

WARRANTY CLAUSE

METROSONICS, INC. warrants each new instrument manufactured and sold to be free from defects in material, workmanship and construction, except for batteries which may be contained therein, and that when used in accordance with this owner's manual will perform to applicable specifications for a period of one year after original delivery.

If examination by METROSONICS, INC. discloses that the product has been defective, then our obligation is limited to repair or replacement, at our option, of the defective unit or its components.

METROSONICS, INC. is not responsible for products which have been subject to misuse, alteration, accident or for repairs not performed by METROSONICS, INC.

Instruments must be returned properly packed with transportation charges prepaid to METROSONICS, INC.; return transportation charges will be F.O.B. factory. No parts shall be returned unless a return authorization number is received, which will be furnished by request.

The foregoing warranty constitutes METROSONICS, INC. sole liability, and is in lieu of any other warranty, of merchantability or fitness. METROSONICS, INC. shall not be responsible for any incidental or consequential damages arising from any breach of warranty.

The hs-3800 Personal Heat Stress Monitor has been developed and is intended for use **ONLY** as an aid in the determination of potential heat stress situations. It is **not** a safety device and under no circumstances guarantees ultimate safety of the user.

It is important to realize that different individuals' response to heat stress can vary significantly. Total reliance, therefore, cannot be placed on the instrument alone. However, the combination of the Personal Heat Stress Monitor and the judgment of the individual is invaluable in Heat Stress Safety Programs.

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Chapter 1

INTRODUCTION

The hs-3800 is a miniature datalogging instrument for monitoring individual physiological (heat) strain in response to heat stress. The purpose of the Personal Monitor is to provide information to wearers on their physiological state during the exposure to heat stress, so that they can make a more informed decision on when to stop working. A further purpose is to evaluate the degree of heat strain that is present in the workplace and how that strain may be reduced with the introduction of control measures.

An exposure to heat stress should be terminated when heart rate or body temperature indicates excessive physiological strain, or when a worker experiences the onset of a heat-related disorder (fatigue, light-headedness, nausea, cramps, etc.). Workers exposed to heat stress, therefore, should be aware of all three factors. The hs-3800 is a means to inform the worker of excessive heart rate and body temperature. Judging the onset of symptoms is a subjective decision that only the worker can make.

While the hs-3800 Personal Heat Stress Monitor is logging, a two-stage alert system, with both visual and audio annunciators, is utilized. The first stage is a warning alert, which indicates that either body temperature, heart rate, or both, are approaching a level at which there is a limited amount of time to work before heat stress may become limiting. At this point it may be possible for the worker to take actions to reduce the physiological strain and extend the work time. The second stage is an action alert, which indicates the worker should stop work immediately and take appropriate actions.

The worker must realize that heat-related disorders are equally as important as heart rate and body temperature in determining heat strain. Workers must take action to limit heat stress exposures if symptoms of heat-related disorders are experienced, even if no alerts are given by the Personal Heat Stress Monitor.

The hs-3800 is based on research by EPRI (Electric Power Research Institute).¹ When used in a conscientiously applied Heat Stress Safety Program, it can be very beneficial in determining oncoming over exposure to heat stress; however, it is essential that Safety Program Managers and users be aware that:

1. Proper instructions, as outlined in this manual, must be strictly followed.
2. This is not a safety device and does not guarantee the ultimate safety of the user.
3. Testing has indicated 92% efficacy, therefore, total reliance cannot be placed on the hs-3800 alone.
4. Because the hs-3800 must be programmed with the individual's age and clothing type before each use, it is recommended that the units be preset and dedicated to individuals.
5. Due to the variations of different individuals, there is no guarantee that this device can protect the user from heat stress disorders.

The hs-3800 is also a valuable tool for evaluation because of its logging capabilities. It records the average heart rate for each minute and the estimated core temperature at the end of each minute. The hs-3800 uses this data to examine heart rate trends and the approaching limit of core temperature, and to compute strain indices, one for heart rate and another for core temperature.

NOTE: Estimated core temperature is the value that is displayed and stored. To estimate core temperature, the temperature of the insulated surface sensor is adjusted using relationships found during the Personal Monitor development. It is the best guess based on a linear fit of the data; the real value is usually within 0.2°C of the measured value.

Demonstrating that the heat stress conditions do not cause excessive heat strain in an adequate sample of workers shows that you are complying with the spirit of commonly used heat stress guidelines. In addition, the effectiveness of heat stress controls can be demonstrated by reductions in heat strain (e.g. lower heart rates, body temperatures and/or strain indices).

¹ T.E. Bernard and W.L. Kenney. "Rationale for a Personal Monitor for Heat Strain", *American Industrial Hygiene Association Journal* (in press for early 1994).

IMPORTANT!

Register your Personal Heat Stress Monitor and ms-3800P Programming Disk **NOW** and receive the first year of software upgrades **FREE**. Either fill out the enclosed card or see "Warranty Registration" in Chapter 4 for quick instructions on using the on-line warranty card to register your products.

Visit our web site at www.metrosonics.com

Chapter 2

GETTING STARTED

The hs-3800 Personal Heat Stress Monitor is comprised of two assemblies: the sensor belt assembly and the monitor module. The sensor belt assembly is worn around the chest and consists of a temperature sensor, heart beat detector and audible indicator. The monitor module is a microprocessor-based unit which combines the monitoring and data logging functions into a compact unit which is worn on the outside of the clothing.

Refer to figure 2.1 for pushbutton control, LED locations, and for connecting the sensor belt assembly and RS-232 cable to the monitor module.

Refer to figure 2.2 for properly wearing the sensor belt assembly.

