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## **Terms of Warranty**

- This product is manufactured and examined by strict quality control and inspection system.
- Compensation standard concerning repair, replacement and refund of the product complies with “Consumer’s protection law” issued by Economic Planning Dept.
- BT-300 is guaranteed by BISTOS Co., Ltd. And its warranty period is two years from the date of purchase.
- Warranty repair or replacement will be made by BISTOS Service Center with free of charge during warranty period if properly used under normal condition in accordance with the instructions for use.
- In the event of a malfunction or failure during warranty period, customer should inform BISTOS Co., Ltd. of the model name, serial number, date of purchase and explanation of failure about the defective equipment.

<b><i>Caution</i></b>
<b>Federal law restricts this device to sale by or on the order of a physician</b>

## **How to contact us ...**



You can contact us the following address and telephone numbers for services and supplies.

<b>Product and Order Inquiries</b>	<b>Oversea Sales Team</b> <b>BISTOS Co., Ltd.</b> <b>201, 2F, 239-15, Gasan-Dong,</b> <b>Geumcheon-Gu, Seoul, Korea</b> <b>Tel : +82-2-862-0642</b> <b>Fax: +82-2-862-0644</b>
<b>Service Request and Technical Support</b>	<b>Customer Service Team</b> <b>BISTOS Co., Ltd.</b> <b>201, 2F, 239-15, Gasan-Dong,</b> <b>Geumcheon-Gu, Seoul, Korea</b> <b>Tel : +82-2-862-0642</b> <b>Fax: +82-2-862-0644</b>
<b>Our Website &amp; Email address</b>	<b>Website: <a href="http://www.bistos.co.kr">http://www.bistos.co.kr</a></b> <b>Email: <a href="mailto:bistos@bistos.co.kr">bistos@bistos.co.kr</a></b>

## **Definition of Warning, Caution, Note**

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- For a special emphasis on agreement, terms are defined as listed below in operation manual. Users should operate the equipment according to all the Warning and Caution instructions.
- Manufacturer or Sales agency takes no responsibility for any kind of damage or breakdown that is caused by misuse and failure to maintain the equipment.

Warning
A <b>Warning</b> indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

Caution
A <b>Caution</b> indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

Note
A <b>Note</b> indicates a particular point of information; something on which to focus your attention.

## General Precaution on Environment

- Do not keep or operate the equipment under the environment listed below.
-

	Avoid placing in an area exposed to moisture. Do not touch the equipment with wet hand.		Avoid exposure to direct sunlight
	Avoid placing in an area where there is a high variation of temperature. Operating temperature ranges from 10°C to 40°C. Operating humidity ranges from 30% to 85%.		Avoid in the vicinity of Electric heater
	Avoid placing in an area where there is an excessive humidity rise or ventilation problem.		Avoid placing in an area where there is an excessive shock or vibration.
	Avoid placing in an area where chemicals are stored or where there is in danger of gas leakage.		Avoid dust and especially metal material into the equipment.
	Do not disjoint or disassemble the equipment. BISTOS Co., Ltd. takes no responsibility of it		Power off when the equipment is not fully installed. Otherwise, the equipment could be

## **General Precaution on Electric Safety**

Check the items listed below before operating the equipment.

- Be sure that power supply line is appropriate to use.  
(Power Adaptor Input: 100 ~ 250V AC, Power Adaptor Output: 16V, 2.8A).
- Be sure that the entire connection cable of the system is properly



and firmly fixed.

**Note**

The equipment should not be placed in the vicinity of electric generator, X-ray, broadcasting apparatus to eliminate the electric noise during operation. Otherwise, it may cause incorrect result.

Self-power line is important for BT-300. To use the same power source with other electric instruments may cause incorrect result.

**Note**

BT-300 is classified as listed below;

- This equipment conforms to Class I, Type-BF.
- Do not use the equipment in the vicinity of flammable anesthetics and solvents.
- The equipment conforms to Class I according to IEC/EN 60601-1 (Safety of Electric Medical Equipment)
- This equipment conforms to Level B according to IEC/EN 60601-1-2 (Electromagnetic Compatibility Requirements)

**Note**

Accessory equipment connected to the analog and digital interfaces must be certified according to the respective IEC standards ( e.g. IEC 950 for data processing equipment and IEC 601-1 for medical equipment ). Furthermore all configurations shall comply with the system standard EN 60601-1-1:1993.

If in doubt, consult the technical service department or your local representative.

## **Section 1. General Information**

### **1.1 Product Overview**

BT-300 is the fetal monitor that measures the fetal heart rate(FHR) which may be evaluated to predict fetal status and uterine contraction. BT-300 irradiates ultrasound wave to the abdomen of a pregnant woman, and detects the Doppler frequency signal reflected from the heart of the fetus. BT-300 analyzes this signal and displays the heart rate by LED. Also, BT-300 provides the sound from the

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heart of fetus.

BT-300 measures the uterine contraction of a pregnant woman by pressure sensors and displays the numerical values.

And BT-300 prints the heart rate of the fetus and the values of uterine contraction.

### 1.2 Product Features

- BT-300 records the heart rate of the fetus, the uterine contraction of a pregnant woman, and basic information of the equipment with a provided thermal printer.
- BT-300 is capable of Monitoring of fetal heart rate with one or two pulsed Ultrasound Transducer(s).
- BT-300 can record automatically with thermal printer through printer setup.
- BT-300 is compact and light, potable and easy to use.
- BT-300 uses a free voltage(100 – 240VAC input) power adaptor.

### 1.3 Product Configuration

BT-300 system consists of the followings. Unpack the package and check out the following items. Also, be sure to check to see any damage of main body and accessories

- ① BT-300 Main Body
- ② Ultrasound Transducer(Doppler Probe) - 2 EA(1 EA for BT-300S)
- ③ Tocotransducer(UC Probe) - 1EA
- ④ Event Marker -1EA
- ⑤ Thermal Print Paper - 2EA
- ⑥ Power Adaptor -1EA
- ⑦ Power Cord -1EA
- ⑧ Ultrasound Gel -1EA
- ⑨ Abdominal Transducer(Probe) Belt -3 EA(2 EA for BT-300S)
- ⑩ User's Manual -1EA

Contents	Name	Description
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	BT-300 Main Body	Main body of BT-300 ( <u>2-year Warranty</u> )
	Doppler Probe	Ultrasound Transducer for Measuring FHR
	UC Probe	Pressure Sensor(Tocotransducer) for Measuring Uterine contraction
	Event Marker	Used for a specific event(for example, fetal Movement)
	Z-folded type Paper	Z-folder type thermal Paper
	Probe Belt	Used for Holding Doppler Probe and/or UC Probe
	Power Adaptor	Adaptor for transform AC Power to DC 16V
	Power Cord	AC Power cord
	Ultrasound Gel	Ultrasonic coupling gel

## **Section 2. Technical Description**

### **2.1 General**

BT-300 is capable of monitoring fetal heart rate and maternal uterine contractions. Simultaneous trends of fetal heart rates (FHR) and uterine activity (UA) are plotted by the built-in chart recorder. FHR and UA are displayed continuously at numeric display on the front panel.

