OPERATING MANUAL

Bidop

ES-100V3

ℬ Hadeco

Excellence in Human Service and Technology

Hadeco, Inc.

CONTENTS

Thank you very much for choosing the Bidop ES-100V3.

The HADECO Bidop ES-100V3 is a uniquely designed bi-directional pocket Doppler with LCD display. It detects arterial and venous blood flows in extremities as well as fetal heart sounds.

The Bidop displays velocity waveform, numerical data and fetal heart rate with heart beat indicator.
Please read this manual carefully to acquaint yourself with the Bidop operation.

This medical device can be used by doctor for the purposes mentioned in "§ 2. CLINICAL APPLICATIONS" for patient in hospital and clinic.

For the use with computer, please refer to the operating manual for Windows linking software optional.

1. FEATURES

* BI-DIRECTIONAL HAND HELD DOPPLER WITH LCD DISPLAY
  Displays real-time waveforms, numerical data and heart rate.

* HADECO DESIGNED SMART MICROPROCESSOR
  Various mode settings are available for optimal measurement with the
  menu displayed on the LCD and unique side Shuttle Button.
  30 waveform memory.

* CONVENIENT PROBE ACTIVATION BUTTON
  Freezes waveform and numerical data for notation.
  Turns Bidop ON and OFF.

* MULTIPROBE SELECTION of 2, 4, 5, 8 and 10 MHz.

* AUTOMATIC POWER "OFF"

* RS-232 COMPUTER INTERFACE
  Stores waveforms and numerical data in your computer for data analyz-
  ing and filing. Cable for communication and communication software are
  optional.

* SMALL SIZED Photoplethysmograph (PPG) PROBE OPTIONAL
  Expands arterial & venous testing.

2. CLINICAL APPLICATIONS

2-1. Detections of fetal heart rate

Probe to be used   BT2M20S8C   (2 MHz)

*Evaluation of fetal heart rate and sounds throughout pregnancy except where fetal heart is not developed sufficiently during the first trimester.

2-2. Detections of arterial and venous blood flow velocity

Probes to be used   BT4M05S8C   (4 MHz)
                      BT5M05S8C   (5 MHz)
                      BT8M05S8C   (8 MHz)
                      BT10M5S8C   (10 MHz)

*ABI studies
*PEAK & MEAN blood velocity determinations.
*Peripheral vascular procedures.
*Blood pressure segmental studies.
*Venous compressions.
*Penile & digit systolic pressures.
*Flow velocities in recovery room.

3. CAUTIONS

Please read the following important points carefully before you operate the unit.

1. Only skilled persons should operate the unit.

2. Use the unit for blood flow measurement purposes only.

3. Do not apply any modification to the unit.

4. Unit installation :
   (1) Take care of storage and operating environments.
   (2) Do not place near water.
   (3) Dot not place where atmospheric pressure, temperature, humidity, ventilation, sunlight, dust, salt, sulfur and so forth will not affect the unit adversely.
   (4) Take care of the stability conditions such as inclination, vibration, and shock during transportation and installation works.
   (5) Do not place where chemicals are stored, or where gas may be generated.
   (6) Do not place where the unit tends to fall.

5. Before use:
   (1) Make sure that the unit operates safely and correctly by following the maintenance procedures mentioned in "§ 13. Performance check procedures by user".
   (2) Make sure that all cables are connected correctly and safely.
   (3) Using more then one equipment together may result in erroneous diagnosis from malfunction or cause a danger.
   (4) Recheck external connections to the patient carefully.
   (5) Do not sterilize the main unit by gas, autoclave or so on to prevent any damage.

6. Operation:
   (1) Do not use the unit simultaneously with an electric cautery, cardioverter, other ultrasonic device or mobile phone.
   (2) Be careful not to exceed time and volume which is necessary for diagnosis treatment.
   (3) Always watch so the unit and patient are not under abnormal conditions.

(4) When any abnormality is found on the unit or the patient, take proper action such as stopping operating the unit in a manner safe to the patient.

(5) Do not let the patient touch the unit.

(6) Use the designated accessories only such as the probe.

(7) Do not use the accessories with other devices.

(8) Use the unit under the operating environments specified on the specifications.

(9) Use the Bidop as specified in the operation manual.

7. After use:

(1) Return all switches to the conditions before use and turn off the power supply following the prescribed procedures.

(2) Do not apply excessive force to disconnect the cables such as pulling them too strongly.

(3) Clean the unit, accessories, cables and probes and place in right place for the next use.

8. Storage:

(1) Take care of (1) to (5) of section #4 in the previous page.

(2) Clean the unit, accessories, cables and probes and place in right place for the next use.

(3) When using the unit next time, follow the maintenance procedures to make sure it works properly and safely.

9. Do the periodical inspection by following the procedures mentioned in "11. Performance check procedures by user".

(1) Inspection must be done once a year.

10. Probes:

(1) Clean the probe using damp cloth or a recommended probe cleaner before use. Using alcohol or thinner may damage the probe

(2) The probe transducer tip is very thin and delicate. Please handle with care and use the probe cap when not in use.

11. Ultrasonic gel:

(1) Use ultrasonic gel only for non-invasive use. Using other materials such as baby oil and cream may cause incorrect Doppler sounds.

(2) Using other materials may damage the probe.

(3) The ultrasonic gel enclosed is non-sterile and do not use it for surgeries.

(4) Incidence of allergy: Discontinue use of gel if an allergic reaction occurs.

12. Battery:
   (1) When battery is low, the LCD display will not operate. Also there will be no speaker sounds. Replace the battery.
   (2) Use a 9 volt alkaline square type battery. A non-alkaline may cause a shortage of power.
   (3) When not using the unit for a long time, remove the battery.

13. Repair services
   (1) When the unit gets out of order, contact the dealer for repair from whom you purchased the unit.
   (2) Only authorized persons should perform the repair services.

14. Do not disassemble the Bidop.

15. Destruction
   (1) In case of destruction of the unit, follow the instructions for disposition of the destruction appointed by each country or local government.

16. Any connected computer is not allowed to be in the patient area according to IEC60601-1.

4. OPERATING CONTROLS

4-1. Front view
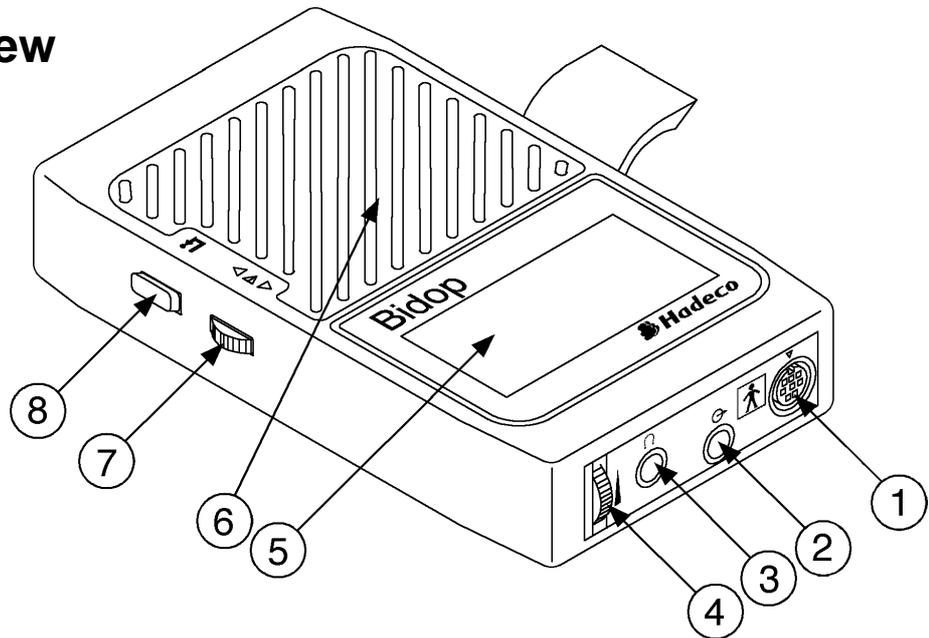
1. Probe: To connect probe.

2. Serial port: To connect computer.

3. Headset: To connect headset. The headset cuts off the speaker.

4. Volume control: To adjust sound volume.

5. LCD display: Displays waveform, numerical data, Heart Rate and menu for mode settings.

6. Speaker: Outputs Doppler sounds.

7. Shuttle Button: Turning it up or down selects menu, and pressing it inside sets the mode or executes command. When on freeze mode, turning it up and down displays memory data.
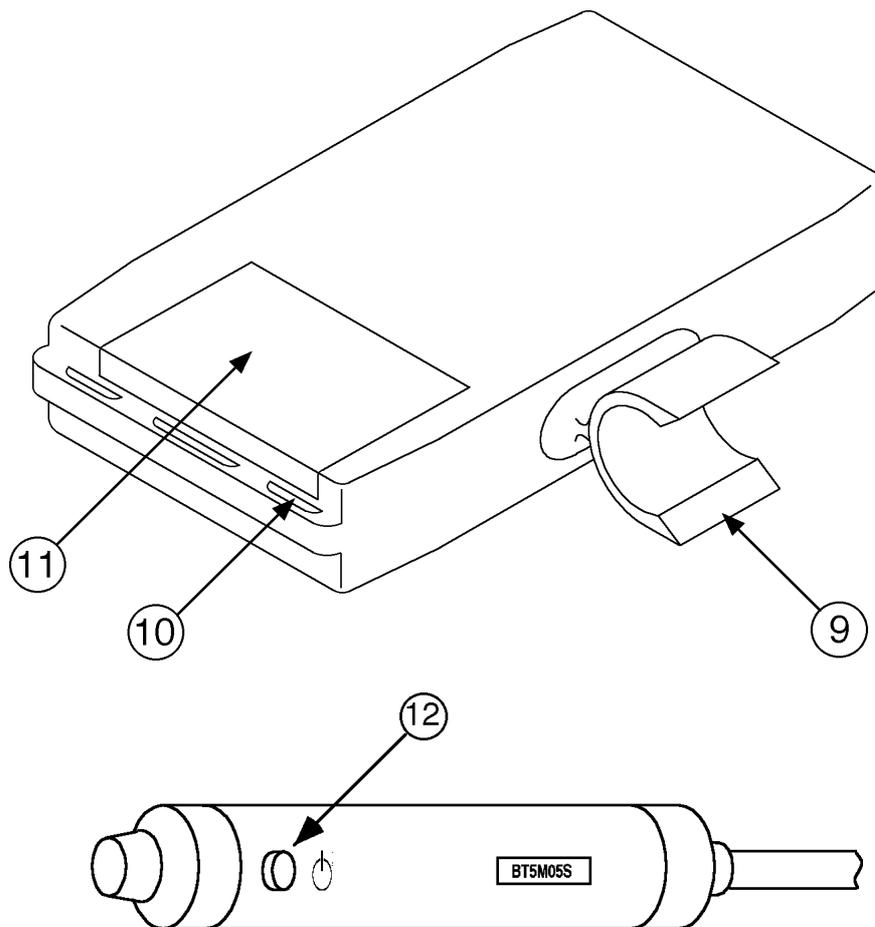
To turn the unit ON/OFF.