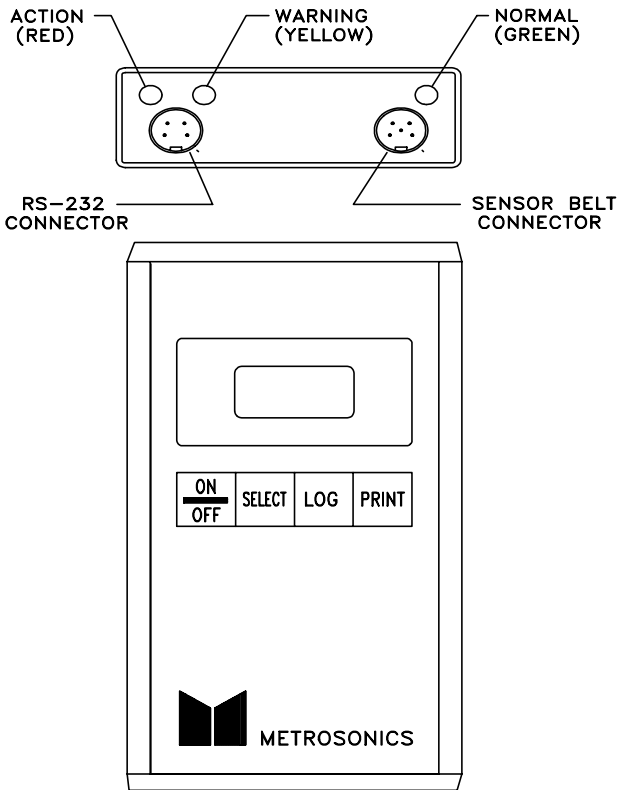


Figure 2.1 - hs-3800 Top End-Cap & Front Panel

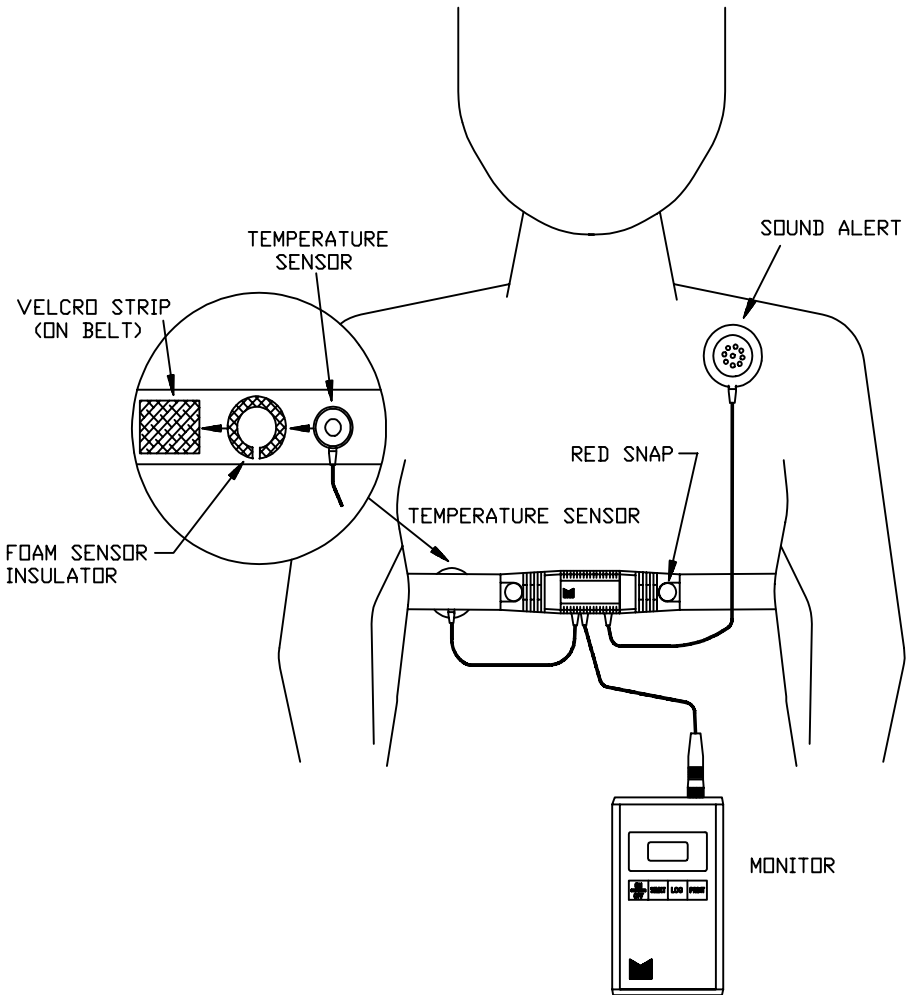


Figure 2.2 - Correct Sensor Belt Position
Control Drawing #2039-006

RS-232 & SENSOR BELT CONNECTOR

To connect the RS-232 cable or sensor belt assembly to the hs-3800, simply plug the connector on the cable into the appropriate input (see Figure 2.1).

NOTE: Be sure to use the correct RS-232 cable (part # ca-383-G). This cable has a 4-pin connector.

PUTTING ON THE SENSOR BELT ASSEMBLY

The sensor belt must be worn correctly for the hs-3800 to accurately monitor heart rate and body temperature. The sensor belt **MUST** be worn directly on the skin; there must be **NOTHING** between the sensors and the skin.

NOTE: There may be a period of time (usually less than 15 minutes) when the surface temperature sensor has not reached equilibrium. During this time, the temperature reading is less precise and the display may even read "LOW" or "HIGH" if the sensor is out of range. It is NOT necessary to delay work until the reading comes into range, UNLESS you have reason to believe that there is not good contact with the skin.

The steps listed below must be followed each time the sensor belt is put on.

1. Clean the conductive rubber pads on the sensor belt with soap and water.
2. Adjust the length of the sensor belt for a secure fit around the chest.
3. Secure the foam sensor insulator to the velcro on the inside of the sensor belt near the buckle. The slot in the insulator must be positioned toward the bottom edge of the sensor belt.
4. Position and secure the sensor belt around the chest (just below breast area), directly on the skin as shown in Figure 2.2.
5. Snap the sensor assembly to the sensor belt. Make sure the snaps are securely fastened. The **RED** snap must be on the left side of the chest.
6. Place the temperature sensor inside the foam insulator on the sensor belt with the metal side of the sensor touching the skin. The cable must fit in the slot in the insulator.
7. The user may now finish dressing. The Sound Alert and Monitor cable may be fed through the clothing in any convenient location. The Sound Alert is typically secured near the collar where the user will be able to hear it even in a noisy environment. The Monitor must be worn in a position where its LEDs are visible to the user.
8. Connect the sensor cable to an hs-3800 Monitor that has been correctly programmed for the user (see "Programming" later in this chapter).

VISUAL & AUDIBLE ALERTS

There are 3 colored LEDs located on the top end-cap of the hs-3800 (see figure 2.1), as well as an audible indicator on the sensor belt (which is attached near the ear). Each colored LED is combined with different audible alerts to provide both visual and audio indicators of the wearer's heat stress status and other conditions such as sensor error and low battery.

When logging (see "Log" in Chapter 3), the unit indicates the level of heat stress (status) as follows:

Alert Status	LED Flashing	Sound Alert
Normal	Green Flashing	No Sound Alert
Warning	Yellow Flashing	Sounds 4 Times
Action	Red Flashing	Sounds 2 Times per Second
Alert Reminder	Red Flashing	After Action Alert is Acknowledged, Sounds 8 Times Rapidly each Minute
Action to Normal	Red Stops Flashing & Green Starts Flashing	Sounds 4 Times
Sensor Error	Solid Red	Sounds 4 Times Rapidly each Minute Until 2 Minutes of Valid Readings are Measured (Once the Sensor Problem has been Corrected, the Sensor Alert will Stop in 2 or 3 Minutes)
Low Battery Shutdown	N/A	Sounds Rapidly for a Few Seconds

IMPORTANT: The hs-3800 MUST be logging for the heat stress alerts to be active (see "Log" in Chapter 3).

NOTE: Since the sound alert is located on the sensor belt, it CANNOT sound if the belt is not properly connected/positioned.

NOTE: The LEDs flash once every heartbeat.

NOTE: If desired, the alert reminder and/or all alerts may be disabled via the Programming Disk or ms-3800 Metrosoft (See Chapter 4).

Heat Stress Indicators

Normal (Green LED): User may continue working at the present rate indefinitely.

Warning Alert (Yellow LED): Either heart rate, body temperature or both are nearing a level at which there is a limited amount of time left to work. The user may slow down or otherwise reduce the strain. If the exposure continues, the action alert will follow soon afterwards.

Action Alert (Red LED): User should stop work and take appropriate action to leave the area.

Action Alert Reminder

After an action alert is given (red LED flashes and audible alert sound twice per second), the user can acknowledge the alert by pressing any key. Once the alert is acknowledged, the unit will sound an alert reminder (8 rapid sounds) once every minute until logging is stopped, or a transition occurs and the heat stress level returns to normal (green).

NOTE: If desired, the action alert reminder can be turned off, so that no further notice of the action alert is given once the alert is acknowledged. This is accomplished by using either the Programming Disk or ms-3800 Metrosoft (see "Disable Alert Reminder" in "Programming the hs-3800" Section in Chapter 4)

Action Alert to Normal Transition

Once an action alert indication is given and the alert is acknowledged, if the wearer's heat strain level returns to normal, the hs-3800 indicates this with 4 rapid beeps and the green LED begins to flash.

IMPORTANT NOTICES

IF THE USER CHOOSES TO CONTINUE HIS/HER WORK AFTER BEING ALERTED, THE CONDITIONS MAY ADVANCE TO A SERIOUS ILLNESS, INCLUDING HEAT STROKE.

THE USER MUST COMBINE SELF-DETERMINATION WITH THE PERSONAL HEAT STRESS MONITOR IN A TOTAL HEAT STRESS SAFETY PROGRAM. THE hs-3800 IS NOT A SAFETY DEVICE AND DOES NOT GUARANTEE THE ULTIMATE SAFETY OF THE USER.

PROGRAMMING

Two parameters **MUST** be programmed before logging is started: Age Group and Clothing Type.

Age Group

There are three age groups to choose from:

- Under 36
- 36 to 50
- Over 50

The age group selection sets operating thresholds; it is **VERY IMPORTANT** that the user's age group be selected correctly and before logging is started.