Measuring fetal heart rate is using 1MHz ultrasound wave which transmits the burst pulse to the 7 ultrasound sensors about 3.47KHz periodically. This wave is reflected to the part of different medium.

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Particularly, the reflection wave is shifted from moving targets like heart, blood, etc. This phenomenon is a Doppler effect. This reflected signal is converted to electrical signal and it can get some useful information by many other processes.

Also, BT-300 measures the uterine contraction of a pregnant woman by pressure sensors and displays waveform by means of numerical values. This waveform informs the period and magnitude of the uterine contraction.

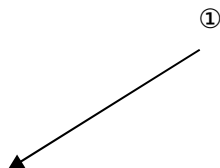
DSP(digital signal processor) calculates the fetal heart rate and uterine contraction, and transmits them to CPU by serial communication.

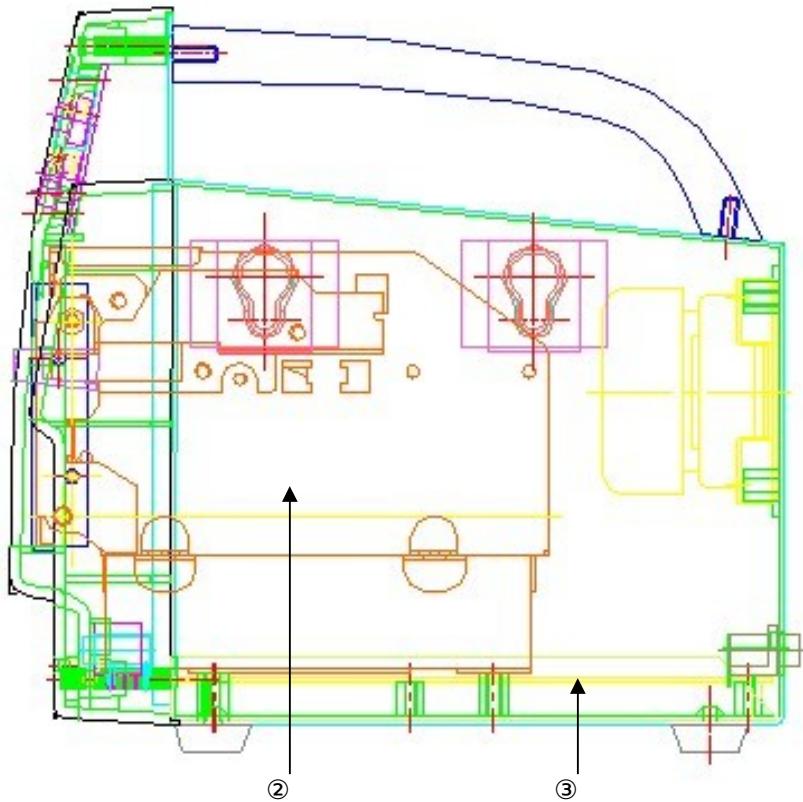
CPU displays these values to the 7-segment, records on the thermal paper and transmits to serial port for central monitoring system. CPU performs these operations by input of key.

Refer to the operator's manual for more detailed operations.

