fetal biometry and Japanese reference values
J Med Ultrasonics Vol. 30 No. 3 (2003) J415-J440

Age	-2SD (mm)	Mean (mm)	+2SD (mm)
16w0d	14.9	20.1	25.4
17w0d	17.4	22.7	28.0
18w0d	19.8	25.3	30.7
19w0d	22.3	27.8	33.3
20w0d	24.8	30.4	35.9
21w0d	27.3	32.9	38.5
22w0d	29.7	35.4	41.1
23w0d	32.1	37.9	43.6
24w0d	34.5	40.3	46.1
25w0d	36.8	42.7	48.6
26w0d	39.1	45.0	51.0
27w0d	41.3	47.3	53.3
28w0d	43.5	49.6	55.6
29w0d	45.6	51.7	57.9
30w0d	47.6	53.8	60.0
31w0d	49.5	55.8	62.1
32w0d	51.4	57.8	64.1
33w0d	53.2	59.6	66.1
34w0d	54.9	61.4	67.9
35w0d	56.5	63.0	69.6
36w0d	58.0	64.6	71.2
37w0d	59.3	66.0	72.7
38w0d	60.6	67.4	74.1
39w0d	61.7	68.6	75.4
40w0d	62.7	69.6	76.5
41w0d	63.6	70.6	77.5
42w0d	64.3	71.4	78.4

(r) FL JSUM-SD Identical

Standardization of ultrasonic fetal biometry and Japanese reference values
J Med Ultrasonics Vol. 30 No. 3 (2003) J415-J440

Age	-2SD (mm)	-1.5SD (mm)	Mean (mm)	+1.5SD (mm)	+2SD (mm)
16w0d	14.9	16.1	20.1	24.1	25.4
17w0d	17.4	18.7	22.7	26.7	28.0
18w0d	19.8	21.2	25.3	29.4	30.7
19w0d	22.3	23.7	27.8	31.9	33.3
20w0d	24.8	26.2	30.4	34.6	35.9
21w0d	27.3	28.7	32.9	37.1	38.5
22w0d	29.7	31.1	35.4	39.7	41.1
23w0d	32.1	33.6	37.9	42.2	43.6
24w0d	34.5	35.9	40.3	44.7	46.1
25w0d	36.8	38.3	42.7	47.1	48.6
26w0d	39.1	40.5	45.0	49.5	51.0
27w0d	41.3	42.8	47.3	51.8	53.3
28w0d	43.5	45.0	49.6	54.2	55.6
29w0d	45.6	47.1	51.7	56.3	57.9
30w0d	47.6	49.1	53.8	58.5	60.0
31w0d	49.5	51.1	55.8	60.5	62.1
32w0d	51.4	53.0	57.8	62.6	64.1
33w0d	53.2	54.8	59.6	64.4	66.1
34w0d	54.9	56.5	61.4	66.3	67.9
35w0d	56.5	58.1	63.0	67.9	69.6
36w0d	58.0	59.6	64.6	69.6	71.2
37w0d	59.3	61.0	66.0	71.0	72.7
38w0d	60.6	62.3	67.4	72.5	74.1
39w0d	61.7	63.5	68.6	73.7	75.4
40w0d	62.7	64.4	69.6	74.8	76.5
41w0d	63.6	65.4	70.6	75.8	77.5
42w0d	64.3	66.1	71.4	76.7	78.4

(s) FL Merz GA

Merz E:
"Ultrasound in Gynecology and Obstetrics"
Stuttgart, New York, Thieme Medical Publishers, Inc. 1991; 326-336

Value (mm)	Age	2SD (days)
10.0	12w2d	9
12.0	13w0d	8
15.0	14w0d	9
17.7	15w0d	9
20.5	16w0d	9
23.5	17w0d	10
26.3	18w0d	11
29.0	19w0d	11
31.7	20w0d	10
34.5	21w0d	12
37.3	22w0d	12
39.7	23w0d	12
42.5	24w0d	12
45.0	25w0d	13
47.5	26w0d	13
50.3	27w0d	13
52.7	28w0d	13
55.0	29w0d	14
57.5	30w0d	14
60.0	31w0d	14
62.3	32w0d	14
64.5	33w0d	14
66.8	34w0d	14
69.0	35w0d	15
71.3	36w0d	15
73.3	37w0d	15
75.7	38w0d	16
77.7	39w0d	16
79.8	40w0d	15
80.0	40w1d	15

(t) FL Merz FG

Merz E:
"Ultrasound in Gynecology and Obstetrics"
Stuttgart, New York, Thieme Medical Publishers, Inc. 1991; 312

Age	5% (mm)	50% (mm)	95% (mm)
12w0d	5.0	9.0	13.0
13w0d	8.0	12.0	16.0
14w0d	11.0	15.0	19.0
15w0d	14.0	18.0	22.0
16w0d	17.0	21.0	25.0
17w0d	20.0	24.0	28.0
18w0d	22.0	27.0	31.0
19w0d	25.0	30.0	34.0
20w0d	28.0	32.0	37.0
21w0d	31.0	35.0	40.0
22w0d	34.0	38.0	42.0
23w0d	36.0	41.0	45.0
24w0d	39.0	43.0	48.0
25w0d	41.0	46.0	51.0
26w0d	44.0	49.0	53.0
27w0d	46.0	51.0	56.0
28w0d	49.0	53.0	58.0
29w0d	51.0	56.0	61.0
30w0d	53.0	58.0	63.0
31w0d	56.0	60.0	65.0
32w0d	58.0	63.0	68.0
33w0d	60.0	65.0	70.0
34w0d	62.0	67.0	72.0
35w0d	64.0	69.0	74.0
36w0d	66.0	71.0	76.0
37w0d	68.0	73.0	78.0
38w0d	69.0	75.0	80.0
39w0d	71.0	76.0	82.0
40w0d	73.0	78.0	84.0

(u) FL Nicolaides Identical

Nicolaides
"Fetal biometry at 14-40 week's gestation"
Ultrasound in Obstetrics and Gynecology 4 1994: P34 to 48

Age	5% (mm)	Median (mm)	95% (mm)
14+0 - 14+6	14.0	17.0	19.0
15+0 - 15+6	17.0	19.0	22.0
16+0 - 16+6	19.0	22.0	25.0
17+0 - 17+6	21.0	24.0	28.0
18+0 - 18+6	24.0	27.0	30.0
19+0 - 19+6	26.0	30.0	33.0
20+0 - 20+6	29.0	32.0	36.0
21+0 - 21+6	32.0	35.0	39.0
22+0 - 22+6	34.0	38.0	42.0
23+0 - 23+6	37.0	41.0	45.0
24+0 - 24+6	39.0	43.0	47.0
25+0 - 25+6	42.0	46.0	50.0
26+0 - 26+6	44.0	48.0	53.0
27+0 - 27+6	47.0	51.0	55.0
28+0 - 28+6	49.0	53.0	58.0
29+0 - 29+6	51.0	56.0	60.0
30+0 - 30+6	53.0	58.0	63.0
31+0 - 31+6	55.0	60.0	65.0
32+0 - 32+6	57.0	62.0	67.0
33+0 - 33+6	59.0	64.0	69.0
34+0 - 34+6	61.0	66.0	71.0
35+0 - 35+6	63.0	68.0	73.0
36+0 - 36+6	64.0	69.0	74.0
37+0 - 37+6	66.0	71.0	76.0
38+0 - 38+6	67.0	72.0	77.0
39+0 - 39+6	68.0	73.0	78.0

(v) FL O'Brien FG

GREGORY D. O'BRIEN, M.B.
"Growth of the Ultrasound femur length during normal pregnancy."
American Journal of Obstetrics and Gynecology 1981; 141: 833-837

Age	-2SD (mm)	Mean (mm)	+2SD (mm)
14w0d	14.1	16.6	19.1
15w0d	17.6	19.9	22.2
16w0d	19.0	22.0	25.0
17w0d	22.3	25.2	28.1
18w0d	26.5	29.6	32.7
19w0d	29.3	32.4	35.5
20w0d	32.3	34.8	37.3
21w0d	33.4	37.5	41.6
22w0d	37.0	40.9	44.8
23w0d	39.9	43.5	47.1
24w0d	42.9	46.4	49.9
25w0d	43.4	48.0	52.6
26w0d	46.1	51.1	56.1
27w0d	49.8	53.0	56.2
28w0d	50.3	54.4	58.5
29w0d	53.0	57.3	61.6
30w0d	54.9	58.7	62.5
31w0d	57.0	61.5	66.0
32w0d	58.6	62.8	67.0
33w0d	60.3	64.9	69.5
34w0d	61.3	65.7	70.1
35w0d	62.9	67.7	72.5
36w0d	64.9	69.5	74.1
37w0d	66.5	70.8	75.1
38w0d	66.2	71.8	77.4
39w0d	69.1	74.2	79.3
40w0d	69.8	75.4	81.0

(w) FL Osaka Identical

Mineo Aoki, Motohiro Yamada
Evaluation of fetal growth
Obstetrics and gynecological treatment
Vol. 47 No. 5 (1983: 11)

Age	-2SD (mm)	-1.5SD (mm)	Mean (mm)	+1.5SD (mm)	+2SD (mm)
13w0d	5.2	6.2	9.4	12.6	13.6
14w0d	8.2	9.3	12.6	15.9	17.0
15w0d	11.3	12.4	15.7	19.0	20.1
16w0d	14.4	15.5	18.8	22.1	23.2
17w0d	17.2	18.3	21.8	25.3	26.4
18w0d	20.1	21.2	24.7	28.2	29.3
19w0d	22.7	23.9	27.5	31.1	32.3
20w0d	25.5	26.7	30.3	33.9	35.1
21w0d	28.2	29.4	33.0	36.6	37.8
22w0d	30.7	31.9	35.7	39.5	40.7
23w0d	33.3	34.5	38.3	42.1	43.3
24w0d	35.8	37.0	40.8	44.6	45.8
25w0d	38.0	39.3	43.2	47.1	48.4
26w0d	40.4	41.7	45.6	49.5	50.8
27w0d	42.4	43.7	47.8	51.9	53.2
28w0d	44.7	46.0	50.1	54.2	55.5
29w0d	46.8	48.1	52.2	56.3	57.6
30w0d	48.7	50.1	54.3	58.5	59.9
31w0d	50.7	52.1	56.3	60.5	61.9
32w0d	52.4	53.8	58.2	62.6	64.0
33w0d	54.3	55.7	60.1	64.5	65.9
34w0d	56.1	57.5	61.9	66.3	67.7
35w0d	57.6	59.1	63.6	68.1	69.6
36w0d	59.3	60.8	65.3	69.8	71.3
37w0d	60.7	62.2	66.9	71.6	73.1
38w0d	62.2	63.7	68.4	73.1	74.6
39w0d	63.6	65.1	69.8	74.5	76.0
40w0d	64.8	66.4	71.2	76.0	77.6
41w0d*	66.1	67.7	72.5	77.3	78.9
42w0d*	67.2	68.8	73.7	78.6	80.2

*: Data for extrapolated gestational age (weeks) when Extrapolate is set to ON

(x) FL Tokyo GA

Norio Shinozuka, Haruo Masuda, Hidenori Kagawa, Yuji Taketani
Standard Values of Ultrasonographic Fetal Biometry
Jpn Med Ultrasonics Vol. 23 No. 12 (1996) P 877-888

Value (mm)	Age	5%, 95% (days)
20.0	16w1d	10
22.5	17w0d	11
25.5	18w0d	11
28.5	19w0d	12
31.0	20w0d	13
33.7	21w0d	13
36.3	22w0d	14
38.7	23w0d	14
41.0	24w0d	15
43.3	25w0d	15
45.3	26w0d	16
47.5	27w0d	16
49.5	28w0d	17
51.5	29w0d	17
53.5	30w0d	18
55.5	31w0d	18
57.3	32w0d	19
59.0	33w0d	19
61.0	34w0d	19
62.8	35w0d	20
64.5	36w0d	20
66.0	37w0d	21
67.8	38w0d	21
69.4	39w0d	21
70.0	39w3d	21

(y) FL Tokyo FG

Norio Shinozuka, Haruo Masuda, Hidenori Kagawa, Yuji Taketani
Standard Values of Ultrasonographic Fetal Biometry
Jpn Med Ultrasonics Vol. 23 No. 12 (1996) P 877-888

Age	5% (mm)	50% (mm)	95% (mm)
16w0d	17.1	21.4	25.8
17w0d	19.6	24.0	28.4
18w0d	22.1	26.5	31.0
19w0d	24.6	29.1	33.6
20w0d	27.1	31.6	36.2
21w0d	29.5	34.1	38.8
22w0d	31.9	36.6	41.3
23w0d	34.3	39.1	43.8
24w0d	36.7	41.5	46.3
25w0d	39.0	43.9	48.7
26w0d	41.3	46.2	51.1
27w0d	43.5	48.4	53.4
28w0d	45.6	50.6	55.7
29w0d	47.7	52.8	57.9
30w0d	49.7	54.8	60.0
31w0d	51.6	56.8	62.0
32w0d	53.5	58.7	64.0
33w0d	55.2	60.5	65.8
34w0d	56.9	62.2	67.6
35w0d	58.4	63.8	69.2
36w0d	59.9	65.3	70.8
37w0d	61.2	66.7	72.2
38w0d	62.4	68.0	73.6
39w0d	63.5	69.1	74.7
40w0d	64.4	70.1	75.8
41w0d	65.3	71.0	76.7
42w0d	65.9	71.7	77.5

(z) FL Tokyo-SD Identical

Norio Shinozuka, Haruo Masuda, Hidenori Kagawa, Yuji Taketani
Standard Values of Ultrasonographic Fetal Biometry
Jpn Med Ultrasonics Vol. 23 No. 12 (1996) P 877-888

Age	-1.5SD (mm)	Mean (mm)	+1.5SD (mm)
16w0d	17.4	21.4	25.4
17w0d	20.0	24.0	28.0
18w0d	22.4	26.5	30.6
19w0d	25.0	29.1	33.2
20w0d	27.4	31.6	35.8
21w0d	29.8	34.1	38.4
22w0d	32.3	36.6	40.9
23w0d	34.8	39.1	43.4
24w0d	37.1	41.5	45.9
25w0d	39.5	43.9	48.3
26w0d	41.7	46.2	50.7
27w0d	43.8	48.4	53.0
28w0d	46.0	50.6	55.2
29w0d	48.2	52.8	57.4
30w0d	50.1	54.8	59.5
31w0d	52.0	56.8	61.6
32w0d	53.9	58.7	63.5
33w0d	55.6	60.5	65.4
34w0d	57.3	62.2	67.1
35w0d	58.8	63.8	68.8
36w0d	60.3	65.3	70.3
37w0d	61.6	66.7	71.8
38w0d	62.9	68.0	73.1
39w0d	63.9	69.1	74.3
40w0d	64.9	70.1	75.3
41w0d	65.8	71.0	76.2
42w0d	66.4	71.7	77.0

(aa) FL Warda GA

Warda, A.H., Deter, R.L., Rossavik, I.K., Carpenter, R.J., Hadlock, F.P. "Fetal Femur Length: A Critical Re-evaluation of Relationship to Menstrual Age"
Obstetrics & Gynecology, July 1985, Vol. 66, No. 1, P. 69-75

Value (mm)	Age	2SD (days)
10.0	13w1d	10
13.0	14w0d	11
16.0	15w0d	11
19.5	16w0d	12
22.5	17w0d	13
25.3	18w0d	14
28.0	19w0d	14
31.0	20w0d	15
33.7	21w0d	16
36.3	22w0d	17
39.0	23w0d	17
41.3	24w0d	18
43.7	25w0d	19
46.3	26w0d	20
48.7	27w0d	20
51.0	28w0d	21
53.3	29w0d	22
55.7	30w0d	23
58.0	31w0d	23
60.3	32w0d	24
62.3	33w0d	25
64.7	34w0d	26
67.0	35w0d	26
69.3	36w0d	27
71.3	37w0d	28
73.7	38w0d	29
76.0	39w0d	30
78.3	40w0d	30
80.0	40w5d	31

(ab) FL Warda FG

Warda, A.H., Deter, R.L., Rossavik, I.K., Carpenter, R.J., Hadlock, F.P. "Fetal Femur Length: A Critical Re-evaluation of Relationship to Menstrual Age"
Obstetrics & Gynecology, July 1985, Vol. 66, No. 1, P. 69-75

Age	-2SD (mm)	Mean (mm)	+2SD (mm)
12w0d	5.7	6.6	7.5
13w0d	8.5	9.9	11.3
14w0d	11.4	13.2	15.0
15w0d	14.1	16.4	18.7
16w0d	16.8	19.5	22.2
17w0d	19.4	22.6	25.8
18w0d	22.0	25.6	29.2
19w0d	24.5	28.5	32.5
20w0d	27.0	31.4	35.8
21w0d	29.4	34.2	39.0
22w0d	31.7	36.9	42.1
23w0d	34.0	39.6	45.1
24w0d	36.2	42.1	48.0
25w0d	38.4	44.7	51.0
26w0d	40.5	47.1	53.7
27w0d	42.6	49.5	56.4
28w0d	44.5	51.8	59.1
29w0d	46.5	54.0	61.6
30w0d	48.3	56.2	64.1
31w0d	50.1	58.3	66.5
32w0d	51.9	60.3	68.7
33w0d	53.6	62.3	71.0
34w0d	55.2	64.2	73.2
35w0d	56.8	66.0	75.2
36w0d	58.3	67.8	77.3
37w0d	59.7	69.5	79.2
38w0d	61.1	71.1	81.0
39w0d	62.5	72.6	82.8
40w0d	63.7	74.1	84.5

(10) Foot

(a) Foot Mercer GA

Mercer, Sklar, et al
"Fetal foot length as a predictor of gestational age"
Am J Obstet Gynecol 156: 350-355, 1987.

Value (mm)	Age	2SD (days)
10.0	12w3d	7
11.5	13w0d	7
14.7	14w0d	8
18.0	15w0d	8
21.0	16w0d	9
24.0	17w0d	9
26.7	18w0d	10
29.7	19w0d	11
32.5	20w0d	11
35.3	21w0d	12
38.0	22w0d	12
41.0	23w0d	13
43.7	24w0d	13
46.3	25w0d	14
49.0	26w0d	15
51.7	27w0d	15
54.3	28w0d	16
57.0	29w0d	16
59.5	30w0d	17
62.0	31w0d	17
64.5	32w0d	18
67.0	33w0d	18
69.3	34w0d	19
72.0	35w0d	20
74.3	36w0d	20
76.7	37w0d	21
79.0	38w0d	21
81.3	39w0d	22
83.7	40w0d	22
86.0	41w0d	23

(b) Foot Mercer FG

Mercer, Sklar, et al
"Fetal foot length as a predictor of gestational age"
Am J Obstet Gynecol 156: 350-355, 1987.

Age	-2SD (mm)	Mean (mm)	+2SD (mm)
12w0d	7.0	8.0	9.0
13w0d	10.0	11.0	12.0
14w0d	13.0	15.0	16.0
15w0d	16.0	18.0	20.0
16w0d	19.0	21.0	23.0
17w0d	22.0	24.0	27.0
18w0d	24.0	27.0	30.0
19w0d	27.0	30.0	34.0
20w0d	30.0	33.0	37.0
21w0d	32.0	36.0	40.0
22w0d	35.0	39.0	43.0
23w0d	37.0	42.0	46.0
24w0d	40.0	45.0	50.0
25w0d	42.0	47.0	53.0
26w0d	45.0	50.0	55.0
27w0d	47.0	53.0	58.0
28w0d	49.0	55.0	61.0
29w0d	51.0	58.0	64.0
30w0d	54.0	60.0	67.0
31w0d	56.0	62.0	68.0
32w0d	58.0	65.0	72.0
33w0d	60.0	67.0	74.0
34w0d	62.0	69.0	77.0
35w0d	64.0	71.0	79.0
36w0d	66.0	74.0	82.0
37w0d	67.0	76.0	84.0
38w0d	69.0	78.0	86.0
39w0d	71.0	80.0	88.0
40w0d	72.0	81.0	90.0

(c) Foot Chitty-%tile Identical

Chitty
Charts of fetal size: limb bones
BJOG: an International Journal of Obstetrics and Gynaecology
August 2002, Vol.109, pp. 919-929

Age	1SD (mm)	3% (mm)	50% (mm)	97% (mm)
12w0d	1.6	5.9	8.9	11.8
13w0d	1.7	8.5	11.7	14.9
14w0d	1.8	11.3	14.6	18.0
15w0d	1.9	14.0	17.6	21.2
16w0d	2.0	16.8	20.6	24.4
17w0d	2.1	19.6	23.6	27.6
18w0d	2.2	22.4	26.6	30.8
19w0d	2.3	25.2	29.6	34.0
20w0d	2.5	28.0	32.6	37.2
21w0d	2.6	30.8	35.6	40.4
22w0d	2.7	33.5	38.6	43.6
23w0d	2.8	36.2	41.5	46.7
24w0d	2.9	38.9	44.4	49.8
25w0d	3.0	41.5	47.2	52.8
26w0d	3.1	44.1	50.0	55.8
27w0d	3.2	46.6	52.7	58.7
28w0d	3.3	49.1	55.3	61.6
29w0d	3.4	51.4	57.9	64.3
30w0d	3.5	53.7	60.4	67.0
31w0d	3.6	55.9	62.8	69.6
32w0d	3.8	58.0	65.1	72.1
33w0d	3.9	60.0	67.3	74.5
34w0d	4.0	61.9	69.4	76.8
35w0d	4.1	63.7	71.4	79.0
36w0d	4.2	65.4	73.3	81.1
37w0d	4.1	66.9	75.0	83.1
38w0d	4.4	68.4	76.7	85.0
39w0d	4.5	69.7	78.2	86.7
40w0d	4.6	70.9	79.6	88.3
41w0d	4.7	71.9	80.8	89.7
42w0d	4.8	72.8	81.9	91.0

(11) FTA

(a) FTA Osaka Identical

Mineo Aoki, Motohiro Yamada
Evaluation of fetal growth
Obstetrics and gynecological treatment
Vol. 47 No. 5 (1983: 11)

Age	-2SD (cm^2)	-1.5SD (cm^2)	Mean (cm^2)	+1.5SD (cm^2)	+2SD (cm^2)
14w0d	3.2	3.8	5.6	7.4	8.0
15w0d	4.5	5.2	7.3	9.4	10.1
16w0d	6.0	6.8	9.2	11.6	12.4
17w0d	7.7	8.6	11.3	14.0	14.9
18w0d	9.5	10.5	13.5	16.5	17.5
19w0d	11.2	12.4	15.8	19.4	20.4
20w0d	13.4	14.6	18.4	22.2	23.4
21w0d	15.4	16.8	21.0	25.2	26.6
22w0d	17.6	19.1	23.8	28.5	30.0
23w0d	20.0	21.7	26.8	31.9	33.6
24w0d	22.5	24.3	29.9	35.5	37.3
25w0d	25.1	27.1	33.1	39.1	41.1
26w0d	27.7	29.9	36.5	43.1	45.3
27w0d	30.5	32.8	39.9	47.0	49.3
28w0d	33.2	35.8	43.4	51.2	53.6
29w0d	36.3	39.0	47.1	55.2	57.9
30w0d	39.2	42.1	50.8	59.5	62.4
31w0d	42.1	45.2	54.5	63.8	66.9
32w0d	44.9	48.2	58.3	68.4	71.7
33w0d	47.9	51.4	62.1	72.8	76.3
34w0d	50.8	54.5	65.8	77.1	80.8
35w0d	53.5	57.6	69.5	81.6	85.5
36w0d	56.4	60.6	73.2	85.8	90.0
37w0d	59.0	63.4	76.8	90.2	94.6
38w0d	61.4	66.1	80.2	94.3	99.0
39w0d	63.7	68.6	83.5	98.4	103.3
40w0d	65.8	71.0	86.6	102.2	107.4
41w0d*	67.6	73.1	89.5	105.9	111.4
42w0d*	69.1	74.8	92.1	109.4	115.1

*: Data for extrapolated gestational age (weeks) when Extrapolate is set to ON

(12) GS

(a) GS Hellman FG

Hellman, LM, Kobayashi M, Fillisti L, Lavenhar M:
"Growth and development of the human fetus prior to the twentieth week of gestation"
Am J Obset & Gynecol 103: 789-800, 1969

Age	—	Mean (mm)	—
5w0d	—	9.7	—
6w0d	—	16.7	—
7w0d	—	23.7	—
8w0d	—	30.7	—
9w0d	—	37.8	—
10w0d	—	44.8	—
11w0d	—	51.8	—
12w0d	—	58.8	—
12w1d	—	59.8	—

(b) GS Rempen GA

Rempen A:
"Biometrie in der fruehgravitaet (l. trimenon)"
Der Frauenarzt 32/1991: 425-430

Value (mm)	Age	5%, 95% (days)
2.0	4w6d	10
3.0	5w0d	10
12.0	6w0d	10
21.0	7w0d	10
29.0	8w0d	10
37.0	9w0d	10
45.0	10w0d	10
52.0	11w0d	10
59.0	12w0d	10
66.0	13w0d	10
72.0	14w0d	10
73.0	14w1d	10

(c) GS Rempen FG

Rempen A:
"Biometrie in der fruehgravitaet (l. trimenon)"
Der Frauenarzt 32/1991: 425-430

Age	5% (mm)	50% (mm)	95% (mm)
4w4d	0.0	0.5	11.0
5w0d	0.0	4.5	15.0
6w0d	2.9	13.4	23.9
7w0d	11.2	21.7	32.2
8w0d	19.0	29.5	40.0
9w0d	26.1	36.6	47.1
10w0d	32.6	43.1	53.6
11w0d	38.5	49.0	59.5
12w0d	43.8	54.3	64.8
13w0d	48.6	59.1	69.6
13w2d	49.8	60.3	70.8

(d) GS Tokyo GA

Takashi Okai Department of Obstetrics and Gynecology, Faculty of Medicine, University of Tokyo
Studies on Fetal Growth and Functional Developments
Official Journal of the Japan Society of Obstetrics and Gynecology
ACTA OBST GYNEC JPN Vol. 38, No. 8, pp. 1209-1217, 1986

Value (mm)	Age	2SD (days)
10.0	4w0d	7
16.0	5w0d	7
22.0	6w0d	8
29.0	7w0d	8
35.0	8w0d	9
42.0	9w0d	10
49.0	10w0d	12
58.0	11w0d	13

(e) GS Tokyo FG

Takashi Okai Department of Obstetrics and Gynecology, Faculty of Medicine, University of Tokyo
Studies on Fetal Growth and Functional Developments
Official Journal of the Japan Society of Obstetrics and Gynecology
ACTA OBST GYNEC JPN Vol. 38, No. 8, pp. 1209-1217, 1986

Age	5% (mm)	50% (mm)	95% (mm)
4w0d	5.6	10.3	17.0
5w0d	9.4	16.1	24.1
6w0d	13.2	22.1	31.1
7w0d	17.7	28.6	39.0
8w0d	22.0	34.9	47.8
9w0d	27.4	41.9	57.8
10w0d	33.6	49.3	69.6
11w0d	40.5	57.6	84.2

(13) HA

(a) HA Chitty GA

Altman, D.G., and Chitty, L.S.
"New charts for ultrasound dating of pregnancy"
Ultrasound Obstet. 10 (1997) 174-191

Value (cm^2)	Age	5%, 95% (days)
4.41	12w1d	8
5.76	13w0d	8
7.57	14w0d	8
9.61	15w0d	9
11.79	16w0d	9
14.07	17w0d	9
16.81	18w0d	9
19.81	19w0d	9
23.04	20w0d	9
26.53	21w0d	10
30.25	22w0d	10
34.03	23w0d	11
37.83	24w0d	12
41.82	25w0d	12
46.24	26w0d	14
49.94	27w0d	15
54.03	28w0d	16
58.27	29w0d	18
61.89	30w0d	19
65.61	31w0d	21
69.45	32w0d	23
72.82	33w0d	24
76.27	34w0d	27
79.66	35w0d	29
81.00	35w3d	30

(b) HA Chitty FG

Chitty, L.S., Altman, D.G.
"Charts of Fetal Size: 2. Head Measurements"
British Journal of Obstetrics & Gynaecology, Jan. 1994, vol. 101, P. 35-43

Age	3% (cm^2)	50% (cm^2)	97% (cm^2)
12w0d	2.4	3.6	5.1
13w0d	3.7	5.3	7.1
14w0d	5.3	7.2	9.4
15w0d	7.2	9.4	12.0
16w0d	9.3	11.9	14.8
17w0d	11.6	14.6	17.9
18w0d	14.1	17.5	21.2
19w0d	16.8	20.6	24.7
20w0d	19.7	23.9	28.5
21w0d	22.7	27.3	32.3
22w0d	25.8	30.9	36.4
23w0d	29.1	34.6	40.5
24w0d	32.4	38.4	44.8
25w0d	35.9	42.2	49.1
26w0d	39.3	46.1	53.5
27w0d	42.8	50.1	57.9
28w0d	46.3	54.0	62.3
29w0d	49.8	57.9	66.7
30w0d	53.2	61.8	71.0
31w0d	56.6	65.6	75.3
32w0d	59.8	69.3	79.5
33w0d	63.0	72.9	83.5
34w0d	66.0	76.4	87.4
35w0d	68.9	79.6	91.2
36w0d	71.6	82.7	94.7
37w0d	74.1	85.6	98.1
38w0d	76.4	88.3	101.2
39w0d	78.4	90.7	104.0
40w0d	80.2	92.9	106.5
41w0d	81.7	94.8	108.8
42w0d	83.0	96.3	110.7

(c) HA Chitty-%tile Identical

Chitty, L.S., Altman, D.G.
"Charts of Fetal Size: 2. Head Measurements"
British Journal of Obstetrics & Gynaecology, Jan. 1994, vol. 101, P. 35-43

Age	1SD (cm^2)	3% (cm^2)	50% (cm^2)	97% (cm^2)
12w0d	0.80	2.4	3.6	5.1
13w0d	0.96	3.7	5.3	7.1
14w0d	1.17	5.3	7.2	9.4
15w0d	1.38	7.2	9.4	12.0
16w0d	1.54	9.3	11.9	14.8
17w0d	1.76	11.6	14.6	17.9
18w0d	1.97	14.1	17.5	21.2
19w0d	2.18	16.8	20.6	24.7
20w0d	2.45	19.7	23.9	28.5
21w0d	2.66	22.7	27.3	32.3
22w0d	2.93	25.8	30.9	36.4
23w0d	3.14	29.1	34.6	40.5
24w0d	3.40	32.4	38.4	44.8
25w0d	3.67	35.9	42.2	49.1
26w0d	3.94	39.3	46.1	53.5
27w0d	4.15	42.8	50.1	57.9
28w0d	4.41	46.3	54.0	62.3
29w0d	4.68	49.8	57.9	66.7
30w0d	4.89	53.2	61.8	71.0
31w0d	5.16	56.6	65.6	75.3
32w0d	5.43	59.8	69.3	79.5
33w0d	5.64	63.0	72.9	83.5
34w0d	5.85	66.0	76.4	87.4
35w0d	6.17	68.9	79.6	91.2
36w0d	6.38	71.6	82.7	94.7
37w0d	6.65	74.1	85.6	98.1
38w0d	6.86	76.4	88.3	101.2
39w0d	7.07	78.4	90.7	104.0
40w0d	7.23	80.2	92.9	106.5
41w0d	7.45	81.7	94.8	108.8
42w0d	7.66	83.0	96.3	110.7

(14) HC

(a) HC ASUM-V1 FG

POLICY ON OBSTETRIC EXAMINATIONS
NORMAL ULTRASONIC FETAL MEASUREMENTS JUNE 1991

Age	-2SD (mm)	Mean (mm)	+2SD (mm)
10w0d	—	42.3	—
11w0d	—	56.4	—
12w0d	—	70.3	—
13w0d	—	84.0	—
14w0d	—	97.6	—
15w0d	—	111.0	—
16w0d	107.1	124.1	141.1
17w0d	119.9	137.1	154.3
18w0d	132.4	149.8	167.2
19w0d	144.7	162.3	179.9
20w0d	156.7	174.5	192.3
21w0d	168.5	186.5	204.5
22w0d	179.3	198.1	216.9
23w0d	189.8	209.5	229.2
24w0d	200.1	220.6	241.1
25w0d	210.0	231.3	252.6
26w0d	219.5	241.7	263.9
27w0d	228.7	251.7	274.7
28w0d	238.7	261.4	284.1
29w0d	248.4	270.7	293.0
30w0d	257.6	279.6	301.6
31w0d	266.4	288.1	309.8
32w0d	274.8	296.1	317.4
33w0d	282.8	303.8	324.8
34w0d	290.8	311.0	331.2
35w0d	298.3	317.7	337.1
36w0d	305.4	324.0	342.6
37w0d	311.9	329.7	347.5
38w0d	318.0	335.0	352.0
39w0d	—	339.7	—
40w0d	—	344.0	—

(b) HC ASUM-V2 GA

Australian Society of Ultrasound Medicine (ASUM) - Policy statement Statement on normal ultrasonics fetal measurements
(Revised May 2001) P 28-P 31

Value (mm)	Age
44.0	11w1d
61.0	12w0d
81.0	13w0d
98.0	14w0d
113.0	15w0d
128.0	16w0d
141.0	17w0d
154.0	18w0d
166.0	19w0d
177.0	20w0d
188.0	20w6d
199.0	22w0d
209.0	23w0d
218.0	23w6d
228.0	25w0d
237.0	26w0d
246.0	27w0d
254.0	28w0d
263.0	29w0d
271.0	30w0d
279.0	31w0d
287.0	32w0d
294.0	33w0d
302.0	34w0d
309.0	35w0d
317.0	36w0d
324.0	37w0d
331.0	38w0d
337.0	39w0d
344.0	40w0d
351.0	41w0d
357.0	42w0d
364.0	43w0d
369.0	43w6d

(c) HC ASUM-V2 FG

Australian Society of Ultrasound Medicine (ASUM) - Policy statement Statement on normal ultrasonics fetal measurements
(Revised May 2001) P 28-P 31

Age	-2SD (mm)	Mean (mm)	+2SD (mm)
11w0d	44.0	59.0	74.0
12w0d	55.0	70.0	85.0
13w0d	69.0	84.0	99.0
14w0d	81.0	96.0	111.0
15w0d	93.0	108.0	123.0
16w0d	113.0	128.0	143.0
17w0d	126.0	141.0	156.0
18w0d	131.0	151.0	171.0
19w0d	140.0	160.0	180.0
20w0d	150.0	170.0	190.0
21w0d	156.0	176.0	196.0
22w0d	168.0	188.0	208.0
23w0d	190.0	210.0	230.0
24w0d	200.0	220.0	240.0
25w0d	211.0	231.0	251.0
26w0d	218.0	238.0	258.0
27w0d	230.0	250.0	270.0
28w0d	243.0	263.0	283.0
29w0d	244.0	269.0	294.0
30w0d	249.0	274.0	299.0
31w0d	259.0	284.0	309.0
32w0d	263.0	288.0	313.0
33w0d	275.0	300.0	325.0
34w0d	280.0	305.0	330.0
35w0d	285.0	310.0	335.0
36w0d	292.0	317.0	342.0
37w0d	296.0	321.0	346.0
38w0d	303.0	328.0	353.0
39w0d	311.0	336.0	361.0
40w0d	315.0	340.0	365.0
41w0d	319.0	344.0	369.0

(d) HC CFEF FG

French fetal biometry: reference equations and comparison with other charts
L. J. SALOMON, M. DUYME, J. CREQUAT, G. BRODATY, C. TALMANT, N. FRIES and M. ALTHUSER
CFEF - Collège Français d'Echographie Foetale, Paris, France
Ultrasound Obstet Gynecol (in press) published online in Wiley InterScience (www.interscience.wiley.com).
DOI: 10.1002/uog.2733

Age	5% (mm)	50% (mm)	95% (mm)
15w0d	104.6	117.7	130.9
16w0d	114.3	128.0	141.7
17w0d	124.3	138.6	152.8
18w0d	134.6	149.4	164.2
19w0d	145.0	160.4	175.7
20w0d	155.5	171.4	187.4
21w0d	166.1	182.6	199.1
22w0d	176.6	193.7	210.8
23w0d	187.1	204.8	222.4
24w0d	197.5	215.7	233.9
25w0d	207.6	226.4	245.2
26w0d	217.5	236.9	256.2
27w0d	227.0	247.0	266.9
28w0d	236.2	256.7	277.1
29w0d	244.8	265.9	287.0
30w0d	253.0	274.6	296.2
31w0d	260.5	282.7	304.9
32w0d	267.4	290.2	313.0
33w0d	273.6	297.0	320.3
34w0d	279.0	302.9	326.8
35w0d	283.6	308.0	332.5
36w0d	287.2	312.2	337.3
37w0d	289.9	315.5	341.1
38w0d	291.5	317.7	343.8
39w0d	292.0	318.7	345.5
40w0d	291.3	318.6	345.9

(e) HC CFEF-%tile Identical

French fetal biometry: reference equations and comparison with other charts
L. J. SALOMON, M. DUYME, J. CREQUAT, G. BRODATY, C. TALMANT, N. FRIES and M. ALTHUSER
CFEF - Collège Français d'Echographie Foetale, Paris, France
Ultrasound Obstet Gynecol (in press) published online in Wiley InterScience (www.interscience.wiley.com).
DOI: 10.1002/uog.2733

Age	1SD (mm)	5% (mm)	50% (mm)	95% (mm)
15w0d	8.0	104.6	117.7	130.9
16w0d	8.3	114.3	128.0	141.7
17w0d	8.7	124.3	138.6	152.8
18w0d	9.0	134.6	149.4	164.2
19w0d	9.3	145.0	160.4	175.7
20w0d	9.7	155.5	171.4	187.4
21w0d	10.0	166.1	182.6	199.1
22w0d	10.4	176.6	193.7	210.8
23w0d	10.7	187.1	204.8	222.4
24w0d	11.1	197.5	215.7	233.9
25w0d	11.4	207.6	226.4	245.2
26w0d	11.8	217.5	236.9	256.2
27w0d	12.1	227.0	247.0	266.9
28w0d	12.5	236.2	256.7	277.1
29w0d	12.8	244.8	265.9	287.0
30w0d	13.1	253.0	274.6	296.2
31w0d	13.5	260.5	282.7	304.9
32w0d	13.8	267.4	290.2	313.0
33w0d	14.2	273.6	297.0	320.3
34w0d	14.5	279.0	302.9	326.8
35w0d	14.9	283.6	308.0	332.5
36w0d	15.2	287.2	312.2	337.3
37w0d	15.6	289.9	315.5	341.1
38w0d	15.9	291.5	317.7	343.8
39w0d	16.2	292.0	318.7	345.5
40w0d	16.6	291.3	318.6	345.9

(f) HC Chitty(drvd) GA

Altman, D.G., and Chitty, L.S.
"New charts for ultrasound dating of pregnancy"
Ultrasound Obstet. Gynecol. 10 (1997) 174-191

Value (mm)	Age	5%, 95% (days)
80.0	12w4d	8
86.7	13w0d	9
98.3	14w0d	9
110.0	15w0d	8
121.7	16w0d	8
135.0	17w0d	9
146.7	18w0d	9
158.3	19w0d	8
171.7	20w0d	9
183.3	21w0d	9
195.0	22w0d	9
208.3	23w0d	11
220.0	24w0d	12
231.3	25w0d	13
241.7	26w0d	13
252.5	27w0d	15
262.5	28w0d	16
271.3	29w0d	17
280.0	30w0d	18
288.8	31w0d	21
297.0	32w0d	23
304.0	33w0d	25
311.0	34w0d	26
317.5	35w0d	29
320.0	35w3d	29

(g) HC Chitty(drvd) FG

Chitty, L.S., Altman, D.G.
"Charts of Fetal Size: 2. Head Measurements",
British Journal of Obstetrics & Gynaecology, Jan. 1994, vol. 101, pp. 35-43

Age	3% (mm)	50% (mm)	97% (mm)
12w0d	55.5	68.1	80.7
13w0d	69.1	82.1	95.2
14w0d	82.5	96.0	109.5
15w0d	95.7	109.6	123.6
16w0d	108.7	123.1	137.4
17w0d	121.5	136.3	151.1
18w0d	134.0	149.3	164.5
19w0d	146.3	162.0	177.6
20w0d	158.3	174.4	190.5
21w0d	170.0	186.5	203.1
22w0d	181.4	198.4	215.4
23w0d	192.5	209.9	227.4
24w0d	203.3	221.1	239.0
25w0d	213.7	232.0	250.3
26w0d	223.7	242.5	261.2
27w0d	233.4	252.6	271.8
28w0d	242.7	262.4	282.0
29w0d	251.6	271.7	291.8
30w0d	260.1	280.6	301.1
31w0d	268.2	289.1	310.0
32w0d	275.8	297.2	318.5
33w0d	283.0	304.8	326.6
34w0d	289.6	311.9	334.1
35w0d	295.8	318.5	341.2
36w0d	301.5	324.6	347.8
37w0d	306.7	330.3	353.8
38w0d	311.4	335.3	359.3
39w0d	315.5	339.9	364.3
40w0d	319.0	343.9	368.7
41w0d	322.0	347.3	372.6
42w0d	324.4	350.1	375.8

(h) HC Chitty (drvd)-%tile Identical

Chitty, L.S., Altman, D.G.
"Charts of Fetal Size: 2. Head Measurements",
British Journal of Obstetrics & Gynaecology, Jan. 1994, vol. 101, pp. 35-43

Age	1SD (mm)	3% (mm)	50% (mm)	97% (mm)
12w0d	6.7	55.5	68.1	80.7
13w0d	6.9	69.1	82.1	95.2
14w0d	7.2	82.5	96.0	109.5
15w0d	7.4	95.7	109.6	123.6
16w0d	7.6	108.7	123.1	137.4
17w0d	7.9	121.5	136.3	151.1
18w0d	8.1	134.0	149.3	164.5
19w0d	8.3	146.3	162.0	177.6
20w0d	8.6	158.3	174.4	190.5
21w0d	8.8	170.0	186.5	203.1
22w0d	9.0	181.4	198.4	215.4
23w0d	9.3	192.5	209.9	227.4
24w0d	9.5	203.3	221.1	239.0
25w0d	9.7	213.7	232.0	250.3
26w0d	10.0	223.7	242.5	261.2
27w0d	10.2	233.4	252.6	271.8
28w0d	10.4	242.7	262.4	282.0
29w0d	10.7	251.6	271.7	291.8
30w0d	10.9	260.1	280.6	301.1
31w0d	11.1	268.2	289.1	310.0
32w0d	11.4	275.8	297.2	318.5
33w0d	11.6	283.0	304.8	326.6
34w0d	11.8	289.6	311.9	334.1
35w0d	12.1	295.8	318.5	341.2
36w0d	12.3	301.5	324.6	347.8
37w0d	12.5	306.7	330.3	353.8
38w0d	12.8	311.4	335.3	359.3
39w0d	13.0	315.5	339.9	364.3
40w0d	13.2	319.0	343.9	368.7
41w0d	13.5	322.0	347.3	372.6
42w0d	13.7	324.4	350.1	375.8

(i) HC Chitty(Pltd) GA

Altman, D.G., and Chitty, L.S.
"New charts for ultrasound dating of pregnancy"
Ultrasound Obstet. Gynecol. 10 (1997) 174-191

Value (mm)	Age	5%, 95% (days)
85.0	12w6d	5
86.7	13w0d	5
100.0	14w0d	6
111.7	15w0d	7
123.3	16w0d	7
136.7	17w0d	8
148.3	18w0d	8
161.7	19w0d	9
175.0	20w0d	10
186.7	21w0d	10
200.0	22w0d	12
211.7	23w0d	12
223.3	24w0d	13
235.0	25w0d	14
246.3	26w0d	15
256.3	27w0d	15
266.3	28w0d	16
275.0	29w0d	16
283.8	30w0d	17
292.5	31w0d	19
300.0	32w0d	19
307.0	33w0d	19
314.0	34w0d	21
320.8	35w0d	22
325.0	35w5d	22

(j) HC Chitty (Pltd) FG

Chitty, L.S., Altman, D.G.
"Charts of Fetal Size: 2. Head Measurements",
British Journal of Obstetrics & Gynaecology, Jan. 1994, vol. 101, pp. 35-43

Age	3% (mm)	50% (mm)	97% (mm)
12w0d	57.4	69.5	81.5
13w0d	71.1	83.6	96.1
14w0d	84.7	97.6	110.6
15w0d	98.1	111.4	124.8
16w0d	111.2	125.0	138.8
17w0d	124.1	138.3	152.6
18w0d	136.8	151.5	166.1
19w0d	149.2	164.3	179.4
20w0d	161.3	176.9	192.4
21w0d	173.2	189.2	205.1
22w0d	184.8	201.2	217.6
23w0d	196.0	212.8	229.7
24w0d	206.9	224.2	241.5
25w0d	217.5	235.2	252.9
26w0d	227.7	245.8	264.0
27w0d	237.5	256.1	274.7
28w0d	247.0	266.0	285.0
29w0d	256.1	275.5	295.0
30w0d	264.7	284.6	304.5
31w0d	272.9	293.2	313.6
32w0d	280.7	301.5	322.2
33w0d	288.0	309.2	330.4
34w0d	294.9	316.5	338.1
35w0d	301.2	323.3	345.4
36w0d	307.1	329.6	352.1
37w0d	312.5	335.4	358.3
38w0d	317.3	340.6	364.0
39w0d	321.6	345.3	369.1
40w0d	325.3	349.5	373.7
41w0d	328.4	353.1	377.8
42w0d	331.0	356.1	381.2

(k) HC Chitty (Pltd)-%tile Identical

Chitty, L.S., Altman, D.G.
"Charts of Fetal Size: 2. Head Measurements",
British Journal of Obstetrics & Gynaecology, Jan. 1994, vol. 101, pp. 35-43

Age	1SD (mm)	3% (mm)	50% (mm)	97% (mm)
12w0d	6.4	57.4	69.5	81.5
13w0d	6.6	71.1	83.6	96.1
14w0d	6.9	84.7	97.6	110.6
15w0d	7.1	98.1	111.4	124.8
16w0d	7.3	111.2	125.0	138.8
17w0d	7.6	124.1	138.3	152.6
18w0d	7.8	136.8	151.5	166.1
19w0d	8.0	149.2	164.3	179.4
20w0d	8.3	161.3	176.9	192.4
21w0d	8.5	173.2	189.2	205.1
22w0d	8.7	184.8	201.2	217.6
23w0d	9.0	196.0	212.8	229.7
24w0d	9.2	206.9	224.2	241.5
25w0d	9.4	217.5	235.2	252.9
26w0d	9.7	227.7	245.8	264.0
27w0d	9.9	237.5	256.1	274.7
28w0d	10.1	247.0	266.0	285.0
29w0d	10.3	256.1	275.5	295.0
30w0d	10.6	264.7	284.6	304.5
31w0d	10.8	272.9	293.2	313.6
32w0d	11.0	280.7	301.5	322.2
33w0d	11.3	288.0	309.2	330.4
34w0d	11.5	294.9	316.5	338.1
35w0d	11.7	301.2	323.3	345.4
36w0d	12.0	307.1	329.6	352.1
37w0d	12.2	312.5	335.4	358.3
38w0d	12.4	317.3	340.6	364.0
39w0d	12.7	321.6	345.3	369.1
40w0d	12.9	325.3	349.5	373.7
41w0d	13.1	328.4	353.1	377.8
42w0d	13.4	331.0	356.1	381.2

(l) HC Hadlock GA

Hadlock FP, Deter RL, Harrist RB, Park SK:
"Estimating fetal age: Computer-assisted analysis of multiple fetal growth parameters"
Radiology 1984; 152: 497-502.

Value (mm)	Age	2SD (days)
55.4	12w0d	8
72.5	13w0d	8
90.0	14w0d	8
105.0	15w0d	8
120.0	16w0d	8
135.0	17w0d	8
148.2	18w0d	10
161.6	19w0d	10
175.0	20w0d	10
186.5	21w0d	10
198.2	22w0d	10
208.8	23w0d	10
220.0	24w0d	14
230.0	25w0d	14
240.0	26w0d	14
248.8	27w0d	14
257.5	28w0d	14
266.3	29w0d	14
275.0	30w0d	21
282.5	31w0d	21
290.0	32w0d	21
298.0	33w0d	21
305.0	34w0d	21
312.4	35w0d	21
320.0	36w0d	19
326.0	37w0d	19
333.0	38w0d	19
339.0	39w0d	19
345.8	40w0d	19
351.6	41w0d	19
357.7	42w0d	19

(m) HC Hadlock FG

Hadlock FP, Deter RL, Harrist RB, Park SK:
"Estimating fetal age: Computer-assisted analysis of multiple fetal growth parameters"
Radiology 1984 ;152: 497-502.

Age	-1SD (mm)	Mean (mm)	+1SD (mm)
12w0d	58.0	68.0	78.0
13w0d	72.4	82.4	92.4
14w0d	86.6	96.6	106.6
15w0d	100.6	110.6	120.6
16w0d	114.4	124.4	134.4
17w0d	127.9	137.9	147.9
18w0d	141.1	151.1	161.1
19w0d	154.1	164.1	174.1
20w0d	166.8	176.8	186.8
21w0d	179.2	189.2	199.2
22w0d	191.3	201.3	211.3
23w0d	203.0	213.0	223.0
24w0d	214.4	224.4	234.4
25w0d	225.4	235.4	245.4
26w0d	236.0	246.0	256.0
27w0d	246.3	256.3	266.3
28w0d	256.1	266.1	276.1
29w0d	265.5	275.5	285.5
30w0d	274.4	284.4	294.4
31w0d	282.9	292.9	302.9
32w0d	290.9	300.9	310.9
33w0d	298.4	308.4	318.4
34w0d	305.5	315.5	325.5
35w0d	312.0	322.0	332.0
36w0d	317.9	327.9	337.9
37w0d	323.3	333.3	343.3
38w0d	328.2	338.2	348.2
39w0d	332.5	342.5	352.5
40w0d	336.1	346.0	356.1
41w0d*	339.2	349.2	359.2
42w0d*	341.6	351.6	361.6

*: Data for extrapolated gestational age (weeks) when Extrapolate is set to ON

(n) HC Hadlock-%tile Identical

Hadlock FP, Deter RL, Harrist RB, Park SK:
"Estimating fetal age: Computer-assisted analysis of multiple fetal growth parameters"
Radiology 1984; 152: 497-502.

