Operation Manual

ACCUVIX V20

CE 0123

(Empty page)

WARRANTY

MEDISON provides the following warranty to the purchaser of this system. This warranty is valid for a period of one year from the date of installation and covers all problems caused by faulty workmanship or faulty material. MEDISON will, as sole and exclusive remedy and at no charge, replace any such defective unit returned to MEDISON within the designated warranty period.

The warranty does not cover damages and loss caused by outside factors including, but not limited to fire, flood, storm, tidal wave, lightening, earthquake, theft, abnormal conditions of operation, and intentional destruction of the equipment. Damage caused by equipment relocation is not covered.

The warranty is void in cases where the equipment has been damaged as a result of an accident, misuse, abuse, dropping, or when attempts to modify or alter any part or assembly of the equipment have taken place.

Parts with cosmetic defects or deterioration will not be replaced.

Replacement of batteries, training materials, and supplies are not covered.

MEDISON will not be responsible for incidental or consequential damages of any kind arising from or connected with the use of the equipment.

MEDISON will not be responsible for any loss, damage, or injury resulting from a delay in services rendered under the warranty.

This limited warranty is in lieu of all other warranties expressed or implied, including warranties of merchant ability or fitness for any particular use. No representative or other person is authorized to represent or assume for MEDISON any warranty liability beyond that set forth herein.

Defective equipment shipped from you to MEDISON must be packed in the replacement cartons. Shipping and insurance costs are the responsibility of the customer. To return defective material to MEDISON, contact the MEDISON Customer Service Department.

MEDISON or a local distributor will make available, upon request, circuit diagrams, component parts lists, descriptions, calibration instructions and other information which will assist your appropriately qualified technical personnel to repair those parts of the equipment which are designated by MEDISON as repairable.

CAUTION : United States federal law restricts this device to sale by or on the order of a physician.

MEDISON

MANUFACTURED BY MEDISON CO., LTD
1003, Daechi-dong, Gangnam-Gu, SEOUL, 135-280 KOREA

MEDISON Customer Service Department
TEL : 82-2-2194-1234 FAX : 82-2-2194-1071 International World Wide Web: www. medison. com

EC Representative
SonoAce Deutschland GmbH Elbestrasse 10, 45768 Marl, Germany
TEL : 49-2365-924-3810 FAX : 49-2365-924-3830

(Empty page)

ACCUVIX V20

Operation Manual

Version 1.00.01

M346-E10000-01

(Empty page)

PROPRIETRAY INFORMATION AND SOFTWARE LICENSE

The Customer shall keep confidential all proprietary information furnished or disclosed to the Customer by MEDISON, unless such information has become part of the public domain through no fault of the Customer. The Customer shall not use such proprietary information, without the prior written consent of MEDISON, for any purpose other than the maintenance, repair or operation of the goods.

MEDISON's systems contain MEDISON's proprietary software in machine-readable form. MEDISON retains all its rights, title and interest in the software except that purchase of this product includes a license to use the machine-readable software contained in it. The Customer shall not copy, trace, disassemble or modify the software. Transfer of this product by the Customer shall constitute a transfer of this license that shall not be otherwise transferable. Upon cancellation or termination of this contract or return of the goods for reasons other than repair or modification, the Customer shall return to MEDISON all such proprietary information.

Safety Requirements

*** Classifications:**

- Type of protection against electrical shock: Class I
- Degree of protection against electrical shock (Patient connection): Type BF equipment
- Degree of protection against harmful ingress of water: Ordinary equipment
- Degree of safety of application in the presence of a flammable anesthetic material with air or with oxygen or nitrous oxide: Equipment not suitable for use in the presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide.
- Mode of operation: Continuous operation

*** Electromechanical safety standards met:**

- IEC/EN 60601-1 Medical Electrical Equipment, Part 1, General Requirements for Safety.
- IEC/EN 60601-1-1 Safety requirements for medical electrical systems.
- IEC/EN 60601-1-2 Electromagnetic compatibility -Requirements and tests.
- IEC 61157 Declaration of acoustic output parameters.
- ISO 10993-1 Biological evaluation of medical devices.
- UL 2601-1 Medical Electrical Equipment, Part 1, General Requirements for Safety.
- CSA 22.2, 601.1 Medical Electrical Equipment, Part 1, General Requirements for Safety.

*** Declarations**

This is CSA symbol for Canada and United States of America

CE 0123

This is manufacturer's declaration of product compliance with applicable EEC directive(s) and the European notified body.

CE

This is manufacturer's declaration of product compliance with applicable EEC directive(s).

READ THIS FIRST

How to Use Your Manual

This manual addresses the reader who is familiar with ultrasound techniques. Only medical doctors or persons supervised by medical doctors should use this system. Sonography training and clinical procedures are not included here. This manual is not intended to be used as training material for the principles of ultrasound, anatomy, scanning techniques, or applications. You should be familiar with all of these areas before attempting to use this manual or your ultrasound system.

This manual does not include diagnosis results or opinions. Also, check the measurement reference for each application's result measurement before the final diagnosis.

It is useless to make constant or complex adjustments to the equipment controls. The system has been preset at the factory to produce an optimum image in the majority of patients. User adjustments are not usually required. If the user wishes to change image settings, the variables may be set as desired. Optimal images are obtained with little difficulty.

We are not responsible for errors that occur when the system is run on a user's PC.

Please keep this user guide close to the product as a reference when using the system.

For safe use of this product, you should read 'Chapter1. Safety' in this manual, prior to starting to use this system.

NOTE	Some features are not available in some countries. The features with options, and specifications that this manual present can be changed without notice. Government approval is still pending in some nations.

Conventions Used in This Manual

DANGER	Describes precautions necessary to prevent user hazards of great urgency. Ignoring a DANGER warning will risk life-threatening injury.
WARNING	Used to indicate the presence of a hazard that can cause serious personal injury, or substantial property damage.
CAUTION	Indicates the presence of a hazard that can cause equipment damage.
NOTE	A piece of information useful for installing, operating and maintaining a system. Not related to any hazard.

System Upgrades and Manual Set Updates

MEDISON Ultrasound is committed to innovation and continued improvement. Upgrades may be announced that consist of hardware or software improvements. Updated manuals will accompany those system upgrades.

Verify that this version of the manual is correct for the system version. If not, please contact the Customer Service Department.

If You Need Assistance

If you need any assistance with the equipment, please contact the MEDISON Customer Service Department or one of their worldwide customer service representatives, immediately.

Table of Contents

Chapter 1 - Safety

Chapter 2 – Introduction and Installation

Chapter 3 – Setting

Chapter 4 – Diagnosis Mode

Chapter 5 – Measurements and Calculations

Chapter 6 – Image Management

Chapter 7 – Maintenance

Chapter 8 – Probes

** Reference Manual

MEDISON is providing an additional ACCUVIX V20 Reference Manual. GA tables and references for each application are included in the Reference Manual.

Chapter 1

Safety

Safety Signs

Please read this chapter before using the MEDISON ultrasound system. It is relevant to the ultrasound system, the probes, the recording devices, and any of the optional equipment.

ACCUVIX V20 is intended for use by, or by the order of, and under the supervision of, a licensed physician who is qualified for direct use of the medical device.

Safety Symbols

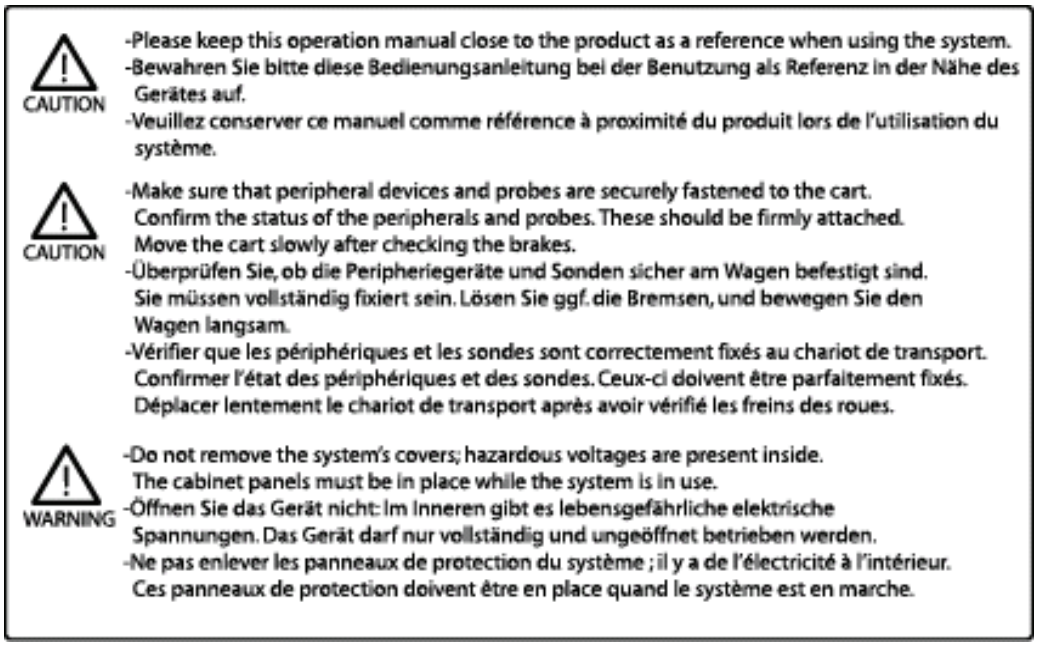
The International Electro Technical Commission (IEC) has established a set of symbols for medical electronic equipment, which classify a connection or warn of potential hazards. The classifications and symbols are shown below.

Symbols	Description
V~	AC (alternating current) voltage source
	Indicates a caution for risk of electric shock.
	Isolated patient connection (Type BF applied part).
	Power switch (Supplies/cuts the power for product)
	OFF (Cuts the power to a part of the product)
	ON (Supplies power to a part of the product)
	Refer to the User Manual.
	Identifies an equipotential ground.
	Indicates dangerous voltages over 1000V AC or over 1500V DC.

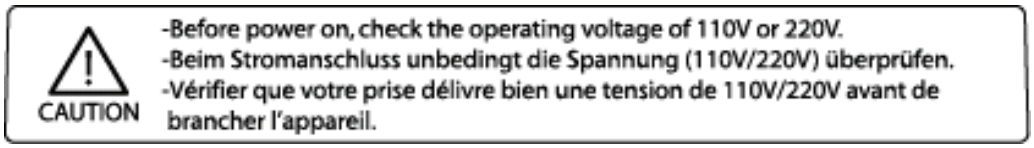
	Identifies the point where the system safety ground is fastened to the chassis. Protective earth connected to conductive parts of Class I equipment for safety purposes.
	Data Output port
	Data Input port
	Data Input/Output port
	Left and right Audio / Video input
	Left and right Audio / Video output
	Remote print output
	Foot switch connector
	ECG connector
	USB connector
	Microphone connector
 IPX 7	Protection against the effects of immersion.
 IPX 1	Protection against dripping water.
	Probe connector

Labels

To protect the system, you may see ‘Warning’ or ‘Caution’ marked on the surface of the product.



[Label 1. Marked on the back sides of the product]



[Label 2. Marked below OUTLET]

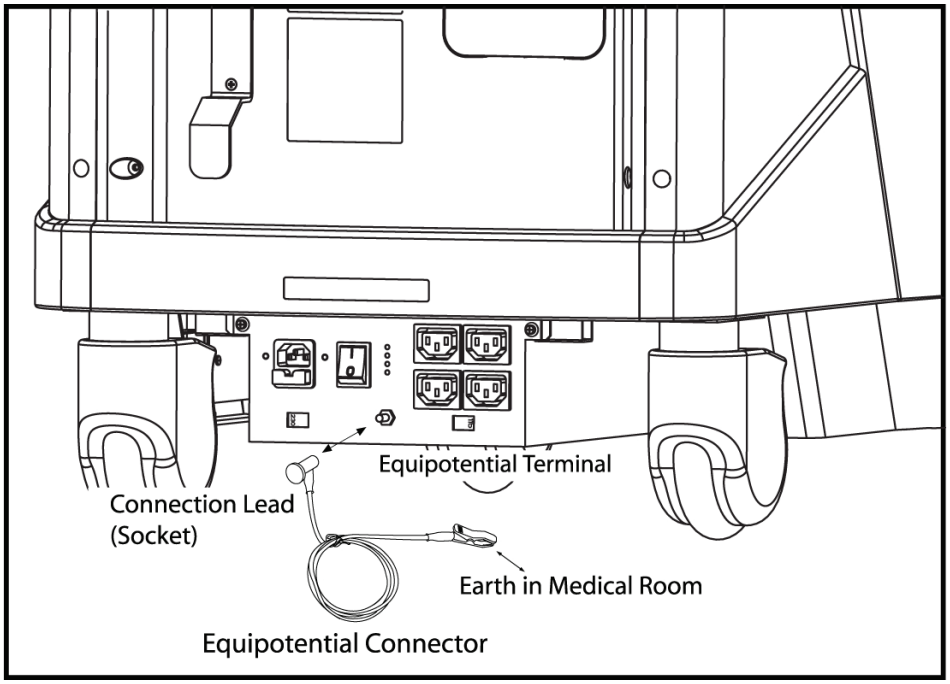
Electrical Safety

This equipment has been verified as a Class I device with Type BF applied parts.

CAUTION	■ As for US requirement, the LEAKAGE CURRENT might be measured from a center-tapped circuit when the equipment connects in the United States to 240V supply system. ■ **To help assure grounding reliability, connect to a "hospital grade" or "hospital only" grounded power outlet.**

Prevention of Electric Shock

In a hospital, dangerous currents are due to the potential differences between connected equipment and touchable conducting parts found in medical rooms. The solution to the problem is consistent equipotential bonding. Medical equipment is connected with connecting leads made up of angled sockets to the equipotential bonding network in medical rooms.



[Figure 1.1 Equipotential bonding]

Additional equipment connected to medical electrical equipment must comply with the respective IEC or ISO standards (e.g. IEC 60950 for data processing equipment). Furthermore all configurations shall comply with the requirements for medical electrical systems (see IEC 60601-1-1 or clause 16 of the 3 Ed. of IEC 60601-1, respectively). Anybody connecting additional equipment to medical electrical equipment configures a medical system and is

therefore responsible that the system complies with the requirements for medical electrical systems. Attention is drawn to the fact that local laws take priority over the above-mentioned requirements. If in doubt, consult your local representative or the technical service department.

WARNING	■ Electric shock may exist result if this system, including and all of its externally mounted recording and monitoring devices, is not properly grounded. ■ Do not remove the covers on the system; hazardous voltages are present inside. Cabinet panels must be in place while the system is in use. All internal adjustments and replacements must be made by a qualified MEDISON Customer Service Department. ■ Check the face, housing, and cable before use. Do not use, if the face is cracked, chipped, or torn, the housing is damaged, or if the cable is abraded. ■ Always disconnect the system from the wall outlet prior to cleaning the system. ■ All patient contact devices, such as probes and ECG leads, must be removed from the patient prior to application of a high voltage defibrillation pulse. ■ The use of flammable anesthetic gas or oxidizing gases (N20) should be avoided.

CAUTION	■ The system has been designed for 100-120VAC and 200-240VAC; you should select the input voltage of monitor, printer and VCR. Prior to connecting an OEM power cord, verify that the voltage indicated on the power cord matches the voltage rating of the OEM device. ■ An isolation transformer protects the system from power surges. The isolation transformer continues to operate when the system is in standby. ■ Do not immerse the cable in liquids. Cables are not waterproof. ■ The operator does not contact the parts (SIP/SOP) and the patient simultaneously

ECG-Related Information

WARNING	■ This device is not intended to provide a primary ECG monitoring function, and therefore does not have means of indicating an inoperative electrocardiograph. ■ Do not use ECG electrodes of HF surgical equipment. Any malfunctions in the HF surgical equipment may result in burns to the patient. ■ Do not use ECG electrodes during cardiac pacemaker procedures or other electrical stimulators. ■ Do not use ECG leads and electrodes in an operating room.

ESD

Electrostatic discharge (ESD), commonly referred to as a static shock, is a naturally occurring phenomenon. ESD is most prevalent during conditions of low humidity, which can be caused by heating or air conditioning. During low humidity conditions, electrical charges naturally build up on individuals, creating static electricity. An ESD occurs when an individual with an electrical energy build-up comes in contact with conductive objects such as metal doorknobs, file cabinets, computer equipment, and even other individuals. The static shock or ESD is a discharge of the electrical energy build-up from a charged individual to a lesser or non-charged individual or object.

The ESD caution symbol is on the probe connector and the rear panel.

[Figure 1. 2 ESD symbol]

CAUTION	■ The level of electrical energy discharged from a system user or patient to an ultrasound system can be significant enough to cause damage to the system or probes. ■ The following precautions can help to reduce ESD: - Anti-static spray on carpets or linoleum - Anti-static mats - A ground wire connection between the system and the patient table or bed.

EMI

Although this system has been manufactured in compliance with existing EMI (Electromagnetic Interference) requirements, use of this system in the presence of an electromagnetic field can cause momentary degradation of the ultrasound image.

If this occurs often, MEDISON suggests a review of the environment in which the system is being used, to identify possible sources of radiated emissions. These emissions could be from other electrical devices used within the same room or an adjacent room. Communication devices such as cellular phones and pagers can cause these emissions. The existence of radios, TVs, or microwave transmission equipment nearby can also cause interference.

CAUTION	In cases where EMI is causing disturbances, it may be necessary to relocate this system.

EMC

The testing for EMC(Electromagnetic Compatibility) of this system has been performed according to the international standard for EMC with medical devices (IEC60601-1-2). This IEC standard was adopted in Europe as the European norm (EN60601-1-2).

Guidance and manufacturer's declaration - electromagnetic emission

This product is intended for use in the electromagnetic environment specified below. The customer or the user of this product should assure that it is used in such an environment.

Emission test	Compliance	Electromagnetic environment -guidance
RF Emission CISPR 11	Group 1	The Ultrasound System uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF Emission CISPR 11	Class B	The Ultrasound System is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies building used for domestic purpose.
Harmonic Emission IEC 61000-3-2	Class A	
Flicker Emission IEC 61000-3-3	Complies	

Approved Cables, Transducers and Accessories for EMC

■ Approved Cable for Electromagnetic Compliance

Cables connected to this product may affect its emissions;
Use only the cable types and lengths listed below table.

Cable	Type	Length
VGA	Shielded	Normal
Parallel	Shielded	Normal
RS232C	Shielded	Normal
USB	Shielded	Normal
LAN(RJ45)	Twisted pair	Any
S-Video	Shielded	Normal
Foot Switch	Shielded	2.5m
B/W Printer	Unshielded Coaxial	Normal
MIC	Unshielded	Any
Printer Remote	Unshielded	Any
Audio R.L	Shielded	Normal
VHS	Shielded	Normal
ECG AUX input	Shielded	< 3m

■ Approved Transducer for Electromagnetic Compliance

The probe listed in ‘Chapter 8. Probes’ when used with this product, have been tested to comply with the group1 class B emission as required by International Standard CISPR 11.

■ Approved Accessories for Electromagnetic Compliance

Accessories used with this product may effect its emissions.

CAUTION	When connecting other customer-supplied accessories to the system, such as a remote printer or VCR, it is the user’s responsibility to ensure the electromagnetic compatibility of the system. Use only CISPR 11 or CISPR 22, CLASS B compliant devices.

WARNING	The use of cables, transducers, and accessories other than those specified may result in increased emission or decreased Immunity of the Ultrasound System

Immunity test	IEC 60601 Test level	Compliance level	Electromagnetic environment -guidance
Electrotatic discharge (ESD) IEC 61000-4-2	±6KV Contact ±8KV air	±6KV Contact ±8KV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000-4-4	±2KV for power supply lines ±1KV for input/output lines	±2KV for power supply lines ±1KV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±1KV differential mode ±2KV common mode	±1KV differential mode ±2KV common mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	<5% U_T for 0.5cycle (>95% dip in U_T) 40% U_T for 5 cycle (60% dip in U_T) 70% U_T for 25 cycle (30% dip in U_T) <5% U_T for 5 s (<95% dip in U_T)	<5% U_T for 0.5cycle (>95% dip in U_T) 40% U_T for 5 cycle (60% dip in U_T) 70% U_T for 25 cycle (30% dip in U_T) <5% U_T for 5 s (<95% dip in U_T)	Mains power quality should be that of a typical commercial or hospital environment. If the user of this product requires continued operation during power mains interruptions, it is recommended that this product be powered from an uninterruptible power supply or a battery.
Power frequency (50/60Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
NOTE U_T is the a.c. mains voltage prior to application of the test level.			

Immunity test	**IEC 60601 Test level**	**Compliance level**	**Electromagnetic environment - guidance**
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80MHz	0.01V	Portable and mobile RF communications equipment should be used no closer to any part of the Ultrasound System, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. **Recommended separation distance** $d = [\frac{3,5}{V_1}]\sqrt{P}$ $d = [\frac{3,5}{E_1}]\sqrt{P}$ 80MHz to 800MHZ $d = [\frac{7}{E_1}]\sqrt{P}$ 800MHz to 2.5GHz
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5GHz	3V/m	where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, [a] should be less than the compliance level in each frequency range. [b] Interference may occur in the vicinity of equipment marked with the following symbol : 

NOTE 1) At 80MHz and 800MHz, the higher frequency range applies.
NOTE 2) These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

[a] Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the Ultrasound System is used exceeds the applicable RF compliance level above, the Ultrasound System should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the Ultrasound System or using a shielded location with a higher RF shielding effectiveness and filter attenuation.

[b] Over the frequency range 150kHz to 80MHz, field strengths should be less than $[V_1]$ V/m.

Recommended separation distances between portable and mobile RF communications equipment and the ACCUVIX V20

This product is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of this product can help Prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and this product as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power of transmitter [W]	Separation distance according to frequency of transmitter [m]		
	150kHz to 80MHz $d = [\frac{3,5}{V_1}]\sqrt{P}$	80MHz to 800MHz $d = [\frac{3,5}{E_1}]\sqrt{P}$	800MHz to 2.5GHz $d = [\frac{7}{E_1}]\sqrt{P}$
	V_1=0.01Vrms	E_1=3 V/m	E_1=3V/m
0.01	35.00	0.11	0.23
0.1	110.68	0.36	0.73
1	350.00	1.16	2.33
10	1106.80	3.68	7.37
100	3500.00	11.66	23.33

For transmitters rated at a maximum output power not listed above, the recommended separation distance *d* in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where *p* is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

NOTE 1) At 80MHz and 800MHz, the separation distance for the higher frequency range applies.
NOTE 2) These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

Electromagnetic environment – guidance

The Ultrasound System must be used only in a shielded location with a minimum RF shielding effectiveness and, for each cable that enters the shielded location. Field strengths outside the shielded location from fixed RF transmitters, as determined by an electromagnetic site survey, should be less than 3V/m.

It is essential that the actual shielding effectiveness and filter attenuation of the shielded location be verified to assure that they meet the minimum specification.

CAUTION	If the system is connected to other customer-supplied equipment, such as a local area network (LAN) or a remote printer, Medison cannot guarantee that the remote equipment will work correctly in the presence of electromagnetic phenomena.

Avoiding Electromagnetic Interference

A medical device can either generate or receive electromagnetic interference. The EMC standards describe tests for both emitted and received interference.

Medison Ultrasound Systems do not generate interference in excess of the referenced standards.

An Ultrasound System is designed to receive signals at radio frequency and is therefore susceptible to interference generated by RF energy sources. Examples of other source of interference are medical device, information technology products, and radio and television transmission towers. Tracing the source of radiated interference can be a difficult task. Customers should consider the following in an attempt to locate the source:

- Is the interference intermittent or constant?
- Does the interference show up only with one transducers operating at the same frequency or with several transducer?
- Do two different transducers operating at the same frequency have the same problem?
- Is the interference present if the system is moved to a different location in the facility?

The answers to these questions will help determine if the problem reside with the system or the scanning environment. After you answer the question, contact your local MEDISON customer service department.

Mechanical Safety

Moving the Equipment

WARNING	The product weighs more than 100kg. Be extra careful when transporting it. Careless transportation of the product may result in product damage or personal injury.

- Before transporting the product, check that the brakes on the front wheels are unlocked. Also, make sure to retract the monitor arm completely so that it is secured in a stationary position.
- Always use the handles at the back of the console and move the product slowly.

This product is designed to resist shocks. However, excessive shock, for example if the product falls over, may cause serious damage.

If the system operates abnormally after repositioning, please contact the MEDISON Customer Service Department.

The Brakes

Brakes are mounted to the front wheels of the console only. To lock the brakes, press the top part of the brake with your foot. To unlock them, press the part labelled OFF at the bottom of the brake with your foot.

You can use the brakes to control the movement of the product. We recommend that you lock the brakes when using the product.

Precautions on Ramps

Always make sure that the control panel is facing the direction of movement.

WARNING	Be aware of the castors, especially when moving the system. MEDISON recommends that you exercise caution when moving the product up or down ramps.

When moving the product down a ramp or resting it temporarily on a ramp, the product may tilt over even with the brakes on depending on the direction of the product. Do not rest the product on ramps.

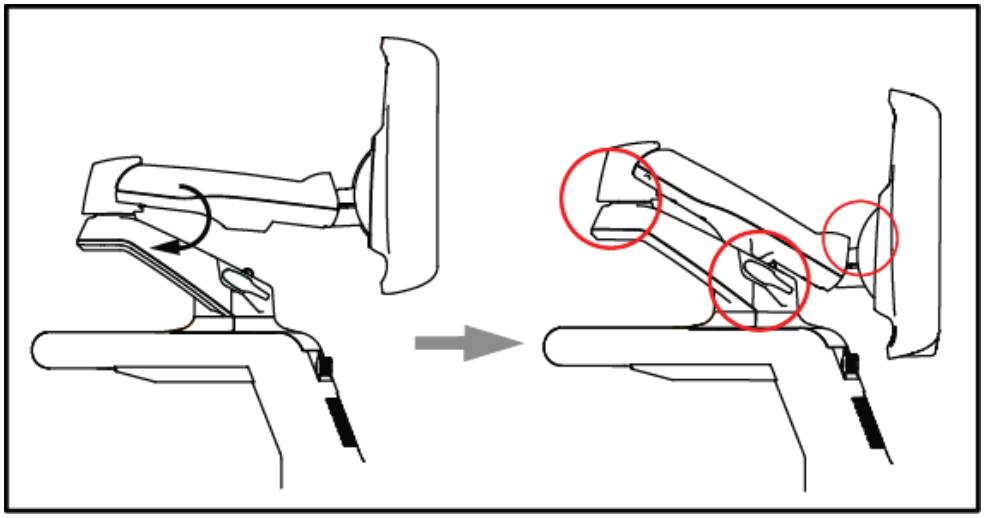
Safety Note

CAUTION	■ Do not press the control panel excessively. ■ Never attempt to modify the product in any way. ■ Check the operational safety when using the product after a prolonged break in service. ■ Make sure that other objects, such as metal pieces, do not enter the system. ■ Do not block the ventilation slots. ■ To prevent damage to the power cord, be sure to grip the plug head – not the cord – when unplugging. ■ Excessive bending or twisting of cables on patient-applied parts may cause failure or intermittent operation of the system. ■ Improper cleaning or sterilization of a patient-applied part may cause permanent damage.

Please refer to “Chapter 7. Maintenance” for detailed information on protecting, cleaning and disinfecting the equipment.

Safety Note for Monitor

When adjusting the height or position of the monitor, be careful of the space in the middle of the monitor arm. Having your fingers or other body parts caught in it may result in injury.



Biological Safety

Verify the alignment of the biopsy guide before use. See the “Chapter 8. Probes” section of this manual.

WARNING

- Ultrasound waves may have damaging effects on cells and, therefore, may be harmful to the patient. If there is no medical benefit, minimize the exposure time and maintain the ultrasound wave output level at low. Please refer to the ALARA principle.
- Do not use the system if an error message appears on the video display indicating that a hazardous condition exists. Note the error code, turn off the power to the system, and call your local MEDISON Customer Service Department.
- Do not use a system that exhibits erratic or inconsistent updating. Discontinuities in the scanning sequence are indicative of a hardware failure that should be corrected before use.
- The system limits the maximum contact temperature to 43 degree Celsius, and the ultrasonic waves output observes American FDA regulations.

ALARA Principle

Guidance for the use of diagnostic ultrasound is defined by the “as low as reasonably achievable” (ALARA) principle. The decision as to what is reasonable has been left to the judgment and insight of qualified personnel. No set of rules can be formulated that would be sufficiently complete to dictate the correct response for every circumstance. By keeping ultrasound exposure as low as possible, while obtaining diagnostic images, users can minimize ultrasonic bioeffects.

Since the threshold for diagnostic ultrasound bioeffects is undetermined, it is the sonographer’s responsibility to control the total energy transmitted into the patient. The sonographer must reconcile exposure time with diagnostic image quality. To ensure diagnostic image quality and limit exposure time, the ultrasound system provides controls that can be manipulated during the exam to optimize the results of the exam.

The ability of the user to abide by the ALARA principle is important. Advances in diagnostic ultrasound not only in the technology but also in the applications of the technology, have resulted in the need for more and better information to guide the user. The output indices are designed to provide that important information

There are a number of variables, which affect the way in which the output display indices can be used to implement the ALARA principle. These variables include mass, body size, location of the bone relative to the focal point, attenuation in the body, and ultrasound exposure time. Exposure time is an especially useful variable, because the user controls it. The ability to limit the index values over time support the ALARA principle.

Applying ALARA

The system-imaging mode used depends upon the information needed. 2D-mode and M-mode imaging provide anatomical information, while Doppler, Power, and Color imaging provide information about blood flow. Scanned modes, like 2D-mode, Power, or Color, disperse or scatter the ultrasonic energy over an area, while an unscanned mode, like M-mode or Doppler, concentrates ultrasonic energy. Understanding the nature of the imaging mode being used allows the sonographer to apply the ALARA principle with informed judgment. The probe frequency, system set-up values, scanning techniques, and operator experience aid the sonographer in meeting the definition of the ALARA principle.

The decision as to the amount of acoustic output is, in the final analysis, up to the system operator. This decision must be based on the following factors: type of patient, type of exam, patient history, ease or difficulty of obtaining diagnostically useful information, and the potential localized heating of the patient due to probe surface temperatures. Prudent use of the system occurs when patient exposure is limited to the lowest index reading for the shortest amount of time necessary to achieve acceptable diagnostic results.

Although a high index reading does not mean that a bioeffect is actually occurring, a high index reading should be taken seriously. Every effort should be made to reduce the possible effects of a high index reading. Limiting exposure time is an effective way to accomplish this goal.

There are several system controls that the operator can use to adjust the image quality and limit the acoustic intensity. These controls are related to the techniques that an operator might use to implement ALARA. These controls can be divided into three categories: direct, indirect, and receiver control.

Direct Controls

Application selection and the output intensity control directly affect acoustic intensity. There are different ranges of allowable intensity or output based on your selection. Selecting the correct range of acoustic intensity for the application is one of the first things required during any exam. For example, peripheral vascular intensity levels are not recommended for fetal exams. Some systems automatically select the proper range for a particular procedure, while others require manual selection. Ultimately, the user bears the responsibility for proper clinical use. The MEDISON system provides both automatic and user-definable settings.

Output has direct impact on acoustic intensity. Once the application has been established, the output control can be used to increase or decrease the intensity output. The output control allows you to select intensity levels less than the defined maximum. Prudent use dictates that you select the lowest output intensity consistent with good image quality.

Indirect Controls

The indirect controls are those that have an indirect effect on acoustic intensity. These controls affect imaging mode, pulse repetition frequency, focus depth, pulse length, and probe selection.

The choice of imaging mode determines the nature of the ultrasound beam. 2D-mode is a scanning mode, Doppler is a stationary or unscanned mode. A stationary ultrasound beam concentrates energy on a single location. A moving or scanned ultrasound beam disperses the energy over a wide area and the beam is only concentrated on a given area for a fraction of the time necessary in unscanned mode.

Pulse repetition frequency or rate refers to the number of ultrasound bursts of energy over a specific period of time. The higher the pulse repetition frequency, the more pulses of energy in a given period of

time. Several controls affect pulse repetition frequency: focal depth, display depth, sample volume depth, color sensitivity, number of focal zones, and sector width controls.

Focus of the ultrasound beam affects the image resolution. To maintain or increase resolution at a different focus requires a variation in output over the focal zone. This variation of output is a function of system optimization. Different exams require different focal depths. Setting the focus to the proper depth improves the resolution of the structure of interest.

Pulse length is the time during which the ultrasonic burst is turned on. The longer the pulse, the greater the time-average intensity value. The greater the time-average intensity, the greater the likelihood of temperature increase and cavitations. Pulse length or burst length or pulse duration is the output pulse duration in pulsed Doppler. Increasing the Doppler sample volume increases the pulse length.

Probe selection affects intensity indirectly. Tissue attenuation changes with frequency. The higher the probe operating frequency, the greater the attenuation of the ultrasonic energy. Higher probe operating frequencies require higher output intensity to scan at a deeper depth. To scan deeper at the same output intensity, a lower probe frequency is required. Using more gain and output beyond a point, without corresponding increases in image quality, can mean that a lower frequency probe is needed.

- **Receiver Controls**

  Receiver controls are used by the operator to improve image quality. These controls have no effect on output. Receiver controls only affect how the ultrasound echo is received. These controls include gain, TGC, dynamic range, and image processing. The important thing to remember, relative to output, is that receiver controls should be optimized before increasing output. For example; before increasing output, optimize gain to improve image quality.

Additional Considerations

Ensure that scanning time is kept to a minimum, and ensure that only medically required scanning is performed. Never compromise quality by rushing through an exam. A poor exam will require a follow-up, which ultimately increases the time. Diagnostic ultrasound is an important tool in medicine, and, like any tool, should be used efficiently and effectively.

Output Display Features

The system output display comprises two basic indices: a mechanical index and a thermal index. The thermal index consists of the following indices: soft tissue (TIs), bone (TIb) and cranial bone (TIc). One of these three thermal indices will be displayed at all times. Which one depends upon the system preset or user choice, depending upon the application at hand.

The mechanical index is continuously displayed over the range of 0.0 to 1.9, in increments of 0.1.

The thermal index consists of the three indices, and only one of these is displayed at any one time. Each probe application has a default selection that is appropriate for that combination. The TIb or TIs is continuously displayed over the range of 0.0 to maximum output, based on the probe and application, in increments of 0.1.

The application-specific nature of the default setting is also an important factor of index behavior. A default setting is a system control state which is preset by the manufacturer or the operator. The system has default index settings for the probe application. The default settings are invoked automatically by the ultrasound system when power is turned on, new patient data is entered into the system database, or a change in application takes place.

The decision as to which of the three thermal indices to display should be based on the following criteria:

Appropriate index for the application: TIs is used for imaging soft tissue; and TIb for a focus at or near bone. Some factors might create artificially high or low thermal index readings e.g. presence of fluid or bone, or the flow of blood. A highly attenuating tissue path, for example, will cause the potential for local zone heating to be less than the thermal index displays.

Scanned modes versus unscanned modes of operation affect the thermal index. For scanned modes, heating tends to be near the surface; for unscanned modes, the potential for heating tends to be deeper in the focal zone.

Always limit ultrasound exposure time. Do not rush the exam. Ensure that the indices are kept to a minimum and that exposure time is limited without compromising diagnostic sensitivity.

- **Mechanical Index (MI) Display**

  Mechanical bioeffects are threshold phenomena that occur when a certain level of output is exceeded. The threshold level varies, however, with the type of tissue. The potential for mechanical bioeffects varies with peak pressure and ultrasound frequency. The MI accounts for these two factors. The higher the MI value, the greater the likelihood of mechanical bioeffects occurring but there is no specific MI value that means that a mechanical effect will actually occur. The MI should be used as a guide for implementing the ALARA principle.

- **Thermal Index (TI) Display**

  The TI informs the user about the potential for temperature increase occuring at the body surface, within body tissue, or at the point of focus of the ultrasound beam on bone. The TI is an estimate of the temperature increase in specific body tissues. The actual amount of any temperature rise is influenced by factors such as tissue type, vascularity, and mode of operation etc. The TI should be used as a guide for implementing the ALARA principle.

  The bone thermal index (TIb) informs the user about potential heating at or near the focus after the ultrasound beam has passed through soft tissue or fluid, for example, at or near second or third trimester fetal bone.

  The cranial bone thermal index (TIc) informs the user about the potential heating of bone at or near the surface, for example, cranial bone.

  The soft tissue thermal index (TIs) informs the user about the potential for heating within soft homogeneous tissue.

  You can select either TIs or TIb using the TIs/TIb selection on the Miscellaneous system setups.

  TIc is displayed when you select a trans-cranial application.

- **Mechanical and Thermal indices Display Precision and Accuracy**

  The Mechanical and Thermal Indices on the system are precise to 0.1 units.

  The MI and TI display accuracy estimates for the system are given in the Acoustic Output Tables manual. These accuracy estimates are based on the variability range of probes and systems, inherent acoustic output modeling errors and measurement variability, as described below.

  The displayed values should be interpreted as relative information to help the system operator achieve the ALARA principle through prudent use of the system. The values should not be interpreted as actual physical values investigated tissue or organs. The initial data that is used to support the output display is derived from laboratory measurements based on the AIUM

measurement standard. The measurements are then put into algorithms for calculating the displayed output values.

Many of the assumptions used in the process of measurement and calculation are conservative in nature. Over-estimation of actual in situ exposure, for the vast majority of tissue paths, is built into the measurement and calculation process. For example:

The measured water tank values are de-rated using a conservative, industry standard, attenuation coefficient of 0.3dB/cm-MHz.

Conservative values for tissue characteristics were selected for use in the TI models. Conservative values for tissue or bone absorption rates, blood perfusion rates, blood heat capacity, and tissue thermal conductivity were selected.

Steady state temperature rise is assumed in the industry standard TI models, and the assumption is made that the ultrasound probe is held steady in one position long enough for steady state to be reached.

A number of factors are considered when estimating the accuracy of display values: hardware variations, algorithm accuracy estimation and measurement variability. Variability among probes and systems is a significant factor. Probe variability results from piezoelectric crystal efficiencies, process-related impedance differences, and sensitive lens focusing parameter variations. Differences in the system pulse voltage control and efficiencies are also a contributor to variability. There are inherent uncertainties in the algorithms used for estimating acoustic output values over the range of possible system operating conditions and pulse voltages. Inaccuracies in laboratory measurements are related to differences in hydrophone calibration and performance, positioning, alignment and digitization tolerances, and variability among test operators.

The conservative assumptions of the output estimation algorithms of linear propagation, at all depths, through a 0.3dB/cm-MHz attenuated medium are not taken into account in calculation of the accuracy estimate displayed. Neither linear propagation, nor uniform attenuation at the 0.3dB/cm-MHz rate, occur in water tank measurements or in most tissue paths in the body. In the body, different tissues and organs have dissimilar attenuation characteristics. In water, there is almost no attenuation. In the body, and particularly in water tank measurements, non-linear propagation and saturation losses occur as pulse voltages increase.

The display accuracy estimates take into account the variability ranges of probes and systems, inherent acoustic output modeling errors, and measurement variability. Display accuracy estimates are not based on errors in, or caused by measuring according to, the AIUM measurement standards. They are also independent of the effects of non-linear loss on the measured values.

Control Effects - Control affecting the indices

As various system controls are adjusted, the TI and MI values may change. This will be most apparent as the POWER control is adjusted; however, other system controls will affect the on-screen output values.

■ Power

Power controls the system acoustic output. Two real-time output values are on the screen: a TI and a MI. They change as the system responds to POWER adjustments.

In combined modes, such as simultaneous Color, 2D-mode and pulsed Doppler, the individual

modes each add to the total TI. One mode will be the dominant contributor to this total. The displayed MI will be from the mode with the largest peak pressure.

2D-mode Controls

2D-mode size

Narrowing the sector angle may increase the frame rate. This action will increase the TI. Pulse voltage may be automatically adjusted down with software controls to keep the TI below the system maximums. A decrease in pulse voltage will decrease MI.

Zoom

Increasing the zoom magnification may increase frame rate. This action will increase the TI. The number of focal zones may also increase automatically to improve resolution. This action may change MI since the peak intensity can occur at a different depth.

Persistence

A lower persistence will decrease the TI. Pulse voltage may be automatically increased. An increase in pulse voltage will increase MI.

Focal no.

More focal zones may change both the TI and MI by changing frame rate or focal depth automatically. Lower frame rates decrease the TI. MI displayed will correspond to the zone with the largest peak intensity.

Focus

Changing the focal depth will change the MI. Generally, higher MI values will occur when the focal depth is near the natural focus of the transducer.

Color and Power Controls

Color Sensitivity

Increasing the color sensitivity may increase the TI. More time is spent scanning for color images. Color pulses are the dominant pulse type in this mode.

Color Sector Width

Narrower color sector width will increase color frame rate and the TI will increase. The system may automatically decrease pulse voltage to stay below the system maximum. A decrease in pulse voltage will decrease the MI. If pulsed Doppler is also enabled then pulsed Doppler will remain the dominant mode and the TI change will be small.

Color Sector Depth

Deeper color sector depth may automatically decrease color frame rate or select a new color focal zone or color pulse length. The TI will change due to the combination of these effects. Generally, the TI will decrease with increased color sector depth. MI will correspond to the peak intensity of the dominant pulse type, which is a color pulse. However, if pulsed Doppler is also enabled then pulsed Doppler will remain the dominant mode and the TI change will be small.

Scale

Using the SCALE control to increase the color velocity range may increase the TI. The system will automatically adjust pulse voltage to stay below the system maximums. A decrease in pulse voltage will also decrease MI.

Sec Width

A narrower 2D-mode sector width in Color imaging will increase color frame rate. The TI will increase. MI will not change. If pulsed Doppler is also enabled, then pulsed Doppler will remain as the primary mode and the TI change will be small.

M-mode and Doppler Controls

Speed

M-mode and Doppler sweep speed adjustments will not affect the MI. When M-mode sweep speed changes, TI changes.

Simultaneous and Update Methods

Use of combination modes affects both the TI and MI through the combination of pulse types. During simultaneous mode, the TI is additive. During auto-update and duplex, the TI will display the dominant pulse type. The displayed MI will be from the mode with the largest peak pressure.

Sample Volume Depth

When Doppler sample volume depth is increased the Doppler PRF may automatically decrease. A decrease in PRF will decrease the TI. The system may also automatically decrease the pulse voltage to remain below the system maximum. A decrease in pulse voltage will decrease MI.

Doppler, CW, M-mode, and Color Imaging Controls

When a new imaging mode is selected, both the TI and the MI will change to default settings. Each mode has a corresponding pulse repetition frequency and maximum intensity point. In combined or simultaneous modes, the TI is the sum of the contribution from the modes enabled and MI is the MI for the focal zone and mode with the largest derated intensity. If a mode is turned off and then reselected, the system will return to the previously selected settings.

■ **Probe**

Each probe model available has unique specifications for contact area, beam shape, and center frequency. Defaults are initialized when you select a probe. MEDISON factory defaults vary with probe, application, and selected mode. Defaults have been chosen below the FDA limits for intended use.

■ **Depth**

An increase in 2D-mode depth will automatically decrease the 2D-mode frame rate. This would decrease the TI. The system may also automatically choose a deeper 2D-mode focal depth. A change of focal depth may change the MI. The MI displayed is that of the zone with the largest peak intensity.

■ **Application**

Acoustic output defaults are set when you select an application. MEDISON factory defaults vary with probe, application, and mode. Defaults have been chosen below the FDA limits for intended use.

Related Guidance Documents

For more information about ultrasonic bioeffects and related topics refer to the following;

- AIUM Report, January 28, 1993, “Bioeffects and Safety of Diagnostic Ultrasound”
- Bioeffects Considerations for the Safety of Diagnostic Ultrasound, *J Ultrasound Med*., Sept. 1998: Vol. 7, No. 9 Supplement
- Acoustic Output Measurement Standard for Diagnostic Ultrasound Equipment. (AIUM, NEMA. 1998)
- Acoustic Output Labeling Standard for Diagnostic Ultrasound Equipment (AIUM, 1998)
- Second Edition of the AIUM Output Display Standard Brochure, Dated March 10, 1994. (A copy of this document is shipped with each system.)
- Information for Manufacturer Seeking Marketing Clearance of Diagnostic Ultrasound Systems and Transducers. FDA. September 1997. FDA.
- Standard for Real-Time Display of Thermal and Mechanical Acoustic Output Indices on Diagnostic Ultrasound Equipment. (Revision 1, AIUM, NEMA. 1998)
- WFUMB. Symposium on Safety of Ultrasound in Medicine: Conclusions and Recommendations on Thermal and Non-Thermal Mechanisms for Biological Effects of Ultrasound, *Ultrasound in Medicine and Biology*, 1998: Vol. 24, Supplement1.

Acoustic Output and Measurement

Since the first usage of diagnostic ultrasound, the possible human biological effects (bioeffects) of ultrasound exposure have been studied by various scientific and medical institutions. In October 1987, the American Institute of Ultrasound in Medicine(AIUM) ratified a report prepared by its Bioeffects Committee (Bioeffects Considerations for the Safety of Diagnostic Ultrasound, J Ultrasound Med., Sept. 1988: Vol.7, No.9 Supplement), sometimes referred to as the Stowe Report, which reviewed available

data on possible effects of ultrasound exposure. Another report “Bioeffects and Safety of Diagnostic Ultrasound,” dated January 28, 1993 provides more up to date information.
The acoustic output for this system has been measured and calculated in accordance with the December 1985 “510(K) Guide for Measuring and Reporting Acoustic Output of Diagnostic Ultrasound Medical Devices,” except that the hydrophone meets the requirements of “Acoustic Output Measurement Standard for Diagnostic Ultrasound Equipment” (NEMA UD 2-1992)

In Situ, Derated, and Water Value Intensities

All intensity parameters are measured in water. Since water does not absorb acoustic energy, these water measurements represent a worst case value. Biological tissue does absorb acoustic energy. The true value of the intensity at any point depends on the amount and type of tissue and the frequency of the ultrasound that passes through the tissue. The intensity value in the tissue, *In Situ*, has been estimated using the following formula:

In Situ = Water [$e^{-(0.23alf)}$]

where: *In Situ* = *In Situ* Intensity Value

Water = Water Value Intensity

e = 2.7183

a = Attenuation Factor

Tissue	a(dB/cm-MHz)
Brain	.53
Heart	.66
Kidney	.79
Liver	.43
Muscle	.55

l = skin line to measurement depth (cm)

f = Center frequency of the transducer/system/mode combination(MHz)

Since the ultrasonic path during an examination is likely to pass through varying lengths and types of tissue, it is difficult to estimate the true *In Situ* intensity. An attenuation factor of 0.3 is used for general reporting purpose; therefore, the *In Situ* value which is commonly reported uses the formula:

In Situ (*derated*) = Water [$e^{-(0.069lf)}$]

Since this value is not the true *In Situ* intensity, the term “derated” is used.
The maximum derated and the maximum water values do not always occur at the same operating condition; therefore, the reported maximum water and derated values may not be related to the *In Situ* (derated) formula. Take for example a multi-zone array transducer that has maximum water value intensities in its deepest zone: the same transducer may have its largest derated intensity in one if its shallowest focal zones.

Acoustic Output and Measurement

The terms and symbols used in the acoustic output tables are defined in the following paragraphs.

ISPTA.3 The derated spatial-peak temporal-average intensity (milliwatts per square centimeter).

ISPPA.3 The **derated spatial-peak pulse-average intensity** (watts per square centimeter). The value of IPA.3 at the position of global maximum MI (IPA.3@MI) may be reported instead of ISPPA.3 if the global maximum MI is reported.

MI The **Mechanical Index**. The value of MI at the position of ISPPA.3, (MI@ISPPA.3) may be reported instead of MI (global maximum value) if ISPPA.3 is □190W/cm^2

Pr.3 The **derated peak rarefactional pressure** (megapascals) associated with the transmit pattern giving rise to the reported MI value.

WO The **ultrasonic power** (milliwatts). For the operating condition giving rise to ISPTA.3, WO is the total time-average power;. For operating conditions subject to reporting under ISPPA.3, WO is the **ultrasonic power** associated with the transmit pattern giving rise to the value reported under ISPPA.3

fc The **center frequency** (MHz). For MI and ISPPA.3, fc is the **center frequency** associated with the transmit pattern giving rise to the global maximum value of the respective parameter. For ISPTA.3, for combined modes involving beam types of unequal **center frequency**, fc is defined as the overall ranges of center frequencies of the respective transmit patterns.

ZSP The axial distance at which the reported parameter is measured (centimeters).

x-6,y-6 are respectively the in-plane (azimuth) and out-of-plane (elevation) -6□ dimensions in the x-y plane where ZSP is found (centimeters).

PD The **pulse duration** (microseconds) associated with the transmit pattern giving rise to the reported value of the respective parameter.

PRF The **pulse repetition frequency** (Hz) associated with the transmit pattern giving rise to the reported value of the respective parameter.

EBD The **entrance beam dimensions** for the azimuth and elevation planes (centimeters).

EDS The **entrance dimensions of the scan** for the azimuth and elevation planes (centimeters).

Acoustic Measurement Precision and Uncertainty

The Acoustic Measurement Precision and Acoustic Measurement Uncertainty are described below.

Quantity	Precision	Total Uncertainty
PII.3 (derated pulse intensity integral)	3.2 %	+21 % to - 24 %
Wo (acoustic power)	6.2 %	+/- 19 %
Pr.3 (derated rarefaction pressure)	5.4 %	+/- 15 %
Fc (center frequency)	< 1 %	+/- 4.5 %

- **Systematic Uncertainties.**

For the pulse intensity integral, derated rarefaction pressure Pr.3, center frequency and pulse duration, the analysis includes considerations of the effects on accuracy of:
Hydrophone calibration drift or errors.
Hydrophone / Amp frequency response.
Spatial averaging.
Alignment errors.
Voltage measurement accuracy, including.

- Oscilloscope vertical accuracy.
- Oscilloscope offset accuracy.
- Oscilloscope clock accuracy.
- Oscilloscope Digitization rates.
- Noise.

The systematic uncertainties Acoustic power measurements using a Radiation Force are measured through the use of calibrated NIST acoustic power sources.
We also refer to a September 1993 analysis done by a working group of the IEC technical committee 87 and prepared by K. Beissner, as a first supplement to IEC publication 1161.

The document includes analysis and discussion of the sources of error / measurement effects due to:

Balance system calibration.
Absorbing (or reflecting) target suspension mechanisms.
Linearity of the balance system.
Extrapolation to the moment of switching the ultrasonic transducer (compensation for ringing and thermal drift).
Target imperfections.
Absorbing (reflecting) target geometry and finite target size.
Target misalignment.
Ultrasonic transducer misalignment.
Water temperature.
Ultrasonic attenuation and acoustic streaming.
Coupling or shielding foil properties.
Plane-wave assumption.
Environmental influences.
Excitation voltage measurement.
Ultrasonic transducer temperature.
Effects due to nonlinear propagation and saturation loss.

The overall findings of the analysis give a rough Acoustic Power accuracy figure of +/- 10% for the frequency range of 1 - 10 MHz.

Environmental Protection

CAUTION

- The console and peripherals could be sent back to manufacturers for recycling or proper disposal after their useful lives.
- Disposal of waste shall be disposed in accordance with national laws.
- The waste sheaths are to be disposed of safely and national regulations must be observed.

Waste Electrical and Electronic Equipment

This symbol is applied in the European Union and other European countries.

This symbol on the product indicates that this product shall not be treated as household waste. Instead it shall be handed over to the applicable collection point for the recycling of electrical and electronic equipment. By ensuring this product is disposed of correctly, you will help prevent potential negative consequences for the environment and human health, which could otherwise be caused by inappropriate waste handling of this product. The recycling of materials will help to conserve natural resources. For more detailed information about recycling of this product, please contact your local city office, your electrical and electronic waste disposal service or the shop where you purchased the product.

Chapter 2

Introduction And Installation

What is ACCUVIX V20?

The **ACCUVIX V20** is a high-resolution color ultrasound scanner with high penetration and a variety of measurement functions.

Features and Advantages of ACCUVIX V20

- High-end Digital Beam Forming – The ACCUVIX V20 utilizes the newly developed Digital Beam forming technology.
- A variety of applications – The ACCUVIX V20 is optimized for use in a variety of ultrasound departments, including general, abdomen, obstetrics, gynecology, vascular, extremity, pediatric, cardiac, breast, urology, and etc.
- Various diagnostic Modes - 2D Mode, M Mode, Color Doppler Mode, Power Doppler Mode, PW Spectral Doppler Mode, CW Spectral Doppler Mode, Tissue Doppler Image Mode etc.
- 3D / 4D images can be obtained.
- Measurement and Report Functions – Besides the basic distance, area, circumference and volume measurement functions, the ACCUVIX V20 also provides application-specific measurement functions. The report function collates measurement data.
- Review of Scanned Images – The ACCUVIX V20 displays Cine images of 2048 frames and loop images of 8192 lines.
- SONOVIEW^{TM} - This is a total ultrasound image management system, which allows a user to archive, view and exchange documents.
- Digital Imaging and Communication in Medicine (DICOM) Function - This is used to archive, transmit and print DICOM images through a network.
- Peripheral/Accessory Connection – A variety of peripheral devices including VCRs and printers can be easily connected to the ACCUVIX V20.

Specifications

Physical Dimensions	Height: 1350mm (with monitor) Width: 580mm Depth: 1050mm Weight: more than 120.3kg (with monitor)
Imaging modes	2D imaging mode M imaging mode Color Doppler Imaging (CDI) mode Power Doppler Imaging (PDI) mode Directional Power Doppler Imaging (DPDI) mode Tissue Doppler Imaging (TDI) mode Power Pulse Inversion Imaging (PPII) mode Pulse Wave (PW) Spectral Doppler imaging mode Continuous Wave (CW) Spectral Doppler imaging mode 3D imaging mode Dual modes Quad modes Combined modes Simultaneous mode Zoom
Gray Scale	256 (8 bits)
Focusing	Transmit focusing, maximum of eight points (four points simultaneously selectable) Digital dynamic receive focusing (continuous)
Probes	**Curved Linear Array** C2-5EL, C2-6IC, C3-7IM **Linear Array** L4-7EL, L5-12/50EP, L5-13IS, L6-12IS, L7-16IS, L8-15IS **Phased Array** P2-4AC, P3-5AC **Endocavity Curved Linear Array** EC4-9IS **Volume Probe** 3D2-6ET, 3D4-8ET,3D4-9ES, 3D5-9EK

Probes	**CW** CW2.0, CW4.0
Probe connections	5 probe connectors (including one CW probe connector)
Monitor	17 inch LCD monitor
Rear Panel Input / Output Connections	VHS and SVHS VCR left and right audio Microphone B/W printer video and remote control VGA monitor Parallel port USB LAN
Image Storage	Maximum 2048 frames for CINE memory Maximum 8192 Lines for LOOP memory Image filing system
Application	Obstetrics, Gynecology, Abdomen, Pediatric, Cardiac, Pediatric Cardiology, Appendix, Urology, Vascular, Small Parts, Musculoskeletal, TCD
Electrical Parameters	100-120V/200-240VAC, 10A, 50/60Hz
Measurement Packages	Obstetrics, Gynecology, Cardiac, Carotid, Urology, Fetal Echo, LE Artery, UE Artery, LE Vein, UE Vein, Radiology, TCD, Thyroid, Breast, Testicle, Superficial, Pediatric Hips, MSK * Refer the Chapter 5 for additional information
Signal processing (Pre-processing)	TGC control Mode-independent gain control Acoustic power control (adjustable) Dynamic aperture Dynamic apodization Dynamic range control (adjustable) Image view area control M-mode sweep speed control
Signal processing (Post-processing)	Frame average Edge Enhancement / Blurring Gamma-scale windowing Image orientation (left/right and up/down, rotation) White on black/black on white Zoom

Measurement	Trackball operation of multiple cursors 2D mode: Linear measurements and area measurements using elliptical approximation or trace M mode: Continuous readout of distance, time, and slope rate Doppler mode: Velocity and trace
Auxiliary	VCR Video Page Printer Color Video Page Printer USB Video Printer USB Color Video Printer Inkjet Printer Laser Printer USB MO Driver USB Wireless LAN Foot Switch USB Flash Memory Media Microphone Monitor
Pressure Limits	Operating: 700hPa to 1060hPa Storage: 700hPa to 1060hPa
Humidity Limits	Operating: 30% to 75% Storage & Shipping: 20% to 90%
Temperature Limits	Operating: 10 ^{O}C ~ 35^{O}C Storage & Shipping: -25^{O}C ~ 60^{O}C

Product Configuration and Installation

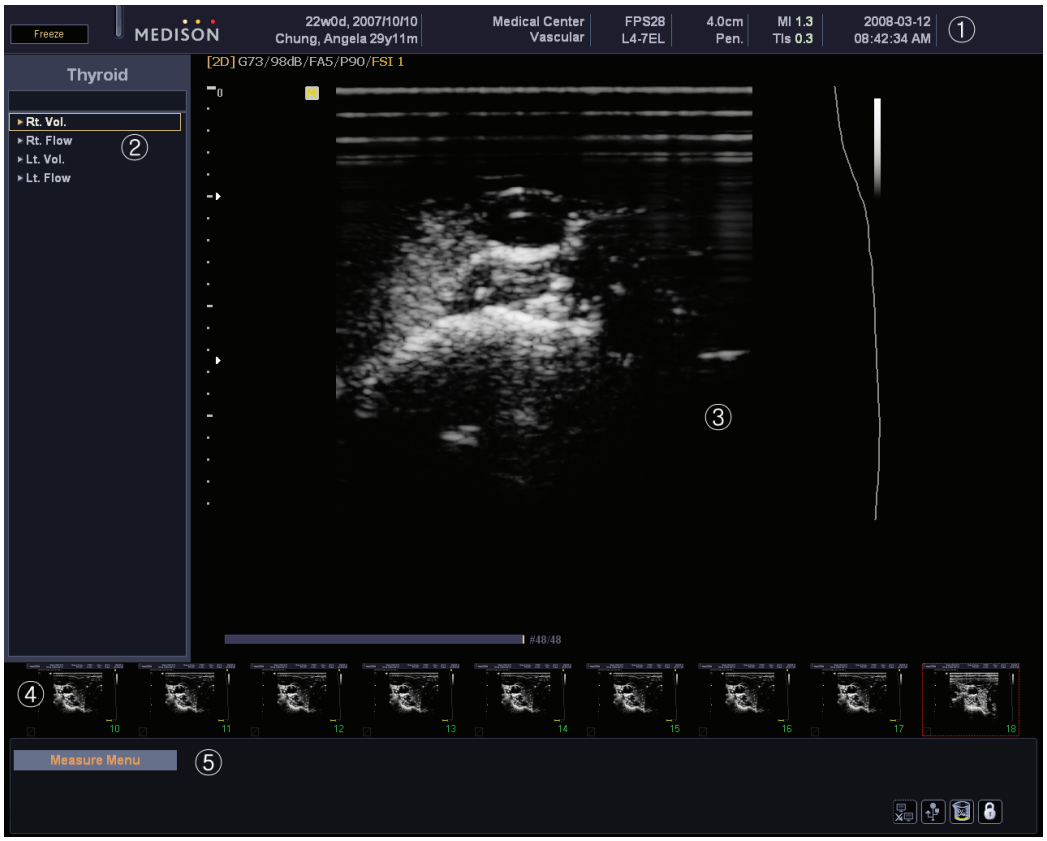
This Product consists of the monitor, the control panel, the console, the peripheral devices, and the probes.

Monitor

The monitor of this system is a color VGA monitor, which displays ultrasound images and additional information. Use the monitor arm to adjust the height or position of the monitor.

Monitor Display

The monitor displays ultrasound images, operation menus and a variety of other information. The screen is divided into six sections: ①Title, ②Measurement ③Menu, Image, ④ Thumbnails, and⑤User Information.



[Figure 2.1 Monitor Display]

- **Title Area**

  This section displays the Logo, Patient Name, Hospital Name, Application, Frame Rate & Depth, Probe Information, Acoustic Output Information and Date & Time.

- **Measurement Menu**

  The measurement menu appears in this area during measurement. Use **Menu** dial-button to select an item from the menu.

- **Image Area**

  The ultrasound image, image information, annotation, and measurement are displayed in the image area.

- **Thumbnails Area**

  Saved images, by pressing the **Save** button on the control panel, are displayed in the thumbnails area.
  Click a thumbnail with a pointer to enlarge. When there are more than 9 images, the arrow button on the screen can be used for navigation.

- **User Information Area**

  User information area provides a variety of information necessary for system use e.g. current system status, bodymarkers, and so on.

※Tips! Displaying the current status of the system

 : Shows the status of LAN connection.

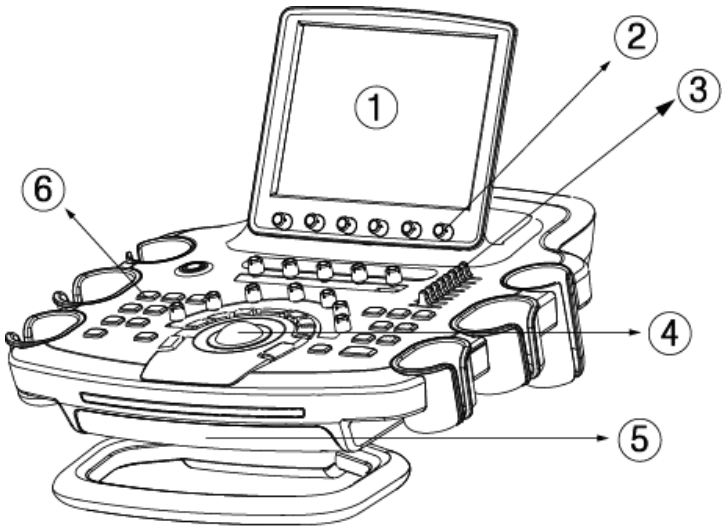
 : Shows the total disk space and available disk space for the system.

 : Shows whether a removable disk is connected to the system. Double-click the icon to display the **Storage Manager** window.

 : Shows Caps Lock 'On' When user press the **Caps Lock** on the alphanumeric keyboard. Under the 'Caps Lock On' status, user can input text as large character.

Control Panel

The control panel can be used for controlling the system. It consists of the following five sections:



[Figure 2.2 Control Panel]

① Touch-Screen

② Dial-Button

③ Slide

④ Track Ball

⑤ Alphanumeric keyboards

⑥ Button

The dial-button can be used both as a dial and a button.

Control Panel Map

The following are descriptions and instructions for the controls on the control panel. For more information on the buttons with multiple functions, see Chapter 3 and later of this manual.

- **Power On/Off**

On/Off	Powers the product On/Off. Press and hold down the button for 2 seconds to turn the product On or Off. Once turned Off, the system needs a 5-second interval before restarting by pressing the button.

CAUTION	Pressing the **On/Off** button over five seconds turn off the power forcibly. It can cause hard disk damage.

NOTE	■ The product should be turned on about 10 seconds after the AC power switch at the back of the product is turned on. ■ During booting the system, do not press any key of the alphanumeric keyboard. It may cause malfunction. ■ If you turn on the power after turning off forcibly, the system can turn on and off momentary. It is one of the character of Intel® PC main board, not system error.

- **Starting and Finishing Exam**

Patient	This is used to appear the Patient Information window for patient selection and information entry.
End Exam.	This is used to finish the exam of the currently selected patient and reset the related data.
Probe	This is used to appear the Probe Selection window to select /change probes and applications.

■ Selecting Diagnosis mode and Gain Control

2D	Pressing this dial-button while in other single image modes will return the system to 2D Mode from other image modes. However, pressing this again while in 2D mode does not turn it off. Pressing this button while in combine modes will return the system to single image modes. Turning this dial-button again when in 2D mode adjusts the 2D Gain.
C	Press this dial-button to turn Color Doppler Mode on / off. Turning this dial-button when in Color Doppler mode adjusts the Color Doppler Gain.
PD	Press this button to turn Power Doppler Mode on / off. Turning this dial-button adjusts the power Doppler gain.
M	Press this dial-button to turn M Mode on / off. Turning this dial-button adjusts the M Gain.
PW / z	Press this dial-button to turn PW Spectral Doppler Mode on / off. Turning this dial-button adjusts the Spectral Doppler Gain. Also, turning this dial-button when in 3D View rotates the image along the z-axis.
CW / y	Press this button to turn CW Spectral Doppler Mode on / off. Turning this dial-button adjusts the CW Spectral Doppler Gain. Also, turning this dial-button when in 3D View rotates the image along the y-axis. This mode can only be activated when using the Phased Array Probes or Static CW Probes.
TDI / x	Press this dial-button to turn Tissue Doppler Image Mode on / off. This mode is available for specific diagnostic applications with specific probes only. Turning this dial-button adjusts the TDI Gain. Also, turning this dial-button when in 3D View rotates the image along the x-axis.
3D/4D	Press this button to turn 3D / 4D Mode on / off. This function is available under 2D mode.

■ Multi-Image Mode

Dual	Press this button to turn Dual Mode on. In 3D View-MPR, the system will switch to the 2D/3D screen.
Quad	Press this button to turn Quad Mode on. The system will switch to the ROI 3D screen.

Single	Press this button in Dual or Quad Mode to switch to Single Mode, in which only a single diagnosis mode is available. In 3D View-MPR, the system will switch to full screen.

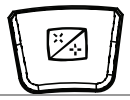
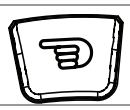
- **Image Adjustment**

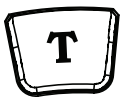
Q Scan	Press this button to turn Quick Scan function on. The 'Q' mark is displayed on the top of the image.
Baseline	This is used to raise/lower the baseline in Color Doppler Mode, Power Doppler Mode and Spectral Doppler Mode.
Scale	This is used to adjust the speed of blood flow (or frequency) range in Color Doppler Mode, Power Doppler Mode and Spectral Doppler Mode.
Zoom	Press this button to turn Zoom mode on.
Focus	This dial is used to focus on the area of interest. Turn this dial clockwise / counter clockwise to rise / lower the focusing point.
Depth	This dial is used to adjust the scanning depth of an image.
Freeze	Press this button to stop/start scanning.

- **TGC (Time Gain Control)**

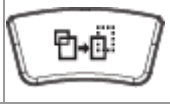
TGC	Eight slides are used to adjust TGC values.

- **Measurement and Annotation**

Caliper		This button is used to measure distance, circumference, area, and volume.
Calculator		A different measurement menu appears, depending on the examination subject and diagnosis mode.
Indicator		When this is pressed, an arrow marker appears to point to the parts of the displayed image.

Text		When this is pressed, a cursor appears to input texts on the displayed image.
Clear		When this is pressed, the text, Indicator, Body Marker, and measurement data are erased from the displayed image.
Body Marker		When this is pressed, a Body Marker list appears.
User 1 User 2		This button is used to perform the special function as you set before. The function of each button can be set in Utility > Setup > Peripherals > Key Setup.

- **Trackball and its related control**

Trackball		This is used to move the cursor on the display and to scroll through CINE images.
Set / Exit		There are two buttons on each side of the **Trackball.** SET; This is used in conjunction with the **Trackball** to set a specific item or value. EXIT; This is used to exit the current mode and return to initial settings. The function of each button can be set in Utility > Setup > Peripherals > Key Setup.
Pointer		This is used to appear an arrow-shaped pointer on the screen in Scan mode.
Change		This is used to change the current **Trackball** function.

- **SONOVIEW and Report**

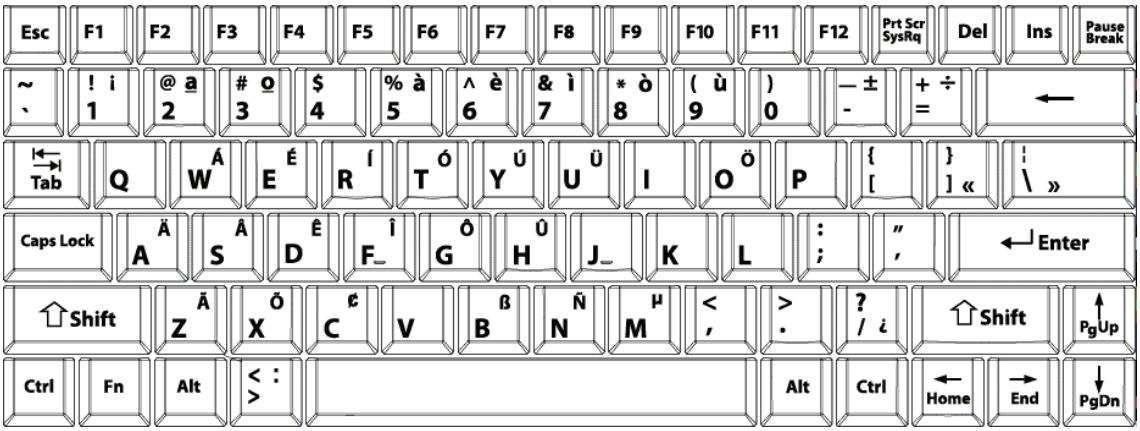
SONOVIEW	This is used to activate SONOVIEW^{TM}, the Image Filing program.
Report	This is used to appear a report program containing measurement results from the current diagnosis mode.

■ **Save and Print**

Save	This is used to save a currently displayed image or measurement report in the system database.
Print1 (Rec1) Print2 (Rec2)	The button can be used to access the printer or VCR function. The function of each button can be set in Utility > Setup > Peripherals > Key Setup.

Alpha-numeric Keyboards

The alphanumeric keyboard is under the control panel. This is used to type in text or performs some functions.



[Figure 2.3 Alphanumeric keyboards]

Space bar	This button is used to hide / appear the image information on the screen.

Touch-Screen

The touch screen is an operating tool that can be touched by the user to create input. The functions that are available in the current mode are shown in the form of buttons or a dial-button.

■ **Touch screen display**

The touch screen consists of the following four areas:

① Information Area: Shows the title of the touch screen currently displayed.

② Tab Area: Shows diagnostic modes and utilities under different tabs. The touch

screen can be changed by pressing one of the tabs.

③ Menu Area: The menu items that are available in the current input mode are shown in the form of buttons. The user can access the desired menu item by pressing the corresponding button. The menu currently in use is shown in orange.

④ Flexible Menu Area: The Flexible menu items that are available in the current input mode are shown. The menus in use are shown with orange borders. Press or rotate the dial-buttons right below the menu.

※ Tip! When there are two Flexible menus

When there are two menus available upper and lower, both menus can be adjusted with the corresponding dial-button. Press a desired menu button on the touch screen and then use the dial-button.

[Figure 2.4 Touch Screen]

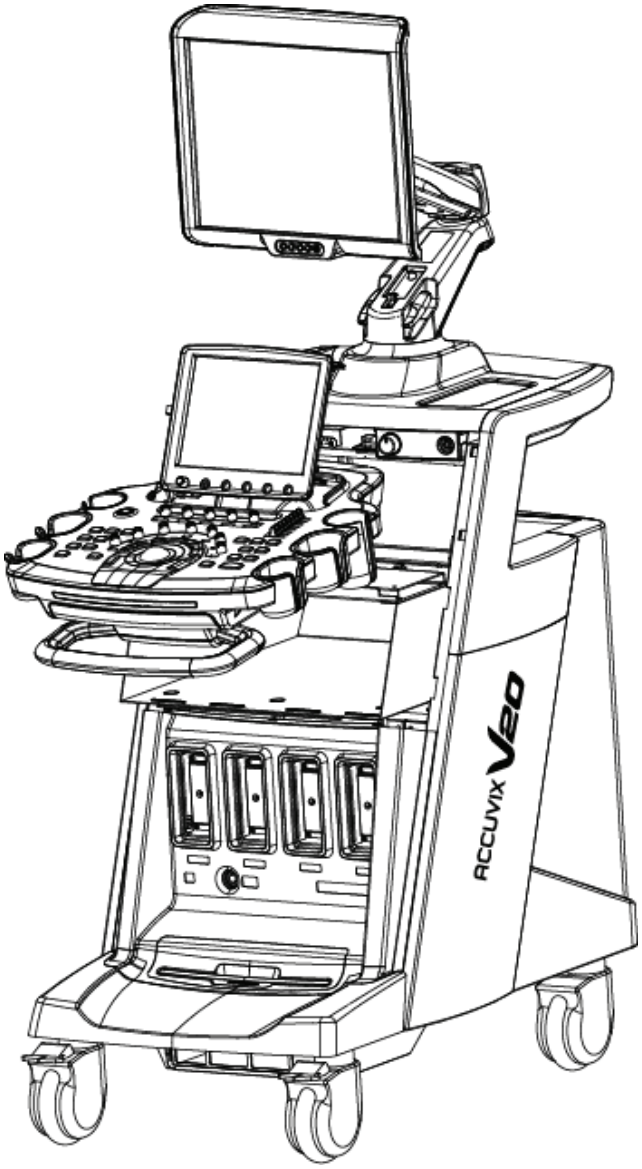
Adjusting Control Panel Angle

The angle of the control panel can be adjusted to the left or right. Gently turn the control panel in the desired direction.

CAUTION	Do not apply excessive force to the control panel.

Console

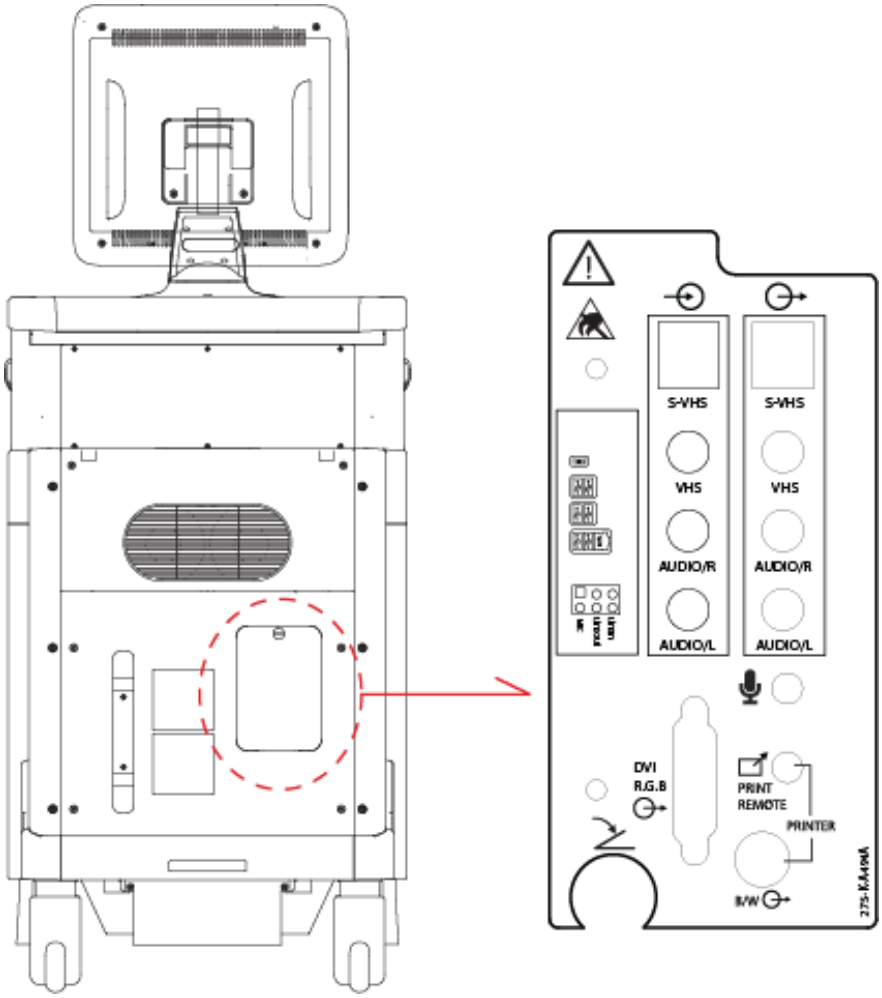
The console consists of two parts – the inner unit and the outer unit. The interior of the console mainly contains devices that produce ultrasound images. On the exterior of the console are various connectors, probe holders, storage compartments, handles, wheels, etc.



[Figure 2.5 Console]

Rear Panel

A monitor and other peripheral devices like printer, VCR, etc. are connected via the rear panel at the back of the system.



[Figure 2.6 Rear Panel]

- **DVI (Output)**

  The DIV signal is sent to the external monitor.

- **Parallel (Output)**

  Devices such as standard PC printers are connected via the parallel port on the rear panel.

- **USB (Input/Output)**

  USB peripheral devices are connected via the USB port. There is another USB port in the front panel to connect the USB storage device.

- **LAN (Input/Output)**

  DICOM can be connected via the LAN port. Patient information is transferred to another server via the DICOM network.

- **AUDIO (Input/Output)**

  Use to Input or output Audio signals.

- **VHS (Input/Output)**

  Connect the VCR using the VHS method.

- **S-VHS (Input/Output)**

  Connect the VCR using the S-VHS method.

- **Printer (Output)**

  Echo printer connection.

- **Print Remote (Output)**

  Remote Echo printer connection.

- **Microphone (Input)**

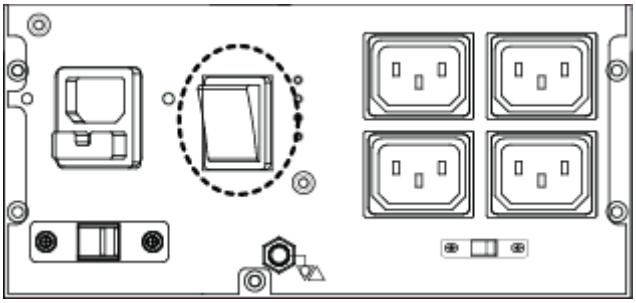
  Connect the microphone.

- **Foot Switch (Input)**

  Connect the Foot Switch.

Main Power On/Off Switch

The main power on/off switch locates under the rear panel. Powers the product On/Off.



[Figure 2.7 Main Power On/Off Switch]

Probe Holder

A probe holder is mounted at the left and right side of the control panel.

Cable Holder

A cable holder is mounted under the control panel.

Peripheral Devices

NOTE	Refer to the operation manual of peripheral device about its operating.

Internal Peripheral Devices

These are peripheral devices mounted in the system.

- **DVD**

  DVD+RW, DVD-RW, DVD-RAM, DVD-R, DVD+R, DVD-ROM, CD-R, CD-RW, CD-ROM

- **Hard Disc Drive**

  More than 80Gbytes.

External Peripheral Devices

These are peripheral devices that can be connected for use when needed and are connected via the USB port located at the rear panel.

CAUTION	When using a peripheral device from a USB port, always turn the power off before connecting/disconnecting the device. Connection/disconnection of USB devices during power-on may lead to malfunction of the system and USB devices.

NOTE	■ When remove the removable disk, use Utility > Storage manager. ■ USB ports are located both on the front panel and the rear panel of the console. We recommend that you connect USB storage devices (MO drive, flash memory media, etc.) to the ports on the front panel and other USB peripheral devices to the rear panel for added convenience.

The following products are recommended:

- **Video Cassette Recorder (VCR)**

  Panasonic MD835 SVHS (NTSC/PAL), SONY DVO 1000 (NTSC/PAL)

- **Video Page printer**
  - Color : Mitsubishi CP910U(NTSC), Mitsubishi CP910E(PAL), SONY UP-20
  - Black and White : Mitsubishi P93W, SONY UP-897MD

- **USB Video printer**

  - Color : Mitsubishi 30DW, Mitsubishi 900DW, SONY UP-D21MD, SONY UP-D23MD
  - Black and White : Mitsubishi P93DW, SONY UP-D897

CAUTION	■ You must install a Microsoft Windows XP™ or above (English) compatible printer and driver. Contact MEDISON Customer Service Center for inquiries about printer driver installation. ■ When connecting the printer, ensure that the printer is configured under Microsoft Windows ™ or system setup and has been chosen as the default printer. ■ Please check the port used in printer before connecting. Printers should be connected to the Printer port while the USB printer connected to the USB port.

- **USB Magnetic Optical (MO) Disk Drive**

  1.4G External USB Optical Disk

CAUTION	The USB MO Drive should not be used with other USB storage devices simultaneously.

- **USB Wireless LAN**

  3COM 3CRUSB10075, Linksys 2.4GHz Wireless-G USB Network Adapter

- **USB to RS-232C Serial Cable**

  USB to Serial (RS-232C) Converter with FTDI Chipset (FTDI FT232BM Compatible)

NOTE	For more information about the Open Line Transfer, refer to `Chapter 5. Measurements and Calculations'.

- **Foot Switch**

  Set the function of the foot switch in Utility > Setup > Peripherals > Foot Switch; Freeze, Update, Record, Print, Store, or Volume Start.

- **Others**

  Flash Memory media

NOTE	■ If you use the USB 1.1 flash memory, the system cannot recognize it. In the case of this, delete the flash memory from the console and quip again. ■ Regarding file formats that are not ordinarily saved: Please check first to see if it is possible to save the file format on a desktop PC before trying to save the file on a Flash Memory.

Probe

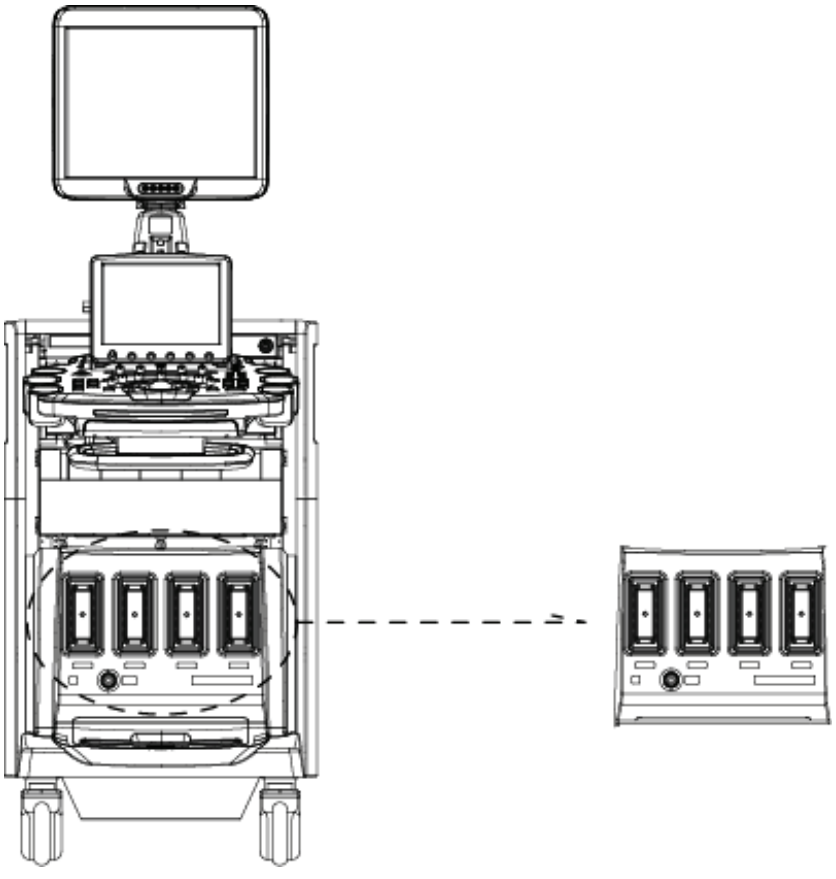
Probes are devices that generate ultrasound waves and process reflected wave data for the purpose of image formation.

NOTE	For more information, refer to `Chapter 8 Probes'.

Connecting probes

Be sure to connect or disconnect probes when the power is off to ensure the safety of the system and the probes.

1. Equip probes to the probe connectors on the front panel of the system. A maximum of four probes can be connected at one time. The CW probe should only be connected to its own connector.
2. Turn the connector-locking handle clockwise.

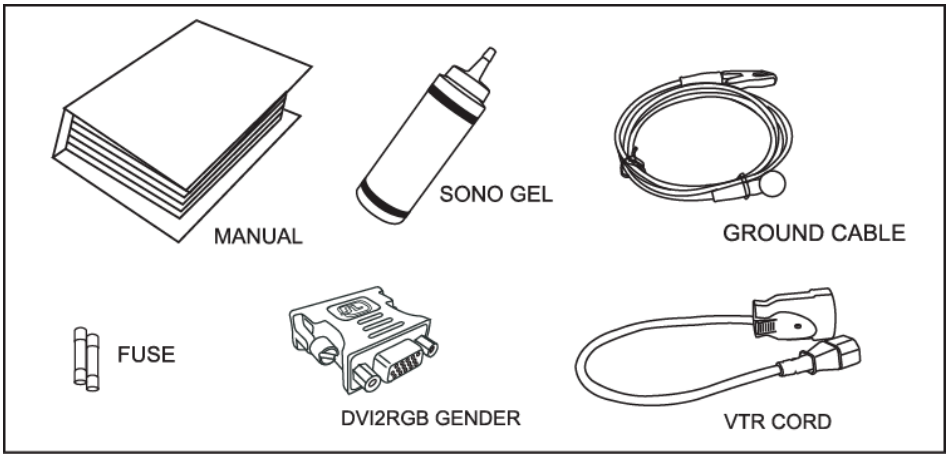


[Figure 2.8 Probe Connector]

Accessories

An accessory box containing the items below is supplied with the product.

CAUTION	**Main cord set, separately certified according to the relevant standards, is to be used when supplied to EU and USA/CAN.**



[Figure 2.9 Accessories]

NOTE	Accessories can be different according to the country.

Optional Functions

This product has the following optional functions:

- 4D
- 3D XI™
- CW Function
- Cardiac Measurement
- Dynamic MR™
- DICOM
- DICOM SR
- Spatial Compound
- XI STIC

For further information about optional functions, please refer to the relevant chapters in this manual.

Chapter 3

Setting

Probes & Applications

Before scanning, select a probe and an application.

CAUTION	Please refer to Chapter 8 “Probes” for more information about the probes supported by this system.

Probe Selection and Application

The selected probe and its application appear in the title area of the monitor.

[Figure 3.1 Touch Screen for Probe Selection]

1. Press the **Probe** button on the control panel and then the *Probe Selection* screen will appear.
2. Select a probe, an application, or a preset on the touch screen.
3. Press a preset or a user preset twice to switch to scan mode with the selected probe. Press the **Cancel** button on the touch screen or the **Exit** button on the control panel to cancel the selection.

※ **Tip! User Preset**

If user presets are specified as User 1, User 2, etc., the specified name will appear in the title area.

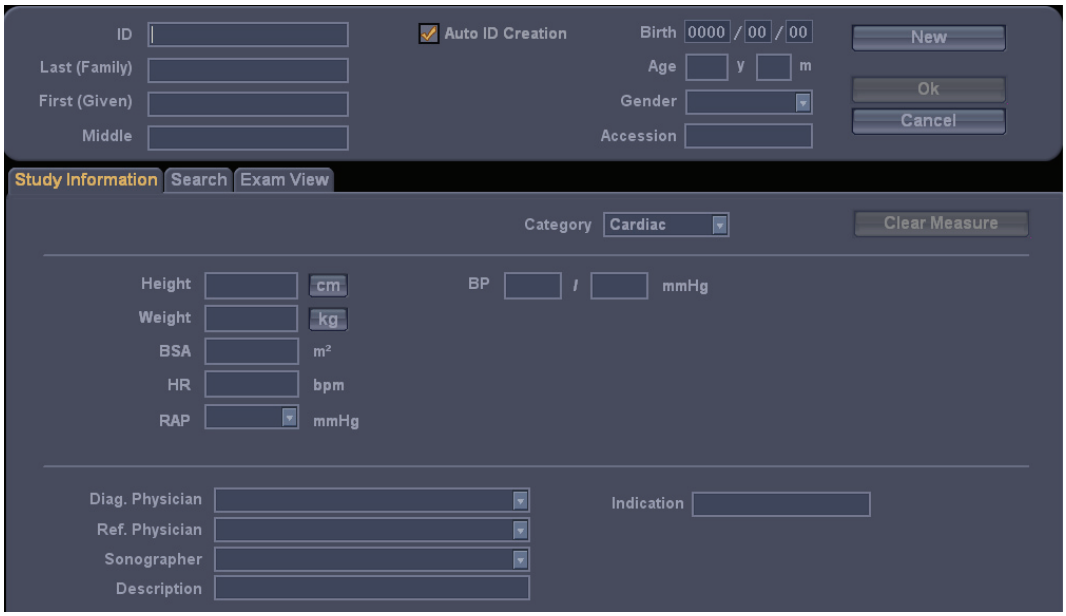
For example, if the Cardiac application along with the preset User1 is selected, 'Cardiac/User1' will be displayed in the title area.

NOTE	To change the value for presets, press **Utility > Presets.** Refer to 'Presets' in this chapter for details.

Patient Information

Press the **Patient** button on the control panel and the *Patient Information* screen will appear.

In this screen, you can enter, search or change patient information. Patient information includes basic information such as the patient ID, name, DOB, and gender, together with additional information for applications.



[Figure 3.2 Patient Information]

Use the **Trackball** and the **Set** button to select the desired field. Press a button on the touch screen to enter information with the touch screen.

Press **OK** on the screen to save the information and exit. Press **Cancel** or **Exit** on the touch screen to cancel.

[Figure 3.3 Touch Screen for Patient Information]

Entering Basic Patient Information

You can enter or change basic patient data at the top of the *Patient Information* screen.

NOTE	The ID and name fields are required.

- **ID**

  Enter a patient ID.

  - To enter it manually, enter an ID in the ID field.
  - To enter it automatically, select **Auto ID Creation** and press **New**. The icon is changed to .
  - If you enter an ID that exists already, the icon next to the ID field is changed to .

- **Name**

  Enter patient's full name.

  - Last Name: Enter the patient's last name - the last (family) name.
  - First Name: Enter the patient's first name - the first (given) name.
  - Middle Name: Enter the patient's middle name.

  The name that you have entered will appear in the title area and reports.

- **Birth**

  Enter the patient's birth date in the specified format.

- **Age**

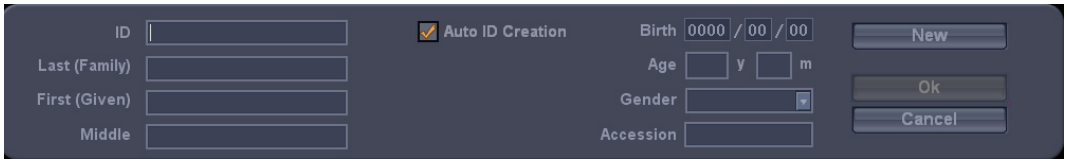
  Enter the patient's age in "yy-mm" format. When a birth date is specified in the **Birth** field, this information is automatically calculated and displayed.

- **Gender**

  Select the patient's gender with male or female.

- **Accession**

  When viewing the worklist for a patient via the DICOM server, this information is automatically filled in.



[Figure 3.4 Basic Patient Information]

Patient Information for Application

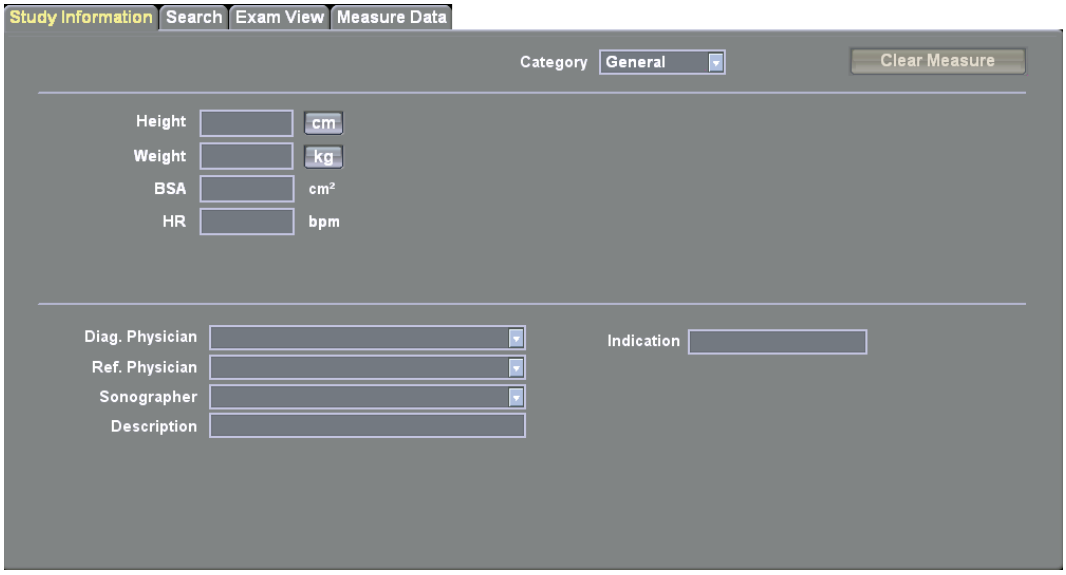
Enter additional patient information or change the existing patient information required for a diagnosis.

1. Press the **Study Information** tab in the *Patient Information* screen on the monitor, or select **Information** by using the **Page** dial-button on the touch screen.
2. Select an application by using **Category** on the monitor or the touch screen.
3. Enter additional information required for diagnosis.

To delete all past measurement values, press **Clear Measure** on the monitor.

General

In **Category**, select **General**. Enter additional information. The items in General are also included in the *patient information* screen for other applications.



[Figure 3.5 Study Information-General]

- **Height**

  Enter the patient's height in Inches (in) or Centimetres (cm). Press the unit button to change the unit. When the unit is changed, the entered number is automatically recalculated and displayed in the changed unit.

- **Weight**

  Enter the patient's weight in Ounces (oz), Pounds (lb) or Kilograms (Kg). Press the unit to change it.

- **BSA (Body Surface Area)**

  When height and weight are entered, BSA (Body Surface Area) is automatically calculated and displayed.

- **HR (Heart Rate)**

  Enter a heart rate.

- **Diag. Physician (Diagnostic Physician)**

  Enter the name of the physician who diagnosed the patient. When there is more than one physician available, you can use the combo button to make a selection.

- **Ref. Physician (Ref.Physician)**

  Enter the name of the physician. When there is more than one physician available, you can use the combo button to make a selection.

- **Sonographer**

  Enter the name of the sonographer who scanned the patient. When there is more than one sonographer available, you can use the combo button to make a selection.

- **Description**

  Enter a description of the diagnosis. If a description is entered, it can be searched for and viewed under **Description** in **SONOVIEW**.

- **Indication**

  Enter a brief description of the symptom or disease.

OB

In **Category**, select **OB**. Enter additional information for OB.

- **LMP (Last Menstrual Period)**

  Enter the last menstrual period for a patient.
  You can enter it manually in the specified format, or have it automatically calculated and displayed with the GA entered.

- **GA (LMP)**

  Indicates the gestational age of a patient.
  You can enter it manually in the specified format, or have it automatically calculated and displayed with the LMP entered.

- **EDD (LMP)**

  With the LMP or GA entered, EDD (Expected Date of Delivery) is calculated and displayed.

※Tips! Calculating EDD (LMP)

EDD can be calculated by entering LMP or GA.

- When LMP is entered: GA and EDD are automatically calculated and displayed on the screen.
- When GA is entered: LMP and EDD are automatically calculated and displayed on the screen.

- **Estab.Due Date**

  Enter EDD in the specified format.

- **Ovul. Date**

  Enter an ovulation date in the specified format. LMP, GA, and EDD will be automatically calculated and displayed.

※Tips! Calculating LMP and EDD (LMP) with Ovul. Date

The following formulae are used:

- LMP = Ovul. Date - 14
- EDD = (280 -14) + Ovul. Date

- **Gestations**

  Enter the number of fetuses, up to maximum of 4.

- **Day of Cycle**

  Enter a menstrual period in number of days (dd).

- **Ectopic**

  Enter the number of ectopic pregnancies

- **Gravida**

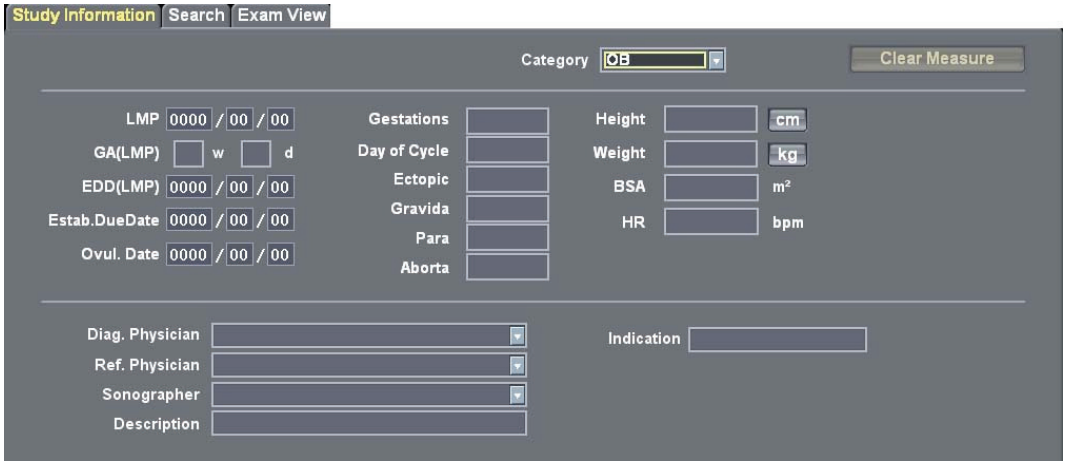
  Enter the number of pregnancies.

- **Para**

  Enter the number of deliveries.

- **Aborta**

  Enter the number of miscarriages.

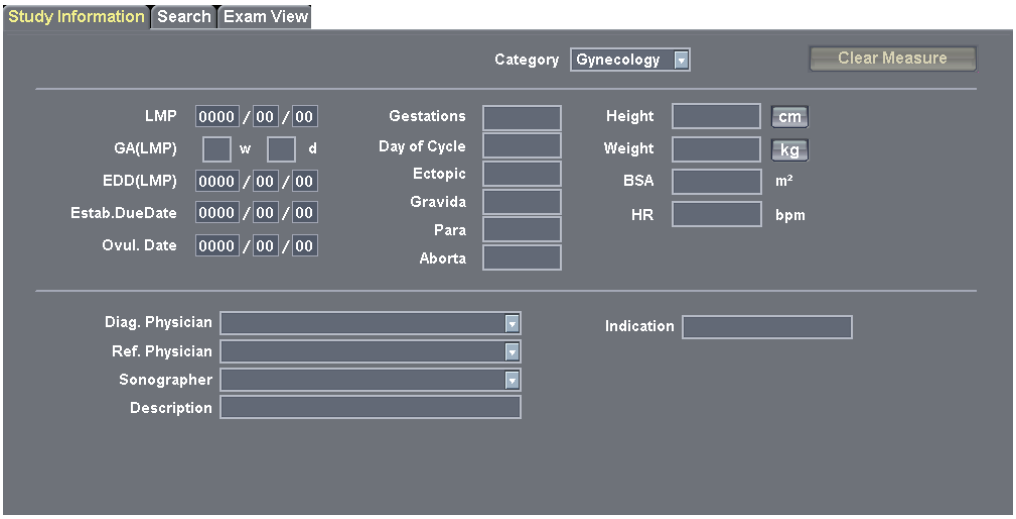


[Figure 3.6 Study Information-OB]

Gynecology

In **Category**, select **Gynecology.** Enter additional information for Gyn. This is the same information as for OB.

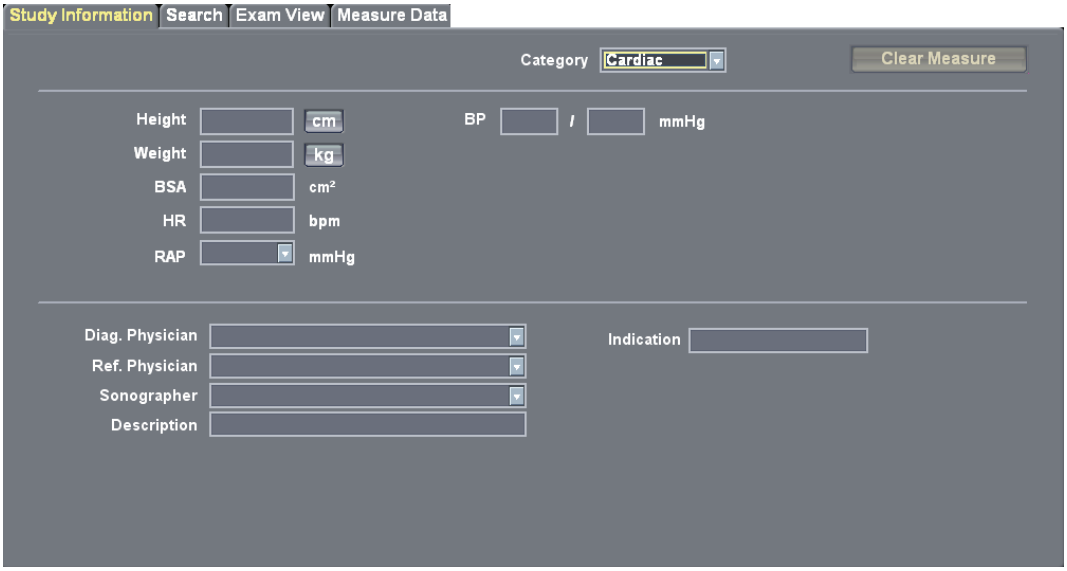
NOTE	In the GYN information input screen, even if the Ovul. Date is entered, LMP and EDD will not be calculated automatically.



[Figure 3.7 Study Information-Gyn]

Cardiac

In **Category**, select **Cardiac**. Enter additional information for Cardiac.



[Figure 3.8 Study Information-Cardiac]

- **RAP (Right Atrium Pressure)**

  Enter blood pressure.

- **BP (Body Pressure)**

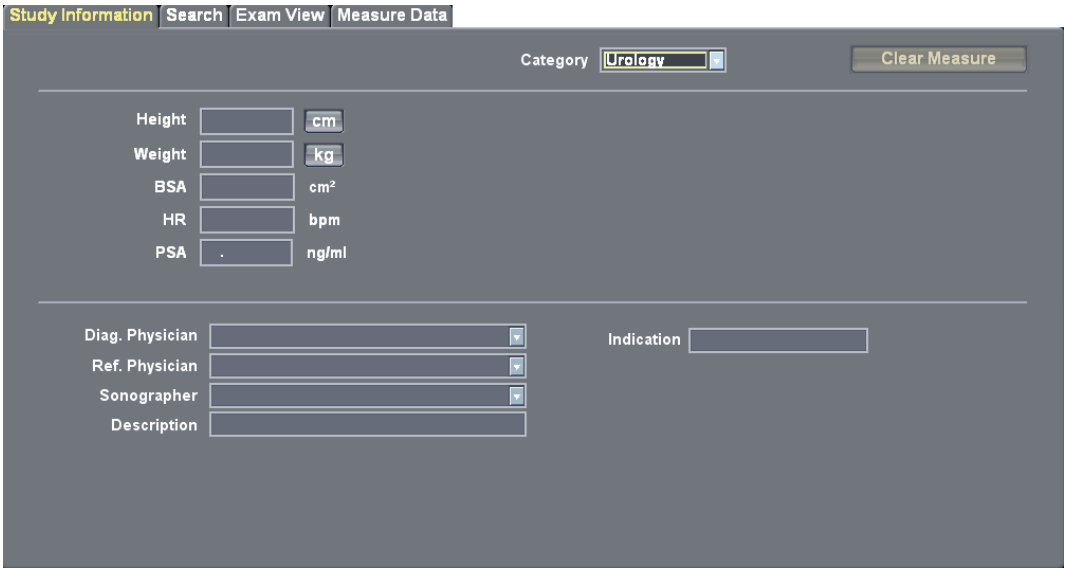
  Enter maximum/minimum blood pressures.

Urology

In **Category**, select **Urology**. Enter additional information for Urology.

- **PSA (Prostate Specific Antigen)**

  Enter the PSA value.



[Figure 3.9 Study Information-Urology]

Finding Patient Information

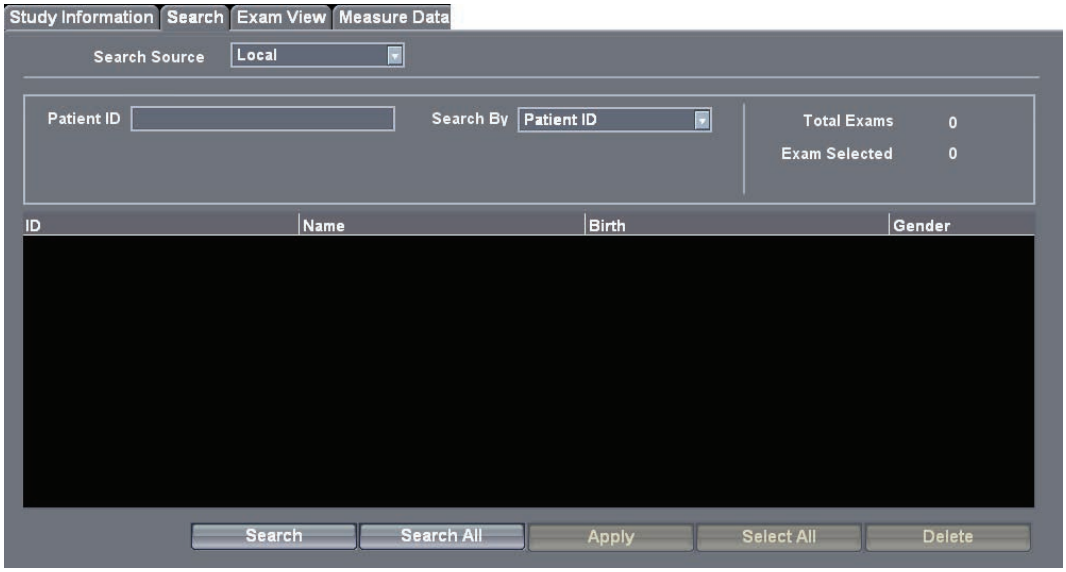
In the *Patient Information* screen, select the **Search** tab.

> ※ **Tips! – Selecting a tab**
>
> You can select a desired tab in either of two ways. Select the way that suits you.
>
> - Select a tab on the monitor screen by using the **Trackball** and the **Set** button.
> - Press the **Page** dial-button on the touch screen.

Local Search

Search through the information stored in the system.

WARNING	If a patient ID is deleted, all related data and images stored in SONOVIEW are erased.



[Figure 3.10 Search-Local]

1. Select **Local** by using **Search Source** on the monitor or the touch screen.
2. In **Search By**, select a search condition.
   - Select **Patient ID** to search by ID, or select a patient's name under **Patient Name** to search by name.
3. In the search window, enter an ID or name and press **Search**. The list of patients who meet the conditions will appear. Pressing **Search All** will show a list of all the patients stored in the system.

In the list, press ID or Name to sort the information alphabetically or numerically by the selected item.

4. Select the desired patient and press **Apply**. The information on the selected patient will be applied to the system.

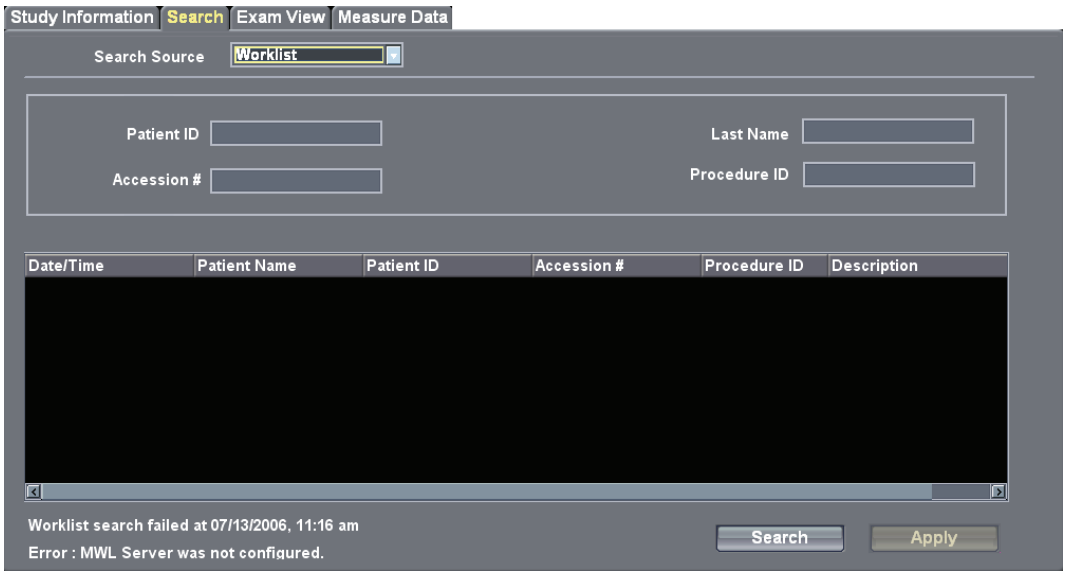
Press **Select All** to select all the patients in the list. Press **Delete** to delete the ID and other information for the selected patient.

Worklist Search

Perform a search by connecting to the DICOM Modality Worklist server in the hospital network.

NOTE	The worklist server is configured under the **DICOM** tab on the **Setting** screen. Please refer to “DICOM Setting” in this chapter.

1. Select **Worklist** by using **Search Source** on the monitor or the touch screen.
2. Enter more than one item from among **Patient ID**, **Last Name**, **Accession #** or **Procedure ID**, and then press **Search**. The list of patients who meet the condition will appear.
   - In the list, press Date/Time or Patient Name to sort the information alphabetically or numerically by the selected item.
3. Select the desired patient and press **Apply**. The information on the selected patient will be applied to the system.



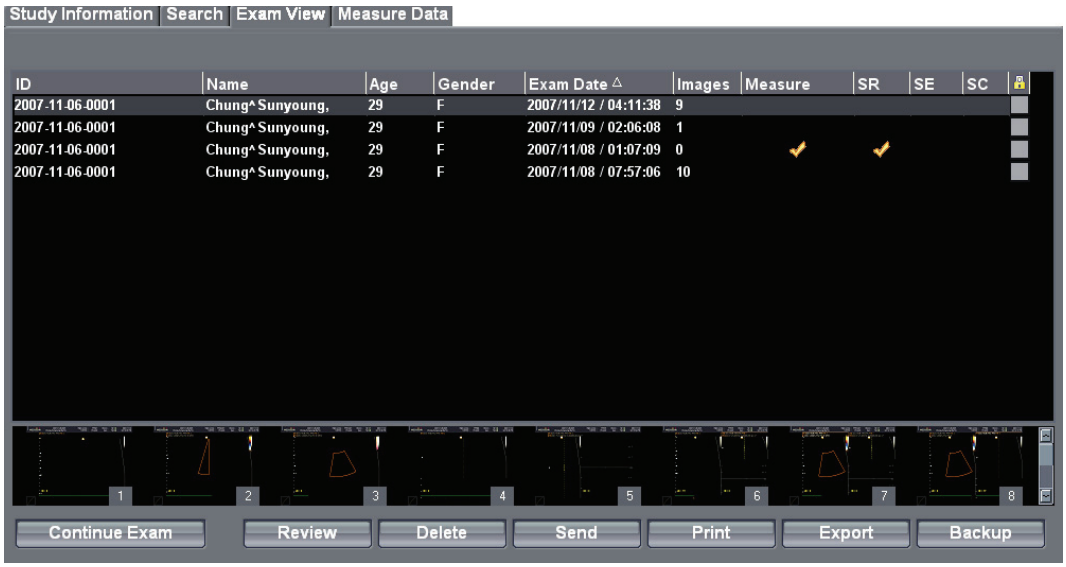
[Figure 3.11 Search-Worklist]

Managing Patient Exams

In the *Patient Information* screen, select the **Exam View** tab. The list of exams for the patient ID applied in the previous search will appear.

NOTE	The exam list appears only when a patient searches is completed and the related patient information is applied to the system.

In addition to the patient ID, Age and Gender, information such as the Exam Date, the number of images stored (Images), the measurement status (Measure), the report creation status (Structured Report, SR), the stress echo exam status (Stress Echo, SE), the exam transfer status (Storage Commit, SC) and the lock status are displayed. You can press ID or Name to sort the information alphabetically or numerically by the selected item.
To select more than one exam, press the **Set** button while holding down the **Ctrl** button on the keyboard.



[Figure 3.12 Exam View]

Executing Exam

NOTE	If the selected exam has been executed in the past 24 hours, the button in the lower left corner is displayed as **Continue Exam**. If the exam was executed earlier than this, the button is displayed as **Review Exam**.

Use the **Trackball** and the **Set** button to select an exam, and then press **Review Exam** or **Continue Exam** on the screen. For an exam currently being executed, the button is displayed as **Current Exam** and disabled.

- **Continue Exam**

  In addition to using the **Resume Exam** function, you can update the current scan with the exam executed previously.
  The selected exam appears on the screen and scanning is available. The initial execution date for the corresponding exam (Exam Resumed) is displayed in the feedback area.
  Double-clicking a stored image in the thumbnail area in the right side of the screen retrieves the image and displays the stored image information. In the retrieved exam screen, you can perform measurements or enter text, bodymarkers or indicators.

- **Review Exam**

  The selected exam appears on the screen. Double-clicking a stored image in the thumbnail area in the right side of the screen retrieves the image and displays the initial execution date for the corresponding exam (Exam Reviewed) and the stored image information. In the retrieved exam screen, you can perform measurements or enter text, bodymarkers or indicators.

Viewing Exam

Select an exam by using the **Trackball** and the **Set** button, and press **Review** on the screen. Switch to the SONOVIEW screen.

NOTE	For information on using SONOVIEW, please refer to Chapter 6 “Image Management.”

Deleting Exam

Select an exam by using the **Trackball** and the **Set** button, and press **Delete** on the screen. However, an exam in progress or a locked exam cannot be deleted.

NOTE	Once deleted, exams cannot be restored.

Sending Exams via DICOM

You can send the selected exams via the DICOM network.

NOTE	Before using this feature, make sure that DICOM is properly configured. For information on configuring DICOM, please refer to “DICOM Setting” in this chapter.

1. Select an exam(s) and then press **Send** on the screen. The **DICOM Storage** window will appear.

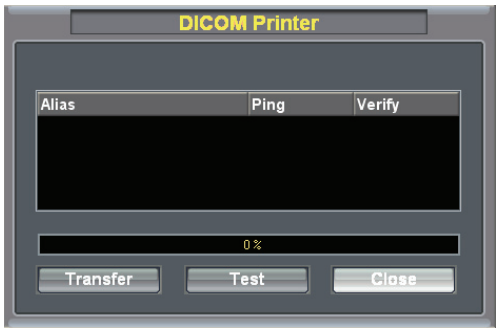
   - To check the connection between the server and DICOM before sending, press **Test**.

[Figure 3.13 DICOM Storage]

2. Select an image or report to send. You can select images under **Storage Image**, and reports under **Storage SR**.
3. Pressing **Transfer** starts a transfer and displays the transfer progress (%). To cancel the transfer, press **Close**.

Printing Exams via DICOM

You can print the selected exams via the DICOM network. You cannot print exams if DICOM has not been properly configured.



