DATREND
Systems Inc.

FMS-3

Fetal Monitor Simulator

Operating Manual

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Copyright

Unpacking and Inspection

Follow standard receiving practices upon receipt of the instrument. Check the shipping carton for damage. If damage is found, stop unpacking the instrument. Notify the freight carrier and ask for an agent to be present while the instrument is unpacked. There are no special unpacking instructions, but be careful not to damage the instrument when unpacking it. Inspect the instrument for physical damage such as bent or broken parts, dents, or scratches.

Claims

Our routine method of shipment is via common carrier. Upon delivery, if physical damage is found, retain all packing materials in their original condition and contact the carrier immediately to file a claim. If the instrument is delivered in good physical condition but does not operate within specifications, or if there are any other problems not caused by shipping damage, please contact your local sales representative or Datrend Systems immediately.

Standard Terms and Conditions

Refunds & Credits

Please note only serialized products (products labelled with a distinct serial number) and accessories are eligible for partial refund and/or credit. Non-serialized parts and accessory items (cables, carrying cases, auxiliary modules, etc.) are not eligible for return or refund. In order to receive a partial refund/credit, the product must not have been damaged, and must be returned complete (meaning all manuals, cables, accessories, etc.) within 90 days of original purchase and in "as new" and resalable condition. The Return Procedure must be followed.

Return Procedure

Every product returned for refund/credit must be accompanied by a Return Material Authorization (RMA) number, obtained from Datrend Customer Service. All items being returned must be sent prepaid (freight, duty, brokerage, and taxes) to our factory location.

Restocking Charges

Products returned within 30 days of original purchase are subject to a minimum restocking fee of 15%. Products returned in excess of 30 days after purchase, but prior to 90 days, are subject to a minimum restocking fee of 20%. Additional charges for damage and/or missing parts and accessories will be applied to all returns. Products which are not in "as new" and resalable condition, are not eligible for credit return and will be returned to the customer at their expense.

Certification

This instrument was thoroughly tested and inspected and found to meet DSI's manufacturing specifications when it was shipped from the factory. Calibration measurements are traceable to the National Research Council of Canada (NRC) and/or the National Institute of Standards and Technology (NIST). Devices for which there are no NRC/NIST calibration standards are measured against in-house performance standards using accepted test procedures.

WARRANTY AND PRODUCT SUPPORT

Datrend Systems Inc. ("DSI") warrants this instrument to be free from defects in materials and workmanship under normal use and service for a period of **one (1) year** from the date of original purchase. This warranty will be automatically extended up to a **maximum of five (5) years** from the date of original purchase provided that calibration is performed on an **annual** basis by a Datrend Authorized Service Center. During the warranty period DSI will, at our option, either repair or replace a product at no charge that proves to be defective; provided you return the product (shipping, duty, brokerage and taxes prepaid) to DSI. Any and all transportation charges incurred are the responsibility of the purchaser and are not included within this warranty. This warranty extends only to the original purchaser and does not cover damage from abuse, neglect, accident or misuse or as the result of service or modification by other than DSI. IN NO EVENT SHALL DATREND SYSTEMS INC. BE LIABLE FOR CONSEQUENTIAL DAMAGES.

This warranty is subject to the following limitations:
!   Re-calibration of the instrument, which has a recommended annual calibration frequency, is not covered under the warranty.

No warranty shall apply when damage is caused by any of the following:
!   Misuse or abuse of any form;
!   Discharge of a defibrillator or transcutaneous pacemaker into any terminal, interface connection or port not intended for that specific use;
!   Use of an AC power supply adapter other than the AC adapter specified for the instrument;
!   Power failure, surges, or spikes;
!   Damage in transit or when moving the instrument;
!   Improper power supply such as low voltage, incorrect voltage, defective wiring or inadequate fuses;
!   Accident, alteration, abuse or misuse of the instrument;
!   Fire, water damage, theft, war, riot, hostility, acts of God, such as hurricanes, floods, etc.

Only serialized products (those items bearing a distinct serial number tag) and their accessory items are covered under this warranty. PHYSICAL DAMAGE CAUSED BY MISUSE OR PHYSICAL ABUSE IS NOT COVERED UNDER THE WARRANTY. Items such as cables and non-serialized modules are not covered under this warranty.

This warranty gives you specific legal rights and you may have other rights, which vary from province to province, state to state, or country to country. This warranty is limited to repairing the instrument to DSI's specifications.

When you return an instrument to DSI for service, repair or calibration, we recommend shipment using the original shipping foam and container. If the original packing materials are not available, we recommend the following guide for repackaging:

!   Use a double-walled carton of sufficient strength for the weight being shipped.
!   Use heavy paper or cardboard to protect all instrument surfaces. Use non-abrasive material around all projecting parts.
!   Use at least four inches of tightly packed, industrial-approved, shock-absorbent material all around the instrument.

DSI will not be responsible for lost shipments or instruments received in damaged condition due to improper packaging or handling. All warranty claim shipments must be made on a prepaid basis (freight, duty, brokerage, and taxes). No returns will be accepted without a Return Materials Authorization ("RMA") number. Please contact Datrend Systems to obtain a Return Materials Authorization (RMA) number and receive help with shipping/customs documentation (Refer to Chapter 15 for contact information).

Warranty Disclaimer

Should you elect to have your instrument serviced and/or calibrated by someone other than Datrend Systems, please be advised that the original warranty covering your product becomes void when the tamper-resistant Quality Seal is removed or broken without proper factory authorization. We strongly recommend, therefore, that you send your instrument to Datrend Systems for service and calibration, especially during the original warranty period.

In all cases, breaking the tamper-resistant Quality Seal should be avoided at all cost, as this seal is the key to your original instrument warranty. In the event that the seal must be broken to gain internal access to the instrument (e.g., in the case of a customer-installed firmware upgrade), you must first contact Datrend Systems. You will be required to provide us with the serial number for your instrument as well as a valid reason for breaking the Quality Seal. You should break this seal only after you have received factory authorization. Do not break the Quality Seal before you have contacted us! Following these steps will help ensure that you will retain the original warranty on your instrument without interruption.

WARNING

Unauthorized user modifications or application beyond the published specifications may result in electrical shock hazards or improper operation. Datrend Systems will not be responsible for any injuries sustained due to unauthorized equipment modifications.

DSI DISCLAIMS ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR APPLICATION.

> **THIS PRODUCT CONTAINS NO USER-SERVICEABLE COMPONENTS. UNAUTHORIZED OPENING OF THE INSTRUMENT SHALL VOID THIS AND ALL OTHER EXPRESSED OR IMPLIED WARRANTIES.**

Table of Contents

Abbreviations, Definitions and Symbols

The following abbreviations, terms and acronyms are used throughout this manual:

°C	degrees Celsius (centigrade)
°F	degrees Fahrenheit
AED	Automated External Defibrillator
AHA	American Heart Association
Arrhythmia	An abnormal rhythm of the cardiac muscle; an abnormal pattern or rate of heart beats.
Autosequence	A series of measurements or test operations that are run automatically in a predefined order, with or without user involvement.
BP	Blood Pressure
BPM	(ECG) Beats Per Minute or (RESPIRATION) Breaths Per Minute
cc	cubic centimeters
cm	centimeter
cardiotocograph monitor	medical device for monitoring fetal activity through the use of fetal heart rate and uterine pressure, commonly includes the ability to monitor the maternal ECG
DUT	Device Under Test
ECG	Electrocardiogram. Equivalent to EKG.
Hg	Mercury
HORIZ	Horizontal
Hz	Hertz
IEC	International Electrotechnical Commission
INT	Intermediate
k	kilo
kg	kilogram
kHz	kilohertz
kV	kilovolt
k	kilo-ohm
l/min	liters per minute
LA	Left arm ECG connection or electrode
LL	Left leg ECG connection or electrode
LV	Left Ventricular
µ	micro
µV/V/mmHg	microvolt per volt per millimeter of Mercury
MHz	megahertz
m	milli-
mA	milliampere
mm	millimeter
mmHg	millimeters of Mercury
mS	milliseconds
msec	milliseconds

mV	millivolt
NSR	Normal Sinus Rhythm
	ohm
Pacer	A transvenous or implanted pacemaker
PAC	Premature Atrial Contraction
PNC	Premature Nodal Contraction
PVC	Premature Ventricular Contraction
QRS complex	A specific segment of the electrocardiogram signal, comprising the Q, R and S waves, which corresponds to the heart systole.
RA	Right arm ECG connection or electrode
RL	Right leg ECG connection or electrode
RV	Right Ventricular
TEMP	Temperature
V	volt
V1-V6	Chest electrodes 1 through 6 of the ECG
VERT	Vertical
W	watt

Style Example	Definition
ENTER	Activates or Enables a Setting, Parameter or Feature.
◀▶	Scrolls Menu Left or Right (as available - indicated by ◀ and ▶ on the LCD Display)
▲▼	Increases or Decreases the value of a setting (as available - indicated by ▲ and ▼ on the LCD Display)

Chapter

1
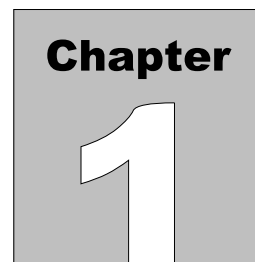
1 Specifications

1.1 General Specifications

Environment:
- Operating Temperature 15°C to 35°C (59°F to 95°F)
- Storage Temperature 0°C to 50°C (32°F to 122°F)
- 10% to 90% Relative Humidity
- Indoor Use Only

Power Supply:
- 9V Alkaline battery, or
- Optional Battery Eliminator, 9 VDC / 500 mA
  (region specific, as noted in Appendix B)

Electrical Interfaces:
- 10 standard ECG snap leads
  (5 lead Maternal, 2 lead Maternal/Fetal, 2 lead Fetal 1, 2 lead Fetal 2)
- 10 ECG jacks, as above (accepts 3 mm or 4 mm plugs)
- IUP/TOCO: proprietary USB
- 3 - 8pin mini-DIN for Ultrasound 1/2/3
- High-level ECG Out: 2.5mm stereo phono jack
- DC IN: EIAJ-3, center-positive (9 VDC, 500 mA)
- RS-232 Serial Port: proprietary RJ-12

User Interface:
FMS-3 is controlled through 10 keys on the front panel keypad, allowing the user to easily access all functions of the simulator.

As individual functions are activated, they remain active unless turned off, allowing numerous simulations to be enabled concurrently, with all appropriate signals synchronized.

