
Defibrillators

One year warranty. Repairs or replacements of defibrillators will be provided on site if the installation is located within 100 miles of any existing Marquette service person. In other locations, Marquette guarantees 48 hour turn-around service at the factory. If the customer requires a loaner for the return-to-factory service, one will be provided at no charge except for return shipping charges. Batteries are covered for a period of one year from the date of shipment.

Resting ECG analysis and exercise testing systems

One year warranty. Repairs or replacements of defective resting ECG analysis and exercise testing systems will be made for a period of one year from the date of shipment.

Exceptions

Resting ECG product batteries are covered for 90 days from the date of shipment.

Repairs or replacements of MAC® PC resting ECG analysis systems will be provided on site if the installation is located within 100 miles of any existing Marquette service person. In other locations, Marquette guarantees 48 hour turn-around service at the factory. If the customer requires a loaner for the return-to-factory service, one will be provided at no charge except for return shipping charges.

MAC 500 and MAC 1000 have a three year warranty. A refurbished unit will be provided for next working day delivery. Defective unit must be returned to Marquette Medical Systems Service Department in Jupiter, Florida. The remaining warranty period left on original unit applies to exchange unit. Customer may choose return-to-factory 48 hour repair for warranty service in lieu of an exchange unit.

Excluded from this warranty are expendable supply items such as, but not limited to, electrodes, magnetic media, leadwires, patient cables, ink, and ribbons. This warranty does not cover repairs or replacement parts which, in the opinion of Marquette, are required as the result of abuse or misuse of the equipment, failure to maintain the equipment in the manner described in any applicable instructions, use of electrodes, batteries, magnetic media, or other supplies not recommended by Marquette, or faulty devices connected to Marquette equipment.

THIS WARRANTY IS GIVEN BY MARQUETTE IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY AS TO MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE.

Document Revision History PN418913-001		
Revision	Date	Comment
A	25 March 1997	Initial release with company name change.
B	16 July 1997	Added resting ECG product battery information.
C	16 December 1997	Included Hellige resting and stress product information.
D	25 June 1998	Updated MUSE information.

Cardiology Products

Marquette Medical Systems, Inc., hereafter referred to as Marquette, warrants to repair or replace all new Cardiology Products sold by Marquette or its authorized agents when shown to be defective in either materials or workmanship.

Ambulatory (Holter Recorders)

One year warranty on ambulatory digital analysis and Series 8500 Recorders. Repair or replacement of defective recorders will be made for a period of one year from the date of shipment, provided they are returned to the factory with freight prepaid.

Two year warranty on SEER® XT and SEER® MC.

MARS™

One year warranty on analog remote system support from the date of installation. One and a half year warranty on digital remote system support from the date of installation.

MUSE CV™ information system

Software

PERFORMANCE WARRANTY: Marquette represents and warrants that licensed software substantially conforms to Marquette's published specifications, and performs substantially in accordance with the user manual for a period of ninety days from the installation date, or for a duration otherwise specified in the Purchase Order. If the system does not meet published specifications, customer may promptly notify Marquette and request corrective services.

WARRANTY FROM DEFECT: Marquette will provide remedies to software 'bugs' at no cost to customer for a period of one year from the installation date.

Hardware

Marquette represents and warrants that hardware substantially conforms to Marquette's published specifications, is free of defects and performs substantially in accordance with the user manual for a period of one year from the installation date, or for a duration otherwise specified in the Purchase Order. If the system does not meet published specifications, customer may promptly notify Marquette and request corrective services.

Exceptions

Customer failure to assure either

- Marquette provided product is not modified or
- Customer provided hardware deviates from Marquette published specifications

will result in charges to customer by Marquette for warranty and technical support services provided in support of inquiries, problems or calls from customer for Marquette service and support relating to such modifications or deviations. These warranties do not cover circumstances beyond Marquette's control; service or parts to correct problems resulting from the use or alterations not marketed by Marquette, service required as a result of relocation, unauthorized modifications, misuse, abuse or failure to follow Marquette's operating instructions.

Other questions or problems

For additional information contact one of the offices listed below.

Headquarters

Marquette Medical Systems, Inc.
8200 West Tower Avenue
Milwaukee, Wisconsin 53223
USA
Telephone: 414-355-5000
800-558-5120 (U.S. only)
414-355-5790

Europe

Marquette Hellige GmbH
Postfach 728
D-79007 Freiburg
Germany
Telephone: 49-761-4543-0
Fax: 49-761-4543-233

Australia

Marquette Medical Systems (Australia) Pty Ltd.
Forest Corporate Centre, Suite 7
19 Rodborough Road
Frenchs Forest NSW 2086
Australia
Telephone: (61) (2) 9975-5501
Fax: (61) (2) 9975-5503

Japan

Marquette Medical Systems, Japan
Waseda Hirai Building, 7th Floor
1-18-9, Nishi-Waseda
Shinjuku-Ku Tokyo, Japan
Telephone: (81) (3) 3203-1631
Fax: (81) (3) 3202-1626

Hong Kong

Marquette Medical Systems (HK)
26/F, Catic Plaza
8 Causeway Road
Causeway Bay, Hong Kong
Telephone: (852) 2804-2320
Fax: (852) 2804-1776

Southeast Asia

Marquette Electronics (SEA) Pte.
#2 Leng Kee Road
04-04A Thye Hong Centre
Singapore 0315
Telephone: (65) 471-2133
Fax: (65) 471-1540

Tech support

Tech Support has the most current information about your equipment, and can provide assistance with any technical questions or problems.

- Resting ECG analysis systems1-800-558-7072
 - Exercise testing systems1-800-558-7072
 - Ambulatory ECG analysis
and editing systems1-800-558-6802
 - MARS™ unity workstation1-800-282-6297
 - MUSE® cardiology management systems:
D-Series (errors/hardware problems)1-800-558-7070
Network systems (errors/hardware problems) ..1-800-645-9309
-

Applications ("How to..." questions)

- All diagnostic cardiology products1-800-531-5613
 - MUSE CardioWindow cath lab information systems
.....1-800-343-9341
-

Repairs

48-hour turnaround

Some Marquette products (MAC® PC resting ECG analysis systems, acquisition modules, and Holter recorders) are repaired on a 48-hour turnaround basis. Send items for 48-hour repair to:

Marquette Service and Supplies
Attn: 48-Hour Turnaround Repair
100 Marquette Drive
Jupiter, FL 33468-9100
Telephone: 1-800-552-3246 (Holter recorders) or
1-800-558-7072 (MAC PC systems and acquisition
modules)

Diagnostic hardware

Send all items except 48-hour turnaround repair items to the above address, Attention: Diagnostic Hardware Repair, Telephone: 1-800-558-5102.

Service agreements

For information about service agreements call: 1-800-552-3248.

How to Reach Us . . .

Revision History

Each page of the document has the document part number and revision letter at the bottom of the page. The revision letter identifies the document's update level.

The revision history of this document is summarized in the table below.

Table 1-1. Revision History PN 403409-009

Revision	Date	Comment
A	5 March 1998	Initial release
B	2 June 1998	Deleted specific phone numbers for MARS products in the <i>Applications</i> section.

Service calls

Contact various service, supplies, and repair personnel using the following telephone numbers and addresses.

To open a service call with Marquette Service, call:

USA 1-800-558-7044 (24-hour service)

Other countries 561-575-5000 (during U.S. business hours only)

or contact your local sales and service representative.

Supply products and service parts

Order supplies (leadwires, electrode paste, thermal paper, etc.) or service parts (circuit boards, cables, software, etc.) and manuals from:

Marquette Service and Supplies
Attn: Supplies (or Service Parts)
P.O. Box 9100, 100 Marquette Drive
Jupiter, FL 33468-9100
Telephone: 1-800-558-5102 (U.S. only)
561-575-5070 (outside U.S.)
Fax: 561-575-5050

Have the following information handy:

- part number of the defective part, or
- model and serial number of the equipment,
- part number/name of the assembly where the item is used,
- item name, and
- where applicable, reference designation (eg, R13, S12).

When ordering additional operator manuals, remember to get the software version from either the back of the title page or a printed report.

MD1020-032B

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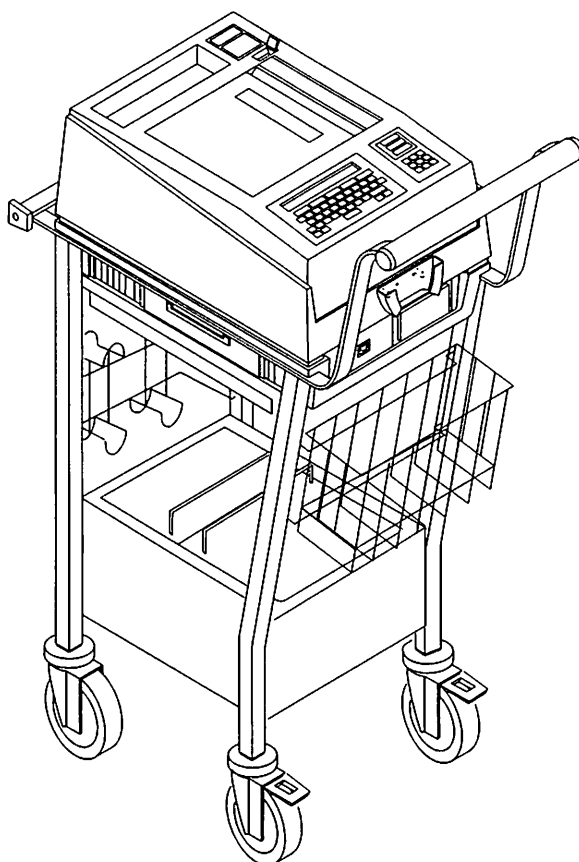
MAC[®] 12/15 resting ECG analysis system

operator's manual

Software Versions 008A,B,C; 108A,B; 009A; 109A; 010A,B,C; 110A,B,C

PN 401003-032

Revision L



marquette
Medical Systems

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Manual Information

Revision History

Each page of the document has the document part number followed by a revision letter at the bottom of the page. The latest letter of the alphabet corresponds to the most current revision of the document.

The revision history of this document is summarized in the table below.

Table 1-1. Revision History PN 401003-032

Revision	Date	Comment
A	December 26, 1991	This release updates the MAC 12/15 cardiograph to 008/108 software.
B	January 8, 1992	This release corrects use of AM-4 acquisition module with MAC 12/15 cardiograph.
C	January 28, 1992	This release updates the Hi-Res chapter to include the AM-4 acquisition module.
D	February 13, 1992	This release updates the MAC 12/15/ to 008B and 108B software.
E	May 14, 1993	Note was added about grey-based leadwire plug causing incorrect data during pediatric and vector loops ECGs. Also, minor editing changes were made.
F	June 1, 1993	This release adds receiving 12-lead ECG data from the Marquette Responder 1500 Defibrillator.
G	June 11, 1993	Correction to document—added the software revision 008C to the T-2 page and to revision history.
H	October 29, 1993	This document changed due to the installation of the new 8-inch CSCAN writer, Therefore, instructions were added for changing the paper.
J	August 7, 1995	This release adds software versions 009A and 109A.
K	October 29, 1997	This release adds software versions 010A and 110A to: <ul style="list-style-type: none"> ■ Support the year 2000. ■ Define the MUSE location identification numbers in <i>Miscellaneous Setup</i>. ■ Add the ability to enter, display and print a 4-digit year. This release also prepares this manual for CD-ROM distribution.
L	October 2, 1998	This release adds software version 010B, C and 110B, C enhancements.

Manual Purpose

This manual contains the instructions necessary to operate the equipment safely in accordance with its function and intended use. These instructions include but are not limited to:

- an explanation of the function of controls and indicators,
- the sequence of operation,
- connection and disconnection of detachable parts and accessories, and
- instructions for operator cleaning, preventive inspection and maintenance.

Where necessary the manual identifies additional sources of relevant information and/or technical assistance.

Chapter Content

This manual is organized into the following chapters:

1	Introduction	Describes the manual contents and provides general information about safety precautions and service requirements.
2	Equipment Overview	Describes how to connect the system to a power outlet and the acquisition module.
3	Preparing the Patient	Describes how to prepare the skin and locates chest and limb electrode positions.
4	Taking a Resting ECG	Describes the steps necessary to take a patient's resting ECG and to store the ECG data on a diskette.
5	Printing a Rhythm Strip	Describes the steps necessary to print a patient's rhythm strip.
6	Receiving and Transmitting ECG	Describes how to receive and transmit by telephone, locally or via the RS232 connector.
7	Editing ECG Reports	Describes how to change information on a patient's ECG report stored on a diskette.
8	Printing	Describes how to print a patient's ECG that has been stored on a diskette.
9	Creating a Directory	Describes how to review all of the stored ECGs. You can also view a summary of how much memory is available.
10	Deleting an ECG	Describes how to erase one or more patient files from diskette.
11	Using the Pacemaker Option	Describes how to use the Pacemaker option that permits local or remote evaluation of either single or dual chamber pacemakers using standard surface electrodes and a special "Pace" acquisition module.
12	Using the Hi-Res Option	Hi-Res is a system option which analyzes high-frequency low-amplitude (HFLA) ECG information using a special "Hi-Res" acquisition module.
13	Setup	Describes various setup options on your system, such as the date and time, types of reports, etc.
	Appendices	Includes abbreviations, basic maintenance information, steps for troubleshooting malfunctions, sample report formats, and a glossary.

Related Manuals

See these documents for additional information.

Table 1-2. MAC 12/15 system Documents

Part Number	Name
402539-001	MAC 12/15 resting ECG analysis system Quick Reference
401003-004	MAC 12/15 resting ECG analysis system Transmitting Guide
4001003-033	MAC 12/15 resting ECG analysis system Hi-Res Quick Reference
000-90160-010	Physicians Guide to Marquette Electronic's Resting ECG Analysis
402832-001	Physicians Guide to MAC 12/15 Options: High Res., Pacemaker Analysis, and Vector Display

Conventions

These are the conventions used in this manual.

Safety Messages

DANGER safety messages indicate an imminently hazardous situation which, if not avoided, WILL result in death or serious injury.

WARNING safety messages indicate a potentially hazardous situation which, if not avoided, COULD result in death or serious injury.

CAUTION safety messages indicate a potentially hazardous situation which, if not avoided may result in minor or moderate injury.

NOTE messages provide additional user information.

Definitions

- Items shown in **Black** text are keys on the keyboard, text to be entered, or hardware items such as buttons or switches on the equipment.
- Items shown in *Italicized* text are software terms which identify menu items, buttons, or options in various windows.
- To perform an operation which appears with a plus (+) sign between the names of two keys, you press and hold the first key while pressing the second key once. This is called a keystroke combination.

For example, "Press **Ctrl+Esc**" means to press and hold down the **Ctrl** key while pressing the **Esc** key.

- When instructions are given for typing a precise text string with one or more spaces, the point where the spacebar must be pressed is indicated as: <Space>. The purpose of the < > brackets is to ensure you press the spacebar when required.
- **Enter** means to press the "Enter" or "Return" key on the keyboard. Do not type "enter."

Safety Information

Responsibility of the Manufacturer

Marquette Medical Systems is responsible for the effects of safety, reliability, and performance only if:

- Assembly operations, extensions, readjustments, modifications, or repairs are carried out by persons authorized by Marquette.
- The electrical installation of the relevant room complies with the requirements of the appropriate regulations.
- The equipment is used in accordance with the instructions for use.

General

When connected to a Marquette acquisition module this equipment is protected against the effects of cardiac defibrillator discharge to ensure recovery, as required by test standards.

This equipment will not cause abnormal operation of a patient's cardiac pacemaker or other electrical stimulator.

This device uses a computerized ECG analysis program which can be used as a tool in ECG tracing interpretation. This computerized interpretation is only significant when used in conjunction with clinical findings. All computer-generated tracings should be overread by a qualified physician.

To ensure patient safety, use only parts and accessories manufactured or recommended by Marquette Medical Systems, Inc.

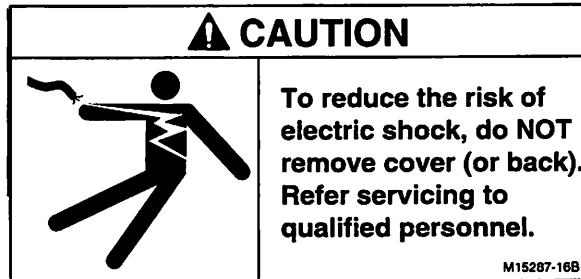
Contact Marquette Medical Systems for information before connecting any devices to this equipment that are not mentioned in this manual.

The intended uses of this device is to record electrocardiograms, vectorcardiograms and signal-averaged electrocardiograms from surface ECG electrodes, not for positioning ("floating") temporary pacemaker leadwires, performing pericardiocentesis, or other internal applications.

This device is intended for use under the direct supervision of a licensed health care practitioner.

Equipment Symbols

The following symbols appear on the equipment.



Type B equipment. Type B equipment is suitable for intentional external and internal application to the patient, excluding direct conductive connection to the patient's heart.



Type BF equipment. Type BF equipment is suitable for intentional external and internal application to the patient, excluding direct conductive connection to the patient's heart. Type BF equipment has an F-type isolated applied part. The paddles indicate that the equipment is defibrillator proof.



When this symbol appears on a leadwire, it indicates that the leadwire is resistive.



Mains power switch on the Power Module-3 (PM-3). The "I" is the on position and the "O" is the off position of this switch.

AC

Indicates alternating current.

or



This equipment complies with part 68 FCC rules. The FCC registration number is AM995H-67836-DT-E and the ringer equivalence is 1.3B.



This symbol means that you must pay attention to the documents delivered with this equipment. It calls attention to the things to which you must pay special attention during operation and when the equipment is operated in conjunction with other equipment.


AM


This is the acquisition module connector.

AUX

The auxiliary connector. This is the auxiliary connector which is used in "local" transmissions. The amount of voltage that can be applied to this connector without damaging the equipment is 0 volts.

Warnings and Cautions

⚠ DANGER	
	Do NOT use in the presence of flammable anesthetics.
<small>M15287-1B</small>	

⚠ WARNING	
	Replace only with the same type and rating of fuse.
<small>M15287-2B</small>	

⚠ WARNING	
	Do NOT contact unit or patient during defibrillation.
<small>M15287-8C</small>	

⚠ WARNING	
This device is intended for use under the direct supervision of a licensed health care practitioner.	
<small>M15287-13A</small>	

⚠ CAUTION	
Federal law restricts this device to sale by or on the order of a physician.	
<small>M15287-17A</small>	

Service Information

Service Requirements

Refer equipment servicing to Marquette Medical Systems' authorized service personnel only. Any unauthorized attempt to repair equipment under warranty voids that warranty.

It is the user's responsibility to report the need for service to Marquette Medical Systems or to one of their authorized agents.

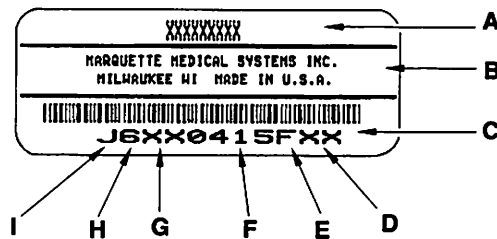
Failure on the part of the responsible individual, hospital, or institution using this equipment to implement a satisfactory maintenance schedule may cause undue equipment failure and possible health hazards.

Regular maintenance, irrespective of usage, is essential to ensure that the MAC 12/15 resting ECG analysis system will always be functional when required.

Technical specifications describing the equipment can be found in the "MAC 15 resting ECG analysis system field service manual," PN 401003-002.

Equipment Identification

Every Marquette Medical Systems device has a unique serial number for identification. The serial number appears on the product label on the base of each unit.



MD1113-022B

Table 1-3. Equipment Identifications

Item	Name	Description
A	name of device	MAC 12/15 resting ECG analysis system
B	manufacturer	Marquette Medical Systems, Inc.
C	serial number	Unique identifier
D	device characteristics	One or two letters that further describe the unit, for example: P = prototype not conforming to marketing specification; R = refurbished equipment; S = special product documented under Specials part numbers; U = upgraded unit
E	division	F = Cardiology G = Monitoring J = GW Labs
F	product sequence number	Manufacturing number (of total units manufactured)
G	product code	Two-character product descriptor LO = MAC 12 system, LB = MAC 15 system
H	year manufactured	4 = 1994, 5 = 1995, 6 = 1996, (and so on)
I	month manufactured	A = January, B = February, C = March, D = April, E = May, F = June, G = July, H = August, J = September, K = October, L = November, M = December

FCC Requirements

Type of Service

Your system is designed to be used on standard device telephone lines. Connection to telephone company-provided coin service (central office implemented systems) is prohibited. Connection to party lines service is subject to State tariffs.

Telephone Company Procedures

The goal of the telephone company is to provide you the best service it can. In order to do this, it may occasionally be necessary for them to make changes in their equipment, operations, or procedures. If these changes might affect your service or the operation of your equipment, the telephone company will give you notice, in writing, to allow you to make any changes necessary to maintain uninterrupted service.

If you have any questions about your telephone line, such as how many pieces of equipment you can connect to it, the telephone company will provide this information upon request.

In certain circumstances, it may be necessary for the telephone company to request information from you concerning the equipment which you have connected to your telephone line. Upon request of the telephone company, provide the FCC registration number and the ringer equivalence number (REN) of the equipment which is connected to your line; both of these items are listed on the equipment label found at the back of the system. The sum of all of the RENs on your telephone lines should be less than five in order to assure proper service from the telephone company. In some cases, a sum of five may not be usable on a given line.

If Problems Arise

If any of your telephone equipment is not operating properly, you should immediately remove it from your telephone line, as it may cause harm to the telephone network. If the telephone company notes a problem, they may temporarily discontinue service. When practical, they will notify you in advance of this disconnection. If advance notice is not feasible, you will be notified as soon as possible. When you are notified, you will be given the opportunity to correct the problem and informed of your right to file a complaint with the FCC.

NOTE

This equipment complies with part 68 FCC rules. The FCC registration number is AM995H-67836-DT-E and the ringer equivalence is 1.3B.

2

EQUIPMENT OVERVIEW

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Equipment Description

Overview

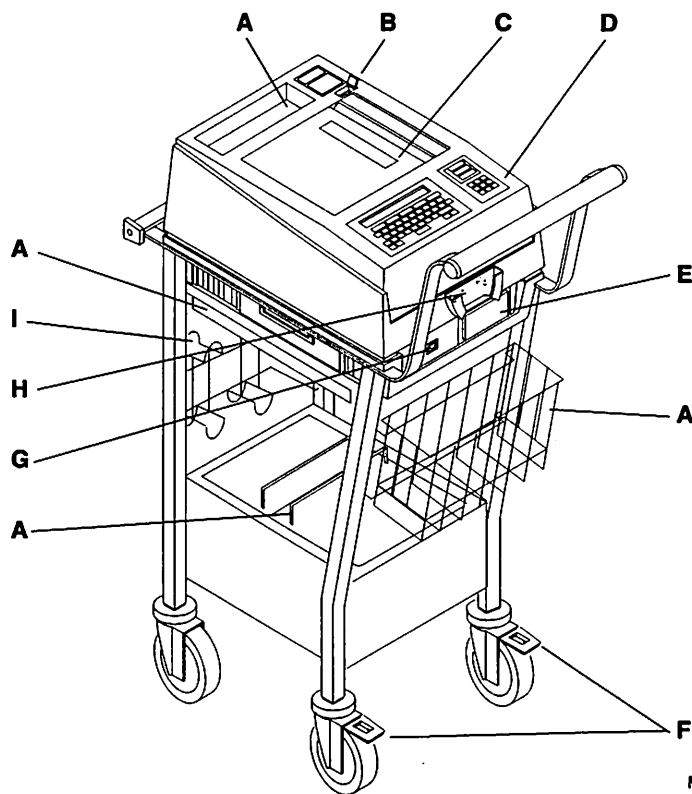
This system represents the latest and most sophisticated technology in electrocardiography. This instrument performs rapid, accurate analysis of both morphology and rhythm on a patient's 12-lead ECG. The system also stores and/or transmits these analyses and waveforms to central processors via telephone, cellular telephone, or satellite.

The system contains a complete computer system which will rapidly perform the well-accepted 12SL analysis program, developed and continually critiqued by over 20 of the world's best known electrocardiographers. Updates of the program, as well as additional features, are distributed to each user from time to time via a small software module.

The system produces ultra-high fidelity, paper records in many formats to meet your electrocardiography needs. The direct digital writer is capable of transcribing up to 15 simultaneous leads at many paper speeds.

The acquisition module acquires, amplifies, and digitizes the patient's signals and is connected to the system with a telephone-type cord.

Side View

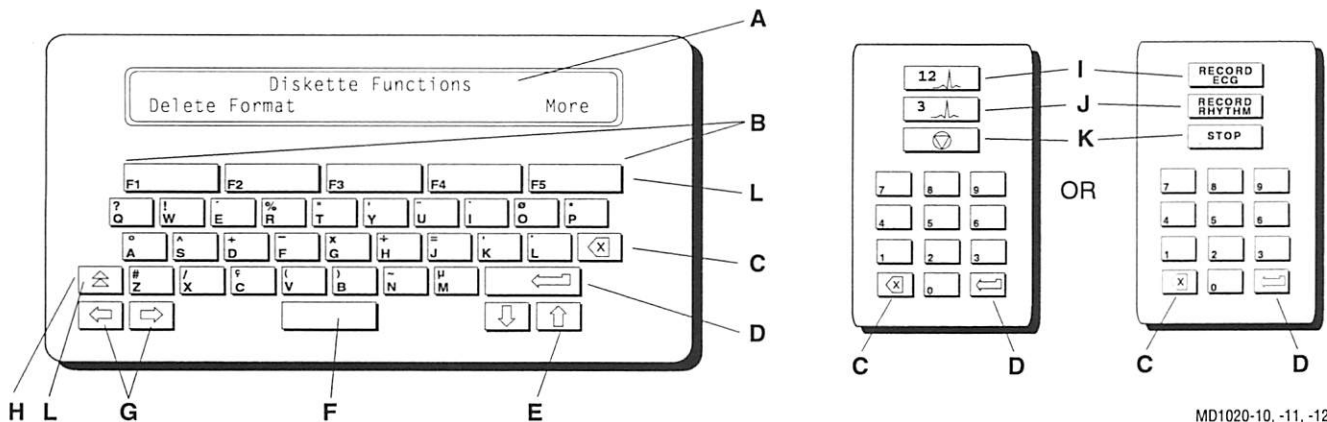


MD1020-032B

Table 2-1. Side View

Item	Name	Description
A	storage areas	Use for supplies, paper, diskettes.
B	paper release button	Move to release the paper door.
C	thermal paper compartment	Holds thermal paper for printing reports.
D	keyboards	Use keys to enter information, acquire ECGs, start/stop printing, etc. (See following page for more information.)
E	diskette drive slot	Insert floppy diskettes here.
F	brake	Apply brake to stabilize drive. <ul style="list-style-type: none"> ■ Step on lever to set or release brake.
G	acquisition module connector	Connect acquisition module here.
H	AM-4 acquisition module holder	Store the AM-4 acquisition module here.
I	power cord holder	Store the mains power cord here.

Keyboard



MD1020-10, -11, -12

Table 2-2. Keyboard Description

Item	Name	Description
A	LCD	Displays information, characters typed in, etc.
B	function keys	Select a LCD function that is directly above the key.
C	DELETE key	Erases previous character on LCD.
D	ENTER key	Sends information to memory after typing in response to an LCD prompt.
E	DOWN/UP ARROWS keys	<ul style="list-style-type: none"> Lightens or darkens LCD contrast when pressed with the SHIFT key. Press the UP ARROW to return the LCD to the previous display, if any.
F	SPACE BAR key	Press this key to create a space on the LCD.
G	LEFT/RIGHT ARROW keys	<ul style="list-style-type: none"> Press the LEFT ARROW key to move the LCD cursor left. Press the RIGHT ARROW key to move the LCD cursor right.
H	SHIFT key	<ul style="list-style-type: none"> Types uppercase (shifted) characters. Accesses special functions when pressed with another key.
I	RECORD ECG key	Press this key to acquire an ECG from a patient. Press to print a 3-, 6-, 12-, and/or 15-lead report. Display the <i>Main Menu</i> before you record an ECG.
J	RECORD RHYTHM key	Prints either a 3-, 6-, or 12-lead report depending on cart setup. Display the <i>Main Menu</i> before you record a rhythm report.
K	STOP key	Quits the function you are using, stops printing, and returns to the <i>Main Menu</i> .
L	F5 and SHIFT key	Press both keys at the same to print a rhythm Recall report. This report consists of 10 seconds of 3-lead ECG rhythm data. Display either of the <i>Main Menu</i> displays before you press both keys.

Main Menu

The *Main Menu* is the starting point for most of the functions of the system and its features are described below. If the *Main Menu* is not displayed, press the **STOP** key.

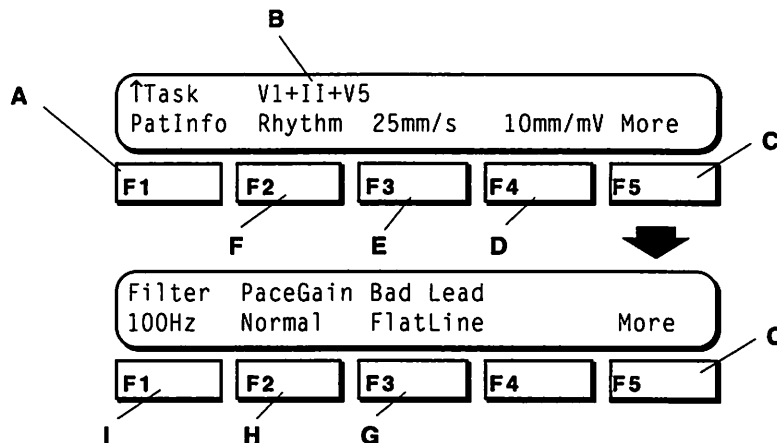
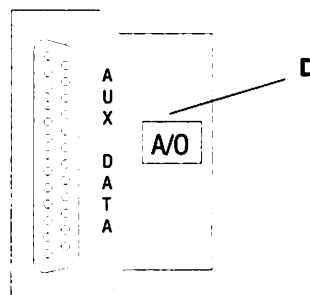
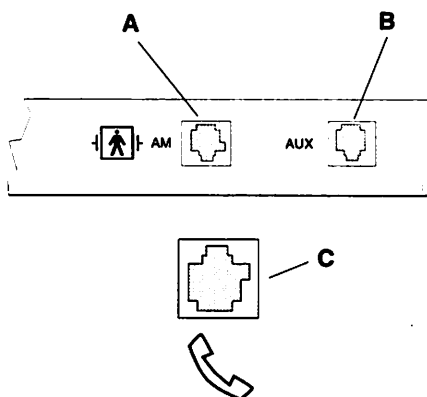
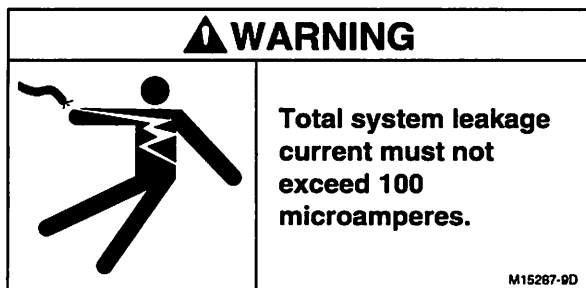


Table 2-3. Main Menu

Item	Name	Description
A	patient information	Press to enter patient information (patient name, age, etc.).
B	rhythm leads default	The default or startup Automatic Rhythm leads are shown here.
C	<i>More</i>	Press to advance to the second display of the <i>Main Menu</i> or return to the first display.
D	writer gain	Press to change the writer gain - either 2.5, 5, 10, or 20 mm/mV. <ul style="list-style-type: none"> ■ Adjusting the gain only affects the output traces. ■ Data for the interpretive option program (12SL) are measured at the 10mm/mV setting. ■ Also a "split calibration" of 10/5 mm/mV may also be selected which sets the limb leads at 10 mm/mV and the chest and auxiliary leads at 5 mm/mV. A split calibration, like the following, will appear on writer reports.
		<p style="text-align: center;">LIMB CHEST</p> <p style="text-align: right;">MD1020-13</p>
E	writer speed	Press to change the writer speed - either 1, 5, 25, or 50 mm/s. (1 and 5 mm/s apply only to rhythm reports.)
F	rhythm leads	Press to change rhythm leads - either Automatic Rhythm, Group 1, Group 2, Group 3, or Group 4.
G	bad lead	Press to enable or disable the <i>Bad Lead</i> feature. Selecting <i>FlatLine</i> will result in a flat line report if an override of an "XX Disconnected" lead error message occurred during data acquisition. Selecting <i>Use</i> will print a report of raw data and no lead error messages will be displayed during data acquisition. The ability to print a report of raw data without having to override any lead error message is only possible when an AM-3 or AM-4 is used for data acquisition.
H	pace gain	Press to enable or disable the <i>PaceGain</i> feature. Selecting <i>Enhance</i> will enable <i>PaceGain</i> . Selecting <i>Normal</i> will disable <i>PaceGain</i> . (When <i>PaceGain</i> is enabled, the pacemaker spike on ECG reports is enhanced, thus making it more obvious. <i>PaceGain</i> will only function when an AM-3 or AM-4 is being used for data acquisition.)
I	writer filter	Press to change the writer filter (either 40 Hz or 100 Hz).

Connectors

Connector Identification



MD1014-13, -14, M14403-025

Table 2-4. Connector Identification


Location	Item	Connector Name	Description
Front Panel	A	acquisition module	Connect the acquisition module cable here.
	B	auxiliary	Connect the local transfer cable here to transmit data "locally".
Back Panel	C	telephone	Connect the telephone cable from a telephone wall outlet here to transmit data via modem. The modem is an option.
	D	analog output	Use to connect the system to an oscilloscope to monitor waveforms. This is an option

NOTE

The amount of voltage that can be applied to the connector **AUX** and **A/O** without damaging the equipment is 0 volts.

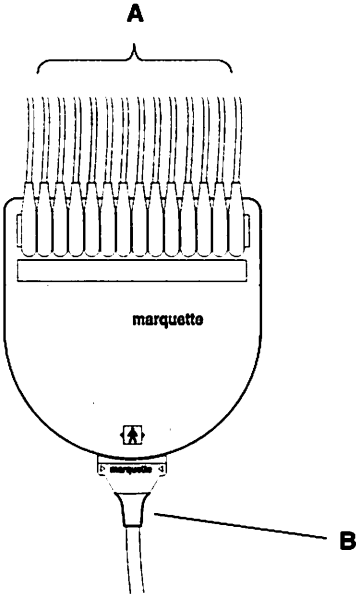
AM-4 Acquisition Module

There are no controls or indicators on the AM-4 acquisition module. You can use this acquisition module with a variety of Marquette Medical Systems' host equipment.

 WARNING
<p>To ensure defibrillator protection and protection against high-frequency burns, use only the AM-2, AM-3 or AM-4 with this equipment. Otherwise, serious injury could result.</p>
<small>M15287-6C</small>

Connectors

Even though the AM-2, AM-3, and AM-4 acquisition modules have 16-lead (or 14-wire) capabilities, you can only use the 12-lead (or 10-wire) capabilities on the system for resting ECG analysis. You can use the additional leads for pediatric, vector loops, and late potentials. (See chapter 3, "Preparing the Patient.")



MD1024-079A

Table 2-5. AM-4 Connectors		
Item	Name	Description
A	leadwires	Attach to electrodes.
B	acquisition module cable	Connects the acquisition module to the electrocardiograph.

Applying AM-4 Labels

For your convenience, 1 of 6 different labels may be placed on the acquisition module.

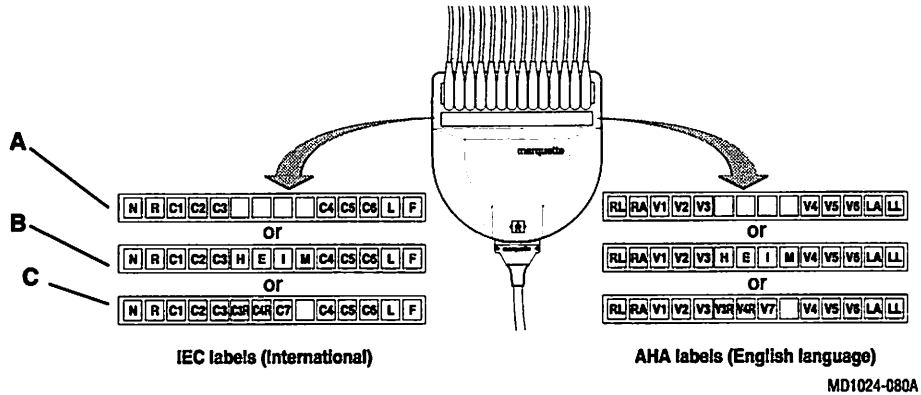


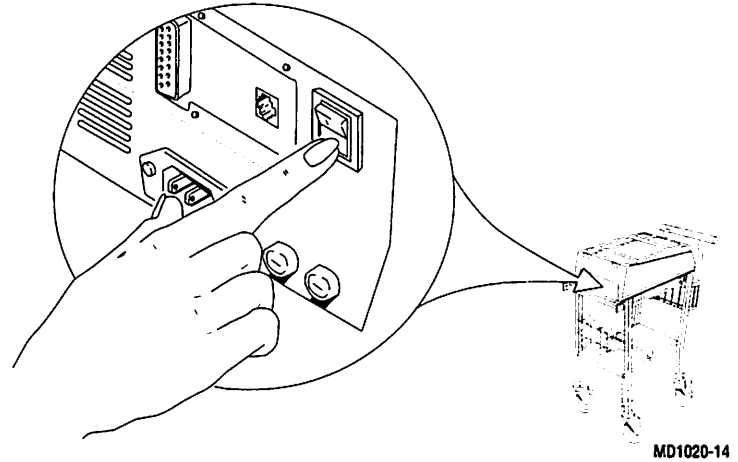
Table 2-6. AM-4 Labels

Item	Description
A	Resting ECG label
B	Hi-Res ECG label
C	Pediatric ECG label

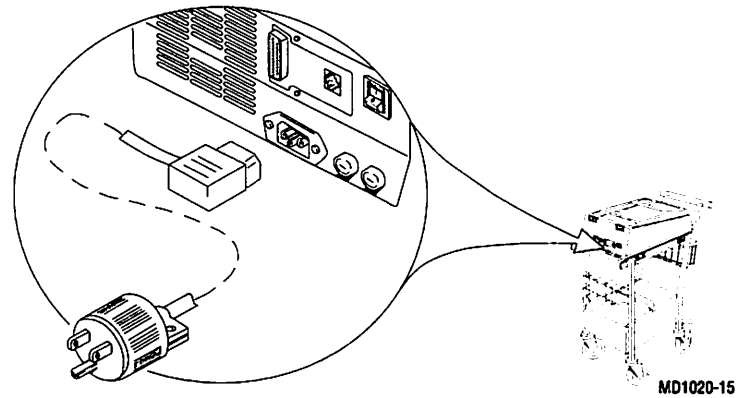
Preparing for Use

Use this 6 step procedure to prepare the system for use.

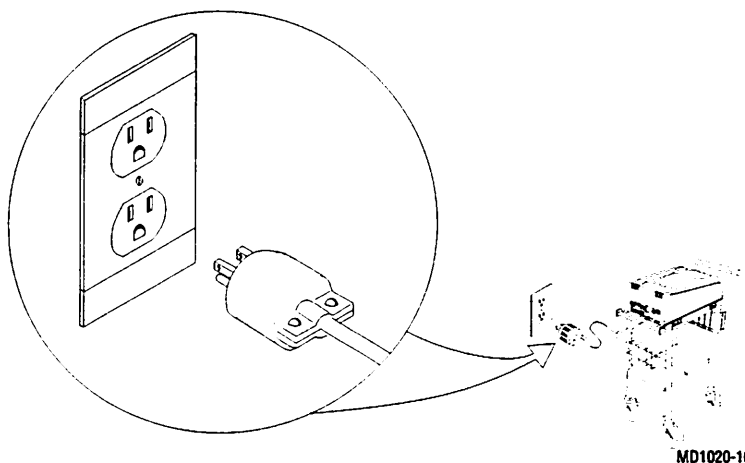
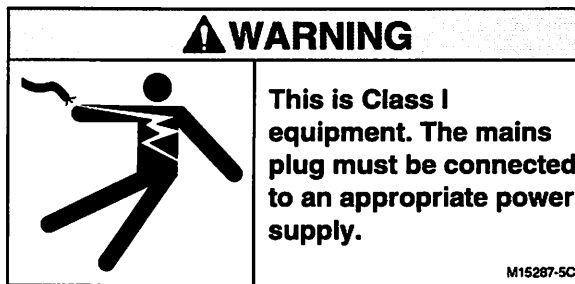
1. Make sure that the mains power switch is in the off or "O" position.



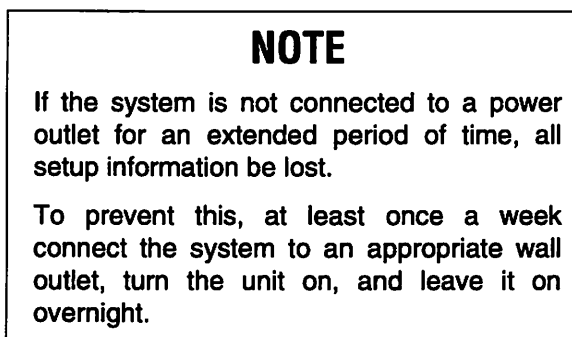
2. Connect one end of the power cord to the system.



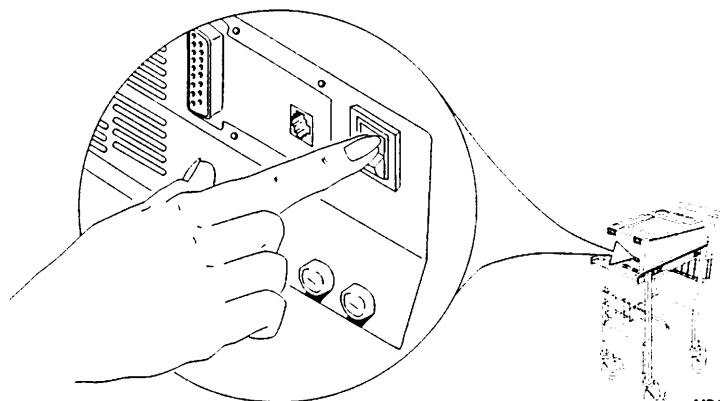
3. Connect the other end of the power cord to an appropriate, grounded power outlet.



MD1020-16



4. Turn on the power to the system by pressing the "I" part of the mains power switch.



MD1020-17

- The system does a short self test and displays similar to the following appear.

Software version that the system is using.

Pgm 008A Self Test 12

THEN

A1 FD M RAM = 512K

The "512K" represents the amount of memory available in the unit, 512 kilobytes in this case.

After the self test, one of the following two displays will appear.

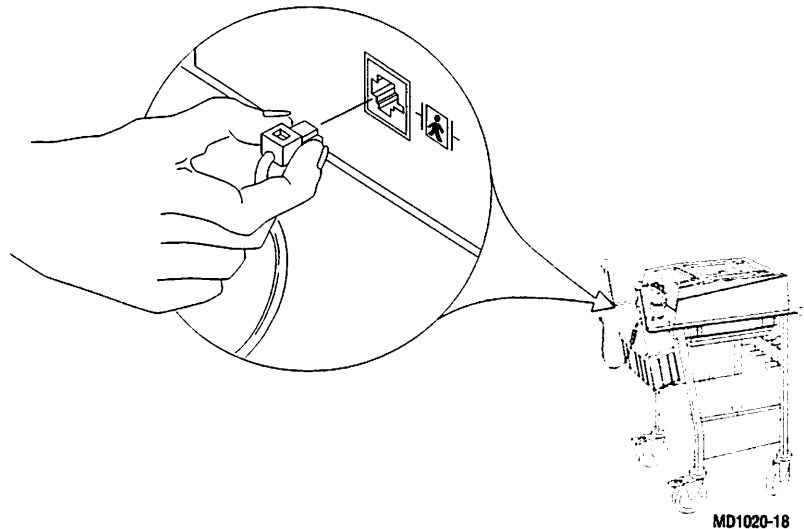
↑Task V1+II+V5
PatInfo Rhythm25mm/s10mm/mV More

OR

Most recent ECG NOT saved on diskette
Press F1 to acknowledge

The second display will appear after a power loss or in cases where the integrity of the ECG data cannot be verified. To continue, press the **F1** key.

- Connect the telephone-type connector of the acquisition module to the connector on the front of the system.



3

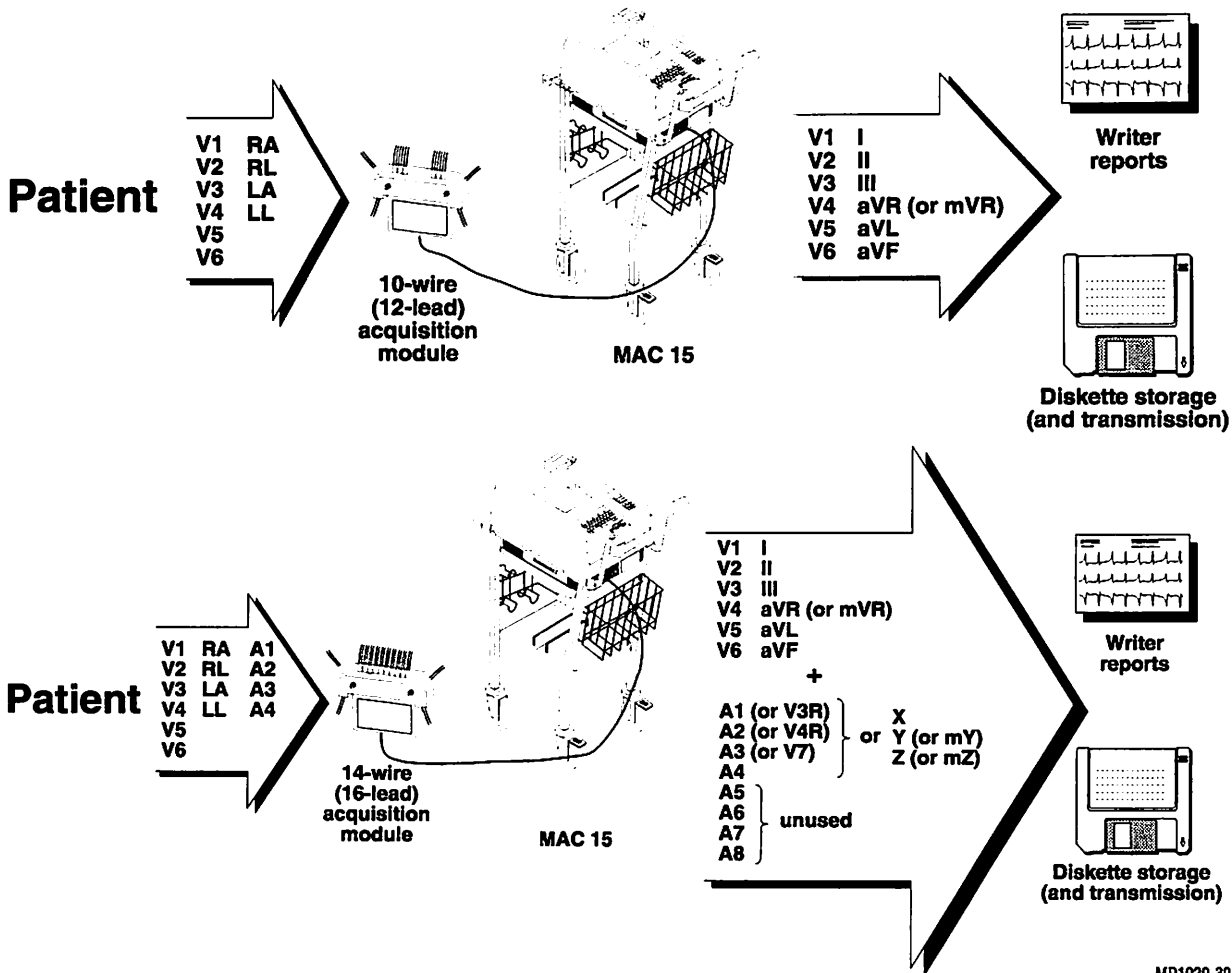
PREPARING THE PATIENT

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Auxiliary Electrode Placement for Pediatric Connection	11

Patient Preparation

Overview

The differences between the 12-lead and 16-lead acquisition modules are shown below.

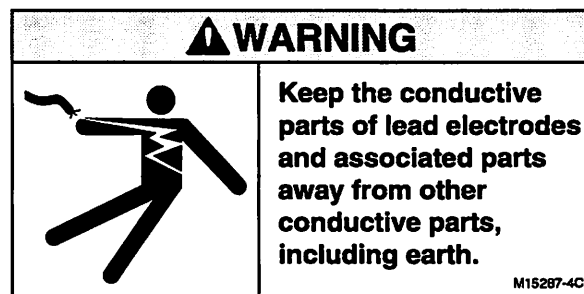


MD1020-30, 31, 32

Skin Preparation

Use this 6 step procedure to insure good quality ECG data.

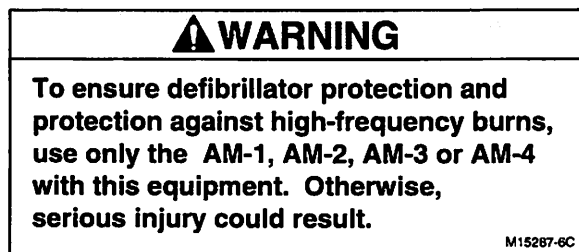
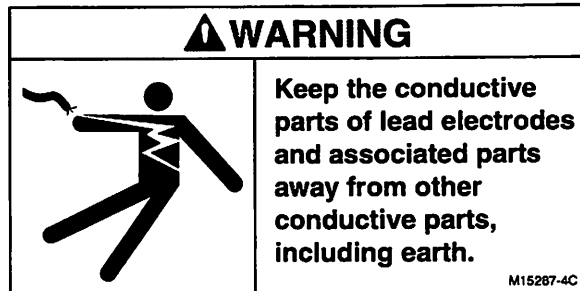
1. Shave any hair from each electrode site. This improves conductivity, helps hold the electrode to the skin, and makes the removal of the electrode easier.
2. Rub each electrode site thoroughly with alcohol. This removes oil from the skin.
3. Mark each electrode site with a felt tip pen. This provides an easy way to determine when the epidermis has been sufficiently abraded.
4. Use an abrasive pad to remove the epidermal skin layer at each electrode site. The epidermal skin layer has been removed when the mark left from the felt tip pen has been erased.
5. Place an electrode on each prepared site.
6. If possible, use a skin preparation analyzer to test each electrode site.



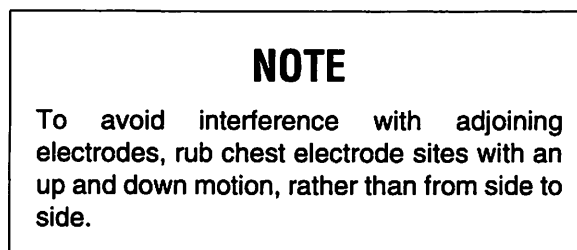
Using the 10-Wire (12-Lead) Acquisition Module

Setup

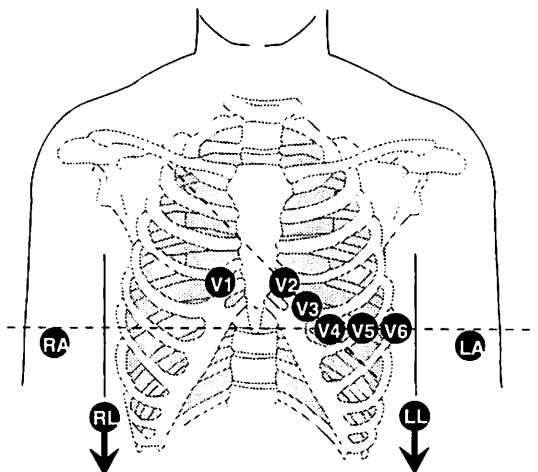
When using the 12-lead acquisition module with the system, follow these steps.



1. Set *10 Wire* in the *AM Type* section of the *Lead Grps* menu. (See “Lead Groups Setup” in chapter 13, “Setup”.)
2. Prepare the limb and precordial electrodes.



Standard 12-Lead Electrode Placement



MD1040-01A

Table 3-1. Chest and Limb Electrode Placement

Leadwire	Position
V1	Fourth intercostal space at the right border of the sternum.
V2	Fourth intercostal space at the left border of the sternum.
V3	Midway between locations V2 and V4.
V4	At the mid-clavicular line in the fifth intercostal space.
V5	At the anterior axillary line on the same horizontal level as V4.
V6	At the mid-axillary line on the same horizontal level as V4 and V5.
RA and LA	Traditionally placed anywhere on the arm. Alternate placement to reduce muscle artifact is midway between the elbow and the shoulder.
RL and LL	Traditionally placed a few inches above the ankle. Alternate placement to reduce muscle artifact is on the upper leg as close to the torso as possible.

NOTE

Do not pull or jerk tangled leadwires. To untangle, disconnect leadwires from electrodes.

Using the 14-Wire (16-Lead) Acquisition Module

When using the 16-lead acquisition module with the system, follow these steps.

Setup

1. Set *14 Wire* in the *AM Type* section of the *Lead Grps* menu. (See "Lead Groups Setup" in chapter 13, "Setup".)
 - ◆ The system allows you to select additional lead groups defined as A1, A2, A3, and A4. When selected, the lead group is defined as the difference between the electrode site and $(RA+AL+LL)/3$.
2. Prepare the electrodes.

NOTE

To avoid interference with adjoining electrodes, rub chest electrode sites with an up and down motion, rather than from side to side.

3. Connect the electrodes to the patient.

NOTE

Do not pull or jerk tangled leadwires. To untangle, disconnect leadwires from electrodes.

XYZ Setup

To obtain XYZ, set the A1 through A4 leads to XYZ.

1. Use the *AM Type* function by returning to the *Main Menu*.
2. Press the **SHIFT** key and **F1** key at the same time to display the *System Functions* menu.
3. Select *Setup*.