[Figure 3.14 DICOM Printer]

1. Select an exam(s) and then press **Print** on the screen. The **DICOM Printer** window will appear.

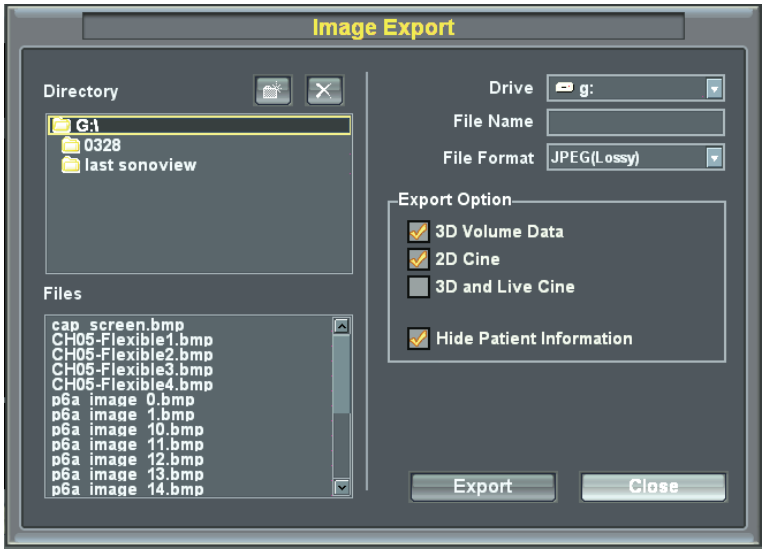
   - To check the connection between the server and DICOM before sending, press **Test**.

2. Select an Exam(s) to print.
3. Pressing **Print** starts printing and displays the transfer progress (%). To cancel printing, press **Close**.

Exporting Exam

You can save the selected exams in an external storage device.

1. Select exam(s) and then press **Export** on the screen. The **Image Export** window will be displayed.
2. Under **Drive**, select a media where the selected exams will be saved. You can select MO, CD-ROM or Flash Memory.
3. Under **File Name**, specify the file name. The same file name is assigned to all images associated with an exam. When there is more than one image, a serial number is automatically appended to the end of the file name.
4. Under **File Format**, specify a file format in which files will be saved. You can select BMP, JPEG, TIFF or DICOM.
5. Under **Export Option**, select a file option(s). You can select more than one option.
   - 3D Volume Data: Export the 3D volume data along with an image.
   - 2D Cine: Convert the stored Cine image to an .AVI file before exporting.
   - 3D and Live Cine: Convert the 3D Cine and Live Cine images to an .AVI file before exporting.
   - Hide Patient Information: Export an image without a patient ID and name.
6. Under **Directory**, select a location where the selected exams will be saved. To create a new directory, press  and specify a directory name. To delete a directory, press  . Under **Files**, files saved in the storage device are displayed.
7. Press **Export** to start saving. To cancel saving, press **Close**.

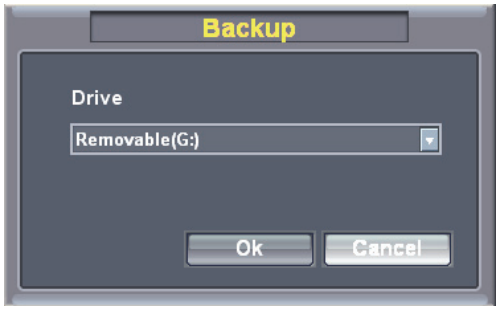


[Figure 3.15 Image Export]

Backing up Exam

You can back up the selected exams in an external storage device.

1. Connect a storage media for backup. MO, CD-ROM or Flash Memory can be used.
2. Select an exam(s) and then press **Backup** on the screen.
3. A confirmation window will appear asking whether to continue the backup. Press **Yes** to continue. Press **No** to cancel.
4. The Select Drive window will appear. Under **Drive**, select the media where the selected exams will be saved.
5. Press **Ok** to start the backup. Press **Cancel** to cancel.



[Figure 3.16 Backup]

Changing Measurements

In the *Patient Information* screen, press the **Measure Data** tab. Under the **Measure Data** tab, you can enter obstetrics measurements for a patient or check the existing measurements. Press the button, and the **Insert** screen will appear.

NOTE	This option is available for obstetrics only and enabled only when a patient ID is selected.

The Insert Screen

You can enter the existing obstetrics measurements.

- **Exam. Date**

  Enter the measurement date.

- **Fetus**

  If the fetus is a twin, identify each fetus. Up to 4 fetuses (A, B, C, D) can be specified.

- **Exam No.**

  Up to 8 exam numbers can be entered for each date. An exam number appears next to the **Fetus** field.

- **New Data**

  Cancel all measurement data entered for other exams and enter new measurement data.

- **Clear**

  Cancel entering the measurement data.

- **Insert**

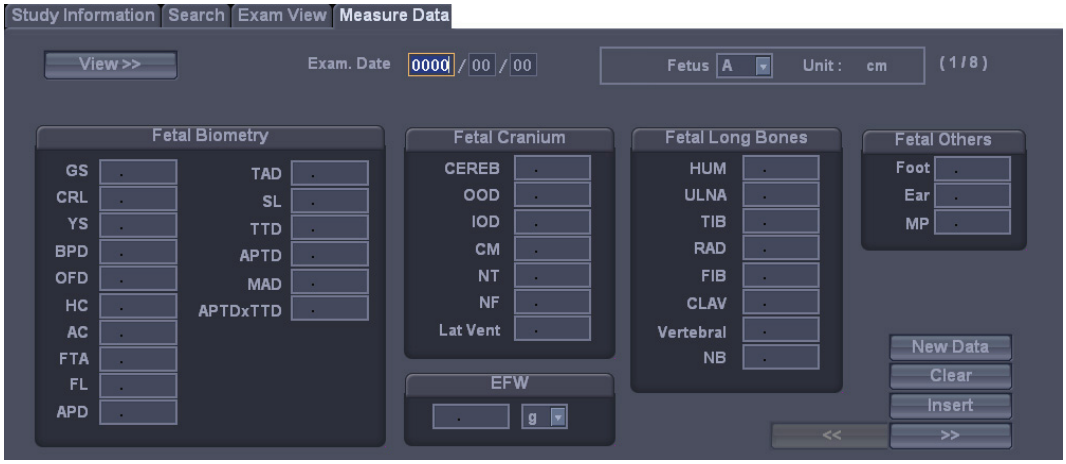
  Complete entering the measurement data.

- **Page Browse**

  Use the [>>] or [<<] button.

- **View**

  Switch to the *View* screen.



[Figure 3.17 Measure Data-View]

The View Screen

You can view the measurements entered or save them in an Excel file. The * symbol next to **Exam Date** indicates that the data is the current measurement data.

- **Package**

  Select a measurement package to display on the screen. Enter the measurement date.

- **Refresh**

  Update the measurement data. New measurements, or the measurements entered, are added. m

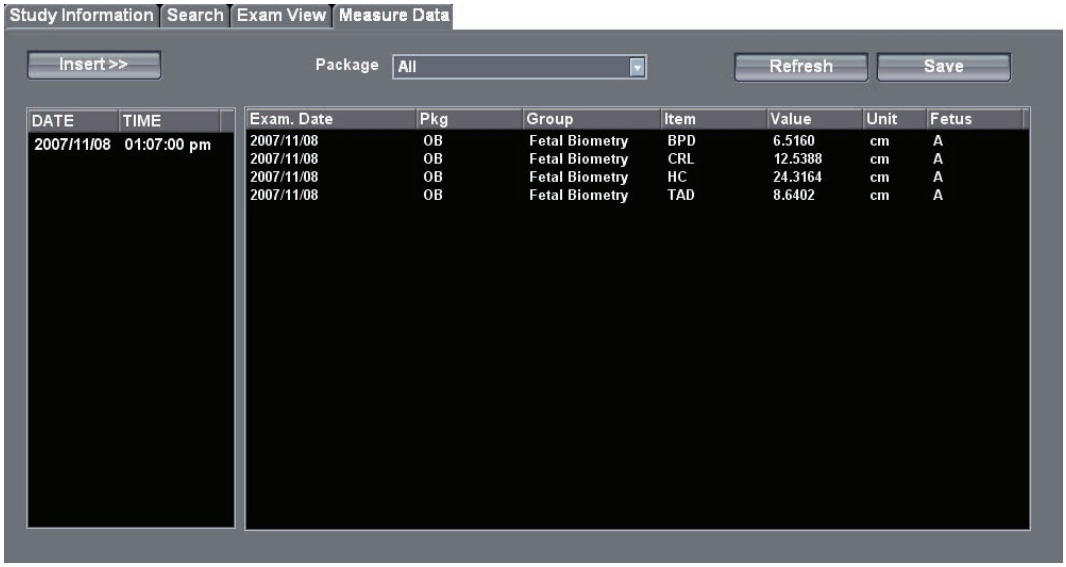
- **Save**

  The **Save To Excel** window appears, allowing you to save information on the screen in an Excel file. By default, the Excel file name is set to the measurement ID.
  After specifying the target path and file name, press **Save** to save the information. To cancel saving, press **Close**.

NOTE	Checking the HTML checkbox saves information in an HTML file instead of an Excel file.

- **Insert**

  Switch to the *Insert* screen.



[Figure 3.18 Measure Data-Insert]

System Settings

This mode is used for system settings. It does not affect image output. The setup may be modified depending on specific needs or preferences.

1. Press the **Utility > Setup** button on the touch screen.
2. The *Setting* screen will appear. Select a tab that has items to specify.

> ※ **Tips! – Selecting a tab**
>
> You can select a tab in either of two ways as desired.
>
> - Use the **Trackball** and the **Set** button to select a tab.
> - Press a button on the touch screen.

3. Specify settings for each item.
4. Save and finish the setting. Press the **Close** button on the monitor screen or the **Exit** button on the touch screen or the control panel to switch to scan mode. Press **Return** on the touch screen to go back to the **Utility** menu.

[Figure 3.19 Touch Screen for Setup]

Touch Screen Setting

Adjust the contrast and brightness of the touch screen with the dial-button on the touch screen.

- **Touch Screen Contrast**

  Set the contrast for the touch screen. Select a value between –20 and 20 with the dial-button.

- **TouchScreen Brightness**

  Set the brightness of the touch screen. Select a value between -25 and 25 with the dial-button.

General System Settings

Select **General**.

Title

You can specify information displayed in the title area on the screen.

- **Institution**

  Enter the name of the hospital/institution where the product is installed.

NOTE	You cannot input following characters; # [" ; : ? | ₩

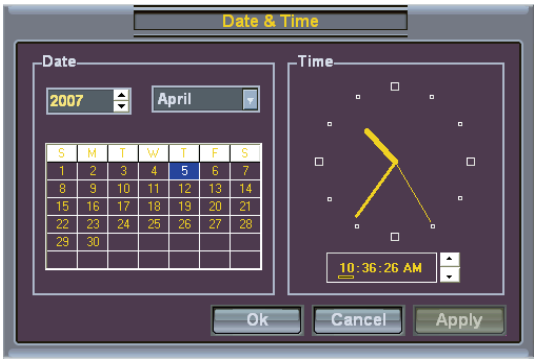
- **Date**

  The current date is displayed. To change the date, press  .

NOTE	■ You cannot change the date and time when a patient ID is registered. To change the date and time, you should finish the current diagnosis by pressing **End Exam** on the control panel. ■ You can select the year from 2006 to 2027.

※Tip! How to set the date and time

1. Press  in the **Date** (or **Time**) button.
2. Set the date and time by using the **Trackball** and the **Set** button on the control panel.
3. If it is properly set, press Apply to apply changes. Press OK to close the Date & Time window. To cancel, press **Cancel** or the **Exit** button on the control panel.



[Figure 3.20 Data & Time]

- **Date Format**

  Specify the date format. Select a desired date format by pressing the combo button. The date format that you specify will be applied to various date fields in *Patient Information*.

- **Time**

  The current time is displayed.

- **Time Format**

  Specify the time format. Select a desired time format by pressing the combo button.

Clip Store Setting

- **Clip Store Method**

  Specify the method and range in which an image is acquired and saved.
  You can select ECG Beat, Time or Manual. Note that ECG Beat can be selected only when ECG is on.
  - ECG Beat: Specify the heart beat as 1 – 8 beats.
  - Time: Specify it as 1 – 8 seconds.
  - Manual: Save images automatically for 8 seconds after pressing the **Clip Store** button.

- **Prospective**

  When **Store Clip** is pressed during scanning, the subsequent images are saved.

- **Retrospective**

  When **Store Clip** is pressed during scanning, the previous images are saved.

Scan Mode

- **Simultaneous Mode**

  This determines whether to enable simultaneous mode in Spectral Doppler Mode.
  - Off: Select this if you do not wish to use simultaneous mode.
  - Allow B/PW: Select this if you do not wish to use simultaneous mode in 2D/C/PW modes but do wish to use it in 2D/PW mode.
  - Allow B/C/PW: Select this if you wish to use simultaneous mode for both 2D/PW and for 2D/C/PW.

- **Doppler Axis**

  Select the axis scale unit in Spectral Doppler Mode.

- Velocity: Specify the Doppler axis scale unit in cm/s (mm/s).
- Frequency: Specify the Doppler axis scale unit in kHz.

■ **Dual / Quad Operation**

Specify whether the selected area is activated in Dual or Quad mode. If 'Auto Unfreeze' is selected, the selected area will be activated in Dual or Quad mode all the time.

Control

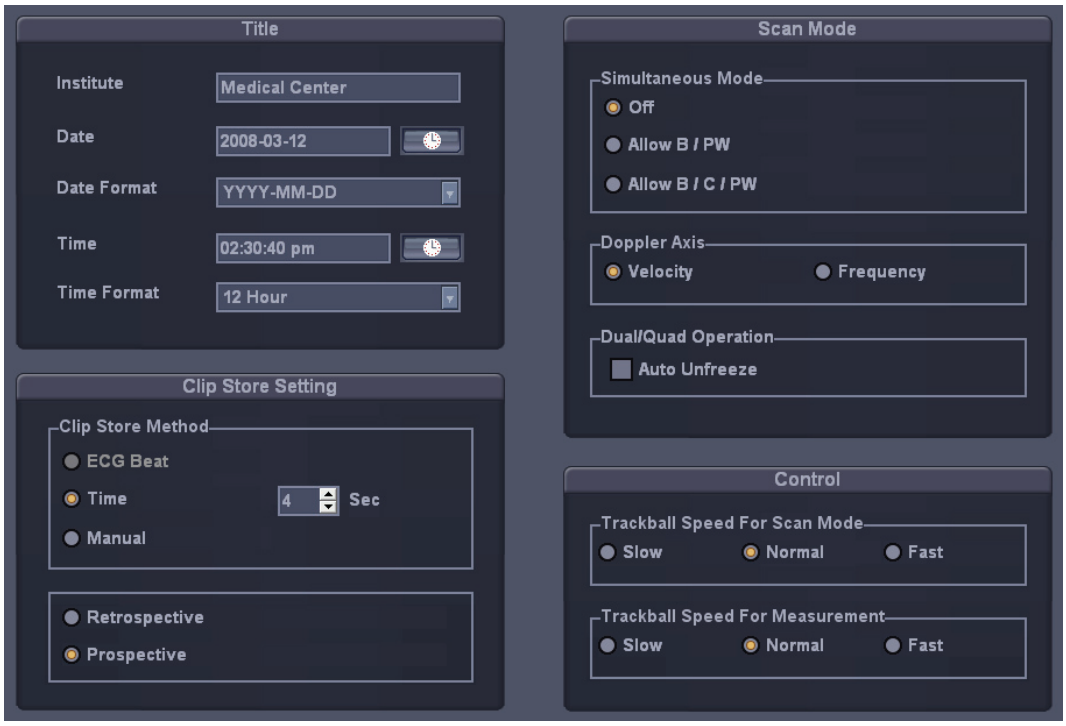
You can specify display-related options.

■ **Track Ball Speed for Scan Mode**

Specify the Trackball speed as Slow, Normal or Fast.

■ **Track Ball Speed for Management**

Specify the Trackball speed as Slow, Normal or Fast. Slower speed allows more precise measurement.



[Figure 3.21 Setup-General]

Display Setup

Select the **Display**.

[Figure 3.22 Setup-Display]

Display

■ Option

You can specify more than one item. Use the **Trackball** and the **Set** button to select a desired item and check or uncheck it.

- Auto Freeze: If the product is unused for 10 minutes, the scan mode will be automatically stopped.

NOTE	In Live 3D Mode, if the product is unused for 20 minutes, the Auto Freeze function is applied.

- Post Map: This sets whether to display the Post Map in the feedback area on the screen.

- TGC Line: This sets whether to display the TGC line.
- VCR Counter: This sets whether to show the VCR Counter on the screen when a VCR is connected to a serial port. When the counter interferes with an image and is turned off, it will appear during recording only.
- Image Info: This sets whether to display image information. When the image information interferes with an image and is turned off, it will not be displayed.
- Name + Age: This sets whether to display the patient ID, name and age.
- Bodymarker after freeze: Bodymarker mode starts automatically after pressing **Freeze** button.
- TI (Thermal Index) Display: Specify the TI to display on the screen as TIs (Soft tissue Thermal Index), TIb (Bone Thermal Index) or TIc (Cranial bone Thermal Index).

■ **Freeze Action**

Select a function to execute when the **Freeze** button on the control panel is pressed. Available options are Bodymark, Caliper, Measure and None.

■ **2D/C Live**

Select the location of Color Doppler Mode in 2D/C Live Mode. In the 2D menu, you can select from Up/Down if **Horizontal Dual** is on, or from Left/Right if it is off.

- Left/Up: Color Doppler Mode is located in the left or upper part.
- Right/Down: Color Doppler Mode is located in the right or lower part.
- Disable Horizontal Format: Turn off the Horizontal Dual function in 2D/C Live mode.

■ **LMP / GA Display**

Select the LMP and GA display of the patient information.

- Information Bar (Replace ID): LMP and GA are displayed at the ID position of the title area.
- Information Bar (Replace Name): LMP and GA are displayed at the Name position of the title area.
- Measure Result: During measurement, LMP and GA are displayed along with measurements.
- None: Neither LMP nor GA is displayed on the screen.

Font

■ **Font**

Select the font to use in.

- **Font Name**

  Select the font type to use.

- **Font Size**

  Select the font size to use.

- **Font Color**

  Select the font colour to use.

- **Preview**

  Preview window displays the font you selected.

- **Default**

  Go back to the default setting like below.

	Document Font	Measure Result Font
Font Name	Helvetica	Verdana
Font Size	11	11
Font Color	White	Yellow

NOTE	Certain fonts may not appear correctly on the screen.

Peripherals Setup

Select the **Peripherals**. You can configure keys, buttons and the peripheral devices connected to the product.

Peripherals

- **VCR Model**

  Select the type of VCR Model from Panasonic MD835 or Sony SVO 9500MD.

  You should reboot the system before you can use the configured VCR.

- **COM**

  Configure a device to connect to a serial port. Available devices are VCR and Open Line Transfer. If you select **Reserve**, the COM port will not be used.

Foot Switch

Specify the left/right pedal of the foot switch to Freeze, Update, Record, Print, Store, or Volume Start.

NOTE	The left and right pedals cannot be configured to provide the same function.

Key Setup

- **Set / Exit Key Switch**

  Set the location of the **Exit** and **Set** buttons on the control panel. Select the checkbox to make the **SET** / **EXIT** button on the left work as **Set** and the button on the right work as **Exit**.

- **Print Key**

  Set the functionality of the **Print 1** and **Print 2** buttons on the control panel. Select from Analog Printer, Digital Printer or Record. Also set a printer or VCR to use when each button is pressed.

- **Printing Area**

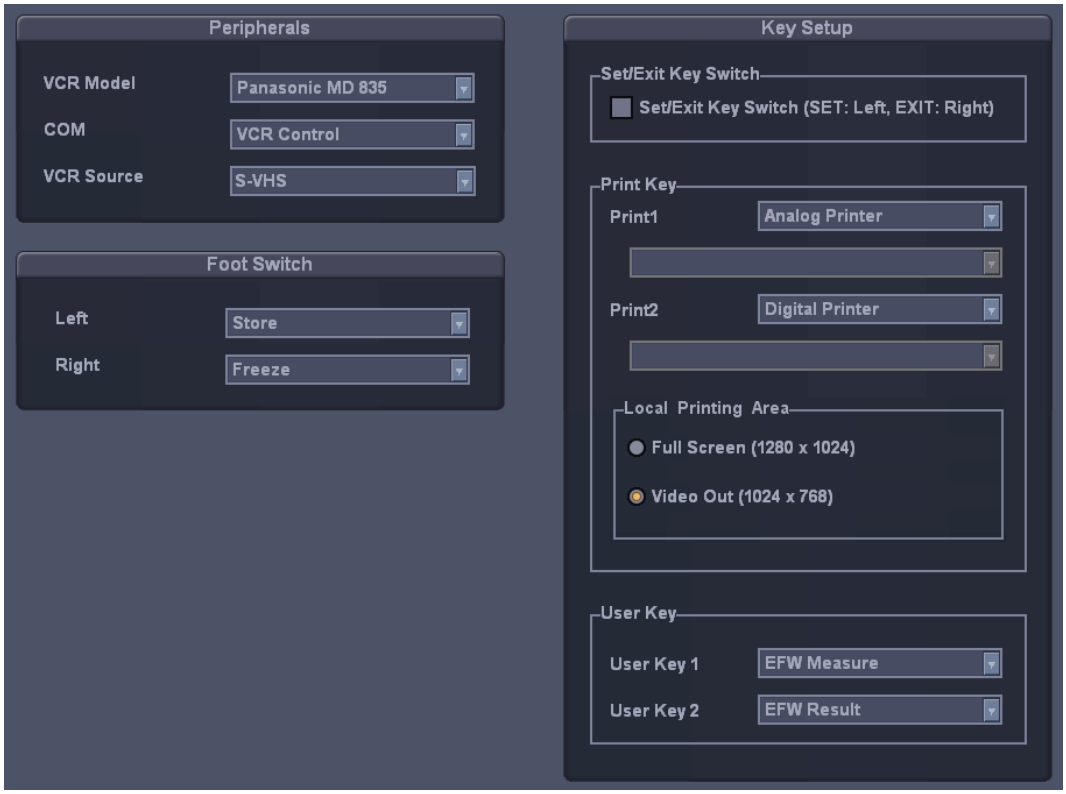
  Configure the printing area. The following two options are provided.

  - Full Screen (1280*1024): The entire screen is printed.

- Video Out (1024*768): Only the image area is printed.

■ **User Key**

Specify the function of the **User 1** and **User 2** buttons on the control panel. Select one from None, EFW Measure, or EFW Result.



[Figure 3.23 Setup-Peripherals]

System Information

Select the **Information**. Information about the system S/W version will be displayed.

Press **Detail** to view more detailed information on the product version.

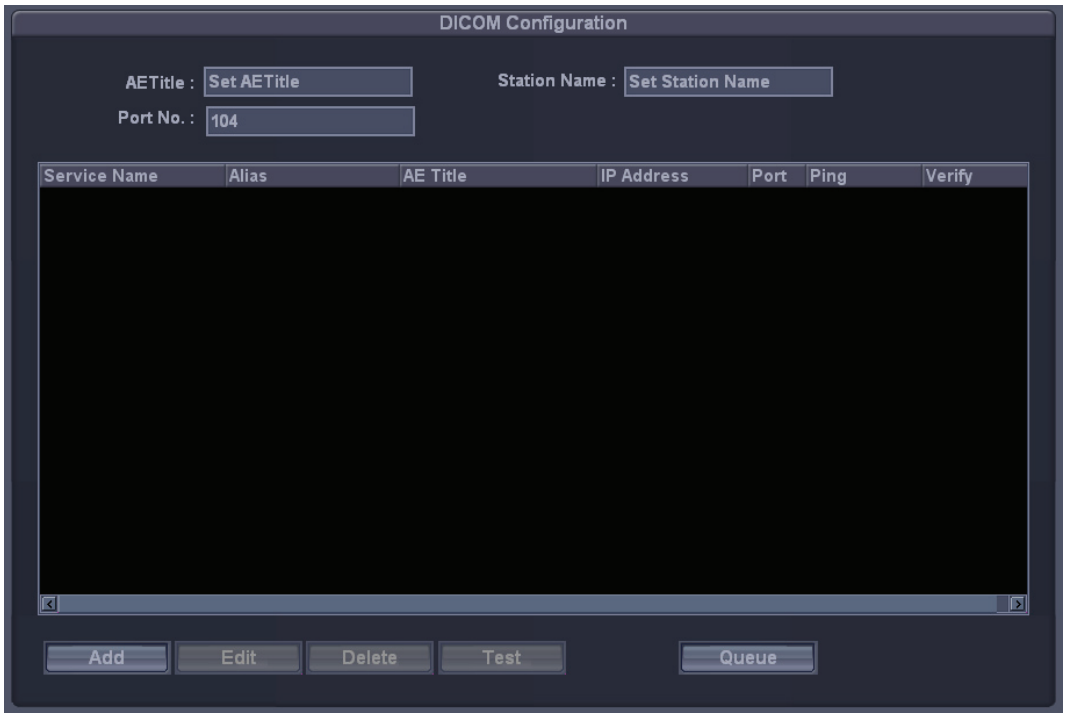
[Figure 3.24 Setup-Information]

* The S/W version of your system may be different from that in the figure above.

DICOM Setup (Optional)

Select the **DICOM**. You can configure the DICOM (Digital Imaging and Communication in Medicine) operation and the DICOM server.

NOTE	For more information, please refer to the user manual for the server equipment or the DICOM Conformance Statement.



[Figure 3.25 Setup-DICOM]

DICOM Configuration

The information on the DICOM server used by the system is displayed.

You can change the information, or add or delete a server. The server information is used to identify DICOM for the system in a network. It is also used to transfer data between other DICOM servers.

NOTE	Please consult your network administrator to set **IP Address**, **AE Title** and **Port No**.

- **AE Title**

  Enter the name of the DICOM AE (Application Entity). The title is used to identify devices that use DICOM in a network. (E.g. US1, US2, etc.)

- **Station Name**

  Enter the name of the system. Along with **AE Title**, it is often used to identify the system in the DICOM network. (E.g. X81, X82, etc.)

- **Port No.**

  Enter the port number of the server being used.

Adding DICOM Service

Press **Add** on the screen. The system is switched to a screen where you can enter a DICOM service to add. After adding a service, press **Save** to save the information. Press **Cancel** to cancel.

- **Services**

  Select the type of service to use via DICOM. The supported DICOM servers are Storage, Print, Worklist, Modality PPS, SC and Storage SR.

- **Alias**

  Enter the name of the DICOM server.

- **AE Title**

  Enter the AE title of the DICOM server. Consult your network administrator before specifying this option.

- **Transfer Mode**

  Select a transfer method:

  - Batch: Send all saved images when you click the **End Exam** button.
  - Send As You Go: Send an image whenever you press the **Save** button to save it.
  - Manual: Send the specified image in Exam List or SONOVIEW.

- **Connect Timeout**

  Specify how long the system will wait until it receives a response from the DICOM server. You can specify it in seconds.

- **IP Address**

  Enter the IP address of the server being used. Consult your network administrator before specifying this option.

- **Port**

  Enter the port number of the server being used. Consult your network administrator before specifying this option.

■ **Retry Interval**

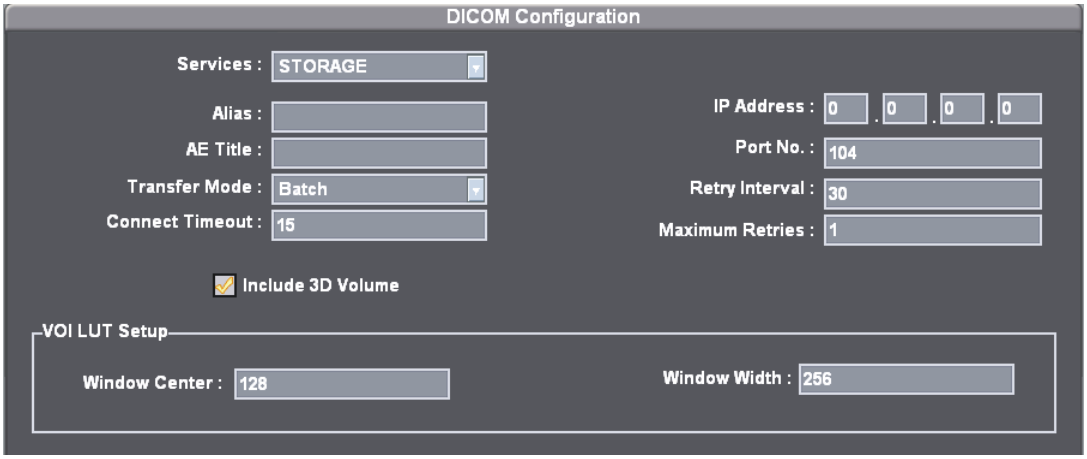
Specify how long the system will wait before it retries when transmission fails. You can specify it in seconds.

■ **Maximum Retries**

Specify how many times the system will retry when transmission fails.

Storage Server Information

Select **STORAGE** under **Services**. Configure the Image Storage Service using DICOM.



[Figure 3.26 DICOM Configuration - Storage]

■ **VOI LUT Setup**

Configure VOI LUT (Value Of Interest Look Up Table). Adjust the brightness and contrast of a DICOM image when saving it. The saved image can be viewed with any PACS device that has DICOM VOI LUT implemented.

- Window Centre: Enter a value for the DICOM Tag (0028, 1050) setting. The setting value indicates the brightness of an image that is displayed by the Storage service. Relative to 128, a higher value results in a darker image. Note that this function can be used only when it is supported by the Storage service.
- Window Width: Enter a value for the DICOM Tag (0028, 1051) setting. The setting value indicates the brightness of an image that is displayed by the Storage service. Relative to 256, higher values result in lower contrast. Note that this function is available only when it is supported by the Storage service.

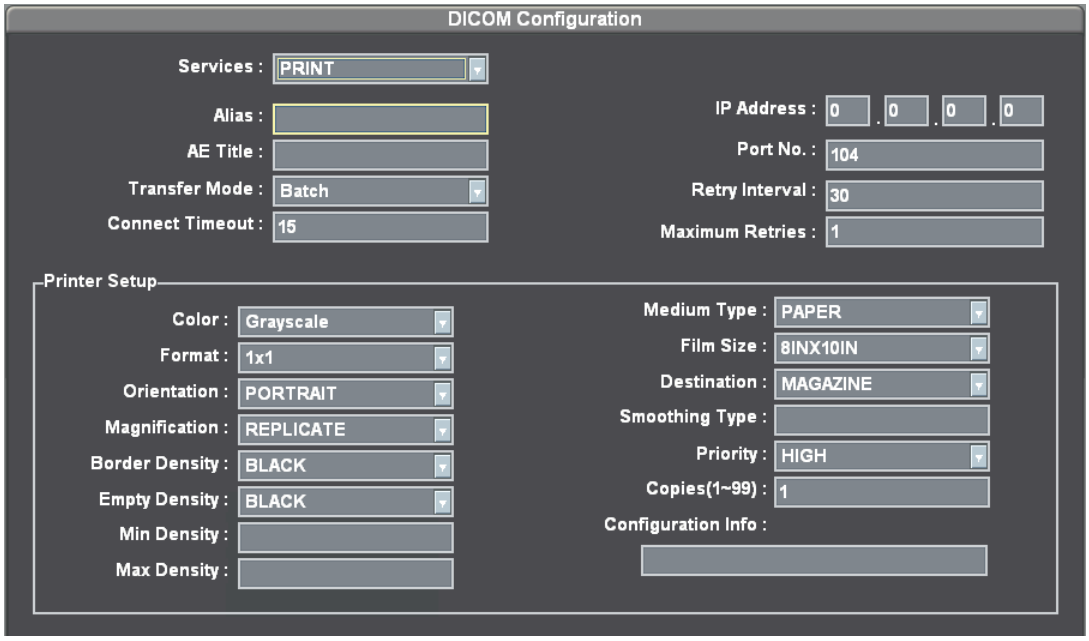
■ **Include 3D Volume**

When selected, the 3D volume data is transferred when a 3D image is saved. You should select this option only when the Storage service supports MEDISON 3D volume data.

Print Server Information

Select **PRINT** under **Services**. Configure the Print Service using DICOM.

NOTE	■ You can configure a printer connected to the DICOM network only. ■ Depending on the printer, some of the following functions may not be available. Before configuring a printer service, please refer to the user manual for the printer or the DICOM Conformance Statement.



[Figure 3.27 DICOM Configuration - Storage]

■ **Color**

Specify whether to use colors. Select **Grayscale** or **RGB**.

■ **Format**

Specify the paper layout. Select from 1 x 1, 1 x 2, 2 x 2, 2 x 3, 3 x 3, 3 x 4, 3 x 5, 4 x 4, 4 x 5 and 4 x 6.

■ **Orientation**

Specify the paper orientation. Select Landscape or Portrait.

■ **Magnification**

When resizing an image to print, specify the interpolation. Select from Replicate, Bilinear, Cubic and None.

- **Border Density**

  Specify the border density of an image to print. Select Black or White.

- **Empty Density**

  Specify the background color of an image to print. Select Black or White.

- **Min Density**

  Specify the minimum brightness of an image to print. If this option is not specified, the default value is applied.

- **Max Density**

  Specify the maximum brightness of an image to print. If this option is not specified, the default value is applied.

- **Medium Type**

  Specify the paper type. Select from Paper, Clear Film, Blue Film, Mammo Clear Film and Mammo Blue Film.

- **Film Size**

  Specify the paper size. Select from 8 inch x 10 inch, 5 inch x 11 inch, 10 inch x 12 inch, 10 inch x 14 inch, 11 inch x 14 inch, 11 inch x 17 inch, 14 inch x 14 inch, 14 inch x 17 inch, 24cm x 24cm, 24cm x 30cm, A4 and A3.

- **Destination**

  Specify the paper pathway. Select Magazine or Processor.

- **Smoothing Type**

  This option is available only when **Magnification** is set to **CUBIC**. Enter a value specified in the DICOM Conformance Statement for the printer.

- **Priority**

  Specify a priority for the print command. Select from High, Med and Low.

- **Copies**

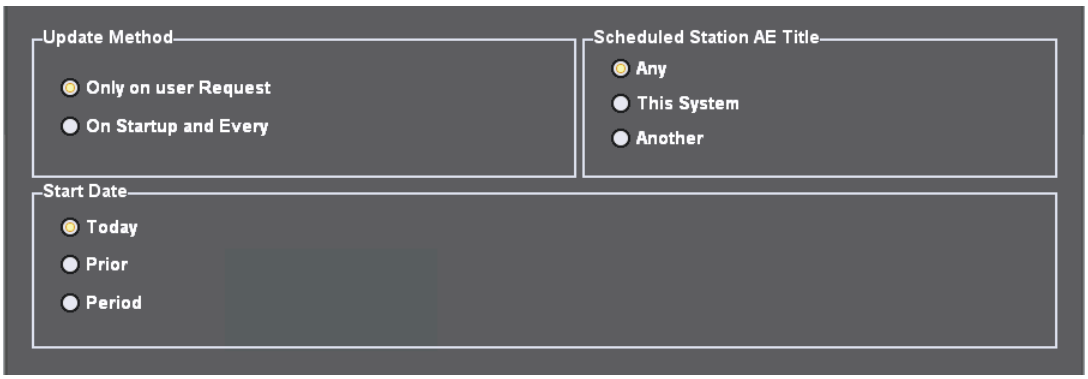
  Enter the number of copies between 1 and 99.

- **Configuration Info**

  Specify the unique value for a printer. Please refer to the DICOM Conformance Statement for the printer.

Worklist Server Information

Select **WORKLIST** under **Services**. Configure the Modality Worklist Service using DICOM.



[Figure 3.28 DICOM Configuration -Worklist]

■ **Update Method**

Specify the update method for Worklist.

- Only on user Request: Update only when asked by the user.

> **※ Tip!**
> To update a worklist, in the **Search** tab on the *Patient Information* screen, select **Worklist** for Search Source and press **Search**.

- On Startup and Every : Update automatically at a specified interval after the system boots and Worklist is updated.

■ **Scheduled Station AE Title**

Specify the range of AE Title to retrieve from the Worklist server in a hospital.

- Any: Retrieve the patient list stored in all AE Titles in the server.
- This System: Retrieve the patient list specified under the DICOM tab.
- Another: Retrieve the patient list stored in the AE Title specified by the user.

NOTE	This option is available only when the Worklist server is enabled.

■ **Start Date**

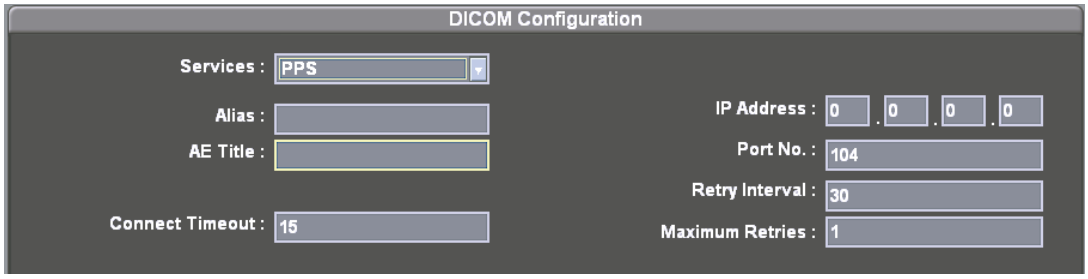
Specify the range of dates to search.

- Today: Retrieve the patient list for the current date.
- Prior_days, Next_days: Retrieve the patient list for n days before and n days after the current date.
- Period: Retrieve the patient list for the period specified by the user.

PPS Server Information

Select **PPS** (Performed Procedure Step) under **Services**. Configure the Modality Performed Procedure Step Service using DICOM.

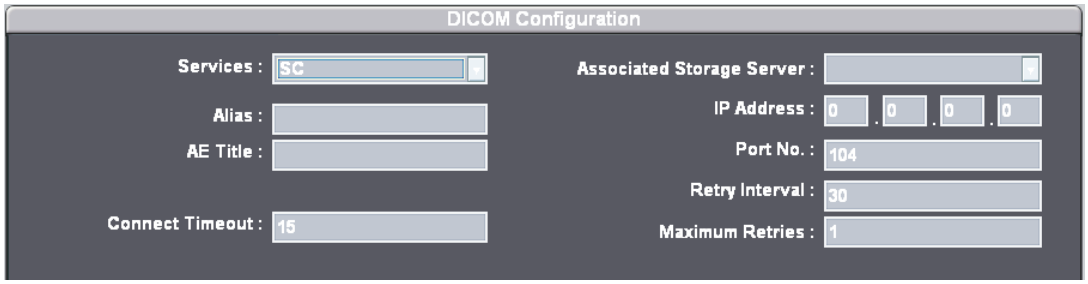
It can be configured in the same way as for the Storage server.



[Figure 3.29 DICOM Configuration -PPS]

SC Server Information

Select **SC** (Storage Commitment) under **Services**. Configure the Storage Commitment Service using DICOM. The Storage Commitment Service is used after a diagnosis is finished and all saved images and reports are transferred.



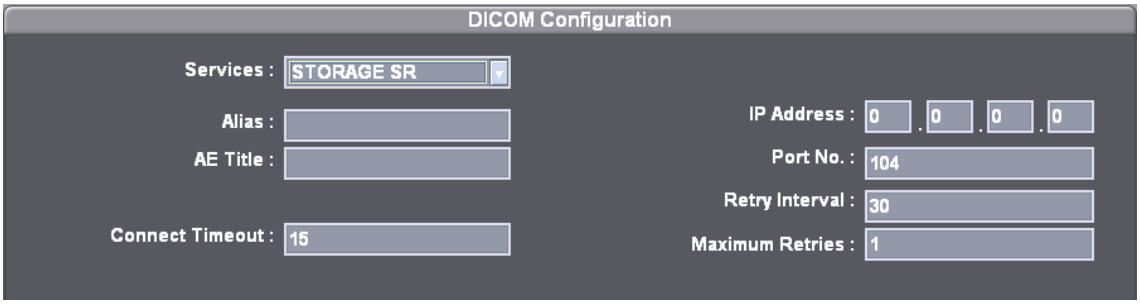
[Figure 3.30 DICOM Configuration -Storage]

- **Associated Storage Server**

  Select an image storage server to connect.

Storage SR Server Information

Select **Storage SR** (Storage Structured Report) under **Services**. Configure the Report Storage Service using DICOM.



[Figure 3.31 DICOM Configuration –Storage SR]

It can be configured in the same way as for the Storage server.

Changing DICOM Information

Select a service and press **Edit** on the screen. The information on the selected service will appear.

After changing the information, press **Save** to save the changes. Press **Cancel** to cancel.

Deleting DICOM Service

Select a service and press **Delete** on the screen. A message appears asking whether to delete it. Press **Ok** to delete the selected service. Press **Cancel** to cancel.

Testing DICOM Server

Select a service and press **Test** on the screen. The connection with the selected service is tested and the results are shown under the **Ping** and **Verify** items. If the result is Normal, it indicates that the connection is normal.

Managing DICOM

Press **Queue** on the screen and then the system will switch to the **DICOM Job Status** screen. In this screen, you can manage service operations and the history of services performed.

The DICOM Manager provides two major functions: a Job Monitor that allows you to check the operation of the DICOM Service, and a Log Manager that allows you to manage the history of services performed.

Job Monitor

Press the **Job Monitor** tab.

A job indicates a patient diagnosis. Therefore, under the **Job Monitor** tab, you can view and manage diagnoses performed or in progress using the product and the relevant DICOM services.

Job shows the status of the current exam. If you select a list of patients, all related DICOM services and their operation status are shown under **Service**.

[Figure 3.32 Job Monitor]

- **Delete Job**

  Under **Job**, select a list of patients and press **Delete Job**. Note that patients can be deleted only when an exam is finished and its **Status** is set to COMPLETED or FAILED.

- **Restart Job**

  Under **Job**, select a list of patients and press **Restart Job**. The DICOM service will be restarted for the selected list of patients. Note that it can be restarted only when the DICOM service has failed and its **Status** is set to FAILED.

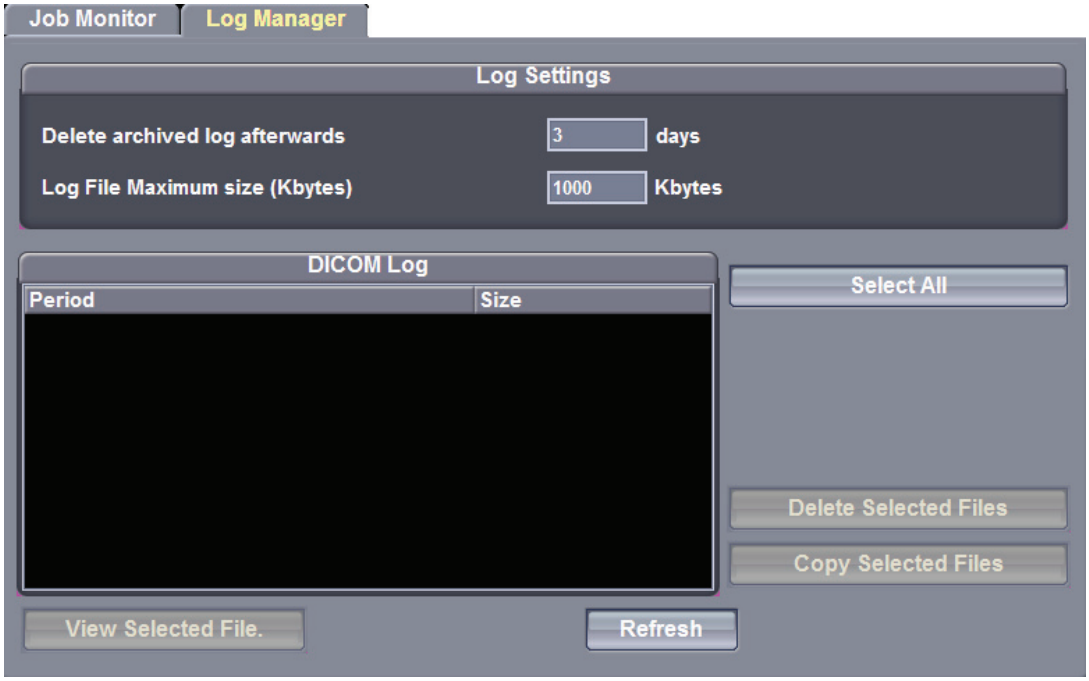
- **Restart Service**

  Under **Service**, select a service and press **Restart Service**. The selected DICOM service will be restarted. Note that it can be restarted only when the DICOM service has failed and its **Status** is set to FAILED.

Log Manager

Press the **Log Manager** tab.

A log indicates the DICOM history and is saved in a file. Under the Log Manager tab, you can manage the history of all the DICOM services performed using the product.



[Figure 3.33 Log Manager]

■ **Specify Log File Management Method**

Under **Log Settings**, you can specify how log files are managed.

- Delete archived log file after: Specify how long a log file will be archived. Enter a number in days. If the specified time has elapsed after the log file was created, the file is deleted from the system.
- Log File Maximum Size: Specify the maximum size of a log file that can be archived. Enter a number in Kb. A log file that is larger than the specified size is not archived on the system and deleted immediately.

■ **Manage Log File**

DICOM Log shows information on log files.

- Select All: Select all log files.
- Delete Selected Files: Delete the selected log file.
- Copy Selected Files: Copy the selected log file to an external storage media.
- View Selected File: Display the details of the selected log file on the screen.
- Refresh: Update the information of a log file.

Utilities Setup

Select the **Utility** tab. You can configure settings for e-mail, text and network status.

E-mail

You can specify a server through which you will send and receive e-mails.

- **Mail (SMTP) Server**

  Specify the e-mail server.

- **Port No.**

  Enter a port number.

- **ID**

  Enter an ID for the e-mail server.

- **Password**

  Enter a password for the e-mail server.

Buzzer Control

Generate a buzzer sound when a button or dial-button is used.

- **Buzzer Sound**

  If **Buzzer On** is selected, the buzzer sound is turned on. A buzzer sound is generated whenever a button or dial-button is used.

BodyMarker

- **BodyMarker Auto Active**

  'If 'BodyMarker Auto Active' is selected, the system automatically enters the BodyMarker input mode when the **Freeze** button is pressed.

Text Setup

You can specify whether to use Autotext or Quick Text.

- **Autotext Setup**

  If an abbreviation is entered, the system retrieves and enters a full word automatically. When this option is selected, you can enter text more easily and quickly.

For example, to enter the text ‘Abdominal Circumference’, you only need to enter ‘AC’ and the system will search the full word from the abbreviation list and automatically enter it.

To enable Autotext, check the **Autotext** checkbox with the **Trackball**. Otherwise, uncheck the checkbox.

If this option is selected, the abbreviation list appears on the screen when text is entered.

[Figure 3.34 Abbreviation list]

The system has a built-in abbreviation list for this function. You can add a new abbreviation or edit the existing abbreviation as desired.

※ Editing Abbreviation List

To enable the abbreviation list stored in the system, press the **Autotext Edit** button. The system will switch to the **Autotext Edit** screen.

To save the changes and finish editing, press the **Close** button.

- Modify Word

1. Use the **Trackball** and the **Set** button to select a word to modify in the list. An abbreviation for the selected word and its full word are displayed under the **Abbreviation** and **Full Word** fields at the bottom of the screen.
2. Modify words in the **Abbreviation** and **Full Word** fields. The abbreviation list is updated in real time.

- Add Word

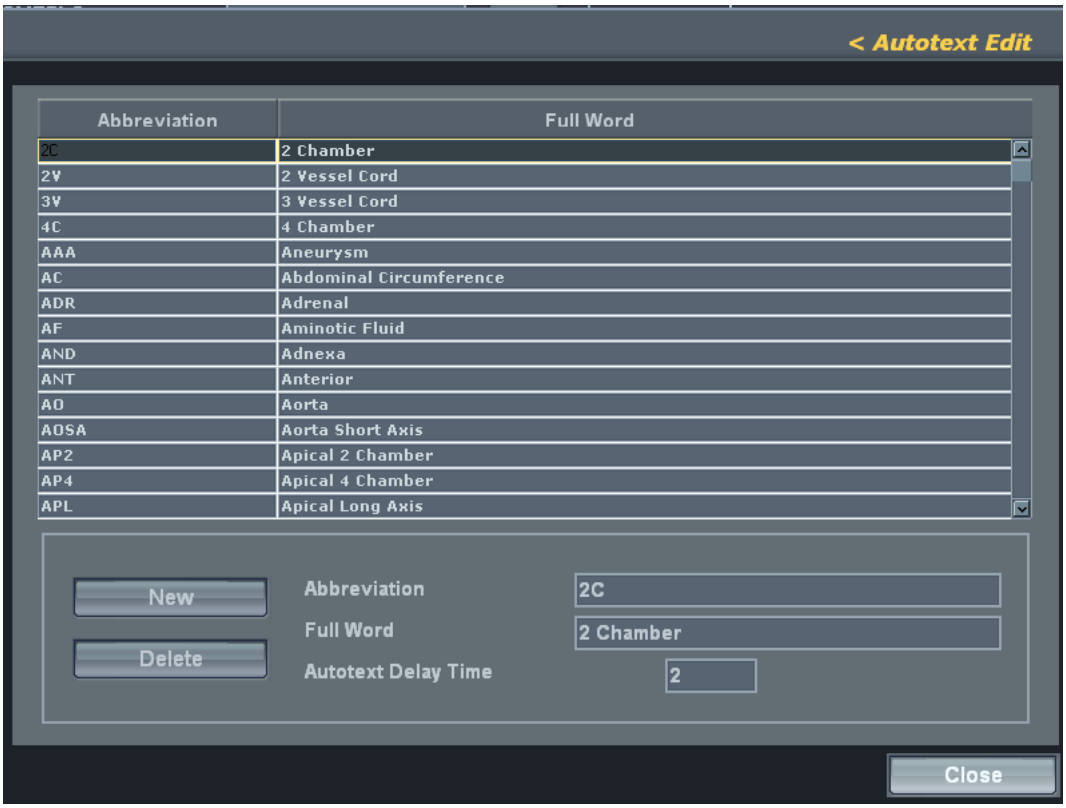
1. Press the **New** button.
2. Enter words to add in the **Abbreviation** and **Full Word** fields at the bottom of the screen. The entered words are added to the abbreviation list.

- Delete Word

1. Use the **Trackball** and the **Set** button to select a word to delete from the list. An abbreviation for the selected word and its full word are displayed under **Abbreviation** and **Full Word** at the bottom of the screen.
2. Press the **Delete** button, and the following warning message will appear.
3. To delete the selected word, press **Ok.** The selected word will be deleted from the abbreviation list. Press **Cancel** to cancel.

- Specify Word Input Delays

Specify the time taken by the system to convert an abbreviation to a full word and enter it. In the **Autotext Delay Time** field at the bottom of the screen, enter the input delay time in seconds.



[Figure 3.35 Autotext Edit]

- **Quick Text**

If the checkbox is selected, the Quick Text function is enabled. Quick Text switches the system to the text input mode immediately after a character key in the Alphanumeric Keyboard is pressed.

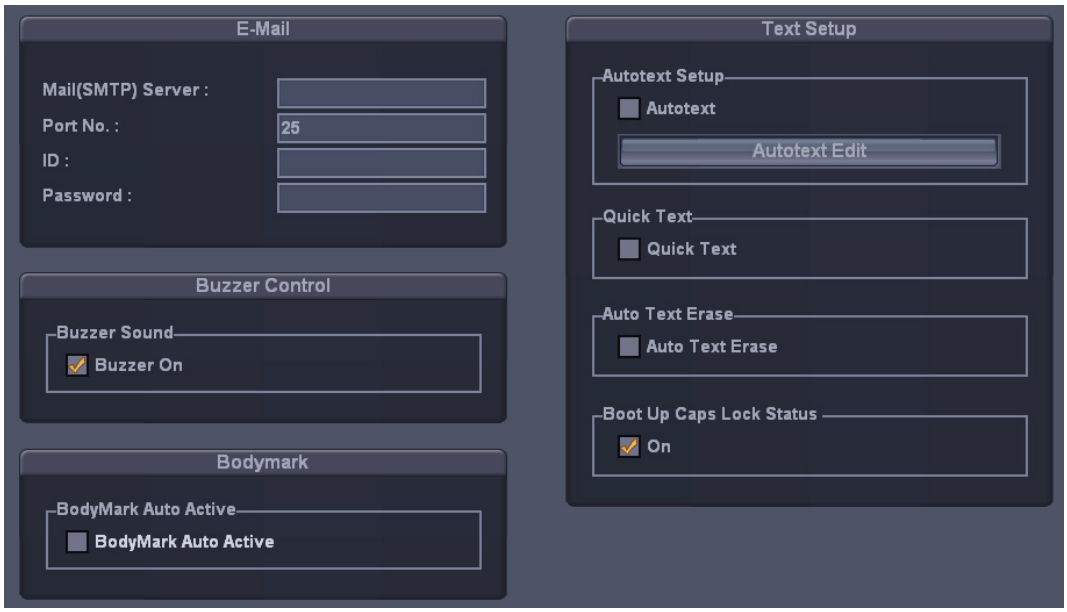
NOTE	You can still enter text if this option is not enabled. If this is the case, press the F2 key in the Alphanumeric Keyboard to switch to the text mode.

- **Auto text Erase**

If this checkbox is checked, whole texts are deleted at once when pressing **Freeze** button after input texts.

■ **Boot up Caps Lock Status**

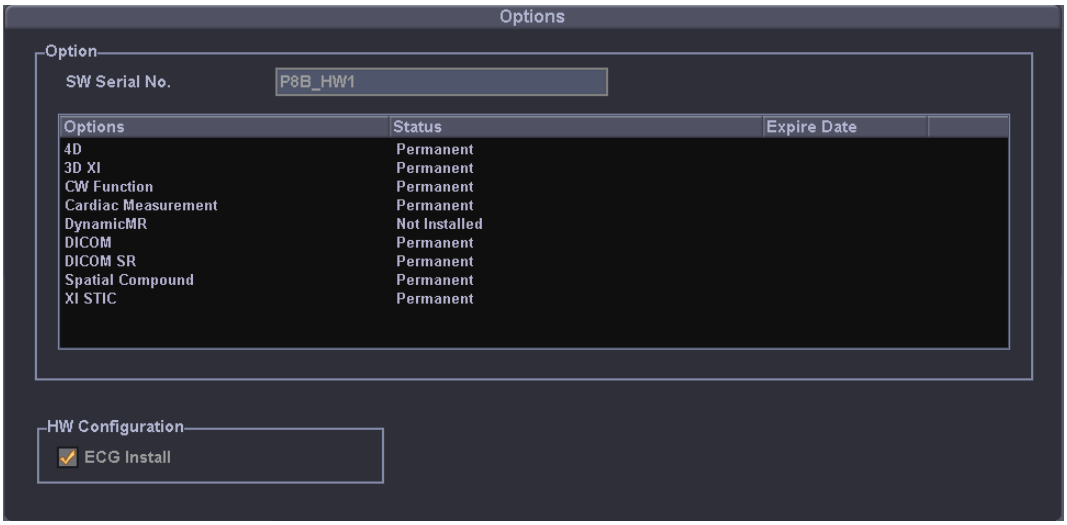
If this checkbox is checked, Boot up Caps Lock Status is turned on. When text is entered, it is entered in capital letters.



[Figure 3.36 Setup-Utility]

Option Setup

Select the **Option**. You can enable or disable optional software and hardware.



[Figure 3.37 Setup-Options]

■ **Options**

The list of optional software is displayed on the screen.

- Options: Shows the types of optional software that can be installed on the product. The following table shows the list of optional software that is available with ACCUVIX V20:

4D	DICOM
3D XI™	DICOM SR
CW Function	Spatial Compound
Cardiac Measurement	XI STIC
Dynamic MR™	

- Status: Shows the current status of optional software.

  Lock_Not Installed: No hardware is connected.

  Lock_Unregistered: The software is not registered.

  Lock_Installed: Hardware is installed but not registered.

  Unlock_Permanent: Ready for use without any time limitation.

  Unlock_Restricted: Ready for use for a certain period.

NOTE	To purchase optional software, please contact the distributor for the software.

- **Hardware Configuration**

  The list of optional hardware is displayed on the screen. Currently, only ECG is supported.

  Check the checkbox for hardware that will be used. Reboot the system to finish settings.

Auto Calc

Select the **AutoCalc**. The Auto Calc function calculates specified measurement items automatically with measurement data and is supported in Spectral Doppler Mode.

NOTE	The specified items appear in Spectral Doppler Mode only when **Auto Calc** on the touch screen is pressed.

[Figure 3.38 Setup- AutoCalc. Setting]

AutoCalc Setting

Enable or disable the following items for automatic calculation by checking their checkbox.

- Peak Systolic Velocity
- End Diastolic Velocity
- Time Averaged Peak Velocity
- Resistive Index
- Pulsatility Index
- Systole / Diastole Ratio
- Time Averaged Mean Velocity

When the Peak Systolic Velocity and End Diastolic Velocity values are 0, not all results for the items will be displayed n the screen.
In addition, the result value for Timed Averaged Mean Velocity is displayed only when Mean Trace is is ‘On’.

Measurement Setup

Specify various setup options for measurement. The setup may be modified depending on specific needs or preferences.

1. Press the **Utility** button on the control panel and select **Measure Setup** in the menu.
2. When the *Measure Setup* screen appears, select a tab that has items to configure.

> ※ **Tips! – Selecting a tab**
>
> You can select a tab in either of two ways as desired.
>
> - Use the **Trackball** and the **Set** button to select a tab.
> - Select a tab on the touch screen.

3. Specify settings for each item.
4. Save and finish the setting. Press the **Close** button on the monitor screen or the **Exit** button on the touch screen or the control panel to switch to scan mode. Press **Return** on the touch screen to go back to the **Utility** menu.

[Figure 3.39 Touch Screen for Measure Setup]

Touch Menu Design

Press Touch Menu Design on the touch screen. The monitor and touch screen will then switch to the Touch Menu Design screen.

Set the buttons that will appear on the touch screen during measurement. The menus for

measurement items and results can be configured as desired.

The screen is divided into five areas as below:

[[Figure 3.40 Touch Menu Design]

① Touch Page: The names of the touch pages and the layout of measurement buttons are displayed. The specified settings are shown on the touch screen when measurement for an application is started by pressing **Calculation** during scanning.

Up to 6 buttons can be set both vertically and horizontally. Up to 16 pages can be configured for each application. Use [←] or [→] on the screen or the **Page Up/Dn** dial-button on the touch screen to change pages.

NOTE	User 1 and User 2, the 15th and 16th pages, can be renamed.

② Application Tree: Measurement items for each application are presented in a tree structure. This tree is used to configure application menus.

③ Simple Measurement: Simple measurement items for each application are presented in a tree structure. This tree is used to configure simple measurement menus.

④ Command: Menu related to measurement results. This tree is used to configure result-related menus.

⑤ Page Management Buttons: Buttons for managing the current setting are displayed.

- [←]: Move to the previous page.
- [→]: Move to the next page.
- [Clear]: Delete the setting of the current touch page.
- [Reload]: Cancel the setting of the current touch page and restore the previous setting.
- [Save]: Save the current setting.
- [Save & Exit]: Save the current setting and then exit Touch Menu Design.
- [Close]: Exit Touch Menu Design.

■ **Measurement Menu Setup**

Use application and diagnosis mode trees.

1. Double-click a tree or click the + sign with the **Trackball**.
2. After selecting a diagnosis item by using the **Trackball** and the **Set** button, drag it to the touch screen in the upper right corner of the screen.

NOTE	For more information on measurement items, please refer to Chapter 5 “Measurements.”

■ **Measurement Result-related Menu Setup**

Use the Command area.

After selecting an item by using the **Trackball** and the **Set** button, drag it to a touch page button in the upper right corner of the screen.

The measurement result-related menu includes the following:

- Menu Visible: Specify whether the measurement menu is displayed on the screen.
- Meas. value in menu: Specify whether measurement results are displayed in the measurement menu.
- Result Move: Change the location where measurement results are displayed.
- Result Reset: Initialize the location where measurement results are displayed.
- Undo: Cancel the last measurement.
- Assign: After measuring items in Simple Measurement, proceed to diagnosis items for each application.
- Packages: Move to the application selection page where an application can be changed.

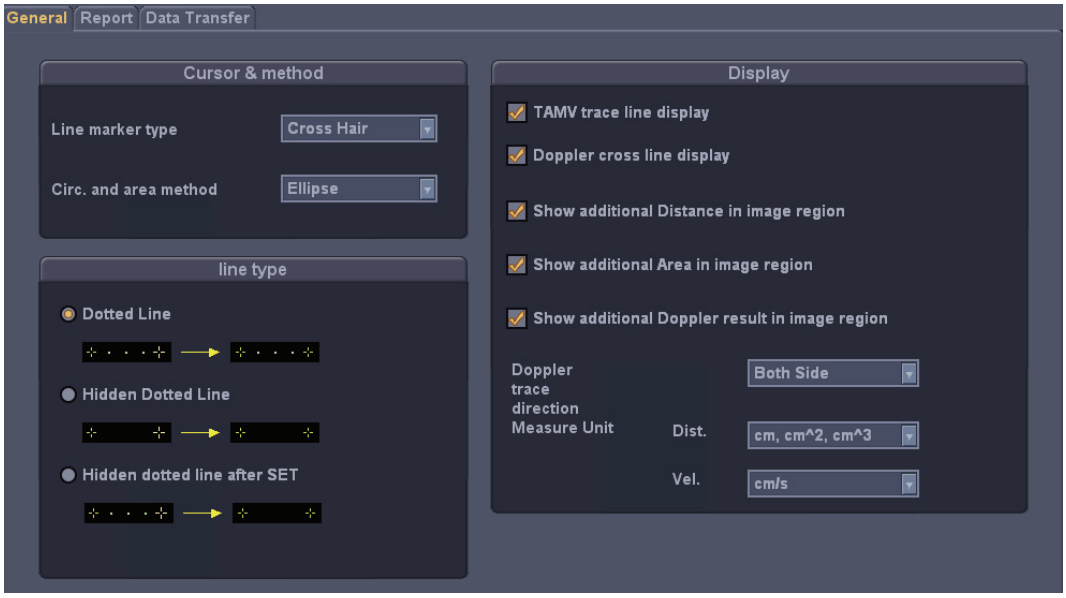
※ Tip! Menu Placement
Place the measurement menu at the top of a touch page and the measurement result-related menu at the bottom for easier menu access.

General Measurement Setup

Select the **General**. You can specify basic measurement options.

General

Select the sub tab **General** under the **General**. You can specify basic measurement options.



[Figure 3.41 General -General]

Cursor & Method

- **Line Marker Type**

  Specify the shape of the caliper cursor displayed on the screen. Either Cross Hair or Arrow Head can be selected.

- **Circ. and area method**

  Specify the method for measuring circumference and area. Either Ellipse or Trace can be selected.

  By default, the selected method appears when the **Caliper** button is pressed. Therefore, you can start measurement more easily by specifying the most commonly used measurement method. For more information on Ellipse and Trace, please refer to the “Circumference and Area Measurement” section in Chapter 5 “Measurement.”

Line Type

From the following three options, select the line pattern to use when measuring a distance.

- **Dotted Line**

  Display with dotted line.

- **Hidden Dotted Line**

  Display start and end point of the line.

- **Hidden Dotted line after Set**

  Display with dotted line during making line. After set the line with **Set** button, dotted line will be disappeared.

NOTE	If you select Hidden Dotted Line or Hidden Dotted Line after Set, you can keep images from being interfered with by a measurement line.

Display

Specify items to display during measurement by checking their checkbox.

- **TAMV trace line display**

  Specify whether to show the Mean Trace Line when tracing the frozen spectrum.

- **Doppler cross line display**

  Specify whether to show the Cross Line when measuring various items such as speed in the frozen spectrum. This function can be useful when values are estimated.

- **Show additional distance in image region**

  Specify whether to display addition information such as ratios and average as well as basic measurement data when measuring a distance. When selected, the additional information is also displayed when measurement data is saved or printed.

- **Show additional area in image region**

  Specify whether to display addition information such as averages as well as basic measurement data when measuring an area. When selected, the additional information is also displayed when measurement data is saved or printed.

- **Show additional Doppler result in image region**

  Specify whether to display additional information when measuring D Velocity in Spectral Doppler Mode.

- **Doppler trace direction**

  Specify the direction when tracing a spectrum in Doppler Mode. Select from Both sides (both up and down), Above (above the baseline) and Below (below the baseline).

- **Measure Unit**

  Specify measurement units. Under Dist, specify the units for distance, area and volume. Select cm or mm. Under Vel, specify the unit for speed and select cm/s or m/s. For smaller objects, it is recommended to use mm under Dist. Also, for faster blood flow speeds, it is recommended to use m/s under Vel.

Report

Select the sub tab **Report** under the **General** tab. You can specify options for measurement reports and printing.

Report Header

Specify header options for reports. You can specify more than one item and the specified items appear in all measurement reports.

- **Hospital Info**
  - Information on a hospital where the product is installed.
  - Patient Info: Patient information.
  - Other: Other comments.
  - OB / Gyn: Obstetrics- and gynecology -related information.

Print Format

- **OB Trend Graph**

  Specify the print format for graphs in obstetrics reports.

  Select from Only Current Page (the current screen), All Pages (1x1) and All Pages (3x2). If 1x1 is selected, only one graph is printed per side of paper. If 3x2 is selected, 6 graphs are printed per side of paper.

Result

- **Measure Result**

  Specify how measurements listed in a report are calculated.

  - Average: Shows the average of the last three measurement values.

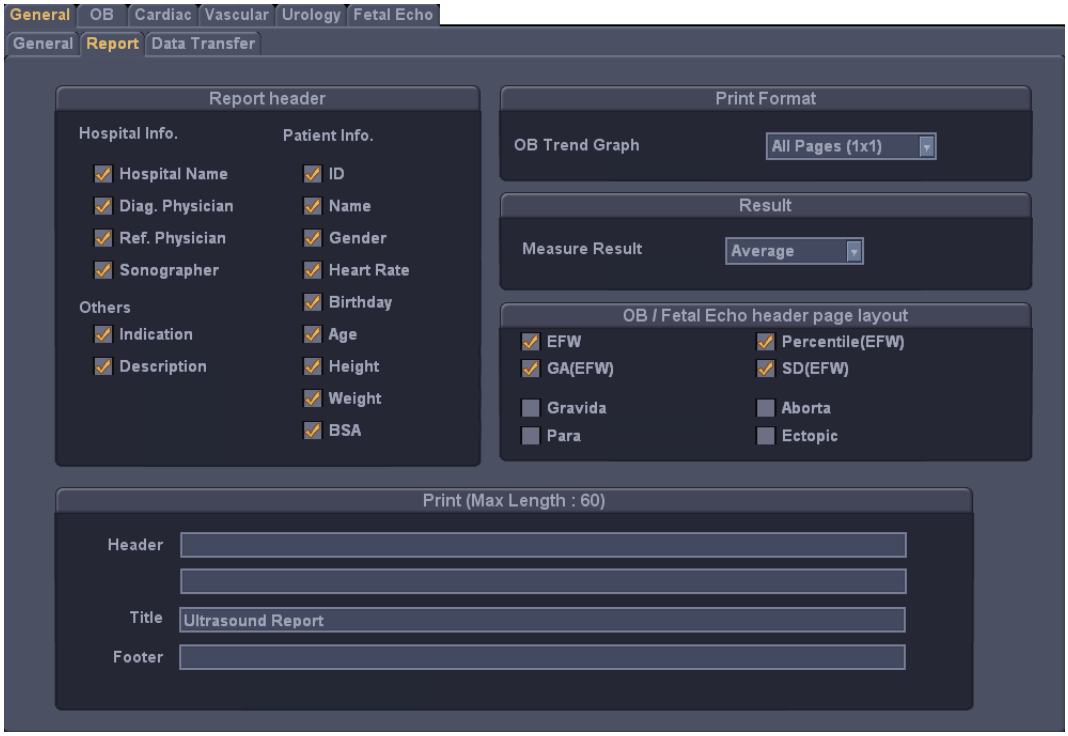
- Last: Shows the last measurement value.
- Max: Shows the largest measurement value.
- Min: Shows the smallest measurement value.

OB / Fetal Echo header page layout

Specify item(s) to display under the header of obstetrics or fetal echo measurement reports. You can specify more than one item.

Print

Enter additional information for the header, title and footer to display when printing measurements.



[Figure 3.42 General -Report]

Data Transfer

Specify the data transfer method. Select the sub tab **Transfer** under the **General** tab.

- **Save to file**

  Specify the file format in which files will be saved. You can select from a text format and an XML format.

- **Serial Transfer**

  Specify the data format in which data will be transferred. You can select from a text format and an XML format.

  This product uses an RS-232C USB serial cable to transfer data. Select the XML format to transfer data with reporting tools such as Astraia, Sonoultra and Viewpoint.

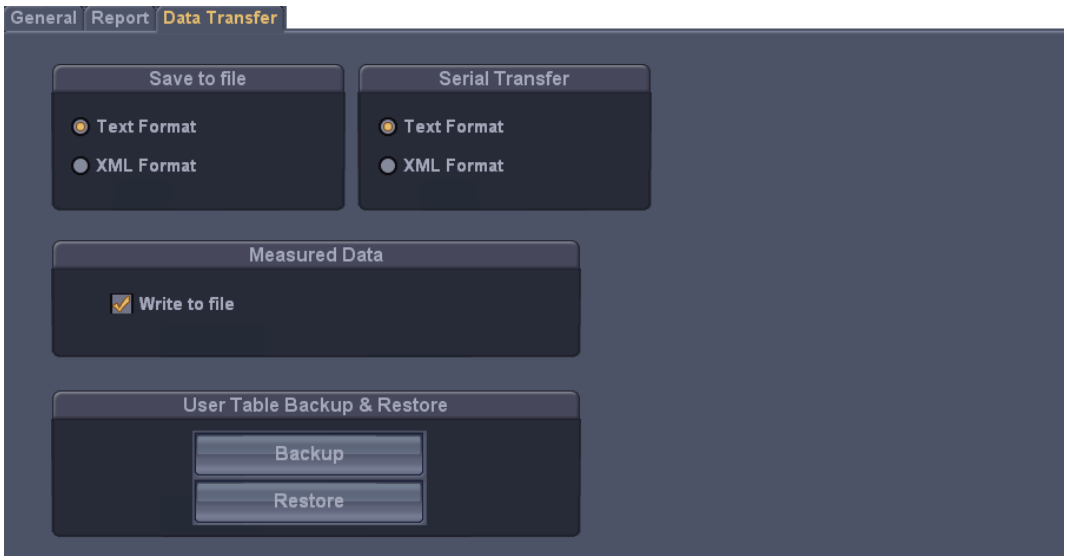
NOTE	Before setting, make sure that **COM** is set to Open Line Transfer under the **Peripherals** tab in the **Setting** screen.

- **User Table Backup & Restore**

  Back up a user-defined table or restore the backed-up table to the system. Press the **BackUp** or **Restore** button and specify desired options.

- **Measured Data**

  When the **Write to file** checkbox is selected, the **Write to file** button is created in the report screen. The Write to file function allows you to convert a measurement report to a file and save it in a storage media.



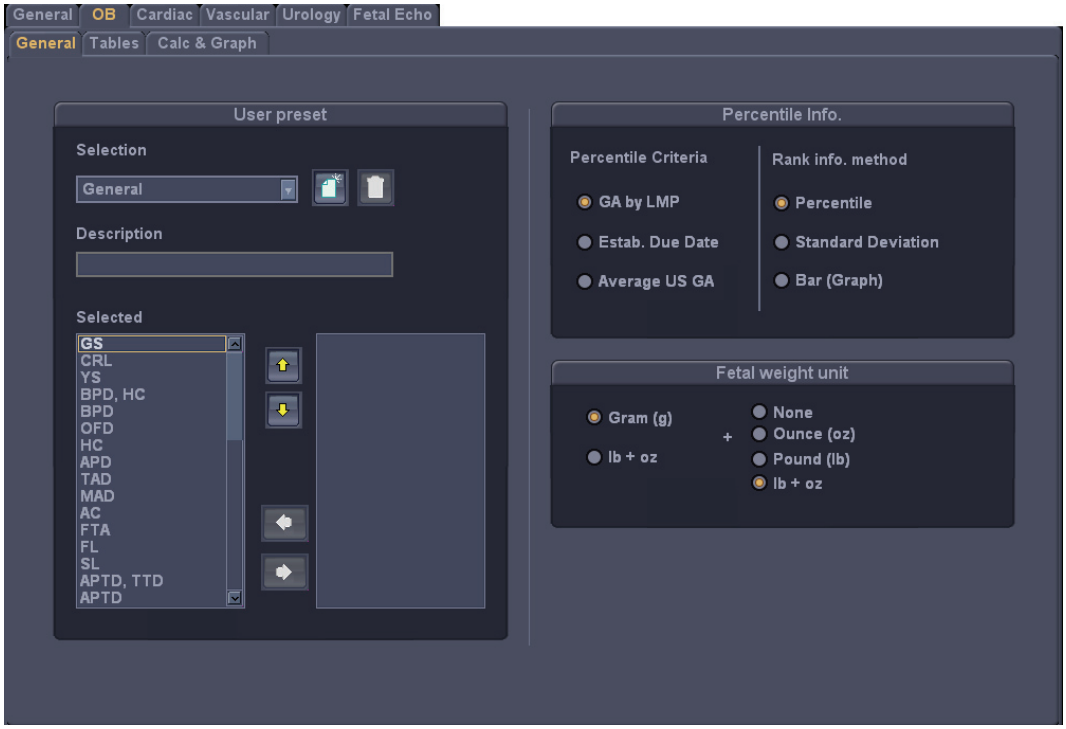
[Figure 3.43 General –Data Transfer]

Obstetrics Measurement Setup

Select the **OB**. You can specify obstetrics options.

General Settings

Select the sub tab **General** under the **OB** tab. You can specify basic options for obstetrics measurement.



[Figure 3.44 OB- General]

User Preset

Specify measurement items to use for a diagnosis.

- **Selection**

  Select a preset to use. The system provides the default presets **General** and **Fetal Biometry**. You can also add your own preset. When **General** is selected, all items including Fetal Biometry, Fetal Long Bone and Fetal Cranium are used. When **Fetal Biometry** is selected, only those items related to Fetal Biometry are used.

■ **Description**

A brief description for the selected preset is displayed.

■ **Selected**

A list is created to include commonly used items among the obstetrics measurement items available in ACCUVIX V20. The obstetrics measurement items available in the product are shown on the right, and the user-defined list (Selected) appears on the left.

After selecting a measurement item to use from the list on the right, press [←] on the screen. The selected item will be moved to the list on the left. Conversely, after selecting a measurement item to delete from the list on the left, press [→] on the screen. The selected item will be deleted from the list.

To change the order of items in the specified measurement item list, select a measurement item and use [↑] or [↓]. The items appear in the order specified in the measurement menu during obstetrics measurement.

※ Adding Preset

1. Under **Selection**, press  . The **New Preset** window will appear.

[Figure 3.45 New Preset]

2. Enter a name and description for the new preset.
3. Press **OK** to finish. Press **Cancel** to cancel.

※ Deleting Preset

1. Under **Selection**, select a preset to delete.
2. Press  . A confirmation message appears asking whether to delete.
   Press **OK** to delete. Press **Cancel** to cancel.

NOTE	Measurement items may not be added to the default presets, General and Fetal Biometry; only their order can be changed.

Percentile Info.

- **Percentile Criteria**

  Select a value that will be used for percentile calculation.

  - GA by LMP: GA is calculated based on the maternal LMP.
  - Estab. Due Date: GA is calculated based on the Estab. Due Date that is entered in the *Patient Information*.
  - Average US GA: GA is calculated using the average value of several ultrasound measurements.

- **Rank Info. Method**

  Specify how the growth range information will be displayed. Specify how the growth range information will be displayed. The growth range information can be used to observe fetal development and abnormality, if any.

  - Percentile: The fetal development is indicated as a percentile. Fetal development and abnormality are observed on the basis of 50% of normal development.
  - Standard Deviation: International standard deviation is used to indicate the fetal development. Fetal development and abnormality are observed on the basis of SD = 0 indicating the standard development.
  - Bar (Graph): The percentile is shown in a bar graph. This option is available with OB reports only. The green color indicates normal development range, while the red color indicates abnormal development range.

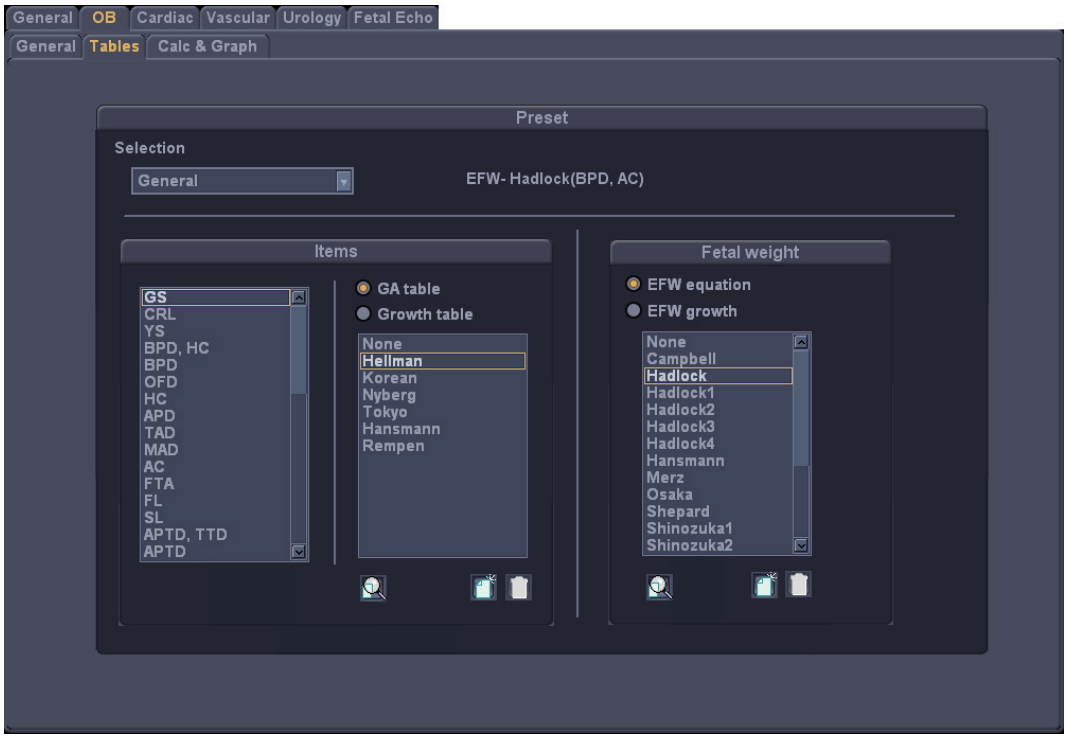
Fetal Weight Unit

Specify the unit for fetal weight measurement. You can select up to 2 units from grams [g], ounces [oz] and pounds [lb]. The primary and secondary units can be combined to show measurements in various units. The primary unit can be either ‘Gram [g]’ or ‘lb +oz’ on the left. The secondary unit can be selected from the units on the right, and can be any unit other than the one selected as the primary unit.

‘lb +oz’ is a unit combining pounds and ounces, and ‘None’ indicates that no unit is used.

Table Settings

Select the sub tab **Tables** under the **OB** tab. You can specify references such as reference tables and equations that will be used by each measurement item.



[Figure 3.46 OB- Tables]

- **Selection**

  Select a preset to use.

  After selecting a preset, select a measurement item and table to use under **Items**.

- **Items**

  This setting is intended for measurement of the gestational age (GA) and fetal size (Growth). Select items in the following order:

  1. Select a measurement item in the list on the left.
  2. Select a reference type from the GA table and Growth table.
  3. Select a reference in the list on the right.

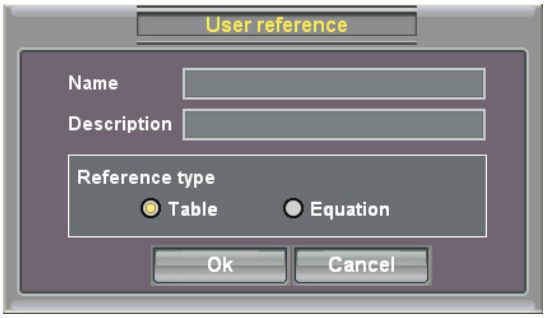
- **Fetal Weight**

  This setting is intended for measurement of the estimated fetal weight (EFW). Select items in the following order:

  1. Select the EFW measurement method from EFW equation and EFW growth.
  2. Select a reference in the list on the below.

■ **Add Reference**

1. Press  . The **User Reference** window will appear.



[Figure 3.47 User Reference]

2. Enter a name and description for a new reference.
3. Specify the reference type as Table or Equation.
4. Press **OK** to go to the next step. The system will switch to the **Editor** screen.

   Press **Cancel** to cancel.
5. Enter a reference.
6. Press **Save** to save the information. Press **Cancel** to cancel.
7. Press **OK** to finish. Press **Cancel** to cancel.

※ Add Reference Table

If a reference appears in a table, the following should be entered:

Table

Enter a reference table.

- You should make over two rows; use [+] or [-] button to add or delete a row.
- Press the **Tab** or **Enter** key on the Alphanumeric keyboard to save the current state and move to next item.

Unit Information

The various units for the selected reference (Input, Output, SD) are displayed.

Table type

Specify the table type and SD (Standard Deviation) for the selected reference.

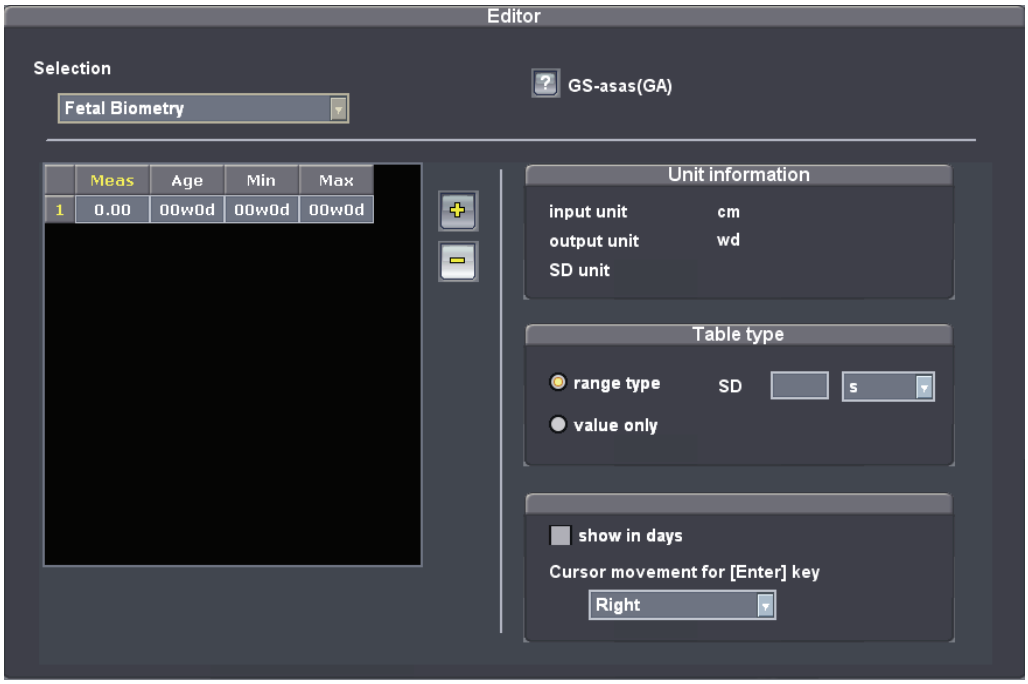
- Range Type: The Min and Max values for the selected reference are shown in a table. The SD value varies depending on the range specified by the user.

- Value Type: Only measurements entered by the user are shown, regardless of Min, Max or SD.

For Growth Table, SD (Standard Deviation) is displayed.

Misc.

- Show In Days: When the checkbox is selected, the table unit is changed from wd (Week-day) to d (day).
- Cursor Movement for the **Enter** key: Specify the direction of cursor movement when the Enter key on the alphanumeric keyboard is pressed while a table is being edited. Select from Right, Down and Edit.



[Figure 3.48 User Table]

※ Add Reference Equation

If a reference appears in an equation, the following should be entered:

Equation

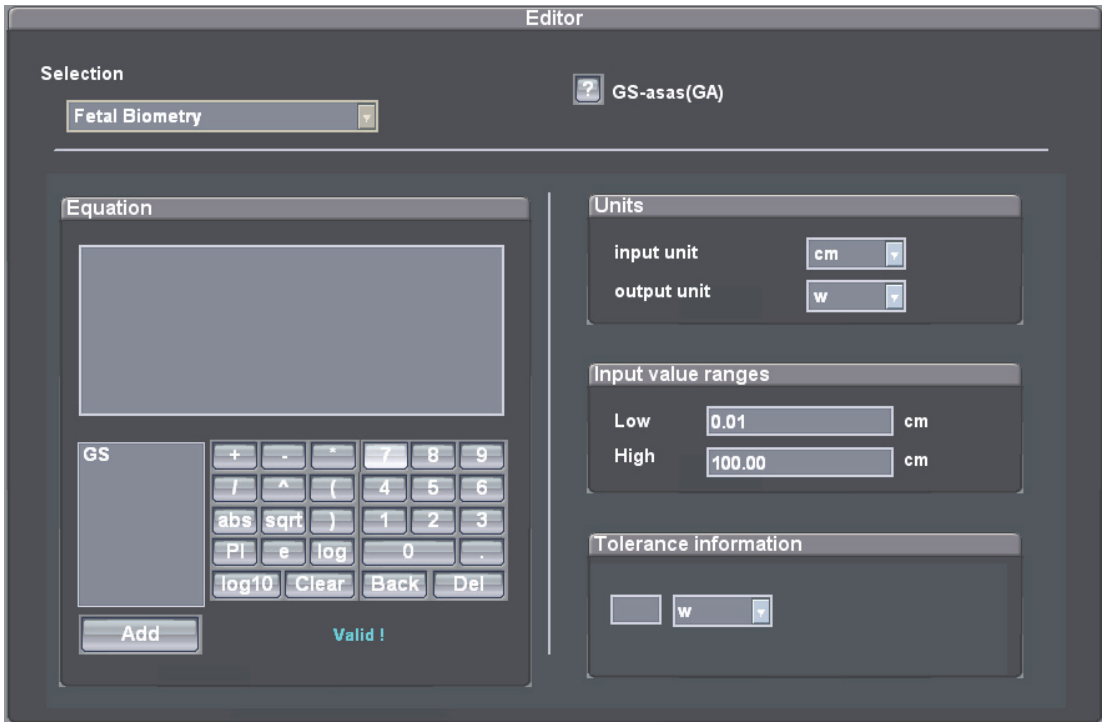
Enter a reference equation. Use the measurement calculator shown in the lower right corner.

Input Value Ranges

Enter the minimum (Low) and maximum (High) ranges for the selected reference.

Tolerance Information

Select the tolerance from w, d and %.



[Figure 3.49 User Equation]

■ **Delete Reference**

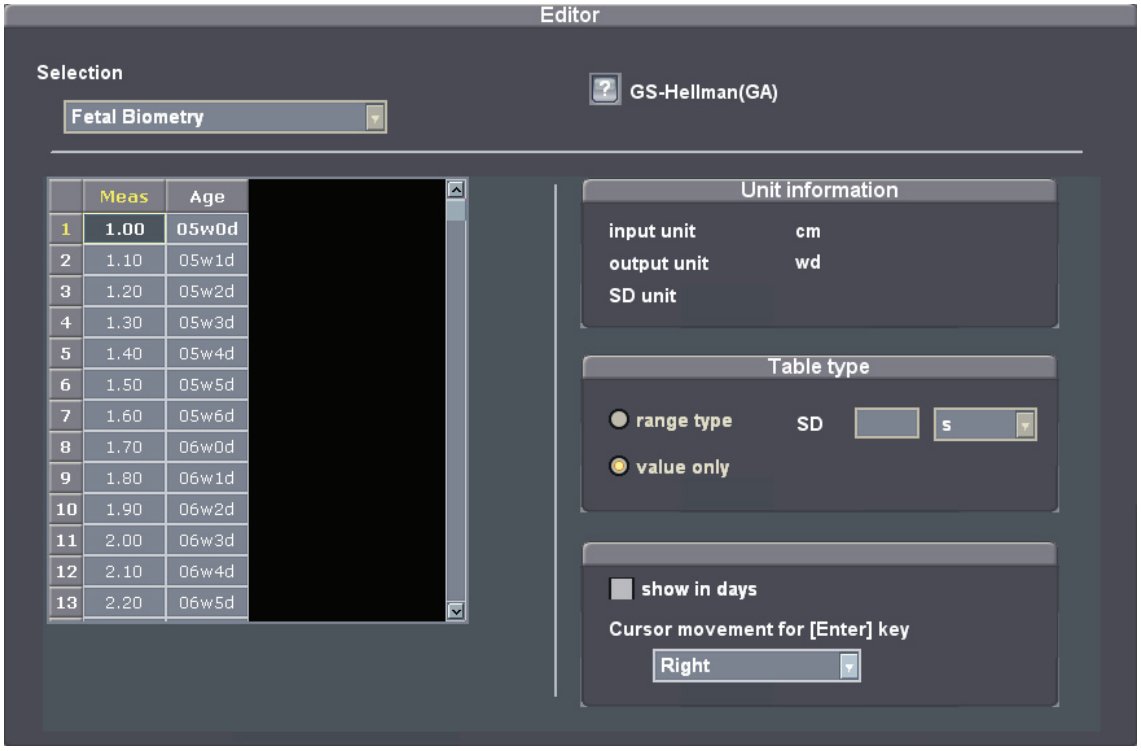
1. Under **Selection**, select a preset to delete.
2. Press  . A confirmation message appears asking whether to delete it.
3. Press **OK** to delete. Press **Cancel** to cancel.

■ **View & Modify Reference**

1. Under **Selection**, select a preset to delete.
2. Press  and the **Editor** screen will appear.
3. View or modify a reference.

- Selection

A preset for the selected measurement reference is displayed. The name and type of the reference is displayed on the right. Press the question mark button to show the source for the reference. Press it again to hide it.



[Figure 3.50 Editor]

Calc & Graph

Select the sub tab **Calc & Graph** under the **OB** tab. You can specify settings for calculation and graphs.

Auto calculations

Specify an item that will be calculated automatically. For example, if the **MAD** checkbox is selected as shown below, when APD and TAD are measured, the measurements are used to calculate MAD automatically and display the result on the screen. The results of automatic calculation may affect GA and EDD information.

Ratio calculations

Specify a measurement item for which a ratio will be calculated. For example, if the **FL/BPD** checkbox is selected, when FL and BPD are measured, the ratio between them is calculated and displayed on the screen. This ratio also appears in a report.

Fetal Doppler trend graph

Specify whether to include PI and RI graphs for MCA (Mid Cerebral Artery) and UA (Umbilical Artery) in an obstetrics report. Press  , and the **Editor** screen for the selected graph will appear.

Trend graph

Specify whether to include a graph for a certain item or ratio in an obstetrics report. Press  and the **Editor** screen for the selected graph will appear.

[Figure 3.51 Calc & Graph]

Cardiac Measurement Setup

Select the **Cardiac.** You can specify settings for cardiac measurement.

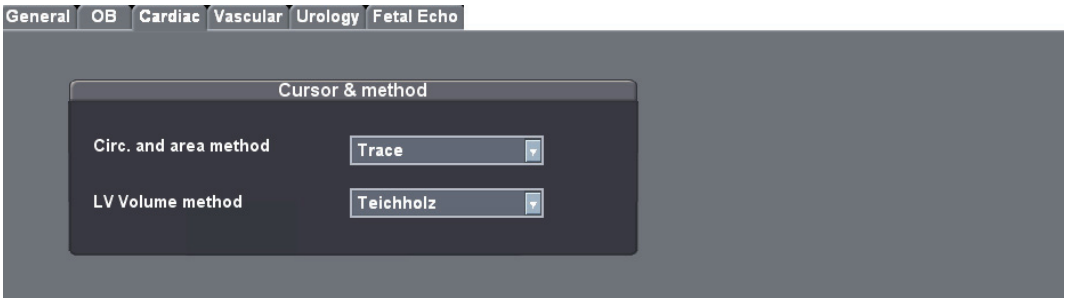
Cursor & Method

- **Circ. and Area method**

  Specify how a circumference and area is measured in a 2D cardiac image. Either Ellipse or Trace can be selected.

- **LV Volume Method**

  Specify how the volume of the left ventricle is measured. Teichholz, Cubed or Gibson can be selected. For more information on calculation formulae, please refer to Chapter 5 “Fetal Echo Measurement.”



[Figure 3.52 Cardiac Setup]

Vascular Measurement Setup

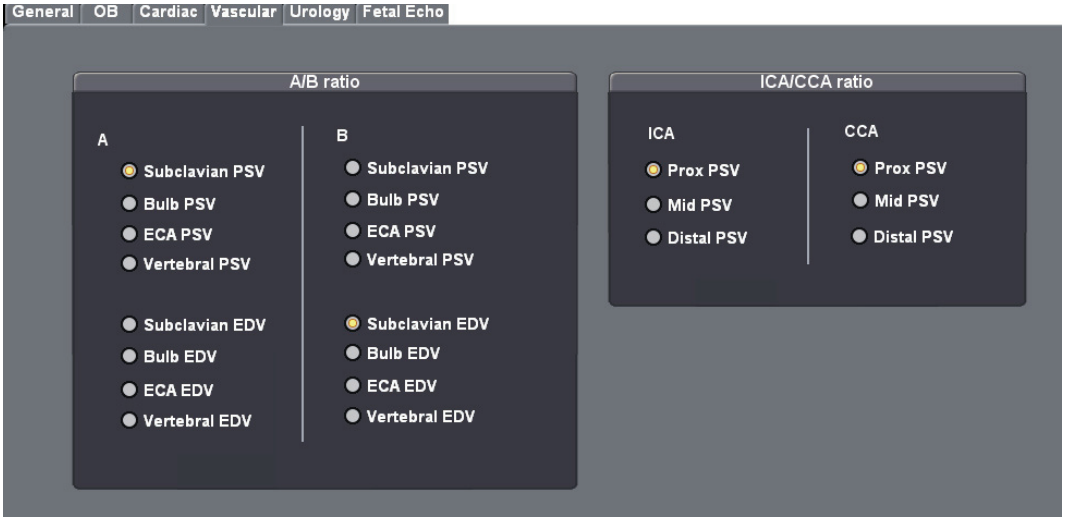
Select the **Vascular**. You can specify settings for vascular measurement.

A/B Ratio

Specify each individual peak velocity for which a ratio between A and B will be calculated.

ICA/CCA Ratio

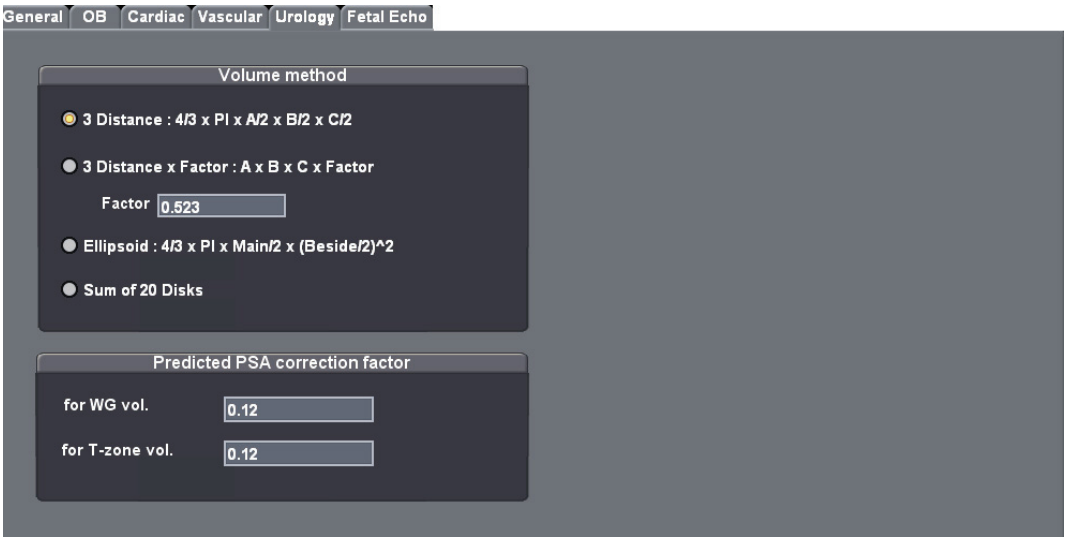
Specify each individual measurement item that will be used for the ICA/CCA ratio.



[Figure 3.53 Vascular Setup]

Urology Measurement Setup

Select the **Urology** tab in the *Measure Setup* screen. You can specify settings for urology measurement.



[Figure 3.54 Urology Setup]

Volume Method

Specify an equation that will be used for volume calculation.

- 3 Distance: The volume is calculated using three diameters in the longitudinal and transverse planes (4 / 3 x π x A/2 x B/2 x C/2).
- 3 Distance x Factor: The volume is calculated using three diameters in the longitudinal and transversal planes, and a factor (F) value entered by the user (A x B x C x Factor).
- Ellipsoid: The volume is calculated using the length of the Main and Beside axes (4 / 3 x π x Main / 2 x (Beside / 2)^2).
- Sum of 20 Disks: The volume is calculated by summing the areas in the 20 parallel planes (d / 20 x (A1 + A2 + ... A20), d : the sum of the distances between disks).

NOTE	3 Distances: A = 1st Dia. ; B = 2nd Dia. ; C = 3rd Dia. The factor value is set to “0.523” by default. When the value needs to be changed, a value between 0 and 1 (0 < factor <= 100) is recommended.

Predicted PSA correction factor

Specify the predicted PSA correction factor for measurement of volume of the WG and T-Zone. The default value is 0.12.

Fetal Echo Measurement Setup

Select the **Fetal Echo** tab in the *Measure Setup* screen. You can specify settings for fetal echo measurement.

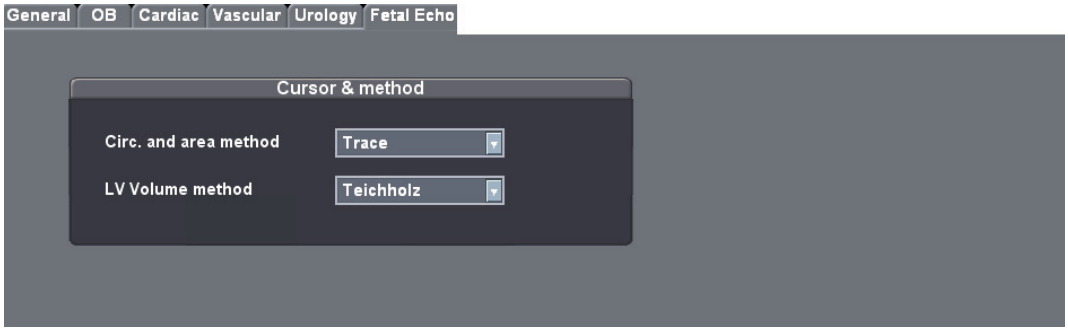
Cursor & Method

- **Circ. and area method**

  Specify how a circumference and area is measured in a 2D fetal cardiac image. Either Ellipse or Trace can be selected.

- **LV Volume Method**

  Specify how the volume of the left ventricle is measured. For more information on calculation formulae, please refer to Chapter 5 “Fetal Echo Measurement.”



[Figure 3.55 Fetal Echo Setup]

Utility

Specify the system settings or use Biopsy or Histogram.

1. Press the Utility button on the touch screen in the control panel. The Utility menu and the Flexible Soft menu will appear on the touch screen.
2. Select an item to use by pressing the **Menu** dial-button.
3. Press **Reset** to finish and go back to the Utility screen. Press the **Close** button on the monitor screen or the **Exit** button on the touch screen or the control panel to exit the Utility screen and switch to scan mode.

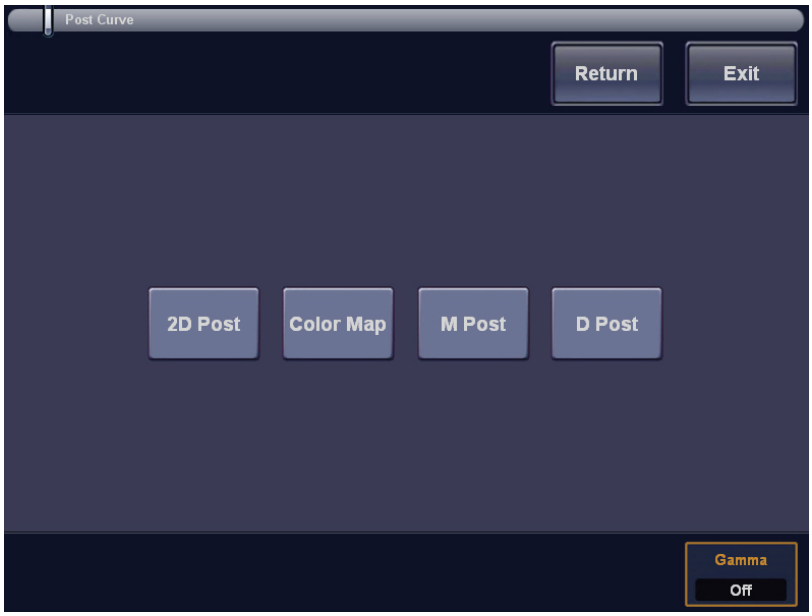
[Figure 3.56 Touch Screen for Utility]

Key Volume

Control the touch screen key volume. Use the Dial-Button 0~100. ‘0’ means the Volume is off.

Post Curve

Press **Post Curve**. Specify various post map and Gamma values.



[Figure 3.57 Touch Screen for Post Curve]

2D Post

Select 2D Post.

■ **Post Curve**

Select a post curve by using the dial-button on the touch screen. 8 system-preset types and 2 user types that can be customized by the user are provided.

■ **Edit**

Set a user type post curve. The set post curve is also applied to post curves in 2D, M, and PW Spectral Doppler Mode.

If this option is selected, the touch screen changes.

- [Picker Pos]: Select a point in the curve. Select a point with the dial-button.
- [Insert]: Add a point to the current curve. A new point will be placed halfway between the currently selected point and the next point.
- [Delete]: Delete the currently selected point.
- [Save]: Save the current curve.

- **Pseudo**

  Press the **Pseudo** button to turn it on/off. Change the color of an image on the screen to the desired colour.

- **Pseudo Color**

  Use the **Menu** dial-button to select a pseudo color. Up to 9 types of pseudo colors are supported.

- **Gamma**

  Use the dial-button on the touch screen to specify the brightness and contrast. Off, Weak, Medium or Hard can be selected.

  - Weak: Make the image brighter.

  - Hard: Make the image darker.

- **Return**

  Save the current setting of Post Map and return to the previous step of the menu.

[Figure 3.58 Touch Screen for 2D Post]

Color Map

Select **Color Map** in the **Post Curve** menu.

[Figure 3.59 Touch Screen for Color Map]

- **Color Map**

  Use the dial-button on the touch screen to select the type of color map. 9 types of post curves are supported.

- **Tag**

  Press the **Tag** button to turn it on/off. When turned on, a random color is applied to a certain area in an image.

- **Tag Width**

  Use the dial-button on the touch screen to select the range of tags, from between 8~256. Tag Width affect to Tag Pos.

- **Tag Pos**

  Use the dial-button on the touch screen to select the position of tags, from between 0~248. Tag Pos affect to Tag Width.

- **Capture**

  Press the **Capture** button to turn it on/off. When turned on, a one-scecond image can be acquired with Capture Frame.

■ **Capture Frame**

Use the dial-button on the touch screen to select a value between 5~100. Capture Frame allows you to capture an image with a user-defined frame for better observation of the image.

M Post

Select **M Post**. The settings can be specified in the same way as for 2D Post.

[Figure 3.60 Touch Screen for M post]

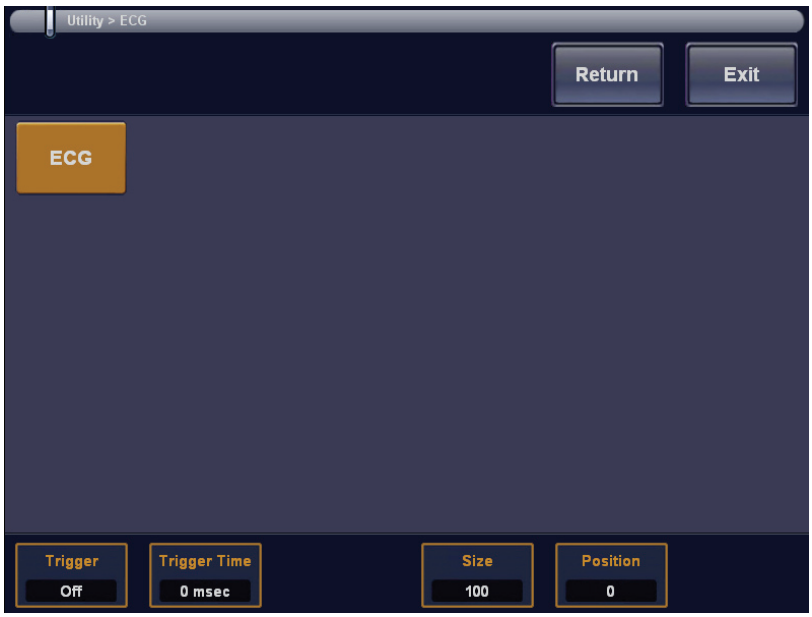
D Post

Select **D Post**. The settings can be specified in the same way as for 2D Post.

[Figure 3.61 Touch Screen for D post]

ECG

Select the **ECG**. The ECG (echocardiogram) function allows viewing of the cardiac pulsation.



[Figure 3.62 Touch Screen for ECG]

NOTE	It shows an image of the heart beat and appears in the menu for cardiac application only.

In Multi Image Mode such as Dual or Quad, ECG CINE can be used for each image.

Starting ECG and terminating

Press the **ECG** button to turn on or off the ECG.

ECG Setup

- **Trigger**

  Set the trigger interval. Turn it off or select a value between 1 – 5 by using the dial-button on the touch screen.

- **Trigger Time**

  Set the time to initiate a trigger. Select a value between 0 - 1000 msecs by using the dial-button on the touch screen.

- **Size**

  Set the ECG size. Select a value between 50 - 200 by using the dial-button on the touch screen.

- **Position**

  Set the ECG position. Select a value between 0 - 90 by using the dial-button on the touch screen. ECG moves toward the top as the value increases.

- **2D / Loop**

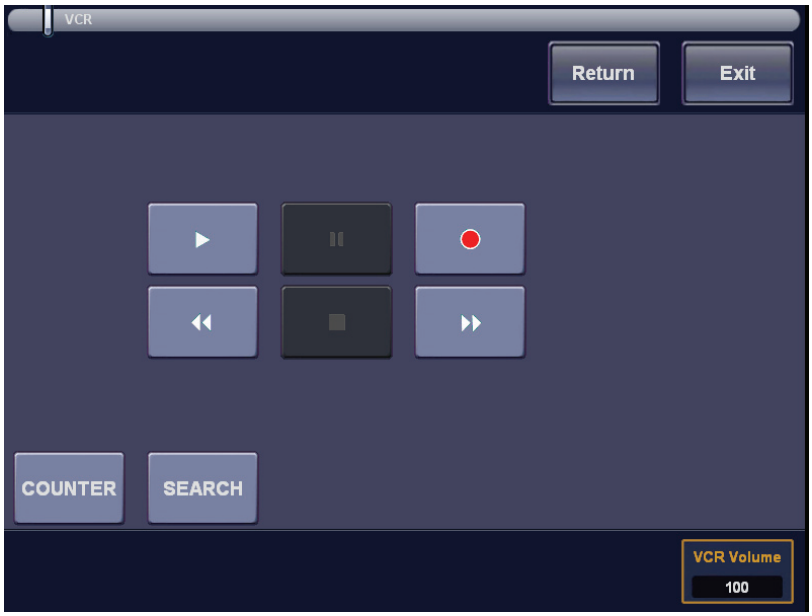
  Set an area where ECG will be used. Press **2D** to use ECG in the 2D area, or **Loop** to use it in the Loop area in Spectral Doppler Mode.

CAUTION	■ If the ECG is less then 30Hz, the Heart Rate (HR) is not displayed. ■ In CW Mode, when ECG is active, the error ratio of the Heart Rate (HR) should be within 2%.

VCR

Press **VCR** in the **touch screen**.

CAUTION	■ **Connect the VCR on the system before using.** ■ **Check the capacity of the media before recording.**



[Figure 3.63 Touch Screen for VCR]

■ **Using VCR**

- Play: Playback recordings.
- Pause: Pause playback.
- Record: Start recording.
- Rew: Rewind.
- FF: Fast forward.

CAUTION	**Return** and **Exit** are not available during playback.

■ **Counter**

The VCR Counter window appears on the monitor screen. Reset the counter.

- **Search**

  The VCR Counter window appears on the monitor screen. Search for an image by entering the counter value at a certain point.

- **VCR Volume**

  Adjust the VCR volume. Select a value between 0 - 100 by using the dial-button on the touch screen.

Histogram

A histogram is a type of graph representing the distribution of echoes.

1. Press **Histogram** in the **touch screen**.
2. Specify an area that a histogram is to cover. Use the **Trackball** and the **Set** button to specify area 1, 2 and 3.
3. Histogram 1, 2 and 3 will appear on the screen.

[Figure 3.64 Histogram]

[Figure 3.65 Touch Screen for Histogram]

Setting Histogram

Specify the position or type of a histogram.

- **Move Hist. 1 / Move Hist. 2 / Move Hist. 3**

  After selecting a histogram to move by pressing the button on the touch screen, move it by using the **Trackball** and the **Set** button.

- **Rectangle, Ellipse**

  Set the histogram shape by pressing the Rectangle or Ellipse button on the touch screen. Select Rectangle or Ellipse.

Biopsy

Press **Biopsy** on the touch screen.

CAUTION	Before performing biopsy, you should specify the Biopsy Guide Line.

Editing Biopsy Guide Line

NOTE	■ Note that the Biopsy Guide Line cannot be edited when the Trapezoidal function is in use for the Linear Probe. ■ If the system is rebooted, the Biopsy Guide Line settings are restored to the default.

1. Press the **Edit** button on the touch screen. The warning message will appear.
2. If you press **OK**, a screen will appear allowing you to edit the Guide Line.
3. Use the **Trackball** and the **Set** button to edit the Biopsy Guide Line.
4. Press the **Save** button to save settings. To specify new settings, press the **Edit** button.
5. Press the **OK** button on the message to apply the changed Biopsy Guide Line. Press **Cancel** to cancel saving.

Starting and Finishing Biopsy

NOTE	Before performing biopsy, make sure that the Biopsy Guide Line is adjusted.

1. Press the **Biopsy On/Off** button. The warning message will appear.
2. Press **OK**, and the Biopsy Guide Line will appear on the screen.

NOTE	If the Biopsy Guide Line displayed is not correct, press the **Edit** button to edit it.

3. Insert a needle along the Guide Line. And then perform biopsy as desired.
4. When finished, press the **Biopsy On/Off** button again. The biopsy is completed.

[Figure 3.66 Biopsy]

[Figure 3.67 Touch Screen for Biopsy]

Demo Play

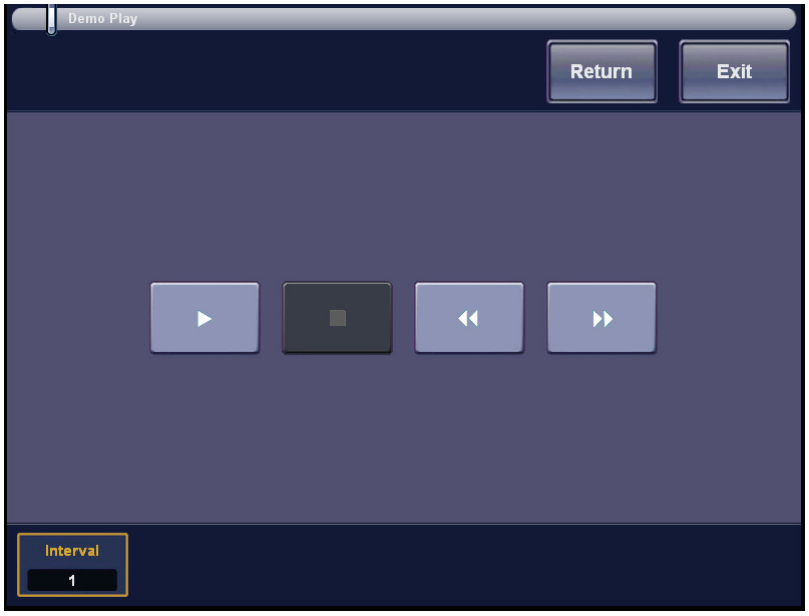
Press **Demo Play** on the touch screen. The best images scanned with the product are presented.

- Play: Playback demo images.
- Stop: Stop playback of demo images.
- Rew: Stop playback of demo images and display the previous image.
- FF: Stop playback of demo images and display the next image.

■ **Adjusting Playback Time**

Adjust the **Interval** by using the dial-button on the touch screen. A value between 1 – 20 secs can be selected.

[Figure 3.68 Demo Play]



[Figure 3.69 Touch Screen for Demo Play-]

Presets

Select **Presets** on the touch screen. The touch screen switches to Presets, where probe presets supported by the current application appear in the form of button.

[Figure 3.70 Touch Screen for Presets]

- **Presets**

  Select this button to switch to the selected probe setting. Different settings can be saved based on the application.

- **User Presets**

  Set a desired preset.

  - [Rename]: Rename a user preset.
  - [App. Load]: Apply the selected preset to the system.

- **Save**

  Select this button to save the settings of the current screen.

Setup

Press **Setup** on the touch screen. Please refer to “System Setup” in this chapter.

Measure Setup

Press **Measurement** on the touch screen. Please refer to “Measurement Setup” in this chapter.

Storage Manager

Press **Storage Manager** on the touch screen. All disk drives mounted in the system will be shown. The drive type, available space and total space for each drive are displayed.

Storage Manager is a program that lets you manage various storage devices connected to the system. You can remove, format or update a drive for which the checkbox in front of the drive symbol is checked.

NOTE	You may not remove, format or update a drive mounted in the computer within the system.

Press **Exit** on the screen or on the control panel to exit Storage Manager.

- **Eject / Remove**

  Disconnect the selected drive.

NOTE	Before unplugging a USB Flash memory drive, make sure to disconnect it by using the **Eject / Remove** button.