Display:
   20 character by 8 line alphanumeric/128 x 64 graphic LCD

Dimensions and Weight:
   • 14cm x 9.1cm x 3.4 cm (3.6" x 5.6" x 1.3")
   • 0.33 kg (11.5 oz)

1.2 Simulation Specifications

ECG General:

• Simulation Type:	5-Lead Maternal ECG with independent outputs for each signal lead, referenced to RL 2 lead Maternal/Fetal1 combined ECG 2 lead Fetal1 2 lead Fetal2
• Output Impedance:	750 ohms to RL (nominal)
• High Level Output:	Maternal, Lead II amplitude x 500 (0.5V per Lead II millivolt)
• Amplitude Accuracy:	± 1% (Lead II, 2 Hz Square Wave)

Normal Sinus Rhythm:

• Maternal Rates:	60, 80, 100, 120, 140, 160 BPM , Sinus Variability Variable (80 - 100) with TOCO pressure
• Maternal Amplitudes (Lead II):	0.5, 1, 2, 3, 4 and 5 mV
•Fetal 1 Rates:	30, 60, 80, 90, 100, 120, 140, 150, 160, 180, 200, 210, 240 BPM
• Fetal 1 Amplitudes:	0.05, 0.1, 0.2, 0.5, 1 and 2 mV
• Fetal 1 Variability:	Absent Low Variability Minimal Variability Average Variability Moderate Variability Marked Variability Long Term Variability

Fetal 1 Waveforms/Patterns:

- Normal @ 140 bpm
- Tachycardia @ 180 bpm
- Bradycardia @ 90 bpm
- Arrythmia
- Late Deceleration
- Early Deceleration
- Moderate Variable Deceleration
- Acceleration 1
- Acceleration 2
- Sinusoidal - high (large change)
- Sinusoidal - low (small change)
- Severe Variable Deceleration 1
- Severe Variable Deceleration 2
- Prolonged Deceleration
- Biphasic Deceleration
- Exaggerated Deceleration
- Non-uniform Deceleration
- Variable 'U' Deceleration
- Variable High BPM Deceleration
- Variable 'V' Deceleration
- Variable Deceleration with Position Changes
- Long Deceleration
- Compensatory Acceleration

ECG Performance Tests:

- Square Wave: 2 Hz

- Square Wave: 0.125 Hz

  - Pulse: 80 msec, 1 Hz (60 BPM)

Pressure : Intra Uterine Pressure/TOCO:

• Channels:	1
• Static Pressures (IUP):	-5, 0, 20, 40, 60, 80, 100, 150 and 200 mmHg (units)
• Transducer Sensitivity:	5 µV/V/mmHg or 40 µV/V/mmHg

• TOCO Amplitude Simulations:	0 - 25 Units
	0 - 40
	0 - 50
	0 - 60
	0 - 80
	0 - 100
	0 - 300
	0 - 400

• Waveform Simulations:	Tocodynamometer
	Hypotonic TOCO Amplitude
	Picket Fence
	Coupling
	Tripling
	Irregularities of the Acme
	Hypertonic
	Hypertonus
	'V' Spikes

• Baseline Elevation	5, 10 and 20 units
	On/Off

• Respiration Artifact:	OFF; 3 mmHg; or 5 mmHg
	Maternal Respiration Rate: 15, 20, 30 Breaths per Min.
	Wander: Mild - 5mmHg
	Moderate - 10mmHg
	Period - 3, 5, 10, 20, 30 Min.

Fetal 2:

•Fetal 2 Rates: 60, 80, 100, 140, 160, 200 BPM

• Fetal 2 Amplitudes: 0.5, 1, 2, 3, 4 and 5 mV (tracks Maternal)

• Rate Accuracy: ± 1BPM

• Fetal 2 Waveforms: Normal
Tachycardia
Bradycardia

• Fetal 2 Trends: Pattern 1
Pattern 2
Pattern 3

Ultrasound:

• Channel 1:   tracks Fetal 1 rate

• Channel 2:   tracks Fetal 2 rate; or,
Separate Wave Mode (155 bpm + variability)

• Channel 3:   rate approximately 140 bpm

Auto Presets:

Ten user-defined simulation setups can be programmed and uploaded to FMS-3 using PC based software (Hyperterminal, or equivalent).

FMS-3 OPERATING MANUAL
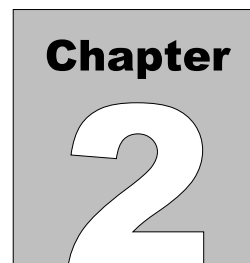
2 General Information

2.1 Overview

The FMS-3 Fetal Monitor Simulator is a simulation platform designed to expedite and simplify the testing of many fetal monitoring devices.

The wide range of simulations available for Maternal ECG, Fetal ECG, Ultrasound, artifacts, waveforms and patterns, performance tests, and Intra Uterine/TOCO pressures make FMS-3 suitable for testing most of the functions of many Fetal Monitors.

2.2 Features

The compact and portable FMS-3 measures just 9.2cm x 14.5cm x 3.3 cm (3.6" x 5.6" x 1.3"), weighs less than 330 grams (11.5 ounces), and operates for approximately 20 hours continuous use when powered by a single 9 Volt alkaline battery.

FMS-3 is controlled through 10 keys on the front panel keypad, allowing the user to easily access all functions of the simulator. As individual functions are activated, they remain active unless turned off, allowing numerous simulations to be enabled concurrently, with all appropriate signals synchronized.

FMS-3 includes an RS-232 communication port to allow control through serial commands. This allows FMS-3 to be integrated with Datrend's ES601 Plus Automated Safety Analyzer, and to communicate with a personal computer (PC), allowing the user to create Auto Settings (i.e. combinations of simulator settings) using suitable terminal emulation software applications such as Hyperterminal, or equivalent.

2.3 Main Functions of FMS-3

- Maternal 5 lead ECG, Normal Sinus Rhythm
- Maternal/Fetal 1 combined ECG
- Fetal 1 ECG
- Fetal 2 ECG
- Ultrasound 1/2/3
- ECG Performance Waveforms
- ECG/Pressure Waveforms and Patterns
- Intra Uterine Pressures
- TOCO Waveforms

Details and specifications of each function are described in the chapters to follow.

2.4 Powering up FMS-3

To power up, press the POWER button on the right side of FMS-3.

The Power-On screen, which shows the firmware version number, will appear briefly and then be replaced by the Main Menu screen, Figure 1.
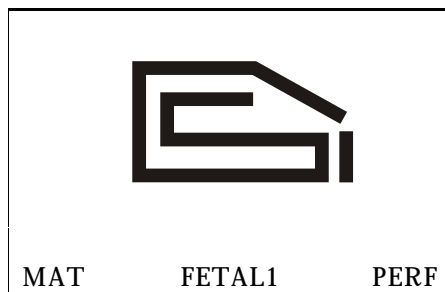
Figure 1: Power On Screen

ECG, Pressures, Ultrasound, waveforms and other simulation parameters are automatically initialized to default values when FMS-3 is powered up. These settings are the "Power-On" defaults for FMS-3. As described in section 2.6, up to eight FMS-3 parameters can be programmed by the user to configure the default simulator operation which takes effect at power-on.

Selection of the operating Functions in FMS-3 is accomplished through a menu list which consists of four lines with three function selections on each line. One of the four menu lines will be displayed on the bottom line of the LCD screen. Each function selection is placed above an unlabeled 'soft-key' which, when pressed, will select the Function above it (eg. MAT, FETAL1, PERF).

The four lines of the Menu are:

MAT	FETAL1	PERF
UA	F1WAVES	TREND
VAR	FETAL2	VIEW
AUTO	SAVE	SETUP

Pressing the MAIN key will scroll through the Menu lines repeatedly until a Function is selected with a 'soft-key'. Pressing MAIN will also return to the Menu screen above, from within any other screen.

2.5 MENU and NUMERIC Modes

At power-on, FMS-3 operates in a menu mode. In this mode, a three function menu line appears at the bottom of the screen (eg. MAT, FETAL1, PERF). There are four menu lines available which can be accessed by pressing the MAIN key. The three un-named keys below the screen are 'soft-keys' which will activate the functional menu of the function above it on the menu line. Each 'soft-key' button (MAT; FETAL1; PERF; and so on) enters a menu corresponding to the label on the button face. The scroll keys (◄; ►; ▲; ▼) are then used to navigate the selected menu. When a desired setting is shown on the LCD display, the ENTER button is pressed to activate the setting.

A NUMERIC mode is available through the RS-232 port. In NUMERIC mode, code numbers can be input via the RS-232 port which will then activate corresponding simulation functions or settings. Code numbers used in NUMERIC mode are listed in Appendix A of this manual.

2.6 Power-On Defaults

A range of simulation parameters are automatically initialized to default values when FMS-3 is powered up. These settings are the "Power-On" defaults for FMS-3.

Immediately after applying power to FMS-3, pressing the VIEW button, then the ENTER button repeatedly will scroll through the current settings for the "Power- On" defaults, as shown in Chapter 11.

There are two methods to change power-on default settings: via menu mode and via the RS-232 port.

2.6.1 Menu Mode

Press the desired menu keypad button to open the corresponding functional menu.

Using the Arrow buttons (◄; ►; ▲; ▼)to select any of following simulator parameters listed in the table below. After making a selection, press the ENTER button to enable the change.

Menu button	Parameters which can be set as power-on defaults
FETAL1	VARIABILITY, AMPLITUDE
MATERNAL	AMPLITUDE
PRESSURE	IUP SENSITIVITY
ULTRASOUND	WIDTH
SETUP DEFAULT	AMPLITUDE KEY, DISPLAY BACKGROUND, BACKLIGHT TIMER

Continue until the above parameters are configured to your preferences. Remember to press ENTER after making each selection to enable the change.

When you are finished changing the settings, press the 'soft-key' SAVE selection to store the settings as the power-on defaults in FMS-3 memory.

2.6.2 Numeric Mode

After powering up FMS-3 connect the simulator to an RS-232 port on a PC. If your PC does not have a serial port a suitable USB - RS-232 adapter may be required. Contact Datrend if one is not available locally.

Referring to the table in the preceding section, and to the numeric codes listed in Appendix A, find the numeric code for the setting you wish to apply as a power-on default. Input the appropriate code following the instructions for RS-232 control in Chapter 13. To change another power-on setting in NUMERIC mode, repeat these steps.

When you are finished changing settings or selections, select the SAVE function from the Menu.

2.7 Connecting to FMS-3

As shown in Figure 2, the lower half of the enclosure, on the left and right sides and the bottom edge of FMS-3 features a full set of universal ECG snaps and jacks, enabling connection of any 3, or 5 lead ECG device. AHA and IEC colour-coded rings surrounding each post and jack aid in connection of corresponding U.S. or international patient leads to the proper ECG signals. Alternating snaps and jacks make connecting easy and conveniently keep leads out of the way. The ECG jacks accommodate standard 3 mm or 4 mm plugs. In addition to the Maternal ECG connections, there are connections for an Maternal/Fetal 1 combined signal, a Fetal 1 only signal and a Fetal 2 signal.

The left side on the upper half of the enclosure of FMS-3 provides connections for 3 Ultrasound (US1, US2, US3) signals, 1 Intra Uterine Pressure(IUP)/TOCO channel.