Clothing Type

There are two selections for clothing types

- Single Layer
 - Work clothes or other single layer of woven clothing with or without a light-weight tee-shirt
 - Breathable (vapor-permeable or vapor-transmitting) clothing with or without a light-weight tee-shirt
 - Any clothing ensemble when air is forcibly circulated under the clothing
- Multiple Layer
 - Two or more layers of woven and/or non-woven clothing (excluding a light-weight tee-shirt)
 - One or more layers that includes a vapor-barrier fabric

The type that most closely matches what the user will be wearing must be selected. Since this clothing selection also sets operating thresholds, it is **VERY IMPORTANT** that the user's clothing type be selected correctly and before logging is started.

Selection

There are two ways to program the age group and clothing type:

1. Using the SELECT button on the hs-3800 Monitor (see "Select" in Chapter 3).
2. Using either the Programming Disk or ms-3800 Metrosoft (see Chapter 4).

DEFAULT SETTINGS

The hs-3800 comes to you factory programmed for common conditions, allowing immediate operation. You can change the settings by using either the Programming Disk or ms-3800 Metrosoft (see Chapter 4).

The following is a list of the settings programmed at Metrosonics factory:

Temperature Scale: °C
Enable Security: No
User ID: -Blank-
Custom Header: -Blank-
Age Group: Under 36
Clothing Type: Single Layer
Disable All Alerts: No
Disable Alert Reminder: No
Printer Baud Rate: 9600
Screens to Display:
 Heart Rate & Temperature: Yes
 Date & Time: Yes
 Test Duration: Yes
 Strain Index: Yes

REAL TIME CLOCK

The date and time are NOT programmed into the hs-3800 at the factory. If you want to record data with real time indication, you MUST use either the Programming Disk or ms-3800 Metrosoft to set the real time clock. The real time clock of the hs-3800 is automatically set to the current date and time at your computer when the hs-3800 is programmed. Since the hs-3800 retains all programming information, including the real time clock setting, this step only needs to be done once. See Chapter 4 in this manual for information on programming the hs-3800.

NOTE: You may also program the hs-3800 via a remote terminal or PC (see Chapter 5).

BATTERY

The hs-3800 Personal Heat Stress Monitor is powered by a single 9 volt alkaline battery (NEDA 1604A). Typical battery life is 40 hours minimum (without audible alarm).

When the battery becomes low and cannot power the hs-3800 for approximately 8 hours of operation, the message "<8 HRS BAT LIFE" will flash every 10 seconds. If the battery voltage drops too low, the hs-3800 will display the message "LOW BAT TURN OFF" and shut down all circuits except data memory, programming information and the real time clock. All information will be maintained for approximately 30 days, but prompt replacement of the battery is recommended.

If the battery completely loses power or is removed for several minutes, all logged data and the real time clock setting will be lost. If this occurs, you **MUST** use either the Programming Disk, ms-3800 Metrosoft or a remote terminal to reset the real time clock (see Chapters 4 and 5). If you have programmed the hs-3800 for settings other than the factory defaults, the hs-3800 will retain all programming selections you have made.

NOTE: Even when off, the hs-3800 draws power from the battery in order to maintain the clock settings and any recorded data.

NOTE: If the unit will not be used for an extended period of time, the battery should be removed. A new battery should be installed when the unit is used again. In addition, if you wish to record data with real time indication, the hs-3800 must be reprogrammed to reset its real time clock (see "Programming the hs-3800" in Chapter 4).

Battery Replacement

The procedure for replacing the battery is very simple and can easily be performed within seconds. The hs-3800 will maintain its programming and logged data during battery replacement provided that the replacement procedure does not take more than 20 seconds.

The hs-3800 **MUST** be turned off before removing the bottom end-cap. If the hs-3800 is on when the battery is removed, all programming and logged data may be lost.

Follow these instructions for battery replacement (be sure you have a fresh battery ready before beginning this procedure):

1. Turn the hs-3800 off.
2. Unscrew the bottom end-cap screw with a flat-head screwdriver, and then remove the end-cap.
3. Tilt the unit so the old battery slides out.
4. Slide the fresh battery, terminals first, into the battery compartment, with the + and - terminals matching the diagram on the rear label of the unit.
The battery must be installed in less than 20 seconds to prevent possible data loss.
5. Replace the bottom end-cap and tighten the screw. If the end-cap is not seated correctly or the screw is not tightened correctly, the hs-3800 will **NOT** be water-tight.

Chapter 3

OPERATING THE hs-3800

The instructions in this chapter assume you have reviewed Chapter 2 in this manual. If you have not reviewed Chapter 2, you should do so at this time.

These instructions also assume that you have followed the instructions in Chapter 2 (i.e. you have installed a battery and connected the sensor belt assembly).

PUSHBUTTONS

The hs-3800 has 4 buttons, which are used to control all unit operations. Pressing the buttons individually or in groups allows you to perform various functions.

When pressed individually, the functions of the 4 buttons are:

- ON/OFF** Turn the unit on and off; perform a system check
- SELECT** View unit setup and Strain Index
- LOG** Start and stop logging
- PRINT** Output a report to a serial printer

When pressed and held down, the following functions are implemented:

- ON/OFF** Clear data
- SELECT** Program clothing type and age group

When pressed in groups, the following functions are implemented:

- ON/OFF & SELECT** Calibration verification
- ON/OFF & PRINT** Select printer baud rate

ON/OFF & SYSTEM CHECK

1. Press and release ON/OFF. The unit will turn on and automatically begin a system check. The alert sounds 3 times and each LED flashes 3 times. The unit displays the instrument model number and serial number, the battery status, and then the current heart rate and temperature.

The model number and serial number will be displayed in the following format:

hs-3800
SN10312

The battery status screen will be in the following format:

BATTERY
IS OK

OR

<8 HRS
BAT LIFE

The current heart rate and temperature will be in the following format:

124 bpm
37.2°C

NOTE: If the sensors are NOT being worn or if there is NOT good contact with the skin, the hs-3800 may display a very low heart rate (e.g. 24 bpm) and/or a temperature reading of "LOW" or "HIGH".

2. Press and release ON/OFF again to turn the hs-3800 off.

NOTE: The unit may NOT be turned off while it is logging. This is to prevent logging from accidentally being stopped. See "Log" later in this chapter.

NOTE: When the hs-3800 is NOT logging and no key is pressed for 5 minutes, the unit will automatically turn off to conserve battery life.

Setup Restored

When the hs-3800 is turned on, if this is the first time you use the hs-3800, or if the battery completely loses power or is removed for several minutes, the following message will be displayed :

SETUP
RESTORED

The purpose of this message is to inform you that the real time clock is NOT set, and the setup the hs-3800 was last (most recently) programmed for is being used (if you have never programmed the hs-3800, the default settings are used).

You MUST acknowledge this message by pressing any key. Then, if you wish to set the real time clock, you may do so using either the Programming Disk, ms-3800 Metrosoft, or a remote terminal or PC(see Chapters 4 and 5).

Factory Defaults

It is very unlikely that the following message be displayed when the hs-3800 is turned on:

FACTORY
DEFAULTS

The purpose of this message is to inform you that the instrument is NOT properly calibrated. If this occurs, press any key to acknowledge the message and then call Metrosonics Service Department at 716-334-7300. The hs-3800 can ONLY be calibrated by Metrosonics personnel.

WARNING: The unit will continue to function after this message is displayed, HOWEVER, it should **NOT** be used.

SELECT

The SELECT button allows viewing the instrument setup, which includes programmed clothing type and age group, user ID, present date and time, and elapsed logging duration. If data has been logged, Strain Index may also be displayed.

The SELECT button can also be used to change the programmed age group and clothing type.

Viewing the Instrument Setup & Strain Index

1. Make sure the hs-3800 is turned on and displaying the current heart rate and temperature.
2. Press and release SELECT and the unit will display the programmed age group and clothing type.

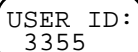
Ex:



SNG LAYR
UNDER 36

3. Press and release SELECT again and the unit will display the programmed user ID.

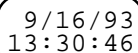
Ex:



USER ID:
3355

4. Press and release SELECT again and the unit will display the present date and time.

Ex:



9/16/93
13:30:46

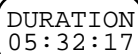
If the real time clock has not been set (see Chapters 4 and 5), the following message will be displayed instead of the present date and time:



TIME
NOT SET

5. Press and release SELECT again and the unit will display test duration (amount of time logging):

Ex:



DURATION
05:32:17

If logging has not been started, 0:00:00 is displayed.