- **Format**

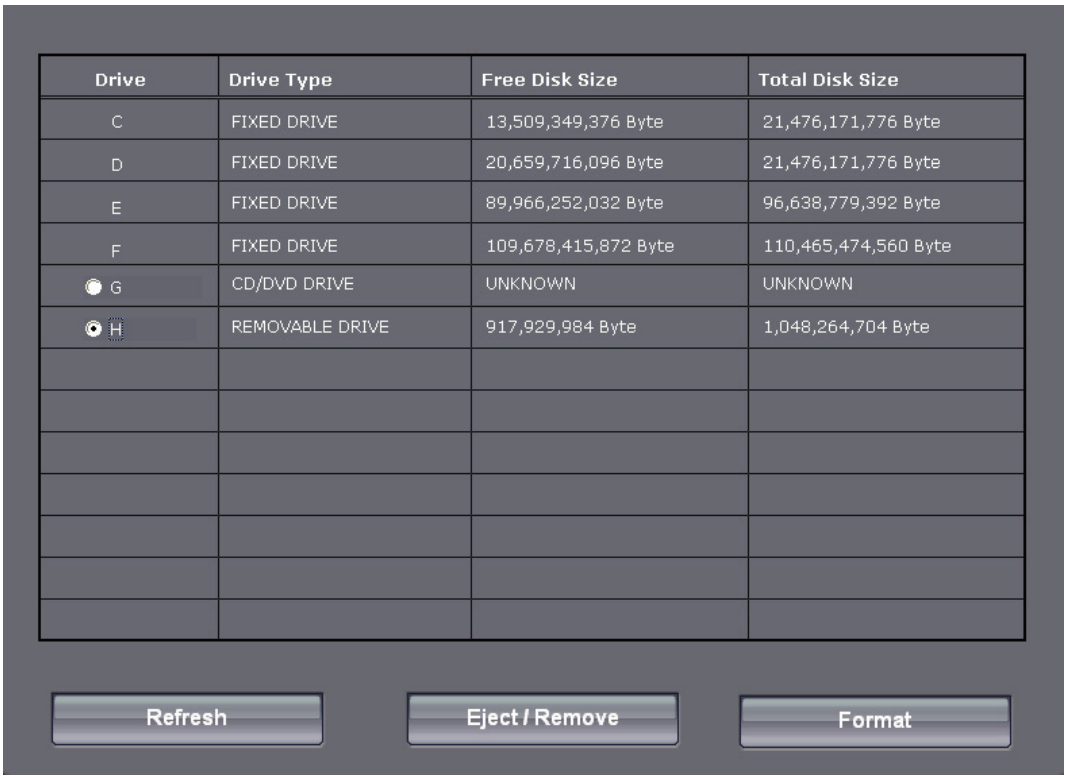
  Initialise the selected drive. Under the **Format** window, you can initialize various settings. Press **Start** to start initialization. Press **Close** to cancel.

NOTE	In the case of DVD+RW or DVD-RW, its free space can be displayed as 'O bytes' after formatting. Because it is an error of Windows™, there is no problem to use that media.

- **Refresh**

  Update the dislay on the touch screen to play of drives currently connected to the system.

NOTE	When using Storage Manager, you should press **Refresh** to update information.



[Figure 3.71 Storage Manager]

Help

Press **Help** in the touch screen.

Eject CD / DVD

Press **Eject CD / DVD** in the touch screen.

Chapter 4

Diagnosis Modes

Information

Diagnosis Mode Type

This product supports a variety of diagnosis modes including Basic Mode, Combined Mode, Multi-Image Mode, and 3D/4D Mode.

- Basic Mode: Consists of different modes, each of which has a specific usage and function. By default, 2D Mode is applied together with another mode.
- Combined Mode: For an image, two or three Basic Modes are applied at the same time. By default, 2D Mode is applied together with another mode. An image is viewed in a single screen.
- Multi-Image Mode: The screen is divided into two (dual) or four (quad) sub screens, each of which is used to view an image. Since each sub screen can display a different image, it can be a very useful feature, allowing multilateral views of an organ.
- 3D / 4D Mode: 3D and 4D images can be obtained.

The types of diagnosis mode that are available with the product are shown below:

Mode	Type
Basic Mode	2D Mode Color Doppler Mode Power Doppler Mode M Mode PW Spectral Doppler Mode CW Spectral Doppler Mode Tissue Doppler Imaging Mode Tissue Doppler Wave Mode
Combined Mode	2D/C/PW Mode 2D/PD/PW Mode 2D/C/CW Mode 2D/PD/CW Mode 2D/C/M Mode 2D/C Live Mode 2D/TDI/TDW Mode 2D/C Live Mode
Multi-Image Mode	Dual Mode Quad Mode
3D Mode	Freehand 3D Mode Static 3D Mode
4D Mode	4D Mode

NOTE The functionalities for each mode may be restricted by the selected probe.

Basic Use

The items that can be used commonly in each diagnosis mode are shown below:

Using Control Panel

The items that can be used in each diagnosis mode are provided as menu items. You can change the image format or optimize an image to facilitate your diagnosis.

- **Gain**

  Use the dial-button on the control panel. The **Gain** button appears differently depending on the diagnosis mode, but it is usually in the form of a dial-button used to select a diagnosis mode.

  You can adjust the brightness of an image. If you rotate the **Gain** dial-button clockwise, its value increases.

- **TGC (Time Gain Compensation)**

  Use the **TGC** slide on the control panel.

  In general, ultrasound penetration gets weaker with depth. **TGC** can be used to compensate for this effect.

  The product provides eight **TGC** slides for varying depths, allowing you to adjust Gain by area. Among the eight slides, the top slide represents the shallowest area, while the lower slides represent the deeper ones.

  Move the slide to the right (+) to increase Gain, brightening the image.

- **Focus**

  Use the **Focus** dial-button on the control panel.

  You can adjust the focusing point. As you rotate the **Focus** dial clockwise, the focusing point becomes shallower.

- **Depth**

  Use the **Depth** dial-button on the control panel.

  You can adjust the scanning depth of an image. As you rotate the dial-button clockwise, the depth increases.

  The allowable range for adjustment varies with the selected probe.

- **Zoom**

  Use the **Zoom** dial-button on the control panel.

  You can magnify an image. An image can be magnified by either Read Zoom or Write

Zoom.

- Read Zoom

This function allows you to zoom an image saved in a hard disk.

1. Rotate the **Zoom** dial-button on the control panel.
2. Use the Trackball to move the **Zoom** box. You can locate the **Zoom** box in an image with the **Zoom Navigation** box on the left side of the screen.
3. View the magnified image. If you rotate the dial-button clockwise, the image is magnified.

- Write Zoom

This function allows you to magnify and scan an image in real time.

1. Use the **Zoom** dial-button on the control panel. The **Write Zoom** box will appear on the screen.
2. Use the **Change** button to move and resize the **Zoom** box. Each time you press the **Change** button, the current state of the Zoom box is displayed in the lower left of the screen.
   - PreZoom position: You can move the **Zoom** box. Use the Trackball to move the **Zoom** box and press the **Set** button to specify its position.
   - PreZoom size: You can resize the **Zoom** box. Use the Trackball to resize the **Zoom** box and press the **Set** button to specify its size.
3. Press the **Set** button to start the Write Zoom function. Magnify an image and scan it.

Press the **Exit** button to exit Zoom Mode. Changing the depth also exits Zoom Mode automatically.

- **QuickScan**

Use the **Quick Scan** button on the control panel. The ‘Q Scan’’ mark will appear at the top of an image.

In 2D Mode, it is used to optimize the contrast and brightness of an image by adjusting Gain and TGC automatically. In PW Spectral Doppler Mode, it is used to optimize the spectrum by adjusting Scale and Baseline automatically.

- **Image Planning**

Turn it on or off by pressing **Update** on the control panel.

Move the ROI box to the desired area in a scanned image for more detailed observation. Move the ROI box with the Trackball on the control panel. The position of the ROI box appears in the left side of the screen.

Using Touch Screen Menu

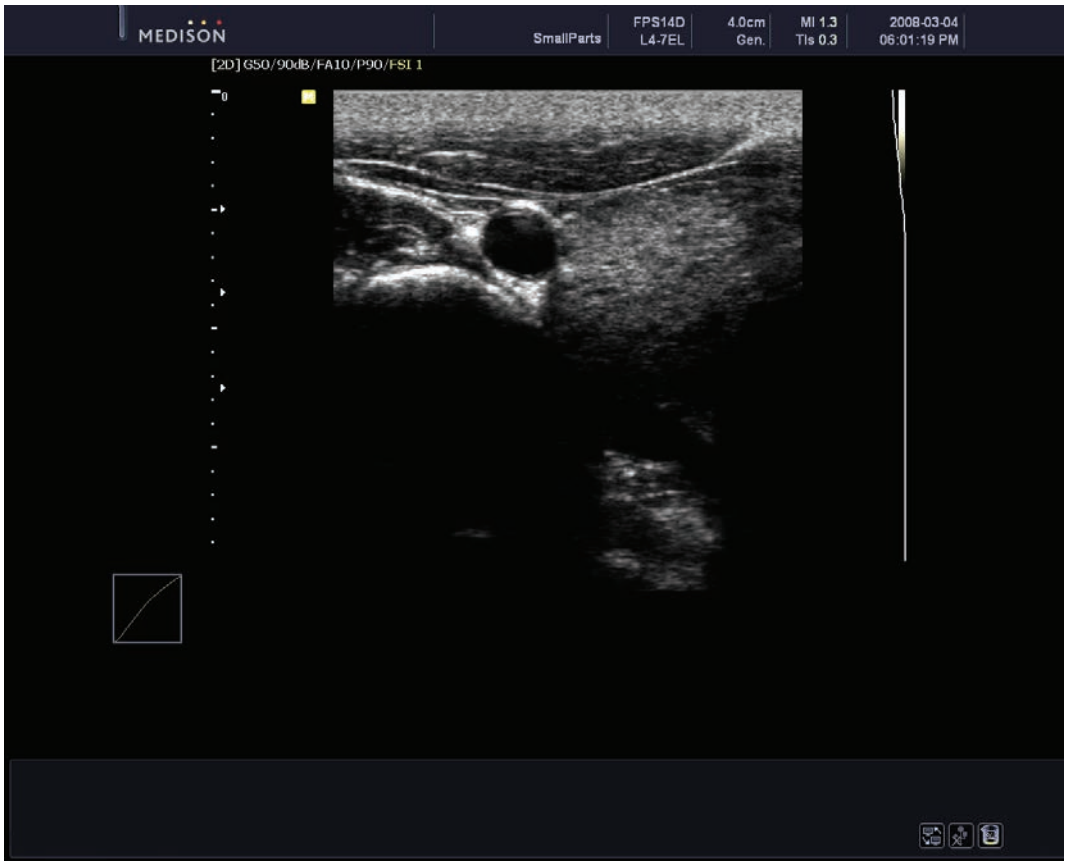
The items that can be used in each diagnosis mode are provided as touch screen menu items. You can change the image format or optimize an image to facilitate your diagnosis.

1. In a diagnosis mode, press the item button or rotate the dial-button on the touch screen.
   - In a combined mode that uses more than one diagnosis mode, press a tab on the touch screen to specify settings for each mode.
   - When there is more than one menu on the touch screen, used the **Next** or **Prev** button to navigate through pages.
2. Select a value by pressing a button or by rotating the dial-button on the touch screen.

Basic Mode

2D Mode

This basic mode, also referred to as B Mode (Brightness mode), provides scan planes of organs. This is used to display two-dimensional anatomy images in the direction of scanning in real time.



[Figure 4.1 2D Mode]

Entering 2D Mode

NOTE	Because 2D Mode is applied by default for all diagnosis modes, it cannot be terminated.

Press the **2D** dial-button on the control panel.

If you press the **2D** dial-button in other diagnosis modes, it will switch to the basic 2D Mode.

2D Mode Menu

- **Trapezoidal**

NOTE	The Trapezoidal item appears in the menu only when a Linear Probe is used.

Turn it on or off by pressing **Trapezoidal** on the touch screen.

In general, the rectangular frame provided by a Linear Probe is changed to a trapezoidal shape. This allows a wider view of an image.

The Trapezoid function may not be available for certain depths. In addition, the Write Zoom function cannot be accessed with the **Zoom** button when the Trapezoidal function is in use. (However, Read Zoom can be used.)

- **Harmonic**

Turn it on or off by pressing **Harmonic** on the touch screen. The 'HRA' mark will be displayed in the image data.

This product provides the OHI (Optimal Harmonic Imaging) function that optimizes an image with high frequencies.

NOTE	The Harmonic function is available with specific probes only.

- **2D/C Live**

Turn it on or off by pressing **2D/C Live** on the touch screen.

The 2D image and Color Doppler image for the scanned area can be displayed simultaneously in real time.

In ACCUVIX V20, this item is placed in the 2D menu so that the 2D/C Dual Live Mode, which is used frequently, can be easily accessed. You can toggle between two images easily with a single button operation.

- **U/D Flip**

Press **U/D Flip** on the touch screen.

Each time you press the button, the image is flipped up or down.

- **L/R Flip**

Press **L/R Flip** on the touch screen.

If you press the button, the image is flipped left to right or vice versa. The M mark at the top of the image shows the current direction of the image.

- **Pulse Inversion**

  Turn it on or off by pressing **Pulse Inv** on the touch screen.

  If it is turned on, pulses are inverted to sharpen the displayed image.

NOTE	Pulse Inversion is available with specific probes only.

- **PPI (Power Pulse Inversion)**

NOTE	PPI is available with specific probes only.

  Turn it on or off by pressing **PPI** on the touch screen.

  If it is turned on, power pulses are inverted to sharpen the displayed image.

- **M Line**

  Turn it on or off by pressing **M Line** on the touch screen.

  If M Mode or PW Mode is used with 2D Mode, it indicates where an image in that particular Mode appears in the 2D image.

  If it is turned on, the **M Line Angle** button is enabled.

- **M Line Angle**

  Press **M Line Angle** on the touch screen.

  Use the dial-button to change the M line angle.

- **Density**

  Press **Density** on the touch screen.

  Set the scan line density. Select Middle, High or Low by pressing a desired button. If it is set to High, the number of scan lines increases, enhancing the image resolution. However, the frame rate is reduced.

- **Frequency**

  Press **Frequency** on the touch screen.

  Use the button to change the frequency of the current probe. Select from **Res**, **Pen** and **Gen**.

  - Res (Resolution): High frequency
  - Gen (General): General frequency
  - Pen (Penetration): Low frequency

The selected frequency is displayed in the title area, allowing you to determine the state of the current frequency easily.

- **FSI (Full Spectrum Imaging)**

  Use **FSI** on the touch screen. Select an FSI value between 1 – 3 by pressing a desired button.

  This function synthesizes images with data obtained with frequencies of different characteristics. Therefore, shallow observation depths yield higher resolution and deep observation depths yield higher penetration.

- **Gamma**

  Use **Gamma** on the touch screen. Set the Gamma value to Off, Weak, Medium or Hard by pressing a desired button.

  Gamma determines brightness and contrast. If it is set to Weak, contrast is increased, and if it is set to Hard, contrast is decreased.

- **DynamicMR (Optional)**

  Turn it on or off by pressing **DynamicMR** on the touch screen. The 'DMR' mark will be displayed in the image data.
  You can obtain a clearer image by eliminating noise and enhancing boundaries. Five pre-configured indices are provided.
  If it is turned on, **DMR Index** is enabled on the touch screen.

NOTE	■ Connect a dongle to the console before using DynamicMR™. (Dongles can be purchased separately from the product.) ■ For information on installing a dongle, please refer to the DynamicMR™ User Manual.

- **DMR Index (Optional)**

  Press **DMR Index** on the touch screen. Select an index between 1 - 5 by pressing a desired button or using the dial-button on the touch screen.

- **SRF (Speckle Reduction Filter)**

  Turn it on or off by pressing **SRF** on the touch screen. 'SRF' will be displayed in the image data.

  SRF stands for Speckle Reduction Filter. It is used to optimize an image by minimizing noise and adjusting the brightness of boundaries automatically. If it is turned on, **SRF Index** is enabled on the touch screen.

- **SRF Index**

  Press **SRF Index** on the touch screen. Set the SRF index to 1, 2 or 3 by pressing a

desired button or using the dial-button on the touch screen.

NOTE	When SRF is used, the **Edge Enhance** button is not available.

- **Pseudo**

  Turn it on or off by pressing **Pseudo** on the touch screen.

  If it is turned on, **Pseudo Color** is enabled on the touch screen.

- **Pseudo Color**

  Press **Pseudo Color** on the touch screen. Set the image color by pressing a desired button or using the dial-button on the touch screen The product supports 9 pseudo color types.

- **Spatial Compound (Optional)**

NOTE	This item appears in the Flexible Soft menu only when a Linear Probe is used.

  Press **Spatial Compound** on the touch screen. The Spatial Compound mark will be displayed in the image data. Set the Spatial Compound value to Off, Low, Middle or High by pressing a desired button or using the dial-button on the touch screen.

- **Frame Avg.**

  Press **Frame Avg** on the touch screen. Select the Frame Average value between 0 – 15 by pressing a desired button or using the dial-button on the touch screen.

  You can average the current image with the previous image when an image is updated. When you continue to scan the same diagnosis area, speckles may appear in the updated image. This function is used to minimize this effect. Select a value between 0 – 15.

- **Dynamic Range**

  Press **Dynamic Range** on the touch screen. Select a Dynamic Range value between 50 - 170 by pressing a desired button or using the dial-button on the touch screen.

- **Focus**

  Press **Focus** on the touch screen. Select the number of focusing points between 1 – 4 by pressing a desired button or using the dial-button on the touch screen.

  This function is used to change the contrast by adjusting the ratio of the minimum / maxim-um input signal values. Increase/decrease Dynamic Range to smooth/roughen an image.

- **Reject Level**

  Press the **Reject Level** button on the touch screen. Select a value between 1 - 32 by pressing a desired button or using the dial-button on the touch screen.

  This function is used to eliminate noise or low level echo for clearer signals.

- **Edge Enhance**

  Press **Edge Enhance** on the touch screen. Select a value between -3 and 3 by pressing a desired button or using the dial-button on the touch screen.

  This function allows you to view more accurate images of organ or tissue boundaries. A higher value provides more accurate images of boundaries.

- **Post Curve**

  Press **Post Curve** on the touch screen. Select the Post Curve type from Type 1 – 8 or User 1 - 2 by pressing a desired button or using the dial-button on the touch screen.

  ※ Post Curve Type

  -2D, M and Spectral Doppler Modes: Select from Type 1 – 8 or User 1 -2.

  -C and PD Modes: Select from Type 1 – 8.

- **View Area**

  Press **View Area** on the touch screen. Select the width of an image between 20 and 100 by pressing a desired button or using the dial-button on the touch screen. Increasing the image width reduces the frame rate.

NOTE	View Area varies depending on the preset.

- **2D Image Size**

  Press **2D Image Size** on the touch screen. Set a 2D image size between 80 – 100 by pressing a desired button or using the dial-button on the touch screen.

- **Frame Rate**

  Press **Frame Rate** on the touch screen. Select from Fast, Normal or Slow by pressing a desired button or using the dial-button on the touch screen.

  The frame rate is the number of images generated per second. Therefore, it is recommended to increase the frame rate when scanning an object with a lot of movement.

■ Rotation

Press the **Rotation** button on the touch screen. Rotate the current image by pressing a desired button or using the dial-button on the touch screen. The image can be rotated by 90 degrees.

■ Angle

Press **Angle** on the touch screen. Adjust the image angle by pressing a desired button or using the dial-button on the touch screen. The button is enabled only when **View Area** is less than 100%.

■ Tissue

Press **Tissue** on the touch screen. Select from Solid, Normal, Adipose or Cystic by pressing a desired button or using the dial-button on the touch screen.

■ Power

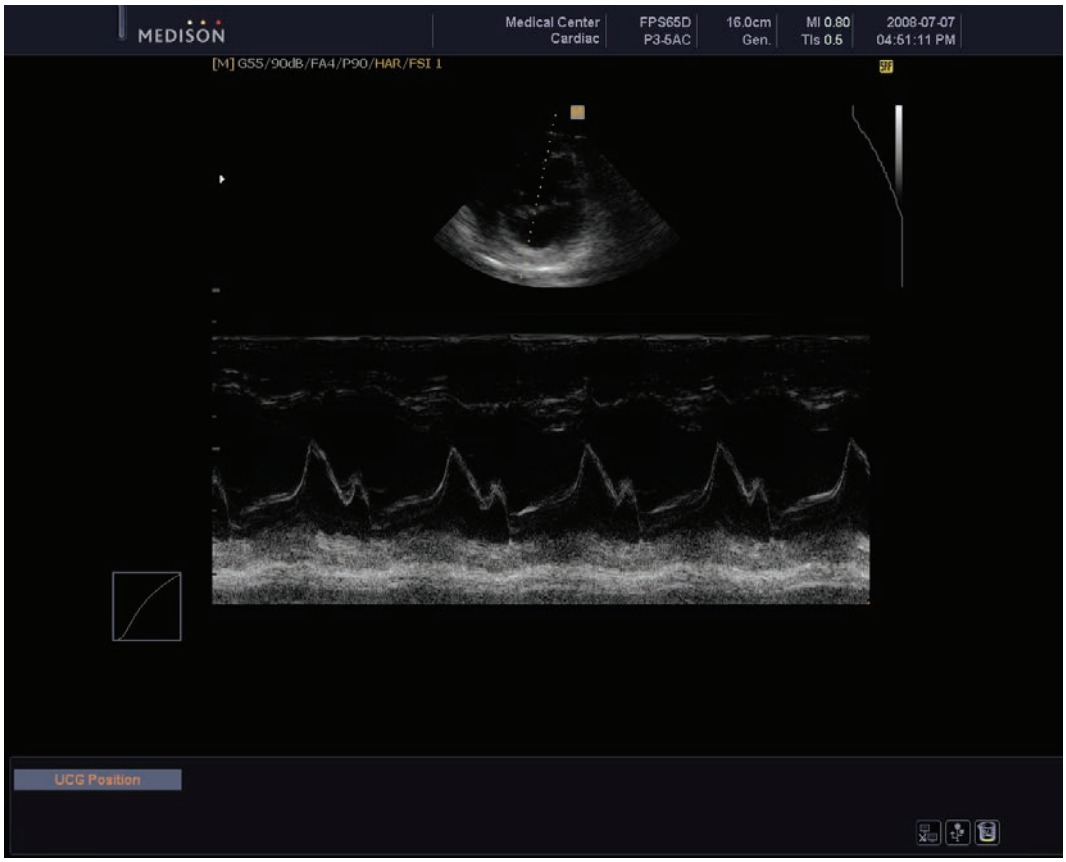
Press **Power** on the touch screen. Select ultrasound power between 10 – 100 by pressing a desired button or using the dial-button on the touch screen.

[Figure 4.2 Touch screen for 2D Mode]

M Mode

The M Mode is used to specify an observation area in a 2D image with the M Line, and display changes over time.

This mode is appropriate for the observation of organs with a lot of movement such as cardiac valves. The 2D Mode image is also shown, allowing the marking and adjustment of an observation area within the entire image.



[Figure 4.3 M Mode]

Entering & Exiting M Mode

Press the **M/s** dial-button on the control panel. Press this button again. M Mode will be terminated and the mode switched to 2D.

M Mode Screen

- **M Line**

  Use the trackball on the control panel to move to the right or left. The M Line indicates the relative position of the M Mode image in the 2D image. Therefore, you can move the M Line to change the observation area.

M Mode Menu

- **Sweep Speed**

  Press **Sweep Speed** on the touch screen. Select the sweep speed of M images between 60 – 360 Hz by pressing a desired button on the touch screen.

- **FreeAngle M**

NOTE	This item appears in the Flexible Soft menu only when a Phase Array Probe is used.

  Turn it on or off by pressing **FreeAngle M** on the touch screen.

  Free Angle M allows you to specify M Line for image observation. Use the **Change** button on the control panel to specify the length, position and angle of the M Line.

  ※ Tip! Setting Free Angle M

  1. Press the **FreeAngle M** button on the touch screen. The 'M Point1' mark will appear in the user information area, indicating that the start point for M line can be set.
  2. Use the Trackball to specify the start point of the M Line (M Point 1) for the 2D image.
  3. Press the **Change** button to save the start point. **M Point2** will appear in the user information area.
  4. Use the Trackball to specify the end point of the M Line (M Point 2) for the 2D image.
  5. To finish, turn off the FreeAngle M function by pressing the **FreeAngle M** button again. If the system is switched to Combined Mode or Multi Image Mode, FreeAngle M turns off automatically.

- **Negative**

  Turn it on or off by pressing **Negative** on the touch screen.

  This function inverts the color of M images.

■ **Loop Format**

Press **Loop Format** on the touch screen. Set the screen layout for M and 2D images by pressing a desired button.

- Top / Bottom: A 2D image is placed at the top and an M image is placed at the bottom.
- Side by Side: A 2D image is placed on the left and an M image is placed on the right.

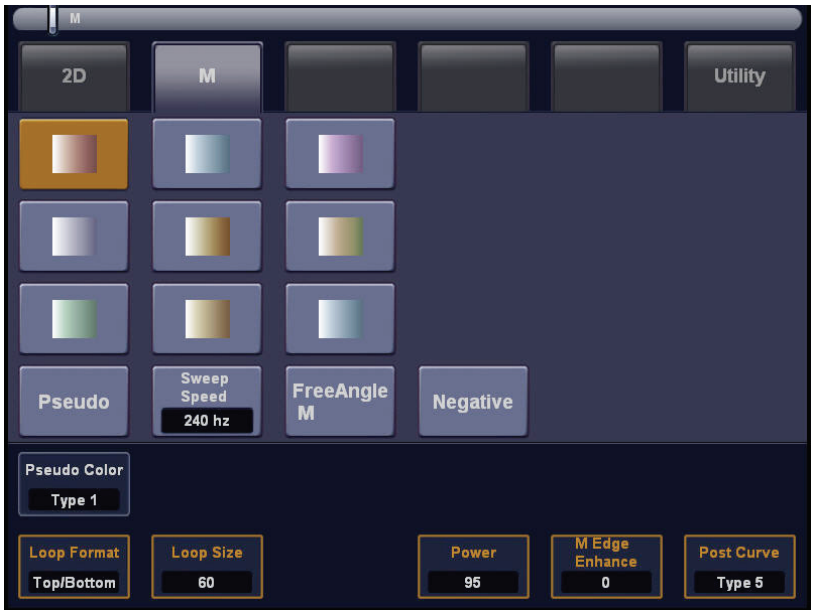
■ **Loop Size**

Press **Loop Size** on the touch screen. Select an M image size between 30 - 70 by pressing a desired button or using the dial-button on the touch screen.

■ **M Edge Enhance**

Press **M Edge Enhance** on the touch screen. Select an Edge Enhancement value between -3 and 3 by pressing a desired button or using the dial-button on the touch screen. Higher values provide more accurate images of boundaries.

NOTE	For information on other menu items, please refer to “2D Mode.”

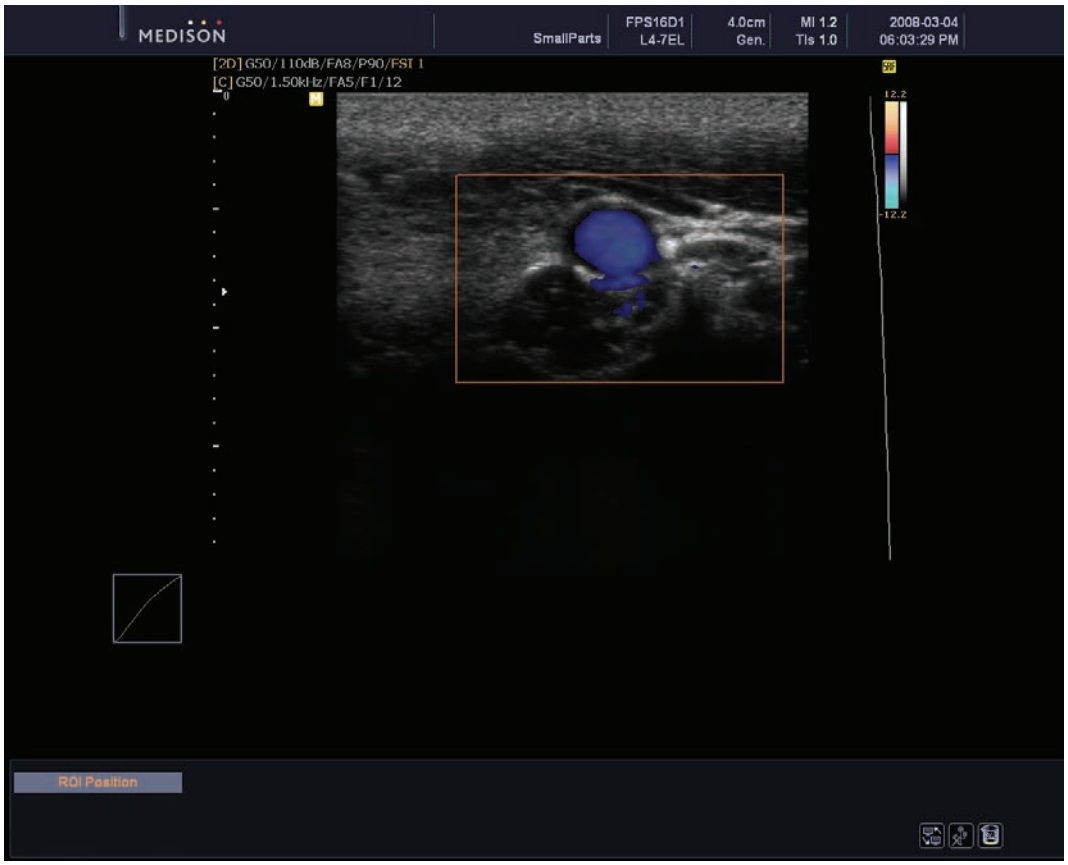


[Figure 4.4 Touch Screen for M Mode]

Color Doppler Mode

This mode displays the colored blood flow pattern of the ROI (Region of Interest) within the 2D image.

It is appropriate for examining the presence of the blood flow, its average speed and direction. The 2D Mode image is also shown, allowing the marking and adjustment of the ROI within the entire image.



[Figure 4.5 Color Doppler Mode]

Entering & Exiting C Mode

Press the **C** dial-button on the control panel. Press the **C** button again. C Mode will be terminated and the mode switched to 2D.

C Mode Screen

- **ROI Box**

  ROI stands for Region of Interest. The ROI Box outlines the area of the 2D image where color (blood flow) information is displayed in Color Doppler Mode.

  Use the **Change** button to move and resize the ROI box. Each time you press the **Change** button, the current state of the ROI box is displayed in the lower left of the screen.

  - ROI Position: You can move the ROI box. Use the Trackball to move the ROI box and press the **Set** button to specify its position.

  - ROI Size: You can resize the ROI box. Use the Trackball to resize the ROI box and press the **Set** button to specify its size.

- **Color Bar**

  In Color Doppler Mode, the color bar indicates the direction and speed of blood flow. Relative to the baseline in the centre, the red color indicates the direction and speed of the blood flow towards a probe. By contrast, the blue color indicates the direction and speed of the blood flow away from a probe.

  - Adjusting the color bar baseline: Use the **Baseline** dial-button on the control panel. If you rotate the **Baseline** dial-button clockwise, the baseline on the color bar rises.

    The baseline can be adjusted only when the Color Doppler Mode value is set to **Variance**.

- **Scale (PRF)**

  Use the **Scale** dial-button on the control panel. Rotating the **Scale** dial clockwise makes the PRF (Pulse Repetition Frequency) increase so that the speed range of the blood flow is widened, and vice versa.

- **Wall Filter**

  Wall Filter is an electrical filter used to eliminate low-frequency Doppler signals caused by the motion of vessel walls. Adjust Cutoff Frequency to remove from the screen the Doppler signals for which the frequencies are lower than the Cutoff Frequency.

  Use the **Filter** dial-button on the control panel. Rotating the **Filter** dial-button clockwise increases the Cutoff Frequency for Wall Filter, and rotating it counter-clockwise decreases the Cutoff Frequency for Wall Filter.

C Mode Menu

- **Left, None, Right**

  Press **Left**, **None** or **Right** on the touch screen. Minimize the loss of color information by adjusting the ultrasound beam angle.

NOTE	This option appears on the touch screen menu only when linear probes are used.

- **Invert**

  Press **Invert** on the touch screen. Each time the button is pressed, the color bar is inverted. Inverting the color bar also inverts the colors displayed on the image.

- **Multi Freq (Multi Frequency)**

  Press **Multi Freq** on the touch screen. Adjust the frequency within the ROI box. Select Pen or Gen by pressing the desired button.

- **Filter**

  Press **Filter** on the touch screen. Select a Wall Filter number between 0 – 3 by pressing the desired button.
  The block frequency of the Wall Filter increases as the number grows. The selected Wall Filters will be displayed in the mode information on the screen as F1, F2, etc.

- **CFR (Color Frame Rate)**

  Press **CFR** on the touch screen.
  If it is turned on, **CRF Index** is enabled on the touch screen.

- **CFR Index**

  Select the frame rate for color images from between 0 - 3 by pressing the desired button or using the dial-button on the touch screen.

- **Color Mode**

  Press **Color Mode** on the touch screen. Select the color display information from Velocity, Power, Variance or Vel + Var by pressing the desired button or using the dial-button on the touch screen.
  If **Velocity** or **Vel + Var** is selected, numbers will be displayed above and below the color bar, indicating the color scale values. If **Variance** is selected, +1.0 and -1.0 will be displayed. If **Power** is selected, no numbers will be displayed.

- **Balance**

  Press **Balance** on the touch screen. Select the Balance value between 1 – 16 by pressing a desired button or using the dial-button on the touch screen.

Adjust the range of color image display by comparing the Gray Level of the 2D image with the Doppler signal values of the color image. As the Balance value increases, the color image appears, even in regions with a high Gray Level in 2D image (bright regions), expanding the range of the color image.

- **Display Mode**

  Press **Display Mode** on the touch screen. Select the type of images to display on the screen from Color + B/W, Color Only or B/W Only by pressing a desired button or using the dial-button on the touch screen.

- **Sensitivity**

  Press **Sensitivity** on the touch screen. Select the sensitivity of color images between 8 - 31 by pressing a desired button or using the dial-button on the touch screen.

  As the number increases, the sensitivity of color images increases but the frame rate drops.

- **Color Map**

  Press **Color Map** on the touch screen. Select a color map between Type 1 – Type 8 by pressing a desired button or using the dial-button on the touch screen.

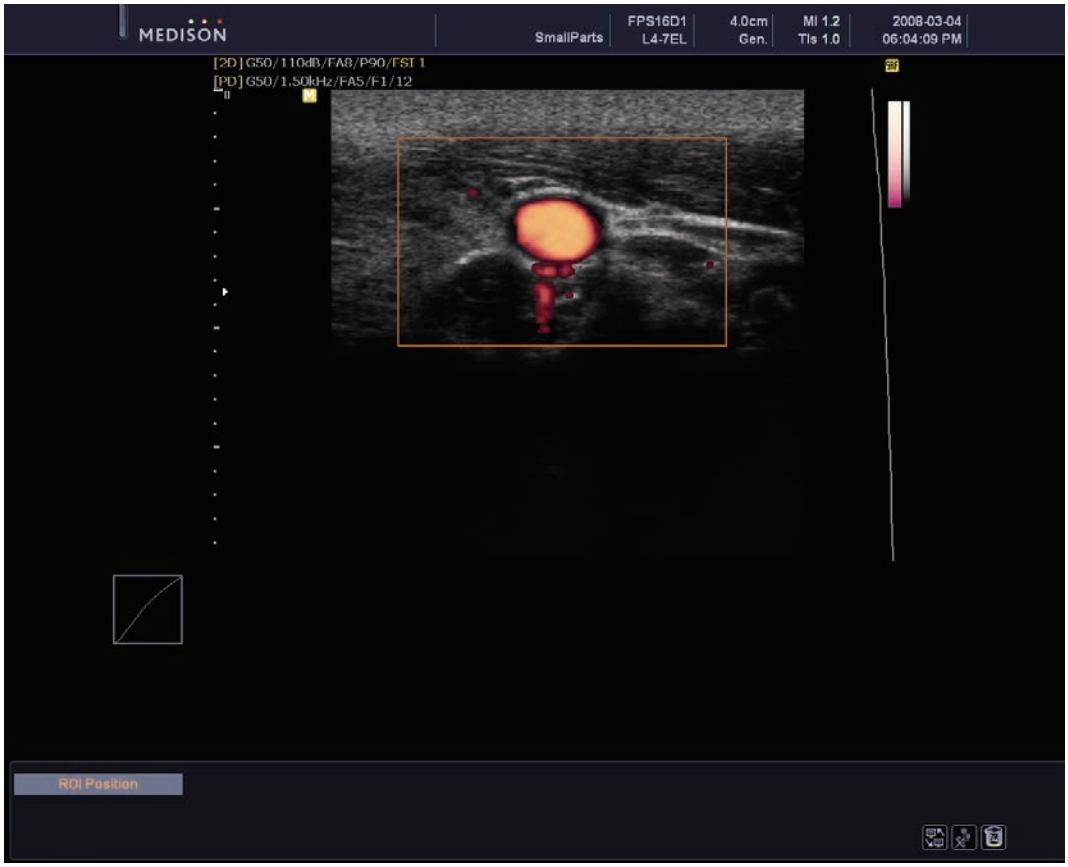
NOTE	For information on other items, please refer to “2D Mode.”

[Figure 4.6 Touch Screen for Color Doppler Mode]

Power Doppler Mode

This mode displays the color intensity of blood flow within the ROI in the 2D image.

It is appropriate for examining the presence and amount of blood flow. The 2D Mode image is also shown, allowing the marking and adjustment of the ROI within the entire image.



[Figure 4.7 Power Doppler Mode]

Entering & Exiting PD Mode

Press the **PD** dial-button on the control panel. Press the button again. PD Mode will be terminated and the mode switched to 2D.

PD Mode Screen

- **Color Bar**

  In Power Doppler Mode, the color bar varies depending on the screen display for Power Doppler Mode that is selected in the **PD Mode** menu.

- PD Mode: The color bar indicates the presence of blood flow and its amount. The top of the color bar is the brightest section, where the amount of blood flow is at its highest.
- DPDI Mode: The color bar indicates the direction and speed of blood flow. With the baseline in the centre, the red color represents the direction and speed of blood flow moving toward the probe, and the blue color represents the direction and speed of blood flow away from the probe.

■ ROI Box

The ROI (Region of Interest) outlines the area of the 2D image where color (blood flow) information is displayed in Power Doppler Mode.

PD Mode Menu

■ PD Mode

Press **PD Mode** on the touch screen. Select the screen layout for Power Doppler Mode by pressing a desired button or using the dial-button on the touch screen.

- PD Mode: Shows only the power of the blood flow.
- DPDI Mode: Directional Power Doppler Imaging (DPDI) shows the power, velocity and direction of blood flow.

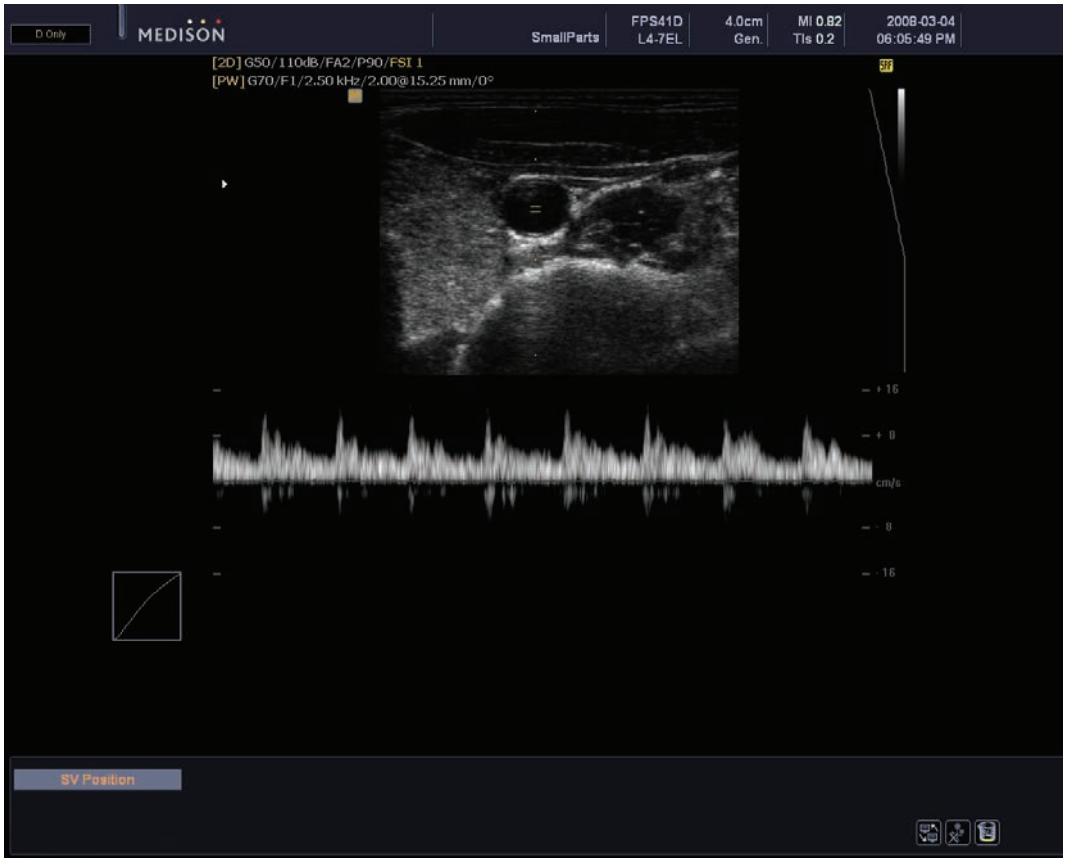
NOTE	Description for touch screen menu items is the same as for Color Doppler Mode.

[Figure 4.8 Touch Screen for Power Doppler Mode]

PW Spectral Doppler Mode

PW stands for Pulse Wave. PW Spectral Doppler Mode gives information on the speed of blood flow at a specific site in the form of a spectral trace and audio signal. Distance (depth) information can also be obtained by transmitting pulses over time frames.

This mode is useful for measuring low-speed blood flow such as in the abdomen and peripheral vessels. The 2D Mode image is also shown, allowing the marking and adjustment of an observation area within the entire image.



[Figure 4.9 PW Spectral Doppler Mode]

Entering & Exiting PW Spectral Doppler Mode

Press the **PW/z** dial-button on the control panel. Press it again to return to 2D Mode.

Press the **Update** button on the control panel to obtain a spectral Doppler image.

PW Spectral Doppler Mode Screen

- **Sample Volume**

  When Sample Volume is on the blood flow of the 2D image, it represents Doppler Spectrum. The size and depth of Sample volume is displayed in [mm] units. Its position is moved with the Trackball and displayed in the xx.xx@yy.yy mm format. The format means that a Sample Volume of 'xx.xx' mm size is located at a depth of 'yy.yy' mm. For example, 2.00@16.70 mm means that a Sample Volume of 2.00mm size is located at a depth of 16.07mm.

  - Moving Sample Volume: Use the Trackball on the control panel.

  - Resizing Sample Volume

    On the control panel: After pressing the **Change** button on the control panel, adjust the size of the sample volume by using the **Trackball**. Press the **Change** button again to return to the Sample Volume Position Control screen. The icon showing the two **Trackball** functions (SV Pos/SV Size) is shown for a second and disappears.

    On the touch screen: Press **SV Size** on the touch screen. Select a value between 0.5 - 15 by pressing a desired button or using the dial-button on the touch screen.

  - Adjusting Sample Volume Angle: Adjust the angle between -70 and +70 by rotating the **Angle** dial-button on the touch screen. Pressing the **Angle** button directly on the touch screen changes the angle to –60, 0 or 60 degrees. Controlling the sample volume angle ensures precise speed measurement.

- **Adjusting Doppler Baseline**

  Press the **Baseline** dial-button on the control panel. If you rotate the dial-button clockwise, the baseline goes up.

- **HPRF (High PRF) Function**

  This function measures blood flow for which the speed exceeds the specified limit at a specified depth. It expands the scale into double the size of the original scale. This function is available only in PW Spectral Doppler Mode (D Only).

  – **Activating HPRF**

    To activate HPRF, increase the Scale values at the required depth. A The Phantom Gate will appear on the D Line at a position higher than the sample volume. Once HPRF starts, PRF does not increase even if you increase the scale value.

  – **Finishing HPRF**

    While HPRF is in use, decrease the scale value by one step to finish HPRF. The maximum PRF values in PW Spectral Doppler Mode are shown.

– **Moving Sample Volume**

To move the Sample Volume position in the D Only state, the system calculates PRF values and the Phantom Gate position, and updates them on the PW Spectral Doppler image. HPRF is terminated when HPRF cannot be activated.

When Sample Volume is moved in the 2D Only state, the PRF values don't change.

NOTE	HPRF is not activated in Simultaneous Mode. It is also not activated if [PRF*2] exceeds 23KHz.

CAUTION	■ The Phantom Gate position can be located outside the 2D image area in Zoom Mode. ■ Make sure that sample volume and Phantom Gate are not placed together in the measuring area. If more than two Sample Volumes are located in the vessels, all Doppler components will appear in the spectrum, causing noise.

PW Spectral Doppler Mode Menu

■ **Simultaneous**

Press **Simultaneous** on the touch screen. Each time you press the button, the Simultaneous function turns on and off.

NOTE	It appears in the PW menu only when "Utility > Setup > General > Simultaneous Mode" is set to **Allow**.

If the Simultaneous function is enabled, you can view the 2D image and Spectral Doppler image simultaneously in real time. If it is disabled, you can view only one of the two images.

The Simultaneous function decreases Doppler PRF, thus decreasing the measurable speed range.

■ **Invert**

Press **Invert** on the touch screen.

Each time the button is pressed, the speed indicator (+ / –) for a spectrum is inverted.

■ **Automatic Calculator**

Turn it on or off by pressing **Auto Clac** on the touch screen.

If it is turned on, Doppler Trace is performed and its results are displayed. If it is turned on, the **Mean Trace** button is enabled.

The values displayed are as follows:

- Peak Systolic Velocity (PSV)
- End Diastolic Velocity (EDV)
- Time Averaged Peak Velocity (TAPV)
- Resistive Index (RI)
- Pulsatility Index (PI)
- Systole/Disastole Ratio (S/D)
- Time Averaged Mean Velocity (TAMV)

For information on setting display values, please refer to Chapter 3, “Settings.”

CAUTION	The measurements done by Auto Trace under **Measure** and Real Time Automatic Doppler Trace (Automatic Calculator) may be different from each other. This is because the algorithms for these two methods are different. It is recommended to use Auto Trace under **Measure** for more accurate measurement.

※ Things to Consider for Real Time Automatic Doppler Trace

1. Aliasing occurs because PRF is too low in comparison to the image speed, or the spectrum is clustered around the baseline because PRF is too high.
2. Peak is indistinctive or intermittent such as in Spectral waveforms for veins.
3. Meaningful spectrum distinction becomes difficult because Doppler Gain is set too high or too low.
4. An index is displayed during the transition time after Sample Volume is moved with the Trackball.
5. The major spectral signals are cut off because Doppler Wall Filter is set too high.
6. Peak Trace is interrupted due to abnormal Doppler noise or artifact, and the heart rate is above approximately 140 bpm.

The trace and/or results of Real Time Automatic Doppler Trace may not be accurate in the above situations. Furthermore, during auto calculation, results will not be displayed if the Freeze function is run against inaccurate values.

- **Mean Trace**

  Press **Mean Trace** on the touch screen. Mean Trace for the selected spectrum is performed.

- **AutoCalc Direction**

  Press **AutoCalc Direction** on the touch screen. Select the part of spectrum to use AutoCalc from Up or Down.

- **TDW (Tissue Doppler Wave Mode)**

  Press **TDW** on the touch screen. The system will switch to TDW Mode.

NOTE	This option is available only when the cardiac application is selected for a Phased Array probe.

- **Doppler Average**

  Press **Doppler Average** on the touch screen.

  This function determines availability (on/off) of FDRP (Fast DRP). It can enhance expression of Spectral Doppler images. You can select this function On or Off.

- **SV Size**

  Press **SV Size** on the touch screen. Select the Sample Volume size between 0.5 - 15 by pressing a desired button or using the dial-button on the touch screen.

- **Spectrum Type**

  Press **Spectrum Type** on the touch screen. Select the spectrum type from Type 1 – 3.

- **Loop Format**

  Press **Loop Format** on the touch screen. Refer to **Loop Format** in the M mode.

- **Loop Size**

  Press **Loop Size** on the touch screen. You can change the size of the PW Spectral Doppler image for the 2D image. You can select a value between 30 – 70.

- **Spectrum Enhancement**

  Press **Spectrum Enhancement** on the touch screen. This function controls brightness and sensitivity of Spectral Doppler images. You can select a value between 1-4.

- **Sound**

  Press the **Sound** button on the touch screen. Select a Doppler sound between 0 - 100 by pressing the desired button or using the dial-button on the touch screen.

NOTE	■ For information on Wall Filter, Scale, Dynamic Range, Steer adjustment and other menu items, please refer to “2D Mode” and “Color Doppler Mode.” ■ For information on TDW, please refer to “Tissue Doppler Wave Mode.”

[Figure 4.10 PW Spectral Doppler Mode]

CW Spectral Doppler Mode

CW stands for Continuous Wave. PW Spectral Doppler Mode gives information on the speed/direction of blood flow at a specific site in the form of a spectral trace and audio signal. Unlike PW Spectral Doppler Mode, it does not provide Sample Volume.

[Figure 4.11 CW Spectral Doppler Mode]

- **Steered CW Spectral Doppler Mode**

  This mode is available with a Phase Array Probe only.

  The 2D Mode image is also shown, allowing the marking and adjustment of an observation area within the entire image.

- **Static CW Spectral Doppler Mode**

  This mode is available with a Static CW Probe only.

  The 2D image is not displayed.

Entering & Exiting CW Spectral Doppler Mode

Press the **CW/y** button on the control panel. Press it again to return to 2D Mode.

NOTE	The information on menu and Flexible Soft menu items for PW Spectral Doppler Mode also applies to this mode.

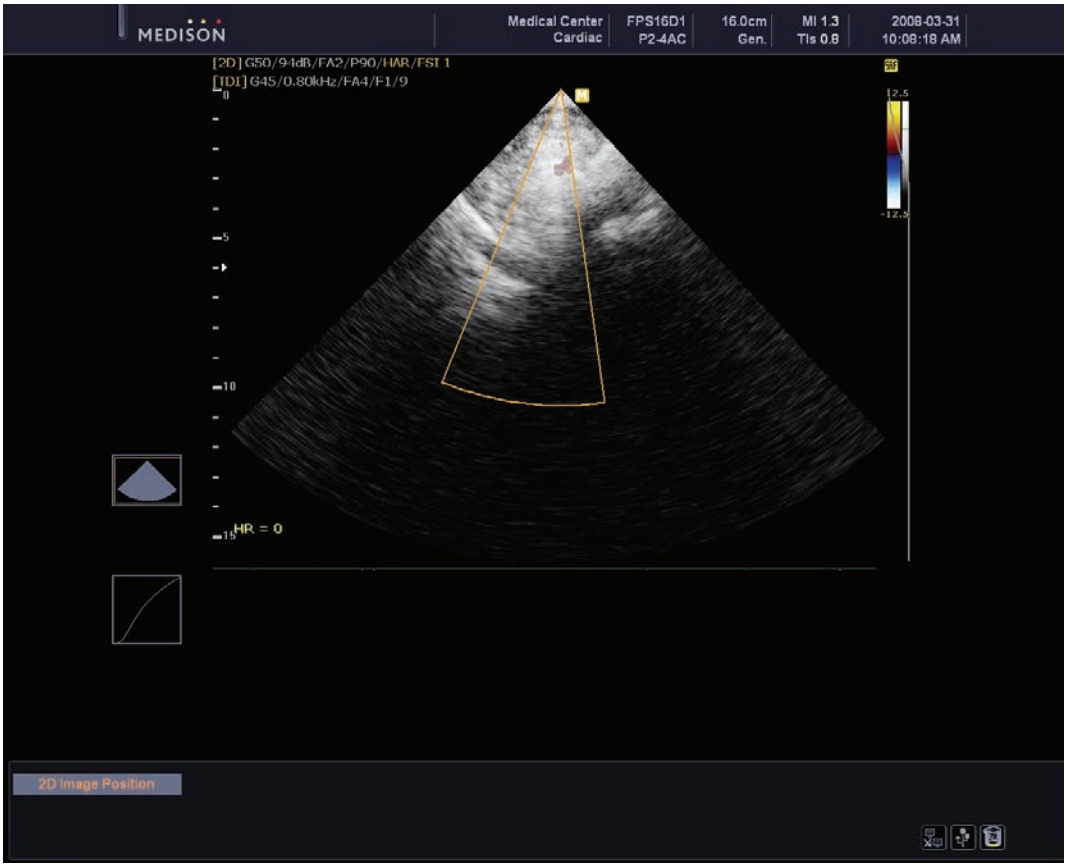
[Figure 4.12 Touch Screen for CW Spectral Doppler Mode]

Tissue Doppler Imaging Mode

NOTE	This function can be used only with Phased Array Probe and cardiac application.

TDI mode represents movements of tissues such as a heart.

TDI Mode is available in Color Doppler or Power Doppler Mode. In Color Doppler or Power Doppler Mode, TDI shows cardiac tissues in color.



[Figure 4.13 Tissue Dopple Imaging Mode]

Entering & Exiting TDI Mode

Press the **TDI/x** dial-button on the control panel.

TDI Mode Menu

[Figure 4.14 TDI Mode]

NOTE	The description for touch screen menu items is the same as for PW Spectral Doppler Mode.

Tissue Doppler Wave Mode

NOTE	This function can be used only with Phased Array Probe and cardiac application.

TDW mode represents movements of tissues such as a heart.

TDW Mode is available in PW or CW Spectral Doppler Mode. If it is used in Spectral Doppler Mode along with Color Doppler or Power Doppler Mode, changes in cardiac tissues over time can be observed.

[Figure 4.15TDW Mode]

Entering & Exiting TDW Mode

Press **PW/z** or **CW/y** in TDI Mode. Alternatively, press the **TDW** button on the touch screen in PW Spectral Mode.

TDW Mode Menu

[Figure 4.16 Touch Screen for TDW Mode Menu]

NOTE	The description for touch screen menu items is the same as for PW Spectral Doppler Mode.

Combined Mode

In Combined Mode, three different modes are combined including the default 2D Mode. Note that, in 2D/C Live Mode, only two modes are combined: 2D and Color Doppler Modes.

2D/C/PW Mode

Color Doppler Mode and PW Spectral Doppler Mode are displayed simultaneously.

In Color Doppler Mode, press the **PW/z** dial**-**button on the control panel. Or, in PW Spectral Doppler Mode, press the **Color/y** dial-button on the control panel.

2D/PD/PW Mode

Power Doppler Mode and PW Spectral Doppler Mode are displayed simultaneously.

In Power Doppler Mode, press the **PW/z** dial**-**button on the control panel. Or, in PW Spectral Doppler Mode, press the **PD** button on the control panel.

2D/C/CW Mode

Color Doppler Mode and CW Spectral Doppler Mode are displayed simultaneously. This mode is available only with certain probes.

In Color Doppler Mode, press the **CW/y** button on the control panel. Or, in CW Spectral Doppler Mode, press the Color/y dial-button on the control panel.

2D/PD/CW Mode

Power Doppler Mode and CW Spectral Doppler Mode are displayed simultaneously. This mode is available only with certain probes.

In Power Doppler Mode, press the **CW/y** button on the control panel. Or, in CW Spectral Doppler Mode, press the **PD** button on the control panel.

2D/C/M Mode

Color Doppler Mode and M Mode are displayed simultaneously.

In Color Doppler Mode, press the **M** dial**-**button on the control panel. Or, in M Mode, press the

Color/y dial-button on the control panel. (This button is enabled for specific diagnostic applications with specific probes only.)

2D/C Live Mode

2D Mode and Color Doppler Mode are displayed simultaneously. Press **2D/C Live** in the 2D menu.

2D/TDI/TDW

TDI Mode and TDW Mode are displayed simultaneously. Press **PW/z** or **CW/y** in the TDI mode.

Changing Combined Mode Format

- **Changing the active image mode**

  Press the **Update** button on the control panel. The current active image mode - 'D Only' or '2D Only' - is displayed above the menu on the screen.

  In Combined Mode, more than two image modes are used at the same time. The image mode currently in use is called 'Active Image Mode.' For example, if Sample Volume is moved with the Trackball in 2D/C/PW Mode, PW Spectral Doppler Mode becomes the current active image mode.

  Because the menu and button options vary depending on the active image mode, use the **Update** button change the active image mode.

  Note that the active image mode cannot be changed with the **Update** button when the Freeze function is in effect.

- **Changing menu**

  Press the **Change Menu** button on the control panel.

  You can change the menu and Flexible Soft menu items without changing the active image mode. Buttons for the active image mode appear on the control panel.
  For example, if the Flexible Soft Menu for 2D Mode is displayed on the screen in 2D/C/PW Mode, press the **Change Menu** button to switch to the Flexible Soft Menu for Color Doppler Mode.

NOTE	For information on optimizing an image in Combined Mode, please refer to "Basic Mode."

Multi-Image Mode

The product supports Dual Mode and Quad Mode.

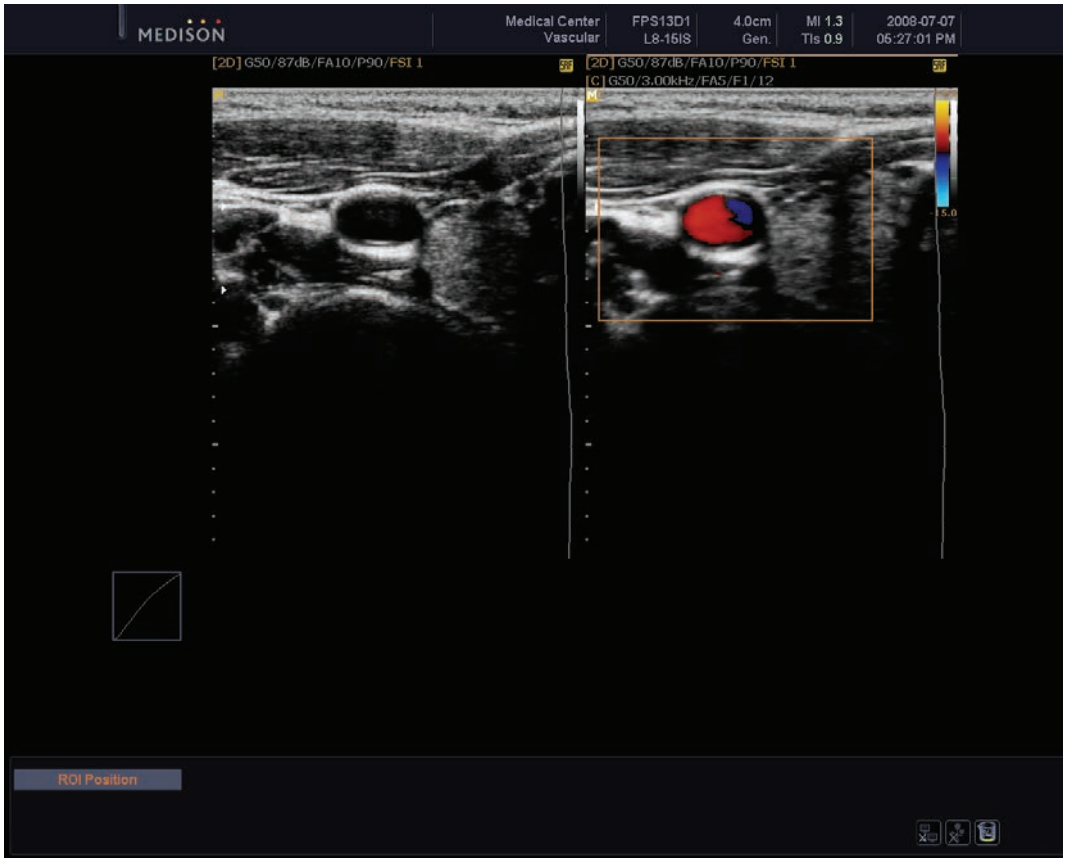
In Multi-Image Mode, an image can be displayed in different combined modes. Button operations in an active area are the same as in Combined Mode.

Dual Mode

Press the **Dual** button on the control panel.

You can compare two different images at the same time. Each time you press the Dual button, one of the two images is selected. The current active image mode is displayed as a yellow line at the top. Button and menu items for the current image mode are displayed.

Press the **Single** button on the control panel to exit Dual Mode.



[Figure 4.17 Dual mode]

Quad Mode

Press the **Quad** button on the control panel.

You can compare four different images at the same time. Each time you press the Quad button, one of the four images is selected. The current active image mode is displayed as a yellow line at the top. Button and menu items for the current image mode are displayed.

Press the **Single** button on the control panel to exit Quad Mode.

[Figure 4.18 Quad mode]

NOTE	For information on optimizing an image in Multi-Image Mode, please refer to “Basic Mode.”

3D / 4D Mode

An observation area is displayed in a 3D image. ACCUVIX V20 provides 3D Mode and 4D Mode.

Things to Note

3D Mode

In 3D Mode, 3D images can be obtained with 3D or standard probes.

NOTE	■ CW probes cannot be used for 3D Mode. ■ Standard probes cannot be used for 4D and XI STIC Modes, and there are certain limitations when they are used in 2D and 3D Modes.

[Figure 4.19 3D Mode]

Depending on the probes being used and how images are obtained, 3D Mode can be further divided into the following modes:

- **2D/3D**

  3D images can be obtained with 3D or standard probes.

  ※ Tip!

  If 3D probes are used, it is called Static 3D Mode. If standard probes are used, it is called Freehand 3D Mode.

- **XI STIC**

  Fetal cardiac cycle and STIC volume data can be obtained with 3D probes.

NOTE	In Color STIC, a heart rate can be calculated when the frame rate is over 20.

In addition, the following two modes are supported depending on the observation object in 3D Mode.

- Color 3D Mode (3D/C): Press the **3D/4D** button in Color Doppler Mode. Along with a 3D image of the observation area, the speed and direction of blood flow will be shown in color.
- Power Doppler 3D Mode (3D/PD): Press the **3D/4D** button in Power Doppler Mode. Along with a 3D image of the observation area, the presence and amount of blood flow will be shown in color.

4D Mode

In 4D Mode, 3D images can be obtained in real time with 3D probes. This mode is also called Live 3D Mode.

NOTE	4D Mode is not available in Color 3D and Power Doppler 3D Modes.

[Figure 4.20 4D Mode]

Entering and Exiting 3D/4D Modes

Press the **3D/4D** button on the control panel. Press it again to exit 3D/4D Mode and return to 2D Mode.

3D/4D Mode Screen

- **ROI Box**

  In 3D/4D Modes, the ROI box is also called the volume box. The ROI Box represents a specific area of a 2D image that will be converted into a 3D/4D image.

  The position and size of the ROI box can be adjusted by using the **Change** button on the control panel. Each time the **Change** button is pressed, the state of the ROI box is shown in the lower left corner of the screen as follows:

  - ROI Position: In this state, the ROI box can be moved. After moving the ROI box with the **Trackball**, confirm the new position by pressing the **Set** button.

- ROI Size: In this state, the ROI box can be resized. After resizing the ROI box with the **Trackball**, confirm the new size by pressing the **Set** button. Alternatively, adjust **ROI Width** and **ROI Height** by using the dial-button on the touch screen.

Using 3D/4D Modes

3D/4D Modes can be used through the following steps:

1. Press the **3D/4D** button on the control panel.
2. Use the **trackball** and the **Set** button on the control panel to set the position and size of the ROI box.
3. Set each menu in the **3D Stand By** screen on the touch screen.
4. Press the **Freeze** button on the control panel to start acquiring a 3D image.
5. Once the acquisition is complete, the system switches to the 3D View or 3D XI screen.
   - If **MPR** is selected in the 3D Stand By screen, 3D View is enabled. If **MSV** or **Oblique** is selected, 3D XI is enabled. “3D View” or “3D XI” is in the upper left corner of the screen.
   - If a horizontally reversed 3D image is obtained, the image will be also shown horizontally reversed in 3D View or 3D XI.
   - Press the **Freeze** button in XI STIC 3D View to switch the touch screen menu to that of standard 3D View.
   - Press **3D/4D** to acquire a 3D image again.
6. Optimize the 3D image for diagnosis.

※ Tips! - How to Improve 3D Image Quality

- Consider the direction, size and division of the viewpoint as well as the visibility of an object.
- Before acquiring 3D images, adjust the contrast in 2D Mode.
- The bigger the ROI box, the slower the rendering speed. Therefore, set an appropriate ROI box size.
- To see the 3D image of a fetus in frontal view, position the fetal head in the direction of the Direction Mark, putting it in the coronal plane. Then scan the fetus from back to abdomen.
- The 3D image of the fetal face is more easily found in the coronal plane than in the sagittal plane.
- To determine surface contour, objects such as amniotic fluid that do not generate echoes should be insulated with hypo-echoic textures.
- To obtain a high quality 3D surface, adjust the Low Threshold value. The general rule is not to adjust High Threshold; set it to the maximum value of 255.

3D Stand By

Set how 3D images are acquired. Once 3D image acquisition is complete, the 3D View or 3D XI screen is displayed with the pre-determined content:

[Figure 4.21 Touch Screen for 3D Stand By]

Tab

Press a desired 3D Mode tab from among **2D/3D**, **4D** or **XI STIC** on the touch screen.

NOTE	■ When standard probes are used, only the **2D/3D** tab can be selected. ■ The **4D** tab is not available in Color 3D and Power Doppler 3D Modes.

Mode & Display Format

Sub modes that are available under the selected 3D tab will be displayed. Select a desired sub mode on the touch screen. The display format varies depending on the selected sub mode.

MPR (Multi-Planar Rendering)

Press **MPR** on the touch screen.

MPR is a standard 3D Mode. After 3D images are acquired, the 3D View screen will be displayed.

NOTE	**Fixed 3D** becomes available only after 3D image acquisition is complete.

- **2D**

  Press **2D** on the touch screen. After 3D images are acquired, images in the Axial, Sagittal and Coronal planes and Orientation Help (OH) will be displayed.

- **2D / 3D**

  Press the **2D/3D** button on the touch screen. After 3D images are acquired, images in the Axial, Sagittal or Coronal plane and 3D images will be displayed.

- **VCT (Volume CT)**

  Press the **VCT** button on the touch screen. After 3D images are acquired, images in the Axial, Sagittal and Coronal planes, and in combination, will be displayed.

- **ROI 3D**

  Press the **ROI 3D** button on the touch screen. After 3D images are acquired, images with an ROI box in the Axial, Sagittal and Coronal planes and 3D images will be displayed.

- **Full**

  Turn it on or off by pressing the **Full** button on the touch screen. If it is turned on, after 3D images are acquired, the acquired 3D images will be displayed in full screen. However, if **2D** is selected, 2D images will be displayed in full screen.

  Full can be used with other display format buttons at the same time.

NOTE	For more information, please refer to “3D View.”

MSV (Multi Slice View)

Press **MSV** on the touch screen. The supported display formats are **1x1**, **2x1**, **3x2**, **3x3**, **4x3** and **6x4**.

MSV is a kind of 3D XI. After 3D images are acquired, the **3D XI** screen will be displayed.

NOTE	For more information, please refer to “3D XI™.”

Oblique

Press **Oblique** on the touch screen. The supported display format is **Single Static Line**.

Oblique is a kind of 3D XI. After 3D images are acquired, the **Oblique View** screen will be displayed.

NOTE	For more information, please refer to “3D XI™.”

User Set

Set presets for 3D images. Select from **Default** or **User1** - **User5** by pressing the desired button on the touch screen.

Auto ROI

NOTE	This option appears in the menu for OB or OB Early application only.

Turn it on or off by pressing **Auto ROI** on the touch screen. If it is turned on, the ROI box is automatically located in an area that will be converted to a 3D image.

The following should be taken into account with Auto ROI:

- Only images of the fetal body can be acquired.
- If Auto ROI is turned on, the position or size of the ROI box cannot be changed.
- It is affected by the brightness or contrast of 2D images.
- It is not available in Color or Power Doppler Mode.

Scan Quality

Press **Scan quality** on the touch screen. Set the quality of 3D images by pressing a desired

button or using the dial-button on the touch screen.

- Fastest: The image quality is low but the 3D image speed (or rendering speed) is fast.
- Fast: The image quality is better than **Fastest** but the speed is slower.
- Normal: The image quality is better than **Fast** but the speed is slower.
- Slow: The image quality is excellent. It is used to obtain detailed images.

Scan Angle

Press **Scan Angle** on the touch screen. Adjust the scan angle between 10˚-70˚by pressing a desired button or using the dial-button on the touch screen.

NOTE	In **XI STIC**, set the scan angle between 15˚- 60˚.

Scan Time

Set the scan time between 7 – 15 seconds by using the dial-button on the touch screen. This button is enabled in XI STIC only.

NOTE	For more information, please refer to “XI STIC.”

Trimester

Set the trimester by using the dial-button on the touch screen. This button is enabled in XI STIC only.

NOTE	For more information, please refer to “XI STIC.”

ROI Width

Press **ROI Width** on the touch screen. Adjust the width of the ROI box by rotating the dial-button.

ROI Height

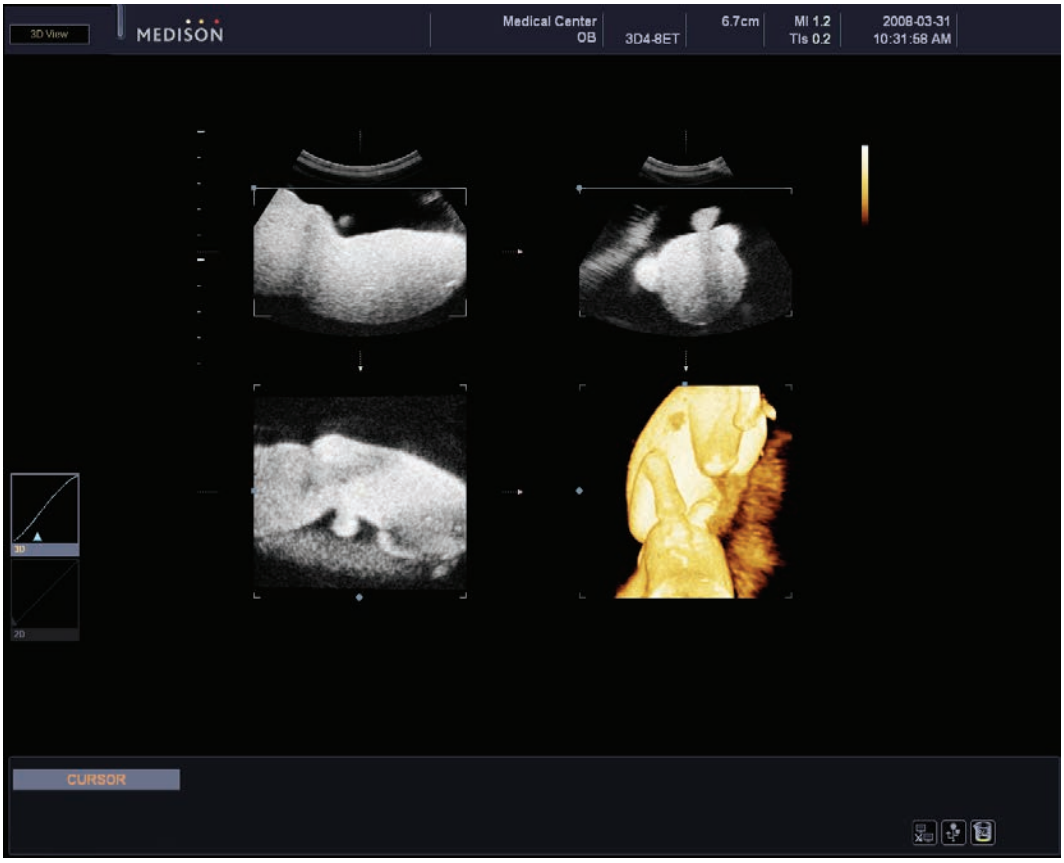
Press **ROI Height** on the touch screen. Adjust the height of the ROI box by rotating the dial-button.

3D View - MPR

This screen is displayed when 3D image acquisition is complete if **MPR** is selected in the **3D Stand By** screen. “3D View” is shown in the upper left corner of the screen.

In this screen, acquired 3D images can be optimized, and diagnosis and measurement can be made.

NOTE	The 3D XI screen is displayed if **MSV** or **Oblique** is selected in the **3D Stand By** screen. “3D XI” is shown in the upper left corner of the screen.



[Figure 4.22 3D View]

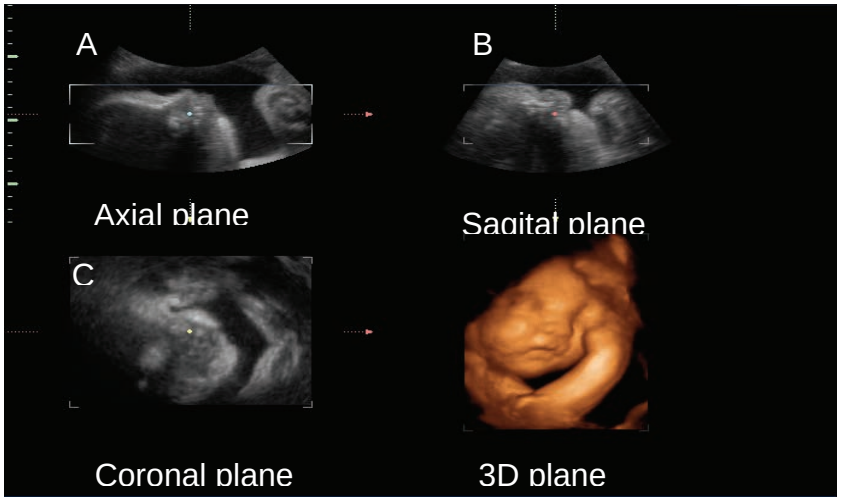
[Figure 4.23 Touch Screen for 3D View]

The Basic of 3D View

■ Screen Layout

The default 3D View screen consists of Axial Section, Sagittal Section and Coronal Section surface images—which are volume data cut at anatomical positions—and 3D images.

For the user's convenience, Axial Section is shown as "A plane," Sagittal Section as "B plane," and Coronal Section as "C plane."



- **Touch Screen Layout**

  The touch screen in 3D View is divided into 3D Menu and 3D Quick Menu. The 3D Quick Menu appears vertically in the right side of the touch screen. It is available in all modes in 3D View. At the bottom of the quick menu, a page number is shown. Pages can be navigated through by using the dial-button at the bottom.

  Only those buttons that are available in the current mode are enabled. If any of these buttons are pressed, the system switches to the corresponding screen.

- **Trackball Status Indication**

  The current status of the **Trackball** appears in at the bottom of the screen. Select from Cursor, Move or ROI to access **Trackball** functions. Press the **Change** button on the control panel to change the **Trackball** status. Each time the button is pressed, the **Trackball** status is toggled.

  - Move: Move a 3D image with the **Trackball**. The acquired 3D image is moved around based on the **Trackball** movements.
  - ROI: Resize the ROI box with the **Trackball**. The size of the ROI box over a 3D image is changed based on the **Trackball** movements.
  - Cursor: The **Trackball** can be used like a cursor. This option can also be used by pressing the **Pointer** button on the control panel.

- **Image Zoom**

  Adjust the zoom factor by rotating the dial-button on the control panel. The current zoom factor appears in the left side of the screen.

- **Rotate Image by X-axis**

  Use the **TDI / x** dial-button on the control panel.

- **Rotate Image by Y-axis**

  Use the **CW / y** dial-button on the control panel.

- **Rotate Image by Z-axis**

  Use the **PW / z** dial-button on the control panel.

- **Measurement by Application**

  Press the **Calculator** button on the control panel. All measurements are performed in the same way as in Chapter 5, “Measurements and Calculations.”

NOTE	■ Only MPR, MSV or 4D images can be measured. ■ During measurement, the **SONOVIEW**, **Patient**, **Report**, **Indicator** and **Text** buttons only are available.

- **Basic Measurement**

  Press the **Caliper** button to switch to the *Caliper* screen, and press the **Caliper** tab. The system switches to the ***Caliper*** screen. All measurements are performed in the same way as in Chapter 5, “Measurements and Calculations.”

- **Slice Measure**

  Press the **Caliper** button to switch to *Caliper* screen, and press the **Slice Measure** tab. The system switches to the ***Slice Measure*** screen. Slice Measure allows you to measure a single volume by splitting it into several slices. That is, you move images in the A, B or C planes one at a time along the Z-axis, and sum their areas to measure the entire volume.

※ Tip! Editing Curve

Before pressing the **Set** button to specify the end point, you can rotate the **Delete** dial button on the touch screen to delete a part of the curve being traced.

[Figure 4.24 Slice Measure Menu]

The buttons on the touch screen are like below;

- **Ref. A**, **Ref. B**, or **Ref. C**: Select the reference plane.
- **NEW**: Delete measurements and perform a new measurement.
- **SLICE INIT**: Initialize the location to measure.
- **Meas. Plan Left**: Move to the previous (left) slice. It is only enabled during measurement.
- **Meas. Plan Right**: Move to the next (right) slice. It is enabled only during measurement.
- **Ref. Slice**: Select a slice to measure. The slice number indicates a relative value.

■ **Text Input**

For information on entering text, please refer to the “Typing Text” section in Chapter 6, “Image Management.”

NOTE	The Autotext function is not available in 3D View.

■ **Indicator Input**

For information on displaying an indicator, please refer to the “Displaying Indicator” section in Chapter 6, “Image Management.”

■ **Saving Images**

Press the **Save** button on the control panel. The **3D Data Save** window will appear. Press **Image** and then **Save,** to save an image.

■ **Saving an image with volume data**

Press **Save** on the control panel and then the **3D Data Save** window will appear.

Press **Volume** and then **Save** to save an image with volume data. When a CINE image is included in volume data, the CINE image is also saved.

NOTE	When there are 3D CINE and 4D CINE images, you need to select one or the other for saving.

If an image is saved with volume data, new 3D rendering images can be reproduced with SonoView.

[Figure 4.25 3D Data Save]

■ **Printing Images**

Press the **Print 1** button (or **Print 2** button) on the control panel.

Display Format

- **2D**

  Press **2D** on the touch screen.

  Images in the Axial, Sagittal and Coronal planes and Orientation Help (OH) will be displayed. OH indicates the relative position of the currently selected plane in regard to volume data.

  > **※ Tips!**
  >
  > Since only multi-planar images are used for diagnosis in 2D Mode, use the **Full** button on the touch screen for more detailed observation.

- **2D / 3D**

  Press the **2D/3D** button on the touch screen.

  Images in the Axial, Sagittal or Coronal plane and 3D images will be displayed.

- **VCT (Volume CT)**

  Press the **VCT** button on the touch screen.

  Images in the Axial, Sagittal and Coronal planes, and in combination will be displayed. Each plane is displayed with frames in different colors.

- **ROI 3D**

  Press the **ROI 3D** button on the touch screen.

  Images in the Axial, Sagittal and Coronal planes and 3D images will be displayed. Adjust the ROI box for observation.

- **Fixed 3D**

  Press the **Fixed 3D** button on the touch screen.

  Images in the Axial, Sagittal or Coronal plane and a 3D image in the ROI box set in ROI 3D Mode will be displayed. ROI is not displayed.

- **Full**

  Press the **Full** button on the touch screen.

  3D images will be displayed in full screen. Press the button again to return to the previous screen.

※ Tips!

The display format can be easily changed by using the following buttons on the control panel:

- **Single** Button: Switch to full screen.
- **Dual** Button: Switch to the 2D/3D screen.
- **Quad** Button: Switch to the ROI 3D screen.

Ref. Image

Select a reference image from A, B or C by pressing a desired button on the touch screen. The direction of the arrow may vary depending on the selected reference image.

Orientation

Select from 0, 90, 180 or 270˚ by pressing a desired button on the touch screen. The coordinate system rotates by the Z-axis in the “3D standard coordinate system.”

NOTE	This option is available only in **2D/3D**, **ROI 3D** or **Fixed 3D**.

Init

Press **Init** on the touch screen. The system will be initialized to the initially acquired 3D images and their settings.

Niche Zoom

Press **Niche Zoom** on the touch screen. Select a value between 25 and 400 by pressing a desired button or using the dial-button on the touch screen. This option zooms in/out the combined images of Volume CT.

NOTE	This option is available only when the display format is VCT.

Transparency

Press the **Transparency** button on the touch screen. Set the transparency of 3D images between 20 – 250 by pressing a desired button or using the dial-button on the touch screen. The lowest value (20) is for complete transparency, and the highest value (250) is for complete opacity.

NOTE	This option is available only in **2D/3D**, **ROI 3D** or **Fixed 3D**.

Mix

Press the **Mix** button on the touch screen. Set the rendering mix between 0 – 100 by pressing a desired button or using the dial-button on the touch screen.

NOTE	This option is available only in **2D/3D**, **ROI 3D** or **Fixed 3D**.

Select

Press the **Select** button on the touch screen. Select a post curve by pressing a desired button or using the dial-button on the touch screen.

NOTE	This option is available only in **2D/3D**, **ROI 3D** or **Fixed 3D**.

Position

Press the **Position** button on the touch screen. Set the position of the selected post curve between 0 – 100 by pressing a desired button or using the dial-button on the touch screen.

Bias

Press the **Bias** button on the touch screen. Set the bias of the selected post curve between -100 and 100 by pressing a desired button or using the dial-button on the touch screen.

Th. Low

Press the **Th. Low** button on the touch screen. Select a value between 0 and 254 by pressing a desired button or using the dial-button on the touch screen.

This option allows the user to adjust the threshold value in order to eliminate unnecessary data from images. As the number increases, Cyst elements become more apparent. As the number decreases bone elements become more apparent.

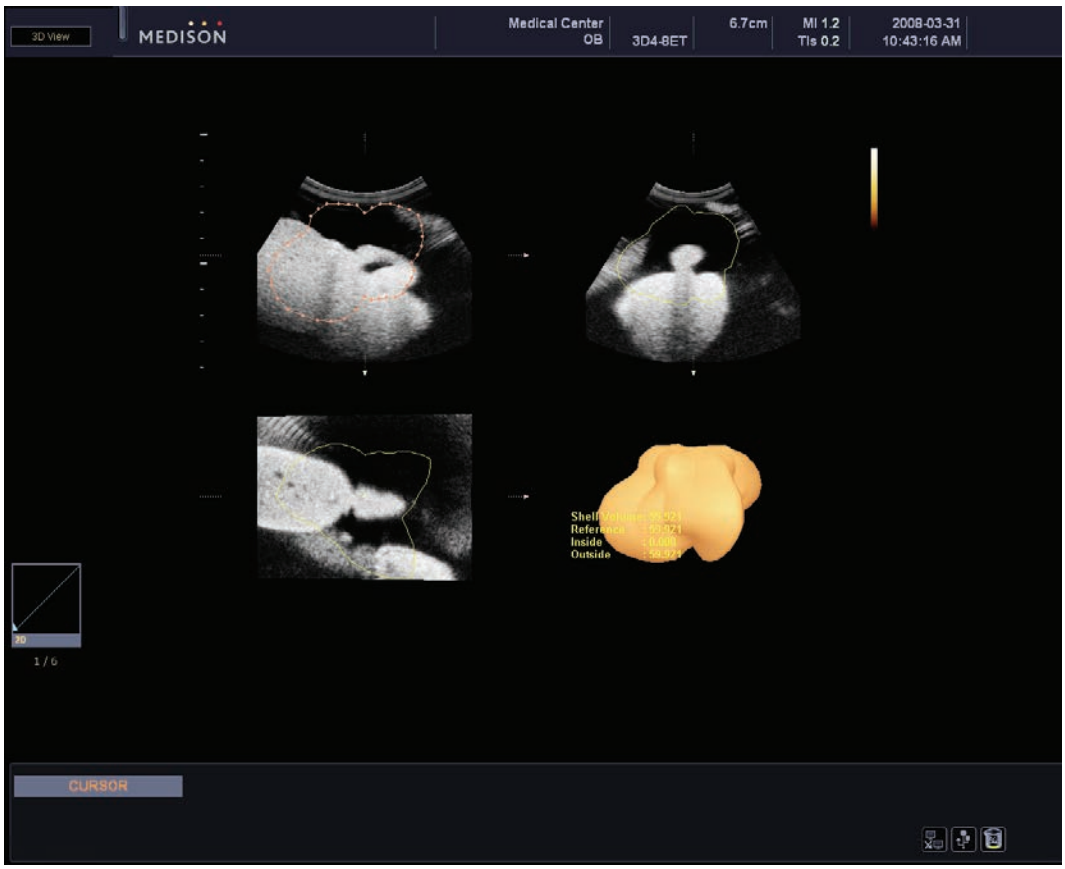
NOTE	This option is available only in **2D/3D**, **ROI 3D** or **Fixed 3D**.

3D View- VOCAL

Press the **VOCAL** tab on the touch screen. VOCAL stands for Virtual Organ Computer Aided anaLysis and it is used to measure the volume of internal tissues in a human body.

VOCAL can be performed in the following order:

Contour → Edit Contour → Accept Contour→ Shell Histogram



[Figure 4.26 VOCAL Mode]

Contour

[Figure 4.27 Touch Screen for VOCAL Mode]

Contour Type

Select the contour type from the following:

- **Solid**

  Used for object data with many echoes.

- **General**

  Create a contour based on a typical object. It is faster than other automatic contour types but less accurate.

- **Prostate**

  Used for prostate data.

- **Cystic**

  Used for object data with fewer echoes.

- **Sphere**

  After creating a spherical object, edit its contour to make it into a desired shape.

■ **Manual**

The user can create a desired object shape manually.

Ref. Image

Set the reference image. Press **A**, **B** or **C** on the touch screen.

Ref. Angle

Set the reference angle. Press **12**, **18** or **30** on the touch screen.

Pole Point Move Using Trackball

Set the range to perform VOCAL in a reference image. In a reference image, Pole 1 indicates the position of the upper arrow and Pole 2 indicates the position of the lower arrow.
Press the Pole1 and Pole2 buttons on the touch screen, and then use the **Trackball** and the **Set** button on the control panel. Or, press the **None** button and then use the dial-button on the touch screen.

Starting Contour

Press the **Next** button on the touch screen. Once VOCAL data is generated, the volume information will appear in the lower right corner of the screen. Press **New Contour** to perform VOCAL again.

■ **※ When the contour type is set to Manual**

1. Press the **Next** button on the touch screen. The **Image Position** screen will appear on the touch screen.
2. After pressing the **Set** button in an image, move the **Trackball** to contour.
   - Press **Next** to move the next frame.
   - Press **Previous** to move the previous frame.
3. If contouring for all frames is complete, press **Done** on the touch screen. Start VOCAL.

Edit Contour

When contouring is complete, the touch screen switches to Edit Contour Mode. Edit the current contour or create a new contour.

- **Accept Contour**

  Press the **Accept Contour** button on the touch screen. The shell contour will be saved and the system switches to the **Accept Contour** screen.

- **Clear Contour**

  Press the **Clear Contour** button on the touch screen. The system will delete the current contour and return to the initial VOCAL screen.

- **New Contour**

  Press the **New Contour** button on the touch screen. The system will delete the current contour and return to the initial VOCAL screen, where the contour type is **Manual**.

- **Multi Edit**

  Turn it on or off by pressing the **Multi Edit** button on the touch screen. The current contour for each frame appears in one screen. Up to 6 frames can be displayed in a page. When there are more than 6 frames, use the MEV Page dial-button to navigate through pages.

  Edit the contour shape by using the trackball and the **Set** button on the control panel. Or use the Pole 1 and Pole 2 buttons. Once editing is complete, press the **Multi Edit** button again to turn it off.

- **MEV Page (Multi Edit View Page)**

  Change the Multi Edit pages by using the **MEV Page** dial-button on the touch screen. This button appears only when the **Multi Edit** button is turned on and there are more than two pages in Multi Edit View. The current contour for each frame appears in one screen.

Shell Mode

- **Off**

  The created contour and the shell overlap.

- **Inside**

  The shell is drawn inside the created contour by the shell thickness specified.

■ **Outside**

The shell is drawn outside the created contour by the shell thickness specified.

■ **Symmetric**

Half the shell is drawn inside the contour by half the Shell Thickness specified and the other half of the shell is drawn outside the contour by half the Shell Thickness specified.

■ **Thickness**

Set the shell thickness to between 1 – 20 mm by rotating the dial-button on the touch screen. This option does not appear on the screen when Shell Mode is **Off**.

Image Position

The current contour for each frame can be viewed. Use the **Previous** and **Next** buttons to move through frames.

[Figure 4.28 Touch Screen for Edit Contour]

Accept Contour

Accept images and perform various tasks over them.

■ **ROI 3D**

Press the **ROI 3D** button on the touch screen.

Images in the Axial, Sagittal and Coronal planes and VOCAL images will be displayed.

- **Fixed 3D**

  Press the **Fixed 3D** button on the touch screen.

  Images in the Axial, Sagittal or Coronal plane and 3D images in the contoured area will be displayed.

- **Volume CT**

  Press the **VCT** button on the touch screen.

  The contour area in the Axial, Sagittal and Coronal planes and their combination will be displayed. Each plane is displayed with frames in different colors.

- **Full**

  Press the **Full** button on the touch screen.

  3D images will be displayed in full screen. Press the button again to return to the previous screen.

- **VOCAL Edit**

  Press the **VOCAL Edit** button on the touch screen. The system will switch to the **Edit Contour** screen.

- **Init**

  Press the **Init** button on the touch screen. The system will return to the **Contour** screen at the initial VOCAL stage.

- **Histogram**

  Press the **Histogram** button on the touch screen. A shell histogram will be calculated.

  It represents the gray value distribution within the 2D and Power Doppler images of an object for which VOCAL is performed. It also indicates Mean Gray (MG), Vascularization Index (VI), Flow Index (FI) and Vascularization Flow Index (VFI).

- **Mode**

  Select **Surface** or **Wireframe** mode by using the dial-button on the touch screen. This option is available only when the display format is **ROI 3D**.

  - Surface: Represents VOCAL data in the Ray-Casting method, which shows the shell of an image with curved surfaces.

  - Wireframe: Represents VOCAL data with points and lines.

[Figure 4.29 Shell Histogram]

NOTE	VOCAL Histogram is only available for 2D images and Power Doppler 3D images.

※ Formula for Shell Histogram

- MG: The average value of gray voxel brightness (gray)

  MG = The sum of brightness (gray) / The total number of voxels

- VI: The ratio of color voxels over all voxels within the shell

  VI = The number of color voxels / The total number of voxels

- FI: The average value of brightness (color) for color voxels within the shell

  FI = The sum of brightness (color) / The total number of color voxels

- VFI: The average value of brightness (color) for all voxels within the shell

  VFI = The sum of brightness (color) / The total number of voxels

3D XI™ Mode (Optional)

This screen is displayed when 3D image acquisition is complete if **MSV** or **Oblique** is selected in the **3D Stand By** screen. Selecting **MSV**, **Oblique** or **Volume CT** in the **3D View** screen also switches to **3D XI™** Mode.

3D XI™ Mode enhances the usefulness of an examination by representing an image in multiple slices. The following three sub modes are available.

NOTE	3D XI is available only when 3D probes are used.

3D XI-MSV (Multi Slice View)

Press the **MSV** tab on the touch screen. An image can be viewed in multiple slices.

[Figure 4.30 Multi Slice View]

[Figure 4.31 Touch Screen for Multi Slice View]

Display Format

Set image layout. Press the **1x1**, **2x1**, **3x2**, **3x3**, **4x3** or **6x4** button on the touch screen.

※ Tips!

- If it is set to 1×1, one image can be viewed. If it is set to 6×4, 24 slice images can be viewed at a time.
- Each time a new layout is selected, the currently selected image moves to the first position on the screen.

Ref. Image

Set the plane to view among multi slice images. Select from Plane A, B or C.

- **OH (Orientation Help)**

  Turn it on or off by pressing the **OH** button on the touch screen. If it is turned on, the **Ref. OH** button is enabled.

  - If OH Ref. Plane is 3D: It indicates which portion of volume data the selected slice corresponds to.

If OH Ref. Plane is A, B or C: It indicates which portion the selected slice corresponds to.

Ref. OH

Select a plane to use as the reference OH by pressing a desired button on the touch screen. This option is available only when the **OH** button in **Ref. Image** is set to On.

- If Ref. OH is **3D**: It indicates which portion of volume data the selected slice corresponds to.
- If Ref. OH is **A**, **B** or **C**: It indicates which portion the selected slice corresponds to.

Index Change

Change an index by pressing a desired button or using the dial-button on the touch screen. The selected index is highlighted with yellow frames.

Ruler

Set the position of the ruler by pressing the button or using the dial-button on the touch screen.

Page Change

Change the page by pressing a desired button or using the dial-button on the touch screen. This option is used when there is more than one page due to multiple indices.

Cut Depth

Select the cutting depth for slicing from 0.5, 1.0, 2.0, 3.0, 4.0 or 5.0 mm by pressing a desired button or using the dial-button on the touch screen.

NOTE	The Cut Depth represents the slice width in volume data, and it does not indicate an anatomical position.

Rotation

Rotating the reference plane affects all planes.

- X-axis Rotation: Use the **TDI / X** dial-button on the control panel. If the **Trackball** is set to a cursor, press and hold the **Set** button around the X-axis of an image and then move the **Trackball**.
- Y-axis Rotation: Use the **CW / Y** dial-button on the control panel. If the **Trackball** is set to a cursor, press and hold the **Set** button around the Y-axis of an image and then move the **Trackball**.

- Z-axis Rotation: Use the **PW / Z** dial-button on the control panel. If the **Trackball** is set to a cursor, press and hold the **Set** button around the Z-axis of an image and then move the **Trackball**.

Translation

Move multi slice images. Use the **Change** button and the **Trackball** on the control panel. Or press and hold the **Exit** button and then move the **Trackball**. Move images to the X- and Y-axes on the coordinate system.

NOTE	Available options are **Calculator**, **Caliper**, **Text** and **Indicator**.

3D XI - Oblique View

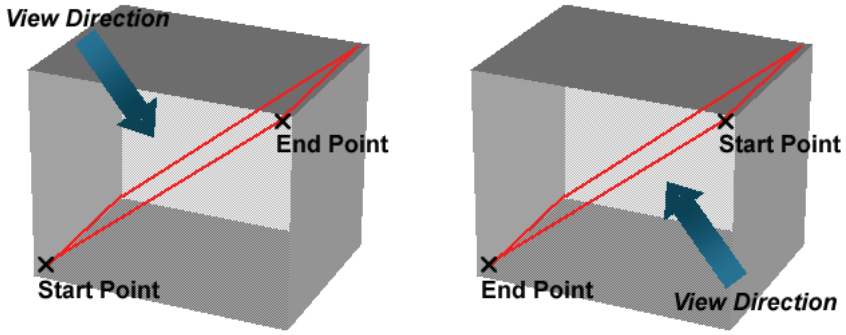
Press the **Oblique** tab on the touch screen. Vertical surface images can be viewed by applying a line or contour on the coronal, sagittal and axial images.

[Figure 4.32 Oblique View]

[Figure 4.33 Touch Screen for Oblique View]

■ **Direction of View of Vertical Surface Image**

The observer is located perpendicular to the section of volume data. Please see the view direction as shown below:



Oblique Cut Type

Make a selection by pressing a desired button on the touch screen.

■ **Single Static Line**

View a surface image that is perpendicular to the default line in an image.

- **Dynamic Line**

  After drawing a straight line, view a surface image that is perpendicular to it.

  - Draw a line by using the **Trackball** and the **Set** button on the control panel. The start point is shown as S and the end point is shown as E.
  - Press the **Change** button on the control panel to move the line. After moving the line to a desired position with the **Trackball**, press the **Set** button to confirm the new position.
  - To change the line angle, adjust **Line Rotation** by pressing the desired button or using the dial-button on the touch screen.

- **Contour**

  After contouring a straight line or curve, view a surface image that is perpendicular to it. The way a line is contoured, moved or edited is the same as with Dynamic Line.

- **Multi Line**

  After drawing a straight line, view a surface image that is perpendicular to the line. The way a line is drawn, moved or edited is the same as with **Dynamic Line**.

NOTE	In **Multi Line** and **Multi Contour**, more than one line can be drawn only when **Auto Increase** is set to On.

- **Multi Contour**

  After contouring a straight line or curve, view a surface image that is perpendicular to it. The way a line is contoured, moved or edited is the same as with **Dynamic Line**.

- **Multi Parallel**

  If the user draws a straight line, four lines parallel to it are applied to a reference image and then its Oblique image is displayed.

  - Press **Multi Parallel** and then use the **Trackball** and the **Set** button to draw a reference line. Parallel lines will then be drawn automatically.
  - Use **Line Offset** on the touch screen to adjust the distance between parallel lines.

- **Multi Plumb**

  If the user draws a straight line, four lines perpendicular to it are applied to a reference image and then its Oblique image is displayed.

  - Press **Multi Plumb** and then use the **Trackball** and the **Set** button to draw a reference line. Perpendicular lines will then be drawn automatically.
  - Use **Line Offset** on the touch screen to adjust the distance between perpendicular lines.

Position

Press the **Position** button on the touch screen. Set the position of a post curve between 0 – 100 by pressing a desired button or using the dial-button on the touch screen.

Bias

Press the **Bias** button on the touch screen. Set the bias of a post curve between -100 and 100 by pressing a desired button or using the dial-button on the touch screen.

Oblique View eXtended (OVIX)

Turn it on or off by pressing the **OVIX** button on the touch screen. This option is available only when Oblique Cut Type is set to **Single Static Line** or **Dynamic Line**.

If it is turned on, the OVIX line appears in the reference image and a 3D image for the OVIX line appears in the right side of the screen. In addition, a post curve for the OVIX image is shown.

Adjust the line thickness with **OVIX Line Offset**.

OVIX Line Offset

Adjust the thickness of the OVIX line by pressing the **OVIX Line Offset** button or using the dial-button on the touch screen. A 3D image with the changed thickness will be displayed.

Select

Select a post curve to relocate or for which to adjust bias by pressing the **Select** button or using the dial-button on the touch screen. Select OVIX or 2D.

Line Rotation

Adjust the line position by pressing the **Line Rotation** button or using the dial-button on the touch screen. This option is not available when Oblique Cut Type is set to **Contour** or **Multi Contour**.

Line Offset

Adjust the distance between parallel lines by pressing the **Line Offset** button or using the dial-button on the touch screen. This option is available only when Oblique Cut Type is set to **Multi Parallel** or **Multi Plumb**.

Select Line

Select a line by pressing the **Select Line** button or using the dial-button on the touch screen. This option is available only when Oblique Cut Type is set to **Multi Line** or **Multi Contour**.

Auto Increase

Turn it on or off by pressing the **Auto Increase** button on the touch screen. If it is turned on, more than one line can be drawn. This option is available only when Oblique Cut Type is set to **Multi Parallel** or **Multi Plumb**.

NOTE	While **Calculator** and **Caliper** are available, **Text** and **Indicator** are not..

3D XI - Volume CT

Press the **Volume CT** tab on the touch screen. An image is divided into Axial, Sagittal and Coronal images and then recompiled for display. In this way, information on surface images can be obtained.

There are two types available: Cube Volume CTand Cross Volume CT.

Cube Volume CT

Press the **Cube** button on the touch screen. Information on external surface images near the cube can be obtained.

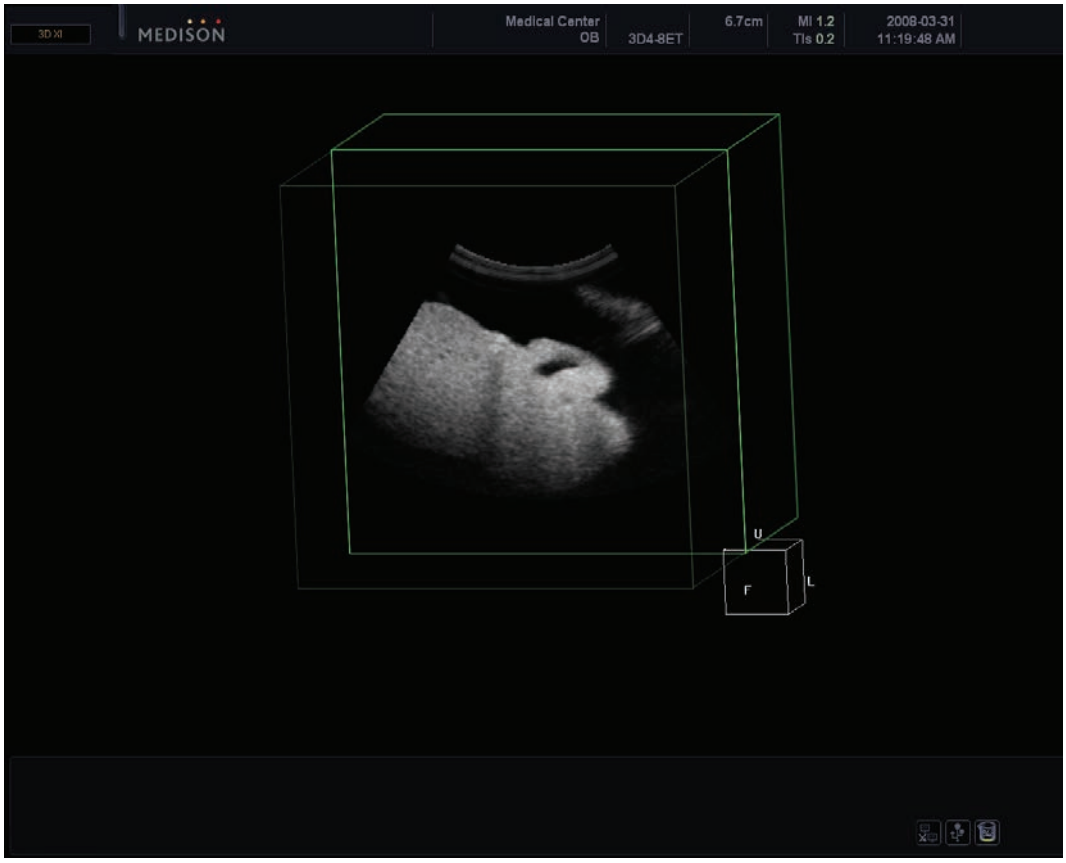
- **Select Surface**

  Select a reference image to view from 6 surfaces (Front / Back / Left / Right / Up / Down). The selected surface is shown at the front. The orientation of the current cube is shown in the lower right corner of the screen.

  Use the dial-button on the touch screen to change the position of the selected reference surface.

- **Boundary**

  Turn it on or off by pressing the **Boundary** button on the touch screen. Show or hide the additional boundary lines for Cube Volume CT. Additional boundary lines indicate the external area of the entire volume.



[Figure 4.34 Cube Volume CT]

[Figure 4.35 Touch Screen for Cube Volume CT]

Cross Volume CT

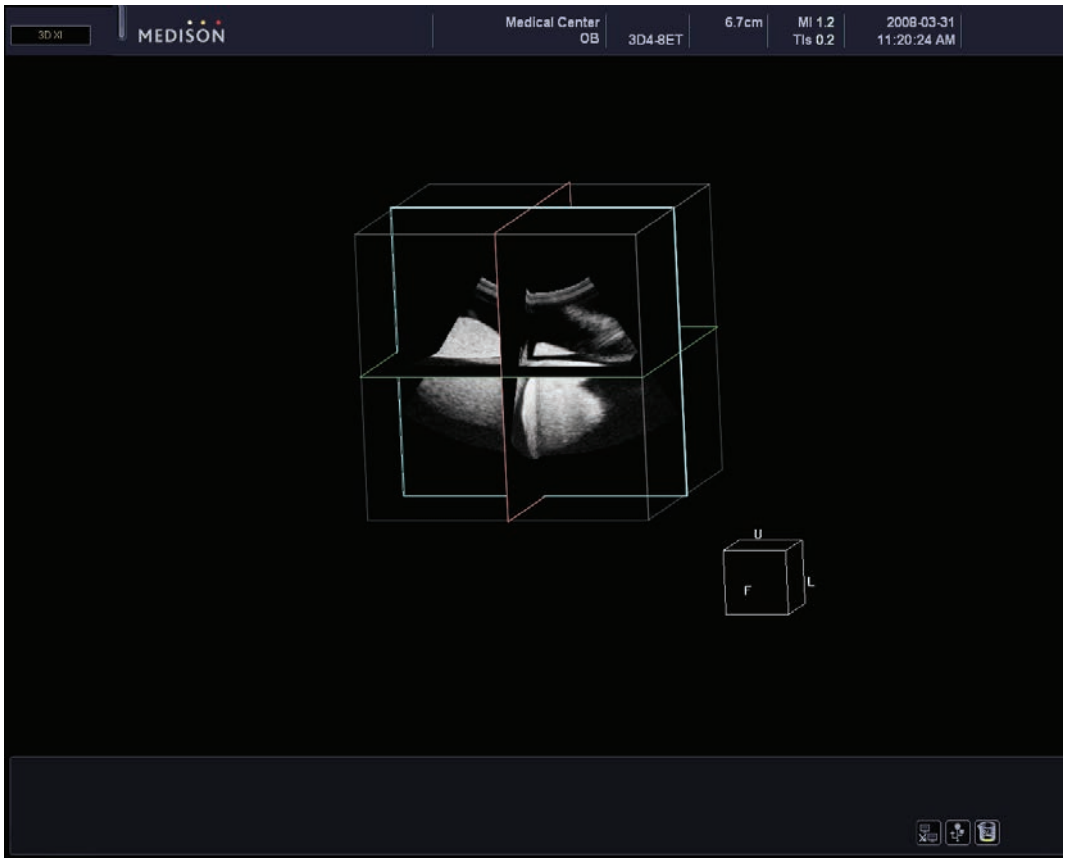
Press the **Cross** button on the touch screen. Information on images inside the planes intersecting each other can be obtained.

- A Plane: Front Surface. Shown in blue.
- B Plane: Up Surface. Shown in red.
- C Plane: Left Surface. Shown in green.

Use the dial-button on the touch screen to change the position of the reference surface.

Specify a value between -126 and 126.

NOTE	Other usage is the same as with Cubic Volume CT.



[Figure 4.36 Cross Volume CT]

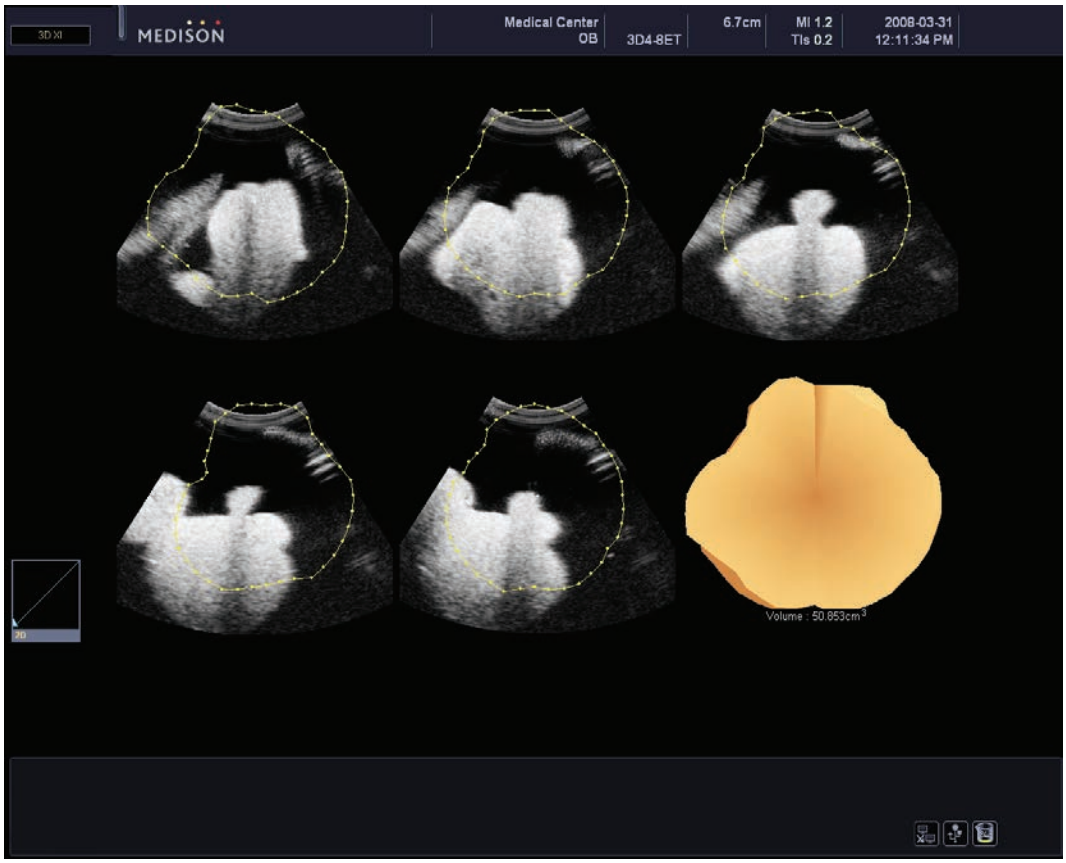
NOTE	While **Calculator** and **Caliper** are available, **Text** and **Indicator** are not.

3D XI - XI VOCAL (Optional)

Press the **XI VOCAL** tab on the touch screen. The reference image set in the Multi Slice View screen will be displayed.

Unlike VOCAL, Which uses rotational cross-sections, XI VOCAL calculates the object volume by slicing the object in parallel cross-sections.

NOTE	When a 3D XI menu tab such as **MSV**, **Oblique** and **Volume CT** is selected, **VOCAL** appears as **XI VOCAL**.



[Figure 4.37 XI VOCAL]

XI VOCAL can be performed in the following order:

Contour → Edit Contour → All Slice View

Contour

[Figure 4.38 Touch Screen for XI VOCAL]

Contour Type

Select from **Solid**, **Cystic**, **General** or **Manual**. For information on the features of each type, please refer to “VOCAL” in this chapter.

Set Line

Set the start and end lines by using the **Set** button and the **Trackball** on the control panel. On the screen, the distance between two lines will appear along with the Start and End Planes.

Ref. Image

Set a reference image. Select **A**, **B** or **C** on the touch screen.

- The image set as a reference under MSV cannot be selected.
- When a line is set, the **Ref. Contour** button can be used to determine whether to contour a reference image.

Ref. Image numbers

Set the number of images to contour. Select **5**, **10**, **15** or **20** on the touch screen.

Set Pole Point

Set the position of the pole points.

When automatic contouring is enabled, two pole points appear in a slice, based on which an object is contoured.

Use the **Set** button and the **Trackball** on the control panel to change the position of the pole points in a slice. Press and hold the **Set** button and then move the **Trackball**. The position of each pole in a slice can be changed.

Start Contouring

If positioning is complete, press the **Pole Done** button. Once VOCAL data is generated, the volume information will appear in the lower right corner of the screen. Press the **Zoom** button on the control panel to zoom in the VOCAL data.

※ When Contour Type is set to Manual

If it is set to **Manual**, a pole point will not appear. The user should retrieve a contour by drawing a contour line. If editing is complete, Press the **Manual Done** button.

Edit Contour

Press **Edit Contour** on the touch screen. The **Manual Done** and **New Contour** buttons will appear.

- **Manual Done**

  It appears when **Edit Contour** is pressed.

  After editing the current contour with the **Set** button and the **Trackball** on the control panel, press the **Manual Done** button to finish editing.

  Use the **Set** button and the **Trackball** on the control panel to edit the existing contour. If editing is complete, Press **Manual Done** on the touch screen.

- **New Contour**

  Delete the current contour and return to the initial VOCAL screen.

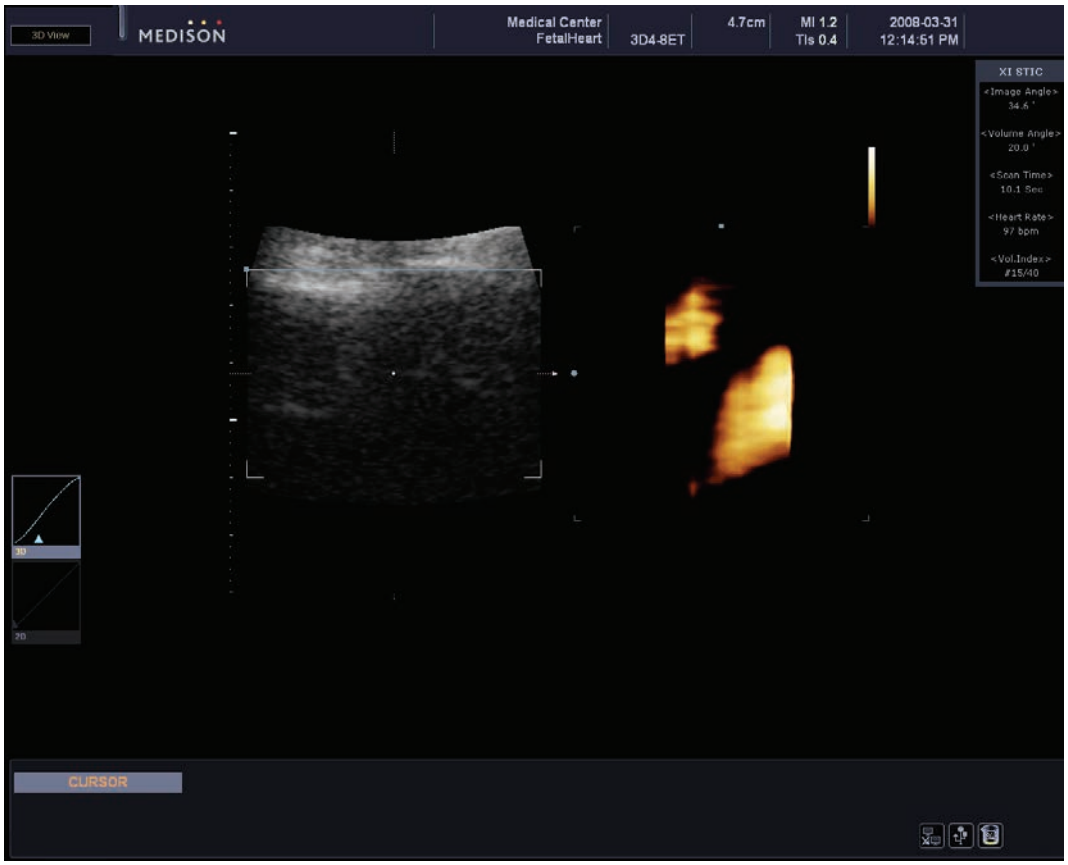
All Slice View

Press **All Slice View** on the touch screen. Along with XI VOCAL data, all slices will be displayed on the screen.

NOTE	The zoom option is not available.

XI STIC (Optional)

STIC stands for Spatio-Temporal Image Correlation. It can be used to obtain the fetal cardiac cycles with volume data on fetal cardiac area and to recompile the volume data for display.



