

**TM-2430-13**

**(Doctor Pro)**

**Ambulatory Blood Pressure Monitor**

**Data Analysis Software**

**INSTRUCTION MANUAL**



# COMPLIANCE

## **Compliance with the European Directive 93/42/EEC for Medical Products**

The device conforms to the European Directive 93/42/EEC for Medical Products. This is evidenced by the CE mark of conformity accompanied by the reference number of a designated authority.

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# 1. INTRODUCTION

## 1-1 About the Data Analysis Software

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Welcome to the Ambulatory Blood Pressure Monitor (ABPM) Data Analysis Software (hereafter referred to as "program"). This software is intended for use with the following monitors and processors.

- 1) A&D TM-2420/TM-2421 Ambulatory Blood Pressure Monitor (hereafter referred to as "monitor") and the TM-2020/TM-2021 Printer/Processor/Interface (hereafter referred to as "processor").
- 2) A&D TM-2430 Series Ambulatory Blood Pressure Monitor (hereafter referred to as "monitor")


The ABPM Data Analysis Software is a powerful tool for analyzing ambulatory blood pressure data. The following features are incorporated in this program:

- ◆ **Statistical Analysis**                      Statistical data may be viewed in full, partial, sleep, and awake periods by switching between clearly labeled tabs.
- ◆ **Graphical Data**                              Systolic/diastolic blood pressure, mean arterial blood pressure, and pulse data are displayed graphically to quickly determine patterns or trends in the data.
- ◆ **Data Conversion**                            Data Convert feature automatically stores blood pressure and pulse data in standard (CSV) file format for use with popular spreadsheet programs.
- ◆ **Printed Reports**                            Custom data reports formats are easily defined and printed. "Mini-report" feature automatically prints a compact summary report.
- ◆ **On-line Help**                                Built-in Help feature provides context-sensitive help at any time.
- ◆ **Maximum Time Period**                    Doctor Pro uses up to one week's data starting from the oldest reading.  
Delete the old data in the recorder.
- ◆ **Maximum number of readings**          A maximum of 896 readings can be downloaded using Doctor Pro.

## 1-2 Symbols

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The symbols printed on the device have the following meaning:

	CE marking
SN	Serial number

## 1-3 Monitoring Device Review

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The following section briefly reviews the monitors and processors and how they may be used with this program.

A&D Ambulatory Blood Pressure Monitors are used to record an individual's blood pressure over an extended period of time, normally 24~72 hours. The monitor (TM-2420 Korotkoff, TM-2421 dual Korotkoff and oscillometric, or TM-2430 series oscillometric) is worn by the patient. The monitor non-invasively records the patient's systolic/diastolic blood pressure and heart rate based on user defined intervals and conditions.

The user may divide each 24 hour period into several time periods. Within each period the monitor may be programmed to record the patient's blood pressure at 5, 10, 15, 20<sup>1</sup>, 60 and 120 minute interval. The monitor can also be programmed to remain OFF during any time period. These measurement intervals may be timed to coincide with the patient's daily activities.

The A&D TM-2020/TM-2021 Printer/Processor/Interface is used for performing one or more of the following functions: Analyse blood pressure data stored in the monitor; program the monitor's intervals and conditions; function as an interface between the monitor and the program.

For those who do not want to utilise the Printer/Processor/Interface to analyse the blood pressure data stored in the monitor, the program may be used in conjunction with an interface to retrieve the data stored in the monitor. Data that was initially analysed using A&D TM-2020-01/02/03 or TM-2021-01/02/03 Data Analysis Software for DOS™ Program is compatible with this program's format and may be analysed by this program.

1 The 20 minute measurement interval is available only with the TM-2421

## 1-4 Software Package Components

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Items included in your complete software package are:

- ♦ CD ROM 'Doctor Pro'
- ♦ Ambulatory Blood Pressure Monitor Data Analysis Software Instruction Manual
- ♦ For TM-2420/21  
AX-K0600 (9 pin D-SUB, socket type), Communication cable for TM-2420/  
TM-2421
- ♦ For TM-2430 series  
AX-KO1502 (9 pin D-SUB, socket type), Communication cable for TM-2430  
series

## 1-5 System Requirements

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- ♦ Computer                      A 486DX or higher microprocessor
- ♦ RAM memory                      Minimum of 8MB
- ♦ Operating System                      Windows™ '95, 98, NT 4.0
- ♦ Graphic Adaptor                      SVGA video card (minimum of 256 colours)
- ♦ Disk Type                      CD ROM Drive
- ♦ Hard Disk                      At least 1.5MB available
- ♦ Serial Ports                      Minimum one (9 pin D-SUB or 25 pin D-SUB)  
(A cable, separately available, is required for the 25 pin  
D-SUB serial port)
- ♦ Printer Type                      Printers supported by MS Windows™ operating system

## 1-6 Software Installation

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If you encounter a problem installing the program on your system or you believe that your software has been damaged, contact your A&D office. Be sure to have the program's serial number ready, located on the CD label, when you call.

The program must be run from a hard disk drive only. It may not be run from the CD. To install the program onto your hard disk drive, complete the following instructions:

**Step 1**      Insert the CD into your CD ROM drive. If you have Autorun installed then the program will start automatically, otherwise click the **START** button on the Windows™ taskbar and select **Run**. Type "D:setup" (This assumes your CD is in drive D: If necessary substitute the correct drive number for D) and click **OK**.

**Step 2**      Follow the instructions on the screen

## 1-7 Safety

---

Do not attach the monitor to a patient when the monitor, or the monitor and the processor, are being connected to the computer.

## 2. OPERATING PROCEDURE

### 2-1 Getting Started

Two initial actions may be executed when starting up the program:

- (1) Data may be retrieved from the monitor.
- (2) Stored data files may be opened and viewed for analysis.

To retrieve data from the monitor, see:

- ◆ "2-2 Communication Between the Monitor and the Program"

To view stored files, see:

- ◆ "2-5-1 Open"

### 2-2 Communication Between the Monitor and the Program

To communicate between the monitor and the program, the connection between the monitor and the computer must be established first.

#### 2-2-1 Connecting the TM-2420/TM-2421 to the computer

- ◆ You must use the A&D-supplied RS-232C communication cable, otherwise communication errors will occur.
- ◆ Steps 1-4 below must be completed prior to accessing the program or it may not recognize that the monitor is connected to the computer. If proper communication is not established, a cable check error may occur.
- ◆ You must use AX-KO600 cable for 9 pin serial port (supplied) or AX-KO599 cable for 25 pin serial port (available separately as an option).

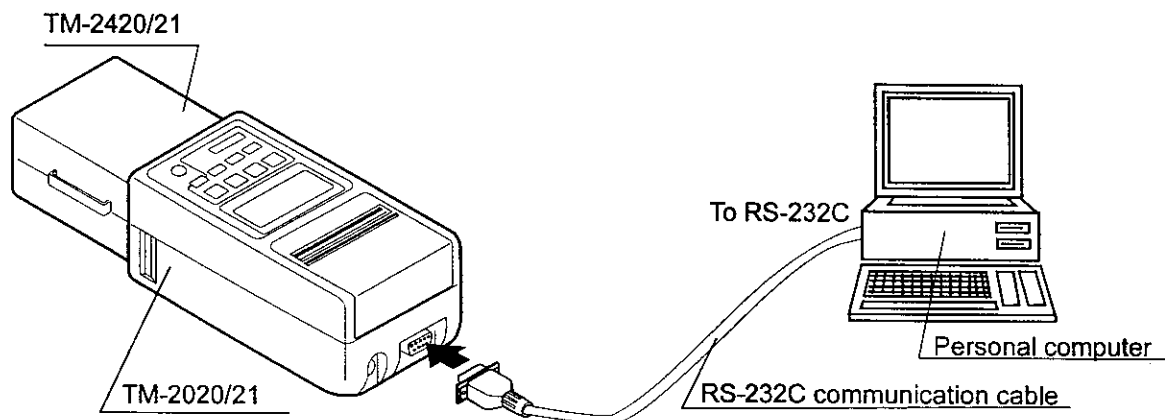


Figure 3: Connection between the TM-2420/2421 and the computer  
(The illustration above is not to scale.)

- Step 1** Connect the monitor to the processor.
- Step 2** Connect the male end of the A&D-supplied RS-232C communication cable to the processor.
- Step 3** Connect the female end of the A&D-supplied RS-232C communication cable to the computer.
- Step 4** The display on the processor will show "0-----". If the processor does not have a display, the LED should be green. If the LED is not green or the "0-----" does not appear, see "**3-2 Communication Errors**". If the processor shows "0-----", go to step 5. If the processor has a green light, go to step 6.

*Note: If possible, keep the cable connected to the computer unless the port is needed for other functions.*

- Step 5** Press the ENTER key on the processor keypad. A series of 6 dashes "-----" will appear on the processor screen.
- Step 6** Run the program.
- Step 7** Confirm that the correct serial port is set. For details, see "**2-9-4-2 Serial Port**".

#### 2-2-2 Connecting the TM-2430 series to the computer

- ◆ You must use the A&D-supplied RS-232C communication cable, otherwise communication errors will occur.
- ◆ You must use AX-KO1502 cable for 9 pin serial port (supplied) or AX-KO1503 cable for 25 pin serial port (available separately as an option).

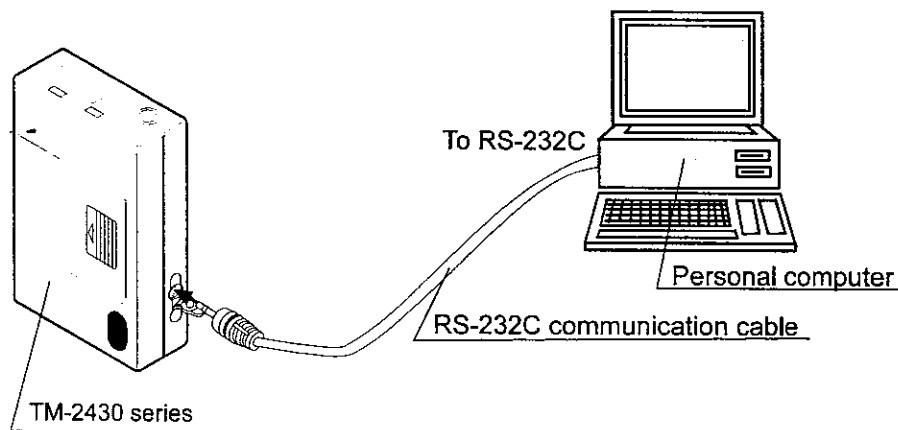


Figure 4 : Connection between the TM-2430 series and the computer  
(The illustration above is not to scale.)

- Step 1** Connect the male end of the A&D-supplied RS-232C communication cable to the monitor.

**Step 2** Connect the female end of the A&D-supplied RS-232C communication cable to the computer.

**Step 3** The display on the monitor will show "----". If "----" does not appear, see "**3-2 Communication Errors**". Otherwise go to step 4.

*Note: If possible, keep the cable connected to the computer unless the port is needed for other functions.*

**Step 4** Run the program.

**Step 5** Confirm that the correct serial port is set. For details, see "**2-9-4-2 Serial Port**".

The system is now ready to:

- ◆ Retrieve data from the monitor. See "**2-7-1 Retrieving Data from the Monitor**".
- ◆ Clear the monitor's memory. See "**2-7-2 Clearing the Monitor's Memory**".
- ◆ Program the monitor's intervals and conditions. See "**2-7-3 Programming the Monitor's Intervals and Conditions**".