Figure 2: FMS-3 Interface

A variety of IUP and US cables are available and are listed in Appendix B of this manual.

The right side on the upper half of the enclosure of FMS-3 provides interfaces for DC adapter plug, Power On/Off button, a RS-232 communications port and a stereo phono jack provides a high-level ECG output on the tip connection.

2.8 Navigating FMS-3 Menus

The menus of FMS-3 have been arranged to minimize, as much as possible, the keystrokes needed to select a particular setting.

The three blank keys below the display screen are associated with a high level function. The functions are provided in four lines with three functions per line. For example: MAT, FETAL1, PERF are on line one, and so on. The key labeled **MAIN** will scroll through the four menu lines. At any time, pressing **MAIN** will either cycle through the menu lines, or return to the Menu if you are in some other function. Each time a function key is pressed, you are taken to a menu which allows you to change the simulation settings for that function.

In Figure 3 below, MAT has been selected. The screen now displays the status of the Maternal ECG parameters, along with the standard functional selection menu on the bottom two lines of the screen.

```
MATERNAL SETTINGS:
MAT ECG= NSR 60 BPM
MAT ECG AML=   1mV


_____
◄ MAT ECG RATE/TYPE ►
▲
▼ AMPL: 1mV              ▲▼
```
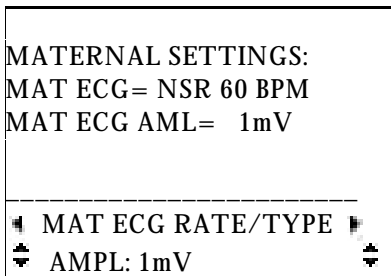
Figure 3: FMS-3 MAT Initial Selection Screen

The upper of these two lines of the LCD screen will show a *parameter* for the selected function. For example, parameters associated with the MECG function are: Rate and Amplitude. LEFT (◄) and RIGHT (►) arrow keys in the lower center of the FMS-3 keypad, under the LCD, allow you to scroll through the available parameters. UP (▲) and DOWN (▼) arrow keys, on the lower of the two functional menu lines, are used to modify the *setting* for the displayed parameter. Settings may be numeric (e.g., AMPL: 0.5mv), or descriptive (e.g., MAT ECG RATE/TYPE:VARIABLE). After a selection is made, ENTER is pressed to activate the selection. When in this mode, no change will be made to the *parameter*, or *setting* unless the ENTER key is pressed.

> ⚠ After selecting any simulator setting, the setting *will not take effect* until the ENTER key is pressed. This prevents inadvertent changes of waveform during the menu-scrolling process.

In addition to the **MAIN** button on the FMS-3 keypad, there is an AMPLITUDE button. At any time, the amplitude of the FETAL1ECG waveform can be advanced to the next setting, without pressing the ENTER button.

Chapter

3

3 Maternal ECG Normal Sinus Rhythm

3.1 Overview

An electrocardiogram (ECG or EKG) is a recording of the electrical activity of the muscles of the heart. Electrical impulses cause the heart muscle to pump. These impulses pass through the body and can be measured at electrodes (electrical contacts) attached to the skin. Up to 10 electrodes may be placed at standard locations on the body, providing information from different directions or orientation with respect to the heart's 'standard' position. An ECG monitor displays the voltage between pairs of these electrodes (and the muscle activity they represent). This display indicates the overall rhythm of the heart, and weaknesses in different parts of the heart muscle.

A fetal monitor will normally provide a subset of up to 5 of the 10 electrodes available on a diagnostic ECG. FMS-3 simulates a maternal ECG with Normal Sinus Rhythm, with adjustable settings for heart rate and amplitude.

3.2 Normal Sinus Rhythm

In a normal heart rhythm, the sinus (SA) node generates an electrical impulse which travels through the right and left atrial muscles producing electrical changes which are represented on the electrocardiogram (ECG) by the P wave. The electrical impulse then continues to travel through specialized tissue known as the atrioventricular (AV) node, which conducts electricity at a slower pace. This creates a pause (PR interval) before the ventricles are stimulated. This pause is helpful since it allows blood to be emptied into the ventricles from the atriums prior to ventricular contraction to propel blood out into the body. The ventricular contraction is represented electrically on the ECG by the QRS complex of waves as depicted in Figure 4. This is followed by the T wave which represents the electrical changes in the ventricles as they are relaxing. The cardiac cycle, after a short pause, repeats itself.
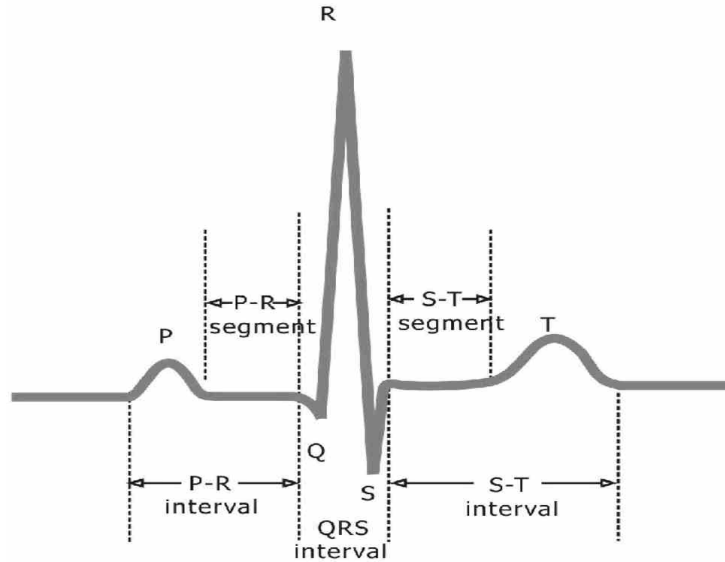
Figure 4 : QRS Complex

3.3 Available Settings

After selecting a parameter, use ▲ and ▼ to change the setting value. Press ENTER to activate that setting.

3.3.1 Maternal Rates
• 60, 80, 100, 120, 140, 160 BPM, SINUS and VARIABLE

3.3.2 Maternal Amplitudes (Lead II)
• 0.5, 1, 2, 3, 4 and 5 mV

3.4 ECG Function

Parameters provided for the ECG function are: Rate; Amplitude.

Press the **MAIN** key, until the MAT/FETAL1/PERF line is displayed on the bottom line of the screen. Press the 'soft-key' below the MAT menu label to change the LCD display to that of Figure 5, the MAT ECG RATE Menu.

```
MATERNAL SETTINGS:
MAT ECG= NSR 60 BPM
MAT ECG AMPL=   1mV


_____
◀ MAT ECG RATE/TYPE ▶
▼ RATE: 80 BPM          ▼
```

Figure 5: FMS-3 MECG Rate Menu

Press the UP (▲) or DOWN(▼) arrow button to scroll through the settings provided for the ECG rate: 60, 80, 100, 120, 140 and 160 BPM.

The SINUS setting under RATE provides a maternal rate of approximately 80 BPM, with a random variability of +/- 10%.

The VARIABLE setting under RATE provides a maternal rate of approximately 80 BPM, with a variability influenced by the TOCO contraction signal.

Press the ENTER button to activate the desired rate. The change in rate can be observed via a cardiotocograph monitor if such a monitor is connected.

While viewing the display of Figure 5, pressing the RIGHT (▶) arrow button once will change the display to that of Figure 6, the maternal ECG Amplitude Menu.

```
MATERNAL SETTINGS:
MAT ECG= NSR 60 BPM
MAT ECG AMPL=   1mV


_____
◀ MAT ECG AMPLITUDE ▶
▲ MAT AMPL: 1mV          ▼
```

Figure 6: FMS-3 MECG Amplitude Menu

Press the UP (▲) or DOWN(▼) arrow button to scroll through the settings provided for the maternal ECG amplitude: 0.5, 1, 2, 3, 4 and 5mV. This amplitude setting will remain in effect in the maternal ECG setting until another AMPLitude is selected.

Press the ENTER button to activate the desired amplitude. The cardiotocograph monitor should show an immediate change in signal amplitude.

Pressing the RIGHT (▶) arrow button once again will return you to the Rate menu.

Chapter

4

4 Fetal Heart Signals

4.1 Overview

There are two direct fetal heart signals available from FMS-3 in addition to a combined maternal/fetal heart signal. FMS-3 can output specific rates for each, including variability and a number of patterns and trends. The abdominal pressure generated during a contraction is output in sync with the heart rates.

4.2 Fetal Signals

Press **MAIN** until either FETAL1 or FETAL2 appears on the menu line. Press the softkey below the appropriate parameter of interest.

4.3 Available Settings: FETAL1

When on the FETAL1 screen, the current settings will be displayed on the top 5 lines of the screen. As settings are changed for one of the displayed parameters, the setting will be updated on the screen. Use the ◄ and ► keys to change between the parameters. After selecting a parameter, use ▲ and ▼ to change the setting value. Press ENTER to activate that setting.

4.3.1 Fetal1 Rate
  • 30, 60, 80, 90, 100, 120, 140, 150, 160, 180, 200, 210 and 220 BPM

4.3.2 Fetal1 Amplitude
  • 0.05, 0.1, 0.2, 0.5, 1, and 2 mV

4.4 Fetal1 ECG Function

Parameters provided for the FECG1 function are: Rate; Amplitude.

Press the **MAIN** key, until the MAT/FETAL1/PERF line is displayed on the bottom line of the screen. Press the 'soft-key' below the FETAL1 menu label to change the LCD display to that of Figure 7, the FETAL1 ECG RATE Menu.
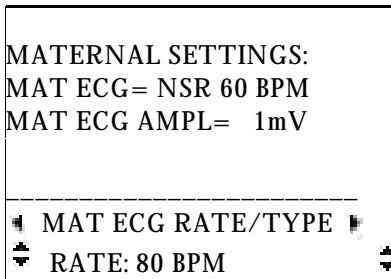
```
FETAL1 SETTINGS
FETAL1 = 60 BPM
FET1 AMPL= 1mV
FET1 VAR= ABSENT
FET1=LONG TERM OFF
_____
◄  FETAL1 ECG RATE   ►
▲
▼  FECG RATE:  80 BPM      ↕
```

Figure 7: FMS-3 FECG1 Rate Menu

Press the UP (▲) or DOWN(▼) arrow button to scroll through the settings provided for the ECG rate: 30, 60, 80, 90, 100, 120, 140, 150, 160, 180, 200, 210 and 220 BPM.

Press the ENTER button to activate the desired rate.