## 2.2 Main Unit

### 1.2. Composition

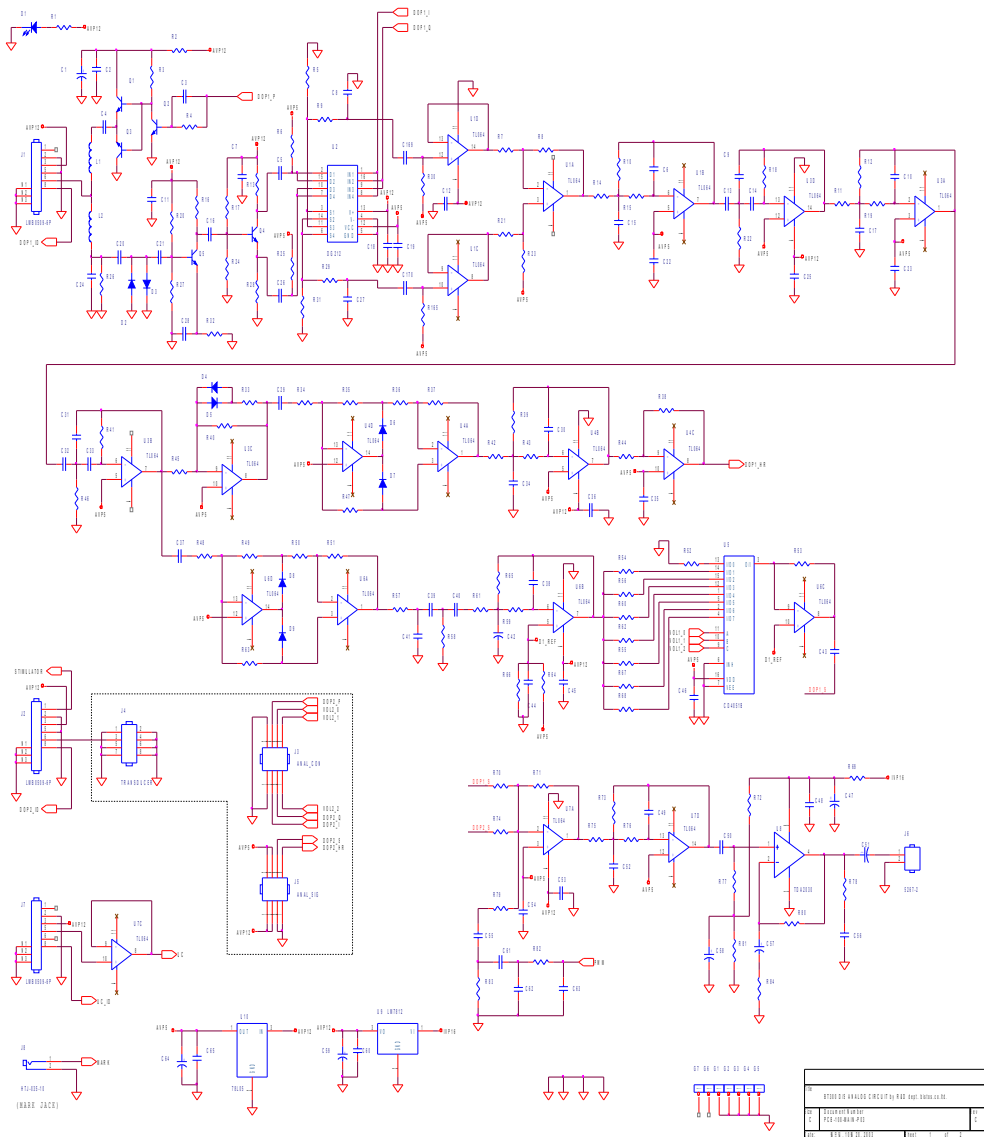




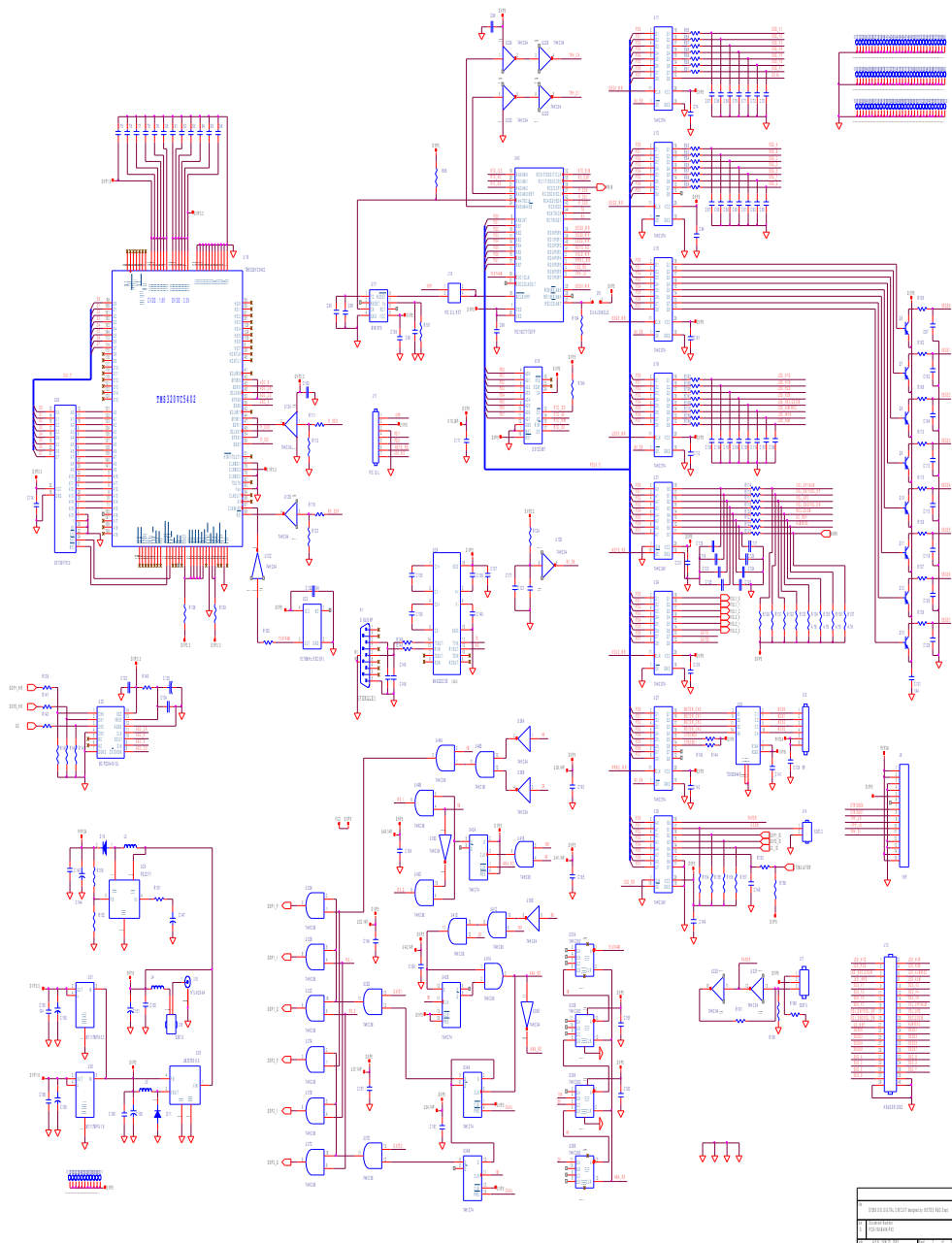
- ① Key Board
- ② Print Engine
- ③ Main Board

## 2.2. Main Board

- Circuit Diagram
  - < Analog Part >



< Digital Part >



## ● Technical Description

### 1 Doppler signal generation circuit

The burst signal drives the ultrasound sensor using by Q1 ~

Q3.

The L-C impedance matching circuit is used to match the received ultrasound signal and the signal is amplified about 40 dB at Q5.

U2 demodulates by 1MHz to get the Doppler signal and the most adequate signals are abstracted through the 4 stages filter.

BT-300 uses the 1MHz ultrasound, so the Doppler frequency is low frequency about 100 ~ 200Hz. The OP Amps (U6A, U6D) perform the frequency doubling by full-wave rectifier to hear clearly when user hears the fetal heart signal. After using the amplifier and LPF, this signal is adjusted the volume (U5, 8 steps) and transferred to audio amplifier (U8).

The other rectifier circuit (U4A, U4D) is used to calculate the heart rate, this signal is amplified and used LPF for envelope detection. And adjust the DC level to fit in the input level of U25, A/D converter (0 ~ 3.3V).

## 2 Sound output circuit

The signal of Doppler (DOP1\_S, DOP2\_S), alarm and information are summed in U7A. The signal for alarm(bee bee) and information(ding~ dong~) is PWM signal generated from U43.

This signal is converted to be able to hear using RC low pass filter. This signal and Doppler signal are integrated and output to speaker by audio amplifier (U8).

## ③ A/D converter & DSP circuit

MCP3204(U28) A/D converter is possible to convert to 4 channels and converts each signal DOP\_1HR, DOP2\_HR, UC to 12 bits digital signal by 200Hz periodically. The range of analog input signal of this A/D converter must be in 0 ~ +3.3V. The converted digital signal is transmitted to DSP(U16) by serial and calculated an useful value using many signal processing techniques. DSP is TMS320VC5402 by TI company and the fetal heart rate is calculated at 0.25 second using auto-correlation algorithm. The output is transmitted to CPU to display and record.