Password:

4. Enter a Level 1 password. (The default password is "L1".)

Cart Setup
Dat/Tim Phone Ld Grps Reports More

5. Select *Ld Grps*.

Lead Groups
Rhythm Standrd CGR/RMR S1 AM Type

6. Select *AM Type*.

AM Type:
10 Wire 14 Wire

7. Select *14 Wire*.

Set A1-A4 leads as:
unused A1-A4 XYZ V3R,V4R,V7

8. Select *XYZ*.

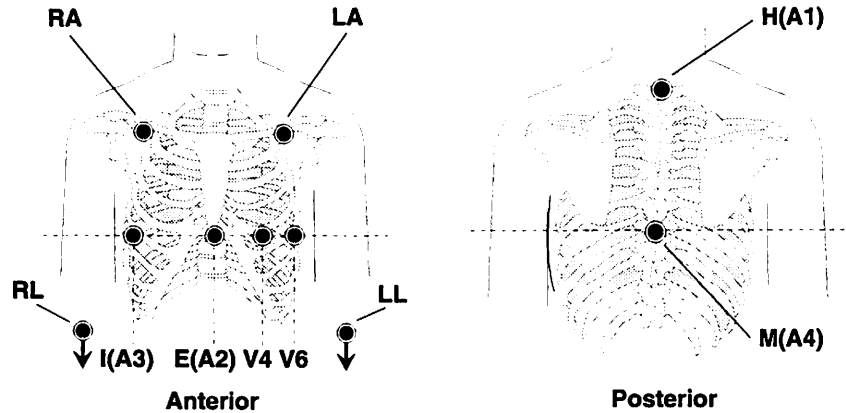
NOTE

Do NOT use the auxiliary lead group mode (A1, A2, A3, A4, or V3R, V4R, V7) for XYZ. If you do, the resulting ECG data may be inaccurate and may cause misinterpretation.

9. In the final prompt, decide whether or not the XYZ leads will be stored.

Auxiliary Electrode Placement for XYZ Connection

Connect the auxiliary leadwires (A1 through A4) to the patient as shown in the figures below.



MD1040-02A, -03A

Table 3-2. X, Y, Z Electrode Placement

Leadwire	Position
V4	At the mid-clavicular line in the fifth intercostal space.
V6	At the left mid-axillary line on the same horizontal level as V4.
H(A1)	Back of neck, avoid carotid artery and jugular vein.
E(A2)	Mid-sternum on the same horizontal level as V4 and V6.
I(A3)	At the right mid-axillary line on the same horizontal level as V4 and V6.
M(A4)	Center of spine on the same horizontal level as V4 and V6.

Hi-Res Recording

For Hi-Res recording, position the limb leads as follows.

Table 3-3. Hi-Res Recording Electrode Placement

Leadwire	Position
RA and LA	Right and left arm just below the clavicle.
RL and LL	Right and left leg on the lower abdominal quadrant.

Vectorcardiograms

For vectorcardiograms, position the limb leads according to the standard 12-lead placement.

V3R, V4R, V7 Setup

To obtain V3R, V4R, and V7, set the A1 through A4 leads to V3R, V4R, and V7.

1. Use the *AM Type* function by returning to the *Main Menu*.
2. Press the **SHIFT** key and **F1** key at the same time to display the *System Functions* menu.
3. Select *Setup*.

Password:

4. Enter a Level 1 password. (The default password is "L1".)

Cart Setup
Dat/Tim Phone Ld Grps Reports More

5. Select *Ld Grps*.

Lead Groups
Rhythm Standrd CGR/RMR S1 AM Type

6. Select *AM Type*.

AM Type:
10 Wire 14 Wire

7. Select *14 Wire*.

Set A1-A4 leads as:
unused A1-A4 XYZ V3R,V4R,V7

8. Select *V3R,V4R,V7*.

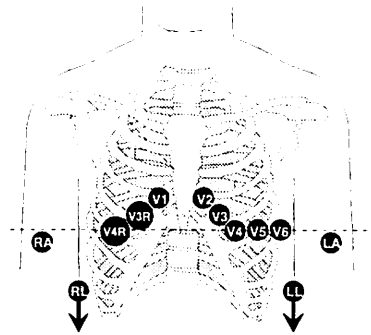
NOTE

Do NOT use the auxiliary lead group mode (A1, A2, A3, A4, or V3R, V4R, V7) for XYZ. If you do, the resulting ECG data may be inaccurate and may cause misinterpretation.

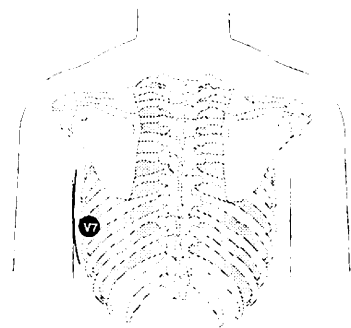
9. Additional prompts, ask you to decide which leads - V3R, V4R, and/or V7 - will be used, and whether or not these leads will be stored.

Auxiliary Electrode Placement for Pediatric Connection

Connect the auxiliary leadwires (A1 through A4) to the patient as shown in the figures below. Place the limb (LA, LL, RA, RL) and chest (V1 through V6) leadwires, according to the standard 12-lead electrode placement.



Anterior



Posterior

MD1040-04A, -05A

Table 3-4. Pediatric Electrode Placement

Leadwire	Position
V3R	Halfway between V1 and V4R.
V4R	At the mid-clavicular line in the fifth right intercostal space.
V7	At the same horizontal level of V4 in the posterior axillary line.

4

TAKING A RESTING ECG

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Entering Patient Information

Patient ID Number

Helpful Hint

Before you begin entering patient information there are a few special keys you should be familiar with. See "Keyboard Description" in chapter 2, "Equipment Overview."

It is NOT necessary to enter any of the following information in order to take a resting ECG unless the unit has been set up to require a patient ID before recording a 12-lead ECG.

If the patient ID is not required, you can record an ECG at any time – if the *Main Menu* is displayed – by pressing the **RECORD ECG** key.

If the unit does not require the patient's ID number, the patient can be identified by the date and time the ECG was taken. However, if the ECG is transmitted to a MUSE system it will be very difficult to keep track of it without a patient identification number.

Order Manager

Instead of entering patient information via the keyboard each time you record an ECG, you can use the order manager to transfer sets of patient information — called "orders" — from the Marquette Order Manager computer to the MAC 12/15 system. (See appendix E, "Using the Order Manager Function.")

Patient Information

You can select a *Long* or *Short* list of patient information items under *Misc in Cart Setup*. (See chapter 13, "Setup.")

1. If the *Main Menu* is not already displayed, press the **STOP** key.

```
↑Task   V1+II+V5
PatInfo Rhythm 25mm/s 10mm/mV More
```

2. Select *PatInfo*. One of the following two prompts will appear.

```
New Patient:
Yes         No
```

OR

```
Patient Last Name:
A to Z, Space, ' , - , .
```

This is the start of the patient information prompts. You can answer as many as you like, skipping as many as you wish.

Software Version 009A and 109A

The order of the questions asked in the *PatInfo* menu has been rearranged with software version 009A, 109A.

- To go through the patient information prompts rapidly, press the **ENTER** key after each prompt appears.
- Press the **STOP** key to skip all the patient information prompts.

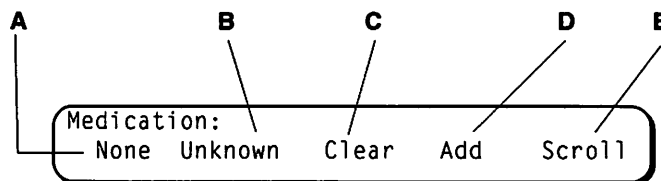
Pediatric Analysis

When a patient's age is entered and the patient is 15 years of age or less, then a pediatric 12SL analysis is performed on the ECG data.

However, if no age is entered, then the system will always perform an adult analysis.

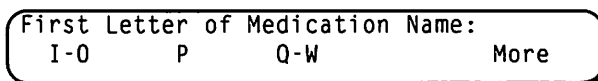
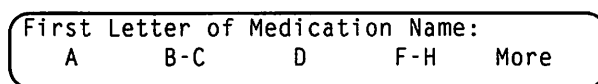
Patient Medications

The last series of patient information prompts asks you about a patient's medications. The first medication prompt is shown below.



Item	Prompt	Description
A	<i>None</i>	The patient is taking no medications.
B	<i>Unknown</i>	Use if you do not know what medications the patient is taking.
C	<i>Clear</i>	Erases all medications that are currently entered for the patient.
D	<i>Add</i>	Use to add a medication that the patient is taking.
E	<i>Scroll</i>	Use to review the patient's medications one at a time.

1. Press the appropriate key and then press the **ENTER** key.
 - ◆ If you selected either *None*, *Unknown*, or *Clear*, then go to step 3.
 - ◆ If you selected *Add*, then go to step 2.
 - ◆ If you selected *Scroll*, the next medication will appear on the display.
 - ◆ After reviewing all medications, press the **ENTER** key to continue. Then go to step 3.
2. After selecting *Add* and pressing the **ENTER** key, the following display will appear.



Adding Medications

To add a medication, press the key that matches the first letter of the medication you wish to add.

For example, if you want to add *Aspirin*, then press the **F1** key to select *A*. Then press the **ENTER** key.

NOTE

The major medical groups are displayed between "<>" symbols.

Next, a list of medications will appear for the letter *A*.

Select Medication:
 <A-ang> <A-arh> <A-coa> <A-hyp> Aspirin

If you want to select *Aspirin* from the list above, press the **F5** key. Then press the **ENTER** key.

You can add the following list of medications.

Table 4-2. Medications	
<p style="text-align: center;">A</p> <p><A-ang> (Antianginal) <A-arh> (Antiarrhythmic) <A-coa> (Anticoagulants) <A-hyp> (Antihypertensive) Aspirin</p>	<p style="text-align: center;">I-O</p> <p><i>Isosorb</i> (Isosorbide) <i>Lidoca</i> (Lidocaine) <i>Nitrate</i> (Nitrates) <i>Other</i></p>
<p style="text-align: center;">B-C</p> <p><BetaB> (Beta Blockers) CalcBlk (Calcium Blockers) Catoprl (Catopril) Clonid (Clonidine) Coumadn (Coumadin)</p>	<p style="text-align: center;">P</p> <p><i>Phenoth</i> (Phenothiazide) <i>Phenytn</i> (Phenytoin) <i>Procaïn</i> (Procainamide) <i>Propran</i> (Propranolol) <Psych> (Psychotropic)</p>
<p style="text-align: center;">D</p> <p><i>Digital</i> (Digitalis) Digitox (Digitoxin) Digoxin (Digoxin-Lanoxin) <Digox> (Digoxin) <Diurt> (Diuretics) Dysopyr (Dysopyramide)</p>	<p style="text-align: center;">Q-W</p> <p><i>Quinid</i> (Quinidine) Reserp (Reserpine) Thiazid (Thiazide) Tricyli (Tricyclic Antidepressant) Warfar (Warfarin)</p>
<p style="text-align: center;">F-H</p> <p><i>Furosem</i> (Furosemide) Heparin Hydral (Hydralazine)</p>	

3. After the medications' prompt, the option number and blood pressure prompts will appear if they were asked for in the *Cart Setup* menu. Finally, the *Main Menu* will reappear. This completes the entry of patient information.

Recording an ECG

Preparation To record an ECG, follow these steps.

1. Prepare the system as described in chapter 2, "Equipment Overview."
2. Prepare the patient as described in chapter 3, "Preparing the Patient."
3. You do not have to enter patient information in order to record an ECG. However, this step is necessary if the unit has been set up to require a patient ID before recording a 12-lead ECG.

If you do not provide a patient ID when it is mandated, the system responds similarly in each of the 3 following situations.

- ◆ If you attempt to ignore the request for patient ID while using the *PatInfo* menu, the unit beeps and freezes on the *Patient ID* query. Enter the patient ID to continue.
- ◆ If you press the **RECORD ECG** key immediately after turning on the unit, the unit beeps and the *Patient ID* query display. Enter the patient ID to continue.
- ◆ If you press the **RECORD RHYTHM** key immediately after turning on the unit, a 3- or 6-lead strip prints. If you then press the **RECORD ECG** key, the printing stops, the unit beeps, and the *Patient ID* query displays. Enter the patient ID to continue.

This mandatory ID option has no effect when editing a stored ECG.

4. If you do not want to save the recorded ECGs, remove any diskette that is in the diskette drive, and go to step 7. Otherwise, make sure you have a diskette that can be used to save the ECGs. Also, make sure that this diskette is not write protected (see appendix E, "Miscellaneous Tasks.")
5. Press the eject button to remove a diskette from the diskette drive slot.
6. Insert the diskette - label side up - into the diskette drive slot.
7. If the *Main Menu* is not displayed, press the **STOP** key.

ECG Status Messages

8. Press the **RECORD ECG** key.

This number increases during the acquisition process.

1 ** Acquiring Data **

Lead error messages appear in this area.

Lead Error Messages

- ◆ If no error messages appear, go to step 9.
- ◆ If a lead error message appears, you have two choices: either correct or override the lead error. Examples of lead error messages are *** V1 DISCONNECTED ***, *** H(A1) BASELINE SWAY ***, *** RL LL 60 HZ NOISE ***, *** V3R(A2) MUSCLE TREMOR ***.
- ◆ If you correct the lead error, the lead error message disappears, and 10 seconds of data is acquired by the system. Go to step 9.
- ◆ If you override the lead error by pressing the **RECORD ECG** key, a display similar to the following appears.

21 ** Acquiring Data **
** LEAD ERROR OVERRIDE **

- ◆ The override message and the error condition appear on all ECG reports printed immediately after acquisition. The override message and the error condition will not be stored to diskette or transmitted.

9. When the system has acquired the ECG, the following prompt appears.

** ECG Acquisition Complete **

- ◆ If you answered *Yes* to the *Disable Automatic Gain Check* prompt in the *Cart Setup* menu, go to "Printing."
- ◆ If the *Main Menu* gain is set to 5 mm/mV and a normal or low amplitude ECG was acquired, the following display appears.

10 mm/mV Limb/Chest Leads:
 YES NO Limb Only

A B C

Table 4-3. Normal or Low ECG Options		
Item	Prompt	Description
A	<i>Yes</i>	Sets all leads to 10 mm/mV.
B	<i>No</i>	Sets all leads to 5 mm/mV. ■ ** ALL LEADS AT 1/2 STD. ** will appear on all ECG reports except the 1 complex/lead report.
C	<i>Limb Only</i>	Sets the limb leads to 10 mm/mV and the chest and auxiliary leads to 5 mm/mV. ■ ** CHEST LEADS AT 1/2 STD ** will appear on all ECG reports except the 1 complex/lead report.

- ◆ If the *Main Menu* gain is set to 10 mm/mV and a high amplitude ECG was acquired, the following display appears.

5 mm/mV Limb/Chest Leads:
 YES NO Chest Only

A B C

Table 4-4. High ECG Options		
Item	Prompt	Description
A	<i>Yes</i>	Sets all leads to 5 mm/mV. ■ ** ALL LEADS AT 1/2 STD. ** will appear on all ECG reports except the 1 complex/lead report.
B	<i>No</i>	Sets all leads to 10 mm/mV.
C	<i>Chest Only</i>	Sets the chest and auxiliary leads to 5 mm/mV and the limb leads to 10 mm/mV. ■ ** CHEST LEADS AT 1/2 STD. ** will appear on all ECG reports except the 1 complex/lead report.

Printing

10. The system processes the ECG and begins printing reports.

** Analyzing ECG **

THEN

** Printing Reports **
Page 1 of 3

These numbers will vary according to how many unconfirmed reports you have selected to print.

- ◆ If you answered *No* to the *Ask for Extra Copies of Plots* prompt in the *Cart Setup* menu. Go to "Vector Loops."
- ◆ If you asked for the extra copies prompt, the following display appears after all reports have printed.

Number of Extra Copies:
0 to 99

11. Type the number of copies you want.
12. Press the **ENTER** key.
13. The following prompt appears.

Change Writer Setting for Reports?"
Yes No

14. Press the appropriate key.
15. Press the **ENTER** key.

- ◆ If you selected *No*, the system will use the current writer settings (speed, gain, and filter) to print the copies. Go to "Vector Loops."
- ◆ If you selected *Yes*, the following appears.

Select Settings. Press PRINT to continue
PRINT NoPrint 25mm/s 10mm/mV 100Hz

A B C D E

Table 4-5. Print Settings

Item	Prompt	Description
A	<i>PRINT</i>	Begins printing the report copies.
B	<i>NoPrint</i>	Cancels printing.
C	<i>25mm/s</i>	Changes the writer speed.
D	<i>10mm/mV</i>	Changes the writer gain.
E	<i>100Hz</i>	Changes the writer filter.

Vector Loops

16. If the acquisition module type is set to *14 Wire* and the auxiliary leads are defined as *XYZ*, the following vector loop report prompt appears. Otherwise, go to “Storing ECGs.”

```
Would you like to see Vector Loops?
Yes      No
```

- ◆ If you selected *No*, go to “Storing ECGs.”
- ◆ If you selected *Yes*, then the following appears.

```
ONSET   OFFSET   GAIN
Qon     Toff     20mm/mV  PRINT   EXIT
  A      B      C      D      E
```

Table 4-6. Vector Loop Settings

Item	Prompt	Description
A	<i>Qon</i>	Changes the vector loop onset. <ul style="list-style-type: none"> ■ For example, <i>Qon</i> (Q onset), <i>Qoff</i> (Qoffset), etc. Clears any onset increment value. ■ For example, <i>Qon+8</i>. Press the SHIFT key and F1 at the same time to add 4 milliseconds to the onset increment value.
B	<i>Toff</i>	Changes the vector loop offset. <ul style="list-style-type: none"> ■ For example, <i>Poff</i> (P offset), <i>Toff</i> (T offset), etc. Clears any offset increment value. ■ For example, <i>Toff+8</i>. Press the SHIFT key and F2 at the same time to add 4 milliseconds to the <u>offset</u> increment value.
C	<i>20mm/mV</i>	Changes the vector loop gain.
D	<i>PRINT</i>	Prints a vector loop plot. <ul style="list-style-type: none"> ■ If the system “beeps”, check the onset and offset locations for accuracy.
E	<i>EXIT</i>	Exits this prompt and continues with the next step.

Storing ECGs

17. After all reports have printed, the following displays appears.

** Processing ECG For Storage **

THEN

** Write to Diskette **

NOTE

Do NOT press the **STOP** key when the **** Write to Diskette **** message appears on the LCD.

- ◆ If a diskette error occurs, go to "Diskette Error."
- ◆ If no diskette error occurs, the following appears.

Storage to Diskette Complete
Type any key to Continue

18. Press any key to return to the *Main Menu*.

Diskette Error

19. If a diskette error occurs, a display similar to the following appears.

```
    ** Write To Diskette **  
DISKETTE NOT IN DRIVE
```

20. Next, a display similar to one of the following appears.

```
    ** Transmit **  
Dialing - 1112345
```

OR

```
ECG Not Stored/Transmitted: Retry?:  
Yes      No
```

The first display appears only:

- If your system is equipped with a modem. In this case the system will try to transmit the recently acquired ECG using the *Cart Setup* phone number. (See "Phone Setup" in chapter 13, "Setup.")
- If no phone number was entered or you wish to cancel the transmission, press the **STOP** key.

When the second display appears:

- Select *Yes* to try saving the recently acquired ECG to diskette or transmitting the ECG over a telephone line.
- Select *No*, and the recently acquired ECG will be lost.

Using the Vector Function to Record 14-Lead XYZ ECGs

The method described in "Recording an ECG" - using the **RECORD ECG** key - may be used to record a 14-lead XYZ ECG. However, the Vector function is a more efficient and an easier method for recording a 14-lead XYZ ECG.

- XYZ configuration is assumed for the A1 through A4 leadwires. Therefore, it is not necessary to use the *Cart Setup* menu to set XYZ for the A1 to A4 leadwires.
- XYZ leads are automatically stored/transmitted after acquisition. Therefore, it is not necessary to use the *Cart Setup* menu to set *Store* for the XYZ leads.

In all other ways, the Vector function operates exactly like the **RECORD ECG** key method. In both methods, for example, press the **RECORD ECG** key to override a lead error.

To use the Vector function to record a 14-lead XYZ ECG, follow these steps.

1. Follow steps 1 through 7 of the previous "Recording an ECG" section.
2. From the *Main Menu*, press the **SHIFT** and **F1** keys at the same time to display the *System Functions* menu.
3. Select *Vector*.
4. A display similar to the following appears.

```
1      ** Acquiring Data **
```

The ECG is acquired, report is printed, and the ECG is stored/transmitted as described in steps 8 through 20 of the previous "Recording an ECG" section.

Using the Pediatric Function

The method described in "Recording an ECG" - using the **RECORD ECG** key - may also be used to record a 14-lead ECG in the pediatric format if the Pediatric format has been enabled in *Cart Setup* and the A1-A4 leads have been set as V3R, V4R, and V7. However, the Pediatric function is a more efficient and easier method for recording a 14-lead V3R, V4R, V7 ECG.

- V3R, V4R, V7 configuration is assumed for the A1 through A4 leadwires. Therefore, it is not necessary to use the *Cart Setup* menu to set V3R, V4R, and V7 for the A1 through A4 leads.
- V3R, V4R, V7 leads are automatically stored/transmitted after acquisition. Therefore, it is not necessary to use the *Cart Setup* menu to set *Store* for these leads.

In all other ways, the Pediatric function operates exactly like the **RECORD ECG** key method. In both methods, for example, press the **RECORD ECG** to override a lead error.

NOTE

Using the Pediatric function will generate a report in the Pediatric format with the A1 through A4 leads set at V3R, V4R, and V7. In order for the 12SL to do a Pediatric Analysis, the patients' age must be 15 years or less. If the age entered is 16 years or more or if no age is entered, the system performs an adult analysis.

1. Follow steps 1 through 7 of the previous "Recording an ECG" section.
2. From the *Main Menu*, press the **SHIFT** and **F1** keys at the same time to display the *System Functions* menu.
3. Select *Ped*.
4. A display similar to the following appears.

1 ** Acquiring Data **

The ECG is acquired, a report in the Pediatric format is printed, and the ECG is stored/transmitted as described in steps 8 through 20 of the previous "Recording an ECG" section.

5

PRINTING A RHYTHM STRIP

To Print a Rhythm Strip3

To Print a Rhythm Strip

To record a rhythm strip (report), follow these steps.

1. Prepare the system as described in chapter 2, "Preparing the Equipment".
2. Prepare the patient as described in chapter 3, "Preparing the Patient".
3. If the *Main Menu* is not already displayed, press the **STOP** key to return to it.

```

↑Task   V1+II+V5
PatInfo Rhythm 25mm/s 10mm/mV More
    
```

4. Press the **RECORD RHYTHM** key. The writer starts printing a rhythm report, and the *Main Menu* will change to the following.

```

V1+II+V5
Rhythm 25mm/s 10mm/mV More
    A         B         C         D
    
```

Table 5-1. Printing Options

Item	Prompt	Description
A	Rhythm	Changes the rhythm leads.
B	25mm/s	Changes the writer's speed.
C	10mm/mV	Changes the writer's gain.
D	More	Changes the writer's filter.

- ◆ If no lead error occurs, go to step 5.
- ◆ If a lead error occurs, a lead error message appears on the *Main Menu*, similar to the following.

```

** V5 DISCONNECTED ***
Rhythm 25mm/s 10mm/mV More
    
```

The lead error may be corrected or overridden.

If you correct the lead error, the lead error message will disappear. Go to step 5.

If you override the lead error by pressing the **RECORD RHYTHM** key, the following appears.

```

** LEAD ERROR OVERRIDE ***
Rhythm 25mm/s 10mm/mV More
    
```

5. To stop printing, press the **STOP** key.

NOTE

Normally, when you press the **RECORD RHYTHM** key, a rhythm report prints until the **STOP** key is pressed. However, if the printing does not stop, turn the system off and then on again.

6

RECEIVING AND TRANSMITTING AN ECG

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Introduction

Overview

This chapter is divided into 6 sections.

- **Transmitting by Telephone** shows you how to use the system's optional modem to send reports over a telephone line.
- **Transmitting Locally** shows you how to send ECGs to another unit using a special cable to connect the system to the other unit.
- **Receiving by Telephone** shows you how to use the system's optional modem to receive ECGs over a telephone line.
- **Receiving Locally (from Another Electrocardiograph)** shows how to receive ECGs from another unit by using a special cable to connect the system to the other unit.
- **Receiving from the MAC PC system** shows you how to receive ECGs from a MAC PC system using a cable to connect the MAC PC system to the MAC 12/15 system.
- **Receiving from the Marquette Responder 1500 Defibrillator** shows you how to receive ECGs from a Marquette Responder 1500 Defibrillator using an external modem and cable to connect to the system.

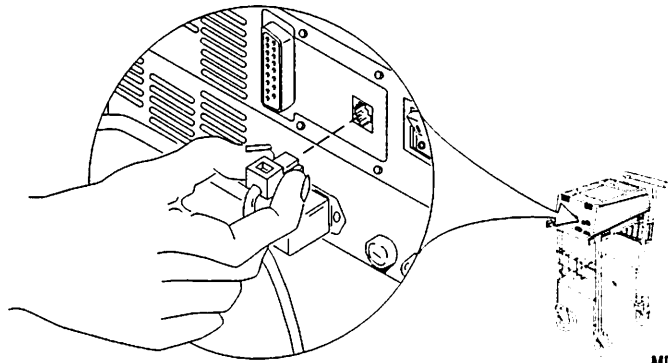
Transmitting by Telephone

Overview

Only a system equipped with a modem can transmit ECG reports by telephone.

Setup

1. Prepare the system as described in chapter 2, "Equipment Overview."
2. Connect a telephone line from a telephone wall connector to the telephone connector on the back of the system.



3. When an ECG is transmitted, the system will try to delete the transmitted ECG. If you do not want the ECGs on diskette deleted, make sure your ECG diskette is write protected (see appendix E, "Miscellaneous Tasks").
4. Press the eject button to remove a diskette from the diskette drive slot.
5. Insert the diskette - label side up - into the diskette drive slot.
6. If the *Main Menu* is not displayed, press the **STOP** key.

```
↑Task    V1+II+V5
PatInfo  Rhythm 25mm/s  10mm/mV  More
```

7. Hold down the **SHIFT** key and then press the **F1** key to display the *System Functions* menu.
8. Select *Disk*.
9. The following display appears.

```
                Diskette Functions
Xmit    Edit    Plot    Dirctry    More
```

10. Select *Xmit* (Transmission).

- ◆ If you answered *No* to the *Will the Local Line be Used* prompt in the *LclLine* section of the *Cart Setup* menu, go to step 13.
- ◆ Otherwise, the following display appears.

```
Transmission Device:
Phone   Local
```

11. Select *Phone*.

12. Press the **ENTER** key.

13. This display appears briefly.

```
** Batch Transmission **
```

14. Next, a phone number prompt appears.

```
Phone Number:
No Spaces or Dashes. - Means Pause.
```

Phone Number

15. If you have not entered a phone number, type one in. (See chapter 13, "Setup" for more information.)

- ◆ Do not use spaces or dashes (-) in the number.
- ◆ The equal (=) sign may be used to insert a pause. For example, in the telephone number 1=2345678, there would be a pause between numbers 1 and 2.

16. After entering the number, press the **ENTER** key.

17. The next prompt allows you to send either all or some of the ECGs on your diskette.

```
Select Data:
All       Select
```

- ◆ Select *All* to transmit all the ECGs of your diskette. Go to "ECG Status Messages."
- ◆ Choose *Select* to select which ECGs to transmit from your diskette. Continue with the next step.

18. The following display appears.

```
Set up Selection Parameters:
Yes   No
```

Setting Up Selection Parameters

19. Select *No* if you want to skip the following selection prompts and view the first ECG on your diskette. Go to step 33.

MUSE System Information

20. Select *Yes* and the first selection prompt appears.

Select by PID:
Yes No

- ◆ If you select *No*, go to "MUSE System Information."
- ◆ If you select *Yes*, the following display appears.

Patient ID:
Digits 0 To 9

21. Type in the patient's identification number (PID) that will be used to select ECGs.

22. Press the **ENTER** key.

23. A prompt appears that allows you to select those ECGs that have the same MUSE system site number.

Select by Site:
Yes No

- ◆ If you select *No*, go to step 26.
- ◆ If you select *Yes*, the following display appears.

Site Number:
1 - 255

24. Type in the MUSE system site number that will be used to select ECGs.

25. Press the **ENTER** key.

26. A prompt appears that allows you to select ECGs by their MUSE system location number.

Select by Location:
Yes No

- ◆ If you select *No*, go to "Cart Information."
- ◆ If you select *Yes*, the following display appears.

Location Number:
0 - 99

27. Type in the MUSE system location number that will be used to select ECGs.

28. Press the **ENTER** key.

Cart Information

29. A prompt appears that allows you to select ECGs by their cart number.

```
Select by Cart:
Yes   No
```

- ◆ If you select *No*, go to "Unconfirmed and Confirmed File Selection."
- ◆ If you select *Yes*, the following display appears.

```
Cart Number:
0 - 255
```

30. Type in the cart number that will be used to select ECGs.

31. Press the **ENTER** key.

32. The following display appears.

```
Select:
Unconf  Confrmd  Both
```

- ◆ Select *Unconf* if you want only unconfirmed ECGs to be transmitted.
- ◆ Select *Confrmd* if you want on confirmed ECGs to be transmitted.
- ◆ Select *Both* if you want unconfirmed and confirmed ECGs to be transmitted.

NOTE

Selecting *Confrmd* eliminates the possibility of selecting any Hi-Res or Pacemaker files since these files can not be confirmed.

33. One of the following two displays, or one very similar, appears.

```
No Data Selected to Transmit
Type Any Key to Continue
```

OR

```
E U 123456789    SMITH, JACK
Yes   No        Yes...  No... Expand
```

- ◆ If the first display appears, either there are no ECGs on your diskette or there are no ECGs that fit your selection parameters. In either case, press any key and start this procedure again.
- ◆ If the second display appears, this is the first ECG on your diskette or the first ECG that fits your selection parameters. This second display is explained in detail in the next step.

Unconfirmed and Confirmed File Selection

Viewing Patient Data

34. Select which ECGs you wish to transmit. Each ECG on your diskette or each ECG on diskette that fits your selection parameters displays in a manner similar to the following.

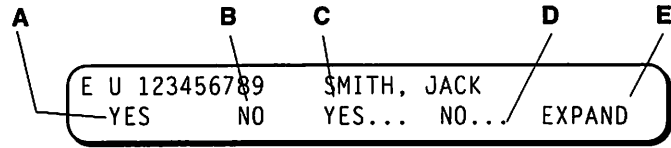


Table 6-1. ECG Patient Data

Item	Prompt	Your Action
A	<i>Yes</i>	Selects this ECG.
B	<i>No</i>	Bypasses this ECG.
C	<i>Yes...</i>	Selects this ECG and all remaining ECGs.
D	<i>No...</i>	Bypasses this ECG and all remaining ECGs.
E	<i>Expand</i>	Provides additional patient information such as date and time of ECG.

35. To display additional patient information, select *Expand* and a message similar to the one below will be displayed.

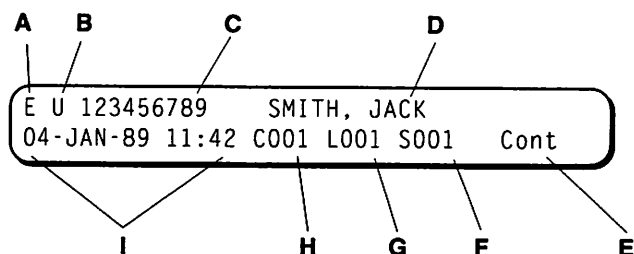


Table 8-2. Expanded Patient Data

Item	Prompt	Description
A	type of data	E = ECG or long form, C = CGR (Computer Graphic Record) P = Packer evaluation file L = Hi-Res file
B	status of data	U = unconfirmed ECG. C = confirmed ECG. (See chapter 7, "Editing ECG Reports" to change an unconfirmed ECG to a confirmed ECG.)
C	patient identification number	Unique identifier.
D	patient name	Last name, first name of patient or the date and time when ECG was recorded.
E	Cont	Select to return to former display.
F	site	MUSE system site number where ECG was recorded.
G	location	Location number where ECG was recorded.
H	cart number	Cart number of the unit where ECG was recorded.
I	date and time	Day, month, year and time when ECG was recorded.

ECG Status Messages

36. Next, messages similar to the following appears.

 ** Batch Transmission **
 Reading Diskette Data
 THEN

 ** Batch Transmission **
 Dialing - 1112345

37. For each ECG transmitted, displays similar to the following appear.

 E U 123456789 SMITH, JACK
 04-JAN-89 11:42 C001 L001 S001
 THEN

 E U 123456789 SMITH, JACK
 Deleting Diskette Data
 THEN

 ** Batch Transmission **
 Reading Diskette Data
 THEN

 ** Batch Transmission **
 Transmitting Diskette Data

NOTE

If the following display appears,

 ** Batch Transmission **

this means that the system could not delete an ECG. This is not an error message. The system will continue transmitting.

38. After all ECGs are transmitted, the following display appears.

 Transmission Complete
 Type Any Key to Continue

39. Press any key to return to the following display.

 Diskette Functions
 Xmit Edit Plot Dirctry More

40. Press the **STOP** key to return to the *Main Menu*.

Transmitting Locally

Overview

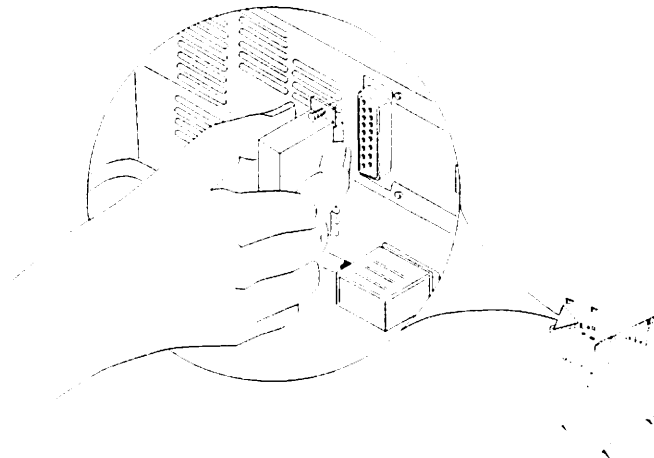
A local connection refers to a direct connection via cable between a transmitting and receiving device.

NOTE

You can only transmit ECGs locally if you have a serial transmission cable. (Refer to the MAC 12/15 resting ECG analysis system field service manual, PN 401003-002, for details.)

Setup

1. Prepare the system as described in chapter 2, "Equipment Overview."
2. Connect the serial transmission cable from the other system (for example, another MAC 12/15 system) to the **AUX DATA** (RS232) port at the back of you system.



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3. When an ECG is transmitted, the system will try to delete the transmitted ECG. If you do not want the ECGs on diskette deleted, make sure your ECG diskette is write protected (see appendix E, "Miscellaneous Tasks").
4. Press the eject button to remove a diskette from the diskette drive slot.
5. Insert the diskette - label side up - into the diskette drive slot.
6. Select *Yes* for *Will the Local Line be Used* prompt in the *LclLine* section of the *Cart Setup* menu.
7. If the *Main Menu* is not displayed, press the **STOP** key.

↑Task	V1+II+V5			
PatInfo	Rhythm	25mm/s	10mm/mV	More

8. Hold down the **SHIFT** key and then press the **F1** key to display the *System Functions* menu.
9. Select *Disk*.
10. The following display appears.

```

          Diskette Functions
Xmit   Edit   Plot   Dirctry   More
    
```

11. Select *Xmit* (Transmission).

```

Transmission Device:
Phone   Local
    
```

12. Select *Local*.
13. Press the **ENTER** key.
14. Select whether or not the ECG should be sent in a compressed format.

```

Data Format:
All     Compr
    
```

- ◆ ECGs sent in the *Comprs* (compressed) format will be transmitted more rapidly than if *All* is used.
- ◆ Only select *Comprs* if you are sending ECGs to another Marquette product (for example, a MAC 12/15 system or MUSE system), because the compression algorithm is proprietary.
- ◆ ECGs sent using *Comprs* are stored by the receiving system.
- ◆ ECGs sent using *All* are not stored by the receiving system.

15. This display appears briefly.

```

          ** Batch Transmission **
    
```

16. The next prompt allows you to send either all or some of the ECGs on your diskette.

```

Select Data:
All     Select
    
```

- ◆ Select *All* to send all the ECGs on your diskette. Go to "ECG Status Messages."
- ◆ Choose *Select* to select which ECGs to send from your diskette. Continue with the next step.

17. The following display appears.

```

Set up Selection Parameters:
Yes   No
    
```

Setting Up Selection Parameters

18. Select *No* if you want to skip the following selection prompts and view the first ECG on your diskette. Go to step 32.
19. Select *Yes* and the first selection prompt appears.

Select by PID:
Yes No

- ◆ If you select *No*, go to "MUSE System Information."
- ◆ If you select *Yes*, the following display appears.

Patient ID:
Digits 0 To 9

20. Type in the patient's identification number (PID) that will be used to select ECGs.
21. Press the **ENTER** key.

MUSE System Information

22. A prompt appears that allows you to select those ECGs that have the same MUSE system site number.

Select by Site:
Yes No

- ◆ If you select *No*, go to step 25.
- ◆ If you select *Yes*, the following display appears.

Site Number:
1 - 255

23. Type in the MUSE system site number that will be used to select ECGs.
24. Press the **ENTER** key.
25. A prompt appears that allows you to select ECGs by their MUSE system location number.

Select by Location:
Yes No

- ◆ If you select *No*, go to "Cart Information."
- ◆ If you select *Yes*, the following display appears.

Location Number:
0 - 99

26. Type in the MUSE system location number that will be used to select ECGs.
27. Press the **ENTER** key.

Cart Information

28. A prompt appears that allows you to select ECGs by their cart number.

```
Select by Cart:
Yes   No
```

- ◆ If you select *No*, go to "Unconfirmed and Confirmed File Selection."
- ◆ If you select *Yes*, the following display appears.

```
Cart Number:
0 - 255
```

29. Type in the cart number that will be used to select ECGs.

30. Press the **ENTER** key.

31. The following display appears.

```
Select:
Unconf  Confrmd  Both
```

- ◆ Select *Unconf* if you want only unconfirmed ECGs to be transmitted.
- ◆ Select *Confrmd* if you want on confirmed ECGs to be transmitted.
- ◆ Select *Both* if you want unconfirmed and confirmed ECGs to be transmitted.

NOTE

Selecting *Confrmd* eliminates the possibility of selecting any Hi-Res or Pacemaker files since these files can not be confirmed.

32. One of the following two displays, or one very similar, appears.

```
No Data Selected to Transmit
Type Any Key to Continue
```

OR

```
E U 123456789    SMITH, JACK
Yes   No     Yes...  No... Expand
```

- ◆ If the first display appears, either there are no ECGs on your diskette or there are no ECGs that fit your selection parameters. In either case, press any key and start this procedure again.
- ◆ If the second display appears, this is the first ECG on your diskette or the first ECG that fits your selection parameters. This second display is explained in detail in the next step.

Unconfirmed and Confirmed File Selection

33. Select which ECGs you wish to transmit. Each ECG on your diskette or each ECG on diskette that fits your selection parameters displays in a manner similar to the following.

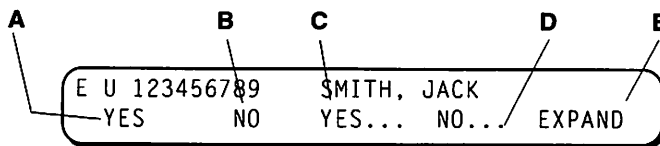


Table 8-3. ECG Patient Data

Item	Prompt	Your Action
A	<i>Yes</i>	Selects this ECG.
B	<i>No</i>	Bypasses this ECG.
C	<i>Yes...</i>	Selects this ECG and all remaining ECGs.
D	<i>No...</i>	Bypasses this ECG and all remaining ECGs.
E	<i>Expand</i>	Provides additional patient information such as date and time of ECG.

34. To display additional patient information, select *Expand* and a message similar to the one below will be displayed.

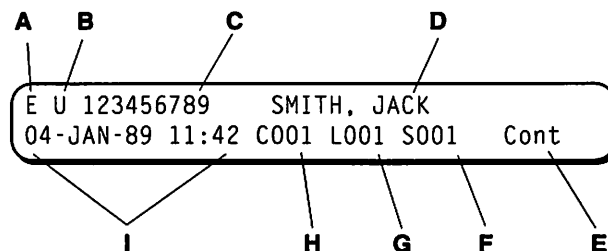


Table 8-4. Expanded Patient Data

Item	Prompt	Description
A	type of data	E = ECG or long form, C = CGR (Computer Graphic Record) P = Packer evaluation file L = Hi-Res file
B	status of data	U = unconfirmed ECG. C = confirmed ECG. (See chapter 7, "Editing ECG Reports" to change an unconfirmed ECG to a confirmed ECG.)
C	patient identification number	Unique identifier.
D	patient name	Last name, first name of patient or the date and time when ECG was recorded.
E	Cont	Select to return to former display.
F	site	MUSE system site number where ECG was recorded.
G	location	Location number where ECG was recorded.
H	cart number	Cart number of the unit where ECG was recorded.
I	date and time	Day, month, year and time when ECG was recorded.

ECG Status Messages

35. For each ECG transmitted, displays similar to the following appear.

NOTE

The first display will only appear if the system is waiting for the receiving system to acknowledge.

** Transmitting Diskette Data **
Waiting for 'Receiver Ready' Message

THEN

** Batch Transmission **
Reading Diskette Data

THEN

E U 123456789 SMITH, JACK
04-JAN-89 11:42 C001 L001 S001

THEN

** Transmitting Diskette Data **
Sending #13 Retry #0

THEN

** Transmitting Diskette Data **
Deleting Diskette Data

NOTE

If the following display appears,

** Batch Transmission **
Diskette Error - Write Protected

this means that the system could not delete an ECG. This is not an error message. The system will continue transmitting.

36. The following two displays appear.

** Batch Transmission **
Ending Transmission

THEN

Transmission Complete
Type Any Key to Continue

37. Press any key to return to the following display.

Diskette Functions
Xmit Edit Plot Dirctry More

38. Press the **STOP** key to return to the *Main Menu*.

Receiving by Telephone

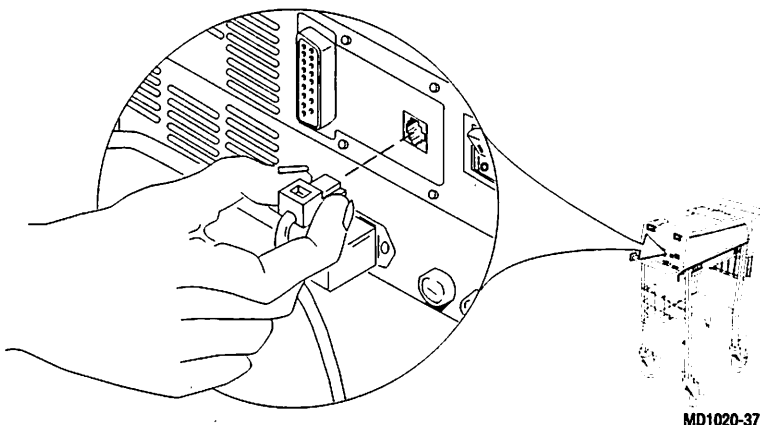
Overview Only a system equipped with a modem can receive ECGs by telephone.

NOTE

When you receive MUSE system data during Reverse Transmission on the MAC 12/15 system, the data will NOT be saved to the system's diskette. The type of report format that is printed on the MAC 12/15 system will depend on the MUSE system settings.

Setup

1. Prepare the system as described in chapter 2, "Equipment Overview."
2. Connect a telephone line from a telephone wall connector to the telephone connector on the back of the system.



3. If you do not want to save the ECGs that you will receive, remove any diskette that is in the diskette drive. Go to step 6. Otherwise, make sure you have a diskette that can be used to save the ECGs. Also, make sure that this diskette is not write protected (see appendix E, "Miscellaneous Tasks").
4. Press the eject button to remove a diskette from the diskette drive slot.
5. Insert the diskette - label side up - into the diskette drive slot.
6. If the *Main Menu* is not displayed, press the **STOP** key.

↑Task	V1+II+V5
PatInfo	Rhythm 25mm/s 10mm/mV More

7. Hold down the **SHIFT** key and then press the **F1** key to display the *System Functions* menu.

8. Select *RevXmit* (Reverse Transmission).

- ◆ If you answered *No* to the *Will the Local Line be Used* prompt in the *LclLine* section of the *Cart Setup* menu, go to step 11.
- ◆ Otherwise, the following display appears.

Receiving Device:
Phone Local

9. Select *Phone*.

10. Press the **ENTER** key.

11. The system will now check for a diskette in the diskette drive and the following display appears.

** Reverse Transmission **
Check the Diskette

12. If there is no diskette in the diskette drive, then the system will only be able to print the reports you will receive. The following display appears.

No Data Storage - Plotter Output Only
Type Any Key to Continue.

13. Press any key to continue.

NOTE

If the following display appears,

No Overreadable Report Format Selected
Type Any Key to Continue

you should cancel receiving reports. Press the **STOP** key.

14. After checking for a diskette, the system will check the phone line. This display appears.

** Reverse Transmission **
Check the Phone Line

15. One of the following two displays appear.

** Reverse Transmission **
Phone Line Not Attached

OR

** Reverse Transmission **
Ready to Receive

- ◆ If the *Phone Line Not Attached* message appears, press the **STOP** key. Check the telephone connection to the system. Restart this procedure.
 - ◆ If the *Ready to Receive* message appears, continue with the next step.
16. The *Ready to Receive* message will remain on the display until your system receives a telephone call from the unit that will be sending the ECGs. The following display appears.

** Reverse Transmission **
Answering the Phone

17. For each ECG received, the following two displays repeat.

** Reverse Transmission **
Receiving Data

OR

** Reverse Transmission **
End of Data Packet

18. When all ECGs are received, the following display appears.

** Printing Reports **
Page 1 of 3

These numbers will vary according to how many ECGs have been received.

19. When the last ECG report is printed, the following display appears.

** Reverse Transmission **
Ready to Receive

20. Press the **STOP** key to return to the *Main Menu*.

Receiving Locally (from Another Electrocardiograph)

Overview

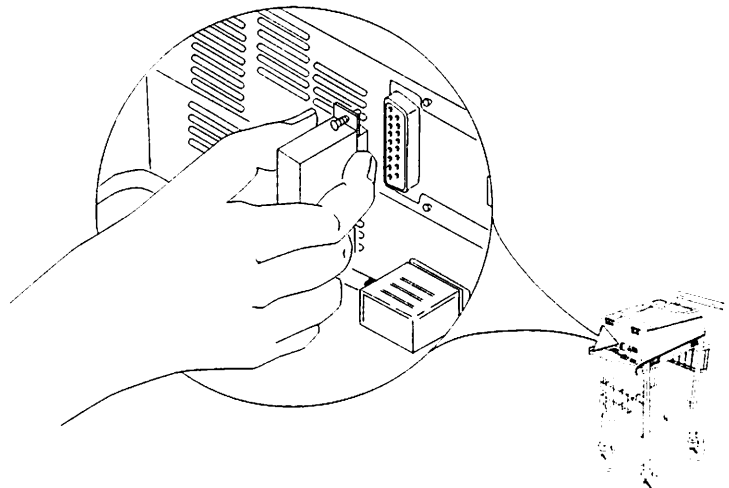
A local connection refers to a direct connection via cable between a transmitting and receiving device.

NOTE

You can only receive ECGs locally if you have a serial transmission cable. (Refer to the MAC 12/15 resting ECG analysis system field service manual, PN 401003-002, for details).

Setup

1. Prepare the system as described in chapter 2, "Equipment Overview."
2. Connect the serial transmission cable from the other unit (for example, another MAC 12/15 system) to the **AUX DATA** (RS232) port at the back of you system.



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3. If you do not want to save the ECGs that you will receive, remove any diskette that is in the diskette drive, and go to step 6. Otherwise, make sure you have a diskette that can be used to save the ECGs. Also, make sure that this diskette is not write protected (see appendix E, "Miscellaneous Tasks").
4. Press the eject button to remove a diskette from the diskette drive slot.
5. Insert the diskette - label side up - into the diskette drive slot.
6. Select *Yes* for *Will the Local Line be Used* prompt in the *LclLine* section of the *Cart Setup* menu.

7. If the *Main Menu* is not displayed, press the **STOP** key.

```
↑Task   V1+II+V5
PatInfo Rhythm 25mm/s 10mm/mV   More
```

8. Hold down the **SHIFT** key and then press the **F1** key to display the *System Functions* menu.
9. Select *RevXmit* (Reverse Transmission).
10. The following display appears.

```
Receiving Device:
Phone   Local
```

11. Select *Local*.
12. Press the **ENTER** key.
13. This display appears briefly.

```
** Local Reverse Transmission **
```

14. For each ECG received, displays similar to the following appear.

NOTE

The numbers in the displays below are given only as examples. Other numbers will appear when you are receiving.

```
** Local Reverse Transmission **
Waiting #12                               Retry #10
```

THEN

```
** Local Reverse Transmission **
Rcvd #2
```

THEN

```
** Printing Reports **
Page 1 of 3
```

15. After all ECGs are received, the following display appears.

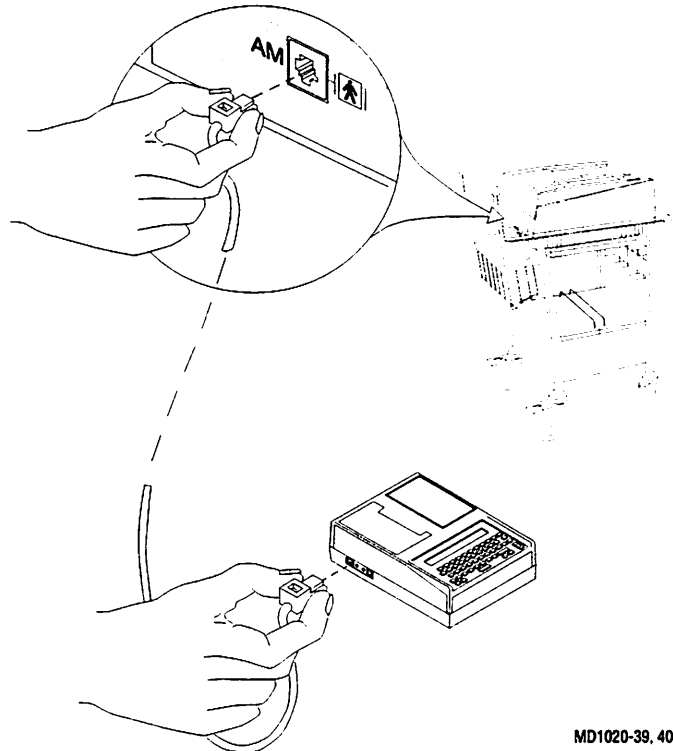
```
** Local Reverse Transmission **
Waiting #13                               Retry #10
```

16. Press the **STOP** key to return to the *Main Menu*.

Receiving from the MAC PC System

Setup

1. Prepare the system as described in chapter 2, "Equipment Overview."
2. Using a straight cable, plug one end into the auxiliary connector on the side of the MAC PC system and the other end into the acquisition module (AM) connector located on the front of the receiving system.



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3. If you do not want to save the ECGs that you will receive, remove any diskette that is in the diskette drive, and go to step 6. Otherwise, make sure you have a diskette that can be used to save the ECGs. Also, make sure that this diskette is not write protected (see appendix E, "Miscellaneous Tasks").
4. Press the eject button to remove a diskette from the diskette drive slot.
5. Insert the diskette - label side up - into the diskette drive slot:
6. If the *Main Menu* is not displayed, press the **STOP** key.

↑Task	V1+II+V5
PatInfo	Rhythm 25mm/s 10mm/mV More

7. Hold down the **SHIFT** key and then press the **F1** key to display the *System Functions* menu.
8. Select *LocPC* (Local PC system).

9. When the following display appears, if you haven't already done so, use a straight cable to connect the MAC PC system to the MAC 12/15 system as shown in step 2.

Disconnect AM & Connect MAC PC
Type Any Key to Continue

Also, make sure that the MAC PC system has been set up to locally transmit ECGs. (Refer to "Transmitting Locally" in chapter 6, "Receiving and Transmitting an ECG" in the MAC PC resting ECG analysis system operators manual, PN 403506-001.)

10. Press any key to continue.
11. One of the following two displays appear.

No Data Storage - Plotter Output Only
Type Any Key to Continue

OR

Waiting to establish ON LINE
Communication with MAC PC

- ◆ If the first display appears, it means that there is no diskette in the diskette drive slot, and ECGs will only be printed, not saved to diskette. Press any key to continue.
 - ◆ If the second display appears, continue with the next step.
12. For each ECG received, displays similar to the following appear.

*** Transfer in Progress ***

THEN

** Printing Report **
Page 1 of 3

THEN

** Record Transferred **

THEN

Waiting to establish ON LINE
communication with MAC PC

13. When the last ECG has been sent, press the **STOP** key to return to the *Main Menu*.

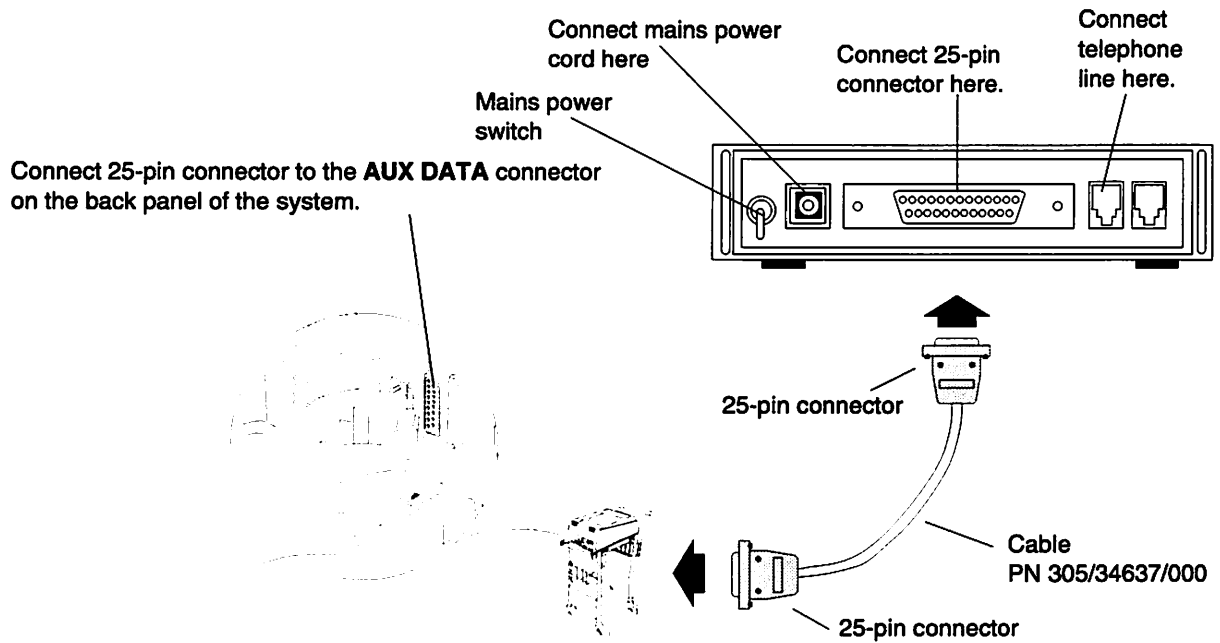
Receiving from the Marquette Responder 1500 Defibrillator

Overview

Only a system equipped with a 1200 baud modem and an **AUX DATA** connector can receive 12-lead ECG data from a Marquette Responder 1500 Defibrillator equipped with the 12SL analysis program option.