Age	1SD (mm)	-2SD (mm)	Mean (mm)	+2SD (mm)
12w0d	10.0	35.4	55.4	126.2
13w0d	10.0	52.7	72.7	178.1
14w0d	10.0	69.4	89.4	228.2
15w0d	10.0	85.4	105.4	276.2
16w0d	10.0	100.7	120.7	322.1
17w0d	10.0	115.2	135.2	365.6
18w0d	10.0	129.1	149.1	407.3
19w0d	10.0	142.3	162.3	446.9
20w0d	10.0	154.8	174.8	484.4
21w0d	10.0	166.8	186.8	520.4
22w0d	10.0	178.3	198.3	554.9
23w0d	10.0	189.2	209.2	587.6
24w0d	10.0	199.7	219.7	619.1
25w0d	10.0	209.8	229.8	649.4
26w0d	10.0	219.4	239.4	678.2
27w0d	10.0	228.7	248.7	706.1
28w0d	10.0	237.7	257.7	733.1
29w0d	10.0	246.3	266.3	758.9
30w0d	10.0	254.6	274.6	783.8
31w0d	10.0	262.7	282.7	808.1
32w0d	10.0	270.5	290.5	831.5
33w0d	10.0	278.1	298.1	854.3
34w0d	10.0	285.5	305.5	876.5
35w0d	10.0	292.6	312.6	897.8
36w0d	10.0	299.6	319.6	918.8
37w0d	10.0	306.3	326.3	938.9
38w0d	10.0	312.9	332.9	958.7
39w0d	10.0	319.3	339.3	977.9
40w0d	10.0	325.6	345.6	996.8
41w0d	10.0	331.7	351.7	1015.1
42w0d	10.0	337.7	357.7	1033.1

(o) HC Hansmann Identical

Hansmann H, Hackeloer B.,
Staudach A.
"Ultrasound Diagnosis in Obstetrics and Gynecology"
New York, Springer Verlag, 1986,
English Edition (ISBN 0-387-15384-9);
P 431

Value (mm)	Age
106.0	14w0d
115.0	15w0d
127.0	16w0d
140.0	17w0d
152.0	18w0d
164.0	19w0d
176.0	20w0d
189.0	21w0d
203.0	22w0d
215.0	23w0d
226.0	24w0d
239.0	25w0d
251.0	26w0d
263.0	27w0d
274.0	28w0d
284.0	29w0d
293.0	30w0d
303.0	31w0d
311.0	32w0d
318.0	33w0d
325.0	34w0d
332.0	35w0d
337.0	36w0d
340.0	37w0d
344.0	38w0d
347.0	39w0d
349.0	40w0d

(p) HC Jeanty GA

Jeanty P
"Fetal Biometry"
Ultrasonography in Obstetrics and Gynecology: P 93 to 108

Value (mm)	Age	5%, 95% (days)
80.0	12w4d	12
87.0	13w0d	13
101.0	14w0d	12
115.0	15w0d	12
129.0	16w0d	13
141.0	17w0d	12
153.0	18w0d	12
165.0	19w0d	12
177.0	20w0d	12
189.0	21w0d	12
200.0	22w0d	12
210.0	23w0d	12
221.0	24w0d	12
231.0	25w0d	13
241.0	26w0d	12
250.0	27w0d	12
260.0	28w0d	12
269.0	29w0d	12
278.0	30w0d	12
288.0	31w0d	13
296.0	32w0d	12
305.0	33w0d	13
313.0	34w0d	12
321.0	35w0d	12
330.0	36w0d	13
338.0	37w0d	13
346.0	38w0d	13
354.0	39w0d	13
361.0	40w0d	12
364.0	40w2d	13

(q) HC Merz GA

Merz E:
"Ultrasound in Gynecology and Obstetrics"
Stuttgart, New York, Thieme Medical Publishers, Inc. 1991; 326-336

Value (mm)	Age	5%, 95% (days)
72.0	12w1d	7
85.0	13w0d	9
100.0	14w0d	8
114.0	15w0d	9
128.0	16w0d	10
142.0	17w0d	10
155.0	18w0d	11
168.0	19w0d	11
181.0	20w0d	12
193.0	21w0d	12
205.0	22w0d	12
217.0	23w0d	12
228.0	24w0d	13
239.0	25w0d	13
250.0	26w0d	13
260.0	27w0d	13
269.0	28w0d	13
279.0	29w0d	14
288.0	30w0d	13
297.0	31w0d	14
305.0	32w0d	14
313.0	33w0d	14
321.0	34w0d	15
329.0	35w0d	15
335.0	36w0d	15
343.0	37w0d	16
349.0	38w0d	17
355.0	39w0d	16
361.0	40w0d	16
364.0	40w4d	16

(r) HC Merz FG

Merz E:
"Ultrasound in Gynecology and Obstetrics"
Stuttgart, New York, Thieme Medical Publishers, Inc. 1991; 312

Age	5% (mm)	50% (mm)	95% (mm)
12w0d	63.0	76.0	90.0
13w0d	77.0	90.0	104.0
14w0d	90.0	104.0	118.0
15w0d	104.0	117.0	132.0
16w0d	117.0	131.0	146.0
17w0d	130.0	144.0	159.0
18w0d	142.0	157.0	172.0
19w0d	155.0	169.0	185.0
20w0d	167.0	182.0	197.0
21w0d	179.0	194.0	210.0
22w0d	190.0	205.0	222.0
23w0d	201.0	217.0	233.0
24w0d	212.0	228.0	245.0
25w0d	223.0	239.0	256.0
26w0d	233.0	249.0	266.0
27w0d	243.0	259.0	277.0
28w0d	253.0	269.0	287.0
29w0d	262.0	279.0	296.0
30w0d	271.0	288.0	306.0
31w0d	279.0	296.0	315.0
32w0d	288.0	305.0	323.0
33w0d	296.0	313.0	332.0
34w0d	303.0	321.0	340.0
35w0d	311.0	328.0	347.0
36w0d	318.0	336.0	355.0
37w0d	324.0	342.0	362.0
38w0d	331.0	349.0	368.0
39w0d	337.0	355.0	375.0
40w0d	343.0	361.0	381.0

(15) Humerus

(a) Humerus ASUM-V2 GA

Australian Society of Ultrasound Medicine (ASUM) - Policy statement Statement on normal ultrasonics fetal measurements
(Revised May 2001) P 28-P 31

Value (mm)	Age
5.0	10w3d
6.7	11w0d
9.3	12w0d
12.0	13w0d
15.0	14w0d
17.7	15w0d
20.3	16w0d
23.0	17w0d
26.0	18w0d
28.5	19w0d
31.0	20w0d
33.7	21w0d
36.0	22w0d
39.0	23w2d
40.5	24w0d
42.7	25w0d
44.8	26w0d
46.8	27w0d
48.7	28w0d
50.5	29w0d
52.3	30w0d
54.0	31w0d
55.6	32w0d
57.2	33w0d
58.8	34w0d
60.2	35w0d
61.6	36w0d
63.0	37w0d
64.4	38w0d
65.8	39w0d
67.0	40w0d
68.3	41w0d
69.5	42w0d
70.7	43w0d
71.8	44w0d
73.0	45w0d
74.0	45w6d

(b) Humerus ASUM-V2 FG

Australian Society of Ultrasound Medicine (ASUM) - Policy statement Statement on normal ultrasonics fetal measurements
(Revised May 2001) P 28-P 31

Age	-2SD (mm)	Mean (mm)	+2SD (mm)
11w0d	5.0	8.0	11.0
12w0d	7.0	9.0	11.0
13w0d	8.0	11.0	14.0
14w0d	10.0	14.0	18.0
15w0d	11.5	17.0	22.5
16w0d	17.0	21.0	25.0
17w0d	20.0	25.0	30.0
18w0d	21.5	27.0	32.5
19w0d	24.0	29.0	34.0
20w0d	26.0	31.0	36.0
21w0d	26.0	32.0	38.0
22w0d	29.0	35.0	41.0
23w0d	34.0	38.0	42.0
24w0d	34.0	40.0	46.0
25w0d	38.0	43.0	48.0
26w0d	40.0	44.0	48.0
27w0d	43.0	47.0	51.0
28w0d	45.0	50.0	55.0
29w0d	46.0	51.0	56.0
30w0d	47.0	52.0	57.0
31w0d	49.0	54.0	59.0
32w0d	51.0	56.0	61.0
33w0d	51.0	57.0	63.0
34w0d	53.5	59.0	64.5
35w0d	54.0	60.0	66.0
36w0d	57.0	62.0	67.0
37w0d	57.0	63.0	69.0
38w0d	58.0	64.0	70.0
39w0d	59.5	65.0	70.5
40w0d	60.0	66.0	72.0
41w0d	62.0	68.0	74.0

(c) Humerus Chitty-%tile Identical

Chitty
Charts of fetal size: limb bones
BJOG: an International Journal of Obstetrics and Gynaecology
August 2002, Vol.109, pp. 919-929

Age	1SD (mm)	3% (mm)	50% (mm)	97% (mm)
12w0d	1.8	3.7	7.1	10.6
13w0d	1.9	7.2	10.7	14.2
14w0d	1.9	10.5	14.1	17.7
15w0d	2.0	13.7	17.3	21.0
16w0d	2.0	16.7	20.4	24.2
17w0d	2.0	19.6	23.4	27.2
18w0d	2.1	22.3	26.2	30.1
19w0d	2.1	24.9	28.9	32.9
20w0d	2.2	27.4	31.5	35.5
21w0d	2.2	29.8	34.0	38.1
22w0d	2.2	32.1	36.3	40.5
23w0d	2.3	34.3	38.6	42.9
24w0d	2.3	36.4	40.7	45.1
25w0d	2.4	38.4	42.8	47.2
26w0d	2.4	40.3	44.8	49.3
27w0d	2.4	42.1	46.7	51.3
28w0d	2.5	43.9	48.5	53.2
29w0d	2.5	45.5	50.2	55.0
30w0d	2.6	47.1	51.9	56.7
31w0d	2.6	48.6	53.5	58.4
32w0d	2.6	50.0	55.0	59.9
33w0d	2.7	51.4	56.4	61.5
34w0d	2.7	52.7	57.8	62.9
35w0d	2.8	53.9	59.1	64.3
36w0d	2.8	55.1	60.3	65.6
37w0d	2.8	56.2	61.5	66.8
38w0d	2.9	57.2	62.6	68.0
39w0d	2.9	58.2	63.7	69.2
40w0d	3.0	59.1	64.7	70.3
41w0d	3.0	60.0	65.6	71.3
42w0d	3.0	60.8	66.5	72.2

(d) Humerus Jeanty GA

Jeanty P, Rodesch F, Delbeke D, Dumont JE
"Estimation of gestational age from measurements of fetal long bones"
J Ultrasound Med 3: 75-79. 1984.

Value (mm)	Age	5%, 95% (days)
10.0	12w4d	19
11.5	13w0d	19
14.5	14w0d	19
17.5	15w0d	19
20.0	16w0d	19
23.0	17w0d	19
25.3	18w0d	19
28.0	19w0d	19
30.3	20w0d	19
32.7	21w0d	19
35.0	22w0d	19
37.3	23w0d	19
39.3	24w0d	19
41.5	25w0d	19
43.5	26w0d	19
45.5	27w0d	19
47.5	28w0d	19
49.5	29w0d	19
51.3	30w0d	19
53.3	31w0d	19
55.0	32w0d	19
57.0	33w0d	19
58.8	34w0d	19
60.5	35w0d	19
62.0	36w0d	19
63.8	37w0d	19
65.5	38w0d	19
67.2	39w0d	19
68.8	40w0d	19
69.0	40w1d	19

(e) Humerus Merz FG

Merz E:
"Ultrasound in Gynecology and Obstetrics"
Stuttgart, New York, Thieme Medical Publishers, Inc. 1991; 312

Age	5% (mm)	50% (mm)	95% (mm)
12w0d	4.0	8.0	11.0
13w0d	7.0	11.0	14.0
14w0d	10.0	14.0	17.0
15w0d	13.0	16.0	20.0
16w0d	16.0	19.0	23.0
17w0d	18.0	22.0	26.0
18w0d	21.0	25.0	28.0
19w0d	24.0	27.0	31.0
20w0d	26.0	30.0	34.0
21w0d	29.0	32.0	36.0
22w0d	31.0	35.0	39.0
23w0d	33.0	37.0	41.0
24w0d	36.0	40.0	44.0
25w0d	38.0	42.0	46.0
26w0d	40.0	44.0	48.0
27w0d	42.0	46.0	50.0
28w0d	44.0	48.0	52.0
29w0d	46.0	50.0	54.0
30w0d	48.0	52.0	56.0
31w0d	49.0	54.0	58.0
32w0d	51.0	55.0	60.0
33w0d	53.0	57.0	62.0
34w0d	54.0	59.0	63.0
35w0d	55.0	60.0	65.0
36w0d	57.0	61.0	66.0
37w0d	58.0	63.0	67.0
38w0d	59.0	64.0	69.0
39w0d	60.0	65.0	70.0
40w0d	62.0	66.0	71.0

(16) Kidney

(a) Kidney Bertagnoli FG

Bertagnoli L, Lalatta F, Gallacio R, et al
"Quantitative characterization of the growth of the fetal kidney"
J Clinical Ultrasound 11: 349-356, 1983.

Age	-2SD (mm)	Mean (mm)	+2SD (mm)
24w0d	22.0	24.4	26.8
25w0d	22.6	25.0	27.4
26w0d	23.3	25.7	28.1
27w0d	24.0	26.4	28.8
28w0d	24.8	27.2	29.6
29w0d	25.6	28.0	30.4
30w0d	26.4	28.8	31.2
31w0d	27.2	29.6	32.0
32w0d	28.0	30.4	32.8
33w0d	28.9	31.3	33.7
34w0d	29.8	32.2	34.6
35w0d	30.8	33.1	35.4
36w0d	31.8	34.1	36.4
37w0d	32.8	35.1	37.4
38w0d	33.8	36.1	38.4
39w0d	34.8	37.1	39.4
40w0d	35.9	38.2	40.5
41w0d	37.0	39.3	41.6
42w0d	38.1	40.4	42.7

(17) OFD

(a) OFD ASUM-V2 GA

Australian Society of Ultrasound Medicine (ASUM) - Policy statement Statement on normal ultrasonics fetal measurements
(Revised May 2001) P 28-P 31

Value(mm)	Age
19.0	10w2d
21.5	11w0d
25.5	12w0d
29.5	13w0d
34.0	14w1d
38.0	15w0d
43.0	16w0d
47.5	17w0d
52.0	18w0d
57.0	19w0d
62.0	20w1d
66.0	21w0d
70.5	22w0d
74.5	23w0d
78.5	24w0d
82.0	25w0d
85.5	26w0d
89.0	27w0d
92.0	28w0d
95.0	29w0d
97.7	30w0d
100.3	31w0d
103.0	32w0d
105.3	33w0d
107.7	34w0d
110.0	35w1d
112.0	36w0d
114.0	37w0d
116.0	38w0d
118.0	39w0d
119.8	40w0d
121.8	41w0d
123.5	42w0d
125.0	43w0d
126.8	44w0d
128.0	44w6d

(b) OFD ASUM-V2 FG

Australian Society of Ultrasound Medicine (ASUM) - Policy statement Statement on normal ultrasonics fetal measurements
(Revised May 2001) P 28-P 31

Age	-2SD (mm)	Mean (mm)	+2SD (mm)
11w0d	19.0	21.0	23.0
12w0d	22.0	24.0	26.0
13w0d	26.0	29.0	32.0
14w0d	31.0	34.0	37.0
15w0d	35.0	38.0	41.0
16w0d	43.0	46.0	49.0
17w0d	47.0	50.0	53.0
18w0d	50.5	54.0	57.5
19w0d	53.5	57.0	60.5
20w0d	57.5	61.0	64.5
21w0d	59.0	63.0	67.0
22w0d	64.5	68.0	71.5
23w0d	72.0	76.0	80.0
24w0d	75.0	79.0	83.0
25w0d	77.5	82.0	86.5
26w0d	79.5	84.0	88.5
27w0d	81.5	86.0	90.5
28w0d	90.0	95.0	100.0
29w0d	91.5	97.0	102.5
30w0d	92.5	98.0	103.5
31w0d	96.0	101.0	106.0
32w0d	97.0	102.0	107.0
33w0d	101.5	107.0	112.5
34w0d	102.5	108.0	113.5
35w0d	103.5	109.0	114.5
36w0d	106.5	112.0	117.5
37w0d	107.0	113.0	119.0
38w0d	110.5	116.0	121.5
39w0d	113.0	119.0	125.0
40w0d	114.0	120.0	126.0
41w0d	116.0	122.0	128.0

(c) OFD Chitty FG

Chitty, L.S., Altman, D.G.
"Charts of Fetal Size: 2. Head Measurements"
British Journal of Obstetrics & Gynaecology, Jan. 1994, vol. 101, pp. 35-43

Age	3% (mm)	50% (mm)	97% (mm)
12w0d	17.7	23.4	29.2
13w0d	22.9	28.6	34.2
14w0d	28.0	33.6	39.2
15w0d	33.0	38.6	44.2
16w0d	37.9	43.5	49.0
17w0d	42.7	48.3	53.8
18w0d	47.4	53.0	58.6
19w0d	51.9	57.6	63.3
20w0d	56.3	62.1	67.9
21w0d	60.6	66.5	72.4
22w0d	64.8	70.8	76.8
23w0d	68.8	74.9	81.1
24w0d	72.6	79.0	85.4
25w0d	76.3	82.9	89.5
26w0d	79.8	86.7	93.5
27w0d	83.1	90.3	97.4
28w0d	86.3	93.8	101.2
29w0d	89.3	97.1	104.9
30w0d	92.1	100.2	108.4
31w0d	94.7	103.2	111.8
32w0d	97.1	106.1	115.0
33w0d	99.4	108.7	118.1
34w0d	101.4	111.2	121.0
35w0d	103.2	113.5	123.8
26w0d	104.7	115.6	126.4
37w0d	106.1	117.5	128.9
38w0d	107.2	119.2	131.1
39w0d	108.1	120.6	133.1
40w0d	108.7	121.9	135.1
41w0d	109.1	123.0	136.8
42w0d	109.3	123.8	138.3

(d) OFD Chitty-%tile Identical

Chitty, L.S., Altman, D.G.
"Charts of Fetal Size: 2. Head Measurements"
British Journal of Obstetrics & Gynaecology, Jan. 1994, vol. 101, pp. 35-43

Age	1SD (mm)	3% (mm)	50% (mm)	97% (mm)
12w0d	3.1	17.7	23.4	29.2
13w0d	3.0	22.9	28.6	34.2
14w0d	3.0	28.0	33.6	39.2
15w0d	3.0	33.0	38.6	44.2
16w0d	3.0	37.9	43.5	49.0
17w0d	3.0	42.7	48.3	53.8
18w0d	3.0	47.4	53.0	58.6
19w0d	3.0	51.9	57.6	63.3
20w0d	3.1	56.3	62.1	67.9
21w0d	3.1	60.6	66.5	72.4
22w0d	3.2	64.8	70.8	76.8
23w0d	3.3	68.8	74.9	81.1
24w0d	3.4	72.6	79.0	85.4
25w0d	3.5	76.3	82.9	89.5
26w0d	3.7	79.8	86.7	93.5
27w0d	3.8	83.1	90.3	97.4
28w0d	4.0	86.3	93.8	101.2
29w0d	4.1	89.3	97.1	104.9
30w0d	4.3	92.1	100.2	108.4
31w0d	4.5	94.7	103.2	111.8
32w0d	4.7	97.1	106.1	115.0
33w0d	5.0	99.4	108.7	118.1
34w0d	5.2	101.4	111.2	121.0
35w0d	5.5	103.2	113.5	123.8
26w0d	5.8	104.7	115.6	126.4
37w0d	6.1	106.1	117.5	128.9
38w0d	6.4	107.2	119.2	131.1
39w0d	6.7	108.1	120.6	133.1
40w0d	7.0	108.7	121.9	135.1
41w0d	7.4	109.1	123.0	136.8
42w0d	7.7	109.3	123.8	138.3

(e) OFD Hansmann Identical

Hansmann H, Hackeloer B., Staudach A.
"Ultrasound Diagnosis in Obstetrics and Gynecology"
New York, Springer Verlag, 1986, English Edition (ISBN 0-387-15384-9); P 431

Value (mm)	Age
31.0	14w0d
38.0	15w0d
41.0	16w0d
46.0	17w0d
50.0	18w0d
54.0	19w0d
58.0	20w0d
63.0	21w0d
67.0	22w0d
72.0	23w0d
76.0	24w0d
80.0	25w0d
84.0	26w0d
88.0	27w0d
91.0	28w0d
95.0	29w0d
98.0	30w0d
100.0	31w0d
103.0	32w0d
105.0	33w0d
107.0	34w0d
109.0	35w0d
111.0	36w0d
112.0	37w0d
113.0	38w0d
114.0	39w0d
115.0	40w0d

(f) OFD Merz FG

Merz E:
"Ultrasound in Gynecology and Obstetrics"
Stuttgart, New York, Thieme Medical Publishers, Inc. 1991; 312

Age	5% (mm)	50% (mm)	95% (mm)
12w0d	18.0	23.0	28.0
13w0d	23.0	28.0	33.0
14w0d	28.0	33.0	38.0
15w0d	33.0	38.0	43.0
16w0d	38.0	43.0	48.0
17w0d	42.0	48.0	53.0
18w0d	47.0	52.0	58.0
19w0d	51.0	57.0	62.0
20w0d	55.0	61.0	67.0
21w0d	59.0	65.0	71.0
22w0d	63.0	69.0	75.0
23w0d	67.0	73.0	79.0
24w0d	71.0	77.0	83.0
25w0d	74.0	80.0	86.0
26w0d	78.0	84.0	90.0
27w0d	81.0	87.0	93.0
28w0d	84.0	90.0	96.0
29w0d	87.0	93.0	99.0
30w0d	90.0	96.0	102.0
31w0d	92.0	99.0	105.0
32w0d	95.0	101.0	108.0
33w0d	97.0	104.0	110.0
34w0d	99.0	106.0	113.0
35w0d	102.0	108.0	115.0
36w0d	104.0	110.0	117.0
37w0d	105.0	112.0	119.0
38w0d	107.0	114.0	121.0
39w0d	109.0	116.0	123.0
40w0d	110.0	117.0	124.0

(g) OFD Nicolaides Identical

Nicolaides
"Fetal biometry at 14-40 week's gestation"
Ultrasound in Obstetrics and Gynecology 4 1994: P34 to 48

Age	5% (mm)	Median (mm)	95% (mm)
14+0 - 14+6	35.0	39.0	42.0
15+0 - 15+6	39.0	42.0	46.0
16+0 - 16+6	42.0	46.0	50.0
17+0 - 17+6	46.0	50.0	54.0
18+0 - 18+6	50.0	54.0	59.0
19+0 - 19+6	54.0	58.0	63.0
20+0 - 20+6	57.0	62.0	68.0
21+0 - 21+6	61.0	67.0	72.0
22+0 - 22+6	65.0	71.0	77.0
23+0 - 23+6	69.0	75.0	82.0
24+0 - 24+6	73.0	79.0	86.0
25+0 - 25+6	77.0	83.0	90.0
26+0 - 26+6	81.0	87.0	95.0
27+0 - 27+6	84.0	91.0	99.0
28+0 - 28+6	87.0	95.0	103.0
29+0 - 29+6	91.0	98.0	107.0
30+0 - 30+6	94.0	102.0	110.0
31+0 - 31+6	96.0	105.0	113.0
32+0 - 32+6	99.0	107.0	116.0
33+0 - 33+6	101.0	110.0	119.0
34+0 - 34+6	103.0	112.0	121.0
35+0 - 35+6	105.0	113.0	123.0
36+0 - 36+6	106.0	115.0	124.0
37+0 - 37+6	107.0	116.0	125.0
38+0 - 38+6	107.0	116.0	126.0
39+0 - 39+6	107.0	116.0	126.0

(18) OOD

(a) OOD Jeanty GA

Jeanty P, et al
"The Binocular Distance: A New Way to Estimate Fetal Age"
J Ultrasound Med, 1984; 3: 241-243

Value (mm)	Age	5%, 95% (days)
15.0	10w3d	23
16.0	11w0d	23
17.6	12w0d	23
19.3	13w0d	23
21.0	14w0d	23
22.8	15w0d	23
24.3	16w0d	23
26.0	17w0d	23
27.8	18w0d	23
29.3	19w0d	23
31.0	20w0d	23
32.8	21w0d	23
34.5	22w0d	23
36.1	23w0d	23
37.8	24w0d	23
39.5	25w0d	23
41.2	26w0d	23
42.8	27w0d	23
44.5	28w0d	23
46.2	29w0d	23
47.8	30w0d	23
49.5	31w0d	23
51.2	32w0d	23
53.0	33w0d	23
54.6	34w0d	23
56.3	35w0d	23
58.0	36w0d	23
59.8	37w0d	23
61.3	38w0d	23
63.0	39w0d	23
64.8	40w0d	23
65.0	40w1d	23

(b) OOD Mayden GA

Mayden
"Orbital diameter:A new parameter for prenatal diagnosis and dating."
Am J Obstet Gynecol 1982;144:
P 289 to 297

Value (mm)	Age
13.0	11w4d
14.8	12w0d
16.8	13w0d
19.8	14w0d
22.0	15w0d
24.4	16w0d
26.4	17w0d
28.5	18w0d
31.3	19w0d
33.3	20w0d
35.3	21w0d
37.3	22w0d
39.3	23w0d
40.7	24w0d
42.8	25w0d
44.7	26w0d
45.9	27w0d
46.9	28w0d
47.9	29w0d
49.4	30w0d
50.4	31w0d
51.4	32w0d
53.0	33w0d
53.7	34w0d
54.6	35w0d
55.6	36w0d
56.7	37w0d
57.5	38w1d
58.1	39w0d
59.0	39w6d

(19) Radius

(a) Radius Merz FG

Merz E:
"Ultrasound in Gynecology and Obstetrics"
Stuttgart, New York, Thieme Medical Publishers, Inc. 1991; 312, 326-336

Age	5% (mm)	50% (mm)	95% (mm)
12w0d	1.0	5.0	8.0
13w0d	4.0	7.0	11.0
14w0d	7.0	10.0	14.0
15w0d	9.0	13.0	16.0
16w0d	12.0	15.0	19.0
17w0d	14.0	18.0	21.0
18w0d	16.0	20.0	24.0
19w0d	19.0	22.0	26.0
20w0d	21.0	25.0	29.0
21w0d	23.0	27.0	31.0
22w0d	25.0	29.0	33.0
23w0d	27.0	31.0	35.0
24w0d	29.0	33.0	37.0
25w0d	31.0	35.0	39.0
26w0d	32.0	37.0	41.0
27w0d	34.0	38.0	43.0
28w0d	36.0	40.0	44.0
29w0d	37.0	41.0	46.0
30w0d	38.0	43.0	47.0
31w0d	40.0	44.0	49.0
32w0d	41.0	45.0	50.0
33w0d	42.0	47.0	51.0
34w0d	43.0	48.0	52.0
35w0d	44.0	49.0	53.0
36w0d	45.0	50.0	54.0
37w0d	46.0	51.0	55.0
38w0d	47.0	51.0	56.0
39w0d	47.0	52.0	57.0
40w0d	48.0	53.0	58.0

(b) Radius Chitty-%tile Identical

Chitty
Charts of fetal size: limb bones
BJOG: an International Journal of Obstetrics and Gynaecology
August 2002, Vol. 109, pp. 919-929

Age	1SD (mm)	3% (mm)	50% (mm)	97% (mm)
12w0d	1.7	2.2	5.5	8.8
13w0d	1.8	4.8	8.2	11.6
14w0d	1.8	7.6	11.0	14.5
15w0d	1.9	10.3	13.9	17.4
16w0d	1.9	13.0	16.7	20.3
17w0d	2.0	15.6	19.3	23.1
18w0d	2.0	18.1	21.9	25.7
19w0d	2.1	20.4	24.4	28.3
20w0d	2.1	22.7	26.7	30.7
21w0d	2.2	24.8	28.9	32.9
22w0d	2.2	26.8	30.9	35.1
23w0d	2.3	28.6	32.9	37.1
24w0d	2.3	30.4	34.7	39.1
25w0d	2.4	32.0	36.5	40.9
26w0d	2.4	33.6	38.1	42.6
27w0d	2.4	35.1	39.7	44.3
28w0d	2.5	36.5	41.2	45.8
29w0d	2.5	37.8	42.6	47.3
30w0d	2.6	39.0	43.9	48.7
31w0d	2.6	40.2	45.1	50.1
32w0d	2.7	41.3	46.4	51.4
33w0d	2.7	42.4	47.5	52.6
34w0d	2.8	43.4	48.6	53.8
35w0d	2.8	44.3	49.6	54.9
36w0d	2.9	45.2	50.6	56.0
37w0d	2.9	46.1	51.6	57.0
38w0d	3.0	46.9	52.5	58.0
39w0d	3.0	47.7	53.5	59.0
40w0d	3.0	48.4	54.2	59.9
41w0d	3.1	49.1	55.0	60.8
42w0d	3.1	49.8	55.7	61.6

(20) TAD

(a) TAD CFEF FG

Biometry 2000. Fetal growth charts by the Collège Français d'Echographie Foetale (CFEF; the "French College of Fetal Ultrasonography") and INSERM U 155.
Gynecol Obstet Fertil 2000 Jun; 28 (6): 435-45

Age	3% (mm)	50% (mm)	97% (mm)
11w0d	9.7	13.5	17.3
12w0d	12.7	17.0	21.5
13w0d	15.6	20.6	25.5
14w0d	18.7	24.0	29.6
15w0d	21.8	27.7	33.6
16w0d	25.0	31.2	37.5
17w0d	28.2	34.7	41.4
18w0d	31.5	38.3	45.1
19w0d	34.8	41.7	48.6
20w0d	38.2	45.2	52.2
21w0d	41.1	48.3	55.6
22w0d	44.2	51.6	59.1
23w0d	47.0	54.7	62.5
24w0d	49.8	57.9	66.0
25w0d	52.5	61.0	69.4
26w0d	55.2	64.0	72.9
27w0d	57.7	67.1	76.4
28w0d	60.4	70.3	79.9
29w0d	63.1	73.3	83.3
30w0d	65.8	76.2	86.8
31w0d	68.4	79.3	90.1
32w0d	70.9	82.1	93.4
33w0d	73.1	84.8	96.6
34w0d	75.3	87.6	99.9
35w0d	77.0	90.0	103.0
36w0d	78.5	92.4	106.3
37w0d	79.8	94.8	109.7
38w0d	80.9	97.0	113.3
39w0d	81.9	99.3	117.0
40w0d	82.6	101.6	120.7
41w0d	82.8	103.0	123.0

(b) TAD CFEF-%tile Identical

Biometry 2000. Fetal growth charts by the Collège Français d'Echographie Foetale (CFEF; the "French College of Fetal Ultrasonography") and INSERM U 155.
Gynecol Obstet Fertil 2000 Jun; 28 (6): 435-45

Age	1SD (mm)	3% (mm)	50% (mm)	97% (mm)
11w0d	2.0	9.7	13.5	17.3
12w0d	2.4	12.7	17.0	21.5
13w0d	2.6	15.6	20.6	25.5
14w0d	3.0	18.7	24.0	29.6
15w0d	3.1	21.8	27.7	33.6
16w0d	3.4	25.0	31.2	37.5
17w0d	3.6	28.2	34.7	41.4
18w0d	3.6	31.5	38.3	45.1
19w0d	3.7	34.8	41.7	48.6
20w0d	3.7	38.2	45.2	52.2
21w0d	3.9	41.1	48.3	55.6
22w0d	4.0	44.2	51.6	59.1
23w0d	4.1	47.0	54.7	62.5
24w0d	4.3	49.8	57.9	66.0
25w0d	4.5	52.5	61.0	69.4
26w0d	4.7	55.2	64.0	72.9
27w0d	4.9	57.7	67.1	76.4
28w0d	5.1	60.4	70.3	79.9
29w0d	5.3	63.1	73.3	83.3
30w0d	5.6	65.8	76.2	86.8
31w0d	5.7	68.4	79.3	90.1
32w0d	6.0	70.9	82.1	93.4
33w0d	6.3	73.1	84.8	96.6
34w0d	6.5	75.3	87.6	99.9
35w0d	6.9	77.0	90.0	103.0
36w0d	7.4	78.5	92.4	106.3
37w0d	7.9	79.8	94.8	109.7
38w0d	8.7	80.9	97.0	113.3
39w0d	9.4	81.9	99.3	117.0
40w0d	10.2	82.6	101.6	120.7
41w0d	10.6	82.8	103.0	123.0

(c) TAD Merz FG

Merz E:
"Ultrasound in Gynecology and Obstetrics"
Stuttgart, New York, Thieme Medical Publishers, Inc. 1991; 312

Age	5% (mm)	50% (mm)	95% (mm)
12w0d	13.0	19.0	25.0
13w0d	17.0	23.0	28.0
14w0d	20.0	26.0	32.0
15w0d	23.0	29.0	35.0
16w0d	26.0	32.0	39.0
17w0d	29.0	36.0	42.0
18w0d	32.0	39.0	46.0
19w0d	35.0	42.0	49.0
20w0d	38.0	45.0	53.0
21w0d	41.0	49.0	56.0
22w0d	45.0	52.0	59.0
23w0d	48.0	55.0	63.0
24w0d	51.0	58.0	66.0
25w0d	54.0	62.0	70.0
26w0d	57.0	65.0	73.0
27w0d	60.0	68.0	76.0
28w0d	63.0	72.0	80.0
29w0d	66.0	75.0	83.0
30w0d	70.0	78.0	87.0
31w0d	73.0	81.0	90.0
32w0d	76.0	85.0	93.0
33w0d	79.0	88.0	97.0
34w0d	82.0	91.0	100.0
35w0d	85.0	94.0	104.0
36w0d	88.0	98.0	107.0
37w0d	92.0	101.0	110.0
38w0d	95.0	104.0	114.0
39w0d	98.0	108.0	117.0
40w0d	101.0	111.0	120.0

(21) THD

(a) THD Hansmann Identical

Hansmann H, Hackeloer B.,
Staudach A.
"Ultrasound Diagnosis in Obstetrics and Gynecology"
New York, Springer Verlag, 1986,
English Edition (ISBN 0-387-15384-9);
P 431

Value (mm)	Age
17.0	12w0d
20.0	13w0d
24.0	14w0d
27.0	15w0d
31.0	16w0d
34.0	17w0d
37.0	18w0d
40.0	19w0d
44.0	20w0d
47.0	21w0d
50.0	22w0d
53.0	23w0d
56.0	24w0d
59.0	25w0d
62.0	26w0d
65.0	27w0d
69.0	28w0d
72.0	29w0d
74.0	30w0d
78.0	31w0d
81.0	32w0d
83.0	33w0d
86.0	34w0d
89.0	35w0d
92.0	36w0d
94.0	37w0d
97.0	38w0d
99.0	39w0d
101.0	40w0d

(22) Tibia

(a) Tibia Jeanty GA

Jeanty P, Rodesch F, Delbeke D, Dumont JE
"Estimation of gestational age from measurements of fetal long bones"
J Ultrasound Med 3: 75-79. 1984.

Value (mm)	Age	5%, 95% (days)
10.0	13w2d	20
12.0	14w0d	20
14.7	15w0d	20
17.3	16w0d	20
20.0	17w0d	20
22.7	18w0d	20
25.0	19w0d	20
27.7	20w0d	20
30.0	21w0d	20
32.3	22w0d	20
34.7	23w0d	20
37.0	24w0d	20
39.3	25w0d	20
41.7	26w0d	20
43.8	27w0d	20
46.0	28w0d	20
48.0	29w0d	20
50.3	30w0d	20
52.3	31w0d	20
54.3	32w0d	20
56.3	33w0d	20
58.3	34w0d	20
60.3	35w0d	20
62.0	36w0d	20
64.0	37w0d	20
66.0	38w0d	20
67.8	39w0d	20
69.0	39w5d	20

(b) Tibia Merz FG

Merz E:
"Ultrasound in Gynecology and Obstetrics"
Stuttgart, New York, Thieme Medical Publishers, Inc. 1991; 312

Age	5% (mm)	50% (mm)	95% (mm)
12w0d	4.0	7.0	10.0
13w0d	6.0	10.0	13.0
14w0d	9.0	12.0	16.0
15w0d	12.0	15.0	19.0
16w0d	14.0	18.0	21.0
17w0d	17.0	21.0	24.0
18w0d	20.0	23.0	27.0
19w0d	22.0	26.0	30.0
20w0d	25.0	28.0	32.0
21w0d	27.0	31.0	35.0
22w0d	29.0	33.0	37.0
23w0d	32.0	36.0	40.0
24w0d	34.0	38.0	42.0
25w0d	36.0	40.0	44.0
26w0d	38.0	42.0	46.0
27w0d	40.0	45.0	49.0
28w0d	42.0	47.0	51.0
29w0d	44.0	49.0	53.0
30w0d	46.0	50.0	55.0
31w0d	48.0	52.0	57.0
32w0d	50.0	54.0	58.0
33w0d	51.0	56.0	60.0
34w0d	53.0	57.0	62.0
35w0d	54.0	59.0	63.0
36w0d	56.0	60.0	65.0
37w0d	57.0	62.0	66.0
38w0d	59.0	63.0	68.0
39w0d	60.0	64.0	69.0
40w0d	61.0	66.0	70.0

(c) Tibia Chitty-%tile Identical

Chitty
Charts of fetal size: limb bones
BJOG: an International Journal of Obstetrics and Gynaecology
August 2002, Vol. 109, pp. 919-929

Age	1SD (mm)	3% (mm)	50% (mm)	97% (mm)
12w0d	1.7	4.4	7.6	10.8
13w0d	1.8	5.8	9.2	12.5
14w0d	1.8	8.0	11.4	14.8
15w0d	1.9	10.6	14.1	17.6
16w0d	1.9	13.3	16.9	20.5
17w0d	2.0	16.2	19.9	23.5
18w0d	2.0	19.0	22.8	26.6
19w0d	2.1	21.8	25.7	29.6
20w0d	2.1	24.5	28.5	32.5
21w0d	2.2	27.2	31.2	35.3
22w0d	2.2	29.7	33.8	38.0
23w0d	2.3	32.1	36.4	40.6
24w0d	2.3	34.4	38.8	43.1
25w0d	2.4	36.6	41.0	45.5
26w0d	2.4	38.7	43.2	47.8
27w0d	2.5	40.7	45.3	49.9
28w0d	2.5	42.6	47.3	52.0
29w0d	2.6	44.4	49.2	54.0
30w0d	2.6	46.1	51.0	55.9
31w0d	2.7	47.7	52.7	57.7
32w0d	2.7	49.3	54.4	59.5
33w0d	2.8	50.8	55.9	61.1
34w0d	2.8	52.2	57.5	62.7
35w0d	2.9	53.5	58.9	64.3
36w0d	2.9	54.8	60.3	65.7
37w0d	3.0	56.0	61.6	67.2
38w0d	3.0	57.2	62.9	68.5
39w0d	3.1	58.3	64.1	69.8
40w0d	3.1	59.4	65.2	71.1
41w0d	3.2	60.4	66.4	72.3
42w0d	3.2	61.4	67.4	73.5

(23) Ulna

(a) Ulna Jeanty GA

Jeanty P, Rodesch F, Delbeke D, Dumont JE
"Estimation of gestational age from measurements of fetal long bones"
J Ultrasound Med 3: 75-79. 1984.

Value (mm)	Age	5%, 95% (days)
10.0	13w1d	21
12.3	14w2d	21
15.0	15w0d	21
17.7	16w0d	21
20.3	17w0d	21
22.7	18w0d	21
25.0	19w0d	21
27.3	20w0d	21
29.5	21w0d	21
31.7	22w0d	21
33.7	23w0d	21
35.8	24w0d	21
37.8	25w0d	21
39.8	26w0d	21
41.7	27w0d	21
43.5	28w0d	21
45.3	29w0d	21
47.3	30w0d	21
49.0	31w0d	21
50.8	32w0d	21
52.3	33w0d	21
54.0	34w0d	21
55.8	35w0d	21
57.3	36w0d	21
59.0	37w0d	21
60.5	38w0d	21
62.0	39w0d	21
63.6	16w0d	21
64.0	40w2d	21

(b) Ulna Merz FG

Merz E:
"Ultrasound in Gynecology and Obstetrics"
Stuttgart, New York, Thieme Medical Publishers, Inc. 1991; 312, 326-336

Age	5% (mm)	50% (mm)	95% (mm)
12w0d	3.0	6.0	9.0
13w0d	5.0	9.0	12.0
14w0d	8.0	12.0	15.0
15w0d	11.0	14.0	18.0
16w0d	14.0	17.0	21.0
17w0d	17.0	20.0	23.0
18w0d	19.0	23.0	26.0
19w0d	22.0	25.0	29.0
20w0d	24.0	28.0	31.0
21w0d	27.0	30.0	34.0
22w0d	29.0	33.0	36.0
23w0d	31.0	35.0	39.0
24w0d	33.0	37.0	41.0
25w0d	35.0	39.0	43.0
26w0d	37.0	41.0	45.0
27w0d	39.0	43.0	47.0
28w0d	41.0	45.0	49.0
29w0d	43.0	47.0	51.0
30w0d	44.0	48.0	52.0
31w0d	46.0	50.0	54.0
32w0d	47.0	51.0	55.0
33w0d	49.0	53.0	57.0
34w0d	50.0	54.0	58.0
35w0d	51.0	55.0	60.0
36w0d	52.0	56.0	61.0
37w0d	53.0	57.0	62.0
38w0d	54.0	58.0	63.0
39w0d	55.0	59.0	64.0
40w0d	56.0	60.0	65.0

(c) Ulna Chitty-%tile Identical

Chitty
Charts of fetal size: limb bones
BJOG: an International Journal of Obstetrics and Gynaecology
August 2002, Vol. 109, pp. 919-929

Age	1SD (mm)	3% (mm)	50% (mm)	97% (mm)
12w0d	1.8	3.9	7.3	10.7
13w0d	1.8	6.2	9.6	13.1
14w0d	1.9	8.8	12.4	15.9
15w0d	1.9	11.6	15.3	18.9
16w0d	2.0	14.5	18.2	22.0
17w0d	2.0	17.3	21.2	25.0
18w0d	2.1	20.1	24.0	28.0
19w0d	2.1	22.8	26.8	30.8
20w0d	2.2	25.3	29.4	33.5
21w0d	2.2	27.8	32.0	36.2
22w0d	2.3	30.1	34.4	38.7
23w0d	2.3	32.3	36.6	41.0
24w0d	2.4	34.3	38.8	43.3
25w0d	2.4	36.3	40.9	45.5
26w0d	2.5	38.2	42.8	47.5
27w0d	2.5	39.9	44.7	49.5
28w0d	2.6	41.6	46.5	51.3
29w0d	2.6	43.2	48.2	53.1
30w0d	2.7	44.7	49.8	54.8
31w0d	2.7	46.2	51.3	56.4
32w0d	2.8	47.5	52.7	58.0
33w0d	2.8	48.8	54.1	59.4
34w0d	2.9	50.0	55.4	60.8
35w0d	2.9	51.2	56.7	62.2
36w0d	3.0	52.3	57.9	63.5
37w0d	3.0	53.4	59.1	64.7
38w0d	3.1	54.4	60.2	65.9
39w0d	3.1	55.4	61.2	67.1
40w0d	3.2	56.3	62.2	68.2
41w0d	3.2	57.2	63.2	69.3
42w0d	3.3	58.0	64.1	70.3

(24) Va

(a) Va Nicolaides-%tile Identical

Nicolaides
Fetal biometry at 14-40 week's gestation.
Ultrasound in Obstetrics and Gynecology 4 1994: P34-48

Age	1SD (mm)	5% (mm)	Median (mm)	95% (mm)
14w0d	1.02	5.0	6.7	8.4
15w0d	1.02	5.1	6.8	8.5
16w0d	1.02	5.2	6.9	8.5
17w0d	1.02	5.3	6.9	8.6
18w0d	1.02	5.4	7.0	8.7
19w0d	1.02	5.4	7.1	8.8
20w0d	1.02	5.5	7.2	8.9
21w0d	1.02	5.6	7.3	9.0
22w0d	1.02	5.7	7.4	9.0
23w0d	1.02	5.8	7.5	9.1
24w0d	1.02	5.9	7.5	9.2
25w0d	1.02	5.9	7.6	9.3
26w0d	1.02	6.0	7.7	9.4
27w0d	1.02	6.1	7.8	9.5
28w0d	1.02	6.2	7.9	9.5
29w0d	1.02	6.3	8.0	9.6
30w0d	1.02	6.4	8.0	9.7
31w0d	1.02	6.5	8.1	9.8
32w0d	1.02	6.5	8.2	9.9
33w0d	1.02	6.6	8.3	10.0
34w0d	1.02	6.7	8.4	10.1
35w0d	1.02	6.8	8.5	10.2
36w0d	1.02	6.9	8.5	10.3
37w0d	1.02	7.0	8.6	10.3
38w0d	1.02	7.0	8.7	10.4
39w0d	1.02	7.1	8.8	10.5
39w60d	1.02	7.2	8.9	10.6

(25) Vp

(a) Vp Nicolaides-%tile Identical

Nicolaides
Fetal biometry at 14-40 week's gestation.
Ultrasound in Obstetrics and Gynecology 4 1994: P34-48

Age	1SD (mm)	5% (mm)	Median (mm)	95% (mm)
14w0d	1.02	5.0	6.7	8.4
15w0d	1.02	5.1	6.8	8.5
16w0d	1.02	5.2	6.9	8.5
17w0d	1.02	5.3	6.9	8.6
18w0d	1.02	5.4	7.0	8.7
19w0d	1.02	5.4	7.1	8.8
20w0d	1.02	5.5	7.2	8.9
21w0d	1.02	5.6	7.3	9.0
22w0d	1.02	5.7	7.4	9.0
23w0d	1.02	5.8	7.5	9.1
24w0d	1.02	5.9	7.5	9.2
25w0d	1.02	5.9	7.6	9.3
26w0d	1.02	6.0	7.7	9.4
27w0d	1.02	6.1	7.8	9.5
28w0d	1.02	6.2	7.9	9.5
29w0d	1.02	6.3	8.0	9.6
30w0d	1.02	6.4	8.0	9.7
31w0d	1.02	6.5	8.1	9.8
32w0d	1.02	6.5	8.2	9.9
33w0d	1.02	6.6	8.3	10.0
34w0d	1.02	6.7	8.4	10.1
35w0d	1.02	6.8	8.5	10.2
36w0d	1.02	6.9	8.5	10.3
37w0d	1.02	7.0	8.6	10.3
38w0d	1.02	7.0	8.7	10.4
39w0d	1.02	7.1	8.8	10.5
39w60d	1.02	7.2	8.9	10.6

(26) Hem

(a) Hem Nicolaides-%tile Identical

Nicolaides
Fetal biometry at 14-40 week's gestation.
Ultrasound in Obstetrics and Gynecology 4 1994: P34-48

Age	1SD (mm)	5% (mm)	Median (mm)	95% (mm)
14w0d	1.71	11.2	14.0	16.8
15w0d	1.71	12.6	15.4	18.2
16w0d	1.71	14.0	16.8	19.6
17w0d	1.71	15.5	18.3	21.1
18w0d	1.71	17.1	19.9	22.7
19w0d	1.71	18.7	21.5	24.3
20w0d	1.71	20.3	23.1	25.9
21w0d	1.71	21.9	24.7	27.5
22w0d	1.71	23.5	26.3	29.1
23w0d	1.71	25.2	28.0	30.8
24w0d	1.71	26.8	29.6	32.4
25w0d	1.71	28.4	31.2	34.0
26w0d	1.71	30.0	32.8	35.6
27w0d	1.71	31.6	34.4	37.2
28w0d	1.71	33.1	35.9	38.7
29w0d	1.71	34.6	37.4	40.2
30w0d	1.71	36.0	38.8	41.6
31w0d	1.71	37.4	40.2	43.0
32w0d	1.71	38.7	41.5	44.3
33w0d	1.71	39.8	42.6	45.4
34w0d	1.71	40.9	43.7	46.5
35w0d	1.71	41.9	44.7	47.6
36w0d	1.71	42.8	45.6	48.5
37w0d	1.71	43.5	46.3	49.2
38w0d	1.71	44.2	47.0	49.9
39w0d	1.71	44.7	47.5	50.4
39w60d	1.71	45.0	47.8	50.7

12.11.2 Calculation item

(1) AXT

(a) AXT Tokyo GA

Norio Shinozuka, Haruo Masuda, Hidenori Kagawa, Yuji Taketani
Standard Values of Ultrasonographic Fetal Biometry
Jpn Med Ultrasonics Vol. 23 No. 12 (1996) P 877-888

Value (cm^2)	Age	5%, 95% (days)
10.0	16w1d	14
12.0	17w0d	14
14.5	18w0d	14
17.0	19w0d	15
19.7	20w0d	15
22.5	21w0d	15
25.3	22w0d	15
28.5	23w0d	16
31.5	24w0d	16
35.0	25w0d	17
38.5	26w0d	18
42.0	27w0d	19
46.0	28w0d	20
50.0	29w0d	21
54.0	30w0d	22
58.0	31w0d	23
62.5	32w0d	25
66.5	33w0d	26
70.5	34w0d	27
74.5	35w0d	28
78.5	36w0d	29
82.0	37w0d	30
85.5	38w0d	31
89.0	39w0d	32
90.0	39w2d	32

(b) AXT Tokyo FG

Norio Shinozuka, Haruo Masuda, Hidenori Kagawa, Yuji Taketani
Standard Values of Ultrasonographic Fetal Biometry
Jpn Med Ultrasonics Vol. 23 No. 12 (1996) P 877-888

Age	5% (cm)	50% (cm^2)	95% (cm)
16w0d	7.0	11.2	15.5
17w0d	8.7	13.3	18.0
18w0d	10.5	15.6	20.7
19w0d	12.5	18.1	23.6
20w0d	14.7	20.8	26.8
21w0d	17.1	23.6	30.2
22w0d	19.6	26.7	33.8
23w0d	22.2	29.9	37.5
24w0d	25.0	33.2	41.5
25w0d	27.9	36.7	45.6
26w0d	30.9	40.3	49.8
27w0d	33.9	44.1	54.2
28w0d	37.1	47.9	58.7
29w0d	40.3	51.8	63.3
30w0d	43.5	55.7	68.0
31w0d	46.8	59.7	72.7
32w0d	50.0	63.8	77.6
33w0d	53.3	67.8	82.4
34w0d	56.5	71.9	87.3
35w0d	59.7	75.9	92.2
36w0d	62.8	79.9	97.0
37w0d	65.9	83.9	101.9
38w0d	68.8	87.7	106.7
39w0d	71.6	91.5	111.4
40w0d	74.3	95.1	116.0
41w0d	76.8	98.6	120.5
42w0d	79.1	102.0	124.8

(c) AXT Tokyo-SD Identical

Norio Shinozuka, Haruo Masuda, Hidenori Kagawa, Yuji Taketani
Standard Values of Ultrasonographic Fetal Biometry
Jpn Med Ultrasonics Vol. 23 No. 12 (1996) P 877-888