## ④ TX burst pulse generation circuit

U33, U34, U37~42 generate the burst signal for driving the ultrasound sensor and control signal for demodulation.

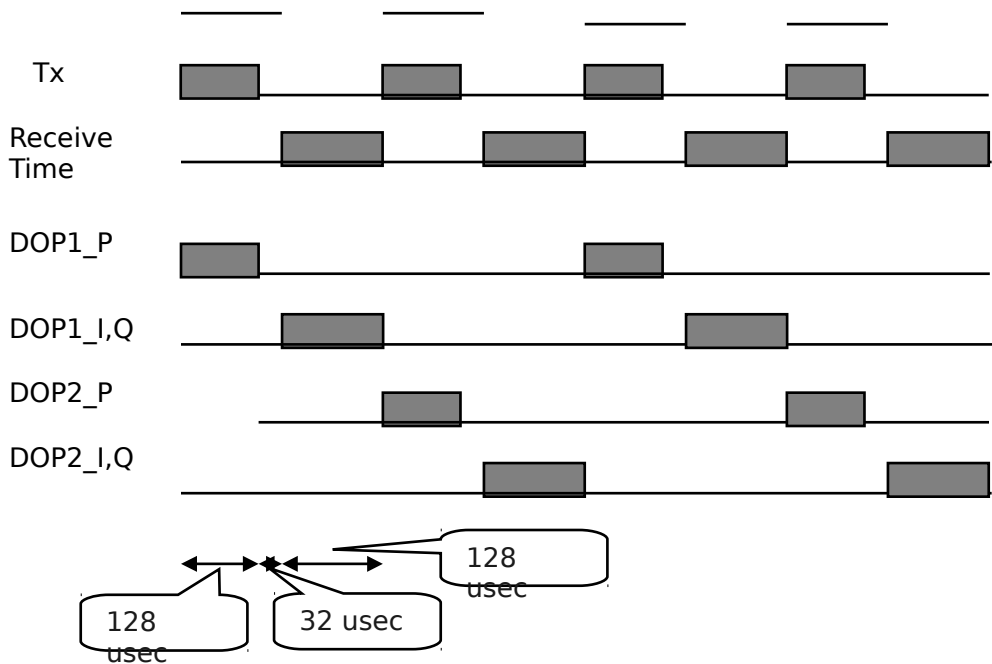
The timing diagram is below.

< Timing Diagram >

3.47KHz







##### ⑤ CPU circuit

CPU(U43) is PIC16F77, when it has malfunction, CPU resets itself using MM1075(U17) watch-dog IC. FHR and UA are displayed on the 7-segment and signal quality is displayed on the LED.

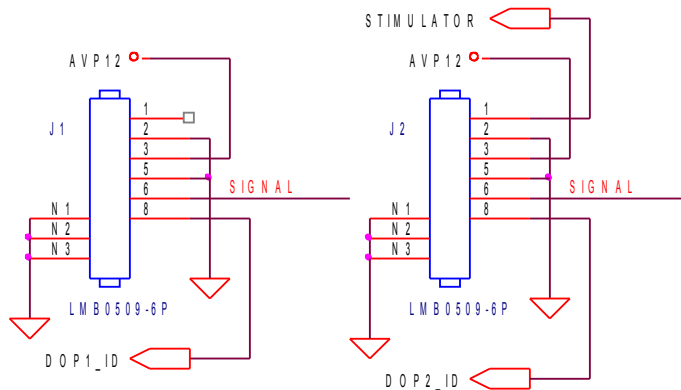
Thermal print is operated +24V. CPU controls the stepping motor and TPH to record the calculated data on the thermal paper. Door open or paper out is recognized by sensor. If that situation happens during recording, then CPU stops recording and displays "See Prn" on the display panel.

Time and date are calculated automatically at the DS12C887(U18). CPU reads the value and records on the recording paper.

Each key is recognized by CPU which performs each operation.

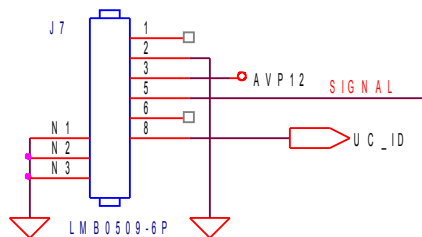
##### ● Connection

##### A. Doppler Probe Connector



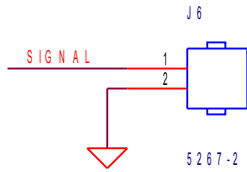
Pin	Name	I/O	Description
1	Stimulator	I	Acoustic stimulator enable signal
2	GND	-	Ground
3	AVP12	O	+12V power
5	GND	-	Ground
6	Signal	I/O	Transmitting and receiving ultrasound signal
8	DOP ID	I	Identity signal

#### B. UC Probe Connector



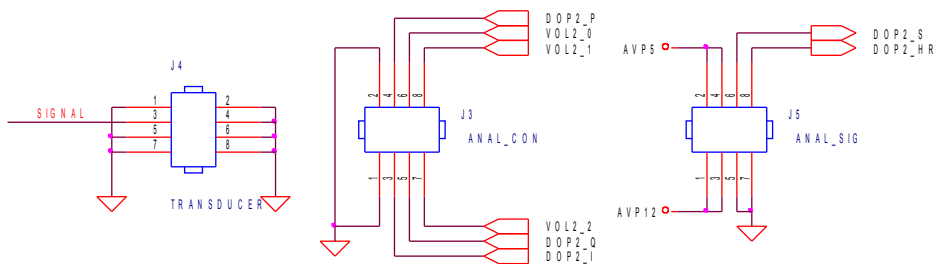
Pin	Name	I/O	Description
1	NC	-	-
2	GND	-	Ground
3	AVP12	O	+12V power
5	Signal	I	UC out signal
6	NC	-	-
8	UC ID	I	Identity signal

#### C. Mark Jack Connection



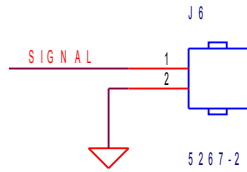
Pin	Name	I/O	Description
1	Signal	I	Mark enable signal
2	GND	-	Ground