Connecting the External Modem

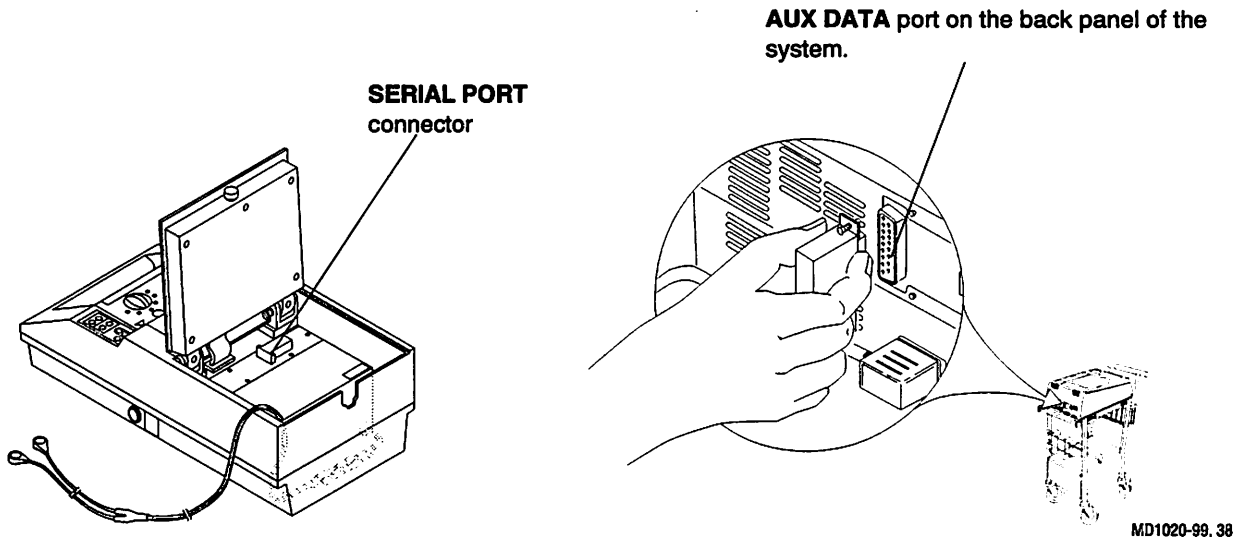
Marquette Electronics recommends that you use the Hayes Smart modem 2400 (PN 900436-001) programmed by Marquette Electronics as the external modem.



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Connecting Locally to the Defibrillator

Connect the system to the defibrillator directly to receive 12-lead ECG data from the defibrillator.



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LclLine Setup

Use this table to set the communication parameters for the **AUX DATA** connector.

Table 8-5. Communication Parameters.

Step	LCD	Your Action
1	System Functions Orders RevXmit Disk Vector More	Select <i>More</i> .
2	System Functions Ped Pace Hi-Res Setup More	Select <i>Setup</i> .
3	Password:	Type the password. The default is <i>L1</i> .
4	Cart Setup Dat/Time Phone LdGrps Reports More	Select <i>More</i> .
5	Cart Setup Passwds Modem LclLine Misc More	Select <i>LclLine</i> .
6	Will the Local Line be Used: Yes No	Select <i>Yes</i> .
7	Local Line Baud Rate: 75 110 134.5 150 More	Select <i>More</i> until you can select <i>1200</i> .
8	Local Line Number of Stop Bits: 1 2	Select <i>1</i> stop bit. The <i>Main Menu</i> appears.

MAC 12/15 System Setup

1. Prepare the system as described in chapter 2, "Equipment Overview."
2. If the *Main Menu* is not displayed, press the **STOP** key.

```
↑Task    V1+II+V5  
PatInfo  Rhythm 25mm/s 10mm/mV  More
```

3. Hold down the **SHIFT** key and then press the **F1** key to display the *System Functions* menu.

```
System Functions  
Orders  RevXmit  Disk  Vector More
```

4. Select *RevXmit*.

```
Receiving Device:  
Phone  Local
```

5. Select *Local*. The following display appears.

```
** Local Reverse Transmission **
```

NOTE

When receiving 12-lead ECG data from a Marquette Responder 1500 Defibrillator, you can only print the data.

6. For each ECG received, displays similar to the following appear.

NOTE

The numbers in the displays below are given only as examples. Other numbers will appear when you are receiving.

```
No Data Storage - Plotter Output Only  
Type Any Key to Continue
```

NOTE

The previous display appears only if you did not insert a diskette in the diskette drive slot.

ECG Status Messages

1. The following series of messages will be displayed for each ECG that is received.

```
  ** Local Reverse Transmission **  
Waiting #12                               Retry #0
```

THEN

```
  ** Local Reverse Transmission **  
Rcvd #2
```

THEN

```
  ** Printing Reports **  
Page 1 of 3
```

2. After all ECGs are received, a display similar to the following appears.

```
  ** Local Reverse Transmission **  
Waiting #1                               Retry #0
```

3. Press the **STOP** key to return to the *Main Menu*.

7

EDITING ECG REPORTS

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Types of Data Reports

Overview This chapter is divided into 2 sections.

- **Full Edit** shows you how to change Marquette's 12SL analysis program statements, measurement data, and patient information that appear on ECG reports.
- **Patient Data Edit** shows you how to change just the patient information that appears on ECG reports.

NOTE

Editing files may change their order on the diskette directory. Therefore, if files are going to be transmitted to a MUSE system for serial comparison analysis, file editing should be done with the MUSE system after transmission. If editing is done with the MAC 12/15 system before transmission, the MUSE system will perform a serial comparison analysis on the wrong ECG files.

Pediatric Analysis

The system's 12SL analysis program will perform a pediatric analysis on patients who are 15 years old or less. (The phrase *****Pediatric Analysis***** will appear on these reports.)

Since the 12SL analysis program analyzed ECG data when it is first acquired, a pediatric analysis can not be changed to an adult analysis – or vice versa – using the system's *Edit* function described in the following pages.

For example, assume a 16-year old patient was mistakenly entered as a 15-year old. (The system would do a pediatric analysis.) Then the *Edit* function was used to correct the patient's age to 16. Even though the age was changed, the patient's ECG reports would still reflect the original pediatric analysis. However, *Edit* can be used to change the 12SL analysis program statements that appear on reports.

Full Edit

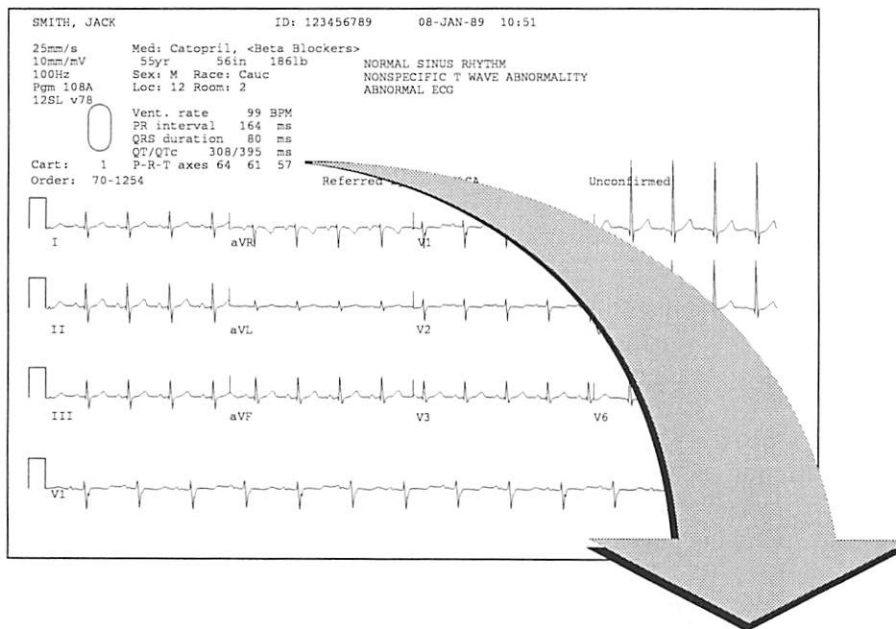
Overview

Your system allows you to edit ECGs stored on diskette. In a full edit you can change the statements, measurements, and/or the patient data.

The statements, measurements, and patient data sections are shown on a sample ECG report below.

NOTE

A full edit can not be done on Hi-Res and Pacemaker evaluation reports.



Patient data

```

SMITH, JACK ID: 123456789 08-JAN-89 10:51
25mm/s Med: Catopril, <Beta Blockers>
10mm/mV 55yr 56in 186lb
100Hz Sex: M Race: Cauc
Pgm 108A Loc: 12 Room: 2
12SL v78
Vent. rate 99 BPM
PR interval 164 ms
QRS duration 80 ms
QT/QTc 308/395 ms
P-R-T axes 64 61 57
Cart: 1
Order:70-1254
Referred by: DR TELSA Unconfirmed
    
```

Measurements

12SL analysis program statements

Setup

To perform a full edit, follow these steps.

Helpful Hint

Before you begin editing information, there are a few special keys you should be familiar with. See "Keyboard Description" in chapter 2, "Preparing the Equipment".

NOTE

Only ECGs stored on a diskette can be edited.

1. Make sure that the diskette containing the ECGs you want to edit is not write protected (see appendix E, "Miscellaneous Tasks").
2. Press the eject button to remove a diskette from the diskette drive slot
3. Insert the diskette - label side up - into the diskette drive slot.
4. If the *Main Menu* is not displayed, press the **STOP** key.

```
↑Task   V1+II+V5
PatInfo Rhythm 25mm/s 10mm/mV   More
```

5. Hold down the **SHIFT** key and then press the **F1** key to display the *System Functions* menu.
6. Select *Disk*.
7. The following display appears.

```
Diskette Functions
Xmit   Edit   Plot   Dirctry  More
```

8. Select *Edit*.
9. The following display appears.

```
Edit Functions
Full   PatData
```

10. Select *Full*.
11. Press the **ENTER** key.

Entering Password

1. The following display appears.

Password:

2. Enter the Level 1 or Level 2 password. (The default passwords are "L1" and "L2".)
3. Press the **ENTER** key.
4. The system will check your ECG diskette and the following display appears briefly.

*** Editor ***
Reading Diskette

NOTE

If a diskette error message appears, make sure your ECG diskette is not write protected.

Selecting the ECG File

1. The next display allows you to edit either all or some of the ECGs on your diskette.

Select Data:
All Select

- ◆ Select *All* to edit all the ECGs on your diskette. Go to "Editing the Selected ECG."
 - ◆ Choose *Select* to select which ECGs to edit on your diskette. Continue with the next step.
2. The following display appears.

Set up Selection Parameters:
Yes No

3. Select *No* if you want to skip the following selection prompts and view the first ECG on your diskette. Go to "Selecting MUSE System Information" step 5.

4. Select *Yes* and the first selection prompt appears.

Select by PID:
Yes No

- ◆ If you select *No*, go to "Selecting MUSE System Information."
- ◆ If you select *Yes*, the following display appears.

Patient ID:
Digits 0 To 9

5. Type in the patient's identification number (PID) that will be used to select ECGs.
6. Press the **ENTER** key.

Selecting MUSE System Information

1. A prompt appears that allows you to select those ECGs that have the same MUSE system site number.

Select by Site:
Yes No

- ◆ If you select *No*, go to step 4.
- ◆ If you select *Yes*, the following display appears.

Site Number:
1 - 255

2. Type in the MUSE system site number that will be used to select ECGs.
3. Press the **ENTER** key.
4. A prompt will appear that allows you to select ECGs by their MUSE system location number.

Select by Location:
Yes No

- ◆ If you select *No*, go to "Selecting ECG by Cart Number."
- ◆ If you select *Yes*, the following display appears.

Location Number:
0 - 99

5. Type in the MUSE system location number that will be used to select ECGs.
6. Press the **ENTER** key.

Selecting ECGs by Cart Number

1. A prompt appears that allows you to select ECGs by their cart number.

```
Select by Cart:
Yes    No
```

- ◆ If you select *No*, go to step 4.
- ◆ If you select *Yes*, the following display appears.

```
Cart Number:
0 - 255
```

2. Type in the cart number that will be used to select ECGs.
3. Press the **ENTER** key.
4. The following prompt appears.

```
Select:
Unconf  Confrmd  Both
```

- ◆ Select *Unconf* if you want only unconfirmed ECGs to be edited.
- ◆ Select *Confrmd* if you want on confirmed ECGs to be edited.
- ◆ Select *Both* if you want unconfirmed and confirmed ECGs to be edited.

NOTE

Selecting *Confrmd* eliminates the possibility of selecting any Hi-Res or Pacemaker files since these files can not be confirmed.

5. One of the following two displays, or one very similar, appears.

```
No Data Selected to Edit
Type Any Key to Continue
```

OR

```
E U 123456789    SMITH, JACK
Yes    No        Yes...  No..  Expand
```

- ◆ If the first display appears, either there are no ECGs on your diskette or there are no ECGs that fit your selection parameters. In either case, press any key and start this procedure again.
- ◆ If the second display appears, this is the first ECG on your diskette or the first ECG that fits your selection parameters. This second display is explained in detail in the next step.

Viewing the Stored ECG

- Select which ECGs you wish to edit. Each ECG on your diskette or each ECG on diskette that fits your selection parameters displays in a manner similar to the following.

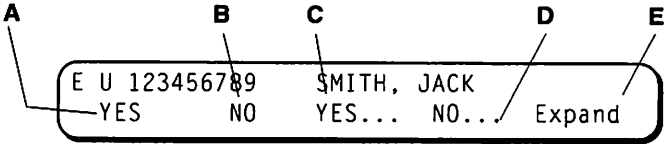


Table 7-1. ECG Patient Data		
Item	Prompt	Your Action
A	<i>Yes</i>	Selects this ECG.
B	<i>No</i>	Bypasses this ECG.
C	<i>Yes...</i>	Selects this ECG and all remaining ECGs.
D	<i>No...</i>	Bypasses this ECG and all remaining ECGs.
E	<i>Expand</i>	Provides additional patient information such as date and time of ECG.

2. To display additional patient information, select *Expand* and a message similar to the one below will be displayed.

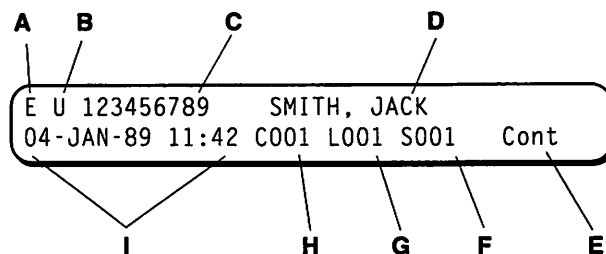


Table 7-2. Expanded Patient Data

Item	Prompt	Description
A	type of data	E = ECG or long form, C = CGR (Computer Graphic Record) P = Packer evaluation file L = Hi-Res file
B	status of data	U = unconfirmed ECG. C = confirmed ECG. (Use the OK or ↑OK function to change an unconfirmed ECG to a confirmed ECG.)
C	patient identification number	Unique identifier.
D	patient name	Last name, first name of patient or the date and time when ECG was recorded.
E	Cont	Select to return to former display.
F	site	MUSE system site number where ECG was recorded.
G	location	Location number where ECG was recorded.
H	cart number	Cart number of the unit where ECG was recorded.
I	date and time	Day, month, year and time when ECG was recorded.

Editing the Selected ECG

1. Displays similar to the following appear.

```

** Editor **
Reading Diskette

```

THEN

```

E U 123456789    SMITH, JACK
04-JAN-89 11:42 C001 L001 S001

```

2. Press the **ENTER** key to edit this ECG.

Entering Reviewer Identification

1. This display appears.

```

Reviewer Number:
1 - 999

```

2. Type in your reviewer number.
3. Press the **ENTER** key. The following display appears.

```

Reviewer Name:
Any 24 Characters.

```

4. Type in a reviewer name.
5. Press the **ENTER** key.

Selecting Functions

1. A display similar to the following appears.

```

NSR
Insert Delete Expand Measure More

```

2. Select *More*.

```

NSR
OK Kill Print PatInfo More

```

3. Select a function: *Insert, Delete, Expand, Measure, OK, Kill, Print PatInfo, or More*.

4. For each ECG report, the following display allows you to change the 12SL analysis program statements (using the *Statemts* function), measurements (using the *Measure* function), or patient data (using the *PatData* function).

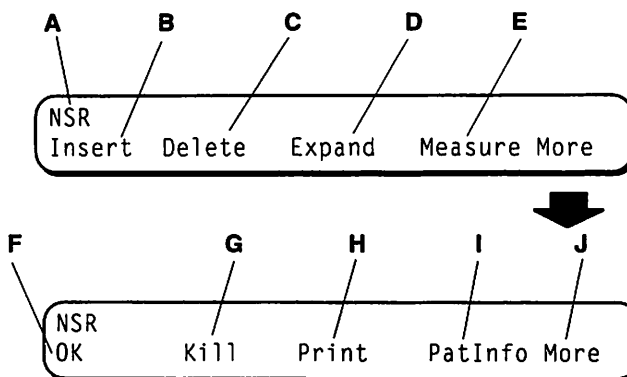


Table 7-3. 12SL Analysis Program Statements

Item	Prompt	Description
A	<i>NSR</i>	Acronym for 12SL analysis program statement (in this case, <i>NSR</i> for Normal Sinus Rhythm).
B	<i>Insert</i>	Adds either an acronym or free text to the statements section of an ECG report (<i>Insert</i> function examples appear on the following pages.)
C	<i>Delete</i>	Erases the currently displayed acronym (in this case, pressing <i>Delete</i> would erase <i>NSR</i> .)
D	<i>Expand</i>	Makes the full name of the currently displayed acronym appear (in this case, pressing <i>Expand</i> would display <i>Normal Sinus Rhythm</i> for <i>NSR</i> .)
E	<i>Measure</i>	Changes items in the measurements section of an ECG report.
F	<i>OK</i>	Makes all your changes. This also changes an unconfirmed report to a confirmed report.
G	<i>Kill</i>	Undoes all the changes you made. The ECG report will revert to its last saved version.
H	<i>Print</i>	The writer prints the currently edited ECG report. (The words PRELIMINARY COPY will appear on the report.)
I	<i>PatInfo</i>	Edits items in the patient data section of an ECG report.
J	<i>More</i>	Returns to the prior display.

Using the *Insert* Function

NOTE

The following examples are provided as a supplement to the directions. If you understand how the *Insert* function works, go to "Printing."

Press the **F1** key for *Insert* to display the *Insert* menu.

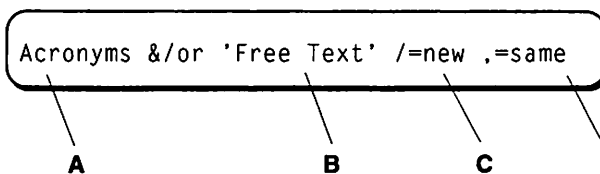


Table 7-4. Insert Function

Item	Prompt	Description
A	<i>Acronyms</i>	These are 12SL library abbreviations like NSR for Normal Sinus Rhythm.
B	<i>'Free Text'</i>	Enter text enclosed by apostrophes (SHIFT and Y keys).
C	<i>/ =new</i>	Free text or an acronym following the / symbol (SHIFT and X keys) appears on a new line.
D	<i>, =same</i>	Free text or an acronym following the = symbol (SHIFT and K keys) appears on the same line.

Insert Function Examples

For each of the following examples it is assumed that the patient has a *NSR (Normal Sinus Rhythm)* listed in his/her ECG statements section.

Where Inserted material will appear on a report

Inserted material is placed before any existing statements. For example, if the following appears on a report:

*ANTERIOR INFARCT
NORMAL SINUS RHYTHM*

and you used the *Insert* function to add the *SMI (Septal Infarct)* acronym, the following appears.

*SEPTAL INFARCT
ANTERIOR INFARCT
NORMAL SINUS RHYTHM*

Example 1 — How to Insert a Single Acronym

You want to add *AB (Abnormal ECG)* on the line above *NSR*.

- Type *AB* as shown below.

AB
Acronyms &/or 'Free Text' /=new ,=same

- Press the **ENTER** key.

The following appears in the statements section of the printed report:

*ABNORMAL ECG
NORMAL SINUS RHYTHM*

Example 2 — How to Insert Multiple Acronyms on the Same Line

You want to add the acronyms *PO (Possible)* and *FLUT (Atrial Flutter)* to both appear on the same line above *NSR*.

- Type *PO*, a comma (,), and then *FLUT* as shown below.

PO,FLUT
Acronyms &/or 'Free Text' /=new ,=same

- Press the **ENTER** key.

The following appears in the statements section of the printed report.

*POSSIBLE ATRIAL FLUTTER
NORMAL SINUS RHYTHM*

Example 3 — How to Insert Multiple Acronyms on Different Lines

You want *SMI (Septal Infarct)* and *AMI (Anterior Infarct)* to appear on different lines above *NSR*.

- Type *SMI*, a slash (/), and *AMI* as shown below.

SMI/AMI
Acronyms &/or 'Free Text' /=new ,=same

- Press the **ENTER** key.

The following appears in the statements section of the ECG report:

*SEPTAL INFARCT
ANTERIOR INFARCT
NORMAL SINUS RHYTHM*

Example 4 — How to Insert a Single Comment

You want to insert the comment “*UNCHANGED SINCE 6-12-86*” on the line above *NSR*.

- Type in the comment as shown below. A comment must be enclosed by apostrophes.

'UNCHANGED SINCE 6-12-86'
 Acronyms &/or 'Free Text' /=new ,=same

- Press the **ENTER** key.

The following appears in the statements section of the report:

UNCHANGED SINCE 6-12-86
NORMAL SINUS RHYTHM

Example 5 — How to Insert Multiple Comments on the Same Line

You want the comments “*UNCHANGED SINCE 6-12-86*” and “*DIABETIC*” to both appear on the same line above *NSR*.

- Type in both comments as shown below. Each comment must be enclosed by apostrophes. Also, a comma (,) is used between each comment so that both comments end up appearing on the same line of the ECG report.

'UNCHANGED SINCE 6-12-86', 'DIABETIC'
 Acronyms &/or 'Free Text' /=new ,=same

- Press the **ENTER** key.

The following appears in the statements section.

UNCHANGED SINCE 6-12-86 DIABETIC
NORMAL SINUS RHYTHM

Example 6 — How to Insert Multiple Comments on Different Lines

You want the comments “*UNCHANGED SINCE 6-12-86*” and “*DIABETIC*” to appear on different lines above *NSR*.

- Type in both comments as shown below. Enclose each comment with apostrophes. Also, use a slash (/) between each comment to ensure that each comment appears on its own line.

'UNCHANGED SINCE 6-12-86' / 'DIABETIC'
 Acronyms &/or 'Free Text' /=new ,=same

- Press the **ENTER** key.

The following appears in the statements section of the report.

UNCHANGED SINCE 6-12-86
DIABETIC
NORMAL SINUS RHYTHM

Example 7 — How to Insert an Acronym and a Comment on the Same Line

You want to insert the acronym *AB* (*Abnormal ECG*) followed by the comment “*SINCE 6-12-86*” on the same line above *NSR*.

- Type *AB*, a comma (,), and the comment as shown below. Note that only the comment must be enclosed by apostrophes.

```
AB, 'SINCE 6-12-86'
Acronyms &/or 'Free Text' /=new ,=same
```

- Press the **ENTER** key.

The inserted material will appear as follows in the statements section of the report:

BORDERLINE ECG SINCE 6-12-86
NORMAL SINUS RHYTHM

Example 8 — How to Insert an Acronym and a Comment on Different Lines

You want to insert the acronym *AB* (*Abnormal ECG*) and the comment “*UNCHANGED SINCE 6-12-86*” on two separate lines above *NSR*.

- Type *AB*, a slash (/), and the comment as shown in the following display. Note that only the comment must be enclosed with apostrophes. Also, the slash (/) must be used to separate the acronym and the comment so that each will appear on its own line.

```
AB/UNCHANGED SINCE 6-12-86'
Acronyms &/or 'Free Text' /=new ,=same
```

- Press the **ENTER** key.

The following will appear in the statements section:

ABNORMAL ECG
UNCHANGED SINCE 6-12-86
NORMAL SINUS RHYTHM

Example 9 — How to Correct a Mistake

You make a mistake while entering inserted material, a display similar to the following will appear.

```
-----^
```

The “^” indicates where the mistake was made. Press the **ENTER** key to return to what you were typing. Then correct your mistake.

Printing

1. After you've finished editing the 12SL analysis program statements, measurements, and/or patient data, one of the following messages appear.

<< End of Patient Data >>

OR

<< End of Statements >>

OR

<< End of Measurement Data >>

2. The *OK*, *Kill*, and *Print* functions will appear in the same menu with the above messages.
 - ◆ Select *Kill* if you want to undo all the editing changes you just made.
 - ◆ Select *Print* to print a preliminary copy of the edited ECG report.
 - ◆ Select *OK* if you are finished editing this patient's ECG. Continue with the next step.
3. The following prompt appears.

Print a Final Report:
Yes No

- ◆ If you select *No*, the ECG you just edited will be saved to diskette. If there is another ECG on diskette to edit, go to "Editing the Selected ECGs." Otherwise, if the ECG you just edited was the last one on diskette, go to step 7.
- ◆ If you select *Yes*, the following display appears.

NOTE

Do not press the **STOP** key when the ****Writing To Diskette**** message appears on the display.

** Editor **
Writing Diskette

THEN

Select Settings. Press PRINT to continue
PRINT NoPrint 25mm/s 10mm/mV 100Hz

4. Press the appropriate function key to change writer settings.
 - ◆ Select *NoPrint* to cancel printing.
 - ◆ Select *PRINT* to start printing the ECG report.
5. If you select *PRINT*, a display similar to the following appears.

** Printing Reports **
Page 1 of 2

6. If you answered *Yes* to the *Ask for Extra Copies of Plots* prompt in the *Reports* function of the *Cart Setup* menu, the following prompt appears.

Number of Extra Copies:
0 to 99

- ◆ Press the **ENTER** key if you do not want any extra copies.
- ◆ Or, type in the number of extra copies. Press the **ENTER** key.

7. If the auxiliary leads were stored after the ECG was acquired, the following prompt appears.

```

Would you like to see Vector Loops?:
Yes      No
    
```

- ◆ If you select *No*, go to step 8.
- ◆ If you select *Yes*, the following display appears.

```

ONSET   OFFSET   GAIN
Qon     Toff     20mm/mV   PRINT   EXIT
  A         B         C         D         E
    
```

Table 7-5. Vector Loop Settings

Item	Prompt	Description
A	<i>Qon</i>	Changes the vector loop onset. <ul style="list-style-type: none"> ■ For example, <i>Qon</i> (Q onset), <i>Qoff</i> (Qoffset), etc. Clears any onset increment value. <ul style="list-style-type: none"> ■ For example, <i>Qon+8</i>. Press the SHIFT key and F1 at the same time to add 4 milliseconds to the onset increment value.
B	<i>Toff</i>	Changes the vector loop offset. <ul style="list-style-type: none"> ■ For example, <i>Poff</i> (P offset), <i>Toff</i> (T offset), etc. Clears any offset increment value. <ul style="list-style-type: none"> ■ For example, <i>Toff+8</i>. Press the SHIFT key and F2 at the same time to add 4 milliseconds to the offset increment value.
C	<i>20mm/mV</i>	Changes the vector loop gain.
D	<i>PRINT</i>	Prints a vector loop plot. <ul style="list-style-type: none"> ■ If the system "beeps", check the onset and offset locations for accuracy.
E	<i>EXIT</i>	Exits this prompt and continues with the next step.

8. The following message appears.

```

Editing Complete
Type Any Key to Continue
    
```

9. Press any key and the following appears.

```

                Diskette Functions
Xmit  Edit  Plot  Dirctry  More
    
```

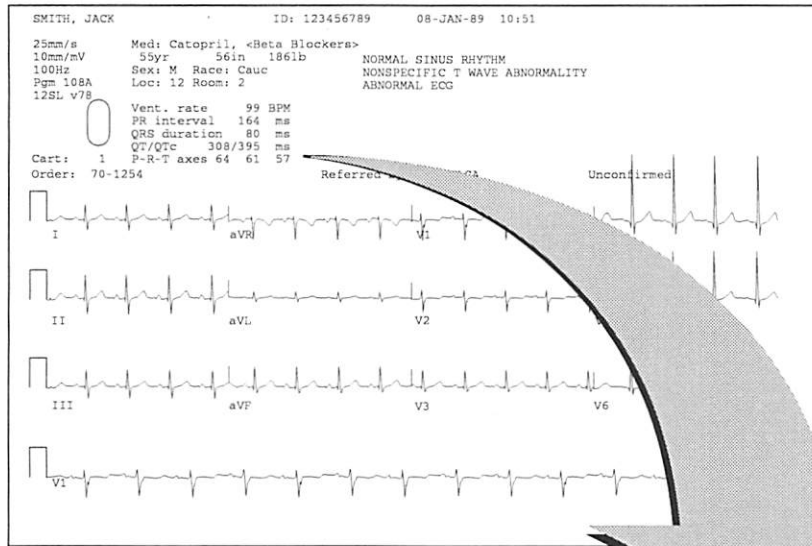
10. Press the **STOP** key to return to the *Main Menu*.

Patient Data Edit

Overview

Your system allows you to edit ECGs stored on diskette. In a patient data edit you can only change the patient data on an ECG report.

The statements, measurements, and patient data sections are shown on the sample ECG report.



Patient data

```

SMITH, JACK                                ID: 123456789    08-JAN-89  10:51
25mm/s                                     Med: Catopril, <Beta Blockers>
10mm/mV                                    55yr           56in  186lb
100Hz                                       Sex: M Race: Cauc
Pgm 108A                                  Loc: 12 Room: 2
12SL v78
                                           NORMAL SINUS RHYTHM
                                           NONSPECIFIC T WAVE ABNORMALITY
                                           ABNORMAL ECG

Vent. rate 99 BPM
PR interval 164 ms
QRS duration 80 ms
QT/QTc 308/395 ms
P-R-T axes 64 61 57

Cart: 1
Order:70-1254
                                           Referred by: DR TELSA
                                           Unconfirmed
    
```

Measurements

12SL analysis program statements

MD1020-41, 42

Setup To perform a patient edit, follow these steps.

NOTE

Only ECGs, Hi-Res files, and pacemaker evaluation files stored on a diskette can be edited.

1. Make sure that the diskette containing the ECGs you want to edit is not write protected (see appendix E, "Miscellaneous Tasks").
2. Press the eject button to remove a diskette from the diskette drive slot.
3. Insert the diskette - label side up - into the diskette drive slot.
4. If the *Main Menu* is not displayed, press the **STOP** key.

```

↑Task   V1+II+V5
PatInfo Rhythm 25mm/s 10mm/mV   More
    
```

5. Hold down the **SHIFT** key and then press the **F1** key to display the *System Functions* menu.
6. Select *Disk*.
7. The following display appears.

```

                Diskette Functions
Xmit   Edit   Plot   Dirctry   More
    
```

8. Select *Edit*.
9. The following display appears.

```

Edit Function:
Full   PatData
    
```

10. Select *PatData*.
11. Press the **ENTER** key.
12. The system will check your ECG diskette and the following display appears briefly.

```

                ** Editor **
Reading Diskette
    
```

NOTE

If a diskette error message appears, make sure your ECG diskette is not write protected.

Selecting the ECG to Edit

1. The next display allows you to edit either all or some of the ECGs on your diskette.

Select Data:
All Select

- ◆ Select *All* to edit all the ECGs on your diskette. Go to "Editing the Selected ECG."
 - ◆ Choose *Select* to select which ECGs to edit on your diskette. Continue with the next step.
2. The following display appears.

Set up Selection Parameters:
Yes No

3. Select *No* if you want to skip the following selection prompts and view the first ECG on your diskette. Go to "Selecting ECGs by Cart Number" step 5.
4. Select *Yes* and the first selection prompt appears.

Select by PID:
Yes No

- ◆ If you select *No*, go to "Selecting MUSE System Information."
- ◆ If you select *Yes*, the following display will appear.

Patient ID:
Digits 0 To 9

5. Type in the patient's identification number (PID) that will be used to select ECGs.
6. Press the **ENTER** key.

Selecting MUSE System Information

1. A prompt appears that allows you to select those ECGs that have the same MUSE system site number.

Select by Site:
Yes No

- ◆ If you select *No*, go to step 4.
- ◆ If you select *Yes*, the following display appears.

Site Number:
1 - 255

2. Type in the MUSE system site number that will be used to select ECGs.

3. Press the **ENTER** key.
4. A prompt will appear that allows you to select ECGs by their MUSE system location number.

Select by Location:
Yes No

- ◆ If you select *No*, go to "Selecting ECGs by Cart Number."
- ◆ If you select *Yes*, the following display appears.

Location Number:
0 - 99

5. Type in the MUSE system location number that will be used to select ECGs.
6. Press the **ENTER** key.

Selecting ECGs by Cart Number

1. A prompt appears that allows you to select ECGs by their cart number.

Select by Cart:
Yes No

- ◆ If you select *No*, go to step 4.
- ◆ If you select *Yes*, the following display will appears.

Cart Number:
0 - 255

2. Type in the cart number that will be used to select ECGs.
3. Press the **ENTER** key.

4. The following prompt appears.

Select:
Unconf Confrmd Both

- ◆ Select *Unconf* if you want only unconfirmed ECGs to be transmitted.
- ◆ Select *Confrmd* if you want on confirmed ECGs to be transmitted.
- ◆ Select *Both* if you want unconfirmed and confirmed ECGs to be transmitted.

NOTE

Selecting *Confrmd* eliminates the possibility of selecting any Hi-Res or Pacemaker files since these files can not be confirmed.

5. One of the following two displays, or one very similar, appears.

No Data Selected to Edit
Type Any Key to Continue

OR

E U 123456789 SMITH, JACK
Yes No Yes... No.. Expand

- ◆ If the first display appears, either there are no ECGs on your diskette, or there are no ECGs that fit your selection parameters. In either case, press any key and start this procedure again.
- ◆ If the second display appears, this is the first ECG on your diskette or the first ECG that fits your selection parameters. This second display is explained in detail in the next step.

Viewing the Stored ECG

1. Select which ECGs you wish to transmit. Each ECG on your diskette or each ECG on diskette that fits your selection parameters displays in a manner similar to the following.

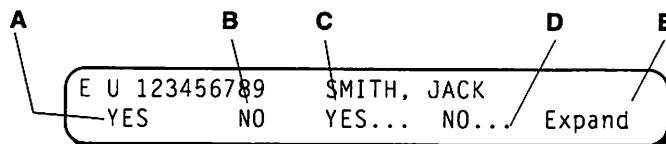


Table 7-6. ECG Patient Data

Item	Prompt	Your Action
A	<i>Yes</i>	Selects this ECG.
B	<i>No</i>	Bypasses this ECG.
C	<i>Yes...</i>	Selects this ECG and all remaining ECGs.
D	<i>No...</i>	Bypasses this ECG and all remaining ECGs.
E	<i>Expand</i>	Provides additional patient information such as date and time of ECG.

2. To display additional patient information, select *Expand* and a message similar to the one below will be displayed.

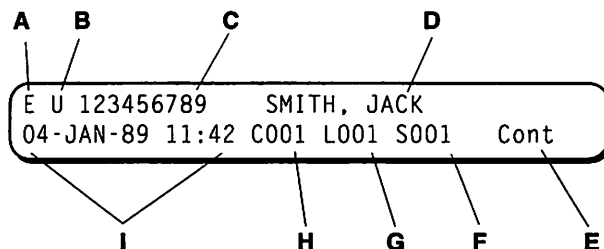


Table 7-7. Expanded Patient Data

Item	Prompt	Description
A	type of data	E = ECG or long form, C = CGR (Computer Graphic Record) P = Packer evaluation file L = Hi-Res file
B	status of data	U = unconfirmed ECG. C = confirmed ECG. (Use the OK or ↑OK function to change an unconfirmed ECG to a confirmed ECG.)
C	patient identification number	Unique identifier.
D	patient name	Last name, first name of patient or the date and time when ECG was recorded.
E	Cont	Select to return to former display.
F	site	MUSE system site number where ECG was recorded.
G	location	Location number where ECG was recorded.
H	cart number	Cart number of the unit where ECG was recorded.
I	date and time	Day, month, year and time when ECG was recorded.

Editing the Selected ECG

1. Displays similar to the following two appears.

** Editor **
Reading Diskette

THEN

E U 123456789 SMITH, JACK
04-JAN-89 11:42 C001 L001 S001

2. Press the **ENTER** key to edit this ECG.
3. The first patient information item appears.

Name

Patient Last Name:
OK Kill Print

- ◆ The current patient last name appears, if any. If you want to leave the last name as it appears, press the **ENTER** key. If you want to change the name, type in the new last name, and press the **ENTER** key. This process applies to all of the following prompts.
 - ◆ Select *OK* when you are finished editing the patient data. This will change an unconfirmed report to a confirmed report. Also, you will be prompted if you would like to print a final report.
 - ◆ Select *Kill* to undo all the changes you made while editing patient information. The ECG report will revert to its last saved version.
 - ◆ Select *Print* to have the writer print the currently edited ECG report. This is an easy way to review the changes you have made before selecting *OK*.
4. The following prompt allows you to change the patient's first name.

Patient First Name:
OK Kill Print

ID Number

5. The next prompt allows you to change the patient's identification number.

Patient ID:
OK Kill Print

Date

6. The following prompt lets you change the date the patient's ECG was taken.

ECG Taken (DD MMM YY):
OK Kill Print

- ◆ If you change the date, remember to type the date in day-month-year format. For example, January 4, 1989 would be typed in as 04 JAN 89.

Time 7. The following prompt allows you to change the time the patient's ECG was taken.

ECG Taken (HH MM)
OK Kill Print

- ◆ If you change the time, remember to type the time in hour-minute format using a 24-hour clock. For example, 8:10 am would be type in as 08 10. However, 8:10 pm would be typed in as 20 10.

Physician 8. The name of the referring physician may be changed in the following prompt.

Referred By:
OK Kill Print

Location 9. The following prompt allows you to change the location number.

Location Number:
OK Kill Print

Room Number 10. Next, the patient's room number can be changed.

Room Number:
OK Kill Print

Age 11. The next prompt allows you to change the patient's age.

Patient Over 1 Year Old:
Yes No

- ◆ If you select *Yes*, go to step 12.
- ◆ If you select *No*, choose the child's age from one of the following displays. Go to "Height".

Age:
<2D 2D<1W 1W<1M 1M<2M More



Age:
2M<3M 3M<4M 4M<5M 5M<6M More



Age:
6M<9M 9M<1Y More

NOTE

In the displays above, *D* stands for day, *W* stands for week, *M* stands for month, and *Y* stands for year. The < symbol stands for "less than."

12. If you are entering the age for a patient who is over 1 year old, the following display will appear.

Age:
1 to 127 yrs

Height

13. After the age prompts, one of the following two displays will appear, and you may change the patient's height.

Height (in inches):
0 to 999

OR

Height (in cm):
0 to 999

NOTE

The *Cart Setup* manu can be used to represent height in either inches or centimeters.

Weight

14. Next, one of the following two displays will appear, and you may change the patient's weight.

Weight (in lbs):
0 to 999

OR

Weight (in kg):
0 to 999

NOTE

Use the *Cart Setup* menu to represent weight in either pounds or kilograms.

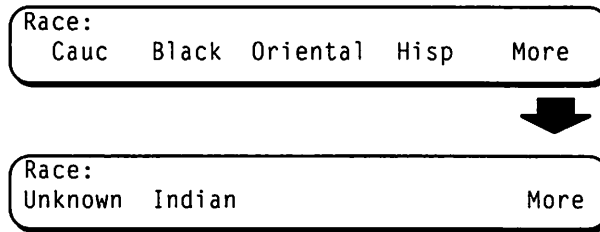
Sex

15. The next prompt allows you to change way you entered the patient's sex.

Sex:
Male Female

Race

16. Next, you may change what you entered for the patient's race.



Medications

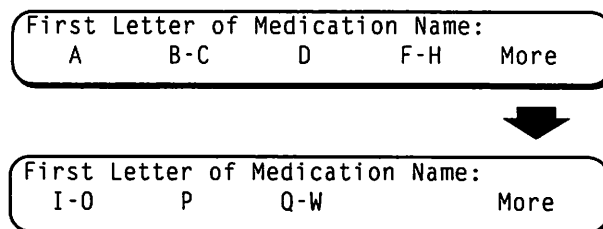
17. The following prompts allow you to change the medications the patient is taking.

Table 7-8. Patient Medication Data		
Item	Prompt	Description
A	<i>None</i>	The patient is taking no medications.
B	<i>Unknown</i>	Use if you do not know what medications the patient is taking.
C	<i>Clear</i>	Erases all medications that are currently entered for the patient.
D	<i>Add</i>	Use to add a medication that the patient is taking.
E	<i>Scroll</i>	Use to review the patient's medications one at a time.

18. Press the appropriate key and then press the **ENTER** key.

- ◆ If you selected either *None*, *Unknown*, or *Clear*, then go to "Order Number."
- ◆ If you selected *Add*, then go to step 19.
- ◆ If you selected *Scroll*, the next medication will appear on the display.
- ◆ After reviewing all medications, press the **ENTER** key to continue. Then go to "Order Number."

19. After selecting *Add* and pressing the **ENTER** key, the following display will appear.



Adding Medications

20. To add a medication, press the key that matches the first letter of the medication you wish to add.

21. For example, if you want to add *Aspirin*, then press the **F1** key to select *A*. Then press the **ENTER** key.

NOTE

The major medical groups are displayed between "<>" symbols.

22. Next, a list of medications will appear for the letter *A*.

Select Medication:
<A-ang> <A-arh> <A-coa> <A-hyp> Aspirin

23. If you want to select *Aspirin* from the list above, press the **F5** key. Then press the **ENTER** key.
24. You can add the following list of medications.

Table 7-9. Medications	
<p style="text-align: center;">A</p> <p><A-ang> (Antianginal) <A-arh> (Antiarrhythmic) <A-coa> (Anticoagulants) <A-hyp> (Antihypertensive) <i>Aspirin</i></p> <p style="text-align: center;">B-C</p> <p><BetaB> (Beta Blockers) <i>CalcBlk</i> (Calcium Blockers) <i>Catopril</i> (Catopril) <i>Clonid</i> (Clonidine) <i>Coumadn</i> (Coumadin)</p> <p style="text-align: center;">D</p> <p><i>Digital</i> (Digitalis) <i>Digitox</i> (Digitoxin) <i>Digoxin</i> (Digoxin-Lanoxin) <Digox> (Digoxin) <Diurt> (Diuretics) <i>Dysopyr</i> (Dysopyramide)</p> <p style="text-align: center;">F-H</p> <p><i>Furosem</i> (Furosemide) <i>Heparin</i> <i>Hydral</i> (Hydralazine)</p>	<p style="text-align: center;">I-O</p> <p><i>Isosorb</i> (Isosorbide) <i>Lidoca</i> (Lidocaine) <i>Nitrate</i> (Nitrates) <i>Other</i></p> <p style="text-align: center;">P</p> <p><i>Phenoth</i> (Phenothiazide) <i>Phenytn</i> (Phenytoin) <i>Procairn</i> (Procainamide) <i>Propran</i> (Propranolol) <Psych> (Psychotropic)</p> <p style="text-align: center;">Q-W</p> <p><i>Quinid</i> (Quinidine) <i>Reserp</i> (Reserpine) <i>Thiazid</i> (Thiazide) <i>Tricyli</i> (Tricyclic Antidepressant) <i>Warfar</i> (Warfarin)</p>

Order Number

25. After the medication display, the order number prompt will appear to edit.

Order number:
Up to 10 character

Secondary ID

26. The next prompt allows you to change the secondary ID number.

Secondary ID number:
Up to 17 characters.

Technician ID

27. The following prompt allows you to change the technician ID number.

Technician ID:
0 to 999

Option Number

28. Next, the option number prompt will only appear if you answered yes to the *Ask Options Question* prompt in the *Cart Setup* menu.

Option Number:
0 to 99

Blood Pressure

29. The following blood pressure prompts will only appear if you answered yes to the *Ask Blood Pressure Questions* prompt in the *Cart Setup* menu.

Systolic Blood Pressure:
50 - 299

Diastolic Blood Pressure:
0 - 199

End of Editing

30. After editing patient information, the following message will appear.

<< End of Patient Data >>

The *OK*, *Kill*, and *Print* functions will appear in the same menu with the above message.

- ◆ Select *Kill* if you want to undo all the editing changes you just made.
- ◆ Select *Print* to print a preliminary copy of the edited ECG report.
- ◆ Select *OK* if you are finished editing this patient's ECG. Continue with the next step.

Printing Report

1. The following prompt appears.

Print a Final Report:
Yes No

- ◆ If you select *No*, the ECG you just edited will be saved to diskette. If there is another ECG on diskette to edit, then go to "Editing the Selected ECG." Otherwise, if the ECG you just edited was the last one on diskette, then go to step 5.
- ◆ If you select *Yes*, then the following display appears.

NOTE

Do not press the **STOP** key when the ****Writing To Diskette**** message appears on the display.

 ** Editor **
Writing Diskette

THEN

Select Settings. Press PRINT to continue
PRINT NoPrint 25mm/s 10mm/mV 100Hz

2. Press the appropriate function key to change writer settings.
 - ◆ Select *NoPrint* to cancel printing.
 - ◆ Select *PRINT* to start printing the ECG report.
3. If you select *PRINT*, a display similar to the following appears.

 ** Printing Reports **
Page 1 of 4

4. If you answered *Yes* to the *Ask for Extra Copies of Plots* prompt in the *Reports* function of the *Cart Setup* menu, the following prompt appears.

Number of Extra Copies:
0 to 99

- ◆ Press the **ENTER** key if you do not want any extra copies.
- ◆ Or, type in the number of extra copies. Press the **ENTER** key.

5. If the auxiliary leads were stored after the ECG was acquired, then the following prompt appears.

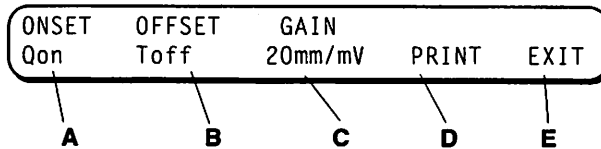
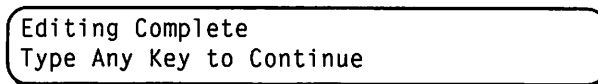
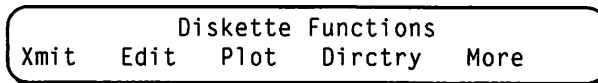


Table 7-10. Vector Loop Settings		
Item	Prompt	Description
A	<i>Qon</i>	Changes the vector loop onset. <ul style="list-style-type: none"> ■ For example, <i>Qon</i> (Q onset), <i>Qoff</i> (Qoffset), etc. Clears any onset increment value. <ul style="list-style-type: none"> ■ For example, <i>Qon+8</i>. Press the SHIFT key and F1 at the same time to add 4 milliseconds to the onset increment value.
B	<i>Toff</i>	Changes the vector loop offset. <ul style="list-style-type: none"> ■ For example, <i>Poff</i> (P offset), <i>Toff</i> (T offset), etc. Clears any offset increment value. <ul style="list-style-type: none"> ■ For example, <i>Toff+8</i>. Press the SHIFT key and F2 at the same time to add 4 milliseconds to the offset increment value.
C	<i>20mm/mV</i>	Changes the vector loop gain.
D	<i>PRINT</i>	Prints a vector loop plot. <ul style="list-style-type: none"> ■ If the system “beeps”, check the onset and offset locations for accuracy.
E	<i>EXIT</i>	Exits this prompt and continues with the next step.

6. The following message appears.



7. Press any key and the following appears.



8. Press the **STOP** key to return to the *Main Menu*.

8

PRINTING

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Printing All ECGs

Overview Any stored ECG may be printed as a paper report. "Plotting" means to print a ECG. To begin printing ECGs, follow these steps.

Setup To print all ECGs on a diskette, follow these steps.

1. If there is a diskette in the diskette drive slot, remove it by pressing the eject button. (See appendix E, "Miscellaneous Tasks.")
2. Insert the diskette - label side up - into the diskette drive slot:
3. If the *Main Menu* is not displayed, press the **STOP** key.

```
↑Task   V1+II+V5
PatInfo  Rhythm 25mm/s 10mm/mV  More
```

4. Press the **SHIFT** and **F1** key at the same time to display the *System Functions* menu.
5. Selecting *Disk*.

```
Diskette Functions
Xmit   Edit   Plot   Dirctry  More
```

6. Select *Plot*.
7. The following message appears briefly.

```
** Plot Diskette Data **
```

Selecting ECGs

1. The next prompt allows you to print either all or some of the ECGs on your diskette.

```
Select Data:  
All   Select
```

2. Select *All*.
3. Press the **ENTER** key.
4. If you answered *Yes* to the *Ask for Extra Copies of Plots* prompt in the *Reports* function of the *Cart Setup* menu, the following prompt appears.

```
Number of Extra Copies:  
0 to 99
```

- ◆ Press the **ENTER** key if you do not want any extra copies.
 - ◆ Or, type in the number of extra copies. Press the **ENTER** key.
5. Next, the following display appears.

```
Select Settings. Press PRINT to continue  
PRINT NoPrint 25mm/s 10mm/mV 100Hz
```

Press the appropriate function key to change the writer settings.

- ◆ Select *NoPrint* to cancel printing.
 - ◆ Select *PRINT* to start printing ECG reports.
6. If you selected *PRINT*, a display similar to one of the following appears.

```
No Data Files Selected to Plot  
Type Any Key to Continue
```

OR

```
E U 1234567890 SMITH, JACK  
04-JAN-89 11:42 C001 L001 S001
```

- ◆ If the first display appears, there are no ECGs on your diskette. In this case press any key and start this procedure again.
- ◆ If the second display appears, this is the first ECG on your diskette that will be printed, and you can continue with the next step.

7. As each ECG on your diskette is printed, displays similar to the following two appears.

```
E U 1234567890    SMITH, JACK  
04-JAN-89 11:42 C001 L001 S001
```

THEN

```
    ** Printing Reports **  
Page 2 of 4
```

8. After all ECGs have been printed, the following display appears.

```
Plots Complete  
Type Any Key to Continue
```

9. Pressing any key causes the following display appears.

```
Diskette Functions  
Xmit  Edit   Plot  Dirctry More
```

10. Press the **STOP** key to return to the *Main Menu*.

Printing Selected ECGs

To print a selection of ECGs on a diskette, follow these steps.

1. If there is a diskette in the diskette drive slot, remove it by pressing the eject button. (See appendix E, "Miscellaneous Tasks.")
2. Insert the diskette - label side up - into the diskette drive slot.
3. If the *Main Menu* is not displayed, press the **STOP** key.

```

↑Task   V1+II+V5
PatInfo Rhythm 25mm/s 10mm/mV   More
    
```

4. Press the **SHIFT** key and the **F1** key at the same time to display the *System Functions* menu.
5. Select *Disk*.

```

Diskette Functions
Xmit   Edit   Plot   Dirctry   More
    
```

6. Select *Plot*.
7. The following message appears briefly.

```

** Plot Diskette Data **
    
```

Selecting ECGs

1. The next prompt allows you to print either all or some of the ECGs on your diskette.

```

Select Data:
All       Select
    
```

2. Choose *Select*.
3. Press the **ENTER** key.
4. The following display appears.

```

Set up Selection Parameters:
Yes   No
    
```

- ◆ Select *No* if you want to skip the following selection prompts and view the first ECG on your diskette. Go to "Selecting ECGs by Cart Number" step 5.
- ◆ If you select *Yes*, go to the next step.

Selecting MUSE System Information

5. The first selection prompt appears.

Select by PID:
Yes No

- ◆ If you select *No*, go to "Selecting MUSE System Information."
- ◆ If you select *Yes*, the following display appears.

Patient ID:
Digits 0 To 9

6. Type in the patient's identification number (PID) that will be used to select ECGs. Press the ENTER key.

1. A prompt appears that allows you to select those ECGs that have the same MUSE system site number.

Select by Site:
Yes No

- ◆ If you select *No*, go to step 4.
- ◆ If you select *Yes*, the following display appears.

Site Number:
1 - 255

2. Type in the MUSE system site number that will be used to select ECGs.
3. Press the **ENTER** key.
4. A prompt appears that allows you to select ECGs by their MUSE system location number.

Select by Location:
Yes No

- ◆ If you select *No*, go to "Selecting ECGs by Cart Number."
- ◆ If you select *Yes*, the following display appears.

Location Number:
0 - 99

5. Type in the MUSE system location number that will be used to select ECGs.
6. Press the **ENTER** key.

Selecting ECG by Cart Number

1. A prompt appears that allows you to select ECGs by their cart number.

```
Select by Cart:
Yes   No
```

- ◆ If you select *No*, go to step 4.
- ◆ If you select *Yes*, the following display appears.

```
Cart Number:
0 - 255
```

2. Type in the cart number that will be used to select ECGs.
3. Press the **ENTER** key.
4. The following prompt appears.

```
Select:
Unconf  Confrmd  Both
```

- ◆ Select *Unconf* if you want only unconfirmed ECGs to be printed.
- ◆ Select *Confrmd* if you want on confirmed ECGs to be printed.
- ◆ Select *Both* if you want unconfirmed and confirmed ECGs to be printed.

NOTE

Selecting *Confrmd* eliminates the possibility of selecting any Hi-Res or Pacemaker files since these files can not be confirmed.

5. One of the following two displays, or one very similar, appears.

```
No Data Selected to Plot
Type Any Key to Continue
```

OR

```
E U 123456789    SMITH, JACK
Yes   No       Yes...  No..  Expand
```

- ◆ If the first display appears, either there are no ECGs on your diskette, or there are no ECGs that fit your selection parameters. In either case, press any key and start this procedure again.
- ◆ If the second display appears, this is the first ECG on your diskette or the first ECG that fits your selection parameters. This second display is explained in detail in the next step.

Viewing the Stored ECG

1. Select which ECGs you wish to print. Each ECG on your diskette or each ECG on diskette that fits your selection parameters displays in a manner similar to the following.