## 2-3 Main Screen Description

The main screen is comprised of six menus and two toolbar buttons located permanently along the top of the screen. These menus may be used to access the various features of the program. The toolbar buttons may be used to set Partial Analysis and Blood Pressure Mode parameters.

### Toolbar Buttons:

Button	See	Description
Analysis Intervals	"2-4-1 Analysis Intervals"	The Analysis Intervals button may be used to define specific "Full" and "Partial" time periods within an opened data file for custom data analysis.
BP Mode	"2-4-2 BP Mode"	The BP Mode (Blood Pressure Method) selection box may be used to specify which blood pressure measurement method (Korotkoff, oscillometric or both) is used as the basis for statistical and graphical analysis.  <i>Note: This only applies to TM-2421 data files.</i>

### Main Menus:

Menu	See	Description
File	"2-5 File Menu"	The File menu may be used to manage the files stored on the hard drive or a disk and to exit the program.
View	"2-6 View Menu"	The View menu may be used to access the statistical, tabular, and graphical analysis screens.
Recorder	"2-7 Recorder Menu"	The Recorder menu may be used to program the monitor, clear measurement data in the monitor's memory and to retrieve the measurement data in the monitor.
Report	"2-8 Report Menu"	The Report menu may be used to specify report formats and print reports.
Option	"2-9 Options Menu"	The Option menu may be used to set the default settings and user-defined parameters.
Help	"2-10 On-line Help"	The Help menu may be used to view information on program usage. Help may also be accessed by pressing F1 when various screens are opened or by selecting the Help button on a screen.

## 2-4 Toolbar

There are two toolbar buttons which appear underneath the main menu bar:

- (1) **Analysis Intervals**
- (2) **BP Mode**

### 2-4-1 Analysis Intervals

The Analysis Intervals feature may be used to define specific periods of time within an opened data file for custom data analysis. Two periods, Full Analysis and Partial Analysis may be defined for each data file. The Partial Analysis Interval settings are displayed on the toolbar.

Adjust the Full Analysis times to change the start and end times for data analysis.

Enable and set the Partial Analysis Interval to define a sub-interval within the Full Analysis interval. For example, you may wish to test a 12-hour drug dosing window to check for pharmaceutical related peaks and troughs within the patient's circadian rhythm.

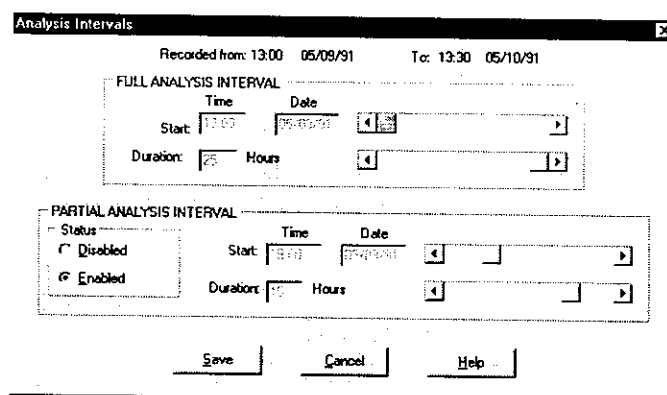


Figure 5: Analysis Intervals dialog box

The Partial Analysis Interval affects many of the program features including:

- ◆ **Summary Data**  
After the Partial Analysis Interval is enabled, the Partial tab in the Summary Data will be activated.
- ◆ **Trend Graphs**  
After Partial Analysis Interval is defined, the data specified within the parameters will appear in red on the Trend Graph.
- ◆ **Histograms**  
After Partial Analysis parameters are defined, the data specified within the parameters will appear in red overlaying the Full Analysis data.
- ◆ **Correlation Plots**  
After Partial Analysis parameters are defined, a second set of Correlation Graphs in red will appear based on the data specified within the Partial Analysis parameters.

## 2-4-2 BP Mode

The BP Mode is used to select which blood pressure method will be used as the primary and secondary choices for displaying the blood pressure measurement data. A&D monitors employ either Korotkoff, oscillometric or dual Korotkoff and oscillometric measurement methods. If the current data file contains data from a dual system, you may choose Korotkoff, oscillometric or both methods to analyze the data.

The measurement method(s) specified in the BP Mode will be the basis for the statistical and graphical analysis performed on the opened data file. The method noted with a one (1) is the primary method and the method noted with a two (2) is the secondary method. If a primary method measurement error occurred during the monitoring session or a measurement is manually excluded (see "2-6-2-1 Excluding/Including BP Measurements"), a valid measurement in the secondary method will be substituted for it with the appropriate BP Mode selection.

Method Setting	Description
Oscillometric only	This option sets the primary blood pressure choice to oscillometric and disables the secondary choice. If the oscillometric reading for any measurement is invalid or has been excluded by the user in the BP Data List, the measurement will be excluded from graphical displays and statistical computations.
1: Oscillometric, 2: Korotkoff	This option sets the primary blood pressure choice to oscillometric and the secondary choice to Korotkoff. If an oscillometric reading is invalid, oscillometric readings will be substituted with Korotkoff readings. If both readings are invalid for a measurement, all data from the measurement is excluded.
Korotkoff only	This option sets the primary blood pressure choice to Korotkoff and disables the secondary choice. If the Korotkoff reading for any measurement is invalid or has been excluded by the user in the BP Data List, the measurement will be excluded from graphical displays and statistical computations.
1: Korotkoff, 2: Oscillometric	This option sets the primary blood pressure choice to Korotkoff and the secondary choice to oscillometric. If a Korotkoff reading is invalid, Korotkoff readings will be substituted with oscillometric readings. If both readings are invalid for a measurement, all data from the measurement is excluded.

To specify the BP Mode while viewing an opened data file, complete these steps:

**Step 1** Select the BP Mode box on the toolbar.

**Step 2** Select the desired BP Mode used to view and analyze the opened data file.

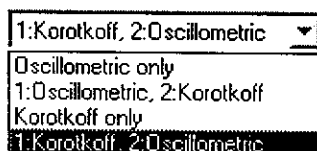


Figure 6: BP Mode selection on toolbar

To set a default BP Mode for the program at startup, see “2-9-4 Default Settings”.

**Note:** The BP Mode for printed reports is assigned separately in the Report Format Setup. See “2-8 Report Menu”.

## 2-5 File Menu

The File menu is used to manage the files stored on a hard drive or floppy disk. It may also be used to exit the program. The File menu has the following sub-menus:

Menu	Description
Open	This function is used to select a data file for viewing, modifying or printing a report. After a file has been opened, the file name, patient name and date of the monitoring session are displayed in the title bar of the main screen
Save As	This function is be used to copy a selected file to a new file with a different name.
Delete	This function is used to delete a selected file.
Convert	This function is used to convert the blood pressure measurement data of a data file to a format which is readable by most spreadsheet applications. The converted file will have the same name as the data file with a .CSV file extension.
Print	This function is used to print reports for one or more data files according to a user-selectable report format.
Exit	This selection may be used to exit the program.

### 2-5-1 Open

The **File | Open** function is used to access the blood pressure data within existing data files.

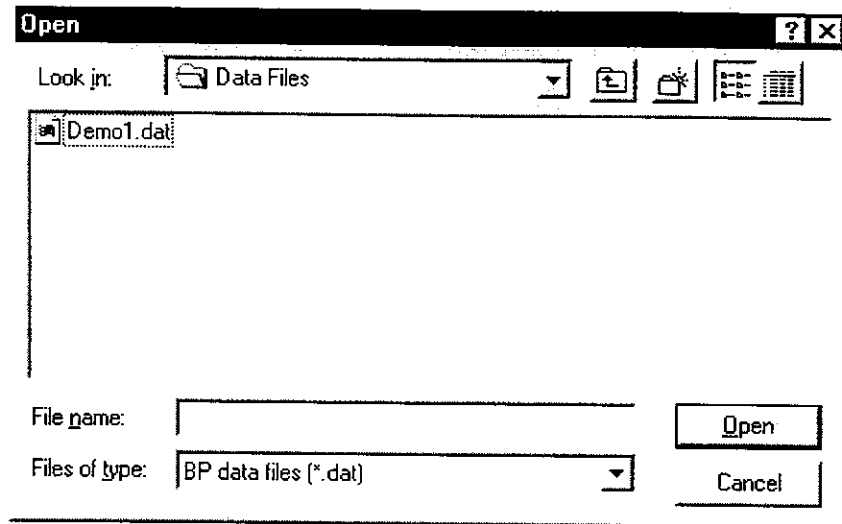


Figure 7: File Open dialog box

To open a file, complete the following steps:

- Step 1** Select the **File** menu.
- Step 2** Select the **Open** sub-menu.
- Step 3** Select a file from the directory shown or move to a different directory.
- Step 4** Click the **Open** button.

*Note: The File | Save As, View and Report menus and Analysis Intervals buttons are disabled until a data file is opened.*

### 2-5-2 Save As

The **File | Save As** function is used to copy an open data file to another data file with a different name or to a different directory with any name.

When a file is copied, corresponding .dat and .P files are created. These two files must stay together within the same directory. The Save As function creates new .dat and .P file with the new file name in the selected directory. When entering a new file name in the Save As dialog box, it is not necessary to type the file extension. The original file will not be altered when using the Save As function.

### 2-5-3 Delete

The **File | Delete** function is used to delete a data file.

**CAUTION: Data files will be permanently removed when deleted.**

#### 2-5-4 Convert

The **File | Convert** function is used to create a .CSV (comma delimited) format file from a .dat file that is compatible with most spreadsheet applications, including Microsoft Excel™. The .CSV file that is created includes DATE, TIME, SYS, DIA, PUL, ERR headings so that the data can be identified correctly when opened in a spreadsheet. The original file will not be modified in any way. The data is being converted and will be saved to the same name and directory as the original data file, but with a .CSV extension.

#### 2-5-5 Print

The **File | Print** function is used to print reports for one or more data files according to a user-selected format. This enables the user to generate multiple reports without having to open each file separately and selecting a report.

To print a report for multiple data files, complete the following steps:

- Step 1** Click the **File** menu, then **Print**.
- Step 2** In the Print dialog box, select the files that you want to print a report for by holding the **Shift** or **Ctrl** key down while clicking the desired files.
- Step 3** Click **Open**.
- Step 4** In the Report Selection dialog box, select the report format that you want to use for the reports or click **Print "Mini" report** to print a condensed report.

#### 2-5-6 Exit

The **File | Exit** selection may be used to exit the program.

#### 2-5-7 Saving a File

Files are automatically saved when the data is retrieved from the monitor. See "**2-7-1 Retrieving Data from the Monitor**". Any modifications made to the data file are saved immediately when the Save button is selected to close a function.

#### 2-5-8 Closing a Data File

There is no file close feature in this program. A file may be closed in two ways:

- 1) By opening another file. The current file will automatically be closed when you open another file.
- 2) By exiting the program.

## 2-6 View Menu

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The View menu may be used to view numerical, statistical and graphical data screens. The View menu is disabled unless a file is opened. For information on how to open a file, see "2-5-1 Open".