Age	-1.5SD (cm)	Mean (cm^2)	+1.5SD (cm)
16w0d	7.3	11.2	15.1
17w0d	9.0	13.3	17.7
18w0d	10.9	15.6	20.3
19w0d	13.0	18.1	23.2
20w0d	15.3	20.8	26.4
21w0d	17.6	23.6	29.6
22w0d	20.2	26.7	33.2
23w0d	22.9	29.9	37.0
24w0d	25.6	33.2	40.9
25w0d	28.6	36.7	44.8
26w0d	31.6	40.3	49.0
27w0d	34.9	44.1	53.3
28w0d	38.0	47.9	57.8
29w0d	41.3	51.8	62.3
30w0d	44.5	55.7	67.0
31w0d	47.8	59.7	71.6
32w0d	51.2	63.8	76.4
33w0d	54.4	67.8	81.2
34w0d	57.8	71.9	86.0
35w0d	61.0	75.9	90.8
36w0d	64.2	79.9	95.7
37w0d	67.5	83.9	100.3
38w0d	70.4	87.7	105.0
39w0d	73.3	91.5	109.7
40w0d	76.0	95.1	114.2
41w0d	78.6	98.6	118.6
42w0d	81.1	102.0	122.9

(2) EFW

(a) EFW Campbell [AC] no charts

EFW Expression

Log_e (EFW)=(-4.564+(0.282*AC)
-(0.00331*AC^2)) *1000.0
EFW (g), AC (cm)

Campbell

The assessment of fetal development by diagnostic ultrasound.
Clinics in Perinatology Viol. 1, No. 2
Sep 1974: P 507 to 524

(b) EFW Hadlock FG

EFW Expression
Hadlock [AC, FL]

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

Hadlock [BPD, AC, FL]

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

Hadlock [HC, AC, FL]

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

Hadlock [BPD, HC, AC, FL]

Log_{10} (EFW)=1.3596-(0.00386*AC*FL)+
(0.0064*HC)+(0.00061*BPD*AC)+
(0.0424*AC)+(0.174*FL)
EFW (g), BPD (cm), HC (cm),
AC (cm), FL (cm)

Hadlock FP, Harrist RB,
Matinex-Poyer J
"In utero analysis of fetal growth: A sonographic weight standard"
Radiology 181: 129-133, 1991

Age	3% (g)	50% (g)	97% (g)
10w0d	26	35	43
11w0d	34	45	56
12w0d	43	58	72
13w0d	55	73	92
14w0d	70	93	116
15w0d	88	117	146
16w0d	110	146	183
17w0d	136	181	226
18w0d	167	223	279
19w0d	205	273	341
20w0d	248	331	414
21w0d	299	399	499
22w0d	358	478	597
23w0d	426	568	709
24w0d	502	670	837
25w0d	589	785	981
26w0d	685	913	1142
27w0d	791	1055	1319
28w0d	908	1210	1513
29w0d	1034	1379	1723
30w0d	1170	1559	1949
31w0d	1313	1751	2189
32w0d	1465	1953	2441
33w0d	1622	2162	2703
34w0d	1783	2377	2972
35w0d	1947	2595	3244
36w0d	2110	2813	3517
37w0d	2271	3028	3785
38w0d	2427	3237	4046
39w0d	2576	3435	4293
40w0d	2714	3619	4524
41w0d	2840	3787	4733
42w0d	2951	3934	4918

(c) EFW Hansmann [BPD, THD] FG

EFW Expression

EFW=((-1.05775*BPD)+
(0.649145*THD)+(0.0930707*BPD^2)-
(0.020562*THD^2)+(0.515263))*1000.0
EFW (g), BPD (cm), THD (cm)

Hansmann H, Hackeloer B.,
Staudach A.;
"Ultrasound Diagnosis in Obstetrics
and Gynecology"
New York, Springer Verlag, 1986,
English Edition (ISBN 0-387-15384-9)

Age	—	Mean (g)	—
20w0d	—	61	—
21w0d	—	178	—
22w0d	—	312	—
23w0d	—	463	—
24w0d	—	624	—
25w0d	—	795	—
26w0d	—	984	—
27w0d	—	1177	—
28w0d	—	1378	—
29w0d	—	1582	—
30w0d	—	1795	—
31w0d	—	2009	—
32w0d	—	2222	—
33w0d	—	2437	—
34w0d	—	2644	—
35w0d	—	2858	—
36w0d	—	3049	—
37w0d	—	3233	—
38w0d	—	3396	—
39w0d	—	3553	—
40w0d	—	3711	—
40w2d	—	3750	—

(d) EFW JSUM [BPD, AC, FL] GA

EFW Expression

EFW=1.07*BPD^3+3.00*10^{-1}*AC^2*FL
EFW(g), BPD (cm), AC (cm), FL (cm)

Standardization of ultrasonic fetal
biometry and Japanese reference
values
J Med Ultrasonics Vol. 30 No. 3 (2003)
J415-J440

Value (g)	Age	SD (Days)
143	18w0d	6
220	19w0d	7
300	20w0d	7
380	21w0d	7
475	22w0d	7
567	23w0d	7
667	24w0d	7
783	25w0d	8
890	26w0d	8
1017	27w0d	8
1150	28w0d	9
1283	29w0d	9
1433	30w0d	10
1600	31w0d	10
1775	32w0d	11
1950	33w0d	12
2125	34w0d	13
2300	34w6d	14
2490	36w0d	15
2650	37w0d	16
2800	38w0d	17
2950	39w0d	18
3075	40w0d	19
3200	41w0d	20
3202	41w0d	20

(e) EFW JSUM [BPD, AC, FL] FG

EFW Expression

$EFW=1.07*BPD^3+3.00*10^{-1}*AC^2*FL$
EFW (g), BPD (cm), AC (cm), FL (cm)

Standardization of ultrasonic fetal biometry and Japanese reference values
J Med Ultrasonics Vol. 30 No. 3 (2003) J415-J440

Age	-2SD (g)	Mean (g)	+2SD (g)
18w0d	126	187	247
19w0d	166	247	328
20w0d	211	313	416
21w0d	262	387	512
22w0d	320	469	617
23w0d	386	560	733
24w0d	461	660	859
25w0d	546	771	996
26w0d	639	892	1144
27w0d	742	1023	1304
28w0d	853	1163	1474
29w0d	972	1313	1653
30w0d	1098	1470	1842
31w0d	1231	1635	2039
32w0d	1368	1805	2243
33w0d	1508	1980	2451
34w0d	1650	2156	2663
35w0d	1790	2333	2875
36w0d	1927	2507	3086
37w0d	2059	2676	3294
38w0d	2181	2838	3494
39w0d	2292	2989	3685
40w0d	2388	3125	3862
41w0d	2465	3244	4023
42w0d*	2516	3338	4160

*: Data for extrapolated gestational age (weeks) when Extrapolate is set to ON

(f) EFW JSUM-SD [BPD, AC, FL] Identical

EFW Expression

$EFW=1.07*BPD^3+3.00*10^{-1}*AC^2*FL$
EFW (g), BPD (cm), AC (cm), FL (cm)

Standardization of ultrasonic fetal biometry and Japanese reference values
J Med Ultrasonics Vol. 30 No. 3 (2003) J415-J440

Age	-2SD (g)	-1.5SD (g)	Mean (g)	+1.5SD (g)	+2SD (g)
18w0d	126	141	187	232	247
19w0d	166	186	247	308	328
20w0d	211	236	313	390	416
21w0d	262	293	387	481	512
22w0d	320	357	469	580	617
23w0d	386	430	560	690	733
24w0d	461	511	660	809	859
25w0d	546	602	771	940	996
26w0d	639	703	892	1081	1144
27w0d	742	812	1023	1233	1304
28w0d	853	930	1163	1396	1474
29w0d	972	1057	1313	1568	1653
30w0d	1098	1191	1470	1749	1842
31w0d	1231	1332	1635	1938	2039
32w0d	1368	1477	1805	2133	2243
33w0d	1508	1626	1980	2333	2451
34w0d	1650	1776	2156	2536	2663
35w0d	1790	1926	2333	2740	2875
36w0d	1927	2072	2507	2942	3086
37w0d	2059	2213	2676	3139	3294
38w0d	2181	2345	2838	3330	3494
39w0d	2292	2466	2989	3511	3685
40w0d	2388	2572	3125	3678	3862
41w0d	2465	2660	3244	3828	4023
42w0d*	2516	2721	3338	3955	4160

*: Data for extrapolated gestational age (weeks) when Extrapolate is set to ON

(g) EFW Merz1 [BPD, AC] no charts

EFW Expression

EFW=-3200.40479+157.07186*AC
+15.90391*BPD^2
EFW (g), BPD (cm), AC (cm)

Merz E
"Ultrasound in Gynecology and Obstetrics"
Stuttgart, New York, Thieme Medical Publishers, Inc. 1991; 312, 326-336

(h) EFW Merz2 [AC] no charts

EFW Expression

EFW=0.1*AC^3
EFW (g), AC (cm)

Merz E
"Ultrasound in Gynecology and Obstetrics"
Stuttgart, New York, Thieme Medical Publishers, Inc. 1991; 312, 326-336

(i) EFW Osaka [BPD, FTA, FL] Identical

EFW Expression

EFW=1.25647*BPD^3+3.50665*FTA*FL
+6.3
EFW (g), BPD (cm), FTA (cm^2),
FL (cm)

Mineo Aoki, Motohiro Yamada
Evaluation of fetal growth
Obstetrics and gynecological treatment
Vol.47 No.5 (1983: 11)

Age	-2SD (g)	-1.5SD (g)	Mean (g)	+1.5SD (g)	+2SD (g)
16w0d	79	93	137	181	195
17w0d	114	129	176	223	238
18w0d	153	170	223	276	293
19w0d	196	217	280	343	364
20w0d	247	272	347	422	447
21w0d	305	335	425	515	545
22w0d	371	406	513	620	655
23w0d	445	486	611	736	777
24w0d	528	576	720	864	912
25w0d	619	674	839	1004	1059
26w0d	718	780	968	1156	1218
27w0d	826	896	1106	1316	1386
28w0d	943	1020	1253	1486	1563
29w0d	1065	1150	1407	1664	1749
30w0d	1192	1286	1568	1850	1944
31w0d	1327	1429	1735	2041	2143
32w0d	1462	1573	1906	2239	2350
33w0d	1601	1720	2079	2438	2557
34w0d	1740	1868	2254	2640	2768
35w0d	1876	2014	2428	2842	2980
36w0d	2008	2156	2600	3044	3192
37w0d	2133	2291	2767	3243	3401
38w0d	2250	2419	2928	3437	3606
39w0d	2356	2537	3080	3623	3804
40w0d	2446	2639	3220	3801	3994
41w0d*	2521	2727	3347	3967	4173
42w0d*	2572	2793	3456	4119	4340

*: Data for extrapolated gestational age (weeks) when Extrapolate is set to ON

(j) EFW Shepard [BPD, AC] no charts

EFW Expression

Log_{10} (EFW)=
(-1.7492+(0.166*BPD)+(0.046*AC)-
(0.002646*AC*BPD))*1000.0
EFW (g), BPD (cm), AC (cm)

Shepard JM, Richards VA,
Berkowitz RL, et al
"An evaluation of two equations for
predicting fetal weight by ultrasound"
Am J Obstet Gynecol, 1: 142: 47-54,
1982

(k) EFW Tokyo [BPD, APTD, TTD, FL] GA

EFW Expression

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

Norio Shinozuka, Haruo Masuda,
Hidenori Kagawa, Yuji Taketani
Standard Values of Ultrasonographic
Fetal Biometry
Jpn Med Ultrasonics Vol. 23 No. 12
(1996) P 877-888

Value (g)	Age	5%, 95% (day)
250	19w3d	11
300	20w0d	11
388	21w0d	11
475	22w0d	11
575	23w0d	12
675	24w0d	12
783	25w0d	12
900	26w0d	13
1025	27w0d	14
1150	28w0d	14
1300	29w0d	15
1450	30w0d	16
1625	31w0d	17
1800	32w0d	18
1975	33w0d	20
2150	34w0d	21
2350	35w0d	23
2517	36w0d	25
2675	37w0d	26
2825	38w0d	28
2975	39w0d	28
3000	39w1d	30

(l) EFW Tokyo [BPD, APTD, TTD, FL] FG

EFW Expression

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

Norio Shinozuka, Haruo Masuda,
Hidenori Kagawa, Yuji Taketani
Standard Values of Ultrasonographic
Fetal Biometry
Jpn Med Ultrasonics Vol. 23 No. 12
(1996) P 877-888

Age	5% (g)	50% (g)	95% (g)
18w0d	158	216	274
19w0d	194	279	355
20w0d	256	349	442
21w0d	314	427	539
22w0d	381	513	645
23w0d	456	609	761
24w0d	541	714	888
25w0d	634	830	1026
26w0d	737	956	1175
27w0d	849	1092	1334
28w0d	970	1237	1504
29w0d	1099	1391	1683
30w0d	1234	1552	1870
31w0d	1375	1720	2064
32w0d	1520	1892	2265
33w0d	1667	2068	2469
34w0d	1814	2244	2675
35w0d	1960	2420	2880
36w0d	2102	2592	3083
37w0d	2236	2758	3280
38w0d	2360	2915	3469
39w0d	2471	3059	3647
40w0d	2565	3187	3809
41w0d	2639	3296	3952

(m) EFW Tokyo-SD [BPD, APTD, TTD, FL]
Identical

EFW Expression

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

Norio Shinozuka, Haruo Masuda,
Hidenori Kagawa, Yuji Taketani
Standard Values of Ultrasonographic
Fetal Biometry
Jpn Med Ultrasonics Vol. 23 No. 12
(1996) P 877-888

Age	-1.5SD (g)	Mean (g)	+1.5SD (g)
18w0d	163	216	269
19w0d	210	279	348
20w0d	264	349	434
21w0d	325	427	529
22w0d	392	513	634
23w0d	470	609	748
24w0d	555	714	873
25w0d	651	830	1009
26w0d	756	956	1156
27w0d	871	1092	1313
28w0d	993	1237	1481
29w0d	1124	1391	1658
30w0d	1261	1552	1843
31w0d	1405	1720	2035
32w0d	1551	1892	2233
33w0d	1702	2068	2434
34w0d	1850	2244	2638
35w0d	1999	2420	2841
36w0d	2143	2592	3041
37w0d	2280	2758	3236
38w0d	2408	2915	3422
39w0d	2522	3059	3596
40w0d	2618	3187	3756
41w0d	2696	3296	3896

(3) HC (BPD, OFD)

(a) HC (BPD, OFD) Nicolaides Identical

Nicolaides
"Fetal biometry at 14-40 week's gestation"
Ultrasound in Obstetrics and Gynecology 4 1994: P 34 to 48

Age	5% (mm)	Median (mm)	95% (mm)
14+0 - 14+6	102.0	110.0	118.0
15+0 - 15+6	111.0	120.0	129.0
16+0 - 16+6	120.0	130.0	140.0
17+0 - 17+6	130.0	141.0	152.0
18+0 - 18+6	141.0	152.0	164.0
19+0 - 19+6	151.0	163.0	176.0
20+0 - 20+6	162.0	175.0	189.0
21+0 - 21+6	173.0	187.0	201.0
22+0 - 22+6	184.0	198.0	214.0
23+0 - 23+6	195.0	210.0	227.0
24+0 - 24+6	206.0	222.0	240.0
25+0 - 25+6	217.0	234.0	252.0
26+0 - 26+6	227.0	245.0	264.0
27+0 - 27+6	238.0	256.0	277.0
28+0 - 28+6	248.0	267.0	288.0
29+0 - 29+6	257.0	277.0	299.0
30+0 - 30+6	266.0	287.0	309.0
31+0 - 31+6	274.0	296.0	319.0
32+0 - 32+6	282.0	304.0	328.0
33+0 - 33+6	288.0	311.0	336.0
34+0 - 34+6	294.0	317.0	342.0
35+0 - 35+6	299.0	323.0	348.0
36+0 - 36+6	303.0	327.0	353.0
37+0 - 37+6	306.0	330.0	356.0
38+0 - 38+6	308.0	332.0	358.0
39+0 - 39+6	309.0	333.0	359.0

(4) Va/Hem

(a) Va/Hem Nicolaides-%tile Identical

Nicolaides
Fetal biometry at 14-40 week's gestation.
Ultrasound in Obstetrics and Gynecology 4 1994: P34-48

Age	1SD	5% (mm)	Median (mm)	95% (mm)
14w0d	0.031	0.44	0.49	0.54
15w0d	0.031	0.40	0.45	0.50
16w0d	0.031	0.36	0.41	0.46
17w0d	0.031	0.33	0.38	0.43
18w0d	0.031	0.31	0.36	0.41
19w0d	0.031	0.28	0.33	0.38
20w0d	0.031	0.26	0.31	0.37
21w0d	0.031	0.25	0.30	0.35
22w0d	0.031	0.23	0.28	0.33
23w0d	0.031	0.22	0.27	0.32
24w0d	0.031	0.21	0.26	0.31
25w0d	0.031	0.20	0.25	0.30
26w0d	0.031	0.19	0.24	0.29
27w0d	0.031	0.19	0.24	0.29
28w0d	0.031	0.18	0.23	0.28
29w0d	0.031	0.17	0.23	0.28
30w0d	0.031	0.17	0.22	0.27
31w0d	0.031	0.17	0.22	0.27
32w0d	0.031	0.16	0.21	0.27
33w0d	0.031	0.16	0.21	0.26
34w0d	0.031	0.16	0.21	0.26
35w0d	0.031	0.16	0.21	0.26
36w0d	0.031	0.16	0.21	0.26
37w0d	0.031	0.16	0.21	0.26
38w0d	0.031	0.16	0.21	0.26
39w0d	0.031	0.16	0.21	0.26
39w60d	0.031	0.16	0.21	0.26

12.11.3 Doppler item

(1) Fetal Ao RI

(a) Fetal Ao RI Mai FG

R. Mai, P. Kristen, A. Rempen
"Farb-Dopplersonographische Normalwerte in der Schwangershaft Z."
Geburish.u.Perinat. P 221-222

Age	5%	50%	95%
30w0d	0.74	0.81	0.89
31w0d	0.73	0.80	0.88
32w0d	0.72	0.80	0.88
33w0d	0.71	0.79	0.87
34w0d	0.71	0.78	0.86
35w0d	0.70	0.78	0.86
36w0d	0.70	0.77	0.85
37w0d	0.69	0.77	0.85
38w0d	0.69	0.77	0.85
39w0d	0.69	0.77	0.85
40w0d	0.69	0.77	0.85

(b) Fetal Ao RI Schaffer FG

H. Schaffer
"IPDS 1998 11th Congress of the International Perinatal Doppler Society."
JOURNAL FÜR FERTILITÄT UND REPRODUKTION July 2-4, 1998

Age	5%	50%	95%
20w0d	0.77	0.84	0.90
21w0d	0.77	0.84	0.90
22w0d	0.77	0.84	0.90
23w0d	0.77	0.84	0.90
24w0d	0.77	0.84	0.90
25w0d	0.77	0.84	0.90
26w0d	0.77	0.84	0.91
27w0d	0.77	0.84	0.91
28w0d	0.77	0.84	0.91
29w0d	0.77	0.84	0.91
30w0d	0.78	0.84	0.91
31w0d	0.78	0.84	0.91
32w0d	0.78	0.84	0.91
33w0d	0.78	0.85	0.91
34w0d	0.78	0.85	0.91
35w0d	0.78	0.85	0.91
36w0d	0.78	0.85	0.92
37w0d	0.78	0.85	0.92
38w0d	0.78	0.85	0.92
39w0d	0.79	0.85	0.92
40w0d	0.79	0.85	0.92
41w0d	0.79	0.86	0.92
42w0d	0.79	0.86	0.92

(2) Fetal Ao PI

(a) Fetal Ao PI Harrington FG

K. Harrington, R. G. Carpenter, M. Nguyen and S. Campbell "Changes observed in Doppler studies of the fetal circulation in pregnancies complicated by pre-eclampsia or the delivery of a small-for-gestational age baby." Ultrasound Obstet. Gynecol. 1995 Jul;6(1):19-28

Age	5%	50%	95%
22w0d	1.45	1.84	2.30
23w0d	1.45	1.85	2.32
24w0d	1.45	1.86	2.33
25w0d	1.46	1.86	2.35
26w0d	1.46	1.87	2.36
27w0d	1.46	1.88	2.38
28w0d	1.46	1.89	2.39
29w0d	1.46	1.90	2.41
30w0d	1.46	1.90	2.42
31w0d	1.46	1.91	2.44
32w0d	1.46	1.92	2.45
33w0d	1.47	1.93	2.47
34w0d	1.47	1.94	2.49
35w0d	1.47	1.95	2.50
36w0d	1.47	1.95	2.52
37w0d	1.47	1.96	2.53
38w0d	1.47	1.97	2.55
39w0d	1.47	1.98	2.56
40w0d	1.47	1.99	2.58
41w0d	1.47	1.99	2.59
42w0d	1.48	2.00	2.61

(b) Fetal Ao PI Mai FG

R. Mai, P. Kristen, A. Rempen "Farb-Dopplersonographische Normalwerte in der Schwangershaft Z." Geburish.u.Perinat. P 221-222

Age	5%	50%	95%
30w0d	1.39	1.73	2.07
31w0d	1.36	1.70	2.04
32w0d	1.33	1.67	2.01
33w0d	1.31	1.65	1.99
34w0d	1.29	1.63	1.97
35w0d	1.28	1.62	1.96
36w0d	1.27	1.61	1.95
37w0d	1.27	1.61	1.95
38w0d	1.28	1.62	1.96
39w0d	1.29	1.63	1.97
40w0d	1.30	1.64	1.98

(c) Fetal Ao PI Schaffer FG

H. Schaffer
"IPDS 1998 11th Congress of the International Perinatal Doppler Society."
JOURNAL FÜR FERTILITÄT UND REPRODUKTION July 2-4, 1998

Age	5%	50%	95%
20w0d	1.34	1.88	2.42
21w0d	1.35	1.89	2.44
22w0d	1.37	1.91	2.45
23w0d	1.38	1.92	2.46
24w0d	1.39	1.93	2.47
25w0d	1.41	1.95	2.49
26w0d	1.42	1.96	2.50
27w0d	1.43	1.97	2.51
28w0d	1.45	1.99	2.53
29w0d	1.47	2.01	2.55
30w0d	1.48	2.02	2.56
31w0d	1.50	2.04	2.58
32w0d	1.52	2.06	2.60
33w0d	1.53	2.07	2.62
34w0d	1.55	2.09	2.63
35w0d	1.57	2.11	2.65
36w0d	1.59	2.13	2.67
37w0d	1.61	2.15	2.69
38w0d	1.63	2.17	2.71
39w0d	1.65	2.20	2.74
40w0d	1.68	2.22	2.76
41w0d	1.70	2.24	2.78
42w0d	1.72	2.26	2.80

(3) MCA RI

(a) MCA RI JSUM FG

Standardization of ultrasonic fetal biometry and Japanese reference values
J Med Ultrasonics Vol. 30 No. 3 (2003) J415-J440

Age	5%	50%	95%
20w0d	0.72	0.78	0.87
21w0d	0.73	0.79	0.88
22w0d	0.74	0.81	0.89
23w0d	0.75	0.82	0.90
24w0d	0.76	0.83	0.91
25w0d	0.77	0.84	0.92
26w0d	0.77	0.85	0.92
27w0d	0.77	0.86	0.93
28w0d	0.78	0.86	0.93
29w0d	0.78	0.86	0.93
30w0d	0.77	0.87	0.93
31w0d	0.77	0.86	0.93
32w0d	0.76	0.86	0.93
33w0d	0.75	0.86	0.92
34w0d	0.74	0.85	0.91
35w0d	0.73	0.84	0.91
36w0d	0.72	0.83	0.90
37w0d	0.70	0.82	0.89
38w0d	0.69	0.81	0.88
39w0d	0.67	0.79	0.86
40w0d	0.65	0.78	0.85
41w0d	0.63	0.76	0.83
42w0d*	0.60	0.74	0.82

*: Data for extrapolated gestational age (weeks) when Extrapolate is set to ON

(b) MCA RI Mai FG

R. Mai, P. Kristen, A. Rempen "Farb-Dopplersonographische Normalwerte in der Schwangershaft Z." Geburish.u.Perinat. P 221-222

Age	5%	50%	95%
30w0d	0.75	0.84	0.93
31w0d	0.73	0.83	0.92
32w0d	0.73	0.82	0.91
33w0d	0.71	0.81	0.90
34w0d	0.71	0.80	0.89
35w0d	0.70	0.79	0.88
36w0d	0.69	0.78	0.87
37w0d	0.68	0.77	0.86
38w0d	0.67	0.76	0.85
39w0d	0.66	0.75	0.85
40w0d	0.65	0.75	0.84

(c) MCA RI Schaffer FG

H. Schaffer
"IPDS 1998 11th Congress of the International Perinatal Doppler Society" JOURNAL FÜR FERTILITÄT UND REPRODUKTION July 2-4, 1998

Age	5%	50%	95%
24w0d	0.65	0.79	0.92
25w0d	0.67	0.80	0.94
26w0d	0.67	0.81	0.95
27w0d	0.68	0.82	0.95
28w0d	0.69	0.82	0.96
29w0d	0.69	0.83	0.96
30w0d	0.69	0.83	0.96
31w0d	0.69	0.83	0.96
32w0d	0.69	0.83	0.96
33w0d	0.69	0.82	0.96
34w0d	0.68	0.81	0.95
35w0d	0.67	0.81	0.94
36w0d	0.66	0.79	0.93
37w0d	0.65	0.78	0.92
38w0d	0.63	0.77	0.90
39w0d	0.61	0.75	0.88
40w0d	0.60	0.73	0.87
41w0d	0.57	0.71	0.84
42w0d	0.55	0.69	0.82

(4) MCA PI

(a) MCA PI Harrington FG

K. Harrington, R. G. Carpenter, M. Nguyen and S. Campbell "Changes observed in Doppler studies of the fetal circulation in pregnancies complicated by pre-eclampsia or the delivery of a small-for-gestational age baby."
Ultrasound Obstet. Gynecol. 1995 Jul; 6 (1): 19-28

Age	5%	50%	95%
22w0d	1.45	1.88	2.47
23w0d	1.54	1.96	2.55
24w0d	1.60	2.03	2.61
25w0d	1.65	2.07	2.65
26w0d	1.68	2.09	2.67
27w0d	1.69	2.10	2.67
28w0d	1.68	2.09	2.66
29w0d	1.66	2.07	2.63
30w0d	1.63	2.03	2.60
31w0d	1.58	1.98	2.54
32w0d	1.52	1.92	2.48
33w0d	1.46	1.86	2.41
34w0d	1.39	1.78	2.33
35w0d	1.31	1.70	2.25
36w0d	1.22	1.61	2.16
37w0d	1.13	1.52	2.06
38w0d	1.04	1.42	1.96
39w0d	0.95	1.33	1.87
40w0d	0.85	1.23	1.77
41w0d	0.76	1.14	1.67
42w0d	0.67	1.05	1.58

(b) MCA PI JSUM FG

Standardization of ultrasonic fetal biometry and Japanese reference values
J Med Ultrasonics Vol. 30 No. 3 (2003) J415-J440

Age	5%	50%	95%
20w0d	1.27	1.44	1.99
21w0d	1.32	1.54	2.09
22w0d	1.36	1.62	2.18
23w0d	1.39	1.70	2.26
24w0d	1.42	1.76	2.33
25w0d	1.44	1.82	2.39
26w0d	1.46	1.86	2.43
27w0d	1.47	1.90	2.46
28w0d	1.47	1.92	2.49
29w0d	1.47	1.94	2.50
30w0d	1.46	1.94	2.50
31w0d	1.45	1.93	2.49
32w0d	1.42	1.92	2.47
33w0d	1.40	1.89	2.43
34w0d	1.36	1.85	2.39
35w0d	1.32	1.80	2.34
36w0d	1.28	1.74	2.27
37w0d	1.23	1.67	2.19
38w0d	1.17	1.59	2.10
39w0d	1.10	1.50	2.00
40w0d	1.03	1.40	1.89
41w0d	0.95	1.29	1.77
42w0d*	0.87	1.17	1.63

*: Data for extrapolated gestational age (weeks) when Extrapolate is set to ON

(c) MCA PI Mai FG

R. Mai, P. Kristen, A. Rempen
"Farb-Dopplersonographische Normalwerte in der Schwangershaft Z."
Geburish.u.Perinat. P 221-222

Age	5%	50%	95%
30w0d	1.53	1.96	2.39
31w0d	1.47	1.89	2.32
32w0d	1.41	1.83	2.26
33w0d	1.35	1.78	2.21
34w0d	1.30	1.73	2.15
35w0d	1.26	1.68	2.11
36w0d	1.22	1.64	2.07
37w0d	1.18	1.60	2.03
38w0d	1.15	1.57	2.00
39w0d	1.13	1.55	1.97
40w0d	1.10	1.52	1.95

(d) MCA PI Schaffer FG

H. Schaffer
"IPDS 1998 11th Congress of the International Perinatal Doppler Society."
JOURNAL FÜR FERTILITÄT UND REPRODUKTION July 2-4, 1998

Age	5%	50%	95%
24w0d	1.06	1.69	2.32
25w0d	1.13	1.76	2.39
26w0d	1.20	1.83	2.46
27w0d	1.24	1.87	2.50
28w0d	1.28	1.91	2.54
29w0d	1.31	1.94	2.57
30w0d	1.32	1.95	2.58
31w0d	1.33	1.96	2.59
32w0d	1.32	1.95	2.58
33w0d	1.30	1.93	2.56
34w0d	1.27	1.90	2.53
35w0d	1.22	1.85	2.48
36w0d	1.17	1.80	2.43
37w0d	1.10	1.73	2.36
38w0d	1.02	1.65	2.28
39w0d	0.93	1.56	2.20
40w0d	0.83	1.46	2.09
41w0d	0.72	1.35	1.98
42w0d	0.60	1.23	1.86

(5) Umb A RI

(a) Umb A RI JSUM FG

Standardization of ultrasonic fetal biometry and Japanese reference values
J Med Ultrasonics Vol. 30 No. 3 (2003) J415-J440

Age	5%	50%	95%
20w0d	0.70	0.78	0.85
21w0d	0.68	0.76	0.84
22w0d	0.66	0.75	0.83
23w0d	0.65	0.74	0.82
24w0d	0.63	0.72	0.81
25w0d	0.62	0.71	0.80
26w0d	0.60	0.70	0.79
27w0d	0.59	0.69	0.78
28w0d	0.57	0.68	0.77
29w0d	0.56	0.67	0.76
30w0d	0.55	0.66	0.75
31w0d	0.54	0.65	0.75
32w0d	0.52	0.64	0.74
33w0d	0.51	0.63	0.73
34w0d	0.50	0.63	0.72
35w0d	0.49	0.62	0.72
36w0d	0.49	0.61	0.71
37w0d	0.48	0.61	0.70
38w0d	0.47	0.60	0.69
39w0d	0.46	0.60	0.69
40w0d	0.46	0.60	0.68
41w0d	0.45	0.59	0.68
42w0d*	0.45	0.59	0.67

*: Data for extrapolated gestational age (weeks) when Extrapolate is set to ON

(b) Umb A RI Mai FG

R. Mai, P. Kristen, A. Rempen "Farb-Dopplersonographische Normalwerte in der Schwangershaft Z." Geburish.u.Perinat. P 221-222

Age	5%	50%	95%
30w0d	0.57	0.66	0.74
31w0d	0.56	0.64	0.73
32w0d	0.55	0.63	0.72
33w0d	0.54	0.62	0.70
34w0d	0.53	0.61	0.70
35w0d	0.53	0.61	0.69
36w0d	0.52	0.60	0.68
37w0d	0.51	0.60	0.68
38w0d	0.51	0.59	0.67
39w0d	0.51	0.59	0.67
40w0d	0.51	0.59	0.67

(c) Umb A RI Schaffer FG

H. Schaffer
"IPDS 1998 11th Congress of the International Perinatal Doppler Society."
JOURNAL FÜR FERTILITÄT UND REPRODUKTION July 2-4, 1998

Age	5%	50%	95%
20w0d	0.63	0.76	0.89
21w0d	0.62	0.75	0.88
22w0d	0.61	0.74	0.87
23w0d	0.60	0.73	0.86
24w0d	0.59	0.72	0.85
25w0d	0.58	0.71	0.84
26w0d	0.57	0.70	0.83
27w0d	0.56	0.69	0.82
28w0d	0.55	0.68	0.81
29w0d	0.54	0.67	0.80
30w0d	0.53	0.66	0.79
31w0d	0.52	0.65	0.78
32w0d	0.51	0.64	0.77
33w0d	0.50	0.63	0.76
34w0d	0.49	0.62	0.75
35w0d	0.48	0.61	0.74
36w0d	0.47	0.60	0.73
37w0d	0.46	0.59	0.72
38w0d	0.45	0.58	0.71
39w0d	0.44	0.57	0.70
40w0d	0.43	0.56	0.69
41w0d	0.41	0.55	0.68
42w0d	0.40	0.54	0.67

(6) Umb A PI

(a) Umb A PI Harrington FG

K. Harrington, R. G. Carpenter, M. Nguyen and S. Campbell
"Changes observed in Doppler studies of the fetal circulation in pregnancies complicated by pre-eclampsia or the delivery of a small-for-gestational age baby."
Ultrasound Obstet. Gynecol. 1995 Jul; 6 (1): 19-28

Age	5%	50%	95%
22w0d	0.97	1.24	1.60
23w0d	0.96	1.22	1.58
24w0d	0.94	1.20	1.56
25w0d	0.93	1.18	1.53
26w0d	0.91	1.16	1.51
27w0d	0.89	1.14	1.49
28w0d	0.87	1.12	1.46
29w0d	0.86	1.10	1.44
30w0d	0.84	1.08	1.41
31w0d	0.82	1.06	1.39
32w0d	0.81	1.04	1.37
33w0d	0.80	1.03	1.35
34w0d	0.79	1.01	1.34
35w0d	0.78	1.01	1.33
36w0d	0.78	1.00	1.32
37w0d	0.78	1.00	1.31
38w0d	0.79	1.00	1.31
39w0d	0.80	1.01	1.32
40w0d	0.82	1.03	1.33
41w0d	0.84	1.05	1.35
42w0d	0.87	1.07	1.37

(b) Umb A PI JSUM FG

Standardization of ultrasonic fetal biometry and Japanese reference values
J Med Ultrasonics Vol. 30 No. 3 (2003) J415-J440

Age	5%	50%	95%
20w0d	1.12	1.39	1.69
21w0d	1.08	1.34	1.64
22w0d	1.03	1.29	1.60
23w0d	1.00	1.25	1.55
24w0d	0.96	1.21	1.51
25w0d	0.93	1.17	1.48
26w0d	0.89	1.13	1.44
27w0d	0.86	1.10	1.40
28w0d	0.84	1.07	1.37
29w0d	0.81	1.04	1.34
30w0d	0.79	1.01	1.31
31w0d	0.77	0.99	1.29
32w0d	0.75	0.97	1.26
33w0d	0.73	0.95	1.24
34w0d	0.72	0.93	1.22
35w0d	0.70	0.92	1.20
36w0d	0.69	0.91	1.18
37w0d	0.69	0.90	1.17
38w0d	0.68	0.89	1.16
39w0d	0.68	0.89	1.14
40w0d	0.68	0.89	1.14
41w0d	0.68	0.89	1.13
42w0d*	0.68	0.90	1.12

*: Data for extrapolated gestational age (weeks) when Extrapolate is set to ON

(c) Umb A PI Mai FG

R. Mai, P. Kristen, A. Rempen
"Farb-Dopplersonographische Normalwerte in der Schwangershaft Z." Geburish.u.Perinat. P 221-222

Age	5%	50%	95%
30w0d	0.88	1.06	1.25
31w0d	0.85	1.03	1.22
32w0d	0.82	1.01	1.19
33w0d	0.80	0.98	1.17
34w0d	0.78	0.96	1.15
35w0d	0.76	0.95	1.14
36w0d	0.75	0.94	1.13
37w0d	0.75	0.94	1.12
38w0d	0.75	0.93	1.12
39w0d	0.76	0.94	1.13
40w0d	0.76	0.95	1.13

(d) Umb A PI Schaffer FG

H. Schaffer
"IPDS 1998 11th Congress of the International Perinatal Doppler Society." JOURNAL FÜR FERTILITÄT UND REPRODUKTION July 2-4, 1998

Age	5%	50%	95%
20w0d	1.09	1.43	1.77
21w0d	1.05	1.39	1.74
22w0d	1.01	1.36	1.70
23w0d	0.98	1.32	1.66
24w0d	0.94	1.28	1.63
25w0d	0.91	1.25	1.59
26w0d	0.87	1.22	1.56
27w0d	0.84	1.18	1.53
28w0d	0.81	1.15	1.49
29w0d	0.78	1.12	1.46
30w0d	0.75	1.09	1.43
31w0d	0.72	1.06	1.40
32w0d	0.69	1.03	1.38
33w0d	0.66	1.00	1.35
34w0d	0.63	0.98	1.32
35w0d	0.61	0.95	1.30
36w0d	0.58	0.93	1.27
37w0d	0.56	0.90	1.25
38w0d	0.54	0.88	1.22
39w0d	0.51	0.86	1.20
40w0d	0.49	0.84	1.18
41w0d	0.47	0.81	1.16
42w0d	0.45	0.80	1.14

(7) Lt Uterin RI

(a) Lt Uterin RI Schaffer FG

H. Schaffer
"IPDS 1998 11th Congress of the International Perinatal Doppler Society."
JOURNAL FÜR FERTILITÄT UND REPRODUKTION July 2-4, 1998

Age	5%	50%	95%
20w0d	0.34	0.47	0.61
21w0d	0.33	0.46	0.60
22w0d	0.32	0.45	0.59
23w0d	0.31	0.45	0.58
24w0d	0.30	0.44	0.57
25w0d	0.30	0.43	0.57
26w0d	0.29	0.42	0.56
27w0d	0.28	0.42	0.55
28w0d	0.28	0.41	0.55
29w0d	0.27	0.41	0.54
30w0d	0.27	0.40	0.54
31w0d	0.26	0.40	0.53
32w0d	0.26	0.39	0.53
33w0d	0.25	0.39	0.52
34w0d	0.25	0.38	0.52
35w0d	0.24	0.38	0.52
36w0d	0.24	0.38	0.51
37w0d	0.24	0.37	0.51
38w0d	0.24	0.37	0.51
39w0d	0.23	0.37	0.51
40w0d	0.23	0.37	0.50
41w0d	0.23	0.37	0.50
42w0d	0.23	0.37	0.50

(8) Lt Uterin PI

(a) Lt Uterin PI Schaffer FG

H. Schaffer
"IPDS 1998 11th Congress of the International Perinatal Doppler Society."
JOURNAL FÜR FERTILITÄT UND REPRODUKTION July 2-4, 1998

Age	5%	50%	95%
20w0d	0.44	0.74	1.04
21w0d	0.42	0.72	1.02
22w0d	0.40	0.70	1.00
23w0d	0.38	0.68	0.98
24w0d	0.36	0.66	0.96
25w0d	0.34	0.64	0.95
26w0d	0.33	0.63	0.93
27w0d	0.31	0.61	0.91
28w0d	0.30	0.60	0.90
29w0d	0.28	0.58	0.89
30w0d	0.27	0.57	0.87
31w0d	0.26	0.56	0.86
32w0d	0.25	0.55	0.85
33w0d	0.24	0.54	0.84
34w0d	0.23	0.53	0.84
35w0d	0.22	0.53	0.83
36w0d	0.22	0.52	0.82
37w0d	0.21	0.52	0.82
38w0d	0.21	0.51	0.81
39w0d	0.21	0.51	0.81
40w0d	0.20	0.51	0.81
41w0d	0.20	0.51	0.81
42w0d	0.20	0.51	0.81

(9) Rt Uterin RI

(a) Rt Uterin RI Schaffer FG

H. Schaffer
"IPDS 1998 11th Congress of the International Perinatal Doppler Society."
JOURNAL FÜR FERTILITÄT UND REPRODUKTION July 2-4, 1998

Age	5%	50%	95%
20w0d	0.34	0.47	0.61
21w0d	0.33	0.46	0.60
22w0d	0.32	0.45	0.59
23w0d	0.31	0.45	0.58
24w0d	0.30	0.44	0.57
25w0d	0.30	0.43	0.57
26w0d	0.29	0.42	0.56
27w0d	0.28	0.42	0.55
28w0d	0.28	0.41	0.55
29w0d	0.27	0.41	0.54
30w0d	0.27	0.40	0.54
31w0d	0.26	0.40	0.53
32w0d	0.26	0.39	0.53
33w0d	0.25	0.39	0.52
34w0d	0.25	0.38	0.52
35w0d	0.24	0.38	0.52
36w0d	0.24	0.38	0.51
37w0d	0.24	0.37	0.51
38w0d	0.24	0.37	0.51
39w0d	0.23	0.37	0.51
40w0d	0.23	0.37	0.50
41w0d	0.23	0.37	0.50
42w0d	0.23	0.37	0.50

(10) Rt Uterin PI

(a) Rt Uterin PI Schaffer FG

H. Schaffer
"IPDS 1998 11th Congress of the International Perinatal Doppler Society."
JOURNAL FÜR FERTILITÄT UND REPRODUKTION July 2-4, 1998

Age	5%	50%	95%
20w0d	0.44	0.74	1.04
21w0d	0.42	0.72	1.02
22w0d	0.40	0.70	1.00
23w0d	0.38	0.68	0.98
24w0d	0.36	0.66	0.96
25w0d	0.34	0.64	0.95
26w0d	0.33	0.63	0.93
27w0d	0.31	0.61	0.91
28w0d	0.30	0.60	0.90
29w0d	0.28	0.58	0.89
30w0d	0.27	0.57	0.87
31w0d	0.26	0.56	0.86
32w0d	0.25	0.55	0.85
33w0d	0.24	0.54	0.84
34w0d	0.23	0.53	0.84
35w0d	0.22	0.53	0.83
36w0d	0.22	0.52	0.82
37w0d	0.21	0.52	0.82
38w0d	0.21	0.51	0.81
39w0d	0.21	0.51	0.81
40w0d	0.20	0.51	0.81
41w0d	0.20	0.51	0.81
42w0d	0.20	0.51	0.81

(11) PIV

(a) Baschat

A. A. BASCHAT
"Relationship between placental blood flow resistance and precordial venous Doppler indices."
Ultrasound Obstet Gynecol
2003; 22: 561-566

Age	5%tile	50%tile	95%tile
20w0d	0.410	0.643	0.875
21w0d	0.409	0.642	0.874
22w0d	0.408	0.641	0.873
23w0d	0.407	0.640	0.872
24w0d	0.406	0.639	0.871
25w0d	0.405	0.638	0.870
26w0d	0.404	0.637	0.869
27w0d	0.403	0.636	0.868
28w0d	0.402	0.635	0.867
29w0d	0.401	0.634	0.866
30w0d	0.400	0.633	0.865
31w0d	0.399	0.632	0.864
32w0d	0.398	0.631	0.863
33w0d	0.397	0.630	0.862
34w0d	0.396	0.629	0.861
35w0d	0.395	0.628	0.860
36w0d	0.394	0.627	0.859
37w0d	0.393	0.626	0.858
38w0d	0.392	0.625	0.857
39w0d	0.391	0.624	0.856
40w0d	0.390	0.623	0.855

(12) PVIV

(a) Baschat

A. A. BASCHAT
"Relationship between placental blood flow resistance and precordial venous Doppler indices."
Ultrasound Obstet Gynecol
2003; 22: 561-566

Age	5%tile	50%tile	95%tile
20w0d	0.381	0.580	0.779
21w0d	0.380	0.579	0.779
22w0d	0.380	0.579	0.778
23w0d	0.379	0.578	0.777
24w0d	0.378	0.578	0.777
25w0d	0.378	0.577	0.776
26w0d	0.377	0.576	0.776
27w0d	0.377	0.576	0.775
28w0d	0.376	0.575	0.774
29w0d	0.375	0.575	0.774
30w0d	0.375	0.574	0.773
31w0d	0.374	0.573	0.773
32w0d	0.374	0.573	0.772
33w0d	0.373	0.572	0.771
34w0d	0.372	0.572	0.771
35w0d	0.372	0.571	0.770
36w0d	0.371	0.570	0.770
37w0d	0.371	0.570	0.769
38w0d	0.370	0.569	0.768
39w0d	0.369	0.569	0.768
40w0d	0.369	0.568	0.767

(13) a/S

(a) Baschat

A. A. BASCHAT
"Relationship between placental blood flow resistance and precordial venous Doppler indices."
Ultrasound Obstet Gynecol
2003; 22: 561-566

Age	5%tile	50%tile	95%tile
20w0d	0.342	0.508	0.674
21w0d	0.341	0.507	0.673
22w0d	0.341	0.507	0.673
23w0d	0.340	0.506	0.672
24w0d	0.339	0.505	0.671
25w0d	0.339	0.505	0.671
26w0d	0.338	0.504	0.670
27w0d	0.338	0.504	0.670
28w0d	0.337	0.503	0.699
29w0d	0.336	0.502	0.688
30w0d	0.336	0.502	0.688
31w0d	0.335	0.501	0.667
32w0d	0.335	0.501	0.667
33w0d	0.334	0.500	0.666
34w0d	0.333	0.499	0.665
35w0d	0.333	0.499	0.665
36w0d	0.332	0.498	0.664
37w0d	0.332	0.498	0.664
38w0d	0.331	0.497	0.663
39w0d	0.330	0.496	0.662
40w0d	0.330	0.496	0.662

(14) S/a

(a) Baschat

A. A. BASCHAT
"Relationship between placental blood flow resistance and precordial venous Doppler indices."
Ultrasound Obstet Gynecol
2003; 22: 561-566

Age	5%tile	50%tile	95%tile
20w0d	1.331	2.161	2.991
21w0d	1.329	2.159	2.989
22w0d	1.327	2.157	2.987
23w0d	1.324	2.154	2.984
24w0d	1.322	2.152	2.982
25w0d	1.320	2.150	2.980
26w0d	1.318	2.148	2.978
27w0d	1.315	2.145	2.975
28w0d	1.313	2.143	2.973
29w0d	1.311	2.141	2.971
30w0d	1.308	2.138	2.968
31w0d	1.306	2.136	2.966
32w0d	1.304	2.134	2.964
33w0d	1.301	2.131	2.961
34w0d	1.299	2.129	2.959
35w0d	1.297	2.127	2.957
36w0d	1.295	2.125	2.955
37w0d	1.292	2.122	2.952
38w0d	1.290	2.120	2.950
39w0d	1.288	2.118	2.948
40w0d	1.285	2.115	2.945

12.11.4 Recommended Ratios

HC/AC RATIO - Range 13-42 weeks
Campbell S, Thomas A.
Ultrasound measurement of the fetal head to abdomen circumference ratio in the assessment of growth retardation. Br J Obstetrics and Gynaecology 1977; 84:165-174.

GA (Weeks)	HC/AC	GA (Weeks)	HC/AC
13	1.14-1.31	28	1.05-1.22
14	1.14-1.31	29	0.99-1.21
15	1.05-1.39	30	0.99-1.21
16	1.05-1.39	31	0.96-1.17
17	1.07-1.29	32	0.96-1.17
18	1.07-1.29	33	0.96-1.11
19	1.09-1.26	34	0.96-1.11
20	1.09-1.26	35	0.93-1.11
21	1.06-1.25	36	0.93-1.11
22	1.06-1.25	37	0.92-1.05
23	1.05-1.21	38	0.90-1.05
24	1.05-1.21	39	0.87-1.06
25	1.04-1.22	40	0.87-1.06
26	1.04-1.22	41	0.93-1.00
27	1.05-1.22	42	0.93-1.00

FL/AC RATIO - Range 22-42 weeks
Hadlock F P, Deter R, Harrist R, Roecker E, Park S.
A date-independent predictor of intrauterine growth retardation: femur length/abdominal circumference ratio. American Journal of Radiology November 1983; 141:979-984.

FL/HC RATIO - Range 15-42 weeks
Hadlock FP, Harrist RB, Shah Y, and Park SK.
The femur length/head circumference relation in obstetric sonography
Journal of Ultrasound in Medicine October 1984; 3:439-442.

GA (Weeks)	FL/HC (%)	GA (Weeks)	FL/HC (%)
15	15-17	29	20-21
16	13-17	30	19-21
17	15-18	31	19-21
18	16-18	32	19-21
19	16-18	33	20-22
20	17-20	34	19-22
21	16-20	35	20-22
22	18-20	36	20-22
23	19-21	37	21-23
24	19-21	38	21-23
25	19-20	39	21-23
26	19-20	40	21-23
27	19-20	41	22-23
28	19-21	42	20-24

FL/BPD RATIO - Range 23-40 weeks
Hohler C, Quetal T.
Comparison of fetal femur length and biparietal diameter in late pregnancy. American Journal Obstetrics and Gynecology December 1, 1981; 141 (No. 7):759-762.

CEPHALIC INDEX
- Range 14-40 weeks
Hadlock F, Deter R, Carpenter R, Park S.
Estimating fetal age: effect of head shape on biparietal diameter. American Journal of Radiology July 1981; 137:83-85.

Hansmann M, Hackelöer BJ, Staudach A
Ultraschalldiagnostik in Geburtshilfe und Gynäkologie 1985

- Range 12-42 weeks
Chitty L S, Altman D G
British Journal of Obstetrics and Gynaecology January 1994, Vol. 101
p29-135.

HEAD CIRCUMFERENCE
- Range 12- 40 weeks
Merz E., Werner G. & Ilan E. T., 1991
Ultrasound in Gynaecology and Obstetrics Textbook and Atlas 312, 326-336.

- Range 15-39 weeks
Hansmann M, Hackelöer BJ, Staudach A
Ultraschalldiagnostik in Geburtshilfe und Gynäkologie 1985

ABDOMINAL CIRCUMFERENCE
- Range 12-39 weeks
Merz E., Werner G. & Ilan E. T., 1991
Ultrasound in Gynaecology and Obstetrics Textbook and Atlas 312, 326-336.

- Range 13-40 weeks
Campbell S.
Ultrasound in obstetrics and Gynaecology - Chervenak,
Campbell ISBN 0/316/IB865/7 Published by Little & Brown.

12.12 Customization of the Touch Panel

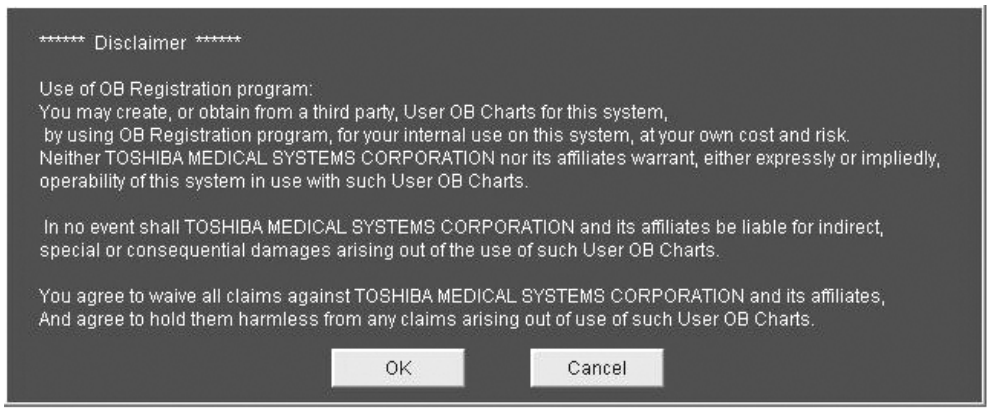
In this system, the switch layout on the touch panel for OB measurement can be customized.