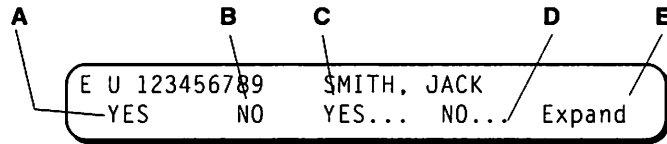


Table 8-1. ECG Patient Data

Item	Prompt	Your Action
A	<i>Yes</i>	Selects this ECG.
B	<i>No</i>	Bypasses this ECG.
C	<i>Yes...</i>	Selects this ECG and all remaining ECGs.
D	<i>No...</i>	Bypasses this ECG and all remaining ECGs.
E	<i>Expand</i>	Provides additional patient information such as date and time of ECG.

- To display additional patient information, select *Expand* and a message similar to the one below will be displayed.

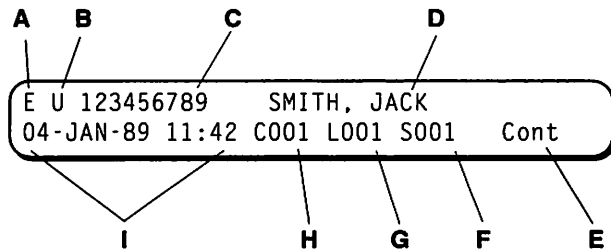


Table 8-2. Expanded Patient Data

Item	Prompt	Description
A	type of data	E = ECG or long form, C = CGR (Computer Graphic Record) P = Packer evaluation file L = Hi-Res file
B	status of data	U = unconfirmed ECG. C = confirmed ECG. (See chapter 7, "Editing ECG Reports" to change an unconfirmed ECG to a confirmed ECG.)
C	patient identification number	Unique identifier.
D	patient name	Last name, first name of patient or the date and time when ECG was recorded.
E	Cont	Select to return to former display.
F	site	MUSE system site number where ECG was recorded.
G	location	Location number where ECG was recorded.
H	cart number	Cart number of the unit where ECG was recorded.
I	date and time	Day, month, year and time when ECG was recorded.

- If you answered *Yes* to the *Ask for Extra Copies of Plots* prompt in the *Reports* function of the *Cart Setup* menu, the following prompt appears.

Number of Extra Copies:
0 to 99

- ◆ Press the **ENTER** key if you do not want any extra copies.
- ◆ Or, type in the number of extra copies. Press the **ENTER** key.

4. The following display appears.

```
Select Settings. Press PRINT to continue
PRINT NoPrint 25mm/s 10mm/mV 100Hz
```

Press the appropriate function key to change the writer settings.

- ◆ Press *NoPrint* to cancel printing.
- ◆ Press *PRINT* to start printing ECG reports.

5. If you select *PRINT*, a display similar to the following displays appear.

```
No Data Files Selected to Plot
Type Any Key to Continue
```

OR

```
E U 1234567890 SMITH, JACK
04-JAN-89 11:42 C001 L001 S001
```

- ◆ If the first display appears, then there are no ECGs on your diskette. In this case press any key and start this procedure again.
 - ◆ If the second display appears, then this is the first ECG on your diskette that will be printed, and you can continue with the next step.
6. As each ECG on your diskette is printed, displays similar to the following two appear.

```
E U 1234567890 SMITH, JACK
04-JAN-89 11:42 C001 L001 S001
```

THEN

```
** Printing Reports **
Page 1 of 3
```

7. If the auxiliary leads were stored after the ECG was acquired, the following prompt appears.

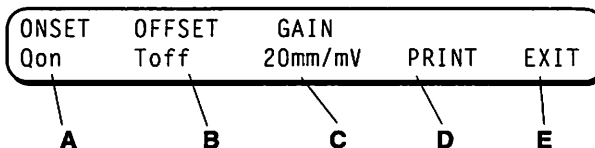
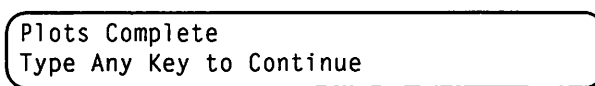
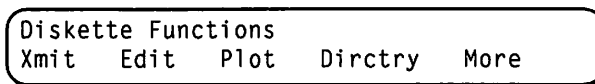


Table 8-3. Vector Loop Settings		
Item	Prompt	Description
A	<i>Qon</i>	Changes the vector loop onset. <ul style="list-style-type: none"> For example, <i>Qon</i> (Q onset), <i>Qoff</i> (Qoffset), etc. Clears any onset increment value. <ul style="list-style-type: none"> For example, <i>Qon+8</i>. Press the SHIFT key and F1 at the same time to add 4 milliseconds to the onset increment value.
B	<i>Toff</i>	Changes the vector loop offset. <ul style="list-style-type: none"> For example, <i>Poff</i> (P offset), <i>Toff</i> (T offset), etc. Clears any offset increment value. <ul style="list-style-type: none"> For example, <i>Toff+8</i>. Press the SHIFT key and F2 at the same time to add 4 milliseconds to the offset increment value.
C	<i>20mm/mV</i>	Changes the vector loop gain.
D	<i>PRINT</i>	Prints a vector loop plot. <ul style="list-style-type: none"> If the system "beeps", check the onset and offset locations for accuracy.
E	<i>EXIT</i>	Exits this prompt and continues with the next step.

8. After all ECGs have been printed, the following display appears.



9. Press any key and the following appears.



10. Press the **STOP** key to return to the *Main Menu*.

9

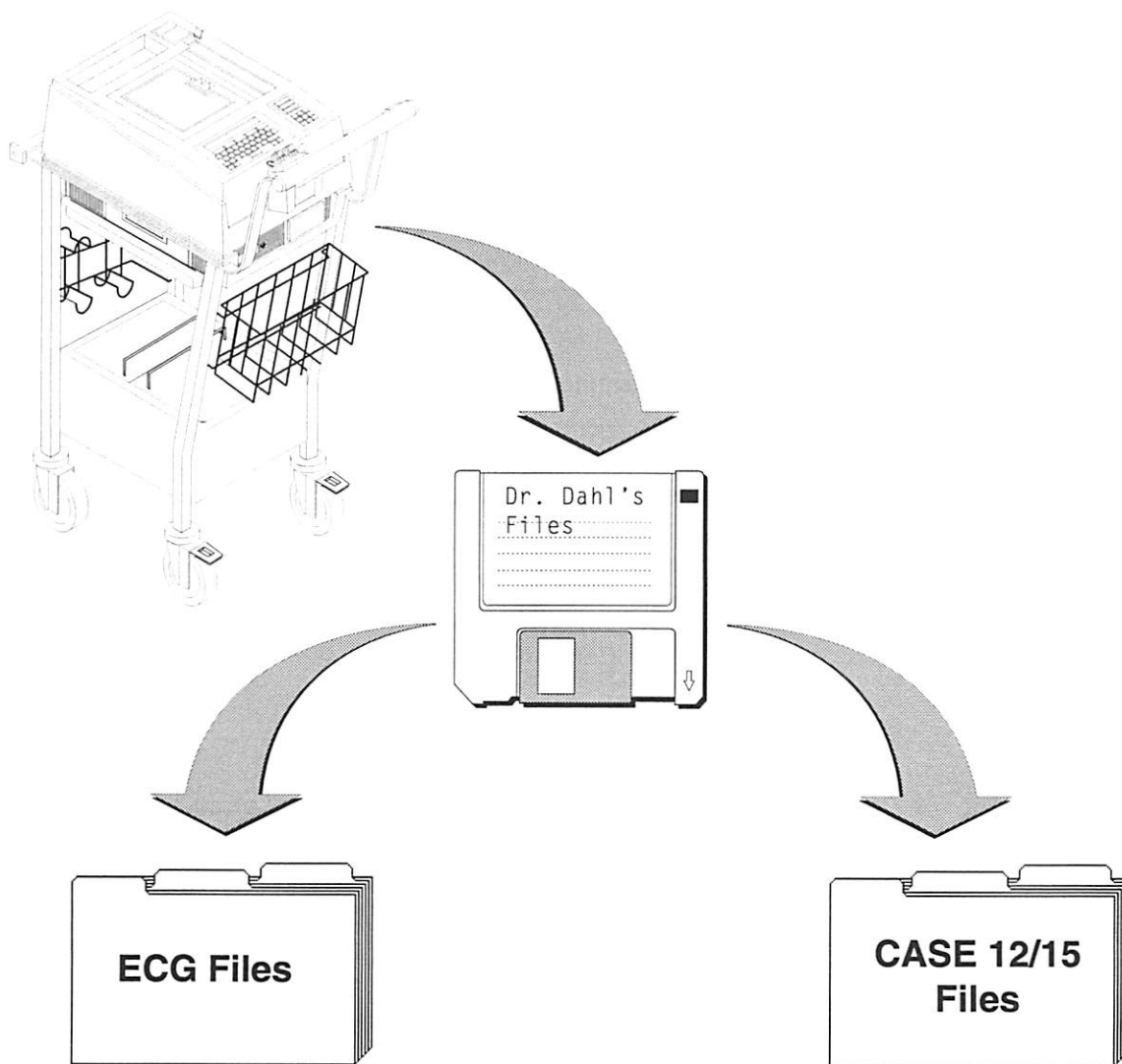
CREATING A DIRECTORY

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Create a Directory

Chapter Summary

This chapter shows you how to either print or display all the files stored on a diskette.



MD1020-32, 26, 43

Setup To print or display a diskette directory, follow these steps.

1. If there is a diskette in the diskette drive slot, remove it by pressing the eject button. (See appendix E, "Miscellaneous Tasks.")
2. Insert the diskette - label side up - into the diskette drive slot.
3. If the *Main Menu* is not displayed, press the **STOP** key.

```

↑Task      V1+II+V5
PatInfo    Rhythm 25mm/s  10mm/mV    More
    
```

4. Press the **SHIFT** and **F1** key at the same time to display the *System Functions* menu.
5. Select *Disk*.

```

                Diskette Functions
Xmit   Edit   Plot   Dirctry  More
    
```

6. Select *Dirctry* (Directory).
7. The following display appears.

```

                Diskette Directory
Print   Display
    
```

- ◆ Select *Print* to have a paper copy of all the files on you diskette. Go to step 13.
- ◆ Or, select *Display* to view each diskette file on the display. Continue with the next step.

8. The following display appears.

```

                ** Diskette Directory **
    
```

9. Followed by a display similar to the following.

```

                ** Diskette Directory **
Available storage space: 75 ECGs  More
    
```

10. Select *More*. A record of the first file on the diskette will appear. Files will be displayed in the ECG file format or the non-ECG file format.

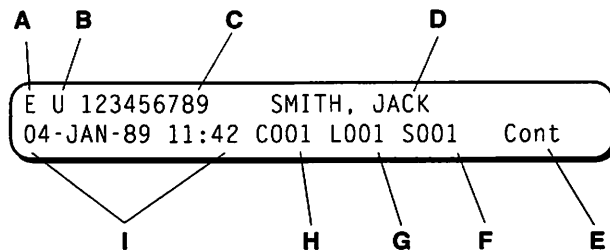


Table 9-1. ECG File Format

Item	Prompt	Description
A	type of data	<i>E</i> = ECG or long form, <i>C</i> = CGR (Computer Graphic Record) <i>P</i> = Packer evaluation file <i>L</i> = Hi-Res file
B	status of data	<i>U</i> = unconfirmed ECG. <i>C</i> = confirmed ECG. (See chapter 7, "Editing ECG Reports" to change an unconfirmed ECG to a confirmed ECG.)
C	patient identification number	Unique identifier.
D	patient name	Last name, first name of patient or the date and time when ECG was recorded.
E	<i>Cont</i>	Select to return to former display.
F	site	MUSE system site number where ECG was recorded.
G	location	Location number where ECG was recorded.
H	cart number	Cart number of the unit where ECG was recorded.
I	date and time	Day, month, year and time when ECG was recorded.

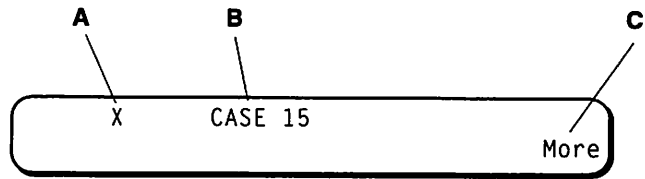
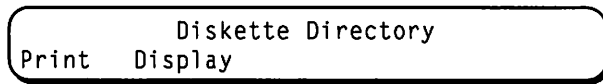


Table 9-2. Non-ECG File Format

Item	Prompt	Description
A	type of file	O = CASE 12/15 system screen file. S = CASE 12/15 system setup file. T = CASE 12/15 system procedure file. U = CASE 12/15 system stress test file. X = task file. Z = SEER file.
B	file name	The name of the file.
C	<i>More</i>	Select <i>More</i> to view the next file, if any.

11. Select *More* to view the next file. When the last file has been displayed, the following display appears.



12. Press the **STOP** key to return to the *Main Menu*.

13. If you selected *Print*, messages similar to the following two appear briefly.

** Diskette Directory **

THEN

E U 123456789 SMITH, JACK
04-JAN-89 11:42 C001 L001 S001

- ◆ The second display will change repeatedly because the system displays each file on the display before starting to print.
- ◆ Then a directory or list of all the files stored on diskette will be printed in a manner similar to the following.

Seq	Type	U/C	PID	Name	Date	Time	Cart	Loc	Site
				Diskette Directory		Available storage space:		75 ECGs	
				10-JAN-89 11:34 Pgm 106A					
1	E	U	123456789	SMITH, JACK	01-JAN-89	11:42	001	006	001
2	E	U	000234666	STUMPF, CARRIE	01-JAN-89	12:12	001		001
3	E	U	000234666	STUMPF, CARRIE	02-JAN-89	08:45	001	006	001
4	E	C	245345567	BUCKLEY, BILL	05-JAN-89	09:00	001	005	001
5	E	U	190089282	HUGHES, TOM	06-JAN-89	16:21	001	001	001
6	X			CASE12					
7	O			ERGOMETER					
8	S			DRBILL					MD1020-444
9	T			ANALOGOUT					

14. After all files have been printed, the following display appears.

Diskette Directory
Print Display

15. Press the **STOP** key to return to the *Main Menu*.

10

DELETING AN ECG

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Deleting All Files

Setup

To delete all files on a diskette, follow these steps:

1. Make sure that the diskette containing the files you wish to delete is not write protected (see appendix E, "Miscellaneous Tasks").
2. If there already is a diskette in the diskette drive slot, press the eject button to remove it.
3. Insert the diskette - label side up - into the diskette drive slot.
4. If the *Main Menu* is not displayed, press the **STOP** key.

```

↑Task   V1+II+V5
PatInfo Rhythm 25mm/s 10mm/mV   More
  
```

5. Press the **SHIFT** key and the **F1** key at the same time to display the *System Functions* menu.
6. Select *Disk*.

```

                Diskette Functions
Xmit  Edit  Plot  Dirctry  More
  
```

7. Select *More*.

```

                Diskette Functions
Delete Format
  
```

Entering Password

8. Select *Delete*.

```

Password:
  
```

- ◆ Enter the Level 1 or Level 2 password. (The default passwords are "L1" and "L2".)
- ◆ Press the **ENTER** key.

Selecting the ECGs to Delete

1. The following message appears briefly.

** Delete Diskette Data **

NOTE
If a diskette error message appears, make sure your diskette is not write protected.

2. Next, this prompt appears.

Select Data:
All Select

3. Select *All*.
4. Press the **ENTER** key.

The following prompt allows you to change your mind before deleting.

Delete Data Files Now!!:
Yes No

5. If you select *Yes*, a display similar to the following appears.

Deleting PID: 123456789

6. When all files have been deleted, the following appears.

Delete Complete
Type Any Key to Continue

7. Typing any key displays the following.

Diskette Functions
Delete Format More

8. Press the **STOP** key to return to the *Main Menu*.

Deleting Selected Files

Setup To delete one or more files from a diskette, follow these steps.

1. Make sure that the diskette containing the files you wish to delete is not write protected (see appendix E, "Miscellaneous Tasks").
2. If there already is a diskette in the diskette drive slot, press the eject button to remove it.
3. Insert the diskette - label side up - into the diskette drive slot.
4. If the *Main Menu* is not displayed, press the **STOP** key.

```

↑Task   V1+II+V5
PatInfo Rhythm 25mm/s 10mm/mV   More
  
```

5. Press the **SHIFT** key and the **F1** key at the same time to display the *System Functions* menu.
6. Select *Disk*.

```

                Diskette Functions
Xmit   Edit   Plot   Dirctry   More
  
```

7. Select *More*.

```

                Diskette Functions
Delete  Format
  
```

Entering Password

8. Select *Delete*.

```

Password:
  
```

- ◆ Enter the Level 1 or Level 2 password. (The default passwords are "L1" and "L2".)
- ◆ Press the **ENTER** key.

Selecting the ECGs to Delete

1. The following message appears briefly.

** Delete Diskette Data **

NOTE

If a diskette error message appears, make sure your diskette is not write protected.

2. The next prompt allows you to delete either all or some of the files on your diskette.

Select Data:
All Select

Setting Up Selecting Parameters

3. Choose *Select*.
4. Press the **ENTER** key.

Set up Selection Parameters:
Yes No

- ◆ Select *No* if you want to skip the following selection prompts and view the first ECG on your diskette. Go to "Unconfirmed or Confirmed Files" step 2.
 - ◆ If you select *Yes*, go to the next step.
5. The first selection prompt appears.

Select by PID:
Yes No

- ◆ If you select *No*, go to "MUSE System Site Numbers."
- ◆ If you select *Yes*, the following display appears.

Patient ID:
Digits 0 To 9

6. Type in the patient's identification number (PID) that will be used to select ECGs.
7. Press the **ENTER** key.

MUSE System Site Numbers

1. A prompt appears that allows you to select those ECGs that have the same MUSE system site number.

Select by Site:
Yes No

- ◆ If you select *No*, go to "MUSE System Location."
- ◆ If you select *Yes*, the following display appears.

Site Number:
1 - 255

2. Type in the MUSE system site number that will be used to select ECGs.
3. Press the **ENTER** key.

MUSE System Location

1. A prompt appears that allows you to select ECGs by their MUSE system location number.

Select by Location:
Yes No

- ◆ If you select *No*, go to "Cart Number."
- ◆ If you select *Yes*, the following display appears.

Location Number:
0 - 99

2. Type in the MUSE system location number that will be used to select ECGs.
3. Press the **ENTER** key.

Cart Number

1. A prompt appears that allows you to select ECGs by their cart number.

Select by Cart:
Yes No

- ◆ If you select *No*, go to "Unconfirmed or Confirmed Files."
- ◆ If you select *Yes*, the following display appears.

Cart Number:
0 - 255

2. Type in the cart number that will be used to select ECGs.
3. Press the **ENTER** key.

Unconfirmed or Confirmed Files

1. The following prompt appears.

```
Select:
Unconf  Confrmd  Both
```

- ◆ Select *Unconf* if you want only unconfirmed ECGs to be deleted.
- ◆ Select *Confrmd* if you want on confirmed ECGs to be deleted.

Selecting *Confrmd* will eliminate the possibility of selecting any Hi-Res or Pacemaker files since these files can not be confirmed.

- ◆ Select *Both* if you want unconfirmed and confirmed ECGs to be deleted.

2. One of the following displays, or one very similar, appears.

```
No Data Files Deleted!!
Type Any Key to Continue
```

OR

```
E U 123456789    SMITH, JACK
Yes      No      Yes...  No..  Expand
```

- ◆ If the first display appears, either there are no ECGs on your diskette, or there are no ECGs that fit your selection parameters. In either case, press any key and start this procedure again.
- ◆ If the second display appears, this is the first ECG on your diskette or the first ECG that fits your selection parameters.

Selecting File Format

1. Select which ECGs you wish to delete. Each ECG on your diskette or each ECG on diskette that fits your selection parameters appears on the display.
2. Files are displayed in the ECG file format or the non-ECG file format.

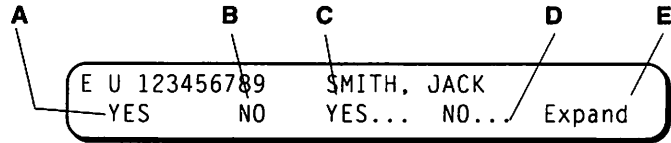


Table 10-1. ECG File Format

Item	Prompt	Your Action
A	<i>Yes</i>	Selects this ECG.
B	<i>No</i>	Bypasses this ECG.
C	<i>Yes...</i>	Selects this ECG and all remaining ECGs.
D	<i>No...</i>	Bypasses this ECG and all remaining ECGs.
E	<i>Expand</i>	Provides additional patient information such as date and time of ECG.

3. To display additional patient information, select *Expand* and a message similar to the one below will be displayed.

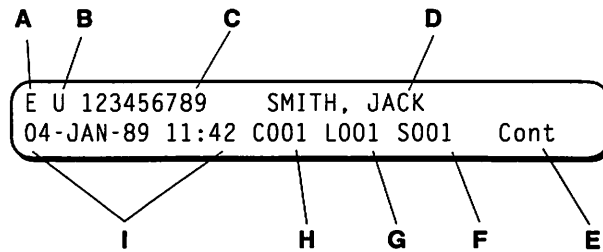


Table 10-2. Expanded ECG File Format

Item	Prompt	Description
A	type of data	E = ECG or long form, C = CGR (Computer Graphic Record) P = Packer evaluation file L = Hi-Res file
B	status of data	U = unconfirmed ECG. C = confirmed ECG. (See chapter 7, "Editing ECG Reports" to change an unconfirmed ECG to a confirmed ECG.)
C	patient identification number	Unique identifier.
D	patient name	Last name, first name of patient or the date and time when ECG was recorded.
E	Cont	Select to return to former display.
F	site	MUSE system site number where ECG was recorded.
G	location	Location number where ECG was recorded.
H	cart number	Cart number of the unit where ECG was recorded.
I	date and time	Day, month, year and time when ECG was recorded.

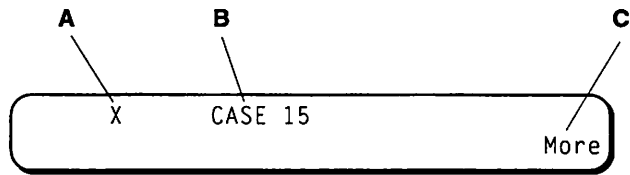


Table 10-3. Non-ECG File Format

Item	Prompt	Description
A	type of file	O = CASE 12/15 system screen file. S = CASE 12/15 system setup file. T = CASE 12/15 system procedure file. U = CASE 12/15 system stress test file. X = task file. Z = SEER file.
B	file name	The name of the file.
C	<i>More</i>	Select <i>More</i> to view the next file, if any.

File Status Messages

- After selecting which files to delete, the following prompt allows you to change your mind before deleting.

Delete Data Files Now!!:
Yes No

- Select *Yes* or *No*.

- If you select *Yes*, a display similar to the following appears.

Deleting PID: 123456789

- When all files have been deleted, the following appears.

Delete Complete
Type Any Key to Continue

- Typing any key displays the following.

Diskette Functions
Delete Format More

- Press the **STOP** key to return to the *Main Menu*.

11

USING THE PACEMAKER OPTION

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Local Pacemaker Option

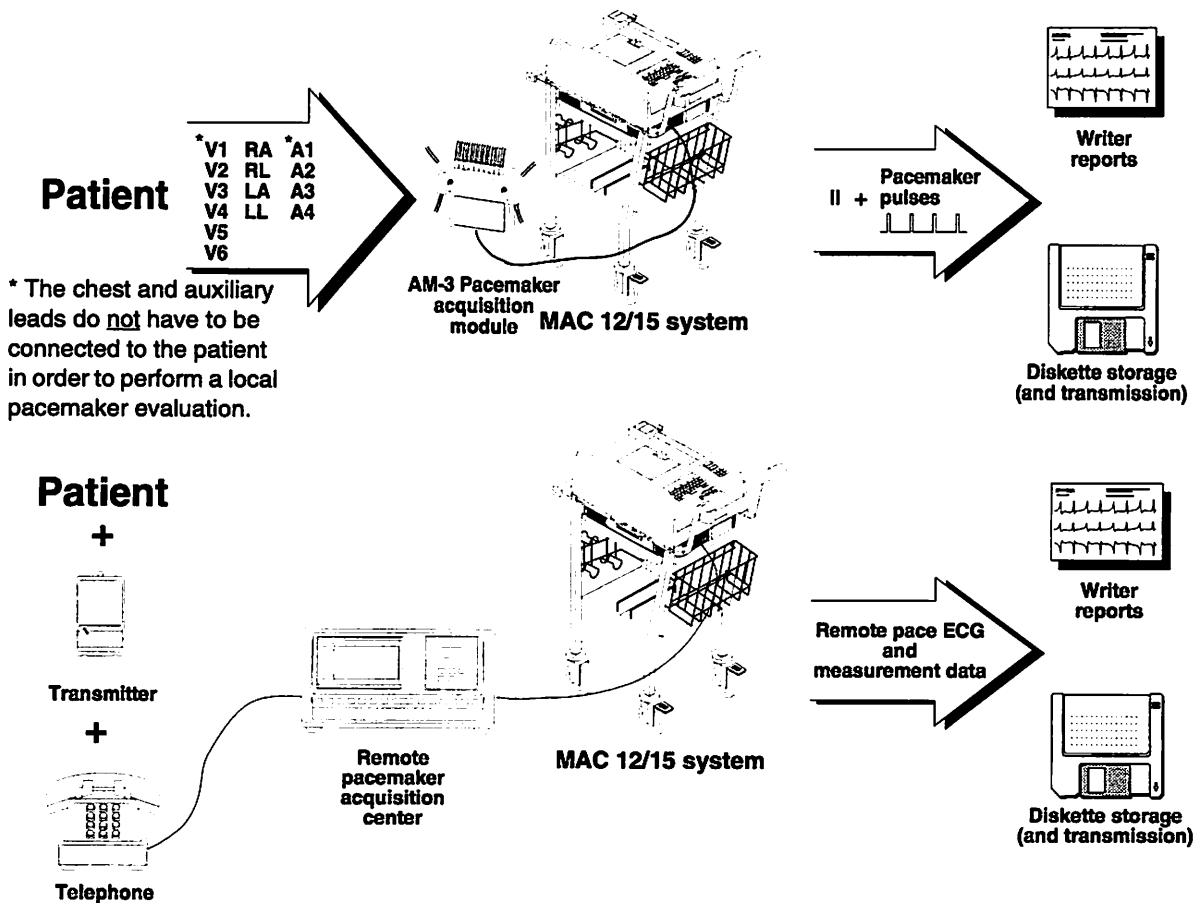
Overview

This chapter consists of two sections.

The local pacemaker option enables the system to evaluate an implanted single or dual chamber pacemaker using standard surface limb electrodes and a pace acquisition module.

The remote pacemaker option enables the system to evaluate an implanted single or dual chamber pacemaker via telephone transmission using a transmitter and a receiving center.

The differences between the local and the remote pacemaker options are shown below.



Two Phase Acquisition

Data for the local pacemaker evaluation is acquired in two separate phases: with a magnet and without a magnet placed over the pacemaker.

- The *Magnet* function acquires 10 seconds of pacemaker and lead II ECG data.
- The *No Mag* function acquires 20 seconds of pacemaker and lead II ECG data.

After local acquisition of pacemaker and ECG data, a final report is printed using the *Report* function. The final report consists of two pages. Each page contains three channels of data.

Page one of the final report contains:

- Channel 1—lead II ECG data (0 through 10 seconds) without a magnet.
- Channel 2—lead II ECG data (10 through 20 seconds) without a magnet.
- Channel 3—lead II ECG data (0 through 10 seconds) with a magnet.

Page two of the final report contains:

- Channel 1—lead II ECG data (0 through 10 seconds) with a magnet. This is the same data as channel 3 from page 1.
- Channel 2—type 1 pacemaker pulses at 3200 (with 25 mm/s writer speed) or 6400 (with 50 mm/s writer speed) millimeters per second.
- Channel 3—type 2 pacemaker pulses at 3200 (with 25 mm/s writer speed) or 6400 (with 50 mm/s writer speed) millimeters per second.

Also, pulse interval, pulse width, pulse amplitude, ratio of the amplitude of the trailing edge to the leading edge, and pulse rate are included on both pages of the final report. (See sample of these measurements below.)

Sample Final Report

		A	B
		No Magnet	Magnet
G	Int 1-1/1-2	854/ 150 mx	711/ 149 ms
F	PW 1/2	.50/ .30 ms	.51/ .30 ms
E	Amp1 1/2	10/ 7mV	10/ 7mV
D	T/L Ratio 1/2	.60/ .86	.50/ .86
C	Rate	70.3 PPM	84.4 PPM

Table 11-1. Final Report Sample Measurement Data

Item	Description
A	Pacemaker artifact with no magnet applied.
B	Pacemaker artifact with magnet applied.
C	Pulses per minute (PPM) – the number of pulses that occur during a 1-minute period computed as follows: $\text{PPM} = \frac{60}{\text{interval 1-1}}$
D	Trailing-to-leading-edge ratio – the ratio of the amplitudes of the trailing edge to the leading edge of the pacemaker artifact. Measurement of this ratio identifies any change of pulse slope which indicates a difference in electrode impedance.
E	Amplitude – the measurement of the electrical potential. The amplitude is measured in millivolts.
F	Pulse width – the length of time that current flows during each electrical impulse. The width is measured in milliseconds ± 5 microseconds.
G	Pulse interval – the distance between two pacing artifacts. This interval is the distance between two ventricular pulses (listed as "1-1") for a single chamber pacemaker or the distance between an atrial pacemaker artifact and a ventricular pacemaker artifact (listed as "1-2") for a dual chamber pacemaker. The time is listed in milliseconds ± 1 millisecond.

Recording a Local Pacemaker Evaluation

Use a PACE AM-3 acquisition module to perform a pacemaker evaluation. To evaluate an implanted pacemaker locally, follow these steps.

1. Prepare the system as described in chapter 2, "Equipment Overview."
2. Prepare the patient as described in chapter 3, "Preparing the Patient."
3. You do NOT have to enter patient information in order to evaluate a pacemaker. You may enter patient information (*PatInfo*) as described in "Entering Patient Information" in chapter 4.
4. If you do not want to save the pacemaker evaluations, remove any diskette that is in the diskette drive, and go to step 7.

Otherwise, make sure you have a diskette that can be used to save the pacemaker evaluation. Also, make sure that this diskette is not write protected (see appendix E, "Miscellaneous Tasks").

5. If there already is a diskette in the diskette drive slot, press the eject button to remove it.
6. Insert the diskette - label side up - into the diskette drive slot.
7. If the *Main Menu* is not displayed, press the **STOP** key:
8. Select 25 mm/s to change the *Main Menu* writer speed. The *Main Menu* writer speed sets the writer speed for pacemaker rhythm strips and the pacemaker final report.
 - ◆ Although the ECG and pulse data speeds can be changed, the ECG and pulse gains can not be changed.

For pacemaker rhythm strips use these values.

Main Menu Writer Speed (mm/s)	ECG Data Speed (mm/s)	Pulse Data Speed (mm/s)
1	1	128
5	5	640
10	10	1280
25	25	3200
50	50	6400

For the pacemaker final report use these values

Main Menu Writer Speed (mm/s)	ECG Data Speed (mm/s)	Pulse Data Speed (mm/s)
25	25	3200
50	50	6400

9. Press the **SHIFT** key and the **F1** key at the same time to display the *System Functions* menu.
10. Select *More*.

```

      System Functions
Ped   Pace  Hi-Res  Setup  More
    
```

11. Select *Pace*.

```

      Pacemaker
Local  Remote
    
```

Local Paced Acquisition

1. Select *Local*. One of the following three displays appear.

```

      ** Local Pace Acquisition **
Magnet No Mag Report
    
```

OR

```

      ** No MAC Acquisition Module ? **
    
```

OR

```

      Incompatible MAC Acquisition Module
    
```

- ◆ If the first display appears, go to "Acquiring Data."
- ◆ If the second display appears, make sure the correct acquisition module is attached to the system.
- ◆ If the third display appears, make sure you are using the AM-3 pacemaker acquisition module.

Acquiring Data Data for the pacemaker evaluation is acquired.

** Local Pace Acquisition **
Magnet No Mag Report

Using *Magnet*

Place the magnet over the pacemaker. Select *Magnet* to acquire 10 seconds of pacemaker and lead II ECG data with a magnet over the pacemaker.

Using *No Mag*

Remove the magnet from over the pacemaker before selecting *No Mag*. Select *No Mag* to acquire 20 seconds of pacemaker and lead II ECG data.

With either *Magnet* or *No Mag* selected, the following display appears.

** Press RECORD ECG or RECORD RHYTHM **

- ◆ Press the **RECORD ECG** key to acquire pacemaker and lead II data for the final report.
- ◆ Press the **RECORD RHYTHM** key to print pacemaker and lead II data as it is acquired on a rhythm strip. This data is not acquired for the final report, and measurement data do not appear on rhythm strips.

Pacemaker Pulse Groups

After pressing either the **RECORD ECG** or **RECORD RHYTHM** key, a display similar to the following appears.

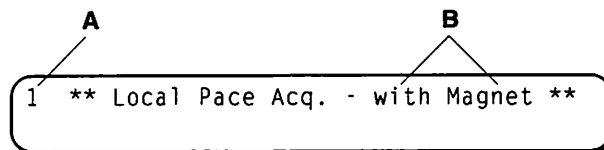


Table 11-2. Pacemaker Data.

Item	Prompt	Description
A	acquisition time	The number of seconds data has been acquired. This will only appear if the RECORD ECG key was pressed.
B	magnet use	This will be either be <i>Magnet</i> or <i>No Magnet</i> , depending on your selection.

During acquisition, interval and width measurements are used to classify pacemaker pulses into one of two groups: type 1 (titled "PULSES 1" on the final report and type 2 (titled "PULSES 2" on the final report).

- If only one class of pacemaker pulse is found, all pulses are designated as type 1.
- If two classes of pacemaker pulses are found, and the shorter interval is less than 300 milliseconds, then the shorter class of pulses are called type 1. Otherwise, the most common of the two classes is chosen as type 1.

Override Feature

When data is being acquired for the final report after pressing the **RECORD ECG** key, the local pacemaker option provides an override feature. If a pacemaker pulse is acquired that can not be measured (for example, the pulse is too small or too large), then the data acquisition will reset and start over.

However, the acquisition time on the display will not start over, but will instead show the elapsed time.

If pacemaker pulses that can not be measured are acquired at a regular rate, then the data acquisition will continually reset. In this case, you may want to override this continuous resetting by pressing the **RECORD ECG** key a second time. (The message *Override Pulse Reject* will appear on the display.) Pulses that can not be measured will be ignored.

Printing Reports

After acquiring pacemaker and lead II data using the *Magnet* and *No Mag* functions, the following display appears.

** Local Pace Acquisition **
Magnet No Mag Report

1. Select *Report* to print the two page pacemaker evaluation final report.

** Printing Reports **
Page 1 of 2

- ◆ If you answered *No* the *Ask for Extra Copies of Plots* prompt in the *Cart Setup* menu, then go to "Storing ECG Data."
- ◆ If you asked for the extra copies prompt, the following display appears after the final report has been printed.

Number of Extra Copies:
0 to 99

2. Type in the number of copies you want.
3. Press the **ENTER** key.

** Printing Reports **
Page 1 of 2 Copy 1

Storing ECG Data

After all reports have been printed, the following displays appear.

** Processing ECG For Storage **

THEN

** Write To Diskette **

NOTE

Do NOT press the **STOP** key when the **** Write To Diskette **** message appears on the display.

- ◆ If a diskette error occurs, go to "Diskette Error."
- ◆ If no diskette error occurs, the following appears.

Storage to Diskette Complete
Type Any Key to Continue

- ◆ Typing any key returns you to the *Main Menu*.

Diskette Error If a diskette error occurs, a display similar to the following appears.

** Write To Diskette **
DISKETTE NOT IN DRIVE

NOTE

Do NOT press the **STOP** key when the
** *Write To Diskette* ** message appears on
the display.

**Transmitting Pacemaker
Evaluation**

A display similar to one of the following appears.

** Write To Diskette **
DISKETTE NOT IN DRIVE

OR

** Write To Diskette **
DISKETTE NOT IN DRIVE

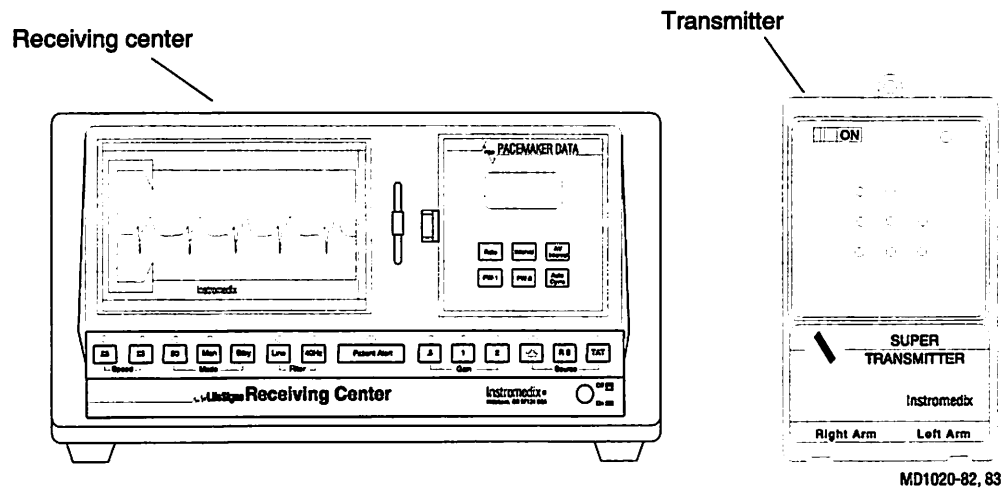
The first display appears only if your system is equipped with a modem. In this case the system will try to transmit the recently acquired pacemaker evaluation final report using the *Cart Setup* phone number. (See "Phone Setup" in chapter 13, "Setup".)

1. If no phone number was entered or you wish to cancel the transmission, press the **STOP** key.
2. If the second display appears, select *Yes* to try saving the recently acquired pacemaker evaluation final report to diskette or transmitting over a telephone line (if your system is equipped with a modem).
3. Otherwise, select *No*, and the recently acquired pacemaker evaluation final report will be lost.

Remote Pacemaker Option

Overview

The remote pacemaker option evaluates an implanted single or dual chamber pacemaker using telephonic transmission. In order to perform a remote pacemaker evaluation, you need a transmitter, receiving center, and remote pace interface cable.



Data for the remote pacemaker evaluation is acquired in two separate phases: with a magnet and without a magnet placed over the pacemaker.

- Using the *Magnet* function, 10 seconds of remote pacemaker ECG data is acquired with a magnet.
- Using the *No Mag* function, 20 seconds of remote pacemaker ECG data is acquired without a magnet.

After remote acquisition of pacemaker and ECG data, a final report can be printed using the Report function. The final report consists of one page, which contains three channels of data.

- Channel 1– ECG data (0 through 10 seconds) without a magnet.
- Channel 2– ECG data (10 through 20 seconds) without a magnet.
- Channel 3 – ECG data (0 through 10 seconds) with a magnet.

Also, pulse interval, pulse width and pulse rate are included in the final report. (A sample is shown on the following page.)

Sample Final Report

		A		B	
		No Magnet		Magnet	
G	Int 1-1/1-2	854/	150 mx	711/	149 ms
F	PW 1/2	.50/	.30 ms	.51/	.30 ms
E	Amp1 1/2	*/	* mV	*/	* mV
D	T/L Ratio 1/2	*/	*	*/	*
C	Rate	70.3	PPM	84.4	PPM

Table 11-3. Final Report Sample Measurement Data

Item	Description
A	Pacemaker artifact with no magnet applied.
B	Pacemaker artifact with magnet applied.
C	<p>Pulses per minute (PPM) – the number of pulses that occur during a 1-minute period computed as follows:</p> $PPM = \frac{60}{\text{interval 1-1}}$
D	Trailing-to-leading-edge ratio – the ratio of the amplitudes of the trailing edge to the leading edge of the pacemaker artifact. (This data is not available through remote acquisition, hence the asterisk appears on the final report in this field.)
E	Amplitude – the measurement of the electrical potential. (This data is not available through remote acquisition, hence the asterisk appears on the final report in this field.)
F	Pulse width – the length of time that current flows during each electrical impulse. The width is measured in milliseconds ± 5 microseconds.
G	Pulse interval – the distance between two pacing artifacts. This interval is the distance between two ventricular pulses (listed as "1-1") for a single chamber pacemaker or the distance between an atrial pacemaker artifact and a ventricular pacemaker artifact (listed as "1-2") for a dual chamber pacemaker. The time is listed in milliseconds ± 1 millisecond.

Recording a Remote Pacemaker Evaluation

The system must be equipped with the RS232 serial option in order to perform a remote pacemaker evaluation.

To evaluate an implanted pacemaker using data acquired from a remote location, follow these steps.

1. Prepare the system as described in chapter 2, "Equipment Overview.")
2. Prepare the remote receiving center as described in its operation and service manual. Connect the remote pace interface cable from the system to the remote receiving center.
3. Prepare and instruct the patient in the use of the telephone transmitter.
4. You do not have to enter patient information in order to evaluate a pacemaker. You may, enter patient information (PatInfo) as described in "Entering Patient Information" in chapter 4, "Taking a Resting ECG".
5. If you do not want to save the pacemaker evaluation, remove any diskette that is in the diskette drive, and go to step 8.

Otherwise, make sure you have a diskette that can be used to save the pacemaker evaluation. Also, make sure that this diskette is not write protected (see appendix E, "Miscellaneous Tasks").

6. If there already is a diskette in the diskette drive slot, press the eject button to remove it.
7. Insert the diskette - label side up - into the diskette drive slot.
8. If the *Main Menu* is not displayed, press the **STOP** key.
9. Press the **SHIFT** key and the **F1** key at the same time to display the *System Functions* menu.
10. Select *More*.

```
System Functions
Ped   Pace  Hi-Res  Setup  More
```

11. Select *Pace*.

```
Pacemaker
Local  Remote
```

Remote Pace Acquisition

Select *Remote*, and one of the following three displays appear.

**** Remote Pace Acquisition ****
 Magnet No Mag Report

OR

**** Receiving Center Not Responding ****

OR

Incorrect module installed in LRC?

- ◆ If the first display appears, go to “Acquiring Data.”
- ◆ If the second display appears, make sure the remote pacemaker receiving center is attached to the system and is turned on.
- ◆ If the third display appears, make sure you are using the correct data module in the remote pacemaker receiving center.

Acquiring Data

Data for the pacemaker evaluation is acquired.

**** Remote Pace Acquisition ****
 Magnet No Mag Report

Using *Magnet*

1. Before selecting *Magnet*, instruct the patient to place the magnet over the pacemaker and begin transmitting data.
2. Use the strip recorder on the remote receiving center to insure a stable ECG is being received before selecting *Magnet*.
3. Select *Magnet* to acquire 10 seconds of remote pacemaker ECG data with a magnet over the pacemaker.

Using *No Mag*

1. Before selecting *No Mag*, instruct the patient to remove the magnet previously held over the pacemaker and continue transmitting data.
2. Use the strip recorder on the remote receiving center to insure a stable ECG is being received before selecting *No Mag*.
3. Select *No Mag* to acquire 20 seconds of pacemaker ECG data without a magnet over the pacemaker.

When either *Magnet* or *No Mag* is selected, a display similar to the following appears.

A
B

1 ** Remote Pace Acq. - with Magnet **

Table 11-4. Pacemaker Data		
Item	Prompt	Description
A	acquisition time	The number of seconds data has been acquired. This will only appear if the RECORD ECG key was pressed.
B	magnet use	This will be either be <i>Magnet</i> or <i>No Magnet</i> , depending on your selection.

Printing Report

After acquiring remote pacemaker data using the *Magnet* and *No Mag* functions, the following display appears.

** Remote Pace Acquisition **
 Magnet No Mag Report

1. Select *Report* to print the one page pacemaker evaluation final report.

** Printing Reports **
 Page 1 of 1

- ◆ If you answered *No* to the *Ask for Extra Copies of Plots* prompt in the *Cart Setup* menu, then go to “Storing ECG Data.”
- ◆ If you asked for the extra copies prompt, the following display appears after the final report has been printed.

Number of Extra Copies:
 0 to 99

2. Type in the number of copies you want.
3. Press the **ENTER** key.

** Printing Reports **
 Page 1 of 1 Copy 1

Storing ECG Data After all reports have been printed, the following displays appear.

** Processing ECG For Storage **

THEN

** Write To Diskette **

NOTE

Do NOT press the **STOP** key when the **** Write To Diskette **** message appears on the display.

- ◆ If a diskette error occurs, go to "Diskette Error."
- ◆ If no diskette error occurs, the following appears.

Storage to Diskette Complete
Type Any Key to Continue

- ◆ Typing any key returns you to the *Main Menu*.

Diskette Error If a diskette error occurs, a display similar to the following appears.

** Write To Diskette **
DISKETTE NOT IN DRIVE

NOTE

Do NOT press the **STOP** key when the **** Write To Diskette **** message appears on the display.

Transmitting Pacemaker
Evaluation

A display similar to one of the following appears.

 ** Transmit **
Dialing - 1112345

OR

ECG Not Stored/Transmitted! Retry?:
Yes No

The first display appears only if your system is equipped with a modem. In this case the system will try to transmit the recently acquired pacemaker evaluation final report using the *Cart Setup* phone number. (Refer to "Phone Setup" in chapter 13, "Setup".)

1. If no phone number was entered, or you wish to cancel the transmission, press the **STOP** key.
2. If the second display appears, select *Yes* to try saving the recently acquired pacemaker evaluation final report to diskette or transmitting over a telephone line (if your system is equipped with a modem).
3. Otherwise, select *No*, and the recently acquired pacemaker evaluation final report will be lost.

12

USING THE HI-RES OPTION

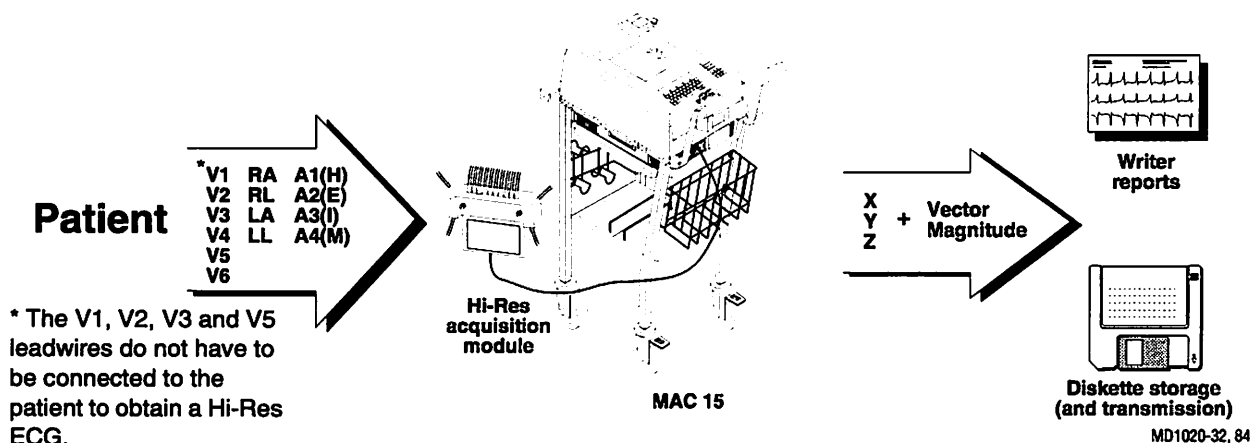
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Introduction

Overview

A high resolution ECG can not be performed with version 008 software. Use an AM-3 Hi-Res or AM-4 acquisition module to acquire a Hi-Res ECG.

The Hi-Res acquisition process is shown below.



The High Resolution (Hi-Res) option for the MAC 12/15 system analyzes high-frequency low-amplitude (HFLA) ECG information using a special "Hi-Res" acquisition module

The Hi-Res acquisition module acquires an orthogonal ECG at 1000 samples per second, and transmits this data to the electrocardiograph. Of greatest interest are signals within the terminal or mid portions of the QRS. The Hi-Res software delineates QRS complexes and correlates them with a template in frequency domain to compute an average cardiac complex (P, QRS, and T).

This complex is used for analysis of HFLA information. The average beat is bandpass filtered using 4 lower cutoff frequencies—25, 40, 80, and 150 Hz—with the higher cutoff at 250 Hz.

For the 25, 40, and 80 Hz filters, the following data are extracted:

- standard QRS duration (unfiltered),
- total QRS duration (filtered),
- duration of HFLA signals (40 μ V),
- RMS voltage in the terminal 40 milliseconds,
- mean voltage in the terminal 40 milliseconds,
- noise level in ST segment (standard deviation), and
- average value of noise voltage.

For the 150 Hz filter, the following data are extracted:

- standard QRS duration (unfiltered),
- total QRS duration (filtered),
- RMS voltage and noise level in the X, Y, and Z leads as well as the vector magnitude.

A Hi-Res report can be 2 to 7 pages long. The first page is the template report, followed by one or more pages of periodic average plots (if enabled in *Cart Setup*). The pages that follow contain the final report (averaged signals and vector magnitude plots filtered at 25-250, 40-250, 80-250, and/or 150-250 Hz.)

The *Cart Setup* menu selects the analysis filters. For example, if the 25-250 Hz and 40-250 Hz filters are chosen and if periodic average plots is enabled, then the Hi-Res report would consist of a minimum of four pages: a template, one or more pages of periodic average plots, and the two filtered reports.

Taking a Hi-Res ECG

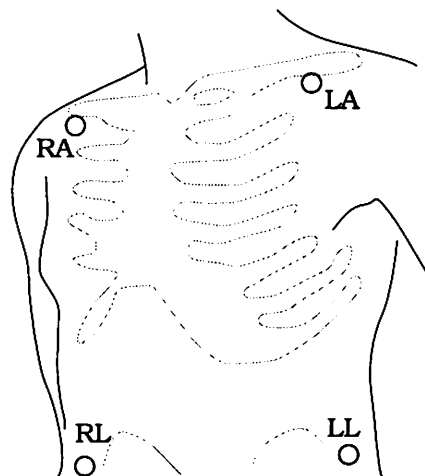
STOP Key Use

Normally, pressing the **STOP** key causes the *Main Menu* to appear on the display and writer reports to stop printing. However, this is not always the case in Hi-Res mode. Pressing the **STOP** key has no effect in Hi-Res mode.

1. Prepare the system as described in chapter 2, "Equipment Overview."
2. Prepare the patient as described in chapter 3, "Preparing the Patient." Then use the electrode placement described in steps 3 through 5 below.

Limb Electrode Placement

3. Attach the limb electrodes as shown below.
 - ◆ Do not pull or jerk tangled wires. To untangle wires, disconnect leadwires from electrodes.
 - ◆ To avoid interference with adjoining electrodes, rub chest electrode sites with an up and down motion rather than from side to side.

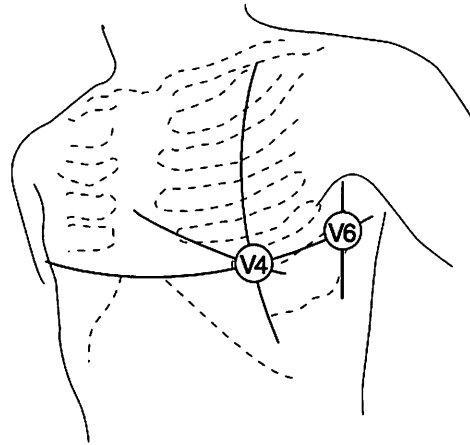


MD1020-87

- RA and LA electrodes should be placed just below the right and left clavicles on the midlines.
- RL and LL electrodes should be placed on the pelvis.

Chest Electrode Placement

4. Attach the chest electrodes as shown below.



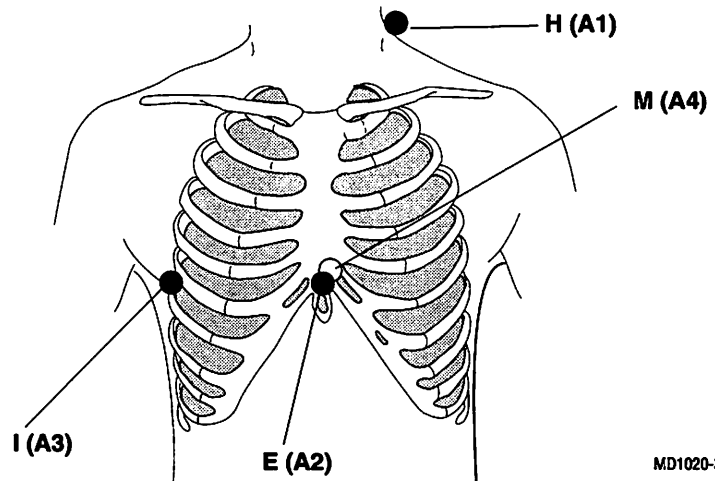
MD1020-88

- V4 at the mid-clavicular line in the fifth intercostal space.
V6 at the mid-axillary line on the same horizontal level as V4.

Auxiliary Electrode Placement

5. Connect the auxiliary (A1 through A4) leadwires to the patient as follows: A1 = H position, A2 = E position, A3 = I position, and A4 = M position as shown below.

- ◆ Do NOT use the auxiliary lead group mode (A1, A2, A3, A4, or V3R, V4R, V7) for XYZ. If you do, the resulting ECG data may be inaccurate and may cause misinterpretation.



MD1020-35

- H (A1) on the back of the neck (or either side of the neck).
E (A2) over the mid-sternum at the same horizontal level as V4 and V6.
I (A3) at the right mid-axillary line (opposite and on the same level with V6).
M (A4) center of the back (opposite E) or slightly off the spine.

Patient Information

6. You can, enter patient information (*PatInfo*) as described in "Entering Patient Information" in chapter 4, "Taking a Resting ECG". You do not have to enter patient information in order to record a Hi-Res ECG. You can enter patient data later using the *Diskette Functions*.

Saving the Hi-Res ECG to Diskette

NOTE

The Hi-Res ECG must be saved on a diskette in order to reanalyze the data.

NOTE

You can transmit a stored Hi-Res ECG using Diskette Functions as described in chapter 6, "Receiving and Transmitting an ECG." A Hi-Res file acquired on a MAC 12/15 system can be transmitted to another MAC 12/15 system equipped with identical software.

NOTE

If you don't want to save the Hi-Res ECG, proceed with Step 3 below.