The View menu has the following six sub menus:

Menu	See	Description
Summary Data	"2-6-1 Summary Data"	Function for viewing statistical data.
BP Data List	"2-6-2 BP Data List"	Function for viewing numerical data and entering comments.
Trends	"2-6-3 Trends Screen"	Function for viewing blood pressure, mean arterial blood pressure, pulse (heart rate) and double product Trends.
Correlation	"2-6-4 Correlation Plots"	Function for viewing correlation plots of Systolic Blood Pressure to Diastolic Blood Pressure and Diastolic Blood Pressure to Pulse.
Histograms	"2-6-5 Histograms"	Function for viewing the frequency distribution of the measurement data.
Patient Information	"2-6-6 Patient Information"	Function for entering patient and physician information, as well as fields for the sleep and awake periods.

### 2-6-1 Summary Data

The Summary Data screen includes statistics on the data of the opened file and may be viewed directly on the screen. These statistics are separated into four data tabs:

**Full** Statistics based on all the data within the file.

**Partial** Statistics based on the data specified within in the Partial Analysis parameter. See "2-4-1 Analysis Intervals".

**Awake** Statistics based on the data during the waking hours.

*Note: Waking hours are specified as those hours outside the identified sleeping hours.*

**Sleep** Statistics based on the data during specified sleeping hours. See "2-6-6 Patient Information".

To view, close, or print the individual Summary Data screen, complete the following steps:

**Step 1** Click the **View** menu.

**Step 2** Click **Summary Data**. The Summary Data display appears.

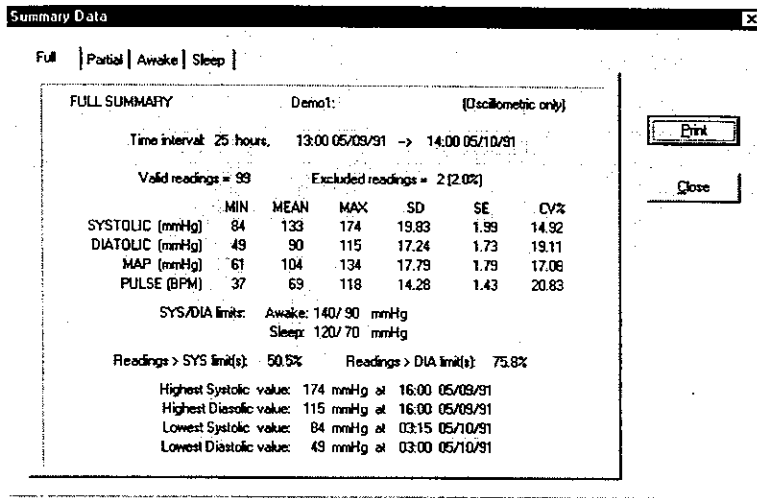


Figure 8: Summary Data display

**Step 3** Click one of the four data tabs, Full, Partial, Awake or Sleep. The Full tab will always be enabled. The Partial, Sleep and Awake tabs will be enabled after they are specified. See "2-4-1 Partial Analysis" to specify Partial Analysis and "2-6-6 Patient Information" to specify the Sleep period.

**Step 4** To print an individual Summary Data tab, select the tab you want to print and select the Print button on the right hand side of the screen.

**Note:** You may also print the Summary Data screens in the standard report, see "2-8 Report Menu".

**Step 5** Close the Data Summary screen when finished.

Each of the four Summary Data tabs is titled with the name of the tab, file, patient and measurement method. For detailed information on Summary Data screen listings, see below:

<b>Summary Data Tab</b>	<b>Definition</b>
Time Interval	The analysis period, start time/date – end time/date, for the activated Summary Data tab.
Valid Readings	The total number of measurements taken during the monitoring session less any monitoring errors or manually excluded readings within the data set. See " <b>3-1 Measurement Errors</b> " for information on measurement errors.
Excluded Readings	The measurement error percentage. This figure is based on the combined total of measurement errors and excluded measurements.
Min (Minimum)	The minimum measurement value for Systolic, Diastolic, MAP and Pulse measurements during the Time Interval.
MAP (Mean arterial blood pressure)	The mean arterial blood pressure value of the measurements for Systolic, Diastolic and Pulse measurements during the Time Interval.
Max (Maximum)	The maximum measurement value for Systolic, Diastolic, MAP and Pulse measurements during the Time Interval.
SD (Standard Deviation)	The Standard Deviation of the measurement value for Systolic, Diastolic, MAP and Pulse measurements during the Time Interval.
SE (Standard Error)	The Standard Error of the measurement value for Systolic, Diastolic, MAP and Pulse measurements during the Time Interval.
CV(%) (Coefficient of Variation )	The Coefficient of Variation for Systolic, Diastolic, MAP and Pulse readings during the Time Interval.
SYS Values	The percentage of the Systolic measurement values greater than the specified Systolic limit. See " <b>2-9-4-1 BP (Blood Pressure) Settings</b> " for information on specifying the Systolic Blood Pressure Limit.
DIA Values	The percentage of the Diastolic measurement values greater than the specified Diastolic limit. See " <b>2-9-4-1 BP (Blood Pressure) Settings</b> " for information on specifying the Diastolic Blood Pressure Limit.
Highest Systolic Value	The time and date of the highest Systolic value during the Time Interval.
Highest Diastolic Value	The time and date of the highest Diastolic value during the Time Interval.
Lowest Systolic Value	The time and date of the lowest Systolic value during the Time Interval.
Lowest Diastolic Value	The time and date of the lowest Diastolic value during the Time Interval.

## 2-6-2 BP Data List

The BP Data List function displays individual blood pressure measurement within an open data file in tabular form. With the BP Data List, you may input measurement comments, exclude/include a measurement within the graphics and statistics or link a measurement to the beginning of the Trend screen.

The following table defines each heading within the Blood Pressure Data List:

Item	Description
NO.	Measurement number
DATE/TIME	Date and time of the measurement
SYS	Systolic blood pressure
DIA	Diastolic blood pressure
MAP	Mean arterial blood pressure
PUL	Pulse
DP	Double Product, equals $\frac{SYS * PUL}{100}$
STATUS	The status line has 4 positions. When filled with a character other than "-", each denotes a specific occurrence or condition.  <u>Position 1</u> BP method, O or K Denotes the BP method used for the specific measurement. "K" refers to Korotkoff method, "O" refers to oscillometric method.  <u>Position 2</u> E (Event) Indicates that data was measured when the monitor's EVENT button was activated.  <u>Position 3</u> Error code Denotes the specific error code that occurred during the monitoring session, see "3-1 Measurement Errors".  <u>Position 4</u> X-Exclude- When this position 4 has an "X", the measurement has been excluded from the statistics and graphs.
Comment	Space provided for user to enter patient diagnostic notations up to 20 characters.
Vertical scroll bar	The vertical scroll bar on the right hand side of the screen helps scroll through the measurements. This may also be performed with the up and down arrow keys, as well as the mouse.
Save button	Saves any edits, i.e. comments, exclusions or inclusions.
Close button	Closes the screen. <b>Note:</b> Edits (comments, exclusions or inclusions) will not be saved.
Help button	Opens the Blood Pressure Data List help screen.

#	DATE	TIME	SYS	DIA	MAP	PUL	DP	STATUS	EXCLUDE	COMMENTS
1	05/09/91	13:00	152	103	119	78	118	0	-	
2	05/09/91	13:15	154	99	117	74	113	0	-	
3	05/09/91	13:30	136	99	111	73	99	0	-	
4	05/09/91	13:45	140	101	114	74	103	0	-	
5	05/09/91	14:00	145	102	116	78	113	0	-	
6	05/09/91	14:15	136	95	108	74	100	0	X	teisei
7	05/09/91	14:30	150	97	114	78	117	0	-	
8	05/09/91	14:45	138	97	111	90	125	0	-	
9	05/09/91	15:00	146	98	114	83	121	0	-	
10	05/09/91	15:15	147	112	123	83	122	0	-	
11	05/09/91	15:30	153	106	121	78	119	0	-	
12	05/09/91	15:45	147	111	123	74	108	0	-	
13	05/09/91	16:00	174	115	134	76	132	0	-	
14	05/09/91	16:15	148	115	126	85	125	0	-	

Figure 9: Blood Pressure Data List display

### 2-6-2-1 Excluding/Including BP Measurements

It is useful to exclude a measurement from the Blood Pressure Data List in cases where the measurement is clearly incorrect. The program provides a simple way to include or exclude measurements while viewing a list. When a measurement is excluded from the Blood Pressure Data List, it will not be included in any of the program's statistical or graphical analysis functions.

A measurement can be included or excluded by clicking on the measurement in the column labeled Exclude. An "X" in the Exclude column indicates that the measurement is excluded. A "-" indicates that the measurement is included.

In some cases the program automatically excludes measurements if an error occurred during the reading. Measurements that have been automatically excluded are displayed with an "X" in the Exclude column and cannot be included by the user.

**Note:** Measurements that have been excluded are not deleted from the data file.

### 2-6-2-2 Entering Comments

Comments, such as information taken from the patient activity diary, may be entered into the data file. To enter a comment, complete the steps below:

**Step 1** Click the measurement in the column labeled Comments.

**Step 2** Type your comment – maximum 20 characters.

**Note:** You may write over any of the automatic measurement error comments.

**Step 3** Press the **Enter** key or click a different measurement to store the comment.

**Step 4** To save the comments, click the **Save** button before closing the Blood Pressure Data List screen.

**Step 5** Click the **Close** button if you do not want to save the comments.

### 2-6-2-3 Linking to Trends Screen

A measurement may be linked to the Trend Graph by highlighting an individual measurement and then closing the Blood Pressure Data List. When opened, the Trend screen will be aligned with the time of the highlighted measurement in the Blood Pressure Data List. This feature may be used to pinpoint the position of an individual measurement on the Trend Graph.

### 2-6-3 Trends Screen

The Trends function is used to visualize trends in a patient's blood pressure, pulse, MAP and DP calculation over time. The Trends screen is a useful diagnostic tool to determine nocturnal dips and related peaks and troughs in the patient's circadian rhythm.

The Trends function provides graphic representation of the data file. The Trends function is dependent on the following parameters:

- ◆ Partial Analysis
- ◆ BP Mode (Measurement Method)
- ◆ Sleep Period
- ◆ Blood Pressure Limits

The following four trends can be displayed in the Trend function:

- ◆ **Systolic/Diastolic Blood Pressure (BP Trend) and Pulse (Pulse Trend):**  
The vertical axis represents millimeters of mercury (mmHg) and the horizontal axis represents time. A vertical dotted line connects the measurement's systolic and diastolic pressures. This line may be used to estimate the pulse pressure<sup>2</sup>.
- ◆ **Rate, Pulse (Pulse Trend):**  
The vertical axis represents beats per minute (BPM) and the horizontal axis represents time.
- ◆ **Mean Arterial Blood Pressure (MAP Trend):**  
The vertical axis represents millimeters of mercury (mmHg) and the horizontal axis represents time. The MAP Trend may be displayed on its own or in combination with the BP Trend. If the MAP Trend is combined with the BP Trend, it will appear between the Systolic and Diastolic Trend lines.
- ◆ **Double Product:**  
The vertical axis represents millimeters of mercury (mmHg) and the horizontal axis represents time.

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2 The Pulse Pressure is the difference between the Systolic and Diastolic blood pressures.

## Delimitation, Scroll Bar and Linking

- ◆ **Partial Analysis:**

When the Partial Analysis feature is enabled, red bands will appear on all the Trend Graphs highlighting the period and data specified within the Partial Analysis parameters.

- ◆ **Sleep:**

When the Sleep period is identified, black bands will appear around all the Trend Graphs highlighting the specified Sleep period.