[Figure 4.39 XI STIC]

1. Press the **XI STIC** tab in the **3D Stand By** screen.
2. Set touch screen menus.

> **※ Tip! How to Improve STIC Volume Data**
>
> - Scan Angle: Specify a small scan angle for small fetal hearts.
> - Scan Position: Adjust the scan position so that the center of the scan angle and the fetal heart are aligned properly.
> - Volume Box: Adjust the size of the volume box so that it nearly fits the size of the fetal heart.

3. If setting is complete, press the **Freeze** button. The system will begin to acquire STIC volume data.

4. The **XI STIC Confirm** window appears on the screen. The fetal heart rate is calculated and displayed. Press **Yes** to continue. Press **No** to cancel and scan again.

NOTE	When a heart rate cannot be calculated because motion artifact is severe or a cardiac cycle is not present, the system returns to the STIC volume data acquisition screen.

5. STIC image and information is displayed in the **3D View** screen.
   - By default, STIC Volume CINE is applied to volume data in 3D View. Press the **Freeze** button on the control panel to stop CINE playback.
   - STIC information is displayed in the right side of the screen and it includes information such as Image Angle, Volume Angle, Scan Time, Heart Rate and Vol. Index.

NOTE	Other usage and screen layout are the same as with **2D/3D** in 3D Stand By.

[Figure 4.40 Touch Screen for XI STIC]

Scan Angle

Select a scan angle between 15˚~60˚ by using the dial-button on the touch screen.

Scan Time

Set the scan time between 7 – 15 seconds by using the dial-button on the touch screen.

Trimester

Set the trimester by using the dial-button on the touch screen. Set it to 1st, 2nd, 3rd or User set. If it is set to any of 1st - 3rd, the recommended scan time and STIC angle are automatically set for the specified trimester. Please see the following table:

	1st	**2nd**	**3rd**
Trimester	10 sec	12 sec	15 sec
STIC Angle	20˚	25˚	30˚

If a scan time and STIC angle other than the ones in the above table are set, the trimester is displayed as user set.

STIC Speed

Adjust the image playback speed. Select from All Cine, 25%, 33%, 50% and 100% by using the dial-button on the touch screen.

If it is set to All CINE, all stored Volume CINEs can be viewed regardless of speed. If it is set to a percentage, images are played at the speed of the set percentage of the fetal heart rate (100%).

3D Quick Menu

3D Quick Menu appears on the touch screen in any 3D View Mode. Only those buttons that are available in the current mode are enabled. If any of these buttons is pressed, the system switches to the corresponding screen.

While using the menu, press **Exit** on the touch screen to return to the previous screen.

At the bottom of the quick menu, a page number is shown. When there is more than one page, they can be navigated through by using the dial-button.

In this section, 3D Quick Menu is described with the focus on the screen that is displayed when **Map** is pressed.

NOTE	For information on **MPR**, **MSV**, **Oblique** and **VOCAL**, please refer to the corresponding sections in this chapter.

Map

Press **Map** on the touch screen. The main functions of 3D Mode will be presented in the form of map.

Only those buttons that are available in the current mode are enabled. If any of these buttons is pressed, the system switches to the corresponding screen.

[Figure 4.41 Map]

Utility

3D Cine

Press **3D Cine** on the touch screen.

3D Cine Define

Specify the settings needed for Cine execution.

- **Rotation Angle**

  Set the overall rotation angle by pressing a button on the touch screen. Select a desired value from 30, 45, 60, 90, 180 or 360˚.

- **Step Angle**

  Set the rotation angle for a single step in an image by pressing a desired button on the touch screen. Select a value from 1, 3, 5, or 15˚.

  ※ The Difference between Rotation Angle and Step Angle

  A Cine image rotates to the angle specified under 'Rotation Angle.' During this process, each rotational step is equivalent to the angle specified under 'Step Angle'. For example, if Rotation Angle is set to 360˚ and Step Angle is set to 15˚, a 3D Cine image rotates to 360˚in 22 steps, each of which requires a rotation of 15˚.

- **Rotate Axis**

  Select the rotation direction by pressing a desired button on the touch screen.

- **Start Pos.**

  Set the start point of Cine image by using the dial-button on the touch screen. Setting **Start Pos.** cancels the setting of **Rotation Angle.**

- **End Pos.**

  Set the end point of Cine image by using the dial-button on the touch screen. Setting **End Pos.** cancels the setting of **Rotation Angle.**

- **Mix**

  Press the **Mix** button on the touch screen. Set the rendering mix between 0 – 100 by pressing the button or using the dial-button on the touch screen.

- **Calculate**

  Start to configure a Cine image with the specified settings.

3D Cine

Specify the settings needed for Cine execution.

- **Play**

  Play a 3D Cine image. Select the playback method by pressing a desired button on the touch screen.

  - Loop: Repeats playback in one direction.
  - Yoyo: Play until the end in one direction and then play in the reverse direction.

- **Cine Control**
  - Pause: Pause playback.
  - New Cine: Return to the **3D Cine Define** screen and then enter the Cine mode again.
  - Clear Cine: Delete the current Cine image and then return to the **3D Cine Define** screen.

- **Speed**

  Set the playback speed of Cine image by using the dial-button on the touch screen. Select a value from 25, 50,100, 200, 300 or 400%.

- **Mix**

  Press the **Mix** button on the touch screen. Set the rendering mix between 0 – 100 by pressing a desired button or using the dial-button on the touch screen.

4D Cine

Press **4D Cine** on the touch screen. The **4D Cine** screen will appear.

NOTE	You can also press the **Freeze** button in 4D Mode to execute 4D Cine.

After specifying the playback method and Cine type, press the **Play** button to start Cine image playback.

- **Play**

  Select the playback method by pressing a desired button on the touch screen.

  - Loop: Repeats playback in one direction.
  - Yoyo: Play until the end in one direction and then play in the reverse direction.

- **Cine Type**

  Select the Cine type by pressing a desired button on the touch screen.

  - Volume: During Cine image playback, the **MPR** screen appears on the touch screen. The display format can be changed before Cine images are played. The **Vol. Indices** dial-button appears.
  - Image: A typical Cine playback method. **Start Pos.**, **End Pos.**, **Speed (%)** and **Position** dial-buttons appear.

- **Vol. Index**

  Select volume data to display on the screen with the dial-button. This option appears on the touch screen only when Cine Type is set to **Volume**.

- **Start Pos.**

  Set the start point of Cine image by using the dial-button on the touch screen. This option appears on the touch screen only when Cine Type is set to **Image**.

- **End Pos.**

  Set the end point of Cine image by using the dial-button on the touch screen. This option appears on the touch screen only when Cine Type is set to **Image**.

- **Speed (%)**

  Set the playback speed of Cine image by using the dial-button on the touch screen. Select from 25 – 400%. This option appears on the touch screen only when Cine Type is set to **Image**.

- **Position**

  Select Cine image to display on the screen with the dial-button. This option appears on the touch screen only when Cine Type is set to **Image**.

MagiCut

Press **MagiCut** on the touch screen. The **MagiCut** screen will appear.

MagiCut Mode is used to remove the parts not related to diagnosis from 3D images.

Mode

Enter the Cut mode by pressing a desired button on the touch screen.

- **Inside Contour**

  Cuts the inside of the selected area.

- **Outside Contour**

  Cuts the outside of the selected area.

- **Inside Box**

  Cuts the inside of the box.

- **Outside Box**

  Cuts the outside of the box.

- **Small Eraser**

  Cuts using a small eraser.

- **Big Eraser**

  Cuts using a big eraser.

Depth

Set the cut depth.

- **Full**

  Cuts the entire area.

- **Defined**

  Specify an area to cut.

  1. Specify an area by using the **Trackball** and the **Set** button.
  2. Set the cut depth by using the **Depth** dial-button on the touch screen. Select from 1 – 100.
  3. Press the **Apply** button to finish setting.

Undo

- **Undo**

  Cancel the cutting of the selected area.

- **Undo All**

  Cancel all cutting.

- **Redo**

  Used to cut the same part again after restoring it with **Undo** or **Undo All**.

Preset

Press **Preset** on the touch screen. The **3D Preset** screen will appear.

Set or rename a preset as desired.

- **Set Preset**

  Select **Default** or **User1** - **User5** on the touch screen. Press **Default** to revert to the system defaults.

- **Rename Preset**

  After selecting a user preset, press **Rename** on the touch screen. In the **Name** popup window, rename the selected user preset.

- **Save and Apply Preset**

  Press **Save Preset** to save the current preset. Press **Load Preset** to apply the selected preset.

Auto Contour

Turn it on or off by pressing **Auto Contour** on the touch screen.

This option automatically locates the facial area in a fetal image scanned for Sagittal. If it is turned on, a contour line appears and a 3D image is contoured in the ROI box on A Plane.

NOTE	This option is available only in ROI 3D Mode where Render Direction is set to 'C+' under **Render Setup**.

Contour Edit

Turn it on or off by pressing **Contour Edit** on the touch screen. This option appears in the menu only when **Auto Contour** is turned on.

If it is turned on, a contour line can be edited by using the **Trackball** and the **Set** button.

Orientation Cube

Press **Orientation Cube** on the touch screen. The **Orientation Cube** screen will appear.

Set the orientation cube that shows the image direction in 2D/3D, ROI 3D or Fixed 3D Mode. Switching modes turns off the orientation cube automatically.

- **Orientation Cube Type**

  Select the type of orientation cube. Pressing **Ref.** shows a human body shape with a probe shape indicating the scan direction. Pressing **Manual** shows a BodyMarker shape.

- **Model**

  Select a BodyMarker shape. The **Orientation Cube** screen will appear.

- **Reference Direction**

  Select the BodyMarker direction. This option appears in the menu only when Orientation Cube Type is set to **Manual**.

- **Probe Direction**

  Set the direction of reference or BodyMarker for a probe.

- **Init**

  Initialize settings.

- **Move X**

  Move a probe in the X-axis with the dial-button. This option appears in the menu only when Orientation Cube Type is set to **Reference**.

- **Move Y**

  Move a probe in the Y-axis with the dial-button. This option appears in the menu only when Orientation Cube Type is set to **Reference**.

- **Rot. X**

  Rotate the orientation cube around the X-axis with the dial-button.

- **Rot. Y**

  Rotate the orientation cube around the Y-axis with the dial-button.

- **Rot. Z**

  Rotate the orientation cube around the Z-axis with the dial-button.

- **Apply**

  Press the button on the touch screen to apply or cancel the orientation cube.

Image Setup

Render Setup

Press **Render Setup** on the touch screen. The **Rendering Setup** screen will appear.

Select one of the following rendering methods: Gray Render Mode, Color Render Mode or SeeThru Render Mode.

Gray Render Mode

Press the **Gray** tab on the touch screen. This mode shows volume data acquired by the gray method as a 3D rendering image.

- **Render Direction**

  Set the rendering direction by pressing a desired button on the touch screen. '+' indicates the direction from the front and '-' indicates the opposite direction.

- **Render Mode 1, 2**

  Enter Render Mode 1 and 2 by pressing a desired button on the touch screen.

  - Surface: Represents 3D images in the Ray-Casting method, which shows the shell of an image with curved surfaces.
  - Surface Smooth: Represents 3D images that are smoother than **Surface**.
  - Max: Represents 3D images at maximum intensity. It is useful for observation of bone structures in a human body.
  - Min: Represents 3D images at minimum intensity. It is useful for observation of vessels or hollow parts in a human body.
  - Light: Represents the depth of 3D images in terms of brightness.
  - X-Ray: Represents 3D images in average intensity. It shows images similar to X-ray images.

- **Mix**

  Set the combination of render modes by rotating the **Mix** dial-button on the control panel.

- Th. High / Th. Low

  Press **Th. Low** or **Th. High** on the touch screen. Set the threshold by pressing a desired button or using the dial-button on the touch screen.

- **Inversion**

  Press **Inversion** on the touch screen. This option shows inverted images when the volume data acquired by the gray method is rendered as 3D images.

Color Render Mode

Press the **Color** tab on the touch screen. This mode shows the volume data acquired by the Angio/CFM method as 3D rendering images. It can be set in the same way as Gray Render Mode.

NOTE	This tab appears only when 3D images are acquired in C or PD Modes.

See Thru Render Mode

Press the **See Thru.** tab on the touch screen. This mode shows the Gray + Angio or Gray + CFM combination of data as 3D rendering images.

NOTE	This tab appears only when 3D images are acquired in C or PD Modes.

It supports any combination of Transp-Surface, Transp-Transp, Max-Surface and Max-Transp.

- **Transp-Surface**

  Adjust the transparency of gray data to view color data as gray data. The parts hidden by gray data may appear slightly darker.

  Adjust the transparency by using the **Mix** dial-button on the touch screen. The threshold range can be set by using **Th. Low** or **Th. High**.

- **Transp-Transp**

  Adjust the transparency of both gray and color data to view color data as gray data. The parts hidden by gray data may appear slightly darker.

  Adjust the transparency by using the **Mix** dial-button on the touch screen.

- **Max-Surface**

  Set gray data to **Max** and color data to **Surface** in order to view color data. Parts hidden by the gray data may appear slightly brighter.

  Adjust the combination of the two sets of data by using the **Mix** dial-button on the touch screen. The threshold range can be set by using **Th. Low** or **Th. High**.

- **Max-Transp**

  Set gray data to **Max** and color data to **Transp** in order to view color data. Parts hidden by the gray data may appear slightly brighter.

  Adjust the combination of two data by using the **Mix** dial-button on the touch screen.

VOCAL Render Mode

Press the **VOCAL** tab on the touch screen.

NOTE	The tab appears only when VOCAL data is available.

- **Render Direction**

  Set the rendering direction by pressing a desired button on the touch screen. '+' indicates the facing direction and '-' indicates the opposite of the facing direction.

- **VOCAL Render Mode**

  Set the display format for VOCAL data by pressing a desired button on the touch screen.

  - Surface: Represents VOCAL data in the Ray-Casting method, which shows the shell of an image with curved surfaces.
  - Wireframe: Represent VOCAL data with points and lines.

NOTE	For information on **Mix**, **Th. Low** and **Th. High**, please refer to "Gray Render Mode."

Palette

Press **Palette** on the touch screen. The **Palette** screen will appear on the touch screen.

The color of 2D and 3D images can be set in this screen. This option is not available in 3D XI.

NOTE	For information on XI MR and 3D CI, please refer to the "Post Processing" section in this chapter.

Post Processing

Press **Post Processing** on the touch screen. The **Post Processing** screen will appear on the touch screen.

Post Processing is intended for post-processing of multi slice images, and it is not applicable to Volume CT.

NOTE	In 3D Quick Menu, you can press any of **Invert**, **Auto Contrast**, **Sharpen**, **L/R Flip** and **U/D Flip** to apply it immediately.

Gradient Mask

Make a selection by pressing a desired button on the touch screen.

Gradient Mask adjusts the brightness of a certain area within multi slice images. The area corresponding to the selected button will appear brighter.

Flip Image

Flip the position of multi slice images.

- **L/R Flip**

  Turn it on or off by pressing **L/R Flip** on the touch screen. If it is turned on, the left and right sides of an image are flipped.

- **U/D Flip**

  Turn it on or off by pressing **U/D Flip** on the touch screen. If it is turned on, an image is flipped upside down.

XI MR

Turn it on or off by pressing **XI MR** on the touch screen.

XI MR makes the brightness and boundaries of an image clearer. When it is turned on, it only affects index images with yellow frames.

Processing

- **Invert**

  Turn it on or off by pressing **Invert** on the touch screen. If it is turned on, the brightness of multi slice images is inverted.

- **Auto Contrast**

  Turn it on or off by pressing **Auto Contrast** on the touch screen. If it is turned on, the brightness of multi slice images is automatically adjusted.

- **Thres.**

  Turn it on or off by pressing the **Thres.** button on the touch screen.

  This option removes the brightness of levels that are not wanted in images. If it is turned on, **Th. Low** or **Th. High** will appear on the touch screen.

- **Th. Low / Th. High**

  Press **Th. Low** or **Th. High** on the touch screen. Set the threshold by pressing a desired button or using the dial-button on the touch screen.

  It appears in the menu only when **Thres.** is turned on.

- **Sharpen**

  Turn it on or off by pressing **Sharpen** on the touch screen.

  Adjust the boundary of Multi Slice images. If it is turned on, the **Sharp** button will appear on the touch screen.

- **Sharp**

  Press **Sharp** on the touch screen. Select a value between 100 and 400 by pressing a desired button or using the dial-button on the touch screen. As the number increases, the boundaries become sharper.

  This option appears in the menu only when **Sharpen** is turned on.

- **3D CI**

  Turn it on or off by pressing **3D CI** on the touch screen.

  3D Compound Imaging (3D CI) eliminates noises and enhances image quality by composing images.

  If it is turned on, the **CSI Offset** button will appear on the touch screen.

- **CSI Offset**

  Press **CSI** on the touch screen. Set the distance between images for 3D Ci between 1– 10 by pressing a desired button or using the dial-button on the touch screen.

  Compound of Sectional Image (CSI) enhances C Plane images by overlapping them.

  This option appears in the menu only when 3D CI is turned on.

VCE

Turn it on or off by pressing **VCE** on the touch screen.

VCE stands for Volume Contrast Enhancement and it enhances the contrast of volume data.

Orientation Dot

Turn it on or off by pressing **Orientation Dot** on the touch screen. If it is turned on, a dot will appear in the center of images.

Chapter 5

Measurements and Calculations

Measurement Accuracy

Measurement values can vary, depending on the nature of the ultrasound, the body's response to ultrasound, the measurement tools, algorithms, product settings, probe type and user operation.
Before using this product, make sure to read and understand the following information regarding the causes of measurement errors, and measurement optimization.

Causes of Measurement Errors

Image Resolution

The resolution of ultrasound images may be limited by the available space.

- Errors due to signal range may be minimized by adjusting focus settings. Optimizing focus settings increases the resolution of the measurement area.
- In general, lateral resolution is lower than axial resolution. Therefore, measurements should be performed along the axis of the ultrasound beam to obtain accurate values.
- Gain has a direct impact on resolution. Gain can be adjusted by using the Gain button for each mode.
- In general, increasing the frequency of ultrasound enhances resolution.

Pixel Size

- An ultrasound images in the product consist of pixels.
- Since a single pixel represents the basic unit of an image, a measurement error may result in the displacement of approximately ±1 pixel when compared to the original image size.
- However, this error becomes significant only when a narrow area in an image is measured.

Ultrasound Velocity

- The velocity of ultrasound used during measurement is usually 1,540 m/s on average.
- The velocity of ultrasound may vary depending on the cell type.
- The possible range of error is between approximately 2-5% depending on the structure of cells (about 2% for typical cells and about 5% for fatty cells).

Doppler Signal Adjustment

- During velocity measurement, an error may occur depending on the cosine angle

between the blood flow and the ultrasound beam.

- For Doppler velocity measurements, the most accurate results can be ensured when the ultrasound beam is aligned in parallel with the blood flow.
- If that is not possible, the angle between them should be adjusted by using the **Angle** option.

Aliasing

- PW Spectral Doppler Mode uses a signal sampling technique to calculate the frequency (or velocity) spectrum.
- Adjust the baseline or the velocity scale to minimize aliasing. A lower frequency probe can also be used to reduce aliasing.
- Aliasing is dramatically reduced in CW Spectral Doppler Mode.

Calculation Equation

- Some of the calculation equations used for clinical purposes originate from hypotheses and approximation.
- All calculation equations are based on medical reports and articles.

Human Error

- Human error may occur due to inappropriate use or lack of experience.
- This can be minimized through compliance with and thorough understanding of the manuals.

Optimization of Measurement Accuracy

2D Mode

- Resolution is in proportion to the frequency of the probe.
- Penetration is in inverse proportion to the frequency of the probe.
- The highest resolution can be obtained at the focus of the probe where the ultrasound beam is narrowest.
- The most accurate measurements can be obtained at the focus depth. The accuracy decreases as the distance from the focus increases, widening the beam width.
- Using the zoom function or minimizing the depth display makes distance or area measurements more accurate.

M Mode

- The accuracy of time measurements can be increased when the sweep velocity and the display format are set to high values.
- The accuracy of distance measurements can be increased when the display format is set to higher values.

Doppler Mode

- It is recommended to use lower frequency ultrasound for measurement of faster blood flows.
- The size of the sample volume is limited by the axial direction of the ultrasound.
- Using lower frequency ultrasound increases penetration.
- The accuracy of time measurements can be increased when the sweep velocity is increased.
- The accuracy of velocity measurements can be increased when the vertical scale is set to smaller values.
- It is most important to use an optimal Doppler angle to enhance the accuracy of velocity measurements.

Color/Power Doppler Mode

- A protocol is not specified for images in Color Doppler Mode or Power Doppler Mode. Therefore, the same limitations imposed when measurements are taken in B/W images apply to the accuracy of the measurements taken in these modes.
- It is not recommended to use images in Color/Power Doppler Mode for measurement of accurate blood flow velocity.
- The amount of blood flow is calculated based on the average velocity rather than the peak velocity.
- In all applications, the amount of blood flow is measured in PW/CW Spectral Doppler Mode.

Cursor Position

- All measurements are affected by input data.
- To ensure accurate positioning of the cursor:

  Adjust the images on the screen so that they are displayed at maximum granularity.

  Use the front edge or boundary point of a probe to make the start and end points of a measurement object more distinct.

  Make sure that the probe direction is always aligned during measurement.

Measurement Accuracy Table

The following tables show the accuracy of the measurements available using the product. Ensure that the results of measurement accuracy checks are kept within the ranges specified in the table. Except for certain applications or probes, the following accuracy ranges should be maintained for measurement of a straight distance.

NOTE	To ensure accurate measurements, an accuracy check should be performed at least once per year. If the measurement accuracy falls outside the ranges specified in the following table, contact Medison Customer Service.

2D Mode

The following measurements have been taken with an RMI413 Phantom.

Measurement Type	Range	Accuracy	Notes
Axial Distance	0.01-25.00cm	± 1% or ± 0.1cm	Acquisition
Lateral Distance	0.01-35.00cm	± 2% or ± 0.2cm	Acquisition
Diagonal Distance	0.01-25.00cm	± 2% or ± 0.2cm	Acquisition
Area	0.01-1000.00cm^2	± 4% or 0.25cm^2	Acquisition
Circumference	0.03-10000.00cm	± 3% or ± 0.2cm	Acquisition
Ellipse Area	0.01-1000.00cm^2	± 0.01cm^2	Algorithmic
Ellipse Circumference	0.03-10000.00cm	± 0.01cm	Algorithmic
Volume	0.01-60601.51cm^3	± 8%	Acquisition

M Mode

The following measurements have been taken with an RMI413 Phantom.

Measurement Type	Range	Accuracy	Notes
Depth	0.01-25.00cm	< ± 1% or ± 0.1cm	Acquisition
Time	0.01-11.3sec	+/- 2% of time mesurement	Acquisition
Slope	0.01-1000.00cm/s	< ± 0.01cm/sec	Algorithmic

Doppler Mode

The following measurements have been taken with an RMI 1425A Phantom.

Measurement Type	Range	Accuracy	Note
Velocity	PW: 0.1cm/s - 8.8m/s CW: 0.1cm/s - 19.3m/s	< ± 1 % or 1/2 pixel	Acquisition
Frequency	PW: 6Hz - 22.727kHz CW: 6Hz - 50.0kHz	< ± 1 % or 1/2 pixel	Acquisition
Time difference	10ms - 9.44s	< ± 1 % or 1 column	Acquisition
Velocity difference	PW: 0.2cm/s - 8.8m/s CW: 0.2cm/s - 19.3m/s	< ± 2 % or 1 pixel	Acquisition
Frequency difference	PW: 12Hz - 22.727kHz CW: 12Hz - 50.0kHz	< ± 2 % or 1 pixel	Acquisition
Slope (in Velocity)	PW: 0.1cm/s^2 - 880m/s^2 CW: 0.1cm/s^2 - 1930m/s^2	< ± 1 % or 1 pixel /1 column	Acquisition
Slope (in Frequency)	PW: 1Hz/s - 2272.7kHz/s CW:1Hz/s - 5000kHz/s	< ± 1 % or 1 pixel /1 column	Acquisition

NOTE The accuracies cited in the above table have been obtained from the cursor positions in Doppler Mode and when measurements were made. The velocity tests can therefore be used to check these values since these are not indicators of the underlying absolute velocity. The absolute velocity accuracy is tested using phantom measurements.

※ Absolute Doppler Velocity Accuracy:

Accuracy is defined as the difference between a calibrated phantom velocity and that annotated as the time-averaged mean by the system. The time-averaged mean is calculated as the average over a predetermined period of time of the intensity-weighted mean of the spectrum.

All probes have been tested to ensure that the time-averaged mean velocity falls within +/- 15% of that annotated on the phantom. Due to Doppler phantom constraints, these tests have been conducted in the range 15 cm/sec to 110 cm/sec.

Basic Measurements

Press the **Caliper** button on the control panel. Press the button again to exit the basic measurement mode.

NOTE	Take basic measurements of distance and area regardless of the application. For information on measurements for each application, please refer to "Measurements by Application" in this chapter.

The available measurement methods vary depending on the current diagnosis mode. Please refer to the following table:

Measurement	Diagnosis Mode	Measurement Method
Distance Measurement	2D, M, D	Distance Line Trace Hip Joint
	M	M Distance
	D	D Velocity D A/B D Trace
Circumference and Area Measurement	2D, M, D	Ellipse Trace
Volume Measurement	2D, M, D	3 Distance 1 Distance Distance + Ellipse

[Table 5.1 Basic Measurements by Diagnosis Mode]

Basic Measurement Operations

The following is the information on common button operations for basic measurements:

- **Select/Change Measurement Method**

  Select a desired measurement method on the touch screen. Available selections on the touch screen may vary depending on the diagnosis mode. The selected

measurement method is shown in the user information area.

- **Delete Measurement Result**

  Press the **Clear** button on the control panel.

- **Print Measurement Result**

  Press the **Print 1** (or **Print 2**) button on the control panel.

- **Finish Basic Measurements**

  Press the **Exit** button on the control panel.

- **Move Measurement Result**

  Press the **Move** button on the touch screen. Move the result using trackball and **Set** button.

- **Reset Measurement Result**

  Press the **Reset** button on the touch screen.

- **Font Size**

  Press the **Font Size** button on the touch screen. Use dial-button to change the font size 10-30.

NOTE	To change various settings such as measurement units, press **Utility** on the control panel and select **Measure Setup** > **General**. For more information, please refer to Chapter 3 “Setting.”

Distance Measurement

Distance

This is a basic measurement that is available in all diagnosis modes. You can specify two points in a 2D image and measure the straight distance between them.

You can measure up to 4 distances. When taking more than one measurement, use measurement cursors with different shapes (+, X, #, *) to differentiate them.

1. Press the **Distance** button on the touch screen. “2D Distance” is displayed in the user information area.
2. Use the **Trackball** and the **Set** button on the control panel to specify both end points of the measurement area.
   - Place the cursor at a desired position with the **Trackball**, and press the **Set** button.

   ※ Tip! Repositioning Point

   Pressing the **Change** button before pressing the **Set** button to complete positioning resets the position of a point just set.
3. If you specify both end points, the distance between them will be automatically calculated.
4. When the measurement is finished, its result is shown on the screen.
   - The measured distances are shown as “Dist.” and can be differentiated with their measurement cursor. The ratio (+/x, #/*) and average for each measurement data is calculated and displayed as a percentage.
5. A new measurement cursor appears. When more than 4 measurements are taken, measurements are deleted in the order in which they have been taken.

Line Trace

It is a basic measurement that is available in all diagnosis modes. You can specify a point in a 2D image and trace a curve from that point to measure the distance between them.

You can measure up to 4 distances. When taking more than one measurement, use measurement cursors with different shapes (+, X, #, *) to differentiate them.

1. Press the **Line Trace** button on the touch screen. “2D Line Trace” is displayed in the user information area.
2. Use the **Trackball** and the **Set** button on the control panel to specify the start point of the measurement area.
   - Place the cursor at a desired position with the **Trackball**, and press the **Set** button.
3. With the **Trackball**, draw a desired curve and press the **Set** button to specify the end point.

> **※ Tip! Editing Curve**
>
> Before pressing the **Set** button to specify the end point, you can rotate the **Flexible Soft dial-button [5] Delete (trace)** to delete a part of the curve being traced.

4. If you specify both end points, the length of the curve will be automatically calculated.
5. When the measurement is finished, its result is shown on the screen.
   - The measured distances are shown as “Dist.” and can be differentiated with their measurement cursor. The ratio (+/x, #/*) and average for each measurement data is calculated and displayed as a percentage.
6. A new measurement cursor appears. When more than 4 measurements are taken, measurements are deleted in the order in which they have been taken.

Hip Joint

This is a basic measurement that is available in all diagnosis modes. You can measure the angle of two straight lines to a straight line in a 2D image. This measurement is commonly used in the obstetrics application.

1. Press the **Hip Joint** button on the touch screen. “2D Hip Joint” is displayed in the user information area.
2. Use the **Trackball** and the **Set** button on the control panel to specify the first straight line.
   - Place the cursor at a desired position with the **Trackball**, and press the **Set** button.

   > **※ Tip! Repositioning Point**
   >
   > Pressing the **Change** button before pressing the **Set** button to complete positioning resets the position of a point just set.
3. Repeat the above process to specify two other straight lines.
4. The angle between them will be calculated automatically.
   - α: The angle between the first and second straight lines.
   - β: The angle between the first and third straight lines.
5. When the measurement is finished, its result is shown on the screen. The angles α and β, and the Hip Joint Type are displayed on the screen.
6. A new measurement cursor appears. When more than 3 straight lines are specified, the lines are deleted in the order in which they have been specified.

Please refer to the table below for Hip Joint Type information:

Type	α	β
1a	60 ≤ α < 90	0 < β < 55
1b	60 ≤ α < 90	55 ≤ β < 90
2a/b	50 ≤ α < 60	0 < β < 90
2c	43 ≤ α < 50	77 ≤ β < 90
d	43 ≤ α < 50	0 < β < 77
3/4	0 < α < 43	

[Table 5.2 Hip Joint Type Table]

M Distance

This is a basic measurement that is available in M Mode only. You can specify two points in an M image and measure the distance, elapsed time and velocity between them.

1. Press the **M Distance** button on the touch screen. “M Distance” is displayed in the user information area.
2. Specify two points and measure the straight distance between them. The method for measuring a line is the same as in “2D Distance.”
3. When the measurement is finished, its result is shown on the screen.
   - The measured distances are shown as “Dist.” and can be differentiated with their measurement cursor.
   - The elapsed time (Time) and velocity (Slope) are also displayed.
4. A new measurement cursor appears. When more than 4 measurements are taken, measurements are deleted in the order in which they have been taken.

D Velocity

This is a basic measurement that is available in Spectral Doppler Mode only. You can specify two points in a Spectral Doppler image and measure the distance between them, and the velocity at each point to calculate the velocity change, time change and acceleration.

NOTE	In a Spectral Doppler image, the X- and Y-axes represent time and velocity, respectively.

You can measure acceleration for up to two segments and differentiate the points of segments into Point 1 and 2.

1. Press the **D Velocity** button on the touch screen. “D Velocity” is displayed in the user information area.

2. Specify two points and measure the straight distance between them. The method for measuring a line is the same as in “2D Distance.”
3. When the measurement is finished, its result is shown on the screen.

   - Vel. 1: Velocity at Point 1
   - Vel. 2: Velocity at Point 2
   - PGmax
   - V2-V1: Velocity Change
   - Time: Time Change
   - Acc : Acceleration
   - RI: Resistivity Index
   - S/D: Systolic to Diastolic Ratio

4. A new measurement cursor appears. When more than 2 measurements are taken, measurements are deleted in the order in which they have been taken.

The equations used for D Velocity measurement are as follows:

- $RI = \frac{V_1 - V_2}{V_1}$
- $dV = V_2 - V_1$
- $Acceleration = \frac{(V_2 - V_1)}{(T_2 - T_1)} = \frac{dV}{dT}$

D A/B

This is a basic measurement that is available in Spectral Doppler Mode only. You can specify two points in a Spectral Doppler image and measure the velocity at each point to calculate the ratio of the velocity between them.

You can calculate up to 4 sets of velocity ratios. The points representing each set are differentiated into Point A and B.

1. Press the **D A/B** button on the touch screen. “D A/B” is displayed in the user information area.
2. Specify two points to measure velocity for.

   - Place the cursor at a desired position with the **Trackball**, and press the **Set** button.

3. When the measurement is finished, its result is shown on the screen.

   - Vel. A: Velocity at Point A
   - Vel. B: Velocity at Point B
   - PGmax
   - A/B: Velocity Ratio

4. A new measurement cursor appears. When more than 4 sets are measured, measurements are deleted in the order in which they have been taken.

D Trace

This is a basic measurement that is available in Spectral Doppler Mode only. You can specify a point in a Spectral Doppler image and trace a curve from that point to calculate the velocity, integral value and average velocity of blood flow.

1. Press the **D Trace** button on the touch screen. “D Trace” is displayed in the user information area.
2. Trace a curve. The method for measuring a curve is the same as in “2D Line Trace.”
3. When the measurement is finished, its result is shown on the screen.

   - Vmax: Max. Velocity
   - Vmean: Average Velocity
   - PGmax
   - PGmean
   - VTI: VTI (Velocity Time Integral)
   - Time: Time Change

4. A new measurement cursor appears.

The equations used for D Trace measurement are as follows:

- $dT = T_2 - T_1$
- $VTI = \int v \times dt\ , \quad (VTI : Velocity\ Time\ Integral)$
- $V\ mean = \dfrac{VTI}{Duration\ of\ \ flow}$

Circumference and Area Measurement

Ellipse

This is a basic measurement that is available in all diagnosis modes. You can measure the circumference and area of a circular (elliptical) object in a 2D image.

You can measure up to 4 distances. When taking more than one measurement, use measurement cursors with different shapes (+, X, #, *) to differentiate them.

1. Press the **Ellipse** button on the touch screen. "2D Ellipse" is displayed in the user information area.
2. Use the **Trackball** and the **Set** button on the control panel to specify the diameter (axis) of the measurement area.

   - Place the cursor at a desired position with the **Trackball**, and press the **Set** button.

   > **※ Tip! Repositioning Point**
   >
   > Pressing the **Change** button before pressing the **Set** button to complete positioning resets the position of a point just set.

3. Specify the size of the circle (ellipse).

   - Adjust the size using the **Trackball**, and press the **Set** button.

4. When the measurement is finished, its result is shown on the screen.

   - Circ.: Circumference of Object
   - Area: Area of Object
   - Avg.(C): Average Circumference
   - Avg.(A): Average Area

5. A new measurement cursor appears. When more than 4 straight lines are specified, the lines are deleted in the order in which they have been specified.

The equations used for ellipse measurement are as follows:

- $Circ = 2\pi \cdot \sqrt{\frac{1}{2} \cdot \left\{ \left(\frac{A}{2}\right)^2 + \left(\frac{B}{2}\right)^2 \right\}}$, (A: Long axis, B: Short axis)

- *Area* = $\pi \times a \times b$, (a, b: Axis)

Trace

This is a basic measurement that is available in all diagnosis modes. You can measure the circumference and area of an irregular object in a 2D image.

You can measure up to 4 distances. When taking more than one measurement, use measurement cursors with different shapes (+, X, #, *) to differentiate them.

1. Press the **Trace** button on the touch screen. "2D Trace" is displayed in the user information area.
2. Use the **Trackball** and the **Set** button on the control panel to specify the start point for tracing over the contour of the measurement area.

- Place the cursor at a desired position with the **Trackball**, and press the **Set** button.

3. Trace the curve so that the measurement cursor returns to the start point, and then press the **Set** button.

NOTE	Trace lines must be closed. If you press the **Set** button before tracing is complete, tracing may be done over a straight line between the current point and the start point, resulting in a significant error.

4. When the measurement is finished, its result is shown on the screen.

   - Circ.: Circumference of Object
   - Area: Area of Object
   - Avg.(C): Average Circumference
   - Avg.(A): Average Area

5. A new measurement cursor appears. When more than 4 straight lines are specified, the lines are deleted in the order in which they have been specified.

The equations used for Trace measurement are as follows:

- $Circ = sum\sqrt{\{X(n)-X(n-1)\}^2+\{Y(n)-Y(n-1)\}^2}$, (N = 1,2… last point)
- $Area = sum\left[\sqrt{X(n-1)\times Y(n)-X(n)\times Y(n-1)}\right]$, (N = 1,2… last point)

Volume Measurement

3 Distance

This is a basic measurement that is available in all diagnosis modes. You can measure the volume of an object in a 2D image by using 3 straight lines.

1. Press the **3 Distance** button on the touch screen. “3 Distance” is displayed in the user information area.
2. Specify two points and measure the straight distance between them. The method for measuring a line is the same as in “2D Distance.”
3. Measure the length of the remaining two straight lines as in the above. Measure the other two distances using the same method as 2.
4. When the measurement is finished, its result is shown on the screen. The volume of the object along with the length of each straight line are calculated.
5. A new measurement cursor appears. When more than 3 straight lines are specified, the lines are deleted in the order in which they have been specified.

The equations used for 3 Distance measurement are as follows:

- $Vol = \frac{4}{3}\pi \cdot \frac{D_1}{2} \cdot \frac{D_2}{2} \cdot \frac{D_3}{2}$, (D: distance)

1 Distance

This is a basic measurement that is available in all diagnosis modes. You can measure the volume of an object in a 2D image by using only one straight line.

You can measure up to 4 sets of volumes. When measuring more than one set, use measurement cursors with different shapes (+, X, #, *) to differentiate them.

1. Press the **1 Distance** button on the touch screen. “1 Distance” is displayed in the user information area.
2. Specify two points and measure the straight distance between them. The method for measuring a line is the same as in “2D Distance.”
3. When the measurement is finished, its result is shown on the screen. The volume of the object along with the length of the straight line are calculated.
4. A new measurement cursor appears. When more than 4 straight lines are specified, the lines are deleted in the order in which they have been specified.

The equations used for 1 Distance measurement are as follows:

- $Vol = \frac{4}{3}\pi \cdot \left(\frac{D}{2}\right)^3$, (D: distance)

Distance + Ellipse

This is a basic measurement that is available in all diagnosis modes. You can measure the volume of an object in a 2D image by using one straight line and one circle (ellipse).

You can measure up to 2 sets of volumes. When measuring more than one set, use measurement cursors with different shapes (+, X) to differentiate them.

1. Press the **Distance + Ellipse** button on the touch screen. “Distance + Ellipse” is displayed in the user information area.
2. Specify two points and measure the straight distance between them. The method for measuring a line is the same as in “2D Distance.”
3. Specify the size of the circle (ellipse). The method for measuring a circle (ellipse) is the same as in “2D Ellipse.”
4. When the measurement is finished, its result is shown on the screen.
   - Dia.: Length of Straight Line
   - A: Length of A-axis in Ellipse
   - B: Length of B-axis in Ellipse
5. A new measurement cursor appears. When more than 2 sets are measured, measurements are deleted in the order in which they have been taken.

The equations used for Distance + Ellipse measurement are as follows:

$$Vol = \frac{\pi}{6} \times a \times b \times d \ , \left(a : \text{Short axis}, \quad b : \text{Long axis}, \quad d : \text{Distance}\right)$$

NOTE	Since Dual Mode simultaneously displays two images on the screen, you don't have to return to the diagnosis mode to measure volume in Dual Mode.

Assigning Measurements to Applications

You can assign basic measurement results to measurement items for an application.

1. Press the **Calculator** button on the control panel. The appropriate measurement screen for an application will appear on the touch screen.
2. Select **Simple** by using the **Touch Page** button or the dial-button on the touch screen.
3. Select a desired measurement item on the touch screen.
4. Use the **Trackball** and the **Set** button on the control panel to take measurements. The process by which measurements are taken is the same as with basic measurements. Once measurement is complete, the results will be displayed on the screen.
5. After pressing the **Assign** button on the touch screen, use the **Package** dial-button to select a measurement item for an application to which you want to assign measurement results.
   - Only the measurement items to which the current measurement results can be assigned are enabled in the menu.
   - Press **Cancel Assignment** on the touch screen to cancel an assignment.
6. The measurement results will be assigned to and displayed as the results of the selected measurement item.

Calculations by Application

Press the **Calculator** button on the control panel.

Things to note

Before Taking Measurements

- **Register Patient**

  Make sure that the registration information of the current patient is correct. If the patient is not registered, press the **Patient** button and then register the patient.

- **Check Probe, Application and Preset Settings**

  - Check the probe name and application shown in the title area. Press the **Probe** button on the control panel to use another probe or application.
  - In the **Probe Selection** screen, check the preset settings.

Measurement Operations

The following gives information on the common button operations for measurements:

- **Select/Change Application**

  Use the **Calculator** button on the control panel.
  Press the **Calculator** button several times to toggle applications in the order. Or use the **Package** dial-button on the touch screen.

- **Select Measurement Item**

  After moving the cursor with the **Trackball** on the control panel, press the **Set** button. Or make a selection in the measurement item menu on the touch screen.

NOTE	To edit a measurement item menu on the touch screen, press **Utility** on the touch screen and then select **Touch Menu Design** under **Measure Setup**. For more information, please refer to Chapter 3 “Settings.”

- **Return to Parent Menu**

  After placing the cursor under **Return** in the **Measurement** menu, press the **Set** button.

- **Change Measurement Method**

  Press the **Change** button on the control panel. The measurement method changes

when there are more than one measurement methods available for the current measurement item. Once a measurement starts, the measurement method cannot be changed.

When measuring distance, choose Line or Trace as the measurement method. When measuring circumference and area, choose Ellipse or Trace.

Setting Measurement Result Display

Use a desired button or dial-button on the touch screen.

- **Menu Visibility**

  Specify whether the measurement menu is to be shown on the monitor screen.

- **Meas. value in menu**

  Specify whether measurement results are displayed in the measurement menu on the monitor.

- **Result Move**

  Change the location where measurement results are displayed. Change the position with the **Trackball** and then press the **Set** button.

- **Result Reset**

  Initialize the location where measurement results are displayed.

- **Undo**

  Cancel the last measurement.

- **Packages (button)**

  The **Package** screen will appear on the touch screen, allowing the user to change applications.

- **Package (dial-button)**

  Use the dial-button to select an application.

- **Threshold**

  This option is enabled only when Auto or Limited Trace are performed in Spectral Doppler Mode. Adjusting the threshold value may help contouring of Doppler spectrums.

- **HR Cycle**

  This option is enabled when a heart rate is measured in M/D Mode. Select the number of heart rate cycle(s) between 1 – 20.

- **Delete**

  This option is enabled during trace measurement. Rotate the dial-button to delete a part of

the curve being traced.

■ **Assign**

After measuring items under Simple Measurement, assign the measurement results to diagnosis items for an application.

■ **Touch Page**

Change the page on the touch screen.

> **※ Tip! Setting Touch Screen**
>
> On the touch screen that appears during measurement, User 1 and User 2 can be configured as desired. For more information, please refer to the "Touch Menu Design" section in Chapter 3 "Settings."

■ **Font Size**

Press the **Font Size** button on the touch screen. Use dial-button to change the font size 10-30.

Miscellaneous

Use a desired button or dial-button on the touch screen.

■ **Delete Measurement Result**

Press the **Clear** button on the control panel.

NOTE	The measurement results are deleted from the screen but still shown on the report for the corresponding application.

■ **Print Measurement Result**

Press the **Print 1** (or **Print 2**) button on the control panel.

■ **Exit Measurement**

Press the **Exit** button on the control panel.

■ **End Diagnosis**

Press the **End Exam** button on the control panel. The diagnosis for the current patient ends and all measurement results are saved.

NOTE	For information on settings for each application, please refer to Chapter 3 "Setting."

Common Measurement Methods

This section provides information on the common measurement methods used for applications.

Measurements in Spectral Doppler Mode

In general, if you trace a Doppler spectrum, you can obtain results for various measurement items automatically. There are 3 ways to trace a Doppler spectrum.
ACCUVIX V20 also allows you to select a specific item under the **Measurement** menu and take measurements individually without tracing a Doppler spectrum.

■ **Auto Trace**

A spectrum is traced automatically. It is enabled in the **Measurement** menu in Spectral Doppler Mode.

1. Press **Auto Trace** in the **Measurement** menu.
2. The system traces a spectrum automatically.
3. When Trace is complete, the measurement results are displayed on the screen.

※ Things to consider for Doppler Spectrum Auto Trace

The state of a Doppler spectrum may affect measurement results. Please see the following:

Causes for Trace Failure

- If Gain is changed for a Doppler image in the Freeze state, Contour Trace and Peak Trace will not work.
- If there is little or no noise in an image without a spectrum, Contour Trace will not work.
- If there is severe noise in an image, Contour Trace will not work.
- - If the Clutter filter is set too high, Auto Trace or Limited Trace may not work.

Causes for Inaccurate Peak Trace

- If PRF (Pulse Repetition Frequency) is lower than the velocity of the observation area, aliasing may occur. If the original signals are separated from aliasing, Trace can be done but the peak measurement may not be accurate.
- If the peak of a spectral waveform is not clear or occurs intermittently, Trace can be done but the peak measurement may not be accurate.
- If the Doppler Gain is set to high or low, it becomes difficult to distinguish spectrums. This may result in measurement error(s).
- If the Wall Filter is set too high, only part of the spectrum is displayed. In this case, Trace can be done but Peak measurement may not be accurate.

- If abnormal noise or artifact occurs, Trace can be done but Peak measurement may not be accurate.

Misc.

- Use of the CW Probe may result in measurement error(s).
- Limited Trace is supported only for two-peak spectrums such as Mitral Valve Inflow and Tricuspid Valve Inflow in the cardiology application.

■ **Limited Trace**

If you specify a measurement range, a spectrum is traced automatically. It is enabled in the menu in Spectral Doppler Mode.

1. Press **Limited Trace** in the **Measurement** menu. A bar appears allowing you to specify a measurement area.
2. Specify the measurement range.
   - Place the bar at a desired position with the **Trackball**, and press the **Set** button.
3. The system traces spectrums within the specified range automatically.
4. When Trace is complete, the measurement results are displayed on the screen.

■ **Manual Trace**

A spectrum is traced manually. It is enabled in the menu in Spectral Doppler Mode.

1. Press **Manual Trace** in the **Measurement** menu. A measurement cursor appears over a spectrum.
2. Trace the spectrum. The measuring method is the same as in “D Trace.”
3. When Trace is complete, the measurement results are displayed on the screen.

■ **Itemized Measurement**

In the **Measurement** menu, select an individual item and take a measurement.

1. Press the **Calculator** button on the control panel after obtaining a desired image.
2. Select a desired item in the **Measurement** menu. The “+” cursor appears over a spectral waveform.
3. Position the “+” cursor and press the **Set** button.
4. The measurement results for the selected item are displayed on the screen.

Measurement items for Doppler Spectrum are as follows:

Item	Type	Unit	Equation
PSV (Peak Systolic Velocity)	Velocity	cm/s or m/s	
EDV (End Diastolic Velocity)	Velocity	cm/s or m/s	
TAMV (Time Average Mean Velocity)	Velocity	cm/s or m/s	
TAPV (Time Average Peak Velocity)	Velocity	cm/s or m/s	
PGmean (Mean Pressure Gradient)	Calculation	None	
Pgmax (Max Pressure Gradient),	Calculation	None	$4 \times PSV^2$
S/D (Ratio of PSV to EDV)	Calculation	Ratio	(PSV / EDV)
D/S (Ratio of EDV to PSV)	Calculation	Ratio	EDV /PSV
RI (Resistivity Index)	Calculation	Ratio	(PSV – EDV) / PSV
PI (Pulsatility Index)	Calculation	Ratio	(PSV – EDV) / Vmean

Volume Flow Measurement

Select **Volume Flow** in the **Measurement** menu.

Volume Flow allows you to measure and calculate an area or distance. For information on distance or area measurements, please refer to “Basic Measurements.” The TAMV (Time Avg. Mean Velocity) value is automatically measured.

- **Vesl. Area (Vessel Area)**

  Measure the area of a blood vessel and calculate TAMV and Volume Flow.

  $$VolumeFlow(A) = Area \times TAMV \times 60$$

- **Vesl. Dist. (Vessel Distance)**

  Measure the width of a blood vessel and calculate TAMV and Volume Flow.

  $$VolumeFlow(D) = \frac{\pi \times d^2}{4} \times TAMV \times 60$$

Stenosis Measurement

You can measure the stenosis of each blood vessel system by measuring and calculating an area or distance.

- **% StA (Stenosis Area)**

  Measure the area of the inner and outer walls of a blood vessel.

  1. Select the **%StA** menu and the first cursor will appear in 2D Mode.
  2. Measure the area of the vessel’s outer wall using the Circ/Area measurement method.

3. When the second cursor appears, measure the area of the vessel's inner wall under stenosis.

%Stenosis Area. = (Outer Area – Inner Area) / Outer Area × 100

■ **% StD (Stenosis Distance)**

Measure the diameter of a blood vessel.

1. Select the **%StD** menu and the first cursor will appear in 2D Mode.
2. Measure the total diameter of a blood vessel using the Distance measurement method.
3. When the second cursor appears, measure the diameter of the vessel's inner wall under stenosis.

%Stenosis Dist. = (Outer Distance – Inner Distance) / Outer Distance × 100

Heart Rate Measurement

■ **HR (Heart Rate)**

You can calculate heart rates for a certain period of time.

1. Select **HR** in the **Measurement** menu. A bar appears allowing you to specify a measurement area.
2. Specify the measurement range.
   - Place the bar at a desired position with the **Trackball**, and press the **Set** button.
3. The system measures the heart rate within the specified range automatically. The measurement results are displayed on the screen.

OB Calculation

Before Taking OB Measurements

■ OB Basic Information

Enter the information required for OB diagnosis in the **Patient Information** window. The basic OB information includes LMP (Last Menstrual Period) and Gestations.

Once LMP is entered, EDD (Estimated Delivery Date) and GA (Gestational Age) are calculated automatically. LMP is required for the calculation of values such as EDD and SD in obstetrics measurement.

- EDD(LMP) = LMP + 280 days
- GA(LMP) = Current System Date - LMP

When you input Ovulation Date, it creates LMP and GA(LMP), EDD(LMP) automatically.

LMP=Ovul.Date-14

Regardless of LMP, enter the EDD with a physician's opinion into **Estab. Due Date**. If LMP is not available, when Estab. Due Date is modified, LMP is automatically calculated and the "C" mark is displayed next to the LMP information.

A maximum of four fetuses can be entered in the **Gestations** menu. The default value is '1'. In the case of twins, enter '2'.

For further information about patient information menus and how to input patient information, refer to "Entering Patient Data" in Chapter 3 "Setting".

■ OB Measurement Menu Settings

Set up the GA Equation, GA Table and OB measurement menus that are used in obstetrics measurements. The user can manually write, back up or restore GA Tables. For more information on the GA Equation and Table, refer to the Reference Manual.

Refer to the "Setting Measurements" section in Chapter 3 "Setting" for additional information.

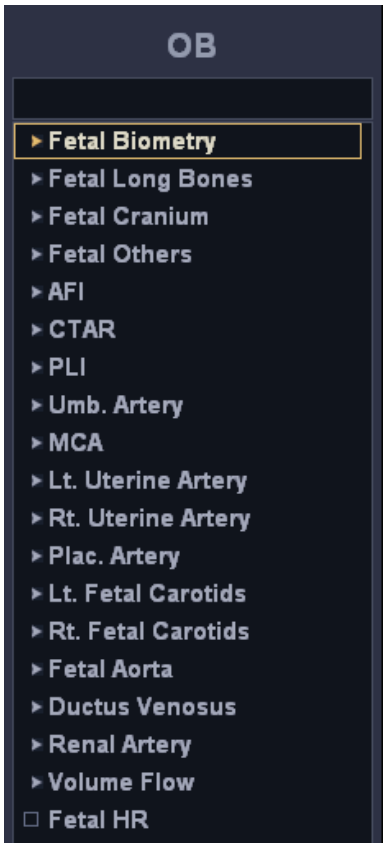
NOTE	For twins, distinguish fetuses by specifying them as Fetus A and Fetus B in the **Measurement** menu. Press the **Change** button on the control panel to change a fetus to measure.

Measurement Menu

The measurement menu items are arranged in the order in which they are used most during obstetrics diagnosis.

When the measurements for the selected items are complete, the measurements and gestational age are displayed on the screen. The measurement method for each item is the same as for basic measurement.

Measured items are automatically recorded in a report.



[Figure 5.2 OB Measurement Menu]

NOTE	■ For information on basic measurements, please refer to “Basic Measurements” in this chapter. ■ For references on measurement items, please refer to “Reference Manual – Part 1.”

OB Measurements in 2D Mode

Measurement Menu	Measurement Item	Measurement Method	Unit
Fetal Biometr	GS	Distance Measurement	cm, mm
	CRL	Distance Measurement	cm, mm
	YS	Distance Measurement	cm, mm
	BPD, HC	Distance Measurement	cm, mm
	BPD	Distance Measurement	cm, mm
	OFD	Distance Measurement	cm, mm
	HC	Circumference Measurement or Automatic Calculation	cm, mm
	APD	Distance Measurement	cm, mm
	TAD	Distance Measurement	cm, mm
	AC	Circumference Measurement or Automatic Calculation	cm, mm
	FTA	Area Measurement or Automatic Calculation	cm^2, mm^2
	FL	Distance Measurement	cm, mm
	SL	Distance Measurement	cm, mm
	APTD, TTD	Distance Measurement	cm, mm
	APTD	Distance Measurement	cm, mm
	TTD	Distance Measurement	cm, mm
	ThC	Circumference Measurement or Automatic Calculation	cm, mm
Fetal Long Bones	HUM	Distance Measurement	cm, mm
	ULNA	Distance Measurement	cm, mm
	TIB	Distance Measurement	cm, mm
	RAD	Distance Measurement	cm, mm
	FIB	Distance Measurement	cm, mm
	CLAV	Distance Measurement	cm, mm
	Vertebral	Distance Measurement	cm, mm
Fetal Cranium	CEREB	Distance Measurement	cm, mm
	CM	Distance Measurement	cm, mm

Fetal Cranium	NF	Distance Measurement	cm, mm
	NT	Distance Measurement	cm, mm
	OOD	Distance Measurement	cm, mm
	IOD	Distance Measurement	cm, mm
	NB	Distance Measurement	cm, mm
	Lat Vent	Distance Measurement	cm, mm
	HW	Distance Measurement	cm, mm
	Lat. Vent / HW	Auto Calculation	%
Fetal Others	Foot	Distance Measurement	cm, mm
	Ear	Distance Measurement	cm, mm
	MP	Distance Measurement	cm, mm
	Lt. Renal L	Distance Measurement	cm, mm
	Lt. Renal AP	Distance Measurement	cm, mm
	Rt. Renal L	Distance Measurement	cm, mm
	Rt. Renal AP	Distance Measurement	cm, mm
	Pelvis	Distance Measurement	cm, mm
AFI	All	Distance Measurement	cm, mm
	Q1	Distance Measurement	cm, mm
	Q2	Distance Measurement	cm, mm
	Q3	Distance Measurement	cm, mm
	Q4	Distance Measurement	cm, mm
	MVP	Circumference Measurement	cm, mm
CTAR	All (D)	Calculate after Distance Measurement	%
	ThD ap	Distance Measurement	cm, mm
	ThD trans	Distance Measurement	cm, mm
	HrtD ap	Distance Measurement	cm, mm
	HrtD trans	Distance Measurement	cm, mm
	All (A)	Calculate after Area Measurement	%
	ThA	Area Measurement	cm^2, mm^2
	HrtA	Area Measurement	cm^2, mm^2

Fetal Biometry

- **GS (Gestational Sac Length)**

  Measure the longest distance of the Gestational Sac.

- **CRL (Crown Rump Length)**

  Measure the longest distance from head to rump of the embryo.

[Figure 5.2 CRL]

- **YS (Yolk Sac Length)**

  Measure the longest diameter of the Yolk Sac.

- **BPD (BiParietal Diameter)**

  Measure the maximum transverse diameter of a fetal head when the thalamus appears symmetrical against the midline.

- **OFD (Occipital Frontal Diameter)**

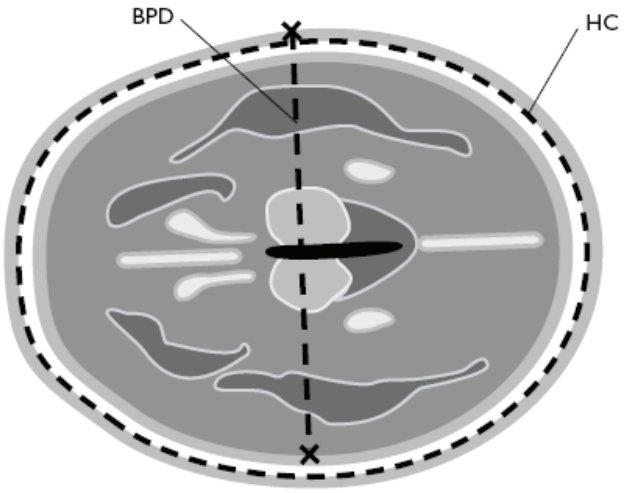
  Measure the maximum longitudinal diameter of a fetal head when the thalamus appears symmetrical against the midline.

- **HC (Head Circumference)**

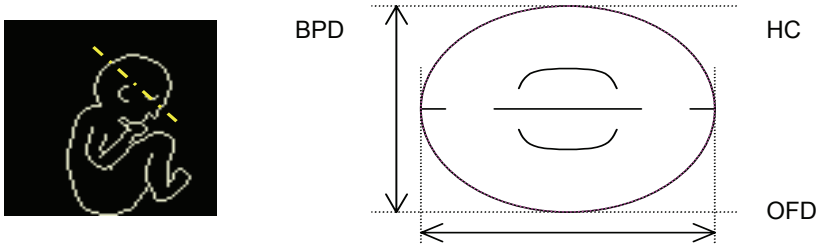
  Measure the circumference of a fetal head. You can measure it by using Trace or Ellipse, or have it automatically calculated by using the BPD and OFD (Inner-to-outer) measurements.

  $HC = \pi \times \sqrt{(BPD^2 + OFD^2)/2}$

  However, when Merz obstetrics materials are used: $HC = 2.325 * \sqrt{BPD^2 + OFD^2}$



[Figure 5.3 BPD, HC]



[Figure 5.4 BPD, HC, OFD]

- **APD (Anterior-Posterior Abdominal Diameter)**

  Measure the front/back diameter of a fetal abdomen.

- **TAD (Transverse Abdominal Diameter)**

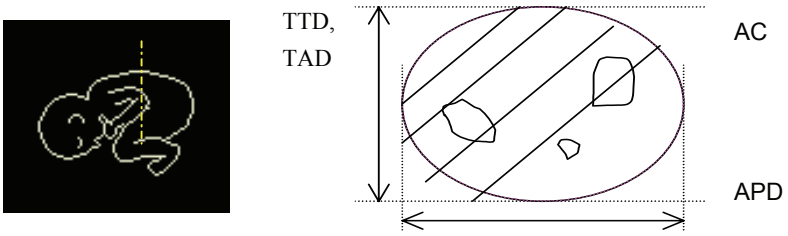
  Measure the transverse diameter of a fetal abdomen.

- **AC (Abdominal Circumference)**

  Measures the circumference of a fetal abdomen. A measurement should be taken when the stomach and vein tubes are clearly visible in a transverse fetal image. At this time, position the cursor on the outside of the skin. You can measure it by using Trace or Ellipse, or have it automatically calculated by using the APD and TAD measurements.

  $$AC = \pi \times \sqrt{(APD^2 + TAD^2)/2}$$

  However, when Merz obstetrics materials are used: $AC = \pi \times (APD + TAD)/2$

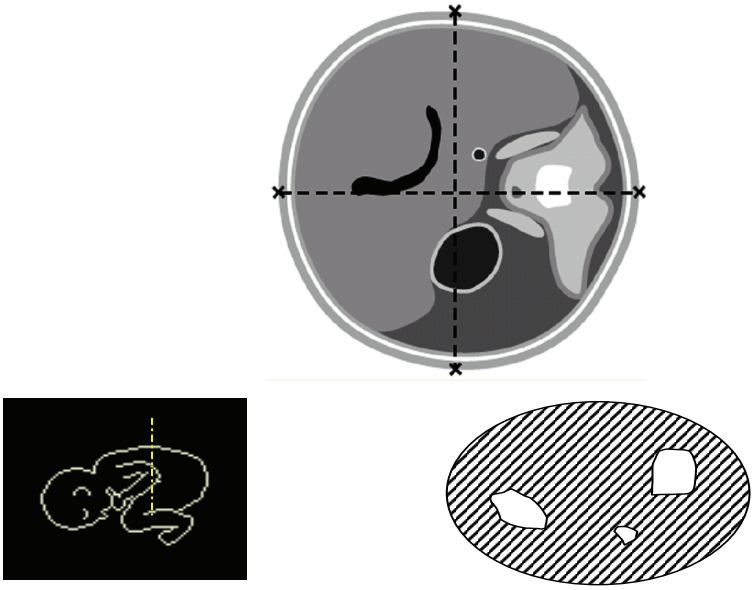


[Figure 5.6 TAD, AC, APD]

■ **FTA (Fetal Trunk Area)**

Measure the area of the fetal trunk (chest or abdomen). You can measure it by using Trace or Ellipse, or calculate it by using the APD and TAD measurements.

$$FTA = \pi \times (APD \times TAD) / 4$$



[Figure 5.6 FTA]

■ **ThC (Thoracic Circumference)**

Measure the circumference of a fetal chest. A measurement should be taken when the heart is clearly visible in a transverse fetal image. At this time, position the cursor on the outside of the skin. You can measure it by using Trace or Ellipse, or calculate it by using the APTD and TTD measurements.

$$ThC = \pi \times \sqrt{(APTD^2 + TTD^2) \div 2}$$

- **FL (Femur Length)**

  Measure the length of a fetal femur. You should measure the longest length of the femur that is closest to the probe.

[Figure 5.7 FL]

- **SL (Spine Length)**

  Measure the length of a fetal spine.

- **TTD (Transverse Thoracic Diameter)**

  Measure the transverse diameter of a fetal chest.

- **APTD (Anterior-Posterior Thoracic Diameter)**

  Measure the front/back diameter of a fetal chest.

Fetal Long Bones

- **HUM (Humerus Length)**

  Measure the length of a humerus in a fetal arm.

- **ULNA (Ulna Length)**

  Measure the length of the ulna that is the lower arm bone on the little finger side of the fetal arm.

- **TIB (Tibia Length)**

  Measure the length of a fetal tibia.

- **RAD (Radius Length)**

  Measure the length of the radius that is the lower arm bone on the thumb side of the fetal arm.

- **FIB (Fibular Length)**

  Measure the length of a fetal fibula.

- **CLAV (Clavicle Length)**

  Measure the length of a fetal clavicle.

■ **Vertebral (Vertebral Length)**

Measure the length of a fetal vertebrae.

[Figure 5.9 Vertebral]

Fetal Cranium

■ **CEREB (Cerebrum)**

Measure the longest transverse diameter of a fetal cerebrum. TCD (Transverse Cerebral Diameter)

■ **CM (Cisterna Magna)**

Measure the shortest diameter of the cisterna magna.

■ **NF (Nuchal Fold)**

Measure the thickness of the skin in the nape of a fetal neck. (Chromosomal Abnormalities)

■ **NT (Nuchal Thickness)**

Measure the circumference of a fetal neck.

■ **OOD (Outer Ocular Diameter)**

Measure the outer ocular diameter of a fetus.

■ **IOD (Inner Ocular Diameter)**

Measure the inner ocular diameter of a fetus.

■ **NB (Nasal Bone Length)**

Measure the length of a fetal nasal bone. (Chromosomal Abnormalities)

■ **Lat Vent (Lateral Ventricle)**

Measure the length of a fetal lateral ventricle.

■ **HW (Hemispheric Width)**

Measure hemispheric width.

- **Lat. Vent / HW**

  If Lat. Vent and HW are measured, the ratio (%) of the two items is calculated.

Fetal Other

- **Foot**

  Measure the longest diameter of the sole of a fetal foot.

- **Ear**

  Measure the longest diameter of a fetal ear. (Chromosomal Abnormalities)

- **MP (Middle Phalanx)**

  Measure the length of a fetal middle phalanx.

- **Lt. / Rt. Renal L (Renal Length)**

  Measure the longest diameter of a fetal kidney

- **Lt. / Rt. Renal AP (Renal Anterior-Posterior)**

  Measure the longest length of a fetal kidney

- **Pelvis**

  Measure the transverse diameter of a fetal pelvis.

AFI (Amniotic Fluid Index)

Measure the amniotic fluid index. Measurements are performed by dividing the pregnant woman's abdomen into four parts. The distance between the fetus and the farthest point of each area is measured. To obtain a specific image from each quadrant plane, press the **Freeze** button to go to the diagnosis mode. After obtaining the image, press the **Freeze** button again to return to the measurement mode.

- **ALL**

  Perform continuous measurements for all AFI items.

- **Q1, Q2, Q3, Q4**

  Sum the values of four measurement items (Q1, Q2, Q3, Q4).

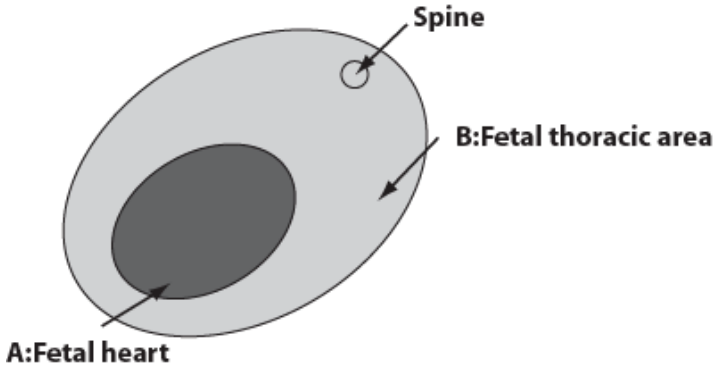
- **MVP (Maximum Vertical Pocket)**

  Measure the diameter of an Amniotic Fluid Pocket.

NOTE	PLI, Renal Artery and Fetal HR can be measured in Doppler Mode only.

CTAR (Cardio-Thorax Area Ratio)

The following measurement items are supported.



[Figure 5.10 CTAR]

- **ALL (D)**

  Perform continuous measurements for all CTAR length items. The result will be displayed as percentage.

- **ThD ap (Anterior-Posterior Thoracic Diameter)**

  Measure the length.

- **ThD trans (Transverse Thoracic Diameter)**

  Measure the transverse length of a chest.

- **HrtD ap (Anterior-Posterior Heart Diameter)**

  Measure the length.

- **HrtD trans (Transverse Heart Diameter)**

  Measure the transverse length of a heart.

- **ALL (A)**

  Perform continuous measurements for all CTAR area items. The result will be displayed as percentage.

- **ThA (Thoracic Area)**

  Measure the area of a chest.

- **HrtA (Heart Area)**

  Measure the area of a heart.

OB Measurements in Spectral Doppler Mode

For information on measurement methods, please refer to “Measurements in Spectral Doppler Mode” in this chapter.

Measurement Menu	Measurement Item	Measurement Method	Unit
PLI	All	Calculate after Velocity Measurement	
	Sys Flow	Velocity Measurement	cm/s, m/s
	Dias Flow	Velocity Measurement	cm/s, m/s
	A. Rev Flow	Velocity Measurement	cm/s, m/s
Umb. Artery	Auto Trace	Doppler Spectrum Trace	
	Limited Trace	Doppler Spectrum Trace	
	Manual Trace	Doppler Spectrum Trace	
	PSV	Velocity Measurement	cm/s, m/s
	EDV	Velocity Measurement	cm/s, m/s
	%StA	Calculate after Area Measurement	%
	%StD	Calculate after Distance Measurement	%
	Vesl. Area	Area Measurement	cm^2, mm^2
	Vesl. Dist	Distance Measurement	cm, mm
MCA	Same as the above		
Rt. / Lt. Uterine Artery	Same as the above		
Plac. Artery	Same as the above		
Rt. / Lt. Fetal Carotids	Same as the above		
Fetal Aorta	Same as the above		
Ductus Venosus	Same as the above		
Renal Artery	Auto Trace	Doppler Spectrum Trace	
	Limited Trace	Doppler Spectrum Trace	
	Manual Trace	Doppler Spectrum Trace	
	PSV	Velocity Measurement	cm/s, m/s
	EDV	Velocity Measurement	cm/s, m/s

Measurement Menu	Measurement Item	Measurement Method	Unit
Volume Flow	Same as the Umb. Artery		
Fetal HR	Fetal Heart Rate	Heart Rate	bpm

Calculating Fetal Weight

When measurements for the following items are complete, the system uses the results to calculate the estimated fetal weight automatically. For an equation for calculating fetal weight, please refer to “Estimated Fetal Weight Formula” in the Reference Manual Part 1.

- BPD and AC
- BPD, FL and FTA
- BPD, APTD, TTD and FL
- BPD, APTD, TTD and SL
- BPD and TTD
- AC and FL
- BPD, AC and FL
- HC, AC and FL
- BPD,HC, AC and FL
- AC

NOTE For reference, the Osaka University /Tokyo University methods are mainly used in Asia, the Merz method in Europe, and the Shepard/ Hadlock methods on the American continent.

Continuous Measurement / Review for EFW Calculation

You can measure OB item(s) continuously for EFW calculation.

※Before Measurement

1. Confirm User key setup in Utility > Setup > Peripherals > User Key.
2. Confirm current EFW reference. If you want to change EFW equation, select it in Utility > Measure Setup > OB > Tables.

NOTE This function is not available in 3D mode. .

■ **How to measure**

1. Press the **User Key1 (**or User **Key 2**) on the control panel. OB menu and measure items are displayed on the screen.
2. Measure the items for EFW calculation using trackball and the **Set** button.
3. Press the **Freeze** button to finish the first measurement.

4. Press the **Freeze** button to measure the next items.
5. When you finish the measurement for all items, the result will be displayed on the monitor.

See following table;

Reference	Measure Item (by Order)
Campbell	AC
Hadlock	BPD→AC
Hadlock1	AC→FL
Hadlock2	BPD→AC→FL
Hadlock3	HC→AC→FL
Hadlock4	BPD, HC→AC→FL
Hansmann	BPD→TTD
Merz	BPD→AC
Osaka	BPD→FTA→FL
Shepard	BPD→AC
Shinozuka1	BPD→AC→FL
Shinozuka2	BPD→APTD, TTD→SL
Shinozuka3	BPD→APTD, TTD→FL
Ferrero	AC→FL
Higginbottom	AC
Thurnau	BPD→AC
Warsof	BPD→AC
Weiner1	HC→AC
Weiner2	HC→AC→FL
Woo	BPD→AC→FL

■ **Review the Result of EFW Calculation**

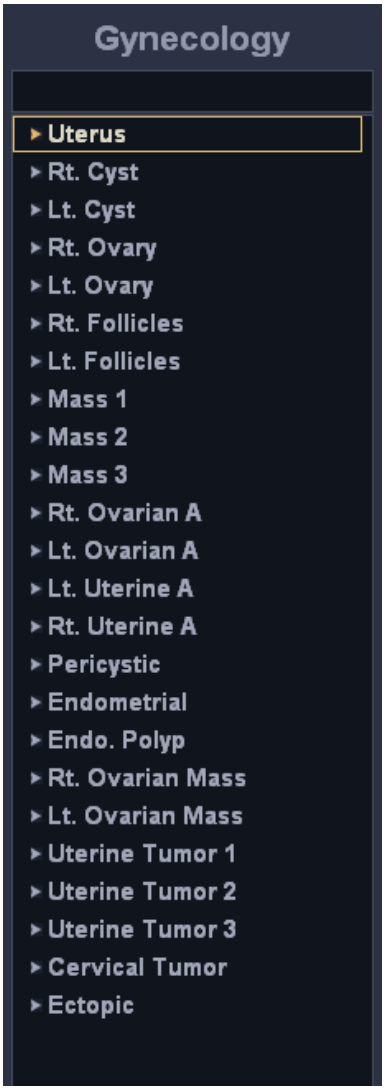
1. Press the **User Key1 (**or User **2**) on the control panel. Measured items and its results are displayed on the screen.
2. To remove the results, press the **Clear** button on the control panel.

Gynecology Calculation

Before Taking GYN Measurements

Enter the information required for GYN diagnosis in the **Patient Information** screen. Basic Information for gynecology includes Gravida, Para, Aborta, Exp. Ovul., Day of Cycle and Ectopic.

Measurement Menu



[Figure 5.10 GYN Measurement Menu]

The measurement menu items are arranged in the order in which they are used most during gynecology diagnosis.

The measurement method for each item is the same as for basic measurement.

Measured items are automatically recorded in a report.

NOTE

- For information on basic measurements, please refer to “Basic Measurements” in this chapter.
- For references on measurement items, please refer to “Reference Manual – Part 2.”

GYN Measurements in 2D Mode

Measurement Menu	Item	Method	Unit
Uterus	Vol.	Calculation after Distance Measurement	ml
	Length	Distance Measurement	cm, mm
	Height	Distance Measurement	cm, mm
	Width	Distance Measurement	cm, mm
	Endo. Thickness	Distance Measurement	cm, mm
	Cervix Vol.	Volume Measurement	ml
	Cervix Length	Distance Measurement	cm, mm
	Cervix Height	Distance Measurement	cm, mm
	Cervix Width	Distance Measurement	cm, mm
Rt. / Lt. Cyst	Vol.	Calculation after Distance Measurement	ml
	Length	Distance Measurement	cm, mm
	Height	Distance Measurement	cm, mm
	Width	Distance Measurement	cm, mm
Rt. / Lt. Ovary	Same as the above		
Rt. / Lt. Follicles	1 ~ 12	Volume Calculate after Distance Measurement	cm, mm, ml
Mass 1	Vol.	Calculation after Distance Measurement	ml
	Length	Distance Measurement	cm, mm
	Height	Distance Measurement	cm, mm

Measurement Menu	Item	Method	Unit
Mass 1	Width	Distance Measurement	cm, mm
	Auto Trace	Doppler Spectrum Trace	
	Limited Trace	Doppler Spectrum Trace	
	Manual Trace	Doppler Spectrum Trace	
	PSV	Velocity Measurement	cm/s, m/s
	EDV	Velocity Measurement	cm/s, m/s
Mass 2	Same as the above		
Mass 3	Same as the above		
Endo. Polyp	Vol.	Calculation after Distance Measurement	ml
	Length	Distance Measurement	cm, mm
	Height	Distance Measurement	cm, mm
	Width	Distance Measurement	cm, mm
	Auto Trace	Doppler Spectrum Trace	
	Limited Trace	Doppler Spectrum Trace	
	Manual Trace	Doppler Spectrum Trace	
	PSV	Velocity Measurement	cm/s, m/s
	EDV	Velocity Measurement	cm/s, m/s
Rt. / Lt. Ovarian Mass	Same as the above		
Uterine Tumor 1	Same as the above		
Uterine Tumor 2	Same as the above		
Uterine Tumor 3	Same as the above		
Cervical Tumor	Same as the above		
Ectopic	Vol.	Calculation after Distance Measurement	ml
	Length	Distance Measurement	cm, mm
	Height	Distance Measurement	cm, mm
	Width	Distance Measurement	cm, mm
	Auto Trace	Doppler Spectrum Trace	

Measurement Menu	Item	Method	Unit
Ectopic	Limited Trace	Doppler Spectrum Trace	
	Manual Trace	Doppler Spectrum Trace	
	PSV	Velocity Measurement	cm/s, m/s
	EDV	Velocity Measurement	cm/s, m/s
	Fetal Heart Rate	Heart Rate	bpm

GYN measurements mainly consist of distance and volume measurements. When multiple images such as the long and transverse axis images are needed, press the **Freeze** button to return to the scan mode and obtain an image in a different view.

GYN Measurements in Spectral Doppler Mode

Measurement Menu	Item	Method	Unit
Rt. / Lt. Ovarian A	Auto Trace	Doppler Spectrum Trace	
	Limited Trace	Doppler Spectrum Trace	
	Manual Trace	Doppler Spectrum Trace	
	PSV	Velocity Measurement	cm/s, m/s
	EDV	Velocity Measurement	cm/s, m/s
Rt. / Lt. Uterine A	Same as the above		
Pericystic	Same as the above		
Endometrial	Same as the above		

For information on measurement methods, please refer to “Measurements in Doppler Spectrum Mode” in this chapter.

Cardiac Calculation

Before Taking Cardiac Measurements

■ **Cardiology Basic Information**

Enter the patient information required for cardiology diagnosis in the **Patient Information** window. The basic information for cardiology includes Height, Weight, HR (Heart Rate), RAP (Right Arterial Pressure) and BP (Blood Pressure). When the patient's height and weight are entered, BSA (Body Surface Area) is automatically calculated and displayed.

For more information about patient information menus and how to enter information, please refer to “Entering Patient Data” in Chapter 3 “Setting.”

■ **Cardiac Measurement Menu Settings**

Set the related menus for convenient measurement. You can specify how an area and volume can be calculated. Please refer to the “Setting Measurements” section in Chapter 3 “Setting” for more information on measurement menus and settings.

Measurement Menu

The measurement menu items are arranged in the order in which they are used most during cardiology diagnosis.
The measurement method for each item is the same as for basic measurement.

Measured items are automatically recorded in a report.

NOTE	■ For information on basic measurements, please refer to “Basic Measurements” in this chapter. ■ For references on measurement items, please refer to “Reference Manual – Part 2.”

[Figure 5.11 Cardiac Measurement Menu]

Cardiac Measurements in 2D Mode

Measurement Menu	Item	Method	Unit
LV	All (D)	Continuous Measurement	
	IVSd	Distance Measurement	cm, mm
	LVIDd	Distance Measurement	cm, mm
	LVPWd	Distance Measurement	cm, mm

Measurement Menu	Item	Method	Unit
LV	RVAWd	Distance Measurement	cm, mm
	RVIIDd	Distance Measurement	cm, mm
	All (S)	Continuous Measurement	
	IVSs	Distance Measurement	cm, mm
	LVIDs	Distance Measurement	cm, mm
	LVPWs	Distance Measurement	cm, mm
	RVAWs	Distance Measurement	cm, mm
	RVIDs	Distance Measurement	cm, mm
LV Vol. (Simpson)	A2C Vol.d	Dist 20	ml
	A2C Vol.s	Dist 20	ml
	A4C Vol.d	Dist 20	ml
	A4C Vol.s	Dist 20	ml
LV Vol. (A/L)	Vol. d	Volume Measurement	ml
	Vol. s	Volume Measurement	ml
LV Vol. (Bullet)	LVAd sax	Area Measurement	cm^2, mm^2
	LVAs sax	Area Measurement	cm^2, mm^2
	LVLd apical	Distance Measurement	cm, mm
	LVLs apical	Distance Measurement	cm, mm
LV Mass	All	Calculation after Area Measurement	g
	LVAd sax epi	Area Measurement	cm^2, mm^2
	LVAd sax endo	Area Measurement	cm^2, mm^2
	LVLd apical	Distance Measurement	cm, mm
RV	RVAWd	Distance Measurement	cm, mm
	RVIDd	Distance Measurement	cm, mm
	RVAWs	Distance Measurement	cm, mm
	RVIDs	Distance Measurement	cm, mm
	MPA Diam	Distance Measurement	cm, mm
	RPA Diam	Distance Measurement	cm, mm
	LPA Diam	Distance Measurement	cm, mm

Measurement Menu	Item	Method	Unit
LA Vol.	All	Calculation after Distance Measurement	ml
	Diam1	Distance Measurement	cm, mm
	Diam2	Distance Measurement	cm, mm
	Diam3	Distance Measurement	cm, mm
Ao / LA	All	Continuous Measurement	
	Ao Root	Distance Measurement	cm, mm
	LA Diam	Distance Measurement	cm, mm
	LVOT Diam	Distance Measurement	cm, mm
	Asc Ao	Distance Measurement	cm, mm
	Desc Ao	Distance Measurement	cm, mm
	Ao Arch	Distance Measurement	cm, mm
RA	All	Calculation after Distance Measurement	ml
	Diam1	Distance Measurement	cm, mm
	Diam2	Distance Measurement	cm, mm
	Diam3	Distance Measurement	cm, mm
	IVC Diam Exp.	Distance Measurement	cm, mm
	IVC Diam Ins.	Distance Measurement	cm, mm
	SVC Diam Exp.	Distance Measurement	cm, mm
	SVC Diam Ins.	Distance Measurement	cm, mm
LVOT	LVOT Diam	Distance Measurement	cm, mm
RVOT	RVOT Diam	Distance Measurement	cm, mm
AV	AV Diam	Distance Measurement	cm, mm
	AR VC Diam	Distance Measurement	cm, mm
MV	Diam 1	Distance Measurement	cm, mm
	Diam 2	Distance Measurement	cm, mm
	MR VC Diam	Distance Measurement	cm, mm
TV	TV Diam	Distance Measurement	cm, mm
	TR VC Diam	Distance Measurement	cm, mm

Measurement Menu	Item	Method	Unit
PV	PV Diam	Distance Measurement	cm, mm
	PR VC Diam	Distance Measurement	cm, mm
Qp: Qs	LVOT Diam	Distance Measurement	cm, mm
	RVOT Diam	Distance Measurement	cm, mm
PE	PE Diam	Distance Measurement	cm, mm

LV (Left Ventricle)

You can perform measurements for the left ventricle.

- **All (d)**

  Perform continuous measurements for all measurable distance items during the diastolic phase.

- **IVSd (Interventricular Septum Diastolic Thickness)**

  Measure the distance from the leading edge of the RV (Right Ventricle) side to the trailing edge of the LV side for the Interventricular Septum during the diastolic phase.

- **LVIDd (Left Ventricle Internal End Diastolic Dimension)**

  Measure the dimension from the end of the Interventricular Septum to the start of the LV Posterior Wall during the diastolic phase.

- **LVPWd (Left Ventricle Posterior Wall Diastolic Thickness)**

  Measure the thickness between the end of the LV Posterior Wall to the start of the Epicardium during the diastolic phase.

- **RVAWd (Right Ventricle Anterior Wall Diastolic Thickness)**

  Measure the length of the RV Anterior Wall during the diastolic phase.

- **RVIDd (Right Ventricle Internal Diastolic Dimension)**

  Measure the dimension from the end of the RV Anterior Wall to the end of the RV side of the Interventricular Septum during the diastolic phase.

- **All (s)**

  Perform continuous measurements for all measurable distance items during the systolic phase.

- **IVSs (Interventricular Septum Systolic Thickness)**

  Measure the distance from the leading edge of the RV (Right Ventricle) side to the trailing edge of the LV side for the Interventricular Septum during the systolic phase.

- **LVIDs (Left Ventricle Internal Systolic Dimension)**

  Measure the dimension from the end of the Interventricular Septum to the start of the LV Posterior Wall during the systolic phase.

- **LVPWs (Left Ventricle Posterior Wall Systolic Dimension)**

  Measure the thickness between the end of the LV Posterior Wall to the start of the Epicardium during the systolic phase.

- **RVIDs (Right Ventricle Internal Systolic Dimension)**

  Measure the dimension from the end of the RV Anterior Wall to the end of the RV side of the Interventricular Septum during the systolic phase.

- **RVAWs (Right Ventricle Anterior Wall Systolic Thickness)**

  Measure the length of the RV Anterior Wall during the systolic phase.

LV Vol. (Simpson)

You can measure the volume of the left ventricle using Simpson's Method.

- **A2C Vol.d (Left Ventricle End Diastolic Volume, Two chambers)**

  In the Apical Two Chamber view, measure the LV volume during the diastolic phase.

- **A2C Vol.s (Left Ventricle Systolic Volume, Two chambers)**

  In the Apical Two Chamber view, measure the LV volume during the systolic phase.

- **A4C Vol.d (Left Ventricle Diastolic Volume, Four chambers)**

  In the Apical Four Chamber view, measure the LV volume during the diastolic phase.

- **A4C Vol.s (Left Ventricle Systolic Volume, Four chambers)**

  In the Apical Four Chamber view, measure the LV volume during the systolic phase.

LV Vol. (A/L)

- **Vol.d (Left Ventricle Volume at Diastole by the Area-Length Method)**

  Measure the LV volume during the diastolic phase.

- **Vol.s (Left Ventricle Volume at Systole by the Area-Length Method)**

  Measure the LV volume during the systolic phase.

LV Vol. (Bullet)

- **LVAd sax (Left Ventricle Short-axis Area at Diastole)**

  In the Short Axis view, measure the LV area during the diastolic phase.

- **LVAs sax (Left Ventricle Short-axis Area at Systole)**

  In the Short Axis view, measure the LV area during the systolic phase.

- **LVLd apical (Left Ventricle Long-axis length at Diastole)**

  In the Apical view, measure the LV length during the diastolic phase.

- **LVLs apical (Left Ventricle Long-axis Area at Systole)**

  In the Apical view, measure the LV length during the systolic phase.

LV Mass

You can measure the size of the left ventricle.

NOTE	In Dual 2D Mode, simultaneous images can be activated, and the images don't have to be scanned during the measurement.

- **LVAd sax epi (Left Ventricle Epicardial Diastolic Area, Short Axis View)**

  In the Short Axis view, measure the LV epi area during the diastolic phase.

- **LVAd sax endo (Left Ventricle Endocardial Diastolic Area, Short Axis View)**

  In the Short Axis view, measure the LV endo area during the diastolic phase.

- **LVLd apical (Left Ventricle apical length)**

  In the Apical view, measure the LV length during the diastolic phase.

RV (Right Ventricle)

You can perform measurements for the right ventricle.

NOTE	■ For RVAWd, RVIDd, RVAWs and RVIDs, please refer to the information on LV measurements. ■ MPA Diam, RPA Diam and LPA Diam can be measured in the Parasternal Short Axis view at the Aortic Valve level.

- **MPA Diam (Main Pulmonary Artery Diameter)**

  Measure the diameter of the Main Pulmonary Artery.

- **RPA Diam (Right Pulmonary Artery Diameter)**

  Measure the diameter of the Right Pulmonary Artery.

- **LPA Diam (Left Pulmonary Artery Diameter)**

  Measure the diameter of the Left Pulmonary Artery.

LA Vol. (Left Atrium Volume)

Measure the volume of the left atrium. For Diam1, Diam2 and Diam3, measure the Anterior-Posterior, Inferior-Superior and Lateral-Medial distances for the left atrium.

Ao / LA (Aortic Valve/ Left Atrium)

- **Ao Root (Aortic Root Diameter)**

  Measure the diameter of the Aortic Root.

- **LA Diam (Left Atrium Dimension)**

  Measure the distance between the Posterior Aortic Wall and Left Atrium Wall.

- **LVOT Diam (Left Ventricle Outflow Tract Diameter)**

  Measure the Aortic Valve Annulus point.

- **Asc Ao (Ascending Aortic Diameter)**

  Measure the diameter of the Ascending Aorta.

- **Desc Ao (Descending Aortic Diameter)**

  Measure the diameter of the Descending Aorta.

- **Ao Arch (Aortic Arch Diameter)**

  Measure the diameter of the Aortic Arch between the Ascending Aorta and Descending Aorta.

RA (Right Atrium)

Measure the volume of the right atrium. For Diam1, Diam2 and Diam3, measure Anterior-Posterior, Inferior-Superior and Lateral-Medial distances for the right atrium.

LVOT (Left Ventricular Outflow Tract)

- **LVOT Diam (Left Ventricular Outflow Tract Diameter)**

  Measure the diameter of the Left Ventricular Outflow Tract.

RVOT (Right Ventricular Outflow Tract)

- **RVOT Diam (Right Arterial Outflow Tract Diameter)**

  Measure the diameter of the Right Ventricular Outflow Tract.

AV (Aortic Valve)

- **AV Diam (Aortic Valve Diameter)**

  Measure the diameter of the AV in a 2D image.

- **AR VC Diam (Aortic Valve Regurgitation Vena Contracta Diameter)**

  Measure the shortest diameter.

MV (Mitral Valve)

- **MV Diam1, MV Diam 2 (Mitral Valve Diameter 1, 2)**

  Measure the diameter of the MV in a 2D image.

- **MR VC Diam (Mitral Valve Regurgitation Vena Contracta Diameter)**

  Measure the shortest diameter.

TV (Tricuspid Valve)

- **TV Diam (Tricuspid Valve Diameter)**

  Measure the diameter of the TV in a 2D image.

- **TR VC Diam (Tricuspid Valve Regurgitation Vena Contracta Diameter)**

  Measure the shortest diameter.

PV (Pulmonic Valve)

- **PV Diam (Pulmonic Valve Diameter)**

  Measure the diameter of the PV in a 2D image.

- **PR VC Diam (Pulmonic valve Regurgitation Vena Contracta Diameter)**

  Measure the shortest diameter.

Qp: Qs

- **LVOT Diam (Left Ventricular Outflow Tract Diameter)**

  Measure the diameter of the Left Ventricular Outflow Tract.

- **RVOT Diam (Right Ventricular Outflow Tract Diameter)**

  Measure the diameter of the Right Ventricular Outflow Tract.

PE (Pericardial Effusion)

- **PE Diam (Pericardial Effusion Diameter)**

  Measure the diameter of the area where the Posterior is clearly visible during the systolic phase.

- **PR VC Diam (PR Vena Contracta Diameter)**

  Measure the shortest diameter.

Cardiac Measurements in M Mode

You can measure all the items at once or select and measure specific items.

Measurement Menu	Item	Method	Unit
LV(M)	All	Continuous Measurement	
	IVSd	Distance Measurement	cm, mm
	LVIDd	Distance Measurement	cm, mm
	LVPWd	Distance Measurement	cm, mm
	RVAWd	Distance Measurement	cm, mm
	RVIDd	Distance Measurement	cm, mm
	IVSs	Distance Measurement	cm, mm
	LVIDs	Distance Measurement	cm, mm
	LVPWs	Distance Measurement	cm, mm
	RVAWs	Distance Measurement	cm, mm
	RVIDs	Distance Measurement	cm, mm
RV (M)	RVAWd	Distance Measurement	cm, mm
	RVIDd	Distance Measurement	cm, mm

Measurement Menu	Item	Method	Unit
RV (M)	RVAWs	Distance Measurement	cm, mm
	RVIDs	Distance Measurement	cm, mm
	Pre-EjectP	Time Measurement	ms
	Eject T	Time Measurement	ms
Ao / LA (M)	All	Continuous Measurement	
	Ao Root	Dist Y (M)	Cm, mm
	AV Cusp Sep	Dist Y (M)	Cm, mm
	LA Diam	Dist Y (M)	Cm, mm
	Pre-EjectP	Time Measurement	ms
	Eject T	Time Measurement	ms
AV	R-R Interval	Heart Rate	bpm
MV (M)	All Points	DEFAC EPSS	Cm, mm
	D-E	D-E	cm
	E-F Slope	E-F	Cm/s, m/s
	A-C Interval	A-C	ms
	EPSS	EPSS	Cm, mm
MV	R-R Interval	Heart Rate	bpm
TV	R-R Interval	Heart Rate	bpm
PV	R-R Interval	Heart Rate	bpm

LV (M)

The measurement method is the same as in 2D Mode.

RV (M)

The measurement method is the same as for RV in 2D Mode.

Ao / LA (M) (Aortic Valve / Left Atrium)

- **Ao Root (Aortic Root)**

  Measure the diameter of the Aortic Valve during the end diastolic phase.

- **AV Cusp Sep (Aortic Valve Cusp Separation)**

  Measure the distance between Coronary Cusp and Coronary Cusp.

- **LA Diam (Left Atrium Diameter)**

  Measure the distance between the Posterior Aortic Wall and Left Atrium Wall.

- **Pre-Eject P (Pre-Ejection Period)**

  Measure the time duration by measuring the distance between the ECG's Q Wave and the Aortic Valve Opening.

- **Eject T (Ejection Time)**

  Measure the time duration by measuring the distance between the Aortic Valve Opening and the Aortic Valve Closing.

AV (Aortic Valve)

- **R-R Interval (Interval between Two R-waves)**

  Measure the distance between consecutive R waves on the ECG.

NOTE	**The R-R Interval** for MV, TV and PV can be measured in the same way.

MV (M) (Mitral Valve)

- **A-C Interval**

  Calculate the time duration by measuring the distance between the A and C points in the **Mitral Valve Measurement** screen.

- **D-E Excursion**

  Measure the distance between the D point of the Mitral Valve Opening and the E point of the Anterior Mitral Valve.

- **D-E Slope**

  Calculate the velocity by measuring the distance between the D and E points in the **Mitral Valve Measurement** screen.

- **E-F Slope**

  Calculate the velocity by measuring the distance between the E and F points in the **Mitral Valve Measurement** screen.

■ **EPSS (Mitral Valve E Point to Septal Separation)**

Measure the distance between the E point and the Posterior Interventricular Septum in the **Mitral Valve Measurement** screen. You can measure only upwards from the E point, and only downwards from Apex.

Cardiac Measurements in Color Doppler Mode

These measurements mainly concern the reversal of cardiac blood flow.

Measurement Menu	Item	Method	Unit
AV	PISA-Radius	Distance Measurement (C Mode)	cm, mm
	PISA-Alias Vel.	Velocity Measurement	m/s
MV	Same as the above		
TV	Same as the above		

■ **PISA-Radius (Proximal Isovelocity Surface Area-Radius)**

Measures the distance between the Valve and First Isovelocity.

■ **PISA-Alias Vel. (Proximal Isovelocity Surface Area-Alias Velocity)**

Calculate the value by multiplying the result value of the PISA-Radius by the regurgitated peak velocity of the color bar.

NOTE The velocity value is needed to measure the items above. Therefore, select Velocity or Vel + Var as the color display. For more information, please refer to “Color Doppler Mode” in Chapter 4 “Diagnosis Mode.”

Cardiac Measurements in Spectral Doppler Mode

Measurement Menu	Item	Method	Unit
LVOT	Auto Trace	Doppler Spectrum Trace	
	Limited Trace	Doppler Spectrum Trace	
	Manual Trace	Doppler Spectrum Trace	
	Vmax	Velocity Measurement	cm/s, m/s
	VTI	Distance Measurement	cm, mm

Measurement Menu	Item	Method	Unit
LVOT	Acc T	Time Measurement	ms
	Eject T	Time Measurement	ms
RVOT	Auto Trace	Doppler Spectrum Trace	
	Limited Trace	Doppler Spectrum Trace	
	Manual Trace	Doppler Spectrum Trace	
	Vmax	Velocity Measurement	cm/s, m/s
	VTI	Distance Measurement	cm, mm
	Eject T	Time Measurement	ms
AV	AV Auto Trace	Doppler Spectrum Trace	
	AV Limited Trace	Doppler Spectrum Trace	
	AV Manual Trace	Doppler Spectrum Trace	
	AV Vmax	Velocity Measurement	cm/s, m/s
	AV PHT	Time Measurement	ms
	AV VTI	Distance Measurement	cm, mm
	AV AccT	Time Measurement	ms
	AV DecT	Time Measurement	ms
	AV Eject T	Time Measurement	ms
	AR Auto Trace	Doppler Spectrum Trace	
	AR Limited Trace	Doppler Spectrum Trace	
	AR Manual Trace	Doppler Spectrum Trace	
	AR Vmax	Velocity Measurement	cm/s, m/s
	AR PHT	Time Measurement	ms
	AR VTI	Distance Measurement	cm, mm
	AR Acc T	Time Measurement	ms
	AR Dec T	Time Measurement	ms
	IVRT	Time Measurement	ms
	IVCT	Time Measurement	ms
MV	MV Limited Trace	Doppler Spectrum Trace	
	MV Manual Trace	Doppler Spectrum Trace	

Measurement Menu	Item	Method	Unit
MV	E-DT-A	Time–Velocity-Time Measurement	ms & m/s
	MV Peak E	Velocity Measurement	cm/s, m/s
	MV Peak A	Velocity Measurement	cm/s, m/s
	MV PHT	Time Measurement	ms
	MV VTI	Distance Measurement	cm, mm
	MV AccT	Time Measurement	ms
	MV DecT	Time Measurement	ms
	A-wave Dur.	Time Measurement	ms
	MV Eject T	Time Measurement	ms
	IVRT	Time Measurement	ms
	IVCT	Time Measurement	ms
	MR Auto Trace	Doppler Spectrum Trace	
	MR Limited Trace	Doppler Spectrum Trace	
	MR Manual Trace	Doppler Spectrum Trace	
	MR Vmax	Velocity Measurement	cm/s, m/s
	MR VTI	Distance Measurement	cm, mm
	MR dp / dt	Calculation after Time Measurement	mmHg/s
TV	TV Limited Trace	Doppler Spectrum Trace	
	TV Manual Trace	Doppler Spectrum Trace	
	TV Peak E	Velocity Measurement	cm/s, m/s
	TV Peak A	Velocity Measurement	cm/s, m/s
	TV PHT	Time Measurement	ms
	TV VTI	Distance Measurement	cm, mm
	TV AccT	Time Measurement	ms
	TV DecT	Time Measurement	ms
	A-wave Dur.	Time Measurement	ms
	Q to TV Open	Time Measurement	ms
	TR Auto Trace	Doppler Spectrum Trace	

Measurement Menu	Item	Method	Unit
TV	TR Limited Trace	Doppler Spectrum Trace	
	TR Manual Trace	Doppler Spectrum Trace	
	TR Vmax	Velocity Measurement	cm/s, m/s
	TR VTI	Distance Measurement	cm, mm
	TR dp/dt	Calculation after Time Measurement	mmHg/s
PV	PV Auto Trace	Doppler Spectrum Trace	
	PV Limited Trace	Doppler Spectrum Trace	
	PV Manual Trace	Doppler Spectrum Trace	
	PV Vmax	Velocity Measurement	cm/s, m/s
	PV PHT	Time Measurement	ms
	PV AccT	Time Measurement	ms
	PV DecT	Time Measurement	ms
	PV EjectT	Time Measurement	ms
	Q to PV Close	Time Measurement	ms
	PR Auto Trace	Doppler Spectrum Trace	
	PR Limited Trace	Doppler Spectrum Trace	
	PR Manual Trace	Doppler Spectrum Trace	
	PR Vmax	Velocity Measurement	cm/s, m/s
	MPA Vmax	Velocity Measurement	cm/s, m/s
	PR PHT	Time Measurement	ms
Tei Index	All	Calculation after Continuous Measurement	
	MCO	Time Measurement	ms
	Eject T	Time Measurement	ms
Plum. Veins	All	Continuous Measurement	
	Sys Vel.	Velocity Measurement	cm/s, m/s
	Dias Vel.	Velocity Measurement	cm/s, m/s
	A. Rev Vel.	Velocity Measurement	cm/s, m/s
	A. Rev Dur.	Time Measurement	ms

Measurement Menu	Item	Method	Unit
Hepatic Veins	Same as the above		
Tissue Doppler	All	Continuous Measurement	
	Peak E'	Velocity Measurement	cm/s, m/s
Tissue Doppler	Peak A'	Velocity Measurement	cm/s, m/s
	Peak S'	Velocity Measurement	cm/s, m/s
	AccT	Time Measurement	ms
	DecT	Time Measurement	ms
Qp: Qs	Sys.HR	Heart Rate	bpm
	Sys.VTI	Distance Measurement	cm, mm
	Plum. HR	Heart Rate	bpm
	Plum. VTI	Distance Measurement	cm, mm
HR	HR	Heart Rate	bpm

NOTE For information on basic measurements, please refer to "Common Measurement Methods" in this chapter.

LVOT (Left Ventricular Outflow Tract)

These items are automatically measured by tracing a Spectral Doppler image. However, each item can also be selectively measured.

- **Vmax (Max Velocity)**
  Measure the max. velocity value.
- **VTI (Velocity Time Integral)**
  Calculate the value using the formula **VTI = Sum of $V_i \times \Delta t$** after tracing a Spectral Doppler image.
- **AccT (Acceleration Time)**
  Measure the acceleration for blood flow.
- **EjectT (Ejection Time)**
  Measure the time by measuring the distance between the Aortic Valve Opening and Aortic Valve Closing.

RVOT (Right Ventricular Outflow Tract)

The measurement methods are the same as with LVOT.

AV (Aortic Valve)

- **IVRT (Left Ventricle Isovolumic Relaxation Time)**

  Measure the time between the end of the systolic phase and the start of the initial diastolic blood flow.

MV (Mitral Valve)

- **E-DT-A**

  Measure Peak E, Deceleration Time and Peak A in turns.

- **Peak E**

  Measure Peak E Velocity at the Ventricular Systole peak.

- **Peak A**

  Measure Peak A Velocity at the Arterial Systole peak.

- **PHT (Pressure Half Time)**

  Calculate the Half-Time using the Pressure gradient value obtained between the E point of the Valve and the baseline.

- **DecT (Deceleration Time)**

  Indicates the blood flow reduction time during the initial diastolic phase. Measure the time taken for **Vmax** or **Peak E** to change from the max. value to 0.

- **A-Wave Dur. (A-Wave Duration)**

  Measure the A wave period for MV or TV.

TV (Tricuspid Valve)

- **Q to TV Open**

  Measure the time taken for TV to open at Q-wave.

PV (Pulmonic Valve)

- **Q to PV Close**

  Measure the time taken for PV to close at Q-wave.

Tei Index

- **All**

  Perform continuous measurements for all items.

- **MCO (Mitral valve Closed-Open time)**

  Measure the time taken for the Mitral Valve to close and open again.

- **Eject T**

  Measure Ejection Time.

Plum. Veins (Pulmonary Veins)

- **Dias Vel.**

  Measure the velocity during the diastolic phase.

- **Sys Vel.**

  Measure the velocity during the systolic phase.

- **A. Rev Vel.**

  Measure the max. velocity of Arterial Reversal caused by LV contraction.

- **A. Rev Dur.**

  Measure the time duration by measuring the distance between the Mitral Valve Closing and the heart diastolic point.

Hepatic Vein

Pulm. The measurement method is the same as with veins.

Tissue Doppler

NOTE	Take measurements in TDI (Tissue Doppler Imaging) Mode.

- **Peak A'**

  Measure the velocity during the later diastolic phase.

- **Peak E'**

  Measure the velocity during the initial diastolic phase.

- **Peak S**

  Measure the peak during the systolic phase.

Qp: Qs

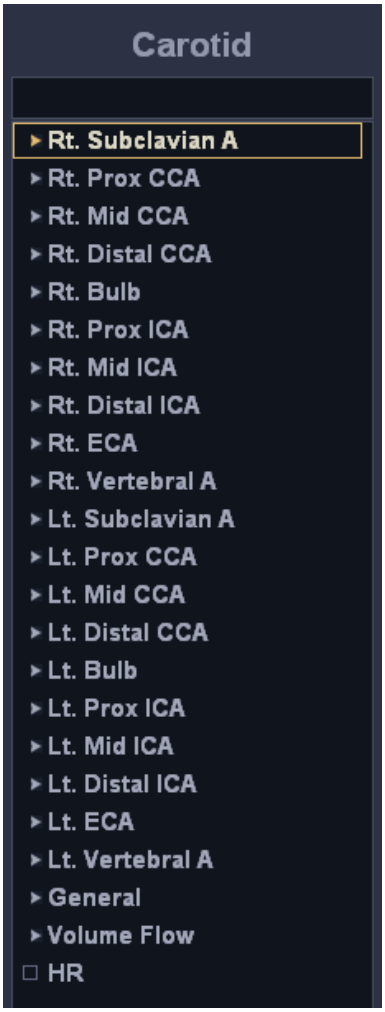
- **Sys. HR (Systemic Heart Rate)**
  Measure the heart rate by measuring the diastolic and systolic phases for LVOT Flow.
- **Sys. VTI (Systemic Velocity Time Integral)**
  Measure VTI by tracing LVOT Flow.
- **Pulm. HR (Pulmonic Heart Rate)**
  Measure the heart rate by measuring the diastolic and systolic phases for RVOT Flow.
- **Pulm. VTI (Pulmonic Velocity Time Integral)**
  Measure VTI by tracing RVOT Flow.

Carotid Calculation

Before Taking Carotid Measurements

Set the related menus for convenient measurement. You can also specify how an area and volume are calculated. Please refer to the “Setting Measurements” section in Chapter 3 “Setting” for more information on the measurement menus and settings.

Measurement Menu



[Figure 5.12 Carotid Measurement Menu]

The measurement menu items are arranged in the order in which they are used most during carotid diagnosis.
The measurement method for each item is the same as for basic measurement.

Measured items are automatically recorded in a report.

NOTE	For information on basic measurements, please refer to “Basic Measurements” in this chapter.

Measurement Menu	Item	Method	Unit
Rt. / Lt. Subclavian A	Auto Trace	Doppler Spectrum Trace	
	Limited Trace	Doppler Spectrum Trace	
	Manual Trace	Doppler Spectrum Trace	
	PSV	Velocity Measurement	cm/s, m/s
	EDV	Velocity Measurement	cm/s, m/s
	%StA	Calculate after Area Measurement	%
	%StD	Calculate after Distance Measurement	%
	Vesl. Area	Area Measurement	cm^2, mm^2
	Vesl. Dist	Distance Measurement	cm, mm
Rt. / Lt. Prox CCA	Auto Trace	Doppler Spectrum Trace	
	Limited Trace	Doppler Spectrum Trace	
	Manual Trace	Doppler Spectrum Trace	
	PSV	Velocity Measurement	cm/s, m/s
	EDV	Velocity Measurement	cm/s, m/s
	%StA	Calculate after Area Measurement	%
	%StD	Calculate after Distance Measurement	%
	Vesl. Area	Area Measurement	cm^2, mm^2
	Vesl. Dist	Distance Measurement	cm, mm
	IMT	Distance Measurement	cm, mm
Rt. / Lt. Mid CCA	Same as the above		
Rt. / Lt. Distal CCA	Same as the above		
Rt. / Lt. Bulb	Same as the above		
Rt. / Lt. Prox ICA	Same as the above		
Rt. / Lt. Mid ICA	Same as the above		

Measurement Menu	Item	Method	Unit
Rt. / Lt. Distal ICA	Same as the above		
Rt. / Lt. ECA	Same as the above		
Rt. / Lt. Vertebral A	Rt. Same as Subclavian A		
General	Same as Rt. Subclavian A		
Volume Flow	Volume Flow	Calculation after Distance Measurement	ml/m
HR	HR	Heart Rate	bpm

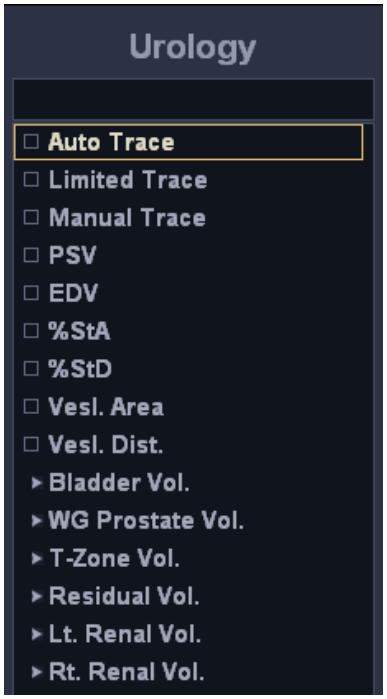
Urology Calculation

Before Taking Urology Measurements

Set the related menus for convenient measurement.

You can select the volume method for measurement. There are four types of volume method. The factor value can be set manually for the formulae that need it.
For more information on the measurement menus and settings, please refer to “Setting Measurements” in Chapter 3 “Settings.”

Measurement Menu



[Figure 5.13 Urology Measurement Menu]

The measurement menu items are arranged in the order in which they are used most during urology diagnosis.
The measurement method for each item is the same as for basic measurement.
Measured items are automatically recorded in a report.

NOTE	■ For information on basic measurements, please refer to “Basic Measurements” in this chapter. ■ For references on measurement items, please refer to “Reference Manual – Part 2.”

Urology Measurements in 2D Mode

NOTE

- The measurement methods of each menu vary with the Volume Method set in the Setup menu.
- The measurement of Transitional Zone Prostate Volume, Bladder Volume, Left Renal Volume, and Right Renal Volume is the same as for Prostate Volume.

3Distance

Calculate a volume by measuring three distances.

Measurement Menu	Item	Method	Unit
General	%StA	Calculate after Area Measurement	%
	%StD	Calculate after Distance Measurement	%
	Vesl.Area	Area Measurement	cm^2, mm^2
	Vesl.Dist.	Distance Measurement	cm, mm
Bladder Vol.	All	Calculate after Distance Measurement	ml
	Length	Distance Measurement	cm, mm
	Height	Distance Measurement	cm, mm
	Width	Distance Measurement	cm, mm
WG Prostate Vol.	Same as the above		
T-Zone Vol.	Same as the above		
Residual Vol.	Pre All	Calculate after Distance Measurement	ml
	Pre Length	Distance Measurement	cm, mm
	Pre Height	Distance Measurement	cm, mm
	Pre Width	Distance Measurement	cm, mm
	Post All	Calculate after Distance Measurement	cm, mm
	Post Length	Distance Measurement	cm, mm
	Post Height	Distance Measurement	cm, mm
	Post Width	Distance Measurement	cm, mm

Measurement Menu	Item	Method	Unit
Rt. / Lt. Renal Vol.	All	Calculate after Distance Measurement	ml
	Length	Distance Measurement	cm, mm
	Height	Distance Measurement	cm, mm
	Width	Distance Measurement	cm, mm
	Renal Pelvis	Distance Measurement	cm, mm

3 Distance * Factor

The same as for “3 Distance.”

Ellipsoid

Calculate a volume by using the Main Diameter and Beside Diameter values.

Measurement Menu	Item	Method	Unit
Bladder Vol.	All	Calculate after Distance Measurement	ml
	Main Dia.	Distance Measurement	cm, mm
	Beside Dia.	Distance Measurement	cm, mm
WG Prostate Vol.	Same as the above		
T-Zone Vol.	Same as the above		
Residual Vol.	Pre All	Calculate after Distance Measurement	ml
	Pre Main Dia.	Distance Measurement	cm, mm
	Pre Beside Dia.	Distance Measurement	cm, mm
	Post All	Calculate after Distance Measurement	ml
	Post Main Dia.	Distance Measurement	cm, mm
	Post Beside Dia.	Distance Measurement	cm, mm
Rt. / Lt. Renal Vol.	All	Calculate after Distance Measurement	ml
	Main Dia.	Distance Measurement	cm, mm
	Beside Dia.	Distance Measurement	cm, mm

Measurement Menu	Item	Method	Unit
Rt. / Lt. Renal Vol	Renal Pelvis	Distance Measurement	cm, mm
Rt. Renal Vol.	Same as the above		

Sum of 20 Disks

After measuring the circumference of a prostate, use the **Trackball** and the **Set** button to calculate the volume by measuring the axis of the prostate.

Measurement Menu	Item	Method	Unit
Bladder Vol.	Vol.	Calculate after Distance Measurement (Dist20)	ml
WG Prostate Vol.	Same as the above		
T-Zone Vol.	Same as the above		
Residual Vol.	Pre Vol.	Calculate after Distance Measurement (Dist20)	ml
	Post Vol.	Calculate after Distance Measurement (Dist20)	ml
Rt. / Lt. Renal Vol.	Vol.	Calculate after Distance Measurement (Dist20)	ml
	Renal Pelvis	Calculate after Distance Measurement (Dist20)	ml

Urology Measurements in Spectral Doppler Mode

Measurement Menu	Item	Method	Unit
General	Auto Trace	Doppler Spectrum Trace	cm, mm
	Limited Trace	Doppler Spectrum Trace	cm, mm
	Manual Trace	Doppler Spectrum Trace	cm, mm
	PSV	Velocity Measurement	cm/s, m/s
	EDV	Velocity Measurement	cm/s, m/s

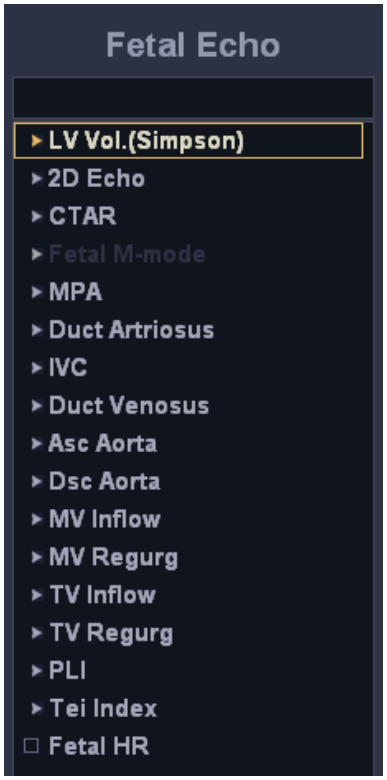
Fetal Echo Calculation

Before Taking Fetal Echo Measurements

Set the related menus for convenient measurement. You can also specify how volume can be calculated.

Please refer to the “Setting Measurements” section in Chapter 3 “Setting” for more information on the measurement menus and settings.

Measurement Menu



[Figure 5.14 Fetal Echo Measurement Menu]

The measurement menu items are arranged in the order in which they are used most during fetal echo diagnosis.
The measurement method for each item is the same as for basic measurement. In addition, measurement items are similar to those for cardiac calculation.

Measured items are automatically recorded in a report.

NOTE	■ For information on basic measurements, please refer to “Basic Measurements” in this chapter. ■ For references on measurement items, please refer to “Reference Manual – Part 2.”

Fetal Echo Measurements in 2D Mode

Measurement Menu	Item	Method	Unit
LV Vol. (Simpson)	A2C Vol.d	Dist 20	ml
	A2C Vol.s	Dist 20	ml
	A4C Vol.d	Dist 20	ml
	A4C Vol.s	Dist 20	ml
2D Echo	Asc Ao	Distance Measurement	cm, mm
	MPA Diam	Distance Measurement	cm, mm
	Duct Art	Distance Measurement	cm, mm
	LA Diam	Distance Measurement	cm, mm
	RA Diam	Distance Measurement	cm, mm
	RV Diam	Distance Measurement	cm, mm
	IVS	Distance Measurement	cm, mm
	LVIDd	Distance Measurement	cm, mm
	LVIDs	Distance Measurement	cm, mm
	LVPW	Distance Measurement	cm, mm
	HrtC	Circumference Measurement	cm, mm
	ThC	Circumference Measurement	cm, mm
CTAR	All (D)	Calculation after Distance Measurement	%
	ThD ap	Distance Measurement	cm, mm
	ThD trans	Distance Measurement	cm, mm
	HrtD ap	Distance Measurement	cm, mm
	HrtD trans	Distance Measurement	cm, mm
	All (A)	Calculation after Area Measurement	%
	ThA	Area Measurement	cm^2, mm^2
	HrtA	Area Measurement	cm^2, mm^2

2D Echo

The fetal heart is measured for diagnosis. Please refer to “Cardiology Measurements” in this chapter.