1. If there already is a diskette in the diskette drive slot, press the eject button to remove it.
2. Insert a formatted diskette - label side up - into the diskette drive slot. Make sure this diskette is not write protected (see appendix E, "Miscellaneous Tasks").
3. If the *Main Menu* is not displayed, press the **STOP** key.
4. Press the **SHIFT** key and the **F1** key at the same time to display the *System Functions* menu.

```

                System Functions
Order   RevXmit   Disk   Vector More
    
```

5. Select *More*.

```

                System Functions
Ped     Pace   Hi-Res   Setup More
    
```

6. Select *Hi-Res*.

```

                Hi-Res Functions
SigAavg ReAnalz
    
```

7. Select *SigAavg*.

8. The *Hi-Res* mode is entered. Pressing the **STOP** key has no effect.



Table 12-1. Hi-Res Mode

Item	Prompt	Description
A	<i>Trgt</i> (Target)	<ul style="list-style-type: none"> Press the F1 key to increase the number of beats that will be averaged for late potential analysis. Press the SHIFT key and F1 key to decrease the number of beats that will be averaged for late potential analysis.
B	<i>Nois</i> (Noise Level in microvolts)	<ul style="list-style-type: none"> Press the F2 key to increase the allowable noise level value. Press the SHIFT key and F2 key to decrease the noise level value. <p><i>Nois</i> (Noise Level in microvolts) will only appear if it was selected in <i>Cart Setup</i> (see chapter 13, "Setup").</p>
C	<i>GenTmpl</i> (Generate Template)	Starts generating the template which will be used for subsequent correlation.
D	<i>Exit</i>	Quits the Hi-Res mode.

Printing Hi-Res ECG Report

1. After selecting *GenTmpl*, the following displays appear. The first page of the Hi-Res ECG report – containing sample X, Y, Z and VM (Vector Magnitude) templates – prints. Pressing the **STOP** key has no effect.

** Acquiring Data for Template **

2. If a lead fail occurs before the acquisition starts, then a display similar to the following appears.

** Lead OFF - M (A4)
Override Exit

3. If a lead off message appears during template acquisition try the following. Press the **STOP** key has no effect.

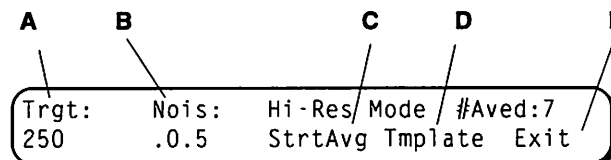


Table 12-2. Hi-Res Mode

Item	Prompt	Description
A	<i>Trgt</i> (Target)	<ul style="list-style-type: none"> Press the F1 key to increase the number of beats that will be averaged for late potential analysis. Press the SHIFT key and F1 key to decrease the number of beats that will be averaged for late potential analysis.
B	<i>Nois</i> (Noise Level in microvolts)	<ul style="list-style-type: none"> Press the F2 key to increase the allowable noise level value. Press the SHIFT key and F2 key to decrease the noise level value. <p><i>Nois</i> (Noise Level in microvolts) will only appear if it was selected in <i>Cart Setup</i> (see chapter 13, "Setup").</p>
C	<i>StrtAvg</i> (Start Averaging)	Begins acquiring data for signal averaging. The result of late potential analysis will appear on the rest of the Hi-Res ECG report. Go to "Acquiring Data for Signal Averaging."
D	<i>Tmplate</i> (Template)	Selects either <i>UsrTmpl</i> (User Defined Template) or <i>NewTmpl</i> (New Template). If you select <i>NewTmpl</i> , go to "Saving the Hi-Res ECG to Diskette" step 8 because the previous template is discarded and a new template will be acquired.
E	<i>Exit</i>	Quits the Hi-Res mode.

- ◆ first, select *Exit*. Then check all electrode and leadwire connections. Restart from "Saving the Hi-Res ECG to Diskette" step 8.
- ◆ second, if a lead off message still appears, then select *Exit*, remove the affected electrodes, prepare the electrode site(s) again, and place new electrodes. Then restart from "Saving the Hi-Res ECG to Diskette" step 8.
- ◆ third, if a lead error message still appears after performing the above, then and only then should *Override* be selected.

4. If no lead off message appears, then the following displays appear.

** Generating Templates **

THEN

** Plotting Template Data **

Selecting *UsrTmpl*

If you select *UsrTmpl*, the following appears.

A	B	C
Seed Beat 2	CorThr High	Go

Table 12-3. UsrTmpl Data

Item	Prompt	Description
A	<i>Seed Beat</i>	Changes the seed beat on the next template generated.
B	<i>CorThr</i> (Correlation Threshold)	Changes the correlation threshold – either low, medium, or high – on the next template generated. <ul style="list-style-type: none"> ■ Set the Correlation Threshold to <i>High</i>. A lower setting could permit the acquisition of noisy ECG data.
C	generates template with your changes	Generates another template with the changes you have selected.

Acquiring Data for Signal Averaging

1. After selecting *StrtAvg*, a display similar to the following appears.

```

** Acquiring Average Data **
Trgt:250      #Aved:9      #dtct:11
  
```

A
B
C

Table 12-4. Signal Averaging Data

Item	Prompt	Description
A	<i>Trgt:</i>	Represents the number of target beats to be averaged.
B	<i>#Aved</i>	<p>Total number of beats currently averaged.</p> <ul style="list-style-type: none"> ■ When this number is equal to or greater than the <i>Trgt</i> number, averaging is complete. ■ However, in <i>Cart Setup</i> if you selected to terminate averaging based on a preset noise level, and not beats, then averaging stops when this preset noise level is reached. <p>If this noise level is not reached, then acquisition stops when the <i>Trgt</i> number is reached.</p>
C	<i>#dtct:</i>	Total number of beats detected.

During the averaging process, periodic average plots are printed if you answered *Yes* to *Periodic Average Plots* in *Cart Setup*.

2. If you press the **STOP** key while the above display is on, then the following appears.

```

** Updating Average Data **
**   Please Wait   **
    
```

THEN

```

A      B      C
Trgt:  Nois:  Hi-Res Mode  #Aved:224
250    0.5   Analyz   Continue  Exit
                                F      E      D
    
```

Table 12-5. Signal Averaging Data

Item	Prompt	Description
A	<i>Trgt</i> (Target)	<ul style="list-style-type: none"> Press the F1 key to increase the number of beats that will be averaged for late potential analysis. Press the SHIFT key and F1 key to decrease the number of beats that will be averaged for late potential analysis.
B	<i>Nois</i> (Noise Level in microvolts)	<ul style="list-style-type: none"> Press the F2 key to increase the allowable noise level value. Press the SHIFT key and F2 key to decrease the noise level value. <p><i>Nois</i> (Noise Level in microvolts) will only appear if it was selected in <i>Cart Setup</i> (see chapter 13, "Setup").</p>
C	<i>#Aved:</i>	Total number of beats currently averaged when the STOP key was pressed.
D	<i>Exit</i>	Quits the Hi-Res mode.
E	<i>Continue</i>	Continues the signal-averaging acquisition.
F	<i>Analyz</i> (Analyze)	Quits the signal-averaging acquisition. Go to "Printing Reports."

Printing Reports

1. When the target number of beats has been averaged, or a preset noise level has been reached, or the acquisition of data has been stopped by the user and *Analyz* selected, displays similar to the following appear. Pressing the **STOP** key has no effect.

** Averaging Completed **

THEN

** Analyzing Data for Late Potentials **

THEN

** Printing Reports **
1 of 4

2. If you answered yes to the *Ask for Extra Copies of Plots* prompt in the *Cart Setup* menu, then the following appears.

Number of Extra Copies:
0 to 99

- ◆ Type in the number of copies. Press the **ENTER** key.
- ◆ Otherwise, press the **ENTER** key if you don't want any extra copies.

More Averaging:
Yes No

3. Select *Yes* to acquire more beats for late potential analysis. Then go to "Saving ECG Data to Diskette." However, the *Template* (Template) function will not be available.

Saving ECG Data To Diskette

1. Select *No* to begin saving the ECG data. Pressing the **STOP** key has no effect.

** Write to Diskette **

2. If no diskette error occurs, the following appears.

Storage to Diskette Complete
Type Any Key to Continue

THEN

Hi-Res Functions
SigAvrg ReAnalz

- ◆ Select *SigAvrg*. Go to "Selecting All Files to Reanalyze" step 3.
- ◆ Select *ReAnalz* and go to "Hi-Res Report Re-Analysis." step 7.
- ◆ Press the **STOP** key to return to the *Main Menu*.

Diskette Error

3. If a diskette error occurs, a display similar to the following appears. Pressing the **STOP** key has no effect.

```
    ** Write To Diskette **  
DISKETTE NOT IN DRIVE
```

If your system is equipped with a modem and there is no diskette in the drive, all the displays shown below appear. A system equipped with a modem will first try to write the Hi-Res file to a diskette and then try to transmit to the phone number specified in the *Cart Setup* menu.

```
    ** Transmit **  
Dialing - 1114567
```

THEN

```
    ** Transmit **  
Sending #
```

If your system is not equipped with a modem and there is no diskette in the drive, only this display appears.

```
ECG Not Stored/Transmitted! Retry?:  
Yes      No
```

In either case, you can save the Hi-Res file.

- ◆ Insert a formatted diskette in the drive.
- ◆ Select *Yes*. This saves the Hi-Res file to the diskette.

Hi-Res Report Re-Analysis

Overview

Use the *Diskette Functions* menu to re-analyze Hi-Res reports stored on diskette. Only Hi-Res reports stored on a diskette can be reanalyzed.

Setup

To perform a Hi-Res re-analysis follow these steps.

1. If there already is a diskette in the diskette drive slot, press the eject button to remove it.
2. Insert the diskette - label side up - into the diskette drive slot.
3. If the *Main Menu* is not displayed, press the **STOP** key.
4. Press the **SHIFT** key and the **F1** key at the same time to display the *System Functions* menu.

```

System Functions
Orders  RevXmit  Disk  Vector  More
    
```

5. Select *More*.

```

System Functions
Ped    Pace    Hi-Res  Setup  More
    
```

6. Select *Hi-Res*.

```

Hi-Res Functions
SigAvg  ReAnalz
    
```

7. Select *ReAnalz* (Hi-Res Re-Analysis).

```

Password:
    
```

8. Enter the Level 1 or Level 2 password. (The default passwords are "L1" and "L2".)
9. Press the **ENTER** key.
10. The system checks the diskette. The following message appears briefly.

```

** Hi-Res Re-analysis **
Reading Diskette
    
```

Selecting All Files to Reanalyze

1. You can re-analyze all or some of the Hi-Res files on your diskette.

Select Data:
All Select

- ◆ Select *All* to re-analyze all the Hi-Res files on your diskette. Go to "Selecting Discrete Files to Reanalyze" step 3.
- ◆ Choose *Select* to select which Hi-Res files on your diskette to re-analyze.

Set up Selection Parameters:
Yes No

- ◆ Select *No* if you want to skip the following selection prompts and view the first ECG on your diskette. If you Select *No*, go to "Selecting Discrete Files to Reanalyze."

2. After selecting *Yes*, the first selection prompt appears.

Select by PID:
Yes No

- ◆ If you select *No*, then go to "MUSE System Information."
- ◆ If you select *Yes*, the following display appears.

Patient ID:
Digits 0 To 9

3. Type the patient's identification number (PID) that will be used to select ECGs.

4. Press the **ENTER** key.

MUSE System Information

5. A prompt appears that allows you to select those ECGs that have the same MUSE system site number.

Select by Site:
Yes No

- ◆ If you select *No*, then go to step 8.
- ◆ If you select *Yes*, the following display appears.

Site Number:
1 - 255

6. Type in the MUSE system site number that will be used to select ECGs.

7. Press the **ENTER** key.

8. A prompt appears that allows you to select Hi-Res files by their MUSE system location number.

Select by Location:
Yes No

- ◆ If you select *No*, go to “Cart Information.”
- ◆ If you select *Yes*, the following display appears.

Location Number:
0 - 99

9. Type in the MUSE system location number that will be used to select Hi-Res files.

10. Press the **ENTER** key.

Cart Information

11. The next prompt that appears allows you to select Hi-Res files by their cart number.

Select by Cart:
Yes No

- ◆ If you select *No*, go to “Unconfirmed and Confirmed File Selection.”
- ◆ If you select *Yes*, the following display appears.

Cart Number:
0 - 255

12. Type the cart number that will be used to select Hi-Res files.

13. Press the **ENTER** key.

Unconfirmed and Confirmed File Selection

14. The following prompt appears.

Select:
Unconf Confrmd Both

- ◆ Select *Unconf* if you want to re-analyze unconfirmed Hi-Res reports.
- ◆ Select *Confrmd* if you want to re-analyze confirmed Hi-Res reports. (Selecting *Confrmd* will result in “*No Files Selected*” message since Hi-Res files can not be confirmed.)
- ◆ Select *Both* if you want to re-analyze both unconfirmed and confirmed reports.

15. One of the following, or a very similar, display appears.

```
No Data Selected to Edit
Type Any Key to Continue
```

OR

```
E U 123456789 SMITH, JACK
Yes No Yes... No.. Expand
```

- ◆ If the first display appears, either there are no Hi-Res files on your diskette, or there are no Hi-Res files that fit your selection parameters. In either case, press any key and start this procedure again.
- ◆ If the second display appears, this is the first Hi-Res file on your diskette or the first Hi-Res file that fits your selection parameters. This second display is explained in detail below.

Selecting Discrete Files to Reanalyze

1. Select the Hi-Res files you wish to re-analyze. Each Hi-Res file on your diskette or each Hi-Res file on diskette that fits your selection parameters will be displayed in a manner similar to the following.

```
E U 123456789 SMITH, JACK
YES NO YES... NO.. Expand
```

The diagram shows a terminal window with the following text: "E U 123456789 SMITH, JACK" on the first line and "YES NO YES... NO.. Expand" on the second line. Callout A points to the first character 'E'. Callout B points to the character '8'. Callout C points to the text "SMITH, JACK". Callout D points to the text "NO..". Callout E points to the text "Expand".

Table 12-6. ECG Patient Data

Item	Prompt	Your Action
A	<i>Yes</i>	Selects this ECG.
B	<i>No</i>	Bypasses this ECG.
C	<i>Yes...</i>	Selects this ECG and all remaining ECGs.
D	<i>No...</i>	Bypasses this ECG and all remaining ECGs.
E	<i>Expand</i>	Provides additional patient information such as date and time of ECG.

2. To display additional patient information, select *Expand* and a message similar to the one below will be displayed.

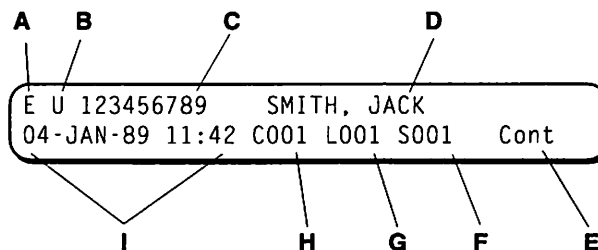


Table 12-7. Expanded Patient Data

Item	Prompt	Description
A	type of data	E = ECG or long form, C = CGR (Computer Graphic Record) P = Packer evaluation file L = Hi-Res file
B	status of data	U = unconfirmed ECG. C = confirmed ECG. (See chapter 7, "Editing ECG Reports" to change an unconfirmed ECG to a confirmed ECG.)
C	patient identification number	Unique identifier.
D	patient name	Last name, first name of patient.
E	<i>Cont</i>	Select to return to former display.
F	site	MUSE system site number where ECG was recorded.
G	location	Location number where ECG was recorded.
H	cart number	Cart number of the unit where ECG was recorded.
I	date and time	Day, month, year and time when ECG was recorded.

3. Displays similar to the following appear.

** Hi-Res Re-analysis **
Reading Diskette

THEN

E U 123456789 SMITH, JACK
04-JAN-89 11:42 C001 L001 S001

4. Type any key to continue.

```
Hi-Res Re-analysis
Filter: 40      Go      Exit
```

- ◆ Press the **F2** key to select the desired filter for the re-analysis.
- ◆ Press the **F3** key to generate the report (as stored on the diskette) with the selected filter. Go to "Printing Discrete Files."
- ◆ Press the **F5** key to proceed with the re-analysis of the next file. Return to step 3.

If no other file has been selected for re-analysis, the following display will appear.

```
Reanalysis Complete
Type Any Key to Continue
```

Printing Discrete Files

1. Selecting *Go* prints a copy of the stored report.

Number of Extra Copies:
0 to 99

- ◆ Press the **ENTER** key if you do not want any extra copies.
- ◆ Or, type the number of extra copies. Press the **ENTER** key.

2. The following display appears.

QRS_On	QRS_Off	Term_Dur	Go	Exit
0 ms	0 ms	40 ms		
A	B	C	D	E

Table 12-8. Printing Discrete Files

Item	Prompt	Description
A	<i>QRS_On</i> (QRS Onset)	<ul style="list-style-type: none"> ■ Press the F1 key to increase the QRS onset in increments of 1 millisecond. ■ Press the SHIFT key and F1 key at the same time to decrease the QRS onset in increments of 1 millisecond.
B	<i>QRS_Off</i> (QRS Offset)	<ul style="list-style-type: none"> ■ Press the F2 key to increase the QRS offset in increments of 1 millisecond. ■ Press the SHIFT key and F2 key at the same time to decrease the QRS offset in increments of 1 millisecond.
C	<i>Term_Dur</i> (Terminal Duration)	<ul style="list-style-type: none"> ■ Press the F3 key to raise the Terminal Duration to the desired number in steps of 10 milliseconds. ■ Press the SHIFT key and F3 key at the same time to lower the Terminal Duration to the desired number in steps of 10 milliseconds.
D	<i>Go</i>	Generates a Hi-Res Re-Analysis Report. Go to the next step.
E	<i>Exit</i>	Return to "Selecting Discrete Files to Reanalyze" step 3.

3. The following display appears.

Number of Extra Copies:
0 to 99

- ◆ Type the number of extra copies of the re-analysis report. Press the **ENTER** key.
 - ◆ Or, if you want to perform another re-analysis of this ECG with different parameters, press the **ENTER** key and return to step 2.
4. When re-analysis is complete, press the **STOP** key to return to the *Main Menu*.

13

SETUP

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How to Begin

Overview

Although your system will operate perfectly when you first receive it from Marquette, you'll want to "set up" a lot of details such as date and time, types of reports, etc. for your particular use. After these are set, the system will retain all of these instructions until you make changes.

Setup

1. To begin setup, press the **STOP** key to display the *Main Menu*.

```

↑Task   V1+II+V5
PatInfo Rhythm 25mm/s 10mm/mV   More
    
```

2. Hold down the **SHIFT** key and then press the **F1** key to display the *System Functions* menu.

```

                System Functions
Orders  RevXmit  Disk      Vector  More
    
```

3. Select *More*.

```

                System Functions
Ped     Pace     Hi-Res  Setup  More
    
```

4. Select *Setup*. The following display will appear if a Level 1 password has been entered. (The default password is "L1".)

```

Password:
    
```

5. Press the **ENTER** key to display the first *Cart Setup* menu.

```

Cart Setup
Dat/Tim  Phone  LdGrps  Reports  More
See "Date and Time Setup"  See "Phone Setup"  See "Lead Groups Setup"  See "Report Formats Setup"
    
```

```

Cart Setup
Passwds  Modem  LclLine  Misc  More
See "Password Setup"  See "Modem Setup"  See "Local Line Setup"  See "Miscellaneous Setup"
    
```

```

Cart Setup
Defaults Hi-Res  More
See "Defaults Setup"  See "Hi-Res Setup"
    
```

Each of these prompts is explained on the following pages.

6. Press the **ENTER** key after each selection to move to the next LCD. Pressing the **ENTER** key sends the information to memory.

Date and Time Setup

The system has an internal calendar and clock which is used to print the date and time on reports. To set the system's internal calendar, follow these steps.

Table 13-1. Date and Time Setup

Step	LCD	Your Action
1	Cart Setup Dat/Tim Phone LdGrps Reports More	Select <i>Dat/Tim</i> .
2	Date and Time Setup Date Time	<ul style="list-style-type: none"> ■ Select <i>Date</i> to change the date. ■ Select <i>Time</i> to change the time.
3	Day of the Week: Monday Tuesday Wednesday Thursday More	<ul style="list-style-type: none"> ■ Select the current day of the week.
4	Today's Date (DD-MMM-YY): DD=Day, MMM=Month, YY or YYYY=Year	<ul style="list-style-type: none"> ■ Type the day, a dash, the month, a dash, and the year. For example, if today is January 12, 1995, type 12 (space) JAN (space) 95 ■ Press the ENTER key. Go to step 6. <p>When your system uses software versions 010A/110A or later, enter a 4-digit year. Otherwise, enter a 2-digit year.</p>
5	Observe Daylight Savings Time: Yes No	<ul style="list-style-type: none"> ■ Press F2 to prevent the system from changing to daylight savings time at 2:00 am on April 26 – which reflects the old daylight savings law.
6	Time (HH-MM): HH=Hour, MM=Minute (24 Hr Clock)	<ul style="list-style-type: none"> ■ Type the hour, a dash, and the minute using a 24-hour clock. For example, type 08 (space) 10 for 8:10 am, and 20 (space) 10 for 8:10 pm. ■ Press the ENTER key.
7	Date and Time Setup Date Time	Press the STOP key to return to the <i>Main Menu</i> .

Phone Setup

If you will be frequently calling a single location to transmit system reports, then it's smart to enter the telephone number of this location. This saves time because the number does not have to be entered again and again. To enter a telephone number, follow these steps.

Table 13-2. Phone Setup

Step	LCD	Your Action
1	Cart Setup Dat/Tim Phone LdGrps Reports More	Select <i>Phone</i> .
2	Phone Number No Spaces or Dashes. = Means Pause.	Type a phone number.
3	Cart Setup Dat/Tim Phone LdGrps Reports More	Press the STOP key to return to the <i>Main Menu</i> .

You can use these special characters in the telephone number.

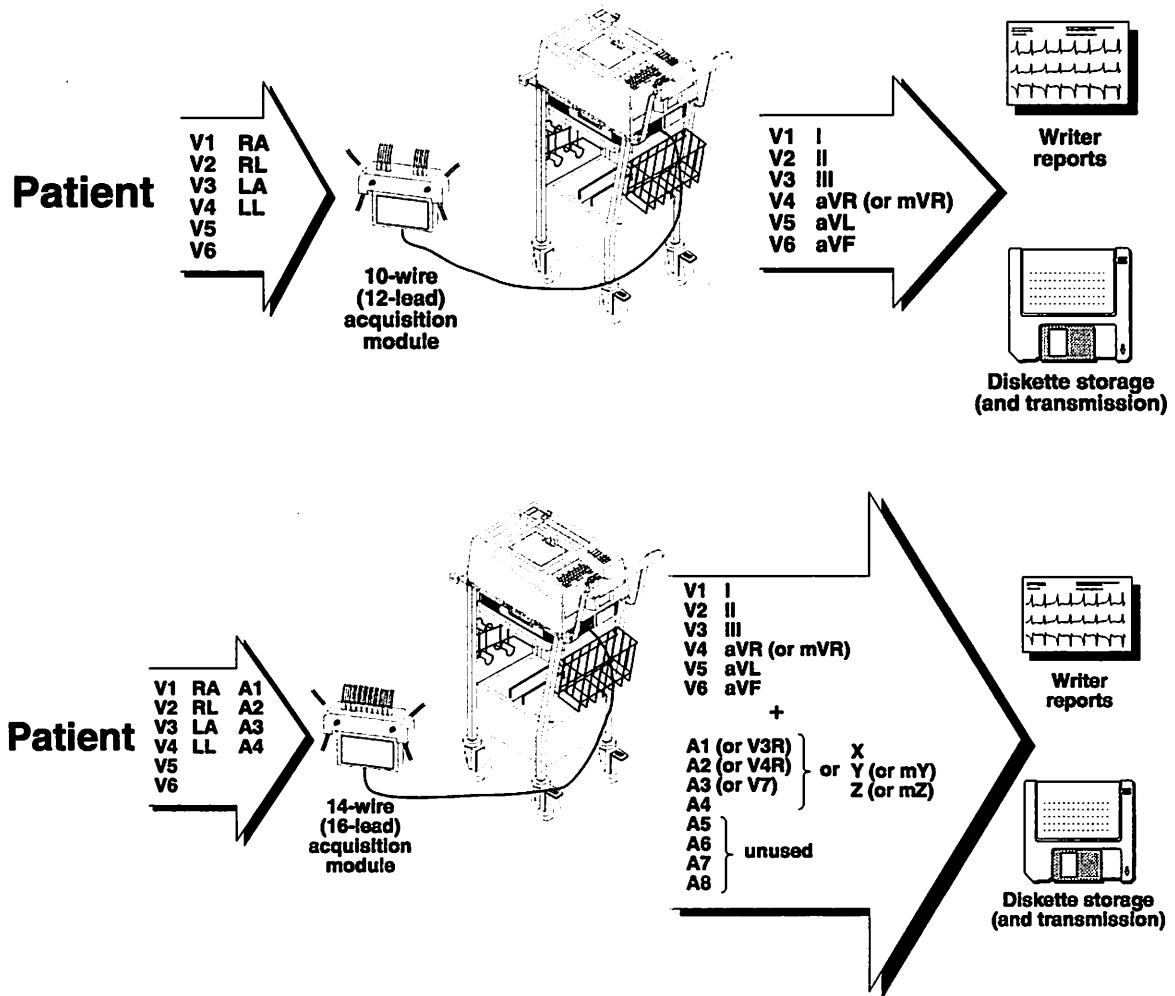
and * Represent touch-tone symbols.

- ,
 - =
- Creates a 2-second pause. Use repeatedly to add longer pauses. (For example, in the phone number 1,,8082345 there will be a 6-second pause between the 1 and 8 numbers when dialing.)
- Use to create a wait for a dial tone. (If you must dial 9 for an outside number before dialing the 7-digit phone number, type 9= before the 7 digits. A sample number would look like this: 9=1234567.)

Lead Groups Setup

Rhythm, Standard (standard), *CGR/RMR* (computer record/rhythm and morphology), or *SI* leads may be set. Also, you must use *AM Type* to set the type of acquisition module (either 10- or 14-wire) that is attached to the system.

The differences between the 10-wire (12-lead) and 14-wire (16-lead) acquisition modules are shown below.



MD1020-30, 31, 32

Rhythm Leads

Follow these steps to set the kind and number of leads that appear on rhythm reports.

Table 13-3. Rhythm Leads

Step	LCD	Your Action
1	Cart Setup Dat/Tim Phone LdGrps Reports More	Select <i>LdGrps</i> .
2	Lead Groups Rhythm Standrd CGR/RMR S1 AM Type	Select <i>Rhythm</i> .
3	Group: AutoRhm Group1 Group2 Group3 Group4	Select a group to edit. Press the ENTER key.
4	Number of Rhythm Leads: 3 6 12	<ul style="list-style-type: none"> ■ Select the number of rhythm leads you want in the group. ■ If you select 12, then the <i>Standrd</i> (Standard) lead settings will be used. In this case, go to "Standard Leads." ■ Press the ENTER key.
5	Rhythm Lead for Channel 1: I II III More	<ul style="list-style-type: none"> ■ Select a lead for each of the rhythm leads you chose. (Select <i>More</i> for additional choices.) ■ A1 through A8, V3R, V4R, V7, X, Y, Z, mY and mZ are available only if you selected the 16-lead acquisition module in <i>AM Type</i>. ■ Press the ENTER key after each lead selection.
6	Lead Groups Rhythm Standrd CGR/RMR S1 AM Type	Press the STOP key to return to the <i>Main Menu</i> .

NOTE

In addition to CGR and RMR report formats, use "Setting CGR/RMR Leads" to set the rhythm leads for the following report formats:
 1-page 4 x 2.5 with 3 rhythm channels,
 1-page 4 x 2.5 with 1 rhythm channel, and
 pediatric.

Standard Leads

Follow these steps to set the “standard” leads on ECG reports. (See appendix E, “Sample Reports” to see where the standard leads appear on reports.)

Table 13-4. Standard Leads

Step	LCD	Your Action
1	Cart Setup Dat/Time Phone LdGrps Reports More	Select <i>LdGrps</i> .
2	Lead Groups Rhythm Standrd CGR/RMR S1 AM Type	Select <i>Standrd</i> .
3	Standard lead (Channel 1): I II III More	<ul style="list-style-type: none"> ■ Select a lead for each of the 12 standard leads. (Select <i>More</i> for additional choices.) ■ A1 through A8, V3R, V4R, V7, X, Y, Z, mY and mZ are only available if you selected the 16-lead acquisition module in <i>AM Type</i>. ■ Press the ENTER key after each lead selection.
4	Lead Groups Rhythm Standrd CGR/RMR S1 AM Type	Press the STOP key to return to the <i>Main Menu</i> .

CGR/RMR Leads

Follow these steps to select one lead for each of the channels. (See appendix E, "Sample Reports" to see where these leads appear on reports.)

NOTE

In addition to setting CGR/RMR rhythm leads, use "Setting CGR/RMR Leads" to set the rhythm for the following report formats:
 1-page 4 x 2.5 with 3 rhythm channels,
 1-page 4 x 2.5 with 1 rhythm channel, and
 pediatric.

Table 13-5. CGR/RMR Leads

Step	LCD	Your Action
1	Cart Setup Dat/Time Phone LdGrps Reports More	Select <i>LdGrps</i> .
2	Lead Groups Rhythm Standrd CGR/RMR S1 AM Type	Select <i>RMR/CGR</i> .
3	RMR/CGR Lead (Channel 1):	<ul style="list-style-type: none"> ■ Select a lead for each of the RMR/CGR leads. (Select <i>More</i> for additional choices.) ■ A1 through A8, V3R, V4R, V7, X, Y, Z, mY and mZ are only available if you selected the 16-lead acquisition module in <i>AM Type</i>. ■ Press the ENTER key after each lead selection.
4	Lead Groups Rhythm Standrd CGR/RMR S1 AM Type	Press the STOP key to return to the <i>Main Menu</i> .

S1 Leads

Follow these steps to choose one of the possible leads for each of the channels for the S1 ECG report. (See appendix E, "Sample Reports" to see where this lead appears on the report.)

Table 13-6. S1 Leads

Step	LCD	Your Action
1	Cart Setup Dat/Time Phone LdGrps Reports More	Select <i>LdGrps</i> .
2	Lead Groups Rhythm Standrd CGR/RMR S1 AM Type	Select <i>S1</i> .
3	S1 Lead (Channel 1): I II III More	<ul style="list-style-type: none"> ■ Select a lead for each of the 6 S1 leads. (Select <i>More</i> for additional lead choices.) ■ A1 through A8, V3R, V4R, V7, X, Y, Z, mY and mZ are only available if you selected the 16-lead acquisition module in <i>AM Type</i>. ■ Press the ENTER key after each lead selection.
4	Lead Groups Rhythm Standrd CGR/RMR S1 AM Type	Press the STOP key to return to the <i>Main Menu</i> .

Setting Acquisition Module Type

After selecting *AM Type*, the following displays appear.

Table 13-7. Setting Acquisition Module Type

Step	LCD	Your Action
1	Cart Setup Dat/Time Phone LdGrps Reports More	Select <i>LdGrps</i> .
2	Lead Groups Rhythm Standrd CGR/RMR S1 AM Type	Select <i>AM Type</i> .
3	AM Type 10 Wire 14 Wire	<ul style="list-style-type: none"> ■ If you select <i>10 Wire</i> return to the <i>Lead Groups</i> menu. ■ If you select <i>14 Wire</i>, go to step 4. ■ Press the ENTER key after each lead selection.
4	Set A1-A4 leads as: Unused A1-A4 XYZ V3R, V4R, V7	<ul style="list-style-type: none"> ■ If you select <i>Unused</i> go to step 7 ■ If you select <i>A1-A4</i>, go to step 5 ■ If you select <i>XYZ</i>, go to step 6 ■ If you select <i>V3R, V4R, V7</i>, go to step 5.
5	Lead XX: Unused Used	<ul style="list-style-type: none"> ■ The <i>XX</i> in the LCD represents A1, A2, A3, A4, V3R, V4R, or V7 - depending on what you selected in step 4.
6	Leads A1 - A4 storage options: No Store Store	<ul style="list-style-type: none"> ■ You can choose whether or not to store data from the auxiliary leads. ■ Press the ENTER key.
7	Lead Groups Rhythm Standrd RMR/CGR 4x2.5 S1	Press the STOP key to return to the <i>Main Menu</i> .

Report Format Setup

Description

You can choose as many of these formats as desired. (See appendix D, "Sample Reports.")

RMR (Rhythm and Morphology) report (1 page)

Consists of a single median complex for each of the 12 leads, combined with 10 seconds of 3-lead rhythm.

CGR (Computer Graphic Record) report (1 page)

Consists of a single median complex for each of the 12 leads, combined with 10 seconds of 3-lead rhythm at half writer speed.

1-Page 4 x 2.5 with 3 rhythm channels report (1 page)

Consists of 2.5 seconds for each of 12 leads with 10 seconds of 3-lead rhythm. The rhythm lead or leads in this report are the same as the rhythm leads used in CGR and RMR reports. (See "Setting CGR/RMR Leads" earlier in this chapter to set the rhythm lead or leads for this report.)

1-Page 4 x 2.5 with 1 rhythm channel report (1 page)

Consists of 2.5 seconds for each of 12 leads with 10 seconds of 1-lead rhythm. The rhythm lead or leads in this report are the same as the rhythm leads used in CGR and RMR reports. (See "Setting CGR/RMR Leads" earlier in this chapter to set the rhythm lead or leads for this report.)

Complex/Lead or 1 Complex/Lead with Abnormals report (1 page)

Consists of a single median complex for each of the 12 leads. A "measurement matrix" of ECG data is included at the top of the report. This report format permits the "Times 2" option which allows the waveform gain to be doubled.

Tic marks may be added to each complex on the report. If you select 1 Complex/Lead with abnormals, then this report is printed only if an abnormal rhythm is detected.

Automatic Rhythm (1 x 10) or Automatic Rhythm (1 x 10) with Abnormals report (1 page)

Consists of 10 seconds of 3-, 6-, or 12-lead rhythm. If you select Automatic Rhythm with abnormals, then this report is printed only if an abnormal rhythm is detected.

12 Leads of Rhythm report (1 page)

Consists of 10 seconds of 12-lead rhythm.

12 Lead (4 x 2.5) report (1 page)

Consists of 2.5 seconds for each of 12 leads.

12 Lead (2 x 5) report (1 page)

Consists of 5 seconds for each of 12 leads.

12 Lead (2 x 10) report (2 pages)

Consists of 10 seconds for each of 12 leads.

12 Lead (4 x 10) or 12 Lead (4 x 10) with Abnormals report (4 pages)

Consists of 10 seconds for each of 12 leads. If you select 12 Lead (4 x 10) with abnormals, then this report is printed only if an abnormal rhythm is detected.

S1 report (1 page)

Consists of a single median complex for each of the 12 leads at 50 mm/s, combined with 5 seconds of 6-lead rhythm at half writer speed. Text is on the bottom of the page.

S2 report (2 pages)

Consists of 5 seconds for each of 12 leads at 50 mm/s. Text is on the bottom of page.

Pediatric report (1 page)

Consists of 2 seconds for each of 15 channels, combined with 10 seconds of 1-lead rhythm. The rhythm lead or leads in this report are the same as the rhythm leads used in CGR and RMR reports. (See "Setting CGR/RMR Leads" earlier in this chapter to set the rhythm lead or leads for this report).

Report Format Setup

Follow these steps to set the type of report formats you want printed automatically for unconfirmed and confirmed ECGs.

- Unconfirmed ECG = an ECG that has not been edited.
- Confirmed ECG = an edited ECG.

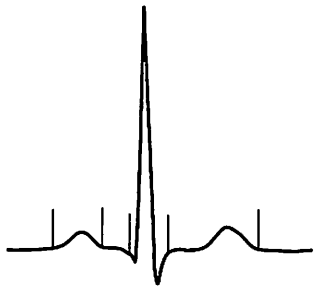
Reports printed just after recording an ECG are unconfirmed. A report becomes confirmed when it is edited using the Edit function. See chapter 7, "Editing ECG Reports" for more information.

Press the **ENTER** key after each selection to move to the next LCD. Pressing the **ENTER** key sends the information to memory.

Table 13-8. Report Format Setup

Step	LCD	Your Action
1	Cart Setup Dat/Time Phone LdGrps Reports More	Select <i>Reports</i> .
2	Report Formats for: Confrmd Unconf	<ul style="list-style-type: none"> ■ Select <i>Confrmd</i> to set up confirmed ECG reports. ■ Select <i>Unconf</i> to set up unconfirmed ECG reports.
3	Ask for Extra Copies of Plots: Yes No	Select <i>Yes</i> if you want to be prompted for extra copies of reports.
4	Suppress Orig Rpt Interpretation: Yes No	Select <i>Yes</i> if you do not want the interpretive option (12SL) statements to appear on the original ECG report.
5	Suppress Copy Interpretation: Yes No	Select <i>Yes</i> if you do not want the interpretive option (12SL) statements to appear on ECG report copies.
6	Suppress Optional Trace Positioning: Yes No	Select <i>No</i> if you want the baseline of a large magnitude signal to be moved automatically so that the signal waveform will not interfere with text or another waveform on a report.
7	Rhythm and Morphology Report (RMR): Yes No	Select <i>Yes</i> for the <i>RMR</i> report.
8	Computer Graphic Record (CGR): Yes No	Select <i>Yes</i> for the <i>CGR</i> report format.
9	S1 Format: Yes No	Select <i>Yes</i> for the <i>S1</i> report format.
10	S2 Format: Yes No	Select <i>Yes</i> for the <i>S2</i> report format.
11	1 Page 4x2.5 with 3 rhythm channel: Yes No	Select <i>Yes</i> for the <i>4 x 2.5 with 3 rhythm channels</i> report format.
12	1 Page 4x2.5 with Rhythm: Yes No	Select <i>Yes</i> for the <i>4 x 2.5 with Rhythm</i> report format.
13	Pediatric Format: Yes No	Select <i>Yes</i> for the <i>Pediatric</i> report format

Table 13-8. Report Format Setup

14	1 Complex / Lead: Yes No or	Select <i>Yes</i> for the <i>1 Complex/Lead</i> report format. or
15	1 Complex / Lead with Abnormals" Yes No	Select <i>Yes</i> for the <i>1 Complex/Lead with Abnormals</i> report format. (If selected, this report format is printed only if a patient's ECG has an abnormal rhythm.)
16	Add Tic to Complexes: Yes No	<ul style="list-style-type: none"> ■ Select <i>Yes</i> to add tic marks to the median complexes on <i>1 Complex/Lead</i> report formats. ■ The five tic marks on each median complex appear at P onset, P offset, QRS onset, QRS offset, and T offset as shown in this sample waveform.
		MD1020-46
17	Times 2 Complexes: Yes No	Select <i>Yes</i> to double the gain on <i>1 Complex/Lead</i> report formats. (This gain is doubled only if the writer gain on the <i>Main Menu</i> is set to 2.5, 5, or 10 mm/mV.)
18	Automatic Rhythm (1x10): Yes No	Select <i>Yes</i> for the <i>Automatic Rhythm (1x10) with Abnormals</i> report format.
19	Automatic Rhythm (1x10)with Abnormals: Yes No	Select <i>Yes</i> for the <i>Automatic Rhythm (1x10) with Abnormals</i> report format. (If selected, this report format is printed only if a patient's ECG has an abnormal rhythm.)
20	12 Leads of Rhythm: Yes No	Select <i>Yes</i> for the <i>12 Leads of Rhythm</i> report format
21	12 Lead (4x2.5): Yes No	Select <i>Yes</i> for the <i>4 x 2.5</i> report format.
22	12 Lead (2x5): Yes No	Select <i>Yes</i> for the <i>2 x 5</i> report format.
23	12 Lead (2x10): Yes No	Select <i>Yes</i> for the <i>2 x 10</i> report format.
24	12 Lead (4x10): Yes No	Select <i>Yes</i> for the <i>4 x 10</i> report format.
25	12 Lead (4x10) with Abnormals: Yes No	Select <i>Yes</i> for the <i>4 x 10 with Abnormals</i> report format. (If selected, this report format is printed only if a patient's ECG has an abnormal rhythm.)
26	Report Formats for: Confrmd Unconf	Press the STOP key to return to the <i>Main Menu</i> .

Passwords Setup

Use passwords to restrict access to the system's functions. The two passwords are called *Level 1* and *Level 2*.

If you know the *Level 1* password, you can access these functions:

- *Setup* (see chapter 13, "Setup").
- *Full Edit* (see chapter 7, "Editing ECG Reports").
- *Format* (see "Formatting a Diskette" in appendix E, "Miscellaneous Tasks").

If you know the *Level 2* password, you can access all of the *Level 1* functions except *Setup*.

Whenever you see the *Password* prompt, this means that either a *Level 1* or *Level 2* password must be entered before proceeding.

NOTE

NEVER DELETE A PASSWORD! You must have at least one character for each password. If a password is deleted, you will be locked out of certain functions.

Table 13-9. Password Setup

Step	LCD	Your Action
1	Cart Setup Dat/Tim Phone LdGrps Reports More	Select <i>More</i> .
2	Cart Setup Passwds Modem LclLine Misc More	Select <i>Passwds</i> .
3	System Passwords Level 1 Level 2	Select <i>Level 1</i> or <i>Level 2</i> .
4	Password: Any 6 characters (A-Z, 0-9)	<ul style="list-style-type: none"> ■ Type a password using up to six characters. ■ Press the ENTER key.
5	System Passwords Level 1 Level 2	<ul style="list-style-type: none"> ■ Select the other password. ■ Press the STOP key to return to the <i>Main Menu</i>.

Modem Setup

If your system has a modem and you have problems either transmitting or receiving reports over telephone, then reset your system by using the *Defaults* part of the *Cart Setup* menu. Try transmitting/receiving again. If you still have problems, then contact Marquette Service.

NOTE

The settings shown in the following LCDs are the normal or default settings.

Table 13-10. Modem Setup

Step	LCD	Your Action
1	Cart Setup Dat/Tim Phone LdGrps Reports More	Select <i>More</i> .
2	Cart Setup Passwds Modem LclLine Misc More	Select <i>Modem</i> .
3	Speaker On: Dial Always	Select <i>Dial</i> if you want the system speaker on only until the answer tone is received.
4	Dialing: Auto Dial Manual Auto	Select <i>Manual</i> to dial with an external phone.
*5	Dialing Format: Touch Tone Pulse T Tone	Select <i>Pulse</i> or <i>T Tone</i> (touch tone).
*6	Dial tone Required: Yes Yes No	Select <i>Yes</i> if a dial tone is required.
*7	Dial Tone Time: 1s 1s .2s	<ul style="list-style-type: none"> ■ Select <i>1s</i> for 1 second. ■ Select <i>.2s</i> .2 seconds.
8	Modem Transmit Power Level: -9dBm -6dBm -7dBm -8dBm More	<ul style="list-style-type: none"> ■ Select a <i>Modem Transmit Power Level</i>. ■ Use <i>More</i> to select other choices.
9	Transmit Synch Time: 148.3ms 800ms 220ms 148.3ms 90ms More	<ul style="list-style-type: none"> ■ Select a <i>Transmit Synch Time</i>. ■ Use <i>More</i> to select other choices.
10	Answer Tone Frequency: 2025Hz 2025Hz 2100Hz	Select an <i>Answer Tone Frequency</i> .
11	Cart Setup Modem Passwds Misc Defaults More	Press the STOP key to return to the <i>Main Menu</i> .

* This prompt will only appear if Auto Dial was selected in step 4.

Local Line Setup

The system has the ability to transmit and receive data either over the telephone lines using a modem (if you have purchased the option) or "locally". Local transmission and reception is done using a special cable to connect your system to another system.

When the system leaves Marquette, it is already set up to communicate locally. However, you may find it necessary to change one or more of the local line values.

Follow these steps to change local line values.

Table 13-11. Local Line Setup		
Step	LCD	Your Action
1	Cart Setup Dat/Time Phone LdGrps Reports More	Select <i>LdGrps</i> .
2	Cart Setup Passwds Modem LclLine Misc More	Select <i>LclLine</i> .
3	Will the Local Line be Used: Yes No	<ul style="list-style-type: none"> ■ Select <i>No</i>, if do not plan on using the local transmit/receive function of the system. Go to step 2 ■ Select <i>Yes</i> to use the local line function. ■ Press the ENTER key after each lead selection.
4	Local Line Baud Rate: 75 110 134.5 150 More	<ul style="list-style-type: none"> ■ Select the baud rate. ■ Press the ENTER key after each lead selection. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p style="text-align: center;">NOTE</p> <p>The system you are transmitting to or receiving data from must be set at the same baud rate as your system.</p> </div>
5	Local Line Number of Stop Bits: 1 2	<ul style="list-style-type: none"> ■ Select the number of <i>Stop Bits</i>. ■ Press the ENTER key after each lead selection. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p style="text-align: center;">NOTE</p> <p>The system you are transmitting to or receiving data from must be set at the same number of stop bits as your system.</p> </div>
6	Cart Setup Dat/Time Phone LdGrps Reports More	Press the STOP key to return to the <i>Main Menu</i> .

Miscellaneous Setup

The following are a variety of items that you may want to set up before starting to use the system. Many of these items, such as institution name, only need to be entered once.

Press the **ENTER** key after each selection to move to the next LCD. Pressing the **ENTER** key sends the information to memory.

Table 13-12. Miscellaneous Setup

Step	LCD	Your Action
1	Cart Setup Dat/Tim Phone LdGrps Reports More	Select <i>More</i> .
2	Cart Setup Passwds Modem LclLine Misc More	Select <i>Misc</i> .
3	Line Frequency: 60Hz 50Hz	<ul style="list-style-type: none"> ■ Select a mains power frequency. <p>Line frequency refers to the frequency of the mains power source connected to your system. If you do not know what your line frequency is, contact your local power company. In the United States, the most common line frequency is 60 Hz (50Hz = Europe)</p>
4	Patient Info format Long Short	The <i>Short</i> format skips some of the patient information selections.
5	Location: 0 - 99 or 0 - 9999	<p>Type an identification number for the default location. If your system uses software versions 010A/110A or later:</p> <ul style="list-style-type: none"> ■ Type a number from 0-99 for a DEC-based MUSE system. ■ Type a number from 100-599 for a MUSE 1000/3000/5000 system.
6	Cart ID: 0-255	Type an identification number for the system.
7	Site ID: 1-255	<ul style="list-style-type: none"> ■ Type the MUSE system site number <p>A "site" has access to the ECG data acquired from the locations that are defined within it. The data from each site is kept in separate files. A site may be a hospital or an institution with many locations transmitting to it that receives, overreads, transmits, and stores data, or it may be a hospital or office that functions as an independent review station.</p>
8	Institution Name: Up to 40 Characters	Type the name of your institution.
9	Number of Patient ID Digits: 1-12	Type a number from 1 to 12. This will be the number of digits in a patient's ID.
10	ID required to record ECG: Yes No	Select <i>Yes</i> if you want the patient's ID entered before a 12-lead ECG can be recorded.

Table 13-12. Miscellaneous Setup

11	Height/Weight: in/lb cm/kg	<p>Select the units of measurement for a patient's height and weight.</p> <ul style="list-style-type: none"> ■ in/lb = inches and pounds or ■ cm/kg = centimeters and kilograms.
12	Input Patient Age As: DOB Years	<p>Select how to represent a patient's age:</p> <ul style="list-style-type: none"> ■ DOB = date of birth in day-month-year order. <p>DOB will not work for patients born before 1900.</p> <ul style="list-style-type: none"> ■ Years = age in years.
13	Ask Blood Pressure Questions: Yes No	<p>Select Yes to have blood pressure questions asked each time you enter patient information.</p>
14	Ask Options Question: Yes No	<ul style="list-style-type: none"> ■ Select Yes if you want to ask for an options number when you enter patient information. <p>You can define options numbers to mean whatever you want. For example, these numbers can be used to identify technicians, for quality control, etc.</p>
15	Option: 0 - 99	<ul style="list-style-type: none"> ■ Type an option number.
16	Ask order number questions: Yes No	<ul style="list-style-type: none"> ■ Select Yes if you want to ask for an order number when you enter patient information. ■ Selecting Yes also allows you to enter a secondary ID number when you enter patient information.
17	Confirmation Text: Unconf RevdBy	<ul style="list-style-type: none"> ■ <i>Unconf</i> = the word "unconfirmed" will appear on ECG reports that are not confirmed. ■ <i>RevdBy</i> = the reviewer's name will appear on ECG reports that are confirmed. If the report is unconfirmed, no name will appear.
18	Suppress Normal Statements: Yes No	<p>Select Yes to prevent the "Normal ECG" interpretive option (12SL) statements from appearing on ECG reports. This statement will not be part of the ECG if it is stored or transmitted.</p>
19	Suppress Border + Abnorm. Stmts: Yes No	<p>Select Yes to prevent the "Abnormal ECG" and "Borderline ECG" interpretive option (12SL) statements from appearing on ECG reports. Also, these statements will not be part of the ECG if it is stored or transmitted.</p>
20	ECGs to Store/Transmit: All Abnormal	<p>Select which ECGs to store or transmit.</p> <ul style="list-style-type: none"> ■ All = all ECGs ■ Abnormal = only abnormal ECGs <p>After recording an ECG, the system attempts to save the ECG data to diskette. If it cannot save to diskette, then the system tries to transmit the data over a phone line to a phone number you specified previously in "Phone Setup". (The system can transmit data by phone only if a modem is installed.)</p>
21	Power Up Speed: 25mm/s 50mm/s	<p>Select the writer speed that will appear on the <i>Main Menu</i>.</p>

Table 13-12. Miscellaneous Setup

22	Power Up Filter: 40Hz 100Hz	Select the writer filter that will appear on the <i>Main Menu</i> .
<p style="text-align: center;">NOTE</p> <p>If you desire cleaner writer tracings, without muscle artifact, select the 40-Hz filter. However, this may distort waveforms because it removes ECG signal components with frequencies greater than 40 Hz. Regardless of your choice, the 12SL analysis program always analyzes the data at 100 Hz.</p>		
23	Screening Criteria: Yes No	<p>Select <i>Yes</i> and the following three interpretive option (12SL) statements will not appear on writer reports.</p> <ul style="list-style-type: none"> ■ Cannot rule out anterior infarction; ■ Cannot rule out inferior infarction; ■ Nonspecific ST waveform abnormality; ■ Nonspecific T waveform abnormality (will be suppressed only if the abnormality is detected in 2 or fewer leads); and ■ Abnormal QRS-T angle, consider T wave abnormality.
<p style="text-align: center;">NOTE</p> <p>If you use screening criteria, the letter "S" will appear under the 12SL software version number on a report (as shown below):</p> <p style="text-align: center;"><i>Pgm 108A</i> <i>12SL v78</i> <i>S</i></p>		
24	Baseline Roll Filter: .01Hz .02Hz .16Hz .32Hz	The filter is used to move baseline sway. The higher the setting, the more the filter smooths out a wandering baseline.
25	Pace Pulse Gain (AM-3): Normal Enhance	Select a default for <i>Pace Pulse Gain</i> . This default appears on the <i>Main Menu</i> .
26	Bad Lead Handling (AM-3): Use Flatline	Select a default for <i>Bad Lead Handling</i> . This default appears on the <i>Main Menu</i> .
27	QC Baseline Drift: Yes No	<ul style="list-style-type: none"> ■ Selecting <i>No</i> disables messages relating to baseline drift and muscle tremor. ■ Selecting <i>Yes</i> allows the machine to be more sensitive to bad lead messages. (QC stands for Quality Control)
28	QC Muscle Tremor: Yes No	<ul style="list-style-type: none"> ■ Selecting <i>No</i> disables messages relating to baseline drift and muscle tremor. ■ Selecting <i>Yes</i> allows the machine to be more sensitive to bad lead messages.(QC stands for Quality Control)

Table 13-12. Miscellaneous Setup

29	QC Excessive AC: Yes No	<ul style="list-style-type: none"> ■ If you select <i>Yes</i>, then the system will check for AC (alternating current) interference during ECG acquisition. ■ If you select <i>No</i>, then the system will not check - which could be helpful in determining the cause of a bad lead message
30	Pre-acquisition: Yes No	<ul style="list-style-type: none"> ■ If you select <i>No</i>, the system will begin acquiring ECG data when the RECORD ECG key is pressed. <p>If you are having difficulty with electrode stabilization, you may want to select <i>No</i>.</p> <ul style="list-style-type: none"> ■ If you select <i>Yes</i>, the system will begin acquiring ECG data as soon as the leadwires are connected to the patient. In other words, the system will not wait until you press the RECORD ECG key before acquiring data. <p>When preacquisition is on, the system will always have the latest 10 seconds of ECG data stored for analysis. One advantage of preacquisition is that it allows you to capture a relatively infrequent event.</p> <p>For instance, you can record an arrhythmia that is difficult to capture in the 10-second window. Simply press the RECORD ECG key and watch the rhythm strip. When the arrhythmia appears on the rhythm strip, press the RECORD ECG key. If preacquisition is on, then the arrhythmia is captured and analyzed.</p>
31	Disable Automatic Gain Check: Yes No	Select <i>No</i> if you want to be able to increase or decrease the gain after data acquisition and before data analysis.
32	Paper Type: 8.5x 11 A4	Select the type of paper used in the system (<i>8.5x11</i> = U.S.A., <i>A4</i> = Europe).
33	Rhythm Recall Delay: 0 - 8 Sec.	Select how long data for this report is delayed from 0 seconds ("real time") up to 8 seconds. A Recall report contains 10 seconds of 3-lead ECG rhythm data. <p>A long delay is beneficial if you are using an oscilloscope that is monitoring the three rhythm leads because data on the oscilloscope - which is always in real time - can be captured on paper much easier if there is a long delay between what is seen and what is printed.</p>
34	Cart Setup Passwds Modem LclLine Misc More	Press the STOP key to return to the <i>Main Menu</i> .

Defaults Setup

When you receive your system, all the settings in the *Cart Setup* menu are set to the default or “factory settings”. However, you may decide to change some or all of these settings – especially in the Reports section.

Follow these steps to return your system to its original factory or default settings.

Table 13-13. Defaults Setup

Step	LCD	Your Action
1	Cart Setup Dat/Tim Phone LdGrps Reports More	Select <i>More</i> . twice.
2	Cart Setup Defaults Hi-Res More	Select <i>Defaults</i> .
3	Are You Sure??? Yes No	<ul style="list-style-type: none"> ■ Select <i>Yes</i> to return the system to the original factory settings. Any setup changes you made will be lost. ■ Press the ENTER key.
4	Cart Setup Passwds Modem LcLine Misc More	Press the STOP key to return to the <i>Main Menu</i> .

Hi-Res Setup

In order to print a high resolution report, 1 or more of the 4 analysis filters – 25-250 Hz, 40-250 Hz, 80-250 Hz, and 150-250 Hz – must be selected using the *Cart Setup* menu.

NOTE

Hi-Res Setup is only required for software version 108.