NOTE: See "Log" later in this chapter for information on logging data.

6. If at least one minute of data has NOT been logged, skip to step 8 below. If data HAS been logged for at least 1 minute, press and release SELECT again and the unit will display the Strain Index (S.I.) for heart rate.

Ex:

SI-H.R.
0.45

7. While viewing the Strain Index for heart rate, press and release SELECT again and the unit will display the Strain Index (S.I.) for temperature.

Ex:

SI-TEMP.
0.87

8. Press and release SELECT again to return to viewing the current heart rate and temperature.

Strain Index

Strain Index is a method of showing the progression of physiological strain, with 0.00 being resting conditions and 1.00 being the action (red) alert. The hs-3800 calculates a separate Strain Index for heart rate and temperature.

Programming Age Group & Clothing Type

To select the user's age group and/or clothing type using the SELECT key, follow these steps

1. Make sure the hs-3800 is turned on and displaying the current heart rate and temperature, and is NOT logging.
2. Press and hold SELECT and the unit will scroll through choices for the age group and clothing type.
3. Release SELECT when the desired age group and clothing type is displayed. The unit is now reprogrammed for those settings.
4. If desired, press SELECT repeatedly until the current heart rate and temperature are redisplayed.

NOTE: The age group and clothing type CANNOT be changed while logging is in progress.

NOTE: Once you change the age group and clothing type, the new settings are permanently stored until you change them.

NOTE: Age group and clothing type may also be selected with the Programming Disk or ms-3800 Metrosoft (see Chapter 4).

LOG

While the hs-3800 is logging, it measures and records the user's heart rate, and temperature, and calculates the level of heat strain once a minute. The LEDs and sound alerts will reflect the level of heat strain (see "Visual and Audible Alerts" in Chapter 2). **The alerts are ONLY active while logging.**

IMPORTANT: BEFORE you begin logging, you should verify that the unit is correctly programmed for the wearer's age group and clothing type (see "Select" earlier in this chapter). In addition, you should verify that all systems are OK during the turn-on systems check (see "On/Off & System Check" earlier in this chapter).

WARNING: The LEDs flash once every heartbeat. If the sensor belt is not worn correctly, the audible and visual alerts may not function properly to warn of a heat stress condition.

NOTE: If desired, all alerts may be disabled using either the Programming Disk or ms-3800 Metrosoft (see Chapter 4).

Start and Stop Logging

1. Make sure the hs-3800 is turned on and displaying the current heart rate and temperature.
2. Press and release LOG to start logging. The LEDs will be activated and the following message is displayed:



LOGGING
STARTED

The unit then returns to displaying the current heart rate and temperature. The message "DATA LOGGING" will flash periodically as a reminder that logging is in progress.

3. Press and release LOG twice within 3 seconds to stop logging. The following message is displayed:



LOGGING
STOPPED

If the Monitor is indicating an action (red) alert, you **MUST** acknowledge the alert before you can stop logging (see "Action Alert Acknowledgement" later in this section). Once the alert has been acknowledged, you can press LOG twice to stop logging.

NOTE: The hs-3800 **CANNOT** be turned off while logging is in progress. If ON/OFF is pressed during logging, the message "INVALID: LOGGING" is displayed.

NOTE: While logging, if no key is pressed for 5 minutes, the display will turn off to conserve battery life. The hs-3800 will continue to log and alarm. To turn the display back on, simply press any key.

NOTE: The hs-3800 can be placed in secure mode via the Programming Disk, ms-3800 Metrosoft, or a remote terminal or PC (see Chapters 4 and 5). While in secure mode, the LOG button CANNOT be used to stop logging. The only way to stop logging while in secure mode is by using either the Programming Disk, ms-3800 Metrosoft, or a remote terminal or PC (see Chapters 4 and 5).

Action Alert Acknowledgment

If the Monitor is indicating an Action (red) Alert, press any button to acknowledge the alert. After acknowledgment, the sound alert will beep eight times each minute and the red LED will continue to flash as a reminder of the Action Alert status.

If the wearer cools down and his/her status returns to normal, the green LED will flash and the sound alert will no longer be given.

NOTE: The Action Alert Reminder may be disabled using either the Programming Disk or ms-3800 Metrosoft (see Chapter 4).

PRINT

The PRINT button allows you to print a formatted report which shows, for each test (logging session), all programmed parameters, test start time, heart rate and temperature logged every minute with time stamp, the alert status for that minute, and a graphical representation of both heart rate and temperature. A sample report is shown in Figure 3.1.

To output a report:

1. After logging is complete, make sure the hs-3800 is turned on and displaying the current heart rate and temperature.
2. Connect the RS-232 cable from the connector on the top end-cap of the hs-3800 to a serial printer.
3. Press and release PRINT and the report will be output.
4. Press and release PRINT again if you wish to terminate printing in progress.

NOTE: Reports can also be output via remote terminal or PC (see Chapter 5).

NOTE: The hs-3800 baud rate **MUST** match the baud rate your serial printer is set for (see "Baud Rate" later in this chapter).

NOTE: If the report does not print, try changing the slide position of the switch on the RS-232 cable and request the report again.

NOTE: Serial printing is done using 1 start bit, 8 data bits, 1 stop bit, and no parity. Software handshaking (Xon/Xoff) is required to control the flow of characters to the printer.

METROSONICS PERSONAL MONITOR hs-3800 SN 1070 V1.0
 USER ID: 5555
 AGE GROUP: ABOVE 50
 CLOTHING TYPE: SINGLE LAYER
 TEST START DATE AND TIME: 07/14/93 AT 14:24:24
 DURATION: 0:32:27
 DATA FOR TEST NUMBER 1 OF 1

E.T.	H.R.	TEMP.	ALERT	(bpm) (*)					175	220
hh:mm	bpm	deg F	STATUS	40	85	130				
0:01	98					*				
0:02	109					*				
0:03	128						*			
0:04	132	96.3				+	*			
0:05	136	96.4				+	*			
0:06	141	96.4				+	*			
0:07	145	96.5				+	*			
0:08	148	96.6				+	*			
0:09	151	96.6				+	*			
0:10	151	96.7				+	*			
0:11	152	96.8	WARNING			+	*			
0:12	150	96.8	WARNING			+	*			
0:13	148	96.8	ACTION			+	*			
0:14	139	96.8	ACTION			+	*			
0:15	138	96.9	ACTION			+	*			
0:16	140	96.9	ACTION			+	*			
0:17	134	97.0	ACTION			+	*			
0:18	141	97.0	WARNING			+	*			
0:19	143	97.0	WARNING			+	*			
0:20	143	97.0	ACTION			+	*			
0:21	142	97.0	ACTION			+	*			
0:22	139	97.0	ACTION			+	*			
0:23	145	97.0	ACTION			+	*			
0:24	151	97.0	ACTION			+	*			
0:25	149	97.0	ACTION			+	*			
0:26	151	97.1	ACTION			+	*			
0:27	153	97.1	ACTION			+	*			
0:28	156	97.0	ACTION			+	*			
0:29	154	97.1	ACTION			+	*			
0:30	143	97.1	ACTION			+	*			
				91.4	93.9	96.4	99.0	101.5	104.0	
				(deg F) (+)						

Fig. 3.1 -- Sample Formatted Output Report

CLEAR DATA

Clearing data erases ALL previously recorded data from the hs-3800. Follow these instructions to clear the data:

1. Make sure the hs-3800 is turned on and displaying the current heart rate and temperature.
2. Press and hold ON/OFF. The display will shut off momentarily, and then the following message and countdown timer is displayed:

HOLD TO
CLEAR 9

3. Continue to hold ON/OFF. The timer will count down to 1, then data will be cleared and the following message will be displayed:

ALL DATA
CLEARED

Release ON/OFF before the timer counts down to 1 and the data will NOT be erased.

NOTE: You may also clear data with the Programming Disk or ms-3800 Metrosoft (see Chapter 4), or with a remote terminal or PC (see Chapter 5).

CALIBRATION VERIFICATION

The Calibration Verification Mode is used to verify that the hs-3800 is operating within its performance specifications.

You **MUST** use a cl-383-G calibrator to perform a calibration verification.