## D. Doppler 2 control signal (only BT-300 *dual*)



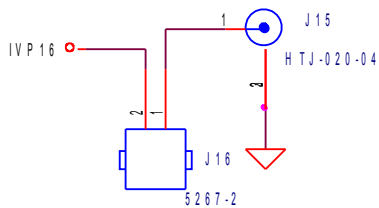
Name	Description
Signal	Transmitting and receiving ultrasound signal
DOP2_P	Digital pulse for transmitting
VOL2_0	Volume control signal 0
VOL2_1	Volume control signal 1
VOL2_2	Volume control signal 2
DOP2_Q	180° control signal for demodulation
DOP2_I	0° control signal for demodulation
DOP2_S	Doppler sound signal
DOP2_HR	Doppler heart rate signal
AVP5	+5V power
AVP12	+12V power

## E. Speaker Connector



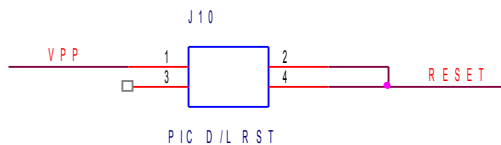
Pin	Name	I/O	Description
1	Signal	O	Sound output
2	GND	-	Ground

#### F. Input Power Connector



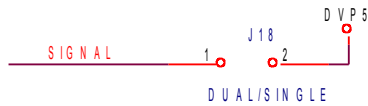
Pin	Name	I/O	Description
1	IVP	I	+16V input power
2	IVP16	I	+16V input power through power switch

#### G. CPU Reset Connector



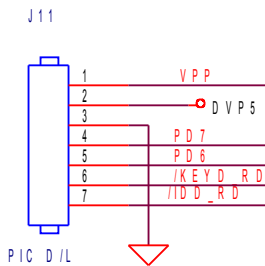
Pin	Name	I/O	Description
1	VPP	I	Power for program writing to CPU
2	RESET	O	CPU reset signal
3	NC	-	-
4	RESET	O	CPU reset signal

#### H. Dual / Single Recognized Connector



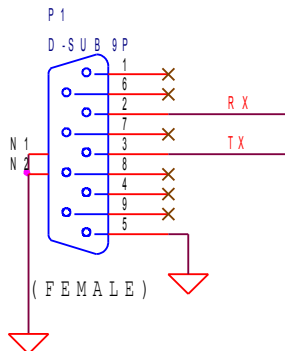
Pin	Name	I/O	Description
1	DVP5	O	+5V power
2	SIGNAL	I	Recognized signal

#### I. CPU Program Download Connector



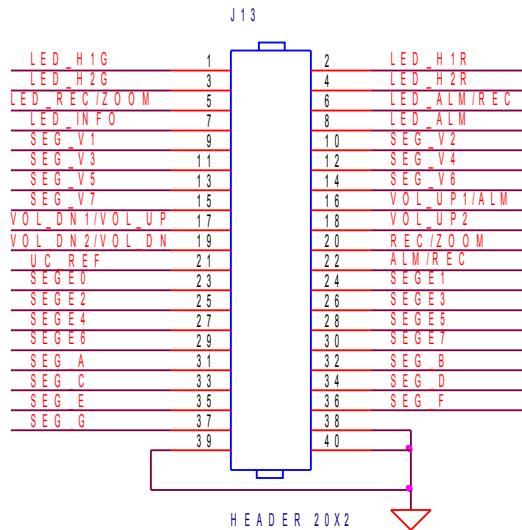
This connector is used only to download the CPU program.

#### J. Central Monitor Interface Connector (RS-232C)



Pin	Name	I/O	Description
2	RX	I	Receiving signal for central monitor
3	TX	O	Transmitting signal for central monitor
5	GND	-	Ground

#### K. Key Board Connector

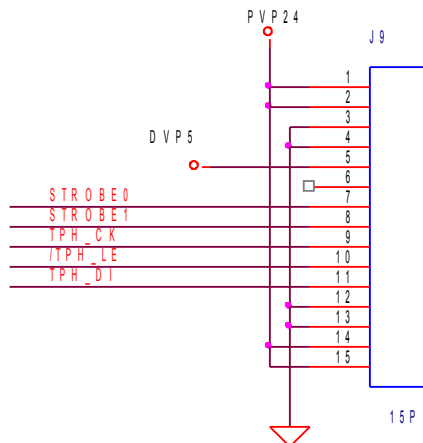


Pin	Name	I/O	Description
1	LED_H1G	O	FHR1 green rhythm LED signal
2	LED_H1R	O	FHR1 red rhythm LED signal
3	LED_H2G	O	FHR2 green rhythm LED signal
4	LED_H2R	O	FHR2 red rhythm LED signal
5	LED_REC/ZOOM	O	Record(D) or zoom(S) LED signal
6	LED_ALM/REC	O	Alarm(D) or record(S) LED signal
7	LED_INFO	O	Information LED signal
8	LED_ALM	O	Alarm LED signal
9	SEG_V1	O	Volume 1 step display signal
10	SEG_V2	O	Volume 2 step display signal
11	SEG_V3	O	Volume 3 step display signal
12	SEG_V4	O	Volume 4 step display signal
13	SEG_V5	O	Volume 5 step display signal
14	SEG_V6	O	Volume 6 step display signal
15	SEG_V7	O	Volume 7 step display signal
16	VOL_UP1/ALM	I	DOP1 volume up(D) or alarm(S) key
17	VOL_DN1/VOL_UP	I	DOP1 volume down(D) or volume up(S) key
18	VOL_UP2	I	DOP2 volume up key
19	VOL_DN2/VOL_D N	I	DOP2 volume down(D) or volume down(S) key
20	REC/ZOOM	I	Record(D) or zoom(S) key
21	UC_REF	I	UC reference key
22	ALM/REC	I	Alarm(D) or record(S) key
23	SEG0	O	7-segment 0 enable signal
24	SEG1	O	7-segment 1 enable signal
25	SEG2	O	7-segment 2 enable signal

26	SEG3	O	7-segment 3 enable signal
27	SEG4	O	7-segment 4 enable signal
28	SEG5	O	7-segment 5 enable signal
29	SEG6	O	7-segment 6 enable signal
30	SEG7	O	7-segment 7 enable signal
31	SEGA	O	7-segment A display signal
32	SEGB	O	7-segment B display signal
33	SEGC	O	7-segment C display signal
34	SEGD	O	7-segment D display signal
35	SEGE	O	7-segment E display signal
36	SEGF	O	7-segment F display signal
37	SEGG	O	7-segment G display signal
38	GND	-	Ground
39	GND	-	Ground
40	GND	-	Ground