Table 13-14. Hi-Res Setup		
Step	LCD	Your Action
1	Cart Setup Dat/Tim Phone LdGrps Reports More	Select <i>More</i> .
2	Cart Setup Passwds Modem LclLine Misc More	Select <i>More</i> again.
3	Cart Setup Defaults Hi-Res	Select <i>Hi-Res</i> .
4	25-250 Hz Analysis Filter: Yes No 40-250 Hz Analysis Filter: Yes No 80-250 Hz Analysis Filter: Yes No 150-250 Analysis Filter: Yes No Expanded Final Report Format: Yes No	<ul style="list-style-type: none"> ■ Select one of the four analysis filters. <div style="border: 1px solid black; padding: 10px; margin-top: 10px;"> <p style="text-align: center;">NOTE</p> <p>At least one of the 4 analysis filters must be selected. Otherwise, Hi-Res reports can not be printed.</p> </div>
5	Periodic Average Plots: Yes No	Select <i>Yes</i> if you want Periodic Average Plots printed during data acquisition for signal averaging. Periodic Average Plots for XYZ and VM (vector magnitude) are printed about every 50 heartbeats.
6	Terminate Averaging based upon: Beats Noise	<ul style="list-style-type: none"> ■ Select Beats to stop signal averaging acquisition after a preset number of beats is reached. ■ Select Noise to stop signal averaging acquisition after a preset noise level is reached. If the preset noise level is not reached, then acquisition continues until a preset number of beats is reached.
7	Cart Setup Defaults Hi-Res More	Press the STOP key to return to the <i>Main Menu</i> .

APPENDIX A ABBREVIATIONS

Abbreviations In Manual3

Abbreviations in Manual

A

A	ampere
A-ang	antianginal
A-arh	antiarrhythmic
A-coa	anticoagulants
A-hyp	antihypertensive
A1 - A4	auxiliary leadwires
AAMI	American Association of Medical Instrumentation
ABP	ambulatory blood pressure
ac, AC	alternating current
ACLS	Advanced Cardiac Life Support
A/D	analog-to-digital
Adj	adjustable
AG	automotive glass
Ah	ampere hours
AHA	American Heart Association
Al	aluminum
AllRam	all RAM
AllSec	all sector
AllTrk	all track
ALT	alternate
Alt-Off	alternate offset
am, AM	acquisition module, ante meridiem
AM-1	acquisition module-1
AM-1M	acquisition module-1 modified
AM-2	acquisition module-2
AM-3	acquisition module-3
AM-4	acquisition module-4
amp	ampere
Ampl	amplifier
AMU	ambulatory monitoring unit
ANA	analog
ANLG	analog
AnsrTone	answer tone
A/O	Analog Output
ASCII	American Standard Code for Information Interchange
ASSY	assembly
Attn	attention
AUG	August
AUST	Australian
AUSTRALN	Australian
Auto	automatic

AutoRhythm	automatic rhythm
AUX	auxiliary
aVF	augmented left leg lead
avg	average
aVL	augmented left arm lead
aVR	augmented right arm lead
AWG	American Wire Gage

B

Bd	board, baud
BDGH	binding head
BetaB	beta blockers
BKSP	backspace
BLK	black
BLU	blue
Blvd	boulevard
BP	blood pressure
BPM	beats per minute
BRIT	Britain
BRN	brown
BSI	British Standards Institute
Btu	British thermal unit

C

CalcBlk	calcium blockers
CAPOC	Computer Assisted Practice of Cardiology
CASE	Computer Aided System for Exercise
Catoprl	Catopril
Cauc	Caucasian
Cer	ceramic
CFM	cubic feet/minute
CGR	computer graphic record
Ch, CH	channel
C/L	center line
CLK	clock signal
Clonid	Clonidine
cm	centimeter
cm2	square centimeters
Cmd	command number
CMMR	common mode rejection ratio
CMOS	complementary metal-oxide semiconductor
c/o	in care of

APPENDIX A ABBREVIATIONS

COM1	communications port 1	Dysopyr	Dysopyramide
COM2	communications port 2		
ComLink	communications link		E
Comp	composition	E	enable, vector electrode site, vector lead
Confrmd	confirmed	ecg, Ecg, ECG	electrocardiogram
		ECO	Engineering Change Order
Cont, CONT	Continental, continued	EDIC	Electrocardiograph Digital Information Center
Coumadn	Coumadin	EEPROM	electrically erasable programmable ROM
CPR	cardiopulmonary resuscitation	e.g.	for example
CPU	central processing unit	EGA	enhanced graphics adapter
CR	diode	EMF	electromotive force
CRC	cyclic redundancy check	EMI	electromagnetic interference
CRD	cord	ENG	English
crt, CRT	cathode ray tube	EOF	end of file
CSA	Canadian Standards Association	EPIC	Electronic Patient Information Chart
CTRL	control	EPLD	electrically programmable logic device
	D	EPROM	erasable, programmable, read-only memory
D/A	digital to analog	ESD	electrostatic discharge
DA	damping relay	etc, etc.	et cetera
dac, DAC	digital-to-analog converter	EURO	Europe, European
DAN	Danish	EXP	Expanded
Dat/Tim	date/time		F
dBm	decibel (referenced to 1 milliwatt into 600 ohms)	F	fuse, Farad, female
dc, DC	direct current	F1-F5	function keys 1 through 5
DD	double density, day	Fax	facsimile
DDD	Digital Diagnostic Diskette	FCC	Federal Communications Commission
DEC	Digital Equipment Corporation, December	FE	front end
Del	delete	FILH	fillister head
DEMO	demonstration	FLH	flat head
DES	designation	FLRAM	flash RAM
DevId	device identification	FR	French
Diag	diagnostic	FrntEnd	front end
Digital	Digitalis	FSK	frequency shift keying
Digitox	Digitoxin	ft	foot, feet
Digox	digoxin	Furosem	Furosemide
Digoxin	Digoxin-Lanoxin		G
DIP	dual in-line package	g	gram, acceleration due to gravity
Dirctry	directory	GB	Great Britain
Diurt	diuretics	GERM	German, Germany
DOB	date of birth	GND	ground, digital ground (dc common)
DOS	disk operating system	GRN	green
DP	diametral pitch	GRY	gray
DPST	double-pole, single-throw		
DRAM	dynamic RAM		
DR/DT	digital recording/digital transmission		
DSKTP	desktop		

H	
H	high, vector electrode site, vector lead
HDLC	high-level data link control
Hex, HEX	hexagon, hexadecimal
HH	hour
HiRes	high-resolution
Hr	hour

I	
I	on, input, vector electrode site
I, II, III	limb leads
II	vector lead
IC	integrated circuit
ID	identification
i.e.	that is
IEC	International Electrotechnical Commission
in	inch
IN	input
inc, inc., INC	incorporated
Info	information

Ins	insert
I/O	input/output
I/P	input
ISA	industry standard architecture
Isosorb	Isosorbide
IT	Italian, Italy
J	
JAN	January
JIS	Japan Industrial Standards
K	
k, K	kilo, 1000, 1024
Kb, KB	kilobyte
kg, Kg	kilogram
kHz, KHz	kilohertz
kV, KV	kilovolt
Kyb	keyboard

L	
L	line
L1	level one

L2	level two
LA	left arm
lb	pound
LCD	liquid crystal display
Lcl Line	local line
Ld Grps	lead groups
LED	light-emitting diode
LH	left hand
Lidoca	Lidocaine
LL	left leg
Loc	location
LocPc	Local MAC PC
LogRetry	log retry

M	
m	meter
M	megabyte, metric, vector electrode site, vector lead, male
mA	milliamperes
MAC	Microcomputer Augmented Cardiograph
mains voltage	voltage of a supply mains between 2 line conductors of a polyphase system or voltage between the line conductor and the neutral of a single-phase system
max	maximum
Measure	measurements
Med	medications
MEM	memory
MF	metal film
MHz	megahertz
min	minutes, minimum
Misc	miscellaneous
mm	millimeter
MM	minute
MMM	month
mm/mV	millimeter per millivolt
mm/s	millimeter per second
MMS	Marquette Medical Systems
Modem	modulator/demodulator
MOS	metal oxide semiconductor
MPE	metallized polycarbonate epitaxial
ms	milliseconds
MS-DOS	Microsoft Disk Operating System
MTBF	mean time between failures

APPENDIX A ABBREVIATIONS

mtg	mounting		
MTR	MOTOR		
MUSE	Marquette Universal System for Electrocardiography		
mux	multiplexer		
mV	millivolt		
mVR	minus (inverted) aVR		
N			
N	neutral		
n/a	not available		
NA	not applicable		
NC	no connection		
Nitrate	nitrates		
NLQ	near letter quality		
NMI	non-maskable interrupt		
NMOS	N-channel metal-oxide semiconductor		
No	number		
NO	normally open		
norm	normal		
nS	nanoseconds		
NSR	Normal Sinus Rhythm		
O			
O	off, original		
OE	other errors		
OEM	original equipment manufacturer		
OH	off-hook relay		
OneSec	one sector		
ORG	orange		
Orig	original		
OUT	output		
oz	ounce		
P			
P	P wave (section of the ECG waveform)		
p-p	peak-to-peak		
PA	P wave amplitude		
Params	parameters		
Passwds	passwords		
PatData	patient data		
PatInfo	patient information		
PATN	patient		
PC	printed circuit, personal computer		
		Pgmlid	program identification
		Phenoth	Phenothiazide
		Phenytn	Phenytoin
		PID	patient identification digit
		PLCC	plastic leadless chip carrier
		PM	power module
		pm, PM	post meridiem, preventive maintenance
		PM-2	Power Module-2
		PM-3	Power Module-3
		pn, PN	part number
		PNH	pan head
		PPA	P wave amplitude
		PR	ECG signal interval
		Pro-Off	progressive offset
		Procain	Procainamide
		PROM	programmable read-only memory
		Propran	Propranolol
		PSK	phase shift keying
		PSU	power supply unit
		Psych	psychotropic
		PUP	pull-up signal
		PVC	polyvinyl chloride
		PWM	pulse-width modulation
		PWR	power
		PWR CRD	power cord
Q			
		Q	transistor
		QA	quality assurance, Q wave amplitude
		QAD	Quality Assurance Deviation
		QAM	quadrature amplitude modulation (phase and amplitude modulation)
		QC	quality control
		QD	Q wave duration
		QRS	QRS complex (portion of ECG waveform), interval of ventricular depolarization
		QT	QRS interval
		QTC	QRS interval
		QTY	quantity
		Quinid	Quinidine

R			
R	resistor, red, reset	SRAM	static RAM
RA	right angle, right arm or R wave amplitude	ST-T	ST-T wave (section of the ECG waveform)
		standrd, Standrd	standard
RAM	random access memory	STD	standard
RC	resistor capacitor	STE	ST segment displacement at the end
RD	R wave duration	STJ	ST segment displacement at the J point
Ref	reference, refresh	STM	ST segment displacement at the mid-point between STJ and STE
REN	Ringer Equivalence Number	stmts, Stmts	statements
Reserp	Reserpine	SumRam	some RAM
REV	revision	supply mains	permanently installed power source
RevdBy	reviewed by	SVT	power cord type; 300 V
RevXmit	reverse transmission	sw, SW	switch, software
rf	radio frequency	SW	Swedish, Sweden
RFI	radio frequency interference		
RGB	red, green, blue		T
RI	ring indicate	T Tone	touch tone
RL	right leg	TA	T wave amplitude
RMR	Rhythm and Morphology Report	Tant	tantalum
ROM	read only memory	TDML	treadmill
RPA	R wave amplitude	TE	timeout errors
RPD	R wave duration	Tech	technical
rpt, Rpt	report	Thiazid	Thiazide
RTC	real time clock	TM	trademark
RTI	relative to patient input	Tot	total number or errors
RTN	return	TP	test point
RVS	reverse	TPA	T' wave amplitude
R/W	read/write	TRAM	Transport Remote Acquisition Monitor
		Tricyli	Tricylic antidepressant
		TTL	transistor-transistor logic, TTL levels
		TVS	transient voltage suppressor
S			
12SL	12 simultaneous leads		
s, S	second, select, switch		
SA	s wave amplitude		U
SB	slow-blow	UE	undefined errors
SCL	safe current limits	uF	microfarad
SD	schematic diagram, S wave duration	UL	Underwriters' Laboratory, Inc
SE	serial input/output errors	Unconf	unconfirmed
sec	second	UUT	unit-under-test
sec.s	seconds		
SEER	Solid-state Electronic ECG Recorder		V
SING	Singapore	v, V	volt, volts
SP	Spanish	V1-V6	precordial leads
SPA	S wave amplitude	V123	V1, V2, V3
SPDT	single-pole, double-throw	V3R	precordial lead

APPENDIX A ABBREVIATIONS

V456	V4, V5, V6	%	percent
V4R	precordial lead	®	registered
V ac	volts, alternating current	>	greater than
V dc	voltage, direct current	<	less than
VA	volt-amperes	±	plus or minus
Var	variable	*	An asterisk after a signal name indicates the signal is active at its relatively lower potential, or "active-low." Signals without the asterisk suffix are active at their relatively higher potential, or "active-high."
VDE	Verband Deutscher Elektrotechniker (German regulatory agency)	12SL	12 simultaneous leads
Vent.	ventricular	%	percent
VF	ventricular fibrillation		
VGA	video graphics array		
VIA	versatile interface adapter		
VIO	violet		
Volt	voltage		
VRAM	video RAM		
vs	versus		

W

W	
w/	with
W	watt
Warfar	Warfarin
WHT	white
WI	Wisconsin

X

x	by (as in "8-1/2x11")
XCV	transceiver
XYZ	orthogonal leads

Symbols

↑	SHIFTEd or alternate function
μ	micro
μF	microfarad
μs, μsec	microsecond
68K	68000
&	and
#	number
°C	degrees Celsius
°F	degrees Fahrenheit
Ω	Ohm, ohm

APPENDIX B

MAINTENANCE

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Introduction

Recommended Maintenance

Maintenance/Repair Log

See the "MAC 15 field service manual," PN 401003-002, for detailed information:

A "Maintenance/Repair Log" is also included in this "Appendix" to aid in keeping a record of the work done on the unit.

NOTE

Unless you have an Equipment Maintenance Contract, Marquette Medical Systems does not in any manner assume the responsibility for performing the recommended maintenance procedures. The sole responsibility rests with the individual or institution using the equipment. Marquette Medical Systems service personnel may, at their discretion, follow the procedures provided in this manual as a guide during visits to the equipment site.

Inspection and Cleaning

Visual Inspection

If you notice any items that need repair, contact an authorized service person to make the repairs.

- Check the case and display screen for cracks or other damage.
- Regularly inspect all cords and cables for fraying or other damage.
- Inspect all plugs, cables, and connectors for bent prongs or pins.
- Verify that all cords and connectors are securely seated.
- Inspect keys and controls for proper operation.
 - ◆ Toggle keys should not stick in one position.
 - ◆ Knobs should rotate fully in both directions.

Precautions

Turn off the unit and remove all power before inspecting or cleaning.

Do not immerse any part of the equipment in water.

Do not use organic solvents, ammonia based solutions, or abrasive cleaning agents which may damage equipment surfaces.

Cleaning

Clean the exterior surfaces with a clean, soft cloth and a mild dishwashing detergent diluted in water.

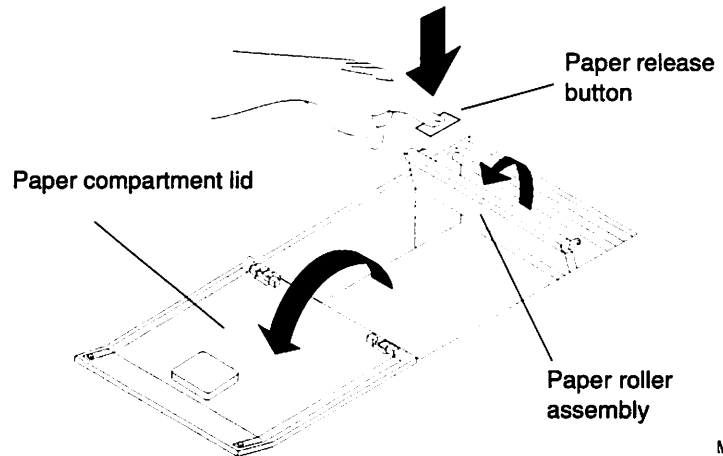
- Wring the excess water from the cloth. Do not drip water or any liquid on the writer assembly, and avoid contact with open vents, plugs, or connectors.
- Dry the surfaces with a clean cloth or paper towel.

Reusable Electrodes

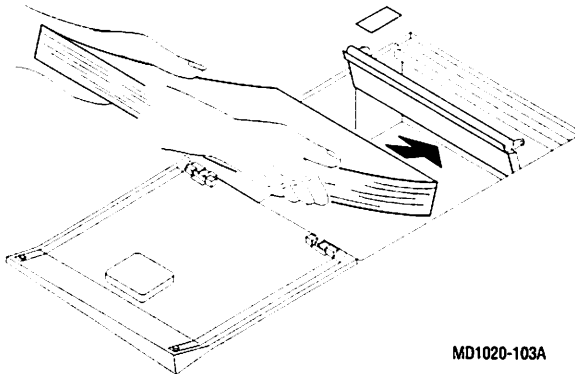
After each use, wipe the reusable electrodes with a tissue or damp cloth to clean them of electrode paste. At the end of each day, thoroughly wash the reusable electrodes with soap and water and dry them. For suction electrodes, a toothbrush may be used to clean out the cups.

Replacing Paper

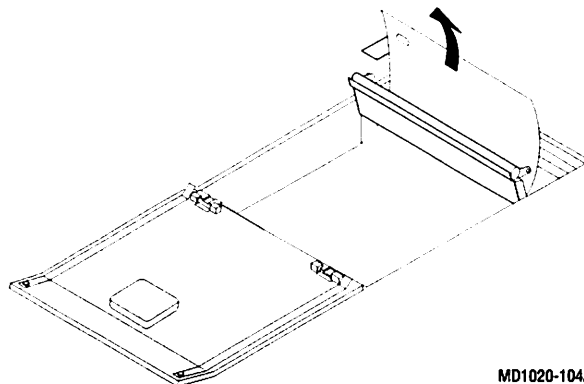
1. Open the paper compartment lid.
2. Press the paper release button to release the paper roller assembly.



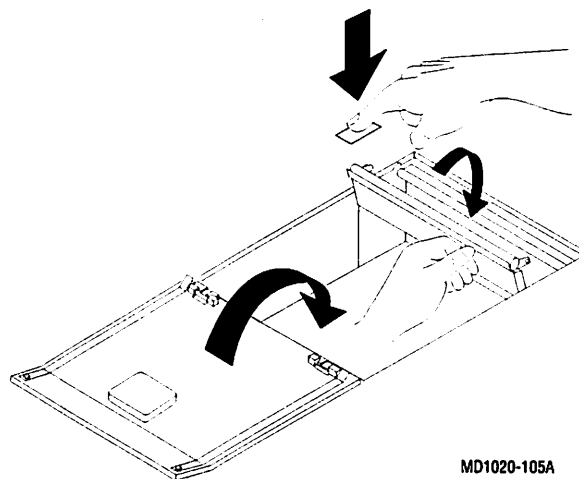
3. Place the fanfold paper into the paper storage compartment.



4. Feed the paper evenly under the paper roller assembly until approximately 3-4 inches extend out of the paper storage compartment.



5. Press the paper release button and at the same time, move the paper roller assembly back into position.



6. Release the paper release button to lock the paper roller assembly into position. Close the paper compartment lid.

NOTE

The writer paper will automatically align itself when an ECG report is printed.

Storing Paper

Thermal Paper

To avoid deterioration or fading of traces follow these precautions.

1. Store in cool, dark, and dry locations. Temperature must be below 80°F (27°C). Relative humidity must be between 40% and 65%.
2. Avoid exposure to bright light or ultraviolet sources such as sunlight, fluorescent, and similar lighting which causes yellowing of paper and fading of tracings.
3. Do NOT store thermal papers with any of the following:
 - ◆ carbon and carbonless forms.
 - ◆ non-thermal chart papers or any other products containing tributyl phosphate, dibutyl phthalate, or any other organic solvents. Many medical and industrial charts contain these chemicals.
 - ◆ document protectors, envelopes, and sheet separators containing polyvinyl chloride or other vinyl chlorides.
4. Avoid contact with: cleaning fluids and solvents such as alcohols, ketones, esters, ether, etc.
5. Do NOT use: mounting forms, pressure-sensitive tapes, or labels containing solvent-based adhesives.

To assure maximum image life, thermal paper should be stored separately in:

- manila folders
- polyester or polyimide protectors.

Plastic document protectors, envelopes, or sheet separators made of polystyrene, polypropylene, or polyethylene will not degrade thermal traces in themselves. However, these materials afford no protection against fading from external causes.

Use only mounting forms and pressure-sensitive tapes made with starch or water-based adhesives.

Paper manufacturers advise us that these thermal products should retain their traces when properly imaged and stored for about 3 - 5 years. If your retention requirements exceed these guidelines, we recommend you consider alternate image storage techniques.

Archivist Thermal Paper

The following applies to Archivist thermal paper only.

Marquette Medical Systems warrants that the image produced on Archivist papers by Marquette equipment will not fade for seven (7) years when handled according to the instructions outlined below:

Archivist papers must be continuously stored below 104°F (40°C) and relative humidity must be maintained between 40% and 60%.

The customer must notify Marquette promptly following any customer knowledge of fading.

The Marquette equipment used shall have periodic maintenance performed in accordance with Marquette service manuals and/or technical memorandums.

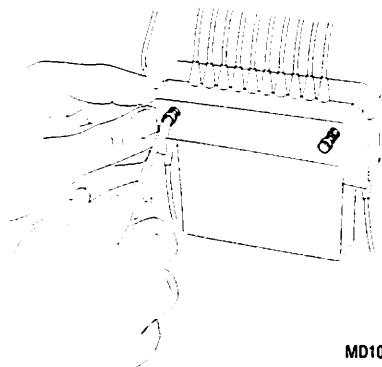
Acquisition Modules

AM-1, AM-2, AM-3 Acquisition Modules

Replacing Leadwires

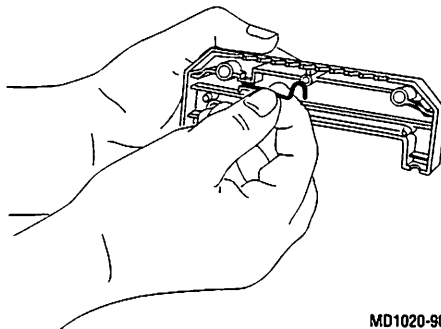
To replace or change one or more of the leadwires attached to the acquisition module, follow the directions below:

1. Disconnect the acquisition module from the coiled cord. Use a screwdriver to loosen the two cover plate screws:



MD1020-89

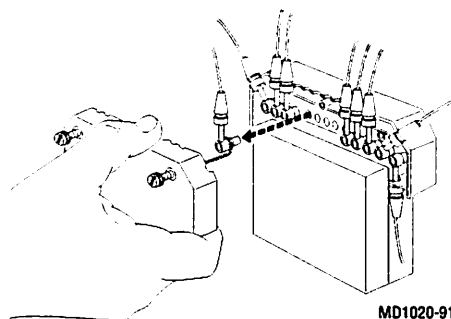
2. Remove the cover plate and gently pull out the leadwire extraction tool inside the cover plate:



MD1020-90

3. Use the leadwire extraction tool to remove a leadwire from its socket on the acquisition module.

A new leadwire may now be placed into this empty socket. Repeat this procedure for any other leadwires you wish to replace and then reassemble the acquisition module.



MD1020-91

AM-4 Acquisition Module

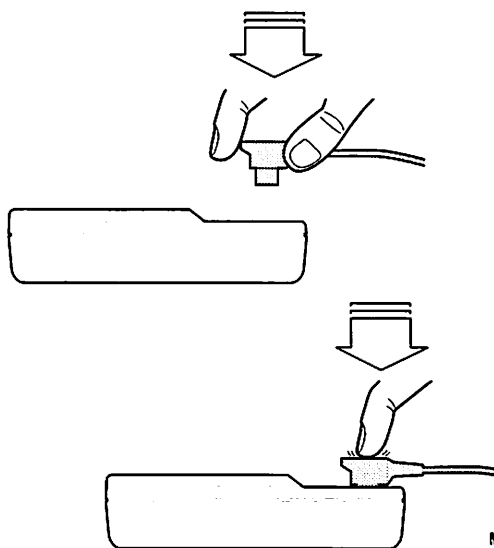
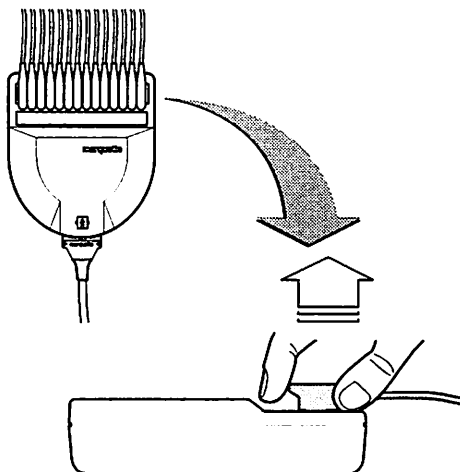
Use the AM-4 acquisition module with software version 008A, 108A or later.

▲ WARNING

To ensure defibrillator protection and protection against high-frequency burns, use only the AM-1, AM-2, AM-3 or AM-4 with this equipment. Otherwise, serious injury could result.

M15267-6C

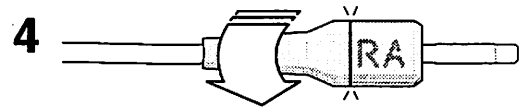
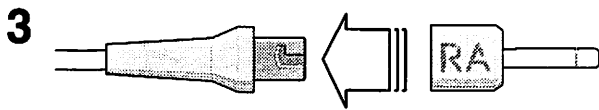
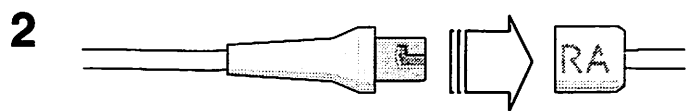
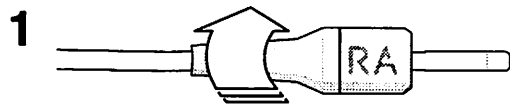
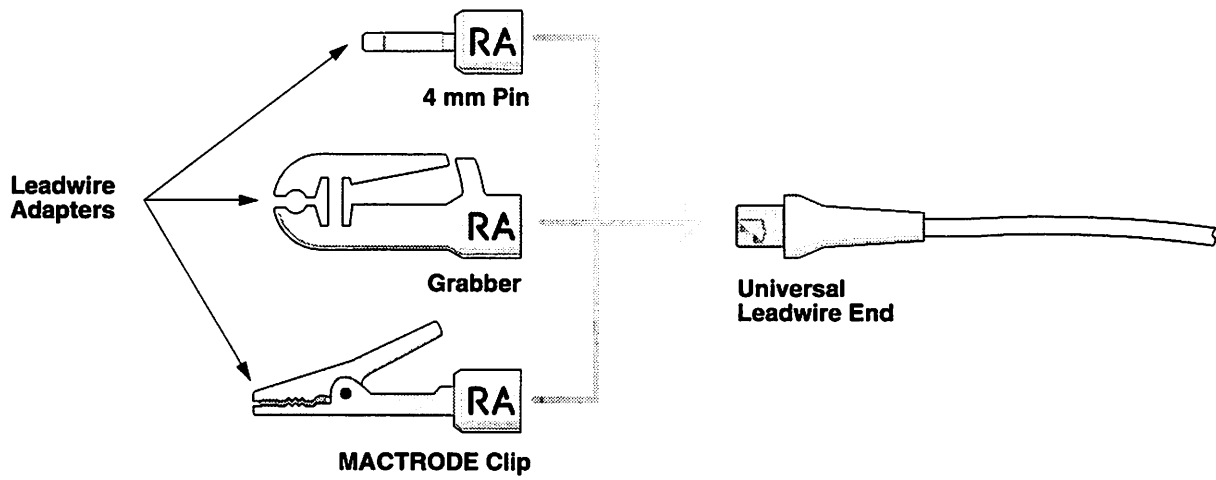
Replacing Leadwires



MD1040-23B

Replacing Leadwire Adapters

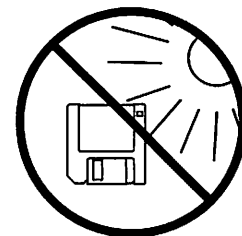
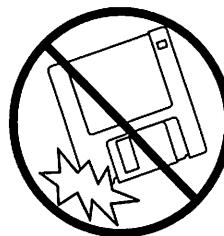
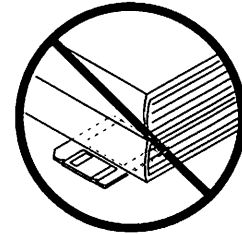
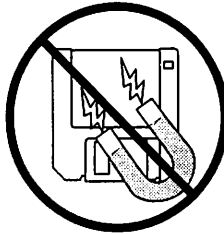
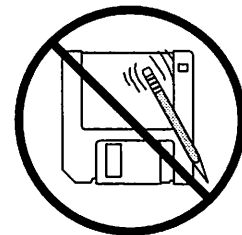
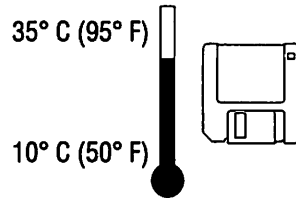
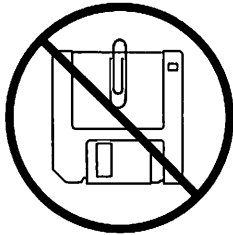
The AM-4 acquisition module features universal leadwires which must be used with a leadwire adapter.



MD1024-78A, 75A

Diskette Care

Care for the 3.5-inch diskette according to the following guidelines.



MD1045-001A, -002A, -003A, -004A, -005A, -006A, -007A, -008A, -009A

APPENDIX C

TROUBLESHOOTING

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Introduction

First Things to Ask

If the system is not working properly, save yourself some time troubleshooting by asking yourself these basic questions.

- Is the unit turned on?
- Have there been any changes in the use, location, or environment of the equipment that could cause the failure?
- Has the unit been modified in any way, either in software or hardware?
- Is operator error the cause of the problem? Try to repeat the user's scenario exactly and compare that to the proper operation of the equipment. Check the operator's manual as necessary.

Visual Inspection

A thorough visual inspection of the equipment can save time. Small things such as disconnected cables or missing hardware can frequently cause symptoms and equipment failures that may appear to be unrelated and difficult to track.

See the "MAC 15 field service manual," PN 401003-002, for detailed instructions.

Equipment Problems

Modem Setup

If your system is equipped with a modem, and you are having problems either transmitting or receiving reports over a telephone, reset your system by using the *Defaults* part of the *Cart Setup* menu. Then try transmitting/receiving again. (Refer to chapter 6, "Transmitting ECGs from a Diskette" for further details.)

If you still experience problems, then contact Marquette Service.

Leadwire Problems

When a lead error occurs* during the data acquisition process because of either improper site preparation or a defective leadwire, an error message will appear on the LCD. (Depending on the type of acquisition module you are using, this error message will appear either briefly or remain on the LCD until the error is corrected or "overridden." However, in all cases, when the problem is corrected, the error message will disappear.)

If you are using an acquisition module manufactured prior to August 1986 and a lead error occurs before the data acquisition process begins, then no LCD message will appear. (For further information, see to "Lead Error Condition" below.)

The system divides lead errors into four general categories. Examples of LCD error messages are in brackets:

- Disconnection {** V6 DISCONNECTED **},
- 60 Hz noise {** RL LL 60 HZ NOISE **},
- Low frequency noise {** H(A1) BASELINE SWAY **}, and High frequency noise {** V3R(A2) MUSCLE TREMOR **}.

Generally, to correct a lead error...

- check the electrode site preparation and the electrode itself by replacing it with a new one if necessary;
- check for a defective leadwire by replacing the leadwire with a new one; and

if neither of the above fix the problem lead, then contact Marquette Service.

Specifically, for the four general categories of LCD messages...

- if a disconnection lead error appears, check the specified electrode/leadwire;
- if a 60 Hz noise lead error appears, check the specified electrode/leadwire and limb electrodes;
- if a low frequency noise lead error appears, check the specified electrode for a loose connection, and adjust the baseline roll filter using the *Cart Setup* menu if necessary; and
- if a high frequency noise lead error appears, check the specified electrode/leadwire.

Lead Error Condition

Pre-August 1986 Acquisition Modules (AM-1 only)

The following applies to acquisition modules with serial numbers before H6XXXXXX (before August 1986).

Whenever a leadwire becomes disconnected during the 10-second acquisition of ECG data, a 2-second lead error message should appear on the LCD similar to

**** V1 DISCONNECTED ** or ** LL DISCONNECTED **.**

Data already acquired will be eliminated and 10 seconds of new data will be acquired. For chest leads V1 through V6, the resulting ECG waveform for a disconnected lead will be a flat-line trace. Disconnected limb leads (except RL) will have a differing effect on leads I, II, III, aVR, aVL, and aVF. A disconnected RL lead will yield flat-line traces for all leads. When RA fails, the system will continue to acquire data, but the ECG that is run will be distorted.

The lead error message will not appear when a lead is disconnected prior to data acquisition. However, results of such a disconnection will be as stated above.

August 1986 and Later Acquisition Modules (AM-1, AM-2, AM-3, and AM-4)

The following applies to acquisition modules with serial numbers H6XXXXXX and later (August 1986 or later):

Whenever a leadwire becomes disconnected prior or during acquisition of ECG data, a lead error message will appear in the LCD similar to **** V1 DISCONNECTED **** or **** LL DISCONNECTED ****.

The message will remain on the LCD until either (1) the leadwire fail is corrected, or (2) the **RECORD ECG** key is pressed after at least 3 seconds of data acquisition.

disappear. Also, 10 seconds of data will be acquired following the corrective action.

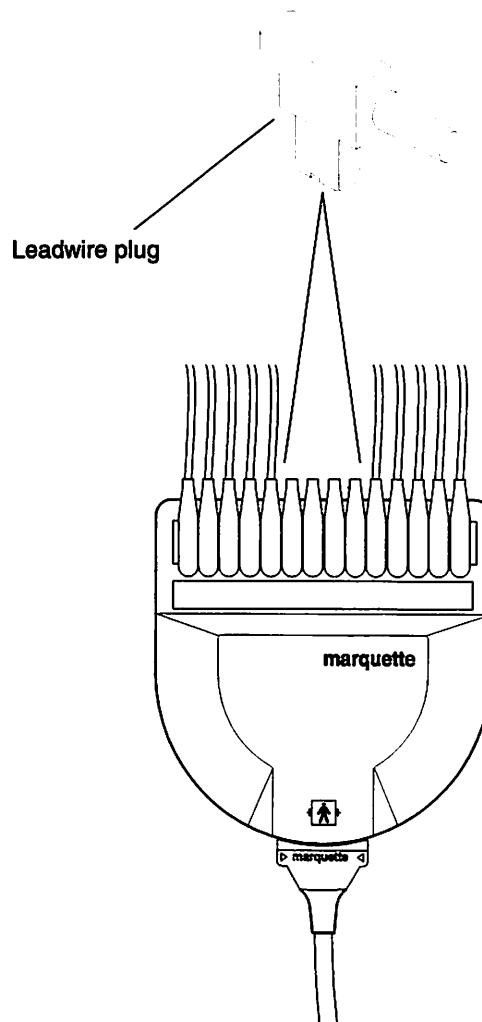
On the other hand, if the **RECORD ECG** key is pressed after at least 3 seconds of data acquisition, a **** LEAD ERROR OVERRIDE **** message will appear on the LCD. Ten seconds of data will then be acquired, and the lead error condition will be printed on ECG reports.

For an AM-2, if RL fails either before or during data acquisition, it is possible that no LCD message will appear.

Improving Signal Quality

When a leadwire is not connected to a patient, replace the leadwire with a black-based leadwire plug to reduce noise.

AM-4 Signal Quality



MD1024-077A, 073A

NOTE

Use only black-based leadwire plugs to reduce noise.

NOTE

Grey-based leadwire plugs may cause incorrect data to be displayed and recorded for those leads not used during a pediatric or vector loops ECG.

High Resolution Signal Quality

To insure that your High Resolution ECG recordings are of the highest quality, it is very important that the acquired data be as free of noise as possible. The primary reasons for noise in the High Resolution ECG are:

- Inadequate skin preparation,
- Damaged leadwires,
- Excessive patient movement,
- Muscle tremor, and
- 50 Hz or 60 Hz power line noise.

Solutions to the first four causes of noise can be obtained by systematically eliminating each possible source of noise. This would include things such as:

- Improving the skin preparation,
- Replacement of a damaged leadwire,
- Reminding the patient to lie still during acquisition, and
- Repositioning of an electrode (avoiding large muscle masses).

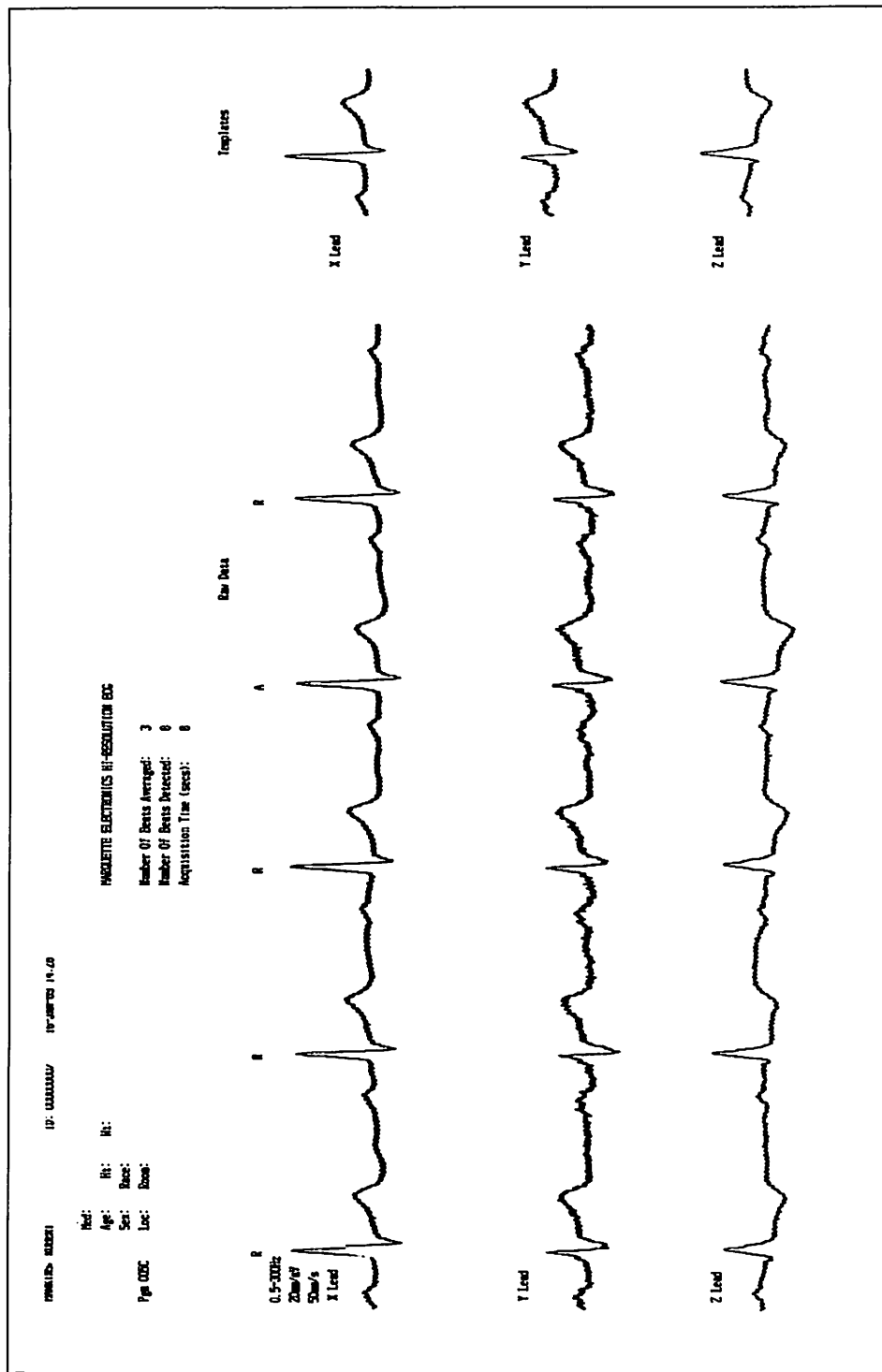
The last reason for noise (50/60Hz power line noise) is more difficult to eliminate. During the acquisition of a standard ECG, the system uses a 50 Hz/60 Hz line filter to eliminate power line noise. However, in the Hi-Res mode, a power line filter is not used because it could distort or even eliminate the HFLA signals within the frequency range of interest (25-250 Hz).

In the Hi-Res mode, minor power line noise is inherently eliminated by the signal averaging process. This is because power line noise is not synchronized with the ECG signal and therefore will be "averaged out." However, if during the template generation step of the Hi-Res routine a steady "buzz" of greater than 2 mm on any channel is evident, the power line noise should be considered excessive. See figures 1 and 2.

In such instances, if excessive power line noise is evident on the template recording, additional steps can be taken to further reduce this noise.

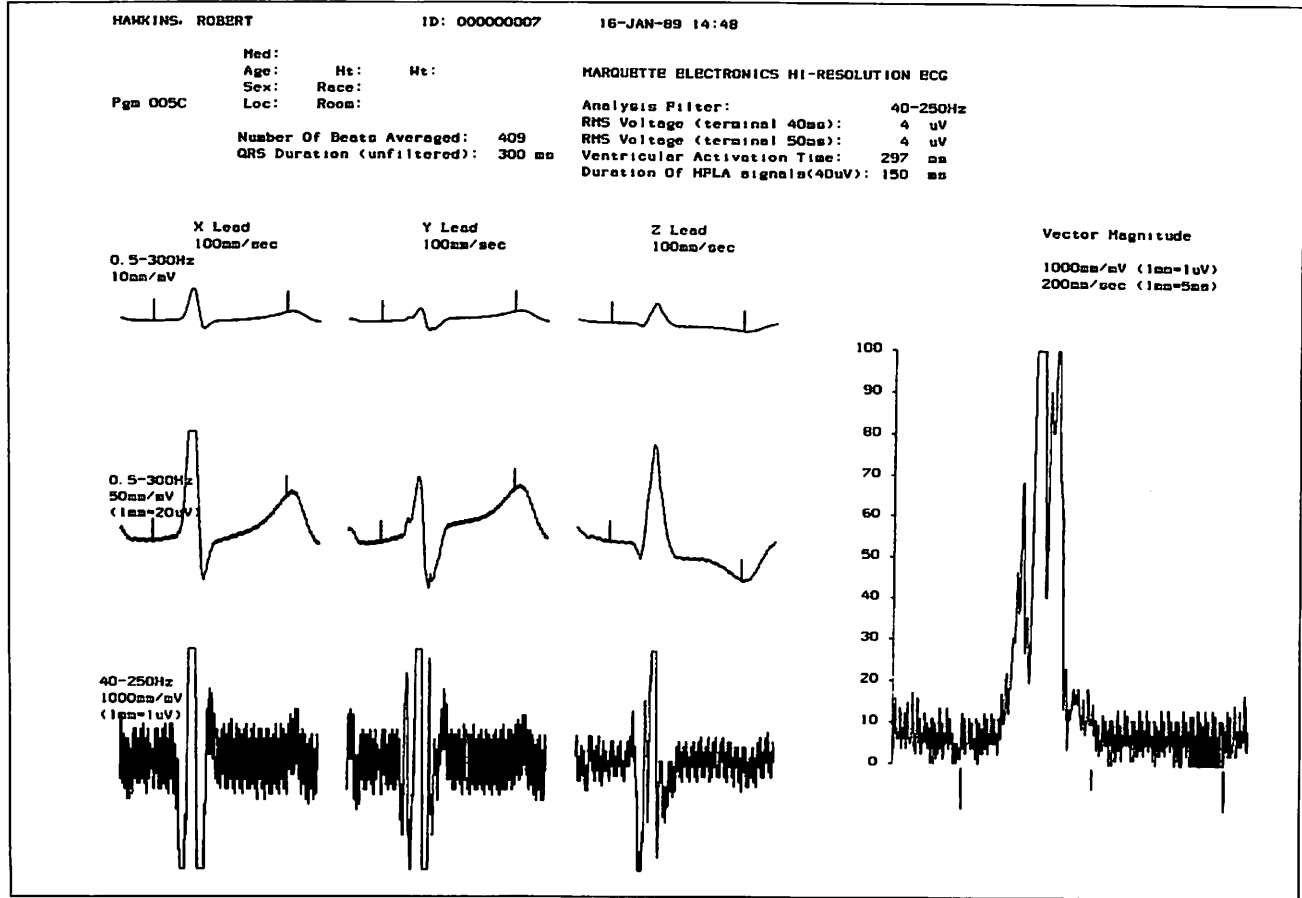
1. Increase the space between the patient and the interfering source.
2. Locate the system several feet away from the patient. This will reduce possible interference from the power supply of the system.
3. Patient leadwire routing.

Leadwires attached to the patient form an electric circuit. Leadwires (especially longer limb leadwires) can create a large open loop, making a good "antenna" for power line magnetic fields. Consequently, laying the leadwires and acquisition module on or close to the patient will reduce the size of the loop and improve the Hi-Res ECG. Placing the left leg leadwire on the lower left abdomen and taking care to place extra leadwire length on top of the patient's abdomen may also help in elimination of excessive noise.



MD1020-092A

Figure 1 - Hi-Res Template Report



MD1020-93A

Figure 2 - Hi-Res Final Report (40-250 Hz Filter)

System Error Messages

Table C-1. System Error Messages

Error Message	Recommended Solution
<i>"Abort Received"</i>	Transmission has stopped. Try transmitting again.
<i>Bad RAM Location</i>	Contact Marquette Service.
<i>Checksum Error UX</i>	Contact Marquette Service.
<i>Data too noisy: Please re-instrument</i>	Check the electrode site preparation and leadwires. Then start over.
<i>DISKETTE FULL</i>	You diskette is full and can not store any more files. Either use another diskette or delete some files.
<i>DISKETTE NOT IN DRIVE</i>	The diskette is either not in the diskette drive slot, or it is in the diskette drive slot but is damaged. Make sure that a properly formatted diskette is inserted in the diskette drive slot.
<i>DISKETTE READ/WRITE ERROR</i>	The diskette you are using is either damaged or not formatted. If damaged, some files may be accessible. Use the <i>Dirctry</i> function to print a list of all the files on the diskette. (See chapter 9, "Creating a Directory".) The files on the printed list will be accessible - except those files where the message <i>DISKETTE WRITE ACTIVITY WAS NOT FINISHED</i> appear. If no files are accessible, then format the diskette. (See "Formatting a Diskette" in appendix E, "Miscellaneous Tasks".)
<i>DISKETTE WRITE ACTIVITY WAS NOT FINISHED</i>	The file you were trying to access is incomplete and can not be used.
<i>DISKETTE WRITE PROTECTED</i>	If you want to save data to a diskette, make sure that the diskette is not write protected. (See "Delete All Files" in chapter 10, "Deleting an ECG.")
<i>FAULT TRAP-VECTOR</i>	This message will be present along with other letters and/or digits. If possible, copy them onto a piece of paper then turn the system off and then on again. You may then attempt to repeat what you were originally trying to do. If this message appears continuously, contact Marquette Service.
<i>Incompatible MAC Acquisition Module</i>	An incorrect acquisition module is connected to the system. For example, an AM-1 or AM-2 can not be used to acquire data for the <i>Pace</i> (Pacemaker) function.
<i>Most recent ECG NOT saved to diskette</i>	When the <i>Save</i> and <i>Discard</i> selections appear with this message, it means that the most recently acquired ECG was not saved to diskette or transmitted, and you may now choose to save (or transmit) the ECG or discard the ECG. If <i>Press F1 to acknowledge</i> appears, then the most recently acquired ECG was lost.
<i>No Answer Tone</i>	<ul style="list-style-type: none"> ■ Check cable connections. ■ Check the telephone number for accuracy.
<i>No Confirmed Report Formats Selected!</i>	In order to print a confirmed report, at least one confirmed report format must be selected. (See "Report Format Setup" in chapter 13, "Setup").

Table C-1. System Error Messages

<i>No Data Storage - Plotter Output Only</i>	To record or save data on a diskette, remove the write protection from you diskette, and then insert it into the diskette drive slot. If this message still appears, try using another diskette.
<i>No Dial Tone</i>	<ul style="list-style-type: none"> ■ Check the connection (see chapter 6, "Receiving and Transmitting an ECG"). ■ Check the telephone wall connector.
<i>** No MAC Acquisition Module ? **</i>	Connect the acquisition module to the system.
<i>No Overreadable Report Formats Selected</i>	Select a report format or a different report format. (See "Report Format Setup" in chapter 13, "Setup".)
<i>No Report Formats Selected!</i>	You must select at least one of the three analysis filters – 25-250 Hz, 40-250 Hz, and 80-250 Hz – in order to print a Hi-Res report.
<i>No Such File</i>	Use the Dirctry function to check if the file is on the diskette. (See chapter 9, "Creating a Directory".)
<i>No Unconfirmed Report Formats Selected</i>	In order to print an unconfirmed report, at least one unconfirmed report format must be selected. (See "Report Format Setup" in chapter 13, "Setup".)
<i>NoMem</i>	Contact Marquette Service.
<i>Not Available</i>	The function you were trying to access is not available at this time.
<i>Phone Line Not Attached</i>	<ul style="list-style-type: none"> ■ Check that the telephone cord is properly connected.
<i>Unable to Generate Template</i>	The Hi-Res acquisition process has stopped. Check the electrode site preparation and leadwires. Start over.
<i>XXXX of Bad Blocks Found</i>	Format the diskette again. If this message still appears, use a different diskette.

APPENDIX D

SAMPLE REPORTS

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Introduction

Overview

This chapter contains samples of the writer report formats that are available including a pacemaker evaluation final report, a Hi-Res template report, a Hi-Res periodic averaging plot, a Hi-Res final report, and a Hi-Res re-analysis report.

- **S1 Report Format** -consists of a single median complex for each of the 12 leads at a writer speed of 50 mm/s, combined with 5 seconds of 6-lead rhythm at half writer speed. Text appears on the bottom of the page.
- **S2 Report Format** -consists of 5 seconds for each of 12 leads at a writer speed of 50 mm/s. Text appears on the bottom of the page.
- **Times 1 Complex Report Format (with Tic Marks)**-consists of a single median complex for each of the 12 leads. A "measurement matrix" of ECG data is included at the top of the report. Tic marks are included on each median complex.
- **Times 2 Complex Report Format (with Tic Marks)** -is identical to the Times 1 Complex Report Format except in this format the waveform gain is doubled.
- **One-Page 4 x 2.5 Report Format** -consists of 2.5 seconds for each of the 12 leads. The "4 x 2.5" means that the 12 leads are divided into 4 groups of 3 leads with 2.5 seconds of data for each lead.
- **One-Page 4 x 2.5 with 1 Rhythm Channel Report Format**-consists of 2.5 seconds for each of 12 leads with 10 seconds of 1-lead rhythm. The "4 x 2.5" means that the 12 leads are divided into 4 groups of 3 leads with 2.5 seconds of data for each lead.
- **One-Page 4 x 2.5 with 3 Rhythm Channels Report Format** -consists of 2.5 seconds for each of 12 leads with 10 seconds of 1-lead rhythm. The "4 x 2.5" means that the 12 leads are divided into 4 groups of 3 leads with 2.5 seconds of data for each lead.
- **Computer Graphic Record (CGR) Report Format**-consists of a single median complex for each of the 12 leads, combined with 10 seconds of 3-lead rhythm at half writer speed.
- **Rhythm and Morphology (RMR) Report Format** -consists of a single median complex for each of the 12 leads, combined with 10 seconds of 3-lead rhythm.
- **4 x 10 Report Format** -consists of 10 seconds for each of 12 leads. The "4 x 10" means that the 12 leads are divided into 4 groups of 3 leads with 10 seconds of data for each lead.
- **Automatic Rhythm (1 x 10) Report Format** -consists of 10 seconds of 3, 6, or 12 leads of rhythm. The "1 x 10" means that the 3, 6, or 12 leads of rhythm make up a single 10-second group.

- ***Pediatric*** Report Format -consists of 2 seconds for each of 15 leads, combined with 10 seconds of 1-lead rhythm.
- ***2 x 10*** Report Format-consists of 10 seconds for each of 12 leads. The “2 x 10” means that the 12 leads are divided into 2 groups of 6 leads with 10 seconds of data for each lead.
- ***2 Lead Rhythm*** Report Format -consists of 10 seconds of 12-lead rhythm.
- ***2 x 5*** Report Format-consists of 5 seconds for each of 12 leads. The “2 x 5” means that the 12 leads are divided into 2 groups of 6 leads with 5 seconds of data for each lead.
- ***Vector Loops*** Report Format -consists of sagittal, horizontal, and frontal plane vectorgrams. Also, sample X, Y, and Z complexes are included with marks identifying P onset, P offset, Q onset, Q offset, and T onset.
- ***Pacemaker Evaluation*** Final Report -page 1 consists of 20 seconds of lead II with no magnet and 10 seconds of lead II with a magnet. Page 2 consists of 10 seconds of lead II with a magnet (the same data as page 1) and 2 channels of pacemaker artifact.