CTAR (Cardo-Thorax Area Ratio)

This measurement is intended for comparison of the fetal chest and heart. Compare values by obtaining ThD ap, ThD trans, HrtD ap and HrtD trans.

$$CTAR = \frac{\text{HrtD ap} \times \text{HrtD trans}}{\text{ThD ap} \times \text{ThD trans}} \times 100$$

Fetal Echo Measurements in M Mode

Measurement Menu	Item	Method	Unit
Fetal M-mode	All	Continuous Measurement	cm, mm
	IVSd	Distance Measurement	cm, mm
	LVIDd	Distance Measurement	cm, mm
	LVPWd	Distance Measurement	cm, mm
	IVSs	Distance Measurement	cm, mm
	LVIDs	Distance Measurement	cm, mm
	LVPWs	Distance Measurement	cm, mm
	RVDd	Distance Measurement	cm, mm

- **IVSd (Intraventricular Septum Diastolic Thickness)**

  Measure AIVS and PIVS during the diastolic phase.

- **LVIDd (Left Ventricle Internal End Diastolic dimension)**

  Measure ENDO during the diastolic phase.

- **LVPWd (Left Ventricle Posterior Wall Diastolic Thickness)**

  Measure EPI during the diastolic phase.

- **IVSs (Interventricular Septum Systolic Thickness)**

  Measure AIVS (the Anterior Interventricular Septum) and PIVS (the Posterior Interventricular Septum) during the systolic phase.

■ **LVIDs (Left Ventricle Internal Systolic Dimension)**

Measure ENDO (the End Cardinal Surface of the Left Ventricular Wall) during the systolic phase.

■ **LVPWs (Left Ventricle Posterior Wall Systolic Dimension)**

Measure EPI (the Epicardinal Surface of the Left Ventricular Wall) during the systolic phase.

■ **RVDd (Right Ventricle Diastolic Dimension)**

The measurement method is the same as for LVDd.

Fetal Echo Measurements in Spectral Doppler Mode

Measurement Menu	Item	Method	Unit
MPA	Auto Trace	Doppler Spectrum Trace	
	Limited Trace	Doppler Spectrum Trace	
	Manual Trace	Doppler Spectrum Trace	
	PSV	Velocity Measurement	cm/s, m/s
	EDV	Velocity Measurement	cm/s, m/s
Duct Artriosus	Same as the above		
IVC	Same as the above		
Duct Venosus	Same as the above		
Asc Aorta	Same as the above		
Dsc Aorta	Same as the above		
MV Inflow	Peak E	Velocity Measurement	cm/s, m/s
	Peak A	Velocity Measurement	cm/s, m/s
MV Regurg	Vel.	Velocity Measurement	cm/s, m/s
TV Inflow	Same as MV Inflow	Velocity Measurement	cm/s, m/s
TV Regurg	Same as MV Regurg	Velocity Measurement	cm/s, m/s
PLI	All	Calculation after Velocity Measurement	cm/s, m/s
	Sys Flow	Velocity Measurement	cm/s, m/s

PLI	Dias Flow	Velocity Measurement	cm/s, m/s
	A. Rev Flow	Velocity Measurement	cm/s, m/s
Tei Index	All	Calculation after Continuous Measurement	
	MCO	Time Measurement	ms
	Eject T	Time Measurement	ms
Fetal HR	Fetal Heart Rate	Heart Rate	bpm

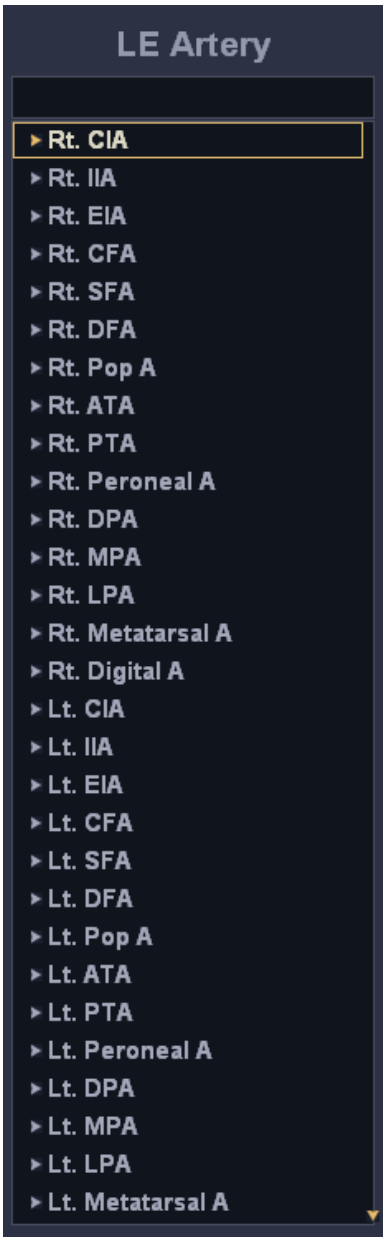
For information on measurement methods, please refer to “Measurements in Doppler Spectrum Mode” in this chapter. The full name of the measurement menu items is shown below:

- MPA (Main Pulmonary Artery)
- Duct Artriosus
- IVC (Inferior Vena Cava)
- Duct Venosus
- Asc Aorta (Ascending Aorta)
- Dsc Aorta (Descending Aorta)
- MV (Mitral Valve) Inflow
- MV Regurg (Regurgitation)
- TV (Tricuspid Valve) Inflow
- TV Regurg (Regurgitation)
- PLI (PreLoad Index)
- Fetal HR (Fetal Heart Rate)

LE Artery Calculations

Perform LE Artery (Lower Extremity Artery) measurements.

Measurement Menu



[Figure 5.16 LE Artery Measurement Menu]

The measurement menu items are arranged in the order in which they are used most during LE artery diagnosis.
The measurement method for each item is the same as for basic measurement.

Measured items are automatically recorded in a report.

NOTE

- For information on basic measurements, please refer to “Basic Measurements” in this chapter.
- For references on measurement items, please refer to “Reference Manual – Part 2.”

Measurement Menu	Item	Method	Unit
Rt. / Lt. CIA	Auto Trace	Doppler Spectrum Trace	
	Limited Trace	Doppler Spectrum Trace	
	Manual Trace	Doppler Spectrum Trace	
	PSV	Velocity Measurement	cm/s, m/s
	EDV	Velocity Measurement	cm/s, m/s
	%StA	Calculate after Area Measurement	%
	%StD	Calculate after Distance Measurement	%
	Vesl. Dist	Distance Measurement	cm, mm
	Vesl. Area	Area Measurement	cm^2, mm^2
Rt. / Lt. IIA	Same as the above		
Rt. / Lt. EIA	Same as the above		
Rt. / Lt. CFA	Same as the above		
Rt. / Lt. SFA	Same as the above		
Rt. / Lt. DFA	Same as the above		
Rt. / Lt. Pop A	Same as the above		
Rt. / Lt. ATA	Same as the above		
Rt. PTA	Same as the above		
Rt. / Lt. Peroneal A	Same as the above		
Rt. / Lt. DPA	Same as the above		
Rt. / Lt. MPA	Same as the above		
Rt. / Lt. LPA	Same as the above		

Measurement Menu	Item	Method	Unit
Rt. / Lt. Metatarsal A	Same as the above		
Rt. / Lt. Digital A	Same as the above		
General	Same as the above		
Volume Flow	Volume Flow	Calculation after Distance Measurement	ml/m
HR	Heart Rate	Heart Rate	bpm

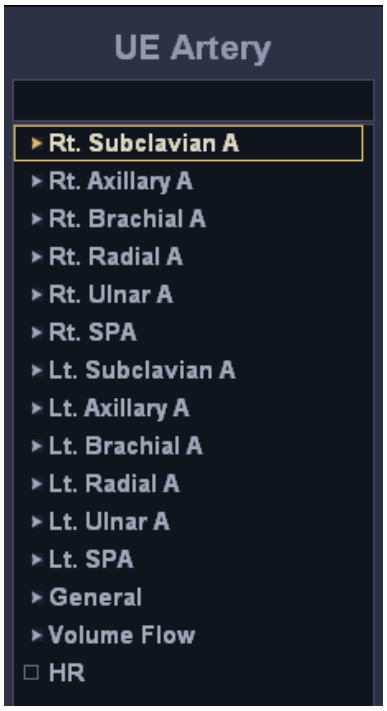
Measurement Method

It is convenient to calculate each measurement value from the Spectral Doppler image.

UE Artery Calculation

Perform UE Artery (Upper Extremity Artery) measurements.

Measurement Menu



[Figure 5.16 UE Artery Measurement Menu]

The measurement menu items are arranged in the order in which they are used most during UE artery diagnosis.
The measurement method for each item is the same as for basic measurement.

Measured items are automatically recorded in a report.

NOTE	■ For information on basic measurements, please refer to “Basic Measurements” in this chapter. ■ For references on measurement items, please refer to “Reference Manual – Part 2.”

Measurement Menu	Item	Method	Unit
Rt. / Lt. Subclabian A	Auto Trace	Doppler Spectrum Trace	
	Limited Trace	Doppler Spectrum Trace	
	Manual Trace	Doppler Spectrum Trace	
	PSV	Velocity Measurement	cm/s, m/s
	EDV	Velocity Measurement	cm/s, m/s
	%StA	Calculate after Area Measurement	%
	%StD	Calculate after Distance Measurement	%
	Vesl. Dist	Distance Measurement	cm, mm
	Vesl. Area	Area Measurement	cm^2, mm^2
Rt. / Lt. Auxiliary A	Same as the above		
Rt. / Lt. Brachial A	Same as the above		
Rt. / Lt. Radial A	Same as the above		
Rt. / Lt. Ulnar A	Same as the above		
Rt. / Lt. SPA	Same as the above		
General	Same as the above		
Volume Flow	Volume Flow	Calculation after Distance Measurement	ml/m
Fetal HR	Fetal Heart Rate	Heart Rate	bpm

Measurement Method

It is convenient to calculate each measurement value from the Spectral Doppler image.

LE Vein Calculation

Perform LE Vein (Lower Extremity Vein) measurements.

Measurement Menu

The measurement menu items are arranged in the order in which they are used most during LE vein diagnosis.
The measurement method for each item is the same as for basic measurement.

Measured items are automatically recorded in a report.

NOTE	■ For information on basic measurements, please refer to “Basic Measurements” in this chapter. ■ For references on measurement items, please refer to “Reference Manual – Part 2.”

[Figure 5.17 LE Vein Measurement Menu]

Measurement Menu	Item	Method	Unit
Rt. / Lt. FV	Auto Trace	Doppler Spectrum Trace	
	Limited Trace	Doppler Spectrum Trace	
	Manual Trace	Doppler Spectrum Trace	
	Vmax	Velocity Measurement	cm/s, m/s
	Dur T	Measurement of Time Taken	ms
	Vesl. Dist.	Distance Measurement	cm, mm
Rt. / Lt GSV	Same as the above		
Rt. / Lt POP V	Same as the above		
Rt. / Lt SSV	Same as the above		
Rt. / Lt MPV	Same as the above		
Rt. / Lt LPV	Same as the above		
Rt. / Lt Metatarsal V	Same as the above		
Rt. / Lt Digital V	Same as the above		
General	Same as the above		

Measurement Method

It is convenient to calculate each measurement value from the Spectral Doppler image.

UE Vein Calculation

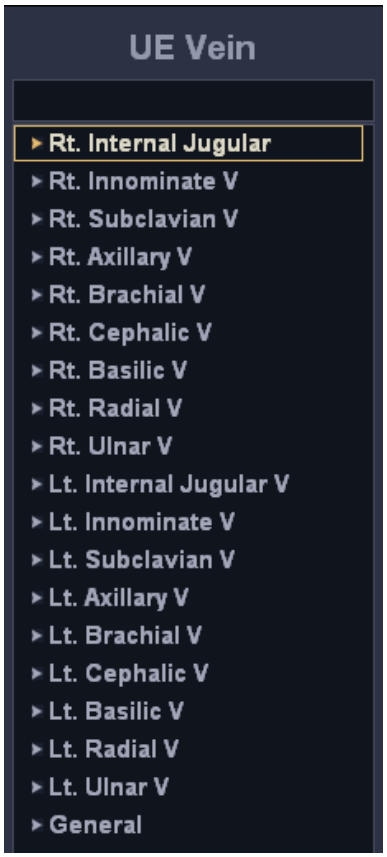
Perform UE Artery (Upper Extremity Vein) measurements.

Measurement Menu

The measurement menu items are arranged in the order in which they are used most during UE vein diagnosis.
The measurement method for each item is the same as for basic measurement.

Measured items are automatically recorded in a report.

NOTE	■ For information on basic measurements, please refer to “Basic Measurements” in this chapter. ■ For references on measurement items, please refer to “Reference Manual – Part 2.”



[Figure 5.18 UE Vein Measurement Menu]

Measurement Menu	Item	Method	Unit
Rt. / Lt. Internal Jugular	Auto Trace	Doppler Spectrum Trace	
	Limited Trace	Doppler Spectrum Trace	
	Manual Trace	Doppler Spectrum Trace	
	PSV	Speed Measurement	cm/s, m/s
	EDV	Velocity Measurement	cm/s, m/s
	%StA	Calculate after Area Measurement	%
	%StD	Calculate after Distance Measurement	%
	Vesl. Dist	Distance Measurement	cm, mm
	Vesl. Area	Area Measurement	cm^2, mm^2
	Vel A	Velocity Measurement	cm/s, m/s
	Vel B	Velocity Measurement	cm/s, m/s
Rt. / Lt. Innominate V	Same as the above		
Rt. / Lt. Subclavian V	Same as the above		
Rt. / Lt. Axillary V	Same as the above		
Rt. / Lt. Brachial V	Same as the above		
Rt. / Lt. Cephalic V	Same as the above		
Rt. / Lt. Basilic V	Same as the above		
Rt. / Lt. Radial V	Same as the above		
Rt. / Lt. Ulnar V	Same as the above		
General	Same as the above		

Measurement Method

It is convenient to calculate each measurement value from the Spectral Doppler image.

Radiology Calculation

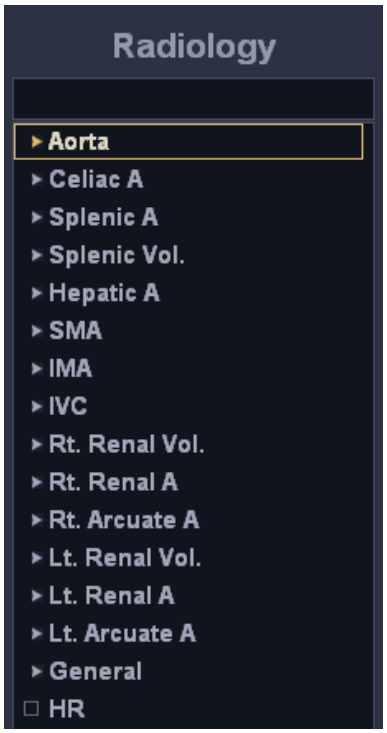
Perform Radiology measurements.

Measurement Menu

The measurement menu items are arranged in the order in which they are used most during radiology diagnosis.
The measurement method for each item is the same as for basic measurement.

Measured items are automatically recorded in a report.

NOTE	For information on basic measurements, please refer to “Basic Measurements” in this chapter.



[Figure 5.19 Radiology Measurement Menu]

Measurement Menu	Item	Method	Unit
Aorta	Auto Trace	Doppler Spectrum Trace	
	Limited Trace	Doppler Spectrum Trace	
	Manual Trace	Doppler Spectrum Trace	
	PSV	Velocity Measurement	cm/s, m/s
	EDV	Velocity Measurement	cm/s, m/s
	%StA	Calculate after Area Measurement	%
	%StD	Calculate after Distance Measurement	%
	Vesl. Dist	Distance Measurement	cm, mm
	Vesl. Area	Area Measurement	cm^2, mm^2
Celiac A	Same as the above		
Splenic A	Same as the above		
Splenic Vol.	All	Calculate after Distance Measurement	ml
	Length	Distance Measurement	cm, mm
	Height	Distance Measurement	cm, mm
	Width	Distance Measurement	cm, mm
Hepatic A	Same as the Aorta		
SMA	Same as the above		
IMA	Same as the above		
IVC	Same as the above		
Rt. / Lt. Renal Vol.	Same as the Splenic Vol.	Volume Measurement	ml
Rt. / Lt. Renal A	Same as the Aorta		
Rt. / Lt. Arcuate A	Same as the above		
General	Same as the above		
HR	Fetal Heart Rate	Heart Rate	bpm

Measurement Method

It is convenient to calculate each measurement value from the Spectral Doppler image.

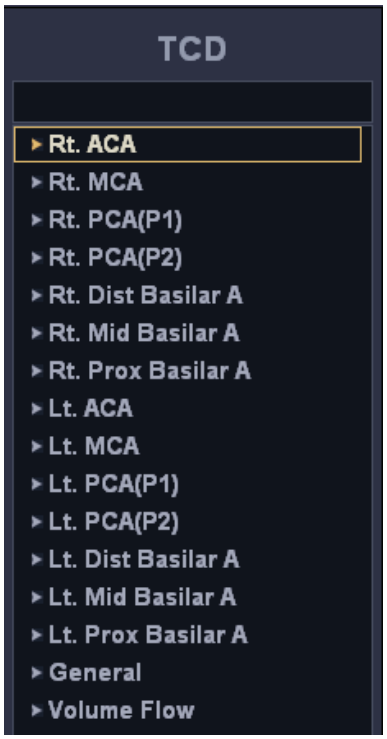
TCD Calculation

Perform Transcranial Doppler measurements.

Measurement Menu

The measurement method for each item is the same as for basic measurement.

Measured items are automatically recorded in a report.



[Figure 5.20 TCD Measurement Menu]

NOTE	For information on basic measurements, please refer to “Basic Measurements” in this chapter.

Measurement Menu	Item	Method	Unit
Rt. / Lt. ACA	Auto Trace	Doppler Spectrum Trace	
	Limited Trace	Doppler Spectrum Trace	
	Manual Trace	Doppler Spectrum Trace	
	PSV	Velocity Measurement	cm/s, m/s
	EDV	Velocity Measurement	cm/s, m/s
	%StA	Calculate after Area Measurement	%
	%StD	Calculate after Distance Measurement	%
	Vesl. Dist	Distance Measurement	cm, mm
	Vesl. Area	Area Measurement	cm^2, mm^2
Rt. / Lt. MCA	Same as the above		
Rt. / Lt. PCA(P1)	Same as the above		
Rt. / Lt. PCA(P2)	Same as the above		
Rt. / Lt. Distal Basilar A	Same as the above		
Rt. / Lt. Mid Basilar A	Same as the above		
Rt. / Lt. Prox Basilar A	Same as the above		
General	Same as the above		
Volume Flow	Volume Flow(D)	Calculate after Distance Measurement	ml/m

Measurement Method

It is convenient to calculate each measurement value from the Spectral Doppler image.

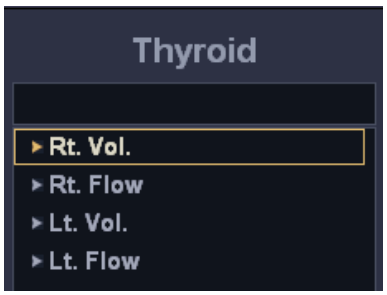
Thyroid Calculation

Perform thyroid measurements.

Measurement Menu

The measurement method for each item is the same as for basic measurement.

Measured items are automatically recorded in a report.



[Figure 5.21 Thyroid Measurement Menu]

NOTE	For information on basic measurements, please refer to “Basic Measurements” in this chapter.

Measurement Menu	Item	Method	Unit
Rt. / Lt. Vol.	Vol.	Calculate after Distance Measurement	ml
	Length	Distance Measurement	cm, mm
	Height	Distance Measurement	cm, mm
	Width	Distance Measurement	cm, mm
Rt. / Lt. Flow	Auto Trace	Doppler Spectrum Trace	
	Limited Trace	Doppler Spectrum Trace	
	Manual Trace	Doppler Spectrum Trace	
	PSV	Velocity Measurement	cm/s, m/s
	EDV	Velocity Measurement	cm/s, m/s
	Vesl. Dist	Distance Measurement	cm, mm
	Vesl. Area	Area Measurement	cm^2, mm^2
	Vel A	Velocity Measurement	cm/s, m/s
	Vel B	Velocity Measurement	cm/s, m/s

Measurement Method

It is convenient to calculate each measurement value from the Spectral Doppler image.

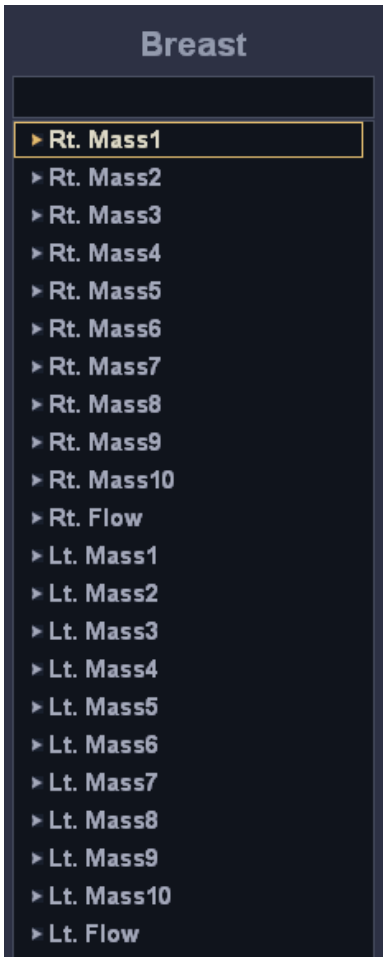
Breast Calculation

Perform Breast measurement.

Measurement Menu

The measurement method for each item is the same as for basic measurement.

Measured items are automatically recorded in a report.



[Figure 5.22 Thyroid Measurement Menu]

NOTE	For information on basic measurements, please refer to “Basic Measurements” in this chapter.

Measurement Menu	Item	Method	Unit
Rt. / Lt. Mass1~10	Length	Distance Measurement	cm, mm
	Depth	Distance Measurement	cm, mm
	Width	Distance Measurement	cm, mm
Rt. / Lt. Flow	Auto Trace	Doppler Spectrum Trace	
	Limited Trace	Doppler Spectrum Trace	
	Manual Trace	Doppler Spectrum Trace	
	PSV	Velocity Measurement	cm/s, m/s
	EDV	Velocity Measurement	cm/s, m/s
	Vesl. Dist	Distance Measurement	cm, mm
	Vesl. Area	Area Measurement	cm^2, mm^2
	Vel A	Velocity Measurement	cm/s, m/s
	Vel B	Velocity Measurement	cm/s, m/s

Measurement Method

It is convenient to calculate each measurement value from the Spectral Doppler image.

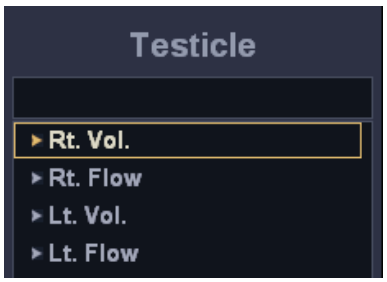
Testicular Calculation

PerformTesticlular measurements.

Measurement Menu

The measurement method for each item is the same as for basic measurement.

Measured items are automatically recorded in a report.



[Figure 5.23 Testicle Measurement Menu]

NOTE	For information on basic measurements, please refer to “Basic Measurements” in this chapter.

Measurement Menu	Item	Method	Unit
Rt. / Lt. Vol.	Vol.	Calculate after Distance Measurement	ml
	Length	Distance Measurement	cm, mm
	Height	Distance Measurement	cm, mm
	Width	Distance Measurement	cm, mm
Rt. / Lt. Flow	Auto Trace	Doppler Spectrum Trace	
	Limited Trace	Doppler Spectrum Trace	
	Manual Trace	Doppler Spectrum Trace	
	PSV	Velocity Measurement	cm/s, m/s
	EDV	Velocity Measurement	cm/s, m/s
	Vesl. Dist	Distance Measurement	cm, mm
	Vesl. Area	Area Measurement	cm^2, mm^2
	Vel A	Velocity Measurement	cm/s, m/s
	Vel B	Velocity Measurement	cm/s, m/s

Measurement Method

It is convenient to calculate each measurement value from the Spectral Doppler image.

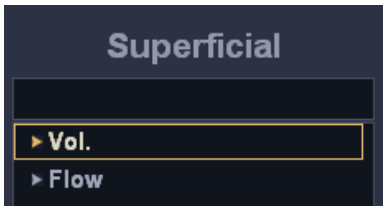
Superficial Calculation

Perform Superficial Doppler measurements.

Measurement Menu

The measurement method for each item is the same as for basic measurement..

Measured items are automatically recorded in a report.



[Figure 5.24 Superficial Measurement Menu]

Measurement Menu	Item	Method	Unit
Vol.	Vol.	Calculate after Distance Measurement	ml
	Length	Distance Measurement	cm, mm
	Height	Distance Measurement	cm, mm
	Width	Distance Measurement	cm, mm
Flow	Auto Trace	Doppler Spectrum Trace	
	Limited Trace	Doppler Spectrum Trace	
	Manual Trace	Doppler Spectrum Trace	
	PSV	Velocity Measurement	cm/s, m/s
	EDV	Velocity Measurement	cm/s, m/s
	Vesl. Dist	Distance Measurement	cm, mm
	Vesl. Area	Area Measurement	cm^2, mm^2
	Vel A	Velocity Measurement	cm/s, m/s
	Vel B	Velocity Measurement	cm/s, m/s

Measurement Method

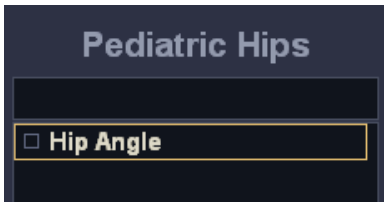
It is convenient to calculate each measurement value from the Spectral Doppler image.

Pediatric Hips Calculation

Measure Pediatric Hips.

Measurement Menu

Measured items are automatically recorded in a report.



[Figure 5.25 Thyroid Measurement Menu]

Measurement Menu	Item	Method	Unit
Hip Angle	Type	Three Distance Measurement	°

Measurement Method

The measurement method for each item is the same as for Hip Joint measurement.

Musculoskeletal Calculation

Measure Musculoskeletal.

Measurement Menu

The measurement method for each item is the same as for basic measurement.

Measured items are automatically recorded in a report.

[Figure 5.26 Thyroid Measurement Menu]

Measurement Menu	Item	Method	Unit
Rt. / Lt. Shoulder	1~10	Distance Measurement	cm, mm
Rt. / Lt. Wrist	1~10	Distance Measurement	cm, mm
Rt. / Lt. Knee	1~10	Distance Measurement	cm, mm
Rt. / Lt. Ankle	1~10	Doppler Spectrum Trace	cm, mm

Report

Measurement results are arranged by application and displayed on the screen in the form of a report.

[Figure 5.27 The Report Screen – Example]

Viewing Report

Press the **Report** button on the control panel. The system switches to the **Ultrasound Report** screen.
Measurement menus that are saved in the current application report are shown in the left side of the screen. Select a menu to review from among them.

Scrolling Page

If there are too many measurement results and they cannot be displayed in one page, use the scroll bar in the right side of the screen. Or use the **Page Up/Dn** dial-button on the touch screen.

Changing Applications

Press **Next App.** to view reports for another application. Each time **Next App.** is pressed, reports for other applications are displayed in turns.

NOTE	Reports for applications that contain no measurements will not be shown.

[Figure 5.28 Touch Screen for Report]

Editing Report

Press **Edit** on the monitor or the touch screen. If the **Edit** screen appears, modify measurement results or change the measurement result display format.

Press the **Ok** button on the monitor or the touch screen or the **Exit** button on the control panel to save the changes and exit the **Edit** screen. Press **Cancel** on the monitor or the touch screen to exit without saving the changes.

Modify Measurements

Use the **Trackball**, the **Set** button and the alphanumeric keyboard on the control panel to modify measurements. The values are displayed in grey, indicating that they are modified.

Measurement Display Method

The product allows you to measure one measurement item several times. However, only the first three measurement results are saved in a report.

When taking the same item more than once, measurements can be displayed in four ways as below: On the edit report screen, you can specify or change the measurement display method.

- **Avg.**

  Obtain the average of measurements and display it on the screen.

- **Last**

  Display the last measurements on the screen.

- **Max**

  Display the largest value of the measurements on the screen.

- **Min**

  Display the smallest value of the measurements on the screen.

[Figure 5.29 Editing Report]

Adding Comment

Press **Comment** on the ***Ultrasound Report*** screen or touch screen to switch to a screen where text can be entered. You can enter a comment or opinion. You can also modify existing comments.

Press **OK** on the screen or the **Exit** button on the control panel to save the changes and close the edit screen. Press **Cancel** to close the edit screen without saving the changes.

[Figure 5.30 Comment]

Printing Report

Press **Print** in the report screen. If there is no connection with a printer, this button will not be displayed.

Saving Report

Press **Write to file** on the report screen. You can save reports into a file.

NOTE	If Utility > Measure Setup > General > Data Transfer > Measured Data is not checked, this button will not be displayed.

When the settings window appears, specify the directory, drive, filename and file type. When using an external storage media, make sure to connect to or disconnect from the storage media by using Storage Manager.

Press **OK** to save the report. Press **Cancel** to cancel.

[Figure 5.31 Saving Report]

Transferring Report

Press **Transfer** on the report screen. Transfer the report data using an RS232C cable. A button is created when a measurement is completed.

To use this button,

1. Connect the RS232C cable with the console.
2. Set Utility > Setup > Peripherals > COM as ‘Open Line Transfer’.

Graph Function

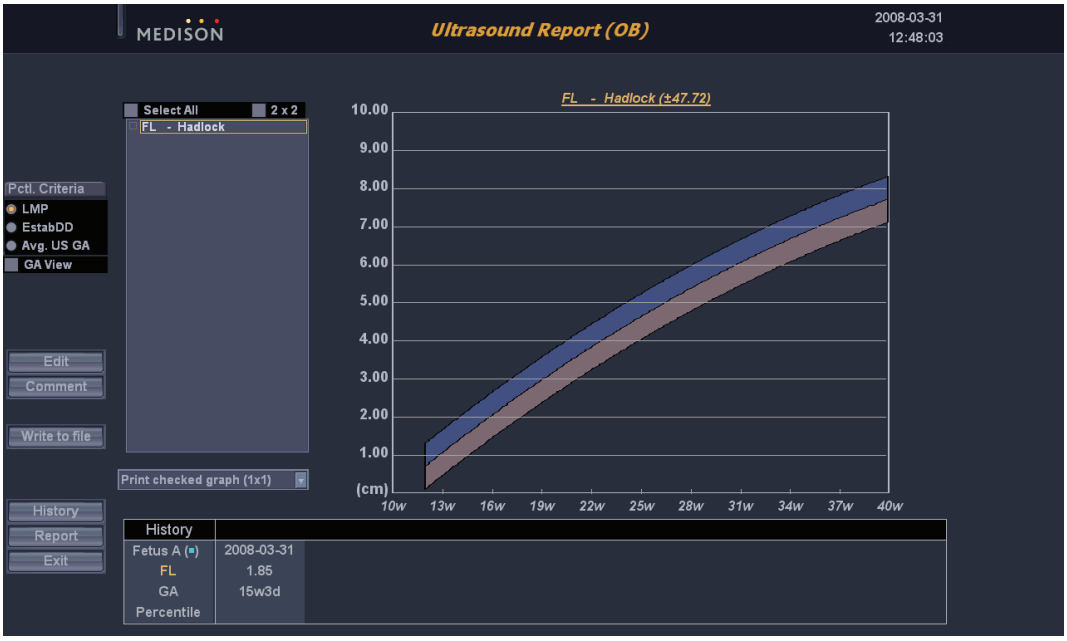
On the **Ultrasound Report** screen, pressing Graph switches to the graph screen, where you can review graphs and history.

NOTE	The graph function is available with OB reports only.

Press **Report** on the screen to return to the report screen.

Graph

The list of measured items appears in the left side of the screen. If you select an item, a graph for the selected item will appear on the screen.



[Figure 5.32 Graph]

NOTE

- To display a graph, the LMP or Estab. Due Date should be saved under Patient Information, and the GA table and Fetal Growth table should be enabled.
- A graph is created based on the patient ID, LMP and measurement date.

- **Select Graph**

  Use the **Trackball** and the **Set** button to select an item from the list.

- **Display Graph**

  If the **2 x 2** checkbox is checked, 4 graphs will be displayed in a screen.

  Specify a desired graph by checking the checkbox for a measurement item.

- **Percentile Criteria**

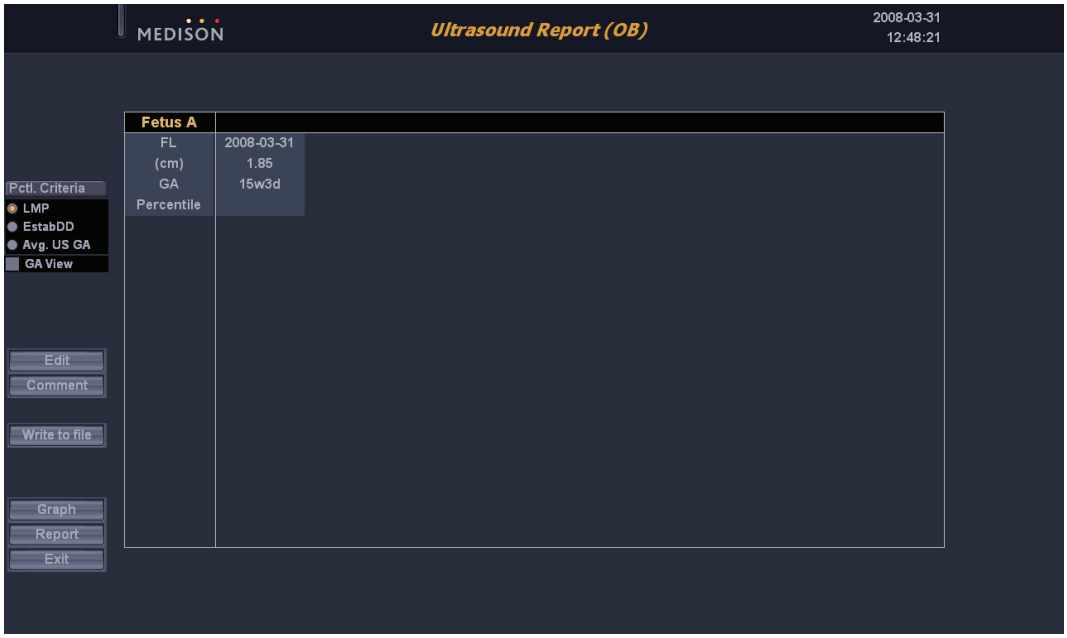
  Select from LMP, EstabDD and Avg.US GA.

  - GA by LMP: GA is calculated based on the maternal LMP.
  - Estab. Due Date: GA is calculated based on the Estab. Due Date that is entered in the *Patient Information*.
  - Average US GA: GA is calculated using the average value of several ultrasound measurements.

■ **History**

The current and past measurements for a fetus are displayed in a concise format.

History



[Figure 5.33 History]

Press **History** in the left menu on the graph screen. The current and past measurements for a fetus are displayed in a tabular format. You can change the percentile criteria as desired.

※ Standard Deviation & Percentile

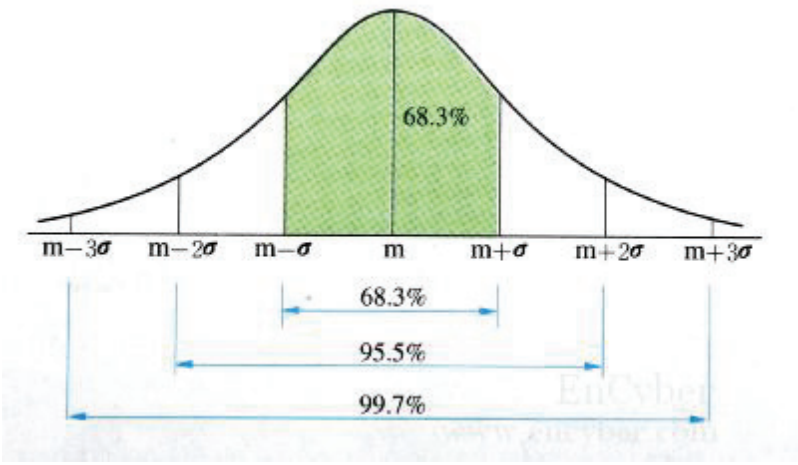
Among OB information, the Growth Table and the typical fetal distribution for the same number of weeks are used to determine the following information:

- The normal distribution curve.
- The measurements for an actual fetus or a position in EFW distribution.
- Whether a distribution point is within the normal range.

The reference number of weeks for the Growth Table can be set to LMP, Estab. DD or Average US GA under [Pctl.Criteria]. The typical setting is LMP.

When LMP is not known or uncertain, or when the difference between LMP and Average US GA is substantial, care must be taken, as selecting different [Pctl.Criteria] can result in a significant difference.

The distribution of the number of weeks in the Growth Table for the selected reference is a normal distribution that is laterally symmetrical around 50% (the average), and it shows the distance from the average as a deviation. The deviation can be represented by Standard Deviation (SD) or Percentile.



[Figure 5.34 The distribution of the Growth Table for the selected number of weeks (m: Average, **σ**: Standard Deviation)]

When represented by SD, a point near the average indicates a value closer to ±0 SD and a point away from the average indicates a value closer to the maximum or minimum value. The greater part of the range falls within ±3 SD, and ±1 SD represents 68.3% of the entire range. Thus it can be seen that most fetal measurements are tightly clustered around the average value.

The Percentile represents a point in distribution from between 0 and 100 inclusive. Therefore, the average point is represented as 50 Percentile.

As shown in the figure, the average point corresponds to 0 SD (that is, 50 Percentile). If a point is in the range between -1 SD and +1 SD, it falls within 68.3% of the entire range. This means that the point falls within the range between 16 and 84.

Further, if a point is in the range between -2 SD and +2 SD, it falls within 95.5% of the entire range. Thus, the point falls in the range between 3 and 97.

SD and Percentile are interchangeable. Percentile can be used when a fetal measurement ranking is desired, and SD can be used when the distance between actual fetal measurements and the average measurement is sought.

While the range of Growth Table references that are primarily used with OB measurement data varies depending on the user, the typical range accepted by most users is as below:

1) When references are created based on SD:

-2.0 SD - +2.0 SD (when converted to Percentile: 2.28 Percentile - 97.72 Percentile)

-1.5 SD - +1.5 SD (when converted to Percentile: 6.68 Percentile - 93.32 Percentile)

-1.0 SD - +1.0 SD (when converted to Percentile: 15.87 Percentile - 84.13 Percentile)

2) When references are created based on Percentile:

2.5 Percentile - 97.5 Percentile (when converted to SD: -1.96 SD - 1.96 SD)

5.0 Percentile - 95.0 Percentile (when converted to SD: -1.645 SD - 1.645 SD)

10.0 Percentile - 90.0 Percentile (when converted to SD: -1.288 SD - 1.288 SD)

Closing Report

Press **Exit** on the **Ultrasound Report** screen or on the control panel. The system will return to the previous diagnosis mode screen.

Chapter 6

Image Management

Reviewing Images (CINE / LOOP)

Images are automatically saved in the memory during scanning. The saved images can be useful when a patient is diagnosed and reviewed.

The saved images can be in CINE or LOOP depending on the diagnosis mode.

- CINE: Images that are saved in all modes other than M Mode and Spectral Mode.
- LOOP: Images that are saved in M Mode and Spectral Mode.

[Figure 6.1 Reviewing Images]

Starting and Finishing Image Review

During scanning, press the **Freeze** button on the control panel. The scanning is stopped and the system switches to the image review mode screen.

Press the **Freeze** button again to return to the scan mode.

How to Review Images

Use the **Trackball** on the control panel. You can search for saved images in chronological order by rotating the Trackball to the left or right. The number of images saved so far and the number of the image currently under review are displayed in the user information area.

The touch screen menu is changed when images are reviewed.

- **Auto Run**

  Press the **Auto Run** and use the dial-button on the touch screen. You can adjust the automatic playback speed for CINE or LOOP by rotating the dial-button. The allowable range for adjustment is 10-200% in increments/decrements of 10%.

- **Run / Stop**

  Press the **Run / Stop** button on the touch screen. You can stop or resume playback of an image by pressing the button.

- **CINE / LOOP**

  Use the **Change** button on the control panel. This option appears only when both CINE and LOOP are available, as in M Mode or Spectral Doppler Mode. You can select an image to play in CINE and LOOP by pressing the button. The selection is displayed in the left side of the user information area.

- **First Pos**

  Press the **First Pos** and use the dial-button on the touch screen. You can specify the first frame in the range in which CINE or LOOP will be saved. After specifying the position of the first frame by rotating the dial-button or using the **Trackball**, press the dial-button to save it.

- **Last Pos**

  Press the **Last Pos** and use the dial-button on the touch screen. You can specify the last frame in the range in which CINE or LOOP will be saved. After specifying the position of the last frame by rotating the dial-button or using the **Trackball**, press the dial-button to save it.

- **CINE Save**

  Press the **CINE Save** button on the touch screen. This has the same function as when the **Clip Store** button on the control is pressed. You can save the specified image area by pressing the dial-button. The saved image appears in the thumbnail list on the screen, and can be reloaded or replayed in scan mode or SONOVIEW. You can select CINE or LOOP.

[Figure 6.2 Touch Screen for Reviewing Images]

Reviewing Images in Multi-Image Mode

Only images in an active area can be reviewed. To review images in another area, change the active area by using the **Dual** or **Quad** button on the control panel. Alternatively, after pressing **Pointer** on the control panel, place the cursor in the area to activate and press the **Set** button on the control panel.

Annotating Images

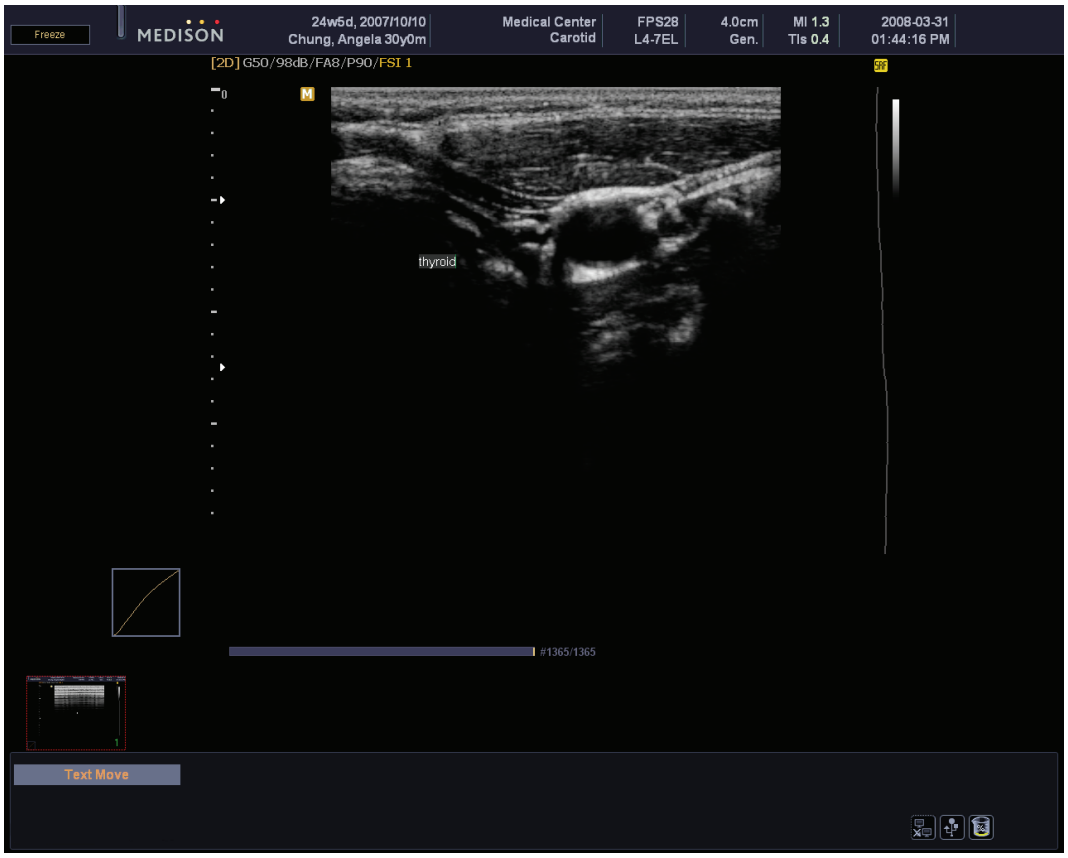
Text

You can enter comments or text over an image. This function can be useful when the diagnosis area is differentiated or displayed.

Starting Text Input Mode

Press the **Text** button on the control panel. The system will switch to text input mode.

NOTE	When **Quick Text** is enabled, the system switches to text input mode immediately after the Alphanumeric Keyboard is pressed.



[Figure 6.3 Text Input Mode]

Typing Text

Use the Alphanumeric Keyboard. You can move the cursor by using the **Trackball** or the arrow keys on the keyboard.

- **Font Size**

  Press the **Font Size** and use the dial-button on the touch screen. You can specify the font size, from 11 – 30, by rotating the dial-button.

- **Default Size**

  Press the **Default Size** button on the touch screen to return the default size (Size 11).

- **Home Position**

  Press the **Home Position** button on the touch screen. Home Position represents the default position of the cursor in the text mode. Press the button to move to the default position.

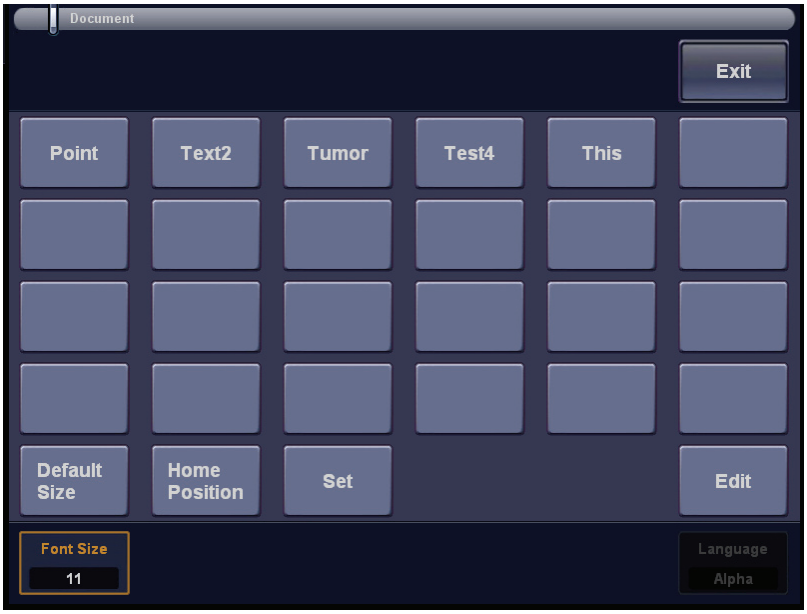
- **Text / Input**

  Press the button on the touch screen to enter the selected text in an image. You can select a predefined text and enter it into an image.

- **Edit**

  Press the **Edit** button on the touch screen. You can edit predefined Texts 1 – 24.

  Press **OK** to finish editing. Press **Cancel** to cancel.



[Figure 6.4 Touch Screen for Text Input Mode]

Autotext

This function allows you to enter text automatically by using an abbreviation. In this way, you can enter text easily and quickly. When Autotext is enabled, the autotext list appears on the screen.

[Figure 6.5 The Autotext List]

NOTE	Select **Utility** > **Setup** > **Utility** > **Text Setup** > **Autotext**.

Deleting Text

Press the **Clear** button on the control panel. All the text entered on the screen will be deleted.

Exiting Text Input Mode

Press **Exit** on the control panel or the **F2** key on the keyboard.

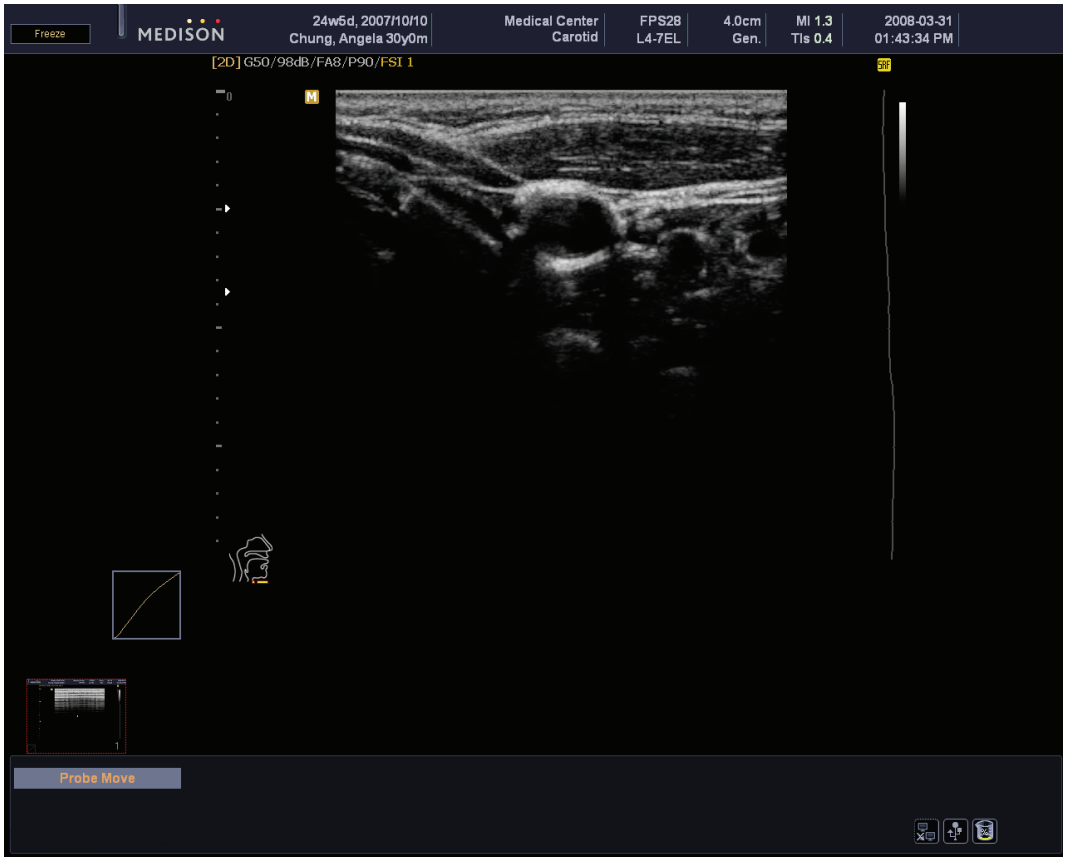
NOTE	For information on using Quick Text and Auto Text Erase, please refer to Chapter 3 “Settings.”

Body Marker

You can place a Body Marker over an image. This function can be useful when the diagnosis area is differentiated or displayed.

Starting Body Marker Input Mode

Press the **Body Marker** button on the control panel. The system will switch to Body Marker input mode and Body Markers will appear in the user information area.



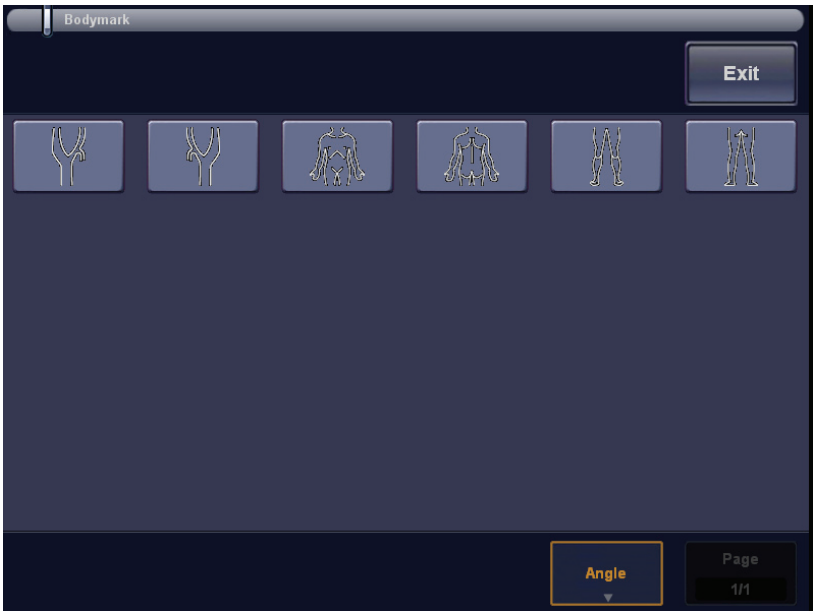
[Figure 6.6 Body Marker]

Entering Body Marker

1. Body markers will appear on the touch screen menu.
   - The types of Body Marker shown in the Flexible Soft Menu vary with the diagnosis mode.
   - A maximum of 56 body markers are displayed on the screen at any one time.

When there are more Body Markers than this, press the **Body Marker** button repeatedly to move to other pages or press the **Page Change** and use dial-button on the touch screen.

2. Press the button on the touch screen for the Body Marker that you want. The Body Marker will appear in the image.
3. Position the probe cursor on the Body Marker using the **Trackball**.
4. Press the **Angle button and rotate dial-button** on the touch screen to adjust the angle of the probe cursor.
5. Press the **Set** button to finish. Press the **Exit** button to cancel.



[Figure 6.7 Touch Screen for Body Marker]

Changing Body Marker Position

1. Press the **Change** button on the control panel.
2. Move the Body Marker to a desired position by using the **Trackball**.
3. Press the **Change** button on the control panel again to confirm the new position.

Deleting Body Marker

Press the **Clear** button on the control panel.

Exiting Body Marker Input Mode

Press the **Exit** button on the control panel.

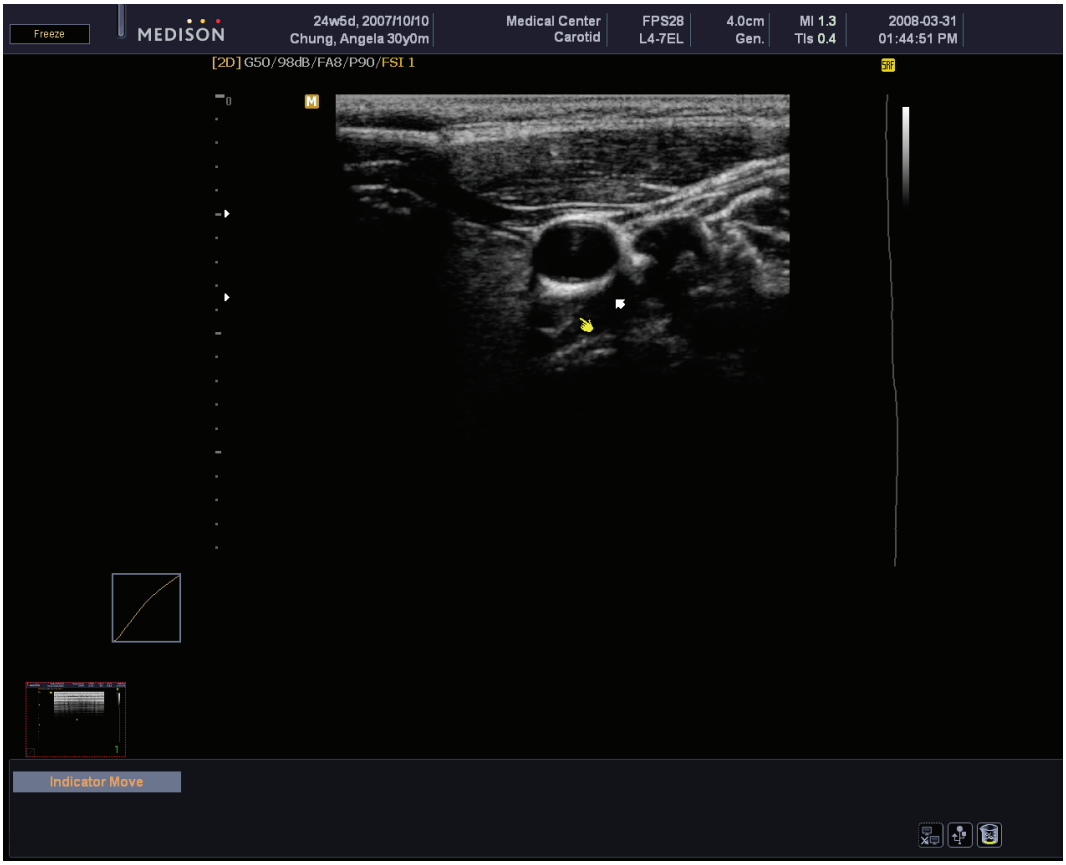
NOTE	For information on BodyMarker Auto Active, please refer to Chapter 3 “Settings.”

Indicator

You can place an Indicator over an image. This function can be useful when the diagnosis area is differentiated or displayed. You can place one or more Indicators on specific positions.

Starting Indicator Input Mode

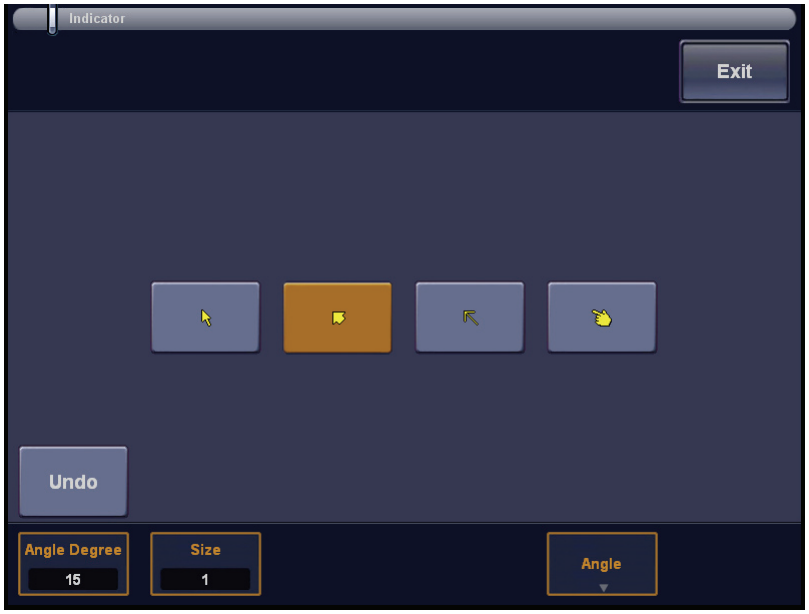
Press the **Indicator** button on the control panel. The system will switch to the Indicator input mode.



[Figure 6.8 Indicator Display]

Entering Indicator

1. Press the **Indicator** button on the control panel and an Indicator will appear on the touch screen.
2. Select the shape of an indicator on the screen.
3. Move the Indicator to a desired position by using the **Trackball**.
4. Adjust the Indicator direction by using the **Angle** dial-button on the touch screen.
5. Adjust the angle degree of the Indicator by using Angle **Degree** dial-button.
6. Press the **Set** button to finish. Press the **Exit** button to cancel.



[Figure 6.9 Touch Screen for Indicator Display]

Deleting Indicator

Press the **Clear** button on the control panel and all Indicators displayed on the screen will be deleted.

Press the Flexible Soft dial-button **[1] Undo** to delete the last entered indicator only.

Saving, Playing and Transferring Images

Saving Images

Saving Still Images

Press the **Save** button on the control panel.

Images are stored and managed on a patient basis. Therefore, if you press the **Save** button without entering patient information, the Patient Information screen will appear first. The saved images can be edited and managed with SONOVIEW™.

WARNING	You must enter the patient ID because all images are saved according to patient ID. Failure to enter a patient ID may result in a loss of and/or critical error(s) in previously saved images.

Saving Multi Frame Images

Press the **Store Clip** button on the control panel. When images are frozen, press the **Flexible Soft button [6] Cine Save**. In Dual/Quad Mode, CINE in the active area is saved only.
A video clip can be saved in two ways, depending on whether it is frozen or not.

- When frozen, use the **Trackball** or rotate the **Flexible Soft dial-button [4]** and **[5]** to specify the range of images to save, and then press the **Flexible Soft dial-button [6]** or press the **Clip Store** button to save the Cine image.
- When in Live Mode, follow the steps below according to the settings. For information on how to specify settings, please refer to Chapter 3 “Setting.”

■ **Method**

- Manual: Specify the start and end of an image by using the **Store Clip** button. That is, the image that is displayed when **Clip Store** is pressed for the first time is saved, through to the image displayed when it is pressed for the second time.
- ECG Beat: The images for the specified beat count are saved and the saving process is automatically finished. Up to 8 beats can be specified.
- Time: The images for the specified time duration are saved and the saving process is automatically finished. Up to 8 seconds can be specified.

If there is no basic patient information, the Patient Information screen appears when a Cine image is saved in Freeze Mode, but an image cannot be saved in Live Mode.

If all frames are saved in Live Mode, the saving process is automatically finished regardless of the settings.

The saved images are added to the thumbnail list in the right.

Playing Images

The saved images can be played in SONOVIEW™ or in a diagnosis mode.

Playing Images in SONOVIEW™

NOTE	Please refer to “SONOVIEW” in this chapter.

Playing Images in Diagnosis Mode

Use the **Pointer** button on the control panel. Note that this function is available only when there are images saved in the thumbnail list.

1. Press the **Pointer** button and the cursor will appear on the screen.
2. Select an image on the Thumbnail list to play on the screen. The selected image is played on the image area.

In Multi Mode, you can specify a location and play an image. For a 3D image, the 3D View screen will appear.

Transferring Images

ACCUVIX V20 allows you to transfer images to the PACS system supporting DICOM. You can transfer all saved images automatically, or select a desired image and transfer it manually. For information on the DICOM server settings and DICOM operations, please refer to “Setting DICOM” in Chapter 3 “Setting.”

Transferring Images in Diagnosis Mode

You can transfer images automatically. Go to **Utility** > **Setup** > **DICOM** and transfer images based on the transfer protocol for the storage server. For more information, please refer to “Setting DICOM” in Chapter 3 “Setting.”

Transferring Images from SONOVIEW™

You can transfer images manually in the following two ways:

■ **Sending Exam**

Send all images for an exam.

1. Select an exam in the **Exam List**
2. Press the **Send** button at the bottom of the screen. All images for the selected exam will be sent.

■ **Sending Selected Images**

Select a desired image from among the images for an exam and send it out.

1. View an exam in the **SONOVIEW** screen.
2. Select an image.
3. Press the **Send** icon at the bottom of the screen. The selected images will be sent.

Printing and Recording Images

NOTE	Set the function of **Print 1** and **Print 2** buttons first. Go to Utility > Setup > Peripherals > Print Key.

Printing Images

Press the **Print 1** (or **Print 2**) button on the control panel. Images are printed via an echo printer. For information on how to setup a printer, please refer to Chapter 3 “Setting.”

Recording Images

Select **VCR** in the **Utility** menu.

NOTE	Please make sure that a VCR is properly connected to the product.

For Regular VCR

Record images by using the record button on the VCR.

For Panasonic MD 835, SONY DVO 1000

A VCR Counter is displayed on the screen. To connect these VCR via a serial port, specify the **VCR Type** and **Source** under the **Peripheral** tab in the **Setting** window.

Press the **Print 1** (or **Print 2**) button on the control panel to record images. Alternatively, press the **Record** button on the VCR. To stop the VCR, press the **Print 1** (or **Print 2**) button on the control panel.

SONOVIEW™

SONOVIEW™ is an integrated image management program. It provides a range of functions including: saving/filing of images, image preview, deleting of images, and exporting files to a standard PC.

The image file types used in this product follow the international standard DICOM (Digital Imaging and Communication in Medicine). As a result, the PACS (Picture Archiving Communication System) can be implemented in the ACCUVIX V20 without any additional costs, and it's easy to exchange image files with other hospitals or equipment.

This product supports the Bitmap file format (the .BMP extension), which is most commonly used on standard PCs, ensuring easier exchange of image data.

Starting SONOVIEW™

Press the **SONOVIEW** button on the control panel. The system will switch to the **SONOVIEW**™ screen.

If there are the saved images available for the current exam, the information and saved images for the exam appear when SONOVIEW™ starts.

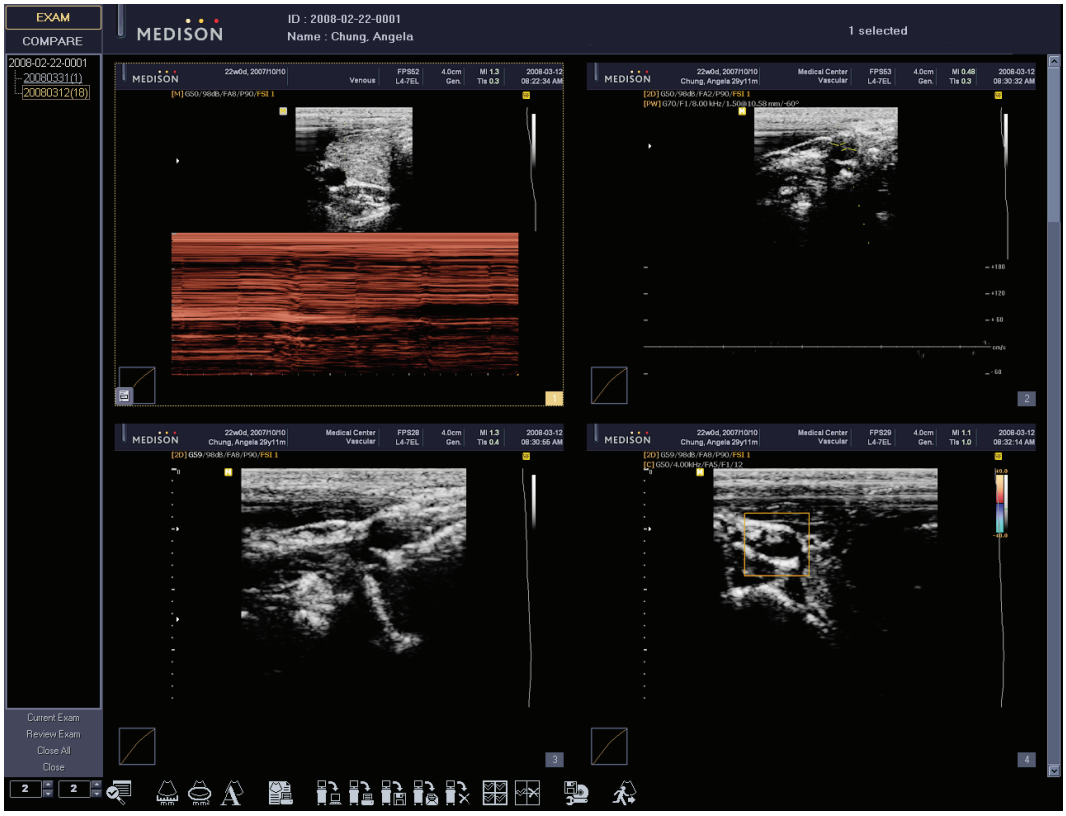
WARNING	Make sure to register a patient before saving images or using SONOVIEW. All diagnosis information in the product is saved and managed for each patient ID. As a result, saving images without entering a patient ID may result in a loss of and/or critical error(s) in previously saved image.

Exam Mode

Press **Exam** in the upper left corner of the screen. The button will appear in yellow.
In the Exam Mode, you can review the current or saved exam.

The Exam Mode Screen

Exams for each patient ID are displayed by date in a tree in the left side of the screen. The numbers in parentheses represent the numbers of the saved images. To show or hide exams, use the **Trackball** and the **Set** button to select a desired ID.

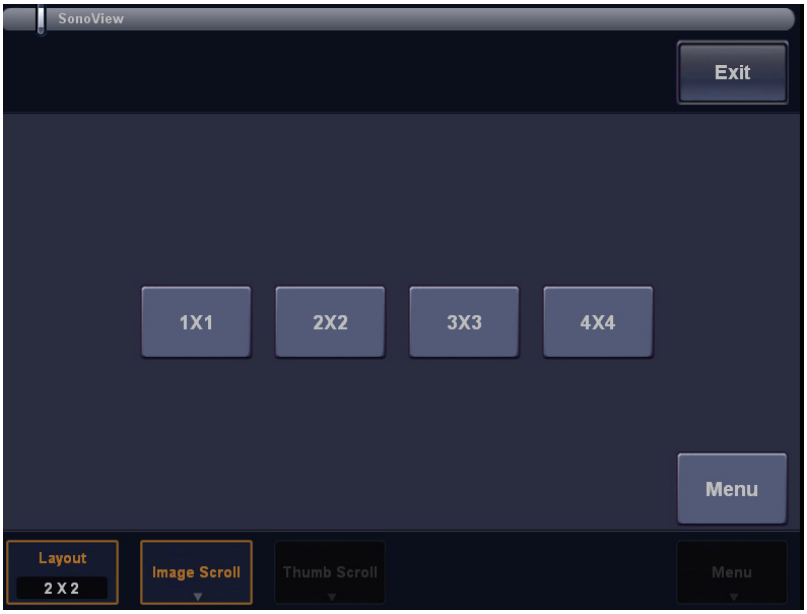


[Figure 6.10 Exam Mode]

Image Scroll

The image of the previous or next page is displayed on the screen. Press the **Image Scroll** and rotate the dial-button. Rotating the dial-button to the left displays the previous page image and rotating it to the right displays the next page image.

However, this button may not be used when the number of exams saved is less than the number of images that appear in a page under the current layout.



[Figure 6.11 Touch Screen for Exam Mode]

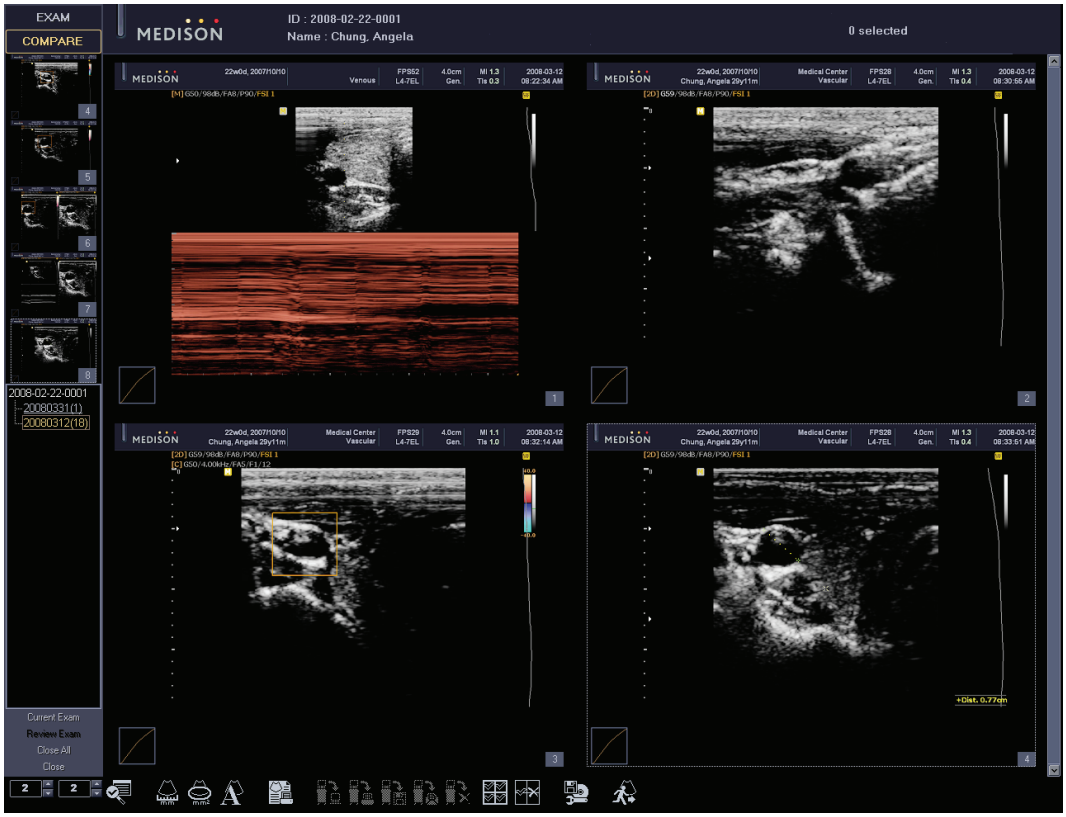
Selecting Exam

Use the trackball and the **Set** button to select a desired exam from the list in the left side of the screen. The selected exam appears in the list and the saved images for it are displayed on the screen.

Compare Mode

Press **Compare** in the upper left corner of the screen. The button will appear in yellow.

In Compare Mode, you can select the images relating to an exam to compare and review them.



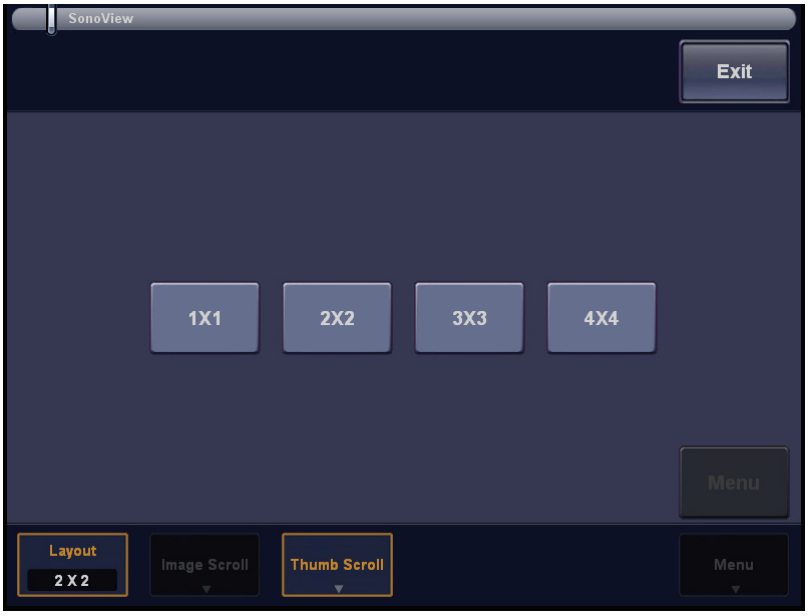
[Figure 6.12 Compare Mode]

The Compare Mode Screen

As in Exam Mode, exams for each ID appear on the screen and images for the selected exam are displayed in a thumbnail format.

Thumb Scroll

The image of the previous or next page is displayed on the thumbnail list. Press the **Thumb Scroll** and use the dial-button on the touch screen. Rotating the dial-button to the left displays the previous page image and rotating it to the right displays the next page image.



[Figure 6.13 Touch Screen for Compare Mode]

Selecting Images

Use the **Trackball** and the **Set** button to select an image from the thumbnail list. The selected image is highlighted in yellow in the list. Select a location on the screen where the image will be displayed, and then the selected image will appear.

Managing Exam Images

Use the icon or the Flexible Soft dial-button on the screen. You can perform various tasks with images for diagnosis.

Reviewing the Current Exam

Press **Current Exam** on the screen. The current exam and its images will be displayed on the screen.

Reviewing the Most Recent Images

Press **Continue Exam** on the screen. The exams and their images for the last 24 hours will be displayed. The initial exam date (Exam Resumed) for each exam will also be shown in the feedback area.

In the retrieved exam screen, tasks such as measurement taking or entering of text, Body Marker or indicator can be performed.

■ **Load Images into Image Area**

The images stored for an exam are displayed in the thumbnail area in the right hand side of the screen. To review an image, double-click an image to review in the thumbnail area.

- Use the arrow buttons below the thumbnail area to move to the next or previous page in the thumbnail area.

The stored image information is displayed in the feedback area.

NOTE	Only scanned data can be loaded into the image area.

■ **Finish Continue Exam**

Press the **End Exam** button on the control panel.

Closing Exam Review

Press **Close** on the screen. To close all exams in the list, press the **Close All** button.

Layouts

You can adjust the number of images displayed on the screen. Press the **Layout** and use the dial-button or press the button on the touch screen. A maximum of 16 images (4 X 4) can be compared at the same time.

The numbers shown in the layout section indicate the column and row of an image to display on the screen. You can change this setting to configure various layouts.

Displaying in Full Screen

Place the cursor on an image and press the **Set** button twice, and then the image will be displayed in full screen.

Selecting Multiple Images

While holding down the Ctrl key, use the **Trackball** and the **Set** button to select an image. The selected image is highlighted in yellow.

Selecting All Images

Press the **Select All Images** () icon on the screen. All images saved for the current exam are selected and highlighted in yellow.

Deselecting All Images

Press the **Deselect All Images** () icon on the screen. All images are deselected and unhighlighted.

Post-Processing Menu

Press  in the lower left corner of an image, and the post-processing menu will appear. Use the menu to adjust the image for diagnosis. The effects of post-processing are not saved into the image.

NOTE	CINE images can be only played in the 2 x 2 or less layout.

Reviewing 3D Images

If the saved image is 3D, the 3D indication () appears at the bottom of the image. Press **3D** and the **3D View** screen will appear allowing you to review the image.

Reviewing CINE

If the saved image is CINE, the playback and search scroll bar appear at the bottom of the image. You can play, pause, stop or search forward/backward with the scroll bar.

NOTE	CINE images can be only played in the 2 x 2 or less layout.

[Figure 6.14 CINE Scroll Bar]

Searching Exam

1. Press the **Exam Search** () icon on the screen. The Exam List screen will appear.
2. Select a desired exam and press the **Review** button. The system will switch to the **SONOVIEW** window showing the selected exam.

Measuring Distance

Press the **Distance Caliper** () icon on the screen. You can measure the distance between two points on an image. Measurement results are not saved.

1. Place the cursor over an image and press the **Set** button. The image will be resized to its original size.
2. Measure the desired distance. For information on measurements, please refer to “Basic Measurements” in Chapter 5 “Measurements.”
3. Press the **Exit** button on the control panel and then press the icon again to finish measurement.

Measuring Circumference and Area

Press the **Ellipse Caliper** () icon on the screen. You can measure the circumference and area of the desired area in an image. Measurement results are not saved.

1. Place the cursor over an image and press the **Set** button. The image will be resized to its original size.
2. Measure the circumference and area of the desired area. For information on measurements, please refer to “Basic Measurements” in Chapter 5 “Measurements.”
3. Press the **Exit** button on the control panel and then press the icon again to finish measurement.

Typing Text

Press the **Text Annotation** () icon on the screen. You can enter text into an image.

1. Place the cursor over an image and press the **Set** button. The image will be resized to its original size.
2. Position the cursor on the desired area and enter text.
   - Font Color: Change the font color.
   - Font Size: Change the font size.
   - Language: Select a language.

NOTE	This button appears on the screen only in a product that supports Asian patient names.

3. Press the **Set** button to confirm the text.
4. Press the **Exit** button on the control panel and then press the icon again to finish measurement.

Printing Images

1. Press the **Print Image** () icon on the screen. The **Image Print** window will appear.
2. Specify **Setup** and **Comment**.
3. Press the **Print** button to print the image. Press **Close** to cancel.

Transferring Images via DICOM

Transfer the selected image and measurement data via DICOM. The icon is enabled only when an image(s) is selected. The icon is disabled in a system where DICOM is not enabled.

1. After selecting an image, press the **Send Image to DICOM Storage** () icon on the screen. The **DICOM Storage** window will appear.
2. Press the **Send** button to transfer the selected image to the DICOM server. To cancel saving, press **Close**.

Printing via DICOM

You can print the selected images via DICOM. The icon is enabled only when an image(s) is selected. The icon is disabled in a system where DICOM is not enabled.

1. After selecting an image, press the **Send Image to DICOM Print** () icon on the screen. The **DICOM Printer** window will appear.
2. Press the **Transfer** button to transfer the selected image to the DICOM server and print it. To cancel saving, press **Close**.

Transferring Images

1. Press the **Export Image** () icon on the screen. The **Image Export** window will appear.
2. Specify various parameters such as directory, drive, filename and file format.
3. Press the **Export** button to start a transfer. Press the **Close** button to cancel.

NOTE	The Export function is not activated when the file name and directory are not entered.

Sending in E-mail

1. Press the **Send E-mail** () icon on the screen. The **E-mail** window will appear.
2. Specify various parameters such as sender and recipient.
3. After **selecting** an image to attach in the thumbnail list, enter a message.
4. Press the **Send** button to transfer the selected image. Press the **Close** button to cancel.

NOTE	When email cannot be transferred although the mail server is working properly, please check the following: - The connection of the LAN cable - E-mail settings at **Setup** > **Utility** - If ICMP (ping) is open for the corresponding Mail Server. If ICMP (ping) is closed, the E-mail function may not work properly.

Deleting Images

Press the **Delete Image** () icon on the screen. Press **OK** to delete the selected image. Please note that images for the current patient under diagnosis cannot be deleted.

Storage Manager

Press the **Device** () icon on the screen. The **Storage Manager** window will appear. For information on Storage Manager, please refer to Chapter 3 “Setting” in this manual.

Closing SONOVIEW

Press the **Exit** () icon on the screen. Alternatively, you can press the **SONOVIEW** button or the **Exit** button on the control panel to close SONOVIEW.

Chapter 7

Maintenance

System Maintenance

NOTE	The user must ensure that safety inspections are performed every two years according to the requirements of safety standard EN 60601-1. Only trained persons are allowed to perform the safety inspections mentioned above.

Installation Requirements

When installing:

- Avoid humidity.
- Avoid direct sunlight.
- Avoid places with extreme temperature variations.
- Optimal conditions for the system are temperatures of 10° ~ 35° C and humidity of 30% ~ 75%.
- Avoid heat sources.
- Avoid dusty and unventilated areas.
- Avoid places where the system is likely to be exposed to vibration or impacts.
- Avoid places where the system is likely to be exposed to chemical substances or gases.

CAUTION	Placing the system near generators, X-Ray machines, or broadcast cables may result in screen noise and abnormal visual images. Using the power source with other electric devices may also induce noise.

Cleaning and disinfections

Using inappropriate detergent or disinfectant may damage the product. Please read the following carefully.

WARNING	■ Turn off the system and disconnect the system power cord from the wall outlet. Otherwise, it may result in electric shock or fire. ■ Always use protective eyewear and gloves when cleaning and disinfecting the equipment.

Cleaning

CAUTION	■ Do not use a spray directly on the product exterior. It may cause cracks in the appliance, or the color to deteriorate. ■ Do not use chemical substances such as wax, benzene, alcohol, thinner, mosquito repellant, deodorant, lubricant or detergent.

■ **Console**

Use a soft cloth lightly dampened in a mild soap or detergent solution to clean exterior surfaces on the system.

■ **Cleaning Monitor**

Wipe the LCD surface with a soft dry cloth. When the LCD panel has dirt on it, wipe it 2 - 3 times or more in one direction.

NOTE	For information on cleaning and disinfection of the probe & biopsy kit, please refer to Chapter 8 “Probes.”

Disinfections

CAUTION Use only recommended disinfectants on system surfaces.

A disinfectant qualified by the FDA 510(k) process is recommended. The following disinfectants are recommended both because of their biological effectiveness (as qualified through the FDA 510(k) process) and their chemical compatibility with MEDISON ultrasound products.

Solutions	Country	Type	Active ingredient	FDA 510(k)
Cidex	USA	Liquid	Gluteraldehyde	K934434
Cidex Plus	USA	Liquid	Gluteraldehyde	K923744

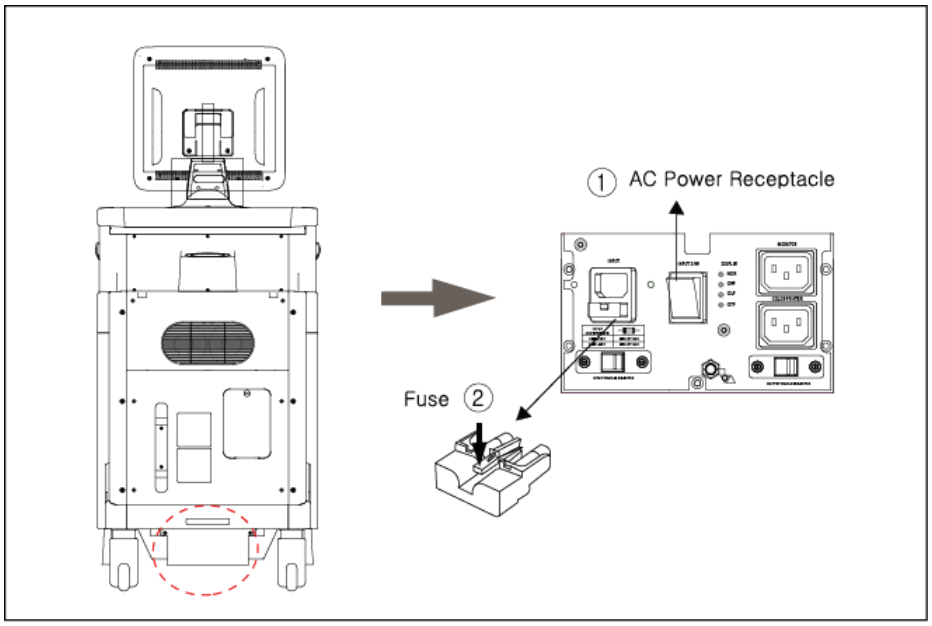
1. Turn off the system and disconnect the system power cord from the wall outlet.
2. Mix the disinfection solution compatible with your system according to label instructions for solution strength.
3. Wipe the system surfaces with the disinfectant solution, following the disinfectant label instructions for wipe durations, solution strength, and disinfectant contact duration.
4. Air dry or towel dry with a sterile clothe according to the instructions on the disinfectant label.

Fuse Replacement

The power protection fuse protects the product from excess current. If the power monitoring protection circuit detects excess current, it shuts off the current to the equipment in order to prevent overheating and to restrict the ultrasound power output.

If the fuse blows, replace it as shown below.

DANGER	To avoid risk of electric shock, always disconnect the plug from the system prior to fuse replacement.



[Figure 7.1 Fuse replacement]

1. Turn off the system and disconnect the system power cord from the wall outlet. (See ①)
2. Press the fuse holder in the direction of the arrow and pull it out. (See ②)
3. Remove the old fuse and replace it with a new one.
4. After installing the new fuse, connect the plug to the system.

Fuse information is shown in the following table.

Input Ratings	Fuse Ratings	Maker	Order No.
100-120VAC	10AH/250V	Orisel	55T210000
200-240VAC	10A/H250V	Orisel	55T210000

Cleaning The Air Filters

The air filters minimize the indraft of dust. Clean the air filter to ensure that a clogged filter does not cause the system to overheat and reduce the noise and the system performance.
It is recommended the air filters be cleaned once every three months.

CAUTION	Be sure to lock the brakes on the front wheels before cleaning the air filters to avoid injury by any unexpected movement of the product.

1. Pull the filter under the front of the console away from the product.
2. Shake the filter to remove the dust and wash in a mild soapy solution.
3. Rinse and air dry or dry with a cloth.
4. Slide the filter back into the product.

NOTE	Allow the wet filter to dry thoroughly before installing. A wet filter can cause a malfunction.

Accuracy Check

The product's maintenance status may affect the measurements obtained using the product. The product should be maintained in an optimal state to ensure reliable measurements.

To ensure optimal operation of the product, perform an accuracy check every year. The equations and table related to measurement accuracy are included in Chapter 5 "Measurements" in this manual.

Administration of Information

CAUTION	You may lose information files on user settings or patients, because of shock on the product or internal error. Thus, back-up on a regular basis.

User Setting Back up

Always keep a backup copy of all information related to the user settings in case of data loss. Clients cannot back-up the user settings of the product. Please contact the MEDISON Customer Service Department to attain support for back-up.
However, clients may back up the user setting on GA Table used in obstetrics diagnosis. For further information please refer to 'Chapter 3. Settings'.

Patient information Back-up

The SonoView program can be used for backing up patients' basic information and scanned images. The user can choose to save the data, and the data is also saved in the system by default. If the system needs to be reinstalled due to product failure, etc., the MEDISON customer support staff will restore the patients' basic information and scanned images that are saved in the system. For more information on this, see 'Chapter 6 Image Management'.

Software

The product software may be updated to enhance performance. The user cannot make any changes to the software. Please contact the MEDISON customer support for help in software changes.

CAUTION	Minor software updates may be carried out without prior notice from the manufacturer.

Should errors occur in the operating system (Windows XP^{TM}), and should you desire to upgrade the operating system, please follow the instructions of the operating system manufacturer.

Table of Contents

OB Reference

Gestational Age Formula and Table List

Abdominal Circumference (AC) : KOREAN

GA Table

Y.G Park. " The Standardization of Fetal body parts according to the normal Korean Gestational Age in Ultrasound" Korean Ultrasound Institute, Vol. 14, No.2, 1995

GA = 7.403506 + 0.76191 × AC + 0.004492304 × AC^2

Output Unit: w (weeks)

Input Unit: cm

Min Range: 5.9 cm

Max Range: 35.2 cm

Fetal Growth Table

Y.G Park. " The Standardization of Fetal body parts according to the normal Korean Gestational Age in Ultrasound" Korean Ultrasound Institute, Vol. 14, No.2, 1995

AC = 135.54085 x MA – 5.9973 x MA^2 - 94.588168

Output Unit : cm

Input Unit: w (week)

Min Range: 12w

Max Range: 40w

Age (W)	Growth (cm)	±SD (cm)
12	5.932	0.794
16	10.793	0.728
20	15.086	0.742
24	19.300	1.258
28	23.988	0.870

Age (W)	Growth (cm)	±SD (cm)
32	27.738	0.799
34	29.578	0.771
36	31.731	0.583
38	33.514	0.370
40	34.490	1.608

Abdominal Circumference (AC) : HADLOCK

GA Table

Frank P. Hadlock, Russell L.Deter, Ronald B. Harrist, Seung K. Park,. "Estimating Fetal Age: Computer-Assisted Analysis of Multiple Fetal Growth Parameters" Radiology, 1984; 152:497-501.

GA = 8.14 + 0.753 × AC + 0.0036 × AC^2

Output Unit: w(weeks)

Input Unit : cm

Min Range : 4.83 cm

Max Range : 38.04 cm

Standard Deviation :

Min (w)	Max (w)	±2SD
12	18	1.66
18	24	2.06
24	30	2.18

Min (w)	Max (w)	±2SD
30	36	2.96
36	42	3.04

Fetal Growth Table

Frank P. Hadlock, Russell L.Deter, Ronald B. Harrist, Seung K. Park,. "Estimating Fetal Age: Computer-Assisted Analysis of Multiple Fetal Growth Parameters" Radiology, 1984; 152:497-501

Graph = 1.61 x MA - 0.00998 x MA^2 - 13.3

Output Unit : cm

Input Unit : w(weeks)

Min Range : 12w

Max Range : 40w

Standard Deviation : 2SD=2.68cm

Abdominal Circumference (AC) : HANSMANN

GA Table

Hansmann, Hackeloer, Staudach, Wittman "Ultrasound Diagnosis in Obstetrics and Gynecology" Springer- Verlag, New York, 1986, p.431.

AC (cm)	GA (wd)	AC (cm)	GA (wd)	AC (cm)	GA (wd)	AC (cm)	GA (wd)
5.3	12w0d	13.5	20w0d	20.2	27w0d	26.8	34w0d
6.3	13w0d	14.5	21w0d	21.1	28w0d	27.7	35w0d
7.5	14w0d	15.5	22w0d	22.2	29w0d	28.7	36w0d
8.5	15w0d	16.5	23w0d	23.0	30w0d	29.6	37w0d
9.7	16w0d	17.3	24w0d	24.0	31w0d	30.6	38w0d
10.7	17w0d	18.3	25w0d	24.9	32w0d	31.5	39w0d
11.6	18w0d	19.1	26w0d	25.8	33w0d	32.0	40w0d
12.6	19w0d						

Abdominal Circumference (AC) : MERZ

GA Table

E. Merz, W. Goldhofer, E. Timor-Tritsch "Ultrasound in Gynecology and Obstetrics" Text book and Atlas, 1991 Georg Thieme Verlag, 308-338

AC (cm)	GA (wd)	5% (wd)	95% (wd)	AC (cm)	GA (wd)	5% (wd)	95% (wd)
5.6	12w1d	10w6d	13w2d	20.4	26w1d	24w3d	27w6d
5.8	12w2d	11w1d	13w4d	20.6	26w3d	24w4d	28w1d
6.0	12w4d	11w2d	13w5d	20.8	26w4d	24w6d	28w2d
6.2	12w5d	11w4d	13w6d	21.0	26w6d	25w0d	28w4d
6.4	12w6d	11w5d	14w1d	21.2	27w0d	25w1d	28w5d
6.6	13w1d	11w6d	14w2d	21.4	27w1d	25w2d	28w6d
6.8	13w2d	12w0d	14w4d	21.6	27w2d	25w4d	29w1d
7.0	13w4d	12w1d	14w5d	21.8	27w4d	25w5d	29w2d
7.2	13w4d	12w3d	14w6d	22.0	27w5d	25w6d	29w4d
7.4	13w6d	12w4d	15w1d	22.2	27w6d	26w1d	29w5d
7.6	14w0d	12w6d	15w2d	22.4	28w1d	26w2d	29w6d
7.8	14w1d	12w6d	15w4d	22.6	28w2d	26w3d	30w1d
8.0	14w3d	13w1d	15w5d	22.8	28w4d	26w4d	30w2d
8.2	14w4d	13w2d	15w6d	23.0	28w5d	26w6d	30w4d
8.4	14w6d	13w4d	16w1d	23.2	28w6d	27w0d	30w5d
8.6	15w0d	13w5d	16w2d	23.4	29w0d	27w1d	30w6d
8.8	15w1d	13w6d	16w4d	23.6	29w1d	27w3d	31w1d

9.0	15w3d	14w0d	16w5d
9.2	15w4d	14w1d	16w6d
9.4	15w5d	14w3d	17w1d
9.6	15w6d	14w4d	17w2d
9.8	16w1d	14w6d	17w4d
10.0	16w2d	14w6d	17w5d
10.2	16w4d	15w1d	17w6d
10.4	16w5d	15w2d	18w1d
10.6	16w6d	15w4d	18w2d
10.8	17w1d	15w5d	18w3d
11.0	17w2d	15w6d	18w4d
11.2	17w3d	16w0d	18w6d
11.4	17w4d	16w1d	19w0d
11.6	17w6d	16w3d	19w1d
11.8	18w0d	16w4d	19w3d
12.0	18w1d	16w6d	19w4d
12.2	18w3d	17w0d	19w6d
12.4	18w4d	17w1d	20w0d
12.6	18w6d	17w2d	20w1d
12.8	19w0d	17w4d	20w3d
13.0	19w1d	17w5d	20w4d
13.2	19w2d	17w6d	20w6d
13.4	19w4d	18w0d	21w0d
13.6	19w5d	18w1d	21w1d

23.8	29w3d	27w4d	31w2d
24.0	29w4d	27w5d	31w4d
24.2	29w6d	27w6d	31w5d
24.4	30w0d	28w1d	31w6d
24.6	30w1d	28w2d	32w1d
24.8	30w3d	28w3d	32w2d
25.0	30w4d	28w4d	32w4d
25.2	30w6d	28w6d	32w5d
25.4	30w6d	29w0d	32w6d
25.6	31w1d	29w1d	33w1d
25.8	31w2d	29w3d	33w2d
26.0	31w4d	29w4d	33w4d
26.2	31w5d	29w5d	33w5d
26.4	31w6d	29w6d	33w6d
26.6	32w1d	30w1d	34w1d
26.8	32w2d	30w2d	34w2d
27.0	32w4d	30w4d	34w4d
27.2	32w5d	30w4d	34w5d
27.4	32w6d	30w6d	34w6d
27.6	33w0d	31w0d	35w1d
27.8	33w1d	31w1d	35w2d
28.0	33w3d	31w3d	35w4d
28.2	33w4d	31w4d	35w5d
28.4	33w6d	31w5d	35w6d

13.8	19w6d	18w3d	21w3d
14.0	20w1d	18w4d	21w4d
14.2	20w2d	18w6d	21w6d
14.4	20w4d	19w0d	22w0d
14.6	20w5d	19w1d	22w1d
14.8	20w6d	19w2d	22w3d
15.0	21w1d	19w4d	22w4d
15.2	21w1d	19w5d	22w6d
15.4	21w3d	19w6d	23w0d
15.6	21w4d	20w1d	23w1d
15.8	21w6d	20w1d	23w3d
16.0	22w0d	20w3d	23w4d
16.2	22w1d	20w4d	23w6d
16.4	22w3d	20w6d	24w0d
16.6	22w4d	21w0d	24w1d
16.8	22w6d	21w1d	24w3d
17.0	23w0d	21w2d	24w4d
17.2	23w1d	21w4d	24w6d
17.4	23w2d	21w5d	25w0d
17.6	23w4d	21w6d	25w1d
17.8	23w5d	22w1d	25w3d
18.0	23w6d	22w1d	25w4d
18.2	24w1d	22w3d	25w6d
18.4	24w2d	22w4d	26w0d

28.6	34w0d	31w6d	36w1d
28.8	34w1d	32w1d	36w2d
29.0	34w3d	32w2d	36w4d
29.2	34w4d	32w4d	36w5d
29.4	34w5d	32w4d	36w6d
29.6	34w6d	32w6d	37w1d
29.8	35w1d	33w0d	37w1d
30.0	35w2d	33w1d	37w3d
30.2	35w4d	33w3d	37w4d
30.4	35w5d	33w4d	37w6d
30.6	35w6d	33w5d	38w0d
30.8	36w1d	33w6d	38w1d
31.0	36w2d	34w1d	38w3d
31.2	36w4d	34w2d	38w4d
31.4	36w4d	34w4d	38w6d
31.6	36w6d	34w4d	39w0d
31.8	37w0d	34w6d	39w1d
32.0	37w1d	35w0d	39w3d
32.2	37w3d	35w1d	39w4d
32.4	37w4d	35w3d	39w6d
32.6	37w6d	35w4d	40w0d
32.8	38w0d	35w5d	40w1d
33.0	38w1d	35w6d	40w3d
33.2	38w3d	36w1d	40w4d

18.6	24w4d	22w6d	26w1d
18.8	24w5d	23w0d	26w3d
19.0	24w6d	23w1d	26w4d
19.2	25w0d	23w2d	26w6d
19.4	25w1d	23w4d	27w0d
19.6	25w3d	23w5d	27w1d
19.8	25w4d	23w6d	27w3d
20.0	25w6d	24w1d	27w4d
20.2	26w0d	24w2d	27w6d

33.4	38w4d	36w2d	40w6d
33.6	38w5d	36w4d	41w0d
33.8	38w6d	36w5d	41w1d
34.0	39w1d	36w6d	41w3d
34.2	39w2d	37w0d	41w4d
34.4	39w4d	37w1d	41w6d
34.6	39w5d	37w3d	42w0d
34.8	39w6d	37w4d	42w1d

Fetal Growth Table

E. Merz, W. Goldhofer, E. Timor-Tritsch "Ultrasound in Gynecology and Obstetrics" Textbook and Atlas, 1991 Georg Thieme Verlag, 308-338

Age (W)	Growth (cm)	5% (cm)	95% (cm)
12	5.8	4	7.6
13	6.8	5	8.7
14	7.9	6	9.8
15	8.9	6.9	10.9
16	9.9	7.9	11.9
17	11	8.9	13
18	12	9.9	14.1
19	13	10.8	15.2
20	14	11.8	16.2

Age (W)	Growth (cm)	5% (cm)	95% (cm)
27	21.2	18.7	23.8
28	22.3	19.7	24.8
29	23.3	20.7	25.9
30	24.3	21.7	27
31	25.3	22.7	28
32	26.4	23.7	29.1
33	27.4	24.6	30.2
34	28.4	25.6	31.2
35	29.5	26.6	32.3

21	15.1	12.8	17.3
22	16.1	13.8	18.4
23	17.1	14.8	19.5
24	18.2	15.8	20.5
25	19.2	16.7	21.6
26	20.2	17.7	22.7

36	30.5	27.6	33.4
37	31.5	28.6	34.4
38	32.5	29.6	35.5
39	33.6	30.6	36.5
40	34.6	31.6	37.6

Abdominal Circumference (AC) : JEANTY

Fetal Growth Table

Jeanty, P., Cousaert, E., Cantraine, F., "Normal Growth of the Abdominal Perimeter" American Journal of Perinatalogy, 1:129, 1984

Age (W)	Growth (cm)	5% (cm)	95% (cm)
12	5.70	3.50	8.00
13	6.70	4.50	9.00
14	7.70	5.50	10.00
15	8.80	6.50	11.00
16	9.80	7.60	12.00
17	10.90	8.60	13.10
18	11.90	9.70	14.20
19	13.00	10.80	15.20
20	14.10	11.90	16.30
21	15.20	12.90	17.40
22	16.30	14.00	18.50
23	17.30	15.10	19.60

Age (W)	Growth (cm)	5% (cm)	95% (cm)
27	21.50	19.30	23.80
28	22.50	20.30	24.80
29	23.50	21.30	25.70
30	24.40	22.20	26.70
31	25.40	23.10	27.60
32	26.20	24.00	28.50
33	27.10	24.80	29.30
34	27.90	25.60	30.10
35	28.60	26.40	30.90
36	29.30	27.10	31.60
37	30.00	27.80	32.20
38	30.60	28.30	32.80

24	18.40	16.20	20.60
25	19.50	17.20	21.70
26	20.50	18.30	22.70

39	31.10	28.90	33.30
40	31.60	29.40	33.80

Abdominal Circumference (AC) : SHINOZUKA

GA Table

Norio Shinozuka, Takashi Okai, et al. "Standard Values of Ultrasonographic Fetal Biometry" Japanese Journal of Medical Ultrasonics, Vol.23, No.12, 1996, pp877-888

AC (cm)	GA (wd)	±SD (wd)
10.0	15w3d	1w1d
10.5	16w0d	1w1d
11.0	16w4d	1w1d
11.5	17w0d	1w1d
12.0	17w4d	1w2d
12.5	18w0d	1w2d
13.0	18w4d	1w2d
13.5	19w0d	1w2d
14.0	19w4d	1w2d
14.5	20w0d	1w2d
15.0	20w3d	1w3d
15.5	21w0d	1w3d
16.0	21w3d	1w3d
16.5	22w0d	1w3d
17.0	22w3d	1w3d

AC (cm)	GA (wd)	±SD (wd)
22.0	27w3d	1w5d
22.5	28w0d	1w5d
23.0	28w4d	1w5d
23.5	29w0d	1w5d
24.0	29w4d	1w6d
24.5	30w1d	1w6d
25.0	30w5d	1w6d
25.5	31w2d	1w6d
26.0	31w6d	1w6d
26.5	32w3d	1w6d
27.0	33w1d	1w6d
27.5	33w5d	2w0d
28.0	34w2d	2w0d
28.5	35w0d	2w0d
29.0	35w4d	2w0d

17.5	22w6d	1w3d
18.0	23w3d	1w4d
18.5	23w6d	1w4d
19.0	24w3d	1w4d
19.5	24w6d	1w4d
20.0	25w3d	1w4d
20.5	25w6d	1w4d
21.0	26w3d	1w5d
21.5	27w0d	1w5d

29.5	36w2d	2w0d
30.0	37w0d	2w0d
30.5	37w5d	2w0d
31.0	38w2d	2w1d
31.5	39w0d	2w1d
32.0	39w6d	2w1d
32.5	40w4d	2w1d
33.0	41w2d	2w1d

Fetal Growth Table

Norio Shinozuka, Takashi Okai, et al. "Standard Values of Ultrasonographic Fetal Biometry" Japanese Journal of Medical Ultrasonics, Vol.23, No.12, 1996, pp877-888

Age (W)	Growth (cm)	-1.5SD (cm)	+1.5SD (cm)
16	10.90	9.50	12.40
17	12.00	10.40	13.50
18	13.00	11.40	14.60
19	14.00	12.30	15.70
20	15.10	13.30	16.80
21	16.10	14.20	17.80
22	17.10	15.10	18.90
23	18.10	16.10	20.00
24	19.10	17.00	21.10
25	20.10	17.90	22.10
26	21.00	18.80	23.10
27	22.00	19.70	24.20

Age (W)	Growth (cm)	-1.5SD (cm)	+1.5SD (cm)
30	24.70	22.20	27.10
31	25.60	23.00	28.10
32	26.50	23.80	29.00
33	27.30	24.50	29.90
34	28.10	25.30	30.70
35	28.90	26.00	31.60
36	29.70	26.60	32.40
37	30.40	27.30	33.20
38	31.10	27.90	34.00
39	31.80	28.50	34.70
40	32.40	29.10	35.40
41	33.00	29.60	36.10

28	22.90	20.50	25.20
29	23.80	21.40	26.10

42	33.60	30.10	36.70

Abdominal Circumference (AC) : CHITTY (D)

Fetal Growth Table

L.S. Chitty, D.G. Altman, S. Campbell, "Charts of Fetal Size: 3. Abdominal Measurement" British Journal of Obstetrics and Gynaecology, February 1994. Vol 101. Pp125-131

Age (W)	Growth (cm)	10% (cm)	90% (cm)
12	5.58	5.05	6.11
13	6.74	6.13	7.34
14	7.89	7.2	8.57
15	9.03	8.27	9.79
16	10.16	9.33	11
17	11.29	10.38	12.21
18	12.41	11.42	13.4
19	13.52	12.45	14.59
20	14.62	13.48	15.77
21	15.71	14.49	16.94
22	16.8	15.5	18.1
23	17.87	16.49	19.25
24	18.93	17.48	20.38
25	19.98	18.45	21.51
26	21.02	19.41	22.63
27	22.04	20.36	23.73

Age (W)	Growth (cm)	10% (cm)	90% (cm)
28	23.06	21.29	24.82
29	24.05	22.22	25.89
30	25.04	23.12	26.96
31	26.01	24.02	28.01
32	26.97	24.9	29.04
33	27.91	25.76	30.06
34	28.84	26.61	31.06
35	29.75	27.44	32.05
36	30.64	28.26	33.02
37	31.51	29.06	33.97
38	32.37	29.84	34.91
39	33.21	30.6	35.82
40	34.04	31.35	36.72
41	34.84	32.08	37.6
42	35.62	32.78	38.46

Abdominal Circumference (AC) : CHITTY (M)

Fetal Growth Table

L.S. Chitty, D.G. Altman, S. Campbell, "Charts of Fetal Size: 3. Abdominal Measurement" British Journal of Obstetrics and Gynaecology, February 1994. Vol 101. Pp125-131

Age (W)	Growth (cm)	10% (cm)	90% (cm)
12	5.89	5.13	6.66
13	7.09	6.26	7.91
14	8.27	7.39	9.15
15	9.45	8.5	10.39
16	10.62	9.62	11.62
17	11.78	10.72	12.84
18	12.93	11.82	14.05
19	14.08	12.9	15.25
20	15.21	13.98	16.45
21	16.34	15.05	17.63
22	17.46	16.1	18.81
23	18.56	17.15	19.97
24	19.66	18.19	21.12
25	20.74	19.21	22.27
26	21.81	20.22	23.39
27	22.87	21.22	24.51

Age (W)	Growth (cm)	10% (cm)	90% (cm)
28	23.91	22.21	25.61
29	24.94	23.18	26.7
30	25.96	24.14	27.78
31	26.96	25.08	28.84
32	27.95	26.01	29.89
33	28.92	26.93	30.92
34	29.88	27.82	31.93
35	30.82	28.7	32.93
36	31.74	29.57	33.91
37	32.64	30.41	34.88
38	33.53	31.24	35.82
39	34.4	32.05	36.75
40	35.25	32.84	37.66
41	36.08	33.62	38.54
42	36.89	34.37	39.41

Abdominal Circumference (AC) : CAMPBELL

GA Table

Professor Campbell's Group at Harris birthright Centre, King's College Hospital

AC (cm)	GA (wd)	±days (wd)
9.00	14w0d	02w0d
10.10	15w0d	02w1d
11.20	16w0d	02w1d
12.30	17w0d	02w1d
13.40	18w0d	02w1d
14.50	19w0d	02w1d
15.60	20w0d	02w2d
16.70	21w0d	02w2d
17.80	22w0d	02w2d
18.80	23w0d	02w3d
19.90	24w0d	02w4d
21.00	25w0d	02w5d
22.10	26w0d	02w5d
23.10	27w0d	02w6d

AC (cm)	GA (wd)	±days (wd)
24.20	28w0d	02w6d
25.30	29w0d	02w6d
26.40	30w0d	03w0d
27.50	31w0d	03w1d
28.60	32w0d	03w1d
29.70	33w0d	03w4d
30.80	34w0d	04w0d
31.70	35w0d	04w2d
32.50	36w0d	04w2d
33.10	37w0d	04w2d
33.80	38w0d	04w2d
34.40	39w0d	0w0d
35.00	40w0d	0w0d

Fetal Growth Table

Chitty, L., Campbell, S., "Charts of Fetal Size : Abdominal measurements," British J of OB and Gyn., February 1994, vol. 101, ppl 125-131, Table1.

Age (W)	Growth (cm)
12	6.00
13	7.02
14	8.43
15	9.43
16	10.96
17	11.75
18	13.06
19	14.44
20	15.20
21	16.53

Age (W)	Growth (cm)
22	17.03
23	18.51
24	19.54
25	20.46
26	21.54
27	22.62
28	24.12
29	25.35
30	26.22
31	27.30

Age (W)	Growth (cm)
32	27.98
33	29.21
34	30.14
35	31.09
36	31.85
37	32.94
38	33.10
39	34.26
40	36.04
41	36.89

Abdominal Circumference (AC) : ASUM(SCW)

Fetal Growth Table

Australasian Society for Ultrasound in Medicine

Policies and Statements - [D7] Statement On Normal Ultrasonic Fetal Measurements (Revised May 2001)

Age (w)	Growth (cm)	±2SD (mm)	Age (w)	Growth (cm)	±2SD (mm)
11	5.2	10.00	27	23.0	25.00
12	6.3	10.00	28	24.2	25.00
13	7.4	10.00	29	25.9	25.00
14	8.4	10.00	30	26.2	25.00
15	9.6	10.00	31	27.2	30.00
16	10.6	10.00	32	28.3	30.00
17	12.0	15.00	33	29.4	30.00
18	13.1	15.00	34	30.5	30.00
19	14.0	15.00	35	31.5	30.00
20	15.1	15.00	36	32.5	35.00
21	16.4	20.00	37	33.3	35.00
22	17.6	20.00	38	34.2	35.00
23	18.6	20.00	39	35.6	35.00
24	20.1	20.00	40	36.2	35.00
25	21.2	20.00	41	36.7	35.00
26	22.3	25.00			

Abdominal Circumference (AC) : CFEF

GA Table

J.Créquat, M. Duyme, G. Brodaty.