While viewing the display , pressing the RIGHT (►) arrow button once will change the display to that of Figure 8, the FETAL1 ECG Amplitude Menu.

```
FETAL1 SETTINGS:
FETAL1 = 60 BPM
FET1 AMPL= 1mV
FET1 VAR= ABSENT
FET1= LONG TERM OFF
_____
◄  FETAL1 ECG AMPLITUDE ►
▲
▼  FETAL AMP:  1mV        ↕
```
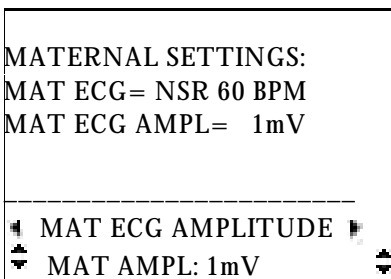
Figure 8: FMS-3 FECG Amplitude Menu

Press the UP (▲) or DOWN(▼) arrow button to scroll through the settings provided for the FECG amplitude: 0.05, 0.1, 0.2, 0.5, 1 and 2mV. Pres ENTER to activate. This amplitude setting will remain in effect in the FECG setting until another AMPLitude is selected.

Press the ENTER button to activate the desired amplitude. The cardiotocograph monitor should show an immediate change in signal amplitude.

Pressing the RIGHT (▶) arrow button once again will return you to the Rate menu.

Note: In the combination signal Maternal/Fetal1 the Fetal signal is 1/4 the size of the Fetal1 signal. For instance, if the Maternal signal is 1mV and the Featl1 signal is 0.5mV, the Fetal signal in the combined output will be 0.125mV. The Maternal and Fetal1 signal amplitudes can be changed independently.

Note: The Ultrasound1 (US1) channel simulates a fetal heart rate which tracks the FETAL1 heart rate.

4.5 Available Settings: FETAL2

When on the FETAL2 screen, the current settings will be displayed on the top 4 lines of the screen. As settings are changed for one of the displayed parameters, the setting will be updated on the screen. Use the ▲ and ▼ to change the parameter/setting value. Press ENTER to activate that parameter/setting.

4.5.1 Fetal2 Parameter/Setting
   • US2 TRACKS FETAL2
   • US2 SEPARATE WAVE
   • FETAL2 PATTERN1
   • FETAL2 PATTERN2
   • FETAL2 PATTERN3
   • FETAL2 NORMAL
   • FETAL2 TACHY
   • FETAL2 BRADY
   • FETAL2 RATE = 60BPM
   • FETAL2 RATE = 80BPM
   • FETAL2 RATE = 100BPM
   • FETAL2 RATE = 140BPM
   • FETAL2 RATE = 160BPM
   • FETAL2 RATE = 200BPM
   • US PULSE WIDTH1
   • US PULSE WIDTH2

Note: the FETAL2 amplitude is linked to the maternal amplitude. If you change the MAT amplitude you also change the FET2 amplitude, as noted from the Settings information displayed on the screen. FET2 amplitude is not changed from within the FETAL2 settings screen.

4.6 Fetal2 ECG Function

Parameters provided for the FECG2 function are: Ultrasound Tracking, Trends, Patterns, Rate and US Width.

Press the Menu key, until the VAR/FETAL2/VIEW line is displayed on the bottom line of the screen. Press the 'soft-key' below the FETAL2 menu label to change the LCD display to that of Figure 9, the FETAL2 Menu.

```
FETAL2 SETTINGS:
FET2ECG= 140 BPM
FET2 AMPL= 3mV
US2= TRACKS FETAL2

_____
FETAL 2
  US2 TRACKS FETAL2
```
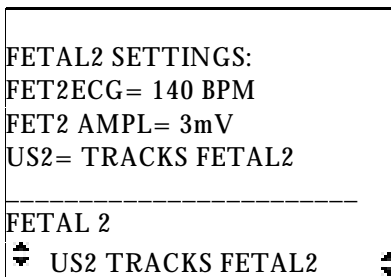
Figure 9: FMS-3 FECG2 Menu

Press the UP (▲) or DOWN(▼) arrow button to scroll through the settings provided for the FETAL2 parameter/settings: US2 TRACKS FETAL2, US2 SEPARATE WAVE, FETAL2 PATTERN1, FETAL2 PATTERN2, FETAL2 PATTERN3, FETAL2 NORMAL, FETAL2 TACHY, FETAL2 BRADY, FETAL2 RATE = 60BPM, FETAL2 RATE = 80BPM, FETAL2 RATE = 100BPM, FETAL2 RATE = 140BPM, FETAL2 RATE = 160BPM, FETAL2 RATE = 200BPM, US PULSE WIDTH1 and US PULSE WIDTH2

Press the ENTER button to activate the desired parameter/setting.

Note: If US2 TRACKS FETAL2 is selected, US2 is linked to FETAL2 with regard to the rate, whether the rate is static or if it is variable.

Note: FETAL2 is not linked with the ultrasound channel US2 with regard to the rate if US2 SEPARATE RATE is selected. In this case, US2 will have a rate of approximately 155 BPM with moderate variability.

The FETAL TRENDx, NORMAL, TACHY and BRADY settings provide specific patterns of the fetal rate FETAL2.

Note: The US PULSE WIDTH setting provides an option to double the width of the US pulse train simulation (WIDTH2). It may increase the detection reliability for some monitors.

Chapter

5
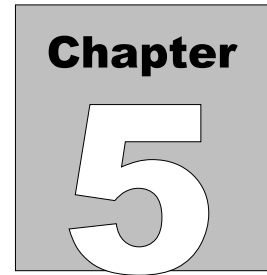
5 Performance Waveforms

5.1 Overview

FMS-3 offers several performance waveforms to evaluate some basic aspects of the performance of the cardiotachograph monitor.

5.2 Available Settings

Press ENTER after selecting a parameter to activate that setting.

5.2.1 Square Wave
• 2 Hz or 0.125 Hz

5.2.2 Pulse
• 80 msec, 1 Hz (60BPM)

5.3 ECG Performance Function

Parameters provided for the ECG performance function are: Square and Pulse waveforms. When selected, the performance waveforms affect all ECG signals (Maternal, Fetal1 and Fetal2)

Press the **MAIN** key, until the MAT, FETAL1, PERF line is displayed on the bottom line of the screen. Press the 'soft-key' below the PERF menu label to change the LCD display to that of Figure 10, the PERFORMANCE main menu.

```
FETAL 1 SETTINGS:
FETAL1 = 150BPM
FET1 AMPL=  1mV
FET1VAR=ABSENT
FET1= LONG TERM OFF
_____
PERFORMANCE SHAPE
  SHAPE: SQUARE 2 Hz
```

Figure 10: FMS-3 PERFORMANCE Menu

Press the UP (▲) or DOWN(▼) arrow button to scroll through the waveshapes provided: SQUARE 2Hz, SQR 0.125Hz and PUL 1 Hz 80ms.

Press ENTER after selecting a parameter to activate your selection.

Chapter

6

6 TOCO/Uterine Pressure

6.1 Overview

FMS-3 provides a single pressure simulation output port. This output can be connected to either the Intra Uterine Pressure (IUP) or the TOCO input of a cardiotocograph monitor. The settings for this pressure channel can be found in the UA (uterine activity) selection on the **MAIN** menu. The uterine pressure is measured in one of two ways: directly using an intra uterine catheter (IUP), or indirectly using a pressure sensing transducer on the maternal abdomen (normally termed TOCO).

The pressure waveform generated will depend on the SHAPE selection chosen in the UA parameter screen. The pressure waveform will be generated in in synchronization with the Fetal1 heart rate patterns selected under F1WAVES. A pressure waveform will not be generated when the Fetal1 rate is set to a STATIC value. When a waveform pattern is selected from the F1WAVES screen, the pressure waveform will generally start within 30 seconds of the selection being made. Re-selecting the waveform (pressing ENTER again) or changing the waveform will restart the sequence and start the presure waveform again within 30 seconds.

IUP/TOCO
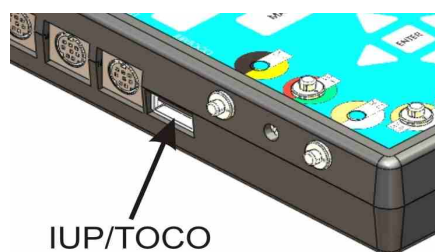
Figure 11: FMS-3 TOCO/IUP Connection

Respiration or baseline wandering artifact can be added to the pressure simulation.

6.2 Available Settings

Press ENTER after selecting a parameter to activate that setting.

6.2.1 Transducer Sensitivity
- 5 or 40 µV/V/mmHg, temporary
- 5 or 40 µV/V/mmHg, power ON setting

6.2.2 TOCO Amplitude
- 25, 40, 50, 60, 80, 100, 300 and 400 Units

6.2.3 TOCO Shape
- Normal: 40, 80, 90, 110 seconds
- Coupling
- Tripling
- Dynamometer
- Picket Fence
- Irregular Acme
- Hypertonic
- Hypertonus
- Hypotonic
- 'V' Spikes

6.2.4 TOCO Artifact
- Elevated Baseline (5 mmHg, 10mmHg, 20mmHg, OFF)
- Respiration Delta (3 mmHg, 5 mmHg)
- Respiration Rate (15, 20, 30, Variable Breaths Per Minute[Br/M], OFF)
- Baseline Wander Mild (5 mmHg)
- Baseline Wander Mod (10 mmHg)
- Baseline Wander (3, 5, 10, 20, 30 Minutes, OFF)

6.2.5 TOCO Static
- -5, 0, 20, 40, 60, 80, 100, 150, 200 mmHg

6.3 Pressure Function

Press the **MAIN** key, until the UA, F1WAVES, TREND line is displayed on the bottom line of the screen. Press the 'soft-key' below the UA menu label to change the LCD display to that of Figure 12, the UA/TOCO main menu.

```
TOCO SETTINGS:
STATIC:  0 mmHg
TOCO AMP: 50 UNITS
IU SENS:  5μV/V/mmHg
ELEVATED BASE: OFF
_____
◀ TOCO AMP/SENS  ▶
⬍  SENS: 5uV/V/mmHg⬍
```
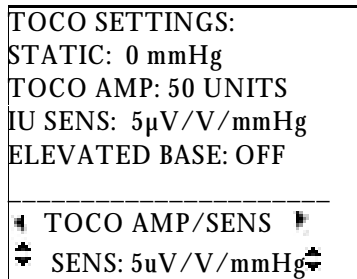
Figure 12: FMS-3 TOCO AMP/SENS Menu

With FMS-3 displaying the menu of Figure 12, press the UP (▲) or DOWN(▼) arrow button to scroll through settings provided for the TOCO/SENS parameter:

      5 or 40 μV/V/mmHg (temporary), 5 or 40 μV/V/mmHg (power ON setting), 25, 40, 50, 60, 80, 100, 300 and 400 Units

Note: when used with an abdominal contraction transducer (TOCO) the pressure is expressed in the arbitrary term: UNITS. In FMS-3 this is actually mmHg, however, some fetal monitors may use a TOCO transducer which is equivalent to a 5uV/V/mmHg transducer, while others may use a force gauge which is set up to be equivalent to grams of force. It may be necessary to check a monitor when it is new to determine which setting makes the most sense for your monitor. For instance, the Sonicaid , requires a sensitivity of 40uV/V/mmHg and an amplitude of 400 Units to give a 80 percent output on the graphic display.