12.12.1 Displaying the OB SW Customize screen

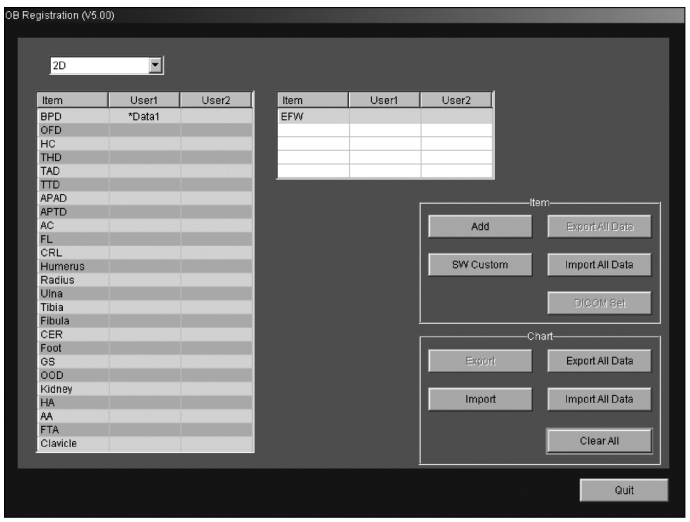
(1) Press MENU. The menu is displayed on the monitor.

(2) Select [System Setting] → [OB Registration]. A confirmation dialog indicating that the measurement will be terminated, not suspended, is displayed.

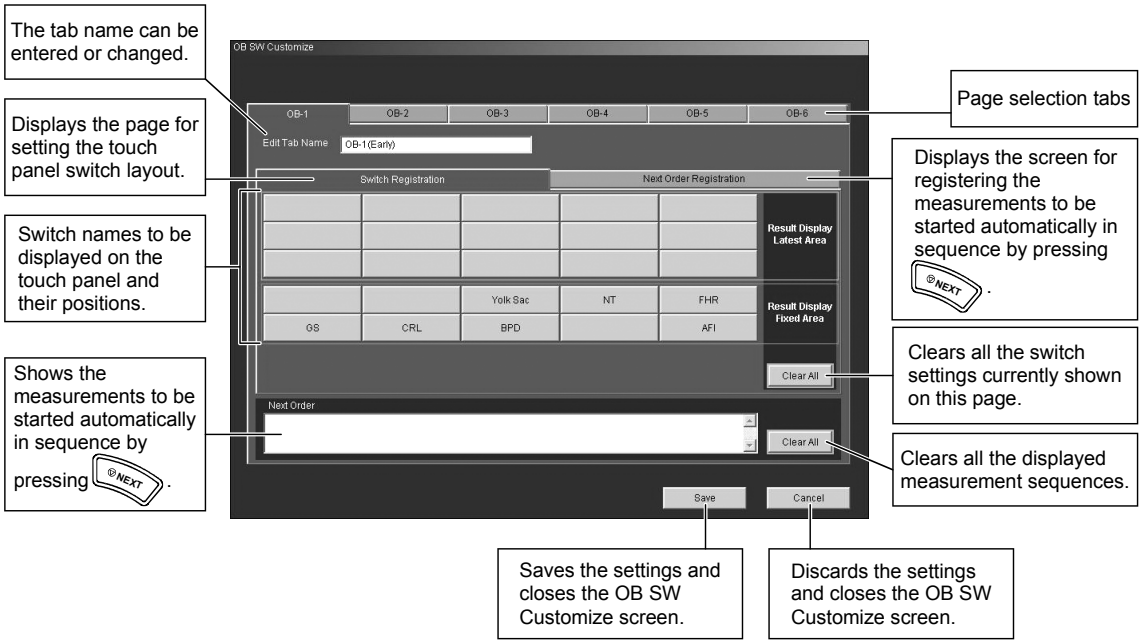
(3) Press [OK]. A confirmation dialog related to the liability for measurement packages created by the user is displayed.



(4) Press [OK]. The OB Registration screen (main screen) is displayed.



(5) Press [SW Custom]. The OB SW Customize screen is displayed. Use this screen to change the switch assignments.



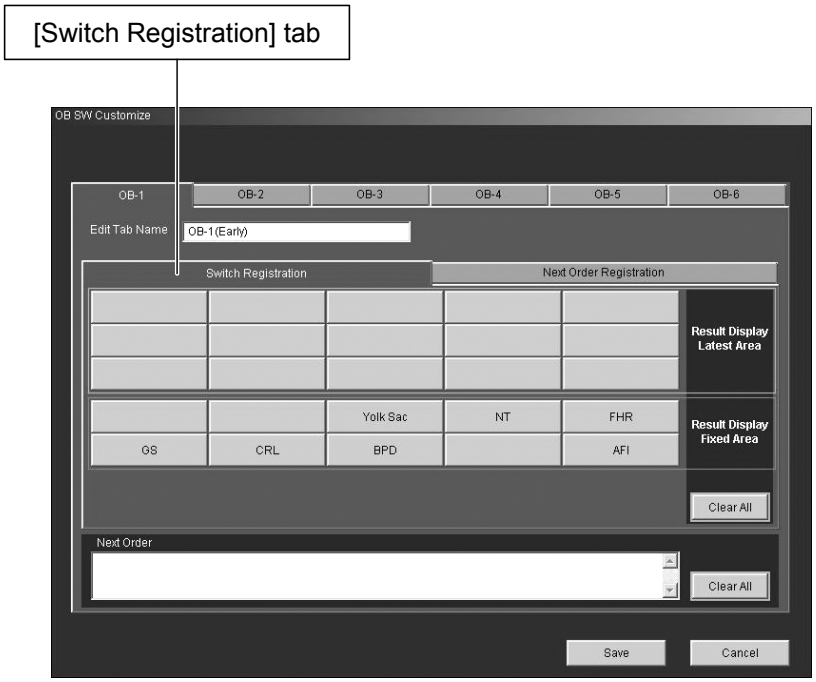
12.12.2 Changing the switch settings on the touch panel

(1) Select the desired page of the OB SW Customize screen.

(2) To change the tab name, enter the new tab name in the Edit Tab Name field.

(3) Press the [Switch Registration] tab.

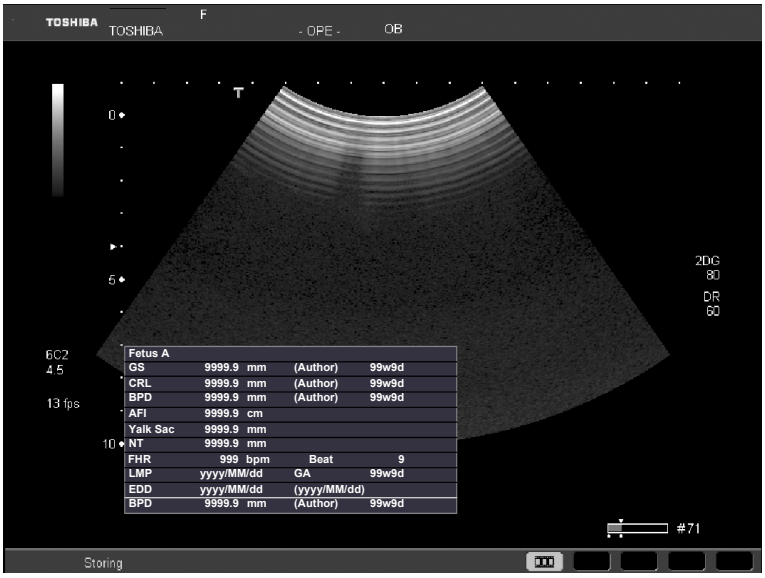
(4) Select the switch to which a new measurement item is to be registered. The list of measurements that can be registered is displayed. Setting of "Result Display Fixed Area" and "Result Display Latest Area" is possible only for 2D measurement items.



The measurement results for the switches that are registered for "Result Display Fixed Area" are displayed in the fixed area.

The measurement results are displayed according to the switch arrangement, starting from the left end to the right end of the bottom row, followed by the left end to the right end of the top row (refer to the figure below).

The measurement results for the switches that are registered for "Result Display Latest Area" are displayed only in the latest area.



In the above example, the BPD value was measured last.

(5) Select the desired measurement item from the list. The measurement item name is displayed on the switch.

* To register no measurement item to the switch, select "DELETE" from the list.

* If the same measurement item as currently registered to the switch or "-----" is selected, the measurement item registered to the switch is not changed.

(6) To change the switch settings on other pages, select the corresponding tabs and repeat steps (2) to (5).

(7) When all the changes are complete, press [Save] to save the new settings.

NOTE: (1) To change the switch position of a measurement item, delete the current switch by selecting "DELETE" and then select the switch at the desired position and repeat steps (4) and (5).

(2) Before using a user-registered switch, confirm that the intended function has been registered correctly. The following confirmation dialog is displayed when [Save] is pressed.

12.12.3 Registering the measurements to be started in sequence automatically by pressing [NEXT]

It is possible to set the system so that measurements are started in the predetermined order each time 

is pressed.

NOTE: When 

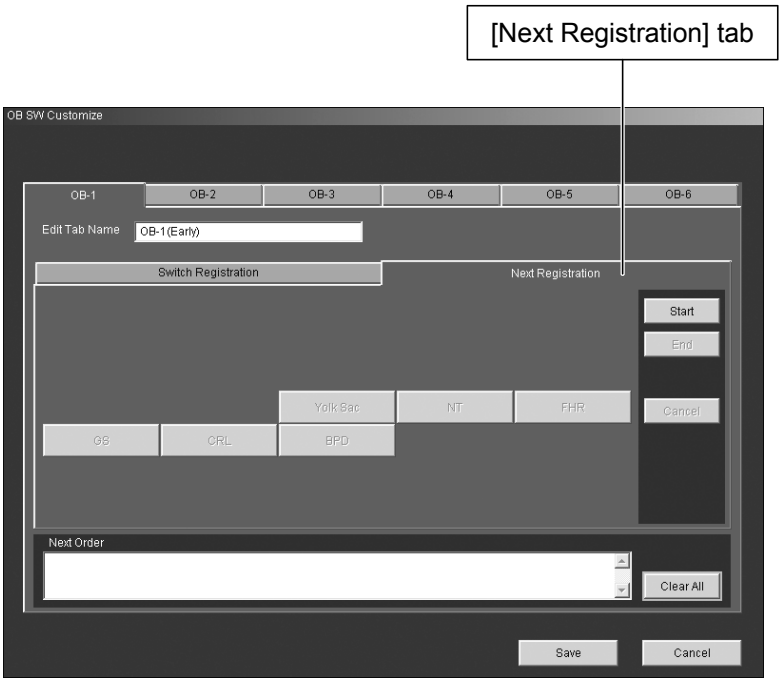
is pressed with the end point of the previous measurement in the sequence not yet set, the previous measurement is completed and the next measurement is started.

When 

is pressed with the start point of the previous measurement in the sequence not yet set, the previous measurement is canceled and the next measurement is started.

(1) Select the desired page.

(2) Select the [Next Registration] tab on the selected page. The screen below is displayed.

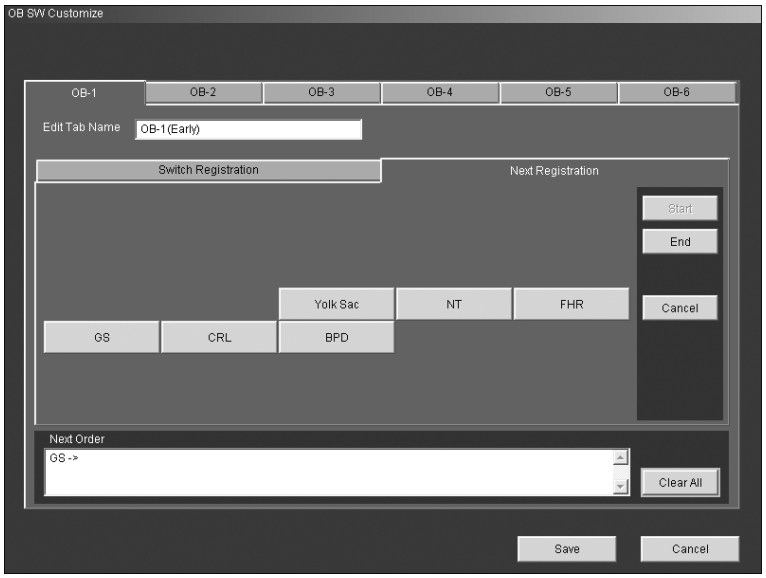


(3) Press [Start].

(4) Select the measurements to be started in sequence each time 

is pressed.

Select them one by one in the order in which they are to be executed. The result of the selection is displayed in the [Next Order] field at the bottom of the page.



NOTE: 1. To carry out measurements in a loop, select the first measurement item again at the end of the sequence.

Example: GS → CRL → BPD → GS

2. If two or more sequences are registered on a single page, each sequence is displayed on a separate line in the [Next Order] field.

(5) When setting is complete, press [End].

(6) To set measurement sequences on other pages, select the corresponding tabs and repeat steps (2) to (5).

(7) Press [Save] to save the new settings.

12.12.4 Closing the OB SW Customize screen

(1) Select [Quit] on the OB Registration screen. The switch layout on the touch panel is updated. During updating, the screen below is displayed. Do not operate any switch on the main panel until this screen disappears.

When the update is completed, the touch panel screen is displayed again and the OB Registration screen is closed.

13. Registration of User-Programmed Measurements

In this system, it is possible to create user-programmed measurement packages (hereinafter referred to as "measurement packages") that contain the following items. It is also possible to import and register measurement packages created on a PC.

- Measurement protocols and calculation formulas using measured values
- Layout settings for measurement result display fields
- Layout settings for report screens
- Registration of DICOM codes in measurement packages

For the procedures for creating data in a PC, contact your Toshiba representative.

The total of the measurement packages and the standard menus must not exceed seven for each Application Preset (six measurement packages can be registered for Abdomen 1 and Abdomen 2, three for Adult Heart 1 and Adult Heart 2, five for Carotid 2, four for CHI, and seven for the other Application Presets).

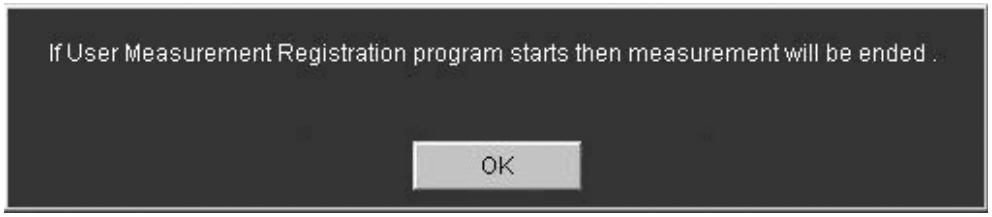
⚠CAUTION:

1. **Toshiba shall not be held liable for results obtained with user-registered functions.**
2. **The data registered in the user-programmed measurements will not be included in future upgraded systems or subsequent models.**
3. **Use the user-registered measurements only after understanding the contents. Refer to subsection 13.3 for the procedure for checking the contents of the user-registered measurements.**

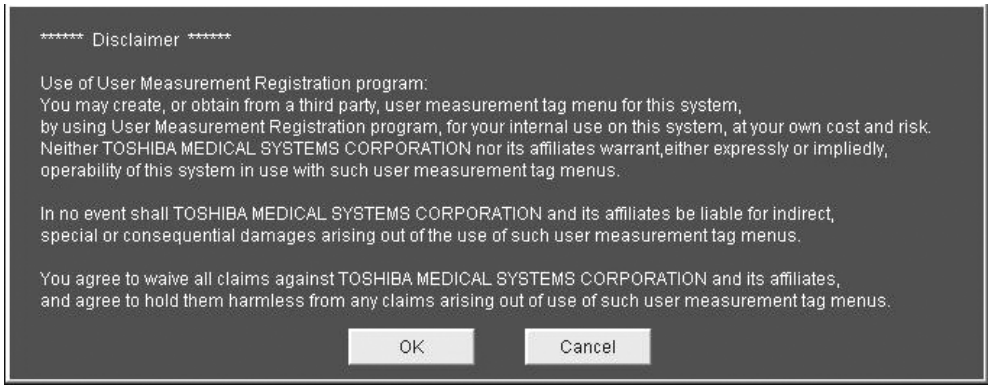
13.1 Opening the Setup Screen

(1) Press MENU. The menu is displayed on the monitor.

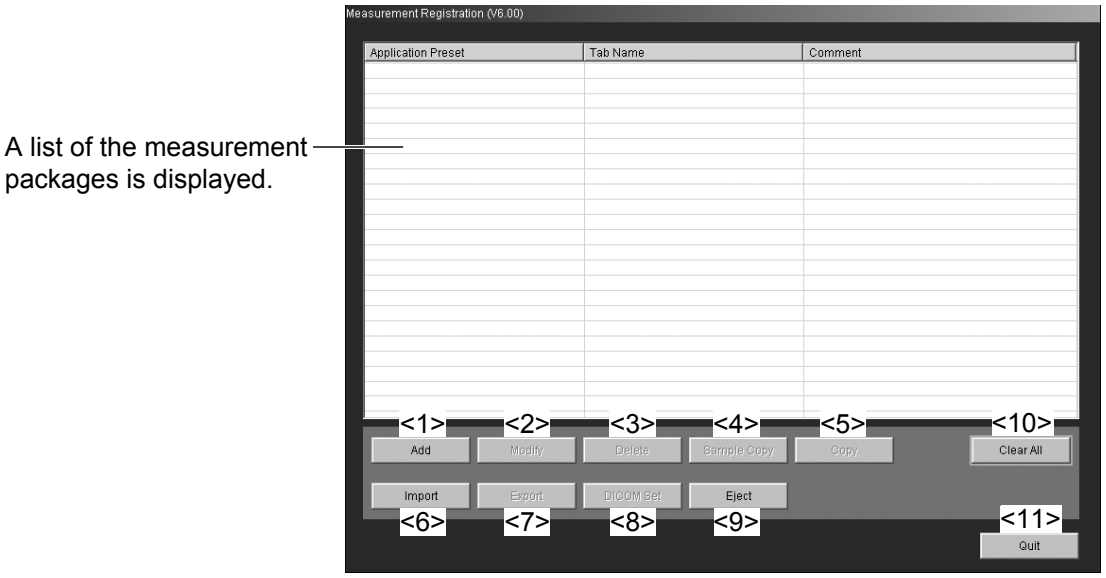
(2) Select [System Setting] → [Meas. Registration]. A confirmation dialog indicating that the measurement will be discontinued, not suspended, is displayed.



(3) Press [OK]. A confirmation dialog indicating that the responsibility for the created measurement package rests solely with the user is displayed.



(4) Press [OK]. The Measurement Registration screen (main screen) is displayed.



Measurement Registration Screen (main screen)

No.	Switch	Description
<1>	Add	Registers a user-programmed measurement package.
<2>	Modify	Modifies the measurement package.
<3>	Delete	Deletes the measurement package.
<4>	Sample Copy	Cannot be used.
<5>	Copy	Cannot be used.
<6>	Import	Imports data from an external source.
<7>	Export	Saves the data to the Windows cache.
<8>	DICOM Set	Registers DICOM codes in the measurement package.
<9>	Eject	Ejects the media.
<10>	Clear All	Deletes all measurement packages.
<11>	Quit	Closes the Measurement Registration screen.

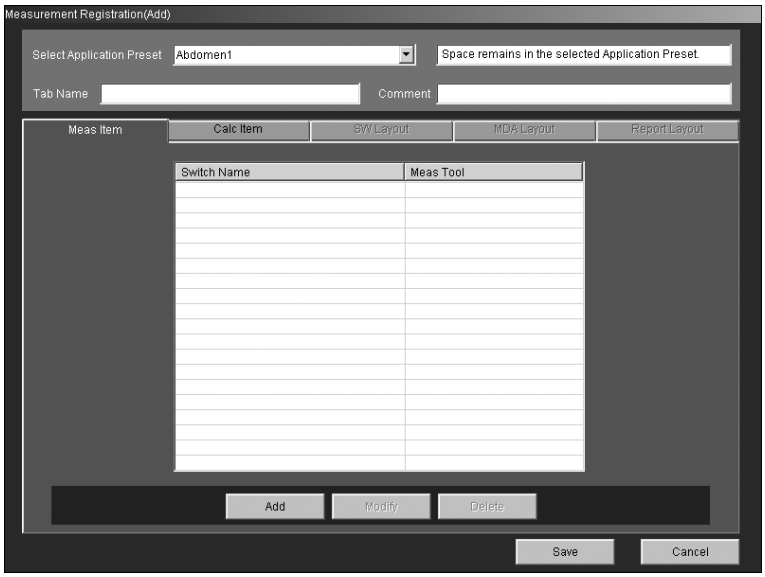
* The grayed-out switches are disabled.

* [Modify], [Delete], and [Export] are enabled when a measurement package is selected on the main screen.

13.2 Registering a User-Programmed Measurement Package

13.2.1 Selecting an application preset and entering the tab name

(1) Press [Add] on the main screen. The screen below (hereinafter referred to as the "Add screen") is displayed.



(2) Select the desired application preset for which the measurement package is to be registered from the pull-down menu.

A message indicating whether or not the new measurement package can be registered to the selected preset is displayed on the right of the Select Application Preset field.

If registration is possible : There is a space in the selected Application Preset.

If registration is not possible : There is no space in the selected Application Preset.

* A maximum of seven measurement packages, including those in the standard menu, can be registered to an Application Preset.

The application presets to which measurement packages can be registered are listed below.

No.	Application presets to which measurement packages can be registered
1.	Abdomen1
2.	Abdomen2
3.	Adult Heart1
4.	Adult Heart2
5.	TCD
6.	PV Upper
7.	PV Lower
8.	Thyroid
9.	Breast
10.	Testes
11.	Prostate
12.	Pelvis
13.	Penile
14.	Carotid2
15.	Neo-Hip
16.	MSK
17.	CHI

(3) Enter the tab name (up to 20 characters). The tab name entered here will be displayed on the tab on the touch panel.

* If the entered tab name already exists in the application preset, the tab name will not be accepted.

(4) Enter a comment (up to 25 characters).

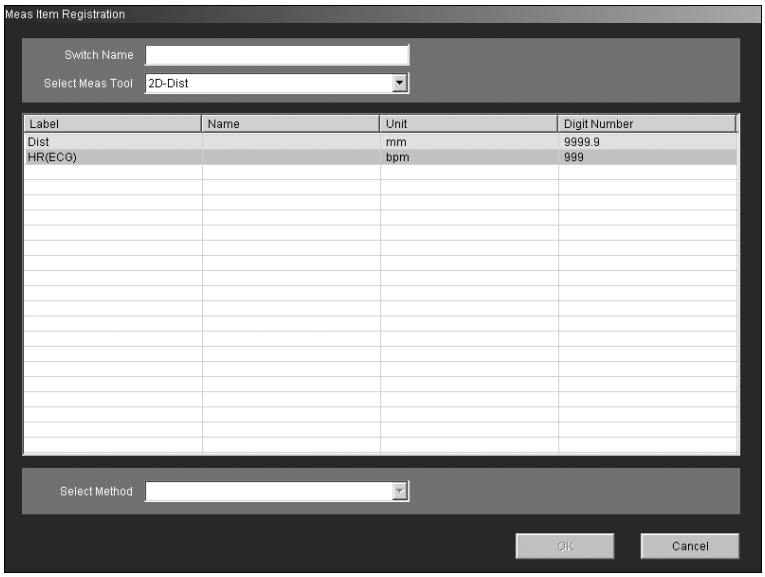
(5) Set the conditions on each tab page as follows and then press [Save]. The settings are registered to the system and the display returns to the main screen.

No.	Tab	Description	Refer to
<1>	Meas. Item	Setting the conditions related to the measurement items (switch names, measurement tools, and measurement item names)	Subsection 13.2.2
<2>	Calc. Item	Setting the conditions related to the calculation items (name for calculation results, calculation formulas, units, and display format)	Subsection 13.2.3
<3>	SW Layout	Setting the switch layout on the touch panel and the system action that occurs when NEXT is pressed.	Subsection 13.2.4
<4>	MDA Layout	Setting the layout for measurement and calculation results to be displayed on the measurement screen.	Subsection 13.2.5
<5>	Report Layout	Setting the layout for measurement and calculation results to be displayed on the Report screen.	Subsection 13.2.6

13.2.2 Registering a measurement item (Meas. item)

13.2.2.1 Adding a measurement item

(1) Click [Add] at the [Meas.Item] tab on the [Add] screen. The screen below is displayed.



(2) Enter the measurement item switch name in the Switch Name field (up to 20 characters).

* The measurement item switch name must be different from all the other switch names in the same measurement package.

(3) Select the measurement to be used from the Select Meas. Tool pull-down menu. For the measurements which can be used and the items to be output, refer to subsection 13.9.

(4) The items to be output at the time of measurement are displayed in the Label field. For the items whose results are to be displayed, enter the measurement item name in the Name field (up to 10 characters).

* The measurement item name must be different from all the other measurement item names in the same measurement package.

NOTE: When the measurement item name is not entered, the item is not displayed on the measurement screen during measurement and the results cannot be used for calculation.

(5) Select the measurement method to be used from the Select Method pull-down menu.

* The following measurement methods can be selected.

Measurements	Measurement methods
Trace Length measurement	Continuous Trace, Spline Trace
Area measurement	Continuous Trace, Spline Trace, Ellipse, Cross
Vel Trace measurement	Continuous Trace, Spline Trace, Line Trace, Range, Auto Range
PI measurement	Continuous Trace, Spline Trace, Line Trace, Range, Auto Range

NOTE: Select the measurement method to be used as the default here. The re-measurement method can be selected while the measurement package is executed.

(6) Press [OK]. The settings are added to the Meas. Item menu list on the Add screen.

(7) To add further measurement items, click [Add] again and repeat the procedure.

13.2.2.2 Deleting a measurement item

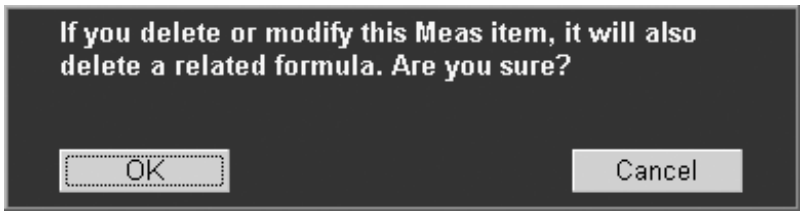
(1) Select the measurement item at the [Meas.Item] tab on the [Add] screen.

[Modify] and [Delete] become enabled.

(2) When [Modify] is clicked, the selected measurement item can be modified using the procedure described in subsection 13.2.2.1.

(3) When [Delete] is clicked, the selected measurement item can be deleted.

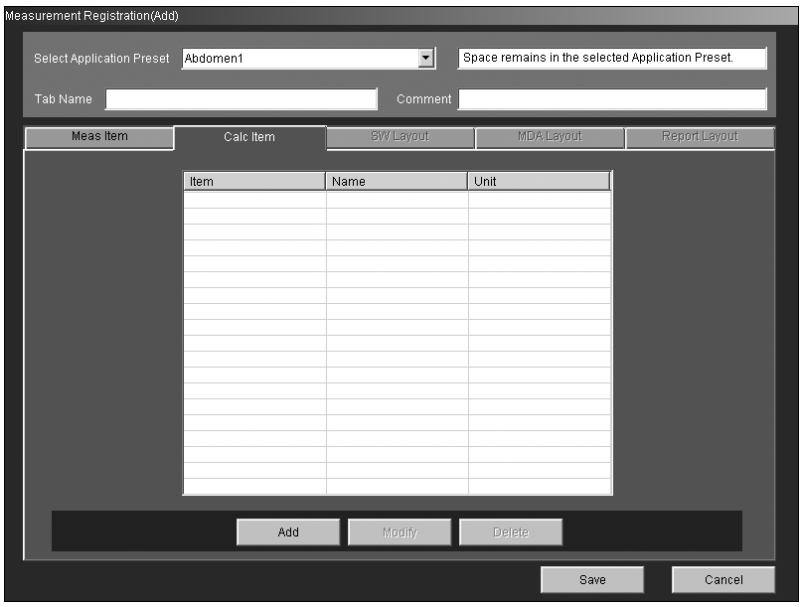
NOTE: When a measurement item used in the calculation items is to be deleted, the confirmation message displayed below is shown. Clicking [OK] deletes both the selected measurement item and its related calculation items. Clicking [Cancel] cancels deletion.



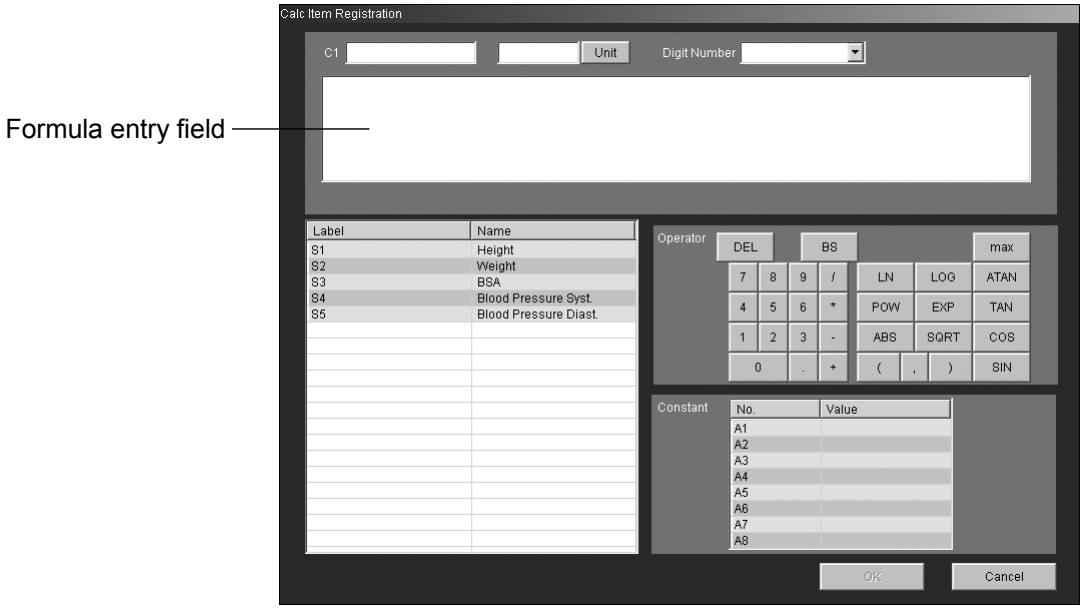
13.2.3 Registering a calculation item (Calc. item)

13.2.3.1 Registering a calculation item

(1) Press the [Calc. Item] tab of the Add screen. The screen below is displayed.



(2) Press [Add]. The screen below is displayed.



(3) Enter the calculation item name in the C1 field (up to 10 characters).

* The calculation item name must be different from all the other calculation item names in the same measurement package.

(4) Click [Unit]. The unit name setup screen is displayed. Select the unit to be displayed on the measurement screen and report.

The following unit names are registered.

Unit names	Applications
mm	Dist
cm	Dist
ms	Time
sec	Time
mm/s	Slope
cm/s	Slope
cm/s	Velocity
m/s	Velocity
mmHg	Press
deg	Angle
mm^2	Area
cm^2	Area
cm^3	Volume
g	Mass
g/cm^3	Gravity
L/min	Flow
mL/s	Flow
mL	Capacity
L	Capacity
bpm	HR
cm	VTI
kg	Weight
cm	Height
%	Ratio
circ/s	MVCF
mL/m^2	SI
cm^2/m^2	AV Index
dyn/cm^2	LV Wall Stress
g/m^2	MASS Index
mmHg/s	dP/dt

The unit name set by the user can be registered for User1 to User6 (up to 8 characters). The registered unit name is available in the same measurement package.

* Registration without setting the unit name (leaving the unit name blank) is also possible.

CAUTION: Setting the unit here does not set the unit to be used for calculation. Set the unit when entering the calculation formula so that the unit to be used for calculation matches the displayed unit.

(5) Select the number of digits to be displayed from the Digit Number pull-down menu.

The choices and display ranges are shown below. Result values that are outside the upper/lower limits are displayed as "****" on the measurement screen and report.

Choices	Display ranges
XX.XXX	-99.999 to 99.999
XXX.XX	-999.99 to 999.99
XXXX.X	-999.9 to 9999.9
XXXXXX	-999999 to 999999

(6) Enter the formula.

NOTE: The measurement item to be used for calculation is entered with M1 to Mn in the Label field.
The height, weight, body surface area, and blood pressure can be specified with S1 to S5 in the Label field and can be calculated.
The arithmetic operators and functions which can be used for calculation are displayed in the Operator field.
When any button in the Operator field is selected using an arrow cursor, the selected arithmetic operators and functions can be entered in the Formula entry field.
Constants can be registered for A1 to A6. To use constants A1 to A6 in the calculation formula, set the constants in the Constant entry field (up to 15 characters).

Arithmetic operators which can be used for calculation

Arithmetic operators	Meanings and applications
(	Opening bracket
)	Closing bracket
/	Division
*	Multiplication
-	Subtraction
+	Addition
Del	Deletion of the character to the right of the cursor
BS	Deletion of the character to the left of the cursor
.	Decimal point
,	Comma
0	Numbers
1	
2	
3	
4	
5	
6	
7	
8	
9	

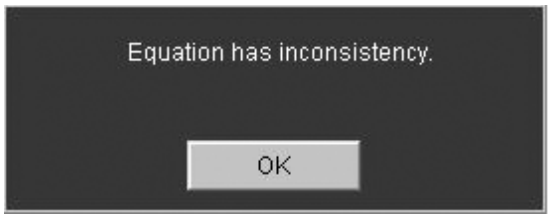
Functions which can be used in calculation

Function switch names	Notations	Functions
SIN	SIN (x)	Sine of x (angle)
COS	COS (x)	Cosine of x (angle)
TAN	TAN (x)	Tangent of x (angle)
ATAN	ATAN (x)	Principal value of arctangent of x
LOG	LOG (x)	Log in base 10 ($\log_{10}x$)
LN	LN (x)	Log in base e ($\log_{e}x$)
EXP	EXP (x)	e^{x}
SQRT	SQRT (x)	Square root of x
POW	POW (x, y)	x^{y}
ABS	ABS (x)	Absolute value of x
max	max (x1, x2, ..., X10)	Maximum of x1, x2, ….., x10

NOTE:
1. Only measurement items can be set as arguments of a max function. Calculation items, calculation formulas, or constants cannot be set as arguments of a max function.
2. A measurement item set as an argument of a max function cannot be set as an argument of other max functions.
3. Up to 10 arguments can be set for a max function.
4. Calculation items that use a max function can be displayed only on the Report screen. Such calculation items cannot be displayed in the MDA.
5. Refer to subsection 13.10 for the Report screen display for calculation items that use a max function.

(7) Press [OK]. The settings are added to the Calc. Item menu list on the Add screen.

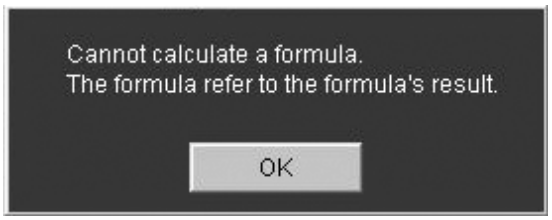
NOTE: If there are any errors in the calculation formula (arithmetic operators used sequentially, spaces entered etc.), the message shown below is displayed.



When the circulation setting (cross reference) is included in the calculation formula, the message shown below is displayed.

(Example) C1 = C2
C2 = C1

C2 = C2 + 1



In this case, press [OK] and enter an appropriate formula.

(8) Set the required calculation item using the same procedures.

NOTE: Previously set calculation items can be set to the calculation formula. The registered calculation items are displayed in C1 to Cn in the Label field.

13.2.3.2 Deleting a calculation item

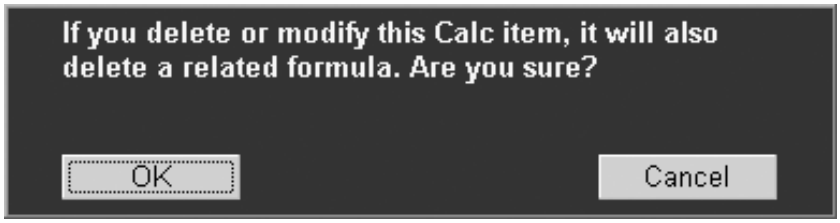
(1) Select the calculation item at the [Calc.Item] tab on the [Add] screen.

[Modify] and [Delete] become enabled.

(2) When [Modify] is clicked, the selected calculation item can be modified using the same procedures as described in subsection 13.2.3.1.

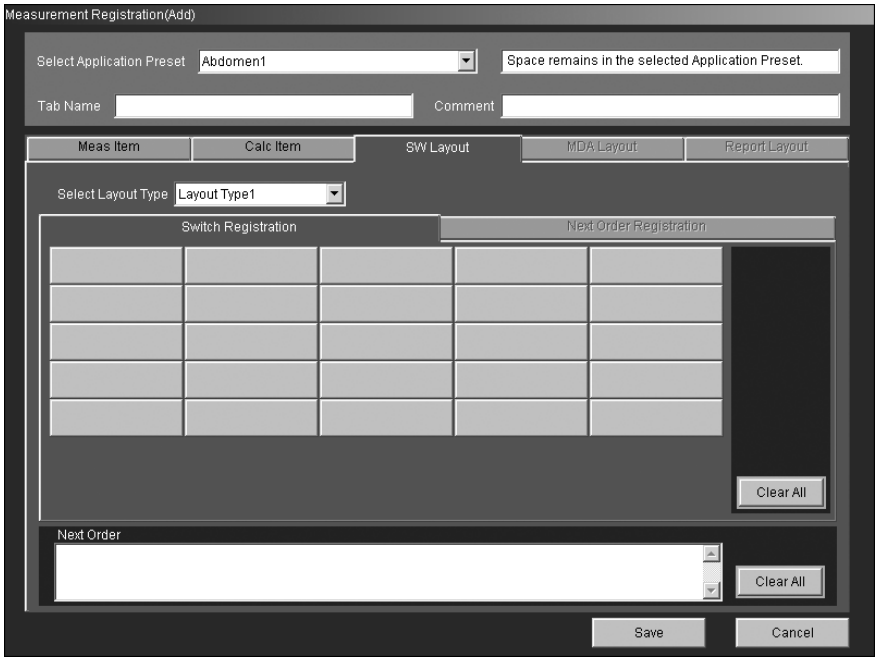
(3) When [Delete] is clicked, the selected calculation item can be deleted.

NOTE: When the calculation item to be deleted is used in other calculation items, the confirmation message shown below is displayed. Clicking [OK] deletes both the selected calculation item and its related calculation items. Clicking [Cancel] cancels deletion.



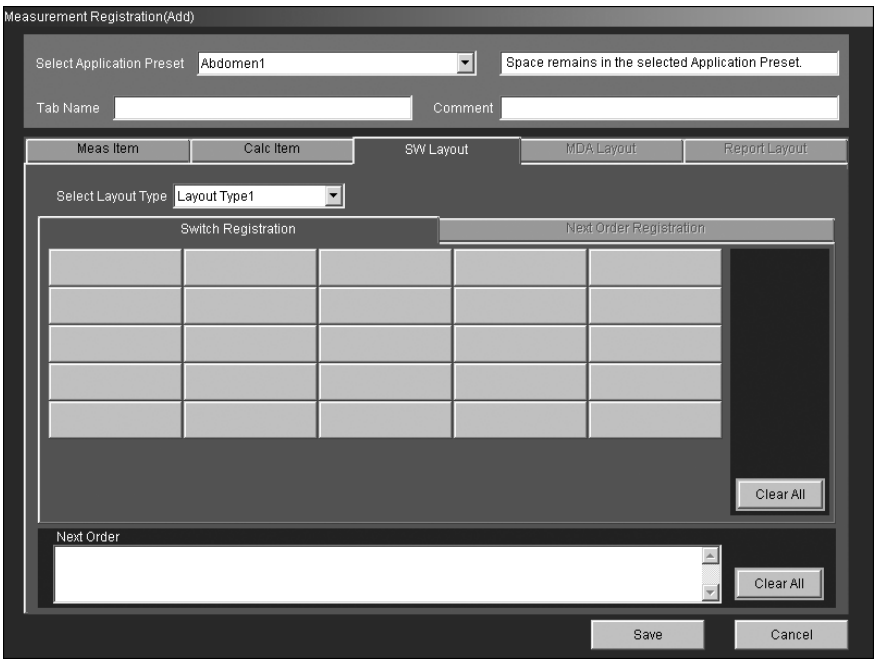
13.2.4 Registering the Switch Layout (SW Layout)

(1) Press the [SW Layout] tab of the Add screen. The screen below is displayed.

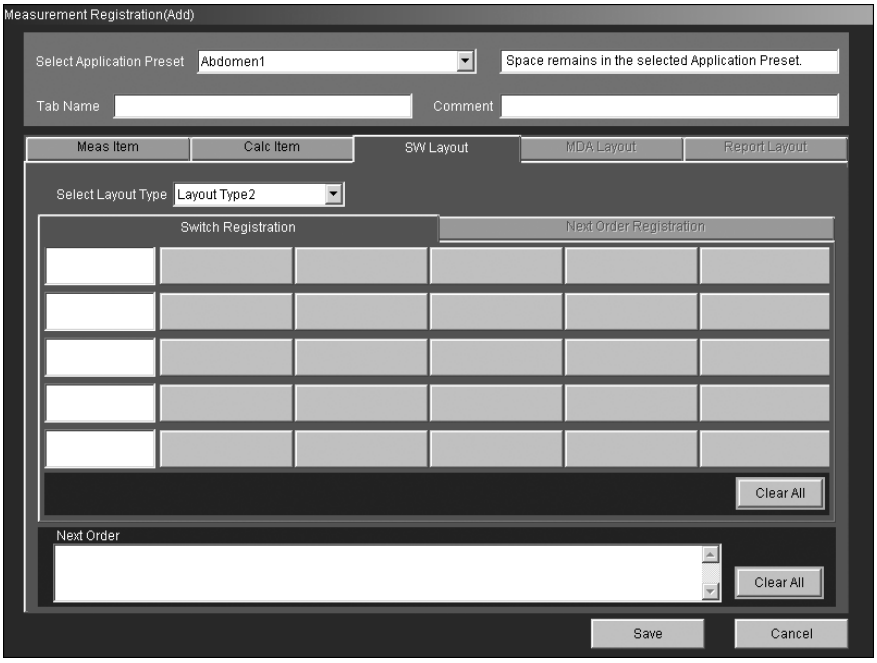


(2) Select the desired layout from the Select Layout Type pull-down menu.

(a) Layout Type 1: 5 × 5 measurement switches



(b) Layout Type 2: 5 × 5 measurement switches with group names



* The group name can be entered (up to 15 characters).

NOTE: When the switch layout is changed after registering the switch positions, the confirmation dialog shown below is displayed. Clicking [OK] clears the registered switch positions and changes the switch layout.

(3) Click the desired switch position. The list of the measurement switches that can be registered is displayed.

(4) Select the desired measurement switch from the list. The selected switch name is displayed at the specified position.

* To delete a registered switch, click the switch, and then select <Delete> from the list.

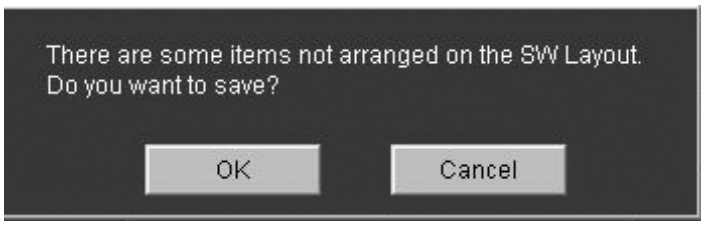
* If the selected measurement switch name is already registered to the selected switch position or if <Cancel> is selected for the selected switch position to which a measurement is already registered, the measurement registered to that switch position is not changed.

(5) To register two or more measurements, repeat steps (3) and (4).

(6) When [Clear All] is clicked, all registered switch positions and all measurement transitions are cleared.

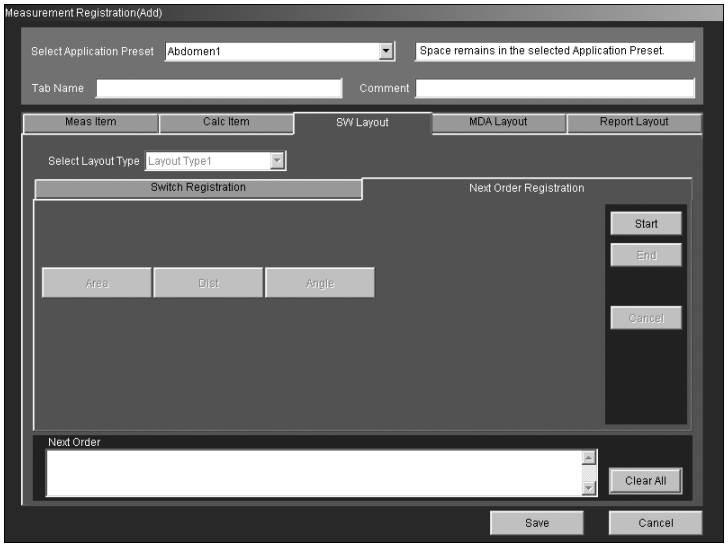
NOTE: 1. The following error message is displayed for measurement packages in which the measurement item switch positions are not set. Such packages cannot be saved.

2. If there is a measurement item for which the switch position is not set, the following confirmation dialog is displayed when saving the measurement package.



3. The line feed positions of the switch names displayed here and those displayed on the TCS of the system differ in some cases.
Check them on the TCS and enter a space when entering the switch name if required as described in subsection 13.2.2.

(7) To set the system so that the next measurement is started automatically by pressing NEXT , press the [Next Order Registration] tab. The screen below is displayed.



(8) Press [Start].

(9) Select the sequence of measurement items to be executed using NEXT by pressing the corresponding switches on the screen in the order in which they are to be executed. The selected items are displayed in the Next Order field at the bottom of the screen.

NOTE: 1. To start the measurements in a loop, set the first item in the sequence again as the last item.

Example: Area → Dist → Angle → Area

2. When more than one sequence is registered at a time, each sequence is displayed on separate line in the Next Order field.

(10) Press [End].

(11) Press [Save] to save the settings.

(12) When [Clear All] is clicked, all measurement transitions are cleared.

13.2.5 Registering the measurement and calculation result display layout (MDA layout)

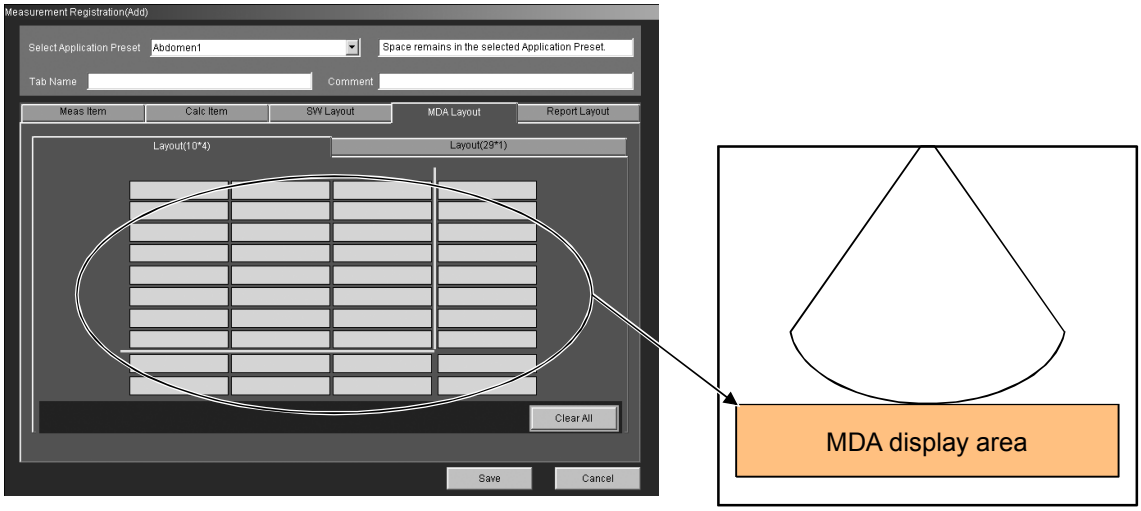
(1) Press the [MDA Layout] tab of the Add screen. The screen below is displayed.

The green lines on the screen indicate the range to be displayed when "Extended" is selected for Font Type.

Items for which it is desired that measurement results are displayed even when "Extended" is selected for Font Type must be registered to the cells on the left of the vertical lines and above the horizontal line in the 10*4 layout or above the horizontal line in the 29*1 layout.

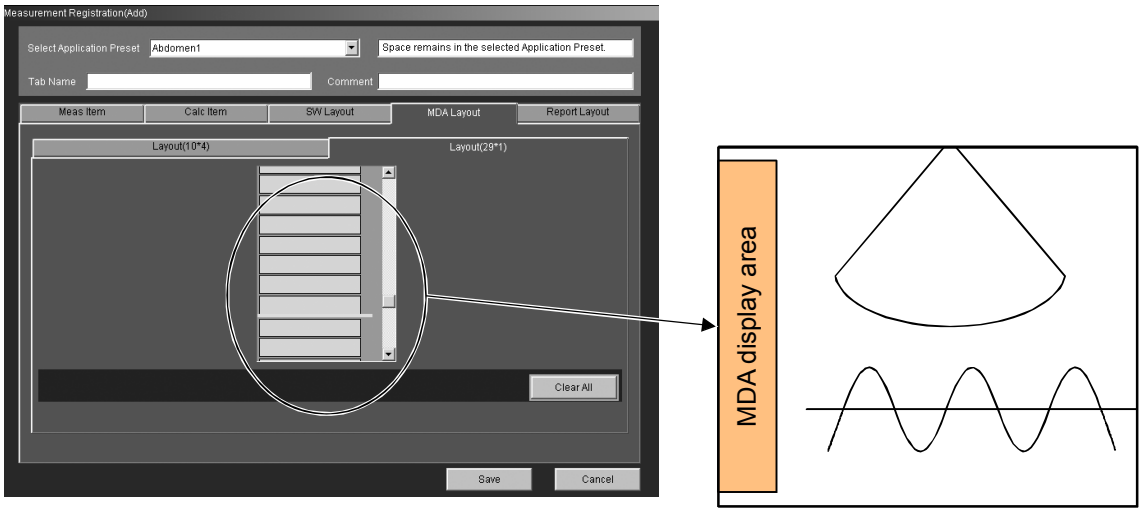
(2) Select the layout type by pressing the [Layout(10*4)] or [Layout(29*1)] tab. Select the display layout from the Select Layout Type pull-down menu.