Three way operations

Press inside   Turn up   Turn down

7
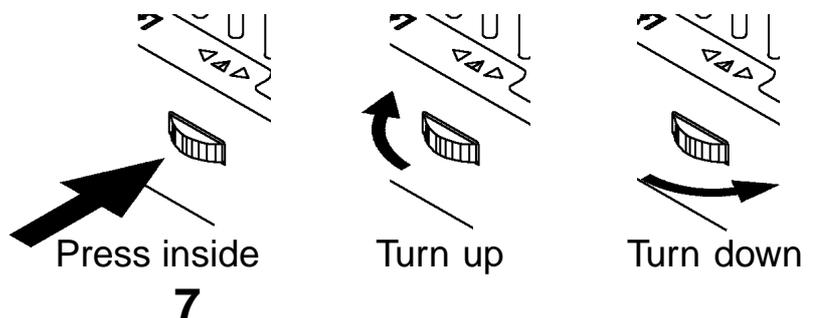
8. BACK key: To quit menu mode.

To go back to previous menu.

To change Display mode WAVE to DATA and vice versa.

4-2. Back side view and Probe

9. Probe holder: For probe placement when not in use.

10. Strap holes: To connect camera strap.

11. Battery cover: For battery placement.

12. Probe button: To turn the unit ON.
To freeze the waveform & numerical data when power is ON. To turn the unit OFF, press the button longer than 2 sec.
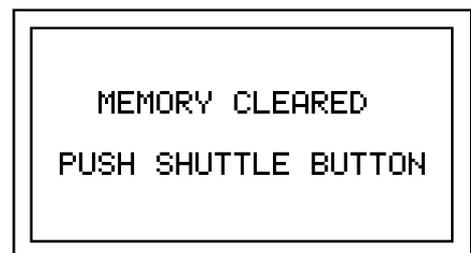
5. TURNING THE UNIT ON AND OFF

(1) Set the alkaline battery in the unit.
   (See § 10. Replacing battery.)

(2) Connect the probe with arrow up (12 o'clock) on the probe connector and press the probe button or Shuttle Button to turn the unit ON.

(3) Press the probe button or Shuttle Button longer than 2 sec to turn the unit OFF.

   Note: The speaker is turned off when the probe button is released after the digital display is off.
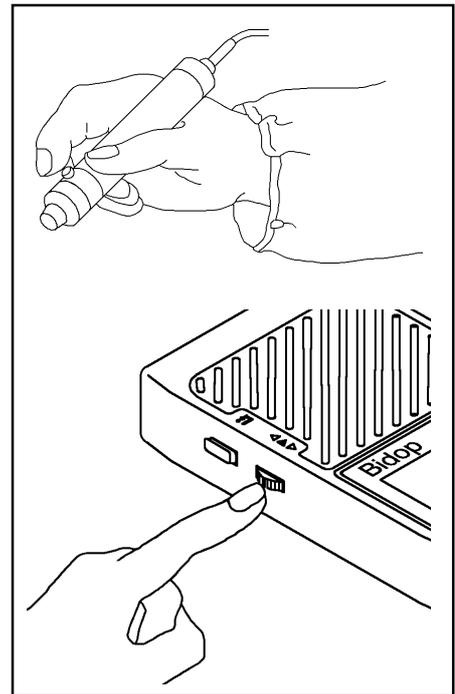
(4) When Bidop is turned ON first time, the message showing right will appear. Please press Shuttle Button to start.

```
MEMORY CLEARED

PUSH SHUTTLE BUTTON
```

(5) When battery is low, low battery indicator showing right appears. You can use Bidop for some time though, we strongly recommend the replacing battery as soon as possible for further use.
   If the Bidop is still used without replacing battery about 1 hour from showing low battery indicator, it makes a laud noise.

```
10.0 cm/s
```
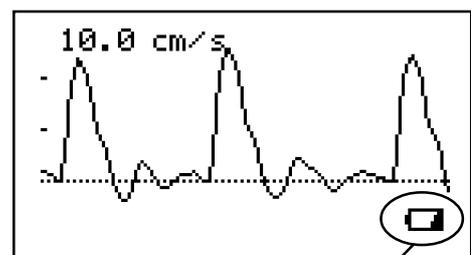
Low battery indicator

(6) AUTOMATIC POWER OFF
   When the AUTO-OFF is ON, if the unit is left on, the power is automatically shut off after following time passes:

   (a) 35 minutes when in measurement. (Only Fetal Heart Rate WAVE mode)
   (b) 15 minutes when in measurement. (Except Fetal Heart Rate WAVE mode)
   (c)   2 minutes when no signal.
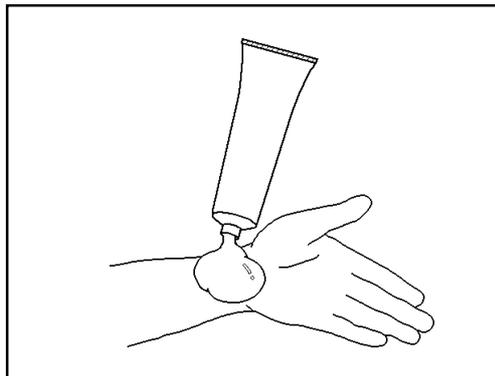   (d)   5 minutes when on freeze mode.

6. OPERATION

This section explains the fundamental use of Bidop. Please refer to § 7. Mode Settings and § 8. LCD Display for various uses.
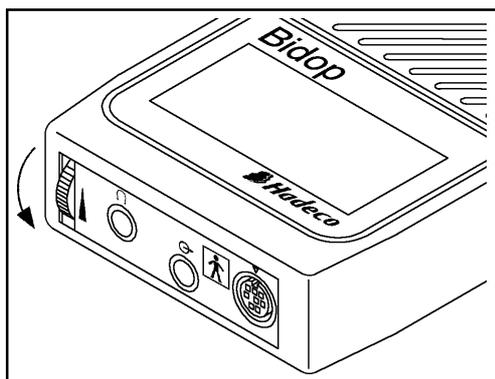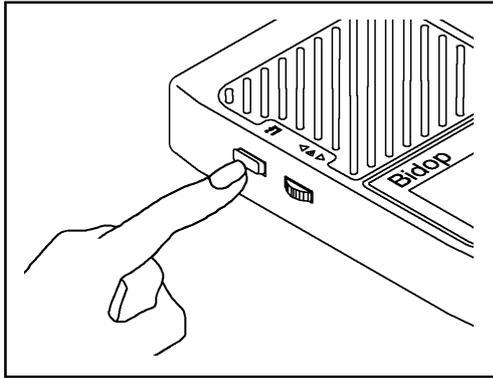
6-1. Blood Velocity mode
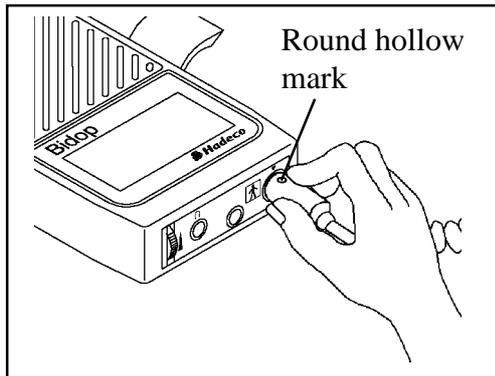
Round hollow mark

(1) Connect the probe to the Bidop with the round hollow mark up on the probe connector (12 o'clock).
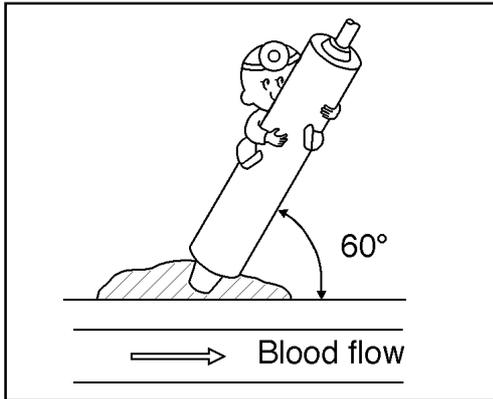

(2) Put ultrasonic gel on the probe top or patient skin.

(3) Press the probe button or Shuttle Button to turn the unit on. Turn the volume control to maximum.
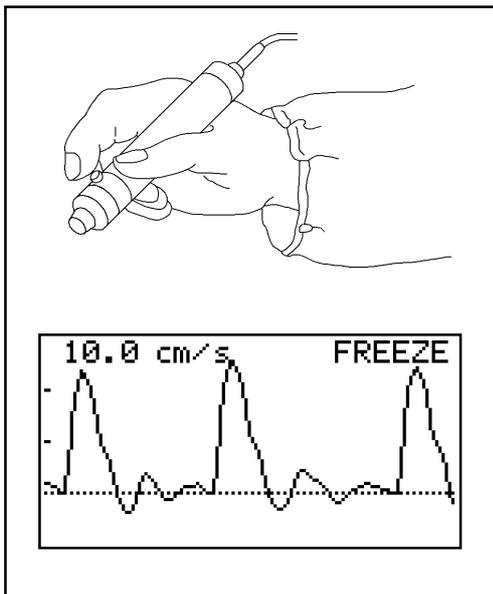
(4) If numerical data are displayed, press BACK key to display waveform. Change other settings if necessary.

Note: See "§7 Mode setting" for details.

(5) Put the probe on the measurement area and move it slowly to locate the point where the maximum Doppler sounds are heard. An ideal probe angle to the vessel is approximately 60 degrees.