- ◆ **Blood Pressure Trend BP Limits:**

When the Systolic and Diastolic Blood Pressure Hypertensive Limits are specified, lines are drawn horizontally across the Blood Pressure and Mean Arterial Blood Pressure trends at the specified limits. These lines may be used to determine when the patient exceeds the user defined limits during the monitoring session.

- ◆ **Scroll bar/Linking:**

The scroll bar at the bottom of the Trends display allows you to scroll through the Trend Graphs. You may also link the Trend display to the Blood Pressure Data List by aligning the left hand side of a Trend screen with the vertical line of an individual blood pressure measurement. When the Blood Pressure Data List is displayed, the aligned measurement will be selected.

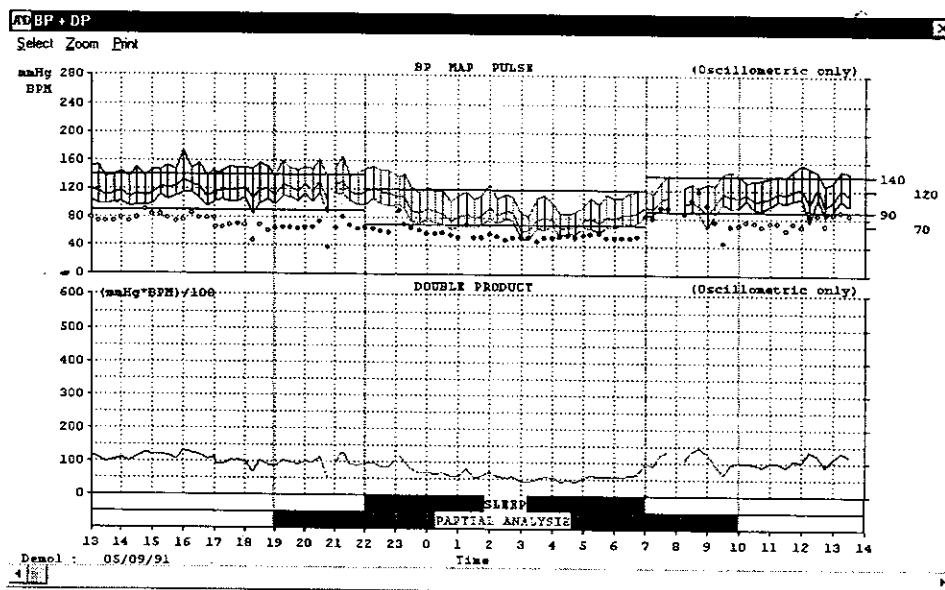


Figure 10: Trend display with all positions specified

The Trends display can be modified in two ways:

- (1) Trends selection
- (2) Scaling

Once you have opened and selected a data file, follow the steps below to view, scale, customize and print the Trends screen.

### 2-6-3- 1 Viewing the Trends

- Step 1** Select the **View** menu.
- Step 2** Select the Trends sub menu.
- Step 3** You may print the Trends screen by selecting the Print heading on the Trends toolbar.
- Step 4** Close the Trends screen when finished.

### 2-6-3- 2 Scaling the Screen

The Trends screen may be scaled to have some or all of the data fit on the screen. To scale the Trend screen, complete the following steps:

- Step 1** Select the Zoom drop-down menu on the Trends toolbar.
- Step 2** Select a scale to view the screen: All data, 1, 3, 6 or 12 hours.

### 2-6-3- 3 Trend Display: Positioning Trends

The Trends screen may be customized to show one or more trends on the screen simultaneously in any order. The trends positions may be set to:

- ◆ Blood Pressure: Systolic/Diastolic or MAP, Pulse
- ◆ Double Product
- ◆ Blank: When a position is set to Blank, the other specified trends will expand to fit the screen.

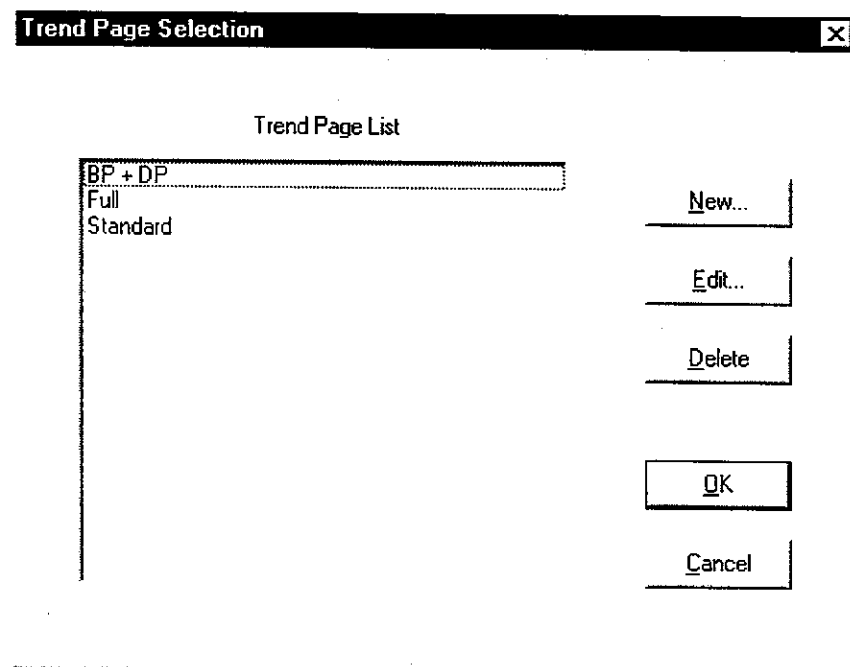


Figure 11: Trend Page Selection dialog box

To customize the Trends screen, complete these steps:

- Step 1** Click the **Select** button on the top left hand corner of the Trends toolbar.
- Step 2** Highlight the Trend Page Template you want to view and click the **OK** button or double click the Trend Page Template.

If an existing template does not meet the requirements, you may create a new template or edit an existing one.

#### 2-6-3-4 Creating a New/Edit Trends Template

The new and edit Trend Page features are quite similar. The instructions for these features have been combined.

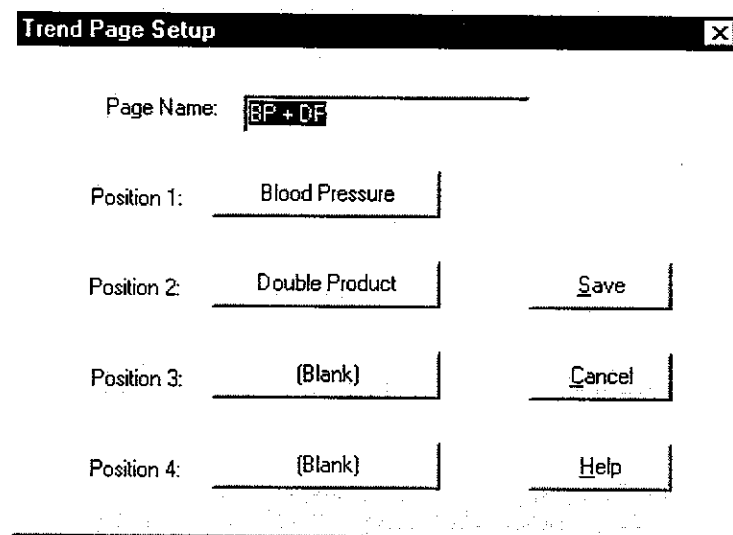


Figure 12: Trend Page Setup dialog box

- Step 1** To create a new Trend template, select New and go to step 2.  
To edit a Trend Page, go to step 3.
- Step 2** Input a name for the New Trend Page and go to step 6.
- Step 3** Highlight the Trend Page template you want to edit and select the **Edit** button.
- Step 4** Enter a name for the Trend Page.
- Step 5** Select Position 1.
- Step 6** Select the Trend to reside in Position 1. The position will be set with the specified trend.

**Note:** There are two sub trends to the Blood Pressure Trend: 1) Systolic/Diastolic 2) MAP.

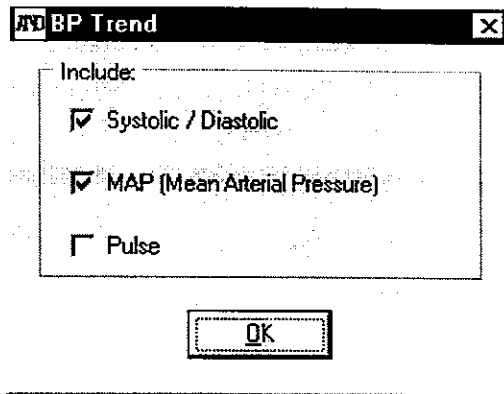


Figure 13: Blood Pressure Trend Setup dialog box

**Step 7** Repeat steps 5-6 to set positions 2, 3, and 4.

**Step 8** To save your trend template, click the **Save** button

**Step 9** To cancel the operation, click the **Cancel** button .

#### 2-6-4 Correlation Plots

The Correlation screen offers a convenient way to view the relationship between the Blood Pressure parameters. It also assesses overall performance of the patient's cardiovascular system. Both Full and Partial Analysis Correlation Plots may be viewed for the following relationships:

- 1) Systolic versus Diastolic
- 2) Systolic versus Pulse (Heart Rate)
- 3) Statistical Data<sup>3</sup>: Systolic, Diastolic, Pulse
  - Mean, "m"
  - Standard Deviation, "s"
  - Correlation Coefficient, "r"
  - Regression Line

The vertical axis represents systolic pressure, the horizontal axis represents the diastolic pressure on the right hand graph and pulse on the left hand graph. All the graphs have scales of 0 to 300 mmHg.

**Note:** If Partial Analysis is enabled, four graphs will appear. The first two graphs on the left hand side of the screen, in blue, are based on Full data. The second pair of graphs, in red, on the right hand side of the screen is created from valid data specified within Partial Analysis parameters.

Each measurement recorded represents a dot on the screen. The vertical position of the dot is equal to the systolic value on both graphs. The horizontal position on graph 1 is equal to the diastolic value and on graph 2, the pulse. The clusters of dots are created by the overlapping of recorded

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3 Statistics and graphs are effected by the deleting and inserting of measurements in the BP Data list.

measurements. Measurement statistics, Mean Systolic blood pressure "m", Standard Deviation "s", Regression Line and Correlation Coefficient "r" values are shown on the bottom of the screen.

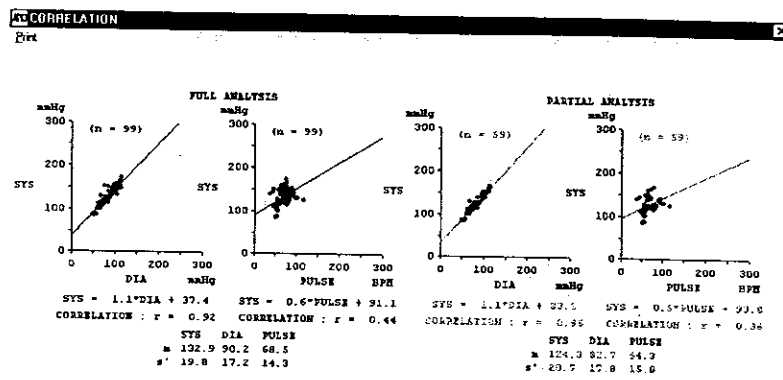


Figure 14: Correlation Plots display

## 2-6-5 Histograms

The Histograms screen offers a convenient way to quickly review the overall magnitude and distribution of the systolic, diastolic, mean arterial blood pressures and pulse (heart rate) measurements. The following Histograms are available:

- ◆ **Systolic Blood Pressure:**  
Full Analysis in blue, Partial Analysis overlaid in red.
- ◆ **Diastolic Blood Pressure:**  
Full Analysis in blue, Partial Analysis overlaid in red.
- ◆ **MAP, Mean Blood Arterial Pressure:**  
Full Analysis in blue, Partial Analysis overlaid in red.
- ◆ **Double Product:**  
Full Analysis in blue, Partial Analysis overlaid in red.
- ◆ **Pulse:**  
Full Analysis in blue, Partial Analysis overlaid in red.
- ◆ **Statistical Data<sup>4</sup>:**  
MAP and SD for: SYS, DIA, MAP, DP and HR. Full Analysis is in blue, Partial Analysis in red.