If the hs-3800 is out of calibration, please contact Metrosonics Service Department at 716-334-7300.

To verify calibration:

1. Make sure the hs-3800 is turned off.
2. Plug the cl-383-G calibrator into the sensor belt connector of the hs-3800.
3. Press and release the black button on the top end-cap of the calibrator to turn it on. Make sure that the calibrator LED flashes twice per second.
4. On the hs-3800, press and hold down SELECT, then press ON/OFF, and then release both buttons. The yellow LED will start flashing.
5. After one minute, the hs-3800 will indicate whether or not the unit is in calibration.

If the hs-3800 IS in calibration, the message OK is displayed and the green LED begins flashing. If the hs-3800 is NOT in calibration, the message BAD is displayed and the red LED begins flashing.

NOTE: The red and green LEDs will be updated once a minute until calibration verification is terminated.

6. Press any button on the hs-3800 to terminate the calibration verification test.
7. Turn the cl-383-G calibrator off by pressing and releasing the black button again, and, if desired, press ON/OFF to turn the hs-3800 off.

NOTE: The hs-3800 automatically converts disk temperature to core temperature. The temperature printed on the calibrator is disk temperature not core temperature.

BAUD RATE

To select the baud rate used by the hs-3800 when printing directly to a serial printer, follow these steps:

1. Make sure the hs-3800 is turned off.
2. Press and hold PRINT, then press ON/OFF, and then release both buttons. The unit will display the baud rate presently programmed.
3. If you wish to select a different baud rate, press and release PRINT repeatedly until the display scrolls to the desired baud rate.
4. Press any button other than PRINT to exit baud rate selection and display the present heart rate and temperature.
5. If desired, press ON/OFF to turn the hs-3800 off.

NOTE: The baud rate selected here is used ONLY when outputting reports to a serial printer via the PRINT button. It has no effect on communication when using the Programming Disk or ms-3800 Metrosoft, or when using a remote terminal or PC.

NOTE: The baud rate CANNOT be changed while logging is in progress.

NOTE: Once you change the baud rate, the new setting is permanently stored until you change it.

NOTE: Baud rate may also be selected with the Programming Disk or ms-3800 Metrosoft (see Chapter 4).

Chapter 4

PROGRAMMING DISK (ms-3800P)

The ms-3800P Programming Disk allows you to program the hs-3800 with your own settings. As an option ms-3800 Metrosoft is available. In addition to programming the hs-3800, this enhanced software program allows you to store datafiles, create graphs & reports, search your data base, and more! Call Metrosonics Sales Department for more information (716) 334-7300.

The Programming Disk contains sample datafiles, which allow you to see the database, report generation and graphing capabilities offered in ms-3800 Metrosoft. See "ms-3800 Metrosoft Features" later in this chapter for more information.

In addition to programming the hs-3800 Personal Heat Stress Monitor, the Programming Disk also allows programming the hs-383 and hs-385 Personal Heat Stress Monitors.

IMPORTANT!

Register your Monitor and Programming Disk **NOW** and receive the first year of software upgrades **FREE**. Either fill out the enclosed card or see "Warranty Registration" later in this chapter for quick instructions on using the on-line warranty card to register your products.

STARTING THE PROGRAMMING DISK

1. Boot MS-DOS Version 3.0 or higher.
2. Insert the Programming Disk into the floppy drive.
3. Type the following command:

M<Enter>

The Metrosonics Logo will appear followed by the Main Menu. Press any key while the logo is on the screen and the Main Menu will appear faster.

NOTE: If desired, you may copy the Programming Disk into a directory on your hard drive. Then, to start the Programming Disk, simply change to the directory and type M<Enter>.

SETTING UP THE PROGRAMMING DISK FOR YOUR COMPUTER

Press F2 (Configure Metrosoft) in the Main Menu, and the Configure Metrosoft Form will appear.

This form allows you to set up the Programming Disk for the type of computer system you have. This step **MUST** be performed the first time you use the Programming Disk to make sure that the software knows what kind of hardware setup you have.

Since the software saves the setup until you change it, you do not have to repeat this step unless a change is desired or if you are using a different COM port, disk drive, or directory name.

Use the following instructions to fill in the Configure Metrosoft Form:

- Press ↓ or <Enter> to move to the next field
- Press ↑ to move to the previous field
- Press → or ← to scroll through choices for a field
- Type information for fields that do not offer choices when → or ← are pressed
- Press F2 to save the setup
- Press F3 to fill out the warranty registration
- Press F10 to return to the Main Menu

NOTE: If you press F10 without saving the setup, the software will remember your changes until you exit the program. Once you exit the software program, the Configure Metrosoft Form will automatically revert to the last saved setup.

The following list provides information on the selections in the Configure Metrosoft Form which are pertinent to programming an hs-3800:

Disk Drive For Recorded Data

This tells the software which disk drive you will be using to store Monitor Setup Files and the sample datafiles. You may enter any letter from A to Z. Generally A and B are floppy drives, and C is the hard disk.

Directory

This tells the software which subdirectory (if any) you will be using to store Monitor Setup Files and the sample datafiles.

When typing the directory name DO NOT type in the disk drive. Metrosoft will bracket (\...) the name if necessary. Invalid subdirectory name characters (spaces, periods, and some special symbols) are beeped.

If you do not have a subdirectory, leave this field blank.

NOTE: Metrosoft does NOT create the subdirectory for you. You must do so from the operating system. If you are using a hard drive, we recommend that you create a subdirectory for Monitor Setup Files and the sample datafiles (see your DOS manual for details on creating subdirectories).

Monitor Type

This field is used to select the type of monitor (video display terminal) used on your computer. You may select either monochrome or color.

Model

The Programming Disk can be used to set up not only the hs-3800 Personal Heat Stress Monitor, but also Metrosonics hs-383 and hs-385 Monitors. This field is used to select which instrument you wish to program. (If hs-3800 is selected, the baud rate is automatically set to 9600 baud. If hs-383 or hs-385 is selected, you must also select the appropriate baud rate - see below).

Baud Rate

This is the baud rate used when Metrosoft is communicating with the instrument. If the model selected is hs-3800, the baud rate is automatically set to 9600 and this field is inaccessible. This baud rate has no effect on the baud rate used by the hs-3800 when printing directly to a serial printer.

When the model selected is hs-383 or hs-385, this field becomes accessible. In this case, you must select the same baud rate that the instrument has been programmed for via its switches (see your hs-383 or hs-385 manual for details).

Communications Port

This is the serial port that will be used when Metrosoft communicates with the Personal Heat Stress Monitor. You may select either COM1 or COM2.

Fields For Datafiles Only

Several fields in the Configure Metrosoft Form are only needed for retrieving and viewing datafiles. These fields must be properly selected for viewing the sample datafiles included on the Programming Disk.

The following lists the fields names that are only necessary for reviewing the sample datafiles:

- Plotter Type (Serial)
- Plotter Port
- Plotter/Serial Printer Baud
- Printer Type
- Printer Port
- Displayed File Listing Format
- Temperature Scale
- All Graphing Options fields (Resolution, Line Types, Draw Grid Lines, Scaling, Parameters to Graph, Manual Ranges and Limit Line)

The field "Store Test into Separate File" applies ONLY to data retrieval, a feature which is ONLY valid with ms-3800 Metrosoft. Since this feature is inaccessible when using the Programming Disk, it may be ignored.

Warranty Registration

Register your Personal Heat Stress Monitor and Programming Disk and receive the first year of software upgrades **FREE**. Simply follow this set of quick instructions to use our on-line warranty card:

1. Press F2 (Configure Metrosoft) in the Main Menu and the Configure Metrosoft Form will appear.
2. Press F3 (Register Warranty) and the Warranty Registration Form will appear on your screen.
3. Press \uparrow , \downarrow or \langle Enter \rangle to move from field to field and type the appropriate information into the form.
4. When the form is complete, press F2 to print the form, and then mail it to: Metrosonics, Inc., P.O. Box 23075, Rochester, NY 14692.
5. Press F10 to exit the Warranty Registration Form and return to the Configure Metrosoft Form.
6. Press F10 again to return to the Main Menu.