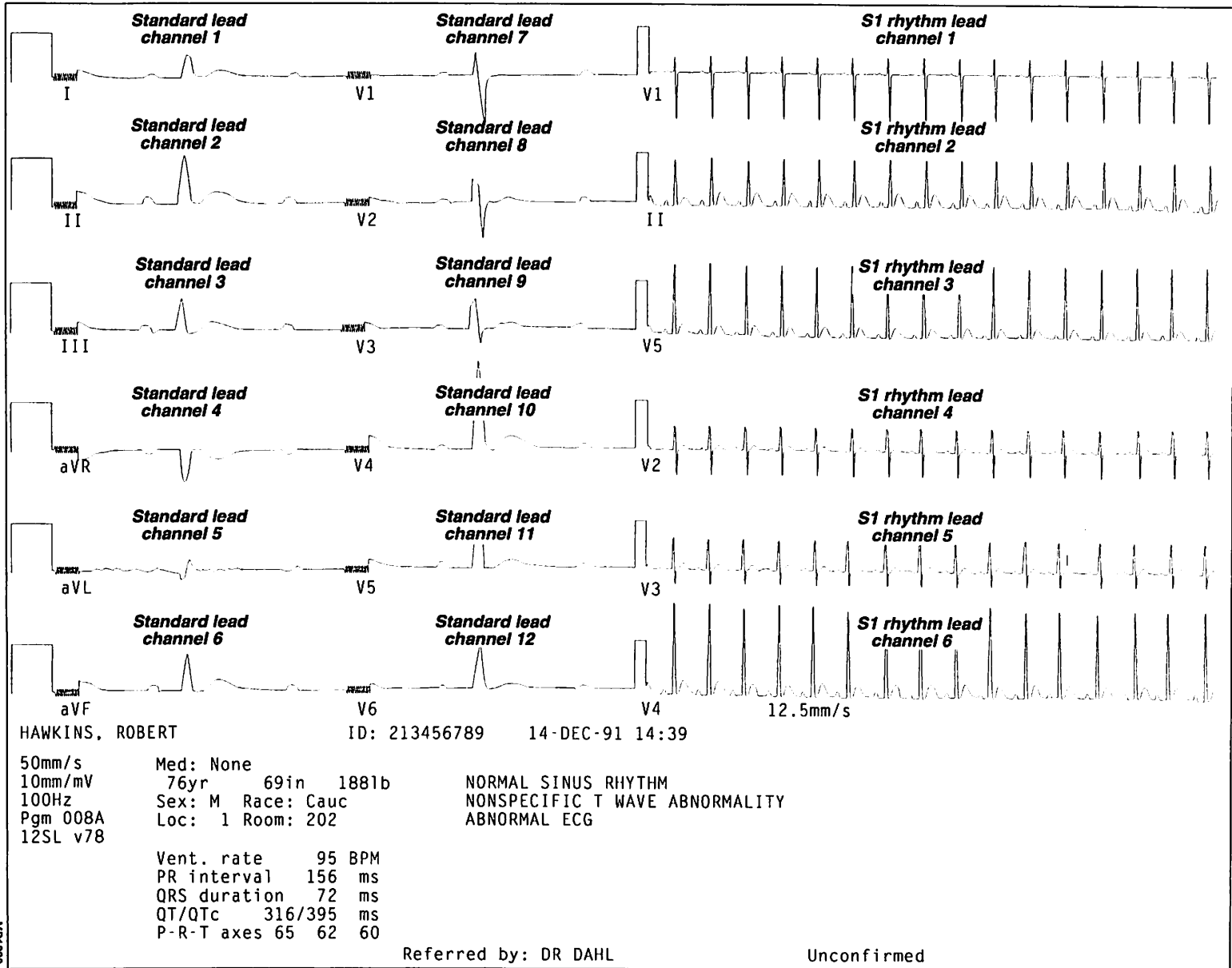
Pacemaker evaluation reports can not be done with version 008 software.

- ***High-Res*** -A Hi-Res report can be up to 9 pages long. The first page printed will be the template report. Periodic average plots will be printed during the averaging process if Periodic Average Plots is enabled in Hi-Res Setup. The one, two, or three pages that follow will be the final report (averaged signals and vector magnitude plots filtered at 25-250, 40-250, and/or 80-250 Hz).

A NO DATA label and a flat line trace appear reports for all extra leads that are not selected in the Cart Setup menu. This applies to real-time rhythm reports also. Hi-Res reports can not be done with version 008 software.

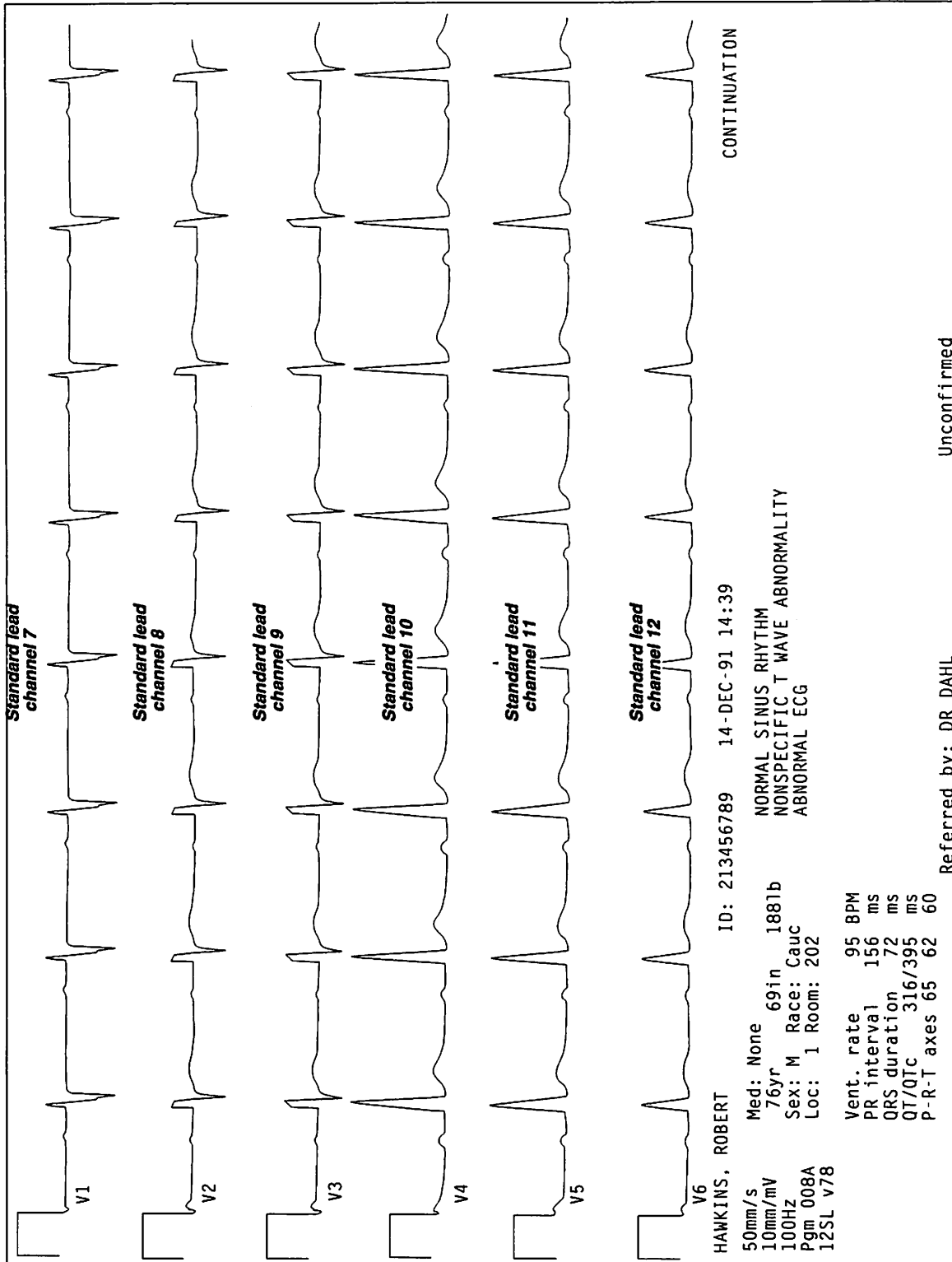
S1 Report Format

APPENDIX D SAMPLE REPORTS

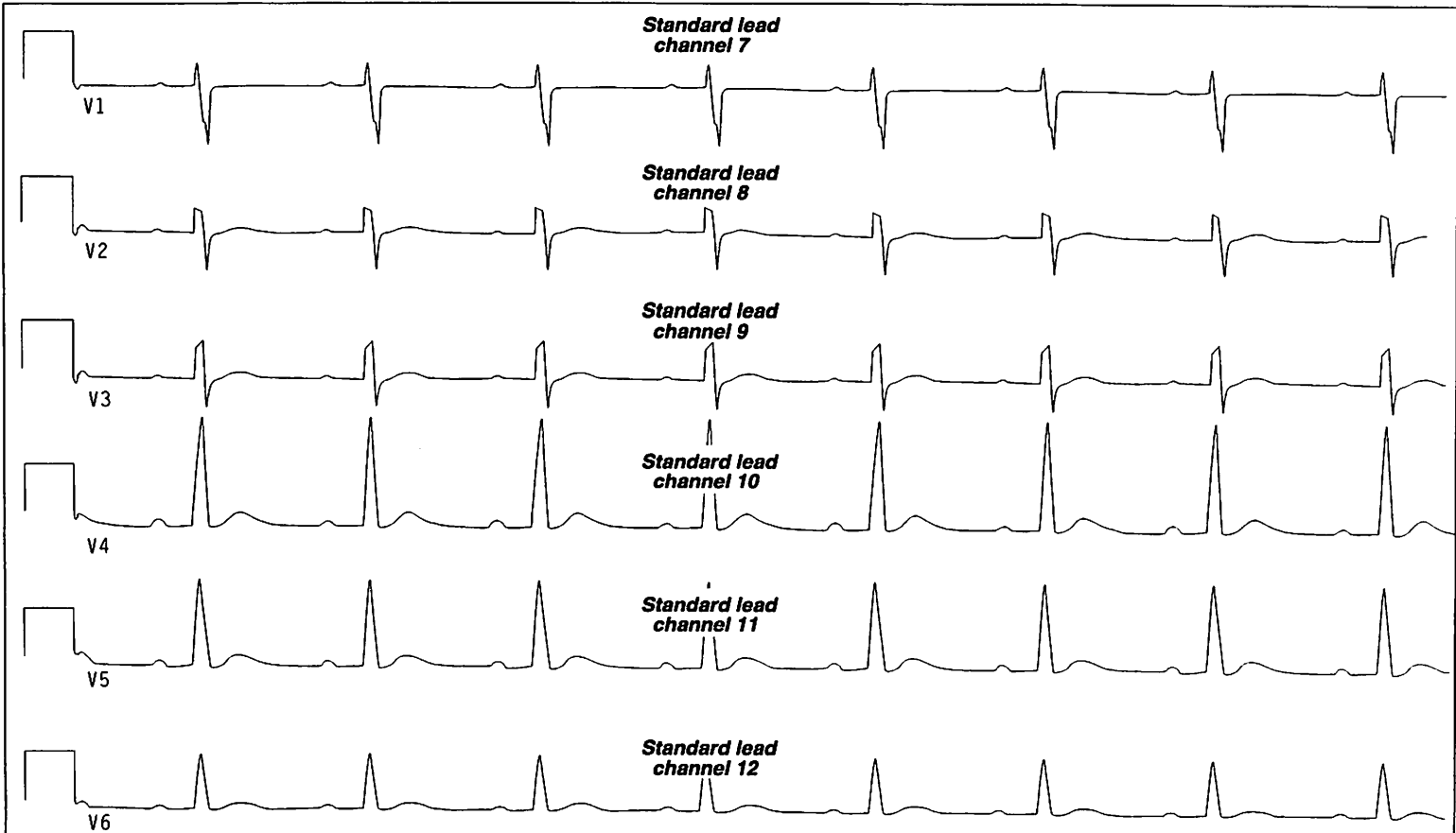


MD1020-47A

S2 Report Format



MD1020-48A



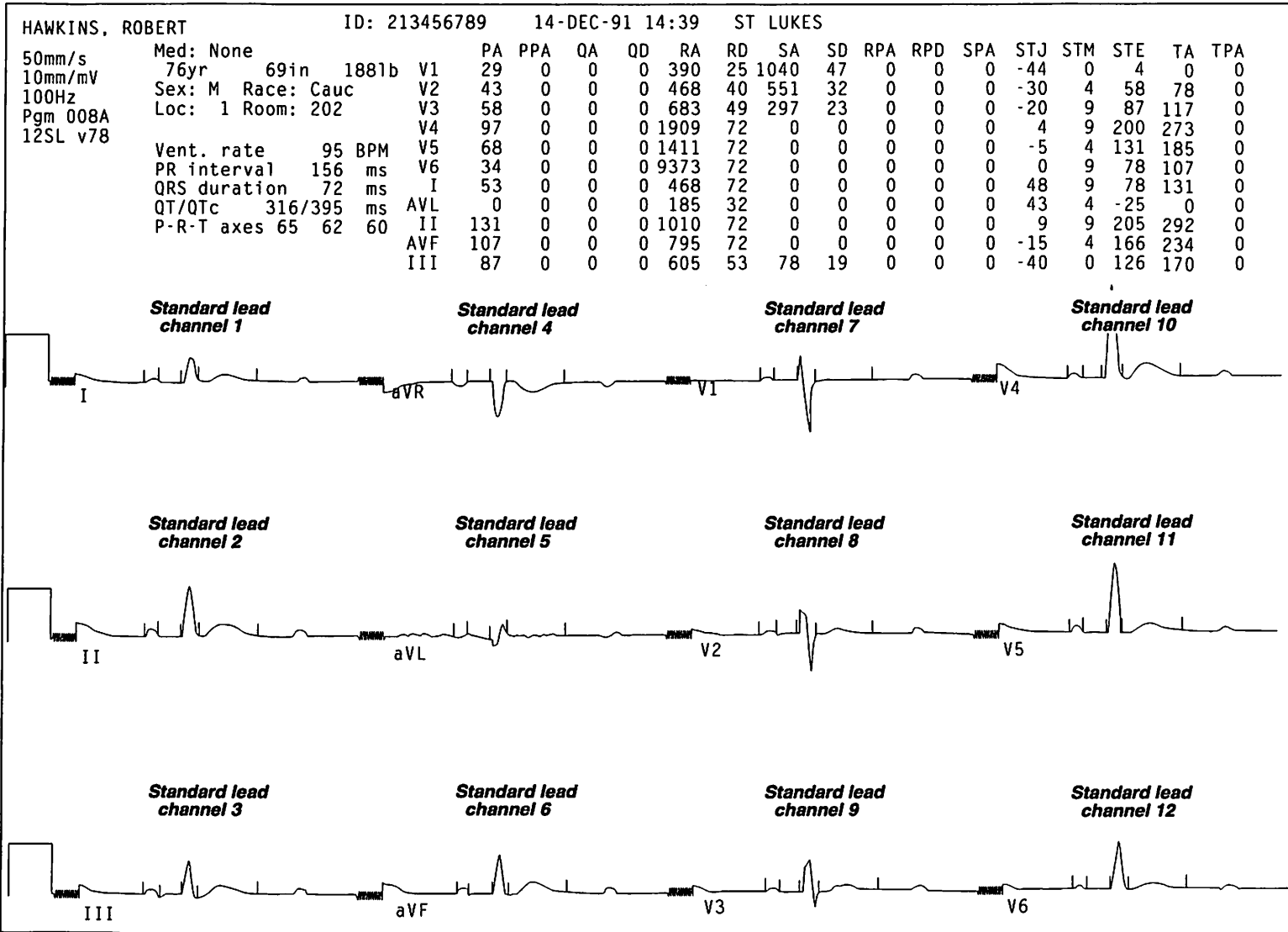
HAWKINS, ROBERT ID: 213456789 14-DEC-91 14:39 CONTINUATION

50mm/s	Med: None	NORMAL SINUS RHYTHM
10mm/mV	76yr 69in 188lb	NONSPECIFIC T WAVE ABNORMALITY
100Hz	Sex: M Race: Cauc	ABNORMAL ECG
Pgm 008A	Loc: 1 Room: 202	
12SL v78		
Vent. rate	95 BPM	
PR interval	156 ms	
QRS duration	72 ms	
QT/QTc	316/395 ms	
P-R-T axes	65 62 60	

Referred by: DR DAHL Unconfirmed

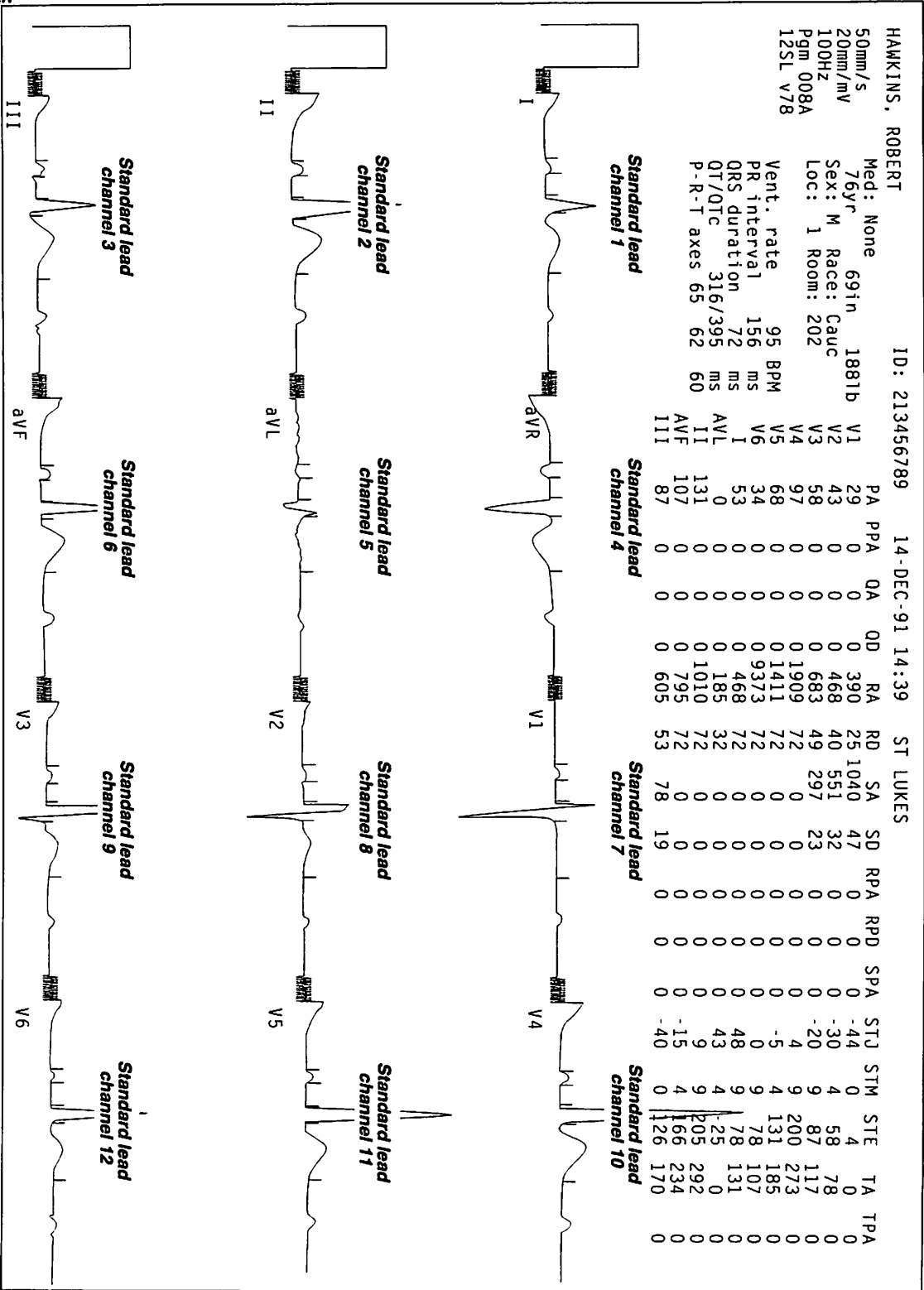
MD1020-49A

Times 1 Complex Report Format (with Tic Marks)

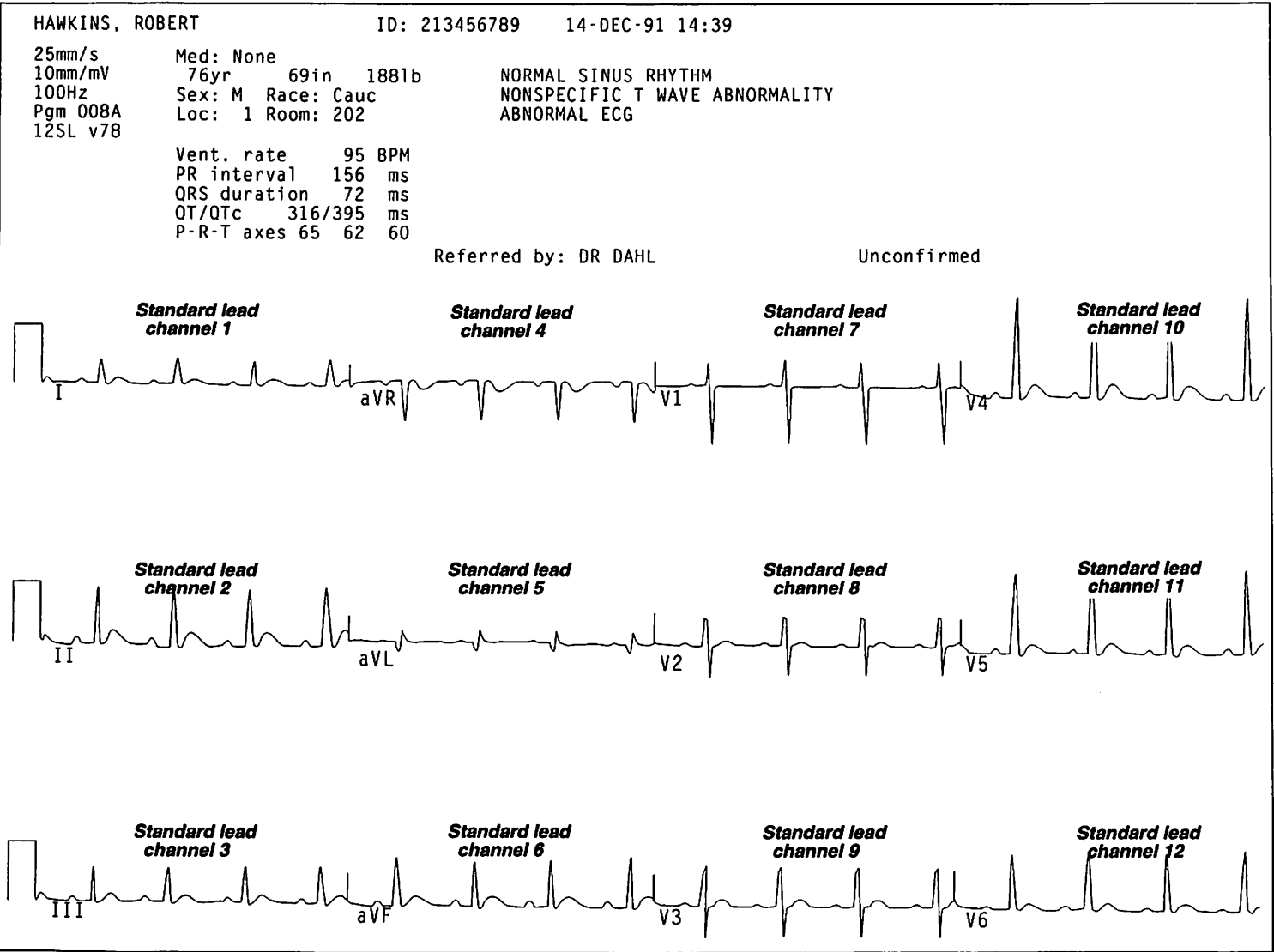


MD1020-50A

MD1020-51A



Times 2 Complex Report Format (with Tic Marks)

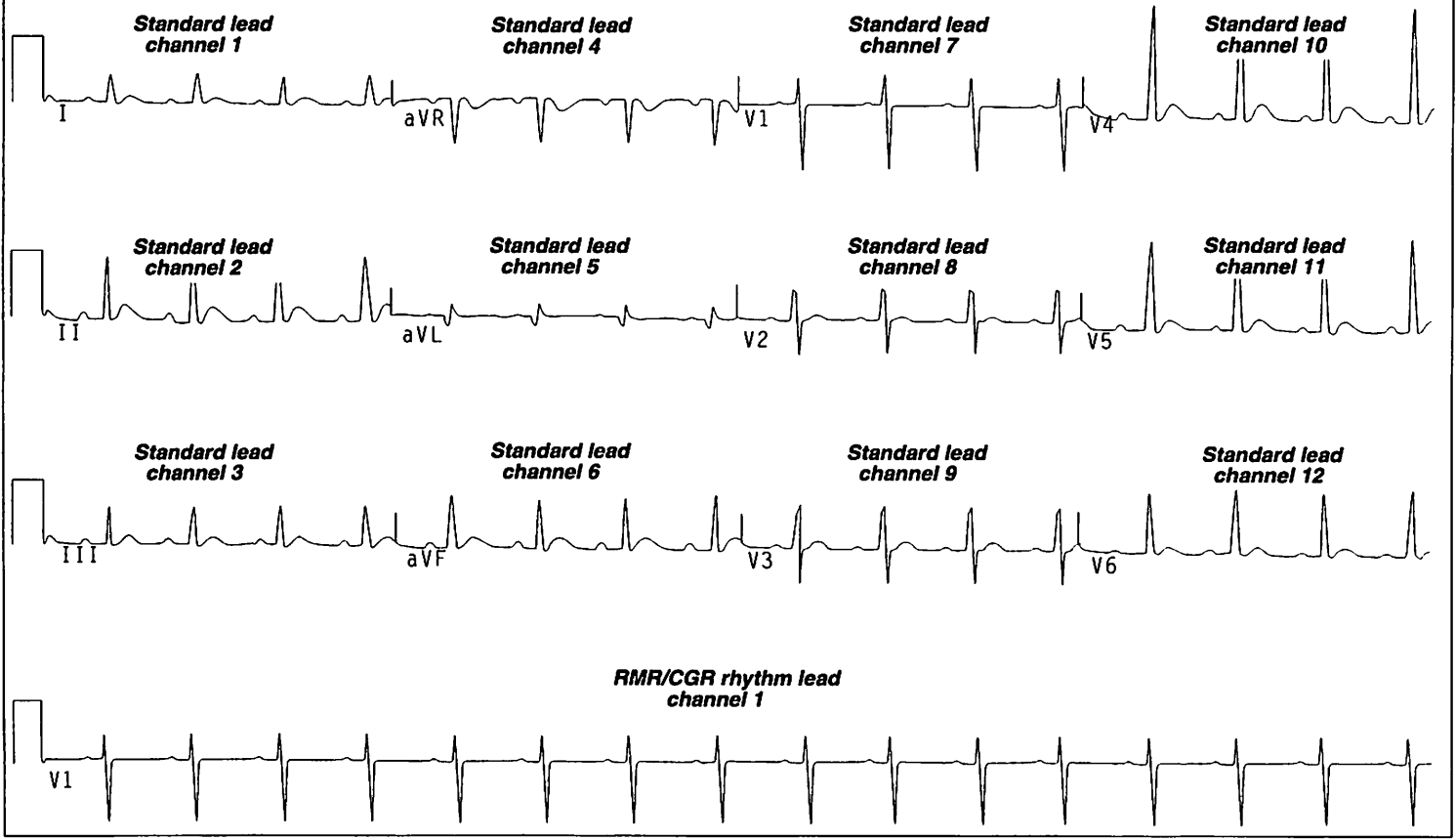


MD1020-S2A

HAWKINS, ROBERT ID: 213456789 14-DEC-91 14:39
25mm/s Med: None
10mm/mV 76yr 69in 188lb
100Hz Sex: M Race: Cauc
Pgm 008A Loc: 1 Room: 202
12SL v78
NORMAL SINUS RHYTHM
NONSPECIFIC T WAVE ABNORMALITY
ABNORMAL ECG

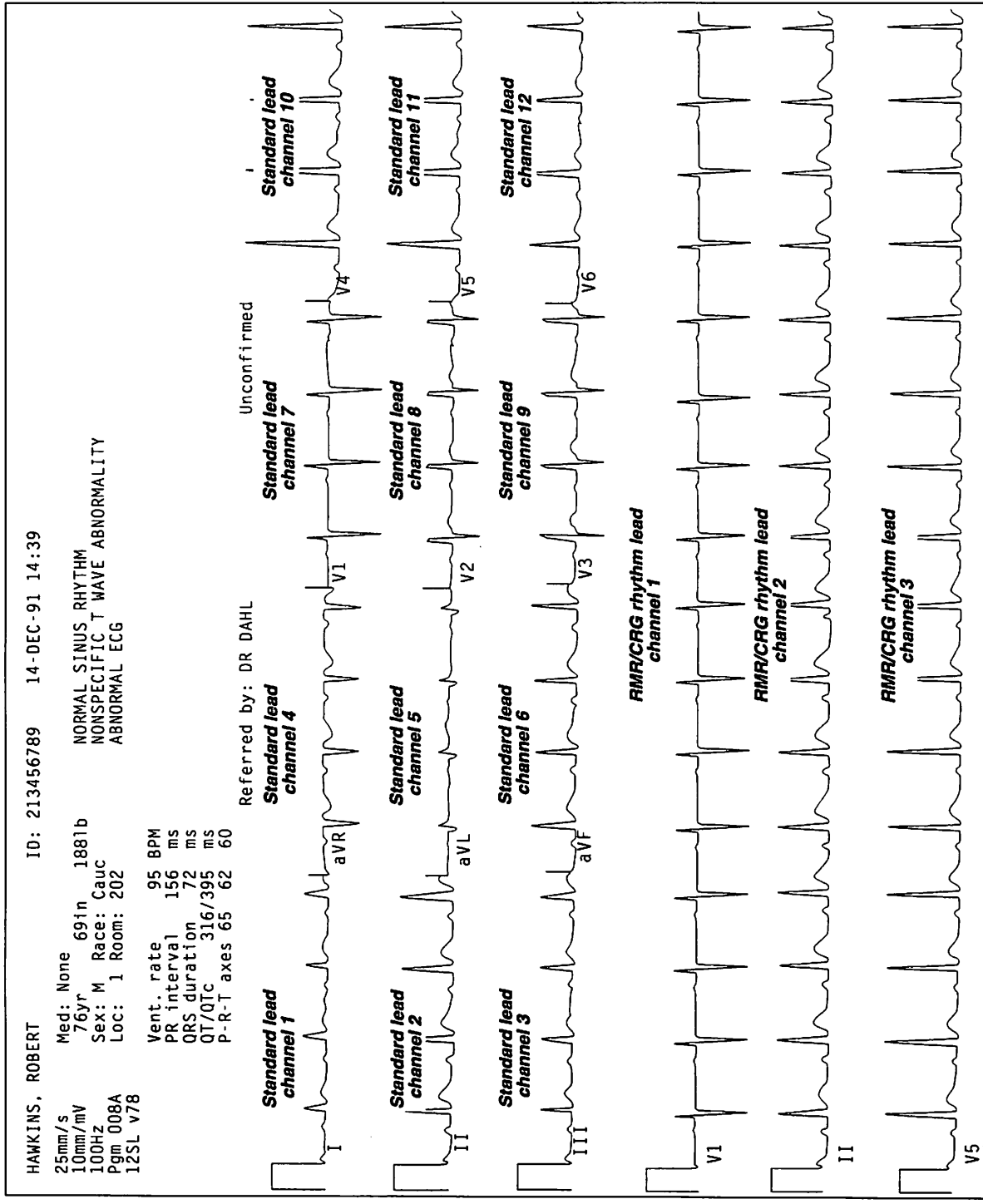
Vent. rate 95 BPM
PR interval 156 ms
QRS duration 72 ms
QT/QTc 316/395 ms
P-R-T axes 65 62 60

Referred by: DR DAHL Unconfirmed



MD1020-53A

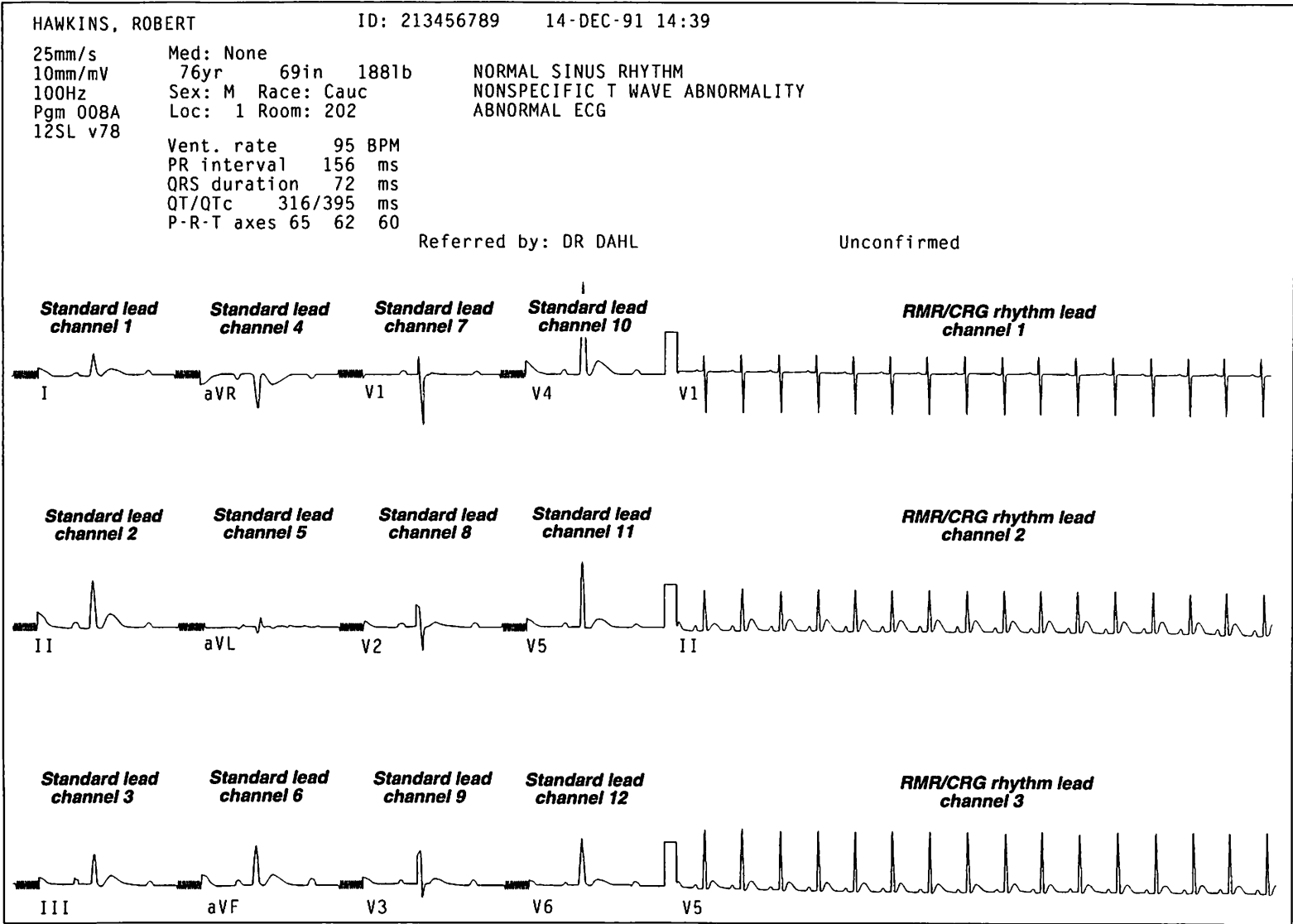
One Page 4 x 2.5 with 3 Rhythm Channels Report Format



MD1020-54A

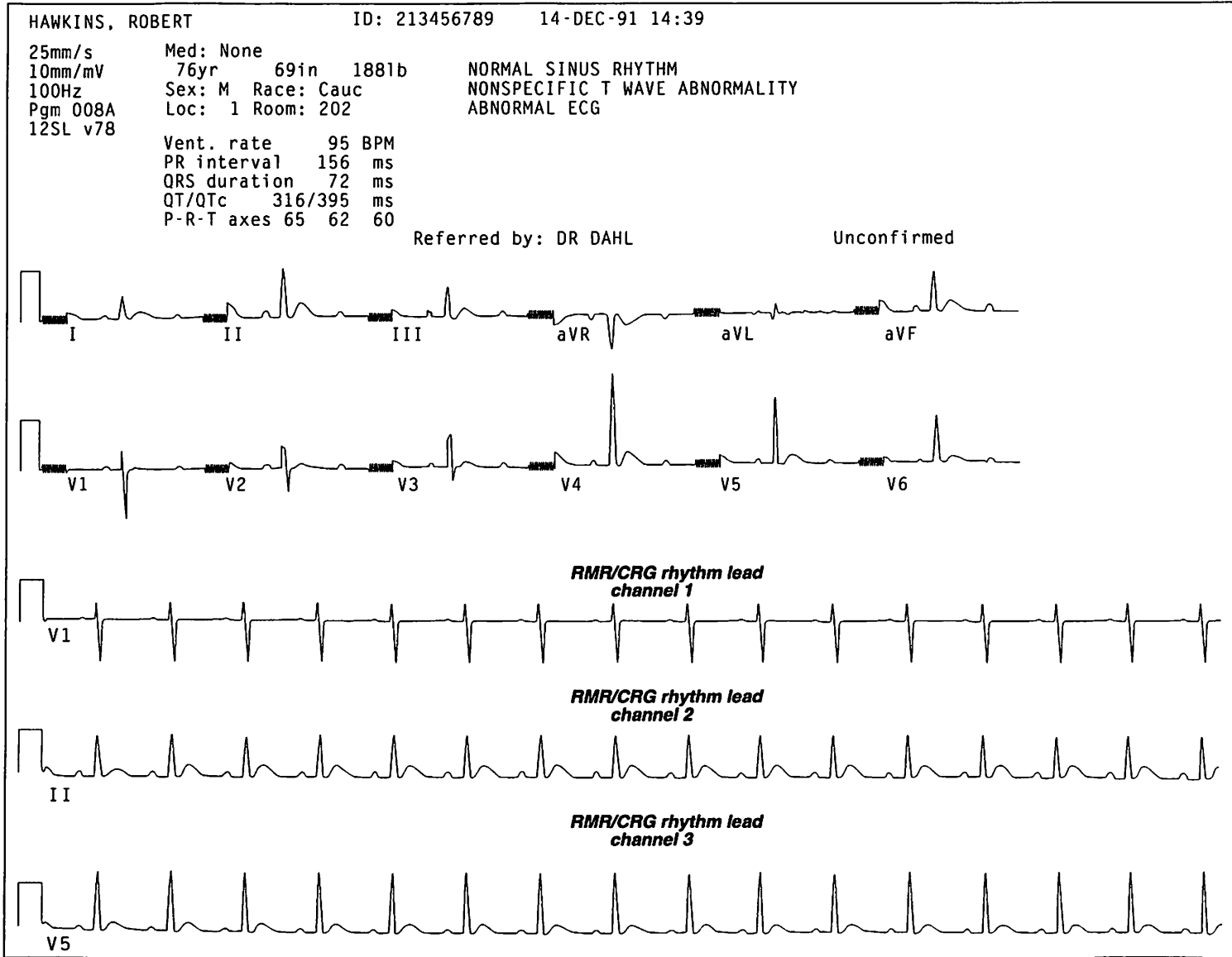
Computer Graphic Record (CGR) Report Format

APPENDIX D SAMPLE REPORTS

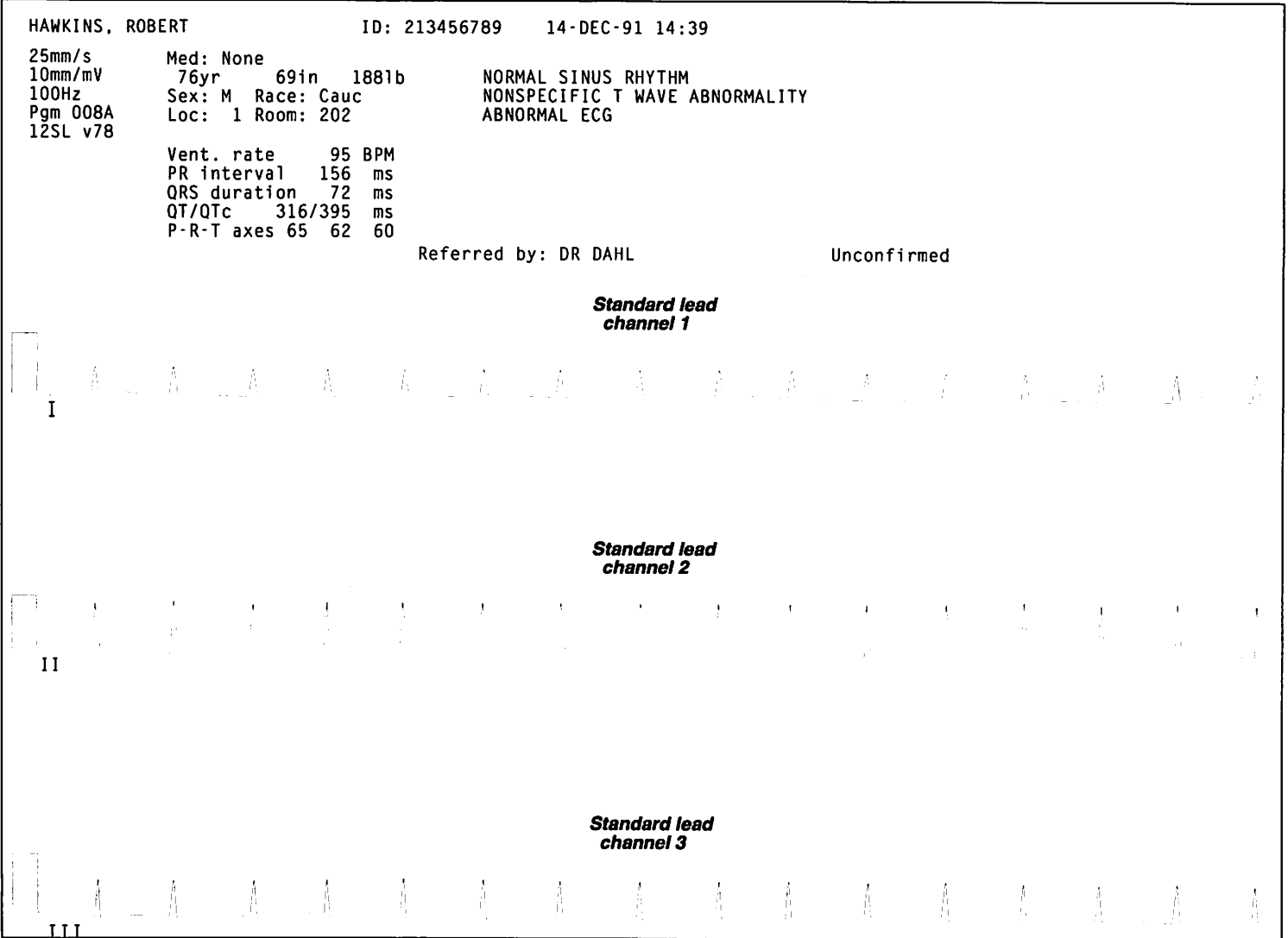


MD1020-55A

Rhythm and Morphology (RMR) Report Format

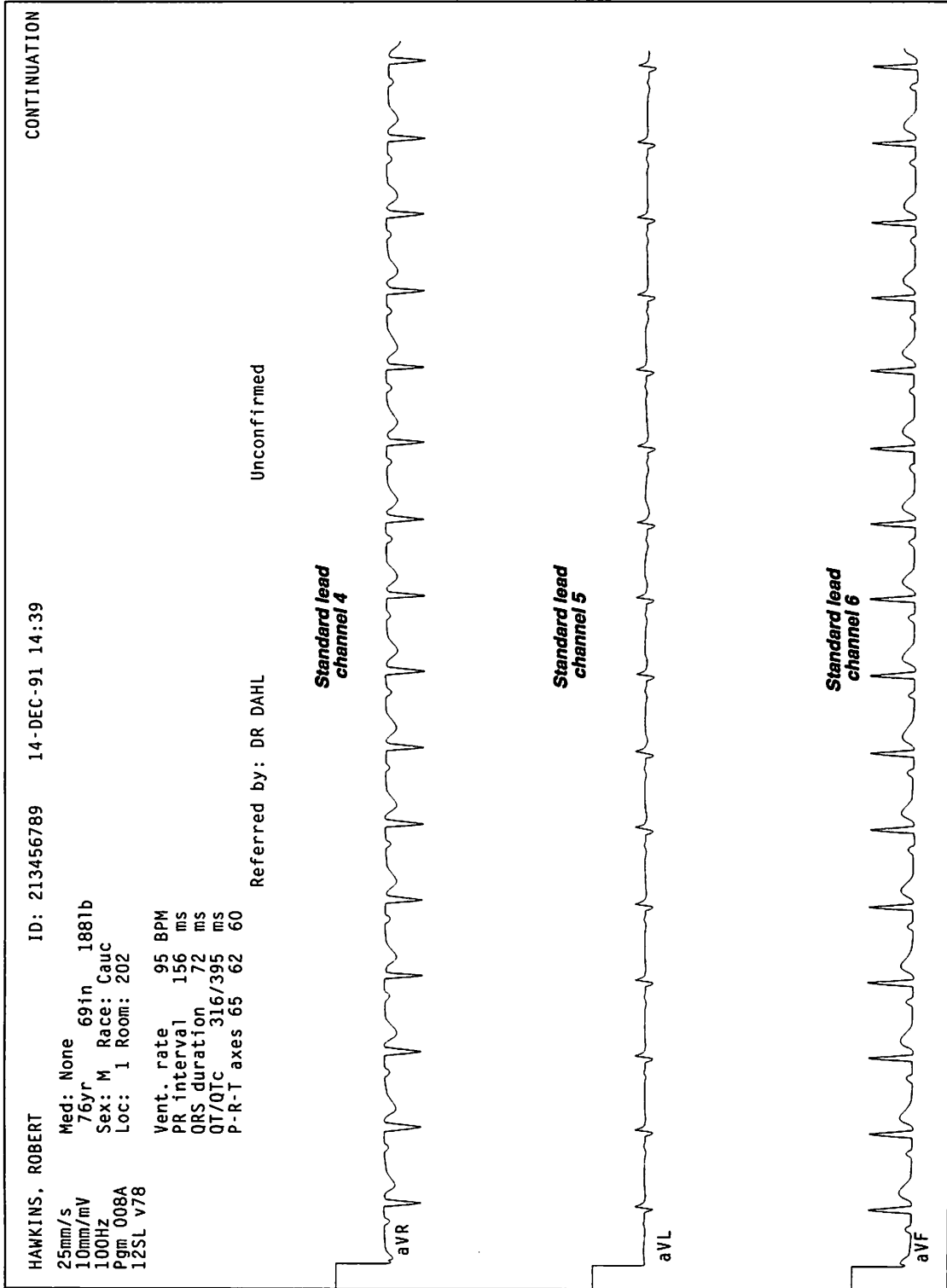


MD1020-56A



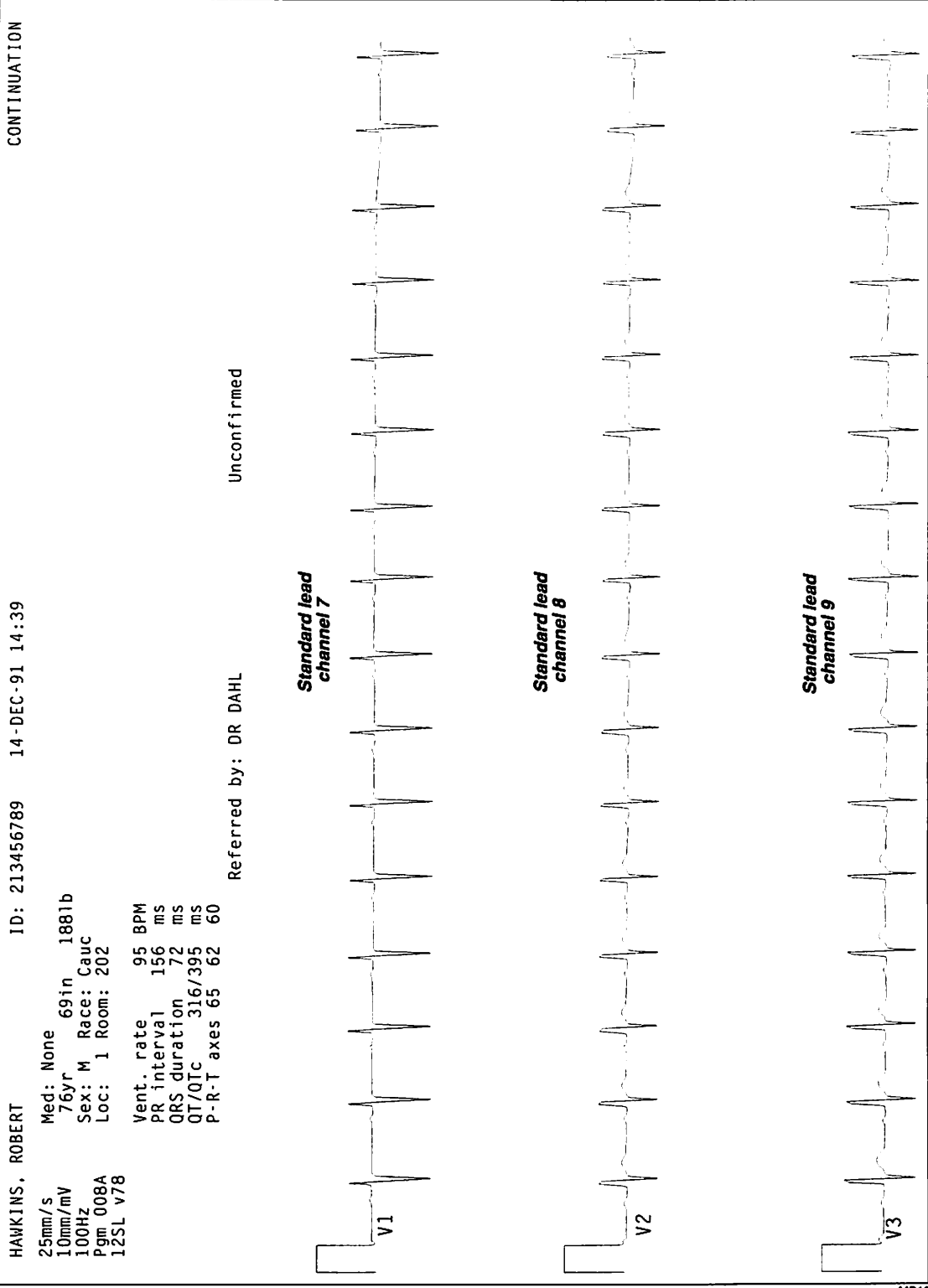
MD1020-57A

4 x 10 Report Format



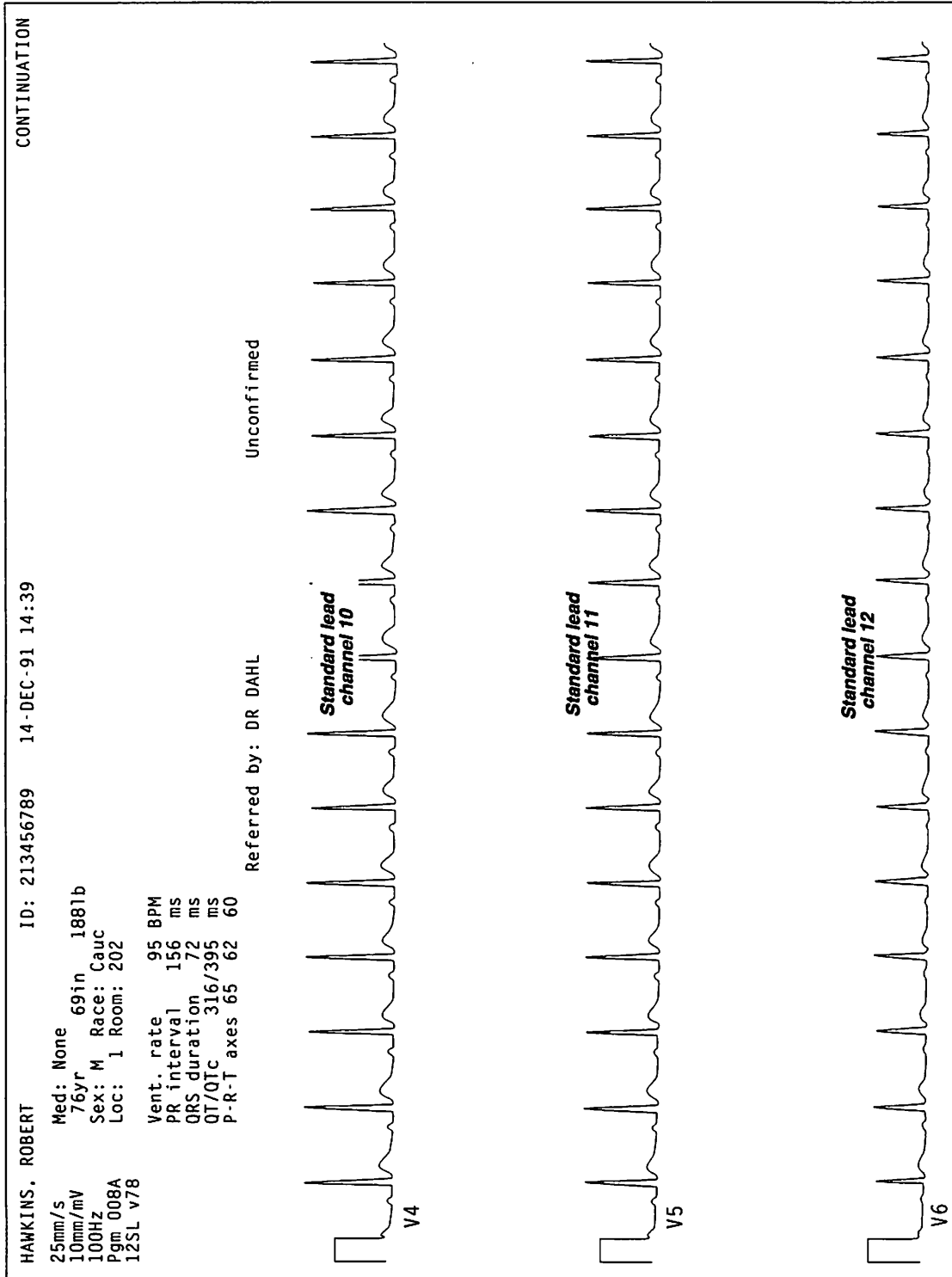
MD1020-58A

4 x 10 Report Format



MD1020-59A

4 x 10 Report Format



MD1020-60A

Automatic Rhythm (1 x 10) Report Format

HAWKINS, ROBERT ID: 213456789 14-DEC-91 14:39

25mm/s
10mm/mV
100Hz
Pgm 008A
12SL V78

Med: None 69in 188lb
Sex: M Race: Cauc
Loc: 1 Room: 202
Vent. rate 95 BPM
PR interval 156 ms
QRS duration 72 ms
QT/QTc 316/395 ms
P-R-T axes 65 62 60