The vertical scale represents 0 to 300 mmHg on all graphs except Pulse which is scaled 0 to 250 BPM. The horizontal scale represents the percentage of total readings that occurred at the corresponding vertical level. The Histograms are displayed in blocks that represent a range of readings.

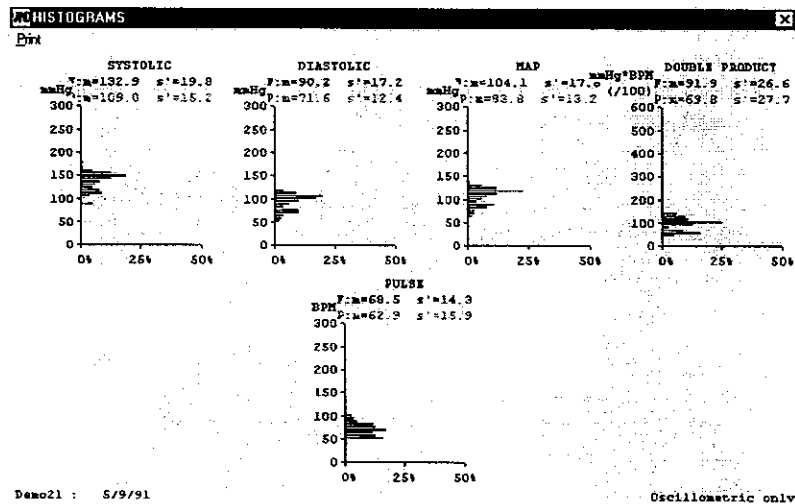


Figure 15: Histograms display

4 Statistics and graphs are effected by the deleting and inserting of measurements in the BP Data list.

## 2-6-6 Patient Information

The Patient Information screen is used to store information on patients and their treatment. This is also the input screen for the patient's Sleep period.

Figure 16: Patient Information display

The Patient Information screen has the following data fields:

(The characters referred to in the table below include CRs and spaces.)

Field	Description
Recorder ID	Recorder ID refers to the monitor identification number. The Recorder ID cannot be modified in this screen. It is established during the monitor setup prior to the monitoring session. See "2-7-3 Programming the Monitor's Intervals and Conditions".
Date	Date corresponds to the first measurement date in the patient record. Date cannot be modified in this screen. It is automatically set at the time the measurement was recorded.
Time	Time corresponds to the first measurement time in the patient record. Time cannot be modified in this screen. It is automatically set at the time the measurement was recorded.
File	File refers to the name of the file. It is initially defined by the user at the time of data retrieval.
Name	There are two name fields. Enter up to 20 characters for the patient name when the data is retrieved. Selecting this field allows changes to the patient name. Enter up to 60 characters for the physician name. The physician's name may be entered automatically by selecting the List button. See "2-9-2 Physician List".
Address	There are two address fields. The patient address field may be filled in manually. The physician address field may either be filled in manually, or automatically by selecting the List button. See "2-9-2 Physician List". Up to 50 characters can be used for each address field.
Phone	There are two telephone fields. The patient phone field may be filled in manually. The physician phone field may either be filled in manually, or automatically by selecting the List button. See "2-9-2 Physician List". Up to 20 characters can be used for each phone field.
Soc. Sec. #	Field for the patient's social security number. Up to 20 characters can be used.
Insurance	Field for the patient's insurance information. Up to 40 characters can be used.

<b>Field</b>	<b>Description</b>
Medicare #	Field for the patient's Medicare or Medicaid number or other health care number. Up to 20 characters can be used.
Medications	Field for the patient's medications. Up to 60 characters can be used.
Age	Field for the patient's age. Up to 10 characters can be used.
Sex	Field for the patient's sex. Up to 10 characters can be used.
Height	Field for the patient's height. Up to 10 characters can be used.
Weight	Field for the patient's weight. Up to 10 characters can be used.
Comments	Field for comments on the patient's condition, treatment or other notes. Up to 400 characters can be used. The scroll bar will automatically be activated when additional space is required.
Sleep	The Sleep field is used to define the sleep parameter. Begin refers to the time the patient went to sleep. End refers to the time the patient woke up. The 24-hour clock must be used when inputting the sleep times. For example, 11 p.m. equals 23:00, Midnight equals 0, and 9 a.m. equals 09:00. Use a colon ":" between hours and minutes.

Follow the instructions below to view, edit and print the Patient Information screen.

- Step 1** Select the **View** menu.
- Step 2** Select Patient Information sub menu.
- Step 3** To edit a field, select the appropriate field and input the information.
- Step 4** To save the edits and close the Patient Information screen, select the **Save** button.
- Step 5** To cancel the edits and close the Patient Information screen, select the **Cancel** button.

***Note:** For some types of printers, the number of printed characters may be different from the number of displayed characters.*

## 2-7 Recorder Menu

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The Recorder menu may be used to retrieve data from the monitor, set the monitor's intervals and conditions and clear the data in the monitor's memory. With the monitor and the processor connected to the computer, the following options are provided:

- 1) Retrieve data
- 2) Condition setup
- 3) Clear data

***Note:** If communications cannot be made due to improper connection or some other failure, see "3 TROUBLE SHOOTING".*

## 2-7-1 Retrieving Data from the Monitor

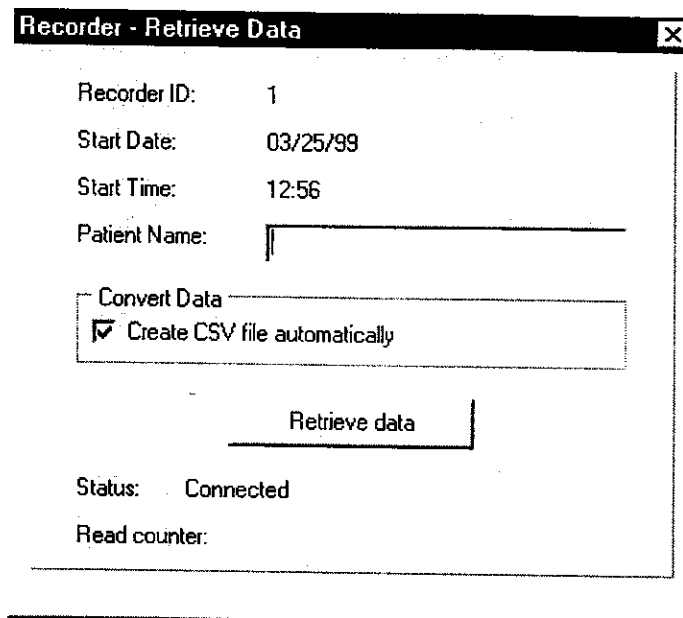


Figure 17: Recorder-Retrieve Data dialog box

See below for the description of each field on the Recorder-Retrieved Data dialog box.

Field	Description
Recorder ID	Recorder ID is set in the monitor's memory prior to the monitoring session.
Start date	Date of first measurement in the monitor's memory.
Start time	Time of first measurement in the monitor's memory.
Patient Name	Field for the patient's name.
Convert Data -	Creates a CSV file automatically when checked.
Status	Status line offers comments on the present stage of the data retrieving process, e.g. "connected" or "retrieving data".

With the monitor and the processor connected to the computer, you may retrieve data from the monitor by completing the steps below:

- Step 1** Select the **Recorder** menu.
- Step 2** Select Retrieve data sub menu.
- Step 3** Select the Patient name field and input the patient's name. The name will appear in the Name field on the Patient Information screen.

**Note:** You must input a patient name or the data can not be retrieved. To exit the Retrieve Data dialog box prior to retrieving the data, select the Windows™ function box in the top left corner of the Recorder–Retrieve Data dialog box.

- Step 4** Select the **Retrieve** button.
- Step 5** Select the File Name field and enter a file name.
- Step 6** Select the Drive and Directory where the file should be saved.

**Step 7** Select the **OK** button.

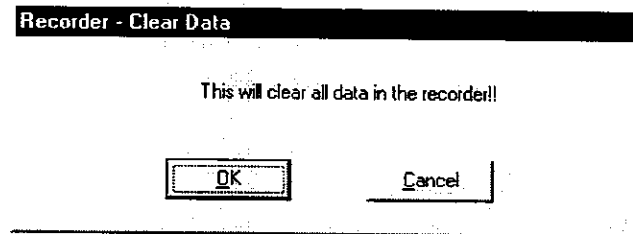
*Note: To view a retrieved file, you must open it.*

### 2-7-2 Clearing The Monitor's Memory

The monitor's memory should be cleared before each monitoring session. With the monitor and the processor connected to the computer, you may clear the measurement data stored in the monitor by completing the steps below:

**Step 1** Select the **Recorder** menu.

**Step 2** Select Clear data sub menu.



*Figure 18: Recorder - Clear Data dialog box*

**Step 3** To clear the monitor's memory, select the **OK** button.

**Step 4** To not clear the monitor's memory, select the **Cancel** button.

**CAUTION: Cleared data cannot be recovered.**

## 2-7-3 Programming the Monitor's Intervals and Conditions

### 2-7-3-1 TM-2420/TM-2421 Setup

With the monitor and the processor connected to the computer, you may setup or change the following monitor condition and interval settings:

Item	Definition
Recorder ID number	Recorder (or patient) ID number (01 through 99). This is useful when more than one monitor is used in the same clinical setting.
Time	Sets monitor's internal clock.
Date	Sets monitor's internal calendar.
Display ON/OFF	Turns the monitor display ON or OFF during automatic measurement session. It may not be desirable for the patient to see the measurement results. Some patients become nervous when they see the measurement results. This may affect their blood pressure readings.
Buzzer ON/OFF	Sets whether or not the monitor will beep 10 seconds prior to the start of a measurement.
Automatic measurements	A 24-hour day may be broken up into 4 periods. For a more detailed explanation, see monitor's instruction manual.
Time	The Time of the first (1) period is the start and end time of the monitoring session.  The Time of the second (2) period, if set, is the start of the second period and end of the first. The Time of the third (3) period, if set, is the start of the third period and end of the second. The Time of the fourth (4) period, if set, is the start of the fourth period and end of the third.
Interval	<b>Note:</b> You do not need to program all periods.  The Interval is the number of minutes between each measurement within the specific period.

The Setup sub menu may be used to program the monitor's intervals and conditions. The monitor is programmed in 24-hour segments, with the End Time for the last Period defaulting to the Period One (1) Time that is both the Start and End Time for the monitoring session. Please also note that the Periods must be defined consecutively, i.e. set Period 1 then Period 2, then Period 3, not Period 1 then Period 3. To program the monitor, follow the steps below:

**Note:** The monitor, interface, and cable must be connected to the computer correctly, see "2-2 Communication Between the Monitor and the Program".