Biométrie 2000. Tables de croissance foetale par le Collège Français d'Echographie Foetale (CFEF) et l'Inserm U155

Gynecol Obstet Fertil, 2000 Jun;28(6):435-45

AC (cm)	GA (w)	AC (cm)	GA (w)	AC (cm)	GA (w)	AC (cm)	GA (w)
9.50	15	17.30	22	24.40	29	29.88	35
10.64	16	18.36	23	25.36	30	30.74	36
11.80	17	19.40	24	26.30	31	31.60	37
12.92	18	20.44	25	27.22	32	32.47	38
14.04	19	21.45	26	28.12	33	33.24	39
15.14	20	22.45	27	29.02	34	33.90	40
16.23	21	23.44	28				

Fetal Growth Table

J.Créquat, M. Duyme, G. Brodaty

Biométrie 2000. Tables de croissance foetale par le Collège Français d'Echographie Foetale (CFEF) et l'Inserm U155

Gynecol Obstet Fertil 2000 Jun;28(6):435-45

Age (W)	Growth (cm)	10% (cm)	90% (cm)	Age (W)	Growth (cm)	10% (cm)	90% (cm)
15	9.50	8.50	10.40	28	23.40	21.50	25.40
16	10.60	9.60	11.70	29	24.40	22.40	26.40
17	11.80	10.70	12.90	30	25.40	23.30	27.40

18	12.90	11.70	14.10
19	14.00	12.80	15.30
20	15.10	13.80	16.50
21	16.20	14.80	17.60
22	17.30	15.80	18.80
23	18.40	16.80	19.90
24	19.40	17.80	21.00
25	20.40	18.70	22.10
26	21.50	19.70	23.20
27	22.50	20.60	24.30

31	26.30	24.20	28.40
32	27.20	25.00	29.40
33	28.10	25.80	30.40
34	29.00	26.70	31.40
35	29.90	27.50	32.30
36	30.70	28.30	33.30
37	31.60	29.00	34.20
38	32.50	29.80	35.10
39	33.20	30.50	36.00
40	33.90	31.10	36.70

Abdominal Circumference (AC) : JOHNSEN

Fetal Growth Table

Johnsen SL, Wilsgaard T, Rasmussen S, Sollien R, Kiserud T. "Longitudinal reference charts for growth of the fetal head, abdomen and femur" Eur J Obstet Gynecol Reprod Biol, 2006 Aug; 127(2): 172-85

Age (W)	Growth (cm)	10% (cm)	90% (cm)
10	3.70	3.10	4.40
11	4.70	4.10	5.50
12	5.80	5.10	6.70
13	6.90	6.10	7.90
14	8.10	7.20	9.10
15	9.30	8.30	10.30
16	10.40	9.40	11.60
17	11.60	10.50	12.80

Age (W)	Growth (cm)	10% (cm)	90% (cm)
26	21.90	20.30	23.60
27	23.00	21.30	24.80
28	24.00	22.30	25.90
29	25.10	23.30	27.00
30	26.10	24.30	28.10
31	27.20	25.20	29.20
32	28.20	26.20	30.30
33	29.20	27.10	31.40

18	12.80	11.60	14.10
19	14.00	12.80	15.30
20	15.10	13.90	16.50
21	16.30	15.00	17.70
22	17.40	16.00	18.90
23	18.60	17.10	20.10
24	19.70	18.20	21.30
25	20.80	19.20	22.50

34	30.20	28.00	32.50
35	31.20	29.00	33.50
36	32.10	29.90	34.60
37	33.10	30.80	35.60
38	34.10	31.60	36.70
39	35.00	32.50	37.70
40	36.00	33.40	38.70
41	36.80	34.10	39.60

Abdominal Circumference (AC) : KURMANAVICIUS

Fetal Growth Table

Kurmanavicius J, Wright EM, Royston P, Zimmermann R, Huch R, Huch A, Wisser J. "Fetal ultrasound biometry: 2. Abdomen and femur length reference values" Br J Obstet Gynaecol, 1999 Feb;106(2):136-43

Age (W)	Growth (cm)	5% (cm)	95% (cm)
12	5.66	4.53	6.79
13	6.82	5.61	8.03
14	7.98	6.69	9.27
15	9.13	7.76	10.50
16	10.27	8.83	11.72
17	11.40	9.88	12.93
18	12.53	10.93	14.13
19	13.64	11.97	15.32
20	14.75	12.99	16.51
21	15.85	14.01	17.68

Age (W)	Growth (cm)	5% (cm)	95% (cm)
28	23.18	20.80	25.56
29	24.17	21.71	26.63
30	25.15	22.61	27.69
31	26.11	23.50	28.73
32	27.06	24.36	29.76
33	27.99	25.22	30.77
34	28.90	26.05	31.76
35	29.80	26.87	32.73
36	30.68	27.67	33.69
37	31.54	28.45	34.62

22	16.93	15.02	18.84
23	18.00	16.01	20.00
24	19.06	16.99	21.13
25	20.11	17.96	22.26
26	21.15	18.92	23.37
27	22.17	19.87	24.48

38	32.38	29.21	35.54
39	33.20	29.95	36.44
40	34.00	30.68	37.32
41	34.78	31.38	38.18
42	35.53	32.06	39.01

Abdominal Circumference (AC) : NICOLAIDES

Fetal Growth Table

Snijders RJ, Nicolaides KH. "Fetal biometry at 14-40 weeks' gestation" Ultrasound in obstetrics and Gynecology, 1994 Jan 1;4(1):34-48

Age (wd)	Growth (cm)	5% (cm)	95% (cm)
14w0d	9.00	8.00	10.20
14w1d	9.00	8.00	10.20
14w2d	9.00	8.00	10.20
14w3d	9.00	8.00	10.20
14w4d	9.00	8.00	10.20
14w5d	9.00	8.00	10.20
14w6d	9.00	8.00	10.20
15w0d	9.90	8.80	11.20
15w1d	9.90	8.80	11.20
15w2d	9.90	8.80	11.20
15w3d	9.90	8.80	11.20

Age (wd)	Growth (cm)	5% (cm)	95% (cm)
27w0d	23.10	20.50	25.90
27w1d	23.10	20.50	25.90
27w2d	23.10	20.50	25.90
27w3d	23.10	20.50	25.90
27w4d	23.10	20.50	25.90
27w5d	23.10	20.50	25.90
27w6d	23.10	20.50	25.90
28w0d	24.30	21.60	27.20
28w1d	24.30	21.60	27.20
28w2d	24.30	21.60	27.20
28w3d	24.30	21.60	27.20

15w4d	9.90	8.80	11.20
15w5d	9.90	8.80	11.20
15w6d	9.90	8.80	11.20
16w0d	10.80	9.60	12.20
16w1d	10.80	9.60	12.20
16w2d	10.80	9.60	12.20
16w3d	10.80	9.60	12.20
16w4d	10.80	9.60	12.20
16w5d	10.80	9.60	12.20
16w6d	10.80	9.60	12.20
17w0d	11.80	10.50	13.30
17w1d	11.80	10.50	13.30
17w2d	11.80	10.50	13.30
17w3d	11.80	10.50	13.30
17w4d	11.80	10.50	13.30
17w5d	11.80	10.50	13.30
17w6d	11.80	10.50	13.30
18w0d	12.80	11.40	14.40
18w1d	12.80	11.40	14.40
18w2d	12.80	11.40	14.40
18w3d	12.80	11.40	14.40
18w4d	12.80	11.40	14.40

28w4d	24.30	21.60	27.20
28w5d	24.30	21.60	27.20
28w6d	24.30	21.60	27.20
29w0d	25.40	22.60	28.50
29w1d	25.40	22.60	28.50
29w2d	25.40	22.60	28.50
29w3d	25.40	22.60	28.50
29w4d	25.40	22.60	28.50
29w5d	25.40	22.60	28.50
29w6d	25.40	22.60	28.50
30w0d	26.60	23.70	29.80
30w1d	26.60	23.70	29.80
30w2d	26.60	23.70	29.80
30w3d	26.60	23.70	29.80
30w4d	26.60	23.70	29.80
30w5d	26.60	23.70	29.80
30w6d	26.60	23.70	29.80
31w0d	27.70	24.60	31.00
31w1d	27.70	24.60	31.00
31w2d	27.70	24.60	31.00
31w3d	27.70	24.60	31.00
31w4d	27.70	24.60	31.00

18w5d	12.80	11.40	14.40
18w6d	12.80	11.40	14.40
19w0d	13.90	12.30	15.60
19w1d	13.90	12.30	15.60
19w2d	13.90	12.30	15.60
19w3d	13.90	12.30	15.60
19w4d	13.90	12.30	15.60
19w5d	13.90	12.30	15.60
19w6d	13.90	12.30	15.60
20w0d	14.90	13.30	16.80
20w1d	14.90	13.30	16.80
20w2d	14.90	13.30	16.80
20w3d	14.90	13.30	16.80
20w4d	14.90	13.30	16.80
20w5d	14.90	13.30	16.80
20w6d	14.90	13.30	16.80
21w0d	16.10	14.30	18.10
21w1d	16.10	14.30	18.10
21w2d	16.10	14.30	18.10
21w3d	16.10	14.30	18.10
21w4d	16.10	14.30	18.10
21w5d	16.10	14.30	18.10

31w5d	27.70	24.60	31.00
31w6d	27.70	24.60	31.00
32w0d	28.70	25.60	32.20
32w1d	28.70	25.60	32.20
32w2d	28.70	25.60	32.20
32w3d	28.70	25.60	32.20
32w4d	28.70	25.60	32.20
32w5d	28.70	25.60	32.20
32w6d	28.70	25.60	32.20
33w0d	29.70	26.50	33.40
33w1d	29.70	26.50	33.40
33w2d	29.70	26.50	33.40
33w3d	29.70	26.50	33.40
33w4d	29.70	26.50	33.40
33w5d	29.70	26.50	33.40
33w6d	29.70	26.50	33.40
34w0d	30.70	27.40	34.50
34w1d	30.70	27.40	34.50
34w2d	30.70	27.40	34.50
34w3d	30.70	27.40	34.50
34w4d	30.70	27.40	34.50
34w5d	30.70	27.40	34.50

21w6d	16.10	14.30	18.10
22w0d	17.20	15.30	19.30
22w1d	17.20	15.30	19.30
22w2d	17.20	15.30	19.30
22w3d	17.20	15.30	19.30
22w4d	17.20	15.30	19.30
22w5d	17.20	15.30	19.30
22w6d	17.20	15.30	19.30
23w0d	18.30	16.30	20.60
23w1d	18.30	16.30	20.60
23w2d	18.30	16.30	20.60
23w3d	18.30	16.30	20.60
23w4d	18.30	16.30	20.60
23w5d	18.30	16.30	20.60
23w6d	18.30	16.30	20.60
24w0d	19.50	17.40	21.90
24w1d	19.50	17.40	21.90
24w2d	19.50	17.40	21.90
24w3d	19.50	17.40	21.90
24w4d	19.50	17.40	21.90
24w5d	19.50	17.40	21.90
24w6d	19.50	17.40	21.90

34w6d	30.70	27.40	34.50
35w0d	31.60	28.20	35.50
35w1d	31.60	28.20	35.50
35w2d	31.60	28.20	35.50
35w3d	31.60	28.20	35.50
35w4d	31.60	28.20	35.50
35w5d	31.60	28.20	35.50
35w6d	31.60	28.20	35.50
36w0d	32.40	28.90	36.40
36w1d	32.40	28.90	36.40
36w2d	32.40	28.90	36.40
36w3d	32.40	28.90	36.40
36w4d	32.40	28.90	36.40
36w5d	32.40	28.90	36.40
36w6d	32.40	28.90	36.40
37w0d	33.20	29.50	37.20
37w1d	33.20	29.50	37.20
37w2d	33.20	29.50	37.20
37w3d	33.20	29.50	37.20
37w4d	33.20	29.50	37.20
37w5d	33.20	29.50	37.20
37w6d	33.20	29.50	37.20

25w0d	20.70	18.40	23.30	38w0d	33.90	30.20	38.00
25w1d	20.70	18.40	23.30	38w1d	33.90	30.20	38.00
25w2d	20.70	18.40	23.30	38w2d	33.90	30.20	38.00
25w3d	20.70	18.40	23.30	38w3d	33.90	30.20	38.00
25w4d	20.70	18.40	23.30	38w4d	33.90	30.20	38.00
25w5d	20.70	18.40	23.30	38w5d	33.90	30.20	38.00
25w6d	20.70	18.40	23.30	38w6d	33.90	30.20	38.00
26w0d	21.90	19.50	24.60	39w0d	34.50	30.70	38.70
26w1d	21.90	19.50	24.60	39w1d	34.50	30.70	38.70
26w2d	21.90	19.50	24.60	39w2d	34.50	30.70	38.70
26w3d	21.90	19.50	24.60	39w3d	34.50	30.70	38.70
26w4d	21.90	19.50	24.60	39w4d	34.50	30.70	38.70
26w5d	21.90	19.50	24.60	39w5d	34.50	30.70	38.70
26w6d	21.90	19.50	24.60	39w6d	34.50	30.70	38.70

Biparietal Diameter (BPD) : KOREAN

GA Table

Y.G Park.“ The Standardization of Fetal body parts according to the normal Korean Gestational Age in Ultrasound” Korean Ultrasound Institute, Vol. 14, No.2, 1995

GA = 1.20007 x BPD + 0.2076 × BPD^2 + 9.209216

Output Unit : w(weeks)

Input Unit : cm

Min Range : 1.9 cm

Max Range : 9.4 cm

Fetal Growth Table

Y.G Park.“ The Standardization of Fetal body parts according to the normal Korean Gestational Age in Ultrasound” Korean Ultrasound Institute, Vol. 14, No.2, 1995

BPD = 51.06104 x MA -4.6719 x MA2 - 35.053334

Output Unit : cm

Input Unit : w(week)

Min Range : 12w

Max Range : 40w

Age (W)	Growth (cm)	±SD (cm)	Age (W)	Growth (cm)	±SD (cm)
12	1.970	0.219	32	8.122	0.263
16	3.483	0.213	34	8.496	0.244
20	4.783	0.231	36	8.849	0.225
24	5.978	0.287	38	9.093	0.121
28	7.164	0.256	40	9.401	0.188

Biparietal Diameter (BPD) : HANSMANN

GA Table

Hansmann, Hackeloer, Staudach, Wittman. "Ultrasound Diagnosis in Obsterics and Gynecology." Springer-Verlag, New York, 1986, p.440-441.

BPD (cm)	GA (wd)	5% (wd)	95% (wd)	BPD (cm)	GA (wd)	5% (wd)	95% (wd)
2.9	13w3d	12w2d	14w3d	6.8	25w6d	24w3d	27w2d
3.0	13w5d	12w5d	14w5d	6.9	26w1d	24w6d	27w4d
3.1	14w0d	12w6d	15w1d	7.0	26w3d	25w0d	27w6d

3.2	14w2d	13w2d	15w3d
3.3	14w4d	13w3d	15w6d
3.4	15w0d	13w5d	16w2d
3.5	15w2d	14w1d	16w3d
3.6	15w4d	14w3d	16w6d
3.7	16w0d	14w6d	17w1d
3.8	16w2d	15w0d	17w4d
3.9	16w4d	15w3d	17w6d
4.0	17w0d	15w5d	18w1d
4.1	17w2d	16w0d	18w4d
4.2	17w4d	16w3d	18w6d
4.3	17w6d	16w4d	19w1d
4.4	18w1d	16w6d	19w3d
4.5	18w4d	17w2d	19w6d
4.6	18w6d	17w4d	20w1d
4.7	19w1d	17w6d	20w4d
4.8	19w3d	18w0d	20w6d
4.9	19w5d	18w1d	21w1d
5.0	20w0d	18w4d	21w1d
5.1	20w3d	19w0d	21w6d
5.2	20w5d	19w2d	22w1d
5.3	21w0d	19w3d	22w4d
5.4	21w3d	20w0d	22w6d
5.5	21w5d	20w2d	23w0d
5.6	22w0d	20w5d	23w2d
5.7	22w2d	21w0d	23w4d
5.8	22w5d	21w3d	23w6d

7.1	26w5d	25w2d	28w3d
7.2	27w1d	25w4d	28w4d
7.3	27w3d	26w0d	29w2d
7.4	27w6d	26w1d	29w4d
7.5	28w1d	26w3d	29w6d
7.6	28w4d	26w5d	30w2d
7.7	28w6d	27w1d	30w5d
7.8	29w2d	27w2d	31w3d
7.9	29w5d	27w3d	32w0d
8.0	30w0d	27w6d	32w1d
8.1	30w3d	28w2d	32w4d
8.2	31w0d	28w6d	33w1d
8.3	31w2d	29w0d	33w5d
8.4	31w6d	29w3d	34w2d
8.5	32w2d	29w6d	34w4d
8.6	32w5d	30w1d	35w1d
8.7	33w2d	30w2d	36w1d
8.8	33w5d	31w0d	36w3d
8.9	34w2d	31w4d	37w0d
9.0	34w5d	32w0d	37w3d
9.1	35w1d	32w1d	38w5d
9.2	35w6d	33w2d	39w2d
9.3	36w5d	33w5d	39w5d
9.4	37w3d	34w5d	40w1d
9.5	38w3d	35w2d	41w0d
9.6	38w6d	35w2d	41w3d
9.7	39w0d	35w6d	42w0d

5.9	23w0d	21w4d	24w3d
6.0	23w2d	21w6d	24w4d
6.1	23w4d	22w1d	25w0d
6.2	24w0d	22w4d	25w3d
6.3	24w2d	22w6d	25w4d
6.4	24w4d	23w1d	26w0d
6.5	24w6d	23w4d	26w2d
6.6	25w1d	23w6d	26w5d
6.7	25w3d	24w1d	27w1d

9.8	39w2d	36w3d	42w0d
9.9	39w3d	36w4d	42w4d
10.0	39w4d	36w5d	42w2d
10.1	39w5d	37w1d	42w4d
10.2	39w6d	37w1d	42w2d
10.3	40w0d	37w2d	42w2d
10.4	40w1d	37w3d	42w2d
10.5	40w2d	37w6d	42w2d

Fetal Growth Table

Hansmann, Hackeloer, Stauch, Wittman "Ultrasound Diagnosis in Obsterics and Gynecology" Springer-Verlag, New York, 1986. p.176

Age (W)	Growth (cm)	5% (cm)	95% (cm)
10	1.4	0.9	1.8
11	1.7	1.3	2.2
12	2.1	1.6	2.5
13	2.4	2	2.9
14	2.8	2.3	3.2
15	3.1	2.7	3.6
16	3.5	3	3.9
17	3.8	3.4	4.3
18	4.2	3.7	4.6
19	4.5	4	4.9
20	4.8	4.4	5.3

Age (W)	Growth (cm)	5% (cm)	95% (cm)
26	6.7	6.2	7.1
27	7	6.5	7.4
28	7.2	6.8	7.7
29	7.5	7	7.9
30	7.7	7.3	8.2
31	7.9	7.5	8.4
32	8.2	7.7	8.6
33	8.4	7.9	8.8
34	8.6	8.1	9
35	8.7	8.3	9.2
36	8.9	8.4	9.3

21	5.1	4.7	5.6
22	5.5	5	5.9
23	5.8	5.3	6.2
24	6.1	5.6	6.5
25	6.4	5.9	6.8

37	9	8.6	9.5
38	9.1	8.7	9.6
39	9.3	8.8	9.7
40	9.3	8.9	9.8

Biparietal Diameter (BPD) : HADLOCK

GA Table

Hadlock, F., Deter, R.L., Harrist, R.B., Park, S.K. "Estimating Fetal Age: Computer-Assisted Analysis of Multiple Fetal Growth Parameters" Radiology, 1984, 152: 497-501.

GA = 9.54 + 1.482 × BPD + 0.1676 × BPD^2

Output Unit : w(weeks)

Input Unit : cm

Min Range : 1.36 cm

Max Range : 10.18 cm

Standard Deviation :

Min Range(w)	Max Range(w)	±2SD(w)
12	18	1.19
18	24	1.73
24	30	2.18
30	36	3.08
36	42	3.20

Fetal Growth Table

Frank P. Hadlock, Russell L.Deter, Ronald B. Harrist, Seung K. Park,. "Estimating Fetal Age: Computer-Assisted Analysis of Multiple Fetal Growth Parameters" Radiology, 1984; 152:497-501.

Equation = 0.41 x MA – 0.000061 x MA^3 – 3.08

Output Unit : cm

Input Unit : w(weeks)

Min Range : 12w

Max Range : 40w

Standard Deviation : 2SD=0.6cm

Biparietal Diameter (BPD) : MERZ

GA Table

E. Merz, W. Goldhofer, E. Timor-Tritsch "Ultrasound in Gynecology and Obstetrics" Textbook and Atlas, 1991 Georg Thieme Verlag, 308-338

BPD (cm)	GA (wd)	5% (wd)	95% (wd)
2.1	12w1d	10w5d	13w5d
2.2	12w3d	10w6d	13w6d
2.3	12w5d	11w1d	14w1d
2.4	13w0d	11w4d	14w4d
2.5	13w1d	11w5d	14w5d
2.6	13w4d	12w0d	15w0d
2.7	13w6d	12w1d	15w3d
2.8	14w1d	12w4d	15w5d
2.9	14w2d	12w5d	15w6d
3.0	14w4d	13w0d	16w1d

BPD (cm)	GA (wd)	5% (wd)	95% (wd)
6.2	24w1d	22w1d	26w1d
6.3	24w4d	22w4d	26w4d
6.4	24w6d	22w6d	26w6d
6.5	25w1d	23w1d	27w1d
6.6	25w4d	23w4d	27w4d
6.7	25w6d	23w6d	27w6d
6.8	26w1d	24w1d	28w2d
6.9	26w4d	24w3d	28w4d
7.0	26w6d	24w5d	28w6d
7.1	27w1d	25w1d	29w2d

3.1	14w6d	13w2d	16w4d
3.2	15w1d	13w4d	16w6d
3.3	15w3d	13w6d	17w0d
3.4	15w5d	14w0d	17w3d
3.5	16w0d	14w2d	17w5d
3.6	16w2d	14w4d	18w0d
3.7	16w4d	14w6d	18w1d
3.8	16w6d	15w1d	18w4d
3.9	17w1d	15w3d	18w6d
4.0	17w3d	15w5d	19w1d
4.1	17w5d	15w6d	19w4d
4.2	18w0d	16w1d	19w6d
4.3	18w2d	16w4d	20w1d
4.4	18w4d	16w6d	20w3d
4.5	18w6d	17w1d	20w5d
4.6	19w1d	17w3d	21w0d
4.7	19w3d	17w4d	21w1d
4.8	19w5d	17w6d	21w4d
4.9	20w0d	18w1d	21w6d
5.0	20w3d	18w4d	22w1d
5.1	20w5d	18w6d	22w4d
5.2	21w0d	19w1d	22w6d
5.3	21w2d	19w3d	23w1d
5.4	21w4d	19w5d	23w4d
5.5	21w6d	20w0d	23w6d
5.6	22w1d	20w2d	24w1d

7.2	27w4d	25w4d	29w5d
7.3	27w6d	25w6d	30w0d
7.4	28w2d	26w1d	30w3d
7.5	28w4d	26w4d	30w5d
7.6	29w0d	26w6d	31w1d
7.7	29w3d	27w1d	31w4d
7.8	29w6d	27w4d	32w0d
7.9	30w1d	27w6d	32w2d
8.0	30w4d	28w2d	32w5d
8.1	30w6d	28w5d	33w1d
8.2	31w2d	29w1d	33w4d
8.3	31w5d	29w4d	33w6d
8.4	32w1d	29w6d	34w2d
8.5	32w4d	30w2d	34w5d
8.6	32w6d	30w5d	35w1d
8.7	33w2d	31w0d	35w4d
8.8	33w6d	31w4d	36w1d
8.9	34w1d	31w6d	36w4d
9.0	34w4d	32w2d	36w6d
9.1	35w1d	32w6d	37w3d
9.2	35w4d	33w1d	37w6d
9.3	35w6d	33w4d	38w1d
9.4	36w3d	34w0d	38w6d
9.5	36w6d	34w4d	39w2d
9.6	37w2d	34w6d	39w5d
9.7	37w6d	35w3d	40w1d

5.7	22w4d	20w4d	24w3d
5.8	22w6d	20w6d	24w5d
5.9	23w1d	21w1d	25w1d
6.0	23w4d	21w4d	25w4d
6.1	23w6d	21w6d	25w6d

9.8	38w2d	35w6d	40w5d
9.9	38w6d	36w3d	41w1d
10.0	39w2d	36w6d	41w6d
10.1	39w6d	37w2d	42w2d
10.2	40w2d	37w6d	42w6d

Fetal Growth Table

E. Merz, W. Goldhofer, E. Timor-Tritsch "Ultrasound in Gynecology and Obstetrics" Textbook and Atlas, 1991 Georg Thieme Verlag, 308-338

Age (W)	Growth (cm)	5% (cm)	95% (cm)
12	2	1.5	2.4
13	2.4	1.9	2.8
14	2.8	2.3	3.2
15	3.1	2.7	3.6
16	3.5	3	4
17	3.9	3.4	4.4
18	4.3	3.8	4.8
19	4.6	4.1	5.1
20	5	4.5	5.5
21	5.3	4.8	5.8
22	5.6	5.1	6.2
23	6	5.4	6.5
24	6.3	5.7	6.8
25	6.6	6	7.1
26	6.9	6.3	7.4

Age (W)	Growth (cm)	5% (cm)	95% (cm)
27	7.2	6.6	7.7
28	7.4	6.9	8
29	7.7	7.1	8.3
30	7.9	7.4	8.5
31	8.2	7.6	8.8
32	8.4	7.8	9
33	8.6	8	9.2
34	8.9	8.2	9.5
35	9.1	8.4	9.7
36	9.3	8.6	9.9
37	9.4	8.8	10.1
38	9.6	9	10.3
39	9.8	9.1	10.4
40	9.9	9.3	10.6

Biparietal Diameter (BPD) : JEANTY

GA Table

Jeanty, P., Romero, R. "Obstetrical Ultrasound" McGraw-Hill Book Company, pages 57-61, 1984.

BPD (cm)	GA (wd)	5% (wd)	95% (wd)
1.00	09w1d	06w4d	11w6d
1.10	09w4d	06w6d	12w1d
1.20	09w5d	07w0d	12w3d
1.30	10w0d	07w2d	12w5d
1.40	10w2d	07w4d	12w6d
1.50	10w4d	07w6d	13w1d
1.60	10w6d	08w1d	13w3d
1.70	11w1d	08w3d	13w5d
1.80	11w2d	08w4d	14w0d
1.90	11w4d	08w6d	14w1d
2.00	11w6d	09w1d	14w4d
2.10	12w1d	09w3d	14w6d
2.20	12w3d	09w5d	15w0d
2.30	12w4d	09w6d	15w2d
2.40	12w6d	10w1d	15w4d
2.50	13w1d	10w4d	15w6d
2.60	13w3d	10w5d	16w1d
2.70	13w5d	11w0d	16w3d
2.80	14w0d	11w2d	16w4d
2.90	14w1d	11w4d	16w6d

BPD (cm)	GA (wd)	5% (wd)	95% (wd)
5.30	21w1d	18w4d	23w6d
5.40	21w4d	18w6d	24w1d
5.50	21w6d	19w1d	24w4d
5.60	22w1d	19w4d	24w6d
5.70	22w4d	19w6d	25w1d
5.80	22w6d	20w1d	25w4d
5.90	23w1d	20w4d	25w6d
6.00	23w4d	20w6d	26w1d
6.10	23w6d	21w1d	26w4d
6.20	24w1d	21w4d	26w6d
6.30	24w4d	21w6d	27w1d
6.40	24w6d	22w1d	27w4d
6.50	25w2d	22w4d	27w6d
6.60	25w4d	22w6d	28w2d
6.70	26w0d	23w2d	28w4d
6.80	26w3d	23w5d	29w0d
6.90	26w5d	24w0d	29w3d
7.00	27w1d	24w3d	29w6d
7.10	27w4d	24w6d	30w1d
7.20	27w6d	25w1d	30w4d

3.00	14w4d	11w6d	17w1d
3.10	14w6d	12w1d	17w3d
3.20	15w1d	12w2d	17w5d
3.30	15w2d	12w4d	18w0d
3.40	15w4d	12w6d	18w2d
3.50	15w6d	13w1d	18w4d
3.60	16w1d	13w4d	18w6d
3.70	16w3d	13w5d	19w1d
3.80	16w5d	14w0d	19w3d
3.90	17w0d	14w2d	19w5d
4.00	17w2d	14w4d	19w6d
4.10	17w4d	14w6d	20w1d
4.20	17w6d	15w1d	20w4d
4.30	18w1d	15w3d	20w6d
4.40	18w3d	15w5d	21w1d
4.50	18w5d	16w0d	21w3d
4.60	19w0d	16w2d	21w5d
4.70	19w2d	16w4d	22w0d
4.80	19w4d	16w6d	22w2d
4.90	19w6d	17w1d	22w4d
5.00	20w2d	17w4d	22w6d
5.10	20w4d	17w6d	23w1d
5.20	20w6d	18w1d	23w4d

7.30	28w2d	25w4d	30w6d
7.40	28w5d	26w0d	31w2d
7.50	29w1d	26w3d	31w5d
7.60	29w4d	26w6d	32w1d
7.70	29w6d	27w1d	32w4d
7.80	30w2d	27w4d	33w0d
7.90	30w5d	28w0d	33w3d
8.00	31w1d	28w4d	33w6d
8.10	31w4d	28w6d	34w2d
8.20	32w0d	29w2d	34w5d
8.30	32w4d	29w6d	35w1d
8.40	32w6d	30w1d	35w4d
8.50	33w3d	30w5d	36w0d
8.60	33w6d	31w1d	36w4d
8.70	34w2d	31w4d	37w0d
8.80	34w6d	32w1d	37w3d
8.90	35w2d	32w4d	37w6d
9.00	35w5d	33w0d	38w3d
9.10	36w1d	33w4d	38w6d
9.20	36w5d	34w0d	39w3d
9.30	37w1d	34w4d	39w6d
9.40	37w5d	35w0d	40w3d
9.50	38w2d	35w4d	40w6d

Biparietal Diameter (BPD) : SABBAGHA

GA Table

Sabbagha, R.E., et. al. "Standardization of Sonar Cephalometry and Gestational Age" Obstetrics and Gynecology, Vol. 52, No.4: 403, October, 1978

BPD (cm)	GA (wd)	±days (wd)
3.70	16w0d	1w0d
4.00	17w0d	1w3d
4.30	18w0d	1w3d
4.50	19w0d	1w3d
4.70	20w0d	1w3d
5.00	21w0d	1w3d
5.30	22w0d	1w3d
5.60	23w0d	1w3d
5.90	24w0d	1w3d
6.20	25w0d	1w3d
6.60	26w0d	1w3d
6.90	27w0d	2w0d
7.20	28w0d	2w0d

BPD (cm)	GA (wd)	±days (wd)
7.50	29w0d	3w0d
7.80	30w0d	3w0d
8.00	31w0d	3w0d
8.30	32w0d	3w0d
8.50	33w0d	3w0d
8.70	34w0d	3w0d
8.80	35w0d	3w0d
9.00	36w0d	3w0d
9.20	37w0d	3w0d
9.30	38w0d	3w0d
9.40	39w0d	3w0d
9.50	40w0d	3w0d

Biparietal Diameter (BPD) : SHINOZUKA

GA Table

Norio Shinozuka, Takashi Okai, et al. "Standard Values of Ultrasonographic Fetal Biometry" Japanese Journal of Medical Ultrasonics, Vol.23, No.12, 1996, pp877-888

BPD (cm)	GA (wd)	-SD (wd)	+SD (wd)
1.30	10w1d	09w4d	10w5d
1.40	10w3d	09w6d	11w0d
1.50	10w5d	10w1d	11w2d
1.60	11w0d	10w3d	11w4d
1.70	11w2d	10w5d	11w6d
1.80	11w4d	11w0d	12w1d
1.90	11w6d	11w2d	12w3d
2.00	12w1d	11w4d	12w5d
2.10	12w3d	11w6d	13w0d
2.20	12w6d	12w2d	13w3d
2.30	13w1d	12w3d	13w6d
2.40	13w3d	12w5d	14w1d
2.50	13w5d	13w0d	14w3d
2.60	14w0d	13w2d	14w5d
2.70	14w2d	13w4d	15w0d
2.80	14w4d	13w6d	15w2d
2.90	14w6d	14w1d	15w4d
3.00	15w1d	14w3d	15w6d
3.10	15w3d	14w5d	16w1d

BPD (cm)	GA (wd)	-SD (wd)	+SD (wd)
5.20	21w6d	20w6d	22w6d
5.30	22w1d	21w0d	23w2d
5.40	22w3d	21w2d	23w4d
5.50	22w5d	21w4d	23w6d
5.60	23w1d	22w0d	24w2d
5.70	23w3d	22w2d	24w4d
5.80	23w5d	22w4d	24w6d
5.90	24w1d	23w0d	25w2d
6.00	24w3d	23w1d	25w5d
6.10	24w5d	23w3d	26w0d
6.20	25w1d	23w6d	26w3d
6.30	25w3d	24w1d	26w5d
6.40	25w5d	24w3d	27w0d
6.50	26w1d	24w6d	27w3d
6.60	26w3d	25w0d	27w6d
6.70	26w6d	25w3d	28w2d
6.80	27w2d	25w6d	28w5d
6.90	27w4d	26w1d	29w0d
7.00	28w0d	26w4d	29w3d

3.20	15w5d	15w0d	16w3d
3.30	16w0d	15w2d	16w5d
3.40	16w2d	15w4d	17w0d
3.50	16w4d	15w6d	17w2d
3.60	16w6d	16w0d	17w5d
3.70	17w1d	16w2d	18w0d
3.80	17w4d	16w5d	18w3d
3.90	17w6d	17w0d	18w5d
4.00	18w1d	17w2d	19w0d
4.10	18w3d	17w4d	19w2d
4.20	18w5d	17w6d	19w4d
4.30	19w0d	18w1d	19w6d
4.40	19w2d	18w3d	20w1d
4.50	19w4d	18w5d	20w3d
4.60	20w0d	19w0d	21w0d
4.70	20w2d	19w2d	21w2d
4.80	20w4d	19w4d	21w4d
4.90	20w6d	19w6d	21w6d
5.00	21w1d	20w1d	22w1d
5.10	21w3d	20w3d	22w3d

7.10	28w3d	27w0d	29w6d
7.20	28w5d	27w1d	30w2d
7.30	29w1d	27w4d	30w5d
7.40	29w4d	28w0d	31w1d
7.50	30w0d	28w3d	31w4d
7.60	30w3d	28w6d	32w0d
7.70	30w6d	29w1d	32w4d
7.80	31w2d	29w4d	33w0d
7.90	31w5d	30w0d	33w3d
8.00	32w1d	30w3d	33w6d
8.10	32w5d	31w0d	34w3d
8.20	33w1d	31w2d	35w0d
8.30	33w5d	31w6d	35w4d
8.40	34w2d	32w3d	36w1d
8.50	34w6d	33w0d	36w5d
8.60	35w3d	33w3d	37w3d
8.70	36w0d	34w0d	38w0d
8.80	36w5d	34w5d	38w5d
8.90	37w4d	35w4d	39w4d
9.00	38w3d	36w2d	40w4d

Fetal Growth Table

Norio Shinozuka, Takashi Okai, et al. "Standard Values of Ultrasonographic Fetal Biometry" Japanese Journal of Medical Ultrasonics, Vol.23, No.12, 1996, pp877-888

Age (W)	Growth (cm)	-1.5SD (cm)	+1.5SD (cm)
10	1.43	1.08	1.77
11	1.76	1.41	2.12
12	2.10	1.74	2.47
13	2.44	2.07	2.82
14	2.78	2.40	3.16
15	3.12	2.73	3.51
16	3.46	3.06	3.86
17	3.80	3.39	4.20
18	4.13	3.72	4.55
19	4.46	4.04	4.88
20	4.79	4.36	5.22
21	5.11	4.67	5.55
22	5.42	4.97	5.87
23	5.73	5.27	6.18
24	6.03	5.56	6.49
25	6.32	5.85	6.79
26	6.60	6.12	7.08

Age (W)	Growth (cm)	-1.5SD (cm)	+1.5SD (cm)
27	6.87	6.38	7.36
28	7.14	6.64	7.63
29	7.39	6.88	7.89
30	7.63	7.11	8.14
31	7.85	7.33	8.38
32	8.06	7.53	8.60
33	8.26	7.72	8.80
34	8.45	7.90	8.99
35	8.61	8.06	9.17
36	8.76	8.20	9.33
37	8.90	8.32	9.47
38	9.01	8.43	9.59
39	9.11	8.52	9.70
40	9.18	8.59	9.78
41	9.24	8.63	9.85
42	9.28	8.66	9.89

Biparietal Diameter (BPD) : OSAKA

GA Table

Osaka University Method 1989, 3 by Univ. Of Osaka

BPD (cm)	G.A (wd)	BPD (cm)	G.A (wd)	BPD (cm)	G.A (wd)	BPD (cm)	G.A (wd)
1.30	10w0d	3.40	15w4d	5.50	22w0d	7.60	29w3d
1.40	10w1d	3.50	16w0d	5.60	22w3d	7.70	29w6d
1.50	10w3d	3.60	16w2d	5.70	22w5d	7.80	30w2d
1.60	10w5d	3.70	16w4d	5.80	23w0d	7.90	30w4d
1.70	11w0d	3.80	16w6d	5.90	23w3d	8.00	31w0d
1.80	11w1d	3.90	17w1d	6.00	23w5d	8.10	31w3d
1.90	11w3d	4.00	17w3d	6.10	24w0d	8.20	32w0d
2.00	11w5d	4.10	17w5d	6.20	24w3d	8.30	32w3d
2.10	12w0d	4.20	18w0d	6.30	24w5d	8.40	32w6d
2.20	12w2d	4.30	18w2d	6.40	25w0d	8.50	33w3d
2.30	12w4d	4.40	18w4d	6.50	25w3d	8.60	33w6d
2.40	12w6d	4.50	18w6d	6.60	25w5d	8.70	34w0d
2.50	13w1d	4.60	19w2d	6.70	26w0d	8.80	35w0d
2.60	13w3d	4.70	19w4d	6.80	26w3d	8.90	35w4d
2.70	13w5d	4.80	19w6d	6.90	26w5d	9.00	36w2d
2.80	14w0d	4.90	20w1d	7.00	27w1d	9.10	37w0d
2.90	14w1d	5.00	20w3d	7.10	27w4d	9.20	37w6d
3.00	14w3d	5.10	20w5d	7.20	27w6d	9.30	39w0d
3.10	14w5d	5.20	21w1d	7.30	28w2d	9.40	40w0d
3.20	15w0d	5.30	21w3d	7.40	28w4d		
3.30	15w2d	5.40	21w5d	7.50	29w0d		

Fetal Growth Table

Osaka University Method 1989, 3 by Univ. Of Osaka

GA (wd)	Growth (cm)	±SD (cm)	GA (wd)	Growth (cm)	±SD (cm)
10w0d	1.33	0.19	25w1d	6.43	0.32
10w1d	1.38	0.19	25w2d	6.47	0.33
10w2d	1.44	0.19	25w3d	6.51	0.33
10w3d	1.50	0.19	25w4d	6.55	0.33
10w4d	1.55	0.19	25w5d	6.59	0.33
10w5d	1.61	0.19	25w6d	6.63	0.33
10w6d	1.66	0.20	26w0d	6.67	0.33
11w0d	1.72	0.20	26w1d	6.71	0.33
11w1d	1.77	0.20	26w2d	6.75	0.33
11w2d	1.83	0.20	26w3d	6.80	0.33
11w3d	1.88	0.20	26w4d	6.84	0.33
11w4d	1.93	0.20	26w5d	6.88	0.33
11w5d	1.99	0.21	26w6d	6.92	0.34
11w6d	2.04	0.21	27w0d	6.95	0.34
12w0d	2.09	0.21	27w1d	6.99	0.34
12w1d	2.15	0.21	27w2d	7.03	0.34
12w2d	2.20	0.21	27w3d	7.07	0.34
12w3d	2.25	0.21	27w4d	7.11	0.34
12w4d	2.31	0.21	27w5d	7.15	0.34
12w5d	2.36	0.22	27w6d	7.19	0.34
12w6d	2.41	0.22	28w0d	7.23	0.34
13w0d	2.46	0.22	28w1d	7.27	0.34

13w1d	2.52	0.22
13w2d	2.57	0.22
13w3d	2.62	0.22
13w4d	2.67	0.23
13w5d	2.72	0.23
13w6d	2.77	0.23
14w0d	2.82	0.23
14w1d	2.87	0.23
14w2d	2.93	0.23
14w3d	2.98	0.23
14w4d	3.03	0.24
14w5d	3.08	0.24
14w6d	3.13	0.24
15w0d	3.18	0.24
15w1d	3.23	0.24
15w2d	3.28	0.24
15w3d	3.33	0.24
15w4d	3.38	0.25
15w5d	3.42	0.25
15w6d	3.47	0.25
16w0d	3.52	0.25
16w1d	3.57	0.25
16w2d	3.62	0.25
16w3d	3.67	0.25
16w4d	3.72	0.25
16w5d	3.77	0.26

28w2d	7.30	0.34
28w3d	7.34	0.34
28w4d	7.38	0.35
28w5d	7.42	0.35
28w6d	7.45	0.35
29w0d	7.49	0.35
29w1d	7.53	0.35
29w2d	7.56	0.35
29w3d	7.60	0.35
29w4d	7.64	0.35
29w5d	7.67	0.35
29w6d	7.71	0.35
30w0d	7.74	0.35
30w1d	7.78	0.35
30w2d	7.81	0.35
30w3d	7.85	0.36
30w4d	7.88	0.36
30w5d	7.92	0.36
30w6d	7.95	0.36
31w0d	7.98	0.36
31w1d	8.02	0.36
31w2d	8.05	0.36
31w3d	8.08	0.36
31w4d	8.12	0.36
31w5d	8.15	0.36
31w6d	8.18	0.36

16w6d	3.81	0.26
17w0d	3.86	0.26
17w1d	3.91	0.26
17w2d	3.96	0.26
17w3d	4.01	0.26
17w4d	4.05	0.26
17w5d	4.10	0.27
17w6d	4.15	0.27
18w0d	4.20	0.27
18w1d	4.24	0.27
18w2d	4.29	0.27
18w3d	4.34	0.27
18w4d	4.39	0.27
18w5d	4.43	0.27
18w6d	4.48	0.28
19w0d	4.53	0.28
19w1d	4.57	0.28
19w2d	4.62	0.28
19w3d	4.67	0.28
19w4d	4.71	0.28
19w5d	4.76	0.28
19w6d	4.80	0.28
20w0d	4.85	0.29
20w1d	4.90	0.29
20w2d	4.94	0.29
20w3d	4.99	0.29

32w0d	8.21	0.36
32w1d	8.24	0.36
32w2d	8.27	0.36
32w3d	8.31	0.36
32w4d	8.34	0.37
32w5d	8.37	0.37
32w6d	8.40	0.37
33w0d	8.43	0.37
33w1d	8.46	0.37
33w2d	8.48	0.37
33w3d	8.51	0.37
33w4d	8.54	0.37
33w5d	8.57	0.37
33w6d	8.60	0.37
34w0d	8.62	0.37
34w1d	8.65	0.37
34w2d	8.68	0.37
34w3d	8.70	0.37
34w4d	8.73	0.37
34w5d	8.75	0.37
34w6d	8.78	0.37
35w0d	8.80	0.37
35w1d	8.83	0.38
35w2d	8.85	0.38
35w3d	8.87	0.38
35w4d	8.90	0.38

20w4d	5.03	0.29
20w5d	5.08	0.29
20w6d	5.12	0.29
21w0d	5.17	0.29
21w1d	5.21	0.29
21w2d	5.26	0.30
21w3d	5.30	0.30
21w4d	5.35	0.30
21w5d	5.39	0.30
21w6d	5.44	0.30
22w0d	5.48	0.30
22w1d	5.52	0.30
22w2d	5.57	0.30
22w3d	5.61	0.30
22w4d	5.66	0.31
22w5d	5.70	0.31
22w6d	5.74	0.31
23w0d	5.79	0.31
23w1d	5.83	0.31
23w2d	5.87	0.31
23w3d	5.92	0.31
23w4d	5.96	0.31
23w5d	6.00	0.31
23w6d	6.05	0.32
24w0d	6.09	0.32
24w1d	6.13	0.32

35w5d	8.92	0.38
35w6d	8.94	0.38
36w0d	8.96	0.38
36w1d	8.98	0.38
36w2d	9.00	0.38
36w3d	9.02	0.38
36w4d	9.04	0.38
36w5d	9.06	0.38
36w6d	9.08	0.38
37w0d	9.10	0.38
37w1d	9.12	0.38
37w2d	9.14	0.38
37w3d	9.15	0.38
37w4d	9.17	0.38
37w5d	9.18	0.38
37w6d	9.20	0.38
38w0d	9.21	0.38
38w1d	9.23	0.38
38w2d	9.24	0.38
38w3d	9.26	0.39
38w4d	9.27	0.39
38w5d	9.28	0.39
38w6d	9.29	0.39
39w0d	9.30	0.39
39w1d	9.31	0.39
39w2d	9.32	0.39

24w2d	6.17	0.32
24w3d	6.22	0.32
24w4d	6.26	0.32
24w5d	6.30	0.32
24w6d	6.34	0.32
25w0d	6.39	0.32

39w3d	9.33	0.39
39w4d	9.34	0.39
39w5d	9.35	0.39
39w6d	9.36	0.39
40w0d	9.36	0.39

Biparietal Diameter (BPD) : CHITTY (OUT-IN)

GA Table

Altman DG, Chitty LS: New Charts for ultrasound dating of pregnancy. Ultrasound in Obstetrics and Gynecology, Vol. 10: 174-191, 1997

BPD (cm)	G.A (wd)	5% (wd)	95% (wd)
2.10	12w5d	11w6d	13w5d
2.20	13w0d	12w1d	14w0d
2.30	13w2d	12w3d	14w2d
2.40	13w4d	12w4d	14w4d
2.50	13w6d	12w6d	14w6d
2.60	14w1d	13w1d	15w1d
2.70	14w3d	13w3d	15w3d
2.80	14w5d	13w4d	15w5d
2.90	14w6d	13w6d	16w0d
3.00	15w1d	14w1d	16w2d
3.10	15w3d	14w3d	16w5d
3.20	15w5d	14w4d	17w0d

BPD (cm)	G.A (wd)	5% (wd)	95% (wd)
5.60	23w1d	21w2d	25w2d
5.70	23w4d	21w4d	25w4d
5.80	23w6d	21w6d	26w0d
5.90	24w1d	22w1d	26w3d
6.00	24w4d	22w3d	26w6d
6.10	24w6d	22w5d	27w1d
6.20	25w2d	23w1d	27w4d
6.30	25w4d	23w3d	28w0d
6.40	26w0d	23w5d	28w3d
6.50	26w2d	24w0d	28w6d
6.60	26w5d	24w2d	29w1d
6.70	27w0d	24w4d	29w4d

3.30	16w0d	14w6d	17w2d
3.40	16w2d	15w1d	17w4d
3.50	16w4d	15w3d	17w6d
3.60	16w6d	15w5d	18w2d
3.70	17w1d	15w6d	18w4d
3.80	17w3d	16w1d	18w6d
3.90	17w6d	16w3d	19w2d
4.00	18w1d	16w5d	19w4d
4.10	18w3d	17w0d	19w6d
4.20	18w5d	17w2d	20w2d
4.30	19w0d	17w4d	20w4d
4.40	19w2d	17w6d	20w6d
4.50	19w4d	18w1d	21w2d
4.60	19w6d	18w3d	21w4d
4.70	20w2d	18w5d	22w0d
4.80	20w4d	19w0d	22w2d
4.90	20w6d	19w2d	22w5d
5.00	21w1d	19w4d	23w0d
5.10	21w4d	19w6d	23w3d
5.20	21w6d	20w1d	23w5d
5.30	22w1d	20w3d	24w1d
5.40	22w4d	20w5d	24w4d
5.50	22w6d	21w0d	24w6d

6.80	27w3d	25w0d	30w0d
6.90	27w5d	25w2d	30w3d
7.00	28w1d	25w4d	30w6d
7.10	28w3d	25w6d	31w2d
7.20	28w6d	26w2d	31w5d
7.30	29w2d	26w4d	32w1d
7.40	29w4d	26w6d	32w4d
7.50	30w0d	27w2d	33w0d
7.60	30w2d	27w4d	33w3d
7.70	30w5d	27w6d	33w6d
7.80	31w1d	28w2d	34w2d
7.90	31w4d	28w4d	34w5d
8.00	31w6d	28w6d	35w1d
8.10	32w2d	29w2d	35w5d
8.20	32w5d	29w4d	36w1d
8.30	33w1d	30w0d	36w4d
8.40	33w3d	30w2d	37w0d
8.50	33w6d	30w5d	37w3d
8.60	34w2d	31w0d	38w0d
8.70	34w5d	31w2d	38w3d
8.80	35w1d	31w5d	38w6d
8.90	35w4d	32w0d	39w3d

Fetal Growth Table

L.S. Chitty, D.G. Altman, S. Campbell. "Charts of Fetal Size: 2. Head Measurement" British Journal of Obstetrics and Gynaecology, January 1994. Vol 101. Pp35-43

Age (W)	Growth (cm)	10% (cm)	90% (cm)
12	1.83	1.57	2.09
13	2.2	1.93	2.47
14	2.56	2.28	2.84
15	2.93	2.64	3.22
16	3.28	2.99	3.58
17	3.63	3.33	3.94
18	3.98	3.66	4.3
19	4.32	4	4.64
20	4.65	4.32	4.99
21	4.98	4.64	5.32
22	5.3	4.95	5.65
23	5.61	5.25	5.97
24	5.92	5.55	6.29
25	6.21	5.84	6.59
26	6.5	6.12	6.89
27	6.78	6.39	7.18

Age (W)	Growth (cm)	10% (cm)	90% (cm)
28	7.05	6.65	7.46
29	7.31	6.9	7.73
30	7.57	7.15	7.99
31	7.81	7.38	8.24
32	8.04	7.6	8.48
33	8.26	7.81	8.71
34	8.47	8.02	8.93
35	8.67	8.21	9.14
36	8.86	8.38	9.33
37	9.03	8.55	9.52
38	9.2	8.7	9.69
39	9.35	8.85	9.85
40	9.48	8.97	9.99
41	9.61	9.09	10.12
42	9.72	9.19	10.24

Biparietal Diameter (BPD) : CHITTY (OUT-OUT)

GA Table

D.G. Altman, L.S. Chitty. "New Charts for Ultrasound Dating of Pregnancy" Ultrasound in Obstetrics and Gynecology, Vol.10, p174-191, 1997

BPD (cm)	G.A (wd)	5% (wd)	95% (wd)
2.20	12w4d	11w5d	13w4d
2.30	12w6d	12w0d	13w6d
2.40	13w1d	12w1d	14w1d
2.50	13w3d	12w3d	14w3d
2.60	13w4d	12w5d	14w5d
2.70	13w6d	12w6d	15w0d
2.80	14w1d	13w1d	15w2d
2.90	14w3d	13w3d	15w4d
3.00	14w5d	13w4d	15w6d
3.10	15w0d	13w6d	16w1d
3.20	15w2d	14w1d	16w3d
3.30	15w4d	14w3d	16w5d
3.40	15w5d	14w4d	17w0d
3.50	16w0d	14w6d	17w2d
3.60	16w2d	15w1d	17w5d
3.70	16w4d	15w3d	18w0d
3.80	16w6d	15w4d	18w2d
3.90	17w1d	15w6d	18w4d
4.00	17w3d	16w1d	19w0d
4.10	17w5d	16w3d	19w2d
4.20	18w0d	16w4d	19w4d
4.30	18w2d	16w6d	19w6d
4.40	18w4d	17w1d	20w2d
4.50	19w0d	17w3d	20w4d
4.60	19w2d	17w5d	20w6d
4.70	19w4d	18w0d	21w2d
4.80	19w6d	18w2d	21w4d
4.90	20w1d	18w4d	22w0d
5.00	20w3d	18w5d	22w2d
5.10	20w5d	19w0d	22w4d
5.20	21w1d	19w2d	23w0d
5.30	21w3d	19w4d	23w2d
5.40	21w5d	19w6d	23w5d
5.50	22w0d	20w1d	24w0d
5.60	22w2d	20w3d	24w3d
5.70	22w5d	20w5d	24w5d
5.80	23w0d	21w0d	25w1d
5.90	23w2d	21w2d	25w4d
6.00	23w5d	21w4d	25w6d
6.10	24w0d	21w6d	26w2d
6.20	24w2d	22w1d	26w5d
6.30	24w5d	22w4d	27w0d
6.40	25w0d	22w6d	27w3d
6.50	25w2d	23w1d	27w6d
6.60	25w5d	23w3d	28w2d
6.70	26w0d	23w5d	28w4d
6.80	26w3d	24w0d	29w0d
6.90	26w5d	24w2d	29w3d
7.00	27w1d	24w4d	29w6d
7.10	27w3d	25w0d	30w2d
7.20	27w6d	25w2d	30w4d
7.30	28w1d	25w4d	31w0d
7.40	28w4d	25w6d	31w3d
7.50	28w6d	26w2d	31w6d
7.60	29w2d	26w4d	32w2d
7.70	29w5d	26w6d	32w5d
7.80	30w0d	27w1d	33w1d
7.90	30w3d	27w4d	33w4d
8.00	30w5d	27w6d	34w0d
8.10	31w1d	28w1d	34w3d
8.20	31w4d	28w3d	34w6d
8.30	31w6d	28w6d	35w2d
8.40	32w2d	29w1d	35w6d
8.50	32w5d	29w4d	36w2d
8.60	33w1d	29w6d	36w5d
8.70	33w3d	30w1d	37w1d
8.80	33w6d	30w4d	37w4d
8.90	34w2d	30w6d	38w1d
9.00	34w5d	31w1d	38w4d
9.10	35w1d	31w4d	39w0d

Fetal Growth Table

L.S. Chitty, D.G. Altman, S. Campbell, "Charts of Fetal Size: 2. Head Measurement" British Journal of Obstetrics and Gynaecology, January 1994. Vol 101. Pp35-43

Age (W)	Growth (cm)	10% (cm)	90% (cm)
12	1.97	1.68	2.25
13	2.35	2.06	2.65
14	2.73	2.43	3.03
15	3.1	2.8	3.41
16	3.47	3.16	3.79
28	7.34	6.93	7.74
29	7.6	7.19	8.01
30	7.86	7.43	8.28
31	8.1	7.67	8.53
32	8.33	7.9	8.77

17	3.83	3.51	4.16
18	4.19	3.86	4.52
19	4.54	4.2	4.88
20	4.88	4.54	5.23
21	5.22	4.86	5.57
22	5.55	5.19	5.91
23	5.87	5.5	6.23
24	6.18	5.8	6.55
25	6.48	6.1	6.86
26	6.78	6.38	7.17
27	7.06	6.66	7.46

33	8.55	8.11	9
34	8.76	8.31	9.21
35	8.96	8.5	9.42
36	9.15	8.68	9.61
37	9.32	8.84	9.79
38	9.48	8.99	9.96
39	9.62	9.13	10.11
40	9.75	9.26	10.25
41	9.87	9.36	10.37
42	9.97	9.46	10.48

Biparietal Diameter (BPD) : CAMPBELL

GA Table

Professor Campbell's Group at Harris birthright Centre, King's College Hospital

BPD (cm)	GA (wd)	±days (wd)
2.40	13w0d	0w0d
2.80	14w0d	01w0d
3.20	15w0d	01w0d
3.70	16w0d	01w0d
4.10	17w0d	01w0d
4.40	18w0d	01w0d
4.70	19w0d	01w1d
5.10	20w0d	01w1d
5.40	21w0d	01w1d

BPD (cm)	GA (wd)	±days (wd)
7.30	27w0d	01w3d
7.50	28w0d	01w4d
7.80	29w0d	01w4d
8.00	30w0d	01w5d
8.30	31w0d	01w6d
8.50	32w0d	02w0d
8.70	33w0d	02w1d
8.90	34w0d	02w3d
9.10	35w0d	02w5d

5.80	22w0d	01w1d
6.10	23w0d	01w2d
6.40	24w0d	01w2d
6.70	25w0d	01w2d
7.00	26w0d	01w3d

9.30	36w0d	02w6d
9.50	37w0d	03w0d
9.70	38w0d	0w0d
9.90	39w0d	0w0d
10.00	40w0d	0w0d

Biparietal Diameter (BPD) : KURTZ

GA Table

Kurtz AB,et.al., "Analysis of biparietal diameter as an accurate indicator of gestational age" Journal of Clinical Ultrasound, 8:319-326, August 1980

BPD (cm)	GA (wd)	±SD (wd)
2.0	12w0d	0w0d
2.1	12w0d	0w0d
2.2	12w5d	0w4d
2.3	13w0d	0w4d
2.4	13w1d	0w4d
2.5	13w4d	0w4d
2.6	13w5d	0w4d
2.7	14w0d	0w4d
2.8	14w2d	0w5d
2.9	14w4d	0w5d
3.0	14w6d	0w5d
3.1	15w1d	0w6d
3.2	15w2d	0w6d
3.3	15w4d	0w6d

BPD (cm)	GA (wd)	±SD (wd)
6.0	23w6d	1w5d
6.1	24w1d	1w5d
6.2	24w4d	1w4d
6.3	24w6d	1w4d
6.4	25w2d	1w4d
6.5	25w4d	1w4d
6.6	26w0d	1w4d
6.7	26w3d	1w3d
6.8	26w5d	1w3d
6.9	27w1d	1w2d
7.0	27w4d	1w1d
7.1	27w6d	1w1d
7.2	28w2d	1w1d
7.3	28w5d	1w1d

3.4	15w6d	0w6d
3.5	16w1d	1w0d
3.6	16w3d	1w0d
3.7	16w5d	1w1d
3.8	17w0d	1w1d
3.9	17w2d	1w1d
4.0	17w4d	1w1d
4.1	17w6d	1w3d
4.2	18w1d	1w4d
4.3	18w3d	1w6d
4.4	18w6d	1w6d
4.5	19w1d	2w1d
4.6	19w3d	2w0d
4.7	19w5d	1w6d
4.8	20w0d	1w6d
4.9	20w2d	1w5d
5.0	20w4d	1w4d
5.1	20w6d	1w4d
5.2	21w1d	1w5d
5.3	21w4d	1w5d
5.4	21w6d	1w6d
5.5	22w1d	1w6d
5.6	22w4d	1w6d
5.7	22w6d	1w5d
5.8	23w1d	1w5d
5.9	23w4d	1w4d

7.4	29w1d	1w0d
7.5	29w4d	1w0d
7.6	30w0d	1w0d
7.7	30w2d	1w2d
7.8	30w4d	1w2d
7.9	31w1d	1w3d
8.0	31w4d	1w3d
8.1	32w1d	1w3d
8.2	32w4d	1w3d
8.3	33w0d	1w4d
8.4	33w3d	1w5d
8.5	34w0d	1w5d
8.6	34w2d	1w6d
8.7	35w0d	1w4d
8.8	35w3d	1w5d
8.9	36w1d	1w5d
9.0	36w4d	1w5d
9.1	37w1d	1w2d
9.2	37w6d	1w1d
9.3	38w2d	1w0d
9.4	39w0d	1w1d
9.5	39w5d	1w1d
9.6	40w2d	1w1d
9.7	41w0d	1w1d
9.8	41w6d	1w2d

Biparietal Diameter (BPD) : ASUM(SCW)

Fetal Growth Table

Australasian Society for Ultrasound in Medicine

Policies and Statements - [D7] Statement On Normal Ultrasonic Fetal Measurements (Revised May 2001)

Age (W)	Growth (cm)	±2SD (cm)
11	1.6	0.2
12	2.0	0.4
13	2.4	0.4
14	2.8	0.4
15	3.1	0.4
16	3.6	0.5
17	3.9	0.5
18	4.2	0.4
19	4.5	0.5
20	4.7	0.4
21	4.9	0.4
22	5.2	0.5
23	5.7	0.5
24	6.0	0.6
25	6.4	0.6
26	6.7	0.4

Age (W)	Growth (cm)	±2SD (cm)
27	6.8	0.5
28	7.2	0.4
29	7.5	0.4
30	7.6	0.4
31	8.0	0.6
32	8.1	0.4
33	8.4	0.6
34	8.6	0.6
35	8.8	0.65
36	9.0	0.6
37	9.2	0.65
38	9.3	0.6
39	9.5	0.8
40	9.6	0.8
41	9.8	0.8

Biparietal Diameter (BPD) : BESSIS

GA Table

The data are those provided by Dr. Bessis to M. Le Bel.(Same as SIGMA 20, see memo from Ch. Gahwiler dated , June 23, 1983)

BPD (cm)	GA (wd)	±days (wd)
1.90	11w4d	0w6d
2.35	13w0d	0w6d
3.65	17w0d	0w6d
4.90	21w0d	1w0d
6.05	25w0d	1w2d
7.20	29w0d	1w5d
8.15	33w0d	2w4d
8.75	37w0d	4w4d
9.70	39w6d	4w4d

Biparietal Diameter (BPD) : CFEF

GA Table

J.Créquat, M. Duyme, G. Brodaty.

Biométrie 2000. Tables de croissance foetale par le Collège Français d'Echographie Foetale (CFEF) et l'Inserm U155

Gynecol Obstet Fertil, 2000 Jun;28(6):435-45

BPD (cm)	GA (w)	BPD (cm)	GA (w)	BPD (cm)	GA (w)	BPD (cm)	GA (w)
1.53	11	4.50	19	6.85	27	8.59	35
1.94	12	4.82	20	7.10	28	8.76	36
2.33	13	5.14	21	7.35	29	8.92	37
2.71	14	5.45	22	7.58	30	9.07	38
3.08	15	5.75	23	7.80	31	9.21	39
3.45	16	6.04	24	8.01	32	9.34	40
3.81	17	6.32	25	8.21	33	9.40	41
4.15	18	6.59	26	8.40	34		

Fetal Growth Table

J.Créquat, M. Duyme, G. Brodaty

Biométrie 2000. Tables de croissance foetale par le Collège Français d'Echographie Foetale (CFEF) et l'Inserm U155

Gynecol Obstet Fertil 2000 Jun;28(6):435-45

Age (W)	Growth (cm)	10% (cm)	90% (cm)	Age (W)	Growth (cm)	10% (cm)	90% (cm)
11	1.50	1.30	1.80	27	6.90	6.40	7.30
12	1.90	1.70	2.20	28	7.10	6.70	7.60
13	2.30	2.10	2.60	29	7.40	6.90	7.80
14	2.70	2.40	3.00	30	7.60	7.10	8.00
15	3.10	2.80	3.40	31	7.80	7.30	8.30
16	3.50	3.10	3.80	32	8.00	7.50	8.50
17	3.80	3.50	4.10	33	8.20	7.70	8.70
18	4.20	3.80	4.50	34	8.40	7.90	8.90

19	4.50	4.10	4.90
20	4.80	4.50	5.20
21	5.10	4.80	5.50
22	5.50	5.10	5.80
23	5.80	5.30	6.20
24	6.00	5.60	6.50
25	6.30	5.90	6.70
26	6.60	6.20	7.00

35	8.60	8.10	9.10
36	8.80	8.30	9.20
37	8.90	8.50	9.40
38	9.10	8.60	9.50
39	9.20	8.70	9.70
40	9.30	8.90	9.80
41	9.40	8.90	9.90

Biparietal Diameter (BPD) : JOHNSEN

GA Table

Johnsen SL, Rasmussen S, Sollien R, Kiserud T. "Fetal age assessment based on ultrasound head biometry and the effect of maternal and fetal factors" Acta Obstet Gynecol Scand, 2004 Aug; 83(8): 716-23

BPD (cm)	Age (wd)	10% (wd)	90% (wd)
1.40	10w3d	09w6d	10w6d
1.50	10w5d	10w1d	11w2d
1.60	10w6d	10w3d	11w3d
1.70	11w1d	10w4d	11w5d
1.80	11w3d	10w6d	12w0d
1.90	11w5d	11w1d	12w2d
2.00	12w0d	11w2d	12w4d
2.10	12w2d	11w4d	12w6d

BPD (cm)	Age (wd)	10% (wd)	90% (wd)
3.80	16w5d	15w6d	17w4d
3.90	17w0d	16w1d	17w6d
4.00	17w2d	16w3d	18w1d
4.10	17w4d	16w5d	18w3d
4.20	17w6d	17w0d	18w5d
4.30	18w1d	17w2d	19w1d
4.40	18w3d	17w4d	19w3d
4.50	18w5d	17w6d	19w5d

2.20	12w3d	11w6d	13w1d
2.30	12w5d	12w1d	13w3d
2.40	13w0d	12w2d	13w5d
2.50	13w2d	12w4d	14w0d
2.60	13w3d	12w6d	14w1d
2.70	13w5d	13w0d	14w3d
2.80	14w0d	13w2d	14w5d
2.90	14w2d	13w4d	15w0d
3.00	14w4d	13w6d	15w2d
3.10	14w6d	14w0d	15w4d
3.20	15w0d	14w2d	15w6d
3.30	15w2d	14w4d	16w1d
3.40	15w4d	14w6d	16w3d
3.50	15w6d	15w1d	16w5d
3.60	16w1d	15w2d	17w0d
3.70	16w3d	15w4d	17w2d

4.60	19w0d	18w1d	20w0d
4.70	19w3d	18w3d	20w3d
4.80	19w5d	18w5d	20w5d
4.90	20w0d	19w0d	21w0d
5.00	20w2d	19w2d	21w3d
5.10	20w4d	19w4d	21w5d
5.20	21w0d	20w0d	22w0d
5.30	21w2d	20w2d	22w3d
5.40	21w4d	20w4d	22w5d
5.50	22w0d	20w6d	23w1d
5.60	22w2d	21w2d	23w3d
5.70	22w5d	21w4d	23w6d
5.80	23w0d	21w6d	24w1d
5.90	23w3d	22w2d	24w4d
6.00	23w5d	22w4d	25w0d

Fetal Growth Table

Johnsen SL, Wilsgaard T, Rasmussen S, Sollien R, Kiserud T. "Longitudinal reference charts for growth of the fetal head, abdomen and femur" Eur J Obstet Gynecol Reprod Biol, 2006 Aug; 127(2): 172-85

Age (w)	BPD (cm)	10% (cm)	90% (cm)
10w	1.40	1.20	1.60
11w	1.70	1.50	1.90
12w	2.00	1.80	2.30
13w	2.40	2.10	2.70
14w	2.70	2.50	3.00
15w	3.10	2.80	3.40
16w	3.50	3.10	3.80
17w	3.80	3.50	4.20
18w	4.20	3.80	4.50
19w	4.50	4.20	4.90
20w	4.90	4.50	5.20
21w	5.20	4.90	5.60
22w	5.50	5.20	5.90
23w	5.90	5.50	6.30
24w	6.20	5.80	6.60
25w	6.50	6.10	6.90

Age (w)	BPD (cm)	10% (cm)	90% (cm)
26w	6.80	6.40	7.20
27w	7.10	6.60	7.50
28w	7.30	6.90	7.80
29w	7.60	7.20	8.00
30w	7.80	7.40	8.30
31w	8.10	7.60	8.60
32w	8.30	7.80	8.80
33w	8.50	8.00	9.00
34w	8.70	8.20	9.30
35w	8.90	8.40	9.50
36w	9.10	8.60	9.70
37w	9.30	8.80	9.80
38w	9.50	8.90	10.00
39	9.60	9.10	10.20
40w	9.80	9.20	10.40
41w	9.9	9.30	10.50

Biparietal Diameter (BPD) : REMPEN

GA Table

Rempen A. "Biometrie in der Fruhgraviditat (I. Trimenon)" Der Frauenarzt, 32:425, 1991

BPD (cm)	GA (wd)	5% (wd)	95% (wd)
0.30	6w6d	05w5d	08w0d
0.40	7w1d	06w0d	08w2d
0.50	7w3d	06w2d	08w4d
0.60	7w5d	06w4d	08w6d
0.70	8w0d	06w6d	09w1d
0.80	8w2d	07w1d	09w3d
0.90	8w4d	07w3d	09w5d
1.00	8w6d	07w5d	10w0d
1.10	9w1d	08w0d	10w2d
1.20	9w3d	08w2d	10w4d
1.30	9w5d	08w4d	10w6d
1.40	10w0d	08w6d	11w1d
1.50	10w2d	09w1d	11w3d

BPD (cm)	GA (wd)	5% (wd)	95% (wd)
1.60	10w4d	09w3d	11w5d
1.70	10w6d	09w5d	12w0d
1.80	11w1d	10w0d	12w2d
1.90	11w3d	10w2d	12w4d
2.00	11w5d	10w4d	12w6d
2.10	12w0d	10w6d	13w1d
2.20	12w2d	11w1d	13w3d
2.30	12w4d	11w3d	13w5d
2.40	12w6d	11w5d	14w0d
2.50	13w1d	12w0d	14w2d
2.60	13w3d	12w2d	14w4d
2.70	13w5d	12w4d	14w6d

Fetal Growth Table

Rempen A. "Biometrie in der Fruhgraviditat (I. Trimenon)" Der Frauenarzt, 32:425, 1991

Age (wd)	BPD (cm)	5% (cm)	95% (cm)
6w2d	0.20	0.00	0.57
6w3d	0.25	0.00	0.62
6w4d	0.30	0.00	0.67
6w5d	0.34	0.00	0.71
6w6d	0.39	0.02	0.76
7w0d	0.43	0.06	0.80
7w1d	0.48	0.11	0.85
7w2d	0.53	0.16	0.90
7w3d	0.57	0.20	0.94
7w4d	0.62	0.25	0.99
7w5d	0.67	0.30	1.04
7w6d	0.71	0.34	1.08
8w0d	0.76	0.39	1.13
8w1d	0.80	0.43	1.17
8w2d	0.85	0.48	1.22
8w3d	0.89	0.52	1.26
8w4d	0.94	0.57	1.31
8w5d	0.98	0.61	1.35
8w6d	1.03	0.66	1.40
9w0d	1.07	0.70	1.44
9w1d	1.12	0.75	1.49
9w2d	1.16	0.79	1.53
9w3d	1.21	0.84	1.58
9w4d	1.25	0.88	1.62
9w5d	1.30	0.93	1.67
9w6d	1.34	0.97	1.71
10w0d	1.39	1.02	1.76
10w1d	1.43	1.06	1.80
10w2d	1.48	1.11	1.85
10w3d	1.52	1.15	1.89
10w4d	1.57	1.20	1.94
10w5d	1.61	1.24	1.98
10w6d	1.65	1.28	2.02
11w0d	1.70	1.33	2.07
11w1d	1.74	1.37	2.11
11w2d	1.79	1.42	2.16
11w3d	1.83	1.46	2.20
11w4d	1.87	1.50	2.24
11w5d	1.92	1.55	2.29
11w6d	1.96	1.59	2.33
12w0d	2.00	1.63	2.37
12w1d	2.05	1.68	2.42
12w2d	2.09	1.72	2.46
12w3d	2.13	1.76	2.50
12w4d	2.18	1.81	2.55
12w5d	2.22	1.85	2.59
12w6d	2.26	1.89	2.63
13w0d	2.31	1.94	2.68
13w1d	2.35	1.98	2.72
13w2d	2.39	2.02	2.76

Biparietal Diameter (BPD) : KURMANAVICIUS

Fetal Growth Table

Kurmanavicius J, Wright EM, Royston P, Wisser J, Huch R, Huch A, Zimmermann R. "Fetal ultrasound biometry: 1. Head reference values" Br J Obstet Gynaecol, 1999 Feb; 106(2): 126-35

GA (w)	BPD (cm)	5% (cm)	95% (cm)
12w	2.10	1.70	2.50
13w	2.49	2.08	2.90
14w	2.87	2.45	3.29
15w	3.25	2.82	3.68
16w	3.62	3.18	4.06
17w	3.99	3.53	4.44
18w	4.35	3.88	4.81
19w	4.70	4.22	5.17
20w	5.04	4.56	5.53
21w	5.38	4.88	5.88
22w	5.71	5.20	6.22
23w	6.03	5.51	6.55
28w	7.49	6.92	8.07
29w	7.76	7.17	8.34
30w	8.01	7.41	8.60
31w	8.25	7.64	8.85
32w	8.47	7.86	9.09
33w	8.69	8.06	9.31
34w	8.89	8.25	9.53
35w	9.08	8.43	9.73
36w	9.26	8.60	9.91
37w	9.42	8.75	10.09
38w	9.57	8.89	10.25
39w	9.70	9.01	10.39

24w	6.34	5.81	6.87
25w	6.65	6.11	7.19
26w	6.94	6.39	7.49
27w	7.22	6.66	7.78

40w	9.82	9.12	10.52
41w	9.92	9.21	10.63
42w	10.01	9.29	10.73

Biparietal Diameter (BPD) : NICOLAIDES

Fetal Growth Table

Snijders RJ, Nicolaides KH. "Fetal biometry at 14-40 weeks' gestation" Ultrasound in obstetrics and Gynecology, 1994 Jan 1; 4(1): 34-48

Age (wd)	BPD (cm)	5% (cm)	95% (cm)
14w0d	3.10	2.80	3.40
14w1d	3.10	2.80	3.40
14w2d	3.10	2.80	3.40
14w3d	3.10	2.80	3.40
14w4d	3.10	2.80	3.40
14w5d	3.10	2.80	3.40
14w6d	3.10	2.80	3.40
15w0d	3.40	3.10	3.70
15w1d	3.40	3.10	3.70
15w2d	3.40	3.10	3.70
15w3d	3.40	3.10	3.70
15w4d	3.40	3.10	3.70

Age (wd)	BPD (cm)	5% (cm)	95% (cm)
27w0d	7.20	6.60	7.80
27w1d	7.20	6.60	7.80
27w2d	7.20	6.60	7.80
27w3d	7.20	6.60	7.80
27w4d	7.20	6.60	7.80
27w5d	7.20	6.60	7.80
27w6d	7.20	6.60	7.80
28w0d	7.50	6.90	8.10
28w1d	7.50	6.90	8.10
28w2d	7.50	6.90	8.10
28w3d	7.50	6.90	8.10
28w4d	7.50	6.90	8.10

15w5d	3.40	3.10	3.70
15w6d	3.40	3.10	3.70
16w0d	3.70	3.40	4.00
16w1d	3.70	3.40	4.00
16w2d	3.70	3.40	4.00
16w3d	3.70	3.40	4.00
16w4d	3.70	3.40	4.00
16w5d	3.70	3.40	4.00
16w6d	3.70	3.40	4.00
17w0d	4.00	3.60	4.30
17w1d	4.00	3.60	4.30
17w2d	4.00	3.60	4.30
17w3d	4.00	3.60	4.30
17w4d	4.00	3.60	4.30
17w5d	4.00	3.60	4.30
17w6d	4.00	3.60	4.30
18w0d	4.30	3.90	4.70
18w1d	4.30	3.90	4.70
18w2d	4.30	3.90	4.70
18w3d	4.30	3.90	4.70
18w4d	4.30	3.90	4.70
18w5d	4.30	3.90	4.70

28w5d	7.50	6.90	8.10
28w6d	7.50	6.90	8.10
29w0d	7.80	7.20	8.50
29w1d	7.80	7.20	8.50
29w2d	7.80	7.20	8.50
29w3d	7.80	7.20	8.50
29w4d	7.80	7.20	8.50
29w5d	7.80	7.20	8.50
29w6d	7.80	7.20	8.50
30w0d	8.10	7.40	8.80
30w1d	8.10	7.40	8.80
30w2d	8.10	7.40	8.80
30w3d	8.10	7.40	8.80
30w4d	8.10	7.40	8.80
30w5d	8.10	7.40	8.80
30w6d	8.10	7.40	8.80
31w0d	8.30	7.70	9.00
31w1d	8.30	7.70	9.00
31w2d	8.30	7.70	9.00
31w3d	8.30	7.70	9.00
31w4d	8.30	7.70	9.00
31w5d	8.30	7.70	9.00

18w6d	4.30	3.90	4.70
19w0d	4.60	4.20	5.00
19w1d	4.60	4.20	5.00
19w2d	4.60	4.20	5.00
19w3d	4.60	4.20	5.00
19w4d	4.60	4.20	5.00
19w5d	4.60	4.20	5.00
19w6d	4.60	4.20	5.00
20w0d	4.90	4.50	5.40
20w1d	4.90	4.50	5.40
20w2d	4.90	4.50	5.40
20w3d	4.90	4.50	5.40
20w4d	4.90	4.50	5.40
20w5d	4.90	4.50	5.40
20w6d	4.90	4.50	5.40
21w0d	5.20	4.80	5.70
21w1d	5.20	4.80	5.70
21w2d	5.20	4.80	5.70
21w3d	5.20	4.80	5.70
21w4d	5.20	4.80	5.70
21w5d	5.20	4.80	5.70
21w6d	5.20	4.80	5.70

31w6d	8.30	7.70	9.00
32w0d	8.60	7.90	9.30
32w1d	8.60	7.90	9.30
32w2d	8.60	7.90	9.30
32w3d	8.60	7.90	9.30
32w4d	8.60	7.90	9.30
32w5d	8.60	7.90	9.30
32w6d	8.60	7.90	9.30
33w0d	8.80	8.10	9.60
33w1d	8.80	8.10	9.60
33w2d	8.80	8.10	9.60
33w3d	8.80	8.10	9.60
33w4d	8.80	8.10	9.60
33w5d	8.80	8.10	9.60
33w6d	8.80	8.10	9.60
34w0d	9.00	8.30	9.80
34w1d	9.00	8.30	9.80
34w2d	9.00	8.30	9.80
34w3d	9.00	8.30	9.80
34w4d	9.00	8.30	9.80
34w5d	9.00	8.30	9.80
34w6d	9.00	8.30	9.80

22w0d	5.60	5.10	6.10
22w1d	5.60	5.10	6.10
22w2d	5.60	5.10	6.10
22w3d	5.60	5.10	6.10
22w4d	5.60	5.10	6.10
22w5d	5.60	5.10	6.10
22w6d	5.60	5.10	6.10
23w0d	5.90	5.40	6.40
23w1d	5.90	5.40	6.40
23w2d	5.90	5.40	6.40
23w3d	5.90	5.40	6.40
23w4d	5.90	5.40	6.40
23w5d	5.90	5.40	6.40
23w6d	5.90	5.40	6.40
24w0d	6.20	5.70	6.80
24w1d	6.20	5.70	6.80
24w2d	6.20	5.70	6.80
24w3d	6.20	5.70	6.80
24w4d	6.20	5.70	6.80
24w5d	6.20	5.70	6.80
24w6d	6.20	5.70	6.80
25w0d	6.60	6.00	7.10

35w0d	9.20	8.50	10.00
35w1d	9.20	8.50	10.00
35w2d	9.20	8.50	10.00
35w3d	9.20	8.50	10.00
35w4d	9.20	8.50	10.00
35w5d	9.20	8.50	10.00
35w6d	9.20	8.50	10.00
36w0d	9.40	8.60	10.20
36w1d	9.40	8.60	10.20
36w2d	9.40	8.60	10.20
36w3d	9.40	8.60	10.20
36w4d	9.40	8.60	10.20
36w5d	9.40	8.60	10.20
36w6d	9.40	8.60	10.20
37w0d	9.50	8.70	10.30
37w1d	9.50	8.70	10.30
37w2d	9.50	8.70	10.30
37w3d	9.50	8.70	10.30
37w4d	9.50	8.70	10.30
37w5d	9.50	8.70	10.30
37w6d	9.50	8.70	10.30
38w0d	9.60	8.80	10.40

25w1d	6.60	6.00	7.10	38w1d	9.60	8.80	10.40
25w2d	6.60	6.00	7.10	38w2d	9.60	8.80	10.40
25w3d	6.60	6.00	7.10	38w3d	9.60	8.80	10.40
25w4d	6.60	6.00	7.10	38w4d	9.60	8.80	10.40
25w5d	6.60	6.00	7.10	38w5d	9.60	8.80	10.40
25w6d	6.60	6.00	7.10	38w6d	9.60	8.80	10.40
26w0d	6.90	6.30	7.50	39w0d	9.70	8.90	10.50
26w1d	6.90	6.30	7.50	39w1d	9.70	8.90	10.50
26w2d	6.90	6.30	7.50	39w2d	9.70	8.90	10.50
26w3d	6.90	6.30	7.50	39w3d	9.70	8.90	10.50
26w4d	6.90	6.30	7.50	39w4d	9.70	8.90	10.50
26w5d	6.90	6.30	7.50	39w5d	9.70	8.90	10.50
26w6d	6.90	6.30	7.50	39w6d	9.70	8.90	10.50

Crown-Rump Length (CRL) : KOREAN

GA Table

Y.G Park.“ The Standardization of Fetal body parts according to the normal Korean Gestational Age in Ultrasound” Korean Ultrasound Institute, Vol. 14, No.2, 1995

GA = CRL × 1.08815 + 6.321988

Output Unit : w(weeks)

Input Unit : cm

Min Range : 0.9 cm

Max Range : 5.4 cm

Fetal Growth Table

Y.G Park.“ The Standardization of Fetal body parts according to the normal Korean Gestational Age in Ultrasound” Korean Ultrasound Institute, Vol. 14, No.2, 1995

CRL=90.37523XMA-54.736362

Output Unit : cm

Input Unit : w(week)

Min Range : 7w

Max Range : 11w

Age (W)	Growth (cm)	±SD (cm)	Age (W)	Growth (cm)	±SD (cm)
7	1.045	0.287	10	3.307	0.297
8	1.589	0.304	11	4.286	0.346
9	2.339	0.291			

Crown-Rump Length (CRL) : ROBINSON

GA Table

Robinson HP, Fleming JEE British Journal of Obstetrics and Gynecology 82:702-710, September 1975

GA = 8.052 × $\sqrt{\text{CRL}}$ **+ 23.73**

Output Unit : d(days)

Input Unit : mm

Min Range : 0.70 cm

Max Range : 7.96 cm

Crown-Rump Length (CRL) : HANSMANN

GA Table

Hansmann, Hackeloer, Staudach, Wittman. "Ultrasound Diagnosis in Obsterics and Gynecology." Springer-Verlag, New York, 1986, p.439.

CRL (cm)	GA (wd)	-2SD (wd)	+2SD (wd)
0.60	06w1d	05w1d	07w0d
0.70	06w2d	05w3d	07w2d
0.80	06w4d	05w4d	07w3d
0.90	06w6d	05w6d	07w6d
1.00	07w0d	06w1d	08w0d
1.10	07w2d	06w2d	08w1d
1.20	07w3d	06w3d	08w3d
1.30	07w4d	06w5d	08w4d
1.40	07w6d	06w6d	08w6d
1.50	08w0d	07w0d	09w0d
1.60	08w2d	07w2d	09w1d
1.70	08w3d	07w3d	09w2d
1.80	08w4d	07w4d	09w4d
1.90	08w5d	07w5d	09w5d
2.00	08w6d	07w6d	09w6d
2.10	09w0d	08w0d	10w0d
2.20	09w1d	08w1d	10w1d
2.30	09w2d	08w2d	10w2d
2.40	09w3d	08w3d	10w3d
2.60	09w5d	08w5d	10w5d

CRL (cm)	GA (wd)	-2SD (wd)	+2SD (wd)
5.20	12w2d	11w0d	13w4d
5.40	12w3d	11w0d	13w5d
5.60	12w4d	11w1d	13w6d
5.80	12w5d	11w2d	14w0d
6.00	12w6d	11w3d	14w1d
6.30	13w0d	11w4d	14w3d
6.60	13w2d	11w5d	14w5d
7.00	13w3d	12w0d	15w0d
7.30	13w5d	12w1d	15w1d
7.60	13w6d	12w2d	15w3d
8.00	14w1d	12w4d	15w5d
8.30	14w2d	12w5d	16w0d
8.60	14w4d	12w6d	16w2d
9.00	14w6d	13w1d	16w4d
9.30	15w1d	13w3d	16w6d
9.60	15w3d	13w4d	17w1d
10.00	15w5d	13w6d	17w3d
10.30	16w0d	14w1d	17w6d
10.60	16w2d	14w3d	18w1d
11.00	16w4d	14w5d	18w4d

2.80	10w0d	08w6d	11w1d
3.00	10w2d	09w1d	11w2d
3.20	10w3d	09w2d	11w4d
3.40	10w5d	09w4d	11w5d
3.60	10w6d	09w5d	12w0d
3.80	11w1d	09w6d	12w2d
4.00	11w2d	10w1d	12w3d
4.20	11w3d	10w2d	12w4d
4.40	11w4d	10w3d	12w6d
4.60	11w6d	10w5d	13w0d
4.80	12w0d	10w6d	13w2d
5.00	12w1d	10w6d	13w3d

11.30	17w0d	15w0d	19w0d
11.60	17w2d	15w2d	19w2d
12.00	17w4d	15w4d	19w4d
12.30	18w0d	16w0d	20w0d
12.60	18w2d	16w2d	20w3d
13.00	18w6d	16w5d	20w6d
13.30	19w1d	17w0d	21w2d
13.60	19w4d	17w3d	21w6d
14.00	20w0d	17w6d	22w2d
14.30	20w3d	18w1d	22w5d
14.60	20w6d	18w4d	23w1d
15.00	21w3d	19w0d	23w5d

Fetal Growth Table

Hansmann, Hackeloer, Staudach, Wittmann. "Ultrasound Diagnosis in Obstetrics and Gynecology." Springer-Verlag, New York, 1986

Age (wd)	Growth (cm)	-2SD (cm)	+2SD (cm)
06w1d	0.69	0.23	1.15
06w2d	0.76	0.28	1.25
06w3d	0.83	0.32	1.34
06w4d	0.90	0.36	1.43
06w5d	0.96	0.39	1.52
06w6d	1.02	0.43	1.61
07w0d	1.08	0.47	1.69
07w1d	1.14	0.50	1.78

Age (W)	Growth (cm)	-2SD (cm)	+2SD (cm)
12w2d	5.56	4.00	7.13
12w4d	5.94	4.32	7.55
12w6d	6.31	4.64	7.98
13w2d	6.88	5.13	8.63
13w4d	7.26	5.56	9.06
13w6d	7.63	5.78	9.48
14w2d	8.18	6.25	10.11
14w4d	8.54	6.56	10.52

07w2d	1.21	0.54	1.87	14w6d	8.89	6.86	10.92
07w3d	1.27	0.58	1.96	15w2d	9.39	7.28	11.50
07w4d	1.33	0.62	2.05	15w4d	9.71	7.55	11.87
07w5d	1.40	0.66	2.14	15w6d	10.01	7.80	12.22
07w6d	1.47	0.70	2.24	16w2d	10.44	8.15	12.73
08w0d	1.54	0.75	2.34	16w4d	10.70	8.36	13.04
08w1d	1.62	0.80	2.44	16w6d	10.95	8.56	13.34
08w3d	1.78	0.91	2.65	17w2d	11.30	8.83	13.77
08w5d	1.96	1.03	2.88	17w4d	11.51	8.99	14.04
09w0d	2.15	1.17	3.12	17w6d	11.72	9.15	14.29
09w2d	2.36	1.33	3.39	18w2d	12.00	9.35	14.65
09w4d	2.59	1.51	3.66	18w4d	12.19	9.48	14.89
09w6d	2.83	1.70	3.96	18w6d	12.37	9.62	15.12
10w2d	3.24	2.03	4.44	19w1d	12.55	9.75	15.36
10w4d	3.53	2.27	4.79	19w3d	12.74	9.89	15.60
10w6d	3.83	2.52	5.14	19w5d	12.94	10.03	15.85
11w2d	4.32	2.93	5.71	20w0d	13.16	10.20	16.12
11w4d	4.66	3.22	6.13	20w1d	13.28	10.29	16.26
11w6d	5.02	3.53	6.51	20w2d	13.40	10.40	16.41

Crown-Rump Length (CRL) : SHINOZUKA

GA Table

N.Shinozuka. "Fetal biometry standard values" http://www.shinozuka.com, 1996

CRL (cm)	Age (wd)	±SD (wd)	CRL (cm)	Age (wd)	±SD (wd)
0.50	06w3d	00w3d	3.00	10w2d	01w0d
1.00	07w3d	00w4d	3.50	10w6d	01w1d
1.50	08w1d	00w5d	4.00	11w3d	01w1d
2.00	08w6d	00w6d	4.50	11w6d	01w2d
2.50	09w4d	00w6d	5.00	12w2d	01w3d

Fetal Growth Table

N.Shinozuka. "Fetal biometry standard values" http://www.shinozuka.com, 1996

Age (wd)	Growth (cm)	-1.64 SD (cm)	+1.64 SD (cm)
7w0d	0.79	0.51	1.07
7w1d	0.86	0.55	1.17
7w2d	0.93	0.6	1.27
7w3d	1.01	0.65	1.37
7w4d	1.09	0.71	1.47
7w5d	1.17	0.76	1.58
7w6d	1.25	0.82	1.69
8w0d	1.34	0.88	1.80
8w1d	1.43	0.95	1.91
8w2d	1.52	1.01	2.03
8w3d	1.61	1.08	2.15

8w4d	1.71	1.15	2.27
8w5d	1.81	1.22	2.39
8w6d	1.91	1.30	2.52
9w0d	2.01	1.38	2.65
9w1d	2.12	1.46	2.78
9w2d	2.23	1.54	2.91
9w3d	2.34	1.63	3.05
9w4d	2.45	1.72	3.18
9w5d	2.57	1.81	3.32
9w6d	2.68	1.90	3.47
10w0d	2.80	1.99	3.61
10w1d	2.93	2.09	3.76
10w2d	3.05	2.19	3.91
10w3d	3.18	2.29	4.06
10w4d	3.31	2.40	4.22
10w5d	3.44	2.51	4.38
10w6d	3.58	2.62	4.54
11w0d	3.71	2.73	4.70
11w1d	3.85	2.84	4.86
11w2d	4.00	2.96	5.03
11w3d	4.14	3.08	5.20
11w4d	4.29	3.20	5.37
11w5d	4.44	3.33	5.55
11w6d	4.59	3.45	5.73
12w0d	4.74	3.58	5.91
12w1d	4.90	3.72	6.09
12w2d	5.06	3.85	6.27
12w3d	5.22	3.99	6.46
12w4d	5.39	4.13	6.65
12w5d	5.55	4.27	6.84
12w6d	5.72	4.41	7.03
13w0d	5.89	4.56	7.23

Crown-Rump Length (CRL) : NELSON

GA Table

Nelson, L. "Comparison of Methods for Determining Crown-Rump Measurement by Real-Time Ultrasound." Journal of Clinical Ultrasound, 9:67-70, February, 1981.

GA = 51.0008 + 0.6 × CRL

Output Unit : d(days)

Input Unit : cm

Min Range : 0.67 cm

Max Range : 8.24 cm

Crown-Rump Length (CRL) : HADLOCK

GA Table

Frank P. Hadlock, Yogesh P. Shah, Donna J. Kanon, Joshua V. Lindsey,. "Fetal Crown-Rump Length: Reevaluation of Relation to Menstrual Age(5-18 weeks) with High-Resolution Real-Time US" Radiology, 1992; 182:501-505

CRL (cm)	GA (wd)	-2SD (wd)	+2SD (wd)
0.2	5w5d	5w2d	6w1d
0.3	5w6d	5w3d	6w3d
0.4	6w1d	5w4d	6w4d
0.5	6w1d	5w5d	6w5d

CRL (cm)	GA (wd)	-2SD (wd)	+2SD (wd)
6.2	12w4d	11w4d	13w4d
6.3	12w5d	11w5d	13w5d
6.4	12w6d	11w5d	13w6d
6.5	12w6d	11w5d	13w6d

0.6	6w3d	5w6d	6w6d
0.7	6w4d	6w1d	7w1d
0.8	6w5d	6w1d	7w2d
0.9	6w6d	6w2d	7w3d
1.0	7w1d	6w4d	7w5d
1.1	7w1d	6w4d	7w5d
1.2	7w3d	6w6d	8w0d
1.3	7w4d	6w6d	8w1d
1.4	7w5d	7w1d	8w2d
1.5	7w6d	7w2d	8w4d
1.6	8w0d	7w3d	8w4d
1.7	8w1d	7w3d	8w5d
1.8	8w2d	7w4d	9w0d
1.9	8w3d	7w5d	9w1d
2.0	8w4d	7w6d	9w2d
2.1	8w5d	8w0d	9w3d
2.2	8w6d	8w1d	9w4d
2.3	9w0d	8w2d	9w5d
2.4	9w1d	8w3d	9w6d
2.5	9w1d	8w3d	10w0d
2.6	9w3d	8w5d	10w1d
2.7	9w4d	8w5d	10w2d
2.8	9w4d	8w6d	10w3d
2.9	9w5d	8w6d	10w3d
3.0	9w6d	9w1d	10w5d
3.1	10w0d	9w1d	10w6d
3.2	10w1d	9w2d	10w6d

6.6	12w6d	11w6d	14w0d
6.7	13w0d	12w0d	14w0d
6.8	13w1d	12w0d	14w1d
6.9	13w1d	12w0d	14w1d
7.0	13w1d	12w1d	14w2d
7.1	13w2d	12w2d	14w3d
7.2	13w3d	12w2d	14w3d
7.3	13w3d	12w2d	14w3d
7.4	13w4d	12w3d	14w4d
7.5	13w4d	12w4d	14w5d
7.6	13w5d	12w4d	14w6d
7.7	13w6d	12w5d	14w6d
7.8	13w6d	12w5d	14w6d
7.9	13w6d	12w6d	15w0d
8.0	14w0d	12w6d	15w1d
8.1	14w1d	13w0d	15w2d
8.2	14w1d	13w0d	15w2d
8.3	14w1d	13w0d	15w2d
8.4	14w2d	13w1d	15w3d
8.5	14w3d	13w2d	15w4d
8.6	14w4d	13w2d	15w5d
8.7	14w4d	13w3d	15w5d
8.8	14w5d	13w4d	15w6d
8.9	14w6d	13w4d	16w0d
9.0	14w6d	13w5d	16w1d
9.1	15w0d	13w6d	16w1d
9.2	15w1d	13w6d	16w2d

3.3	10w1d	9w3d	11w0d
3.4	10w2d	9w3d	11w1d
3.5	10w3d	9w4d	11w2d
3.6	10w4d	9w5d	11w2d
3.7	10w4d	9w5d	11w3d
3.8	10w5d	9w6d	11w4d
3.9	10w6d	10w0d	11w5d
4.0	10w6d	10w0d	11w5d
4.1	11w0d	10w1d	11w6d
4.2	11w1d	10w1d	11w7d
4.3	11w1d	10w2d	12w1d
4.4	11w1d	10w2d	12w1d
4.5	11w2d	10w3d	12w1d
4.6	11w3d	10w3d	12w2d
4.7	11w4d	10w4d	12w3d
4.8	11w4d	10w5d	12w4d
4.9	11w5d	10w5d	12w4d
5.0	11w5d	10w5d	12w4d
5.1	11w6d	10w6d	12w5d
5.2	11w6d	11w0d	12w6d
5.3	12w0d	11w0d	13w0d
5.4	12w0d	11w0d	13w0d
5.5	12w1d	11w1d	13w0d
5.6	12w1d	11w2d	13w1d
5.7	12w2d	11w2d	13w2d
5.8	12w2d	11w2d	13w2d
5.9	12w3d	11w3d	13w3d

9.3	15w1d	13w7d	16w3d
9.4	15w2d	14w1d	16w4d
9.5	15w2d	14w1d	16w4d
9.6	15w3d	14w1d	16w4d
9.7	15w4d	14w2d	16w5d
9.8	15w4d	14w2d	16w6d
9.9	15w5d	14w3d	17w0d
10.0	15w6d	14w4d	17w1d
10.1	16w0d	14w5d	17w2d
10.2	16w1d	14w6d	17w3d
10.3	16w1d	14w6d	17w3d
10.4	16w2d	14w7d	17w4d
10.5	16w3d	15w1d	17w5d
10.6	16w4d	15w1d	17w6d
10.7	16w4d	15w2d	17w6d
10.8	16w5d	15w3d	18w0d
10.9	16w6d	15w3d	18w1d
11.0	16w6d	15w4d	18w2d
11.1	17w0d	15w4d	18w3d
11.2	17w1d	15w5d	18w3d
11.3	17w1d	15w6d	18w4d
11.4	17w2d	15w6d	18w5d
11.5	17w3d	16w0d	18w6d
11.6	17w4d	16w1d	18w6d
11.7	17w4d	16w1d	19w0d
11.8	17w5d	16w2d	19w1d
11.9	17w6d	16w3d	19w2d

6.0	12w4d	11w4d	13w4d
6.1	12w4d	11w4d	13w4d

12.0	17w6d	16w3d	19w2d
12.1	18w0d	16w4d	19w3d

Crown-Rump Length (CRL) : OSAKA

GA Table

Osaka University Method 1989, 3 by Univ. Of Osaka

CRL (cm)	GA (wd)
0.90	07w1d
1.00	07w3d
1.10	07w4d
1.20	07w6d
1.30	08w0d
1.40	08w1d
1.50	08w2d
1.60	08w3d
1.70	08w4d
1.80	08w5d
1.90	08w6d
2.00	09w0d
2.10	09w0d
2.20	09w1d

CRL (cm)	GA (wd)
2.30	09w2d
2.40	09w3d
2.50	09w3d
2.60	09w4d
2.70	09w5d
2.80	09w6d
2.90	09w6d
3.00	10w0d
3.10	10w1d
3.20	10w1d
3.30	10w2d
3.40	10w3d
3.50	10w3d
3.60	10w4d

CRL (cm)	GA (wd)
3.70	10w4d
3.80	10w5d
3.90	10w6d
4.00	10w6d
4.10	11w0d
4.20	11w0d
4.30	11w1d
4.40	11w2d
4.50	11w2d
4.60	11w3d
4.70	11w3d
4.80	11w4d
4.90	11w5d
5.00	11w6d

CRL (cm)	GA (wd)
5.10	11w6d
5.20	11w6d
5.30	12w0d
5.40	12w1d
5.50	12w1d
5.60	12w2d
5.70	12w2d
5.80	12w3d
5.90	12w3d
6.00	12w4d
6.10	12w5d
6.20	12w5d
6.30	12w6d

Fetal Growth Table

Osaka University Method 1989, 3 by Univ. Of Osaka

Age (wd)	Growth (cm)	±1.5SD (cm)
6	0.52	0.10
7	0.90	0.14
8	1.41	0.19
9	2.11	0.24

Age (wd)	Growth (cm)	±1.5SD (cm)
10	2.99	0.28
11	4.06	0.31
12	5.32	0.31

Crown-Rump Length (CRL) : ASUM(SCW)

Fetal Growth Table

Australasian Society for Ultrasound in Medicine

Policies and Statements - [D7] Statement On Normal Ultrasonic Fetal Measurements (Revised May 2001)

Age (wd)	Growth (cm)
05w2d	0.1
05w3d	0.2
05w4d	0.3
05w5d	0.3
05w6d	0.4
06w0d	0.4
06w1d	0.5
06w2d	0.6
06w3d	0.7
06w4d	0.8

Age (wd)	Growth (cm)
08w3d	2.0
08w4d	2.1
08w5d	2.2
08w6d	2.2
09w0d	2.3
09w1d	2.4
09w2d	2.6
09w3d	2.7
09w4d	2.8
09w5d	2.9

Age (wd)	Growth (cm)
11w4d	5.2
11w5d	5.5
11w6d	5.6
12w0d	5.7
12w1d	5.8
12w2d	6.0
12w3d	6.1
12w4d	6.3
12w5d	6.4
12w6d	6.5

06w5d	0.9	09w6d	3.1	13w0d	6.8
06w6d	1.0	10w0d	3.4	13w1d	7.0
07w0d	1.1	10w1d	3.6	13w2d	7.2
07w1d	1.1	10w2d	3.7	13w3d	7.4
07w2d	1.2	10w3d	3.8	13w4d	7.6
07w3d	1.2	10w4d	3.9	13w5d	7.7
07w4d	1.3	10w5d	3.9	13w6d	8.0
07w5d	1.4	10w6d	4.0	14w0d	8.1
07w6d	1.5	11w0d	4.4	14w1d	8.4
08w0d	1.7	11w1d	4.5	14w2d	8.5
08w1d	1.8	11w2d	4.7	14w3d	8.6
08w2d	1.9	11w3d	4.8	14w4d	8.7

Crown-Rump Length (CRL) : REMPEN

GA Table

Rempen A. "Biometrie in der Fruhgraviditat (I. Trimenon)" Der Frauenarzt, 32:425, 1991

CRL (cm)	GA (wd)	5% (wd)	95% (wd)	CRL (cm)	GA (wd)	5% (wd)	95% (wd)
0.2	6w0d	5w1d	6w6d	4.1	10w5d	9w6d	11w4d
0.3	6w1d	5w2d	7w0d	4.2	10w6d	10w0d	11w5d
0.4	6w2d	5w3d	7w1d	4.3	11w0d	10w1d	11w6d
0.5	6w3d	5w4d	7w2d	4.4	11w0d	10w1d	11w6d
0.6	6w4d	5w5d	7w3d	4.5	11w1d	10w2d	12w0d
0.7	6w5d	5w6d	7w4d	4.6	11w2d	10w3d	12w1d
0.8	6w6d	6w0d	7w5d	4.7	11w2d	10w3d	12w1d

0.9	7w0d	6w1d	7w6d	4.8	11w3d	10w4d	12w2d
1.0	7w1d	6w2d	8w0d	4.9	11w4d	10w5d	12w3d
1.1	7w2d	6w3d	8w1d	5.0	11w4d	10w5d	12w3d
1.2	7w3d	6w4d	8w2d	5.1	11w5d	10w6d	12w4d
1.3	7w4d	6w5d	8w3d	5.2	11w5d	10w6d	12w4d
1.4	7w5d	6w6d	8w4d	5.3	11w6d	11w0d	12w5d
1.5	7w6d	7w0d	8w5d	5.4	12w0d	11w1d	12w6d
1.6	7w6d	7w0d	8w5d	5.5	12w0d	11w1d	12w6d
1.7	8w0d	7w1d	8w6d	5.6	12w1d	11w2d	13w0d
1.8	8w1d	7w2d	9w0d	5.7	12w1d	11w2d	13w0d
1.9	8w2d	7w3d	9w1d	5.8	12w2d	11w3d	13w1d
2.0	8w3d	7w4d	9w2d	5.9	12w3d	11w4d	13w2d
2.1	8w4d	7w5d	9w3d	6.0	12w3d	11w4d	13w2d
2.2	8w5d	7w6d	9w4d	6.1	12w4d	11w5d	13w3d
2.3	8w5d	7w6d	9w4d	6.2	12w4d	11w5d	13w3d
2.4	8w6d	8w0d	9w5d	6.3	12w5d	11w6d	13w4d
2.5	9w0d	8w1d	9w6d	6.4	12w5d	11w6d	13w4d
2.6	9w1d	8w2d	10w0d	6.5	12w6d	12w0d	13w5d
2.7	9w2d	8w3d	10w1d	6.6	12w6d	12w0d	13w5d
2.8	9w3d	8w4d	10w2d	6.7	13w0d	12w1d	13w6d
2.9	9w3d	8w4d	10w2d	6.8	13w0d	12w1d	13w6d
3.0	9w4d	8w5d	10w3d	6.9	13w1d	12w2d	14w0d
3.1	9w5d	8w6d	10w4d	7.0	13w1d	12w2d	14w0d
3.2	9w6d	9w0d	10w5d	7.1	13w2d	12w3d	14w1d
3.3	9w6d	9w0d	10w5d	7.2	13w2d	12w3d	14w1d
3.4	10w0d	9w1d	10w6d	7.3	13w3d	12w4d	14w2d
3.5	10w1d	9w2d	11w0d	7.4	13w3d	12w4d	14w2d

3.6	10w2d	9w3d	11w1d		7.5	13w4d	12w5d	14w3d
3.7	10w2d	9w3d	11w1d		7.6	13w4d	12w5d	14w3d
3.8	10w3d	9w4d	11w2d		7.7	13w4d	12w5d	14w3d
3.9	10w4d	9w5d	11w3d		7.8	13w5d	12w6d	14w4d
4.0	10w5d	9w6d	11w4d					

Fetal Growth Table

Rempen A. "Biometrie in der Fruhgraviditat (I. Trimenon)" Der Frauenarzt, 32:425, 1991

Age (wd)	CRL (cm)	5% (wd)	95% (wd)		Age (wd)	CRL (cm)	5% (wd)	95% (wd)
05w5d	0.12	0.00	0.90		9w4d	2.95	2.17	3.73
05w6d	0.21	0.00	0.99		9w5d	3.07	2.29	3.85
06w0d	0.30	0.00	1.08		9w6d	3.20	2.42	3.98
06w1d	0.38	0.00	1.16		10w0d	3.33	2.55	4.11
06w2d	0.47	0.00	1.25		10w1d	3.46	2.68	4.24
06w3d	0.57	0.00	1.35		10w2d	3.59	2.81	4.37
6w4d	0.66	0.00	1.44		10w3d	3.72	2.94	4.50
6w5d	0.75	0.00	1.53		10w4d	3.85	3.07	4.63
6w6d	0.85	0.07	1.63		10w5d	3.99	3.21	4.77
7w0d	0.95	0.17	1.73		10w6d	4.13	3.35	4.91
7w1d	1.05	0.27	1.83		11w0d	4.26	3.48	5.04
7w2d	1.15	0.37	1.93		11w1d	4.40	3.62	5.18
7w3d	1.25	0.47	2.03		11w2d	4.54	3.76	5.32
7w4d	1.35	0.57	2.13		11w3d	4.69	3.91	5.47
7w5d	1.46	0.68	2.24		11w4d	4.83	4.05	5.61
7w6d	1.56	0.78	2.34		11w5d	4.98	4.20	5.76
8w0d	1.67	0.89	2.45		11w6d	5.12	4.34	5.90
8w1d	1.78	1.00	2.56		12w0d	5.27	4.49	6.05
8w2d	1.89	1.11	2.67		12w1d	5.42	4.64	6.20
8w3d	2.00	1.22	2.78		12w2d	5.57	4.79	6.35
8w4d	2.11	1.33	2.89		12w3d	5.73	4.95	6.51
8w5d	2.23	1.45	3.01		12w4d	5.88	5.10	6.66
8w6d	2.35	1.57	3.13		12w5d	6.03	5.25	6.81
9w0d	2.46	1.68	3.24		12w6d	6.19	5.41	6.97
9w1d	2.58	1.80	3.36		13w0d	6.35	5.57	7.13
9w2d	2.70	1.92	3.48		13w1d	6.51	5.73	7.29
9w3d	2.83	2.05	3.61		13w2d	6.67	5.89	7.45

Femur Length (FL) : KOREAN

GA Table

Y.G Park." The Standardization of Fetal body parts according to the normal Korean Gestational Age in Ultrasound" Korean Ultrasound Institute, Vol. 14, No.2, 1995

GA = FL × 2.36855 + 0.2089 × FL^2 + 10.513242

Output Unit : w(weeks)

Input Unit : cm

Min Range : 0.7 cm

Max Range : 7.3 cm

Fetal Growth Table

Y.G Park.“ The Standardization of Fetal body parts according to the normal Korean Gestational Age in Ultrasound” Korean Ultrasound Institute, Vol. 14, No.2, 1995

FL = 42.21513 x MA -3.5314 x MA^2 - 38.929993

Output Unit : cm

Input Unit : w(week)

Min Range : 12 w

Max Range : 40 w

Age (W)	Growth (cm)	±SD (cm)	Age (W)	Growth (cm)	±SD (cm)
12	0.790	0.142	32	6.100	0.205
16	1.900	0.133	34	6.461	0.226
20	3.000	0.204	36	6.710	0.222
24	4.100	0.198	38	7.013	0.245
28	5.100	0.209	40	7.287	0.216

Femur Length (FL) : HADLOCK

GA Table

Frank P. Hadlock, Russell L.Deter, Ronald B. Harrist, Seung K. Park,. "Estimating Fetal Age: Computer-Assisted Analysis of Multiple Fetal Growth Parameters" Radiology, 1984; 152:497-501.

GA = 10.35 + 2.460 × FL + 0.170 × FL^2

Output Unit : w(weeks)

Input Unit : cm

Min Range : 0.64 cm

Max Range : 8.20 cm

Standard Deviation :

Min Range(w)	Max Range(w)	±2SD(w)
12	18	1.38
18	24	1.80
24	30	2.08
30	36	2.96
36	42	3.12

Fetal Growth Table

Hadlock, F., Deter, R.L., Harrist, R.B., Park, S.K. "Estimating Fetal Age: Computer-Assisted Analysis of Multiple Fetal Growth Parameters" Radiology, 1984, 152: 497-501.

Equation = 0.427 x MA - 0.0034 x MA^2 - 3.91

Output Unit : cm

Input Unit : w(weeks)

Min Range : 12 w

Max Range : 40 w

Standard Deviation : 2SD=0.6cm

Femur Length (FL) : MERZ

GA Table

E. Merz, W. Goldhofer, E. Timor-Tritsch "Ultrasound in Gynecology and Obstetrics" Textbook and Atlas, 1991 Georg Thieme Verlag, 308-338

FL (cm)	GA (wd)	5% (wd)	95% (wd)	FL (cm)	GA (wd)	5% (wd)	95% (wd)
1.0	12w2d	11w1d	13w4d	4.6	25w3d	23w4d	27w1d
1.1	12w5d	11w4d	13w6d	4.7	25w6d	24w0d	27w4d

1.2	13w0d	11w6d	14w1d
1.3	13w2d	12w1d	14w4d
1.4	13w5d	12w3d	15w0d
1.5	14w0d	12w5d	15w2d
1.6	14w3d	13w1d	15w5d
1.7	14w5d	13w3d	16w0d
1.8	15w1d	13w6d	16w3d
1.9	15w3d	14w1d	16w5d
2.0	15w6d	14w4d	17w1d
2.1	16w1d	14w6d	17w3d
2.2	16w4d	15w1d	17w6d
2.3	16w6d	15w3d	18w1d
2.4	17w1d	15w6d	18w4d
2.5	17w4d	16w1d	19w1d
2.6	17w6d	16w3d	19w3d
2.7	18w2d	16w6d	19w6d
2.8	18w4d	17w1d	20w1d
2.9	19w0d	17w4d	20w4d
3.0	19w3d	17w6d	20w6d
3.1	19w5d	18w1d	21w1d
3.2	20w1d	18w4d	21w4d
3.3	20w4d	18w6d	22w1d
3.4	20w6d	19w1d	22w3d
3.5	21w1d	19w4d	22w6d
3.6	21w4d	20w0d	23w1d
3.7	21w6d	20w2d	23w4d

4.8	26w1d	24w3d	28w0d
4.9	26w4d	24w5d	28w2d
5.0	26w6d	25w1d	28w5d
5.1	27w2d	25w4d	29w1d
5.2	27w5d	25w6d	29w4d
5.3	28w1d	26w1d	30w0d
5.4	28w4d	26w4d	30w4d
5.5	29w0d	27w0d	31w0d
5.6	29w3d	27w3d	31w3d
5.7	29w6d	27w6d	31w6d
5.8	30w1d	28w1d	32w1d
5.9	30w4d	28w4d	32w4d
6.0	31w0d	29w0d	33w0d
6.1	31w4d	29w4d	33w4d
6.2	31w6d	29w6d	33w6d
6.3	32w2d	30w2d	34w2d
6.4	32w6d	30w6d	34w6d
6.5	33w1d	31w1d	35w1d
6.6	33w4d	31w4d	35w4d
6.7	34w1d	32w0d	36w1d
6.8	34w4d	32w3d	36w4d
6.9	35w0d	32w6d	37w1d
7.0	35w3d	33w2d	37w4d
7.1	35w6d	33w6d	38w0d
7.2	36w2d	34w1d	38w3d
7.3	36w6d	34w4d	39w0d

3.8	22w2d	20w5d	23w6d
3.9	22w5d	21w0d	24w3d
4.0	23w1d	21w3d	24w6d
4.1	23w3d	21w5d	25w1d
4.2	23w6d	22w1d	25w4d
4.3	24w1d	22w4d	25w6d
4.4	24w4d	22w6d	26w3d
4.5	25w0d	23w1d	26w6d

7.4	37w2d	35w1d	39w4d
7.5	37w5d	35w4d	39w6d
7.6	38w1d	36w0d	40w3d
7.7	38w5d	36w4d	40w6d
7.8	39w1d	37w0d	41w3d
7.9	39w4d	37w3d	41w6d
8.0	40w1d	37w6d	42w2d

Fetal Growth Table

E. Merz, W. Goldhofer, E. Timor-Tritsch "Ultrasound in Gynecology and Obstetrics" Textbook and Atlas, 1991 Georg Thieme Verlag, 308-338

Age (W)	Growth (cm)	5% (cm)	95% (cm)
12	0.90	0.50	1.30
13	1.20	0.80	1.60
14	1.50	1.10	1.90
15	1.80	1.40	2.20
16	2.10	1.70	2.50
17	2.40	2.00	2.80
18	2.70	2.20	3.10
19	3.00	2.50	3.40
20	3.20	2.80	3.70
21	3.50	3.10	4.00
22	3.80	3.40	4.20
23	4.10	3.60	4.50

Age (W)	Growth (cm)	5% (cm)	95% (cm)
27	5.10	4.60	5.60
28	5.30	4.90	5.80
29	5.60	5.10	6.10
30	5.80	5.30	6.30
31	6.00	5.60	6.50
32	6.30	5.80	6.80
33	6.50	6.00	7.00
34	6.70	6.20	7.20
35	6.90	6.40	7.40
36	7.10	6.60	7.60
37	7.30	6.80	7.80
38	7.50	6.90	8.00

24	4.30	3.90	4.80
25	4.60	4.10	5.10
26	4.90	4.40	5.30

39	7.60	7.10	8.20
40	7.80	7.30	8.40

Femur Length (FL) : HANSMANN

GA Table

Hansmann, Hackeloer, Staudach, Wittman. "Ultrasound Diagnosis in Obsterics and Gynecology." Springer-Verlag, New York, 1986, p431.

FL (cm)	GA (wd)
1.0	13w0d
1.2	14w0d
1.6	15w0d
1.8	16w0d
2.2	17w0d
2.5	18w0d
2.8	19w0d
3.1	20w0d
3.4	21w0d
3.6	22w0d

FL (cm)	GA (wd)
3.9	23w0d
4.1	24w0d
4.4	25w0d
4.7	26w0d
4.9	27w0d
5.1	28w0d
5.4	29w0d
5.6	30w0d
5.9	31w0d
6.1	32w0d

FL (cm)	GA (wd)
6.3	33w0d
6.5	34w0d
6.7	35w0d
6.9	36w0d
7.1	37w0d
7.3	38w0d
7.4	39w0d
7.5	40w0d

Fetal Growth Table

Hansmann, Hackeloer, Staudach, Wittman "Ultrasound Diagnosis in Obstetrics and Gynecology" Springer- Verlag, New York, 1986, p.182.