(a) MDA Layout (10*4)



* Up to 40 items can be set. When items are set in a row with free space(s) between them, the items are displayed as specified on the measurement screen. When items are set in a column with free space(s) between them, however, the items are displayed without free spaces between them on the measurement screen.

(b) MDA Layout (29*1)



* Up to 29 items can be set. Even when items are set with free space(s) between them, the items are displayed without free spaces between them on the measurement screen.

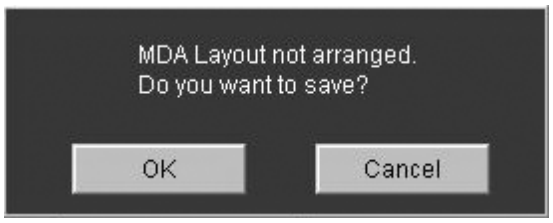
(3) Click the desired position. A list of the items that can be registered is displayed.

(4) Select the desired item from the list. The selected item is displayed at the specified position.

* To delete a registered item, click the item, and select <Delete> from the list.

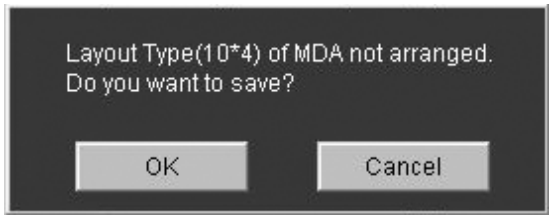
* If the selected item is already registered to the selected position or if <Cancel> is selected for the selected position to which an item is already registered, the item registered to that switch position is not changed.

NOTE: 1. If the display layout for the measurement and calculation results is not registered, the results are not displayed on the measurement screen. If nothing is set on the layout tabs, the confirmation dialog shown below is displayed when an attempt is made to save a measurement package.



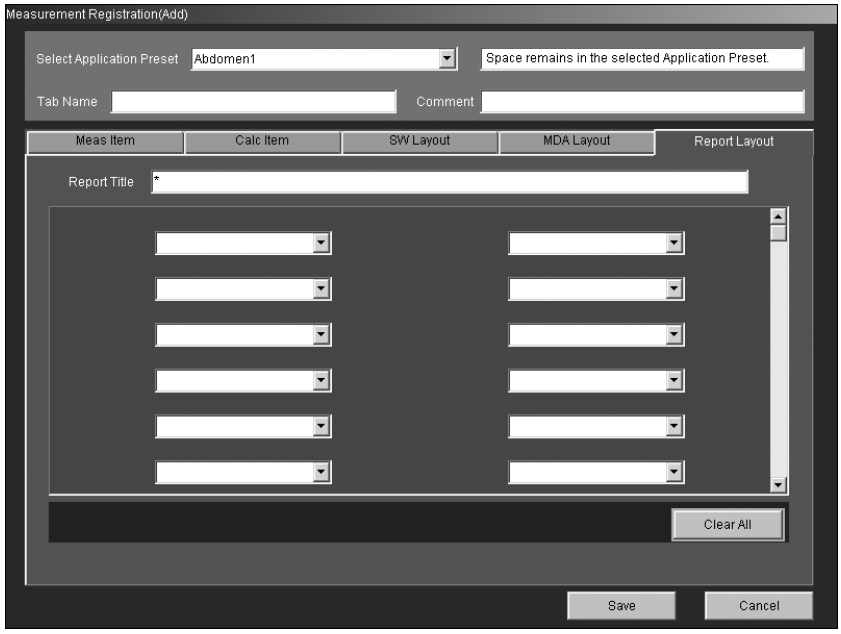
2. To display the results regardless of the image mode, set the measurement and calculation items on both the Layout (10*4) and Layout (29*1) tabs. When the items are set on only one of the layout tabs, the confirmation dialog shown below is displayed when an attempt is made to save a measurement package.

   Example: Dialog that appears when nothing is set on the Layout (10*4) tab



13.2.6 Registering the report screen layout (Report layout)

(1) Press the [Report Layout] tab of the Add screen. The screen below is displayed.



(2) Enter the report title (up to 48 characters).

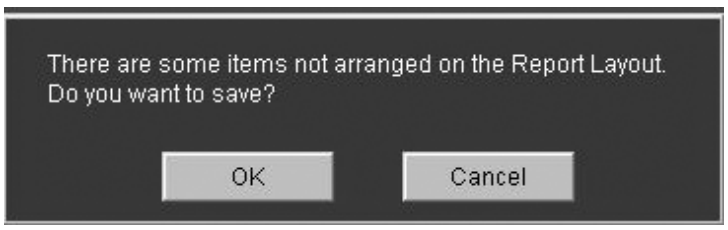
NOTE: If the tab name has been entered, the tab name is displayed preceded by an asterisk (*) followed by a space as the default in the Report Title field.

(3) Select the item to be displayed from the pull-down menu.

(4) Repeat step (3) to register two or more items.

(5) When [Clear All] is clicked, all report setting is cleared.

NOTE: If the report display layout is not registered, the results are not displayed on the report screen.
If any of the registered measurement items or calculation items are not set on the Report Layout tab page, the confirmation dialog shown below is displayed when an attempt is made to save a measurement package.



13.3 Editing a User-Registered Measurement Package

(1) Select the measurement package to be edited from the package list on the main screen. [Modify] becomes effective.

(2) Press [Modify]. The contents of the selected package are displayed.

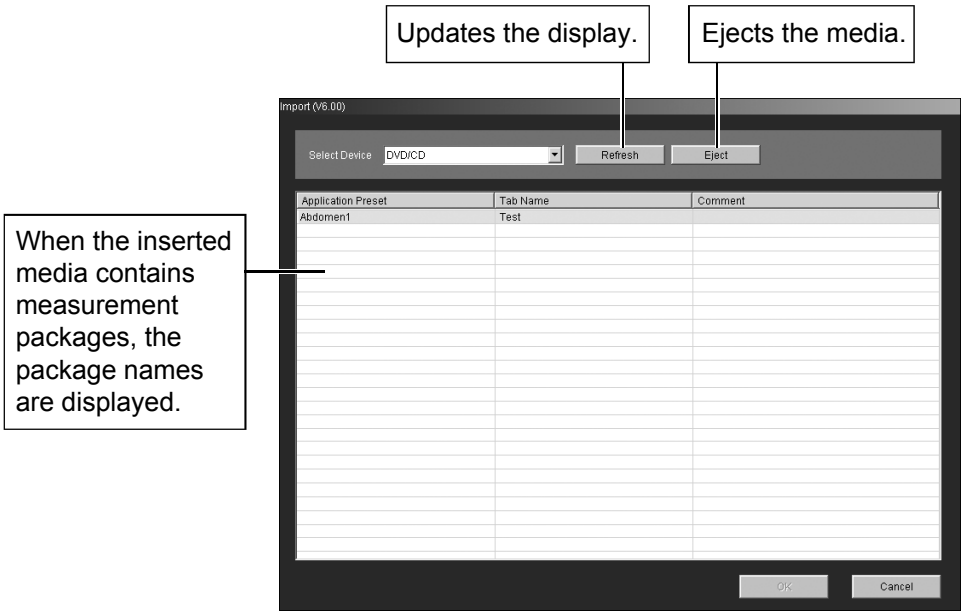
(3) Edit the contents using the procedure described in the previous section. However, the application presets cannot be changed.

(4) Press [Save] to save the changes.

13.4 Importing a User-Programmed Measurement Package

(1) Insert the media containing the measurement package data into the DVD/CD drive.

(2) Press [Import] on the Measurement Registration screen. The Import screen is displayed.

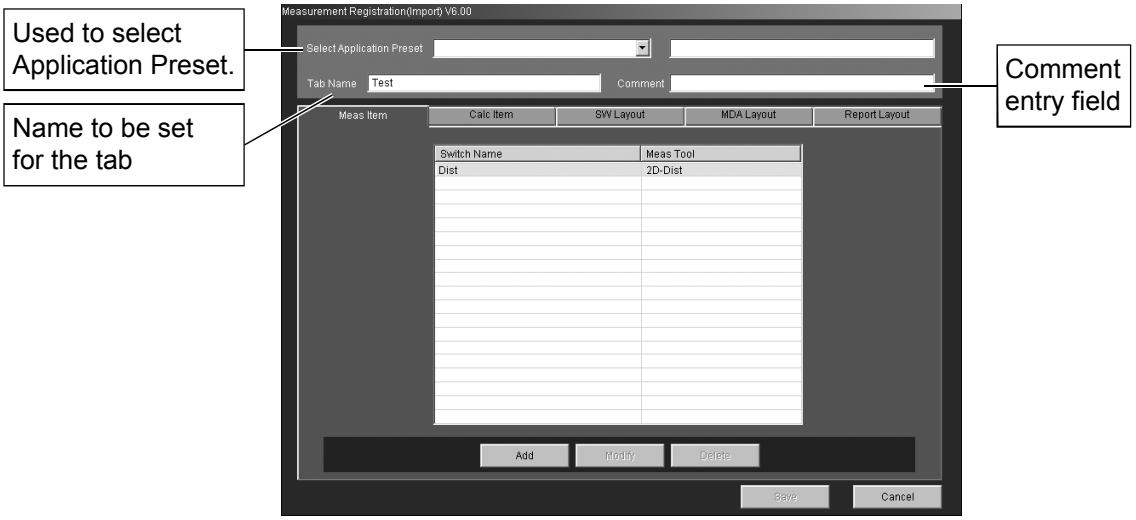


(3) The list of measurement packages stored on the selected media is displayed.

* Press [Refresh] to update the list.

* Press [Eject] to eject the inserted media.

(4) Select the measurement package to be imported and press [OK]. The screen shown below is displayed.



(5) Select the desired Application Preset from the pull-down menu.

After selection, a message indicating whether the registration is accepted or not is displayed in the field on the right.

Accepted : Space remains in the selected Application Preset.

Not accepted : There is no space in the selected Application Preset.

The Application Presets for which user measurement functions can be registered are shown below.

No.	Application Presets for which user measurement functions can be registered
1.	Abdomen1
2.	Abdomen2
3.	Adult Heart1
4.	Adult Heart2
5.	TCD
6.	PV Upper
7.	PV Lower
8.	Thyroid
9.	Breast
10.	Testes
11.	Prostate
12.	Pelvis
13.	Penile
14.	Neo-Hip
15.	Carotid2
16.	MSK
17.	CHI

(6) Enter the tab name (up to 20 characters). The tab name entered here is displayed on the touch panel.

* The tab name must be different from the all other tab names in the same Application Preset.

(7) Enter the comments in the Comment field (up to 25 characters) if required.

(8) Edit the imported measurement packages as required using the procedure described in subsection 13.3.

(9) Press [Save]. A list of the imported measurement packages is displayed on the Measurement Registration screen.

13.5 Exporting a User-Registered Measurement Package

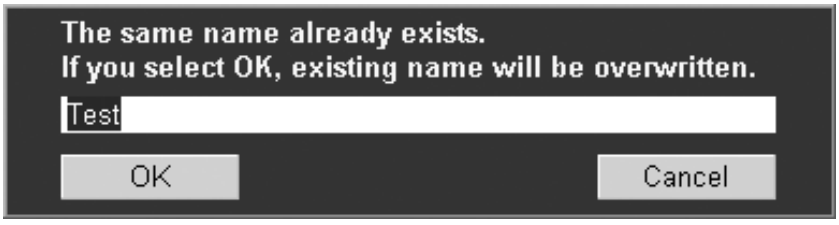
(1) Select the measurement package to be exported.

(2) Press [Export] on the Measurement Registration screen. The dialog below is displayed.

(3) Select the desired media and press [OK]. The export process is started.

(4) When the export process is completed, the dialog below is displayed.

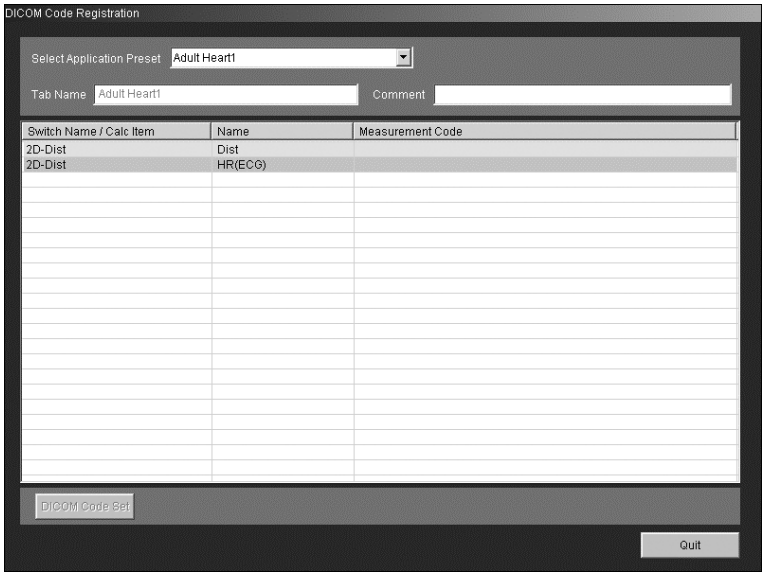
NOTE: If a measurement package with the same name exists at the export destination (Windows cache), the overwriting confirmation dialog is displayed. To store the measurement package without overwriting the existing one, change the tab name in this dialog and press [OK].



13.6 Registering DICOM Codes in Measurement Packages

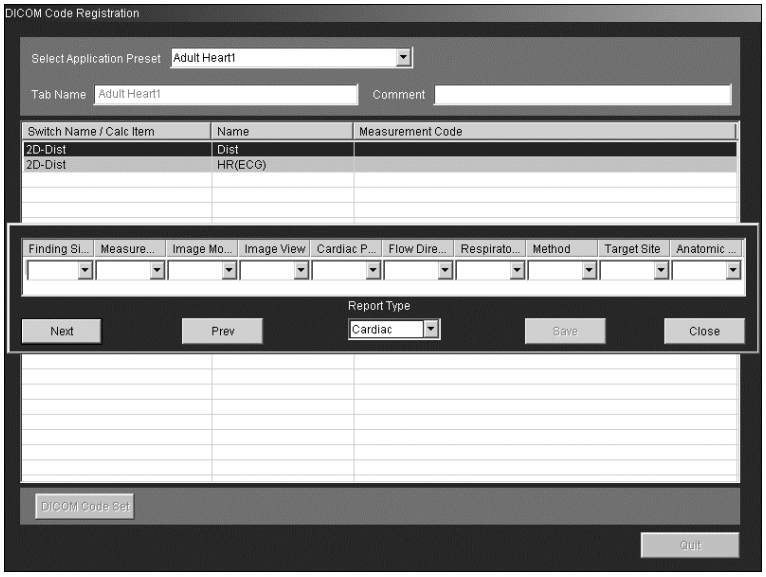
(1) Select the measurement package for which a DICOM code is to be added or edited in the package list on the main screen.
The [DICOM Set] switch becomes effective.

(2) Press [DICOM Set] on the main screen. The contents of the selected package are displayed.

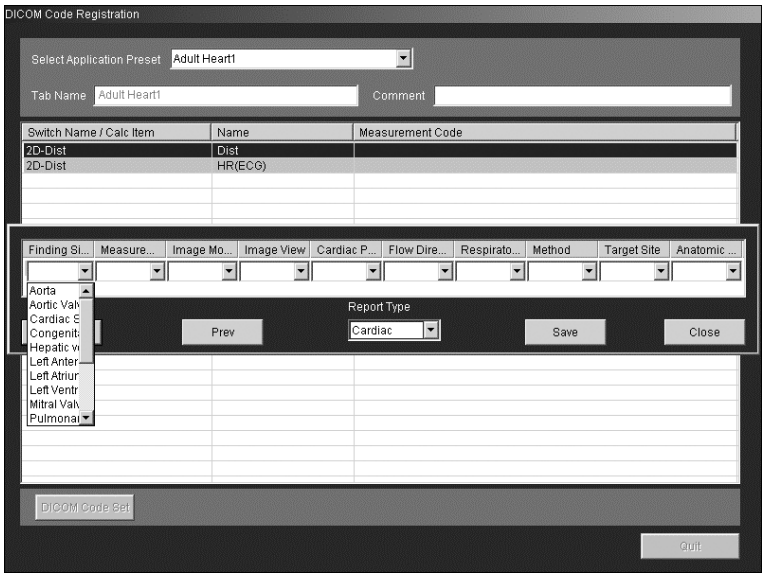


(3) Select the measurement item or calculation item for which the DICOM code is to be edited.

(4) Press [DICOM Code Set] to display the DICOM editor window.



(5) Select the desired DICOM code from the pull-down menu.



NOTE: If an attempt is made to select a DICOM code but the following error message is displayed, the DICOM code cannot be selected. XXXXXX represents an item name.

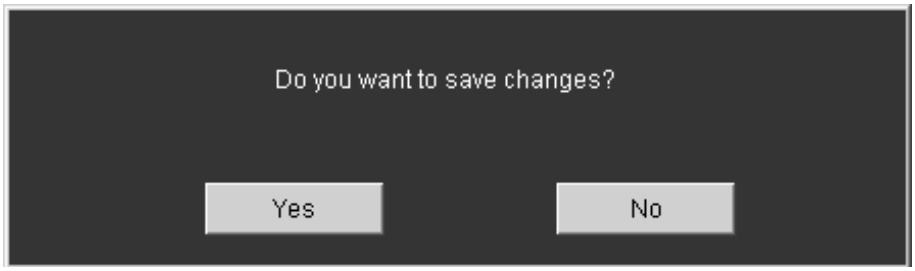
(6) After the DICOM codes are selected for the desired items, press [Save] to save the changes.

(7) To move to the previous measurement or calculation item, press [Prev]. The display in the DICOM editor window is updated.

(8) To move to the next measurement or calculation item, press [Next]. The display in the DICOM editor window is updated.

(9) Press [Close] to close the DICOM editor window.

NOTE: If [Prev], [Next], or [Close] is pressed without saving the changes, the following confirmation dialog is displayed. Press [Yes] to save the changes. If [No] is pressed, the changes are discarded.



13.7 Deleting a User-Registered Measurement Package

(1) Select the measurement package to be deleted in the package list area of the Measurement Registration screen. [Delete] becomes effective.

(2) Press [Delete]. The confirmation dialog is displayed.

(3) Press [OK] to delete the selected measurement package.

13.8 Deleting All Measurement Packages

(1) Press [Clear All]. The confirmation dialog is displayed.

(2) Press [OK] to delete all the measurement packages displayed in the list area.

13.9 Closing the Measurement Registration Screen

(1) Press [Quit] on the Measurement Registration screen. The measurement packages displayed in the list area are registered to the system and the Measurement Registration screen is then closed.

CAUTION:	A dialog is displayed during registration of the measurement packages. Do not operate the panel while this dialog is displayed.

13.10 Measurement Tools and Output Items

CAUTION: When the measurement data is to be stored in the server as DICOM SR, leave the unit field blank or select one of the existing units in the Manual Input tool and also for the calculation items.

* Items for which an arbitrary unit is set cannot be stored in the server.

- 2D/Color mode

Measurement tool		Method	Output item	Format	Unit
2D-Distance	Distance measurement	—	Dist (distance)	9999.9	mm
	ECG heart rate	Acquisition of HR value from ECG	HR (ECG)	999	bpm
Trace Length	Distance measurement	Continuous Trace	Same as above		
		Spline Trace	Same as above		
Circle	Circle measurement	Balloon	Area	999.99	cm^2
			Circ (circumference)	999.9	mm
			Dist (diameter)	9999.9	mm
		Both ends	Area	999.99	cm^2
			Circ (circumference)	999.9	mm
			Dist (diameter)	9999.9	mm
Angle	Angle measurement	—	Angle1 (acute angle)	99	deg
			Angle2 (obtuse angle)	999	deg
Area	Area/ circumference measurement	Continuous Trace	Area	999.99	cm^2
			Circ (circumference)	999.9	mm
		Spline Trace	Same as above		
		Ellipse	Area	999.99	cm^2
			Circ (circumference)	999.9	mm
			Dist1 (long-axis length)	9999.9	mm
			Dist2 (short-axis length)	9999.9	mm
		Cross	Same as above		
Joint	Angle between two lines (α, β)	—	Alpha (angle between the reference line and the first line)	999	deg
			Beta (angle between the reference line and the second line)	999	deg
Modified Cross	Modified Cross measurement	—	Dist1 (length of the first axis)	9999.9	mm
			Dist2 (length of the second axis)	9999.9	mm
2D-PARA 3 Segment	Parallel measurement	—	Dist1 (distance between the start point and the 1st point)	9999.9	mm
			Dist2 (distance between the 1st point and the 2nd point)	9999.9	mm
			Dist3 (distance between the 2nd point and the last point)	9999.9	mm
	ECG heart rate	Acquisition of HR value from ECG	HR (ECG)	999	bpm

Measurement tool		Method	Output item	Format	Unit
2D-PARA 4 Segment	Parallel measurement	—	Dist1 (distance between the start point and the 1st point)	9999.9	mm
			Dist2 (distance between the 1st point and the 2nd point)	9999.9	mm
			Dist3 (distance between the 2nd point and the 3rd point)	9999.9	mm
			Dist4 (distance between the 3rd point and the last point)	9999.9	mm
	ECG heart rate	Acquisition of HR value from ECG	HR (ECG)	999	bpm
IMT (*1)	IMT measurement	—	Distance	'999.99	mm
MOD	MOD measurement	—	Volume	9999.9	ML
			Area (area of traced part)	999.99	cm^2
			Distance (length of axis line)	9999.9	mm
		Spline	Volume	9999.9	ML
			Area (area of traced part)	999.99	cm^2
			Distance (length of axis line)	9999.9	mm

*1: The IMT measurement results are always displayed to two decimal places in the MDA and on the Report screen.
A single quotation mark (') is displayed before the value to indicate that the value should be used for reference purposes only.
These conditions are not affected by the setting of Thickness (IMT) Precision (Available after PR) on the 2D-Mode Meas. page of the preset menu.

- M mode

Measurement tool		Method	Output item	Format	Unit
M-Distance	Distance measurement	—	Dist (distance)	9999.9	mm
	ECG heart rate	Acquisition of HR value from ECG	HR (ECG)	999	bpm
Slope	Slope measurement	—	Slope	999.9	mm/s
			Time	9.999	s
			Dist (distance)	999.9	mm
M-PARA 3 Segment	Parallel measurement	—	Dist1 (distance between the start point and the 1st point)	9999.9	mm
			Dist2 (distance between the 1st point and the 2nd point)	9999.9	mm
			Dist3 (distance between the 2nd point and the last point)	9999.9	mm
	ECG heart rate	Acquisition of HR value from ECG	HR (ECG)	999	bpm
M-PARA 4 Segment	Parallel measurement	—	Dist1 (distance between the start point and the 1st point)	9999.9	mm
			Dist2 (distance between the 1st point and the 2nd point)	9999.9	mm
			Dist3 (distance between the 2nd point and the 3rd point)	9999.9	mm
			Dist4 (distance between the 3rd point and the last point)	9999.9	mm
	ECG heart rate	Acquisition of HR value from ECG	HR (ECG)	999	bpm

- Doppler mode

Measurement tool		Method	Output item	Format	Unit
Velocity	Velocity measurement	—	Vel (velocity)	999.9	cm/s
			PG (Pressure Gradient)	999.9	mmHg
			Vel-abs (absolute value of velocity)	999.9	cm/s
Accel	Acceleration measurement	—	Accel (acceleration)	999.9	cm/s^2
			Vel1 (velocity)	999.9	cm/s
			Vel2 (velocity)	999.9	cm/s
			Time	9.999	s
			PG1 (pressure gradient)	999.9	mmHg
			PG2 (pressure gradient)	999.9	mmHg
			Vel1-abs (absolute value of velocity)	999.9	cm/s
			Vel2-abs (absolute value of velocity)	999.9	cm/s
Vel Trace	Velocity trace measurement	Continuous Trace	Vmax (maximum velocity)	999.9	cm/s
			Vmin (minimum velocity)	999.9	cm/s
			Ved (end-diastolic velocity)	999.9	cm/s
			Vm (time-average velocity)	999.9	cm/s
			PI (*1)	99.99	None
			RI (*2)	99.99	None
			S/D	99.99	None
			VTI (Velocity Time Integral)	999.99	cm
			VM (time-average velocity)	999.9	cm/s
			PPG (maximum pressure gradient)	999.9	mmHg
			MPG (mean pressure gradient)	999.9	mmHg
			Vmax-abs (absolute value of maximum velocity)	999.9	cm/s
			Vmin-abs (absolute value of minimum velocity)	999.9	cm/s
			Ved-abs (absolute value of end-diastolic velocity)	999.9	cm/s
			VM-abs (absolute value of time-averaged velocity)	999.9	cm/s
			VTI-abs (absolute value of velocity-time integral)	999.99	cm
			Vm-abs (absolute value of time-averaged velocity)	999.9	cm/s
		Spline Trace	Same as above		
		Line Trace	Same as above		

Measurement tool		Method	Output item	Format	Unit
Vel Trace	Velocity trace measurement	Range	Vmax (maximum velocity)	999.9	cm/s
			Vmin (minimum velocity)	999.9	cm/s
			Ved (end-diastolic velocity)	999.9	cm/s
			Vm_peak (time-average velocity of peak trace)	999.9	cm/s
			Vm_mean (time-average velocity of mean trace)	999.9	cm/s
			PI (*1)	99.99	None
			RI (*2)	99.99	None
			S/D	99.99	None
			VTI (Velocity Time Integral)	999.99	cm
			VM (time-averaged velocity)	999.9	cm/s
			PPG (maximum pressure gradient)	999.9	mmHg
			MPG (mean pressure gradient)	999.9	mmHg
			Vmax-abs (absolute value of maximum velocity)	999.9	cm/s
			Vmin-abs (absolute value of minimum velocity)	999.9	cm/s
			Ved-abs (absolute value of end-diastolic velocity)	999.9	cm/s
			Vm_peak-abs (absolute value of time-averaged velocity of peak trace)	999.9	cm/s
			Vm_mean-abs (absolute value of time-averaged velocity of mean trace)	999.9	cm/s
			VM-abs (absolute value of time-averaged velocity)	999.9	cm/s
			VTI-abs (absolute value of velocity-time integral)	999.9	cm
		Auto Range	Same as above		
	ECG heart rate	Acquisition of HR value from ECG	HR (ECG)	999	bpm

Measurement tool		Method	Output item	Format	Unit
PI	PI measurement	Continuous Trace	PI (*1)	9.99	None
			RI (*2)	9.99	None
			S/D	9.99	None
			Vmax (maximum velocity)	999.9	cm/s
			Vmin (minimum velocity)	999.9	cm/s
			Ved (end-diastolic velocity)	999.9	cm/s
			Vm (time-average velocity)	999.9	cm/s
			Vmax-abs (absolute value of maximum velocity)	999.9	cm/s
			Vmin-abs (absolute value of minimum velocity)	999.9	cm/s
			Ved-abs (absolute value of end-diastolic velocity)	999.9	cm/s
			Vm-abs (absolute value of time-averaged velocity)	999.9	cm/s
		Spline Trace	Same as above		
		Line Trace	Same as above		
		Range	PI (*1)	9.99	None
			RI (*2)	9.99	None
			S/D	9.99	None
			Vmax (maximum velocity)	999.9	cm/s
			Vmin (minimum velocity)	999.9	cm/s
			Ved (end-diastolic velocity)	999.9	cm/s
			Vm_peak (time-average velocity of peak trace)	999.9	cm/s
			Vmax-abs (absolute value of maximum velocity)	999.9	cm/s
			Vmin-abs (absolute value of minimum velocity)	999.9	cm/s
			Ved-abs (absolute value of end-diastolic velocity)	999.9	cm/s
			Vm_peak-abs (absolute value of time-averaged velocity of peak trace)	999.9	cm/s
		Auto Range	Same as above		
RI	RI measurement	—	RI (*2)	9.99	None
			Vmax (maximum velocity)	999.9	cm/s
			Vmin or Ved	999.9	cm/s
			Vmax-abs (absolute value of maximum velocity)	999.9	cm/s
			Vmin-abs or Ved-abs (absolute value of minimum velocity or absolute value of end-diastolic velocity)	999.9	cm/s

Measurement tool		Method	Output item	Format	Unit
S/D	S/D measurement	—	S/D	9.99	None
			Vmax (maximum velocity)	999.9	cm/s
			Ved (end-diastolic velocity)	999.9	cm/s
			Vmax-abs (absolute value of maximum velocity)	999.9	cm/s
			Ved-abs (absolute value of end-diastolic velocity)	999.9	cm/s
dP/dt	dP/dt measurement	dP/dt	dP/dt	99999	mmHg/s
			dt	9.999	s
			Vel1	999.9	cm/s
			Vel2	999.9	cm/s
			Vel1-abs (absolute value of velocity)	999.9	cm/s
			Vel2-abs (absolute value of velocity)	999.9	cm/s
dP/dt (-1, -3 m/s)	dP/dt measurement	—	dP/dt	99999	mmHg/s
			dt	9.999	s
			Vel1	999.9	cm/s
			Vel2	999.9	cm/s
			Vel1-abs (absolute value of velocity)	999.9	cm/s
			Vel2-abs (absolute value of velocity)	999.9	cm/s
PHT	PHT measurement	—	PHT (Pressure Half Time)	9.999	s
DcT	DcT measurement	—	Vel	999.9	cm/s
			DcT	9.999	s
			PHT	9.999	s
			Vel-abs (absolute value of velocity)	999.9	cm/s
Velocity trace with DcT	Velocity trace with DcT measurement	—	VP	999.9	cm/s
			VM	999.9	cm/s
			DcT	9.999	s
			PHT	9.999	s
			VP-abs (absolute value of velocity)	999.9	cm/s
			VM-abs (absolute value of velocity)	999.9	cm/s

- Common to M mode and Doppler mode

Measurement tool		Method	Output item	Format	Unit
HR	Heart rate measurement	—	HR (heart rate)	999	bpm
			Beat (specified number of heartbeats)	9	None
			Time	9.999	s
Time	Time measurement	—	Time	9.999	s

- Common to all modes

Measurement tool		Method	Output item	Format	Unit
Manual Input	Manual input tool	—	Value input in the Manual Input dialog (acceptable in the range from -9999.99 to 9999.99)	9999.99	User definable (maximum of 8 characters)

*1: Whether Vmin or Ved is used for calculating PI can be preset.

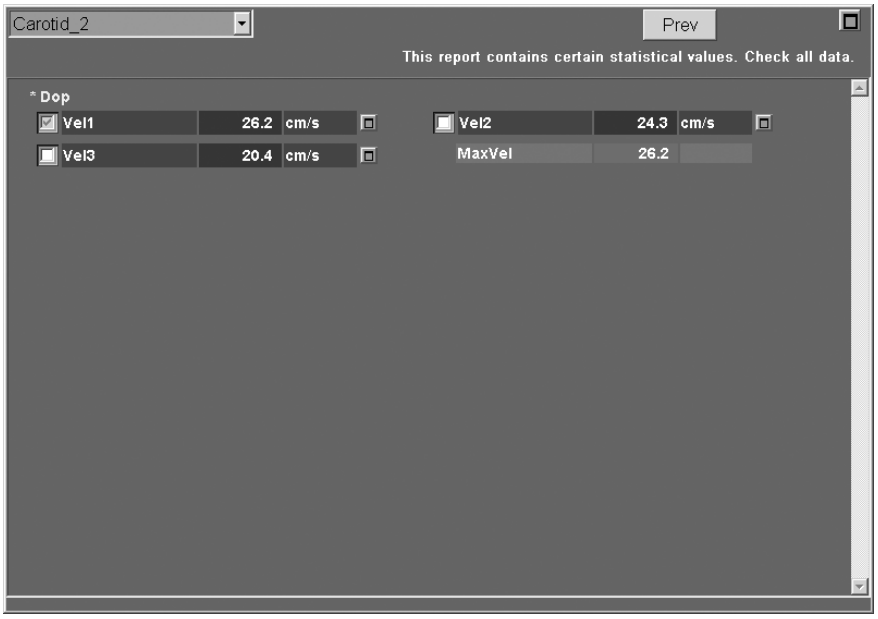
- PI = | (Vmax − Vmin) / Vm_peak |
- PI = | (Vmax − Ved) / Vm_peak |

*2: Whether Vmin or Ved is used for calculating RI can be preset.

- RI = | (Vmax − Vmin) / Vmax |
- RI = | (Vmax − Ved) / Vmax |

13.11 Report Display of Calculation Items That Use a Max Function

(1) When a calculation item that uses a max function is allocated to the Report screen, a check box is displayed on the left of the measurement items that are set as arguments of the max function.
On the Report screen displayed directly after a measurement, a check mark is displayed in the box for the measurement item that has the maximum value.



(2) To use another measurement item for calculation, select the check box for the desired measurement item.

The new setting of the measurement item to be used for calculation is maintained until one of the following operations is performed.

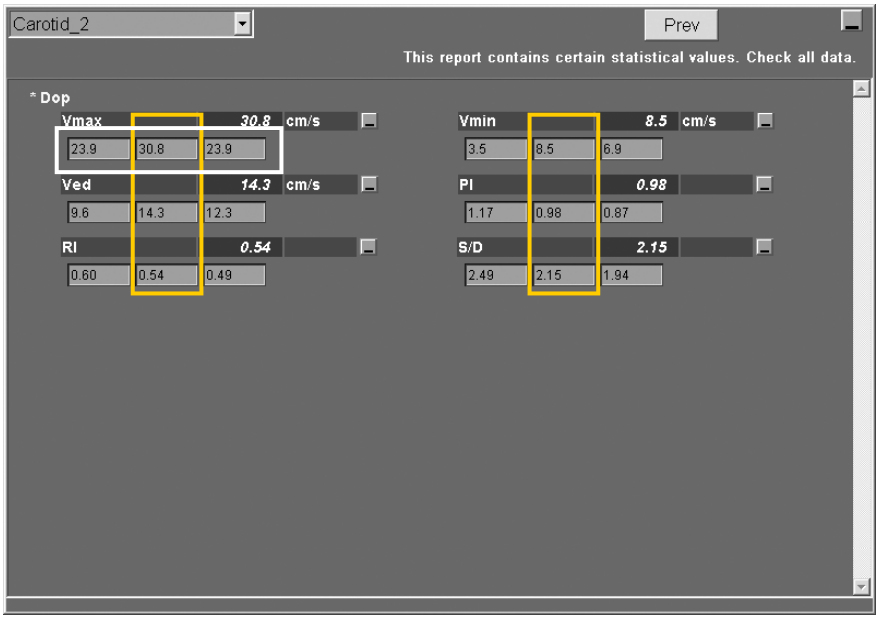
- A new measurement is started.
- A measurement value is edited or deleted using [Caliper Edit] on the TCS.
- A measurement value is deleted using [Delete] on the TCS.
- A measurement value is deleted on the Report screen.

13.12 Report Display When the Maximum Value Is To Be Displayed as the Central Value

(1) It is possible to specify the type of velocity to be displayed on the Report screen for the user-registered Doppler measurements (Velocity and Vel Trace). For this purpose, use the "Maximum Velocity data" check box for "Measurement Value Display of Doppler in User Programmed package" on the Meas. Report2 page of the preset menu.

(a) When the check box for Maximum Velocity data is selected

- In Velocity measurement, the velocity value (Vel) that is the highest in absolute value among several measurement values is selected and displayed as the central value.
- In Vel Trace measurement, the maximum velocity value (Vmax) that is the highest in absolute value among several measurement values is selected and displayed as the central value.
- A line is displayed above the central velocity value (Vel for velocity measurement and Vmax for Vel Trace measurement).
- The central values are displayed in italics.



(b) When the check box for Maximum Velocity data is not selected

- The Velocity measurement value and the Vel Trace measurement value are displayed according to the [Measurement Value Display Method] settings on the Meas. Report page of the preset menu.

14. Registration of User-Programmed OB Measurement Packages

In this system, it is possible to create OB measurement packages that contain the following items and OB measurement user charts for the following items.
It is also possible to import and register OB measurement packages and measurement user charts created on a PC.

<<OB measurement package>>

- Measurement protocols and calculation formulas based on measurement values
- Layout settings for the measurement result display area
- Layout settings for report screens
- Registration of DICOM codes in the OB measurement package

<<User chart>>

- User chart of a 2D measurement item that has been registered as a table.
- User chart of a 2D measurement item that has been registered as a formula.
- User chart of an EFW that has been registered as a table.
- User chart of an EFW that has been registered as a formula.
- User chart of a Doppler calculation item (RI or PI) that has been registered as a table.
- User chart of a Doppler calculation item (RI or PI) that has been registered as a formula.

For the PC data creation procedures, contact your Toshiba representative.

For OB measurement packages, up to 35 measurement switches and up to 30 calculation items can be registered.

On the user chart, up to two datasets with author names can be registered for each measurement item.

⚠CAUTION:

1. **Toshiba shall not be held liable for results obtained with OB measurement user chart registration function.**
2. **The data registered on the OB measurement user chart will not be included in future upgraded systems or subsequent models.**
3. **Use the OB measurement packages only after understanding the registered data.**

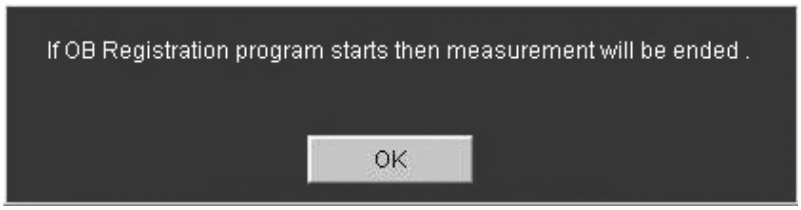
   *** Refer to subsection 14.2 for details.**
4. **Use the OB measurement user charts only after understanding the registered data.**

   *** Refer to subsection 14.8 for details.**

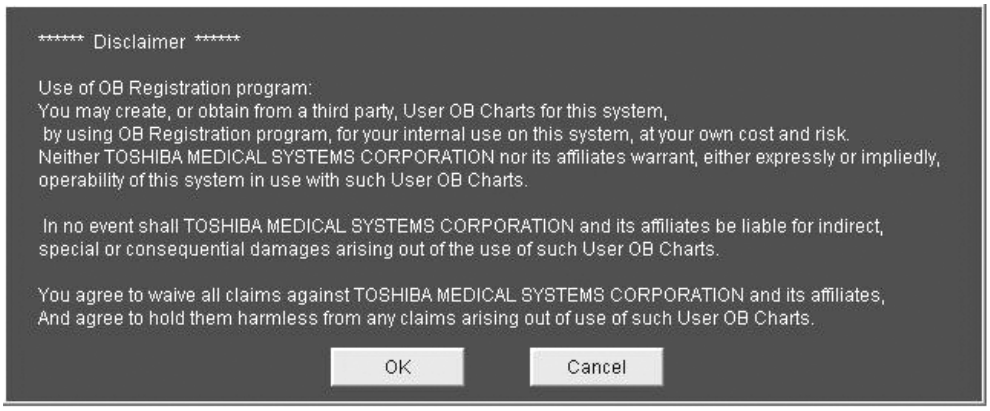
14.1 Opening the Setup Screen

(1) Press MENU. The menu is displayed on the monitor.

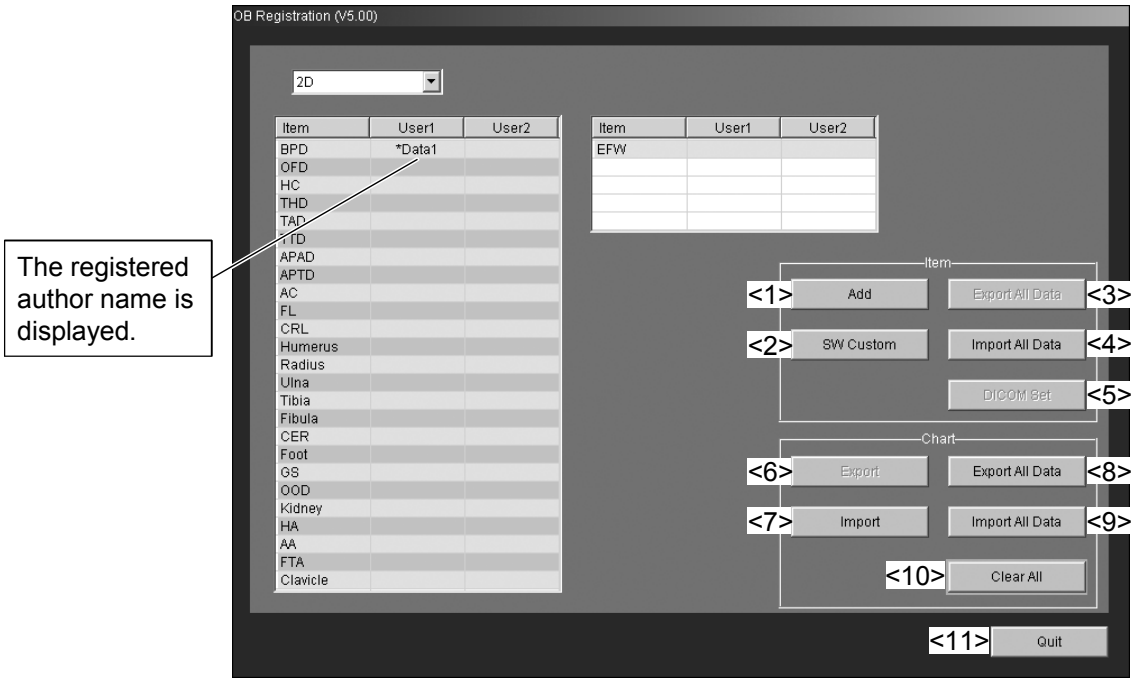
(2) Select [System Setting] → [OB Registration]. A confirmation dialog indicating that the measurement will be discontinued, not suspended, is displayed.



(3) Press [OK]. A confirmation dialog indicating that the responsibility for the created user chart resets solely with the user is displayed.



(4) Press [OK]. The OB Registration screen (main screen) is displayed.



OB Registration screen (main screen)

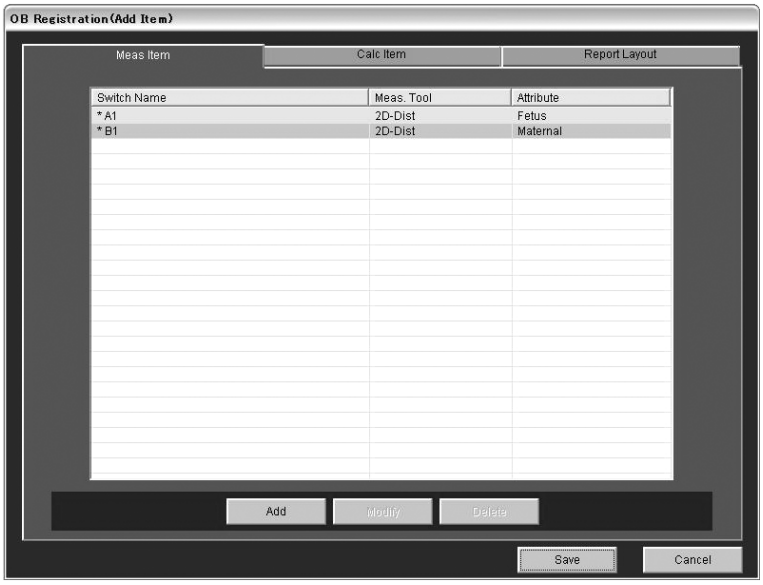
No.	Group	Switch	Description
<1>	Item	Add	Creates an OB measurement package.
<2>		SW Custom	Customizes the switch layouts on the OB measurement menus on the TCS.
<3>		Export All Data	Exports all the OB measurement packages.
<4>		Import All Data	Imports all the OB measurement packages.
<5>		DICOM Set	Registers DICOM codes in the OB measurement package.
<6>	Chart	Export	Exports the selected user chart.
<7>		Import	Imports the selected user chart.
<8>		Export All Data	Exports all the user charts.
<9>		Import All Data	Imports all the user charts.
<10>		Clear All	Deletes all the user charts.
<11>		Quit	Closes the OB Registration screen.

* The switches in the Item group are used to register OB measurement packages.
* The switches in the Chart group are used to register user charts.
* The grayed-out switches are disabled.
* [Export] is enabled when a user chart on the OB Registration screen is selected.

14.2 Registration of a User-Programmed OB Measurement Package

14.2.1 Starting up the registration screen

(1) Press [Add] on the main screen. The screen below (hereinafter referred to as the "Add screen") is displayed.



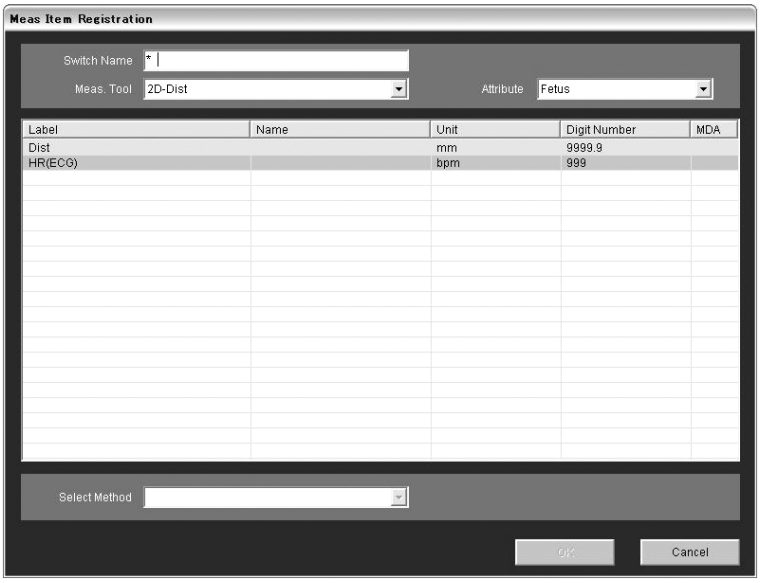
(2) Set the conditions on each tab page as follows and then press [Save]. The settings are registered to the system and the display returns to the Add screen.

No.	Tab	Description	Refer to
<1>	Meas. Item	Setting the conditions related to the measurement items (switch names, measurement tools, attributes, and measurement item names)	Subsection 14.2.2
<2>	Calc. Item	Setting the conditions related to the calculation items (name for calculation results, attributes, calculation formulas, units, and display format)	Subsection 14.2.3
<3>	Report Layout	Setting the layout for measurement and calculation results to be displayed on the Report screen.	Subsection 14.2.4

14.2.2 Registering a measurement item (Meas. item)

14.2.2.1 Adding a measurement item

(1) Click [Add] at the [Meas.Item] tab on the [Add] screen. The screen below is displayed.



(2) Enter the measurement item switch name in the Switch Name field (up to 20 characters).

* The measurement item switch name must be unique. An asterisk (*) is displayed before each switch name, indicating that the switch is assigned to a user-registered OB measurement.

(3) Select the measurement to be used from the Meas. Tool pull-down menu.
For the measurements which can be used and the items to be output, refer to subsection 14.7.

(4) Select the attribute (Fetus or Maternal) of the measurement item from the Attribute pull-down menu.

(5) The items to be output at the time of measurement are displayed in the Label field. For the items whose results are to be displayed, enter the measurement item name in the Name field (up to 10 characters).

* The measurement item switch name must be unique. An asterisk (*) is displayed before each switch name, indicating that the switch is assigned to a user-registered OB measurement.

NOTE: When the measurement item name is not entered, the item is not displayed on the measurement screen during measurement and the results cannot be used for calculation.

Even if multiple measurement items are set for a measurement switch, the switch can display only one item in the MDA. The measurement item for which an asterisk (*) is displayed in the MDA column is displayed in the MDA.

The display in the MDA depends on the switch layout. Refer to subsection 12.4.7 for details.

(6) Select the measurement method to be used from the Select Method pull-down menu.

The following measurement methods can be selected.

Measurements	Measurement methods
Trace Length measurement	Continuous Trace, Spline Trace
Area measurement	Continuous Trace, Spline Trace, Ellipse, Cross
Circle measurement	Balloon, Both ends
Vel Trace measurement	Continuous Trace, Spline Trace, Line Trace, Range, Auto Range
PI measurement	Continuous Trace, Spline Trace, Line Trace, Range, Auto Range

NOTE: Select the measurement method to be used as the default here. The re-measurement method can be selected while the OB measurement package is executed.

(7) Press [OK]. The settings are added to the Meas. Item menu list on the Add screen.

(8) To add further measurement items, click [Add] again and repeat the procedure.

14.2.2.2 Deleting a measurement item

(1) Select the measurement item at the [Meas.Item] tab on the [Add] screen.

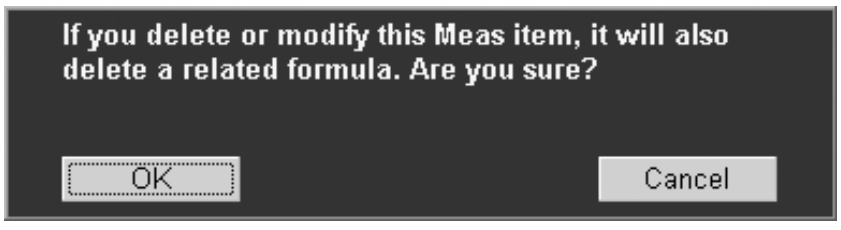
[Modify] and [Delete] become enabled.

(2) When [Modify] is clicked, the selected measurement item can be modified using the procedure described in subsection 14.2.2.1.

NOTE: The attribute cannot be modified. To change the attribute, delete the current setting and register a new attribute.

(3) When [Delete] is clicked, the selected measurement item can be deleted.

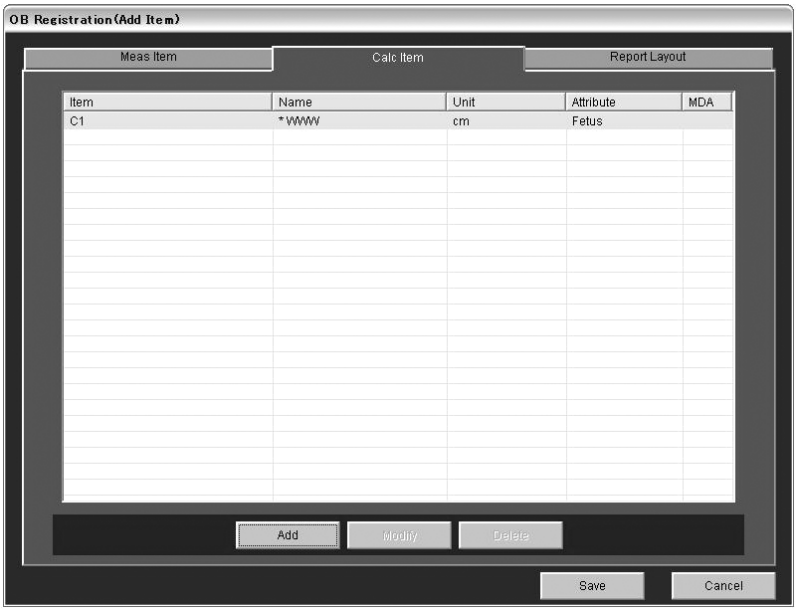
NOTE: When a measurement item used in the calculation items is to be deleted, the confirmation message displayed below is shown. Clicking [OK] deletes both the selected measurement item and its related calculation items. Clicking [Cancel] cancels deletion.