60°

Blood flow

(6) When the waveform becomes rhythmical and stable, press the probe button to freeze the waveform.

Note: If the probe button is pressed longer than 2 sec, the unit will turn OFF.

```
10.0 cm/s        FREEZE
```
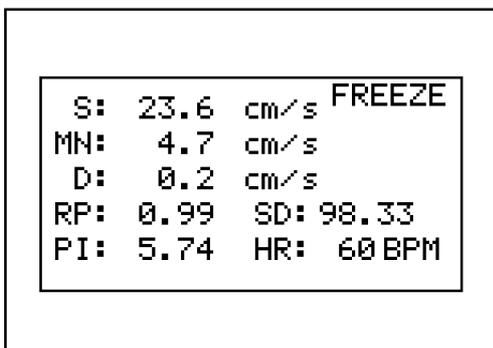
(7) To get numerical data, press BACK key or change the DISP mode to DATA.

Note: See "§ 7-3. MENU for Blood Velocity freeze mode" for operation. Also, see "§ 8-1-2. Numerical data" for the definitions of parameter.

```
 S:  23.6  cm/s  FREEZE
MN:   4.7  cm/s
 D:   0.2  cm/s
RP:  0.99  SD: 98.33
PI:  5.74  HR:  60 BPM
```

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```
MENU
  MEMORY
  MODE      △⊽
  DIR       コ↚
  TIME      ↳
  OTHERS
```

```
MEMORY
  STORE      10.05
  READ
  CLEAR
```
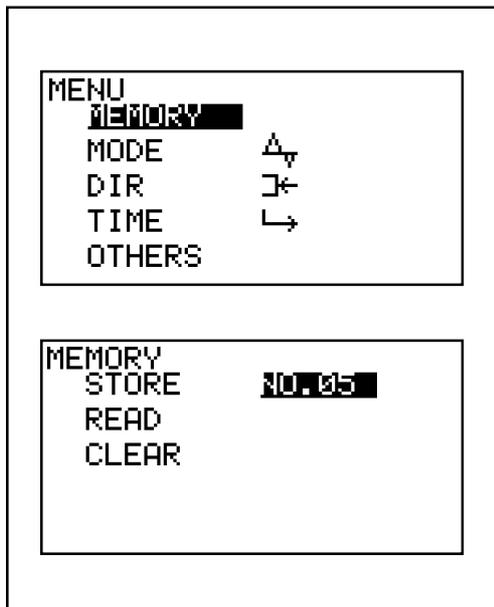
(8) If you need to save frozen waveform and numerical data in the memory, follow the following procedures.
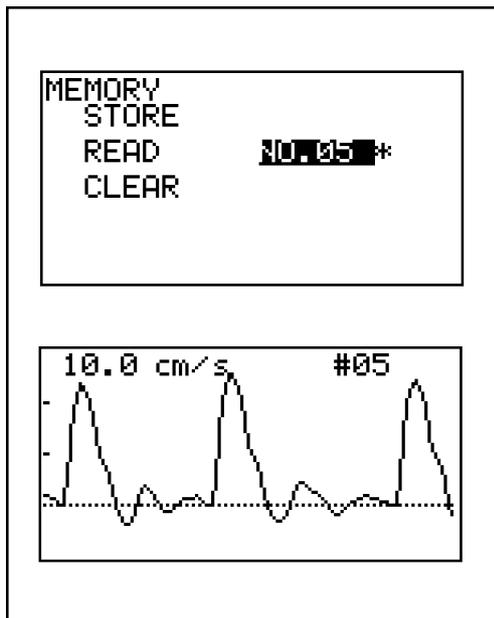
  • Press Shuttle Button to display MENU.
  • Select MEMORY by turning Shuttle Button up or down and press it.
  • Select STORE by turning Shuttle Button up or down and press it.
  • The memory number showing left will be displayed.
  • Turn Shuttle Button up or down several times to choose the memory number in which frozen waveform and numerical data will be stored.
  • Press Shuttle Button to store the frozen data.

```
MEMORY
  STORE
  READ       10.05 *
  CLEAR
```

```
10.0 cm/s        #05
```

(9) To display stored data on the LCD follow the follwing procedures.

  • Select MEMORY with Shuttle Button and press it to display sub menu.
  • Select READ with Shuttle Button and press it.
  • Select memory number from which you want to read the data.
  • Press Shuttle Button to read the data.
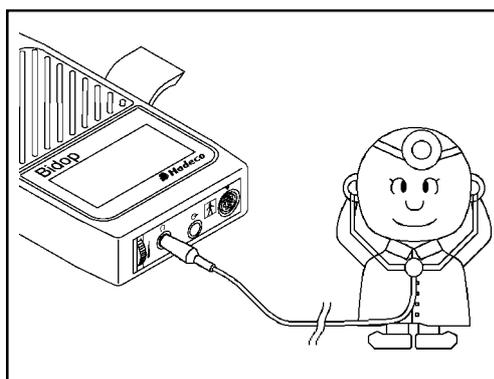
(10) Headset can be used to listen to Doppler sounds. It will cut off the speaker.

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6-2. Fetal Heart Rate (FHR) mode (2 MHz only)
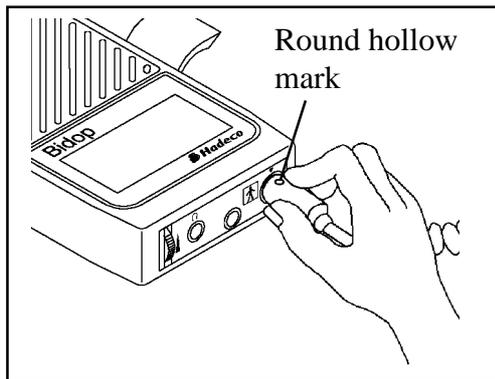
Round hollow mark

(1) Connect the 2 MHz probe to the Bidop with the round hollow mark up on the probe connector (12 o'clock).
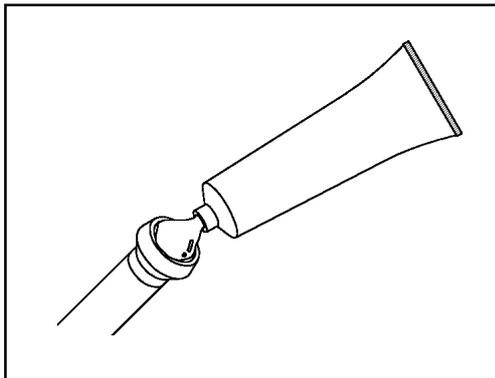
(2) Put ultrasonic gel on the probe top or patient skin.
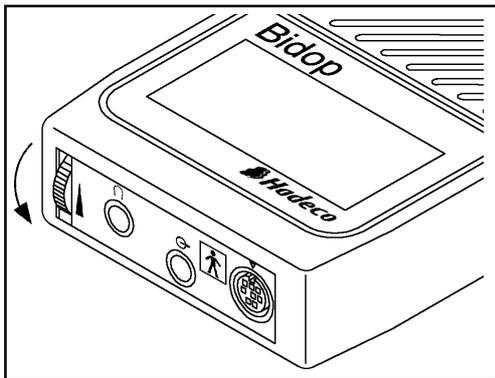
(3) Press the probe button or Shuttle Button to turn the unit on.
Turn the volume control to maximum.

(4) If you want to monitor heart rate displaying in graph, go to (7) of this section.
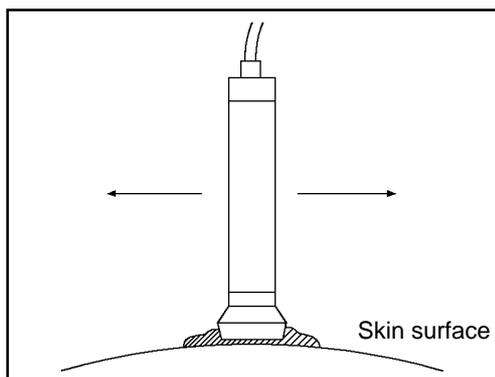
Skin surface

(5) Put the probe on the middle of the abdomen at right angle to the skin surface, and move it slowly to locate the point where the maximum heart beat Doppler sounds are heard.
Caution: Verify the fetal heart rate.
(Maternal heart rates match the maternal pulse rates.)

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FREEZE

HR: 130 BPM
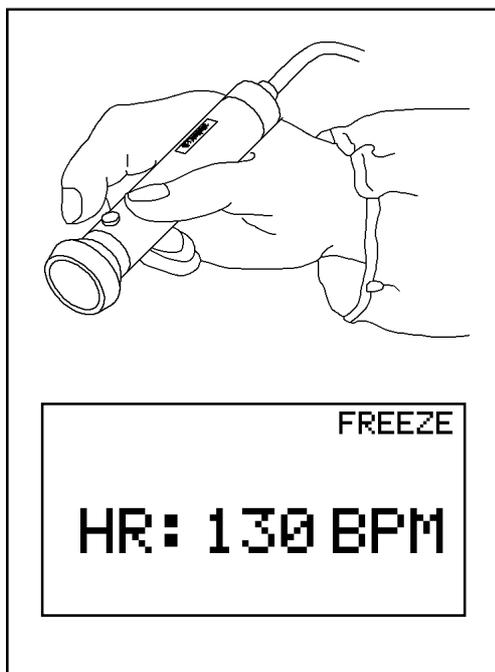
(6) When the heart rate becomes stable, press the probe button or BACK key to freeze it.

Note: If the asterisk (*) is displayed on the LCD, repeat the process.
*   If the probe button is pressed longer than 2 sec, the unit will turn OFF.*

Skip (7), (8) and (9) of this section, and Go to (10).

MENU
  MEMORY
  DISP   WAVE
  UPPER   160
  LOWER   120
  LANGUAGE ENGLISH
               ▼

♥

131 BPM   0:02

(7) Press Shuttle Button to display MENU.

Select DISP by turning Shuttle Button up or down and press it to change the mode to WAVE.

Press BACK key and monitoring screen will be displayed.

Skin surface

(8) Put the probe on the middle of the abdomen at right angle to the skin surface, and move it slowly to locate the point where the maximum heart beat Doppler sounds are heard.
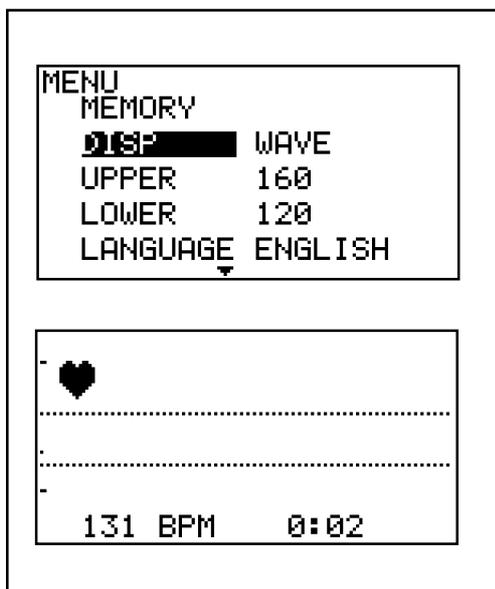**Caution: Verify the fetal heart rate.**
(Maternal heart rates match the mater-

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Upper threshold

131 BPM 2:05

Lower threshold

Page number

1   FREEZE

156-115 BPM 2:20

MENU
MEMORY
DISP   DATA
UPPER   160
LOWER   120
LANGUAGE ENGLISH

MEMORY
STORE   NO.01
READ
CLEAR
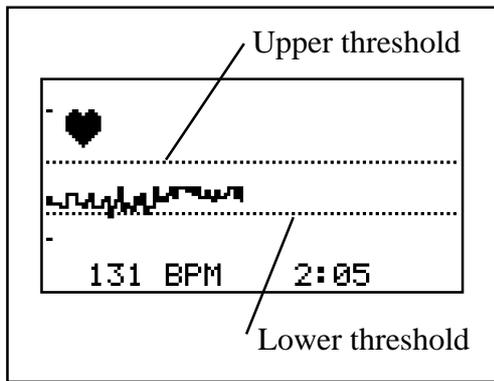
nal pulse rates.)

(9) Heart rates are plotted on the screen every 2 seconds. And numerical heart rate is also displayed bottom of the screen.
When a heart rate exceeds the upper threshold or is blow the lower threshold, the LCD flashes. (After 30 seconds have passed from the start.)
Press probe button or BACK key to stop monitoring and freeze waveform. A maximum of approx. 33 minutes heart rate data can be displayed in 4 pages. Turn Shuttle Button down to turn the page.

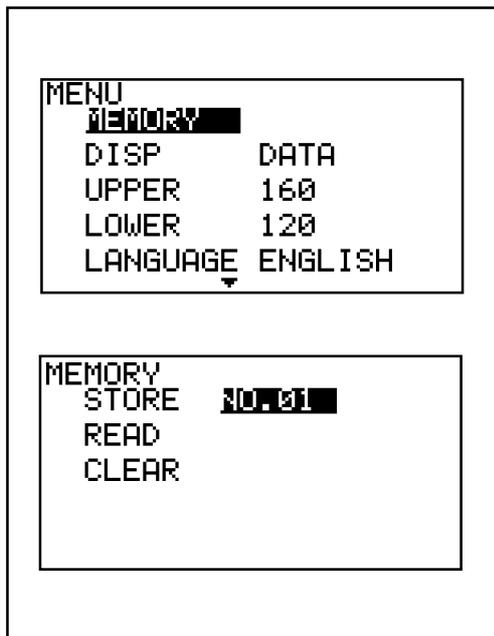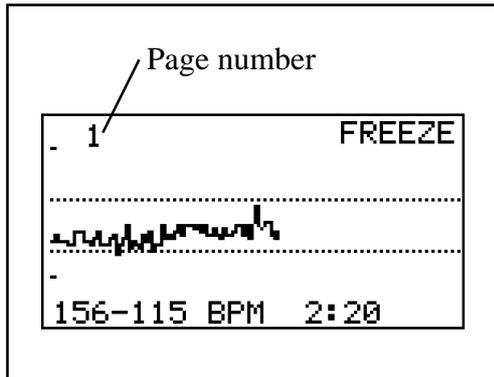(10) If you need to save heart rate data in the memory, follow the following procedures.

• Press Shuttle Button to display MENU.
• Select MEMORY by turning Shuttle Button up or down and press it.
• Select STORE by turning Shuttle Button up or down and press it.
• The memory number showing left will be displayed.
• Turn Shuttle Button up or down several times to choose the memory number in which frozen data will be stored.
• Press Shuttle Button to store the frozen data.

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```
MEMORY
   STORE
   READ      NO.01 *
   CLEAR
```

```
  1              #01


[waveform graph]

156-115 BPM   2:20
```
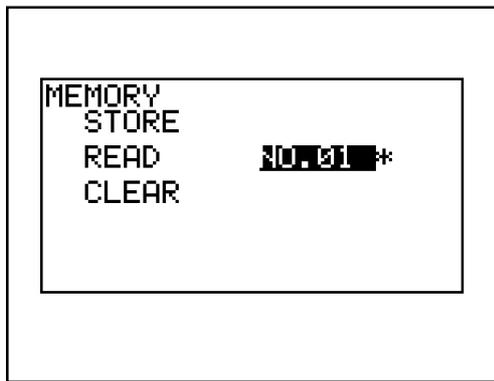
(11) To display stored data on the LCD follow the below procedures.