Age (W)	Growth (cm)	5% (cm)	95% (cm)
12	0.8	0.4	1.3
13	1.1	0.6	1.6
14	1.4	0.9	1.8
15	1.7	1.2	2.1
16	2.0	1.5	2.4
17	2.3	1.8	2.7
18	2.5	2.1	3.0
19	2.8	2.4	3.3
20	3.1	2.6	3.6
21	3.4	2.9	3.8
22	3.6	3.2	4.1
23	3.9	3.5	4.4
24	4.2	3.7	4.6
25	4.4	4.0	4.9
26	4.7	4.2	5.1
27	4.9	4.5	5.4
28	5.2	4.7	5.6
29	5.4	5.0	5.9
30	5.6	5.2	6.1
31	5.9	5.4	6.3
32	6.1	5.6	6.5

33	6.3	5.8	6.7
34	6.5	6.0	6.9
35	6.7	6.2	7.1
36	6.8	6.4	7.3
37	7.0	6.5	7.4
38	7.1	6.7	7.6
39	7.3	6.8	7.7
40	7.4	7.0	7.9

Femur Length (FL) : HOHLER

GA Table

Hohler, C.W., Quetel, T.A. "Fetal Femur Length: Equations for Computer Calculation of Gestational Age from Ultrasound Measurements." American Journal of Obsterics and Gynecology, Vol. 143, No. 4: 479-481, June 15, 1982

$GA = 9.18 + 2.67 \times FL + 0.16 \times FL^2$

Output Unit : w(weeks)

Input Unit : cm

Min Range : 1.0 cm

Max Range : 8.0 cm

Femur Length (FL) : JEANTY

GA Table

Jeanty et al,. "Estimation of Gestational Age from Measurements of Fetal Long Bones" Journal of Ultrasound in Medicine, February 1984. Vol 3. Pp75-79

FL (cm)	GA (wd)	5% (wd)	95% (wd)
1.0	12w4d	10w3d	14w6d
1.1	12w6d	10w5d	15w1d
1.2	13w2d	11w1d	15w4d
1.3	13w4d	11w3d	15w6d
1.4	13w6d	11w5d	16w1d
1.5	14w1d	12w0d	16w3d
1.6	14w4d	12w3d	16w6d
1.7	14w6d	12w5d	17w1d
1.8	15w1d	13w0d	17w3d
1.9	15w4d	13w3d	17w6d
2.0	15w6d	13w5d	18w1d
2.1	16w2d	14w1d	18w4d
2.2	16w4d	14w3d	18w6d
2.3	16w6d	14w5d	19w1d
2.4	17w2d	15w1d	19w4d
2.5	17w4d	15w3d	19w6d
2.6	18w0d	15w6d	20w1d
2.7	18w2d	16w1d	20w4d
2.8	18w5d	16w4d	20w6d
2.9	19w0d	16w6d	21w1d

3.0	19w3d	17w1d	21w4d
3.1	19w6d	17w4d	22w0d
3.2	20w1d	17w6d	22w2d
3.3	20w4d	18w2d	22w5d
3.4	20w6d	18w5d	23w1d
3.5	21w1d	19w0d	23w3d
3.6	21w4d	19w3d	23w6d
3.7	22w0d	19w6d	24w1d
3.8	22w3d	20w1d	24w4d
3.9	22w5d	20w4d	24w6d
4.0	23w1d	20w6d	25w2d
4.1	23w4d	21w2d	25w5d
4.2	23w6d	21w5d	26w1d
4.3	24w2d	22w1d	26w4d
4.4	24w5d	22w4d	26w6d
4.5	25w0d	22w6d	27w1d
4.6	25w3d	23w1d	27w4d
4.7	25w6d	23w4d	28w0d
4.8	26w1d	24w0d	28w3d
4.9	26w4d	24w3d	29w6d
5.0	27w0d	24w6d	29w1d
5.1	27w3d	25w1d	29w4d
5.2	27w6d	25w4d	30w0d
5.3	28w1d	26w0d	30w3d
5.4	28w4d	26w3d	30w6d
5.5	29w1d	26w6d	31w2d
5.6	29w4d	27w2d	31w5d
5.7	29w6d	27w5d	32w1d
5.8	30w2d	28w1d	32w4d
5.9	30w5d	28w4d	32w6d
6.0	31w1d	28w6d	33w2d
6.1	31w4d	29w3d	33w6d
6.2	32w0d	29w6d	34w1d
6.3	32w3d	30w1d	34w4d
6.4	32w6d	30w5d	35w1d
6.5	33w2d	31w1d	35w4d
6.6	33w5d	31w4d	35w6d
6.7	34w1d	32w0d	36w3d
6.8	34w4d	32w3d	36w6d
6.9	35w0d	32w6d	37w1d
7.0	35w4d	33w2d	37w5d
7.1	35w6d	33w5d	38w1d
7.2	36w3d	34w1d	38w4d
7.3	36w6d	34w4d	39w0d
7.4	37w2d	35w1d	39w4d
7.5	37w5d	35w4d	39w6d
7.6	38w1d	36w0d	40w3d
7.7	38w4d	36w3d	40w6d
7.8	39w1d	36w6d	41w2d
7.9	39w4d	37w2d	41w5d
8.0	40w0d	37w6d	42w1d

Fetal Growth Table

Jeanty, P. "Fetal Limb Biometry" (Letter) Radiology, 147:602, 1983

Age (W)	Growth (cm)	5% (cm)	95% (cm)
11	0.6	0.6	0.6
12	0.9	0.9	0.9
13	1.2	0.6	1.9
14	1.5	0.5	1.9
15	1.9	1.1	2.6
16	2.2	1.3	2.4
17	2.5	2.0	2.9
18	2.8	1.9	3.1
19	3.1	2.3	3.8
20	3.3	2.2	3.9
21	3.6	2.7	4.5
22	3.9	2.9	4.4
23	4.1	3.5	4.8
24	4.4	3.4	4.9
25	4.6	3.8	5.4
26	4.9	3.9	5.3
27	5.1	4.5	5.7
28	5.3	4.5	5.7
29	5.6	4.9	6.2
30	5.8	4.9	6.2
31	6	5.3	6.7
32	6.2	5.3	6.7
33	6.4	5.6	7.1
34	6.5	5.7	7.0
35	6.7	6.1	7.3
36	6.9	6.1	7.4
37	7.1	6.4	7.7
38	7.2	6.2	7.9
39	7.4	6.4	8.3
40	7.5	6.6	8.1

Femur Length (FL) : SHINOZUKA

GA Table

Norio Shinozuka, Takashi Okai, et al. "Standard Values of Ultrasonographic Fetal Biometry" Japanese Journal of Medical Ultrasonics, Vol.23, No.12, 1996, pp877-888

FL (cm)	GA (wd)	-SD (wd)	+SD (wd)
2.00	16w1d	15w2d	17w0d
2.10	16w3d	15w4d	17w2d
2.20	16w6d	16w0d	17w5d
2.30	17w1d	16w1d	18w1d
2.40	17w3d	16w3d	18w3d
2.50	17w6d	16w6d	18w6d
2.60	18w1d	17w1d	19w1d
2.70	18w3d	17w3d	19w3d
2.80	18w6d	17w6d	19w6d
2.90	19w1d	18w1d	20w1d

3.00	19w4d	18w3d	20w5d
3.10	20w0d	18w6d	21w1d
3.20	20w2d	19w1d	21w3d
3.30	20w5d	19w4d	21w6d
3.40	21w1d	20w0d	22w2d
3.50	21w3d	20w2d	22w4d
3.60	21w6d	20w5d	23w0d
3.70	22w2d	21w0d	23w4d
3.80	22w5d	21w3d	24w0d
3.90	23w1d	21w6d	24w3d
4.00	23w3d	22w1d	24w5d
4.10	24w0d	22w5d	25w2d
4.20	24w3d	23w1d	25w5d
4.30	24w6d	23w4d	26w1d
4.40	25w3d	24w1d	26w5d
4.50	25w6d	24w3d	27w2d
4.60	26w2d	24w6d	27w5d
4.70	26w5d	25w2d	28w1d
4.80	27w2d	25w6d	28w5d
4.90	27w5d	26w2d	29w1d
5.00	28w2d	26w6d	29w5d
5.10	28w5d	27w2d	30w1d
5.20	29w2d	27w5d	30w6d
5.30	29w5d	28w1d	31w2d
5.40	30w2d	28w5d	31w6d
5.50	30w5d	29w1d	32w2d
5.60	31w2d	29w5d	32w6d
5.70	31w6d	30w2d	33w3d
5.80	32w3d	30w6d	34w0d
5.90	33w0d	31w2d	34w5d
6.00	33w3d	31w5d	35w1d
6.10	34w0d	32w2d	35w5d
6.20	34w4d	32w6d	36w2d
6.30	35w1d	33w3d	36w6d
6.40	35w5d	34w0d	37w3d
6.50	36w2d	34w4d	38w0d
6.60	37w0d	35w2d	38w5d
6.70	37w4d	35w5d	39w3d
6.80	38w1d	36w2d	40w0d
6.90	38w5d	36w6d	40w4d
7.00	39w3d	37w4d	41w2d

Fetal Growth Table

Norio Shinozuka, Takashi Okai, et al "Standard Values of Ultrasonographic Fetal Biometry" Japanese Journal of Medical Ultrasonics, Vol.23, No.12, 1996, pp877-888

Age (W)	Growth (cm)	-1.5SD (cm)	+1.5SD (cm)
16	2.14	1.74	2.54
17	2.40	1.99	2.80
18	2.65	2.25	3.06
19	2.91	2.50	3.32
20	3.16	2.74	3.58
21	3.41	2.99	3.84

22	3.66	3.23	4.09
23	3.91	3.47	4.34
24	4.15	3.71	4.59
25	4.39	3.94	4.83
26	4.62	4.17	5.07
27	4.84	4.39	5.30
28	5.06	4.61	5.52
29	5.28	4.81	5.74
30	5.48	5.01	5.95
31	5.68	5.21	6.16
32	5.87	5.39	6.35
33	6.05	5.57	6.54
34	6.22	5.73	6.71
35	6.38	5.89	6.88
36	6.53	6.03	7.03
37	6.67	6.17	7.18
38	6.80	6.29	7.31
39	6.91	6.40	7.43
40	7.01	6.49	7.53
41	7.10	6.57	7.62
42	7.17	6.64	7.70

Femur Length (FL) : OSAKA

GA Table

Osaka University Method 1989, 3 by Univ. Of Osaka

FL (cm)	GA (wd)	FL (cm)	GA (wd)	FL (cm)	GA (wd)	FL (cm)	GA (wd)
0.90	13w0d	2.50	18w1d	4.10	24w1d	5.70	31w3d
1.00	13w2d	2.60	18w4d	4.20	24w4d	5.80	31w6d
1.10	13w4d	2.70	18w6d	4.30	25w0d	5.90	32w3d
1.20	13w6d	2.80	19w2d	4.40	25w3d	6.00	32w6d
1.30	14w1d	2.90	19w4d	4.50	25w6d	6.10	33w4d
1.40	14w4d	3.00	20w0d	4.60	26w2d	6.20	34w1d
1.50	14w6d	3.10	20w2d	4.70	26w4d	6.30	34w4d
1.60	15w1d	3.20	20w5d	4.80	27w1d	6.40	35w2d
1.70	15w3d	3.30	21w0d	4.90	27w4d	6.50	35w5d
1.80	15w5d	3.40	21w3d	5.00	28w0d	6.60	36w3d
1.90	16w1d	3.50	21w5d	5.10	28w3d	6.70	36w6d
2.00	16w3d	3.60	22w1d	5.20	28w6d	6.80	37w1d
2.10	16w6d	3.70	22w4d	5.30	29w2d	6.90	38w3d
2.20	17w1d	3.80	23w1d	5.40	29w6d	7.00	39w1d
2.30	17w3d	3.90	23w2d	5.50	30w2d	7.10	39w6d
2.40	18w0d	4.00	23w5d	5.60	30w6d		

Fetal Growth Table

Osaka University Method 1989, 3 by Univ. Of Osaka

Age (wd)	Growth (cm)	±SD (cm)
13w0d	0.94	0.21
13w1d	0.98	0.21
13w2d	1.03	0.21
13w3d	1.07	0.21
13w4d	1.12	0.21
13w5d	1.17	0.21
13w6d	1.21	0.22
14w0d	1.26	0.22
14w1d	1.30	0.22
14w2d	1.35	0.22
14w3d	1.39	0.22
14w4d	1.44	0.22
14w5d	1.48	0.22
14w6d	1.53	0.22
15w0d	1.57	0.22
15w1d	1.61	0.22
15w2d	1.66	0.22
15w3d	1.70	0.22
15w4d	1.75	0.22
15w5d	1.79	0.22
15w6d	1.83	0.22
16w0d	1.88	0.22
16w1d	1.92	0.22
16w2d	1.96	0.22
16w3d	2.01	0.23
16w4d	2.05	0.23
16w5d	2.09	0.23
16w6d	2.13	0.23
17w0d	2.18	0.23
17w1d	2.22	0.23
17w2d	2.26	0.23
17w3d	2.30	0.23
17w4d	2.34	0.23
17w5d	2.39	0.23
17w6d	2.43	0.23
18w0d	2.47	0.23
18w1d	2.51	0.23
18w2d	2.55	0.23
18w3d	2.59	0.23
18w4d	2.63	0.23
18w5d	2.67	0.23
18w6d	2.71	0.23
19w0d	2.75	0.24
19w1d	2.79	0.24
19w2d	2.83	0.24
19w3d	2.87	0.24
19w4d	2.91	0.24

Age (wd)	Growth (cm)	±SD (cm)
26w4d	4.69	0.26
26w5d	4.72	0.27
26w6d	4.75	0.27
27w0d	4.78	0.27
27w1d	4.82	0.27
27w2d	4.85	0.27
27w3d	4.88	0.27
27w4d	4.91	0.27
27w5d	4.91	0.27
27w6d	4.97	0.27
28w0d	5.01	0.27
28w1d	5.04	0.27
28w2d	5.07	0.27
28w3d	5.10	0.27
28w4d	5.13	0.27
28w5d	5.16	0.27
28w6d	5.19	0.27
29w0d	5.22	0.27
29w1d	5.25	0.27
29w2d	5.28	0.28
29w3d	5.31	0.28
29w4d	5.34	0.28
29w5d	5.37	0.28
29w6d	5.40	0.28
30w0d	5.43	0.28
30w1d	5.46	0.28
30w2d	5.49	0.28
30w3d	5.52	0.28
30w4d	5.54	0.28
30w5d	5.57	0.28
30w6d	5.60	0.28
31w0d	5.63	0.28
31w1d	5.66	0.28
31w2d	5.69	0.28
31w3d	5.71	0.28
31w4d	5.74	0.28
31w5d	5.77	0.28
31w6d	5.80	0.29
32w0d	5.82	0.29
32w1d	5.85	0.29
32w2d	5.88	0.29
32w3d	5.90	0.29
32w4d	5.93	0.29
32w5d	5.96	0.29
32w6d	5.98	0.29
33w0d	6.01	0.29
33w1d	6.04	0.29

19w5d	2.95	0.24
19w6d	2.99	0.24
20w0d	3.03	0.24
20w1d	3.07	0.24
20w2d	3.11	0.24
20w3d	3.15	0.24
20w4d	3.19	0.24
20w5d	3.23	0.24
20w6d	3.27	0.24
21w0d	3.30	0.24
21w1d	3.34	0.24
21w2d	3.38	0.24
21w3d	3.42	0.24
21w4d	3.46	0.25
21w5d	3.49	0.25
21w6d	3.53	0.25
22w0d	3.57	0.25
22w1d	3.61	0.25
22w2d	3.64	0.25
22w3d	3.68	0.25
22w4d	3.72	0.25
22w5d	3.75	0.25
22w6d	3.79	0.25
23w0d	3.83	0.25
23w1d	3.86	0.25
23w2d	3.90	0.25

33w2d	6.06	0.29
33w3d	6.09	0.29
33w4d	6.11	0.29
33w5d	6.14	0.29
33w6d	6.16	0.29
34w0d	6.19	0.29
34w1d	6.21	0.29
34w2d	6.24	0.29
34w3d	6.26	0.30
34w4d	6.29	0.30
34w5d	6.31	0.30
34w6d	6.34	0.30
35w0d	6.36	0.30
35w1d	6.39	0.30
35w2d	6.41	0.30
35w3d	6.43	0.30
35w4d	6.46	0.30
35w5d	6.48	0.30
35w6d	6.50	0.30
36w0d	6.53	0.30
36w1d	6.55	0.30
36w2d	6.57	0.30
36w3d	6.60	0.30
36w4d	6.62	0.30
36w5d	6.64	0.30
36w6d	6.66	0.30

23w3d	3.93	0.25
23w4d	3.97	0.25
23w5d	4.01	0.25
23w6d	4.04	0.25
24w0d	4.08	0.25
24w1d	4.11	0.26
24w2d	4.15	0.26
24w3d	4.18	0.26
24w4d	4.22	0.26
24w5d	4.25	0.26
24w6d	4.28	0.26
25w0d	4.32	0.26
25w1d	4.35	0.26
25w2d	4.39	0.26
25w3d	4.42	0.26
25w4d	4.45	0.26
25w5d	4.49	0.26
25w6d	4.52	0.26
26w0d	4.56	0.26
26w1d	4.59	0.26
26w2d	4.62	0.26
26w3d	4.65	0.26

37w0d	6.69	0.31
37w1d	6.71	0.31
37w2d	6.73	0.31
37w3d	6.75	0.31
37w4d	6.77	0.31
37w5d	6.79	0.31
37w6d	6.82	0.31
38w0d	6.84	0.31
38w1d	6.86	0.31
38w2d	6.88	0.31
38w3d	6.90	0.31
38w4d	6.92	0.31
38w5d	6.94	0.31
38w6d	6.96	0.31
39w0d	6.98	0.31
39w1d	7.00	0.31
39w2d	7.02	0.31
39w3d	7.04	0.31
39w4d	7.06	0.32
39w5d	7.08	0.32
39w6d	7.10	0.32
40w0d	7.12	0.32

Femur Length (FL) : CHITTY

GA Table

D.G. Altman, L.S. Chitty, "New Charts for Ultrasound Dating of Pregnancy" Ultrasound in Obstetrics and Gynecology, Vol.10, p174-191, 1997

FL (cm)	GA (wd)	5% (wd)	95% (wd)
1.00	13w0d	12w1d	13w6d
1.10	13w2d	12w3d	14w1d
1.20	13w4d	12w5d	14w4d
1.30	13w6d	13w0d	14w6d
1.40	14w1d	13w1d	15w1d
1.50	14w3d	13w3d	15w3d
1.60	14w5d	13w5d	15w6d
1.70	15w0d	14w0d	16w1d
1.80	15w2d	14w2d	16w3d
1.90	15w5d	14w4d	16w6d
2.00	16w0d	14w6d	17w1d
2.10	16w2d	15w1d	17w3d
2.20	16w4d	15w3d	17w6d
2.30	16w6d	15w5d	18w1d
2.40	17w2d	16w0d	18w4d
2.50	17w4d	16w2d	18w6d
2.60	17w6d	16w4d	19w2d
2.70	18w2d	16w6d	19w5d
2.80	18w4d	17w1d	20w0d
2.90	18w6d	17w4d	20w3d
3.00	19w2d	17w6d	20w5d
3.10	19w4d	18w1d	21w1d
3.20	20w0d	18w3d	21w4d
3.30	20w2d	18w5d	22w0d
3.40	20w5d	19w1d	22w2d
3.50	21w0d	19w3d	22w5d
3.60	21w3d	19w5d	23w1d
3.70	21w5d	20w1d	23w4d
3.80	22w1d	20w3d	24w0d

FL (cm)	GA (wd)	5% (wd)	95% (wd)
3.90	22w4d	20w5d	24w3d
4.00	22w6d	21w1d	24w6d
4.10	23w2d	21w3d	25w2d
4.20	23w5d	21w6d	25w5d
4.30	24w1d	22w1d	26w1d
4.40	24w3d	22w4d	26w4d
4.50	24w6d	22w6d	27w1d
4.60	25w2d	23w2d	27w4d
4.70	25w5d	23w4d	28w0d
4.80	26w1d	24w0d	28w3d
4.90	26w4d	24w3d	29w0d
5.00	27w0d	24w5d	29w3d
5.10	27w3d	25w1d	30w0d
5.20	27w6d	25w4d	30w3d
5.30	28w2d	26w0d	31w0d
5.40	28w5d	26w2d	31w3d
5.50	29w2d	26w5d	32w0d
5.60	29w5d	27w1d	32w3d
5.70	30w1d	27w4d	33w0d
5.80	30w4d	28w0d	33w4d
5.90	31w1d	28w3d	34w1d
6.00	31w4d	28w6d	34w4d
6.10	32w1d	29w2d	35w1d
6.20	32w4d	29w5d	35w5d
6.30	33w1d	30w1d	36w2d
6.40	33w4d	30w4d	36w6d
6.50	34w1d	31w0d	37w3d
6.60	34w4d	31w3d	38w0d
6.70	35w1d	32w0d	38w5d

Fetal Growth Table

L.S. Chitty, D.G. Altman, S. Campbell, "Charts of Fetal Size: 4. Femur Length" British Journal of Obstetrics and Gynaecology, February 1994. Vol 101. Pp132-135

Age (w)	Growth (cm)	10% (cm)	90% (cm)
12	0.77	0.55	1.00
13	1.09	0.86	1.33
14	1.41	1.17	1.65
15	1.72	1.47	1.97
16	2.03	1.77	2.28
17	2.33	2.07	2.59
18	2.63	2.36	2.90
19	2.92	2.64	3.20
20	3.21	2.92	3.49
21	3.49	3.20	3.78
28	5.27	4.93	5.62
29	5.50	5.14	5.85
30	5.71	5.35	6.07
31	5.92	5.55	6.29
32	6.12	5.74	6.49
33	6.31	5.93	6.69
34	6.49	6.10	6.88
35	6.66	6.26	7.06
36	6.82	6.42	7.23
37	6.97	6.56	7.38

22	3.76	3.46	4.06
23	4.03	3.72	4.34
24	4.29	3.98	4.61
25	4.55	4.23	4.87
26	4.80	4.47	5.13
27	5.04	4.70	5.38

38	7.11	6.69	7.53
39	7.24	6.81	7.67
40	7.36	6.92	7.79
41	7.46	7.02	7.90
42	7.56	7.11	8.01

Femur Length (FL) : CAMPBELL

GA Table

Professor Campbell's Group at Harris birthright Centre, King's College Hospital

FL (cm)	GA (wd)	±days (wd)
1.80	15w0d	00w6d
2.20	16w0d	00w6d
2.50	17w0d	00w6d
2.80	18w0d	01w0d
3.00	19w0d	01w0d
3.30	20w0d	01w0d
3.60	21w0d	01w0d
3.90	22w0d	01w1d
4.20	23w0d	01w1d
4.40	24w0d	01w1d
4.70	25w0d	01w2d
4.90	26w0d	01w3d
5.20	27w0d	01w3d

FL (cm)	GA (wd)	±days (wd)
5.40	28w0d	01w4d
5.60	29w0d	01w5d
5.80	30w0d	01w6d
6.10	31w0d	02w0d
6.30	32w0d	02w1d
6.50	33w0d	02w3d
6.60	34w0d	02w4d
6.80	35w0d	02w6d
6.90	36w0d	03w1d
7.10	37w0d	00w0d
7.20	38w0d	00w0d
7.40	39w0d	00w0d
7.50	40w0d	00w0d

Fetal Growth Table

Chitty, I., Campbell, Stuart, "Charts of Fetal Size : 4 Femur Length,"

British J of OB and Gyn., February 1994, Vol. 101, pp. 132-135, Table1.

Age (wd)	Growth (mm)
12w0d	0.85
13w0d	1.10
14w0d	1.41
15w0d	1.71
16w0d	2.05
17w0d	2.27
18w0d	2.69
19w0d	2.98
20w0d	3.22
21w0d	3.54
22w0d	3.72

Age (wd)	Growth (mm)
23w0d	4.06
24w0d	4.35
25w0d	4.61
26w0d	4.69
27w0d	5.02
28w0d	5.24
29w0d	5.63
30w0d	5.80
31w0d	5.97
32w0d	6.13
33w0d	6.28

Age (wd)	Growth (mm)
34w0d	6.43
35w0d	6.62
36w0d	6.83
37w0d	6.99
38w0d	7.08
39w0d	7.17
40w0d	7.47
41w0d	7.48
42w0d	7.60

Femur Length (FL) : ASUM(SCW)

Fetal Growth Table

Australasian Society for Ultrasound in Medicine

Policies and Statements - [D7] Statement On Normal Ultrasonic Fetal Measurements (Revised May 2001)

Age (W)	Growth (cm)	±2SD (cm)
11	0.8	0.2
12	1.0	0.25
13	1.1	0.25
14	1.5	0.3
15	1.7	0.4
16	2.2	0.4
17	2.5	0.4
18	2.8	0.5
19	3.0	0.5
20	3.2	0.6
21	3.4	0.6

Age (W)	Growth (cm)	±2SD (cm)
22	3.7	0.5
23	4.3	0.5
24	4.5	0.4
25	4.8	0.5
26	4.9	0.5
27	5.0	0.5
28	5.4	0.4
29	5.5	0.55
30	5.8	0.6
31	5.9	0.55
32	6.2	0.6

Age (W)	Growth (cm)	±2SD (cm)
33	6.5	0.4
34	6.6	0.4
35	6.7	0.6
36	6.9	0.6
37	7.2	0.5
38	7.3	0.6
39	7.5	0.6
40	7.6	0.4
41	7.7	0.5

Femur Length (FL) : DOUBILET

GA Table

Doubilet PM, Benson CB. "Improved Prediction of Gestational Age in the Late Third Trimester" Journal of Ultrasound in Medicine, 12;647-653, 1993

FL (cm)	GA (wd)	FL (cm)	GA (wd)	FL (cm)	GA (wd)
1.00	13w5d	3.30	20w1d	5.60	29w3d
1.10	13w6d	3.40	20w3d	5.70	29w6d
1.20	14w1d	3.50	20w5d	5.80	30w3d
1.30	14w3d	3.60	21w1d	5.90	30w6d
1.40	14w4d	3.70	21w3d	6.00	31w3d
1.50	14w6d	3.80	21w6d	6.10	31w6d
1.60	15w1d	3.90	22w1d	6.20	32w4d
1.70	15w3d	4.00	22w4d	6.30	33w0d
1.80	15w4d	4.10	22w6d	6.40	33w4d
1.90	15w6d	4.20	23w2d	6.50	34w1d
2.00	16w1d	4.30	23w5d	6.60	34w5d
2.10	16w3d	4.40	24w1d	6.70	35w2d
2.20	16w5d	4.50	24w4d	6.80	35w6d
2.30	17w0d	4.60	24w6d	6.90	36w4d
2.40	17w2d	4.70	25w2d	7.00	37w1d
2.50	17w4d	4.80	25w5d	7.10	37w5d
2.60	17w6d	4.90	26w1d	7.20	38w2d
2.70	18w1d	5.00	26w4d	7.30	39w0d
2.80	18w4d	5.10	27w0d	7.40	39w4d
2.90	18w6d	5.20	27w4d	7.50	40w2d

3.00	19w1d	5.30	28w0d	7.60	40w6d
3.10	19w3d	5.40	28w3d	7.70	41w4d
3.20	19w5d	5.50	28w6d	7.80	42w0d

Femur Length (FL) : BESSIS

GA Table

The data are those provided by Dr. Bessis to M. Le Bel.(Same as SIGMA 20, see memo from Ch. Gahwiler dated , June 23, 1983)

FL (cm)	GA (wd)	±days (wd)
1.04	13w0d	1w0d
2.22	17w0d	1w1d
3.37	21w0d	1w1d
4.45	25w0d	1w3d
5.42	29w0d	1w4d
6.42	33w0d	2w1d
6.90	37w0d	2w6d
7.34	41w0d	4w0d

Femur Length (FL) : CFEF

GA Table

J.Créquat, M. Duyme, G. Brodaty

Biométrie 2000. Tables de croissance foetale par le Collège Français d'Echographie Foetale (CFEF) et l'Inserm U155

Gynecol Obstet Fertil 2000 Jun;28(6):435-45

FL (cm)	GA (w)	FL (cm)	GA (w)	FL (cm)	GA (w)
0.63	12	3.78	22	6.11	32
0.98	13	4.05	23	6.30	33
1.33	14	4.31	24	6.47	34
1.66	15	4.56	25	6.64	35
1.99	16	4.81	26	6.81	36
2.31	17	5.05	27	6.96	37
2.62	18	5.28	28	7.11	38
2.92	19	5.49	29	7.24	39
3.22	20	5.71	30	7.37	40
3.50	21	5.91	31	7.40	41

Fetal Growth Table

J.Créquat, M. Duyme, G. Brodaty

Biométrie 2000. Tables de croissance foetale par le Collège Français d'Echographie Foetale (CFEF) et l'Inserm U155

Gynecol Obstet Fertil 2000 Jun;28(6):435-45

Age (W)	Growth (cm)	10% (cm)	90% (cm)
12	0.60	0.40	0.90
13	1.00	0.70	1.20
14	1.30	1.10	1.60
15	1.70	1.40	1.90
16	2.00	1.70	2.30
17	2.30	2.00	2.60
18	2.60	2.30	2.90
19	2.90	2.60	3.20
20	3.20	2.90	3.50
21	3.50	3.20	3.80
22	3.80	3.40	4.10
23	4.10	3.70	4.40
24	4.30	4.00	4.70
25	4.60	4.20	4.90
26	4.80	4.40	5.20

Age (W)	Growth (cm)	10% (cm)	90% (cm)
27	5.10	4.70	5.40
28	5.30	4.90	5.70
29	5.50	5.10	5.90
30	5.70	5.30	6.10
31	5.90	5.50	6.30
32	6.10	5.70	6.50
33	6.30	5.90	6.70
34	6.50	6.10	6.90
35	6.60	6.20	7.10
36	6.80	6.40	7.20
37	7.00	6.50	7.40
38	7.10	6.70	7.50
39	7.20	6.80	7.70
40	7.40	6.90	7.80
41	7.40	7.00	7.90

Femur Length (FL) : JOHNSEN

GA Table

Johnsen SL, Rasmussen S, Sollien R, Kiserud T. "Fetal age assessment based on femur length at 10-25 weeks of gestation, and reference ranges for femur length to head circumference ratios" Acta Obstet Gynecol Scand, 2005 Aug; 84(8): 725-33

FL (cm)	Age (wd)	10% (wd)	90% (wd)
0.20	10w4d	10w0d	11w1d
0.30	11w0d	10w3d	11w4d
0.40	11w3d	10w6d	12w0d
0.50	11w5d	11w1d	12w3d
0.60	12w1d	11w3d	12w5d
0.70	12w3d	11w6d	13w0d
0.80	12w5d	12w1d	13w3d
0.90	13w0d	12w3d	13w5d
1.00	13w2d	12w5d	14w0d
1.10	13w4d	13w0d	14w2d
1.20	13w6d	13w2d	14w4d
1.30	14w1d	13w4d	14w6d
1.40	14w3d	13w6d	15w1d
1.50	14w5d	14w1d	15w3d
1.60	15w1d	14w3d	15w6d
1.70	15w3d	14w5d	16w1d
1.80	15w5d	15w0d	16w3d
1.90	16w0d	15w2d	16w5d
2.00	16w2d	15w4d	17w0d
2.10	16w4d	15w6d	17w2d
2.20	16w6d	16w1d	17w5d
2.30	17w1d	16w3d	18w0d

FL (cm)	Age (wd)	10% (wd)	90% (wd)
2.40	17w4d	16w5d	18w2d
2.50	17w6d	17w0d	18w4d
2.60	18w1d	17w2d	19w0d
2.70	18w3d	17w5d	19w2d
2.80	18w6d	18w0d	19w5d
2.90	19w1d	18w2d	20w0d
3.00	19w4d	18w5d	20w2d
3.10	19w6d	19w0d	20w5d
3.20	20w2d	19w2d	21w1d
3.30	20w4d	19w5d	21w3d
3.40	21w0d	20w0d	21w6d
3.50	21w2d	20w3d	22w1d
3.60	21w5d	20w6d	22w4d
3.70	22w1d	21w1d	23w0d
3.80	22w3d	21w4d	23w3d
3.90	22w6d	22w0d	23w6d
4.00	23w2d	22w2d	24w1d
4.10	23w5d	22w5d	24w4d
4.20	24w1d	23w1d	25w0d
4.30	24w4d	23w4d	25w3d
4.40	25w0d	24w0d	25w6d

Fetal Growth Table

Johnsen SL, Rasmussen S, Sollien R, Kiserud T. "Fetal age assessment based on femur length at 10-25 weeks of gestation, and reference ranges for femur length to head circumference ratios" Acta Obstet Gynecol Scand, 2005 Aug; 84(8): 725-33

Age (w)	Growth (cm)	10% (cm)	90% (cm)
10w	0.20	0.10	0.30
11w	0.40	0.20	0.50
12w	0.60	0.40	0.80
13w	0.80	0.70	1.10
14w	1.20	0.90	1.40
15w	1.50	1.20	1.80
16w	1.80	1.50	2.20
17w	2.10	1.80	2.50
18w	2.50	2.20	2.80
19w	2.80	2.50	3.20
20w	3.10	2.80	3.50
21w	3.40	3.10	3.80
22w	3.70	3.40	4.10
23w	4.00	3.60	4.30
24w	4.20	3.90	4.60
25w	4.50	4.20	4.80

Age (w)	Growth (cm)	10% (cm)	90% (cm)
26w	4.70	4.40	5.10
27w	4.90	4.60	5.30
28w	5.20	4.80	5.50
29w	5.40	5.00	5.70
30w	5.60	5.20	6.00
31w	5.80	5.40	6.20
32w	6.00	5.60	6.40
33w	6.20	5.80	6.50
34w	6.30	6.00	6.70
35w	6.50	6.10	6.90
36w	6.70	6.30	7.10
37w	6.90	6.40	7.30
38w	7.00	6.60	7.50
39w	7.20	6.70	7.70
40w	7.40	6.90	7.90
41w	7.50	7.10	8.00

Femur Length (FL) : KURMANAVICIUS

Fetal Growth Table

Kurmanavicius J, Wright EM, Royston P, Zimmermann R, Huch R, Huch A, Wisser J. "Fetal ultrasound biometry: 2. Abdomen and femur length reference values" Br J Obstet Gynaecol, 1999 Feb;106(2):136-43

Age (w)	Growth (cm)	5% (cm)	95% (cm)
12w	0.70	0.41	0.98
13w	1.03	0.72	1.34
14w	1.36	1.03	1.69
15w	1.68	1.33	2.04
16w	2.00	1.63	2.37
17w	2.30	1.92	2.69
18w	2.61	2.21	3.00
19w	2.90	2.49	3.31
20w	3.19	2.76	3.61
21w	3.47	3.03	3.90
22w	3.74	3.30	4.18
23w	4.01	3.56	4.45
24w	4.26	3.81	4.72
25w	4.52	4.05	4.98
26w	4.76	4.29	5.23
27w	5.00	4.52	5.48

Age (w)	Growth (cm)	5% (cm)	95% (cm)
28w	5.23	4.75	5.71
29w	5.45	4.97	5.94
30w	5.67	5.18	6.16
31w	5.88	5.39	6.38
32w	6.09	5.59	6.58
33w	6.28	5.78	6.79
34w	6.47	5.96	6.98
35w	6.65	6.14	7.16
36w	6.83	6.31	7.34
37w	7.00	6.48	7.51
38w	7.16	6.64	7.68
39w	7.31	6.79	7.84
40w	7.46	6.93	7.99
41w	7.60	7.07	8.13
42w	7.73	7.20	8.26

Femur Length (FL) : NICOLAIDES

Fetal Growth Table

Snijders RJ, Nicolaides KH. "Fetal biometry at 14-40 weeks' gestation" Ultrasound in obstetrics and Gynecology, 1994 Jan 1; 4(1): 34-48

Age (wd)	Growth (cm)	5% (cm)	95% (cm)
14w0d	1.70	1.40	1.90
14w1d	1.70	1.40	1.90
14w2d	1.70	1.40	1.90
14w3d	1.70	1.40	1.90
14w4d	1.70	1.40	1.90
14w5d	1.70	1.40	1.90
14w6d	1.70	1.40	1.90
15w0d	1.90	1.70	2.20
15w1d	1.90	1.70	2.20
15w2d	1.90	1.70	2.20
15w3d	1.90	1.70	2.20
15w4d	1.90	1.70	2.20
15w5d	1.90	1.70	2.20
15w6d	1.90	1.70	2.20
16w0d	2.20	1.90	2.50
16w1d	2.20	1.90	2.50
16w2d	2.20	1.90	2.50
16w3d	2.20	1.90	2.50
16w4d	2.20	1.90	2.50
16w5d	2.20	1.90	2.50
16w6d	2.20	1.90	2.50
17w0d	2.40	2.10	2.80
17w1d	2.40	2.10	2.80
17w2d	2.40	2.10	2.80
17w3d	2.40	2.10	2.80
17w4d	2.40	2.10	2.80
17w5d	2.40	2.10	2.80
17w6d	2.40	2.10	2.80
18w0d	2.70	2.40	3.00
18w1d	2.70	2.40	3.00
18w2d	2.70	2.40	3.00
18w3d	2.70	2.40	3.00
18w4d	2.70	2.40	3.00
18w5d	2.70	2.40	3.00
18w6d	2.70	2.40	3.00
19w0d	3.00	2.60	3.30
19w1d	3.00	2.60	3.30
19w2d	3.00	2.60	3.30
19w3d	3.00	2.60	3.30
19w4d	3.00	2.60	3.30
19w5d	3.00	2.60	3.30
19w6d	3.00	2.60	3.30
20w0d	3.20	2.90	3.60
20w1d	3.20	2.90	3.60
20w2d	3.20	2.90	3.60
20w3d	3.20	2.90	3.60
20w4d	3.20	2.90	3.60

Age (wd)	Growth (cm)	5% (cm)	95% (cm)
27w0d	5.10	4.70	5.50
27w1d	5.10	4.70	5.50
27w2d	5.10	4.70	5.50
27w3d	5.10	4.70	5.50
27w4d	5.10	4.70	5.50
27w5d	5.10	4.70	5.50
27w6d	5.10	4.70	5.50
28w0d	5.30	4.90	5.80
28w1d	5.30	4.90	5.80
28w2d	5.30	4.90	5.80
28w3d	5.30	4.90	5.80
28w4d	5.30	4.90	5.80
28w5d	5.30	4.90	5.80
28w6d	5.30	4.90	5.80
29w0d	5.60	5.10	6.00
29w1d	5.60	5.10	6.00
29w2d	5.60	5.10	6.00
29w3d	5.60	5.10	6.00
29w4d	5.60	5.10	6.00
29w5d	5.60	5.10	6.00
29w6d	5.60	5.10	6.00
30w0d	5.80	5.30	6.30
30w1d	5.80	5.30	6.30
30w2d	5.80	5.30	6.30
30w3d	5.80	5.30	6.30
30w4d	5.80	5.30	6.30
30w5d	5.80	5.30	6.30
30w6d	5.80	5.30	6.30
31w0d	6.00	5.50	6.50
31w1d	6.00	5.50	6.50
31w2d	6.00	5.50	6.50
31w3d	6.00	5.50	6.50
31w4d	6.00	5.50	6.50
31w5d	6.00	5.50	6.50
31w6d	6.00	5.50	6.50
32w0d	6.20	5.70	6.70
32w1d	6.20	5.70	6.70
32w2d	6.20	5.70	6.70
32w3d	6.20	5.70	6.70
32w4d	6.20	5.70	6.70
32w5d	6.20	5.70	6.70
32w6d	6.20	5.70	6.70
33w0d	6.40	5.90	6.90
33w1d	6.40	5.90	6.90
33w2d	6.40	5.90	6.90
33w3d	6.40	5.90	6.90
33w4d	6.40	5.90	6.90

20w5d	3.20	2.90	3.60	33w5d	6.40	5.90	6.90
20w6d	3.20	2.90	3.60	33w6d	6.40	5.90	6.90
21w0d	3.50	3.20	3.90	34w0d	6.60	6.10	7.10
21w1d	3.50	3.20	3.90	34w1d	6.60	6.10	7.10
21w2d	3.50	3.20	3.90	34w2d	6.60	6.10	7.10
21w3d	3.50	3.20	3.90	34w3d	6.60	6.10	7.10
21w4d	3.50	3.20	3.90	34w4d	6.60	6.10	7.10
21w5d	3.50	3.20	3.90	34w5d	6.60	6.10	7.10
21w6d	3.50	3.20	3.90	34w6d	6.60	6.10	7.10
22w0d	3.80	3.40	4.20	35w0d	6.80	6.30	7.30
22w1d	3.80	3.40	4.20	35w1d	6.80	6.30	7.30
22w2d	3.80	3.40	4.20	35w2d	6.80	6.30	7.30
22w3d	3.80	3.40	4.20	35w3d	6.80	6.30	7.30
22w4d	3.80	3.40	4.20	35w4d	6.80	6.30	7.30
22w5d	3.80	3.40	4.20	35w5d	6.80	6.30	7.30
22w6d	3.80	3.40	4.20	35w6d	6.80	6.30	7.30
23w0d	4.10	3.70	4.50	36w0d	6.90	6.40	7.40
23w1d	4.10	3.70	4.50	36w1d	6.90	6.40	7.40
23w2d	4.10	3.70	4.50	36w2d	6.90	6.40	7.40
23w3d	4.10	3.70	4.50	36w3d	6.90	6.40	7.40
23w4d	4.10	3.70	4.50	36w4d	6.90	6.40	7.40
23w5d	4.10	3.70	4.50	36w5d	6.90	6.40	7.40
23w6d	4.10	3.70	4.50	36w6d	6.90	6.40	7.40
24w0d	4.30	3.90	4.70	37w0d	7.10	6.60	7.60
24w1d	4.30	3.90	4.70	37w1d	7.10	6.60	7.60
24w2d	4.30	3.90	4.70	37w2d	7.10	6.60	7.60
24w3d	4.30	3.90	4.70	37w3d	7.10	6.60	7.60
24w4d	4.30	3.90	4.70	37w4d	7.10	6.60	7.60
24w5d	4.30	3.90	4.70	37w5d	7.10	6.60	7.60
24w6d	4.30	3.90	4.70	37w6d	7.10	6.60	7.60
25w0d	4.60	4.20	5.00	38w0d	7.20	6.70	7.70
25w1d	4.60	4.20	5.00	38w1d	7.20	6.70	7.70
25w2d	4.60	4.20	5.00	38w2d	7.20	6.70	7.70
25w3d	4.60	4.20	5.00	38w3d	7.20	6.70	7.70
25w4d	4.60	4.20	5.00	38w4d	7.20	6.70	7.70
25w5d	4.60	4.20	5.00	38w5d	7.20	6.70	7.70
25w6d	4.60	4.20	5.00	38w6d	7.20	6.70	7.70
26w0d	4.80	4.40	5.30	39w0d	7.30	6.80	7.80
26w1d	4.80	4.40	5.30	39w1d	7.30	6.80	7.80
26w2d	4.80	4.40	5.30	39w2d	7.30	6.80	7.80
26w3d	4.80	4.40	5.30	39w3d	7.30	6.80	7.80
26w4d	4.80	4.40	5.30	39w4d	7.30	6.80	7.80
26w5d	4.80	4.40	5.30	39w5d	7.30	6.80	7.80
26w6d	4.80	4.40	5.30	39w6d	7.30	6.80	7.80

Anterior Posterior Thoracic Diameter (APTD) : HANSMANN

GA Table

Hansmann, Hackeloer, Staudach, Wittman "Ultrasound Diagnosis in Obstetrics and Gynecology" Springer-Verlag, New York, 1986

APTD (cm)	GA (W)	APTD (cm)	GA (W)	APTD (cm)	GA (W)	APTD (cm)	GA (W)
2.25	14w	4.65	22w	7.01	30w	9.30	38w
2.58	15w	4.90	23w	7.25	31w	9.53	39w
2.85	16w	5.15	24w	7.62	32w	9.68	40w

3.11	17w	5.48	25w	7.93	33w	9.84	41w
3.46	18w	5.80	26w	8.15	34w	9.91	42w
3.75	19w	6.15	27w	8.40	35w		
4.00	20w	6.39	28w	8.75	36w		
4.34	21w	6.70	29w	9.02	37w		

Fetal Growth Table

Hansmann, Hackeloer, Staudach, Wittman "Ultrasound Diagnosis in Obstetrics and Gynecology" Springer-Verlag, New York, 1986

Age (W)	Growth (cm)	Min (cm)	Max (cm)	Age (W)	Growth (cm)	Min (cm)	Max (cm)
14	2.25	2.25	2.25	29	6.70	5.70	7.70
15	2.58	2.21	2.95	30	7.01	6.01	8.01
16	2.85	2.45	3.25	31	7.25	6.10	8.40
17	3.11	2.61	3.61	32	7.62	6.52	8.72
18	3.46	3.02	3.90	33	7.93	6.81	9.05
19	3.75	3.25	4.25	34	8.15	6.90	9.40
20	4.00	3.40	4.60	35	8.40	7.08	9.72
21	4.34	3.76	4.92	36	8.75	7.40	10.10
22	4.65	4.04	5.26	37	9.02	7.62	10.42
23	4.90	4.20	5.60	38	9.30	7.90	10.70
24	5.15	4.35	5.95	39	9.53	8.06	11.00
25	5.48	4.68	6.28	40	9.68	8.16	11.20
26	5.80	4.95	6.65	41	9.84	8.32	11.35
27	6.15	5.30	7.00	42	9.91	8.41	11.40
28	6.39	5.43	7.35				

▌Anterior Posterior Thoracic Diameter (APTD) and Thorax Transverse Diameter (TTD) : SHINOZUKA

GA Table

Norio Shinozuka, Haruo Masuda, Hideyuki Kagawa, and Yuji Taketani. Department of Obstetrics and Gynecoogy, Faculty of Medicine, University of Tokyo. Jpn J Med Ultrasonics 23(12) 877-888,1996

APTD x TTD (cm^2)	GA (wd)	±SD (wd)	APTD x TTD (cm^2)	GA (wd)	±SD (wd)
10.00	16w1d	01w1d	52.00	29w3d	01w6d
12.00	17w0d	01w1d	54.00	30w0d	01w6d
14.00	17w6d	01w1d	56.00	30w3d	01w6d
16.00	18w4d	01w1d	58.00	31w0d	02w0d
18.00	19w3d	01w1d	60.00	31w3d	02w0d
20.00	20w1d	01w1d	62.00	31w6d	02w0d
22.00	20w6d	01w2d	64.00	32w3d	02w1d
24.00	21w4d	01w2d	66.00	32w6d	02w1d
26.00	22w2d	01w2d	68.00	33w3d	02w1d
28.00	22w6d	01w2d	70.00	33w6d	02w2d
30.00	23w4d	01w2d	72.00	34w2d	02w2d
32.00	24w1d	01w3d	74.00	34w6d	02w3d
34.00	24w5d	01w3d	76.00	35w3d	02w3d
36.00	25w2d	01w3d	78.00	35w6d	02w3d
38.00	25w6d	01w3d	80.00	36w3d	02w4d
40.00	26w3d	01w4d	82.00	37w0d	02w4d
42.00	27w0d	01w4d	84.00	37w4d	02w4d

44.00	27w3d	01w4d
46.00	28w0d	01w5d
48.00	28w4d	01w5d
50.00	29w0d	01w5d

86.00	38w1d	02w4d
88.00	38w5d	02w5d
90.00	39w2d	02w5d

Fetal Growth Table

Norio Shinozuka, Haruo Masuda, Hideyuki Kagawa, and Yuji Taketani. Department of Obstetrics and Gynecoogy, Faculty of Medicine, University of Tokyo. Jpn J Med Ultrasonics 23(12) 877-888,1996

Age (W)	Growth (cm)	-1.28SD (cm)	+1.28SD (cm)
16	11.20	7.90	14.60
17	13.30	9.70	17.00
18	15.60	11.60	19.60
19	18.10	13.70	22.40
20	20.80	16.10	25.50
21	23.60	18.50	28.80
22	26.70	21.20	32.20
23	29.90	23.90	35.90
24	33.20	26.80	39.70
25	36.70	29.80	43.60
26	40.30	33.00	47.70
27	44.10	36.20	52.00
28	47.90	39.40	56.30
29	51.80	42.80	60.80

Age (W)	Growth (cm)	-1.28SD (cm)	+1.28SD (cm)
30	55.70	46.20	65.30
31	59.70	49.60	69.90
32	63.80	53.00	74.50
33	67.80	56.50	79.20
34	71.90	59.90	83.90
35	75.90	63.30	88.60
36	79.90	66.60	93.30
37	83.90	69.80	97.90
38	87.70	72.90	102.50
39	91.50	76.00	107.00
40	95.10	78.90	111.40
41	98.60	81.60	115.70
42	102.00	84.10	119.80

Gestational Sac (GS) : KOREAN

GA Table

Y.G Park.“ The Standardization of Fetal body parts according to the normal Korean Gestational Age in Ultrasound” Korean Ultrasound Institute, Vol. 14, No.2, 1995

GA = GS × 0.71887 + 6.156004

Output Unit : w(weeks)

Input Unit : cm

Min Range : 2.5 cm

Max Range : 6.1 cm

Gestational Sac (GS) : HANSMANN

GA Table

Hansmann, Hackeloer, Staudach and Wittman. "Ultrasound Diagnosis in Obstetrics and Gynecology" Springer-Verlag, New York, 1986; P.36

GS (cm)	Age (wd)
0.7	4w6d
0.9	5w5d
1.0	6w0d
1.3	6w2d
1.5	6w5d
2.4	7w3d
2.8	8w2d
3.4	9w0d

Gestational Sac (GS) : HELLMAN

GA Table

Hellman LM, Kobayashi M, Fillisti L, et al, "Growth and development of the human fetus prior to the twentieth week of gestation" American Journal of Obstetrics and Gynecology, 103:789-800, 1969

GS (cm)	Age (wd)	GS (cm)	Age (wd)	GS (cm)	Age (wd)	GS (cm)	Age (wd)
1.0	5w0d	2.3	6w6d	3.6	8w5d	4.9	10w4d
1.1	5w1d	2.4	7w0d	3.7	8w6d	5.0	10w5d
1.2	5w2d	2.5	7w1d	3.8	9w0d	5.1	10w6d
1.3	5w3d	2.6	7w2d	3.9	9w1d	5.2	11w0d
1.4	5w4d	2.7	7w3d	4.0	9w2d	5.3	11w1d
1.5	5w5d	2.8	7w4d	4.1	9w3d	5.4	11w2d
1.6	5w6d	2.9	7w5d	4.2	9w4d	5.5	11w3d
1.7	6w0d	3.0	7w6d	4.3	9w5d	5.6	11w4d
1.8	6w1d	3.1	8w0d	4.4	9w6d	5.7	11w5d
1.9	6w2d	3.2	8w1d	4.5	10w0d	5.8	11w6d
2.0	6w3d	3.3	8w2d	4.6	10w1d	5.9	12w0d
2.1	6w4d	3.4	8w3d	4.7	10w2d	6.0	12w1d
2.2	6w5d	3.5	8w4d	4.8	10w3d		

Gestational Sac (GS) : NYBERG

GA Table

Nyberg, David, A., Hill, Lyndon, M., Bohm-Vele, Marcela., Mendelson, Ellen, B. "Transvaginal Ultrasound." Mosby Yearbook, 76. 1992

$GA = 0.132 \times GS_{mm} + 4.299$

Output Unit : w(weeks)

Input Unit : mm

Min Range : 0.14 cm

Max Range : 5.54cm

Gestational Sac (GS) : TOKYO

GA Table

Tokyo University Takashi Okai, et al. Japan Society of Obstetrics and Gynecology, Vol.38, No.8

GS (cm)	Age (wd)	±SD (wd)	GS (cm)	Age (wd)	±SD (wd)
1.0	4w0d	1w0d	4.1	9w0d	2w0d
1.6	5w0d	1w1d	4.8	10w0d	2w1d
2.2	6w0d	1w4d	5.7	11w0d	2w2d
2.7	7w0d	1w5d	6.7	12w0d	2w3d
3.4	8w0d	1w6d			

Gestational Sac (GS) : REMPEN

GA Table

Rempen A. "Biometrie in der Fruhgraviditat (I. Trimenon)" Der Frauenarzt, 32:425, 1991

GS (cm)	Age (wd)	5% (wd)	95% (wd)
0.20	04w6d	03w3d	06w2d
0.30	05w0d	03w4d	06w3d
0.40	05w1d	03w5d	06w4d
0.50	05w2d	03w6d	06w5d
0.60	05w2d	03w6d	06w5d
0.70	05w3d	04w0d	06w6d
0.80	05w4d	04w1d	07w0d
0.90	05w5d	04w2d	07w1d
1.00	05w5d	04w2d	07w1d
1.10	05w6d	04w3d	07w2d
1.20	06w0d	04w4d	07w3d
1.30	06w1d	04w5d	07w4d
1.40	06w2d	04w6d	07w5d
1.50	06w2d	04w6d	07w5d
1.60	06w3d	05w0d	07w6d
1.70	06w4d	05w1d	08w0d
1.80	06w5d	05w2d	08w1d
1.90	06w6d	05w3d	08w2d
2.00	06w6d	05w3d	08w2d
2.10	07w0d	05w4d	08w3d
2.20	07w1d	05w5d	08w4d
2.30	07w2d	05w6d	08w5d
2.40	07w3d	06w0d	08w6d
2.50	07w4d	06w1d	09w0d
2.60	07w4d	06w1d	09w0d
2.70	07w5d	06w2d	09w1d
2.80	07w6d	06w3d	09w2d
2.90	08w0d	06w4d	09w3d
3.00	08w1d	06w5d	09w4d
3.10	08w2d	06w6d	09w5d
3.20	08w3d	07w0d	09w6d
3.30	08w3d	07w0d	09w6d
3.40	08w4d	07w1d	10w0d
3.50	08w5d	07w2d	10w1d
3.60	08w6d	07w3d	10w2d
3.70	09w0d	07w4d	10w3d
3.80	09w1d	07w5d	10w4d
3.90	09w2d	07w6d	10w5d
4.00	09w3d	08w0d	10w6d
4.10	09w4d	08w1d	11w0d
4.20	09w5d	08w2d	11w1d
4.30	09w6d	08w3d	11w2d
4.40	09w6d	08w3d	11w2d
4.50	10w0d	08w4d	11w3d
4.60	10w1d	08w5d	11w4d
4.70	10w2d	08w6d	11w5d
4.80	10w3d	09w0d	11w6d
4.90	10w4d	09w1d	12w0d
5.00	10w5d	09w2d	12w1d
5.10	10w6d	09w3d	12w2d
5.20	11w0d	09w4d	12w3d
5.30	11w1d	09w5d	12w4d
5.40	11w2d	09w6d	12w5d
5.50	11w3d	10w0d	12w6d
5.60	11w4d	10w1d	13w0d
5.70	11w5d	10w2d	13w1d
5.80	11w6d	10w3d	13w2d
5.90	12w0d	10w4d	13w3d
6.00	12w1d	10w5d	13w4d
6.10	12w2d	10w6d	13w5d
6.20	12w3d	11w0d	13w6d
6.30	12w4d	11w1d	14w0d
6.40	12w5d	11w2d	14w1d
6.50	12w6d	11w3d	14w2d
6.60	13w0d	11w4d	14w3d
6.70	13w1d	11w5d	14w4d
6.80	13w2d	11w6d	14w5d
6.90	13w3d	12w0d	14w6d
7.00	13w4d	12w1d	15w0d
7.10	13w5d	12w2d	15w1d
7.20	14w0d	12w4d	15w3d
7.30	14w1d	12w5d	15w4d

Fetal Growth Table

Rempen A. "Biometrie in der Fruhgraviditat (I. Trimenon)" Der Frauenarzt, 32:425, 1991

Age (wd)	Growth (cm)	5% (cm)	95% (cm)
04w4d	0.05	0.00	1.10
04w5d	0.18	0.00	1.23
04w6d	0.32	0.00	1.37
05w0d	0.45	0.00	1.50
09w0d	3.66	2.61	4.71
09w1d	3.76	2.71	4.81
09w2d	3.85	2.80	4.90
09w3d	3.95	2.90	5.00

05w1d	0.58	0.00	1.63	09w4d	4.04	2.99	5.09
05w2d	0.71	0.00	1.76	09w5d	4.13	3.08	5.18
05w3d	0.84	0.00	1.89	09w6d	4.22	3.17	5.27
05w4d	0.97	0.00	2.02	10w0d	4.31	3.26	5.36
05w5d	1.09	0.04	2.14	10w1d	4.40	3.35	5.45
05w6d	1.22	0.17	2.27	10w2d	4.49	3.44	5.54
06w0d	1.34	0.29	2.39	10w3d	4.57	3.52	5.62
06w1d	1.46	0.41	2.51	10w4d	4.66	3.61	5.71
06w2d	1.59	0.54	2.64	10w5d	4.74	3.69	5.79
06w3d	1.71	0.66	2.76	10w6d	4.82	3.77	5.87
06w4d	1.83	0.78	2.88	11w0d	4.90	3.85	5.95
06w5d	1.94	0.89	2.99	11w1d	4.98	3.93	6.03
06w6d	2.06	1.01	3.11	11w2d	5.06	4.01	6.11
07w0d	2.17	1.12	3.22	11w3d	5.14	4.09	6.19
07w1d	2.29	1.24	3.34	11w4d	5.21	4.16	6.26
07w2d	2.40	1.35	3.45	11w5d	5.29	4.24	6.34
07w3d	2.51	1.46	3.56	11w6d	5.36	4.31	6.41
07w4d	2.62	1.57	3.67	12w0d	5.43	4.38	6.48
07w5d	2.73	1.68	3.78	12w1d	5.51	4.46	6.56
07w6d	2.84	1.79	3.89	12w2d	5.58	4.53	6.63
08w0d	2.95	1.90	4.00	12w3d	5.64	4.59	6.69
08w1d	3.05	2.00	4.10	12w4d	5.71	4.66	6.76
08w2d	3.16	2.11	4.21	12w5d	5.78	4.73	6.83
08w3d	3.26	2.21	4.31	12w6d	5.84	4.79	6.89
08w4d	3.36	2.31	4.41	13w0d	5.91	4.86	6.96
08w5d	3.46	2.41	4.51	13w1d	5.97	4.92	7.02
08w6d	3.56	2.51	4.61	13w2d	6.03	4.98	7.08

Occipital Frontal Diameter (OFD) : HANSMANN

GA Table

Hansmann, Hackeloer, Staudach, Wittman. "Ultrasound Diagnosis in Obsterics and Gynecology." Springer-Verlag, New York, 1986, p.431.

OFD (cm)	GA (wd)	OFD (cm)	GA (wd)	OFD (cm)	GA (wd)
3.1	14w0d	7.2	23w0d	10.3	32w0d
3.8	15w0d	7.6	24w0d	10.5	33w0d
4.1	16w0d	8.0	25w0d	10.7	34w0d
4.6	17w0d	8.4	26w0d	10.9	35w0d
5.0	18w0d	8.8	27w0d	11.1	36w0d
5.4	19w0d	9.1	28w0d	11.2	37w0d
5.8	20w0d	9.5	29w0d	11.3	38w0d
6.3	21w0d	9.8	30w0d	11.4	39w0d
6.7	22w0d	10.0	31w0d	11.5	40w0d

Fetal Growth Table

Hansmann, Hackeloer, Staudach, Wittman "Ultrasound Diagnosis in Obstetrics and Gynecology" Springer- Verlag, New York, 1986, p.176.

Age (W)	Growth (cm)	5% (cm)	95% (cm)	Age (W)	Growth (cm)	5% (cm)	95% (cm)
10	1.4	0.7	2.1	26	8.0	7.3	8.7
11	1.8	1.1	2.5	27	8.3	7.6	9.0
12	2.3	1.6	3.0	28	8.7	8.0	9.4

13	2.7	2.0	3.4
14	3.1	2.4	3.8
15	3.6	2.9	4.3
16	4.0	3.3	4.7
17	4.4	3.7	5.1
18	4.8	4.1	5.5
19	5.3	4.6	6.0
20	5.7	5.0	6.4
21	6.1	5.4	6.8
22	6.5	5.8	7.2
23	6.9	6.2	7.6
24	7.2	6.5	7.9
25	7.6	6.9	8.3

29	9.0	8.3	9.7
30	9.3	8.6	10.0
31	9.6	8.9	10.3
32	9.9	9.2	10.6
33	10.2	9.5	10.8
34	10.4	9.7	11.1
35	10.6	9.9	11.3
36	10.9	10.2	11.6
37	11.1	10.4	11.8
38	11.2	10.5	11.9
39	11.4	10.7	12.1
40	11.5	10.8	12.2

Occipital Frontal Diameter (OFD) : ASUM(SCW)

Fetal Growth Table

Australasian Society for Ultrasound in Medicine

Policies and Statements - [D7] Statement On Normal Ultrasonic Fetal Measurements (Revised May 2001)

Age (W)	Growth (cm)	±2SD (cm)
11	2.1	0.20
12	2.4	0.20
13	2.9	0.30
14	3.4	0.30
15	3.8	0.30

Age (W)	Growth (cm)	±2SD (cm)
27	8.6	0.45
28	9.5	0.50
29	9.7	0.55
30	9.8	0.55
31	10.1	0.50

16	4.6	0.30
17	5.0	0.30
18	5.4	0.35
19	5.7	0.35
20	6.1	0.35
21	6.3	0.40
22	6.8	0.35
23	7.6	0.40
24	7.9	0.40
25	8.2	0.45
26	8.4	0.45

32	10.2	0.50
33	10.7	0.55
34	10.8	0.55
35	10.9	0.55
36	11.2	0.55
37	11.3	0.60
38	11.6	0.55
39	11.9	0.60
40	12.0	0.60
41	12.2	0.60

Occipital Frontal Diameter (OFD) : KOREAN

GA Table

Y.G Park.“ The Standardization of Fetal body parts according to the normal Korean Gestational Age in Ultrasound” Korean Ultrasound Institute, Vol. 14, No.2, 1995

GA = OFD ×1.55941 + 0.07730580 × OFD^2 + 7.937391

Output Unit : w(weeks)

Input Unit : cm

Min Range : 2.4 cm

Max Range : 12.4 cm

Fetal Growth Table

Y.G Park.“ The Standardization of Fetal body parts according to the normal Korean Gestational Age in Ultrasound” Korean Ultrasound Institute, Vol. 14, No.2, 1995

OFD = 59.56658 x MA -4.5874 x MA^2 - 40.707331

Output Unit : cm

Input Unit : w(week)

Min Range : 12w

Max Range : 40w

Age (W)	Growth (cm)	±SD (cm)
12	2.503	0.391
16	4.250	0.269
20	5.918	0.303
24	7.479	0.564
28	9.173	0.393

Age (W)	Growth (cm)	±SD (cm)
32	10.283	0.357
34	10.716	0.390
36	11.553	0.365
38	12.053	0.233
40	12.059	0.598

Occipital Frontal Diameter (OFD) : KURMANAVICIUS

Fetal Growth Table

Kurmanavicius J, Wright EM, Royston P, Wisser J, Huch R, Huch A, Zimmermann R. "Fetal ultrasound biometry: 1. Head reference values" Br J Obstet Gynaecol, 1999 Feb; 106(2): 126-35

Age (w)	Growth (cm)	5% (cm)	95% (cm)
12w	2.46	2.02	2.91
13w	2.96	2.49	3.43
14w	3.45	2.96	3.94
15w	3.93	3.43	4.44
16w	4.41	3.88	4.94
17w	4.87	4.32	5.42
18w	5.32	4.76	5.89
19w	5.77	5.18	6.35
20w	6.20	5.59	6.81
21w	6.62	5.99	7.24
22w	7.02	6.37	7.67
23w	7.41	6.75	8.08
24w	7.79	7.11	8.48
25w	8.16	7.45	8.87
26w	8.51	7.78	9.24
27w	8.84	8.09	9.59

Age (w)	Growth (cm)	5% (cm)	95% (cm)
28w	9.16	8.39	9.93
29w	9.46	8.67	10.25
30w	9.74	8.93	10.55
31w	10.01	9.18	10.84
32w	10.25	9.41	11.10
33w	10.48	9.61	11.35
34w	10.69	9.80	11.58
35w	10.88	9.97	11.78
36w	11.04	10.11	11.97
37w	11.19	10.24	12.13
38w	11.31	10.34	12.28
39w	11.41	10.42	12.40
40w	11.48	10.47	12.49
41w	11.53	10.51	12.56
42w	11.56	10.51	12.61

Occipital Frontal Diameter (OFD) : NICOLAIDES

Fetal Growth Table

Snijders RJ, Nicolaides KH. "Fetal biometry at 14-40 weeks' gestation" Ultrasound in obstetrics and Gynecology, 1994 Jan 1; 4(1): 34-48

Age (wd)	Growth (cm)	5% (cm)	95% (cm)
14w0d	3.90	3.50	4.20
14w1d	3.90	3.50	4.20
14w2d	3.90	3.50	4.20
14w3d	3.90	3.50	4.20
14w4d	3.90	3.50	4.20
14w5d	3.90	3.50	4.20
14w6d	3.90	3.50	4.20
15w0d	4.20	3.90	4.60
27w0d	9.10	8.40	9.90
27w1d	9.10	8.40	9.90
27w2d	9.10	8.40	9.90
27w3d	9.10	8.40	9.90
27w4d	9.10	8.40	9.90
27w5d	9.10	8.40	9.90
27w6d	9.10	8.40	9.90
28w0d	9.50	8.70	10.30

15w1d	4.20	3.90	4.60
15w2d	4.20	3.90	4.60
15w3d	4.20	3.90	4.60
15w4d	4.20	3.90	4.60
15w5d	4.20	3.90	4.60
15w6d	4.20	3.90	4.60
16w0d	4.60	4.20	5.00
16w1d	4.60	4.20	5.00
16w2d	4.60	4.20	5.00
16w3d	4.60	4.20	5.00
16w4d	4.60	4.20	5.00
16w5d	4.60	4.20	5.00
16w6d	4.60	4.20	5.00
17w0d	5.00	4.60	5.40
17w1d	5.00	4.60	5.40
17w2d	5.00	4.60	5.40
17w3d	5.00	4.60	5.40
17w4d	5.00	4.60	5.40
17w5d	5.00	4.60	5.40
17w6d	5.00	4.60	5.40
18w0d	5.40	5.00	5.90
18w1d	5.40	5.00	5.90
18w2d	5.40	5.00	5.90
18w3d	5.40	5.00	5.90
18w4d	5.40	5.00	5.90
18w5d	5.40	5.00	5.90
18w6d	5.40	5.00	5.90

28w1d	9.50	8.70	10.30
28w2d	9.50	8.70	10.30
28w3d	9.50	8.70	10.30
28w4d	9.50	8.70	10.30
28w5d	9.50	8.70	10.30
28w6d	9.50	8.70	10.30
29w0d	9.80	9.10	10.70
29w1d	9.80	9.10	10.70
29w2d	9.80	9.10	10.70
29w3d	9.80	9.10	10.70
29w4d	9.80	9.10	10.70
29w5d	9.80	9.10	10.70
29w6d	9.80	9.10	10.70
30w0d	10.20	9.40	11.00
30w1d	10.20	9.40	11.00
30w2d	10.20	9.40	11.00
30w3d	10.20	9.40	11.00
30w4d	10.20	9.40	11.00
30w5d	10.20	9.40	11.00
30w6d	10.20	9.40	11.00
31w0d	10.50	9.60	11.30
31w1d	10.50	9.60	11.30
31w2d	10.50	9.60	11.30
31w3d	10.50	9.60	11.30
31w4d	10.50	9.60	11.30
31w5d	10.50	9.60	11.30
31w6d	10.50	9.60	11.30

19w0d	5.80	5.40	6.30
19w1d	5.80	5.40	6.30
19w2d	5.80	5.40	6.30
19w3d	5.80	5.40	6.30
19w4d	5.80	5.40	6.30
19w5d	5.80	5.40	6.30
19w6d	5.80	5.40	6.30
20w0d	6.20	5.70	6.80
20w1d	6.20	5.70	6.80
20w2d	6.20	5.70	6.80
20w3d	6.20	5.70	6.80
20w4d	6.20	5.70	6.80
20w5d	6.20	5.70	6.80
20w6d	6.20	5.70	6.80
21w0d	6.70	6.10	7.20
21w1d	6.70	6.10	7.20
21w2d	6.70	6.10	7.20
21w3d	6.70	6.10	7.20
21w4d	6.70	6.10	7.20
21w5d	6.70	6.10	7.20
21w6d	6.70	6.10	7.20
22w0d	7.10	6.50	7.70
22w1d	7.10	6.50	7.70
22w2d	7.10	6.50	7.70
22w3d	7.10	6.50	7.70
22w4d	7.10	6.50	7.70
22w5d	7.10	6.50	7.70

32w0d	10.70	9.90	11.60
32w1d	10.70	9.90	11.60
32w2d	10.70	9.90	11.60
32w3d	10.70	9.90	11.60
32w4d	10.70	9.90	11.60
32w5d	10.70	9.90	11.60
32w6d	10.70	9.90	11.60
33w0d	11.00	10.10	11.90
33w1d	11.00	10.10	11.90
33w2d	11.00	10.10	11.90
33w3d	11.00	10.10	11.90
33w4d	11.00	10.10	11.90
33w5d	11.00	10.10	11.90
33w6d	11.00	10.10	11.90
34w0d	11.20	10.30	12.10
34w1d	11.20	10.30	12.10
34w2d	11.20	10.30	12.10
34w3d	11.20	10.30	12.10
34w4d	11.20	10.30	12.10
34w5d	11.20	10.30	12.10
34w6d	11.20	10.30	12.10
35w0d	11.30	10.50	12.30
35w1d	11.30	10.50	12.30
35w2d	11.30	10.50	12.30
35w3d	11.30	10.50	12.30
35w4d	11.30	10.50	12.30
35w5d	11.30	10.50	12.30

22w6d	7.10	6.50	7.70
23w0d	7.50	6.90	8.20
23w1d	7.50	6.90	8.20
23w2d	7.50	6.90	8.20
23w3d	7.50	6.90	8.20
23w4d	7.50	6.90	8.20
23w5d	7.50	6.90	8.20
23w6d	7.50	6.90	8.20
24w0d	7.90	7.30	8.60
24w1d	7.90	7.30	8.60
24w2d	7.90	7.30	8.60
24w3d	7.90	7.30	8.60
24w4d	7.90	7.30	8.60
24w5d	7.90	7.30	8.60
24w6d	7.90	7.30	8.60
25w0d	8.30	7.70	9.00
25w1d	8.30	7.70	9.00
25w2d	8.30	7.70	9.00
25w3d	8.30	7.70	9.00
25w4d	8.30	7.70	9.00
25w5d	8.30	7.70	9.00
25w6d	8.30	7.70	9.00
26w0d	8.70	8.10	9.50
26w1d	8.70	8.10	9.50
26w2d	8.70	8.10	9.50
26w3d	8.70	8.10	9.50
26w4d	8.70	8.10	9.50

35w6d	11.30	10.50	12.30
36w0d	11.50	10.60	12.40
36w1d	11.50	10.60	12.40
36w2d	11.50	10.60	12.40
36w3d	11.50	10.60	12.40
36w4d	11.50	10.60	12.40
36w5d	11.50	10.60	12.40
36w6d	11.50	10.60	12.40
37w0d	11.60	10.70	12.50
37w1d	11.60	10.70	12.50
37w2d	11.60	10.70	12.50
37w3d	11.60	10.70	12.50
37w4d	11.60	10.70	12.50
37w5d	11.60	10.70	12.50
37w6d	11.60	10.70	12.50
38w0d	11.60	10.70	12.60
38w1d	11.60	10.70	12.60
38w2d	11.60	10.70	12.60
38w3d	11.60	10.70	12.60
38w4d	11.60	10.70	12.60
38w5d	11.60	10.70	12.60
38w6d	11.60	10.70	12.60
39w0d	11.60	10.70	12.60
39w1d	11.60	10.70	12.60
39w2d	11.60	10.70	12.60
39w3d	11.60	10.70	12.60
39w4d	11.60	10.70	12.60

26w5d	8.70	8.10	9.50
26w6d	8.70	8.10	9.50

39w5d	11.60	10.70	12.60
39w6d	11.60	10.70	12.60

Inner Ocular Distance (IOD) : HANSMANN

Fetal Growth Table

Hansmann, Hackeloer, Staudach, Wittman. "Ultrasound Diagnosis in Obsterics and Gynecology." Springer-Verlag, New York, 1986, p.177

GA	Growth (cm)	5% (cm)	95% (cm)
12	0.8	0.4	1.1
13	0.8	0.5	1.1
14	0.9	0.6	1.2
15	1.0	0.6	1.3
16	1.0	0.7	1.3
17	1.1	0.8	1.4
18	1.1	0.8	1.5
19	1.2	0.9	1.5
20	1.3	1.0	1.6
21	1.3	1.0	1.6
22	1.4	1.1	1.7
23	1.4	1.1	1.7
24	1.5	1.2	1.8
25	1.5	1.2	1.9
26	1.6	1.3	1.9

GA	Growth (cm)	5% (cm)	95% (cm)
27	1.6	1.3	1.9
28	1.7	1.4	2.0
29	1.7	1.4	2.0
30	1.8	1.5	2.1
31	1.8	1.5	2.1
32	1.9	1.5	2.2
33	1.9	1.6	2.2
34	1.9	1.6	2.2
35	2.0	1.6	2.3
36	2.0	1.7	2.3
37	2.0	1.7	2.3
38	2.1	1.7	2.4
39	2.1	1.8	2.4
40	2.1	1.8	2.4

Outer Ocular Distance (OOD) : JEANTY

GA Table

Jeanty, P., Rodesch, F., Delbeke, D., Dumont, J. "Estimation of Gestational Age from Measurements of Fetal Long Bones" Journal of Ultrasound Medicine, 3: 75-79, February, 1984

OOD (cm)	GA (wd)	5% (wd)	95% (wd)
1.50	10w3d	07w1d	13w6d
1.60	11w0d	07w5d	14w3d
1.70	11w4d	08w2d	15w0d
1.80	12w1d	08w6d	15w4d
1.90	12w6d	09w4d	16w1d
2.00	13w3d	10w1d	16w5d
2.10	14w0d	10w5d	17w2d
2.20	14w4d	11w2d	17w6d
2.30	15w1d	11w6d	18w4d
2.40	15w6d	12w4d	19w1d
2.50	16w3d	13w1d	19w5d
2.60	17w0d	13w5d	20w2d
2.70	17w4d	14w2d	20w6d
2.80	18w1d	14w6d	21w4d
2.90	18w6d	15w4d	22w1d
3.00	19w3d	16w1d	22w5d
3.10	20w0d	16w4d	23w2d
3.20	20w4d	17w1d	23w6d
3.30	21w1d	17w6d	24w4d
3.40	21w5d	18w3d	25w1d
3.50	22w2d	19w0d	25w5d
3.60	22w6d	19w4d	26w2d
3.70	23w4d	20w1d	26w6d
3.80	24w1d	20w6d	27w3d
3.90	24w5d	21w3d	28w0d
4.00	25w2d	22w0d	28w4d
4.10	25w6d	23w1d	29w1d
4.20	26w4d	23w4d	29w6d
4.30	27w1d	23w6d	30w3d
4.40	27w5d	24w3d	31w0d
4.50	28w2d	25w0d	31w4d
4.60	28w6d	25w4d	32w1d
4.70	29w4d	26w1d	32w6d
4.80	30w1d	26w6d	33w3d
4.90	30w5d	27w2d	34w0d
5.00	31w2d	27w6d	34w4d
5.10	31w6d	28w4d	35w1d
5.20	32w4d	29w1d	35w6d
5.30	33w0d	29w5d	36w3d
5.40	33w4d	30w2d	37w0d
5.50	34w1d	30w6d	37w4d
5.60	34w6d	31w4d	38w1d
5.70	35w3d	32w1d	38w5d
5.80	36w0d	32w5d	39w2d
5.90	36w4d	33w2d	39w6d
6.00	37w1d	33w6d	40w4d
6.10	37w6d	34w4d	41w1d
6.20	38w3d	35w1d	41w4d
6.30	39w0d	35w5d	42w2d
6.40	39w4d	36w2d	42w6d
6.50	40w1d	36w6d	43w4d

Outer Ocular Distance (OOD) : HANSMANN

Fetal Growth Table

Hansmann, Hackeloer, Staudach and Wittman. "Ultrasound Diagnosis in Obstetrics and Gynecology" Springer-Verlag, New York, 1986; P.177

GA	Growth (cm)	5% (cm)	95% (cm)
12	1.6	1.1	2.0
13	1.8	1.4	2.3
14	2.0	1.6	2.5
15	2.3	1.8	2.7
16	2.5	2.0	2.9
17	2.7	2.2	3.1
18	2.9	2.4	3.3
19	3.1	2.6	3.5
20	3.3	2.8	3.7
21	3.5	3.0	3.9
22	3.6	3.2	4.1
23	3.8	3.4	4.3
27	4.5	4.0	4.9
28	4.6	4.2	5.1
29	4.8	4.3	5.2
30	4.9	4.5	5.3
31	5.0	4.6	5.5
32	5.2	4.7	5.6
33	5.3	4.9	5.7
34	5.4	5.0	5.8
35	5.5	5.1	6.0
36	5.6	5.2	6.1
37	5.7	5.3	6.2
38	5.8	5.4	6.3

24	4.0	3.5	4.4
25	4.2	3.7	4.6
26	4.3	3.9	4.7

39	5.9	5.5	6.4
40	6.0	5.6	6.4

Humerus (HUM) : JEANTY

GA Table

Jeanty et al,. "Estimation of Gestational Age from Measurements of Fetal Long Bones" Journal of Ultrasound in Medicine, February 1984. Vol 3. Pp75-79

Humerus (cm)	GA (wd)	5% (wd)	95% (wd)
1.0	12w4d	9w6d	15w2d
1.1	12w6d	10w1d	15w4d
1.2	13w1d	10w3d	15w6d
1.3	13w4d	10w6d	16w1d
1.4	13w6d	11w1d	16w4d
1.5	14w1d	11w3d	16w6d
1.6	14w4d	11w6d	17w2d
1.7	14w6d	12w1d	17w4d
1.8	15w1d	12w4d	18w0d
1.9	15w4d	12w6d	18w2d
2.0	15w6d	13w1d	18w5d
2.1	16w2d	13w4d	19w1d
2.2	16w5d	13w6d	19w3d
2.3	17w1d	14w2d	19w6d
2.4	17w3d	14w5d	20w1d
2.5	17w6d	15w1d	20w4d
2.6	18w1d	15w4d	21w0d
2.7	18w4d	15w6d	21w3d
2.8	19w0d	16w2d	21w6d
2.9	19w3d	16w5d	22w1d
3.0	19w6d	17w1d	22w4d
3.1	20w2d	17w4d	23w0d
3.2	20w5d	18w0d	23w4d
3.3	21w1d	18w3d	23w6d
3.4	21w4d	18w6d	24w2d
3.5	22w0d	19w2d	24w6d
3.6	22w4d	19w5d	25w1d
3.7	22w6d	20w1d	25w5d
3.8	23w3d	20w4d	26w1d
3.9	23w6d	21w1d	26w4d
4.0	24w2d	21w4d	27w1d
4.1	24w6d	22w0d	27w4d
4.2	25w2d	22w4d	28w0d
4.3	25w5d	23w0d	28w4d
4.4	26w1d	23w4d	29w0d
4.5	26w5d	24w0d	29w4d
4.6	27w1d	24w4d	30w0d
4.7	27w5d	25w0d	30w4d
4.8	28w1d	25w4d	31w0d
4.9	28w6d	26w0d	31w4d
5.0	29w2d	26w4d	32w0d
5.1	29w6d	27w1d	32w4d

5.2	30w2d	27w4d	33w1d
5.3	30w6d	28w1d	33w4d
5.4	31w3d	28w5d	34w1d
5.5	32w0d	29w1d	34w5d
5.6	32w4d	29w6d	35w2d
5.7	33w1d	30w2d	35w6d
5.8	33w4d	30w6d	36w3d
5.9	34w1d	31w3d	36w6d
6.0	34w6d	32w0d	37w4d
6.1	35w2d	32w4d	38w1d
6.2	35w6d	33w1d	38w5d
6.3	36w4d	33w6d	39w2d
6.4	37w1d	34w3d	39w6d
6.5	37w5d	35w0d	40w4d
6.6	38w2d	35w4d	41w1d
6.7	38w6d	36w1d	41w5d
6.8	39w4d	36w6d	42w2d
6.9	40w1d	37w3d	42w6d

Fetal Growth Table

Jeanty, P. "Fetal Limb Biometry" (Letter) Radiology, 147:602, 1983

Age (w)	Growth (cm)	5% (cm)	95% (cm)
11	0.6	0.6	0.6
12	0.9	0.3	1
13	1.3	0.5	2
14	1.6	0.5	2
15	1.8	1.1	2.6
16	2.1	1.2	2.5
17	2.4	1.9	2.9
18	2.7	1.8	3
19	2.9	2.2	3.6
20	3.2	2.3	3.6
21	3.4	2.8	4
22	3.6	2.8	4
23	3.8	3.2	4.5
24	4.1	3.1	4.6
25	4.3	3.5	5.1
26	4.5	3.6	4.9
27	4.6	4.2	5.1
28	4.8	4.1	5.2
29	5	4.4	5.6
30	5.2	4.4	5.6
31	5.3	4.7	5.9
32	5.5	4.7	5.9
33	5.6	5	6.2
34	5.7	5	6.2
35	5.8	5.2	6.5
36	6	5.3	6.3
37	6.1	5.7	6.4
38	6.1	5.5	6.6
39	6.2	5.6	6.9
40	6.3	5.6	6.9

Humerus (HUM) : KOREAN

GA Table

Y.G Park." The Standardization of Fetal body parts according to the normal Korean Gestational Age in Ultrasound" Korean Ultrasound Institute, Vol. 14, No.2, 1995

GA = HUM x 3.02718 + 0.2005 x HUM^2 + 9.907522

Output Unit : w(weeks)

Input Unit : cm

Min Range : 0.7 cm

Max Range : 7.3 cm

Fetal Growth Table

Y.G Park.“ The Standardization of Fetal body parts according to the normal Korean Gestational Age in Ultrasound” Korean Ultrasound Institute, Vol. 14, No.2, 1995

HUM = 36.79948 x MA – 2.9359 x MA^2 - 33.413660

Output Unit : cm

Input Unit : w(week)

Min Range : 12w

Max Range : 40w

Age (W)	Growth (cm)	±SD (cm)	Age (W)	Growth (cm)	±SD (cm)
12	0.690	0.118	32	5.495	0.212
16	1.796	0.122	34	5.800	0.253
20	2.803	0.129	36	6.114	0.249
24	3.802	0.169	38	6.396	0.256
28	4.605	0.178	40	6.579	0.316

Humerus (HUM) : MERZ

GA Table

Merz, Eberband, “Ultrasonic Mensuration of Fetal Limb Bones in the Second and Third Trimesters.” J Clin Ultrasound 15: 175-183, Table 1, March/April 1987

Humerus (cm)	G.A (wd)	Humerus (cm)	G.A (wd)	Humerus (cm)	G.A (wd)
1.00	13w0d	3.70	23w0d	5.60	33w0d
1.20	14w0d	3.80	24w0d	5.80	34w0d
1.40	15w0d	4.20	25w0d	5.90	35w0d
1.70	16w0d	4.30	26w0d	6.00	36w0d
2.00	17w0d	4.50	27w0d	6.10	37w0d
2.30	18w0d	4.70	28w0d	6.40	38w0d
2.60	19w0d	4.80	29w0d	6.50	39w0d
2.90	20w0d	5.00	30w0d	6.60	40w0d
3.20	21w0d	5.30	31w0d		
3.30	22w0d	5.40	32w0d		

Fetal Growth Table

E. Merz, W. Goldhofer, E. Timor-Tritsch "Ultrasound in Gynecology and Obstetrics" Textbook and Atlas, 1991 Georg Thieme Verlag, 308-338

Age (W)	Growth (cm)	5% (cm)	95% (cm)	Age (W)	Growth (cm)	5% (cm)	95% (cm)
12	0.80	0.40	1.10	27	4.60	4.20	5.00
13	1.10	0.70	1.40	28	4.80	4.40	5.20
14	1.40	1.00	1.70	29	5.00	4.60	5.40
15	1.60	1.30	2.00	30	5.20	4.80	5.60
16	1.90	1.60	2.30	31	5.40	4.90	5.80
17	2.20	1.80	2.60	32	5.50	5.10	6.00
18	2.50	2.10	2.80	33	5.70	5.30	6.20
19	2.70	2.40	3.10	34	5.90	5.40	6.30
20	3.00	2.60	3.40	35	6.00	5.50	6.50
21	3.20	2.90	3.60	36	6.10	5.70	6.60
22	3.50	3.10	3.90	37	6.30	5.80	6.70
23	3.70	3.30	4.10	38	6.40	5.90	6.90
24	4.00	3.60	4.40	39	6.50	6.00	7.00

25	4.20	3.80	4.60
26	4.40	4.00	4.80

40	6.60	6.20	7.10

Humerus (HUM) : OSAKA

GA Table

Osaka University Method 1989, 3 by Univ. Of Osaka

Humerus (cm)	G.A (wd)	Humerus (cm)	G.A (wd)	Humerus (cm)	G.A (wd)
1.00	13w0d	2.80	19w4d	4.60	28w0d
1.10	13w2d	2.90	20w0d	4.70	28w4d
1.20	13w5d	3.00	20w3d	4.80	29w1d
1.30	14w0d	3.10	20w5d	4.90	29w5d
1.40	14w2d	3.20	21w2d	5.00	30w3d
1.50	14w5d	3.30	21w4d	5.10	31w0d
1.60	15w0d	3.40	22w1d	5.20	31w5d
1.70	15w3d	3.50	22w4d	5.30	32w3d
1.80	15w5d	3.60	23w0d	5.40	33w1d
1.90	16w1d	3.70	23w3d	5.50	33w6d
2.00	16w3d	3.80	23w6d	5.60	34w4d
2.10	16w5d	3.90	24w2d	5.70	35w3d
2.20	17w2d	4.00	24w6d	5.80	36w2d
2.30	17w4d	4.10	25w3d	5.90	37w1d
2.40	18w0d	4.20	26w0d	6.00	38w1d
2.50	18w3d	4.30	26w3d	6.10	39w2d
2.60	18w6d	4.40	26w6d	6.20	40w0d
2.70	19w1d	4.50	27w3d		

Fetal Growth Table

Osaka University Method 1989, 3 by Univ. Of Osaka

Age (W)	Growth (cm)	±1.5 SD (cm)	Age (W)	Growth (cm)	±1.5 SD (cm)
13	1.12	0.21	27	4.48	0.42
14	1.33	0.24	28	4.67	0.41
15	1.56	0.27	29	4.86	0.40
16	1.81	0.30	30	5.03	0.39
17	2.06	0.33	31	5.19	0.38
18	2.32	0.36	32	5.34	0.37
19	2.57	0.38	33	5.48	0.36
20	2.83	0.40	34	5.61	0.34
21	3.09	0.41	35	5.72	0.33
22	3.34	0.42	36	5.83	0.32
23	3.59	0.43	37	5.93	0.31
24	3.83	0.43	38	6.03	0.29
25	4.05	0.43	39	6.11	0.28
26	4.27	0.47	40	6.19	0.28

Humerus (HUM) : ASUM(SCW)

Fetal Growth Table

Australasian Society for Ultrasound in Medicine

Policies and Statements - [D7] Statement On Normal Ultrasonic Fetal Measurements (Revised May 2001)

Age (W)	Growth (cm)	±2SD (cm)
11	0.8	0.30
12	0.9	0.20
13	1.1	0.30
14	1.4	0.40
15	1.7	0.55
16	2.1	0.40
17	2.5	0.50
18	2.7	0.55
19	2.9	0.50
20	3.1	0.50
21	3.2	0.60
22	3.5	0.60
23	3.8	0.40
24	4.0	0.60
25	4.3	0.50
26	4.4	0.40

Age (W)	Growth (cm)	±2SD (cm)
27	4.7	0.40
28	5.0	0.50
29	5.1	0.50
30	5.2	0.50
31	5.4	0.50
32	5.6	0.50
33	5.7	0.60
34	5.9	0.55
35	6.0	0.60
36	6.2	0.50
37	6.3	0.60
38	6.4	0.60
39	6.5	0.55
40	6.6	0.60
41	6.8	0.60

Humerus (HUM) : HANSMANN

Fetal Growth Table

Hansmann, Hackeloer, Staudach and Wittman. "Ultrasound Diagnosis in Obstetrics and Gynecology" Springer-Verlag, New York, 1986; P.177

Age (w)	Growth (cm)	5% (cm)	95% (cm)
12	0.9	0.9	0.9
13	1.1	0.6	1.6
14	1.4	0.9	1.9
15	1.7	1.2	2.2
16	2.0	1.5	2.5
17	2.2	1.8	2.7
18	2.5	2.0	3.0
19	2.8	2.3	3.3
20	3.0	2.5	3.5
21	3.3	2.8	3.8
22	3.5	3.0	4.0
23	3.8	3.3	4.2
24	4.0	3.5	4.5
25	4.2	3.7	4.7
26	4.4	3.9	4.9

Age (w)	Growth (cm)	5% (cm)	95% (cm)
27	4.6	4.1	5.1
28	4.8	4.3	5.3
29	5.0	4.5	5.5
30	5.1	4.7	5.6
31	5.3	4.8	5.8
32	5.5	5.0	6.0
33	5.6	5.1	6.1
34	5.8	5.3	6.3
35	5.9	5.4	6.4
36	6.1	5.6	6.5
37	6.2	5.7	6.7
38	6.3	5.9	6.8
39	6.5	6.0	7.0
40	6.6	6.1	7.1

Tibia (TIB) : JEANTY

GA Table

Jeanty et al,. "Estimation of Gestational Age from Measurements of Fetal Long Bones" Journal of Ultrasound in Medicine, February 1984. Vol 3. Pp75-79

Tibia (cm)	G.A (wd)	5% (wd)	95% (wd)
1.00	13w3d	10w4d	16w2d
1.10	13w5d	10w6d	16w4d
1.20	14w1d	11w1d	17w0d
1.30	14w3d	11w4d	17w2d
1.40	14w6d	11w6d	17w5d
1.50	15w1d	12w1d	18w0d
1.60	15w4d	12w4d	18w3d
1.70	15w6d	13w0d	18w6d
1.80	16w1d	13w2d	19w1d
1.90	16w4d	13w5d	19w4d
2.00	17w0d	14w1d	19w6d
2.10	17w3d	14w4d	20w2d
2.20	17w6d	14w6d	20w5d
2.30	18w1d	15w1d	21w1d
2.40	18w4d	15w4d	21w3d
2.50	18w6d	16w0d	21w6d
2.60	19w2d	16w3d	22w1d
2.70	19w5d	16w6d	22w4d
2.80	20w1d	17w1d	23w0d
2.90	20w4d	17w4d	23w4d
3.00	21w0d	18w1d	23w6d
3.10	21w3d	18w4d	24w2d
3.20	21w6d	18w6d	24w5d
3.30	22w1d	19w2d	25w1d
3.40	22w4d	19w5d	25w4d
3.50	23w1d	20w1d	26w0d
3.60	23w4d	20w4d	26w3d
3.70	23w6d	21w0d	26w6d
3.80	24w3d	21w4d	27w2d
3.90	24w6d	21w6d	27w5d

Tibia (cm)	G.A (wd)	5% (wd)	95% (wd)
4.00	25w2d	22w3d	28w1d
4.10	25w5d	22w6d	28w4d
4.20	26w1d	23w2d	29w1d
4.30	26w4d	23w5d	29w4d
4.40	27w1d	24w1d	30w0d
4.50	27w4d	24w4d	30w4d
4.60	28w0d	25w1d	30w6d
4.70	28w4d	25w4d	31w3d
4.80	29w0d	26w1d	31w6d
4.90	29w3d	26w4d	32w2d
5.00	29w6d	27w0d	32w6d
5.10	30w3d	27w4d	33w2d
5.20	30w6d	28w0d	33w6d
5.30	31w3d	28w4d	34w2d
5.40	31w6d	29w0d	34w6d
5.50	32w3d	29w4d	35w2d
5.60	32w6d	30w0d	35w6d
5.70	33w3d	30w4d	36w2d
5.80	33w6d	31w0d	36w6d
5.90	34w3d	31w4d	37w2d
6.00	34w6d	32w0d	37w6d
6.10	35w3d	32w4d	38w2d
6.20	35w6d	33w0d	38w6d
6.30	36w4d	33w4d	39w3d
6.40	37w0d	34w1d	39w6d
6.50	37w4d	34w4d	40w3d
6.60	38w0d	35w1d	41w0d
6.70	38w4d	35w5d	41w4d
6.80	39w1d	36w1d	42w0d
6.90	39w5d	36w6d	42w4d

Fetal Growth Table

Jeanty, P. "Fetal Limb Biometry" (Letter) Radiology, 147:602, 1983

Age (W)	Growth (cm)	5% (cm)	95% (cm)
11	0.4	0.4	0.4
12	0.7	0.7	0.7
13	1	0.4	1.7
14	1.3	0.2	1.9
15	1.6	0.5	2.7
16	1.9	0.7	2.5
17	2.2	1.5	2.9
18	2.4	1.4	2.9
19	2.7	1.9	3.5
20	2.9	1.9	3.5
21	3.2	2.4	3.9
26	4.3	3.3	4.9
27	4.5	3.9	5.1
28	4.7	3.8	5.2
29	4.9	4	5.7
30	5.1	4.1	5.6
31	5.2	4.6	5.8
32	5.4	4.6	5.9
33	5.6	4.9	6.2
34	5.7	4.7	6.4
35	5.9	4.8	6.9
36	6	4.9	6.8

22	3.4	2.5	3.9
23	3.6	3	4.3
24	3.9	2.8	4.5
25	4.1	3.1	5

37	6.1	5.2	7.1
38	6.2	5.4	6.9
39	6.4	5.8	6.9
40	6.5	5.8	6.9

Tibia (TIB) : MERZ

GA Table

Merz, E., et al. "Ultrasonic Mensuration of Fetal Limb Bones in the Second and Third Trimesters." J Clin Ultrasound 15: 175-183, Table 1, March/April 1987

Tibia (cm)	GA (wd)
0.90	13w0d
1.00	14w0d
1.30	15w0d
1.60	16w0d
1.80	17w0d
2.20	18w0d
2.50	19w0d
2.70	20w0d

Tibia (cm)	GA (wd)
3.00	21w0d
3.20	22w0d
3.60	23w0d
3.70	24w0d
4.00	25w0d
4.20	26w0d
4.40	27w0d
4.50	28w0d

Tibia (cm)	GA (wd)
4.60	29w0d
4.80	30w0d
5.10	31w0d
5.20	32w0d
5.40	33w0d
5.70	34w0d
5.80	35w0d
6.00	36w0d

Tibia (cm)	GA (wd)
6.10	37w0d
6.20	38w0d
6.40	39w0d
6.50	40w0d
6.60	41w0d
6.80	42w0d

Fetal Growth Table

E. Merz, W. Goldhofer, E. Timor-Tritsch "Ultrasound in Gynecology and Obstetrics" Textbook and Atlas, 1991 Georg Thieme Verlag, 308-338

Age (W)	Growth (cm)	5% (cm)	95% (cm)
12	0.70	0.40	1.00
13	1.00	0.60	1.30
14	1.20	0.90	1.60
15	1.50	1.20	1.90
16	1.80	1.40	2.10
17	2.10	1.70	2.40
18	2.30	2.00	2.70
19	2.60	2.20	3.00
20	2.80	2.50	3.20
21	3.10	2.70	3.50
22	3.30	2.90	3.70
23	3.60	3.20	4.00
24	3.80	3.40	4.20
25	4.00	3.60	4.40
26	4.20	3.80	4.60

Age (W)	Growth (cm)	5% (cm)	95% (cm)
27	4.50	4.00	4.90
28	4.70	4.20	5.10
29	4.90	4.40	5.30
30	5.00	4.60	5.50
31	5.20	4.80	5.70
32	5.40	5.00	5.80
33	5.60	5.10	6.00
34	5.70	5.30	6.20
35	5.90	5.40	6.30
36	6.00	5.60	6.50
37	6.20	5.70	6.60
38	6.30	5.90	6.80
39	6.40	6.00	6.90
40	6.60	6.10	7.00

Tibia (TIB) : HANSMANN

Fetal Growth Table

Hansmann, Hackeloer, Staudach and Wittman. "Ultrasound Diagnosis in Obstetrics and Gynecology" Springer-Verlag, New York, 1986; P.182

GA	Growth (cm)	5% (cm)	95% (cm)
12	0.7	0.7	0.7
13	1.0	1.0	1.0
14	1.2	0.7	1.7
15	1.5	0.9	2.0
16	1.7	1.2	2.2
17	2.0	1.5	2.5
18	2.2	1.7	2.7
19	2.5	2.0	3.0
20	2.7	2.2	3.3
21	3.0	2.5	3.5
22	3.2	2.7	3.8
23	3.5	3.0	4.0
24	3.7	3.2	4.2
25	4.0	3.4	4.5
26	4.2	3.7	4.7

GA	Growth (cm)	5% (cm)	95% (cm)
27	4.4	3.9	4.9
28	4.6	4.1	5.1
29	4.8	4.3	5.3
30	5.0	4.5	5.5
31	5.2	4.7	5.7
32	5.4	4.8	5.9
33	5.5	5.0	6.0
34	5.7	5.2	6.2
35	5.8	5.3	6.4
36	6.0	5.5	6.5
37	6.1	5.6	6.7
38	6.3	5.8	6.8
39	6.4	5.9	6.9
40	6.6	6.1	7.1

Thorax Transverse Diameter (TTD) : HANSMANN

GA Table

TTD (cm)	GA (wd)
1.7	12w0d
2.0	13w0d
2.4	14w0d
2.7	15w0d
3.1	16w0d
3.4	17w0d
3.7	18w0d
4.0	19w0d
4.4	20w0d
4.7	21w0d
5.0	22w0d
5.3	23w0d
5.6	24w0d
5.9	25w0d
6.2	26w0d

TTD (cm)	GA (wd)
6.5	27w0d
6.9	28w0d
7.2	29w0d
7.4	30w0d
7.8	31w0d
8.1	32w0d
8.3	33w0d
8.6	34w0d
8.9	35w0d
9.2	36w0d
9.4	37w0d
9.7	38w0d
9.9	39w0d
10.1	40w0d

Fetal Growth Table

Hansmann, Hackeloer, Staudach, Wittman "Ultrasound Diagnosis in Obstetrics and Gynecology" Springer-Verlag, New York, 1986

Age (W)	Growth (cm)	Min (cm)	Max (cm)	Age (W)	Growth (cm)	Min (cm)	Max (cm)
12	1.70	1.70	1.70	27	6.50	5.90	7.30
13	2.00	2.00	2.00	28	6.90	6.20	7.70
14	2.40	2.00	2.80	29	7.20	6.40	8.00
15	2.70	2.30	3.10	30	7.40	6.70	8.30
16	3.10	2.70	3.50	31	7.80	7.00	8.60
17	3.40	3.00	3.80	32	8.10	7.30	8.90
18	3.70	3.30	4.20	33	8.30	7.50	9.30
19	4.00	3.60	4.60	34	8.60	7.80	9.60
20	4.40	3.90	4.90	35	8.90	8.00	9.90
21	4.70	4.20	5.30	36	9.20	8.30	10.20
22	5.00	4.50	5.60	37	9.40	8.50	10.50
23	5.30	4.80	6.00	38	9.70	8.70	10.80
24	5.60	5.00	6.30	39	9.90	8.90	11.10
25	5.90	5.30	6.70	40	10.10	9.10	11.40
26	6.20	5.60	7.00	41	10.20	9.20	11.70

Cerebellum (CEREB) : HILL

GA Table

Hill LM, David G, Fries J, Hixson J, Dawn R. "The Transverse Cerebellar Diameter in Estimating Gestational Age in the Large for Gestational Age Fetus" Obstetrics and Gynecology,75:981-985, June 1990

CEREB (cm)	G.A (wd)	±2SD (wd)	CEREB (cm)	G.A (wd)	±2SD (wd)
1.4	15w1d	1w0d	3.5	29w3d	2w0d
1.5	15w6d	1w0d	3.6	30w0d	2w3d
1.6	16w4d	1w0d	3.7	30w4d	2w3d
1.7	17w1d	1w0d	3.8	31w1d	2w3d
1.8	17w6d	1w0d	3.9	31w6d	2w3d
1.9	18w4d	1w6d	4.0	32w2d	2w3d
2.0	19w2d	1w6d	4.1	32w6d	2w3d
2.1	20w0d	1w6d	4.2	33w3d	2w3d
2.2	20w5d	1w6d	4.3	33w6d	2w3d
2.3	21w3d	1w6d	4.4	34w3d	2w3d
2.4	22w1d	1w6d	4.5	34w6d	2w3d
2.5	22w6d	1w6d	4.6	35w2d	2w3d
2.6	23w4d	1w6d	4.7	35w5d	2w3d
2.7	24w1d	2w0d	4.8	36w1d	3w1d
2.8	24w6d	2w0d	4.9	36w4d	3w1d
2.9	25w4d	2w0d	5.0	36w6d	3w1d
3.0	26w1d	2w0d	5.1	37w1d	3w1d
3.1	26w6d	2w0d	5.2	37w4d	3w1d
3.2	27w4d	2w0d	5.4	38w0d	3w1d

3.3	28w1d	2w0d	5.5	38w2d	3w1d
3.4	28w6d	2w0d	5.6	38w4d	3w1d

Cerebellum (CEREB) : CHITTY

GA Table

D.G. Altman, L.S. Chitty. "New Charts for Ultrasound Dating of Pregnancy" Ultrasound in Obstetrics and Gynecology, Vol.10, p174-191, 1997

CEREB (cm)	GA (wd)	5% (wd)	95% (wd)	CEREB (cm)	GA (wd)	5% (wd)	95% (wd)
1.30	14w3d	13w1d	16w0d	2.50	24w2d	22w2d	26w3d
1.40	15w2d	14w0d	16w6d	2.60	25w0d	23w0d	27w3d
1.50	16w2d	14w6d	17w5d	2.70	25w6d	23w4d	28w2d
1.60	17w0d	15w4d	18w4d	2.80	26w4d	24w1d	29w2d
1.70	17w6d	16w3d	19w3d	2.90	27w2d	24w5d	30w2d
1.80	18w5d	17w2d	20w2d	3.00	28w0d	25w1d	31w2d
1.90	19w4d	18w0d	21w1d	3.10	28w6d	25w5d	32w2d
2.00	20w3d	18w6d	22w0d	3.20	29w4d	26w1d	33w3d
2.10	21w1d	19w4d	22w6d	3.30	30w2d	26w4d	34w4d
2.20	22w0d	20w2d	23w5d	3.40	31w0d	26w6d	35w5d
2.30	22w5d	21w0d	24w4d	3.50	31w5d	27w2d	36w6d
2.40	23w4d	21w5d	25w4d	3.60	32w3d	27w4d	38w1d

Cerebellum (CEREB) : GOLDSTEIN

Fetal Growth Table

Cerebellar measurements with ultrasonography in the evaluation of fetal growth and development. AM J. Obstet. Gynecol. 156:1065-1069, 1987

Age (W)	Growth (cm)	10% (cm)	90% (cm)	Age (W)	Growth (cm)	10% (cm)	90% (cm)
15	1.40	1.00	1.60	28	3.10	2.70	3.40
16	1.60	1.40	1.70	29	3.40	2.90	3.80
17	1.70	1.60	1.80	30	3.50	3.10	4.00
18	1.80	1.70	1.90	31	3.80	3.20	4.30
19	1.90	1.80	2.20	32	3.80	3.30	4.20
20	2.00	1.80	2.20	33	4.00	3.20	4.40
21	2.20	1.90	2.40	34	4.00	3.30	4.40
22	2.30	2.10	2.40	35	4.05	3.10	4.70
23	2.40	2.20	2.60	36	4.30	3.60	5.50
24	2.50	2.20	2.80	37	4.50	3.70	5.50
25	2.80	2.30	2.90	38	4.85	4.00	5.50
26	2.90	2.50	3.20	39	5.20	5.20	5.50
27	3.00	2.60	3.20				

Cerebellum (CEREB) : NICOLAIDES

Fetal Growth Table

Snijders RJ, Nicolaides KH. "Fetal biometry at 14-40 weeks' gestation" Ultrasound in obstetrics and Gynecology, 1994 Jan 1; 4(1): 34-48

Age (wd)	Growth (cm)	5% (cm)	95% (cm)
14w0d	1.40	1.20	1.50
14w1d	1.40	1.20	1.50
14w2d	1.40	1.20	1.50
14w3d	1.40	1.20	1.50
14w4d	1.40	1.20	1.50
14w5d	1.40	1.20	1.50
14w6d	1.40	1.20	1.50
15w0d	1.50	1.30	1.70
15w1d	1.50	1.30	1.70
15w2d	1.50	1.30	1.70
15w3d	1.50	1.30	1.70
15w4d	1.50	1.30	1.70
15w5d	1.50	1.30	1.70
15w6d	1.50	1.30	1.70
16w0d	1.60	1.40	1.80
16w1d	1.60	1.40	1.80
16w2d	1.60	1.40	1.80
16w3d	1.60	1.40	1.80
16w4d	1.60	1.40	1.80
16w5d	1.60	1.40	1.80

Age (wd)	Growth (cm)	5% (cm)	95% (cm)
27w0d	3.10	2.70	3.40
27w1d	3.10	2.70	3.40
27w2d	3.10	2.70	3.40
27w3d	3.10	2.70	3.40
27w4d	3.10	2.70	3.40
27w5d	3.10	2.70	3.40
27w6d	3.10	2.70	3.40
28w0d	3.20	2.90	3.60
28w1d	3.20	2.90	3.60
28w2d	3.20	2.90	3.60
28w3d	3.20	2.90	3.60
28w4d	3.20	2.90	3.60
28w5d	3.20	2.90	3.60
28w6d	3.20	2.90	3.60
29w0d	3.30	3.00	3.70
29w1d	3.30	3.00	3.70
29w2d	3.30	3.00	3.70
29w3d	3.30	3.00	3.70
29w4d	3.30	3.00	3.70
29w5d	3.30	3.00	3.70

16w6d	1.60	1.40	1.80
17w0d	1.70	1.50	1.90
17w1d	1.70	1.50	1.90
17w2d	1.70	1.50	1.90
17w3d	1.70	1.50	1.90
17w4d	1.70	1.50	1.90
17w5d	1.70	1.50	1.90
17w6d	1.70	1.50	1.90
18w0d	1.80	1.60	2.10
18w1d	1.80	1.60	2.10
18w2d	1.80	1.60	2.10
18w3d	1.80	1.60	2.10
18w4d	1.80	1.60	2.10
18w5d	1.80	1.60	2.10
18w6d	1.80	1.60	2.10
19w0d	2.00	1.70	2.20
19w1d	2.00	1.70	2.20
19w2d	2.00	1.70	2.20
19w3d	2.00	1.70	2.20
19w4d	2.00	1.70	2.20
19w5d	2.00	1.70	2.20
19w6d	2.00	1.70	2.20
20w0d	2.10	1.90	2.40
20w1d	2.10	1.90	2.40
20w2d	2.10	1.90	2.40
20w3d	2.10	1.90	2.40
20w4d	2.10	1.90	2.40

29w6d	3.30	3.00	3.70
30w0d	3.50	3.10	3.90
30w1d	3.50	3.10	3.90
30w2d	3.50	3.10	3.90
30w3d	3.50	3.10	3.90
30w4d	3.50	3.10	3.90
30w5d	3.50	3.10	3.90
30w6d	3.50	3.10	3.90
31w0d	3.60	3.20	4.00
31w1d	3.60	3.20	4.00
31w2d	3.60	3.20	4.00
31w3d	3.60	3.20	4.00
31w4d	3.60	3.20	4.00
31w5d	3.60	3.20	4.00
31w6d	3.60	3.20	4.00
32w0d	3.70	3.40	4.20
32w1d	3.70	3.40	4.20
32w2d	3.70	3.40	4.20
32w3d	3.70	3.40	4.20
32w4d	3.70	3.40	4.20
32w5d	3.70	3.40	4.20
32w6d	3.70	3.40	4.20
33w0d	3.90	3.50	4.30
33w1d	3.90	3.50	4.30
33w2d	3.90	3.50	4.30
33w3d	3.90	3.50	4.30
33w4d	3.90	3.50	4.30

20w5d	2.10	1.90	2.40
20w6d	2.10	1.90	2.40
21w0d	2.20	2.00	2.50
21w1d	2.20	2.00	2.50
21w2d	2.20	2.00	2.50
21w3d	2.20	2.00	2.50
21w4d	2.20	2.00	2.50
21w5d	2.20	2.00	2.50
21w6d	2.20	2.00	2.50
22w0d	2.40	2.10	2.70
22w1d	2.40	2.10	2.70
22w2d	2.40	2.10	2.70
22w3d	2.40	2.10	2.70
22w4d	2.40	2.10	2.70
22w5d	2.40	2.10	2.70
22w6d	2.40	2.10	2.70
23w0d	2.50	2.20	2.80
23w1d	2.50	2.20	2.80
23w2d	2.50	2.20	2.80
23w3d	2.50	2.20	2.80
23w4d	2.50	2.20	2.80
23w5d	2.50	2.20	2.80
23w6d	2.50	2.20	2.80
24w0d	2.60	2.40	3.00
24w1d	2.60	2.40	3.00
24w2d	2.60	2.40	3.00
24w3d	2.60	2.40	3.00

33w5d	3.90	3.50	4.30
33w6d	3.90	3.50	4.30
34w0d	4.00	3.60	4.40
34w1d	4.00	3.60	4.40
34w2d	4.00	3.60	4.40
34w3d	4.00	3.60	4.40
34w4d	4.00	3.60	4.40
34w5d	4.00	3.60	4.40
34w6d	4.00	3.60	4.40
35w0d	4.10	3.70	4.60
35w1d	4.10	3.70	4.60
35w2d	4.10	3.70	4.60
35w3d	4.10	3.70	4.60
35w4d	4.10	3.70	4.60
35w5d	4.10	3.70	4.60
35w6d	4.10	3.70	4.60
36w0d	4.20	3.80	4.70
36w1d	4.20	3.80	4.70
36w2d	4.20	3.80	4.70
36w3d	4.20	3.80	4.70
36w4d	4.20	3.80	4.70
36w5d	4.20	3.80	4.70
36w6d	4.20	3.80	4.70
37w0d	4.30	3.90	4.80
37w1d	4.30	3.90	4.80
37w2d	4.30	3.90	4.80
37w3d	4.30	3.90	4.80

24w4d	2.60	2.40	3.00
24w5d	2.60	2.40	3.00
24w6d	2.60	2.40	3.00
25w0d	2.80	2.50	3.10
25w1d	2.80	2.50	3.10
25w2d	2.80	2.50	3.10
25w3d	2.80	2.50	3.10
25w4d	2.80	2.50	3.10
25w5d	2.80	2.50	3.10
25w6d	2.80	2.50	3.10
26w0d	2.90	2.60	3.30
26w1d	2.90	2.60	3.30
26w2d	2.90	2.60	3.30
26w3d	2.90	2.60	3.30
26w4d	2.90	2.60	3.30
26w5d	2.90	2.60	3.30
26w6d	2.90	2.60	3.30

37w4d	4.30	3.90	4.80
37w5d	4.30	3.90	4.80
37w6d	4.30	3.90	4.80
38w0d	4.40	4.00	4.90
38w1d	4.40	4.00	4.90
38w2d	4.40	4.00	4.90
38w3d	4.40	4.00	4.90
38w4d	4.40	4.00	4.90
38w5d	4.40	4.00	4.90
38w6d	4.40	4.00	4.90
39w0d	4.50	4.10	5.10
39w1d	4.50	4.10	5.10
39w2d	4.50	4.10	5.10
39w3d	4.50	4.10	5.10
39w4d	4.50	4.10	5.10
39w5d	4.50	4.10	5.10
39w6d	4.50	4.10	5.10

Ulna : JEANTY

GA Table

Jeanty et al,. "Estimation of Gestational Age from Measurements of Fetal Long Bones" Journal of Ultrasound in Medicine, February 1984. Vol 3. Pp75-79

Ulna (cm)	GA (wd)	5% (wd)	95% (wd)
1.00	13w1d	10w1d	16w1d
1.10	13w4d	10w4d	16w4d
1.20	13w6d	10w6d	16w6d
1.30	14w1d	11w1d	17w2d
1.40	14w4d	11w4d	17w5d
1.50	15w0d	11w6d	18w0d
1.60	15w3d	12w2d	18w3d
1.70	15w5d	12w5d	18w6d
1.80	16w1d	13w1d	19w1d
1.90	16w4d	13w4d	19w4d
2.00	16w6d	13w6d	20w0d
2.10	17w2d	14w2d	20w3d
2.20	17w5d	14w5d	20w6d
2.30	18w1d	15w1d	21w1d
2.40	18w4d	15w4d	21w4d
2.50	19w0d	16w0d	22w1d
2.60	19w3d	16w3d	22w4d
2.70	19w6d	16w6d	22w6d
2.80	20w2d	17w2d	23w3d
2.90	20w6d	17w5d	23w6d

Ulna (cm)	GA (wd)	5% (wd)	95% (wd)
3.80	25w1d	22w1d	28w1d
3.90	25w4d	22w4d	28w5d
4.00	26w1d	23w1d	29w1d
4.10	26w5d	23w4d	29w5d
4.20	27w1d	24w1d	30w2d
4.30	27w5d	24w5d	30w6d
4.40	28w2d	25w1d	31w2d
4.50	28w6d	25w6d	31w6d
4.60	29w3d	26w2d	32w3d
4.70	29w6d	26w6d	33w0d
4.80	30w4d	27w3d	33w4d
4.90	31w1d	28w0d	34w1d
5.00	31w4d	28w4d	34w5d
5.10	32w1d	29w1d	35w2d
5.20	32w6d	29w5d	35w6d
5.30	33w3d	30w2d	36w3d
5.40	34w0d	30w6d	37w0d
5.50	34w4d	31w4d	37w5d
5.60	35w1d	32w1d	38w2d
5.70	35w6d	32w6d	38w6d

3.00	21w1d	18w1d	24w2d
3.10	21w5d	18w4d	24w6d
3.20	22w1d	19w1d	25w1d
3.30	22w5d	19w4d	25w5d
3.40	23w1d	20w1d	26w1d
3.50	23w4d	20w4d	26w5d
3.60	24w1d	21w1d	27w1d
3.70	24w4d	21w4d	27w5d

5.80	36w3d	33w3d	39w4d
5.90	37w1d	34w0d	40w1d
6.00	37w5d	34w4d	40w6d
6.10	38w2d	35w2d	41w3d
6.20	39w0d	35w6d	42w0d
6.30	39w4d	36w4d	42w5d
6.40	40w2d	37w1d	43w2d

Fetal Growth Table

Jeanty, P. "Fetal Limb Biometry" (Letter) Radiology, 147:602, 1983

Age (W)	Growth (cm)	5% (cm)	95% (cm)
11	0.5	0.5	0.5
12	0.8	0.8	0.8
13	1.1	0.3	1.8
14	1.3	0.4	1.7
15	1.6	1.0	2.2
16	1.9	0.8	2.4
17	2.1	1.1	3.2
18	2.4	1.3	3.0
19	2.6	2.0	3.2
20	2.9	2.1	3.2
21	3.1	2.5	3.6
22	3.3	2.4	3.7

Age (W)	Growth (cm)	5% (cm)	95% (cm)
26	4.1	3.4	4.4
27	4.3	3.7	4.8
28	4.4	3.7	4.8
29	4.6	4.0	5.1
30	4.7	3.8	5.4
31	4.9	3.9	5.9
32	5.0	4.0	5.8
33	5.2	4.3	6.0
34	5.3	4.4	5.9
35	5.4	4.7	6.1
36	5.5	4.7	6.1
37	5.6	4.9	6.2

23	3.5	2.7	4.3	38	5.7	4.8	6.3
24	3.7	2.9	4.1	39	5.7	4.9	6.6
25	3.9	3.4	4.4	40	5.8	5.0	6.5

Ulna : MERZ

Fetal Growth Table

E. Merz, W. Goldhofer, E. Timor-Tritsch "Ultrasound in Gynecology and Obstetrics" Textbook and Atlas, 1991 Georg Thieme Verlag, 308-338

Age (W)	Growth (cm)	5% (cm)	95% (cm)	Age (W)	Growth (cm)	5% (cm)	95% (cm)
12	0.6	0.3	0.9	27	4.3	3.9	4.7
13	0.9	0.5	1.2	28	4.5	4.1	4.9
14	1.2	0.8	1.5	29	4.7	4.3	5.1
15	1.4	1.1	1.8	30	4.8	4.4	5.2
16	1.7	1.4	2.1	31	5.0	4.6	5.4
17	2.0	1.7	2.3	32	5.1	4.7	5.5
18	2.3	1.9	2.6	33	5.3	4.9	5.7
19	2.5	2.2	2.9	34	5.4	5.0	5.8
20	2.8	2.4	3.1	35	5.5	5.1	6.0
21	3.0	2.7	3.4	36	5.6	5.2	6.1
22	3.3	2.9	3.6	37	5.7	5.3	6.2
23	3.5	3.1	3.9	38	5.8	5.4	6.3
24	3.7	3.3	4.1	39	5.9	5.5	6.4
25	3.9	3.5	4.3	40	6.0	5.6	6.5
26	4.1	3.7	4.5				

Ulna : HANSMANN

Fetal Growth Table

Hansmann, Hackeloer, Staudach and Wittman. "Ultrasound Diagnosis in Obstetrics and Gynecology" Springer-Verlag, New York, 1986; P.183

Age (W)	Growth (cm)	5% (cm)	95% (cm)	Age (W)	Growth (cm)	5% (cm)	95% (cm)
12	0.7	0.7	0.7	27	4.4	3.9	4.9
13	1.0	0.5	1.5	28	4.6	4.1	5.1
14	1.3	0.8	1.8	29	4.8	4.3	5.3
15	1.6	1.1	2.1	30	4.9	4.4	5.4
16	1.8	1.3	2.3	31	5.1	4.6	5.6
17	2.1	1.6	2.6	32	5.3	4.8	5.8
18	2.4	1.9	2.9	33	5.4	4.9	5.9
19	2.6	2.1	3.1	34	5.6	5.1	6.1
20	2.9	2.4	3.4	35	5.7	5.2	6.2
21	3.1	2.6	3.6	36	5.8	5.3	6.3
22	3.3	2.8	3.8	37	6.0	5.5	6.5
23	3.6	3.1	4.1	38	6.1	5.6	6.6
24	3.8	3.3	4.3	39	6.2	5.7	6.7
25	4.0	3.5	4.5	40	6.3	5.8	6.8
26	4.2	3.7	4.7				

Head Circumference (HC) : KOREAN

GA Table

Y.G Park.“ The Standardization of Fetal body parts according to the normal Korean Gestational Age in Ultrasound” Korean Ultrasound Institute, Vol. 14, No.2, 1995

GA = HC × 1.43245 - 0.010208 × HC^2 - 0.342015

Output Unit : w(weeks)

Input Unit : cm

Min Range : 7.4 cm

Max Range : 35.4 cm

Fetal Growth Table

Y.G Park.“ The Standardization of Fetal body parts according to the normal Korean Gestational Age in Ultrasound” Korean Ultrasound Institute, Vol. 14, No.2, 1995

HC = 158.43955 x MA – 11.2149 x MA^2 - 99.924727

Output Unit : cm

Input Unit : w(week)

Min Range : 12w

Max Range : 40w

Age (W)	Growth (cm)	±SD (cm)
12	7.246	0.791
16	12.505	0.746
20	17.188	0.743
24	21.522	1.250

Age (W)	Growth (cm)	±SD (cm)
28	25.989	0.870
32	29.231	0.798
34	30.578	0.771
36	32.239	0.577

Age (W)	Growth (cm)	±SD (cm)
38	33.522	0.297
40	37.283	1.389

Head Circumference (HC) : HANSMANN

GA Table

Hansmann, Hackeloer, Staudach, Wittman. "Ultrasound Diagnosis in Obsterics and Gynecology." Springer-Verlag, New York, 1986, p431.