Press ENTER after selecting a parameter to activate that setting.

Pressing the RIGHT (▶)arrow button will change the menu screen to that of Figure 13.

```
TOCO SETTINGS:
TOCO DURATION: 40S
TOCO AMP: 50 UNITS
IU SENS: 5uV/V/mmHg
ELEVATED BASE= OFF
_____
◀ TOCO SHAPE      ▶
⬍  TOCO: NORMAL 40S⬍
```
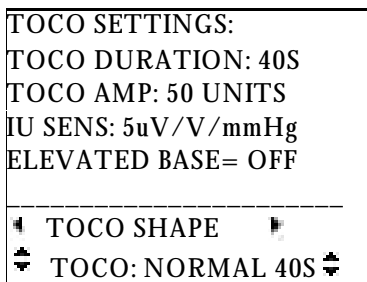
Figure 13: FMS-3 TOCO SHAPE Menu

Press the UP (▲) or DOWN(▼) arrow button to scroll through the simulations of the TOCO SHAPE:

Normal (40, 80, 90, 110 Seconds), Coupling, Tripling, Dynamometer, Picket Fence, Irregular Acme, Hypertonic, Hypertonus, Hypotonic, and 'V' Spikes.

The TOCO SHAPE describes timing or shape of the uterine contractions. A NORMAL contraction is bell shaped and the timing between contractions can be set to a specific time. The remaining setting describe particular shapes of the contraction waveform:
- Coupling: contractions occurring in pairs
- Tripling: contractions occurring in threes
- Dynamometer
- Picket Fence: contractions occurring with spikes resembling a picket fence
- Irregular Acme: contractions occurring with variable time between peaks
- Hypertonic
- Hypertonus
- Hypotonic
- 'V' Spikes

Press ENTER after selecting a parameter to activate that setting.

The SHAPE chosen here will be the pressure shape output when a waveform pattern is chosen in F1WAVES. This will be over-ridden by a TREND selection.

Pressing the RIGHT (▶) arrow button will change the menu screen to that of Figure 14.

```
TOCO SETTINGS:
RESP DELTA: OFF
RESP RATE: VARIABLE
BASE WANDER: OFF
BASE WANDER: 3 MIN
_____
◀  TOCO ARTIFACT    ▶
▲   ELEVATED BASE 5  ▲
▼                    ▼
```
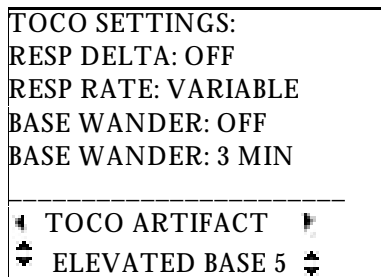
Figure 14: FMS-3 TOCO ARTIFACT Menu

Pressing the UP (▲) or DOWN (▼) button to scroll through the available TOCO ARTIFACT settings:
- Elevated Baseline (5 mmHg, 10mmHg, 20mmHg, OFF)
- Respiration Delta (3 mmHg, 5 mmHg)
- Respiration Rate (15, 20, 30, Variable Breaths Per Minute[Br/M], OFF)
- Baseline Wander Mild (5 mmHg)
- Baseline Wander Mod (10 mmHg)
- Baseline Wander (3, 5, 10, 20, 30 Minutes, OFF)

Press ENTER after selecting a parameter to activate that setting.

If RESP DELTA is OFF, both RESP DELTA and RESP RATE are inactive. If RESP DELTA has a value, there will be change in the TOCO output of 3 or 5 mmHg occurring at a rate set by the number of breaths per minute in the RATE setting.

If either BASE WANDER line is set to OFF, then the wandering setting in mmHg and the wandering time in minutes are both inactive. If the second line BASE WANDER setting in minutes is active, the top setting of BASE WANDER of 5 or 10 mmHg will also be active, and the pressure signal will wander by 5 or 10 mmHg over the time set on the second line.

Pressing the RIGHT (▶) button will change the screen to that of Figure 15.

```
TOCO SETTINGS:
TOCO DURATION: 40S
TOCO AMP: 50 UNITS
IU SENS: 5uV/V/mmHg
ELEVATED BASE= OFF


_____
◀  TOCO STATIC      ▶
⬍ TOCO: NORMAL 40S ⬍
```

Figure 15: FMS-3 TOCO STATIC Menu

Pressing the UP (▲) or DOWN (▼) button to scroll through the available TOCO STATIC pressure values:

• -5, 0, 20, 40, 60, 80, 100, 150, 200 mmHg

These settings are intended to work with the Intra Uterine Pressure channel of a cardiotocograph, showing values in mmHg.

Press ENTER after selecting a parameter to activate that setting.

Pressing the RIGHT (▶) arrow button again will restore the LCD display to the initial menu screen of Figure 12.

Press the LEFT (◀) arrow button to scroll the display through the above simulator parameters in reverse order.

Press ENTER after selecting a parameter to activate your selection.

Chapter

7
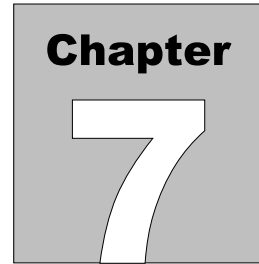
7 Fetal1 Waveforms

7.1 Overview

FMS-3 provides a number of commonly encountered waveforms on the Fetal1 output. These waveforms show fetal heart rate patterns with the corresponding contraction pressure waveform of the shape chosen in the UA section. Explanation of these waveforms is outside of the scope of this manual, however, information on these types of waveforms is available on the Internet. Several websites that were available at the time of issuing this manual are listed at the end of this chapter, and can be visited for more information.

7.2 Available Settings

Press ENTER after selecting a parameter to activate that setting.

7.2.1 Fetal1 Waveforms:
- Normal
- Tachycardia
- Bradycardia
- Arrythmias
- Late Deceleration
- Early Deceleration
- Moderate Deceleration
- Acceleration #1
- Acceleration #2
- Sinusoidal, High
- Sinusoidal, Low
- Severe Variable Deceleration#1
- Severe Variable Deceleration #2
- Prolonged Deceleration
- Biphasic Deceleration
- Exaggerated Deceleration
- Non-Uniform Deceleration
- Variable Deceleration 'U'
- Variable Deceleration Tachycardia
- Variable Deceleration 'V'

- Variable Deceleration Positional
- Deceleration Positional
- Long Deceleration
- Compensatory Acceleration

7.3 Waveform Function

Press the MAIN key, until the UA, F1WAVES, TREND line is displayed on the bottom line of the screen. Press the 'soft-key' below the F1WAVES menu label to change the LCD display to that of Figure 16, the RESP main menu.

Selecting a Fetal Waveform will choose the way in which the fetal rate will be presented. The TOCO output will be synchronized with the fetal rate and will start within 30 seconds of selecting the waveform (pressing ENTER). Pressing ENTER again or making another waveform selection will reset both the rate and the pressure waveform, and the pressure will begin within 30 seconds using the SHAPE defined in the UA section.

```
FETAL  SETTINGS:
FETAL1= NORMAL WAVE
FET1 AMPL=   1mV
FET1VAR= ABSENT
FET1= LONGTERM OFF
_____
FETAL1 WAVES
  NORMAL
```

Figure 16: FMS-3 FETAL Waveforms Menu

Press the UP (▲) or DOWN(▼) arrow button to scroll through the settings provided for the FETAL1 Waveforms.

Press ENTER after selecting a parameter to activate your selection.

The following websites may provide useful information on the waveforms provided by FMS-3:

- http://www.registerednursern.com/studying-fetal-heart-tone-monitoring-decelerations-nclex-hesi/

- http://www.fetalmonitorstrips.com/learn_more.html

- http://www.perifacts.eu/cases/Case_680_Fetal_Heart_Rate_Interpretation.php

- http://www.brooksidepress.org/Products/Military_OBGYN/Textbook/
LaborandDelivery/electronic_fetal_heart_monitoring.htm

- http://www.medicallecturenotes.com/2010/07/10-intra-partum-monitoring.html

- https://e-edcredits.com/nursingcredits/article.asp?TestID=54

- http://www.aafp.org/afp/1999/0501/p2487.html

Datrend does not warrant that any information on these sites is valid or correct, and warns the user that any such information should be confirmed with an expert on the topic, before using it for any sort of waveform interpretation or diagnosis.

Chapter

8
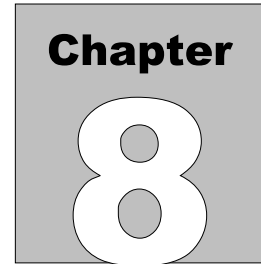
8 Ultrasound

8.1 Overview

FMS-3 provides 3 ultrasound outputs that can be connected to a monitor's ultrasound input, stimulating the ultrasound amplifier at rates corresponding to one of the fetal heart rates.

8.2 Available Settings

The ultrasound outputs are set as follows:

- Channel 1: tracks Fetal 1 rate

- Channel 2: tracks Fetal 2 rate; or,
  Separate Wave Mode (155 bpm + variability)

- Channel 3: rate approximately 140 bpm

8.3 <u>Optional</u> Mechanical Fetal Heart

The Mechanical Fetal Heart (MFH, P/N: 8000-455), an _<u>optional</u>_ accessory for FMS-3, provides a mechanical impulse to test the crystal function of an ultrasound transducer. The mechanical impulse is very small and travels through a liquid column inside the unit. The ultrasound wave exits the MFH through 'stimulation window' at the end of the unit. Internally, the pulse makes a very soft 'swish' each time it is activated by a heart beat signal. The sound made by the MFH can only be heard if it is placed next to the ear.
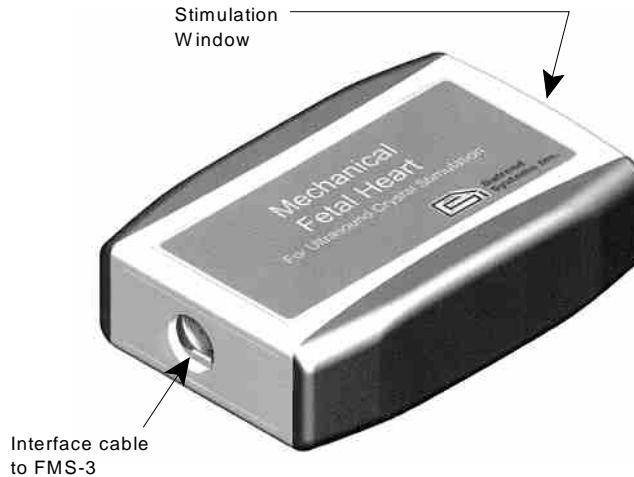
Figure 17- Mechanical Fetal Heart

Connect the Mechanical Fetal Heart accessory to any *one* of the US outputs of FMS-3 using the 8-pin mini-DIN cable supplied with the accessory.