    • Select MEMORY with Shuttle Button and press it to display sub menu.
    • Select READ with Shuttle Button and press it.
    • Select memory number from which you want to read the data.
    • Press Shuttle Button to read the data.
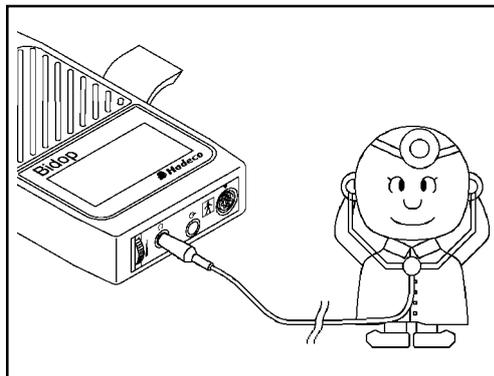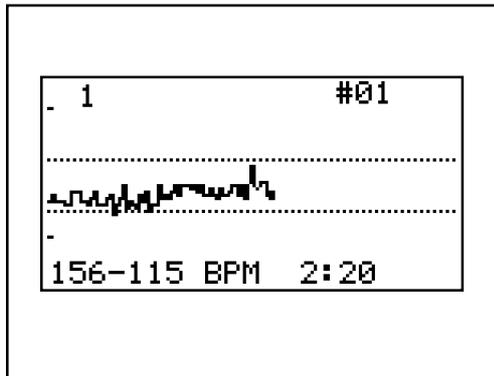
(12) Headset can be used to listen to Doppler sounds. It will cut off the speaker.

7. MODE SETTING

7-1. Changing mode

7-1-1. Fetal Heart Rate mode

Connect 2 MHz probe to the probe connector and turn the unit on. Bidop automatically goes to Fetal Heart Rate mode.
Please refer to § 7-4 MENU for Fetal Heart Rate mode.

7-1-2. Measurement / Freeze mode

Press the probe button to go to freeze mode and press again to get back to measurement mode.

> *Note: If the probe button is pressed longer than 2 sec., the unit will turn OFF.*
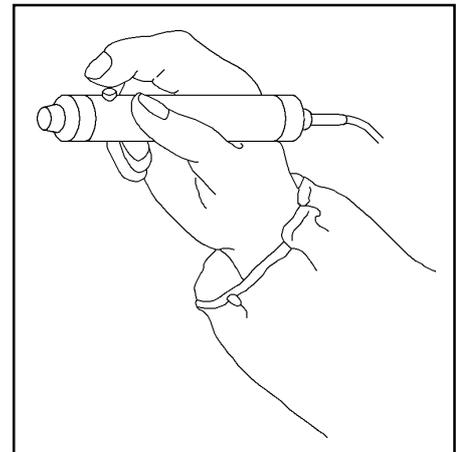
7-1-3. Display mode

When displaying waveform or numerical data, press BACK key to change Display mode WAVE to DATA and vice versa. Also you can change Display mode on the menu mode.

WAVE: Displays waveforms.
DATA: Displays numerical data

> *Note: See § 7-2-11 OTHERS-DISP.*

7-1-4. Menu mode

This section explains the general use of Menu mode. For specified use, please refer to each sections following this section.
Do the mode setting once and subsequent Bidop use will revert to this mode.
When battery is much low or taking more than 5 minutes to replace a

battery, the settings will change to default. For default, please refer to § 7-7. Default setting.

(1) Press Shuttle Button to the inside to display Setting MENU.

(2) Select the mode by turning Shuttle Button up or down and selected mode will be highlighted. Press it once or twice to change the mode.
Select other mode and change it if desire.

BACK key
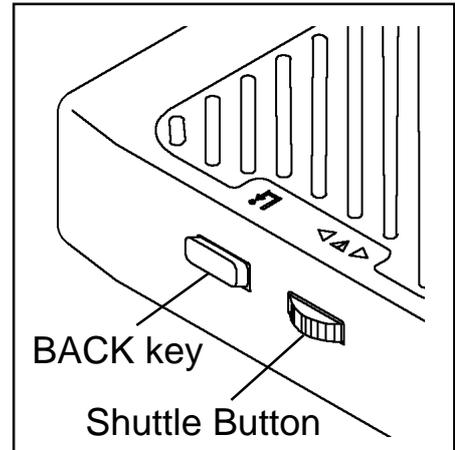
Shuttle Button

(3) For MEMORY and OTHERS, press Shuttle Button to display Sub menu. Turn Shuttle Button up or down for the selection of Sub menu. For MEMORY sub menu and LANGUAGE, turn Shuttle Button up or down again for the selections.

(4) Press BACK key to go back to previous menu or get out of the menu mode.