**Step 1** Select the **Recorder** menu.

**Step 2** Select Setup sub menu. The Recorder Setup dialog box appears.

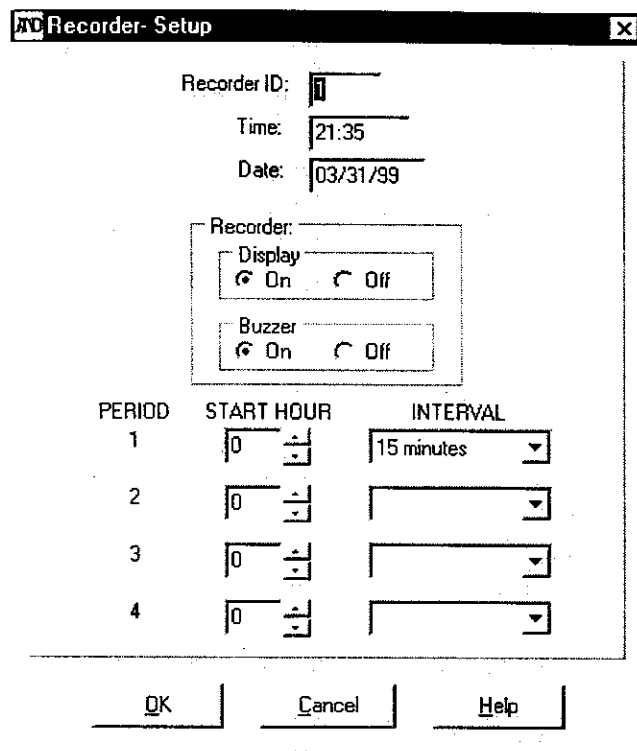


Figure 19: TM-2420/TM-2421 Recorder Setup dialog box

- Step 3** Select the Recorder ID field. Input a Recorder ID number between 1 to 99.
- Step 4** Select the Time field. Enter the current time. Use military time to set the clock. See Figure 20.

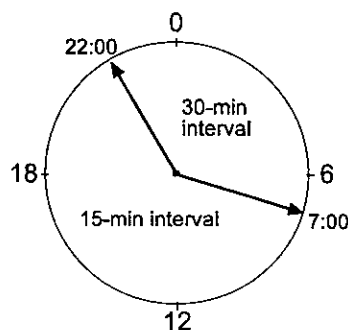


Figure 20: Clock setting example  
7:00-21:59 15-min interval, 22:00-6:59 30-min interval

- Step 5** Select the Display check box to set the display to ON or OFF.
- Step 6** Select the Buzzer check box to set the buzzer ON or OFF.
- Step 7** Select the Time field for Period One (1) and enter the time you want the monitoring session to begin. Use military time to set the Time.

**Note:** The Time for Period One (1) also defines the End of the monitoring session 24 hours later. See examples at the end of this section.

- Step 8** Select the Interval drop-down menu for Period One (1) and set the measurement Interval for Period One (1) to: OFF, 1, 2, 3, 5, 10, 15, 20<sup>s</sup>, 30, 60 or 120 minutes.
- Step 9** If you want to program a second period, go to step 10.  
If you do not want to program a second period, go to step 18.
- Step 10** Select the Time field for Period Two (2) and enter the time you want for this period; this will also set the end for period One (1). Use military time to set the Time. See examples at the end of this section.
- Step 11** Select the Interval drop-down menu for Period Two (2) and set the measurement Interval for Period Two (2) to: OFF, 1, 2, 3, 5, 10, 15, 20, 30, 60 or 120 minutes.
- Step 12** If you want to program a third period, go to step 13.  
If you do not want to program a third period, go to step 18.
- Step 13** Select the Time field for Period Three (3) and enter the time you want for this period; this will also set the end for period Two (2). Use military time to set the Time. See examples at the end of this section.
- Step 14** Select the Interval drop-down menu for Period Three (3) and set the measurement Interval for Period Three (3) to: OFF, 1, 2, 3, 5, 10, 15, 20, 30, 60 or 120 minutes.
- Step 15** If you want to program a fourth period, go to step 16.  
If you do not want to program a fourth period, go to step 18.
- Step 16** Select the Time field for Period Four (4) and enter the time you want for this period; the end period for Period Four (4) will be the Time for Period (1). Use military time to set the Time. See examples at the end of this section.
- Step 17** Select the Interval drop-down menu for Period Four (4) and set the measurement Interval for Period Four (4) to: OFF, 1, 2, 3, 5, 10, 15, 20, 30, 60 or 120 minutes.
- Step 18** If the intervals are set correctly, select the OK button to confirm the programming. If they are not correct, reset them, or go to step 19.
- Step 19** To cancel the programming and close the Recorder–Setup dialog box, select the Cancel button.

### 2-7-3-2 TM-2430 Series Setup

The recorder setup for the TM-2430 series is similar to the TM-2420/TM-2421 except that it includes two additional options for setting the BP measurement intervals as shown in Figure 21.

Description of each mode is as follows:

- Mode 1 07:00-21:59 The measurement is performed every 15 minutes.  
22:00-06:59 The measurement is performed every 30 minutes.
- Mode 2 The AUTO ON/OFF key is pressed at rising and going to bed so that the measurement intervals are changed and the time during sleep can be distinguished on the data.  
When the "S" is off, the measurement is performed every 15 minutes.  
When the "S" is displayed, the measurement is performed every 30 minutes.
- Mode 3 The measurement interval can be changed six times within a maximum of 24 hours. (The recorder can store six measurement intervals (periods) in 24 hours. A period consists of a start time and frequency.)

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5 The 20-minute Interval selection is available only with the TM-2421.

### 2-7-3-3 Examples of Programming the Monitor

#### (A) Example: Programming the Monitor for One (1) Period

Suppose that the start time of the monitoring session is 09:00 and you would like the monitor to measure the patient's blood pressure every 30 minutes. Remember that the Time for Period One (1) also defines the End of the monitoring session. The end time for Period 1 will default to the Time for Period One (1), in this case 09:00.

PERIOD	TIME	INTERVAL	DURATION
1	09:00-09:00	30 minutes Total:	24 hours 24 hours

The following is the monitor setup according to these instructions.

**Note:** Set Period One (1) only. Leave the other Periods blank.

PERIOD	TIME	INTERVAL
1	9	30 minutes
2		OFF
3		OFF
4		OFF
5		OFF
6		OFF

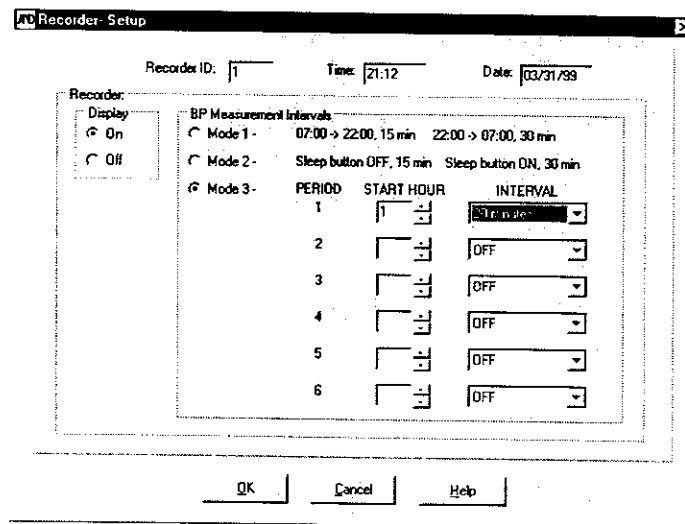


Figure 21: TM-2430 series Recorder-Setup dialog box

**(B) Example: Programming Monitor for Three (3) Periods**

Suppose that the start time of the monitoring session is 09:00 and you would like the monitor to measure the patient's blood pressure every 30 minutes until 22:00, and from 22:00 to 07:00 once an hour, and from 07:00 you would like the blood pressure measured every 15 minutes. Remember that the Time for Period One (1) also defines the End of the monitoring session. The end time for Period Three (3) will default to the Time for Period One (1), in this case 09:00.

PERIOD	TIME	INTERVAL	DURATION
1	09:00-22:00	30 minutes	13 hours
2	22:00-07:00	1 hour	9 hours
3	07:00-09:00	15 minutes	2 hours
		Total:	24 hours

The following is the monitor setup according to these instructions.

**Note:** Set Periods One (1), Two (2) and Three (3) only. Leave the other Periods blank.

PERIOD	TIME	INTERVAL
1	<input type="text" value="9"/>	<input type="text" value="30 minutes"/>
2	<input type="text" value="22"/>	<input type="text" value="1 hour"/>
3	<input type="text" value="7"/>	<input type="text" value="15 minutes"/>
4	<input type="text"/>	<input type="text" value="OFF"/>
5	<input type="text"/>	<input type="text" value="OFF"/>
6	<input type="text"/>	<input type="text" value="OFF"/>

**(C) Example: Programming Monitor for Four (4) Periods**

Suppose that the start time of the monitoring session is 09:00 and you would like the monitor to measure the patient's blood pressure every 30 minutes until 22:00, and from 22:00 to 23:00 you want the monitor OFF so that the patient may sleep, and from 23:00 to 06:00 you would like the patient's blood pressure measured once an hour, and finally from 06:00 you want the blood pressure measured every 15 minutes. Remember that the Time for Period One (1) also defines the End of the monitoring session. The end time for Period Four (4) will default to the Time for Period One (1), in this case 09:00.

PERIOD	TIME	INTERVAL	DURATION
1	09:00- 22:00	30 minutes	13 hours
2	22:00- 23:00	OFF	1 hours
3	23:00- 06:00	1 hour	7 hours
4	06:00- 09:00	15 minutes	3 hours
		Total:	24 hours

The following is the monitor setup according to these instructions.

**Note:** Set Periods One (1), Two (2), Three (3) and Four (4). Leave the other Periods blank.

PERIOD	TIME	INTERVAL
1	<input type="text" value="9"/>	<input type="text" value="30 minutes"/>
2	<input type="text" value="22"/>	<input type="text" value="OFF"/>
3	<input type="text" value="23"/>	<input type="text" value="1 hour"/>
4	<input type="text" value="6"/>	<input type="text" value="15 minutes"/>
5	<input type="text"/>	<input type="text" value="OFF"/>
6	<input type="text"/>	<input type="text" value="OFF"/>

## 2-8 Report Menu

Custom report formats may be saved for future use through the Report menu. The following functions are available in the Report dialog box:

- ◆ Create a new report template
- ◆ Edit an existing report template
- ◆ Delete an existing report template
- ◆ Save an existing template as the default report style
- ◆ Print a user defined report
- ◆ Print a "Mini" report
- ◆ Close the Report dialog box

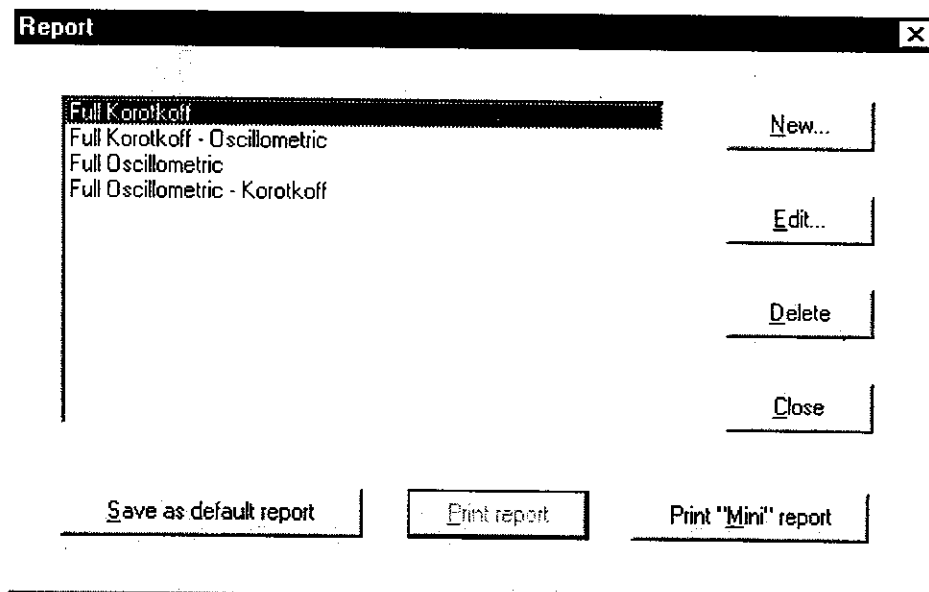


Figure 22: Report dialog box

To open the Report dialog box, print a report, create a new report template or edit an existing template, click the Report menu on the main menu.