As the mechanism draws significant electrical power in operation, the Mechanical Fetal Heart requires FMS-3 to be powered by the optional AC adaptor (P/N 3000-445 for USA/Japan; P/N 3000-446 for continental Europe; or P/N 3000-447 for UK). Connect the AC adaptor which is appropriate for your region to the DC IN jack of FMS-3.

The ultrasound transducer should be placed face up on a stable work surface and coated with ultrasound conductive gel.

The Mechanical Fetal Heart outputs a periodic impulse via the stimulation window. This window must be placed over each crystal of the transducer in turn to verify each crystal's function.

After use, the unit must be cleaned with a mild soap solution and warm water, then dried with a soft, absorbent cloth.

The Mechanical Fetal Heart contains liquid. It should be stored in an upright position with the stimulation window face down. The Mechanical Fetal Heart *must not* be subjected to freezing temperatures.

Chapter

9
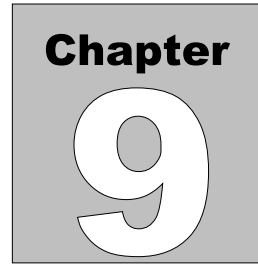
9 Trends

9.1 Overview

FMS-3 provides a number of trends which are clinically relevant and can be used for teaching.

9.2 Available Settings

Press ENTER after selecting a parameter to activate that setting.

9.2.1 Tends:
There are 10 actual clinical recordings available as demonstration tracings. These tracings are:

Trend 1: General
Trend 2: FHR: 135 BPM, absent variability, mixed deceleration; UA: 3-4 minutes, 30-45 mmHg, tonus 15 mmHg
Trend 3: FHR: Tachycardia, average to decreased variability, late deceleration; UA: every 2-3 minutes, pushing, tonus 15-30 mmHg
Trend 4: FHR: 160 BPM, absent variability, mixed variable and late decelerations; UA 2-4 minutes
Trend 5: FHR: 160-165 BPM, decreased variability, late decelerations; UA: 2-3 minutes, 70-90 mmHg, tonus 10-15 mmHg
Trend 6: FHR: baseline 195 BPM, variable decelerations; UA: 60-90 mmHg, tonus 30 - 40 mmHg
Trend 7: FHR: baseline 140 BPM, moderate variability, accelerations; UA: 1.5 - 2.5 minutes, 65 - 80 mmHg, coupling
Trend 8: FHR: baseline 150 - 160 BPM, sinusoidal variability, variable decelerations followed by accelerations; UA: 3-4 minutes, 90 mmHg, tonus 15 mmHg
Trend 9: FHR: baseline 150, decreased variability, mixed variable and late decelerations; UA: 2-3 minutes, 35-50 mmHg, tonus 0 mmHg
Trend 10: FHR: baseline 155-160, variable deceleration followed by early decels; UA: 2-2.5 minutes, 55 - 65 mmHg, tonus 5 - 15 mmHg

9.3 Trends Function

Press the MAIN key, until the UA, F1WAVES, TREND line is displayed on the bottom line of the screen. Press the 'soft-key' below the F1WAVES menu label to change the LCD display to that of Figure 18, the TREND main menu.

The selected TREND will provide both the Fetal Rate and the TOCO shape corresponding to an actual clinical output.

```
FETAL 1 SETTINGS:
FETAL1= TREND3
FET1 AMPL=   1mV
FET1VAR= ABSENT
FET1= LONGTERM OFF
_____
TRENDS
⬍  FETAL1 TREND3  ⬍
```

Figure 18: FMS-3 FETALTrends Menu

Press the UP (▲) or DOWN(▼) arrow button to scroll through the settings provided for the FETAL1 Trends.

Press ENTER after selecting a parameter to activate your selection.

Chapter

10

10 Variability

10.1 Overview

FMS-3 provides a number of settings which introduce variability to the Fetal1 static heart rate.

10.2 Available Settings

Press ENTER after selecting a parameter to activate that setting.

10.2.1 Variability:
- Absent
- Low Variability
- Minimal Variability
- Average Variability
- Moderate Variability
- Marked Variability
- Long Term Variability

10.3 Variability Function

Press the **MAIN** key, until the VAR, FETAL2, VIEW line is displayed on the bottom line of the screen. Press the 'soft-key' below the VAR menu label to change the LCD display to that of Figure 19, the TREND main menu.

```
FETAL 1 SETTINGS:
FETAL1= TREND3
FET1 AMPL=   1mV
FET1VAR= ABSENT
FET1= LONGTERM OFF
_____
VARIABILITY FETAL1
   LOW VARIABILITY
```

Figure 19: FMS-3 FETAL Variability Menu

Press the UP (▲) or DOWN(▼) arrow button to scroll through the settings provided for the FETAL1 Variability.

Press ENTER after selecting a parameter to activate your selection.

Chapter

11

11 Automated Settings

11.1 Overview

The Automated Settings of FMS-3 provide ten fetal simulation setups, 9 of which are user-programmable. These setups allow multiple simulation parameters to be simultaneously modified in as little as two keystrokes, without affecting the power-on default settings of the simulator.

The Auto setups are created or modified using terminal emulation software via the RS-232 port. Programs such as Hyperterminal may be used. Contact Datrend for more details to implement your programmable settings.

11.2 Choosing an Auto Setting

Press the **MAIN** key, until the AUTO, SAVE, SETUP line is displayed on the bottom line of the screen. Press the 'soft-key' below the AUTO menu label to change the LCD display to that of Figure 20, the AUTO SELECTIONS main menu.

AUTO SELECTIONS
‡ AUTO1 SELECTIONS ‡

Figure 20: FMS-3 AUTO SELECTIONS Menu

AUTO SELECTIONS mode provides space in memory for up to 10 pre-defined Function/Parameter/Setting protocols. Within each AUTO SELECTION, there are 8 individual SETTINGS that can be set. The AUTO SELECTIONS may be created using the RS-232 commands through a terminal emulation program such as Hyperterminal. When an AUTO SELECTION is activated, the individual settings within the protocol are enabled sequentially based on the memory allocation for the protocol, enabling settings at lower memory locations first and progressing through the memory until complete. The first AUTO SELECTION is preset at the factory and it is recommended that it is not changed.

In AUTO SELECTIONS mode, the only adjustment is the selection of a different AUTO SELECTION, therefore, the LEFT and RIGHT arrows are not displayed. Pressing them will have no effect on the FMS-3.

Pressing the UP (▲) arrow button repeatedly will scroll through the available AUTO1 - AUTO10 values.

Pressing the MENU button will change the screen back to the Main Menu .

Once an AUTO SELECTION has been chosen, the simulator parameters configured by that selection will remain in effect until one or more of the parameters are modified via the various menus provided by FMS-3, or until FMS-3 is powered down.

Chapter

12

12 VIEWing the Settings

12.1 Overview

The FMS-3 provides the capability of determining the state of each of the function/parameter/setting currently active on the unit. The VIEW function will display a number of screens, each of which will display the parameter settings of a particular function. Each press of ENTER when VIEW has been selected will advance through the VIEW screens, function by function to display the status of all the parameter settings.

12.2 Choosing an VIEW screen

Press the **MAIN** key, until the VAR, FETAL2, VIEW line is displayed on the bottom line of the screen. Press the 'soft-key' below the VIEW menu label to change the LCD display to that of Figure 21, the VIEW main menu.

The VIEW screen displays the SETTINGS on several separate screens, providing information for each of the Functions and Parameters currently in use.

VIEW SELECTIONS
VIEW CURRENT SETTING

Figure 21: FMS-3 FMS-3 VIEW Menu

The VIEW screens can be stepped through by pressing the ENTER key multiple times. To exit the VIEW, press the MENU key. When you re-enter the VIEW menu, you will enter on the screen following the last one that was viewed.

Typical VIEW screens are shown below.

```
FETAL 1 SETTINGS:
FET1 ECG= 150BPM
FET1 AMPL=  1mV
FET1 VAR=ABSENT
FET1= LONG TERM OFF
_____
VIEW SETTINGS
VIEW CURRENT
SETTINGS
```

Figure 22: FMS-3 Fetal1 VIEW screen

```
   MATERNAL SETTINGS:
   MAT ECG= NSR 60 BPM
   MAT ECG AMPL=  1mV

_____
VIEW SETTINGS
VIEW CURRENT
SETTINGS
```

Figure 23: FMS-3 Maternal VIEW Screen

```
FETAL2 SETTINGS:M
FETAL2 ECG=  140 BPM
FET2 AMPL=   1mV
US2= TRACKS FETAL2

_____
VIEW SETTINGS
VIEW CURRENT
SETTINGS
```

Figure 24: FMS-3 FETAL2 VIEW Screen

```
TOCO SETTINGS:
STATIC:   0 mmHg
TOCO AMP: 50 UNITS
IU SENS:  5uV/V/mmHg
ELEVATED BASE: OFF
_____
VIEW SETTINGS
VIEW CURRENT
SETTINGS
```

Figure 25: FMS-3 TOCOVIEW Screen #1

```
TOCO SETTINGS:
RESP DELTA: OFF
RESP RATE: VARIABL
BASE WANDER: OFF
BASE WANDER: 3 MIN
_____
VIEW SETTINGS
VIEW CURRENT
SETTINGS
```

Figure 26: FMS-3 TOCO VIEW Screen #2

```
BATTERY >9V  OK
REVISION= 1.06


_____
VIEW SETTINGS
VIEW CURRENT
SETTINGS
```

Figure 27: FMS-3 Final VIEW Screen

Pressing any of the ARROW keys will change the screen back to that of Figure 21.

Pressing the MENU button will change the screen back to that of Figure 1.

Chapter

13

13 SETUP Configuration

13.1 Overview

FMS-3 has a number of configuration options for the display, the beeper and assorted other system variables.

13.2 Choosing a Configuration Option

Press the **MAIN** key, until the AUTO, SAVE, SETUP line is displayed on the bottom line of the screen. Press the 'soft-key' below the SETUP menu label to change the LCD display to that of Figure 28, the Setup menu.
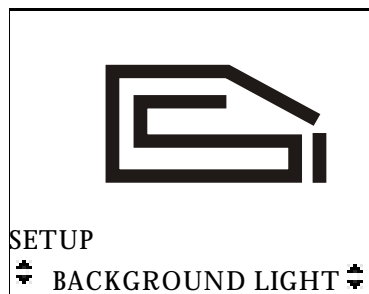
Figure 28: FMS-3 SETUP Menu

The available selections are:
- AMPL KEY = FETAL1
- AMPL KEY = MAT
- CONTRAST UP
- CONTRAST DOWN
- BACKGROUND LIGHT
- BACKGROUND DARK
- BEEPER OFF
- BEEPER ON
- BEEP TEST

- DISPLAY LIGHT OFF
- DISPLAY 5 SEC
- DISPLAY 8 SEC
- DISPLAY 10 SEC.