Setting Menus

	Menu	Sub menu	
Blood Velocity measurement mode	MENU **MEMORY** MODE ▵ᵥ DIR ⊐← TIME ↳ OTHERS	MEMORY **STORE** READ CLEAR	OTHERS **LANGUAGE** ENGLISH UNIT cm/s FILTER 200Hz SMOOTH 10Hz DISP WAVE
Blood Velocity freeze mode	MENU **MEMORY** MODE ▵ᵥ DIR ⊐← DISP WAVE	MEMORY **STORE** READ CLEAR	
Fetal Heart Rate mode	MENU **MEMORY** DISP DATA UPPER 160 LOWER 120 LANGUAGE ENGLISH	MEMORY **STORE** READ CLEAR	

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Menu · Sub menu

PPG AC
mode
optional

```
MENU
 MEMORY
 MODE     AC
 DISP     WAVE
```
(Measurement)

```
MEMORY
 STORE
 READ
 CLEAR
```

PPG DC
mode
optional

```
MENU

 MODE     DC
 COUNT    5
```
(Measurement)

7-2. MENU for Blood Velocity Measurement mode

Menu	Sub Menu	Selections
MEMORY	STORE	1 to 30, FREEZE
	READ	1 to 30, FREEZE
	CLEAR	1 to 30, ALL
MODE		Compound △▽, Separate ◁▷
DIR		Forward ⊐← , Reverse ⊐→
TIME		Normal └→ , Slow ⇘
OTHERS	LANGUAGE	ENGLISH, DEUTSCH, ITALIANO, ESPANOL, FRANCAIS
	UNIT	cm/s, kHz
	FILTER	80Hz, 200Hz
	SMOOTH	5Hz, 10Hz
	DISP	WAVE, DATA
	CAL	ON, OFF
	AUTO-OFF	ON, OFF

7-2-1. MEMORY-STORE

(1) Select MEMORY with Shuttle Button and press it. Sub menu will be displayed.

(2) Select STORE with Shuttle Button and press it.

```
MENU
 MEMORY
 MODE     △▽
 DIR      ⊐←
 TIME     └→
 OTHERS
```

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(3) Select the memory number into which you want to store the frozen data (waveform & numerical data) by turning Shuttle Button up or down several times. Selected memory number will be displayed. The memory number with "✳" indicates in which data was already stored.

```
MEMORY
  STORE      NO.05
  READ
  CLEAR
```
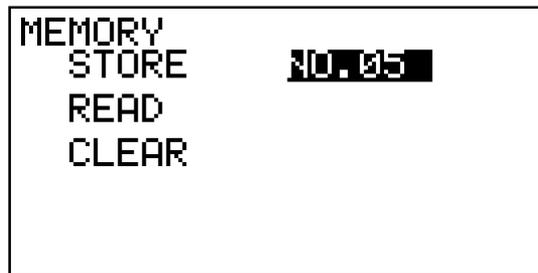
(4) Press Shuttle Button to store the frozen data into the memory. After that the stored data will be displayed.

> *Note:*   *When storing the data into data existing memory, the confirmation "OVERWRITE?" will be displayed. Press Shuttle Button to overwrite, or press BACK key to cancel.*
> *When on measurement mode, the data have been frozen before executing STORE command.*

7-2-2. MEMORY-READ

(1) Select MEMORY with Shuttle Button and press to display sub menu.
(2) Select READ with Shuttle Button and press it.
(3) Select the memory number from which you want to read the data (waveform & numerical data) by turning Shuttle Button up or down several times.
(4) Press Shuttle Button to read the data from the memory.

> *Note:*   *When going into freeze mode, the frozen data will be stored automatically into memory # of FREEZE. If you need to see the frozen data after reading other data from the memory, read FREEZE on the LCD.*

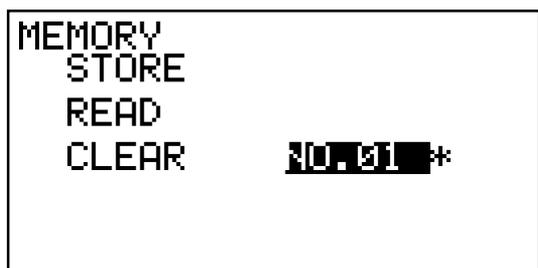## 7-2-3. CLEAR

(1) Select MEMORY with Shuttle Button and press to display sub menu.
(2) Select CLEAR with Shuttle Button and press it.

```
MEMORY
  STORE
  READ
  CLEAR      NO.01 ✳
```

(3) Select the memory number which you want to clear by turning Shuttle Button up or down several times. The memory number with "✳" indicates in which data was already stored.

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(4) Press Shuttle Button and then the stored data & the confirmation "CLEAR?" will be displayed. Press Shuttle Button to clear the memory, or press BACK key to cancel.

(5) If you choose ALL and press Shuttle Button, all data in the memories will be cleared except FREEZE.

7-2-4. MODE (Waveform mode)

(1) Select MODE with Shuttle Button.
(2) Press it to change the mode.
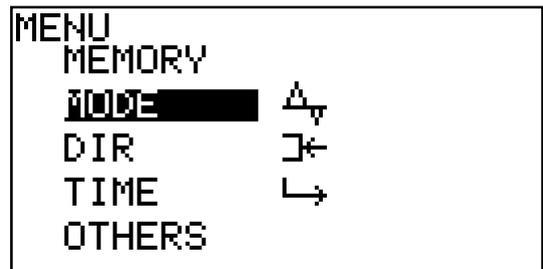
Compound mode: Combined forward and reverse components

Separate mode: Separation of forward from reverse component

Note: See "§ 7-1-1. Blood Velocity mode" for the waveform modes.

7-2-5. DIR (Direction)

(1) Select DIR with Shuttle Button.
(2) Press it to change the polarity of waveform.

Forward: Flow toward probe is processed as positive component.

Reverse: Flow away from probe is processed as positive component.

Reverse mode

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7-2-6. TIME (Time scale)

(1) Select TIME with Shuttle Button.
(2) Press it to change the time scale.

      Normal: ∟⇥   2.56 sec/screen
      Slow: ↳   12.8 sec/screen

7-2-7. OTHERS-LANGUAGE

(1) Select OTHERS with Shuttle Button and press it. Sub menu will be displayed.
(2) Select LANGUAGE with Shuttle Button and press it.
(3) Turn Shuttle Button up or down to select language in which menus and messages are written. And press Shuttle Button to fix it.

```
MENU
   MEMORY
   MODE       △ᵥ
   DIR        ⊐⊢
   TIME       ∟⊣
   OTHERS
```
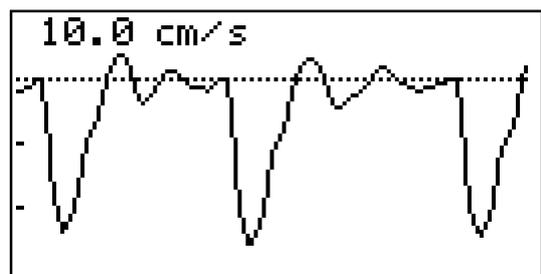
```
OTHERS
   LANGUAGE  ENGLISH
   UNIT      cm/s
   FILTER    200Hz
   SMOOTH    10Hz
   DISP   ▾  WAVE
```
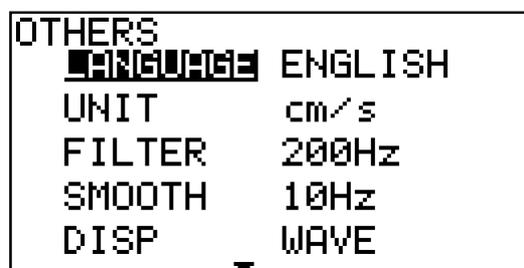
7-2-8. OTHERS-UNIT

(1) Select OTHERS with Shuttle Button and press to display Sub menu.
(2) Select UNIT with Shuttle Button.
(3) Press it to change the unit.

      cm/s: Blood flow velocity
      kHz: Doppler frequency shift

7-2-9. OTHERS-FILTER (High-pass filter)

The high-pass filter cuts low frequency components of the Doppler signal to reduce noise. Choosing 200 MHz for artery or 80 MHz for vein is recommended.

(1) Select OTHERS with Shuttle Button and press to display Sub menu.
(2) Select FILTER with Shuttle Button.
(3) Press it to change the frequency of filter.

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7-2-10. OTHERS-SMOOTH (Smoothing)

(1) Select OTHERS with Shuttle Button and press it. Sub menu will be displayed.
(2) Select SMOOTH with Shuttle Button.
(3) Press it to change the smoothing frequency.

7-2-11. OTHERS-DISP (Display mode)

(1) Select OTHERS with Shuttle Button and press to display Sub menu.
(2) Select DISP with Shuttle Button.
(3) Press it to change the mode.

```
OTHERS
   LANGUAGE ENGLISH
   UNIT     cm/s
   FILTER   200Hz
   SMOOTH   10Hz
   DISP     WAVE
```

    WAVE: Displays waveforms.
    DATA: Displays numerical data

Note: Also, pressing BACK key changes Display mode alternately.

7-2-12. OTHERS-CAL (Calibration)

(1) Select OTHERS with Shuttle Button and press to display Sub menu.
(2) Select CAL with Shuttle Button.
(3) Press it to change the mode.

```
OTHERS
   FILTER   200Hz
   SMOOTH   10Hz
   DISP     WAVE
   CAL      OFF
   AUTO-OFF OFF
```

    ON: Displays 4 step (3, 2, 1,
              0, -1 kHz) calibration waveform.
    OFF: Measurement mode

4 step calibration
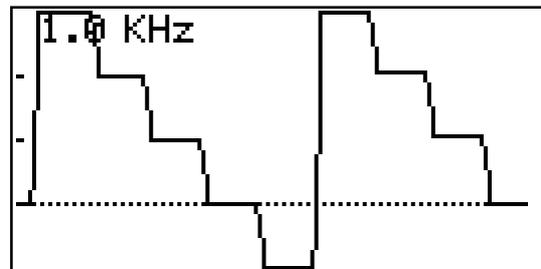
7-2-13. OTHERS-AUTO-OFF (Automatic shut-off)

(1) Select OTHERS with Shuttle Button and press to display Sub menu.
(2) Select AUTO-OFF with Shuttle Button.
(3) Press it to change the mode.

For the explanation of Automatic shut-off, please refer to § 5. Turning the unit on and off.

7-3. MENU for Blood Velocity Freeze mode

Menu	Sub Menu	Selections
MEMORY	STORE	1 to 30, FREEZE
	READ	1 to 30, FREEZE
	CLEAR	1 to 30, ALL
MODE		Compound △▽, Separate △▽
DIR		Forward ⬚⇐, Reverse ⬚⇒
DISP		WAVE, DATA

7-3-1. MEMORY, MODE, DIR

Please refer to § 7-2-1 to § 7-2-5 of this manual.

7-3-2. DISP (Display mode)

(1) Select DISP with Shuttle Button.
(2) Press it to change the mode.