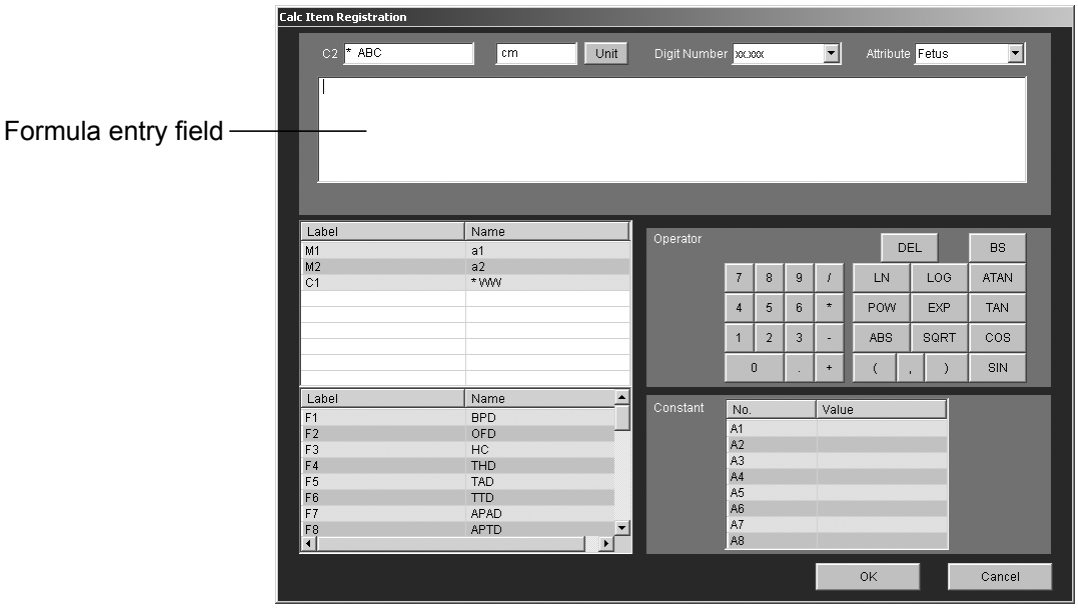
14.2.3 Registering a calculation item (Calc. item)

14.2.3.1 Registering a calculation item

(1) Press the [Calc. Item] tab of the Add screen. The screen below is displayed.



(2) Press [Add]. The screen below is displayed.



(3) Enter the calculation item name in the C1 field (up to 10 characters).

* The calculation item switch name must be unique. An asterisk (*) before the switch name indicates that the switch is assigned to a user-registered OB measurement.

(4) Click [Unit]. The unit name setup screen is displayed. Select the unit to be displayed on the measurement screen and report.

The following unit names are registered.

Unit names	Applications
mm	Dist
cm	Dist
ms	Time
sec	Time
mm/s	Slope
cm/s	Slope
cm/s	Velocity
m/s	Velocity
mmHg	Press
deg	Angle
mm^2	Area
cm^2	Area
cm^3	Volume
g	Mass
g/cm^3	Gravity
L/min	Flow
mL/s	Flow
mL	Capacity
L	Capacity
bpm	HR
cm	VTI
kg	Weight
cm	Height
%	Ratio
circ/s	MVCF
mL/m^2	SI
cm^2/m^2	AV Index
dyn/cm^2	LV Wall Stress
g/m^2	MASS Index
mmHg/s	dP/dt

The unit name set by the user can be registered for User1 to User6 (up to 8 characters). The registered unit name is available in the same OB measurement package.

Registration without setting the unit name (leaving the unit name blank) is also possible.

CAUTION: Setting the unit here does not set the unit to be used for calculation. Set the unit when entering the calculation formula so that the unit to be used for calculation matches the displayed unit.

(5) Select the number of digits to be displayed from the Digit Number pull-down menu.

The choices and display ranges are shown below. Result values that are outside the upper/lower limits are displayed as "***" on the measurement screen and report.

Choices	Display ranges
XX.XXX	-99.999 to 99.999
XXX.XX	-999.99 to 999.99
XXXX.X	-999.9 to 9999.9
XXXXXX	-999999 to 999999

(6) Select the attribute (Fetus or Maternal) of the measurement item from the Attribute pull-down menu.

NOTE: Maternal measurement items and maternal calculation items cannot be selected as fetal calculation items.

Fetal measurement items and fetal calculation items cannot be selected as maternal calculation items.

(7) Enter the formula.

NOTE: The measurement item to be used for calculation is entered with M1 to Mn or F1 to Fn in the Label field. The measurement items that cannot be used due to attribute differences are grayed out.
The height, weight, body surface area, and blood pressure can be specified with S1 to S5 in the Label field and can be calculated.
The arithmetic operators and functions which can be used for calculation are displayed in the Operator field.
When any button in the Operator field is selected using an arrow cursor, the selected arithmetic operators and functions can be entered in the Formula entry field.
Constants can be registered for A1 to A8. To use constants A1 to A8 in the calculation formula, set the constants in the Constant entry field (up to 15 characters).

NOTE: Previously set calculation items can be set to the calculation formula. The registered calculation items are displayed in C1 to Cn in the Label field.

Arithmetic operators which can be used for calculation

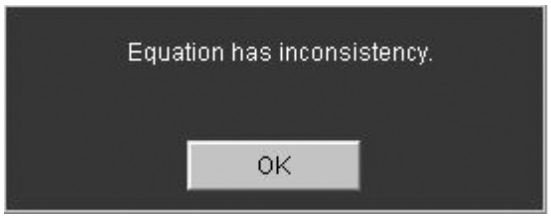
Arithmetic operators	Meanings and applications
(	Opening bracket
)	Closing bracket
/	Division
*	Multiplication
-	Subtraction
+	Addition
Del	Deletion of the character to the right of the cursor
BS	Deletion of the character to the left of the cursor
.	Decimal point
,	Comma
0	Numbers
1	
2	
3	
4	
5	
6	
7	
8	
9	

Functions which can be used in calculation

Function switch names	Notations	Functions
SIN	SIN (x)	Sine of x (angle)
COS	COS (x)	Cosine of x (angle)
TAN	TAN (x)	Tangent of x (angle)
ATAN	ATAN (x)	Principal value of arctangent of x
LOG	LOG (x)	Log in base 10 ($\log_{10}x$)
LN	LN (x)	Log in base e ($\log_{e}x$)
EXP	EXP (x)	e^{x}
SQRT	SQRT (x)	Square root of x
POW	POW (x, y)	x^{y}
ABS	ABS (x)	Absolute value of x

(8) Press [OK]. The settings are added to the Calc. Item menu list on the Add screen.

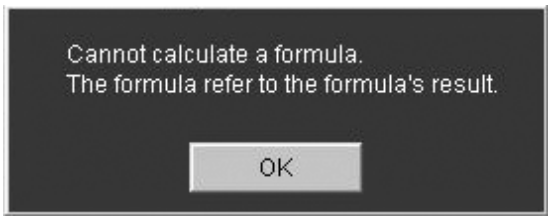
NOTE: If there are any errors in the calculation formula (arithmetic operators used sequentially, spaces entered etc.), the message shown below is displayed.



When the circulation setting (cross reference) is included in the calculation formula, the message shown below is displayed.

(Example) C1 = C2
C2 = C1

C2 = C2 + 1

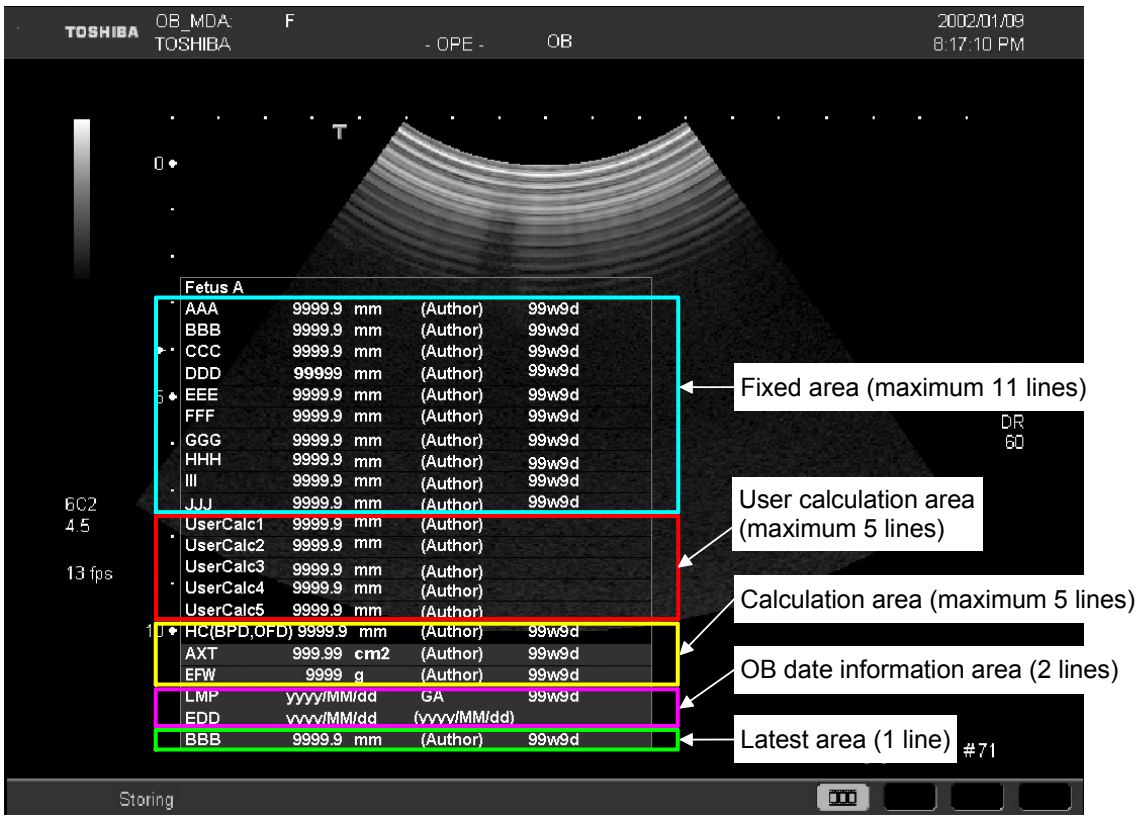


In this case, press [OK] and enter an appropriate formula.

(9) Set the required calculation item using the same procedures.

(10) Move the mouse cursor to the MDA column on the [Calc. Item] tab page and press 

. Set the order in which the items are displayed in the MDA. Up to five items can be displayed in the MDA. The MDA is displayed as shown below.



14.2.3.2 Deleting a calculation item

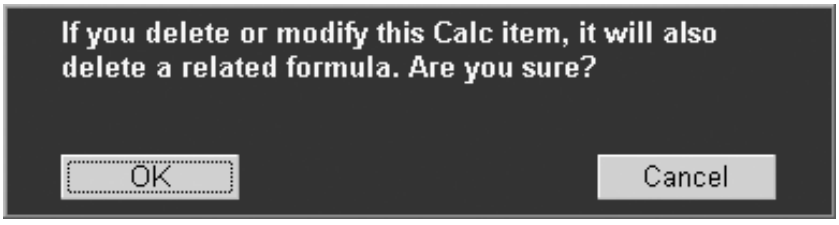
(1) Select the calculation item at the [Calc.Item] tab on the [Add] screen.

[Modify] and [Delete] become enabled.

(2) When [Modify] is clicked, the selected calculation item can be modified using the same procedures as described in subsection 14.2.3.1.

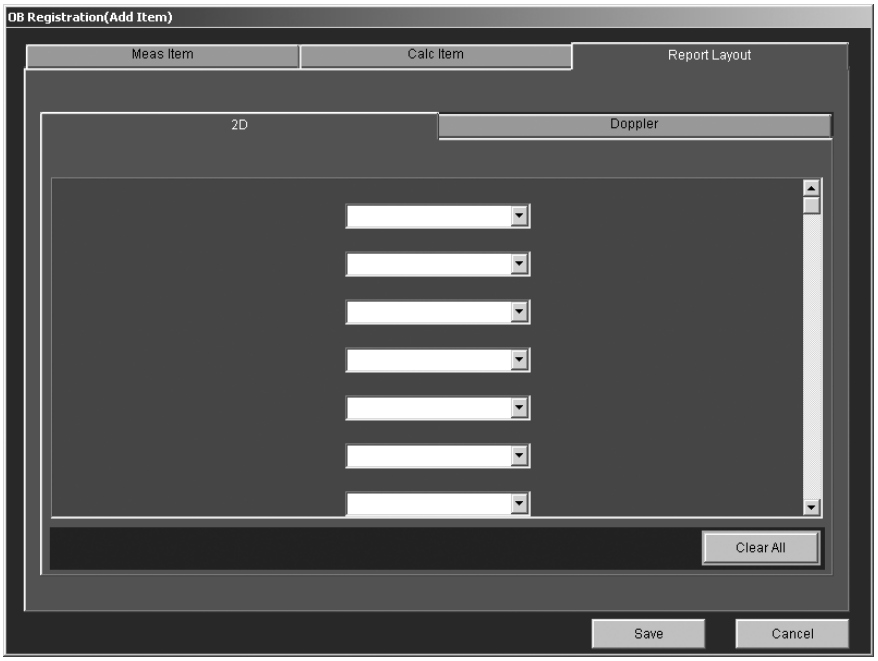
(3) When [Delete] is clicked, the selected calculation item can be deleted.

NOTE: When the calculation item to be deleted is used in other calculation items, the confirmation message shown below is displayed. Clicking [OK] deletes both the selected calculation item and its related calculation items. Clicking [Cancel] cancels deletion.



14.2.4 Display layout of the Report screen (Report Layout)

(1) Press the [Report Layout] tab of the Add screen. The screen below is displayed.



(2) Select the items to be displayed from the pull-down menus.

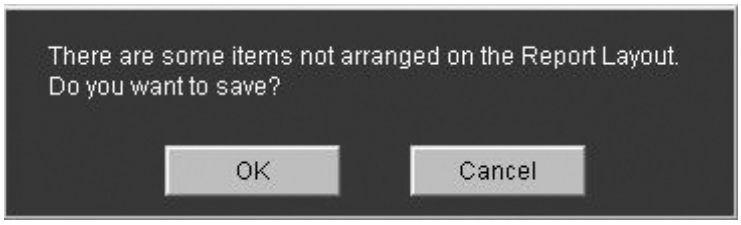
(3) To register more than one switch, repeat step (2).

(4) When [Clear All] is clicked, the report layout setting is cleared.

14.3 Saving a User-Registered OB Measurement Package

(1) Press [Save] on the OB Registration (Add Item) screen to save the settings.

NOTE: (1) User-registered OB measurement or calculation results are not displayed on the Report screen unless the measurement and calculation items are selected on the Report Layout tab page of the OB Registration (Add Item) screen.
If any of the measurement or calculation items to be registered are not selected on the Report Layout tab page, the confirmation dialog below is displayed when an attempt is made to save a measurement package.



(2) Before using a user-registered OB measurement, confirm that the data has been registered correctly. The following confirmation dialog is displayed when an attempt is made to save an OB measurement package.

14.4 Editing a User-Registered OB Measurement Package

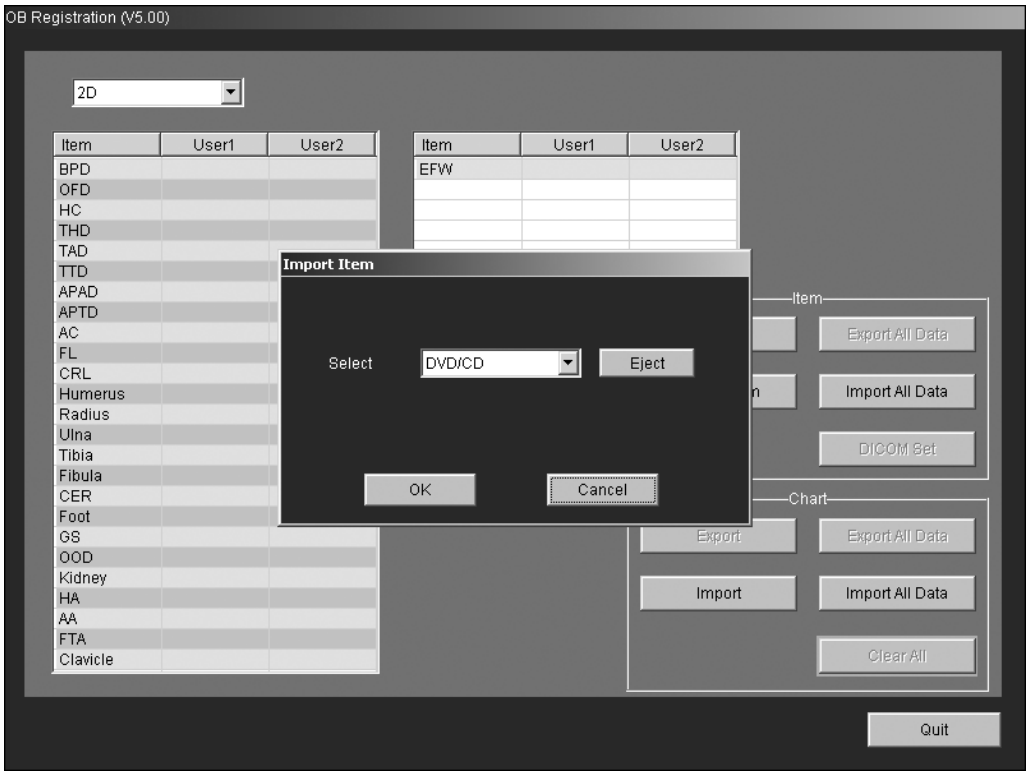
(1) Select the tab page to be edited and edit the contents using the procedure described in subsection 14.2.

(2) Press [Save] to save the changes.

14.5 Importing a User-Programmed OB Measurement Package

(1) Insert the media containing the OB measurement package data into the drive.

(2) Press [Import All Data] in the Item group on the main screen. The confirmation dialog below is displayed.



(3) Press [OK]. The OB measurement packages are imported into the system and the dialog is closed.

NOTE:	If an OB measurement package with the same name already exists in the system, a message confirming whether or not it should be overwritten is displayed. Select [OK] to overwrite the package. When [Cancel] is selected, the corresponding OB measurement package is not imported into the system.

14.6 Exporting a User-Registered OB Measurement Package

(1) Press [Export All Data] in the Item group on the main screen. The dialog below is displayed.

(2) Select the desired media and press [OK]. The export process is started.

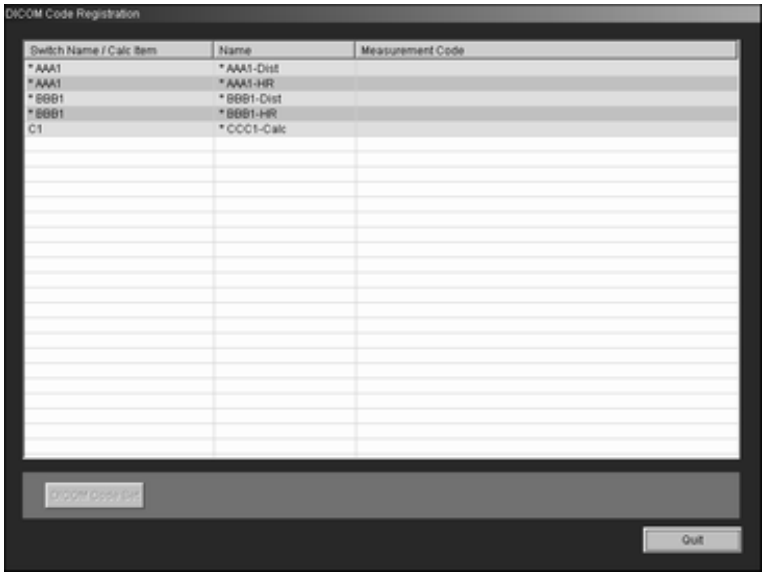
(3) The dialog below is displayed when export is completed.

NOTE:	If an OB measurement package with the same name already exists at the export destination (media), a message confirming whether or not it should be overwritten is displayed. Select [OK] to overwrite the package. When [Cancel] is selected, the corresponding OB measurement package is not exported to the destination.

14.7 Registering DICOM Codes in the OB Measurement Package

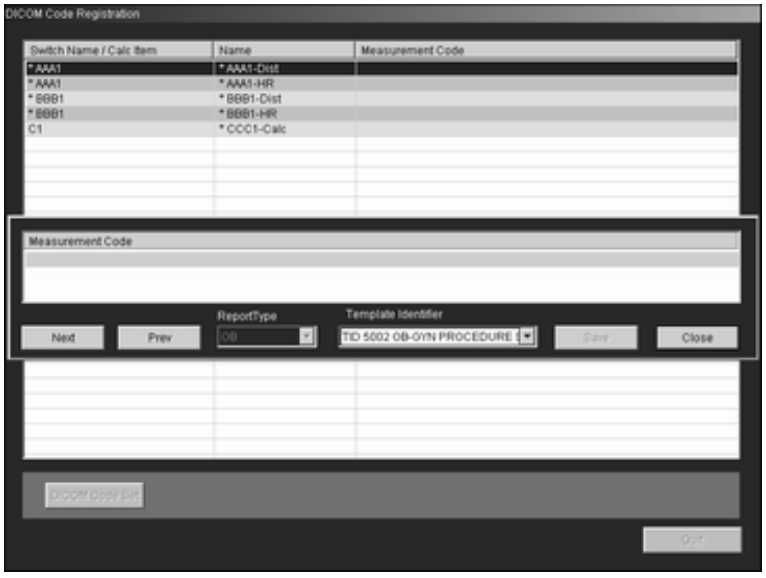
(1) Select the OB measurement package from the package list on the main screen. The [DICOM Set] switch becomes effective.

(2) Press [DICOM Set] on the main screen. The contents of the OB measurement package are displayed.

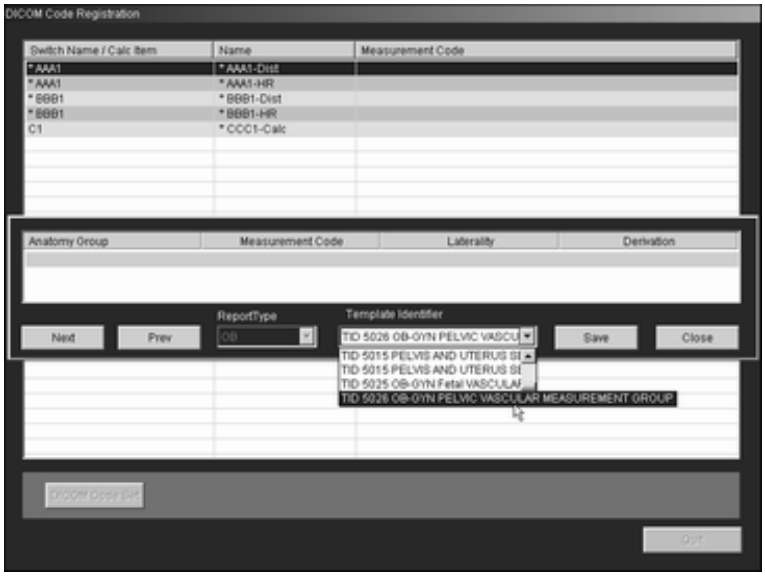


(3) Select the measurement item or calculation item for which the DICOM code is to be edited.

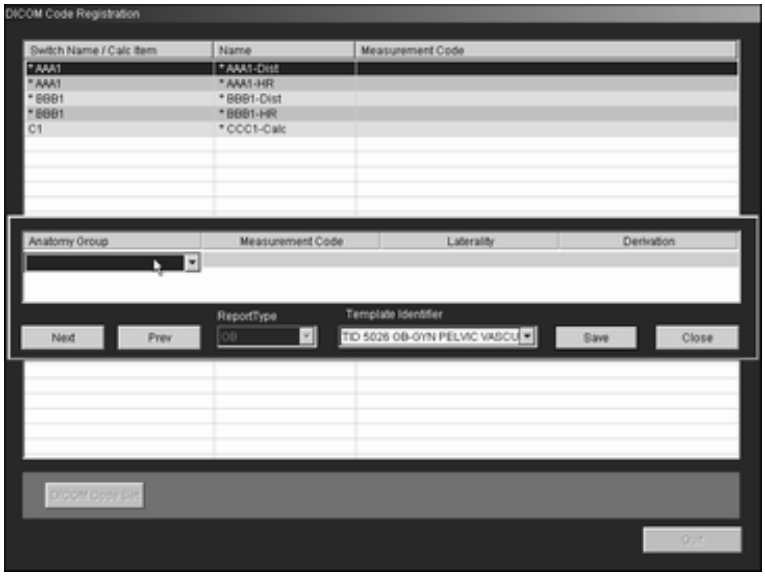
(4) Press [DICOM Code Set] to display the DICOM editor window.



(5) Press [Template Identifier] in the DICOM editor window and select "Template" from the pull-down menu.

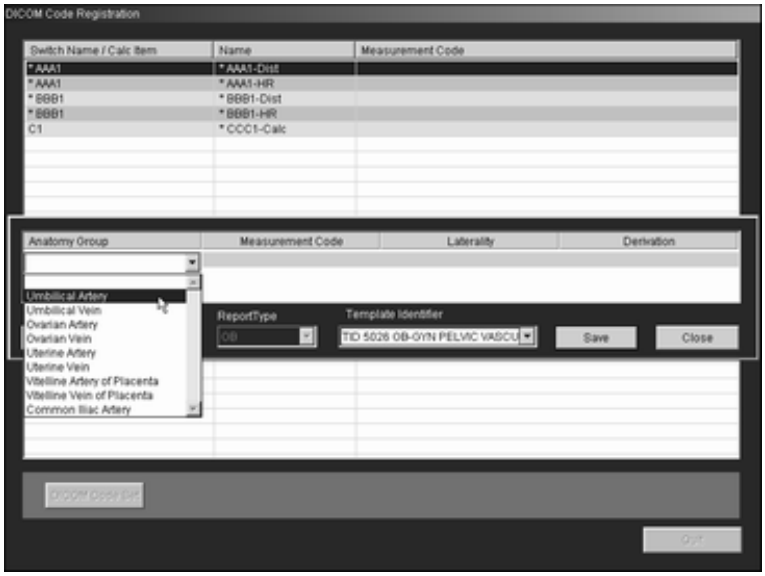


(6) Press the field for the item for which the DICOM code is to be edited. The top of the pull-down menu appears below the item.



NOTE: If an incorrect item is selected first, the following error message is displayed. XXXXXX represents the item name that must be selected first.

(7) Press the item field again to open the pull-down menu. Select the desired DICOM code from the menu.



NOTE: If an attempt is made to select a DICOM code but the following error message is displayed, the DICOM code cannot be selected. XXXXXX represents an item name.

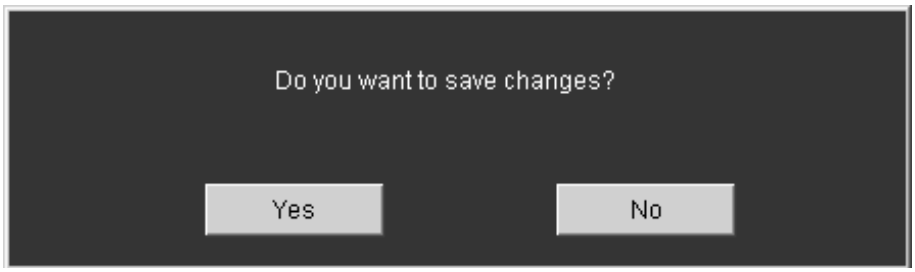
(8) After the DICOM codes are selected for the desired items, press [Save] to save the changes.

(9) To move to the previous measurement or calculation item, press [Prev]. The display in the DICOM editor window is updated.

(10) To move to the next measurement or calculation item, press [Next]. The display in the DICOM editor window is updated.

(11) Press [Close] to close the DICOM editor window.

NOTE: If [Prev], [Next], or [Close] is pressed without saving the changes, the following confirmation dialog is displayed. Press [Yes] to save the changes. If [No] is pressed, the changes are discarded.



14.8 Measurement Tools and Output Items

CAUTION: When the measurement data is to be stored in the server as DICOM SR, leave the unit field blank or select one of the existing units in the Manual Input tool and also for the calculation items.

* Items for which an arbitrary unit is set cannot be stored in the server.

- 2D/Color mode

Measurement tool		Method	Output item	Format	Unit
2D-Distance	Distance measurement	—	Dist (distance)	9999.9	mm
	ECG heart rate	Acquisition of HR value from ECG	HR (ECG)	999	bpm
Trace Length	Distance measurement	Continuous Trace	Dist (distance)	999.9	mm
		Spline Trace	Same as above		
Circle	Circle measurement	Balloon	Area	999.99	cm^2
			Circ (circumference)	999.9	mm
			Dist (diameter)	9999.9	mm
		Both ends	Area	999.99	cm^2
			Circ (circumference)	999.9	mm
			Dist (diameter)	9999.9	mm
Angle	Angle measurement	—	Angle1 (acute angle)	99	deg
			Angle2 (obtuse angle)	999	deg
Area	Area/ circumference measurement	Continuous Trace	Area	999.99	cm^2
			Circ (circumference)	999.9	mm
		Spline Trace	Same as above		
		Ellipse	Same as above		
		Cross	Same as above		
Thickness (*1)	IMT measurement	—	Dist (distance)	'9999.99	mm

*1: The result of Thickness measurement can be displayed to two decimal places in the MDA and on the Report screen, according to the setting of Thickness (IMT) Precision (Available after PR) on the 2D-Mode Meas. page of the preset menu. When display to two decimal places has been selected, a single quotation mark (') is displayed before the measurement value to indicate that the value should be used for reference purposes only.

- M mode

Measurement tool		Method	Output item	Format	Unit
M-Distance	Distance measurement	—	Dist (distance)	9999.9	mm
	ECG heart rate	Acquisition of HR value from ECG	HR (ECG)	999	bpm

- Doppler mode

Measurement tool		Method	Output item	Format	Unit
Velocity	Velocity measurement	—	Vel (velocity)	999.9	cm/s
			PG (Pressure Gradient)	999.9	mmHg
Vel Trace	Velocity trace measurement	Continuous Trace	Vmax (maximum velocity)	999.9	cm/s
			Vmin (minimum velocity)	999.9	cm/s
			Ved (end-diastolic velocity)	999.9	cm/s
			Vm (time-average velocity)	999.9	cm/s
			PI (*1)	99.99	None
			RI (*2)	99.99	None
			S/D	99.99	None
			VTI (Velocity Time Integral)	999.99	cm
			VM (time-average velocity)	999.9	cm/s
			PPG (maximum pressure gradient)	999.9	mmHg
			MPG (mean pressure gradient)	999.9	mmHg
			HR (heart rate)	999	bpm
		Spline Trace	Same as above		
		Line Trace	Same as above		
		Range	Vmax (maximum velocity)	999.9	cm/s
			Vmin (minimum velocity)	999.9	cm/s
			Ved (end-diastolic velocity)	999.9	cm/s
			Vm_peak (time-average velocity of peak trace)	999.9	cm/s
			Vm_mean (time-average velocity of mean trace)	999.9	cm/s
			PI	99.99	None
			RI	99.99	None
			S/D	99.99	None
			VTI (Velocity Time Integral)	999.99	cm
			PPG (maximum pressure gradient)	999.9	mmHg
			MPG (mean pressure gradient)	999.9	mmHg
			HR (heart rate)	999	bpm
		Auto Range	Same as above		
	ECG heart rate	Acquisition of HR value from ECG	HR (ECG)	999	bpm

Measurement tool		Method	Output item	Format	Unit
PI	PI measurement	Continuous Trace	PI (*1)	9.99	None
			Vmax (maximum velocity)	999.9	cm/s
			Vmin (minimum velocity)	999.9	cm/s
			Ved (end-diastolic velocity)	999.9	cm/s
			Vm (time-average velocity)	999.9	cm/s
		Spline Trace	Same as above		
		Line Trace	Same as above		
		Range	PI (*1)	9.99	None
			Vmax (maximum velocity)	999.9	cm/s
			Vmin (minimum velocity)	999.9	cm/s
			Ved (end-diastolic velocity)	999.9	cm/s
			Vm_peak (time-average velocity of peak trace)	999.9	cm/s
RI	RI measurement	—	RI (*2)	9.99	None
			Vmax (maximum velocity)	999.9	cm/s
			Vmin or Ved	999.9	cm/s
S/D	S/D measurement	—	S/D	9.99	None
			Vmax (maximum velocity)	999.9	cm/s
			Ved (end-diastolic velocity)	999.9	cm/s
			dt	9.999	s
			Vel1	999.9	cm/s
			Vel2	999.9	cm/s
			DcT	9.999	s
			PHT	9.999	s
DV	DV measurement	Continuous Trace	DV D	999.9	cm/s
			DV S	999.9	cm/s
			DV a	999.9	cm/s
			Vm_peak (mean velocity of peak trace)	999.9	cm/s
			HR	999	bpm
		Range	Same as above		

1: Whether Vmin or Ved is used for calculating PI can be preset.

- PI = | (Vmax − Vmin) / Vm_peak |
- PI = | (Vmax − Ved) / Vm_peak |

*2: Whether Vmin or Ved is used for calculating RI can be preset.

- RI = | (Vmax − Vmin) / Vmax |
- RI = | (Vmax − Ved) / Vmax |

- Common to M mode and Doppler mode

Measurement tool		Method	Output item	Format	Unit
HR	Heart rate measurement	—	HR (heart rate)	999	bpm
			Beat (specified number of heartbeats)	9	None
			Time	9.999	s
Time	Time measurement	—	Time	9.999	s

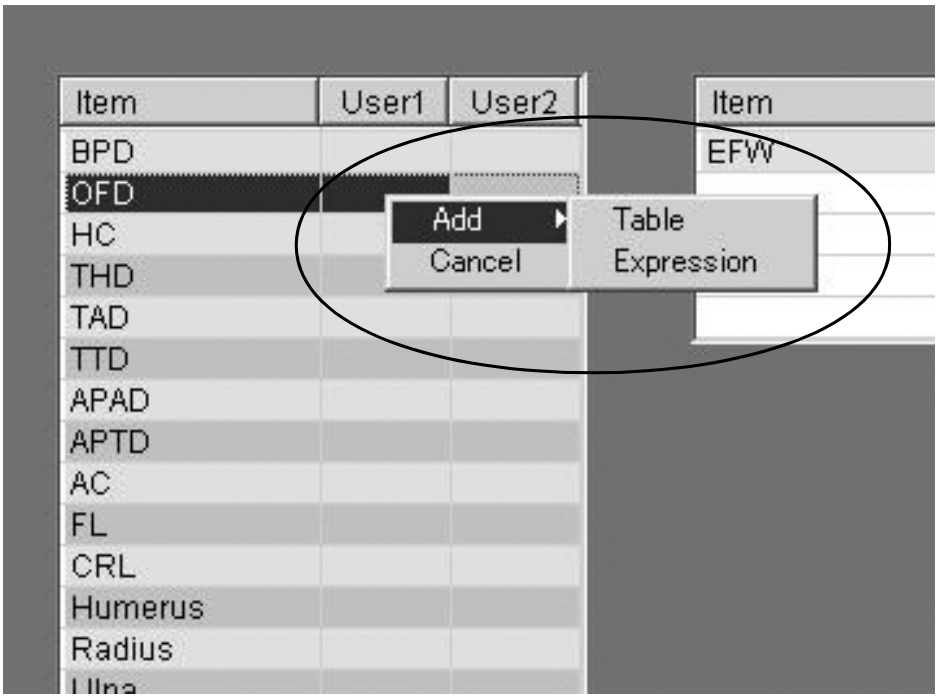
- Common to all modes

Measurement tool		Method	Output item	Format	Unit
Manual Input	Manual input tool	—	Value input in the Manual Input dialog (acceptable in the range from -9999.99 to 9999.99)	9999.99	User definable (maximum of 8 characters)

14.9 Registration of a New User Chart

14.9.1 Selecting a user chart and registration method

(1) On the main screen, move the cursor to a cell for a 2D measurement item or for EFW in which neither [User1] nor [User2] is displayed, and then click the left mouse button. "Add" or "Cancel" can be selected from the pull-down menu displayed.



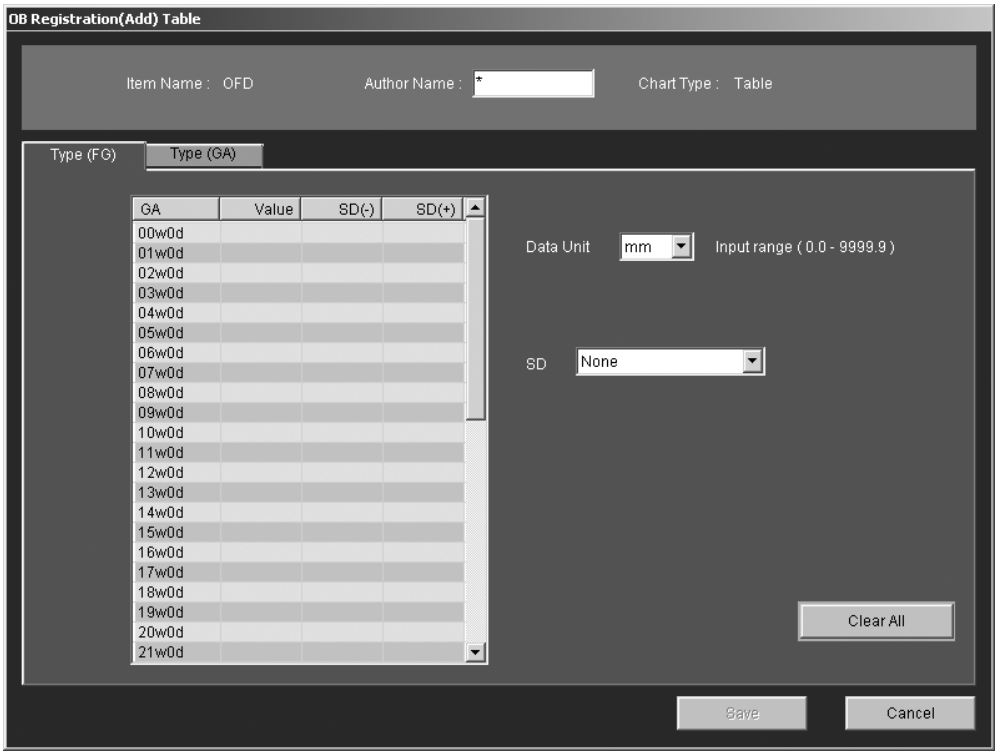
Pull-down menu item	Function
Add	Displays the user chart registration method (Table or Expression).
Cancel	Returns to the initial status without performing processing.

(2) Select the user chart registration method from the pull-down menu. The screen for the selected registration method is displayed. Switching between 2D and Doppler can be performed using the pull-down menu of the combo box located in the top-left part of the main screen.

No.	Screen	Description	Refer to
<1>	OB Registration (Add) Table screen for 2D measurement items	A user chart can be registered to a 2D measurement item using a table.	Subsection 14.9.2
<2>	OB Registration (Add) Expression screen for 2D measurement items	A user chart can be registered to a 2D measurement item using an expression.	Subsection 14.9.3
<3>	OB Registration (Add) Table screen for EFW	A user chart can be registered to EFW using a table.	Subsection 14.9.4
<4>	OB Registration (Add) Expression screen for EFW	A user chart can be registered to EFW using an expression.	Subsection 14.9.5
<5>	OB Registration (Add) Table screen for Doppler calculation items (RI, PI)	A user chart can be registered to a Doppler calculation item (RI or PI) using a table.	Subsection 14.9.6
<6>	OB Registration (Add) Expression screen for Doppler calculation items (RI, PI)	A user chart can be registered to a Doppler calculation item (RI or PI) using an expression.	Subsection 14.9.7

14.9.2 Registering a user chart to a 2D measurement item using a table

(1) Click the [Type (FG)] tab of the OB Registration (Add) Table screen. The page shown below is displayed.



Item	Function
Author Name	Enter the author name for the input data.
Data Unit	Select the unit for the input data. For distance measurement items : mm, cm For area measurement items : mm^2, cm^2
SD	Select the SD type from among the following options. None, 5%/95%, 10%/90%, 1SD, 1.5SD, 2SD, 3%/97%, 1SD (Calculation), % tile (Calculation)
Type (FG) tab/ Type (GA) tab	Select the data input type according to the availability of the clinical age. FG : Select (FG) when the clinical age is available. GA : Select (GA) when the clinical age is not available.
GA	Gestational ages from 0w0d to 45w0d are displayed. Both the number of weeks (w) and days (d) can be edited. Acceptable input range for week : 0 to 45d Acceptable input range for day : 0 to 6 (When the number of weeks is 45, only 0 can be set.)
Value	Enter the values corresponding to GAs.
SD (-) (+)	On the Type (FG) tab : Deviation (value) On the Type (GA) tab : Deviation (number of weeks/days)
Clear All	The settings on the tab are deleted. A confirmation message is displayed before deletion is performed.
Save	The changes are registered and the OB Registration main screen is displayed.
Cancel	The changes are abandoned and the OB Registration main screen is displayed.

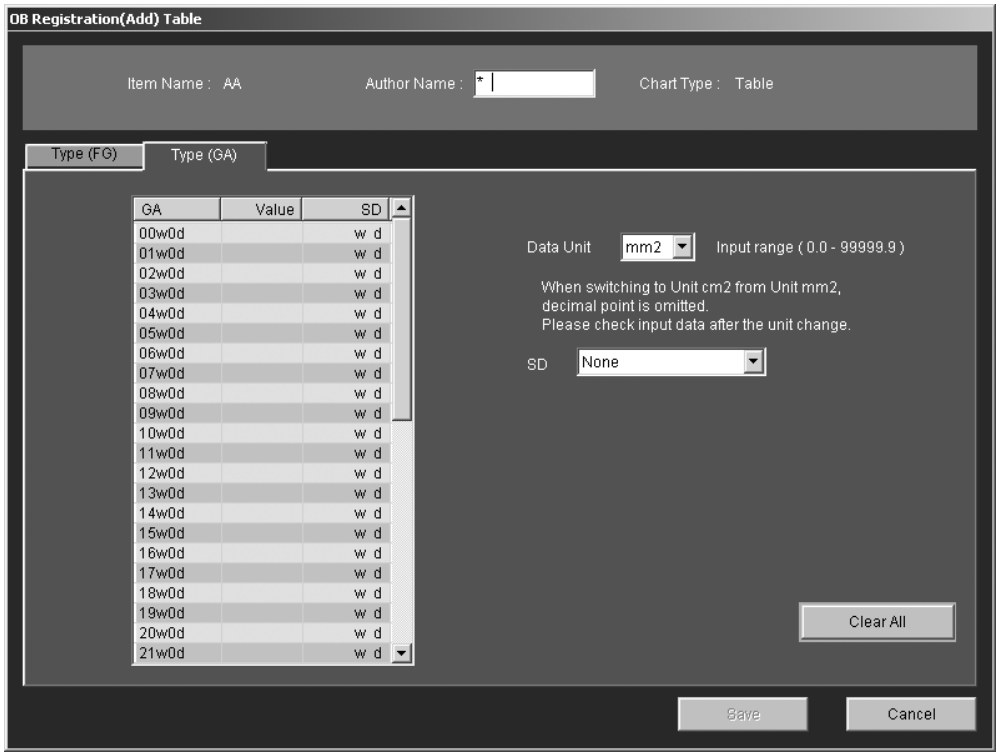
* An asterisk (*) is displayed before the author name, indicating that the data has been registered by the user.

* If "1SD (Calculation)" is selected from the SD drop-down list, the SD limit edit box is displayed. The acceptable limit is 9.9. If a value larger than 9.9 is entered, it is set to 9.9 automatically.

* If "None" is selected from the SD drop-down list, the values set for SD (-) and SD (+) are not used in OB measurements.

* If the GA data items are not arranged in proper time sequence after editing, an error occurs when an attempt is made to save the settings and they cannot be saved.

(2) When the [Type (GA)] tab is selected, the page shown below is displayed.



* If "1SD (Calculation)" is selected from the SD drop-down list, the SD limit edit box is displayed. The acceptable limit is 9.9. If a value larger than 9.9 is entered, it is set to 9.9 automatically.

CAUTION:	When data is to be set on both the Type (FG) and Type (GA) pages, the same value must be set for the same GA. If the value for a GA differs between these two pages and the Week function is used to calculate GA based on the data set on the Type (GA) page, the calculated GA is not plotted at the Mean position on the trend graph that is created based on the data set on the Type (FG) page.

NOTE:	When the mm^2 data unit is changed to cm^2, the fractional portion of the value set in the mm^2 unit is discarded.

14.9.3 Registering a user chart to a 2D measurement item by entering an expression

(1) Click the [Type (FG)] tab of the OB Registration (Add) Expression screen. The page shown below is displayed.

Item	Description
Author Name	Enter the author name for the input data.
Week Low	Enter the minimum value for limiting the range for displaying the gestational age.
Week High	Enter the maximum value for limiting the range for displaying the gestational age.
Calculation Select	Select the unit for the item to be used in calculation. When "Day" is selected, the gestational age in days is used in calculation.
Regist GA tab	Select this tab to enter an expression for calculating the gestational age.
Regist SD tab	Select this tab to enter an expression for calculating the SD.
Expression	Select functions, numerals, and operators in the Operator area and the constants (specified by A1 to A8) from the Constant area to make an expression. Numerals, operators, and constants can also be directly entered from the keyboard (up to 200 items in total). If division by 0 is entered, the output result will be 0.

Item	Description
Operator	Functions, numerals, and operators are provided. Move the cursor to the desired switch and click the mouse button. The selected item is displayed in the Expression field. SIN (x) : Sine of x (degree) COS (x) : Cosine of x (degree) TAN (x) : Tangent of x (degree) LOG (x) : Logarithm in base 10 ($\log_{10}x$) LN (x) : Logarithm in base e ($\log_{e}x$) EXP (x) : e^{x} SQRT (x) : Square root of x ATAN (x) : Principal value of x arctangent POW (x, y) : x^{y} ABS (x) : Absolute value of x Numerals : 1, 2, 3, 4, 5, 6, 7, 8, 9, 0 Operators : +, -, *, /
Constant	Frequently used constants can be registered. Select one from A1 to A8 and enter the numeral from the keyboard.
Save	The changes are registered and the OB Registration main screen is displayed.
Cancel	The changes are discarded and the OB Registration main screen is displayed.

* An asterisk (*) is displayed before the author name, indicating that the data has been registered by the user.

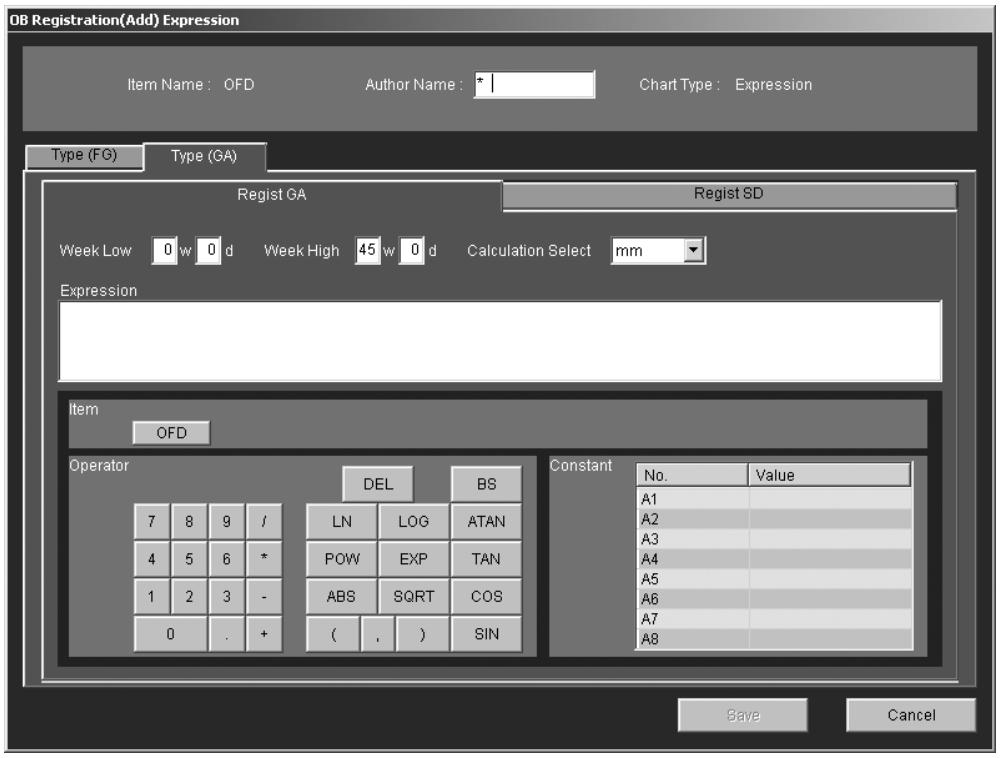
(2) When the [Regist SD] tab is selected, the page shown below is displayed.

The operations on the Regist SD page are the same as those on the Regist GA page of the Type (FG) page except for those described below.

Item	Description
Calculation Select	Select the unit for the item to be used in calculation. For distance measurement items: mm, cm For area measurement items : mm^2, cm^2 When "Day" is selected, the gestational age in days is used in calculation.
SD	Select the SD type from among the following options. None, 5%/95%, 10%/90%, 1SD, 1.5SD, 2SD, 3%/97%

NOTE: The contents of the Regist SD page of the Type (FG) and Type (GA) pages are the same.

(3) When the [Type (GA)] tab is selected, the page shown below is displayed.



The operations on this page are the same as those on the Regist GA page of the Type (FG) page except for those described below.

Item	Description
Calculation Select	Select the unit for the item to be used in calculation. For distance measurement items: mm, cm For area measurement items : mm^2, cm^2

14.9.4 Registering a user chart to EFW using a table

(1) Click the [Formula] tab of the OB Registration (Add) Table screen for EFW. The page shown below is displayed.