### 2-8-1 Creating a New Report Template

- Step 1** Click the **New** button on the Report dialog box. The New Report dialog box will appear.
- Step 2** Type the Report Name.
- Step 3** Edit the Report Heading. This heading will appear on the top of every page along with the file name and time the file is printed.
- Step 4** Select the Text Data you want included in the report by checking the appropriate boxes.

**Note:** You may check all or none of these boxes. An unchecked box will not print; a checked box will print.

**Step 5** Select the Graphical Data you want included in the report by checking the appropriate boxes.

**Note:** You can check all or none of these boxes. An unchecked box will not print; a checked box will print.

**Step 6** Select the Measurement Method to base the report on by selecting the appropriate radio button.

**Step 7** Save the report template by selecting the Save button.

**Step 8** If you do not want to save the report template, select the Cancel button.

## 2-8-2 Editing an Existing Report Template

**Report Setup**

Report Name: \_\_\_\_\_

Report Heading: A&D ABPM ANALYSIS REPORT

**Text Data**

- Patient information
- Summary data
- BP data

**Graphical Data**

- Blood pressure
- Double product
- Correlation
- Histograms

**BP Mode**

- Oscillometric only
- 1:Oscillometric, 2:Korotkoff
- Korotkoff only
- 1:Korotkoff, 2:Oscillometric

Save      Cancel

Figure 23: New Report Template dialog box

**Step 1** Highlight the report template you want to edit.

**Step 2** Click the **Edit** button.

**Step 3** Edit the Report Name.

**Step 4** Edit the Report Heading. The Report Heading will appear on the top of every page along with the file name and time the file printed.

**Step 5** Edit the selected Text Data you want included in the report by checking or unchecking the appropriate boxes.

**Note:** You may check all or none of these boxes. An unchecked box will not print; a checked a box will print.

**Step 6** Edit the selected Graphical Data you want included in the report by checking or unchecking the appropriate boxes.

**Note:** You may check all or none of these boxes. An unchecked box will not print; a checked box will print.

**Step 7** Edit the selected Measurement Method to base the report on by checking or unchecking the appropriate radio button.

**Step 8** Save the report template by selecting the Save button.

**Step 9** If you do not want to save the report template, select the Cancel button.

### 2-8-3 Deleting an Existing Report Template

- Step 1** Highlight the report template you want to delete in the Report dialog box.
- Step 2** Select the Delete button.
- Step 3** Confirm deletion of the specified report format by selecting the OK button.
- Step 4** To cancel this operation, select the Cancel button.

### 2-8-4 Saving a Default Report Template for Printing

- Step 1** Highlight the report template you want to save as the default report.
- Step 2** Select the Save As Default Report button. The specified report template will be saved as the default report.

### 2-8-5 Printing an Existing Report Template

- Step 1** Select the Print Report button to print the Default Report Template. If you want to print a report template other than the Default Report Template, go to the next step.
- Step 2** Highlight the desired report template in the Report dialog box.
- Step 3** Select the Print Report button. The report will print.

### 2-8-6 Closing the Report dialog box

- Step 1** Select the Close button.

## 2-9 Options Menu

---

The Options menu may be used to access default and various formatting screens within the program. The following Options features are available:

<b>Menu</b>	<b>See</b>	<b>Description</b>
Report Formats	"2-8 Report Menu"	The Report formats may be used to create and save custom report formats.
Physicians List	"2-9-2 Physician List"	The Physicians list may be used to store contact information on the patient's physician, i.e. address and phone number, so that the Physician fields in the Patient Information screen may be quickly updated.
Trend Display	"2-6-3-3 Trend Display: Positioning Trends"	The Trend display may be used to customize the Trends screen.
Default Settings	"2-9-4 Default Settings"	There are two default settings: 1) BP settings (Blood Pressure settings) which may be used to set the default BP mode and BP limits. 2) Serial port which may be used to set the communication port for interfacing with the monitor.

## 2-9-1 Report formats

See "2-8 Report Menu".

## 2-9-2 Physician List

The Physicians List is used to store contact information for multiple physicians. This will save time from repetitive data input.

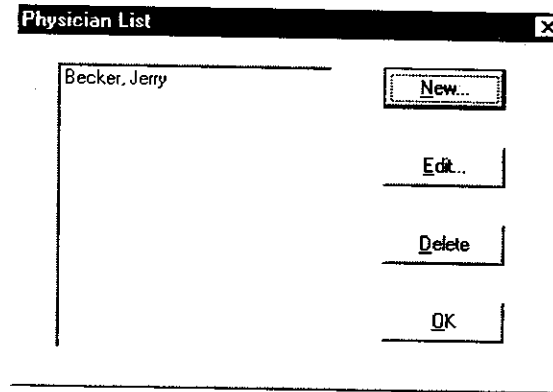


Figure 24: Physician List dialog box

- Step 1** Select the Options menu.
- Step 2** Select the Physician List sub menu.

The following instructions outline the various Physician List features available.

### 2-9-2-1 Adding a New Physician to the List

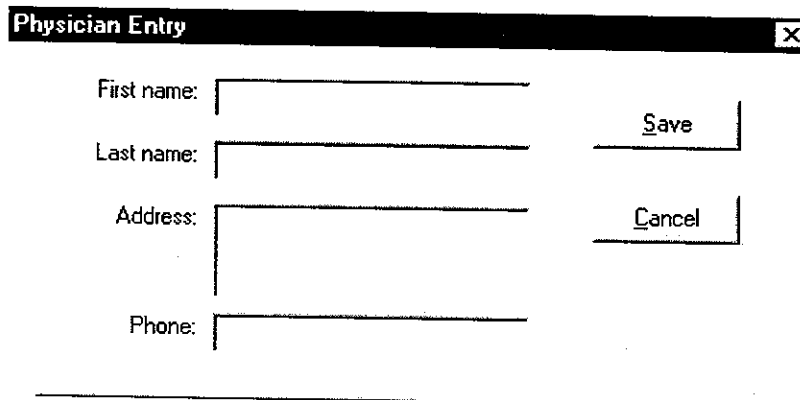


Figure 25: New Physician Entry dialog box

- Step 1** Select the New button on the Physician List dialog box.
- Step 2** Enter the appropriate data.  
*Note: All fields must be completed.*
- Step 3** Save the new physician template in the list by selecting the Save button. If you do not want to save the new physician, select the Cancel button.

### 2-9-2-2 Editing an Existing Physician in the List

**Step 1** Highlight the physician's name you want to edit.

**Step 2** Select the Edit button.

**Step 3** Select the field to edit and then type the new data.

*Note: All fields must be completed.*

**Step 4** Save the edited physician template by selecting the Save button.  
If you do not want to save the edited physician, select the Cancel button.

### 2-9-2-3 Deleting an Existing Physician in the List

**Step 1** Highlight the physician's name you want to delete.

**Step 2** Select the Delete button.

**Step 3** Confirm deletion of the specified physician template by selecting the OK button.

**Step 4** If you do not want to delete the physician template, select the Cancel button.

### 2-9-3 Trend Display

See "2-6-3-3 Trend Display: Positioning Trends".

### 2-9-4 Default Settings

There are three default settings in this program:

- 1) Blood Pressure
- 2) Serial Port
- 3) Recorder Type

#### 2-9-4-1 BP (Blood Pressure) Settings

Edit the Default Blood Pressure Settings as follows:

**Step 1** Select the Measurement Method (BP Mode).

**Step 2** Enter data for each value. The following is the description of each value.

Systolic Limit:

The percentage of readings exceeding the specified Systolic limit for the Awake and Sleep interval will be calculated and noted both on the Summary Data tabs and printed reports.

Diastolic Limit:

The percentage of readings exceeding the specified Diastolic limit for the Awake and Sleep interval will be calculated and noted both on the Summary Data tabs and printed reports.

**Step 3** To save the edits, select the **Save** button.

**Step 4** To cancel the edits, select the **Cancel** button.

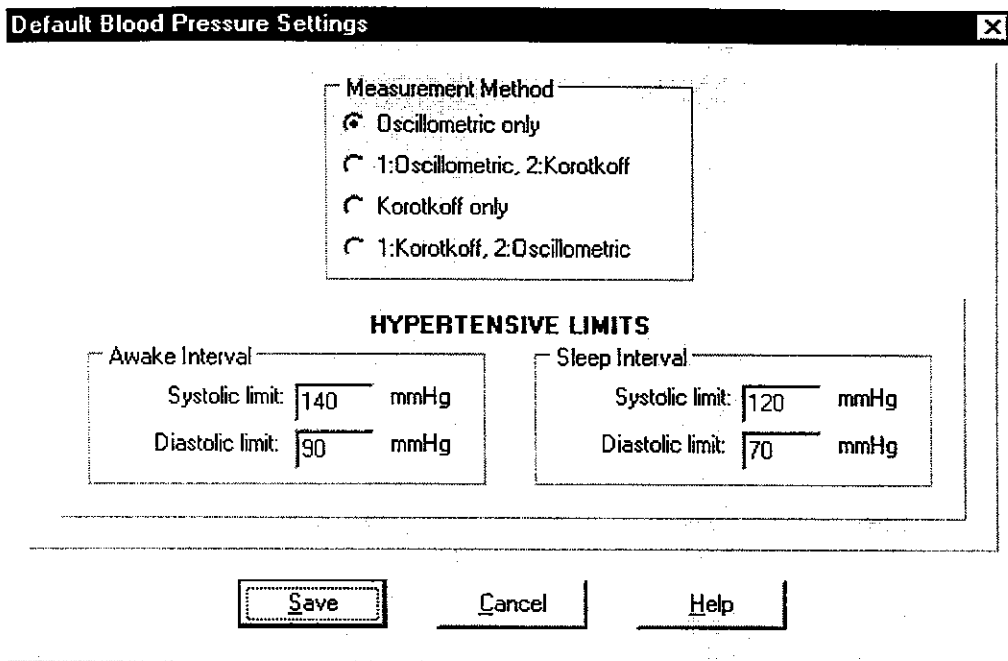


Figure 26: Default Blood Pressure Settings dialog box

#### 2-9-4-2 Serial Port

The serial port is used to communicate between the monitor and the computer. The serial port setting and the port used for communication must be the same.