   WAVE: Displays waveforms.
   DATA: Displays numerical data

   Note: Also, pressing BACK key changes Display mode alternately.

# 7-4. MENU for Fetal Heart Rate (FHR) mode (2 MHz probe only)

Menu	Sub Menu	Selections
MEMORY	STORE	1 to 30, FREEZE
	READ	1 to 30, FREEZE
	CLEAR	1 to 30, ALL
DISP		WAVE, DATA
UPPER		60 to 220 (every 5 bpm)
LOWER		60 to 220 (every 5 bpm)
LANGUAGE		ENGLISH, DEUTSCH, ITALIANO, ESPANOL, FRANCAIS
AUTO-OFF		ON, OFF

7-4-1. MEMORY commands

Please refer to § 7-2-1 to § 7-2-3 of this manual. In Fetal Heart Rate mode, last approx. 16 minutes of heart rate data can be stored in memory.

7-4-2. DISP (Display mode)

(1) Select DISP with Shuttle Button.
(2) Press it to change the mode.

```
MENU
  MEMORY
  DISP      DATA
  UPPER     160
  LOWER     120
  LANGUAGE  ENGLISH
         ▼
```

WAVE: Monitors heart rate in graph. (Monitoring mode)

DATA: Displays heart rate every moment.

Note: Display mode can not be changed on Freeze mode.

7-4-3. UPPER (Upper threshold for warning)

When the heart rate exceeds the upper threshold, the LCD flushes.

(1) Select UPPER with Shuttle Button and press it.
(2) Turn Shuttle Button up or down to select the upper threshold of heart

rate and press Shuttle Button to fix it. The heart rate is selectable every 5 bpm.

7-4-4. LOWER (Lower threshold for warning)

When the heart rate is blow the lower threshold, the LCD flushes.

(1) Select LOWER with Shuttle Button and press it.
(2) Turn Shuttle Button up or down to select the lower threshold of heart rate and press Shuttle Button to fix it. The heart rate is selectable every 5 bpm.

```
MENU
   MEMORY
   DISP      DATA
   UPPER     160
   LOWER     120
   LANGUAGE  ENGLISH
            ▼
```

7-4-5. LANGUAGE

(1) Select LANGUAGE with Shuttle Button and press it.
(2) Turn Shuttle Button up or down to select the language in which menus and messages are written. And press Shuttle Button to fix it

7-4-6. AUTO-OFF (Automatic shut-off)

(1) Select AUTO-OFF with Shuttle Button.
(2) Press it to change the mode.

For the explanations of Automatic shut-off, please refer to § 5. Turning the unit on and off.

```
MENU         ▲
   DISP      DATA
   UPPER     160
   LOWER     120
   LANGUAGE  ENGLISH
   AUTO-OFF  OFF
```

7-4-7. Changing Measurement / Freeze mode

Press the probe button to go to freeze mode and press again to get back to measurement mode.

> *Note: If the probe button is pressed longer than 2 sec., the unit will turn OFF.*
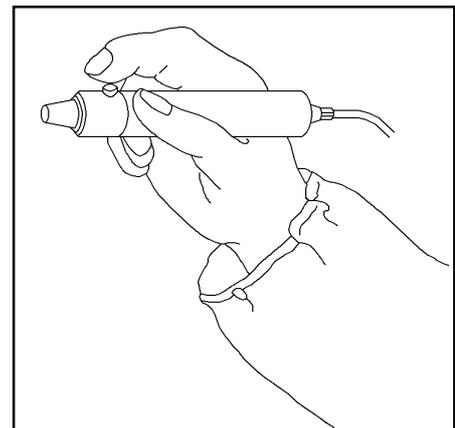
Changing mode is also available by pressing BACK key only when 2 MHz probe is connected to the unit.

7-4-8. Restarting measurement

When Display mode is WAVE in measurement mode, turning Shuttle Button up and down reset monitored data and restart measurement.

7-5. MENU for PPG AC Arterial mode (option*)

Note: The optional PPG probe (PG-21) is required for the studies. See the probe operating manual for the details.

Menu	Sub Menu	Selections
MEMORY	STORE	1 to 30, FREEZE
	READ	1 to 30, FREEZE
	CLEAR	1 to 30, ALL
MODE		AC, DC (Monitoring mode only)
DISP		WAVE, DATA

7-5-1. MEMORY commands

Please refer to § 7-2-1 to § 7-2-3 of this manual.

7-5-2. MODE (AC / DC) (Only Measurement mode)

(1) Select MODE with Shuttle Button.
(2) Press it to change the mode.

    AC: AC coupling mode for arte-
           rial pulse waveform studies
    DC: DC coupling mode for
           venous reflux study

```
MENU
  MEMORY
  MODE      AC
  DISP      WAVE
```

7-5-3. DISP (Display mode)

Please refer to § 7-3-2 of this manual.

7-6. MENU for PPG DC Venous Reflux mode (option*)

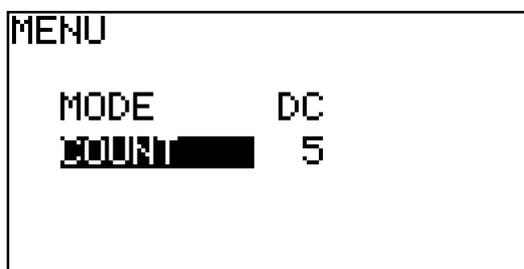| Menu	Selections
MODE	AC, DC (Monitoring mode only)
COUNT	1 to 20 (Monitoring mode only)

7-6-1. MODE (AC / DC)

Please refer to § 7-5-2 of this manual.

7-6-2. COUNT

Set the number of times for patient dorsiflexes.

(1) Select COUNT with Shuttle Button and press it.
(2) Turn Shuttle Button up or down to select number of times and press it to fix it.

```
MENU

  MODE      DC
  COUNT     5
```

Note: Venous (DC) mode PPG cannot be stored in memory.

7-7. Default settings

When you purchase the Bidop, each setting is set as the default showing in the below table.

Mode	Menu	Sub menu	Default
Blood velocity	MODE		COMPOUND
	DIR		FORWARD
	TIME		NORMAL
	OTHERS	LANGUAGE	ENGLISH
		UNIT	cm/s
		FILTER	200Hz
		SMOOTH	10Hz
		DISP	WAVE
		CAL	OFF
		AUTO-OFF	ON
Heart rate	DISP		DATA
	UPPER		160
	LOWER		120
	LANGUAGE		ENGLISH
	AUTO-OFF		ON
PPG	MODE		AC
	DISP		WAVE
	COUNT		5

Changing LANGUAGE resets the following settings as follows. (When a probe connected.)

Mode	Menu	Sub menu	English, Italiano, Espanor, Francais	Deutsch
Blood velocity	MODE		COMPOUND	SEPARATION
	OTHERS	UNIT	cm/s	kHz

| Mode	Menu	Sub menu	English	Deutsch, Italiano, Espanor, Francais
PPG	COUNT		5	10

# 8. LCD DISPLAY

8-1. Blood Velocity mode

8-1-1. Waveforms

(1) The base line is automatically located at best position. Bidop has 4 base lines, the bottom, 1/4 from the bottom, the center, and 3/4 from the bottom.

(2) The waveform amplitude is automatically adjusted for optimal observation.

(3) The amplitude scale (velocity or frequency per division) is displayed at the upper left of the LCD.

Amplitude scale

Division

`10.0 cm/s`

Compound mode

`10.0 cm/s`

Separate mode
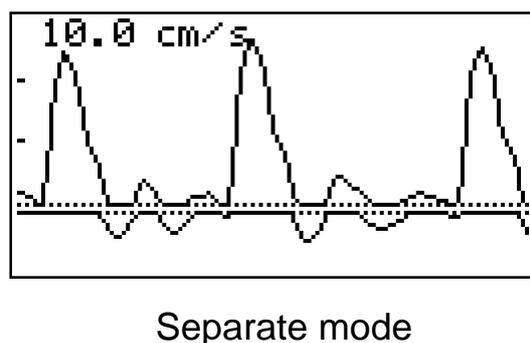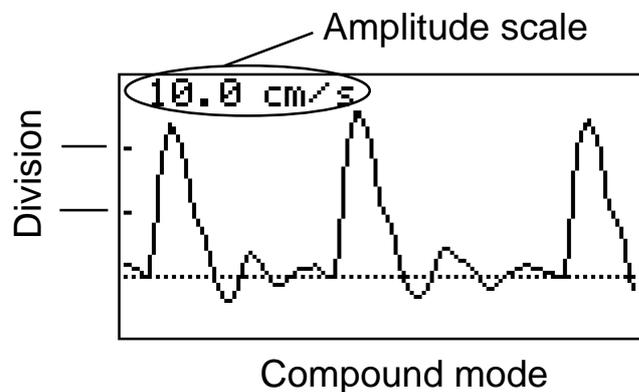
(4) When pressing probe button to freeze the waveform, Bidop will stop monitoring sequence and will display frozen waveform with "FREEZE".

`10.0 cm/s          FREEZE`
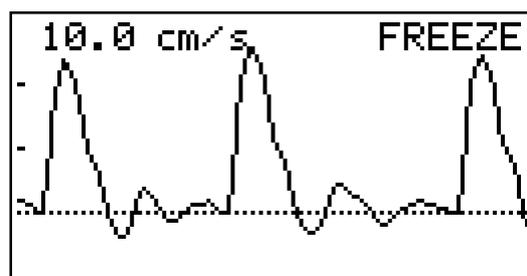
Memory number

(5) The read out waveform is displayed with memory number, e.g. "#01" at the upper right of the LCD

`10.0 cm/s          #01`
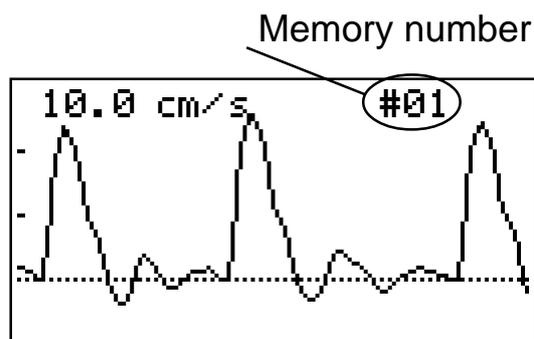
8-1-2. Numerical data

Following numerical parameters are displayed on DATA mode.