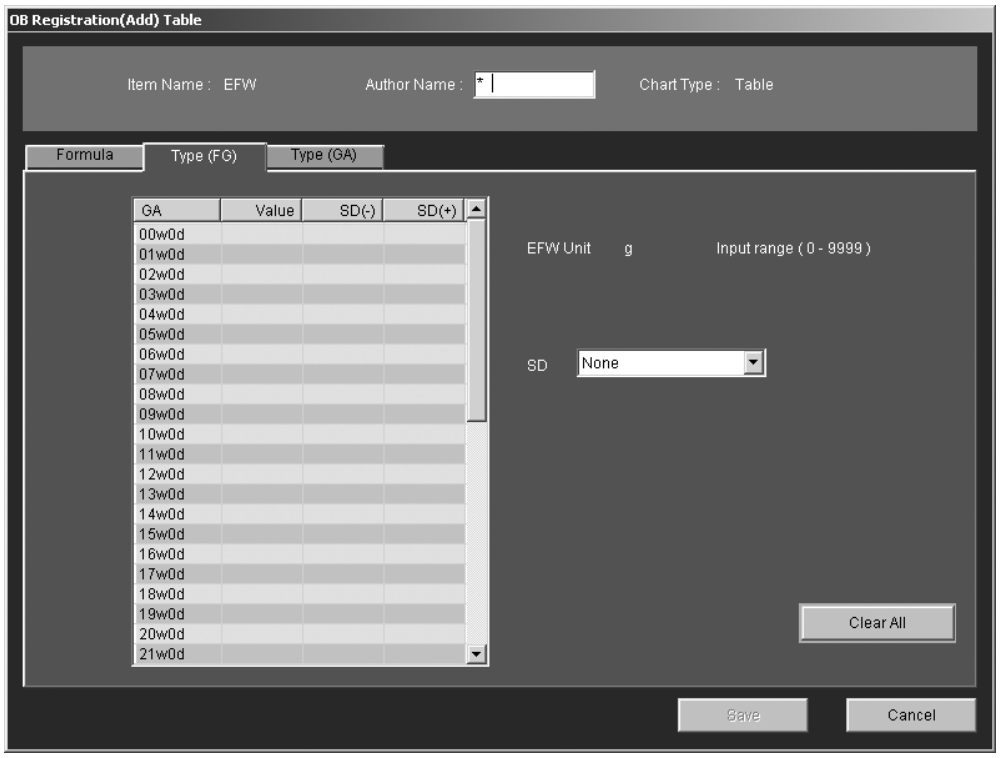
Item	Description
Author Name	Enter the author name for the input data.
Lower Limit	Enter the minimum value for limiting the range for displaying the calculated value.
Upper Limit	Enter the maximum value for limiting the range for displaying the calculated value.
Data Unit	Select the unit for the calculated value.
Expression	Select functions, numerals, and operators in the Operator area and the constants (specified by A1 to A8) from the Constant area to make an expression. Numerals, operators, and constants can also be entered directly from the keyboard (up to 200 items in total).
Item	The selectable items are displayed.

Item	Description
Operator	Functions, numerals, and operators are provided. SIN (x) : Sine of x (degree) COS (x) : Cosine of x (degree) TAN (x) : Tangent of x (degree) LOG (x) : Logarithm in base 10 ($\log_{10}x$) LN (x) : Logarithm in base e ($\log_{e}x$) EXP (x) : e^{x} SQRT (x) : Square root of x ATAN (x) : Principal value of x arctangent POW (x, y) : x^{y} ABS (x) : Absolute value of x Numerals : 1, 2, 3, 4, 5, 6, 7, 8, 9, 0 Operators : +, -, ∗, /
Constant	Frequently used constants can be registered. Select one from A1 to A8 and enter the numeral from the keyboard.
Save	The changes are registered and the OB Registration main screen is displayed.
Cancel	The changes are discarded and the OB Registration main screen is displayed.

* An asterisk (*) is displayed before the author name, indicating that the data has been registered by the user.

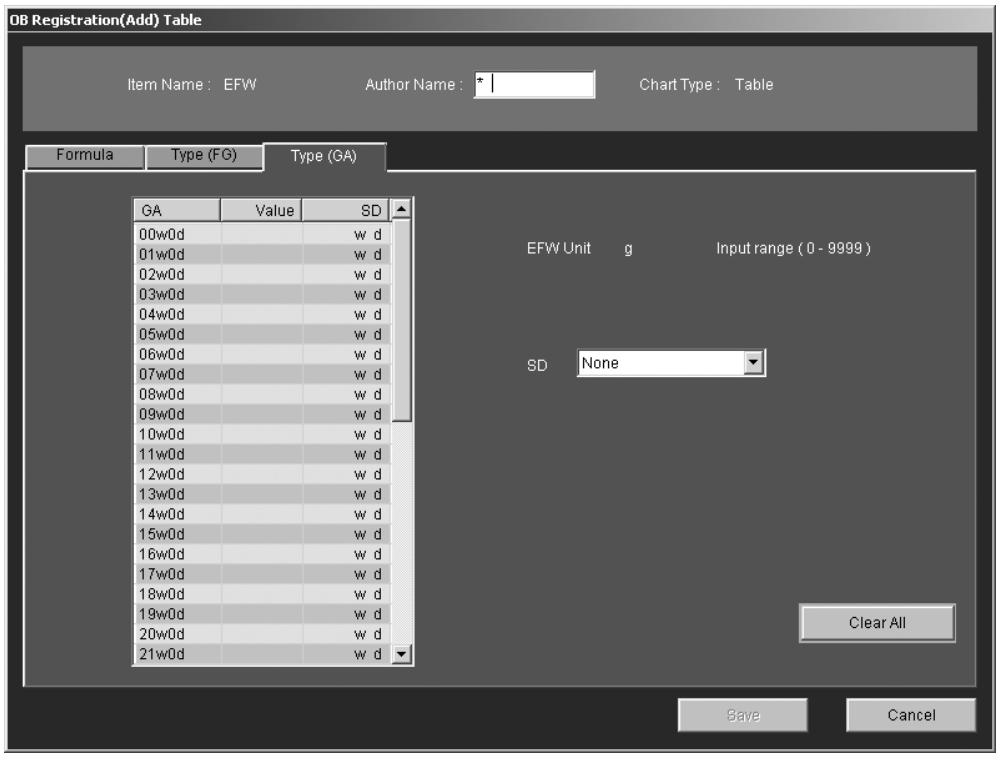
NOTE: If division by 0 is entered, the following error dialog is displayed and the entered expression cannot be registered.

(2) When the [Type (FG)] tab is clicked, the page shown below is displayed.



The operations on this page are the same as those on the Type (FG) page of the OB Registration (Add) Table screen for a 2D measurement item, except that the Data Unit selection function is not provided on this page (the data unit specified on the Formula tab is set automatically).

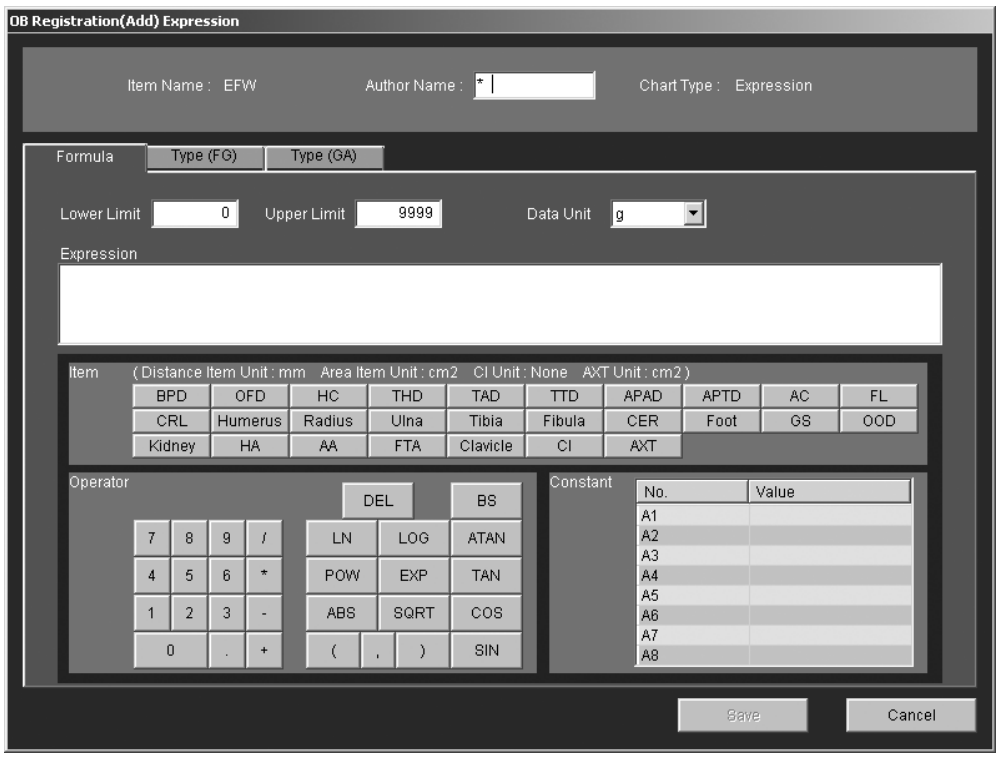
(3) When the [Type (GA)] tab is clicked, the page shown below is displayed.



The operations on this page are the same as those on the Type (GA) page of the OB Registration (Add) Table screen for a 2D measurement item, except that the Data Unit selection function is not provided on this page (the data unit specified on the Formula tab is set automatically).

14.9.5 Registering a user chart to EFW by entering an expression

(1) Click the [Formula] tab of the OB Registration (Add) Expression screen for EFW. The page shown below is displayed.



The operations on this page are the same as those on the Formula page of the OB Registration (Add) Table screen for EFW.

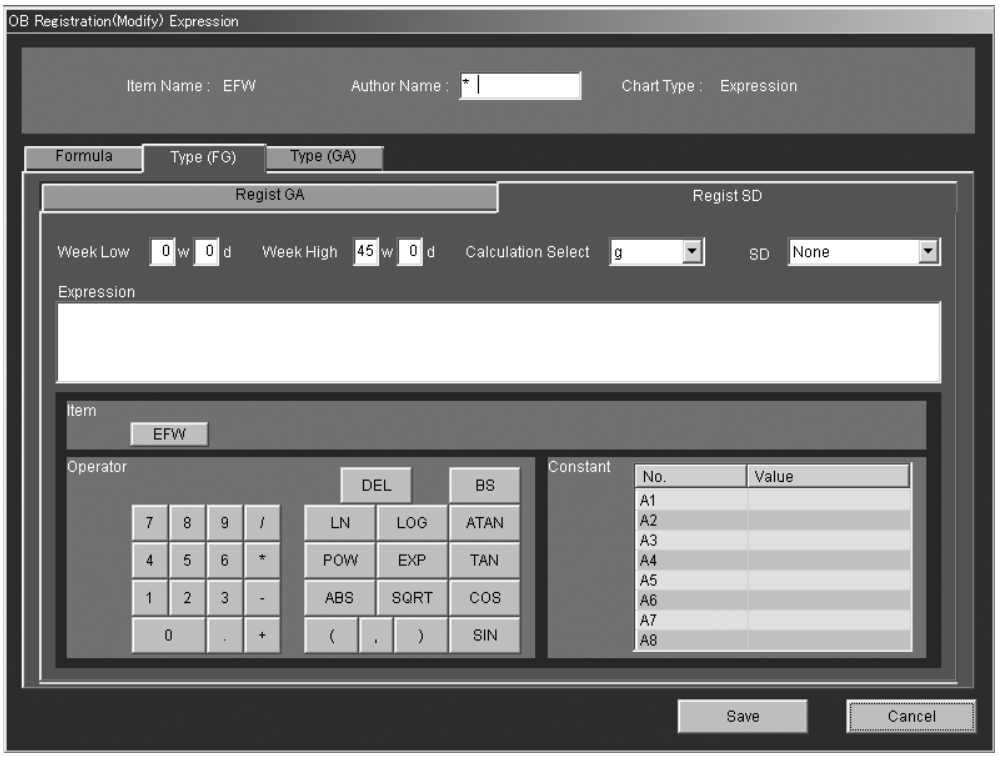
(2) When the [Type (FG)] tab is clicked, the page shown below is displayed.

- Regist GA page

  The operations on this page are the same as those on the Regist GA page of the Type (FG) page of the OB Registration (Add) Expression screen for a 2D measurement item, except that "EFW" should be selected for Calculation Select.

- Regist SD page

(3) When the [Regist SD] tab is clicked, the page shown below is displayed.

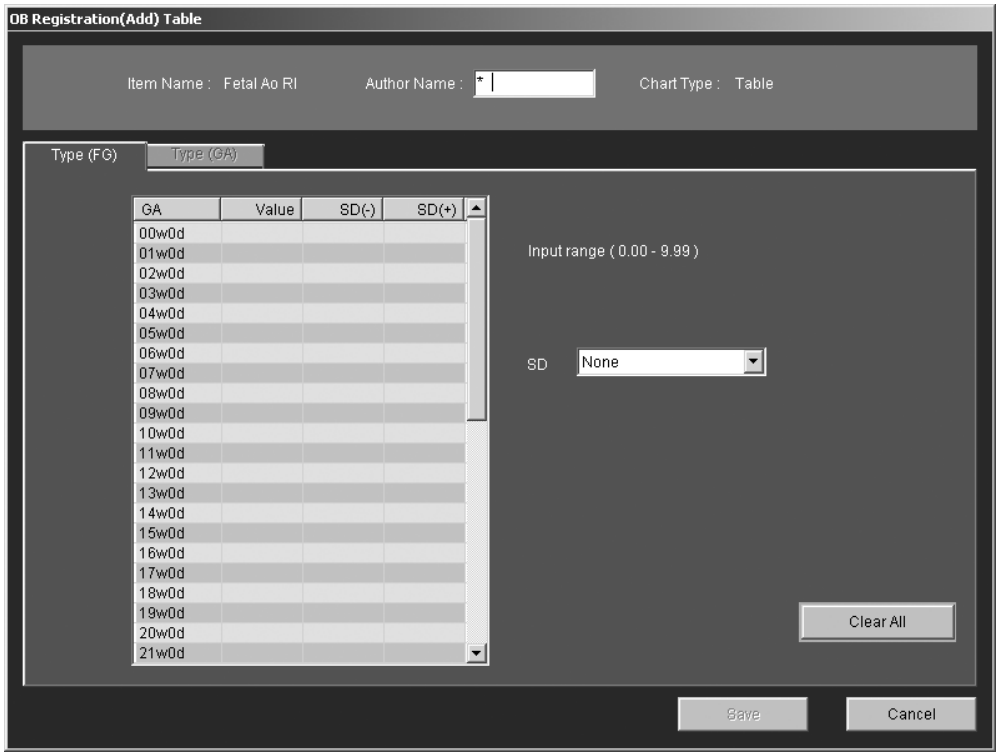


The operations on this page are the same as those on the Regist SD page of the OB Registration (Add) Expression screen for a 2D measurement item, except that "g" and "Day" should be selected for Calculation Select. When "g" is selected, "EFW" is displayed in the Item area.

NOTE:	The contents of the Regist SD page of the Type (FG) and Type (GA) pages are the same.

14.9.6 Registering a user chart to a Doppler calculation item (RI, PI) using a table

(1) The screen for registering a user chart for a Doppler calculation item (RI, PI) using the Table method is displayed. The Type (GA) tab on this screen cannot be selected.



Item	Function
Author Name	Enter the author name for the input data.
SD	Select the SD type from among the following options. None, 5%/95%, 10%/90%, 1SD, 1.5SD, 2SD, 3%/97%
Type (FG) tab/ Type (GA) tab	Select the data input type according to the availability of the clinical age. FG : Select (FG) when the clinical age is available. GA : Select (GA) when the clinical age is not available.
GA	Gestational ages from 0w0d to 45w0d are displayed. Both the number of weeks (w) and days (d) can be edited. Acceptable input range for week : 0 to 45d Acceptable input range for day : 0 to 6 (When the number of weeks is 45, only 0 can be set.)
Value	Enter the values corresponding to GAs.
SD (-) (+)	On the Type (FG) tab : Deviation (value) On the Type (GA) tab : Deviation (number of weeks/days)
Clear All	The settings on the tab are deleted. A confirmation message is displayed before deletion is performed.
Save	The changes are registered and the OB Registration main screen is displayed.
Cancel	The changes are abandoned and the OB Registration main screen is displayed.

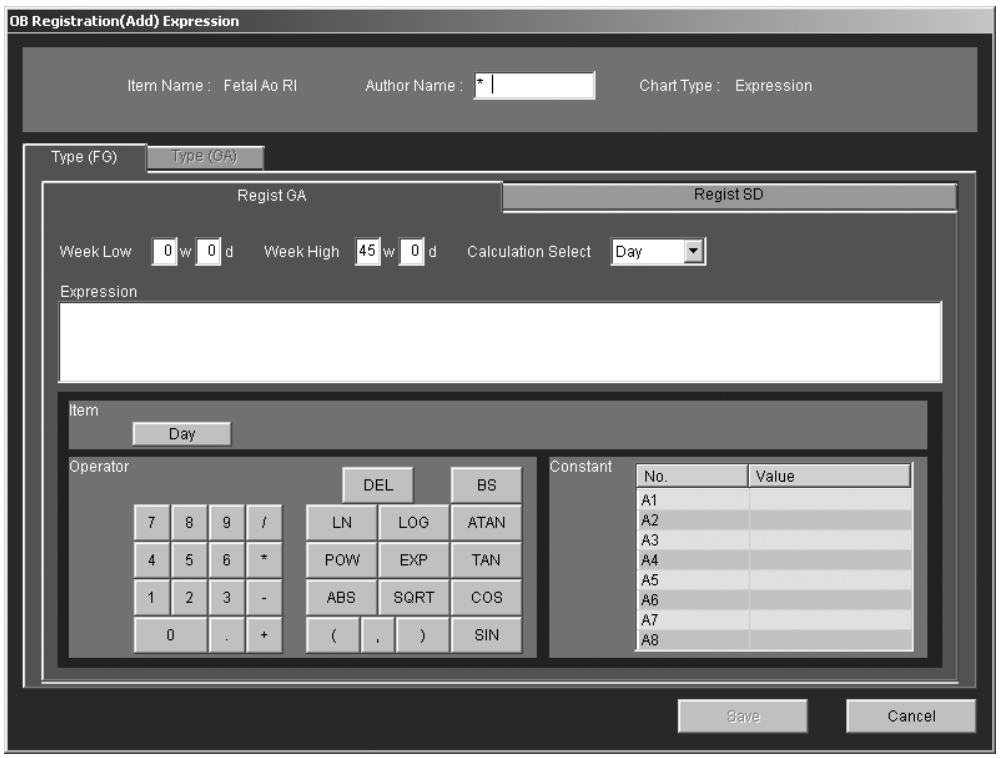
* An asterisk (*) is displayed before the author name, indicating that the data has been registered by the user.

* If "None" is selected from the SD drop-down list, the values set for SD (-) and SD (+) are not used in OB measurements.

* If the GA data items are not arranged in proper time sequence after editing, an error occurs when an attempt is made to save the settings and they cannot be saved.

14.9.7 Registering a user chart to a Doppler calculation item (RI, PI) by entering an expression

(1) The screen for registering a user chart for a Doppler calculation item (RI, PI) by entering an expression is displayed. The Type (GA) tab on this screen cannot be selected.



Item	Description
Author Name	Enter the author name for the input data.
Week Low	Enter the minimum value for limiting the range for displaying the gestational age.
Week High	Enter the maximum value for limiting the range for displaying the gestational age.
Calculation Select	Select the unit for the item to be used in calculation. When "Day" is selected, the gestational age in days is used in calculation.
Regist GA tab	Select this tab to enter an expression for calculating the gestational age.
Regist SD tab	Select this tab to enter an expression for calculating the SD.
Expression	Select functions, numerals, and operators in the Operator area and the constants (specified by A1 to A8) from the Constant area to make an expression. Numerals, operators, and constants can also be directly entered from the keyboard (up to 200 items in total). If division by 0 is entered, the output result will be 0.

Item	Description
Operator	Functions, numerals, and operators are provided. Move the cursor to the desired switch and click the mouse button. The selected item is displayed in the Expression field. SIN (x) : Sine of x (degree) COS (x) : Cosine of x (degree) TAN (x) : Tangent of x (degree) LOG (x) : Logarithm in base 10 ($\log_{10}x$) LN (x) : Logarithm in base e ($\log_{e}x$) EXP (x) : e^{x} SQRT (x) : Square root of x ATAN (x) : Principal value of x arctangent POW (x, y) : x^{y} ABS (x) : Absolute value of x Numerals : 1, 2, 3, 4, 5, 6, 7, 8, 9, 0 Operators : +, -, *, /
Constant	Frequently used constants can be registered. Select one from A1 to A8 and enter the numeral from the keyboard.
Save	The changes are registered and the OB Registration main screen is displayed.
Cancel	The changes are discarded and the OB Registration main screen is displayed.

* An asterisk (*) is displayed before the author name, indicating that the data has been registered by the user.

(2) When the [Regist SD] tab is selected, the page shown below is displayed.

The operations on the Regist SD page are the same as those on the Regist GA page of the Type (FG) page except for those described below.

Item	Description
SD	Select the SD type from among the following options. None, 5%/95%, 10%/90%, 1SD, 1.5SD, 2SD, 3%/97%

14.10 Editing a User Chart

(1) On the main screen, left-click a cell in the User1 or User2 column in which an author name is displayed. A pull-down menu containing Modify, Delete, Export, and Cancel is displayed.

Pull-down menu item	Function
Modify	Edits a user chart.
Delete	Deletes a user chart.
Export	Saves a user chart on media.
Cancel	Cancels Modify, Delete, or Export and returns to the initial status.

(2) To edit a user chart for a 2D measurement item, left-click the desired measurement item for which the user chart to be edited (in User1 or User2 column) is displayed and then select "Modify" from the pull-down menu. The OB Registration (Modify) screen (Table or Expression, whichever exists) for the selected 2D measurement item is displayed. Edit the settings, referring to subsections 14.9.2 and 14.9.3.

(3) To edit a user chart for EFW, left-click "EFW" for which the user chart to be edited (in User1 or User2 column) is displayed and then select "Modify" from the pull-down menu. The OB Registration (Modify) screen (Table or Expression, whichever exists) for EFW is displayed. Edit the settings, referring to subsections 14.9.4 and 14.9.5.

(4) To edit a user chart for a Doppler calculation item (RI or PI), left-click the desired item for which the user chart to be edited (in User1 or User2 column) is displayed and then select "Modify" from the pull-down menu. The OB Registration (Modify) screen (Table or Expression, whichever exists) for the selected Doppler calculation item (RI or PI) is displayed. Edit the settings, referring to subsections 14.9.6 and 14.9.7.

14.11 Deleting a User Chart

(1) Left-click the measurement or calculation item for which User1 or User2 is displayed on the main screen to display the pull-down menu. The menu contains Modify, Delete, Export, and Cancel.

(2) Select "Delete" from the pull-down menu. The dialog below is displayed.

(3) Press [OK] to delete the selected user chart.

14.12 Exporting a User Chart

(1) On the main screen, select the user chart to be exported.

(2) Press [Export] in the Chart group on the main screen. The dialog below is displayed.

(3) Select the desired media and press [OK]. The export process is started.

(4) The dialog below is displayed when export is completed.

NOTE: If the same measurement or calculation item with another user chart already exists in the export destination, the overwrite confirmation dialog shown below is displayed. Press [OK] to overwrite the user chart for that item.

14.13 Exporting All User Charts

(1) Press [Export All Data] in the Chart group on the main screen. The dialog below is displayed.

(2) Select the desired media and press [OK]. The export process is started.

(3) The dialog below is displayed when export is completed.

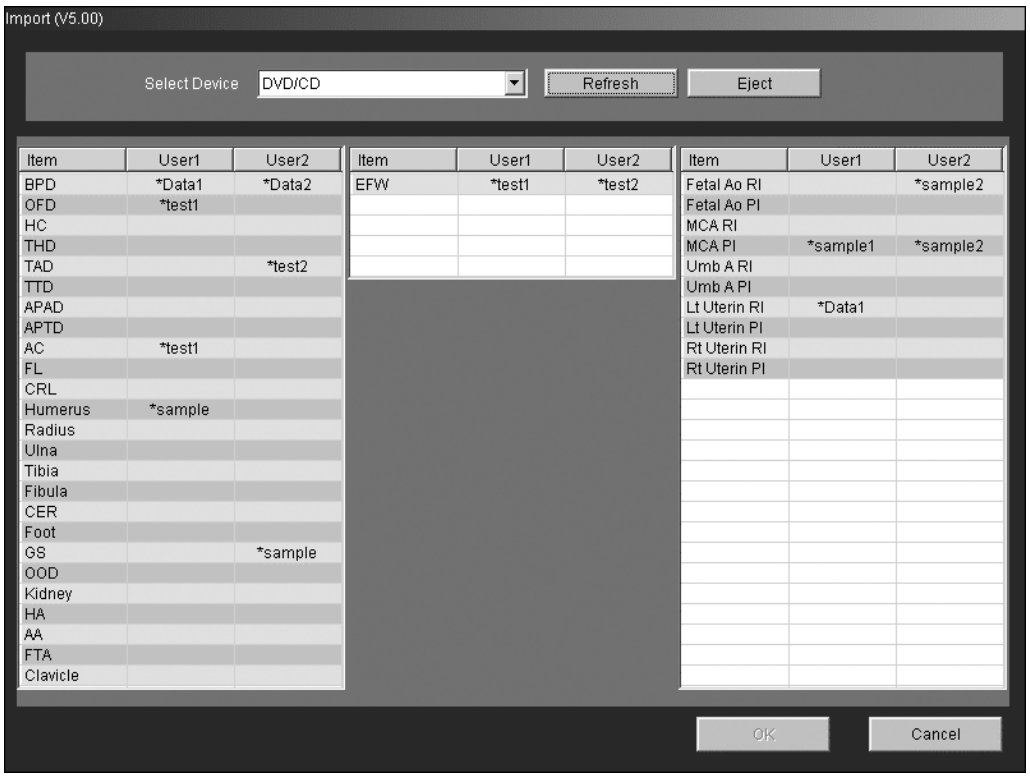
* All the user charts registered in the system are exported.

NOTE: If the same measurement or calculation item with another user chart already exists in the export destination, the overwrite confirmation dialog shown below is displayed. Press [OK] to overwrite the user chart for that item.

14.14 Importing a User Chart

(1) Place the media containing the user charts in the system.

(2) Press [Import] in the Chart group on the main screen.



(3) A list of the user charts stored on the media is displayed.

* Press [Refresh] to update the list of user charts stored on the media in the drive.

* Press [Eject] to eject the media from the drive.

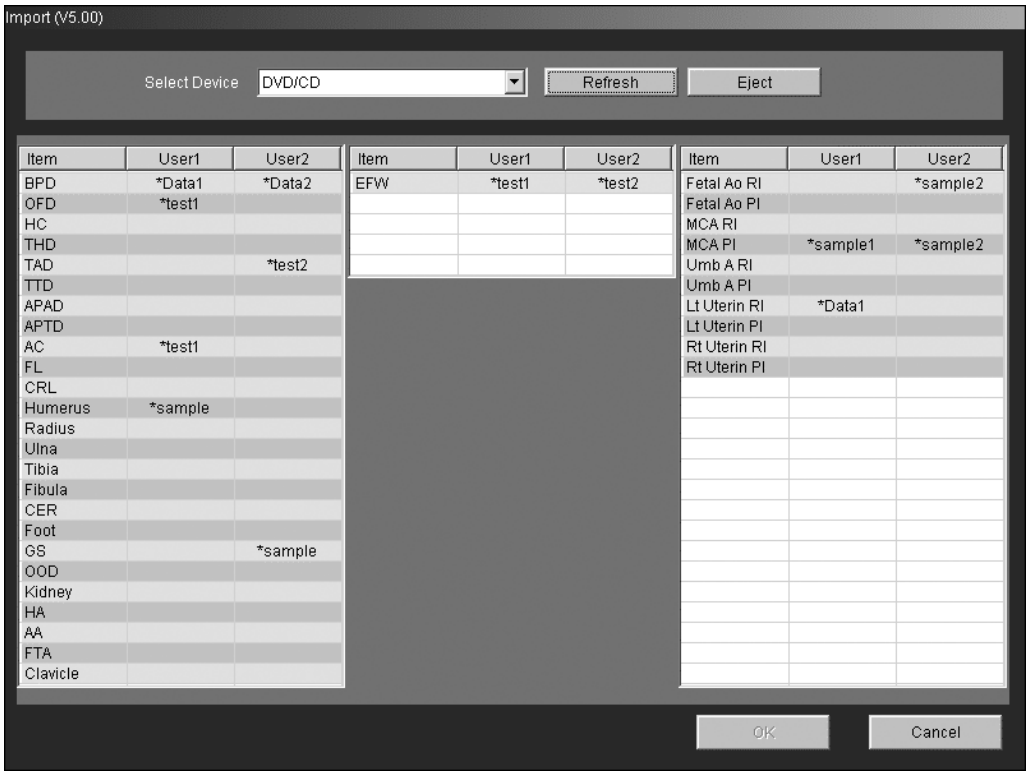
(4) Select the user chart to be imported and press [OK]. The author name of the selected user chart is displayed on the OB Registration main screen.

* The contents of the imported user chart cannot be confirmed at this stage. To check the contents of the imported user chart, select the user chart on the main screen and press [Modify].

14.15 Importing All the User Charts

(1) Insert the media containing the user chart data in the drive.

(2) Press [Import All Data] in the Chart group on the main screen. The Import screen is displayed.



(3) A list of the user charts stored on the media is displayed.

* Press [Refresh] to update the list of the user charts stored on the media in the drive.

* Press [Eject] to eject the media from the drive.

(4) Press [OK]. The author names of all the user charts displayed on the Import screen are displayed on the OB Registration main screen.

* The contents of the imported user charts cannot be confirmed at this stage. To check the contents of an imported user chart, select the user chart on the main screen and press [Modify].

14.16 Deleting All User Charts

(1) Press [Clear All]. The confirmation dialog is displayed.

(2) Press [OK] to delete all the user charts displayed in the list area.

14.17 Closing the OB Registration Screen

(1) Press [Quit] on the OB Registration screen. The user charts displayed in the list area are registered to the system and the OB Registration screen is then closed.

CAUTION:	A dialog is displayed during registration of the user charts. Do not operate the panel while this dialog is displayed.

14.18 Using a User Chart

(1) Select User1 or User2 (author of a user chart) for each item on the OB Calc. page or D calc. page of the preset menu.

14.19 Measurement and Calculation Items to Which User Charts Can Be Registered

- 2D measurement items

	Item name	Formal name
<1>	BPD	Biparietal Diameter
<2>	OFD	Occipito Frontal Diameter
<3>	HC	Head Circumference
<4>	THD	Thoracic Diameter
<5>	TAD	Transverse Abdominal Diameter
<6>	TTD	Transverse Trunk Diameter
<7>	APAD	Antero-Posterior Abdominal Diameter
<8>	APTD	Antero-Posterior Trunk Diameter
<9>	AC	Abdominal Circumference
<10>	FL	Femur Length
<11>	CRL	Crown-Rump Length
<12>	Humerus	Humerus
<13>	Radius	Radius
<14>	Ulna	Ulna
<15>	Tibia	Tibia
<16>	Fibula	Fibula
<17>	CER	Cerebellum
<18>	Foot	Foot Length
<19>	GS	Gestational Sac Diameter
<20>	OOD	Outer Orbital Diameter
<21>	Kidney	Kidney Length
<22>	HA	Head Area
<23>	AA	Abdominal Area
<24>	FTA	Fetal Trunk cross-sectional Area
<25>	Clavicle	Clavicle Length

- 2D calculation item

	Item name	Formal name
<26>	EFW	Estimated Fetal Weight

- Doppler calculation items

	Item name	Formal name
<1>	Fetal Ao RI	Fetal Aorta RI
<2>	Fetal Ao PI	Fetal Aorta PI
<3>	MCA RI	Middle Cerebral Artery RI
<4>	MCA PI	Middle Cerebral Artery PI
<5>	Umb A RI	Umbilical Artery RI
<6>	Umb A PI	Umbilical Artery PI
<7>	Lt Uterin RI	Left Uterin Artery RI
<8>	Lt Uterin PI	Left Uterin Artery PI
<9>	Rt Uterin RI	Right Uterin Artery RI
<10>	Rt Uterin PI	Right Uterin Artery PI

[Export] becomes effective when a user chart is selected on the OB Registration main screen.

15. Measurements on a Stored Image

In this system, it is possible to perform measurement using images displayed in Exam Review (hereinafter referred to as ER images) and using images recorded in the video recording unit (hereinafter referred to as video images).

Refer to section 3 of the operation manual <<Applications>> volume.

For the operating procedures for the video recording unit, refer to section 13 of the operation manual <<Applications>> volume.

When a stored image is used for measurement, the system requires information about relationship between the distance on the screen and the corresponding distance on the patient. However, this information is stored only with ER images. For other images (video images or ER images in which settings such as DEPTH are changed during live image acquisition), this information must be obtained using a separate procedure (manual calibration).

This section describes the three types of measurements below. Each type has different restrictions. Understand the characteristics of each measurement type before performing measurements on stored images.

(1) Measurements on ER images (refer to subsection 15.1)

(2) Measurements on ER images that require manual calibration (refer to subsection 15.2)

(3) Measurements on video images (refer to subsection 15.3)

NOTE:

1. The measurement items listed below are effective only when all the measurement tools that contain these measurement items are set for the same image frame. These items cannot be calculated if the associated measurement tools are set for different image frames.

   - %Stenosis Area
   - %Stenosis Dist
   - mean IMT
   - Flow Vol.
   - Volume

2. In manual calibration, only velocity setting is possible on the Doppler waveform. Frequency cannot be set.
   When velocity measurement or velocity trace measurement is performed and then the measurement data is output to the Windows cache or a server from the Report screen, the data for Frequency acquired in manual calibration is set to "0".

3. When a measurement is to be performed on an ER image or video image, the exam type (application preset) of the displayed image may be different from that currently selected in the system. In this case, the measurement is started with the exam type selected in the system.

4. Basic measurements can be performed with any application presets. Application measurements are possible in all the application presets other than OB/Gyn.

5. Do attempt to perform measurements from the Report screen, Patient Browser screen, or any other non-ultrasound image screen.

15.1 Measurements on ER Images

* Manual calibration is required for images for which the depth or another setting has been changed during acquisition. Refer to subsection 15.2.

* When the wheel of the trackball section on the main panel is operated during measurement, ER measurement is terminated and the system enters Exam Review status.

* Measurement cannot be performed using 3D or Panoramic View images.

⚠CAUTION:

1. **Display the most suitable image and select the most suitable measurement tool for the intended measurement. The appropriate measurement methods and results must be determined by a specialist.**

2. **It is also possible to perform measurement using an image on which measurement has been performed during examination and to print the image with the results of the two measurements. In the case of black-and-white printing, the caliper and measurement results for the first measurement may be confused with those for the second measurement. To prevent such confusion in later image viewing on printed images, take appropriate measures such as placing an identification mark at the head of the results of the first measurement.**

(1) Display the ER image on the monitor.

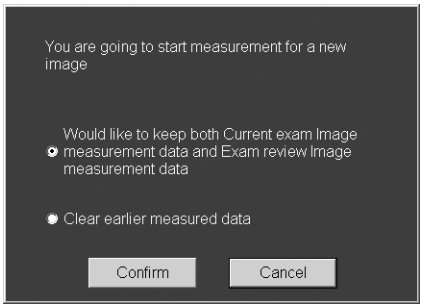
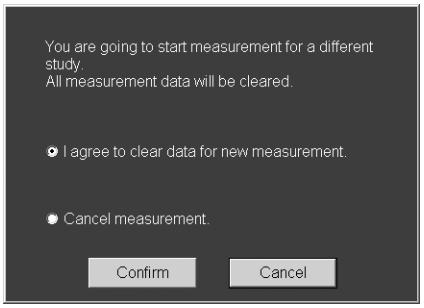
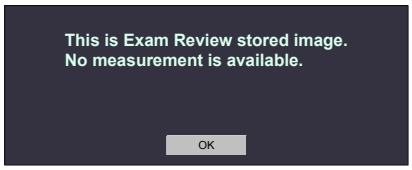
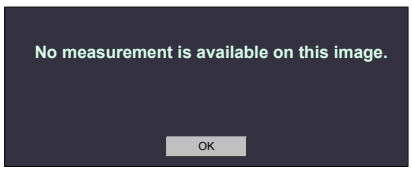
(2) Press the desired measurement switch (

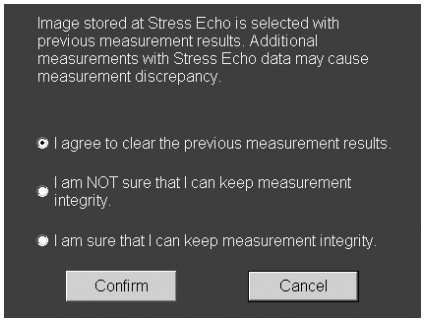
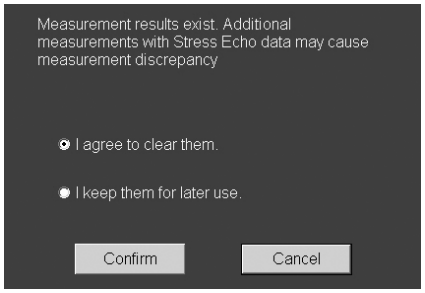
, 

, or 

). The measurement is enabled.

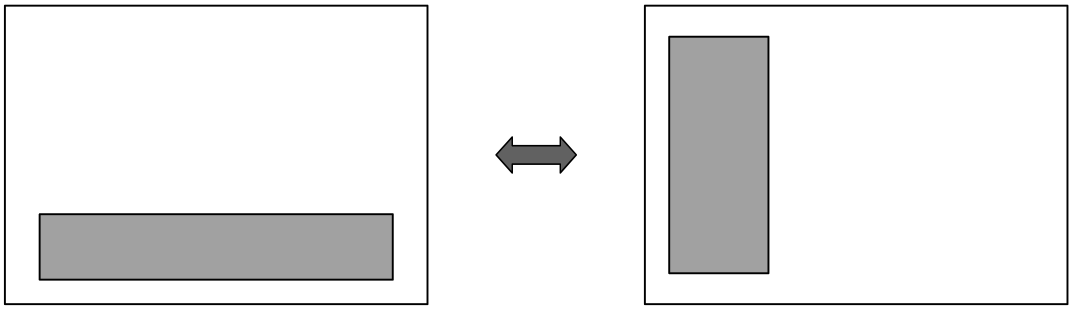
* One of the following messages may be displayed. Confirm the message. If [Cancel] is selected, the measurement is not started.

Message	Detail
	This message is displayed when an attempt is made to start measurement using an ER image belonging to the current exam. To perform ER measurement while retaining the application measurement data, select "Would like to keep both Current exam Image measurement data and Exam review Image measurement data" and then press [Confirm]. The application measurement data is retained when ER measurement is terminated. To clear the application measurement data and perform ER measurement, select "Clear earlier measured data" and then press [Confirm]. In this case, the application measurement data is cleared when the ER measurement is terminated.
	This message is displayed when incomplete application measurement data exists for the current exam and an attempt is made to start measurement using an ER image belonging to a study other than the current exam. To clear the application measurement data and perform ER measurement, select "I agree to clear data for new measurement." and then press [Confirm]. In this case, the application measurement data is cleared when the ER measurement is terminated.
	This message is displayed when an attempt is made to perform measurement again on an ER image for which measurements have been performed and the results have been stored. In this case, measurement cannot be started.
	This message is displayed if an attempt to made to start measurement for images for which measurement is not permitted, for example, Panoramic View images. In this case, measurement cannot be started.

Message	Detail
	This message is displayed when an attempt is made to start ER measurement using an image stored during SE Pause. To clear the application measurement data and perform ER measurement, select "I agree to clear the previous measurement results." and then press [Confirm].
	This message is displayed when application measurement data exists and an attempt is made to terminate ER measurement using an image stored during SE Pause. To clear the application measurement data and terminate ER measurement, select "I agree to clear them." and then press [Confirm].

(3) Perform measurement. The results are displayed on the screen.

* The result display position can be changed as shown below each time [Window Position] on the touch panel is pressed. However, if the results are displayed using too many lines, the setting shown in the figure on the left below is selected automatically.



15.2 Measurements on ER Images that Require Manual Calibration

Manual calibration is required for the following type of images.

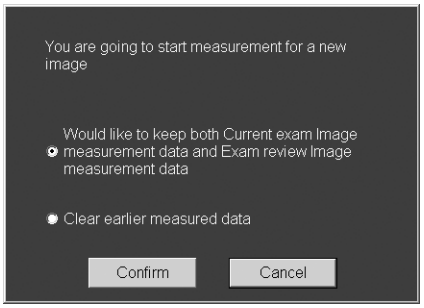
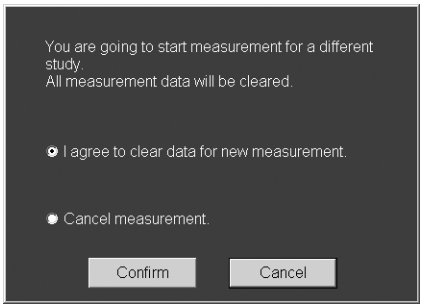
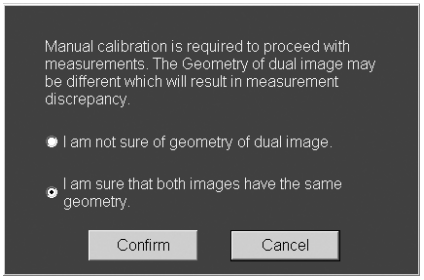
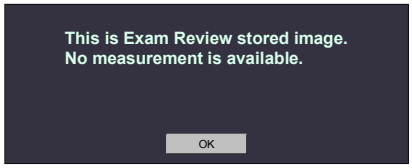
- ER images for which the depth or another setting has been changed during acquisition

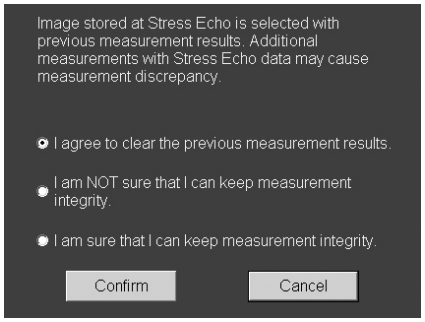
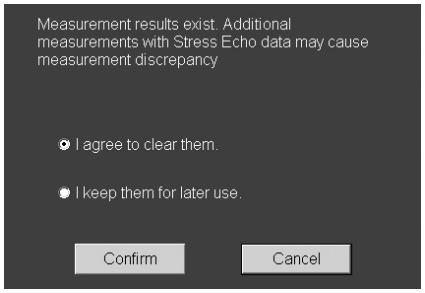
⚠CAUTION:

1. **Display the most suitable image and select the most suitable measurement tool for the intended measurement. The appropriate measurement methods and results must be determined by a specialist.**
2. **Do not use 3D images or Panoramic View images for measurement.**
3. **In manual calibration, the information on the stored image is used to set the information required for measurement. Accordingly, the measurement results will depend on the values set on the stored image. Errors in the settings will affect the measurement results and the measurement accuracy is lower than in measurements using images acquired during examination. In the worst case, the error after calibration can be ±5% for an object that is 100 mm in length. For details, refer to subsection 16.6. Use the manual calibration function only after understanding its characteristics thoroughly.**
4. **In manual calibration, the accuracy of the scale setting used for measurement affects the accuracy of the measurement results as described in 3 above. To increase the accuracy of the scale setting, the calibration marker should be set using the scale graduations as reference. For example, align the center lines of the calibration marker handles with the graduations.**
5. **It is also possible to perform measurement using an image on which measurement has been performed during examination and to print the image with the results of the two measurements. In the case of black-and-white printing, the caliper and measurement results for the first measurement may be confused with those for the second measurement. To prevent such confusion in later image viewing on printed images, take appropriate measures such as placing an identification mark at the head of the results of the first measurement.**

(1) Display an ER image that meets the condition above.

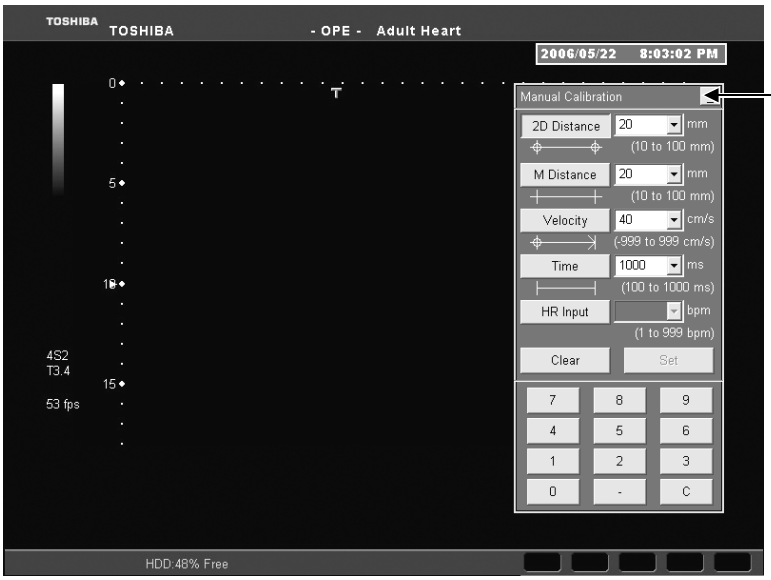
(2) Press the desired measurement switch (CALIPER, TRACE, or CALC). One of the following messages is displayed. If [Cancel] is selected, the measurement is not started.

Message	Detail
	This message is displayed when an attempt is made to start measurement using an ER image belonging to the current exam. To perform ER measurement while retaining the application measurement data, select "Would like to keep both Current exam Image measurement data and Exam review Image measurement data" and then press [Confirm]. The application measurement data is retained when ER measurement is terminated. To clear the application measurement data and perform ER measurement, select "Clear earlier measured data" and then press [Confirm]. In this case, the application measurement data is cleared when the ER measurement is terminated.
	This message is displayed when incomplete application measurement data exists for the current exam and an attempt is made to start measurement using an ER image belonging to a study other than the current exam. To clear the application measurement data and perform ER measurement, select "I agree to clear data for new measurement." and then press [Confirm]. In this case, the application measurement data is cleared when the ER measurement is terminated.
	This message is displayed when an attempt is made to start measurement using ER images displayed in dual mode and the images have been processed with the Dual Parameters function (depth change, panning, or zooming). This message indicates that it is necessary to confirm that the image sizes of the two images are the same. Select the applicable condition and then press [Confirm]. For display modes other than 2D DUAL, select "I am sure that both images have the same geometry." and then press [Confirm]. If "I am not sure of geometry of dual image." is selected, the images cannot be used for measurement.
	This message is displayed when an attempt is made to perform measurement again on an ER image for which measurements have been performed and the results have been stored. In this case, measurement cannot be started.

Message	Detail
	This message is displayed when an attempt is made to start ER measurement using an image stored during SE Pause. To clear the application measurement data and perform ER measurement, select "I agree to clear the previous measurement results." and then press [Confirm].
	This message is displayed when application measurement data exists and an attempt is made to terminate ER measurement using an image stored during SE Pause. To clear the application measurement data and terminate ER measurement, select "I agree to clear them." and then press [Confirm].

(3) If measurement is possible and manual calibration is required for the displayed image, the menu below is displayed. Set the measurement scale on this screen.

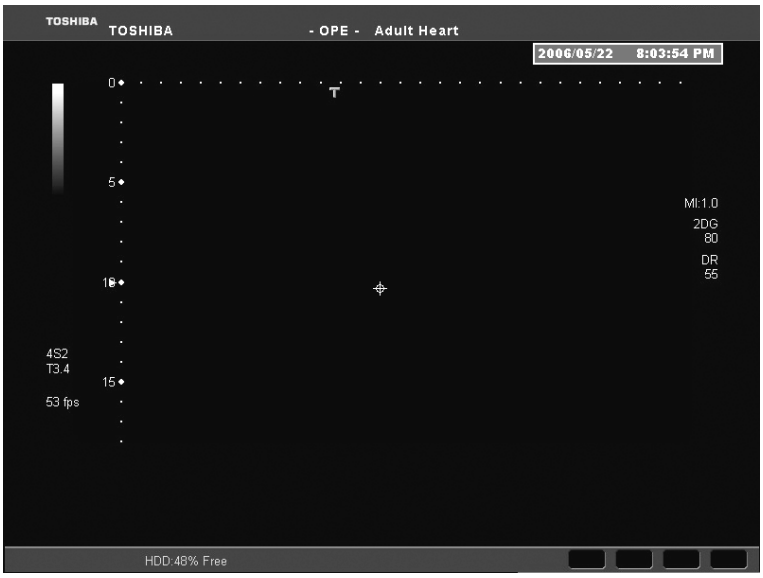
⚠CAUTION: Confirm the unit before entering the value of the calibration marker.



Menu

The procedure for setting the calibration marker for 2D Distance measurement is described below as an example.

(a) Press [2D Distance] in the menu. The menu disappears and the start point marker is displayed.

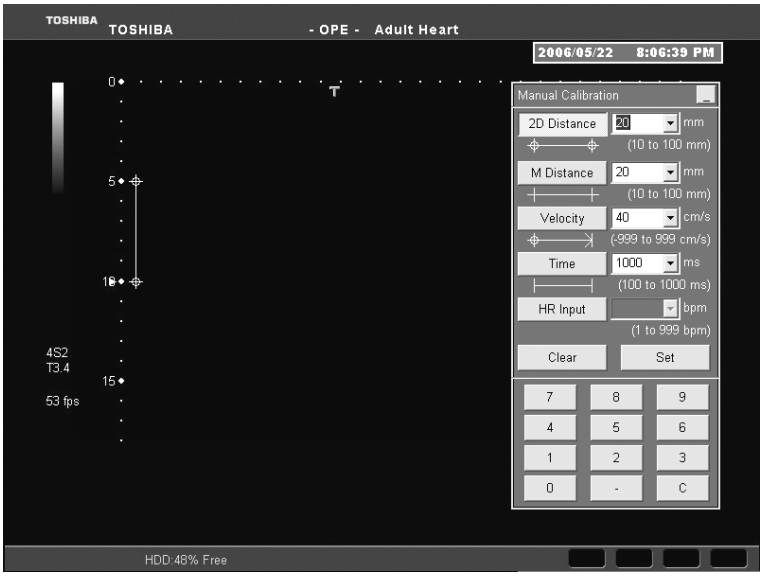


(b) Move the marker to the start point using the trackball and then press 

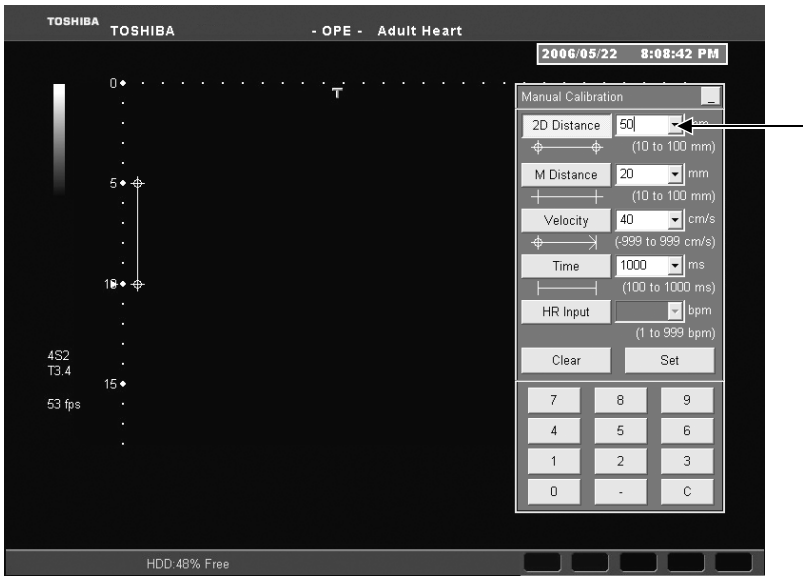
.