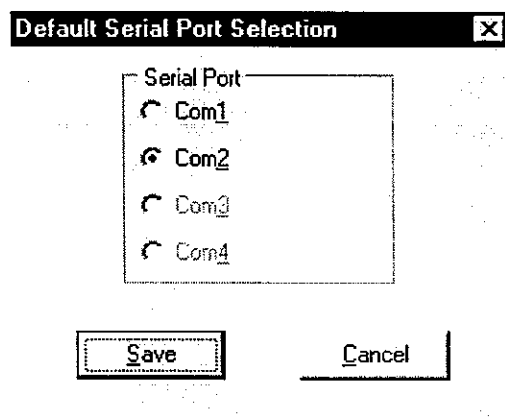


Figure 27: Default Serial Port Selection dialog box

### 2-9-4- 3 Recorder Type

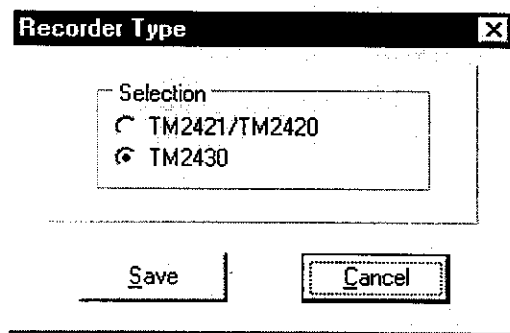


Figure 28: Default Recorder Type dialog box

The default Recorder Type function is used to select the type of monitor the program will communicate with for all Recorder functions. This function does not affect which type of data files the program can analyze.

## 2-10 On-line Help

---

Help screens are available for on-line program assistance. There are three ways to access the Help function.

- 1) Select the Help menu on the Menu bar.
- 2) Click Help buttons which appear on various dialog boxes throughout the program.
- 3) Press the F1 key at any point during the operation of the program.

## 3. TROUBLE SHOOTING

### 3-1 Measurement Errors

The following tables list the error messages that may occur during a monitoring session and offer information on possible causes and corrections.

#### 3-1-1 TM-2420/TM-2421 Error Codes

ERROR CODE	POSSIBLE CAUSE	CORRECTION
E01	The microphone has become disconnected or there has been excessive body motion.	Remove and reconnect the microphone connector at the front of the monitor.
E02	Air leak	Check that the air hose plug is tightly connected to the air connector located at the front of the monitor. Check the connection between the air hose plugs and the air bladder. Check the air bladder for leaks.
E04	Low Battery, "c", shown in the monitor display. The monitor will not take a measurement, print data, or download data until the monitor is charged.	Plug the AC adapter in the monitor. The "c" shown on the display will disappear after 30 minutes. Wait the full 60 minutes charging time to ensure that the battery is fully charged. <i>Note: The monitor will hold all stored readings in memory for two weeks after the appearance of the low battery indicator.</i>
E05	Measurement time exceeds 100 seconds. (Inflation time error)	Check E01 and E02 procedures. Reposition the lower microphone and then correlate it to the subject. Check that the air hose is not held down by a constrictive strap or similar restraint which may disrupt the air flow.
E06	Pressurization greater than 320 mmHg	Confirm that the subject is not moving during the measurement.  Clear the memory. <b>Caution: All measurement data will be erased.</b> After clearing the memory, take one measurement. If the cuff pressurizes to approximately 195 mmHg, the system is OK.  Reset the monitor by gently inserting a paper clip in the hole located on the bottom of the monitor.  <b>Caution: All measurement data, as well as programmed intervals and conditions will be erased.</b>  If the monitor stops and then continues to inflate above 260 mmHg, return the unit to A&D for service.

ERROR CODE	POSSIBLE CAUSE	CORRECTION
E07	Manual stop	The measurement was manually interrupted by depression of the red Start/Stop button.
E08	Korotkoff sounds are undetectable.	Check that the microphone is affixed with the sensing side (skin side) facing the patient's arm. <b>Note:</b> The microphone should always be taped to the arm with the supplied affixing tape. Place "X" of tape over the top of it.
E11	More than 256 Korotkoff sounds are measured.	Check for a break in the microphone lead. Check for external damage to the microphone. Microphone circuit may be damaged. <b>Note:</b> If a break in the microphone lead or external damage has occurred, the microphone Assembly must be replaced.
E20	Pulse Error Pulse less than 35 beats or more than 200 beats per minute.	Check the position of the lower microphone and then re-correlate it to the subject. <b>Note:</b> Certain physiological conditions or pharmaceutical treatment may excessively reduce or increase a pulse rate. In cases of excessively low pulse rates, have the subject walk or stand a few minutes to raise the pulse rate above 35 beats per minute.
E21	Diastolic greater than 160 mmHg or less than 40 mmHg.	Outside of normal physiological parameters.
E22	Systolic greater than 280 mmHg or less than 60 mmHg.	Outside of normal physiological parameters.
E23	Systolic minus diastolic less than 10 mmHg.	Outside of normal physiological parameters.
E24	Systolic minus diastolic greater than 150 mmHg.	Confirm that the subject is not moving during measurement. Reposition the lower microphone and then correlate it to the subject.

**Note:** If a measurement error occurs (other than E08) when the "Auto" mode is set, the monitor will automatically take a 2nd measurement. If a second measurement error occurs, a 3rd measurement will not be taken. The monitor will return to its programmed interval.

### 3-1-2 TM-2430 Series Error Codes

ERROR CODE	POSSIBLE CAUSE	CORRECTION
E00	All parameters are lost.	Enter clock parameters.
E03	An error code is displayed without cuff inflation.	Exhaust the air from the cuff completely.
E04	Measurement is stopped due to the low battery.	Replace with new batteries. Auto mode is quit. Restart the Auto mode if you use it.
E05	Inflation pressure does not reach the target pressure.	Wrap the cuff and connect to the monitor. If the error persists, there may be an air leak and repair is necessary.
E06	Pressurization greater than 320 mmHg.	Do not move and try to relax during the measurement. If you can not clear the error, repair is necessary.
E07	Controlled stop using STOP key	Do not press the STOP key when unnecessary.
E08, E10	Pulse can not be detected.	Do not move and try to relax during the measurement.
E20	Pulse rate<30, 200<pulse rate	Measure the blood pressure by other methods.
E21	DIA<40, 160<DIA	Measure the blood pressure by other methods.
E22	SYS<60, 280<SYS	Measure the blood pressure by other methods.
E23	DSD<10, 150<DSD (DSD=difference between systolic blood pressure and diastolic blood pressure)	Measure the blood pressure by other methods.
E30, E31	Air is exhausted form the cuff.	Repair is necessary.
E32	Clock error	If the error persists, repair is necessary.
E50	Pressure offset error	Repair is necessary.
E52	Memory error	Repair is necessary.
E53	Defective battery contact	Replace batteries correctly. If the error persists, repair is necessary.
E55, E56, E57	Exhaust error	Relax and do not move during the measurement. If this error occurs frequently, repair is necessary.
E60	Interval setting error	Enter the interval parameters correctly.
E70, 71, 72, 73	RS-232C error	Re-connect the communication cable. If the error persists, repair is necessary.
E74	Voltage decreases during communication.	Replace batteries with new ones and restart communication.
E75	Protocol error due to external equipment	Re-connect the communication cable. If the error persists, repair is necessary.

## 3-2 Communication Errors

---

When communicating between the monitor and the PC, the following dialog box may appear if the communication setup is not performed properly:

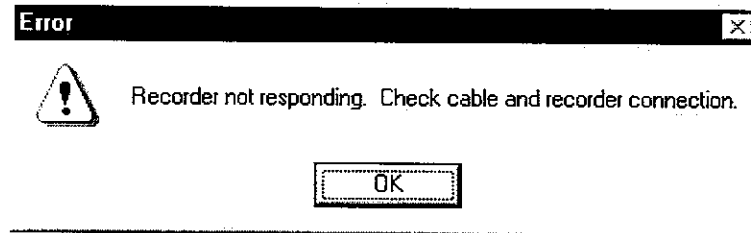


Figure 29: Communications Error dialog box

If this error occurs, complete the steps below:

- Step 1** Select the **OK** button on the Error dialog box.
- Step 2** Check the monitor's Low battery. Recharge the battery if necessary. Or replace with new batteries.
- Step 3** Check the Default Serial Port selection. Make sure it is correct.
- Step 4** Check the Default Recorder Type selection.
- Step 5** Disconnect the monitor from the processor and reconnect them.
- Step 6** Attempt communication. You may need to go through the process a few times to re-establish communication.

If the error still persists, complete the steps below:

- Step 1** Exit the program.
- Step 2** Disconnect the monitor from the processor and then reconnect them.
- Step 3** Charge the monitor's battery.
- Step 5** Start the program.
- Step 6** Check the Default Serial Port selection. Make sure it is correct.
- Step 7** Check the Safest Recorder Type selection.
- Step 8** Attempt communication again.

## 3-3 Missing Files

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If you can not find your files in one of the File menu screens, and the files have not been deleted, there are two possible causes:

The .dat file was relocated to another location on the hard drive without moving its corresponding .P file. Check that both the .dat and .P files are in the same directory. The .P file was relocated to another location on the hard drive without moving its corresponding .dat file. Check that both the .dat and .P files are in the same directory.

### 3-4 Reports Are Not Printing With the Desired BP Mode

It is important to note that the toolbar BP Mode and Default BP Mode settings are separate from the Report Format BP Mode settings. The BP Mode defined in the toolbar is not necessarily the BP Mode that will be used for the printed report. For information on how to set the BP Mode for the printed report, see "2-8-1-2 Editing an Existing Report Template".

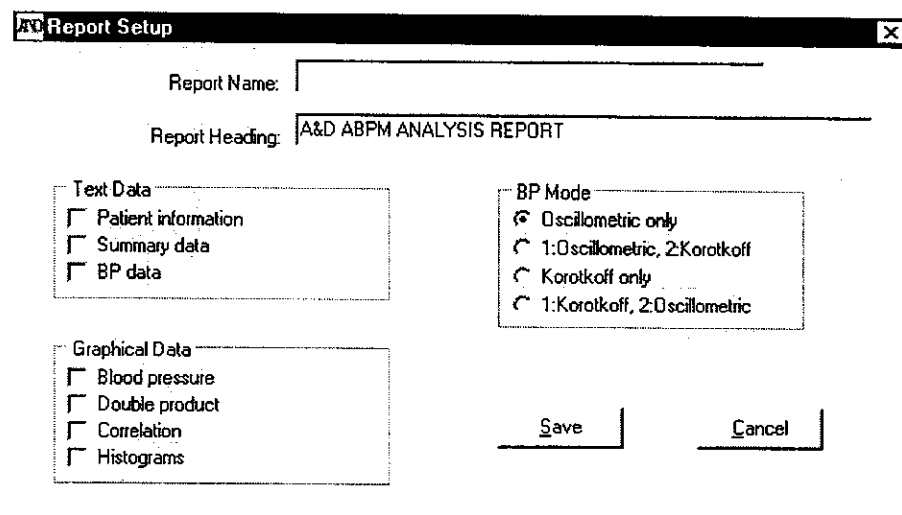


Figure 30: Report Setup dialog box

### 3-5 Summary Data / Sleep Tab Data can not be Seen

Make sure that the Sleep parameters in the Patient Information screen are within the monitoring sessions time. For example, this problem may occur if the monitoring session began at 11:30, but the Sleep Begin time was set at 11:25. Reset the Sleep begin time so that it falls within the monitoring session's times.











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