S: Systolic velocity [cm/s] or
      systolic Doppler shift [kHz]

MN: Mean velocity [cm/s] or
      mean Doppler shift [kHz]

D: Diastolic velocity [cm/s] or
      diastolic Doppler shift [kHz]

RP: Resistance Parameter
      RP = (S - D) / S
      RP = 1 if waveform goes below
      base line.

PI: Pulsatility Index
      PI = (Peak-to-peak) / MN
      PI ≤ 99.99

SD: S/D ratio, SD = S / D

HR: Heart rate [BPM]

```
 S:   23.6  cm/s
MN:    4.7  cm/s
 D:    0.2  cm/s
RP:   0.99  SD: 98.33
PI:   5.74  HR:  60 BPM
```

Unit: cm/s

```
 S:   1.42  kHz
MN:   0.28  kHz
 D:   0.01  kHz
RP:   0.99  SD: 98.33
PI:   5.74  HR:  60 BPM
```

Unit: kHz

8-2. Fetal Heart Rate (FHR) mode (Only 2 MHz probe)

8-2-1. Displaying heart rate at the moment (DATA mode)

Heart rate is displayed based on a 4 beat average once the Bidop gets sufficient data to calculate.
The heart mark "♥" tracks heart beat while in measurement.
When calculated heart rate is not stable, the asterisk (*) is displayed.

```
♥
   *
HR:  61 BPM
```

Asterisk is displayed when calculated heart rate is not stable.

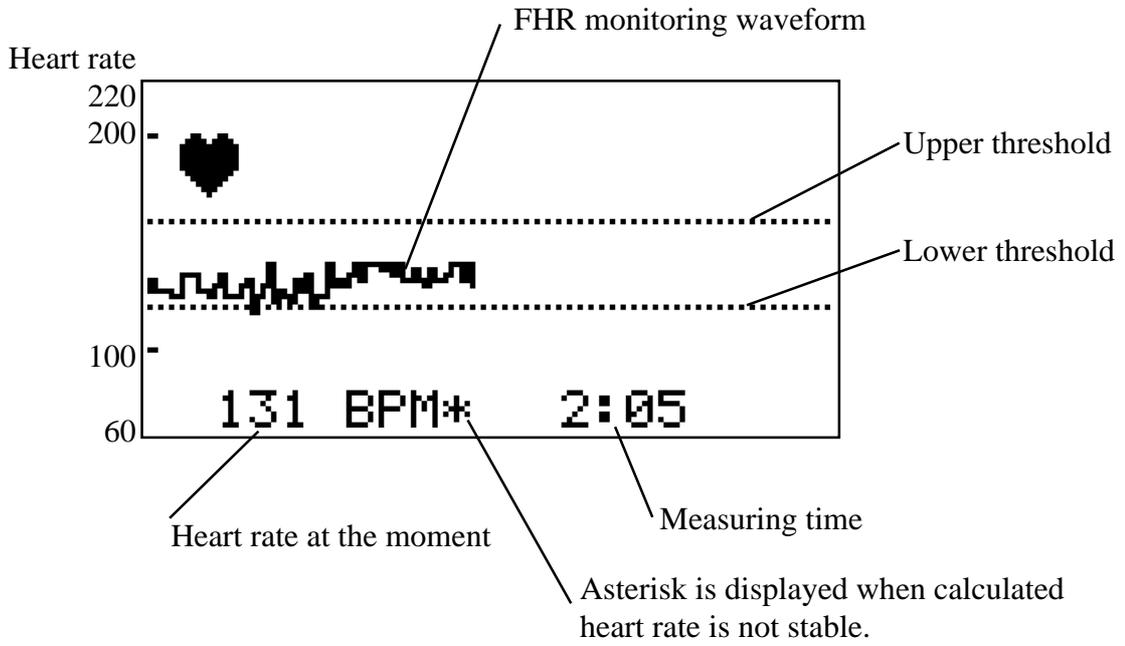*Note: The heart mark also indicates the speed of heart movements in 3 different size of heart marks.*

♥   ♥   ♥
Fast   Medium   Slow

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8-2-2. Monitoring heart rate in graph (WAVE mode, Monitoring mode)

(1) The range of heart rate is 60 to 220 bpm.

(2) The heart rate at the moment is displayed at the bottom left of the screen.

FHR monitoring waveform

Heart rate

Upper threshold

Lower threshold

131 BPM* 2:05

Heart rate at the moment

Measuring time

Asterisk is displayed when calculated heart rate is not stable.

(3) Heart mark indicates as same as in DATA mode.

(4) Two dotted lines indicate Upper and Lower thresholds of heart rate. When the heart rate is out of thresholds, LCD will flush.

(5) When pressing probe button or BACK key to freeze the waveform, Bidop will stop monitoring sequence and will display a maximum of approx. 33 minutes frozen heart rate data in 4 pages with "FREEZE" indicator. (Approx. 8 minutes a page)
Turn Shuttle Button down to turn the page.

Page number Freeze indicator

FREEZE

156-115 BPM 2:20

Max. Min.
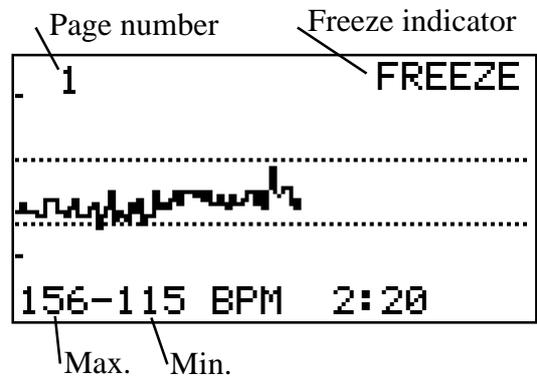
(6) The read out waveform from memories is displayed with memory number, e.g. "#01" at the upper right of the screen.

Page number   Memory number

```
1                    #01

.....................................
 ·····╓┼╥╖┐·····
156-115 BPM  2:20
```
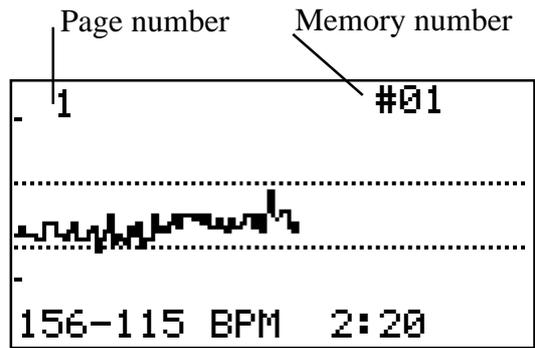
8-3. Low battery indicator

When the battery icon appears at the bottom right of the panel, the battery is low. Replace the battery with new 9 volt alkaline.

Note: See "§ 10 Replacing battery"

```
10.0 cm/s
```

Low battery indicator

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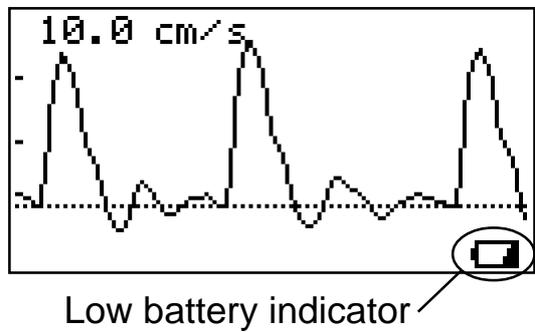
9. EXTERNAL OUTPUTS

9-1. Headset

Connect the headset when necessary. The headset cuts off the speaker.

9-2. Serial port (4 pin plug)

To observe the waveform in high resolution or to print out the waveform and numerical data for documentation.

(1) Connect a computer using with dedicated communication cable (option).

(2) Press the probe button or Back key to turn the unit on.

(3) Run the communication software (option) on your computer.

   Note: For software operation, please refer to the software operating manual.

10. REPLACING BATTERY
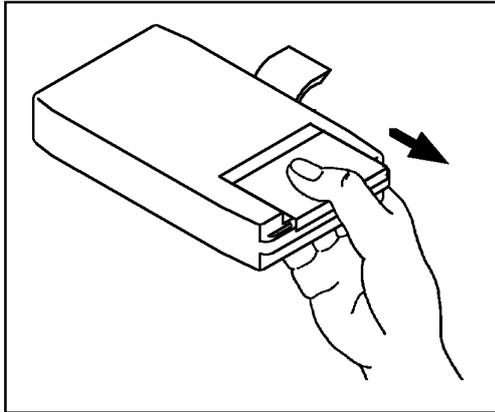
(1) Turn the unit off and open the battery cover as pictured on the left.

BATTERY TYPE
ALKALINE 9V
IEC TYPE 6LF22
S-006P
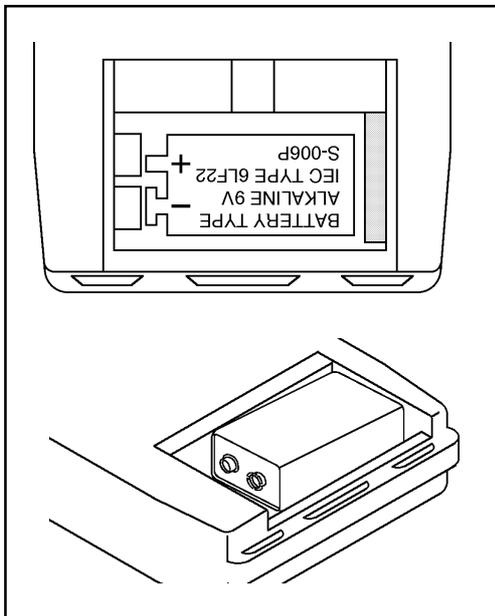
(2) Use a 9 volt ALKALINE square type battery. A non-alkaline may cause a shortage of power.
Set an alkaline square type battery in the unit ensuring that the positive and negative electrodes correspond to the **+** and **-** marks on the label in the battery box.