(c) Move the marker to the end point using the trackball and then press 

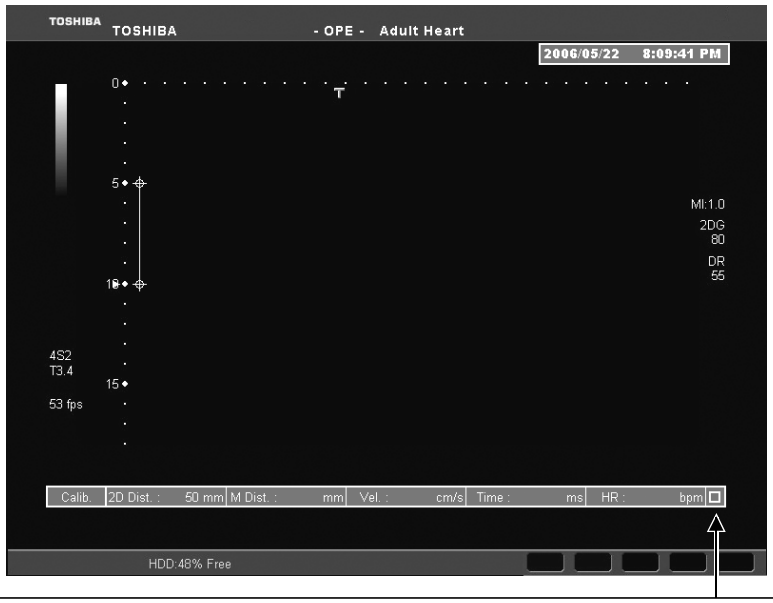
.
The menu appears again.



(d) Enter the length of the calibration marker set in step (c) in the box on the right of [2D Distance].

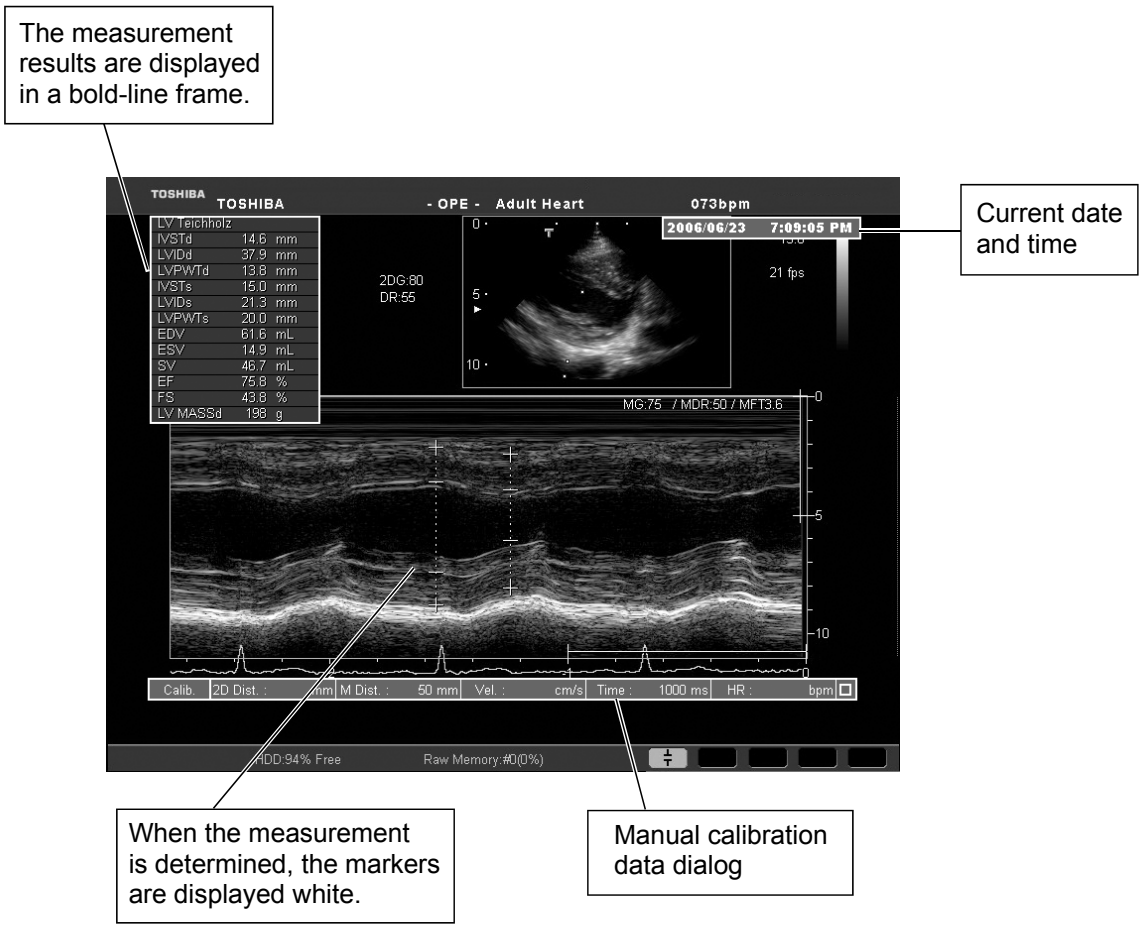


(e) Press [Set] in the menu. The calibration marker length is determined and the manual calibration data dialog is displayed at the bottom of the screen. When a measurement switch on the touch panel is then pressed, the measurement marker appears and measurement becomes possible.



To correct the calibration marker, press [Caliper Edit] on the touch panel, click this box, and repeat the setting procedure.

<<Example of measurement screen during manual calibration>>



15.3 Measurements on Video Images

Manual calibration is required for video images.

⚠CAUTION:

1. **Display the most suitable image and select the most suitable measurement tool for the intended measurement. The appropriate measurement methods and results must be determined by a specialist.**
2. **Do not perform measurements on video images acquired with a system other than Xario.**
3. **Do not use 3D images or Panoramic View images for measurement.**
4. **In manual calibration, the information on the stored image is used to set the information required for measurement. Accordingly, the measurement results will depend on the values set on the stored image. Errors in the settings will affect the measurement results and the measurement accuracy is lower than in measurements using images acquired during examination. In the worst case, the error after calibration can be ±10% for an object that is 100 mm in length. For details, refer to subsection 15.6. Use the manual calibration function only after understanding its characteristics thoroughly.**
5. **In manual calibration, the accuracy of the scale setting used for measurement affects the accuracy of the measurement results as described in 4 above. To increase the accuracy of the scale setting, the calibration marker should be set using the scale graduations as reference. For example, align the center lines of the calibration marker handles with the graduations.**
6. **The scale and graduations may not be seen clearly depending on when the playback is paused. In this case, pause the playback again at a timing at which the scale and graduations are clearly seen and then start calibration.**
7. **It is also possible to perform measurement using an image on which measurement has been performed during examination and to print the image with the results of the two measurements. In the case of black-and-white printing, the caliper and measurement results for the first measurement may be confused with those for the second measurement. To prevent such confusion in later image viewing on printed images, take appropriate measures such as placing an identification mark at the head of the results of the first measurement.**

NOTE: When measurement is performed on a video image, the measurement results cannot be saved.

15.3.1 Daily checks for recording to the video recording unit

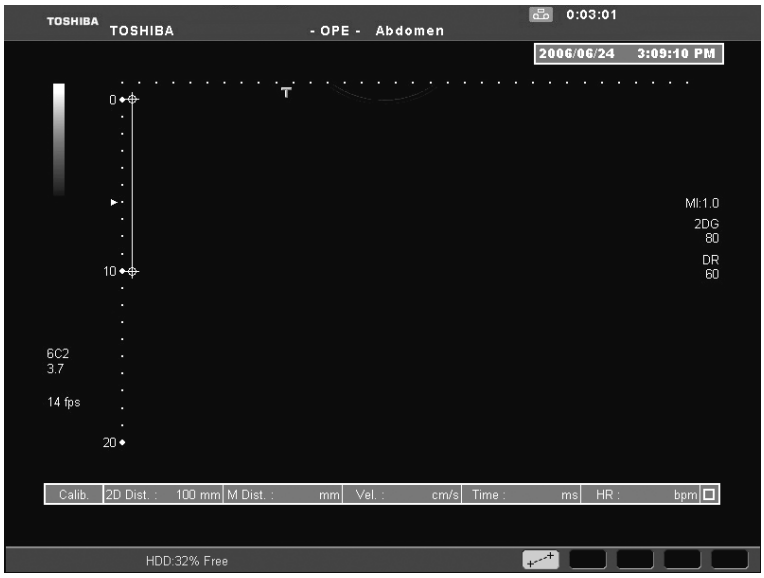
Perform the following checks daily to ensure that the video recording unit is ready for recording and playback.

<<Check procedure>>

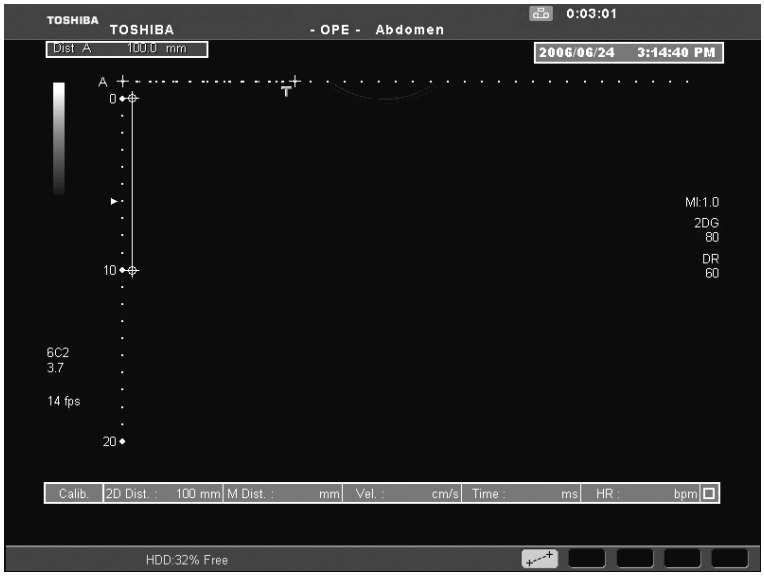
The vertical and horizontal scales of a stored image are measured using the manual calibration function.

(1) Start the system and connect a body-surface transducer such as the PVT-375BT to the system. Display a 2D-single image and set the DEPTH to 20 cm. Record the image in the video recording unit.

(2) Play back the recorded image. Using the manual calibration function, set a calibration marker 100 mm in length using the vertical scale as the reference and enter the length of the calibration marker in the box on the right of [2D Distance]. Measurement becomes possible.



(3) Measure the distance corresponding to 10 graduations on the horizontal scale and confirm that the error is within ±5% of the distance set on the vertical scale (95 mm to 105 mm).

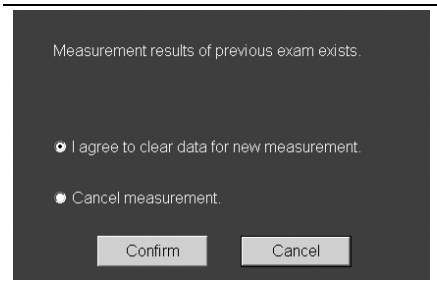
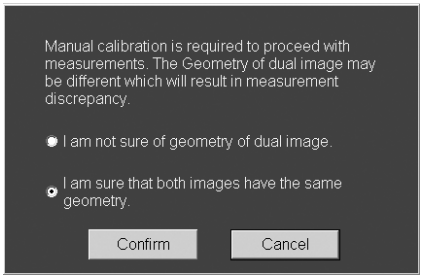
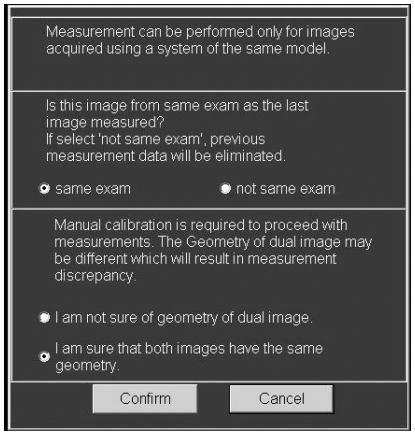


(4) If the error is more than ±5%, set the calibration marker again carefully. If the error is still greater than ±5%, check whether the error is acceptable for the intended use. If the error is not acceptable, do not use the video image for measurement.

15.3.2 Measurement on a video image

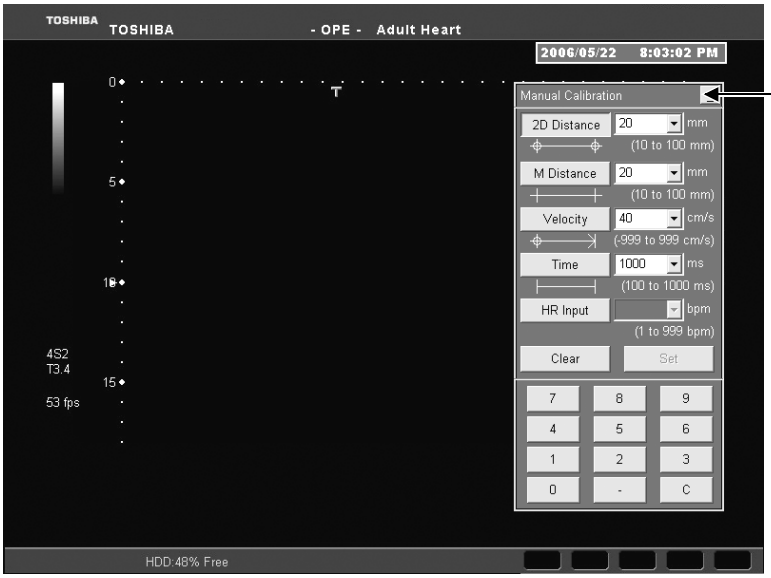
(1) Display a video image on the monitor.

(2) Press the desired measurement switch (CALIPER, TRACE, or CALC). One of the following messages is displayed. If [Cancel] is selected, the measurement is not started.

Message	Detail
	This message is displayed when incomplete application measurement data exists and an attempt is made to start measurement using a video image. To clear the application measurement data and perform VIDEO measurement, select "I agree to clear data for new measurement." and then press [Confirm].
	This message is displayed when an attempt is made to start measurement using video images displayed in dual mode and the images have been processed with the Dual Parameters function (depth change, panning, or zooming). This message indicates that it is necessary to confirm that the image sizes of the two images are the same. Select the applicable condition and then press [Confirm]. For display modes other than 2D DUAL, select "I am sure that both images have the same geometry." and then press [Confirm]. If "I am not sure of geometry of dual image." is selected, the images cannot be used for measurement.
	This message is displayed when it is necessary to confirm that the video image belongs to the same exam as the last image measured (upper part of the dialog) and that the images displayed in dual mode are for the same depth (lower part of the dialog) at the same time. Select the applicable condition and then press [Confirm]. • Upper part of the dialog If the image belongs to the same exam as the last image measured, select "same exam". If "not same exam" is selected, the application measurement data is cleared. • Lower part of the dialog For display modes other than 2D DUAL, select "I am sure that both images have the same geometry." and then press [Confirm]. If "I am not sure of geometry of dual image." is selected, the images cannot be used for measurement.

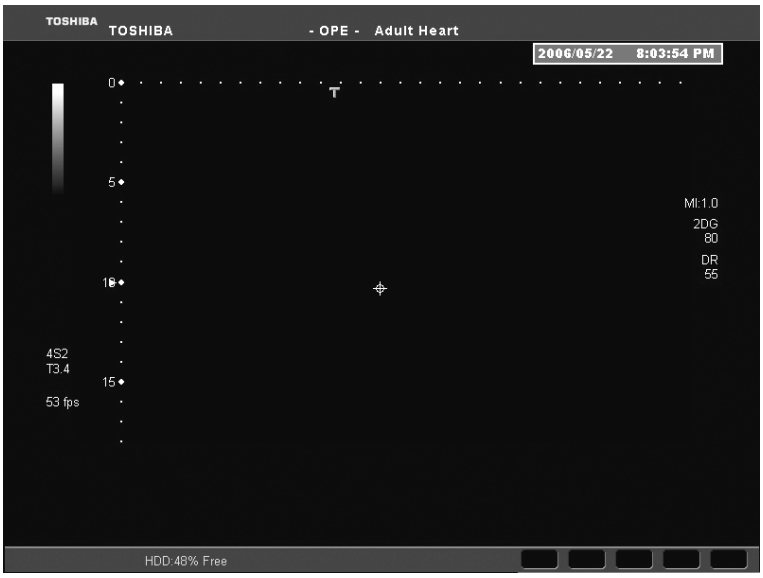
(3) If measurement is possible and manual calibration is required for the displayed image, the menu below is displayed. Set the measurement scale on this screen.

⚠CAUTION: Confirm the unit before entering the value of the calibration marker.



The procedure for setting the calibration marker for 2D Distance measurement is described below as an example.

(a) Press [2D Distance] in the menu. The menu disappears and the start point marker is displayed.

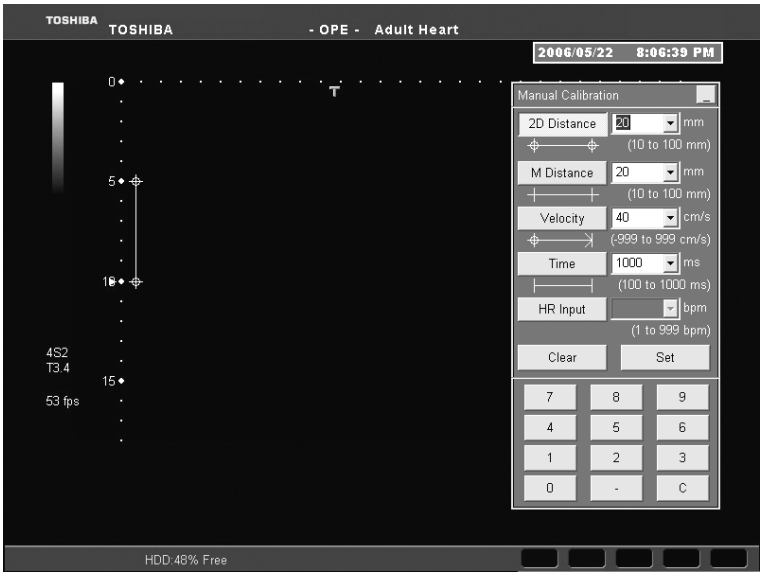


(b) Move the marker to the start point using the trackball and then press 

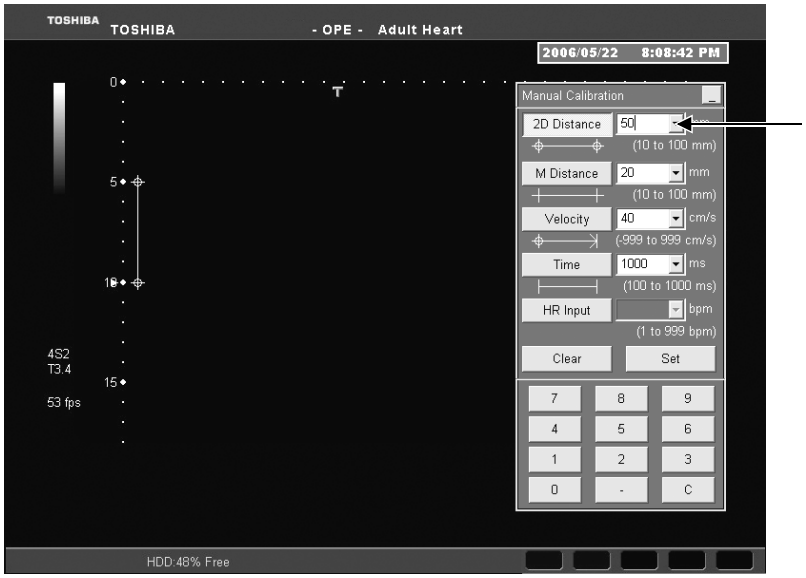
.

(c) Move the marker to the end point using the trackball and then press 

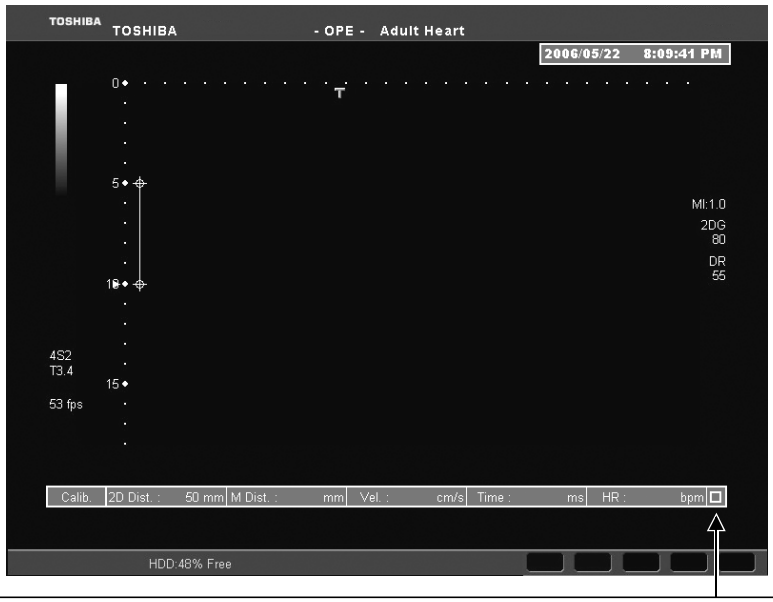
.
The menu appears again.



(d) Enter the length of the calibration marker set in step (c) in the box on the right of [2D Distance].

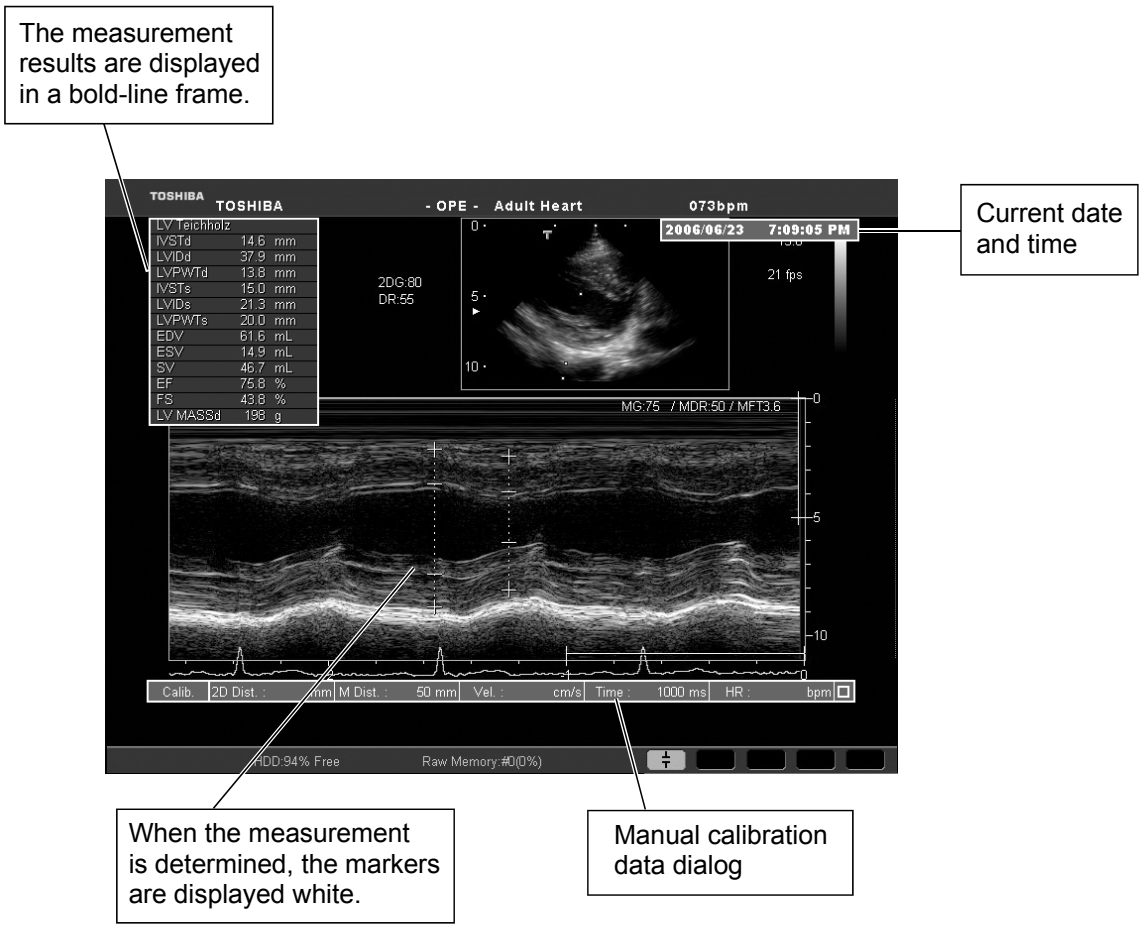


(e) Press [Set] in the menu. The calibration marker length is determined and the manual calibration data dialog is displayed at the bottom of the screen. When a measurement switch on the touch panel is then pressed, the measurement marker appears and measurement becomes possible.



To correct the calibration marker, press [Caliper Edit] on the touch panel, click this box, and repeat the setting procedure.

<<Example of measurement screen during manual calibration>>



15.4 Manual Calibration Required Before the Start of Each Measurement

The table below shows the manual calibration items required for each measurement tool. When performing manual calibration, enter the HR value if required.

○: Required, –: Not required

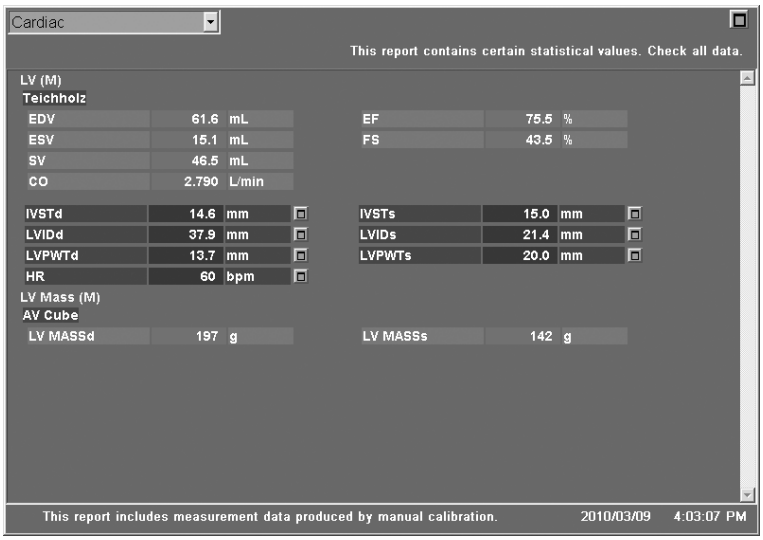
Measurement tool	2D Distance	M Distance	Velocity	Time
2D Angle	○	–	–	–
2D Distance	○	–	–	–
2D CrossArea	○	–	–	–
2D EllipseArea	○	–	–	–
2D Continuous Trace Length	○	–	–	–
2D Continuous Trace Area	○	–	–	–
2D Spline Trace Length	○	–	–	–
2D Spline Trace Area	○	–	–	–
2D Volume	○	–	–	–
2D Joint	○	–	–	–
2D Mean IMT	○	–	–	–
2D %Stenosis Distance	○	–	–	–
2D %Stenosis Area	○	–	–	–
D Accel	–	–	○	○
D HR	–	–	–	○
D Velocity Line Trace	–	–	○	○
D Velocity Spline Trace	–	–	○	○
D Time	–	–	–	○
D Velocity Continuous Trace	–	–	○	○
D Velocity	–	–	○	–
D PI Continuous Trace	–	–	○	○
D PI Spline Trace	–	–	○	○
D PI Line Trace	–	–	○	○
D RI	–	–	○	–
D S/D	–	–	○	–
M Distance	–	○	–	–
M HR	–	–	–	○
M Slope	–	○	–	○
M Time	–	–	–	○
2D MOD Continuous Trace	○	–	–	–
2D MOD Spline Trace	○	–	–	–
2D LPC	○	–	–	–
M LPC	–	○	–	–
D DcT	–	–	○	○
D PHT	–	–	○	○
D dP/dt	–	–	○	○

Measurement tool	2D Distance	M Distance	Velocity	Time
D Velocity Continuous Trace with DCT (coronary) measurement	–	–	○	○

15.5 Report Display

A report can be displayed in all the application presets other than OB/Gyn.

For data for which manual calibration has been performed, the message "This report includes measurement data produced by manual calibration" is displayed at the bottom of the screen.



15.6 Accuracy of Measurement When Manual Calibration Is Used

Accuracy of Each Clinical Measurement Parameter on video Images

Parameter	Range	Accuracy
- Image Depth Scale	Up to 280 mm	< ±10% or < 9 mm, if below 90 mm
- Physio/Image Scales	Up to 10 s	< ±3%
- Distance/Depth	Up to 280 mm	< ±10% or < 9 mm, if below 90 mm
- Area	Up to 999 cm^2	< ±21% or < 17 cm^2, if below 81 cm^2
- Circumference	Up to 1800 mm	< ±10% or < 9 mm, if below 90 mm
- Angle	0° to 180°	< ±2°
- Volume	Up to 4200 cm^3	< ±33% or < 241 cm^3, if below 729 cm^3
- Velocity	Up to 2000 cm/s	< ±10% of the full scale
- Time	Up to 10 s	< ±3% of the full scale
- Heart Rate	20 to 600 bpm	< ±3%
- Accel	Up to 20000 cm/s^2	< ±15%
- M distance	Up to 280 mm	< ±10% or < 10 mm, if below 100 mm
- Slope	Up to 1000 cm/s	< ±15%

Accuracy of Each Clinical Measurement Parameter on ER Images

Parameter	Range	Accuracy
- Image Depth Scale	Up to 280 mm	< ±5% or < 3.6 mm, if below 72 mm
- Physio/Image Scales	Up to 10 s	< ±3%
- Distance/Depth	Up to 280 mm	< ±5% or < 3.6 mm, if below 72 mm
- Area	Up to 999 cm^2	< ±10% or < 1 cm^2, if below 57 cm^2
- Circumference	Up to 1800 mm	< ±5% or < 3.6 mm, if below 72 mm
- Angle	0° to 180°	< ±1°
- Volume	Up to 4200 cm^3	< ±16% or < 58 cm^3, if below 373 cm^3
- Velocity	Up to 2000 cm/s	< ±5% of the full scale
- Time	Up to 10 s	< ±3% of the full scale
- Heart Rate	20 to 600 bpm	< ±3%
- Accel	Up to 20000 cm/s^2	< ±9%
- M distance	Up to 280 mm	< ±5% or < 4 mm, if below 80 mm
- Slope	Up to 1000 cm/s	< ±9%

16. Measurement Data Saving

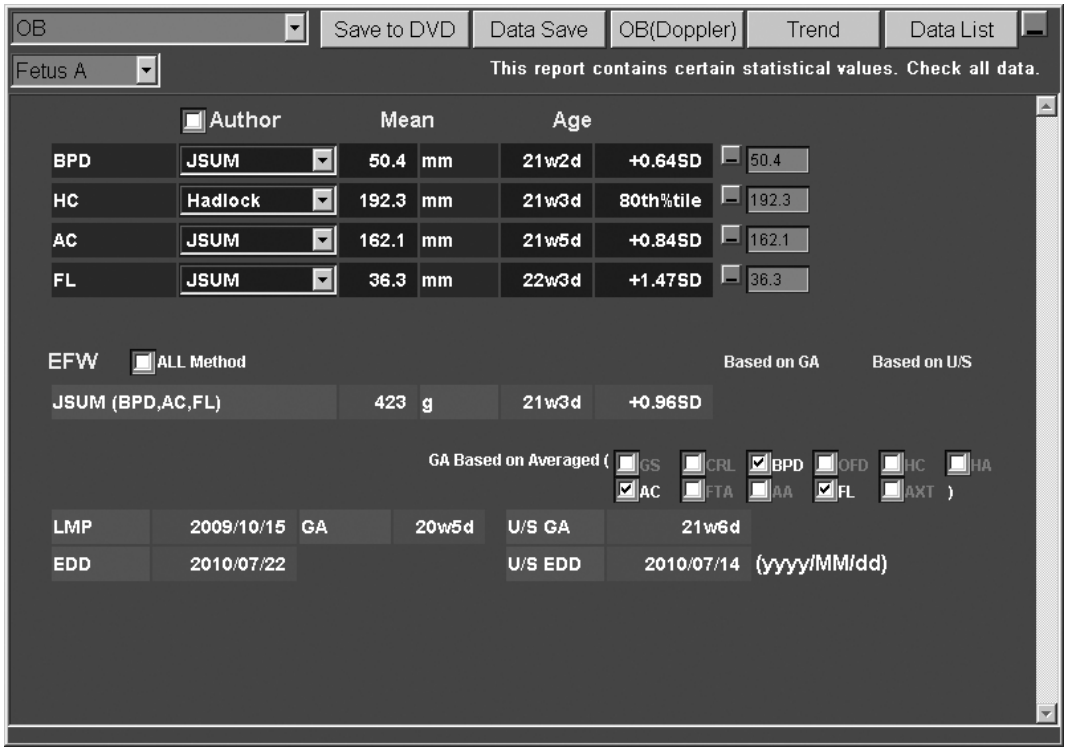
It is possible to save the results of measurement performed in this system to the Windows cache or to a server or PC connected on line using the switches displayed on the Report screen.

NOTE: 1. The data is converted to the XML format before it is saved.

2. To use this function, the system settings must be changed. Contact your Toshiba service representative.

16.1 Saving Measurement Data to Media

[Save to DVD] on the Report screen is used for saving measurement data to the Windows cache.



When [Save to DVD] is selected, a dialog indicating that saving is in progress is displayed. The dialog disappears automatically when the saving is completed.

If there is insufficient space in the HDD cache required for writing to media, an error dialog is displayed.

CAUTION: The patient ID must be entered to save the measurement data onto media. Be sure to enter the patient ID on the Patient Information screen before starting the examination.

The data is saved in the HDD cache for writing media or USB flash memory using the following path.

\other\patient ID\yyyyMMdd\Reporthhmmss.xml

Patient ID : A folder for the patient whose data is entered into the Patient Information screen is created in the Other folder.

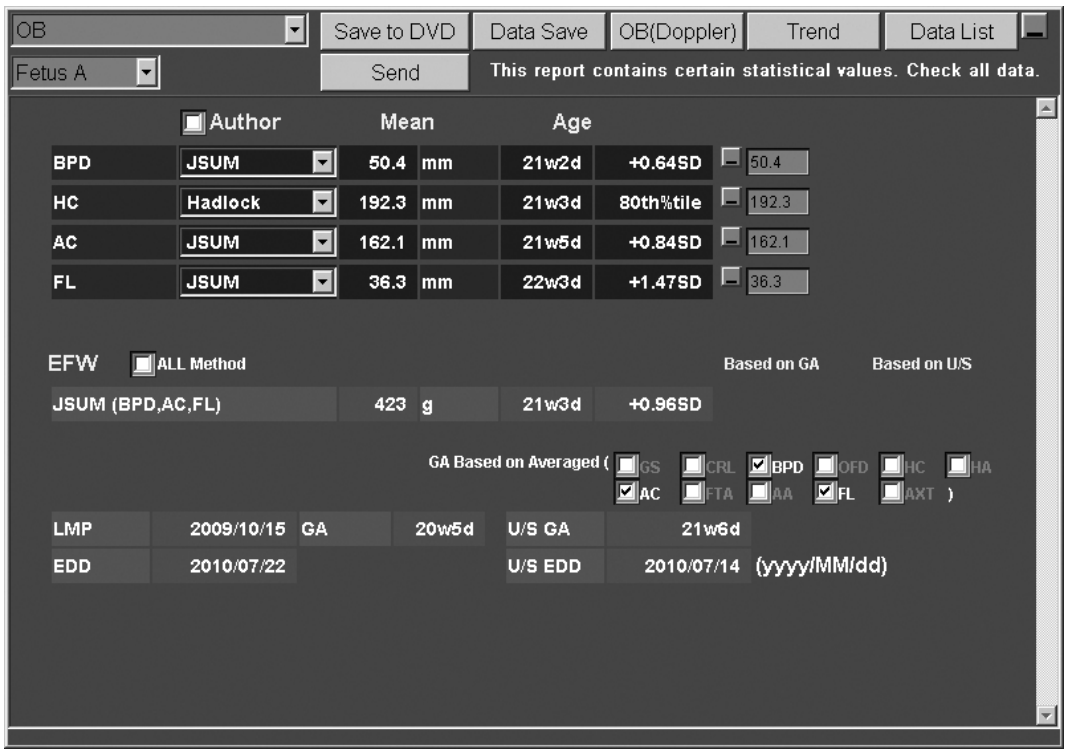
yyyyMMdd : Date when the data was saved

hhmmss : Time at which the data was saved

If more than one data set with the same patient ID is saved on a particular day, a separate file for each data set is created in the same folder.

16.2 Saving Measurement Data Over a Network

[Send] on the Report screen is used for saving measurement data over a network.



When [Send] is selected, a dialog indicating that the saving is in progress is displayed. The dialog disappears automatically when saving is completed.

If the data cannot be saved due to a network problem or there is no free space in the shared folder in the destination server (PC), an error dialog is displayed.

CAUTION: The patient ID must be entered to save the measurement data to a server or PC connected to this system on network. Be sure to enter the patient ID on the Patient Information screen before starting the examination.

NOTE:
1. If the network setting is not correct or the destination server (PC) cannot be accessed due to a network failure, [Send] is not displayed on the Report screen.
2. The response time before the saving is started varies according to the network traffic and the security check at the destination.

The data is saved in the shared folder using the following path.

\patient ID\yyyyMMdd\Reporthhmmss.xml

Patient ID : A folder whose name is the patient ID registered on the Patient Information screen is created in the top level of the shared folder hierarchy.

yyyyMMdd : Date when the data was saved

hhmmss : Time at which the data was saved

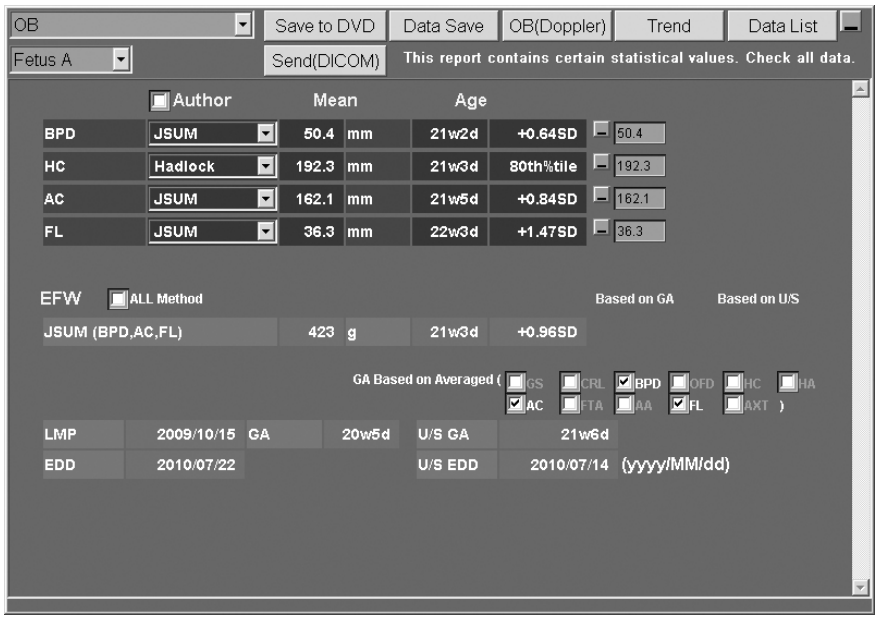
If more than one data set with the same patient ID is saved on a particular day, a separate file for each data set is created in the same folder.

16.3 Saving Measurement Data in the DICOM SR Format

* The DICOM option is required.

16.3.1 Saving the data

Use [Send (DICOM)] on the Report screen.



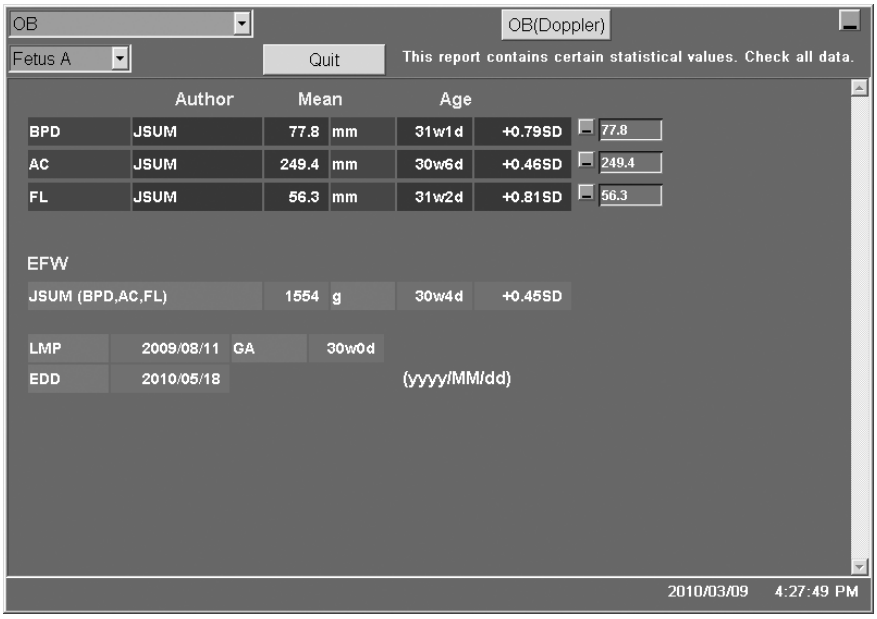
When [Send (DICOM)] is selected, a dialog indicating that data saving is in progress is displayed. This dialog disappears when data saving is completed.

CAUTION:

1. When [Send (DICOM)] is selected, the data is saved onto the HDD and at the same time can be transferred to the server or media.
2. If data transfer fails, a warning message is displayed in a blue window on the monitor. In this case, transfer the data again after the examination is complete using the Job Status function of the Patient Browser.
3. The patient ID must be entered to save the measurement data. Be sure to enter the patient ID on the Patient Information screen before starting examination.
4. When measurement is performed on saved images (such as video images and Exam Review images), it is not possible to save the measurement data in the DICOM format.
   In such cases, [Send (DICOM)] is not displayed on the Report screen.

16.3.2 Displaying the saved data

Select the SR data using the Patient Browser and press [Apply] or double-click the selected data. The Viewer is then activated.



- The saving date of the SR data is displayed at the upper right of the screen. The current date is displayed at the lower right of the screen.
- The Viewer can be operated in the same manner as in OB Report. For detailed operations, refer to subsection 12.9.
- When [Quit] is selected, the Viewer is terminated and the Patient Browser screen returns.

NOTE: 1. The design and operations of the Viewer have been matched to OB Report. However, there are some restrictions as described below.

- The measured value cannot be edited and deleted on the Viewer. In addition, comments cannot be entered.
- When the SR data of OB measurement is displayed, [Data Save], [Anatomy], and [Trend] are not displayed.
- The data displayed on the Viewer cannot be saved on media or a server.
  It is possible to print and store it as image data.

2. The display format used in the Viewer is the same as the system settings when the data was saved.
3. Measurements using stored images (VCR images, Exam Review images) cannot be saved in the DICOM format.
   [Send (DICOM)] is not displayed on the Report screen for such measurements.

17. Confirmation of Automatic Measurement Start Item

It is possible to confirm which measurement item is started automatically when the measurement switch or measurement tag is pressed.

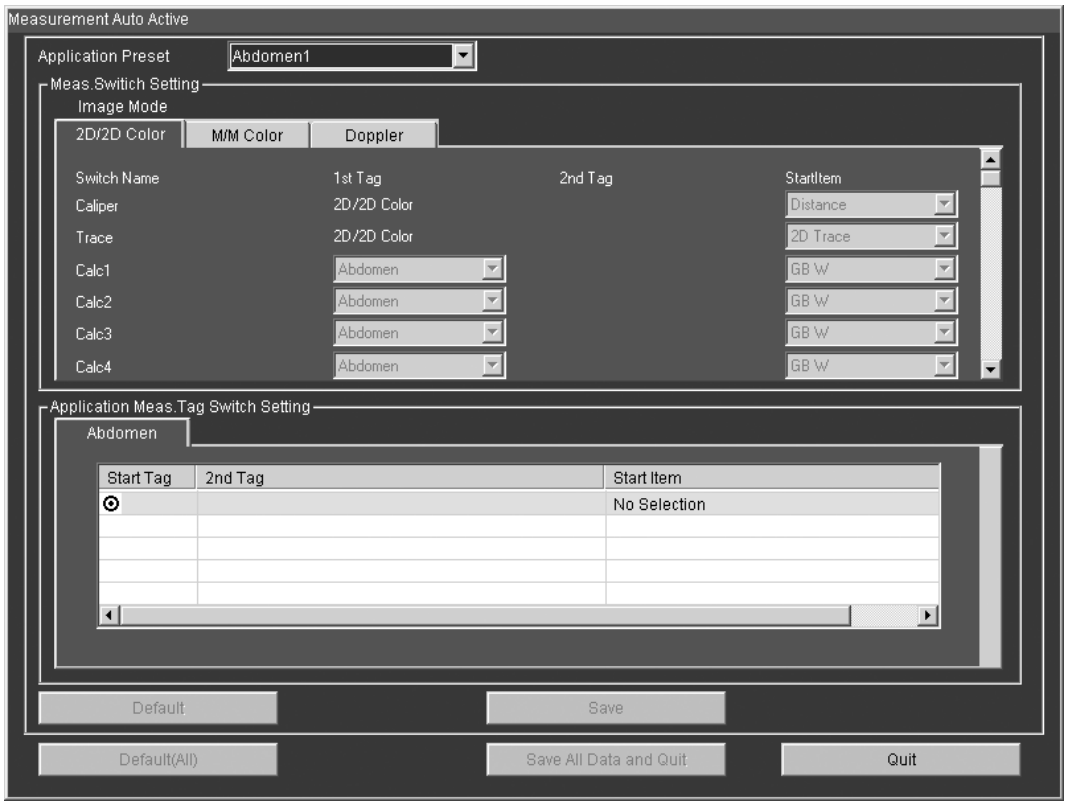
* Contact your Toshiba service representative for the measurement start item setting procedure.

17.1 Opening the Confirmation Screen

(1) Press MENU. The menu is displayed on the monitor.

(2) Select [System Setting] → [Meas. Auto Active].

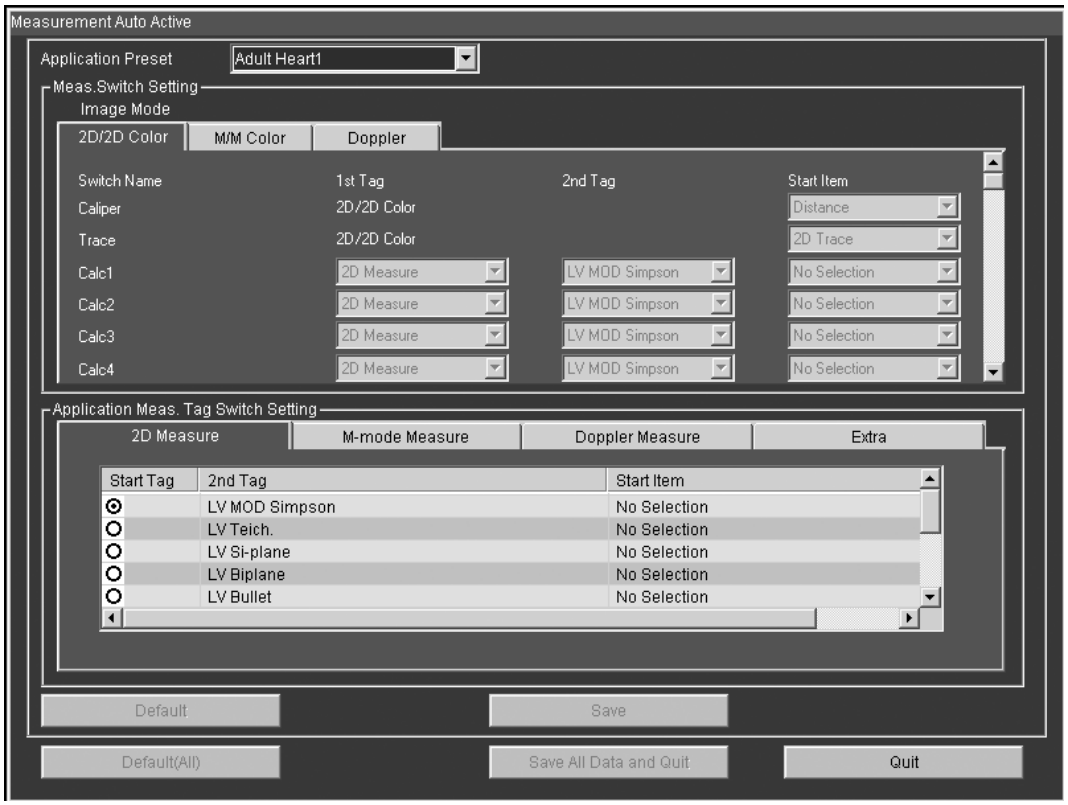
(3) The confirmation screen (Measurement Auto Active screen) is displayed with the settings for the currently selected application preset.



(Example for Abdomen1)

17.2 Entries in the Measurement Auto Active Screen

The following parameters can be set in the automatic measurement start item confirmation screen.



No.	Item	Function
<1>	Application Preset	The currently selected application preset is displayed by default. Select the desired application preset for which the measurement start item is to be confirmed.
<2>	Image Mode tags	The tag for the currently used image mode is displayed by default. Select the desired image mode for which the measurement start item is to be confirmed.
<3>	Application Meas. Tag Switch Setting tags	The tags which are displayed when the application measurement switch is pressed and the start item assigned to each tag can be confirmed.
<4>	Quit	Closes the Measurement Auto Active screen.

* The grayed-out switches are disabled and cannot be used to change the function or input settings.

TOSHIBA

LEGAL MANUFACTURER

TOSHIBA MEDICAL SYSTEMS CORPORATION

1385, SHIMOISHIGAMI, OTAWARA-SHI, TOCHIGI-KEN 324-8550, JAPAN