\* D : dual, S : single

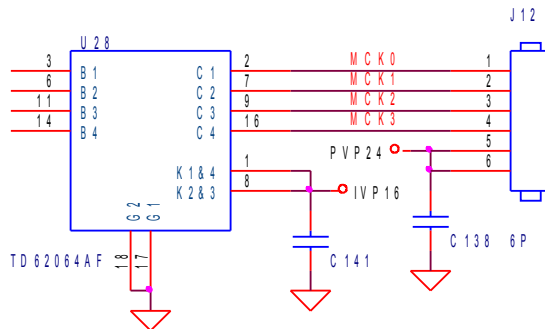
#### L. TPH Connector



Pin	Name	I/O	Description
1	PVP24	O	+24V power
2	PVP24	O	+24V power
3	GND	-	Ground
4	GND	-	Ground
5	DVP5	O	+5V power
6	NC	-	-
7	STROBE 0	O	TPH strobe 0 signal
8	STROBE 1	O	TPH strobe 1 signal

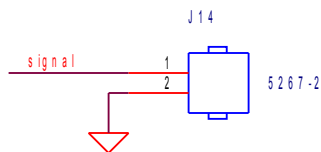
9	TPH CK	O	TPH clock signal
10	/TPH LE	O	TPH LE signal (active low)
11	TPH DI	O	TPH data signal
12	GND	-	Ground
13	GND	-	Ground
14	PVP24	O	+24V power
15	PVP24	O	+24V power

#### M. Motor Connector



Pin	Name	I/O	Description
1	MCK0	O	Motor clock 0 signal
2	MCK1	O	Motor clock 1 signal
3	MCK2	O	Motor clock 2 signal
4	MCK3	O	Motor clock 3 signal
5	PVP24	O	+24V power
6	PVP24	O	+24V power

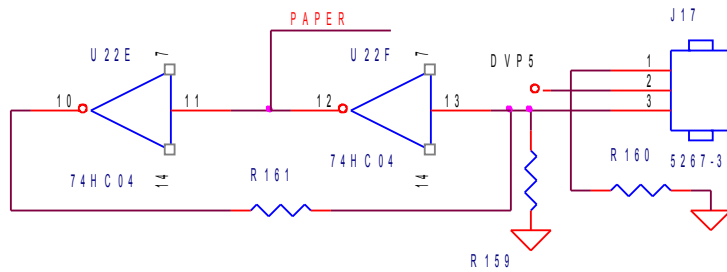
#### N. Printer Door Check Connector



Pin	Name	I/O	Description
1	SIGNAL	I	Door open check signal
2	GND	-	Ground

#### O. Printer Paper Check Connector

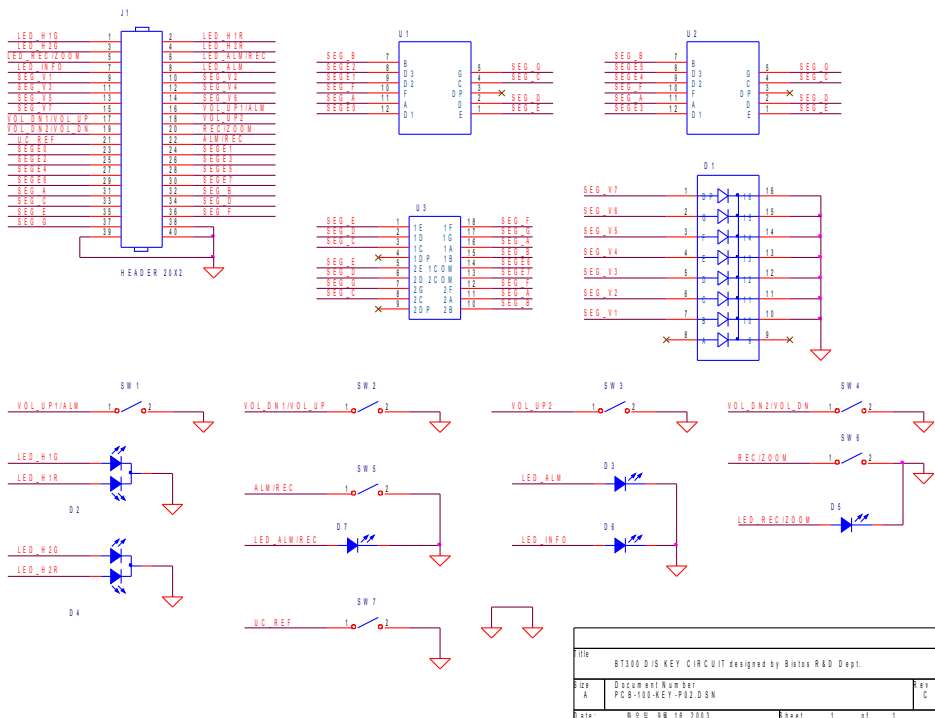




Pin	Name	I/O	Description
1	LL	O	Level signal
2	DVP5	O	+5V power
3	PAP	I	Paper check signal

## 2.2.3 Key Board

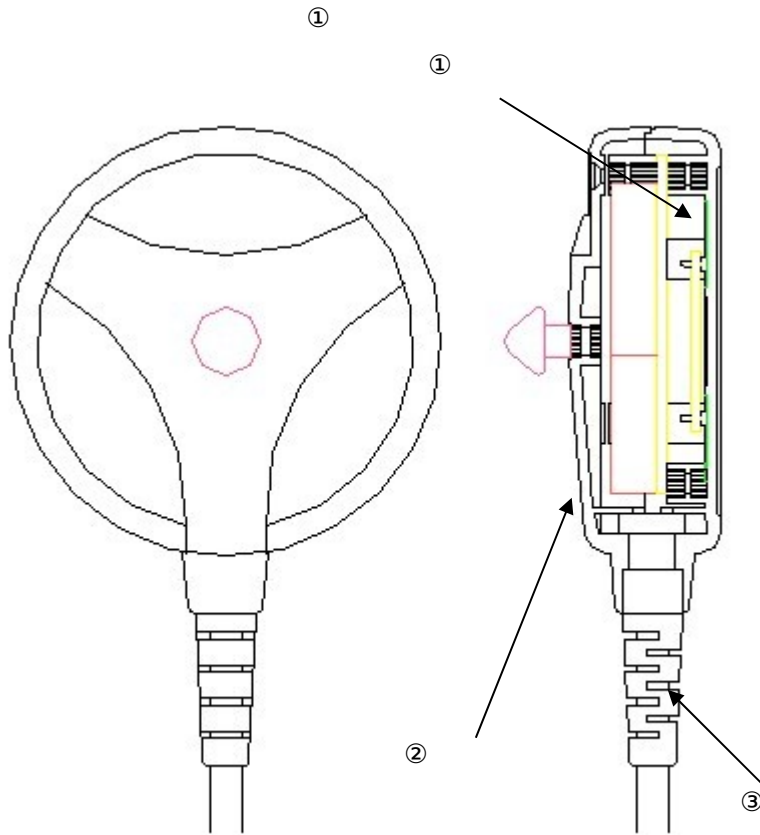
- Circuit Diagram



- Technical Description**  
 FHR and UA are displayed on the 7-segment U1, U2, U3 and signal quality is displayed on the two colors LED D2, D4.  
 D3, D5, D6, D7 LED display the state of alarm, recording, zoom and information operation respectively. SW1 ~ SW7 are key switches.  
 D1 is displayed the volume step.
- Connection**  
 This connection is same as the key board connection in main board.