The AMPL KEY setting configures the AMPLITUDE key on the front keypad to affect either the FETAL1 amplitude or the MATERNAL amplitude setting. Pressing the AMPLITUDE button will display the FETAL1 SETTINGS screen if the AMPL KEY is set to FETAL1, and the FETAL1 ECG amplitude will be set to the next setting in the circular buffer. Similarly, if the AMPL KEY is set to MATERNAL, the MATERNAL SETTINGS screen will be shown and the MAT AMPL setting will change.

The CONTRAST UP, CONTRAST DOWN selections will adjust the darkness of the text on the background.

The BACKGROUND LIGHT, BACKGROUND DARK selections will change the display from dark text on a light background to light text on a dark background (reverse video).

The BEEPER OFF, BEEPER ON, BEEP TEST selections are self explanatory.

The DISPLAY LIGHT OFF, DISPLAY 5 SEC, DISPLAY 8 SEC, DISPLAY 10 SEC selections will determine if the display will be back lit and for how long before it turns off automatically. If the DISPLAY LIGHT is set to 8 seconds, when a keypress is detected, the backlight will turn on for 8 seconds and then turn off unless another keypress is detected. The backlight will turn off at 5, 8 or 10 seconds after the last keypress detected.

Pressing the **MENU** button will change the screen back to that of Figure 1.

Chapter

14
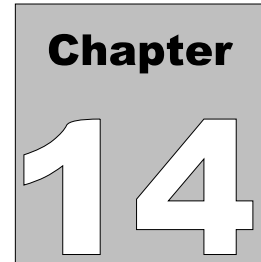
14 Controlling FMS-3 with a PC

14.1 Overview

FMS-3 may be controlled directly from a personal computer via RS-232. Control is effected by sending 3 digit numeric codes to FMS-3. The numeric codes can be found in Appendix A.

14.2 Connecting FMS-3 to a PC

Connect the serial communications cable (P/N 3140-429) to the DB9/RJ12 adapter (P/N 3140-426) provided with FMS-3 .

Connect the DB9 of the adapter to a serial communications port ("COM Port") on your PC, and insert the other end of the cable into RS-232 port of FMS-3.

Power up FMS-3 by pressing the POWER pushbutton. There is no need to set FMS-3 to a particular mode for computer communications, it is ready to accept control commands as soon as it is powered ON.

The serial protocol used by FMS-3 is 9600,N,8,1 (9600 baud; no parity; 8 data bits; 1 stop bit). Any serial communications program, such as Hyperterminal, that allows characters to be sent one at a time will work to send the control commands.

14.3 FMS-3 Command Interface Specifications

The remote commands which control FMS-3 are listed in section 14.4 of this operating manual. Remote commands comprise one, two, or three ASCII numerals (character set '0' to '9'), terminated by the ASCII 'E' character. Carriage return, line feed, and similar ASCII control characters *must not be sent* by the controlling device to FMS-3.

Command examples:

Description	Command
Set MECG to NSR, 80BPM	4
Set F1ECG to 60 BPM	26
Set US2 TO TRACK FETAL2	60
Set TOCO to 'V' SPIKES	193

FMS-3 has special requirements for remote control via RS-232. Characters sent to FMS-3 by a controlling device must be separated by a delay of at least two-tenths of a second.

For example, considering the F1 ECG = 60BPM command listed above, the sending device will require at least 0.8 seconds to send this message to FMS-3. After the first ASCII character '2' is sent, there needs to be a 0.2 second pause to allow the FMS-3 to recognize the character. After the pause, the second ASCII character '6' may be sent, etc. Sending the ASCII character 'E' is equivalent to pressing the ENTER key on the keypad.

14.4 FMS-3 Command Structure

The remote commands which control FMS-3 are listed below:

14.4.1 Enter NUMERIC Setting Command

Syntax:	XXX
Description:	The NUMERIC Setting command prepares to initiate a specific Parameter of a Function at a specific Setting. Each Function/Parameter/ Setting has an assigned numeric code for reference (see Appendix A). For instance, F1ECG/RATE/240BPM has a numeric code of "037". Type the numeric code, the leading 0's are optional.
Example:	"037" prepare to initiate F1ECG/RATE/240BPM
Returns:	If there are too many characters received, FMS-3 will sound a double beep.

14.4.2 Activate Setting Command

Syntax:	E
Description:	The E character acts as an Enter keystroke, activating the numeric entry
Example:	"037E"prepares to initiate F1ECG/RATE/240BPM, then activates or 'E'nters the command
Returns:	2 beeps if an error occurs

FMS-3 OPERATING MANUAL

Chapter

15

15 Calibration and Maintenance

Calibration of FMS-3 by a Datrend Authorized Service facility is recommended on an *annual* basis, and is *required* to extend the product warranty. The basic one (1) year warranty can be extended to a maximum of five (5) years provided that calibration is performed by a Datrend Authorized Service Center on an *annual* basis.

Refer to the Calibration Decal applied on the back of the unit to determine calibration status of your FMS-3.

FMS-3 contains no user serviceable parts. *Opening the case of FMS-3 for any reason will void the warranty.*

For calibration or service assistance, contact Datrend for a Return Materials Authorization (RMA) number or the location of the nearest Service Facility.

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e-mail customerservice@datrend.com
www.datrend.com

FMS-3 should be cleaned with a soft, lint free, damp cloth. Use of cleaning agents may result in scratching, discoloration, or streaking.

FMS-3 OPERATING MANUAL

Appendix

A
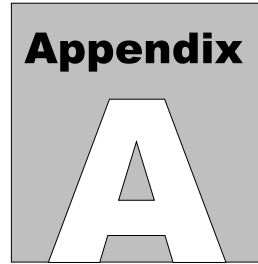
Appendix A - Numeric Codes

Every function or setting provided by FMS-3 corresponds to a preset 1, 2 or 3 digit number or code. When FMS-3 receives a NUMERIC mode vis RS-232, the desired function or setting will activate. There are approximately 250 selections available, numbered from zero to 511 (some are blank), as listed in the table in this Appendix.

The table on the following page(s) list the numeric codes for all FMS-3 settings. Find the desired setting in the table, send the corresponding 1, 2 or 3 digit code via RS-232, followed by the E character, to activate that setting.

RS232 CODE	SELECTION
CODE= 0	NO SELECTION
CODE= 1	NO SELECTION
CODE= 2	NO SELECTION
CODE= 3	MAT NSR 60 BPM
CODE= 4	MAT NSR 80 BPM
CODE= 5	MAT NSR 100 BPM
CODE= 6	MAT NSR 120 BPM
CODE= 7	MAT NSR 140 BPM
CODE= 8	MAT NSR 160 BPM
CODE= 9	MECG RATE: SINUS
CODE= 10	MECG RATE: VARIABLE
CODE= 11	NO SELECTION
CODE= 12	NO SELECTION
CODE= 13	NO SELECTION
CODE= 14	NO SELECTION
CODE= 15	NO SELECTION
CODE= 16	MAT ECG SENS LII AT 0.5 MV
CODE= 17	MAT ECG SENS LII AT 1 MV
CODE= 18	MAT ECG SENS LII AT 2 MV
CODE= 19	MAT ECG SENS LII AT 3 MV
CODE= 20	MAT ECG SENS LII AT 4 MV
CODE= 21	MAT ECG SENS LII AT 5 MV
CODE= 22	NO SELECTION
CODE= 23	NO SELECTION

CODE= 24	NO SELECTION
CODE= 25	FECG RATE: 30BPM
CODE= 26	FECG RATE: 60BPM
CODE= 27	FECG RATE: 80BPM
CODE= 28	FECG RATE: 90BPM
CODE= 29	FECG RATE: 100BPM
CODE= 30	FECG RATE: 120BPM
CODE= 31	FECG RATE: 140BPM
CODE= 32	FECG RATE: 150BPM
CODE= 33	FECG RATE: 160BPM
CODE= 34	FECG RATE: 180BPM
CODE= 35	FECG RATE: 200BPM
CODE= 36	FECG RATE: 210BPM
CODE= 37	FECG RATE: 240BPM
CODE= 38	NO SELECTION
CODE= 39	NO SELECTION
CODE= 40	FETAL1 AMP: 50uV
CODE= 41	FETAL1 AMP: 100uV
CODE= 42	FETAL1 AMP: 200uV
CODE= 43	FETAL1 AMP: 0.5mV
CODE= 44	FETAL1 AMP: 1mV
CODE= 45	FETAL1 AMP: 2mV
CODE= 46	NO SELECTION
CODE= 47	NO SELECTION
CODE= 48	NO SELECTION
CODE= 49	FETAL1 ABSENT VARIABILITY 0 BPM
CODE= 50	FETAL1 LOW VARIABILITY 0-2 BPM
CODE= 51	FETAL1 MINIMAL VARIABILITY 3-5 BPM
CODE= 52	FETAL1 AVERAGE VARIABILITY 6-10 BPM
CODE= 53	FETAL1 MODERATE VARIABILITY 11-25 BPM
CODE= 54	FETAL1 MARKED VARIABILITY <25 BPM
CODE= 55	FETAL1 LONG TERM VARIABILITY ON
CODE= 56	FETAL1 LONG TERM VARIABILITY OFF
CODE= 57	NO SELECTION
CODE= 58	NO SELECTION
CODE= 59	US2 TRACKS FETAL2 ECG
CODE= 60	US2 IN SEPARATE WAVE MODE
CODE= 61	FETAL2 TREND1
CODE= 62	FETAL2 TREND2
CODE= 63	FETAL2 TREND3
CODE= 64	FETAL2 NORMAL
CODE= 65	FETAL2 TACHY
CODE= 66	FETAL2 BRADY
CODE= 67	FETAL2 60BPM
CODE= 68	FETAL2 80BPM
CODE= 69	FETAL2 100BPM
CODE= 70	FETAL2 140BPM