CONFIGURE/REMOTEY CONTROL THE hs-3800 MONITOR

The Programming Disk allows you to connect the hs-3800 to your computer where you can perform the following functions:

- Program (Configure) the Instrument
- Verify Communication Between the Computer and the hs-3800
- Stop Logging at the hs-3800
- Clear All Data at the hs-3800
- View Heart Rate and Temperature in Real Time as They Occur

To access the above functions:

1. Press F4 (Configure/Remotely Control Monitor) in the Main Menu. The Configure/Remotely Control Monitor Menu will appear on your screen.
2. Press the appropriate function key for the task you wish to perform and follow the instructions on the computer screen. See the next sets of instructions for step by step information on each function in this menu.

Verify Communication

Before programming the hs-3800, we recommend you verify that the computer is properly hooked up and communicating with the hs-3800.

Follow these steps to verify communication with the hs-3800:

1. Check your Configure Metrosoft Form to make sure that the Programming Disk is set up for the correct communications port (COM1 or COM2) and instrument type (hs-3800).
2. Press F4 (Configure/Remotely Control Monitor) in the Main Menu.
3. Press F2 (Verify Communication With The Monitor) and instructions will appear on your screen.
4. Connect the RS-232 cable from the hs-3800 to the computer's serial port.
5. Press <Enter>. If the computer is properly communicating with the hs-3800, the message "Communication Established" will appear. If communication fails, a message will appear on the screen, with a list of instructions. If this occurs, check each of the items on the list and try communicating again.

NOTE: The RS-232 cable may have a two-position slide switch at the 25-pin serial connector. If so, the switch must be correctly positioned to communicate with the hs-3800. If unable to communicate, move the switch to the other position.

6. Once communication is established, press any key to continue.

Exit Logging

The Programming Disk allows you to send a command to the hs-3800 to stop logging. This is especially useful if the hs-3800 has been placed in secure mode and you wish to stop logging (see "Programming the hs-3800" later in this section).

Follow these steps to exit logging at the hs-3800:

1. Check your Configure Metrosoft Form to make sure that the Programming Disk is set up for the correct communications port (COM1 or COM2) and instrument type (hs-3800).
2. Press F4 (Configure/Remotely Control Monitor) in the Main Menu.
3. Press F3 (Exit Logging At The Monitor) in the Configure/Remotely Control Monitor Menu and instructions will appear on your screen.
4. Connect the RS-232 cable from the hs-3800 to the computer's serial port.
5. Press <Enter>. If the computer is properly communicating with the hs-3800, the message "Logging Has Been Exited" will appear.
6. Press any key to continue.

Clear All Data

The Programming Disk allows you to send a command to the hs-3800 to clear all data.

Follow these steps to clear data at the hs-3800:

1. Check your Configure Metrosoft Form to make sure that the Programming Disk is set up for the correct communications port (COM1 or COM2) and instrument type (hs-3800).
2. Press F4 (Configure/Remotely Control Monitor) in the Main Menu.
3. Press F4 (Clear All Data At The Monitor) in the Configure/Remotely Control Monitor Menu and instructions will appear on your screen.
4. Connect the RS-232 cable from the hs-3800 to the computer's serial port.
5. Press <Enter>. If the computer is properly communicating with the hs-3800, the question "Clear All Data? (Y/N)" will appear.
6. Type Y to clear the data and the question "Are You Sure? (Y/N)" will appear.
7. Type Y to clear the data and the message "All Data Has Been Cleared" will appear.
8. Press any key to continue.

NOTE: If either the question in steps 5 or 6 are answered with "N", the data will NOT be cleared and the clear data procedure will be aborted.

NOTE: Data CANNOT be cleared while logging.

View Heart Rate & Temperature In Real Time

The Programming Disk allows you to view the Heart Rate and Temperature readings on your computer screen as they occur. Included on the screen is the present date and time, heart rate and temperature readings, and Strain Index for both heart rate and temperature.

Follow these steps to view data in real time:

1. Check your Configure Metrosoft Form to make sure that the Programming Disk is set up for the correct communications port (COM1 or COM2) and instrument type (hs-3800).
2. Press F4 (Configure/Remotely Control Monitor) in the Main Menu.
3. Connect the RS-232 cable from the hs-3800 to the computer's serial port.
4. Press F5 (View Heart Rate & Temperature In Real Time) in the Configure/Remotely Control Monitor Menu and a screen will appear showing the present readings at the hs-3800.

NOTE: Strain Index appears ONLY after data has been logged.

5. Press F10 or the <Esc> key when you wish to return to the Configure/Remotely Control Monitor Menu.

Programming the hs-3800

The hs-3800 comes to you factory programmed for our default settings. If you wish to create your own settings for collecting data, you will need to create Monitor Setup Files.

Monitor Setup Files can be created within seconds. Metrosonics software uses fill-in-the-form programming. This means all you have to do is "fill in a form" by choosing the settings you want for a given test. This information is then sent to the hs-3800 and the test is run. It's that easy!

To program the hs-3800:

1. Check your Configure Metrosoft Form to make sure that the Programming Disk is set up for the correct communications port (COM1 or COM2) and instrument type (hs-3800).
2. Press F4 (Configure/Remotely Control Monitor) in the Main Menu.
3. Press F7 (Create A New Monitor Setup File) in the Configure/Remotely Control Monitor Menu and the Monitor Setup Form will appear on your screen.
4. Make selections for each field on this form to create whatever settings you need.
5. Connect the hs-3800 to the computer's serial port with the RS-232 cable and then press F3.

NOTE: Since the hs-3800 remembers the last test setup sent to it, you do not need to reprogram the hs-3800 unless a change is required or if the battery loses power or is removed.

Use the following commands to make selections in the Monitor Setup Form:

- Press ↓ or <Enter> to move to the next field
- Press ↑ to move to the previous field
- Press → or ← to scroll through choices for a field
- Type information in fields that do not offer choices when → or ← are pressed
- Press F2 to save the Monitor Setup File for future use
- Press F3 to program the hs-3800 with the current setup
- Press F10 to return to the Configure/Remotely Control Monitor Menu (you will be asked if you are sure you want to exit Monitor programming - answer "Y" for yes)

The following list provides information on each selection in the Monitor Setup Form:

Instrument Model

The Programming Disk can be used to set up not only the hs-3800 Personal Heat Stress Monitor, but also Metrosonics hs-383 and hs-385 Monitors. This field is used to select which instrument you wish to program.

Temperature Scale

This field allows you to select whether the hs-3800 (or hs-383/385) will display temperature in °F or °C.

Enable Security

The hs-3800 allows you to turn on a secure mode, which locks out the ability to STOP logging using the LOG button on the hs-3800. This is useful for preventing logging from accidentally being stopped.

When this feature is used, logging can ONLY be stopped by using the Programming Disk or ms-3800 Metrosoft to send a remote command to exit logging (see "Exit Logging" earlier in this section), or by sending a command via remote terminal or PC (see Chapter 5).

If you wish to enable security, simply select "yes" for this field.

User ID

The User ID is a six character identifier that is stored each time logging is started. This is useful for identifying which user was wearing the instrument while data was recorded. If a user ID is entered, it will appear at the top of each report.

Custom Header

This is a 50 character header which will appear at the start of each report.

Age Group (hs-3800 Only)

This selection is used to set up the hs-3800 for the appropriate age group for the person to be monitored. You may select under 36 years, 36 to 50 years or over 50 years.

NOTE: The age group can also be selected using the SELECT button on the hs-3800 Monitor (See "Programming Age Group & Clothing Type" in the "Select" Section of Chapter 3).

Clothing Type (hs-3800 Only)

This selection is used to set up the hs-3800 for the appropriate clothing type. You may select single layer or multiple layer, whichever most closely matches the clothing type that will be worn by the person to be monitored.

NOTE: The clothing type can also be selected using the SELECT button on the hs-3800 Monitor (See "Programming Age Group & Clothing Type" in the "Select" Section of Chapter 3).

Disable All Alerts (hs-3800 Only)

This selection allows you to disable both the visual and audible alerts. When disabled, the hs-3800 will NOT warn the wearer of potential heat stress problems. Typically, this setting should be left on "NO" to provide worker protection. If you wish to passively monitor and NOT provide alerts, select "yes" for this field.