## 2.3 Doppler Probe

### 2.3.1 Composition



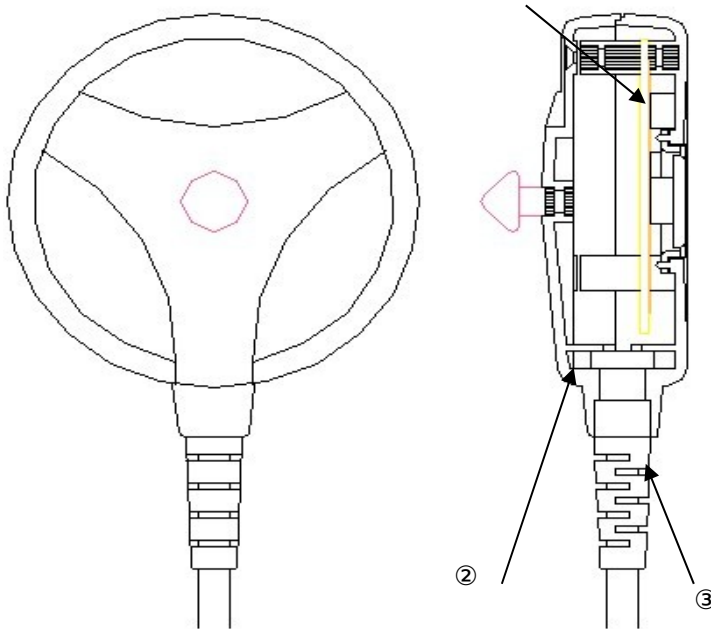
- ① Ultrasound Sensor
- ② Doppler Case
- ③ Probe Cable

## 2.4 UC Probe

### 2.4.1 Composition

①

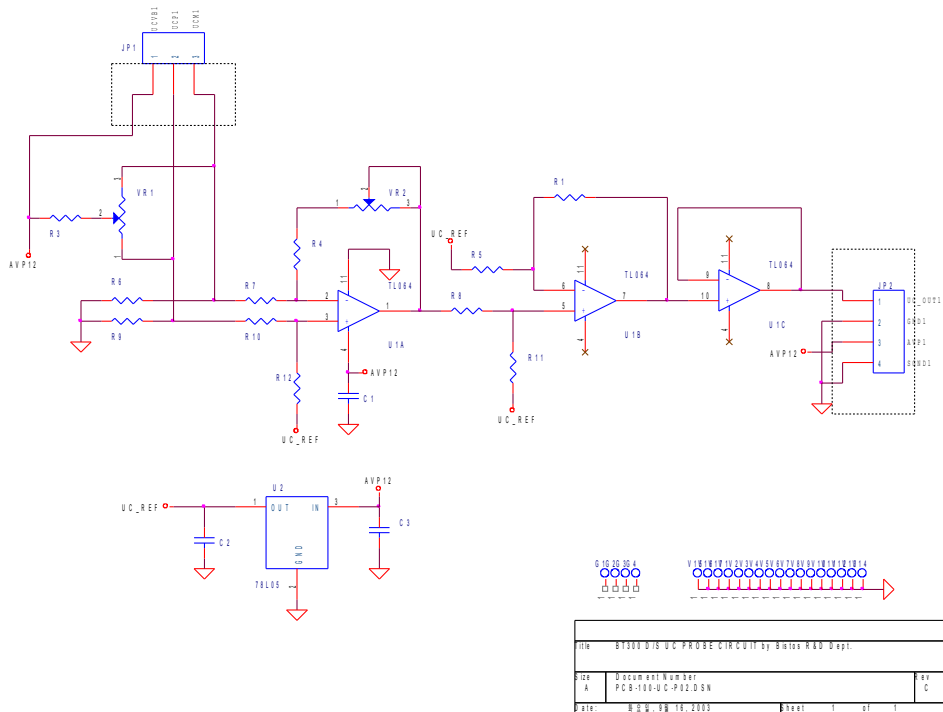
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- ① UC Board
- ② UC Case
- ③ Probe Cable

## 2.4.2 Technical Description

- Circuit Diagram



## ● Technical Description

The uterine contraction is converted to electrical signal by using pressure sensor “strain gauge”. This signal is compensated the difference of production by adjusting the offset and gain. And it is transmitted to main board.

## ● Connection

Pin	Name	I/O	Description
1	UC_OUT 1	O	UC output
2	GND1	-	Ground
3	AVP12	I	+12V power
4	SGND1	-	Shield ground

## Section 3. Troubleshooting

### 3.1 Warning Sign Occasion and Status Checking

- 1 After the monitor power on, Information sound rings once.
- 2 If the ultrasound transducer pulls out of the connector during monitoring(error #4), it rings once every 3 seconds until the transducer is connected to the connector or pressing the **ALM**(alarm) pushbutton causes the alarm function disable.
- 3 When the **REC**(record) pushbutton is pressed for recording in case of print door open or under recording, when the door is opened, it rings once every 3 seconds and "ERR 1" - "REC ERR 1" in BT-300D -appears in the FHR and UC display as shown below until the door is closed or pressing the **ALM**(alarm) pushbutton causes the alarm function to be disabled and return to the normal monitoring mode.



[Figure 4.1 Front Panel for BT-300S]



[Figure 4.2 Front Panel for BT-300D]

- 4 When the **REC**(record) pushbutton is pressed for recording in case of paper empty or printer door open, or when the paper runs out under recording, it rings once every 3 seconds and "ERR 2" - "REC ERR 2" in BT-300D - appears in the FHR and the UC display until the paper is installed or pressing the **ALM**(alarm) pushbutton causes the alarm function to be disabled and go back to the normal monitoring mode.

- 5 When the auto-printing period is expired, it rings once, right after stop recording.