Caution: If it takes more than 5 minutes to replace a battery, the mode settings will be changed to default. All the data in the memories will be erased. When turning the unit on, if the message showing on the left is displayed, all the memories have been cleared. Press Shuttle Button.


```
MEMORY CLEARED

PUSH SHUTTLE BUTTON
```
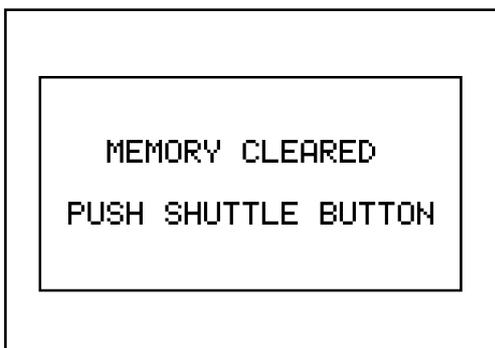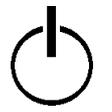
11. PROBES

The frequency of diagnostic ultrasound is inversely proportional to depth of penetration. The Bidop has 5 interchangeable probes with different frequencies.
Use those probes depending on your applications.

BT2M20S8C (2 MHz):   Fetal heart rate and sounds
BT4M05S8C (4 MHz):   Deep peripheral blood velocity and flow
BT5M05S8C (5 MHz):   Deep peripheral blood velocity and flow
BT8M05S8C (8 MHz):   Superficial blood velocity and flow
BT10M5S8C (10 MHz): Superficial blood velocity and flow

12. SYMBOL LIST

	Symbols	Descriptions
1		Type BF applied part
2		Headset
3		Power ON/OFF
4		Serial port
5		BACK key
6	◁ ▲ ▷	Shuttle Button
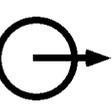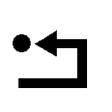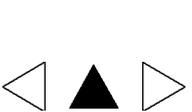
13. PERFORMANCE CHECK PROCEDURES BY USER

Please perform the following performance checks once a year:

   (1) Make sure if there is no damage and/or crack on the main unit and probe.
   (2) Shake the main unit and make sure if there are no sounds inside from internal components coming out.
   (3) Turn the unit on and make sure if the LCD displays normally.

14. PRINCIPLES

Model ES-100V3 Bidop is designed to obtain various blood flow velocity through the ultrasound which is transmitted from probe to patient body and is reflected by the blood (hemocyte, etc.).

The unit amplifies the high frequency oscillation output and then supplies it to the transmitter transducer. It is converted to ultrasound by the transducer and the ultrasound is transmitted to external objects. The ultrasound moves straight through biophysical object, and is reflected by the moving object (blood flow, fetal heartbeat etc.).

The reflected ultrasound is received by the receiving transducer and is converted into electric signals again.

The converted signals are amplified and then detected. After removing unnecessary noise from the signals and improving S/N ratio at the filter circuit, the Doppler shift signals are amplified and are converted to audible sounds through a speaker or a headset.

Simultaneously, the Doppler shift signals are applied to the CPU and converted to blood flow velocity wave form signals which can be displayed.

15. BLOCK DIAGRAM

(Main unit)

Speaker
Headset
Serial port
LCD
Probe button
ON/Freeze/OFF
C P U
Shuttle button
BACK key
Low frequency output
Band pass filter

(Probe)

Wave detection
High frequency amplifier
Transducers
High frequency oscilator
High frequency output
Power supply
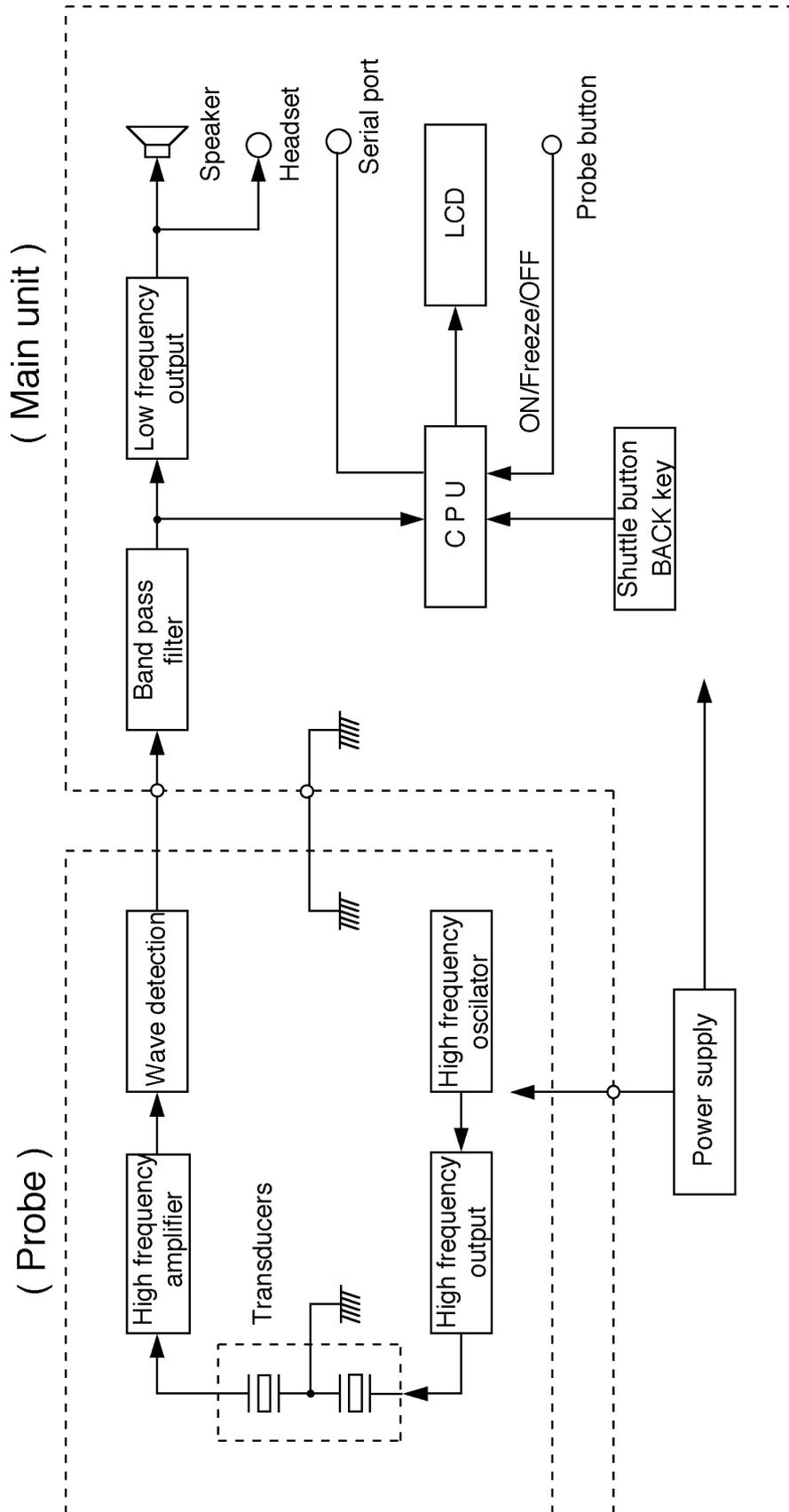
16. SPECIFICATIONS

Probes: (multi freq.)	Model	Freq.	Probe power
	BT2M20S8C	2 MHz	7.0 mW/cm^2
	BT4M05S8C	4 MHz	68.5 mW/cm^2
	BT5M05S8C	5 MHz	82.9 mW/cm^2
	BT8M05S8C	8 MHz	65.5 mW/cm^2
	BT10M5S8C	10 MHz	25.4 mW/cm^2

Battery: DC 9 volts, Alkaline square type battery

Battery life: Approx. 2.5 hours (Alkaline)

Automatic shut-off No signal: 2 min.   Freeze: 5 min.

Others: 15 min. (only FHR WAVE mode: 35 min.)

Frequency range: 80 / 200 Hz to 5 kHz

Mode settings: Memory, Waveform, Direction, Time scale, Others

Waveform memory: 30 memories

LCD display: 128 x 64 dots, STN LCD

Bi-directional wave form (normal & slow mode)
Numerical data (Systolic, diastolic & mean velocities, RP, PI, SD, HR)
Heart rate: 30 to 300 BPM, accuracy of ±3%
Low battery indicator

Velocity accuracy: ±10% or less comparing with internal phantom testing.

Speaker output: 200 mW or more

External outputs: Headset, serial port (RS-232)

Electrical safety: Conform to IEC60601-1
Equipment with an INTERNAL ELECTRICAL POWER SOURCE
Type BF applied part.

Operating environment:

10 to 40 degrees Centigrade
85% humidity or less with no condensation

Storage and transport environment:

        0 to 50 degrees Centigrade

Dimensions: Main unit: 75 (W) x 140 (D) x 25 (H) mm

        Probe: 20 (Diam.) x 105 (L) mm

Weight: 350 grams (including battery & probe)

Manufacturing date :   The first 2 digits and following 2 digits of the serial number represent the year and month of manufacturing, respectively.
The serial number is located inside of the battery compartment and it consists of 4 to 8 digits and may start with "Serial number" or "S/N".

        Examples:

        03020001:   Feb/2003
        0401:   Jan/2004

      * Specifications subject to change

17. STANDARDS

The unit confirms to the following standards:

Manufacturing standard: IEC60601-1
   (1) Protection class against electric shock : Class II device
                             : Internally powered equipment
      Protection grade against electric shock: Type BF applied part
   (2) Leak current:
      Based upon IEC60601-1

Items	Normal	Single fault
Housing leak current	0.1 mA or less	0.5 mA or less
Patient leak current	0.1 mA or less	0.5 mA or less

18. ACCESSORIES

Carrying case 1
Ultrasonic gel 1
Battery 1
Camera strap 1
Headset 1

19. OPTIONS

Doppler probe: 2, 4, 5, 8 and 10 MHz (with curled and
                             straight cable)
Small sized PPG probe :   Model PG-21
Smart-V-Link software with communication cable
Smart-Fetal-Link software with communication cable

20. CLEANING

PROBE

Remove the Doppler gel from the probe head after use.
Clean the probe using damp cloth and then wipe with a soft dry cloth, but
take great care that any water may not penetrate into the probe.
If using disinfectant, please consult in advance with the manufacturer.

MAIN UNIT

To clean the main unit, use a damp cloth and then wipe with a soft dry
cloth, but take great care that any water may not penetrate into the unit.

21. WARRANTY

This equipment is guaranteed for the period of one year after the date of purchase when used under normal conditions.
In the event of a problem during the warranty period, please contact your agent.
In case the warranty period is over, please consult the dealer for a charged service.

Hadeco, Inc.

2-7-11 Arima, Miyamae-ku, Kawasaki, 216-0003 Japan

$C\mathepsilon_{0366}$