WARNING: Use this feature with extreme care!

Disable Alert Reminder (hs-3800 Only)

Under normal operation, once the wearer has reached an action alert condition, and he/she has acknowledged the alert, the hs-3800 provides additional audible alerts to remind the wearer that he/she is still in an action alert condition. This alert reminder continues until either logging is stopped or the wearer cools down to a normal condition. This field allows you to disable the alert reminder by selecting "yes".

WARNING: Use this feature with extreme care!

Printer Baud Rate (hs-3800 Only)

This field allows you to select which baud rate the hs-3800 will use when it prints directly to a serial printer. Be sure to select the same baud rate used by the printer. You may select 150, 300, 600, 1200, 2400, 4800 or 9600 baud.

NOTE: The baud rate selected here is used ONLY when outputting reports to a serial printer via the PRINT button. It has no effect on communication when using the Programming Disk or ms-3800 Metrosoft, or when using a remote terminal or PC. The hs-3800 always communicates with the Programming Disk, ms-3800 Metrosoft, and a remote terminal or PC at 9600 baud.

NOTE: This baud rate can also be selected using the buttons on the hs-3800 Monitor (See "Baud Rate" in Chapter 3), or using a remote terminal or PC (see Chapter 5).

Screens To Display (hs-3800 Only)

Under normal operation, the following information is displayed at the hs-3800:

- Heart Rate and Temperature
- Present Date & Time
- Test Duration (Elapsed Time)
- Strain Index (During Logging Only)

You may choose whether or not you wish to allow viewing any or all of these. To make your selections, move to each field and select either yes or no.

NOTE: If you choose NOT to display heart rate and temperature, the hs-3800 honors this choice ONLY during logging.

Saving Setup Files

After filling in the Monitor Setup Form, you may save the setup on disk for future use. The files created are called Monitor Setup Files. This allows you to recall a specific test setup and quickly program additional hs-3800's in precisely the same way. Valuable time is saved because you don't have to remember the settings or recreate them every time you need to program an hs-3800. You can create as many Monitor Setup Files as you require and recall them as needed.

Follow these instructions to save a Monitor Setup File:

1. Fill in the Monitor Setup Form as needed.
2. Press F2 (Save Setup).
3. You will be prompted to enter a filename without an extension (the software automatically gives the file the extension .CFG). Enter up to 8 characters and press <Enter>.

The Monitor Setup File is saved on the data drive and directory that you specified when you filled in the Configure Metrosoft Form.

NOTE: If you enter a filename that already exists, you may either overwrite it or enter a different filename.

Sending Test Setup Information to the hs-3800

There are two ways to program the hs-3800. You can either create a new Monitor Setup File and immediately send it to the hs-3800, or you can retrieve a saved Monitor Setup File and send it to the hs-3800.

NOTE: You must clear all data from the hs-3800's memory before you can program it for a new test.

Real Time Clock

Metrosoft automatically sets the real time clock (RTC) of the hs-3800 to the current time at your computer when a Monitor Setup File is sent to the hs-3800. Make sure that your computer's clock has been set to the correct time before programming the hs-3800.

Create & Send A New Monitor Setup File

Follow these instructions to create a new Monitor Setup File and immediately send it to the hs-3800:

1. Fill in the Monitor Setup Form.
2. Press F3 (Program Monitor) and instructions will appear on your screen.
3. Connect the RS-232 cable from the hs-3800 to the computer's serial port.
4. Press <Enter>. When Monitor programming is complete the message "The Monitor Has Been Programmed" will appear on your screen.

Retrieve & Send A Saved Monitor Setup File

Follow these instructions to retrieve a saved Monitor Setup File and send it to the hs-3800:

1. Press F4 (Configure/Remotely Control Monitor) in the Main Menu.
2. Press F6 (Retrieve A Saved Monitor Setup File) in the Configure/Remotely Control Monitor Menu. A listing of your saved Monitor Setup Files will be displayed.
3. Press ↓, ↑, → or ← to select the file you want to retrieve.
4. Press F2 to view the file. The completed Monitor Setup Form for this file will appear on the screen so you can review the settings.

NOTE: If you wish to see another file, press F10 to return to the listing of your saved Monitor Setup Files, select the desired file and press F2 to view it.

5. Press F3 (Program Monitor) and instructions will appear on your screen.
6. Connect the RS-232 cable from the hs-3800 to the computer's serial port.
7. Press <Enter>. When Monitor programming is complete the message "The Monitor Has Been Programmed" will appear on your screen.

Deleting a Saved Monitor Setup File

You may remove Monitor Setup Files that you no longer need. Follow these instructions to delete Monitor Setup Files:

1. Press F4 (Configure/Remotely Control Monitor) in the Main Menu.
2. Press F6 (Retrieve A Saved Monitor Setup File) in the Configure/Remotely Control Monitor Menu. A listing of your saved Monitor Setup Files will be displayed.
3. Press ↓, ↑, → or ← to select the file you want to delete.
4. Press F3 to delete the file. You will be asked to verify that you want to delete this file. You must type in Y (yes) to delete the file.

EXIT PROGRAMMING DISK

Exiting from the Programming Disk is very easy. Simply use these commands to exit a function, return to the Main Menu or exit the Programming Disk and return to DOS:

1. Press F10 to exit from a menu or screen and return to the previous screen and then continue to press F10 until you reach the desired Metrosoft screen OR hold down the <Ctrl> key and press F10 to go directly to the Main Menu.
2. Press F10 while at the Main Menu to exit the Programming Disk and return to DOS. You will be asked to verify that you wish to exit. Press Y (yes) to exit or press N (no) to redisplay the Main Menu.

ms-3800 METROSOFT FEATURES

The Programming Disk comes with sample datafiles, which allow you to try some of the powerful features that are available ONLY with ms-3800 Metrosoft. This includes database searching, and creating graphs and reports. These functions can be accessed by pressing F3 (View Stored Test Results) in the Main Menu of the Programming Disk and then following the instructions on the screen. Please take a moment to try these features and see how much time you can save by letting us do your analysis for you.

ms-3800 also allows you to retrieve data from the hs-3800 and store it in a database. This function is labeled as F5 (Get/View Test Results From Monitor) in the Main Menu. The Programming Disk does NOT have the capability to perform data retrieval, and will give a message indicating this, if you press F5.

For more information on ms-3800 Metrosoft, please call Metrosonics Sales Department at (716) 334-7300.

CHAPTER 5

USING A REMOTE TERMINAL OR PC

The hs-3800 has been designed to be simple to program from almost any RS-232 terminal or any PC running a communications program that uses a serial port. In addition, output reports can be initiated by sending a command to the hs-3800 via remote terminal or PC. The terminal or PC must be capable of serial communication at 9600 baud with 1 start bit, 8 data bits, 1 stop bit, and no parity. Software handshaking (Xon/Xoff) is used to control the flow of information.

PROGRAMMING THE hs-3800 FROM A REMOTE TERMINAL OR PC

Limited programming of the hs-3800 can be accomplished using a remote terminal or PC. Complete programming is possible ONLY by using either the Programming Disk or ms-3800 Metrosoft (see Chapter 4).

To program the hs-3800 via remote terminal or PC, simply follow the steps listed below.

1. Make sure the terminal or PC is set for 9600 baud with 1 start bit, 8 data bits, 1 stop bit, and no parity.
2. Connect the hs-3800 to the terminal or PC using the Metrosonics RS-232 cable (ca-383-G).
3. Press the <Esc> key on the terminal or PC. The hs-3800 will respond with an ! (exclamation point). If the hs-3800 does not respond, press the <Esc> key again. If the hs-3800 still does not respond, change the position of the slide switch on the terminal end of the RS-232 cable and try again.
4. Once the hs-3800 has responded with an !, it is ready to be programmed. Press the "P" key to begin programming. The hs-3800 will respond with:

METROSONICS PERSONAL MONITOR hs-3800 VX.X SN1234

Now simply respond to the hs-3800's questions and requests (see steps 5 through 12).

To accept the default (or current) setting and move on to the next question, hold down the <Ctrl> key and press the "J" key (<Ctrl> J) or press the <Line Feed> key. Programming may be terminated at any time by holding down the <Ctrl> key and pressing the "C" key.