Error Number	Cause	Solution
1	Printer door open	Close the door
2	Paper empty	Insert the paper
3	Printer door open & Paper empty	Close the door & Insert the paper
4	Dop1 probe open under normal operation	Connect the Dop1 probe
5	Dop2 probe open under normal operation	Connect the Dop2 probe

[Table 4.1 Errors and Trouble shooting]

- **Alarm Occasion and Status Checking Up**

When the measured FHR is beyond the alarm setting range for more than 20 seconds during monitoring, it rings every 3 second until the FHR is within the alarm setting range at least once or pressing the ALM(alarm) pushbutton causes the alarm function to be disabled on purpose.

### **3.2Troubleshooting on the Other Situation**

#### **3.2.1 Power operation**

- Not operate the power

- 1 Check AC input → supply 110/220 V
- 2 Check +16V Power Adaptor output → replace Power Adaptor
- 3 Check DC power in Main Board
  - +16V (IVP16) : L2 point
  - +24V (PVP24) : U29 - D10 point
  - +5V (DVP5) : U35 - 4pin
  - +3.3V (DVP3.3) : U31 - 2pin
  - +1.8V (DVP2.8) : U36 - 2pin
  - +12V (AVP12) : U9 - 3pin
  - +5V (AVP5) : U10 - 1pin

### **3.2.2 Doppler operation**

- Not display the HR value
  - 1 Check HR signal in Main Board → DOP1\_HR signal : U4C-8pin
  - 2 Refer to display operation
- Not hear the Doppler sound
  - 1 Check sound signal in Main Board
    - DOP1\_S signal : U6C-8pin
  - 2 Check volume operation → U5
  - 3 Refer to sound operation

### **3.2.3 UC operation**

- Not display the UC value
  - 1 Check UC signal in Main Board → U7C - 8pin
  - 2 Refer to display operation

### **3.2.4 Sound operation**

- Not hear the Alarm / Information sound
  - 1 Check the PWM → U43 - 36pin
  - 2 Check the Audio Amp → U8

### **3.2.5 Key operation**

- Not operate the key
  - 1 Check Main Board / Key Board cable → re-connection (J13)
  - 2 Check the key input signal in Main Board → U21 - input

### **3.2.6 Display operation**

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- Not operate the display
  - 1 Check Main Board / Key Board cable → re-connection (J13)
  - 2 Check the display output signal in Main Board  
→ U11, U13, U15, U19 - output

### **3.2.7 Print operation**

- Not operate print
  - 1 Check the cable Main Board / Print Engine  
→ re-connection (J9, J12, J14, J17)
  - 2 Check the TPH control signal in Main Board  
→ U43 - 5pin, 22pin, 24pin, U27 - 14pin, 15pin
  - 3 Check the motor control signal in Main Board  
→ U27 - 19in, 18pin, 17pin, 16pin

### **3.2.8 RS-232C operation**

- Not operate serial communication
  - 1 Check the serial in/out signal in Main Board → U26

## **Section 4. Maintenance and Cleaning**

### **4.1 Maintenance and Cleaning**

You can keep BT-300 clean in many different ways. Use the following recommendations to avoid the damage or stain of the machine.

If you use the material that is not approved, it may cause damage

to the product. In this case, the product will not be guaranteed even within warranty period.

<b>Caution</b>
Check the main unit and the probes thoroughly after cleaning. Do not use the old and damaged equipment.

To keep the machine clean, apply alcohol on a soft cloth and scrub the body and the probe once a month. Do not use lacquer, thinner, ethylene, or the oxidizing substance.

Keep the probes from dust or stain. Wipe the cable with a soaked cloth that is wet with warm water (40°C / 104°F), and with the clinical alcohol once a week.

Do not soak the machine or the probes into any liquid or detergent. Keep the machine or the probes away from any liquid.

#### **4.2Regular Inspection**

Perform the periodical safety inspection on BT-300 once a year. For the inspection details, see the service manual provided by BISTOS Co., Ltd.

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## Section 5. Specifications

### ● Ultrasound Mode

Technique:	Pulsed Doppler Wave / Autocorrelation Processing
Pulse Repetition Frequency:	3.5 KHz
Pulse Duration:	128 $\mu$ s
Center Frequency:	1MHz
Intensity:	<10mW/cm <sup>2</sup>
Heart Rate Counting Range:	50 ~ 240 BPM
FHR Accuracy:	±2% of range
Leakage Current:	<10 $\mu$ A
Dual Fetus	

### ● Uterine Activity Mode

Range, Tocotransducer:	0 ~ 99 Relative Units
Excitation Voltage:	+5.0Vdc
Resolution:	1 Relative Unit
Bandwidth, Tocotransducer:	DC ~ 0.5Hz

### ● Power Requirements

Line Voltage:	100 ~ 250VAC
Line Frequency:	50 or 60Hz
Power Consumption:	80VA max

### ● Physical Characteristic

Height:	19.1cm (7.5 in)
Width:	18.7cm(7.4 in)
Depth:	20.1cm(7.9 in)
Weight:	6Kg(13.2 lbs)

### ● Environmental Characteristics

Operating Temperature:	10°C(50°F) to 40°C(104°F)
Operating Humidity:	30% ~ 85% non-condensing
Storage Temperature:	-10°C(14°F) to 60°C(131°F)
Storage Humidity:	20% ~ 95% non-condensing
Operating Atmospheric Pressure:	70 kPa ~ 106kPa
Storage Atmospheric Pressure:	70 kPa ~ 106kPa

### ● Functional Features

#### **FM**

Dual Fetal Movement

#### **UC**

External Type  
Reference (Zeroing) Control

#### **Printer**

Thermal Array Type  
Print Speed: 10, 20, 30 mm/min  
Paper Feeding Function  
Print Contrast: 1, 2, 3 steps  
Auto Print Period: 0(Off), 10, 20, 30, 40, 50, 60min

#### **Display**

7-Segment LED  
2 Channels (HR, UC)-BT-300S/3 Channels (HR1, HR2, UC)-BT-300D

#### **Indicators**

Heart Rhythm (Green: Stable, Red: Unstable)  
Alarm On/Off State  
Print On/Off State  
AC Power (Green LED)

#### **Sound**

Doppler Sound with Volume Control (8 steps)  
Alarms Sound: exceed FHR Range  
Information Sound: Doppler Probe Off, Paper Off, Door Open, Watch Dog

#### **Set-up**

Alarm Upper/Lower Limit Value  
Print Speed  
Print Contrast  
Auto Print Period

#### **Function**

Event Mark Function  
Zoom in Function  
Doppler2 Offset Function

#### **External Link**

RS-232C: for Central Monitoring(Optional)

**Service Telephone and Fax. Numbers**

**Telephone: 82-2-862-0642, 0643**  
**Fax: 82-2-862-0644**

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