CODE= 71	FETAL2 160BPM
CODE= 72	FETAL2 200BPM
CODE= 73	US 1&2 PULSE WIDTH1
CODE= 74	US 1&2 PULSE WIDTH2
CODE= 75	NO SELECTION
CODE= 76	NO SELECTION
CODE= 77	NO SELECTION
CODE= 78	EXECUTE AUTO SELECTION 1
CODE= 79	EXECUTE AUTO SELECTION 2
CODE= 80	EXECUTE AUTO SELECTION 3
CODE= 81	EXECUTE AUTO SELECTION 4
CODE= 82	EXECUTE AUTO SELECTION 5
CODE= 83	EXECUTE AUTO SELECTION 6
CODE= 84	EXECUTE AUTO SELECTION 7
CODE= 85	EXECUTE AUTO SELECTION 8
CODE= 86	EXECUTE AUTO SELECTION 9
CODE= 87	EXECUTE AUTO SELECTION 10
CODE= 88	NO SELECTION
CODE= 89	NO SELECTION
CODE= 90	NO SELECTION
CODE= 91	FETAL1 TREND1
CODE= 92	FETAL1 TREND2
CODE= 93	FETAL1 TREND3
CODE= 94	FETAL1 TREND4
CODE= 95	FETAL1 TREND5
CODE= 96	FETAL1 TREND6
CODE= 97	FETAL1 TREND7
CODE= 98	FETAL1 TREND8
CODE= 99	FETAL1 TREND9
CODE= 100	FETAL1 TREND10
CODE= 101	NO SELECTION
CODE= 102	NO SELECTION
CODE= 103	NO SELECTION
CODE= 104	NO SELECTION
CODE= 105	NO SELECTION
CODE= 106	NO SELECTION
CODE= 107	NO SELECTION
CODE= 108	NO SELECTION
CODE= 109	NO SELECTION
CODE= 110	NO SELECTION
CODE= 111	NO SELECTION
CODE= 112	NO SELECTION
CODE= 113	NO SELECTION
CODE= 114	NO SELECTION
CODE= 115	NO SELECTION
CODE= 116	NO SELECTION
CODE= 117	NO SELECTION

CODE= 118	NO SELECTION
CODE= 119	NO SELECTION
CODE= 120	NO SELECTION
CODE= 121	NO SELECTION
CODE= 122	NO SELECTION
CODE= 123	NO SELECTION
CODE= 124	NO SELECTION
CODE= 125	NO SELECTION
CODE= 126	NO SELECTION
CODE= 127	NO SELECTION
CODE= 128	NO SELECTION
CODE= 129	NO SELECTION
CODE= 130	NO SELECTION
CODE= 131	NO SELECTION
CODE= 132	NO SELECTION
CODE= 133	NORMAL
CODE= 134	TACHYCARDIA
CODE= 135	BRADYCARDIA
CODE= 136	ARRYTHMIAS
CODE= 137	LATE DECELERATION
CODE= 138	EARLY DECELERATION
CODE= 139	MODERATE DECELERATION
CODE= 140	ACCELERATION #1
CODE= 141	ACCELERATION #12
CODE= 142	SINUSOIDAL, HIGH
CODE= 143	SINUSOIDAL, LOW
CODE= 144	SEV VAR. DEC.#1
CODE= 145	SEV VAR. DEC.#2
CODE= 146	PROLONGED DECELERATION
CODE= 147	BIPHASIC DECELERATION
CODE= 148	EXAGGERATED DECELERATION
CODE= 149	NON-UNIFORM DECELERATION
CODE= 150	VAR DECEL. (U)
CODE= 151	VAR DECEL. TACH.
CODE= 152	VAR DECEL. (V)
CODE= 153	VAR DECEL. (POST)
CODE= 154	DECEL. (POSITION)
CODE= 155	LONG DECELERATION
CODE= 156	COMPENSATORY ACCELERATION
CODE= 157	NO SELECTION
CODE= 158	NO SELECTION
CODE= 159	NO SELECTION
CODE= 160	NO SELECTION
CODE= 161	ECG: SQUARE 2 Hz
CODE= 162	ECG: SQR 0.125 Hz
CODE= 163	ECG: PULSE 1Hz80ms
CODE= 164	NO SELECTION

CODE= 165	NO SELECTION
CODE= 166	NO SELECTION
CODE= 167	NO SELECTION
CODE= 168	BP CHANNELS SENS AT 5MICROVOLTS
CODE= 169	BP CHANNELS SENS AT 40MICROVOLTS
CODE= 170	BP CHANNELS SENS AT 5MICROVOLTS ON POWER UP
CODE= 171	BP CHANNELS SENS AT 40MICROVOLTS ON POWER UP
CODE= 172	TOCO AMP: 25 UNITS
CODE= 173	TOCO AMP: 40 UNITS
CODE= 174	TOCO AMP: 50 UNITS
CODE= 175	TOCO AMP: 60 UNITS
CODE= 176	TOCO AMP: 80 UNITS
CODE= 177	TOCO AMP: 100 UNITS
CODE= 178	TOCO AMP: 300 UNITS
CODE= 179	TOCO AMP: 400 UNITS
CODE= 180	NO SELECTION
CODE= 181	TOCO: NORMAL DURATION 40 SECONDS
CODE= 182	TOCO: NORMAL DURATION 80 SECONDS
CODE= 183	TOCO: NORMAL DURATION 90 SECONDS
CODE= 184	TOCO: NORMAL DURATION 110 SECONDS
CODE= 185	TOCO: COUPLING
CODE= 186	TOCO: TRIPLING
CODE= 187	TOCO: DYNAMOMETER
CODE= 188	TOCO: PICKET FENCE
CODE= 189	TOCO: IRREGULAR ACME
CODE= 190	TOCO: HYPERTONIC
CODE= 191	TOCO: HYPERTONUS
CODE= 192	TOCO: HYPOTONIC
CODE= 193	TOCO: V SPIKES
CODE= 194	NO SELECTION
CODE= 195	NO SELECTION
CODE= 196	NO SELECTION
CODE= 197	ELEVATED BASE 5
CODE= 198	ELEVATED BASE 10
CODE= 199	ELEVATED BASE 20
CODE= 200	ELEVATED BASE OFF
CODE= 201	RESP DELTA 3 MMHG
CODE= 202	RESP DELTA 5 MMHG
CODE= 203	RESP RATE 15 Br/M
CODE= 204	RESP RATE 20 Br/M
CODE= 205	RESP RATE 30 Br/M
CODE= 206	RESP RATE VARIABLE
CODE= 207	RESP ARTIFACT OFF
CODE= 208	BASE WANDER MILD (5)
CODE= 209	BASE WANDER MILD (10)
CODE= 210	BASE WANDER 3 MIN
CODE= 211	BASE WANDER 5 MIN

CODE= 212	BASE WANDER 10 MIN
CODE= 213	BASE WANDER 20 MIN
CODE= 214	BASE WANDER 30 MIN
CODE= 215	BASELINE WANDERING OFF
CODE= 216	NO SELECTION
CODE= 217	NO SELECTION
CODE= 218	NO SELECTION
CODE= 219	NO SELECTION
CODE= 220	NO SELECTION
CODE= 221	STATIC: -5 mmHg
CODE= 222	STATIC: 0 mmHg
CODE= 223	STATIC: 20 mmHg
CODE= 224	STATIC: 40 mmHg
CODE= 225	STATIC: 60 mmHg
CODE= 226	STATIC: 80 mmHg
CODE= 227	STATIC: 100 mmHg
CODE= 228	STATIC: 150 mmHg
CODE= 229	STATIC: 200 mmHg
CODE= 230	NO SELECTION
CODE= 231	NO SELECTION
CODE= 232	NO SELECTION
CODE= 233	AMPLITUDE KEY=FETAL1
CODE= 234	AMPLITUDE KEY=MATERNAL(FETAL2)
CODE= 235	CONTRAST UP
CODE= 236	CONTRAST DOWN
CODE= 237	BACKGROUND LIGHT
CODE= 238	BACKGROUND DARK
CODE= 239	BEEP OFF
CODE= 240	BEEP ON
CODE= 241	BEEP TEST
CODE= 242	DISPLAY LIGHT OFF
CODE= 243	DISPLAY 5 SECONDS
CODE= 244	DISPLAY 8 SECONDS
CODE= 245	DISPLAY 10 SECONDS
CODE= 246	NO SELECTION
CODE= 247	NO SELECTION
CODE= 248	NO SELECTION
CODE= 249	NO SELECTION
CODE= 250	NO SELECTION
CODE= 251	NO SELECTION
CODE= 252	NO SELECTION
CODE= 253	NO SELECTION
CODE= 254	NO SELECTION
CODE= 255	NO SELECTION
CODE= 256	NO SELECTION
CODE= 257	NO SELECTION
CODE= 258	NO SELECTION

```
CODE= 259          NO SELECTION
CODE= 260          NO SELECTION
CODE= 261          NO SELECTION
CODE= 262          NO SELECTION
CODE= 263          NO SELECTION
CODE= 264          SAVE CURRENT SETTINGS
CODE= 265          NO SELECTION
CODE= 266          NO SELECTION
CODE= 267          NO SELECTION
CODE= 268          VIEW CURRENT SETTINGS
CODE= 269          NO SELECTION
CODE= 270          NO SELECTION
CODE= 271          NO SELECTION
CODE= 272          NO SELECTION
CODE= 273          NO SELECTION
CODE= 274          NO SELECTION
CODE= 275          NO SELECTION
CODE= 276          NO SELECTION
CODE= 277          NO SELECTION
CODE= 278          NO SELECTION
CODE= 279          NO SELECTION
CODE= 280          NO SELECTION
CODE= 281          NO SELECTION
CODE= 282          NO SELECTION
CODE= 283          NO SELECTION
CODE= 284-511      DO NOT USE
```

Numbers between 1 - 511 which are not listed are reserved for later use.

Appendix

B
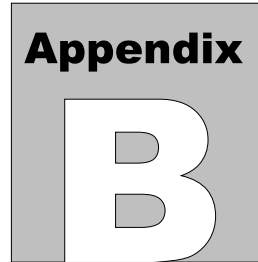
Appendix B - Accessories

Standard Accessories:
    3310-004: 9 Volt Alkaline Battery
    6100-485: Operating Manual
    3140-429: RJ-12 communication cable
    3140-426: RJ-12 to DB-9 adapter

Optional Accessories:
    AC Adapters:
    3000-445: North America/Japan
    3000-446: Euro-Schuko/China
    3000-447: UK

Intra Uterine Pressure/TOCO Cables:
    7200-508: Corometrics 118 IUP 12 Pin
    7200-469: Philips/Series 50/8040 5uV/V/mmHg IUP 12 Pin Dark Red
    7200-474: Philips/Series 50/8040 5uV/V/mmHg IUP 12 Pin Brown
    7200-516: Philips/Series 50/8040 40uV/V/mmHg IUP 12 Pin
    7200-522: Huntleigh IUP12 Pin
    7200-519: HP8040 External TOCO 12 Pin
    7200-520: Philips/Series 50 External TOCO 12 Pin
    7200-511: Corometrics 118 External TOCO 12 Pin
    7200-498: Huntleigh TEAM External TOCO 12 Pin

Ultrasound Cables:
    7200-499: Philips/Series 50
    7200-521: Philips/HP 8040A)
    7200-512: Corometrics 116 (5700)
    7200-514: Huntleigh/Sonicaid 2MHz
    7200-515: Huntleigh/Sonicaid 1.5MHz

Check the Datrend website (www.datrend.com) for additions to this list.