5. If the unit is NOT logging, skip this step. If the hs-3800 IS logging, the first question will be:

EXIT LOGGING? (Y/N)

If <Ctrl> J, <Line Feed> or "N" are pressed, the hs-3800 will respond with:

CANNOT PROGRAM WHILE LOGGING

and programming will be terminated. If you press "Y", the hs-3800 will stop logging and ask about clearing data (see the next step below).

6. The unit next question will be:

CLEAR ALL LOGGED DATA? (Y/N)

If <Ctrl> J, <Line Feed> or "N" are pressed, the hs-3800 will respond with the USER ID request (skip to step 7).

If "Y" is pressed, the hs-3800 will respond with:

ARE YOU SURE? (Y/N)

If <Ctrl> J, <Line Feed> or "N" are pressed, the hs-3800 will respond with the USER ID request (skip to step 7). If "Y" is pressed, the hs-3800 will respond with:

ALL DATA CLEARED

7. The USER ID is requested next:

ENTER USER ID:

The USER ID is a six character identifier which is stored each time logging is started. The USER ID can be used to identify a user for which data was recorded. This allows data to be logged for several users without having to clear data between users. If no USER ID is entered or the USER ID is cleared, no USER ID will be printed on the output report for data logged from this point until a USER ID is programmed and logging is started again.

If <Ctrl> J or <Line Feed> are pressed, the presently programmed USER ID will be shown and the next request will be made. If <Enter> is pressed before any characters are entered, the USER ID will be cleared.

Up to six characters may be entered for the USER ID. <BackSpace> or <Delete> may be used to correct mistakes. Once the desired characters have been typed, press the <Enter> key to save the USER ID and continue to the next step.

8. The date will be requested:

ENTER DATE: (mm/dd/yy)

If neither the date nor time are programmed, the test starting date and time will NOT be printed on any output report.

If <Ctrl> J or <Line Feed> are pressed, the presently programmed date will be shown and the next request will be made.

The month, day, and year must each be entered as two digit numbers. Slashes must be entered between the month and day and the day and year. <Back Space> or <Delete> may be used to correct mistakes.

Once the date is properly entered, press the <Enter> key to save the date. The <Enter> key will only be accepted after the last digit of the year has been entered.

9. The time will be requested:

ENTER TIME: (hh:mm:ss)

If neither the date nor time are programmed, the test starting date and time will NOT be printed on any output report.

If <Ctrl> J or <Line Feed> are pressed, the presently programmed time and the current date and time will be shown, and the next request will be made.

The hours, minutes, and seconds must each be entered as two digit numbers. Colons must be entered between the hours and minutes and the minutes and seconds. <Back Space> or <Delete> may be used to correct mistakes.

Once the time is properly entered, press the <Enter> key to save the time. The <Enter> key will only be accepted after the last digit of the seconds has been entered. After <Enter> is pressed, the current date and time will be shown.

CURRENT DATE AND TIME: 9/21/88 11:14:05

10. The next request is for the report HEADER:

ENTER HEADER:

The HEADER may be up to fifty characters in length and is printed at the top of each report. The HEADER is not saved each time logging is started as is the USER ID, so the HEADER which is in memory at report output time will be printed on all reports for all users. If the HEADER is cleared it will not be printed on any output report.

If <Ctrl> J or <Line Feed> are pressed, the presently programmed HEADER will be shown and the next request will be made. If <Enter> is pressed before any characters are entered, the HEADER will be cleared. <Back Space> or <Delete> may be used to correct mistakes. Once the desired characters have been typed, press the <Enter> key to save the HEADER.

11. The next question will be:

DISABLE EXIT LOGGING FROM PUSH BUTTONS? (Y/N)

If <Ctrl> J or <Line Feed> are pressed, the present choice will be shown and the next question will be presented. Pressing "N" programs the hs-3800 to allow logging to be stopped via the LOG button. If "Y" is pressed, the hs-3800 will be programmed so logging cannot be stopped via the LOG button. In the latter case, to stop logging, you must either program the hs-3800 from a terminal or PC and answer yes to the "EXIT LOGGING?" question OR use either the Programming Disk or ms-3800 Metrosoft (see Chapter 4).

NOTE: This feature is also called "Security Mode".

12. The final question will be:

OUTPUT TEMPERATURE DATA IN DEGREES C OR F? (C/F)

If <Ctrl> J or <Line Feed> are pressed, the presently programmed selection will be shown and programming is complete.

If "C" is pressed, the hs-3800 will be programmed to present all temperature data in Celsius. If "F" is pressed, the hs-3800 will be programmed to present all temperature data in Fahrenheit. The following message is shown:

PROGRAMMING COMPLETE

OUTPUTTING REPORTS FROM THE hs-3800 TO A REMOTE TERMINAL OR PC

To output a report from the hs-3800 to a remote terminal or PC, simply follow the steps listed below.

1. Make sure the terminal or PC is set for 9600 baud with 1 start bit, 8 data bits, 1 stop bit, and no parity.
2. Connect the hs-3800 to the terminal or PC using the Metrosonics RS-232 cable (ca-383-G).
3. Press the <Esc> key on the terminal or PC. The hs-3800 will respond with an ! (exclamation point). If the hs-3800 does not respond, press the <Esc> key again. If the hs-3800 still does not respond, change the position of the slide switch on the terminal end of the RS-232 cable and try again.
4. Once the hs-3800 has responded with an !, it is ready to receive commands. Press the letter "O" key to initiate an output report.

Report generation can be terminated while in progress by holding down the <Ctrl> key and pressing the "C" key.

Report generation can be suspended by holding down the <Ctrl> key and pressing the "S" key. To resume generating the report, hold down the <Ctrl> key and press the "Q" key.

Chapter 6

SERVICE INFORMATION

In the event the hs-3800 needs repair service, call the Metrosonics Service Department at (716) 334-7300.

The Service Department will try to determine the cause of the apparent malfunction and provide the necessary support to correct the problem.

In some cases, problems (or misunderstandings) can be corrected over the phone, therefore before returning the hs-3800 to the factory for service, discuss all problems with the Service Department.

Chapter 7

SPECIFICATIONS & ACCESSORIES

SPECIFICATIONS

INPUT

Temperature Sensor: Solid-state IC

Range: +33.0 to +40.0° C (+91.4 to +104°F) Disk Temperature

Accuracy: + 0.1° C (±0.2°F)

Heart Rate Detector: EKG type Electrodes Belt Configuration

Rate: 40 to 220 beats/minute

Resolution: 1 beat/minute

SAMPLING & DATA STORAGE

Measurement Interval: 1 Minute

Total Intervals Saved: 4000

Statistics Saved: Beats/Minute, Temperature, Alert Status

DIGITAL COMMUNICATIONS

Type: 3 wire RS-232, Xon/Xoff software handshaking

Baud Rate: 150 to 9600 printer; 9600 computer

ENVIRONMENTAL

Operating Temperature: 0 to +60° C (+32 to +122° F)

Humidity: To 95% non-condensing, short term immersion in water in accord with IEC Standards 529-1978

POWER

Internal Battery: 1604A 9 volt battery

Memory Protection: Automatic shut down on low battery; data protected for 30 days.

PHYSICAL (Monitor)

Size: 3.0 x 1.0 x 5.0 in. (7.6 x 2.5 x 12.9 cm)

Weight: 14 oz. (0.4 kg)

Specifications subject to change without notice.

ACCESSORIES

al-383: Alert Enhancement

ba-004: Replacement Batteries

ca-383-G: Printer/Computer Interface Cable

cc-3800H: Leather Carrying Case

cl-383: Calibrator/Simulator

dp-426: Portable Ink Jet Printer

dp-428: Portable 24-column Printer

ms-3800: Metrosoft Software

hs-3800: Personal Heat Stress Monitor

sa-383-X: Sensor Assembly

sb-383: Sensor Belt

sba-383: Shoulder Harness

sc-383: Storage Case

si-383: Sensor Insulator Kit (10 pc.)

sw-383-G: Sensor Assembly with Belt

tc-383: Transit Case (for 1-5 units with dp-426 cutout)

tc-383-1: Transit Case (for 1-10 units)