HC (cm)	GA (wd)
10.6	14w0d
11.5	15w0d
12.7	16w0d
14.0	17w0d
15.2	18w0d
16.4	19w0d
17.6	20w0d
19.0	21w0d
20.3	22w0d

HC (cm)	GA (wd)
21.5	23w0d
22.6	24w0d
24.0	25w0d
25.1	26w0d
26.3	27w0d
27.4	28w0d
28.4	29w0d
29.3	30w0d
30.3	31w0d

HC (cm)	GA (wd)
31.1	32w0d
31.8	33w0d
32.5	34w0d
33.2	35w0d
33.7	36w0d
34.0	37w0d
34.4	38w0d
34.7	39w0d
34.9	40w0d

Fetal Growth Table

Hansmann, Hackeloer, Staudach, Wittman "Ultrasound Diagnosis in Obstetrics and Gynecology" Springer- Verlag, New York, 1986, p.176.

Age (W)	Growth (cm)	5% (cm)	95% (cm)
10	5	2.6	7.4
11	6.3	3.8	8.7
12	7.5	5.1	10.0
13	8.8	6.4	11.2

Age (W)	Growth (cm)	5% (cm)	95% (cm)
26	24.2	21.8	26.6
27	25.2	22.8	27.7
28	26.2	23.8	28.6
29	27.1	24.7	29.6

14	10.1	7.6	12.5
15	11.3	8.9	13.8
16	12.6	10.1	15.0
17	13.8	11.4	16.3
18	15.1	12.6	17.5
19	16.3	13.8	18.7
20	17.5	15.0	19.9
21	18.7	16.2	21.1
22	19.8	17.4	22.3
23	21.0	18.5	23.4
24	22.1	19.6	24.5
25	23.2	20.7	25.6

30	28.1	25.6	30.5
31	28.9	26.5	31.3
32	29.7	27.3	32.2
33	30.5	28.1	32.9
34	31.2	28.8	33.6
35	31.9	29.4	34.3
36	32.5	30.0	34.9
37	33.0	30.6	35.5
38	33.5	31.1	35.9
39	33.9	31.5	36.4
40	34.3	31.9	36.7

Head Circumference (HC) : HADLOCK

GA Table

Frank P. Hadlock, Russell L.Deter, Ronald B. Harrist, Seung K. Park,. "Estimating Fetal Age: Computer-Assisted Analysis of Multiple Fetal Growth Parameters" Radiology, 1984; 152:497-501.

GA = 8.96 + 0.54 × HC + 0.0003 × HC^3

Output Unit : w(weeks)

Input Unit : cm

Min Range : 5.5 cm

Max Range : 35.7 cm

Standard Deviation :

Min Range(w)	Max Range(w)	±2SD(w)
12	18	1.19
18	24	1.48
24	30	2.06
30	36	2.98
36	42	2.70

Fetal Growth Table

Hadlock, F., Deter, R.L., Harrist, R.B., Park, S.K. "Estimating Fetal Age: Computer-Assisted Analysis of Multiple Fetal Growth Parameters" Radiology, 1984, 152: 497-501.

Equation = 1.56 x MA - 0.0002548 x MA^3 - 11.48

Output Unit : cm

Input Unit : w(weeks)

Min Range : 12w

Max Range : 40w

Standard Deviation : 2SD=2.00cm

Head Circumference (HC) : MERZ

GA Table

E. Merz, W. Goldhofer, E. Timor-Tritsch "Ultrasound in Gynecology and Obstetrics" Text book and Atlas, 1991 Georg Thieme Verlag, 308-338

HC (cm)	GA (wd)	5% (wd)	95% (wd)
7.2	12w1d	11w0d	13w1d
7.4	12w2d	11w1d	13w4d
7.6	12w3d	11w1d	13w4d
7.8	12w4d	11w2d	13w5d
8.0	12w5d	11w4d	13w6d
8.2	12w6d	11w4d	14w0d
8.4	12w6d	11w5d	14w1d
8.6	13w1d	11w6d	14w2d
8.8	13w1d	12w0d	14w3d
9.0	13w2d	12w1d	14w4d
9.2	13w4d	12w2d	14w5d
9.4	13w4d	12w3d	14w6d
9.6	13w5d	12w4d	14w6d
9.8	13w6d	12w5d	15w1d
10.0	14w0d	12w6d	15w1d
10.2	14w1d	12w6d	15w4d
10.4	14w2d	13w0d	15w4d
10.6	14w3d	13w1d	15w5d
10.8	14w4d	13w2d	15w6d
11.0	14w5d	13w3d	16w0d
11.2	14w6d	13w4d	16w1d
11.4	15w0d	13w5d	16w2d
11.6	15w1d	13w6d	16w3d
11.8	15w2d	14w0d	16w4d
12.0	15w3d	14w1d	16w5d
12.2	15w4d	14w1d	17w0d
12.4	15w5d	14w2d	17w1d
12.6	15w6d	14w3d	17w1d
12.8	16w0d	14w4d	17w3d
13.0	16w1d	14w5d	17w4d
13.2	16w2d	14w6d	17w5d
13.4	16w3d	15w0d	17w6d
13.6	16w4d	15w1d	18w0d
13.8	16w5d	15w2d	18w1d
14.0	16w6d	15w4d	18w2d
14.2	17w0d	15w4d	18w3d
14.4	17w1d	15w6d	18w4d
14.6	17w2d	15w6d	18w5d
14.8	17w4d	16w0d	19w0d
15.0	17w4d	16w1d	19w1d
15.2	17w6d	16w2d	19w2d
15.4	17w6d	16w3d	19w3d
15.6	18w1d	16w4d	19w4d
15.8	18w1d	16w5d	19w5d
16.0	18w3d	16w6d	19w6d
16.2	18w4d	17w0d	20w0d
16.4	18w5d	17w1d	20w1d
16.6	18w6d	17w2d	20w2d
16.8	19w0d	17w4d	20w4d
17.0	19w1d	17w4d	20w4d
22.0	23w2d	21w4d	25w0d
22.2	23w4d	21w6d	25w1d
22.4	23w4d	21w6d	25w2d
22.6	23w6d	22w1d	25w4d
22.8	24w0d	22w1d	25w6d
23.0	24w1d	22w3d	26w0d
23.2	24w3d	22w4d	26w1d
23.4	24w4d	22w5d	26w2d
23.6	24w5d	22w6d	26w4d
23.8	24w6d	23w1d	26w5d
24.0	25w1d	23w2d	26w6d
24.2	25w2d	23w4d	27w1d
24.4	25w4d	23w5d	27w2d
24.6	25w5d	23w6d	27w4d
24.8	25w6d	24w1d	27w5d
25.0	26w0d	24w1d	27w6d
25.2	26w1d	24w3d	28w0d
25.4	26w3d	24w4d	28w1d
25.6	26w4d	24w6d	28w3d
25.8	26w6d	25w0d	28w4d
26.0	27w0d	25w1d	28w6d
26.2	27w1d	25w3d	29w0d
26.4	27w3d	25w4d	29w1d
26.6	27w4d	25w6d	29w3d
26.8	27w6d	26w0d	29w4d
27.0	28w1d	26w1d	30w0d
27.2	28w2d	26w3d	30w1d
27.4	28w4d	26w4d	30w3d
27.6	28w5d	26w6d	30w4d
27.8	28w6d	27w0d	30w6d
28.0	29w1d	27w1d	31w0d
28.2	29w2d	27w3d	31w1d
28.4	29w4d	27w5d	31w4d
28.6	29w6d	27w6d	31w5d
28.8	30w0d	28w1d	31w6d
29.0	30w1d	28w2d	32w1d
29.2	30w4d	28w4d	32w3d
29.4	30w5d	28w6d	32w4d
29.6	30w6d	29w0d	32w6d
29.8	31w1d	29w1d	33w0d
30.0	31w3d	29w3d	33w3d
30.2	31w4d	29w4d	33w4d
30.4	31w6d	29w6d	33w6d
30.6	32w1d	30w1d	34w1d
30.8	32w2d	30w2d	34w2d
31.0	32w4d	30w4d	34w4d
31.2	32w6d	30w6d	34w6d
31.4	33w1d	31w1d	35w1d
31.6	33w3d	31w3d	35w3d
31.8	33w4d	31w4d	35w4d

17.2	19w2d	17w6d	20w6d
17.4	19w3d	17w6d	20w6d
17.6	19w4d	18w0d	21w1d
17.8	19w6d	18w1d	21w3d
18.0	19w6d	18w2d	21w4d
18.2	20w1d	18w4d	21w5d
18.4	20w1d	18w4d	21w6d
18.6	20w3d	18w6d	22w0d
18.8	20w4d	19w0d	22w1d
19.0	20w5d	19w1d	22w2d
19.2	20w6d	19w2d	22w4d
19.4	21w1d	19w4d	22w5d
19.6	21w1d	19w4d	22w6d
19.8	21w3d	19w5d	23w0d
20.0	21w4d	19w6d	23w2d
20.2	21w5d	20w0d	23w3d
20.4	21w6d	20w1d	23w4d
20.6	22w1d	20w3d	23w6d
20.8	22w1d	20w4d	23w6d
21.0	22w3d	20w5d	24w1d
21.2	22w4d	20w6d	24w2d
21.4	22w5d	21w0d	24w3d
21.6	22w6d	21w1d	24w4d
21.8	23w1d	21w3d	24w6d

32.0	33w6d	31w6d	36w0d
32.2	34w1d	32w0d	36w1d
32.4	34w3d	32w2d	36w4d
32.6	34w5d	32w4d	36w6d
32.8	34w6d	32w6d	37w0d
33.0	35w1d	33w1d	37w2d
33.2	35w4d	33w2d	37w5d
33.4	35w6d	33w4d	38w0d
33.6	36w1d	33w6d	38w2d
33.8	36w3d	34w1d	38w4d
34.0	36w4d	34w3d	38w6d
34.2	36w6d	34w5d	39w1d
34.4	37w1d	35w0d	39w3d
34.6	37w4d	35w2d	39w5d
34.8	37w6d	35w4d	40w1d
35.0	38w1d	35w6d	40w4d
35.2	38w4d	36w1d	40w6d
35.4	38w6d	36w4d	41w1d
35.6	39w1d	36w6d	41w3d
35.8	39w4d	37w1d	41w6d
36.0	39w6d	37w4d	42w1d
36.2	40w1d	37w6d	42w3d
36.4	40w4d	38w1d	42w6d

Fetal Growth Table

E. Merz, W. Goldhofer, E. Timor-Tritsch "Ultrasound in Gynecology and Obstetrics" Textbook and Atlas, 1991 Georg Thieme Verlag, 308-338

Age (W)	Growth (cm)	5% (cm)	95% (cm)
12	7.6	6.3	9.0
13	9.0	7.7	10.4
14	10.4	9.0	11.8
15	11.7	10.4	13.2
16	13.1	11.7	14.6
17	14.4	13.0	15.9
18	15.7	14.2	17.2
19	16.9	15.5	18.5
20	18.2	16.7	19.7
21	19.4	17.9	21
22	20.5	19.0	22.2
23	21.7	20.1	23.3
24	22.8	21.2	24.5
25	23.9	22.3	25.6
26	24.9	23.3	26.6

Age (W)	Growth (cm)	5% (cm)	95% (cm)
27	25.9	24.3	27.7
28	26.9	25.3	28.7
29	27.9	26.2	29.6
30	28.8	27.1	30.6
31	29.6	27.9	31.5
32	30.5	28.8	32.3
33	31.3	29.6	33.2
34	32.1	30.3	34.0
35	32.8	31.1	34.7
36	33.6	31.8	35.5
37	34.2	32.4	36.2
38	34.9	33.1	36.8
39	35.5	33.7	37.5
40	36.1	34.3	38.1

Head Circumference (HC) : CHITTY (D)

GA Table

D.G. Altman, L.S. Chitty. "New Charts for Ultrasound Dating of Pregnancy" Ultrasound in Obstetrics and Gynecology, Vol.10, p174-191, 1997

HC (cm)	GA (wd)	5% (wd)	95% (wd)
8.00	12w4d	11w3d	13w5d
8.50	12w6d	11w6d	14w1d
9.00	13w2d	12w2d	14w4d
9.50	13w5d	12w4d	15w0d
10.00	14w1d	13w0d	15w3d
10.50	14w4d	13w3d	15w5d
11.00	15w0d	13w6d	16w1d
11.50	15w3d	14w2d	16w4d
12.00	15w6d	14w5d	17w0d
12.50	16w2d	15w1d	17w3d
13.00	16w4d	15w4d	17w6d
13.50	17w0d	15w6d	18w2d
14.00	17w3d	16w2d	18w5d
14.50	17w6d	16w5d	19w1d
15.00	18w2d	17w1d	19w3d
15.50	18w5d	17w4d	19w6d
16.00	19w1d	17w6d	20w2d
16.50	19w3d	18w2d	20w5d
17.00	19w6d	18w5d	21w1d
17.50	20w2d	19w1d	21w4d
18.00	20w5d	19w3d	22w0d
18.50	21w1d	19w6d	22w3d
19.00	21w4d	20w2d	22w6d
19.50	22w0d	20w4d	23w2d
20.00	22w2d	21w0d	23w5d

HC (cm)	GA (wd)	5% (wd)	95% (wd)
20.50	22w5d	21w3d	24w2d
21.00	23w1d	21w5d	24w5d
21.50	23w4d	22w1d	25w1d
22.00	24w0d	22w4d	25w5d
22.50	24w3d	22w6d	26w1d
23.00	24w6d	23w2d	26w5d
23.50	25w3d	23w5d	27w1d
24.00	25w6d	24w1d	27w5d
24.50	26w2d	24w3d	28w2d
25.00	26w5d	24w6d	28w6d
25.50	27w2d	25w2d	29w3d
26.00	27w5d	25w5d	30w0d
26.50	28w2d	26w1d	30w4d
27.00	28w6d	26w4d	31w2d
27.50	29w3d	27w0d	32w0d
28.00	30w0d	27w3d	32w4d
28.50	30w4d	27w6d	33w3d
29.00	31w1d	28w3d	34w1d
29.50	31w5d	28w6d	35w0d
30.00	32w3d	29w3d	35w6d
30.50	33w1d	30w0d	36w5d
31.00	33w6d	30w3d	37w4d
31.50	34w4d	31w0d	38w4d
32.00	35w3d	31w5d	39w4d

Fetal Growth Table

L.S. Chitty, D.G. Altman, S. Campbell, "Charts of Fetal Size: 2. Head Measurement" British Journal of Obstetrics and Gynaecology, January 1994. Vol 101. Pp35-43

Age (W)	Growth (cm)	10% (cm)	90% (cm)
12	6.81	5.96	7.67
13	8.22	7.33	9.11
14	9.60	8.69	10.52
15	10.97	10.02	11.92
16	12.31	11.34	13.29
17	13.64	12.63	14.64
18	14.93	13.89	15.97
19	16.20	15.14	17.27
20	17.45	16.35	18.54
21	18.66	17.54	19.79
22	19.85	18.69	21.00
23	21.00	19.81	22.19
24	22.12	20.91	23.34
25	23.21	21.96	24.45
26	24.26	22.98	25.53
27	25.27	23.97	26.58

Age (W)	Growth (cm)	10% (cm)	90% (cm)
28	26.25	24.91	27.58
29	27.18	25.82	28.55
30	28.07	26.68	29.47
31	28.92	27.50	30.35
32	29.73	28.27	31.18
33	30.49	29.00	31.97
34	31.20	29.69	32.72
35	31.87	30.32	33.41
36	32.48	30.90	34.05
37	33.04	31.44	34.64
38	33.55	31.92	35.18
39	34.00	32.34	35.67
40	34.40	32.71	36.10
41	34.74	33.02	36.47
42	35.03	33.27	36.78

Head Circumference (HC) : CHITTY (M)

GA Table

D.G. Altman, L.S. Chitty. "New Charts for Ultrasound Dating of Pregnancy" Ultrasound in Obstetrics and Gynecology, Vol.10, p174-191, 1997

HC (cm)	GA (wd)	5% (wd)	95% (wd)
8.50	12w6d	12w1d	13w4d
9.00	13w2d	12w4d	14w0d
9.50	13w5d	12w6d	14w3d
10.00	14w0d	13w2d	14w6d
10.50	14w3d	13w4d	15w2d
11.00	14w6d	14w0d	15w6d
11.50	15w2d	14w3d	16w2d
12.00	15w5d	14w5d	16w5d
12.50	16w1d	15w1d	17w1d
13.00	16w3d	15w3d	17w4d
13.50	16w6d	15w6d	18w0d
14.00	17w2d	16w1d	18w3d
14.50	17w5d	16w4d	18w6d
15.00	18w1d	17w0d	19w2d
15.50	18w3d	17w2d	19w5d
16.00	18w6d	17w5d	20w1d
16.50	19w2d	18w0d	20w4d
17.00	19w5d	18w3d	21w0d
17.50	20w0d	18w5d	21w3d
18.00	20w3d	19w1d	21w6d
18.50	20w6d	19w3d	22w2d

HC (cm)	GA (wd)	5% (wd)	95% (wd)
21.00	22w6d	21w2d	24w4d
21.50	23w2d	21w5d	25w0d
22.00	23w5d	22w0d	25w4d
22.50	24w1d	22w3d	26w0d
23.00	24w4d	22w6d	26w3d
23.50	25w0d	23w1d	27w0d
24.00	25w3d	23w4d	27w3d
24.50	25w6d	24w0d	28w0d
25.00	26w3d	24w3d	28w3d
25.50	26w6d	24w6d	29w0d
26.00	27w3d	25w2d	29w4d
26.50	27w6d	25w5d	30w1d
27.00	28w3d	26w2d	30w5d
27.50	29w0d	26w5d	31w2d
28.00	29w4d	27w2d	32w0d
28.50	30w1d	27w5d	32w4d
29.00	30w5d	28w2d	33w2d
29.50	31w2d	28w6d	34w0d
30.00	32w0d	29w3d	34w5d
30.50	32w5d	30w0d	35w3d
31.00	33w3d	30w5d	36w2d
19.00	21w2d	19w6d	22w6d
19.50	21w5d	20w1d	23w2d
20.00	22w0d	20w4d	23w5d
20.50	22w3d	20w6d	24w1d

31.50	34w1d	31w2d	37w1d
32.00	34w6d	32w0d	38w0d
32.50	35w5d	32w5d	38w6d

Fetal Growth Table

L.S. Chitty, D.G. Altman, S. Campbell, "Charts of Fetal Size: 2. Head Measurement" British Journal of Obstetrics and Gynaecology, January 1994. Vol 101. Pp35-43

Age (W)	Growth (cm)	10% (cm)	90% (cm)
12	6.96	6.13	7.78
13	8.37	7.52	9.22
14	9.77	8.89	10.65
15	11.15	10.24	12.06
16	12.51	11.57	13.45
17	13.85	12.88	14.81
18	15.16	14.16	16.15
19	16.44	15.41	17.47
20	17.70	16.64	18.76
21	18.93	17.84	20.02
22	20.13	19.01	21.25
23	21.30	20.15	22.44
24	22.43	21.26	23.61
25	23.53	22.33	24.74
26	24.60	23.36	25.83
27	25.63	24.36	26.89

Age (W)	Growth (cm)	10% (cm)	90% (cm)
28	26.62	25.32	27.91
29	27.57	26.24	28.89
30	28.48	27.12	29.83
31	29.34	27.96	30.73
32	30.16	28.75	31.58
33	30.94	29.50	32.38
34	31.67	30.20	33.14
35	32.35	30.85	33.85
36	32.98	31.45	34.51
37	33.56	32.00	35.12
38	34.08	32.49	35.68
39	34.56	32.94	36.18
40	34.97	33.32	36.62
41	35.33	33.65	37.01
42	35.63	33.93	37.34

Head Circumference (HC) : CAMPBELL

GA Table

Professor Campbell's Group at Harris birthright Centre, King's College Hospital

HC (cm)	GA (wd)	±days (wd)
11.50	14w0d	01w3d
12.60	15w0d	01w3d
13.70	16w0d	01w4d
14.80	17w0d	01w5d
15.90	18w0d	01w6d
17.00	19w0d	02w0d
18.10	20w0d	02w1d
19.20	21w0d	02w2d
20.40	22w0d	02w3d
21.50	23w0d	02w3d
22.70	24w0d	02w3d
23.80	25w0d	02w3d
24.90	26w0d	02w4d
26.00	27w0d	02w5d

HC (cm)	GA (wd)	±days (wd)
27.10	28w0d	02w5d
28.10	29w0d	02w6d
29.00	30w0d	03w0d
29.90	31w0d	03w1d
30.80	32w0d	03w4d
31.50	33w0d	03w6d
32.00	34w0d	04w1d
32.50	35w0d	04w1d
33.00	36w0d	04w2d
33.50	37w0d	04w2d
34.00	38w0d	05w0d
34.30	39w0d	00w0d
34.50	40w0d	00w0d

Head Circumference (HC) : ASUM(SCW)

Fetal Growth Table

Australasian Society for Ultrasound in Medicine

Policies and Statements - [D7] Statement On Normal Ultrasonic Fetal Measurements (Revised May 2001)

Age (W)	Growth (cm)	±2SD (cm)
11	5.9	1.5
12	7.0	1.5
13	8.4	1.5
14	9.6	1.5
15	10.8	1.5
16	12.8	1.5
17	14.1	1.5
18	15.1	2.0
19	16.0	2.0
20	17.0	2.0
21	17.6	2.0
22	18.8	2.0
23	21.0	2.0
24	22.0	2.0
25	23.1	2.0
26	23.8	2.0

Age (W)	Growth (cm)	±2SD (cm)
27	25.0	2.0
28	26.3	2.0
29	26.9	2.5
30	27.4	2.5
31	28.4	2.5
32	28.8	2.5
33	30.0	2.5
34	30.5	2.5
35	31.0	2.5
36	31.7	2.5
37	32.1	2.5
38	32.8	2.5
39	33.6	2.5
40	34.0	2.5
41	34.4	2.5

Head Circumference (HC) : CFEF

GA Table

J.Créquat, M. Duyme, G. Brodaty.

Biométrie 2000. Tables de croissance foetale par le Collège Français d'Echographie Foetale (CFEF) et l'Inserm U155

Gynecol Obstet Fertil, 2000 Jun;28(6):435-45

HC (cm)	GA (w)	HC (cm)	GA (w)	HC (cm)	GA (w)	HC (cm)	GA (w)
12.08	16	20.66	23	26.30	29	30.36	35
13.44	17	21.71	24	27.08	30	30.88	36
14.75	18	22.73	25	27.83	31	31.35	37
16.02	19	23.67	26	28.52	32	31.78	38
17.24	20	24.60	27	29.20	33	32.18	39
18.42	21	25.47	28	29.81	34	32.40	40
19.57	22						

Fetal Growth Table

J.Créquat, M. Duyme, G. Brodaty

Biométrie 2000. Tables de croissance foetale par le Collège Français d'Echographie Foetale (CFEF) et l'Inserm U155

Gynecol Obstet Fertil 2000 Jun;28(6):435-45

Age (W)	Growth (cm)	10% (cm)	90% (cm)	Age (W)	Growth (cm)	10% (cm)	90% (cm)
16	12.10	11.10	13.10	29	26.30	24.60	28.00
17	13.40	12.40	14.50	30	27.10	25.40	28.80
18	14.80	13.60	15.90	31	27.80	26.10	29.60
19	16.00	14.90	17.20	32	28.50	26.70	30.40
20	17.20	16.00	18.50	33	29.20	27.30	31.00
21	18.40	17.10	19.70	34	29.80	27.90	31.70
22	19.60	18.20	20.90	35	30.40	28.40	32.30
23	20.70	19.20	22.00	36	30.90	28.90	32.90
24	21.70	20.30	23.10	37	31.40	29.30	33.40
25	22.70	21.20	24.20	38	31.80	29.70	33.90
26	23.70	22.20	25.20	39	32.20	30.10	34.30
27	24.60	23.00	26.20	40	32.40	30.30	34.60
28	25.50	23.90	27.10				

Head Circumference (HC) : JOHNSEN

GA Table

Johnsen SL, Rasmussen S, Sollien R, Kiserud T. "Fetal age assessment based on ultrasound head biometry and the effect of maternal and fetal factors" Acta Obstet Gynecol Scand, 2004 Aug; 83(8): 716-23

HC (cm)	Age (wd)	10% (wd)	90% (wd)	HC (cm)	Age (wd)	10% (wd)	90% (wd)
5.00	10w2d	09w5d	10w6d	13.60	17w0d	16w1d	17w6d
5.20	10w3d	10w0d	11w0d	13.80	17w1d	16w3d	18w0d
5.40	10w4d	10w1d	11w2d	14.00	17w2d	16w4d	18w1d
5.60	10w6d	10w2d	11w3d	14.20	17w3d	16w5d	18w2d
5.80	11w0d	10w3d	11w4d	14.40	17w4d	16w6d	18w3d
6.00	11w1d	10w4d	11w5d	14.60	17w6d	17w0d	18w5d
6.20	11w2d	10w5d	11w6d	14.80	18w0d	17w1d	18w6d
6.40	11w3d	10w6d	12w0d	15.00	18w1d	17w2d	19w0d
6.60	11w4d	11w0d	12w1d	15.20	18w2d	17w3d	19w1d
6.80	11w5d	11w1d	12w2d	15.40	18w3d	17w4d	19w2d

7.00	11w6d	11w2d	12w4d
7.20	12w0d	11w3d	12w5d
7.40	12w1d	11w4d	12w6d
7.60	12w2d	11w5d	13w0d
7.80	12w3d	11w6d	13w1d
8.00	12w4d	12w0d	13w2d
8.20	12w5d	12w1d	13w3d
8.40	13w0d	12w2d	13w4d
8.60	13w1d	12w3d	13w5d
8.80	13w2d	12w4d	14w0d
9.00	13w3d	12w5d	14w1d
9.20	13w4d	12w6d	14w2d
9.40	13w5d	13w0d	14w3d
9.60	13w6d	13w1d	14w4d
9.80	14w0d	13w2d	14w5d
10.00	14w1d	13w3d	14w6d
10.20	14w2d	13w4d	15w0d
10.40	14w3d	13w5d	15w2d
10.60	14w4d	13w6d	15w3d
10.80	14w6d	14w1d	15w4d
11.00	15w0d	14w2d	15w5d
11.20	15w1d	14w3d	15w6d
11.40	15w2d	14w4d	16w0d
11.60	15w3d	14w5d	16w1d
11.80	15w4d	14w6d	16w2d
12.00	15w5d	15w0d	16w4d
12.20	15w6d	15w1d	16w5d

15.60	18w4d	17w5d	19w3d
15.80	18w5d	18w0d	19w5d
16.00	19w0d	18w1d	19w6d
16.20	19w1d	18w2d	20w0d
16.40	19w2d	18w3d	20w1d
16.60	19w3d	18w4d	20w2d
16.80	19w4d	18w5d	20w3d
17.00	19w5d	18w6d	20w5d
17.20	20w0d	19w0d	20w6d
17.40	20w1d	19w2d	21w0d
17.60	20w2d	19w3d	21w1d
17.80	20w3d	19w4d	21w3d
18.00	20w4d	19w5d	21w4d
18.20	20w5d	19w6d	21w5d
18.40	21w0d	20w0d	21w6d
18.60	21w1d	20w2d	22w0d
18.80	21w2d	20w3d	22w2d
19.00	21w3d	20w4d	22w3d
19.20	21w4d	20w5d	22w4d
19.40	21w6d	20w6d	22w5d
19.60	22w0d	21w0d	23w0d
19.80	22w1d	21w2d	23w1d
20.00	22w2d	21w3d	23w2d
20.20	22w3d	21w4d	23w3d
20.40	22w5d	21w5d	23w4d
20.60	22w6d	21w6d	23w6d
20.80	23w0d	22w1d	24w0d

12.40	16w0d	15w2d	16w6d
12.60	16w1d	15w3d	17w0d
12.80	16w3d	15w4d	17w1d
13.00	16w4d	15w5d	17w2d
13.20	16w5d	15w6d	17w3d
13.40	16w6d	16w0d	17w5d

21.00	23w1d	22w2d	24w1d
21.20	23w3d	22w3d	24w3d
21.40	23w4d	22w4d	24w4d
21.60	23w5d	22w5d	24w5d
21.80	23w6d	23w0d	24w6d
22.00	24w1d	23w1d	25w1d

Fetal Growth Table

Johnsen SL, Wilsgaard T, Rasmussen S, Sollien R, Kiserud T. "Longitudinal reference charts for growth of the fetal head, abdomen and femur" Eur J Obstet Gynecol Reprod Biol, 2006 Aug; 127(2): 172-85

Age (W)	Growth (cm)	10% (cm)	90% (cm)
10w	4.90	4.20	5.60
11w	6.00	5.20	6.80
12w	7.10	6.30	8.10
13w	8.40	7.50	9.30
14w	9.60	8.70	10.60
15w	10.90	9.90	11.90
16w	12.10	11.10	13.20
17w	13.40	12.40	14.50
18w	14.70	13.60	15.80
19w	15.90	14.80	17.10
20w	17.20	16.00	18.40
21w	18.40	17.20	19.60
22w	19.60	18.40	20.80
23w	20.70	19.50	22.00

Age (W)	Growth (cm)	10% (cm)	90% (cm)
26w	24.00	22.70	25.30
27w	25.00	23.70	26.30
28w	25.90	24.60	27.30
29w	26.80	25.50	28.30
30w	27.70	26.30	29.20
31w	28.50	27.10	30.00
32w	29.30	27.90	30.90
33w	30.10	28.60	31.60
34w	30.70	29.20	32.30
35w	31.40	29.80	33.00
36w	32.00	30.40	33.60
37w	32.50	30.90	34.20
38w	33.00	31.40	34.70
39w	33.40	31.80	35.20

24w	21.80	20.60	23.10
25w	22.90	21.70	24.20

40w	33.80	32.20	35.60
41w	34.10	32.40	35.90

Head Circumference (HC) : KURMANAVICIUS

Fetal Growth Table

Kurmanavicius J, Wright EM, Royston P, Wisser J, Huch R, Huch A, Zimmermann R. "Fetal ultrasound biometry: 1. Head reference values" Br J Obstet Gynaecol, 1999 Feb; 106(2): 126-35

Age (W)	Growth (cm)	5% (cm)	95% (cm)
12w	7.21	5.97	8.45
13w	8.61	7.33	9.89
14w	9.99	8.67	11.31
15w	11.35	9.99	12.70
16w	12.68	11.29	14.07
17w	13.99	12.56	15.42
18w	15.27	13.81	16.74
19w	16.52	15.02	18.03
20w	17.75	16.21	19.29
21w	18.94	17.36	20.52
22w	20.10	18.49	21.71
23w	21.22	19.57	22.87
24w	22.31	20.62	24.00
25w	23.36	21.64	25.09
26w	24.37	22.61	26.13
27w	25.34	23.55	27.14

Age (W)	Growth (cm)	5% (cm)	95% (cm)
28w	26.27	24.44	28.11
29w	27.16	25.29	29.03
30w	28.00	26.09	29.91
31w	28.79	26.84	30.73
32w	29.53	27.55	31.51
33w	30.22	28.21	32.24
34w	30.87	28.81	32.92
35w	31.45	29.36	33.55
36w	31.99	29.86	34.12
37w	32.46	30.30	34.63
38w	32.88	30.68	35.09
39w	33.24	31.00	35.48
40w	33.54	31.26	35.82
41w	33.77	31.46	36.09
42w	33.94	31.59	36.30

Head Circumference (HC) : NICOLAIDES

Fetal Growth Table

Snijders RJ, Nicolaides KH. "Fetal biometry at 14-40 weeks' gestation" Ultrasound in obstetrics and Gynecology, 1994 Jan 1; 4(1): 34-48

Age (wd)	Growth (cm)	5% (cm)	95% (cm)
14w0d	11.00	10.20	11.80
14w1d	11.00	10.20	11.80
14w2d	11.00	10.20	11.80
14w3d	11.00	10.20	11.80
14w4d	11.00	10.20	11.80
14w5d	11.00	10.20	11.80
14w6d	11.00	10.20	11.80
15w0d	12.00	11.10	12.90
15w1d	12.00	11.10	12.90
15w2d	12.00	11.10	12.90
15w3d	12.00	11.10	12.90
15w4d	12.00	11.10	12.90
15w5d	12.00	11.10	12.90
15w6d	12.00	11.10	12.90
16w0d	13.00	12.00	14.00
16w1d	13.00	12.00	14.00
16w2d	13.00	12.00	14.00
16w3d	13.00	12.00	14.00
16w4d	13.00	12.00	14.00
16w5d	13.00	12.00	14.00

Age (wd)	Growth (cm)	5% (cm)	95% (cm)
27w0d	25.60	23.80	27.70
27w1d	25.60	23.80	27.70
27w2d	25.60	23.80	27.70
27w3d	25.60	23.80	27.70
27w4d	25.60	23.80	27.70
27w5d	25.60	23.80	27.70
27w6d	25.60	23.80	27.70
28w0d	26.70	24.80	28.80
28w1d	26.70	24.80	28.80
28w2d	26.70	24.80	28.80
28w3d	26.70	24.80	28.80
28w4d	26.70	24.80	28.80
28w5d	26.70	24.80	28.80
28w6d	26.70	24.80	28.80
29w0d	27.70	25.70	29.90
29w1d	27.70	25.70	29.90
29w2d	27.70	25.70	29.90
29w3d	27.70	25.70	29.90
29w4d	27.70	25.70	29.90
29w5d	27.70	25.70	29.90

16w6d	13.00	12.00	14.00
17w0d	14.10	13.00	15.20
17w1d	14.10	13.00	15.20
17w2d	14.10	13.00	15.20
17w3d	14.10	13.00	15.20
17w4d	14.10	13.00	15.20
17w5d	14.10	13.00	15.20
17w6d	14.10	13.00	15.20
18w0d	15.20	14.10	16.40
18w1d	15.20	14.10	16.40
18w2d	15.20	14.10	16.40
18w3d	15.20	14.10	16.40
18w4d	15.20	14.10	16.40
18w5d	15.20	14.10	16.40
18w6d	15.20	14.10	16.40
19w0d	16.30	15.10	17.60
19w1d	16.30	15.10	17.60
19w2d	16.30	15.10	17.60
19w3d	16.30	15.10	17.60
19w4d	16.30	15.10	17.60
19w5d	16.30	15.10	17.60
19w6d	16.30	15.10	17.60
20w0d	17.50	16.20	18.90
20w1d	17.50	16.20	18.90
20w2d	17.50	16.20	18.90
20w3d	17.50	16.20	18.90
20w4d	17.50	16.20	18.90

29w6d	27.70	25.70	29.90
30w0d	28.70	26.60	30.90
30w1d	28.70	26.60	30.90
30w2d	28.70	26.60	30.90
30w3d	28.70	26.60	30.90
30w4d	28.70	26.60	30.90
30w5d	28.70	26.60	30.90
30w6d	28.70	26.60	30.90
31w0d	29.60	27.40	31.90
31w1d	29.60	27.40	31.90
31w2d	29.60	27.40	31.90
31w3d	29.60	27.40	31.90
31w4d	29.60	27.40	31.90
31w5d	29.60	27.40	31.90
31w6d	29.60	27.40	31.90
32w0d	30.40	28.20	32.80
32w1d	30.40	28.20	32.80
32w2d	30.40	28.20	32.80
32w3d	30.40	28.20	32.80
32w4d	30.40	28.20	32.80
32w5d	30.40	28.20	32.80
32w6d	30.40	28.20	32.80
33w0d	31.10	28.80	33.60
33w1d	31.10	28.80	33.60
33w2d	31.10	28.80	33.60
33w3d	31.10	28.80	33.60
33w4d	31.10	28.80	33.60

20w5d	17.50	16.20	18.90
20w6d	17.50	16.20	18.90
21w0d	18.70	17.30	20.10
21w1d	18.70	17.30	20.10
21w2d	18.70	17.30	20.10
21w3d	18.70	17.30	20.10
21w4d	18.70	17.30	20.10
21w5d	18.70	17.30	20.10
21w6d	18.70	17.30	20.10
22w0d	19.80	18.40	21.40
22w1d	19.80	18.40	21.40
22w2d	19.80	18.40	21.40
22w3d	19.80	18.40	21.40
22w4d	19.80	18.40	21.40
22w5d	19.80	18.40	21.40
22w6d	19.80	18.40	21.40
23w0d	21.00	19.50	22.70
23w1d	21.00	19.50	22.70
23w2d	21.00	19.50	22.70
23w3d	21.00	19.50	22.70
23w4d	21.00	19.50	22.70
23w5d	21.00	19.50	22.70
23w6d	21.00	19.50	22.70
24w0d	22.20	20.60	24.00
24w1d	22.20	20.60	24.00
24w2d	22.20	20.60	24.00
24w3d	22.20	20.60	24.00

33w5d	31.10	28.80	33.60
33w6d	31.10	28.80	33.60
34w0d	31.70	29.40	34.20
34w1d	31.70	29.40	34.20
34w2d	31.70	29.40	34.20
34w3d	31.70	29.40	34.20
34w4d	31.70	29.40	34.20
34w5d	31.70	29.40	34.20
34w6d	31.70	29.40	34.20
35w0d	32.30	29.90	34.80
35w1d	32.30	29.90	34.80
35w2d	32.30	29.90	34.80
35w3d	32.30	29.90	34.80
35w4d	32.30	29.90	34.80
35w5d	32.30	29.90	34.80
35w6d	32.30	29.90	34.80
36w0d	32.70	30.30	35.30
36w1d	32.70	30.30	35.30
36w2d	32.70	30.30	35.30
36w3d	32.70	30.30	35.30
36w4d	32.70	30.30	35.30
36w5d	32.70	30.30	35.30
36w6d	32.70	30.30	35.30
37w0d	33.00	30.60	35.60
37w1d	33.00	30.60	35.60
37w2d	33.00	30.60	35.60
37w3d	33.00	30.60	35.60

24w4d	22.20	20.60	24.00	37w4d	33.00	30.60	35.60
24w5d	22.20	20.60	24.00	37w5d	33.00	30.60	35.60
24w6d	22.20	20.60	24.00	37w6d	33.00	30.60	35.60
25w0d	23.40	21.70	25.20	38w0d	33.20	30.80	35.80
25w1d	23.40	21.70	25.20	38w1d	33.20	30.80	35.80
25w2d	23.40	21.70	25.20	38w2d	33.20	30.80	35.80
25w3d	23.40	21.70	25.20	38w3d	33.20	30.80	35.80
25w4d	23.40	21.70	25.20	38w4d	33.20	30.80	35.80
25w5d	23.40	21.70	25.20	38w5d	33.20	30.80	35.80
25w6d	23.40	21.70	25.20	38w6d	33.20	30.80	35.80
26w0d	24.50	22.70	26.40	39w0d	33.30	30.90	35.90
26w1d	24.50	22.70	26.40	39w1d	33.30	30.90	35.90
26w2d	24.50	22.70	26.40	39w2d	33.30	30.90	35.90
26w3d	24.50	22.70	26.40	39w3d	33.30	30.90	35.90
26w4d	24.50	22.70	26.40	39w4d	33.30	30.90	35.90
26w5d	24.50	22.70	26.40	39w5d	33.30	30.90	35.90
26w6d	24.50	22.70	26.40	39w6d	33.30	30.90	35.90

Fetal Trunk cross-sectional Area (FTA) : OSAKA

GA Table

Osaka University Method 1989, 3 by Univ. Of Osaka

Fetal (cm^2)	GA (wd)	Fetal (cm^2)	GA (wd)	Fetal (cm^2)	GA (wd)	Fetal (cm^2)	GA (wd)
5.60	14w0d	26.00	22w5d	47.00	29w0d	68.00	34w4d
6.00	14w2d	27.00	23w1d	48.00	29w2d	69.00	34w6d
7.00	14w5d	28.00	23w3d	49.00	29w4d	70.00	35w1d
8.00	15w3d	29.00	23w5d	50.00	29w6d	71.00	35w3d
9.00	16w1d	30.00	24w0d	51.00	30w1d	72.00	35w5d
10.00	16w3d	31.00	24w2d	52.00	30w3d	73.00	36w0d
11.00	16w5d	32.00	24w5d	53.00	30w5d	74.00	36w2d
12.00	17w3d	33.00	25w0d	54.00	30w6d	75.00	36w4d
13.00	17w6d	34.00	25w2d	55.00	31w1d	76.00	36w6d
14.00	18w2d	35.00	25w4d	56.00	31w3d	77.00	37w1d
15.00	18w4d	36.00	25w6d	57.00	31w5d	78.00	37w3d
16.00	19w1d	37.00	26w1d	58.00	32w0d	79.00	37w5d
17.00	19w4d	38.00	26w3d	59.00	32w2d	80.00	37w6d
18.00	19w6d	39.00	26w5d	60.00	32w3d	81.00	38w2d
19.00	20w2d	40.00	27w0d	61.00	32w5d	82.00	38w4d
20.00	20w5d	41.00	27w2d	62.00	33w0d	83.00	39w0d
21.00	21w0d	42.00	27w4d	63.00	33w2d	84.00	39w1d
22.00	21w3d	43.00	27w6d	64.00	33w4d	85.00	39w3d
23.00	21w5d	44.00	28w1d	65.00	33w6d	86.00	39w6d
24.00	22w1d	45.00	28w3d	66.00	34w0d	86.60	40w0d
25.00	22w3d	46.00	28w5d	67.00	34w2d		

Fetal Growth Table

Osaka University Method 1989, 3 by Univ. Of Osaka

Age (W)	Growth (cm^2)	±SD (cm^2)	Age (W)	Growth (cm^2)	±SD (cm^2)
14w0d	5.60	1.20	27w1d	40.40	4.80
14w1d	5.80	1.20	27w2d	40.90	4.80

14w2d	6.00	1.20
14w3d	6.30	1.30
14w4d	6.50	1.30
14w5d	6.80	1.30
14w6d	7.10	1.30
15w0d	7.30	1.40
15w1d	7.60	1.40
15w2d	7.80	1.40
15w3d	8.10	1.50
15w4d	8.40	1.50
15w5d	8.70	1.50
15w6d	8.90	1.50
16w0d	9.20	1.60
16w1d	9.50	1.60
16w2d	9.80	1.60
16w3d	10.10	1.70
16w4d	10.40	1.70
16w5d	10.70	1.70
16w6d	11.00	1.80
17w0d	11.30	1.80
17w1d	11.60	1.80
17w2d	11.90	1.90
17w3d	12.20	1.90
17w4d	12.50	1.90
17w5d	12.80	2.00
17w6d	13.20	2.00

27w3d	41.40	4.90
27w4d	41.90	4.90
27w5d	42.40	5.00
27w6d	42.90	5.00
28w0d	43.40	5.10
28w1d	44.00	5.10
28w2d	44.50	5.20
28w3d	45.00	5.20
28w4d	45.50	5.30
28w5d	46.00	5.30
28w6d	46.60	5.40
29w0d	47.10	5.40
29w1d	47.60	5.50
29w2d	48.10	5.60
29w3d	48.70	5.60
29w4d	49.20	5.70
29w5d	49.70	5.70
29w6d	50.20	5.80
30w0d	50.80	5.80
30w1d	51.30	5.90
30w2d	51.80	5.90
30w3d	52.40	6.00
30w4d	52.90	6.10
30w5d	53.40	6.10
30w6d	54.00	6.20
31w0d	54.50	6.20

18w0d	13.50	2.00
18w1d	13.80	2.10
18w2d	14.10	2.10
18w3d	14.50	2.10
18w4d	14.80	2.20
18w5d	15.20	2.20
18w6d	15.50	2.20
19w0d	15.80	2.30
19w1d	16.20	2.30
19w2d	16.60	2.30
19w3d	16.90	2.40
19w4d	17.30	2.40
19w5d	17.60	2.50
19w6d	18.00	2.50
20w0d	18.40	2.50
20w1d	18.70	2.60
20w2d	19.10	2.60
20w3d	19.50	2.60
20w4d	19.90	2.70
20w5d	20.20	2.70
20w6d	20.60	2.80
21w0d	21.00	2.80
21w1d	21.40	2.80
21w2d	21.80	2.90
21w3d	22.20	2.90
21w4d	22.60	3.00

31w1d	55.00	6.30
31w2d	55.60	6.40
31w3d	56.10	6.40
31w4d	56.70	6.50
31w5d	57.20	6.50
31w6d	57.70	6.60
32w0d	58.30	6.70
32w1d	58.80	6.70
32w2d	59.40	6.80
32w3d	59.90	6.80
32w4d	60.40	6.90
32w5d	61.00	7.00
32w6d	61.50	7.00
33w0d	62.10	7.10
33w1d	62.60	7.10
33w2d	63.10	7.20
33w3d	63.70	7.30
33w4d	64.20	7.30
33w5d	64.70	7.40
33w6d	65.30	7.50
34w0d	65.80	7.50
34w1d	66.40	7.60
34w2d	66.90	7.60
34w3d	67.40	7.70
34w4d	67.90	7.80
34w5d	68.50	7.80

21w5d	23.00	3.00	34w6d	69.00	7.90
21w6d	23.40	3.00	35w0d	69.50	8.00
22w0d	23.80	3.10	35w1d	70.10	8.00
22w1d	24.20	3.10	35w2d	70.60	8.10
22w2d	24.70	3.20	35w3d	71.10	8.20
22w3d	25.10	3.20	35w4d	71.60	8.20
22w4d	25.50	3.30	35w5d	72.20	8.30
22w5d	25.90	3.30	35w6d	72.70	8.40
22w6d	26.40	3.30	36w0d	73.20	8.40
23w0d	26.80	3.40	36w1d	73.70	8.50
23w1d	27.20	3.40	36w2d	74.20	8.60
23w2d	27.70	3.50	36w3d	74.70	8.60
23w3d	28.10	3.50	36w4d	75.20	8.70
23w4d	28.50	3.60	36w5d	75.70	8.80
23w5d	29.00	3.60	36w6d	76.20	8.80
23w6d	29.40	3.70	37w0d	76.80	8.90
24w0d	29.90	3.70	37w1d	77.30	9.00
24w1d	30.30	3.70	37w2d	77.70	9.10
24w2d	30.80	3.80	37w3d	78.20	9.10
24w3d	31.30	3.80	37w4d	78.70	9.20
24w4d	31.70	3.90	37w5d	79.20	9.30
24w5d	32.20	3.90	37w6d	79.70	9.30
24w6d	32.60	4.00	38w0d	80.20	9.40
25w0d	33.10	4.00	38w1d	80.70	9.50
25w1d	33.60	4.10	38w2d	81.10	9.60
25w2d	34.10	4.10	38w3d	81.60	9.60
25w3d	34.50	4.20	38w4d	82.10	9.70
25w4d	35.00	4.20	38w5d	82.60	9.80
25w5d	35.50	4.30	38w6d	83.00	9.80
25w6d	36.00	4.30	39w0d	83.50	9.90
26w0d	36.50	4.40	39w1d	83.90	10.00
26w1d	36.90	4.40	39w2d	84.40	10.10
26w2d	37.40	4.50	39w3d	84.80	10.10
26w3d	37.90	4.50	39w4d	85.30	10.20
26w4d	38.40	4.60	39w5d	85.70	10.30
26w5d	38.90	4.60	39w6d	86.10	10.40
26w6d	39.40	4.70	40w0d	86.60	10.40
27w0d	39.90	4.70			

Clavicle (CLAV) : YARKONI

GA Table

Yarkoni, S., et. al. "Clavicular Measurement: A New Biometric Parameter for Fetal Evaluation." Journal of Ultrasound in Medicine 4:467-470, September, 1985.

Clav (cm)	Mean (wd)	5% (wd)	95% (wd)	Clav (cm)	Mean (wd)	5% (wd)	95% (wd)
1.1	13w6d	8w3d	17w2d	2.9	28w5d	23w2d	32w1d
1.2	14w4d	9w1d	18w1d	3	29w4d	24w0d	34w0d
1.3	14w3d	10w0d	19w6d	3.1	29w2d	25w6d	34w6d
1.4	15w2d	11w6d	20w5d	3.2	30w1d	26w5d	35w4d
1.5	16w1d	12w5d	21w4d	3.3	31w0d	27w4d	35w3d
1.6	18w0d	12w3d	21w3d	3.4	32w6d	27w3d	36w2d

1.7	18w5d	13w2d	22w2d
1.8	19w4d	14w1d	23w0d
1.9	19w3d	16w0d	24w6d
2	20w2d	16w6d	25w5d
2.1	21w1d	17w4d	26w4d
2.2	22w6d	17w3d	26w2d
2.3	23w5d	18w2d	27w1d
2.4	24w4d	19w1d	28w0d
2.5	24w3d	21w0d	29w6d
2.6	25w1d	21w5d	30w5d
2.7	26w0d	22w4d	30w3d
2.8	27w6d	22w3d	31w2d

3.5	33w5d	28w1d	37w1d
3.6	33w3d	29w0d	39w0d
3.7	34w2d	30w6d	39w5d
3.8	35w1d	31w5d	40w4d
3.9	37w0d	32w4d	40w3d
4	37w6d	32w2d	41w2d
4.1	38w4d	33w1d	42w0d
4.2	38w3d	35w0d	43w6d
4.3	39w2d	35w6d	44w5d
4.4	40w1d	36w5d	45w4d
4.5	41w6d	36w3d	45w3d

Fetal Growth Table

Yarkoni, S., Schmidt, W., Jeanty, P. et. al. (1985) Clavicle measurement: A new biometric parameter for fetal evaluation. J. Ultrasound Med., 4, 467-470

Age (W)	Growth (cm)	5% (cm)	95% (cm)
15	1.60	1.10	2.10
16	1.70	1.20	2.20
17	1.80	1.30	2.30
18	1.90	1.40	2.40
19	2.00	1.50	2.50
20	2.10	1.60	2.60
21	2.20	1.70	2.70
22	2.30	1.80	2.80

Age (W)	Growth (cm)	5% (cm)	95% (cm)
28	2.90	2.40	3.40
29	3.00	2.50	3.50
30	3.10	2.60	3.60
31	3.20	2.70	3.70
32	3.30	2.80	3.80
33	3.40	2.90	3.90
34	3.50	3.00	4.00
35	3.60	3.10	4.10

23	2.40	1.90	2.90
24	2.50	2.00	3.00
25	2.60	2.10	3.10
26	2.70	2.20	3.20
27	2.80	2.30	3.30

36	3.70	3.20	4.20
37	3.80	3.30	4.30
38	3.90	3.40	4.40
39	4.00	3.50	4.50
40	4.10	3.60	4.60

Length of Vertebral (Vertebral) : TOKYO

GA Table

Tokyo University Takashi Okai, et al. Japan Society of Obstetrics and Gynecology, Vol.38, No.8

Vertebral (cm)	Age (wd)	±SD (wd)
4.05	21w0d	01w0d
4.39	22w0d	01w2d
4.71	23w0d	01w4d
5.01	24w0d	01w5d
5.30	25w0d	02w0d
5.57	26w0d	02w3d
5.82	27w0d	02w5d
6.06	28w0d	03w0d
6.30	29w0d	03w3d
6.51	30w0d	03w4d

Vertebral (cm)	Age (wd)	±SD (wd)
6.72	31w0d	04w0d
6.93	32w0d	04w3d
7.13	33w0d	04w6d
7.32	34w0d	05w0d
7.51	35w0d	05w3d
7.70	36w0d	05w5d
7.89	37w0d	06w0d
8.08	38w0d	06w2d
8.27	39w0d	06w4d
8.47	40w0d	06w6d

Radius Length (RAD) : MERZ

Fetal Growth Table

E. Merz, W. Goldhofer, E. Timor-Tritsch "Ultrasound in Gynecology and Obstetrics" Textbook and Atlas, 1991 Georg Thieme Verlag, 308-338

Age (W)	Growth (cm)	5% (cm)	95% (cm)
12	0.5	0.1	0.8
13	0.7	0.4	1.1
14	1.0	0.7	1.4
15	1.3	0.9	1.6
16	1.5	1.2	1.9
17	1.8	1.4	2.1
18	2.0	1.6	2.4
19	2.2	1.9	2.6
20	2.5	2.1	2.9
21	2.7	2.3	3.1
22	2.9	2.5	3.3
23	3.1	2.7	3.5
24	3.3	2.9	3.7
25	3.5	3.1	3.9
26	3.7	3.2	4.1

Age (W)	Growth (cm)	5% (cm)	95% (cm)
27	3.8	3.4	4.3
28	4.0	3.6	4.4
29	4.1	3.7	4.6
30	4.3	3.8	4.7
31	4.4	4.0	4.9
32	4.5	4.1	5.0
33	4.7	4.2	5.1
34	4.8	4.3	5.2
35	4.9	4.4	5.3
36	5.0	4.5	5.4
37	5.1	4.6	5.5
38	5.1	4.7	5.6
39	5.2	4.7	5.7
40	5.3	4.8	5.8

Radius Length (RAD) : JEANTY

Fetal Growth Table

Jeanty, P. "Fetal Limb Biometry" (Letter) Radiology, 147:602, 1983

Age (W)	Growth (cm)	5% (cm)	95% (cm)
11	0.5	0.5	0.5
12	0.7	0.7	0.7
13	1.0	1.0	1.0
14	1.3	0.8	1.3
15	1.5	1.2	1.9
16	1.8	0.9	2.1
17	2.0	1.1	2.9
18	2.2	1.4	2.6
19	2.4	2.0	2.9
20	2.7	2.1	2.8
21	2.9	2.5	3.2
22	3.1	2.4	3.4
23	3.2	2.6	3.9
24	3.4	2.7	3.8
25	3.6	3.1	4.0

Age (W)	Growth (cm)	5% (cm)	95% (cm)
26	3.7	3.0	4.1
27	3.9	3.3	4.5
28	4.0	3.3	4.5
29	4.2	3.6	4.7
30	4.3	3.4	4.9
31	4.4	3.4	5.3
32	4.5	3.7	5.1
33	4.6	4.1	5.1
34	4.7	3.9	5.3
35	4.8	3.8	5.7
36	4.8	4.1	5.4
37	4.9	4.5	5.3
38	4.9	4.5	5.3
39	5.0	4.6	5.4
40	5.0	4.6	5.4

Radius Length (RAD) : HANSMANN

Fetal Growth Table

Hansmann, Hackeloer, Staudach and Wittman. "Ultrasound Diagnosis in Obstetrics and Gynecology" Springer-Verlag, New York, 1986; P.183

Age (W)	Growth (cm)	10% (cm)	90% (cm)
12	0.7	0.7	0.7
13	1.0	0.6	1.4
14	1.3	0.8	1.7
15	1.5	1.1	2.0
16	1.8	1.3	2.2
17	2.0	1.4	2.6
18	2.2	1.5	2.9
19	2.4	2.0	2.9
20	2.7	2.2	3.2
21	2.9	2.4	3.3
22	3.1	2.7	3.4
23	3.2	2.6	3.9
24	3.4	2.6	4.2
25	3.6	3.1	4.1
26	3.7	3.2	4.3

Age (W)	Growth (cm)	10% (cm)	90% (cm)
27	3.9	3.3	4.5
28	4.0	3.3	4.8
29	4.2	3.6	4.7
30	4.3	3.6	4.9
31	4.4	3.8	5.0
32	4.5	3.7	5.3
33	4.6	4.1	5.1
34	4.7	4.0	5.3
35	4.8	4.1	5.4
36	4.8	4.9	5.7
37	4.9	4.5	5.3
38	4.9	4.5	5.4
39	5.0	4.5	5.4
40	5.0	4.6	5.5

Middle Abdominal Diameter (MAD) : EIK-NESSH

GA Table

Eik-Nes SH, Jorgensen NP, Grottum P, Lokvik B. Normal range curves for the intrauterine growth of the fetal abdominal diameters, Submitted JCU.

MAD = (APD + TAD) / 2

MAD (cm)	G.A (wd)	MAD (cm)	G.A (wd)	MAD (cm)	G.A (wd)	MAD (cm)	G.A (wd)
3.60	16w0d	5.50	23w0d	7.40	28w2d	9.30	33w6d
3.70	16w3d	5.60	23w2d	7.50	28w4d	9.40	34w1d
3.80	16w6d	5.70	23w4d	7.60	28w6d	9.50	34w3d
3.90	17w3d	5.80	23w6d	7.70	29w1d	9.60	34w6d
4.00	17w6d	5.90	24w1d	7.80	29w3d	9.70	35w1d
4.10	18w2d	6.00	24w3d	7.90	29w5d	9.80	35w3d
4.20	18w4d	6.10	24w5d	8.00	30w0d	9.90	35w6d
4.30	19w0d	6.20	25w0d	8.10	30w2d	10.00	36w1d
4.40	19w3d	6.30	25w2d	8.20	30w4d	10.10	36w4d
4.50	19w5d	6.40	25w4d	8.30	30w6d	10.20	37w0d
4.60	20w1d	6.50	25w6d	8.40	31w1d	10.30	37w3d
4.70	20w3d	6.60	26w1d	8.50	31w3d	10.40	37w6d
4.80	20w5d	6.70	26w3d	8.60	31w5d	10.50	38w2d
4.90	21w1d	6.80	26w5d	8.70	32w0d	10.60	38w5d
5.00	21w3d	6.90	27w0d	8.80	32w2d	10.70	39w1d
5.10	21w5d	7.00	27w2d	8.90	32w4d	10.80	39w5d
5.20	22w0d	7.10	27w3d	9.00	32w6d		
5.30	22w2d	7.20	27w5d	9.10	33w1d		
5.40	22w5d	7.30	28w0d	9.20	33w4d		

Fetal Growth Table

Eik-Nes SH, Jorgensen NP, Grottum P, Lokvik B. Normal range curves for the intrauterine growth of the fetal abdominal diameters, Submitted JCU.

MAD = (APD + TAD) /2

Age (wd)	Growth (cm)
16w0d	3.60
16w3d	3.70
16w6d	3.80
17w3d	3.90
17w6d	4.00
18w2d	4.10
18w4d	4.20
19w0d	4.30
19w3d	4.40
19w5d	4.50
20w1d	4.60
20w3d	4.70
20w5d	4.80
21w1d	4.90
21w3d	5.00
21w5d	5.10
22w0d	5.20
22w2d	5.30
22w5d	5.40

Age (wd)	Growth (cm)
24w5d	6.10
25w0d	6.20
25w2d	6.30
25w4d	6.40
25w6d	6.50
26w1d	6.60
26w3d	6.70
26w5d	6.80
27w0d	6.90
27w2d	7.00
27w3d	7.10
27w5d	7.20
28w0d	7.30
28w2d	7.40
28w4d	7.50
28w6d	7.60
29w1d	7.70
29w3d	7.80
29w5d	7.90

Age (wd)	Growth (cm)
31w3d	8.50
31w5d	8.60
32w0d	8.70
32w2d	8.80
32w4d	8.90
32w6d	9.00
33w1d	9.10
33w4d	9.20
33w6d	9.30
34w1d	9.40
34w3d	9.50
34w6d	9.60
35w1d	9.70
35w3d	9.80
35w6d	9.90
36w1d	10.00
36w4d	10.10
37w0d	10.20
37w3d	10.30

23w0d	5.50
23w2d	5.60
23w4d	5.70
23w6d	5.80
24w1d	5.90
24w3d	6.00

30w0d	8.00
30w2d	8.10
30w4d	8.20
30w6d	8.30
31w1d	8.40

37w6d	10.40
38w2d	10.50
38w5d	10.60
39w1d	10.70
39w5d	10.80

Middle Abdominal Diameter (MAD) : JOHNSEN

Fetal Growth Table

Johnsen SL, Wilsgaard T, Rasmussen S, Sollien R, Kiserud T. "Longitudinal reference charts for growth of the fetal head, abdomen and femur" Eur J Obstet Gynecol Reprod Biol, 2006 Aug; 127(2): 172-85

Age (W)	Growth (cm)	10% (cm)	90% (cm)
10	1.10	1.00	1.40
11	1.50	1.30	1.70
12	1.80	1.60	2.10
13	2.10	1.90	2.40
14	2.50	2.20	2.80
15	2.90	2.60	3.20
16	3.20	2.90	3.60
17	3.60	3.30	4.00
18	4.00	3.60	4.40
19	4.30	4.00	4.80
20	4.70	4.30	5.10

Age (W)	Growth (cm)	10% (cm)	90% (cm)
26	6.80	6.30	7.40
27	7.20	6.60	7.80
28	7.50	7.00	8.10
29	7.90	7.30	8.50
30	8.20	7.60	8.80
31	8.50	7.90	9.20
32	8.80	8.20	9.50
33	9.20	8.50	9.90
34	9.50	8.80	10.20
35	9.80	9.10	10.60
36	10.10	9.30	10.90

21	5.10	4.60	5.50	37	10.40	9.60	11.20
22	5.40	5.00	5.90	38	10.70	9.90	11.50
23	5.80	5.30	6.30	39	11.00	10.20	11.90
24	6.10	5.70	6.70	40	11.30	10.40	12.20
25	6.50	6.00	7.00	41	11.50	10.60	12.40

Middle Abdominal Diameter (MAD) : KURMANAVICIUS

Fetal Growth Table

Kurmanavicius J, Wright EM, Royston P, Zimmermann R, Huch R, Huch A, Wisser J. "Fetal ultrasound biometry: 2. Abdomen and femur length reference values" Br J Obstet Gynaecol, 1999 Feb; 106(2): 136-43

Age (W)	Growth (cm)	5% (cm)	95% (cm)	Age (W)	Growth (cm)	5% (cm)	95% (cm)
12	1.81	1.45	2.18	28	7.40	6.64	8.16
13	2.19	1.79	2.58	29	7.72	6.93	8.50
14	2.55	2.14	2.97	30	8.03	7.22	8.84
15	2.92	2.48	3.36	31	8.64	7.50	9.17
16	3.29	2.82	3.75	32	8.64	7.78	9.50
17	3.65	3.16	4.14	33	8.94	8.05	9.82
18	4.01	3.49	4.52	34	9.23	8.32	10.14
19	4.36	3.82	4.90	35	9.51	8.58	10.45
20	4.71	4.15	5.28	36	9.79	8.84	10.75
21	5.06	4.47	5.65	37	10.07	9.09	11.05
22	5.41	4.80	6.02	38	10.34	9.33	11.34
23	5.75	5.11	6.39	39	10.60	9.57	11.63
24	6.09	5.43	6.75	40	10.85	9.80	11.91
25	6.42	5.74	7.11	41	11.10	10.02	12.18
26	6.75	6.04	7.47	42	11.34	10.24	12.45
27	7.08	6.34	7.82				

Mid Cerebral Artery(MCA)-Resistance Index(RI) : SHINOZUKA

Fetal Growth Table

N.Shinozuka & H.Kagawa 1996. http://www.shinozuka.com

Age (W)	10%	90%	Age (W)	10%	90%
21	0.77	0.86	32	0.78	0.92
22	0.78	0.89	33	0.77	0.91
23	0.79	0.91	34	0.76	0.90
24	0.80	0.92	35	0.75	0.89
25	0.80	0.93	36	0.73	0.88
26	0.80	0.94	37	0.72	0.87
27	0.80	0.94	38	0.70	0.86
28	0.80	0.95	39	0.68	0.85
29	0.80	0.94	40	0.66	0.84
30	0.79	0.94	41	0.64	0.83
31	0.79	0.93			

Mid Cerebral Artery(MCA)-Pulsatility Index(PI) : SHINOZUKA

Fetal Growth Table

N.Shinozuka & H.Kagawa 1996. http://www.shinozuka.com

Age (W)	10%	90%
21	1.51	2.02
22	1.56	2.19
23	1.59	2.34
24	1.62	2.46
25	1.64	2.54
26	1.65	2.60
27	1.65	2.63
28	1.65	2.63
29	1.63	2.61
30	1.61	2.57
31	1.58	2.52

Age (W)	10%	90%
32	1.54	2.45
33	1.49	2.38
34	1.44	2.30
35	1.38	2.21
36	1.32	2.13
37	1.25	2.05
38	1.19	1.98
39	1.12	1.92
40	1.05	1.87
41	0.99	1.83

Umbilical Artery(UmA)-Resistance Index(RI) : SHINOZUKA

Fetal Growth Table

N.Shinozuka & H.Kagawa 1996. http://www.shinozuka.com

Age (W)	10%	90%
13	0.76	0.96
14	0.73	0.92
15	0.71	0.89
16	0.69	0.86
17	0.67	0.84
18	0.66	0.83
19	0.65	0.81
20	0.64	0.80
21	0.64	0.79
22	0.63	0.78
23	0.62	0.78
24	0.62	0.77
25	0.61	0.77
26	0.61	0.76
27	0.60	0.75

Age (W)	10%	90%
28	0.59	0.75
29	0.58	0.74
30	0.57	0.74
31	0.56	0.73
32	0.55	0.72
33	0.54	0.71
34	0.53	0.70
35	0.52	0.70
36	0.51	0.69
37	0.50	0.68
38	0.50	0.67
39	0.50	0.67
40	0.50	0.67
41	0.50	0.67

Umbilical Artery(UmA)- Pulsatility Index(PI) : SHINOZUKA

Fetal Growth Table

N.Shinozuka & H.Kagawa 1996. http://www.shinozuka.com

Age (W)	10%	90%	Age (W)	10%	90%
13	1.29	2.58	28	0.88	1.25
14	1.20	2.22	29	0.87	1.23
15	1.13	1.97	30	0.85	1.21
16	1.08	1.79	31	0.82	1.19
17	1.05	1.66	32	0.80	1.16
18	1.02	1.57	33	0.78	1.14
19	1.00	1.50	34	0.75	1.12
20	0.99	1.45	35	0.73	1.10
21	0.97	1.41	36	0.70	1.08
22	0.96	1.37	37	0.68	1.06
23	0.95	1.35	38	0.67	1.05
24	0.94	1.33	39	0.66	1.04
25	0.92	1.31	40	0.66	1.03
26	0.91	1.29	41	0.67	1.03
27	0.90	1.27			

Anterior Posterior Abdominal Diameter (APD): HANSMANN

Fetal Growth Table

Age (W)	Growth (cm)	Age (W)	Growth (cm)	Age (W)	Growth (cm)	Age (W)	Growth (cm)
15	2.60	22	4.70	29	6.70	36	8.70
16	2.90	23	4.90	30	7.00	37	9.00
17	3.10	24	5.20	31	7.30	38	9.30
18	3.50	25	5.50	32	7.60	39	9.50
19	3.80	26	5.80	33	7.90	40	9.70
20	4.00	27	6.10	34	8.20	41	9.80
21	4.30	28	6.40	35	8.40	42	9.90

Anterior Posterior Abdominal Diameter (APD): BESSIS

GA Table

The data are those provided by Dr. Bessis to M. Le Bel.(Same as SIGMA 20, see memo from Ch. Gahwiler dated , June 23, 1983)

APD (cm)	GA (wd)	±days (wd)	APD (cm)	GA (wd)	±days (wd)
2.50	14w0d	01w1d	8.20	33w4d	03w1d
7.00	28w5d	02w1d	8.40	34w3d	03w4d
7.50	30w5d	02w3d	8.60	35w5d	04w1d
8.00	32w4d	03w1d	8.80	37w1d	04w6d

Transverse Abdominal Diameter (TAD) : CFEF

GA Table

J.Créquat, M. Duyme, G. Brodaty

Biométrie 2000. Tables de croissance foetale par le Collège Français d'Echographie Foetale (CFEF) et l'Inserm U155

Gynecol Obstet Fertil 2000 Jun;28(6):435-45

TAD (cm)	GA (w)	TAD (cm)	GA (w)	TAD (cm)	GA (w)
1.35	11	5.15	22	8.47	33
1.70	12	5.47	23	8.75	34
2.05	13	5.78	24	9.00	35
2.40	14	6.10	25	9.23	36
2.76	15	6.40	26	9.48	37
3.12	16	6.71	27	9.70	38
3.47	17	7.02	28	9.93	39
3.83	18	7.32	29	10.16	40
4.16	19	7.61	30	10.30	41
4.52	20	7.92	31		
4.83	21	8.21	32		

Fetal Growth Table

J.Créquat, M. Duyme, G. Brodaty

Biométrie 2000. Tables de croissance foetale par le Collège Français d'Echographie Foetale (CFEF) et l'Inserm U155

Gynecol Obstet Fertil 2000 Jun;28(6):435-45

Age (W)	Growth (cm)	10% (cm)	90% (cm)	Age (W)	Growth (cm)	10% (cm)	90% (cm)
11	1.40	1.10	1.60	27	6.70	6.10	7.30
12	1.70	1.40	2.00	28	7.00	6.40	7.70
13	2.10	1.70	2.40	29	7.30	6.60	8.00
14	2.40	2.00	2.80	30	7.60	6.90	8.30
15	2.80	2.40	3.20	31	7.90	7.20	8.70
16	3.10	2.70	3.60	32	8.20	7.40	9.00
17	3.50	3.00	3.90	33	8.50	7.70	9.30
18	3.80	3.40	4.30	34	8.80	7.90	9.60
19	4.20	3.70	4.60	35	9.00	8.10	9.90
20	4.50	4.00	5.00	36	9.20	8.30	10.20
21	4.80	4.30	5.30	37	9.50	8.50	10.50
22	5.20	4.70	5.70	38	9.70	8.60	10.80
23	5.50	4.90	6.00	39	9.90	8.70	11.10
24	5.80	5.20	6.30	40	10.20	8.90	11.50
25	6.10	5.50	6.70	41	10.30	8.90	11.70
26	6.40	5.80	7.00				

Thoracic Circumference (ThC): CHITKARA

Fetal Growth Table

Chitkara U, Rosenberg J, Chervenak FA, et al. "Prenatal Sonographic Assessment of the Fetal Thorax: Normal Values" American Journal of Obstetrics and Gynecology, 156:1069, 1987

Age (W)	Growth (cm)	5% (cm)	95% (cm)
16	9.1	6.4	11.9
17	10.0	7.3	12.8
18	11.0	8.2	13.7
19	11.9	9.1	14.6
20	12.8	10.0	15.5
21	13.7	11.0	16.4
22	14.6	11.9	17.3
23	15.5	12.8	18.2
24	16.4	13.7	19.1
25	17.3	14.6	20.0
26	18.2	15.5	21.0
27	19.1	16.4	21.9
28	20.0	17.3	22.8

Age (W)	Growth (cm)	5% (cm)	95% (cm)
29	21.0	18.2	23.7
30	21.9	19.1	24.6
31	22.8	20.0	25.5
32	23.7	20.9	26.4
33	24.6	21.8	27.3
34	25.5	22.8	28.2
35	26.4	23.7	29.1
36	27.3	24.6	30.0
37	28.2	25.5	30.9
38	29.1	26.4	31.9
39	30.0	27.3	32.8
40	30.9	28.2	33.7

Fibula Length (FIB): JEANTY

Fetal Growth Table

Jeanty, P. "Fetal Limb Biometry" (Letter) Radiology, 147:602, 1983

Age	Mean (cm)	5% (cm)	95% (cm)
11	0.2	0.2	0.2
12	0.5	0.5	0.5
13	0.8	0.8	0.8
14	1.1	0.6	1.1
15	1.4	1.0	1.8
16	1.7	0.6	2.2
17	1.9	0.7	3.1
18	2.2	1.0	2.8
19	2.4	1.8	3.0
20	2.7	1.8	3.0
21	2.9	2.4	3.4
22	3.1	2.1	3.7
23	3.3	2.3	4.4
24	3.5	2.6	4.1
25	3.7	3.3	4.2

Age	Mean (cm)	5% (cm)	95% (cm)
26	3.9	3.2	4.3
27	4.1	3.5	4.7
28	4.3	3.6	4.7
29	4.5	4.0	5.0
30	4.7	3.8	5.2
31	4.8	4.0	5.7
32	5.0	4.0	5.6
33	5.1	4.3	5.9
34	5.2	4.6	5.6
35	5.4	5.1	5.7
36	5.5	5.1	5.6
37	5.6	5.5	5.8
38	5.7	5.4	5.9
39	5.8	5.5	6.2
40	5.9	5.4	6.2

Fibula Length (FIB) : HANSMANN

Fetal Growth Table

Hansmann, Hackeloer, Staudach and Wittman. "Ultrasound Diagnosis in Obstetrics and Gynecology" Springer-Verlag, New York, 1986; P.182

GA (W)	50th (cm)	5th (cm)	95th (cm)
12	0.6	0.6	0.6
13	0.9	0.9	0.9
14	1.2	0.6	1.9
15	1.5	0.9	2.1
16	1.8	1.3	2.3
17	2.1	1.3	2.8
18	2.3	1.5	3.1
19	2.6	1.9	3.3
20	2.8	2.1	3.6
21	3.1	2.4	3.7
22	3.3	2.7	3.9
23	3.5	2.8	4.2
24	3.7	2.9	4.5
25	4.0	3.4	4.5
26	4.2	3.6	4.7

GA (W)	50th (cm)	5th (cm)	95th (cm)
27	4.4	3.7	5.0
28	4.5	3.8	5.3
29	4.7	4.1	5.4
30	4.9	4.3	5.6
31	5.1	4.2	5.9
32	5.2	4.2	6.3
33	5.4	4.6	6.2
34	5.5	4.6	6.5
35	5.7	5.1	6.2
36	5.8	5.4	6.3
37	5.9	5.4	6.5
38	6.1	5.6	6.5
39	6.2	5.6	6.7
40	6.3	5.9	6.7

Nuchal Thickness (NT) : YAGEL

Fetal Growth Table

Yagel S, Anteby EY, Rosen L, et al : Assessment of first tirmester nuchal translucency by daily reference intervals. Ultrasound Obstet Gynecol 11:262, 1998

Days (d)	Predicted (mm)	-1.96SD (mm)	+1.96SD (mm)
60	1.034	0.357	1.849
61	1.047	0.367	1.864
62	1.062	0.379	1.882
63	1.079	0.393	1.902
64	1.098	0.409	1.925
65	1.119	0.427	1.950
66	1.142	0.446	1.978
67	1.168	0.468	2.009
68	1.195	0.491	2.042
69	1.226	0.516	2.079
70	1.258	0.543	2.118
71	1.293	0.572	2.16
72	1.330	0.603	2.204
73	1.370	0.636	2.252
74	1.412	0.671	2.303
75	1.457	0.709	2.357
76	1.505	0.748	2.415
77	1.556	0.790	2.475
78	1.609	0.835	2.539
79	1.665	0.882	2.607

80	1.725	0.931	2.679
81	1.787	0.983	2.754
82	1.853	1.038	2.833
83	1.922	1.095	2.916
84	1.995	1.156	3.003
85	2.071	1.219	3.095
86	2.151	1.286	3.191
87	2.235	1.356	3.292
88	2.323	1.429	3.397
89	2.415	1.505	3.508
90	2.511	1.586	3.624
91	2.612	1.669	3.745
92	2.718	1.757	3.872
93	2.828	1.849	4.005
94	2.944	1.946	4.144
95	3.065	2.046	4.290
96	3.192	2.152	4.442
97	3.324	2.262	4.601
98	3.462	2.377	4.767
99	3.607	2.497	4.941
100	3.758	2.623	5.123
101	3.917	2.755	5.313
102	4.082	2.893	5.512
103	4.255	3.037	5.720
104	4.437	3.187	5.938
105	4.626	3.345	6.166

Lateral Ventricular Width (Lat Vent) : JOHNSEN

Fetal Growth Table

Johnson ML, Dunne MG, Mack LA, Rashbaum CL.

"Evaluation of Fetal Intracranial Anatomy by Static and Real-Time Ultrasound" Journal of Clinical Ultrasound, 8:311-318, August 1980

Age (w)	Lat Vent (cm)	Age (w)	Lat Vent (cm)
15	0.75	28	1.1
16	0.86	29	1.0
17	0.85	30	1.0
18	0.83	31	1.0
20	0.82	32	1.1
21	0.76	33	1.1
22	0.82	34	1.1
23	0.83	35	1.1
24	0.83	36	1.1
25	1.1	37	1.2
26	0.9	40	1.2
27	0.9		

Hemispheric Width (HW) : JOHNSEN

Fetal Growth Table

Johnson ML, Dunne MG, Mack LA, Rashbaum CL.

"Evaluation of Fetal Intracranial Anatomy by Static and Real-Time Ultrasound" Journal of Clinical Ultrasound, 8:311-318, August 1980

Age (w)	HW (cm)
15	1.40
16	1.50
17	1.50
18	1.80
20	1.90
21	2.20
22	2.60
23	2.50
24	2.70
25	3.00
26	3.00
27	3.00

Age (w)	HW (cm)
28	3.30
29	3.40
30	3.40
31	3.40
32	3.60
33	3.40
34	3.80
35	3.80
36	3.90
37	4.10
40	4.30

Renal Length (Renal L) : Hansmann

Fetal Growth Table

Hansmann, Hackeloer, Staudach and Wittman. "Ultrasound Diagnosis in Obstetrics and Gynecology" Springer-Verlag, New York, 1986; P.180

Age (w)	Growth (cm)	5% (cm)	95% (cm)
20	2.80	2.10	3.60
21	2.90	2.20	3.60
22	3.00	2.20	3.70
23	3.00	2.30	3.70
24	3.10	2.40	3.80
25	3.10	2.40	3.90
26	3.20	2.50	3.90
27	3.30	2.60	4.00
28	3.30	2.60	4.00
29	3.40	2.70	4.10
30	3.40	2.70	4.20

Age (w)	Growth (cm)	5% (cm)	95% (cm)
31	3.50	2.80	4.20
32	3.60	2.90	4.30
33	3.60	2.90	4.30
34	3.70	3.00	4.40
35	3.80	3.00	4.50
36	3.80	3.10	4.50
37	3.90	3.20	4.60
38	3.90	3.20	4.70
39	4.00	3.30	4.70
40	4.10	3.30	4.80

Renal Anterior-Posterior Length (Renal AP) : Hansmann

Fetal Growth Table

Hansmann, Hackeloer, Staudach and Wittman. "Ultrasound Diagnosis in Obstetrics and Gynecology" Springer-Verlag, New York, 1986; P.180

Age (w)	Growth (cm)	5% (cm)	95% (cm)
20	1.50	1.10	1.90
21	1.50	1.10	1.90
22	1.60	1.20	2.00
23	1.60	1.20	2.00
24	1.70	1.30	2.10
25	1.70	1.30	2.10
26	1.80	1.40	2.20
27	1.80	1.40	2.20
28	1.80	1.40	2.20
29	1.90	1.50	2.30
30	1.90	1.50	2.30

Age (w)	Growth (cm)	5% (cm)	95% (cm)
31	2.00	1.60	2.40
32	2.00	1.60	2.40
33	2.10	1.70	2.50
34	2.10	1.70	2.50
35	2.10	1.70	2.50
36	2.20	1.80	2.60
37	2.20	1.80	2.60
38	2.30	1.90	2.70
39	2.30	1.90	2.70
40	2.30	1.90	2.70

Cisterna Magna Diameter (CM) : NICOLAIDES

Fetal Growth Table

Snijders RJ, Nicolaides KH. "Fetal biometry at 14-40 weeks' gestation" Ultrasound in obstetrics and Gynecology, 1994 Jan 1;4(1):34-48

Age (wd)	Growth (cm)	5% (cm)	95% (cm)
14w0d	0.35	0.19	0.53
14w1d	0.35	0.19	0.53
14w2d	0.35	0.19	0.53
14w3d	0.35	0.19	0.53
14w4d	0.35	0.19	0.53
14w5d	0.35	0.19	0.53
14w6d	0.35	0.19	0.53
15w0d	0.38	0.21	0.57
15w1d	0.38	0.21	0.57
15w2d	0.38	0.21	0.57
15w3d	0.38	0.21	0.57
15w4d	0.38	0.21	0.57
15w5d	0.38	0.21	0.57
15w6d	0.38	0.21	0.57
16w0d	0.41	0.24	0.60
16w1d	0.41	0.24	0.60
16w2d	0.41	0.24	0.60
16w3d	0.41	0.24	0.60
16w4d	0.41	0.24	0.60
16w5d	0.41	0.24	0.60

Age (wd)	Growth (cm)	5% (cm)	95% (cm)
27w0d	0.66	0.46	0.89
27w1d	0.66	0.46	0.89
27w2d	0.66	0.46	0.89
27w3d	0.66	0.46	0.89
27w4d	0.66	0.46	0.89
27w5d	0.66	0.46	0.89
27w6d	0.66	0.46	0.89
28w0d	0.68	0.47	0.91
28w1d	0.68	0.47	0.91
28w2d	0.68	0.47	0.91
28w3d	0.68	0.47	0.91
28w4d	0.68	0.47	0.91
28w5d	0.68	0.47	0.91
28w6d	0.68	0.47	0.91
29w0d	0.69	0.49	0.93
29w1d	0.69	0.49	0.93
29w2d	0.69	0.49	0.93
29w3d	0.69	0.49	0.93
29w4d	0.69	0.49	0.93
29w5d	0.69	0.49	0.93
16w6d	0.41	0.24	0.60
17w0d	0.43	0.26	0.63
17w1d	0.43	0.26	0.63
17w2d	0.43	0.26	0.63
17w3d	0.43	0.26	0.63
17w4d	0.43	0.26	0.63
17w5d	0.43	0.26	0.63
17w6d	0.43	0.26	0.63
18w0d	0.46	0.28	0.66
18w1d	0.46	0.28	0.66
18w2d	0.46	0.28	0.66
18w3d	0.46	0.28	0.66
18w4d	0.46	0.28	0.66
18w5d	0.46	0.28	0.66
18w6d	0.46	0.28	0.66
19w0d	0.49	0.31	0.69
19w1d	0.49	0.31	0.69
19w2d	0.49	0.31	0.69
19w3d	0.49	0.31	0.69
19w4d	0.49	0.31	0.69
19w5d	0.49	0.31	0.69
19w6d	0.49	0.31	0.69
20w0d	0.51	0.33	0.72
20w1d	0.51	0.33	0.72
20w2d	0.51	0.33	0.72
20w3d	0.51	0.33	0.72
20w4d	0.51	0.33	0.72

29w6d	0.69	0.49	0.93
30w0d	0.70	0.50	0.94
30w1d	0.70	0.50	0.94
30w2d	0.70	0.50	0.94
30w3d	0.70	0.50	0.94
30w4d	0.70	0.50	0.94
30w5d	0.70	0.50	0.94
30w6d	0.70	0.50	0.94
31w0d	0.72	0.51	0.96
31w1d	0.72	0.51	0.96
31w2d	0.72	0.51	0.96
31w3d	0.72	0.51	0.96
31w4d	0.72	0.51	0.96
31w5d	0.72	0.51	0.96
31w6d	0.72	0.51	0.96
32w0d	0.73	0.52	0.97
32w1d	0.73	0.52	0.97
32w2d	0.73	0.52	0.97
32w3d	0.73	0.52	0.97
32w4d	0.73	0.52	0.97
32w5d	0.73	0.52	0.97
32w6d	0.73	0.52	0.97
33w0d	0.74	0.53	0.98
33w1d	0.74	0.53	0.98
33w2d	0.74	0.53	0.98
33w3d	0.74	0.53	0.98
33w4d	0.74	0.53	0.98

20w5d	0.51	0.33	0.72	33w5d	0.74	0.53	0.98
20w6d	0.51	0.33	0.72	33w6d	0.74	0.53	0.98
21w0d	0.54	0.35	0.75	34w0d	0.75	0.53	0.99
21w1d	0.54	0.35	0.75	34w1d	0.75	0.53	0.99
21w2d	0.54	0.35	0.75	34w2d	0.75	0.53	0.99
21w3d	0.54	0.35	0.75	34w3d	0.75	0.53	0.99
21w4d	0.54	0.35	0.75	34w4d	0.75	0.53	0.99
21w5d	0.54	0.35	0.75	34w5d	0.75	0.53	0.99
21w6d	0.54	0.35	0.75	34w6d	0.75	0.53	0.99
22w0d	0.56	0.37	0.77	35w0d	0.75	0.54	1.00
22w1d	0.56	0.37	0.77	35w1d	0.75	0.54	1.00
22w2d	0.56	0.37	0.77	35w2d	0.75	0.54	1.00
22w3d	0.56	0.37	0.77	35w3d	0.75	0.54	1.00
22w4d	0.56	0.37	0.77	35w4d	0.75	0.54	1.00
22w5d	0.56	0.37	0.77	35w5d	0.75	0.54	1.00
22w6d	0.56	0.37	0.77	35w6d	0.75	0.54	1.00
23w0d	0.58	0.39	0.80	36w0d	0.76	0.54	1.00
23w1d	0.58	0.39	0.80	36w1d	0.76	0.54	1.00
23w2d	0.58	0.39	0.80	36w2d	0.76	0.54	1.00
23w3d	0.58	0.39	0.80	36w3d	0.76	0.54	1.00
23w4d	0.58	0.39	0.80	36w4d	0.76	0.54	1.00
23w5d	0.58	0.39	0.80	36w5d	0.76	0.54	1.00
23w6d	0.58	0.39	0.80	36w6d	0.76	0.54	1.00
24w0d	0.60	0.41	0.82	37w0d	0.76	0.54	1.01
24w1d	0.60	0.41	0.82	37w1d	0.76	0.54	1.01
24w2d	0.60	0.41	0.82	37w2d	0.76	0.54	1.01
24w3d	0.60	0.41	0.82	37w3d	0.76	0.54	1.01
24w4d	0.60	0.41	0.82	37w4d	0.76	0.54	1.01
24w5d	0.60	0.41	0.82	37w5d	0.76	0.54	1.01
24w6d	0.60	0.41	0.82	37w6d	0.76	0.54	1.01
25w0d	0.62	0.43	0.85	38w0d	0.76	0.55	1.01
25w1d	0.62	0.43	0.85	38w1d	0.76	0.55	1.01
25w2d	0.62	0.43	0.85	38w2d	0.76	0.55	1.01
25w3d	0.62	0.43	0.85	38w3d	0.76	0.55	1.01
25w4d	0.62	0.43	0.85	38w4d	0.76	0.55	1.01
25w5d	0.62	0.43	0.85	38w5d	0.76	0.55	1.01
25w6d	0.62	0.43	0.85	38w6d	0.76	0.55	1.01
26w0d	0.64	0.44	0.87	39w0d	0.76	0.55	1.01
26w1d	0.64	0.44	0.87	39w1d	0.76	0.55	1.01
26w2d	0.64	0.44	0.87	39w2d	0.76	0.55	1.01
26w3d	0.64	0.44	0.87	39w3d	0.76	0.55	1.01
26w4d	0.64	0.44	0.87	39w4d	0.76	0.55	1.01
26w5d	0.64	0.44	0.87	39w5d	0.76	0.55	1.01
26w6d	0.64	0.44	0.87	39w6d	0.76	0.55	1.01

Amniotic Fluid Index (AFI) : MOORE

Fetal Growth Table

Moore TR, Cayle JE: The amniotic fluid index in normal human pregnancy.

Am J Obstet Gynecol 162:1168, 1990

Age (w)	Mean (cm)	5% (cm)	95% (cm)	Age (w)	Mean (cm)	5% (cm)	95% (cm)
16	12.10	7.90	18.50	30	14.50	9.00	23.40
17	12.70	8.30	19.40	31	14.40	8.80	23.80

18	13.30	8.70	20.20
19	13.70	9.00	20.70
20	14.10	9.30	21.20
21	14.30	9.50	21.40
22	14.50	9.70	21.60
23	14.60	9.80	21.80
24	14.70	9.80	21.90
25	14.70	9.70	22.10
26	14.70	9.70	22.30
27	14.60	9.50	22.60
28	14.60	9.40	22.80
29	14.50	9.20	23.10

32	14.40	8.60	24.20
33	14.30	8.30	24.50
34	14.20	8.10	24.80
35	14.00	7.90	24.90
36	13.80	7.70	24.90
37	13.50	7.50	24.40
38	13.20	7.30	23.90
39	12.70	7.20	22.60
40	12.30	7.10	21.40
41	11.60	7.00	19.40
42	11.00	6.90	17.50

Fetal Ratio Reference

Femur Length/Foot Length (FL/Foot) : CAMPBELL

Fetal Ratio

Campbell J, Henderson A, Campbell S. "The fetal femur/foot length ratio: a new parameter to assess dysplastic limb reduction" Obstetrics and Gynecology, 1988 Aug;72(2):181-4

- The nomal value (±2SD) for this ratio during the period 14-40 weeks is 0.99±0.12. (87%-111%)

BPDo/OFDo (Cephlic Index) : HADLOCK

Fetal Ratio

Frank P. Hadlock, R. L.Deter, R. J. Carpenter, S. K. Park. "Estimating Fetal Age: Effect of Head Shape on BPD" American Journal of Roentgenology, 137:83-854, July 1981

- The nomal value (±2SD) for this ratio during the period 14-40 weeks is 78.3±8.8%. (70%-86%)

Femur Length/Abdominal Circumference (FL/AC) : HADLOCK

Fetal Ratio

Frank P. Hadlock, Russell L.Deter, Ronald B. Harrist, Ellen Roecker, Seung K. Park. "A Date-Independent Predictor of Intrauterine Growth Retardation: Femur Length/Abdominal Circumference Ratio" American Journal of Roentgenology, 141:979-984, November 1983

- The nomal value (±2SD) for this ratio during the period 14-40 weeks is 22±2%. (20%-24%)

Femur Length/Head Circumference (FL/HC) : HADLOCK

Fetal Ratio

Hadlock FP, Harrist RB, Shah Y, Park SK. "The Femur Length/Head Circumference Relation in Obstetric Sonography" Journal of Ultrasound in Medicine, 3(10), October 1984, Pp.439-442

Age (W)	Mean (%)	±2SD (%)	Age (W)	Mean (%)	±2SD (%)
15	16.2	1.8	29	20.2	1.2
16	14.9	3.2	30	20.3	2.2
17	16.1	3.0	31	20.3	2.0
18	16.9	2.2	32	20.2	2.2
19	17.2	2.2	33	20.7	1.6
20	18.3	3.0	34	20.6	2.4
21	18.1	4.4	35	21.2	2.2
22	19.3	1.8	36	21.1	2.0
23	20.0	1.6	37	21.7	1.8
24	19.8	2.2	38	21.8	1.8
25	19.5	1.6	39	22.0	2.8
26	19.5	1.8	40	21.6	1.8
27	19.5	1.8	41	22.4	1.6
28	19.7	1.8	42	22.0	3.8

Femur Length/BiParietal Diameter (FL/BPD) : HOHLER

Fetal Ratio

Charles W. Hohler, Thomas A. Quetel. "Comparison of Ultrasound Femur Length and Biparietal Diameter in Late Pregnancy" American Journal of Obsterics and Gynecology, 141:759-762, 1981

- The nomal value (90% Confidence Interval) for this ratio during the period 23-40 weeks is 79±8%. (71%-87%)

Thoracic Circumference/Abdominal Circumference (ThC/AC) : CHITKARA

Fetal Ratio

Chitkara U, Rosenberg J, Chervenak FA, et al. "Prenatal Sonographic Assessment of the Fetal Thorax: Normal Values" American Journal of Obstetrics and Gynecology, 156:1069, 1987

- The nomal value (±2SD) for this ratio during the period 16-40 weeks is 89±12%. (77%-101%)

▌Head Circumference(HC) / Abdominal Circumference(AC): CAMPBELL

Fetal Growth Table

Campbell, s. "Ultasound Measurement of the Fetal Head to Abdomen Circumference Ratio in the Assessment of Growth Retardation." Br J Obstetrics and Gynecology, Vol. 84. 165-174. March 1977.

Age (W)	Mean	5%	95%	Age (W)	Mean	5%	95%
13	1.23	1.14	1.31	28	1.13	1.05	1.22
14	1.23	1.14	1.31	29	1.10	0.99	1.21
15	1.22	1.05	1.39	30	1.10	0.99	1.21
16	1.22	1.05	1.39	31	1.07	0.96	1.17
17	1.18	1.07	1.29	32	1.07	0.96	1.17
18	1.18	1.07	1.29	33	1.04	0.96	1.11
19	1.18	1.09	1.26	34	1.04	0.96	1.11
20	1.18	1.09	1.26	35	1.02	0.93	1.11
21	1.15	1.06	1.25	36	1.02	0.93	1.11
22	1.15	1.06	1.25	37	0.98	0.92	1.05
23	1.13	1.05	1.21	38	0.98	0.92	1.05
24	1.13	1.05	1.21	39	0.97	0.87	1.06
25	1.13	1.04	1.22	40	0.97	0.87	1.06
26	1.13	1.04	1.22	41	0.96	0.93	1.00
27	1.13	1.05	1.22	42	0.96	0.93	1.00

Estimated Fetal Weight Formula

▌Methods using (BPD, AC)

Shepard Method [grams]

[Equation]

$Log_{10}(EFW) = \{(0.166 \times BPD) + (0.046 \times AC) - (0.002646 \times AC \times BPD) - 1.7492\} \times 1000$

[Input Range]

AC :15.5~40.0 cm

BPD : 3.1~10.0 cm

EFW : 224.0~4925.0 g

[Reference]

Shepard MJ, et al, " An Evaluation of Two Equations for Predicting Fetal Weight by Ultrasound," American Journal of Ob & Gyn, January 1982; 142(1):47-54

Hadlock Method [grams]

[Equation]

$Log_{10}(EFW) = 1.11 + (0.05845 \times AC) - (0.000604 \times AC^2) + (0.1694 \times BPD) - (0.007365 \times BPD^2) + (0.000595 \times AC \times BPD)$

[Reference]

Frank P. Hadlock, R. B. Harrist, Robert J. Carpenter, Russell L. Deter, Seung K. Park. "Sonographic Estimation of Fetal Weight" Radiology,1984; 150:535-540

Merz Method [grams]

[Equation]

$EFW = (157.07 \times AC) + (15.9 (BPD2) - 3200.4$

[Reference]

E. Merz, W. Goldhofer, E. Timor-Tritsch "Ultrasound in Gynecology and Obstetrics" Textbook and Atlas, 1991, Georg Thieme Verlag, 308-338

Method using (BPD, FL, FTA)

Osaka university [grams]

[Equation]

$EFW = (1.25647 (BPD^3) + (3.50665 (FTA (FL) + 6.3$

[Reference]

Mineo Aoki. "The Diagnosis and Treatment of IUGR" Perineitaru Kea (Japanese Journal of Perinatal Care), 1990; Vol.9 NO.5, p407-422 (in Japanese)

Method using (BPD, APTD, TTD, FL)

SHINOZUKA 3 Method [grams]

[Equation]

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

[Reference]

N.Shinozuka et al. "Formulas for Fetal Weight Estimation by Ultrasound Measurements based on Neonatal Specific Gravities and Volumes" American Journal of Obsterics and Gynecology, 1987;157:1140-5

Method using (BPD, APTD, TTD, SL)

Shinozuka 2 Method [grams]

[Equation]

$EFW = (1.07 \times BPD^3) + (2.91 \times APTD \times TTD \times SL)$

[Reference]

N.Shinozuka et al. "Formulas for Fetal Weight Estimation by Ultrasound Measurements based on Neonatal Specific Gravities and Volumes" American Journal of Obsterics and Gynecology, 1987;157:1140-5

Method using (BPD, TTD)

Hansmann's fetal weight [grams]

[Equation]

$EFW = \{(0.649145 \times TTD) - (1.05775 \times BPD) + (0.0930707 \times BPD^2) - (0.020562 \times TTD^2) + 0.515263\} \times 1000$

±2SD=15.8%

[Low Range]

BPD : 5.9cm ~ ∞

TTD : 5.6cm ~ ∞

EFW : 500.0g ~ ∞

[Reference]

Hansmann, Hackeloer, Staudach, Wittman, "Ultrasound Diagnosis in Obstetrics and Gynecology," Springer-Verlag, New York, 1986

Method using (AC, FL)

Hadlock 1 Method [grams]

[Equation]

$Log10(EFW) = (0.05281 \times AC) + (0.1938 \times FL) - (0.004 \times AC \times FL) + 1.304$

±2SD=16%

[Reference]

Frank P. Hadlock, R. B. Harrist, Ralph S. Sharman, Russell L. Deter, Seung K. Park. "Estimation of fetal weight with the use of head, body, and femur measurement-A prospective study" American Journal of Obstetrics and Gynaecology, Vol 151. No.3:333-337, February 1, 1985

Ferrero [grams]

[Equation]

$$Log10(EFW) = (0.13244 \times AC) - (0.12996 \times FL) - (0.00173588 \times AC2) + (0.00309212 \times FL \times AC) + (2.18984 \times FL / AC) + 0.77125$$

[Reference]

Ferrero A, Maggi E, Giancotti A, et al: Regression formula for estimation of fetal weight with use of abdominal circumference and femur length: A prospective study. J Ultrasound Med 13:823, 1994

Method using (BPD, AC, FL)

Hadlock 2 Method [grams]

[Equation]

$$Log10(EFW) = (0.0316 \times BPD) + (0.0457 \times AC) + (0.1623 \times FL) - (0.0034 \times AC \times FL) + 1.335$$

±2SD=15%

[Reference]

Frank P. Hadlock, R. B. Harrist, Ralph S. Sharman, Russell L. Deter, Seung K. Park. "Estimation of fetal weight with the use of head, body, and femur measurement-A prospective study" American Journal of Obstetrics and Gynaecology, Vol 151. No.3:333-337, February 1, 1985

Shinozuka 1 Method [grams]

[Equation]

$$EFW = (1.07 \times BPD^3) + (0.30 \times AC^2 \times FL)$$

[Reference]

N.Shinozuka et al. "Formulas for Fetal Weight Estimation by Ultrasound Measurements based on Neonatal Specific Gravities and Volumes" American Journal of Obsterics and Gynecology, 1987;157:1140-5

Woo [grams]

[Equation]

$$Log_{10}(EFW) = (0.15549 \times BPD) + (0.04864 \times AC) - (0.00279682 \times BPD \times AC) + (0.037769 \times FL) - (0.000494529 \times AC \times FL) + 1.13705$$

[Reference]

Woo JS, Wan CW, Cho KM: Computer-assisted evaluation of ultrasonic fetal weight prediction using multiple regression equations with and without the fetal femur length, J Ultrasound Med 4:65, 1985

Method using (HC, AC, FL)

Hadlock 3 Method [grams]

[Equation]

$$Log_{10}(EFW) = (0.0107 \times HC) + (0.0438 \times AC) + (0.158 \times FL) - (0.00326 \times AC \times FL) + 1.326$$

±2SD=15%

[Reference]

Frank P. Hadlock, R. B. Harrist, Ralph S. Sharman, Russell L. Deter, Seung K. Park. "Estimation of fetal weight with the use of head, body, and femur measurement-A prospective study" American Journal of Obstetrics and Gynaecology, Vol 151. No.3:333-337, February 1, 1985

Weiner2 [grams]

[Equation]

$Log_{10}(EFW) = (0.02253 \times HC) + (0.01645 \times AC) + (0.06439 \times FL) + 1.6961$

[Reference]

Weiner CP, Sabbagha RE, Vaisrub N, et al: Ultrasonic fetal weight prediction: Role of head circumference and femur length. Obstet Gynecol 65:812, 1985

Method using (BPD, HC, AC, FL)

Hadlock 4 Method [grams]

[Equation]

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

±2SD=14.8%

[Reference]

Frank P. Hadlock, R. B. Harrist, Ralph S. Sharman, Russell L. Deter, Seung K. Park. "Estimation of fetal weight with the use of head, body, and femur measurement-A prospective study" American Journal of Obstetrics and Gynaecology, Vol 151. No.3:333-337, February 1, 1985

Method using (AC)

Campbell's fetal weight [grams]

[Equation]

$Log_e(EFW) = \{(0.282 \times AC) - (0.00331 \times AC^2) - 4.564\} \times 1000$

[Input Range]

AC :21.0 ~ 40.0cm

EFW : 903.0 ~ 4137.0g

[Reference]

Campbell, S., Wilkin, D. "Ultrasonic Measurement of Fetal Abdomen Circumference in the Estimation of Fetal Weight." British Journal of OB & GYN, 82, 9: 689-697, September 1975

Higginbottom [grams]

[Equation]

$EFW = AC^3 \times 0.0816$

[Reference]

Higginbottom J, Slater J. Porter G, et al: Estimation of fetal weight from ultrasonic measurement of trunk circumference. Br J Obstet Gynecol 82:698, 1975

Method using (BPD, AC)

Thurnau [grams]

[Equation]

$EFW = (9.337 \times BPD \times AC) - 229$

[Reference]

Thurnau GR, Tamura RK, Sabbagha R, et al: A simple estimated fetal weight equation based on real-time ultrasound measurements of fetuses less than thirty-four weeks' gestation. Am J Obstet Gynecol 145:557, 1983

Warsof [grams]

[Equation]

$Log_{10}(EFW) = \{(0.144 \times BPD) + (0.032 \times AC) - (0.000111 \times AC \times BPD^2) - 1.599)\} \times 1000$

[Reference]

Warsof SL, Gohari P, Berkowitz RL, et al: The estimation of fetal weight by computer-assisted analysis. Am J Obstet Gynecol 120:881, 1977

Method using (AC, HC)

Weiner1 [grams]

[Equation]

$Log_{10}(EFW) = (0.04035 \times HC) + (0.01285 \times AC) + 1.6575$

[Reference]

Weiner CP, Sabbagha RE, Vaisrub N, et al: Ultrasonic fetal weight prediction: Role of head circumference and femur length. Obstet Gynecol 65:812, 1985

Estimated Fetal Weight Growth Reference

Estimate Fetal Weight (EFW) : BRENNER

Fetal Growth Table

Brenner WE, Edelman DA, Hendricks CH. "A Standard of Fetal Growth for the United States of America" American Journal of Obstetrics and Cynecology, 126:555-564, November 1976

Age (W)	Growth (g)	10% (g)	90% (g)
21	410	280	860
22	480	320	920
23	550	370	990
24	640	420	1080
25	740	490	1180
26	860	570	1320
27	990	660	1470
28	1150	770	1660
29	1310	890	1890
30	1460	1030	2100
31	1630	1180	2290
32	1810	1310	2500

Age (W)	Growth (g)	10% (g)	90% (g)
33	2010	1480	2690
34	2220	1670	2880
35	2430	1870	3090
36	2650	2190	3290
37	2870	2310	3470
38	3030	2510	3610
39	3170	2680	3750
40	3280	2750	3870
41	3360	2800	3980
42	3410	2830	4060
43	3420	2840	4100
44	3390	2790	4110

Estimate Fetal Weight (EFW) : DOUBILET

Fetal Growth Table

Improved Birth Weight Table for Neonates Developed from Gestations Dated by Early Ultrasonography. Peter M. Doubilet, MD, PhD, Carol B. Benson, MD, Allan S. Nadel, MD, Steven A. Ringer, MD, PhD. by the American Institute of Ultrasound in Medicine J Ultrasound Med 16:241-249, 1997

Age (W)	Growth (g)	10% (g)	90% (g)
25	660	490	889
26	760	568	1016
27	875	660	1160
28	1005	765	1322
29	1153	884	1504
30	1319	1020	1706
31	1502	1171	1928
32	1702	1338	2167
33	1918	1519	2421
34	2146	1714	2687

Age (W)	Growth (g)	10% (g)	90% (g)
35	2383	1919	2959
36	2622	2129	3230
37	2859	2340	3493
38	3083	2544	3736
39	3288	2735	3952
40	3462	2904	4127
41	3597	3042	4254
42	3685	3142	4322
43	3717	3195	4324

Estimate Fetal Weight (EFW) : OSAKA

Fetal Growth Table

Osaka University Method 1989, 3 by Univ. Of Osaka

Age (W)	Growth (g)	±SD (g)	Age (W)	Growth (g)	±SD (g)
16w0d	137	29	28w1d	1275	158
16w1d	142	29	28w2d	1296	160
16w2d	147	29	28w3d	1318	162
16w3d	153	29	28w4d	1340	164
16w4d	158	30	28w5d	1363	167
16w5d	164	30	28w6d	1385	169
16w6d	170	30	29w0d	1407	171
17w0d	176	31	29w1d	1430	174
17w1d	182	31	29w2d	1453	176
17w2d	188	32	29w3d	1476	178
17w3d	195	33	29w4d	1499	181
17w4d	202	33	29w5d	1522	183
17w5d	209	34	29w6d	1545	185
17w6d	216	35	30w0d	1568	188
18w0d	223	35	30w1d	1592	190
18w1d	231	36	30w2d	1615	192
18w2d	238	37	30w3d	1639	195
18w3d	246	38	30w4d	1663	197
18w4d	254	39	30w5d	1687	200
18w5d	263	40	30w6d	1711	202
18w6d	271	41	31w0d	1735	204

19w0d	280	42		31w1d	1759	207
19w1d	289	43		31w2d	1783	209
19w2d	298	44		31w3d	1808	212
19w3d	308	45		31w4d	1832	214
19w4d	317	46		31w5d	1857	217
19w5d	327	48		31w6d	1881	219
19w6d	337	49		32w0d	1906	222
20w0d	347	50		32w1d	1930	224
20w1d	358	51		32w2d	1955	227
20w2d	368	53		32w3d	1980	229
20w3d	379	54		32w4d	2005	232
20w4d	390	56		32w5d	2029	234
20w5d	401	57		32w6d	2054	237
20w6d	413	58		33w0d	2079	239
21w0d	425	60		33w1d	2104	242
21w1d	436	61		33w2d	2129	244
21w2d	449	63		33w3d	2154	247
21w3d	461	65		33w4d	2179	250
21w4d	474	66		33w5d	2204	252
21w5d	486	68		33w6d	2229	255
21w6d	499	69		34w0d	2254	257
22w0d	513	71		34w1d	2279	260
22w1d	526	73		34w2d	2304	263
22w2d	540	74		34w3d	2329	265
22w3d	553	76		34w4d	2354	268
22w4d	568	78		34w5d	2379	271
22w5d	582	80		34w6d	2403	274

22w6d	596	81		35w0d	2428	276
23w0d	611	83		35w1d	2453	279
23w1d	626	85		35w2d	2478	282
23w2d	641	87		35w3d	2502	285
23w3d	656	89		35w4d	2527	288
23w4d	672	91		35w5d	2551	290
23w5d	688	92		35w6d	2576	293
23w6d	704	94		36w0d	2600	296
24w0d	720	96		36w1d	2624	299
24w1d	736	98		36w2d	2648	302
24w2d	753	100		36w3d	2672	305
24w3d	770	102		36w4d	2696	308
24w4d	787	104		36w5d	2720	311
24w5d	804	106		36w6d	2744	314
24w6d	822	108		37w0d	2767	317
25w0d	839	110		37w1d	2791	320
25w1d	857	112		37w2d	2814	323
25w2d	875	114		37w3d	2837	326
25w3d	893	116		37w4d	2860	329
25w4d	912	118		37w5d	2883	332
25w5d	930	120		37w6d	2906	335
25w6d	949	123		38w0d	2928	339
26w0d	968	125		38w1d	2950	342
26w1d	987	127		38w2d	2973	345
26w2d	1007	129		38w3d	2995	348
26w3d	1026	131		38w4d	3016	352

26w4d	1046	133
26w5d	1066	135
26w6d	1086	138
27w0d	1106	140
27w1d	1127	142
27w2d	1147	144
27w3d	1168	146
27w4d	1189	149
27w5d	1210	151
27w6d	1232	153
28w0d	1253	155

38w5d	3038	355
38w6d	3059	358
39w0d	3080	362
39w1d	3101	365
39w2d	3121	369
39w3d	3142	372
39w4d	3162	376
39w5d	3182	379
39w6d	3201	383
40w0d	3220	387

Estimate Fetal Weight (EFW) : HADLOCK

Fetal Growth Table

Frank P. Hadlock, Ronald B. Harrist, Juan Martinez-Poyer, "In Utero Analysis of Fetal Growth: A Sonographic Weight Standard" Radiology, 1991; 181:129-133.

Age (W)	Growth (g)	10% (g)	90% (g)
10	35	29	41
11	45	37	53
12	58	48	68
13	73	61	86
14	93	77	109
15	117	97	137
16	146	121	171

Age (W)	Growth (g)	10% (g)	90% (g)
26	913	758	1068
27	1055	876	1234
28	1210	1004	1416
29	1379	1145	1613
30	1559	1294	1824
31	1751	1453	2049
32	1953	1621	2285

17	181	150	212
18	223	185	261
19	273	227	319
20	331	275	387
21	399	331	467
22	478	398	559
23	568	471	665
24	670	556	784
25	785	652	918

33	2162	1794	2530
34	2377	1973	2781
35	2595	2154	3036
36	2813	2335	3291
37	3028	2513	3543
38	3236	2686	3786
39	3435	2851	4019
40	3619	3004	4234

Estimate Fetal Weight (EFW) : SHINOZUKA

Fetal Growth Table

Norio Shinozuka, Takashi Okai, et al. "Standard Values of Ultrasonographic Fetal Biometry" Japanese Journal of Medical Ultrasonics, Vol.23, No.12, 1996, pp877-888

Age (W)	Growth (g)	-1.5SD (g)	+1.5SD (g)
18	216	163	269
19	279	211	348
20	349	264	434
21	427	324	529
22	513	392	634
23	609	469	748
24	714	555	873
25	830	651	1009

Age (W)	Growth (g)	-1.5SD (g)	+1.5SD (g)
30	1552	1261	1843
31	1720	1404	2035
32	1892	1551	2233
33	2068	1701	2434
34	2244	1851	2638
35	2420	1999	2841
36	2592	2143	3041
37	2758	2280	3236

26	956	756	1156
27	1092	870	1313
28	1237	993	1481
29	1391	1123	1658

38	2915	2407	3422
39	3059	2521	3596
40	3187	2618	3756
41	3296	2695	3896

Estimate Fetal Weight (EFW) : WILLIAMS

Fetal Growth Table

Williams RL, Creasy RK, Cunningham GC, et al: Fetal growth and perinatal viability in California. Obstet Gynecol 1982 May; 59(5): 624-32

Age (W)	Growth (g)	Min (g)	Max (g)
22	513	320	746
23	589	365	861
24	675	417	989
25	773	477	1132
26	882	546	1289
27	1005	627	1463
28	1143	720	1653
29	1298	829	1859
30	1484	955	2136
31	1695	1100	2402
32	1920	1284	2673
33	2155	1499	2910

Age (W)	Growth (g)	Min (g)	Max (g)
34	2394	1728	3132
35	2628	1974	3333
36	2849	2224	3521
37	3052	2455	3706
38	3227	2642	3867
39	3364	2790	3994
40	3462	2881	4080
41	3524	2946	4127
42	3589	3011	4185
43	3626	3044	4221
44	3633	3043	4233

Estimate Fetal Weight (EFW) : YARKONI (TWINS)

Fetal Growth Table

Yarkoni S, Reece EA, Holford T, et al: Estimated fetal weight in the evaluation of growth in twin gestations: A prospective longitudinal study. Obstet Gynecol 69:636, 1987.

Age (W)	Growth (g)	5% (g)	95% (g)
16	154	132	207
17	215	173	249
18	276	214	291
19	300	223	412
20	324	232	534
21	432	275	705
22	540	319	876
23	598	347	880
24	656	376	885
25	793	549	1118
26	931	722	1352
27	1087	755	1563

Age (W)	Growth (g)	5% (g)	95% (g)
28	1244	789	1774
29	1395	900	1883
30	1546	1011	1992
31	1693	1198	2392
32	1840	1385	2793
33	2032	1491	3000
34	2224	1597	3208
35	2427	1703	3336
36	2631	1809	3465
37	2824	2239	3679
38	3017	2669	3894

Estimate Fetal Weight (EFW) : HANSMANN

Fetal Growth Table

Hansmann, Hackeloer, Staudach and Wittman. "Ultrasound Diagnosis in Obstetrics and Gynecology" Springer-Verlag, New York, 1986; P.186

Age (W)	Growth (g)	-2SD (g)	+2SD (g)
9	45	44	46
10	48	45	51
11	54	48	60
12	63	54	72
13	77	63	91
14	96	74	118
15	122	90	154
16	155	111	199
17	197	136	258
18	247	166	328
19	307	203	411
20	377	246	508
21	456	294	618
22	545	348	742
23	644	409	879
24	753	475	1031

Age (W)	Growth (g)	-2SD (g)	+2SD (g)
25	871	547	1195
26	1000	626	1374
27	1139	711	1567
28	1288	802	1774
29	1448	899	1997
30	1618	1003	2233
31	1798	1113	2483
32	1984	1226	2742
33	2176	1342	3010
34	2369	1460	3278
35	2557	1575	3539
36	2734	1682	3786
37	2890	1776	4004
38	3016	1849	4183
39	3099	1888	4310
40	3131	1887	4375

Estimate Fetal Weight (EFW) : JOHNSEN

Fetal Growth Table

Johnsen SL, Rasmussen S, Wilsgaard T, Sollien R, Kiserud T. "Longitudinal reference ranges for estimated fetal weight" Acta Obstet Gynecol Scand, 2006;85(3):286-97

Age (W)	Growth (g)	5% (g)	95% (g)
20	340	269	429
21	416	333	520
22	503	406	623
23	602	490	740
24	713	583	870
25	835	684	1015
26	970	801	1174
27	1116	925	1347
28	1274	1058	1534
29	1442	1199	1734
30	1619	1347	1946
31	1805	1502	2168

Age (W)	Growth (g)	5% (g)	95% (g)
32	1997	1662	2400
33	2194	1824	2638
34	2393	1988	2880
35	2593	2152	3124
36	2791	2313	3367
37	2984	2471	3605
38	3171	2621	3835
39	3347	2764	4054
40	3511	2896	4258
41	3661	3015	4444
42	3793	3121	4609