NORMAL SINUS RHYTHM
NONSPECIFIC T WAVE ABNORMALITY
ABNORMAL ECG

Referred by: DR DAHL Unconfirmed

AutoRhythm lead
channel 1



AutoRhythm lead
channel 2



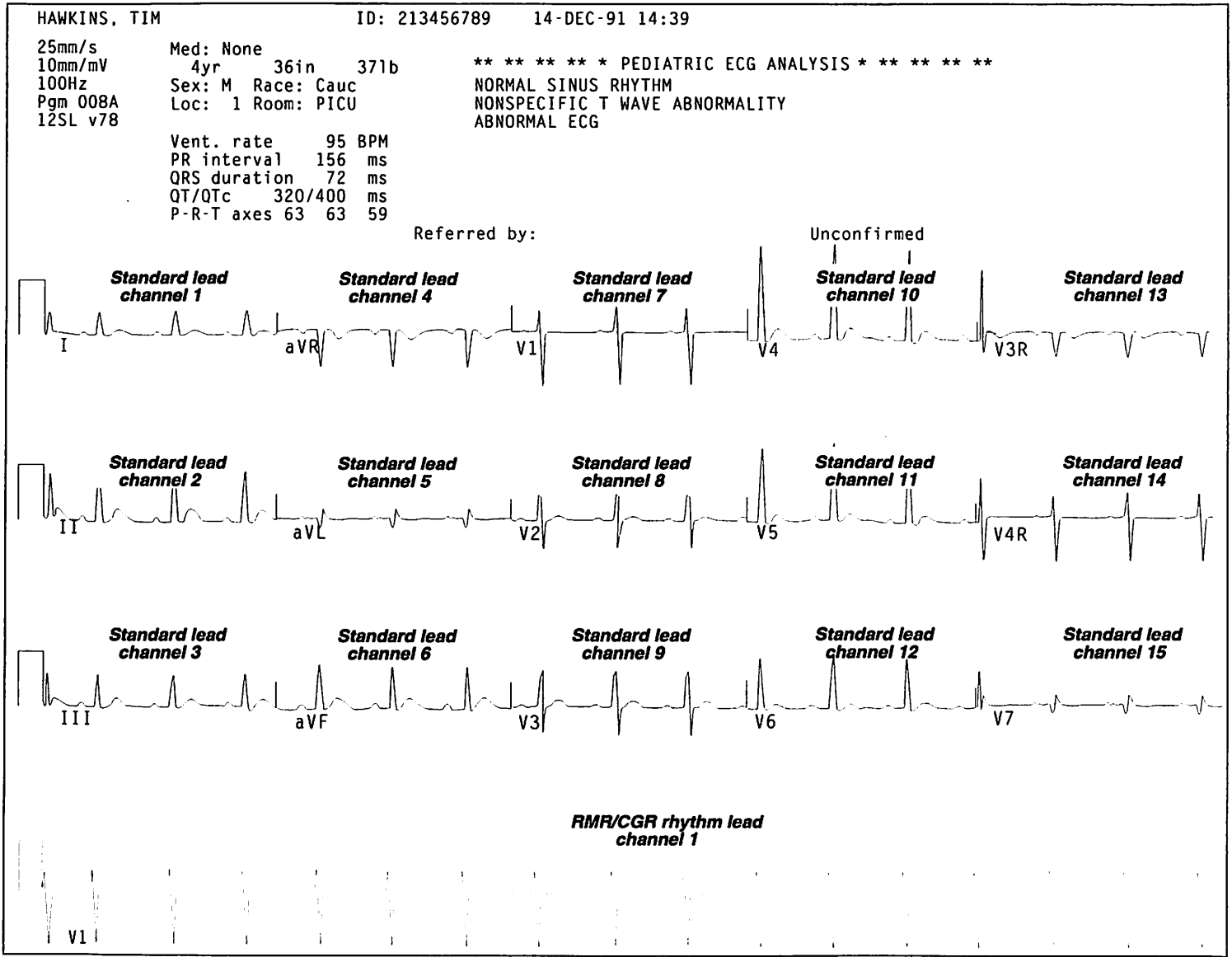
AutoRhythm lead
channel 3



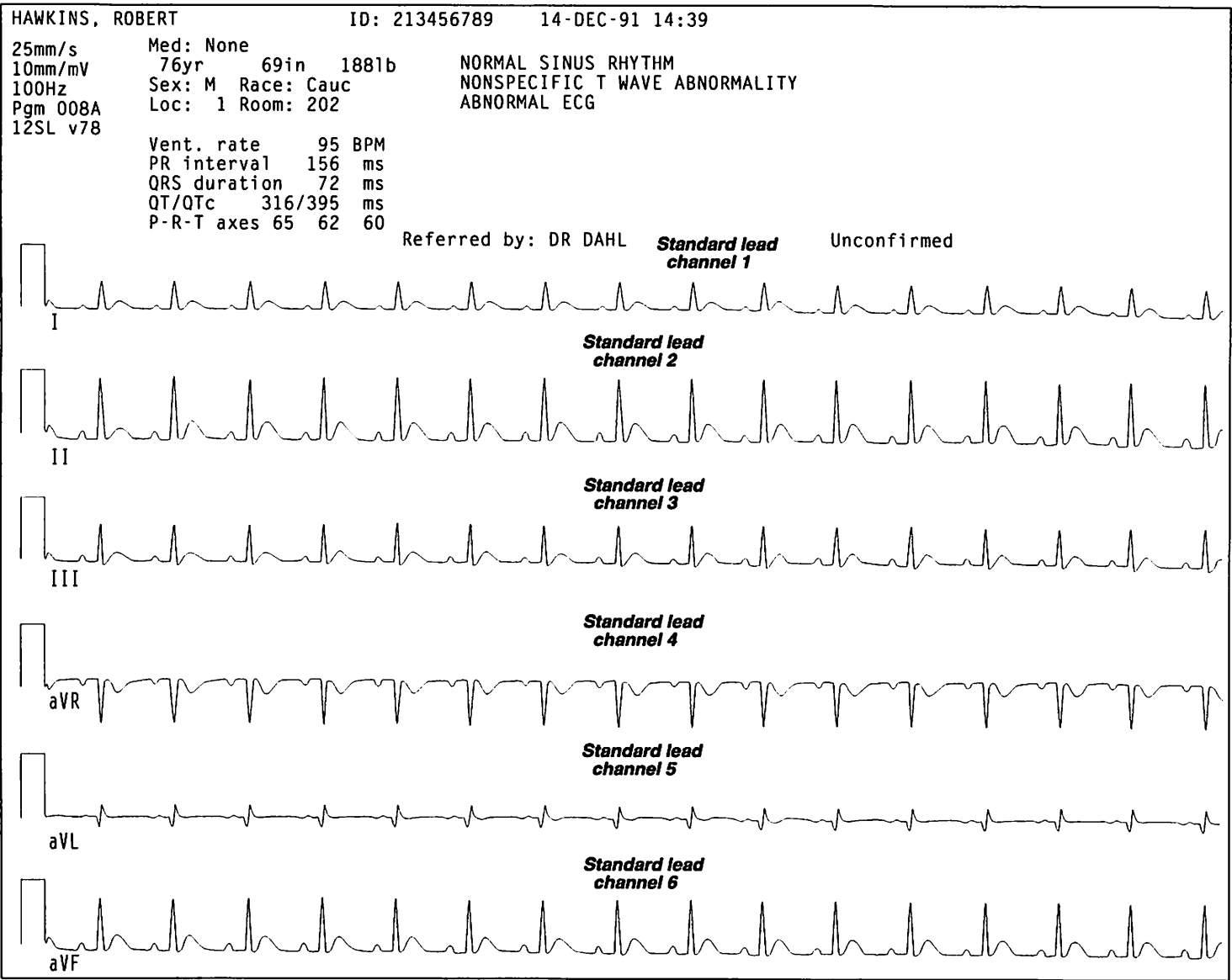
MD1020-61A

*In the 12-lead Automatic Rhythm report format,
the leads chosen for standard leads are used.*

Pediatric Report Format



MD1020-62A



MD1020-63A

2 x 10 Report Format

CONTINUATION

HAWKINS, ROBERT ID: 213456789 14-DEC-91 14:39

Med: None 69in 188lb
25mm/s 76yr Race: Cauc
10mm/mV Sex: M Room: 202
100Hz Loc: 1 Pgm 008A
12SL v78

Vent. rate 95 BPM
PR interval 156 ms
QRS duration 72 ms
QT/QTc 316/395 ms
P-R-T axes 65 62 60

Referred by: DR DAHL Standard lead channel 7 Unconfirmed

Standard lead channel 8

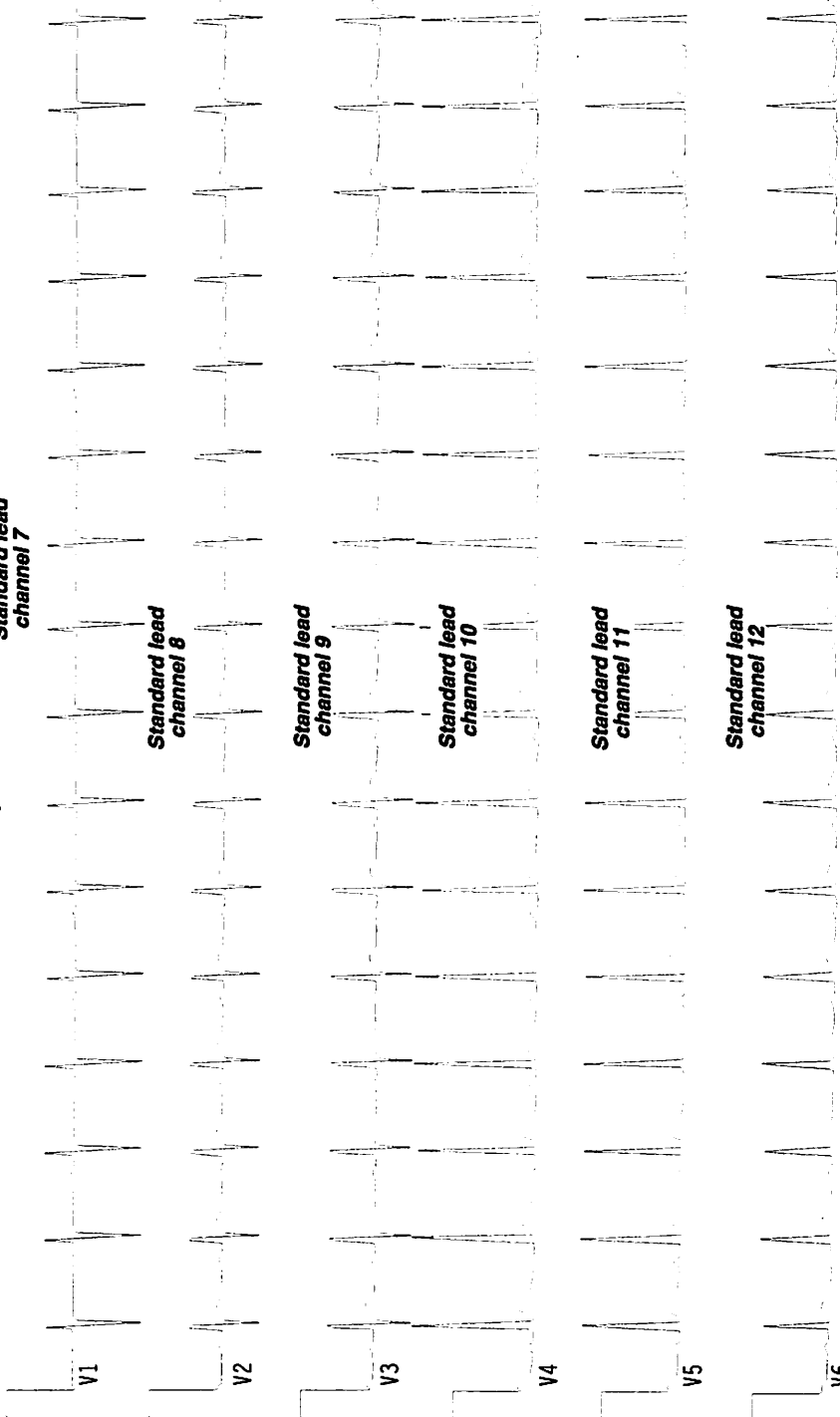
Standard lead channel 9

Standard lead channel 10

Standard lead channel 11

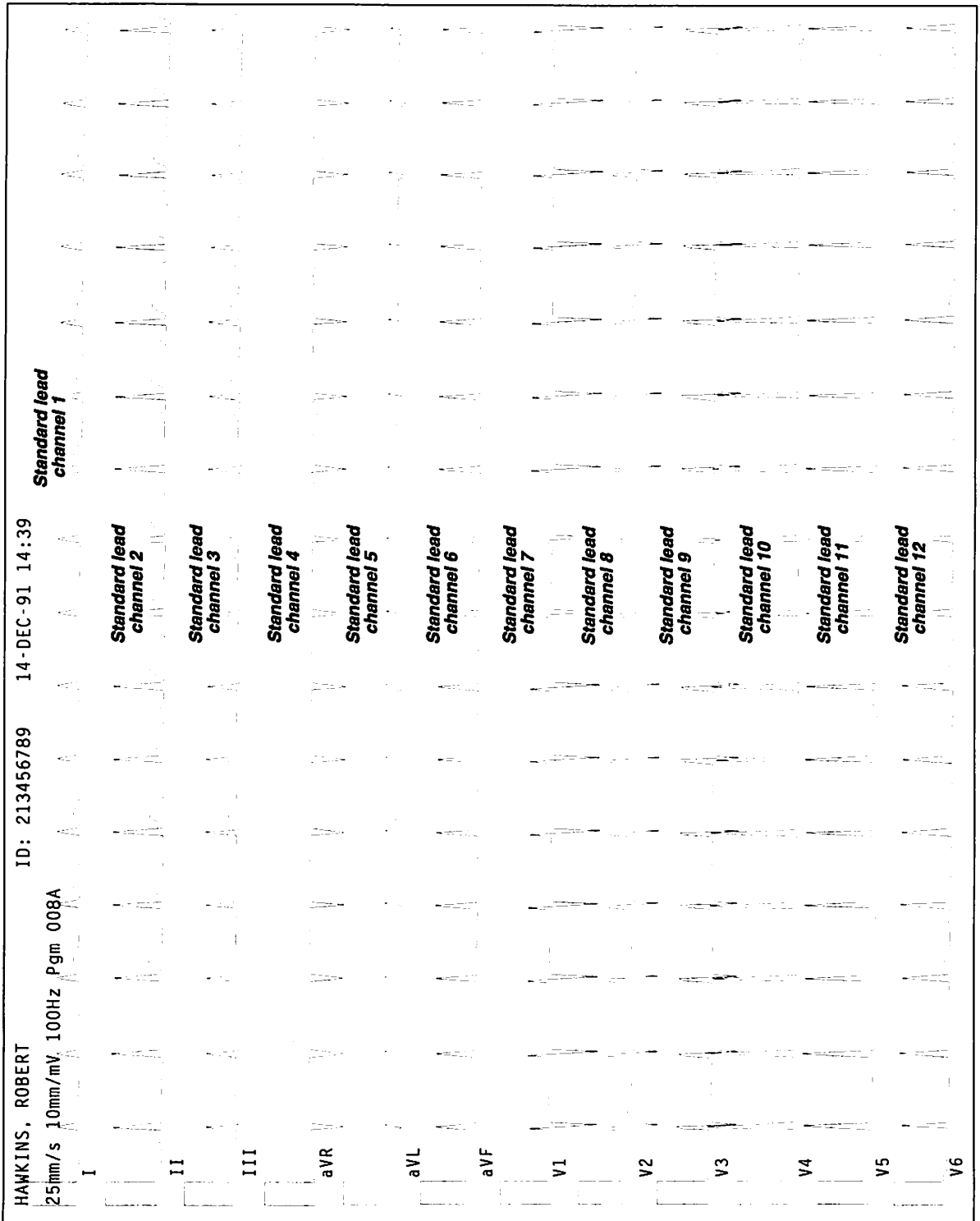
Standard lead channel 12

V1 V2 V3 V4 V5 V6



MD1020-64A

12 Lead Rhythm Report Format



MD1020-65A

2 x 5 Report Format

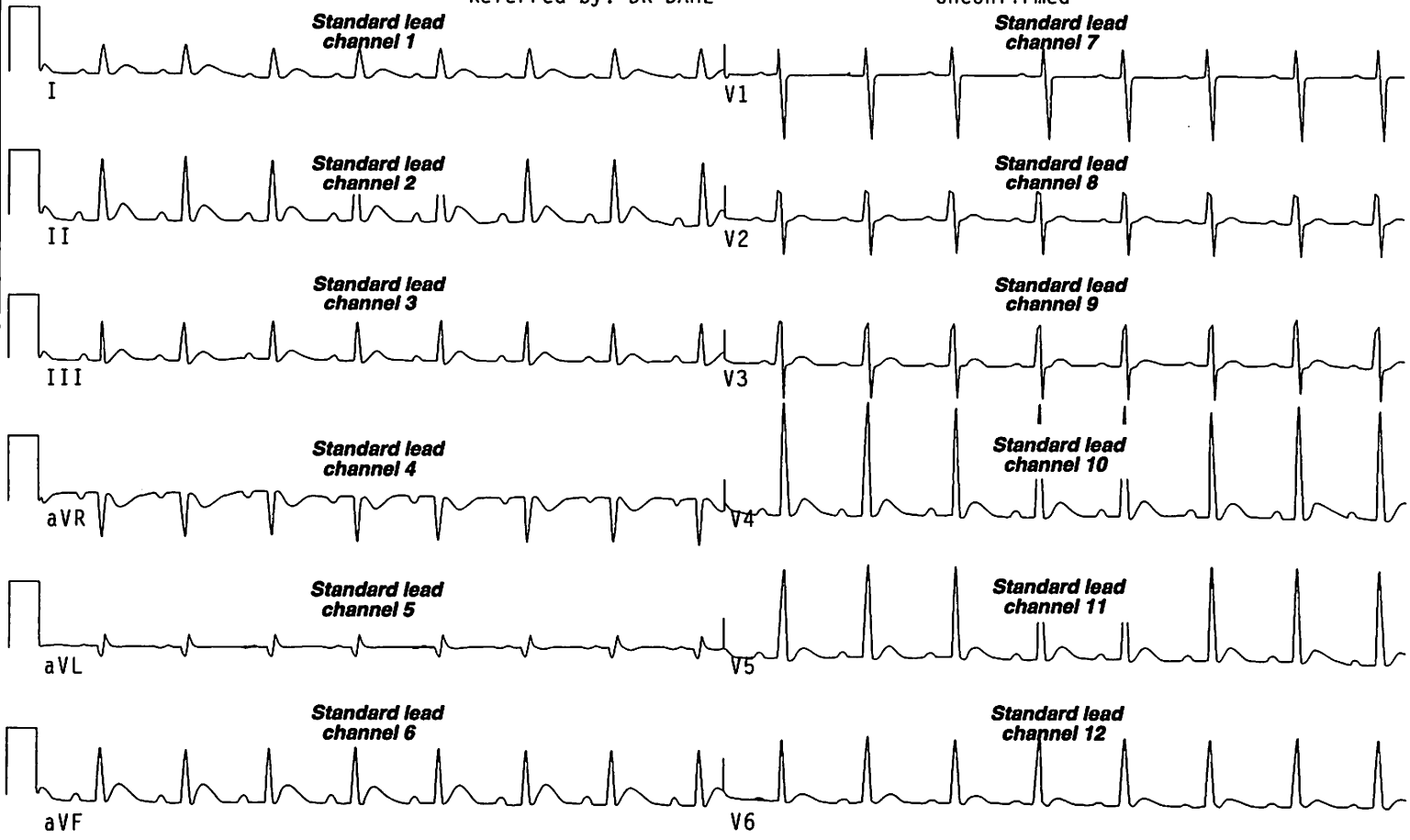
HAWKINS, ROBERT ID: 213456789 14-DEC-91 14:39
25mm/s Med: None
10mm/mV 76yr 69in 188lb
100Hz Sex: M Race: Cauc
Pgm 008A Loc: 1 Room: 202
12SL v78

NORMAL SINUS RHYTHM
NONSPECIFIC T WAVE ABNORMALITY
ABNORMAL ECG

Vent. rate 95 BPM
PR interval 156 ms
QRS duration 72 ms
QT/QTc 316/395 ms
P-R-T axes 65 62 60

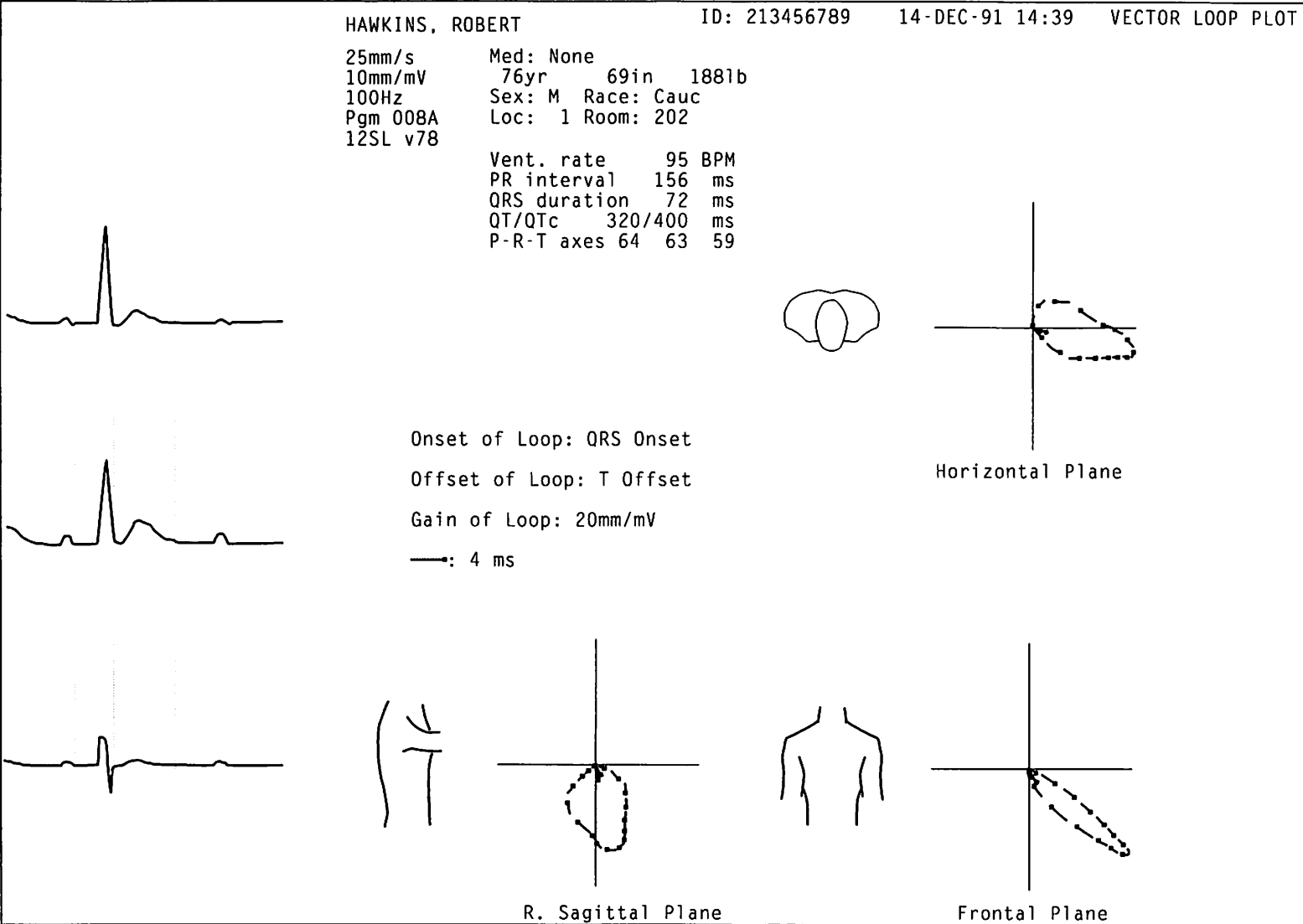
Referred by: DR DAHL

Unconfirmed



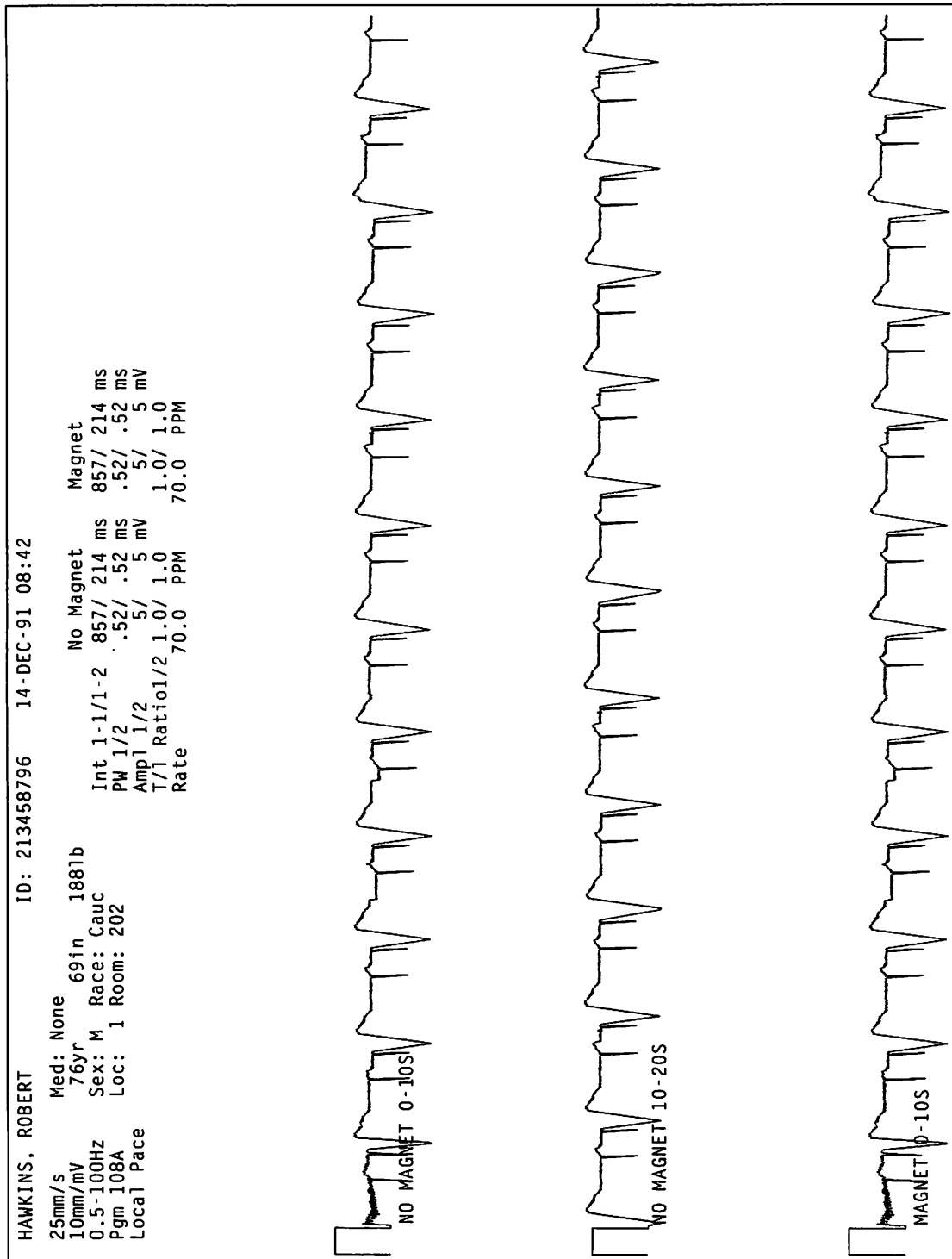
MD1020-68A

Vector Loops Report Format



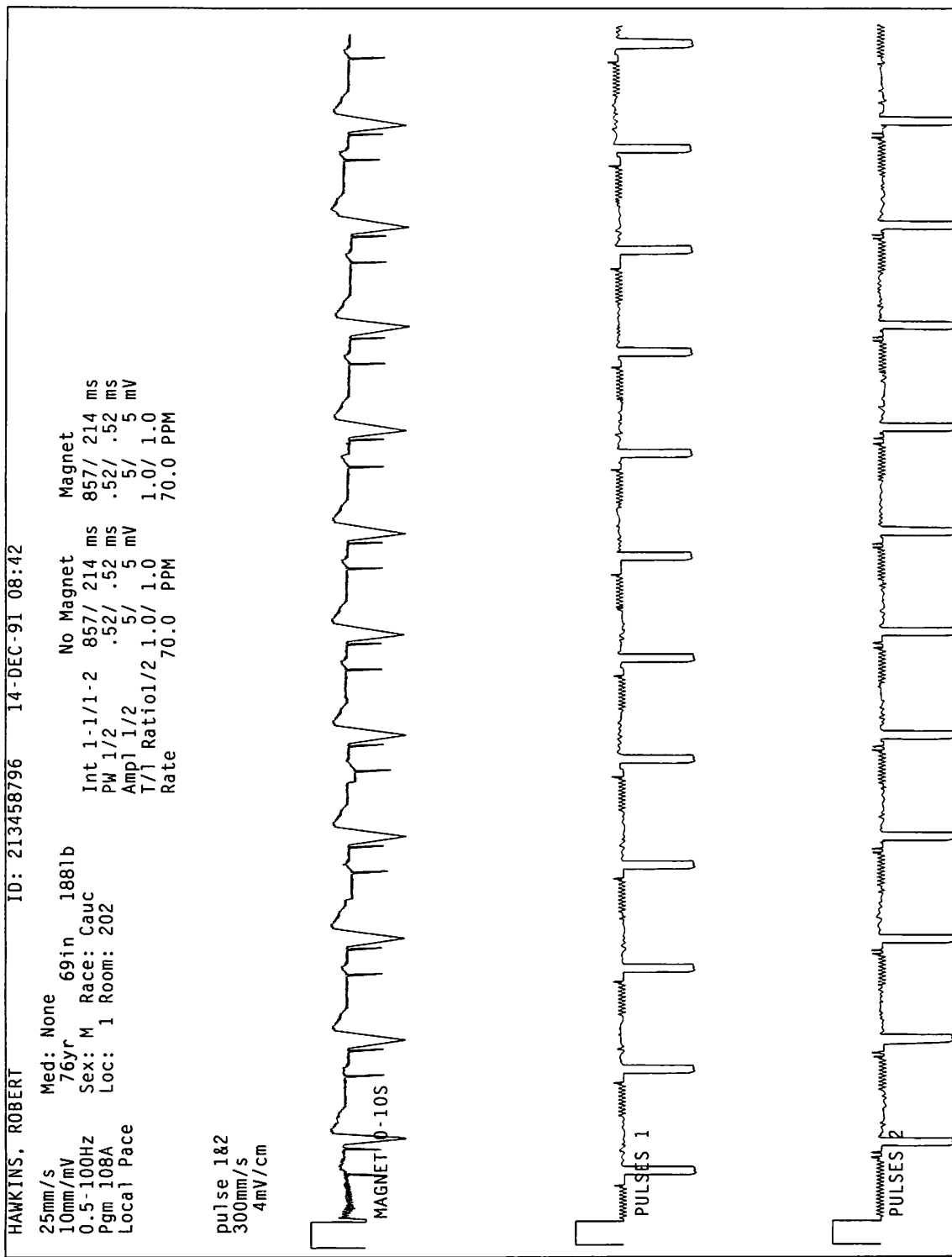
MD1020-67A

Pacemaker Evaluation Final Report



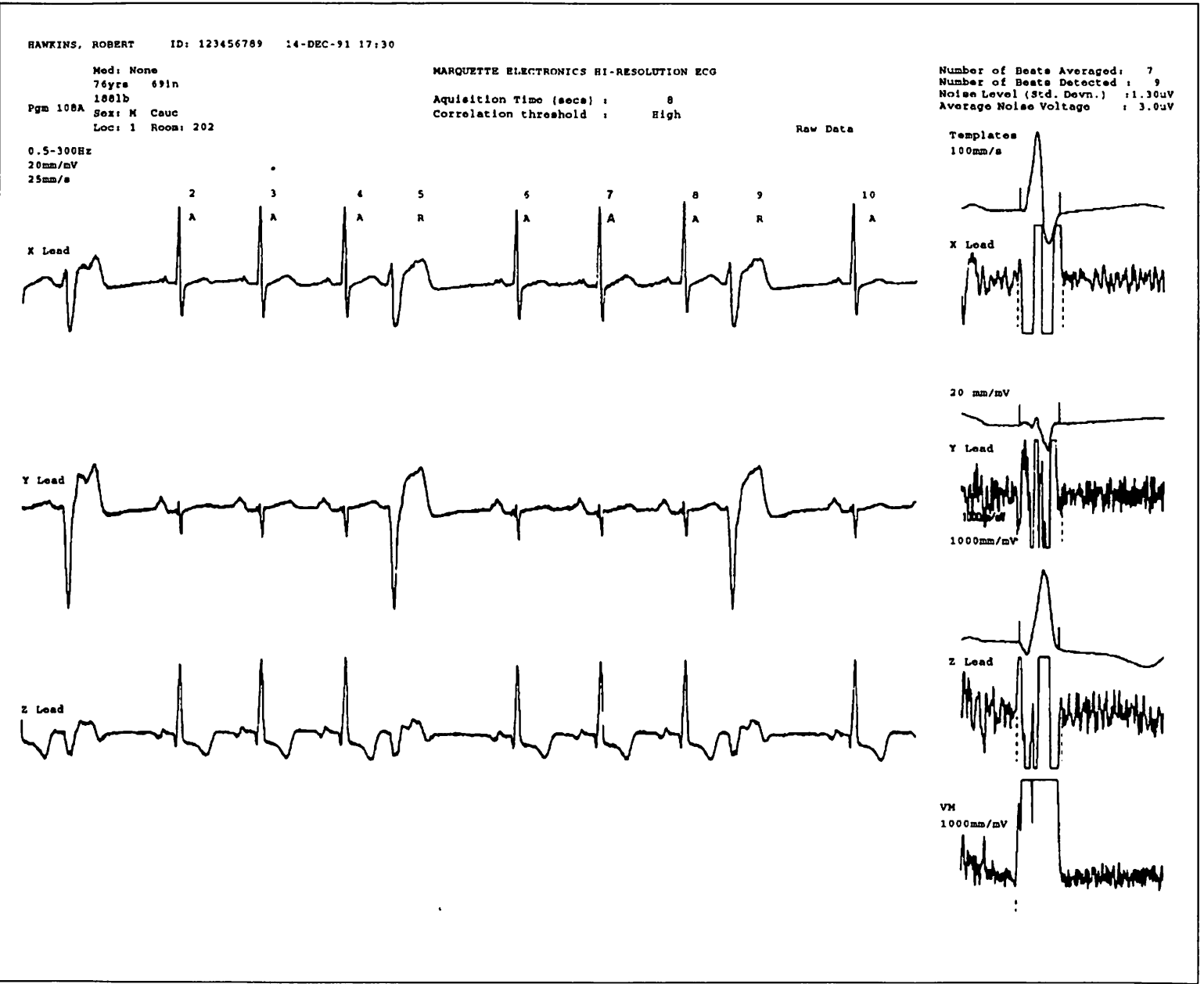
MD1020-68A

Pacemaker Evaluation Final Report



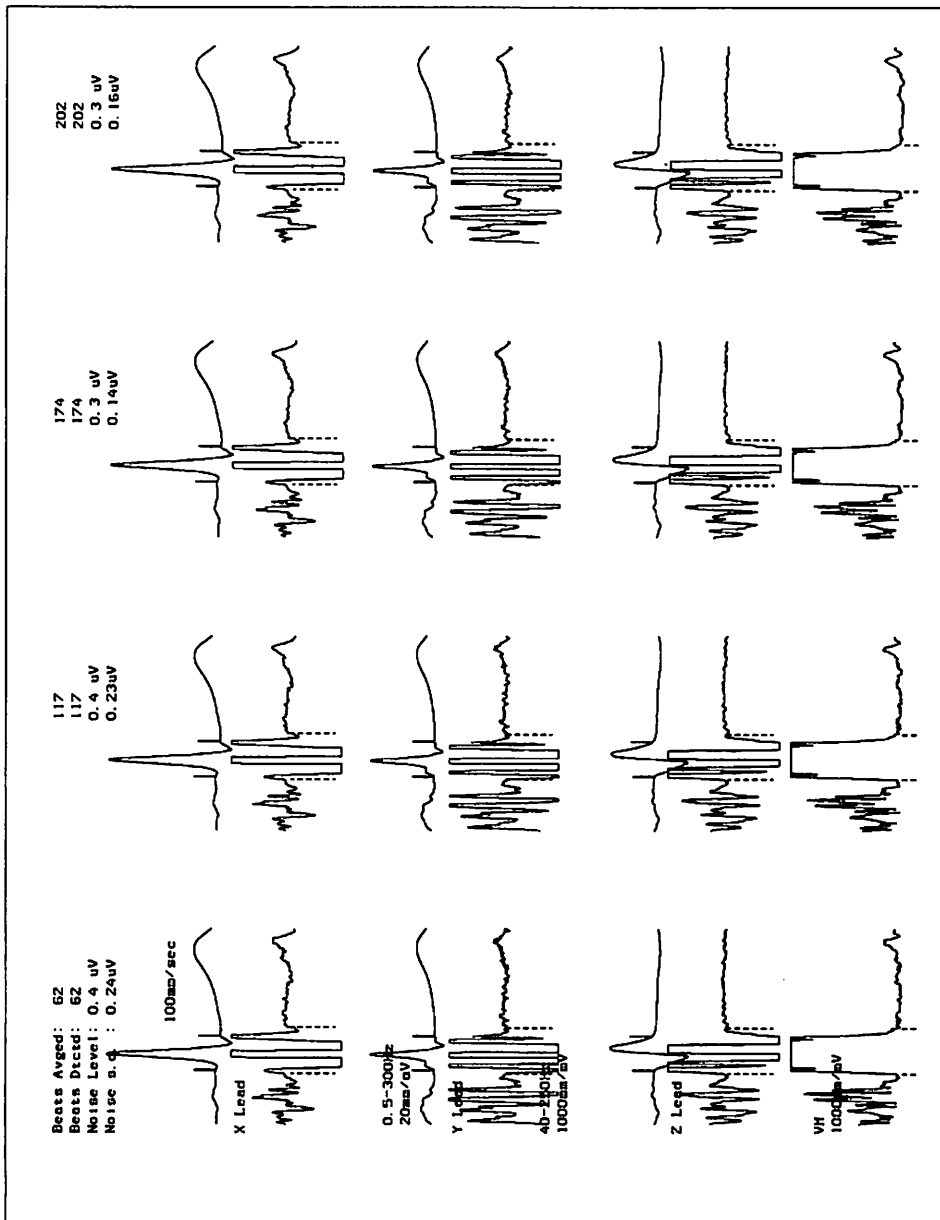
MD1020-69A

Hi-Res Template Report



MD1020-70A

Periodic Average Plots



MD1020-71A

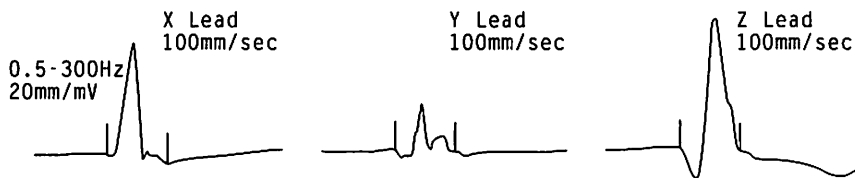
Hi-Res Final Report (40-250 Hz Filter)

HAWKINS, JOHN ID: 213458796 14-DEC-91 11:21

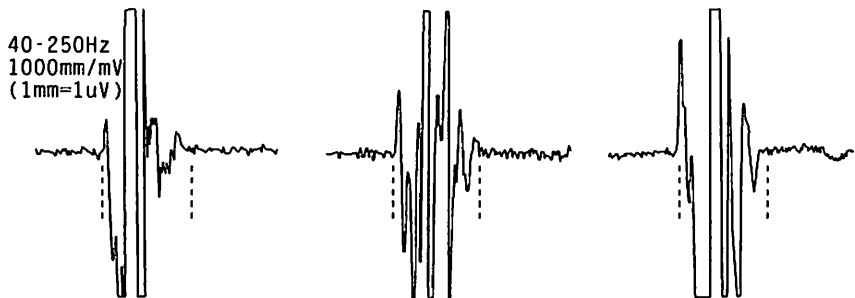
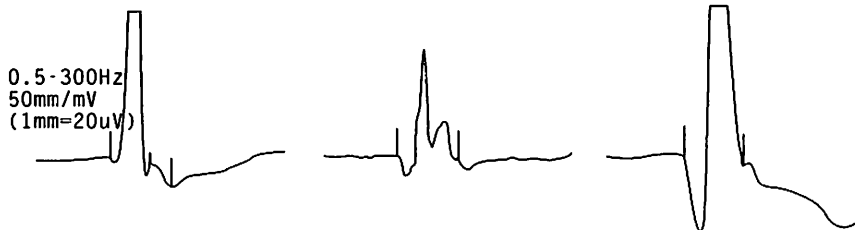
Med: None
40yr 74in 181lb
Sex: M Race: Cauc
Pgm 108A Loc: 1 Room: 202

MARQUETTE ELECTRONICS HI-RESOLUTION ECG
Analysis Filter : 40-250Hz
Std. QRS Duration (unfiltered): 109 ms
Total QRS Duration (filtered) : 149 ms
Duration Of HFLA signals(40uV): 62 ms
RMS Voltage (terminal dur ms) : 12 uV
Mean Voltage (terminal dur ms): 9 uV

Number Of Beats Averaged: 201
Number of Beats Detected: 201
Noise level (ST segment): 0.7uV

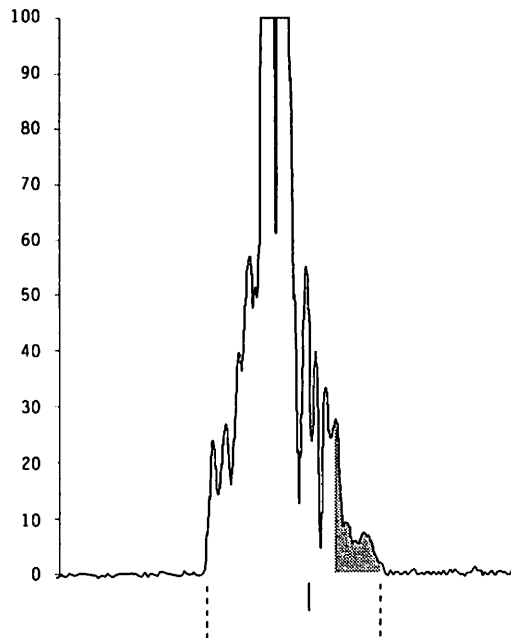


A .5-300Hz filter is used during acquisition with an AM-3 Acquisition Module. A .010-300Hz filter is used during acquisition with an AM-4 Acquisition Module.



MD1020-72A

Vector Magnitude
1000mm/mV (1mm=1uV)
200mm/sec (1mm=5ms)



HAWKINS, JOHN

ID: 213458796

14-DEC-91 11:21

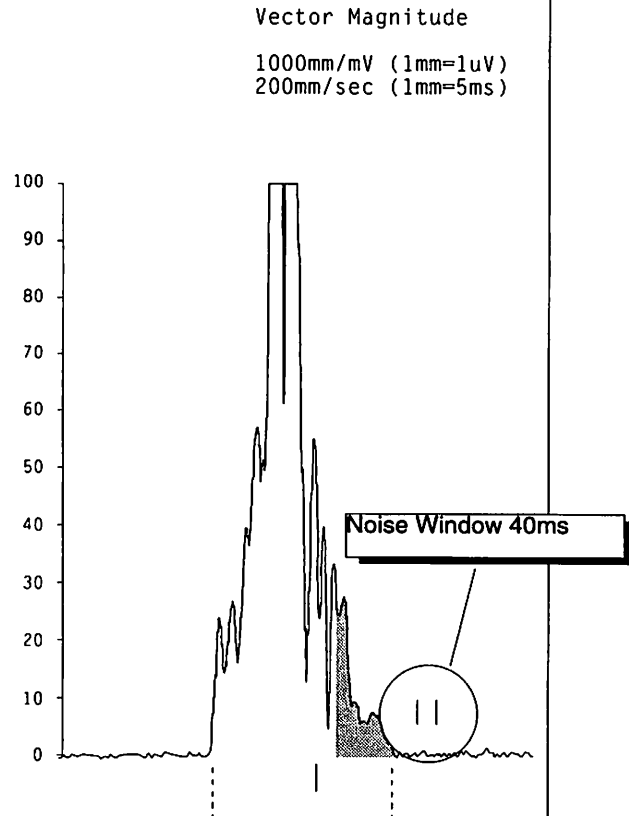
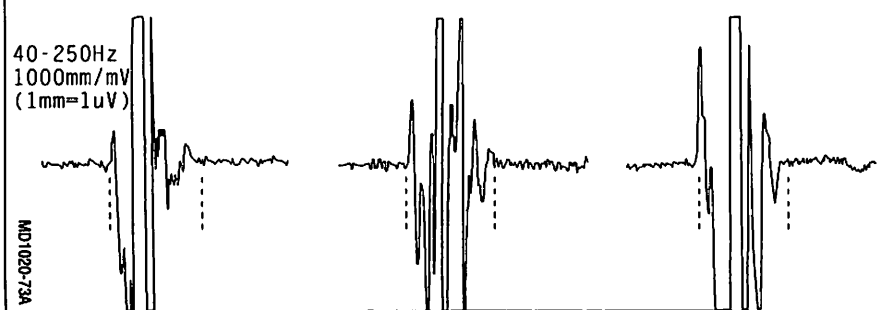
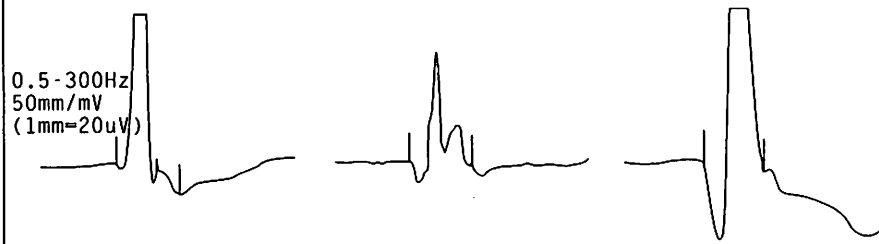
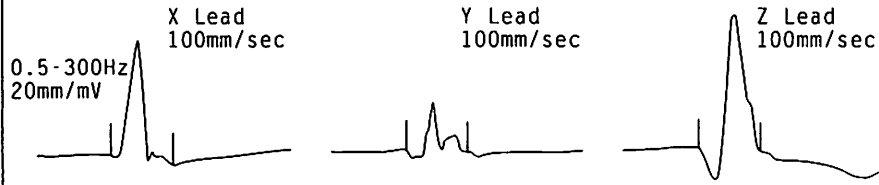
Med: None
40yr 74in 181lb
Sex: M Race: Cauc
Loc: 1 Room: 202
Pgm 108A

Number Of Beats Averaged: 201
Number of Beats Detected: 201
Noise level (ST segment): 0.7uV

MARQUETTE ELECTRONICS HI-RESOLUTION ECG

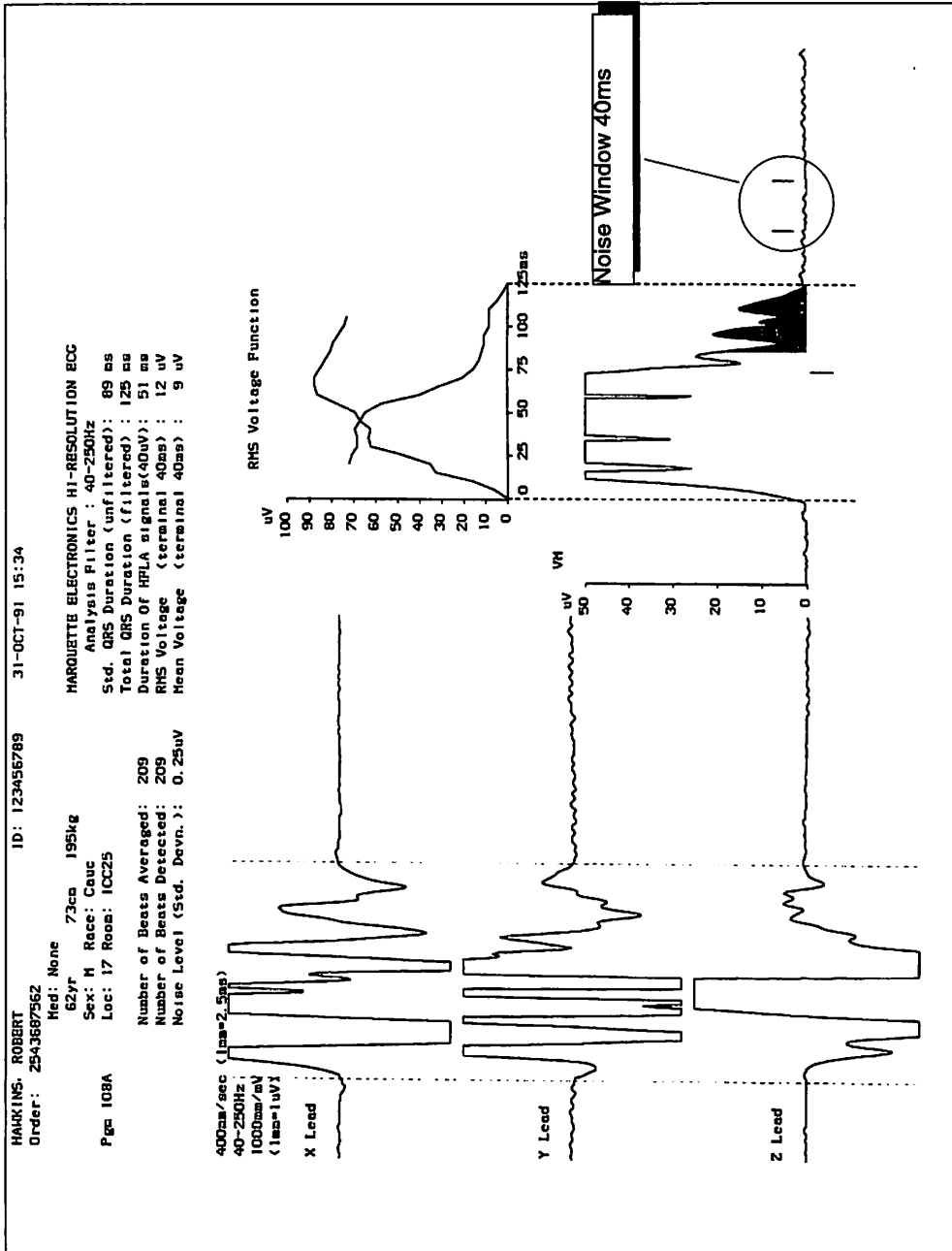
Analysis Filter : 40-250Hz
Std. QRS Duration (unfiltered):109 ms
Total QRS Duration (filtered) :152 ms
Duration Of HFLA signals(40uV): 65 ms
RMS Voltage (terminal dur ms) : 15 uV
Mean Voltage (terminal dur ms): 12 uV

Hi-Res Re-analysis
QRS offset adjust : 3 ms
dur for RMS Voltage: 50 ms



Hi-Res Re-Analysis Report (40-250 Hz Filter)

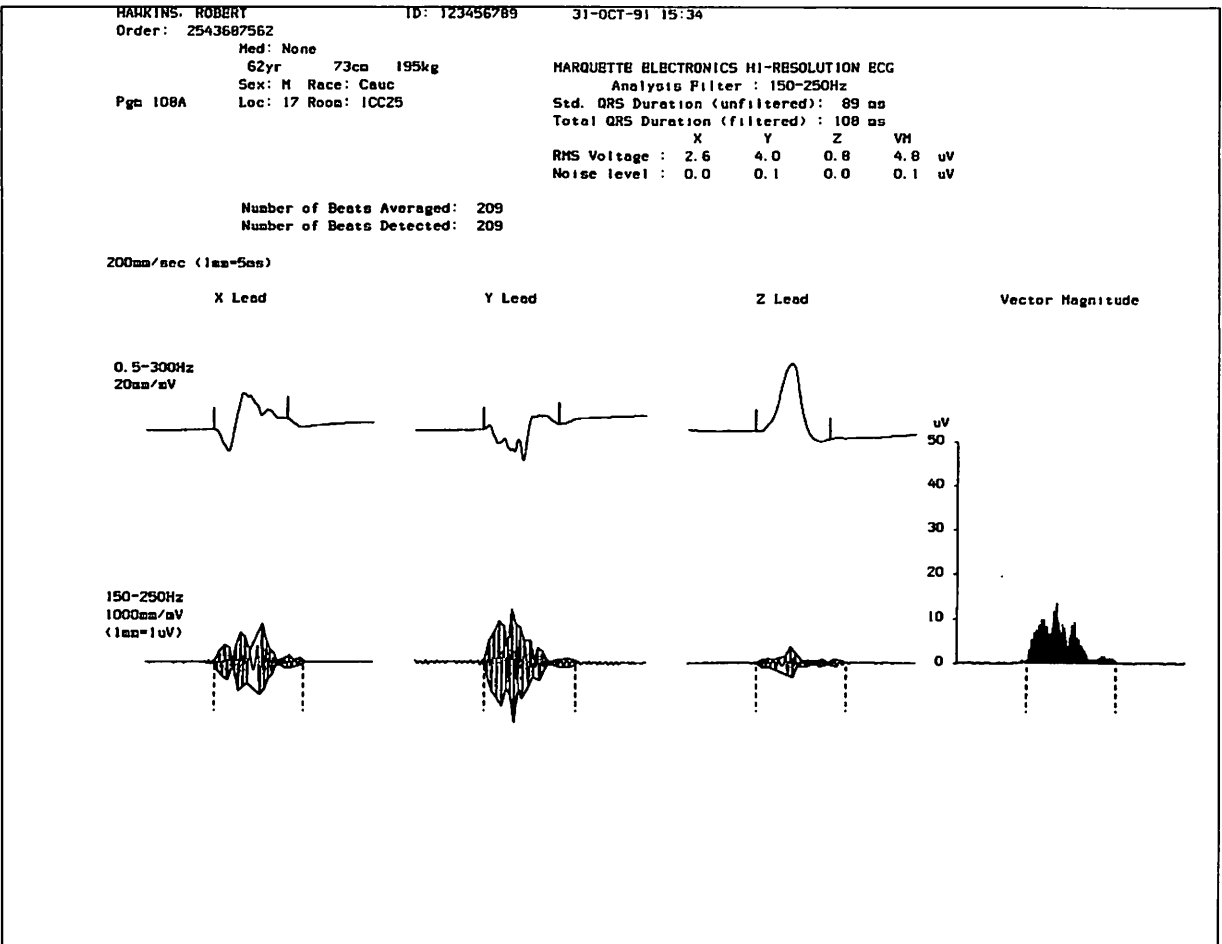
Expanded Report (40-250 Hz Filter)



MD1020-74A

Mid-QRS Analysis Report (150-250 Hz Filter)

APPENDIX D SAMPLE REPORTS



MD1020-75A

APPENDIX E

MISCELLANEOUS

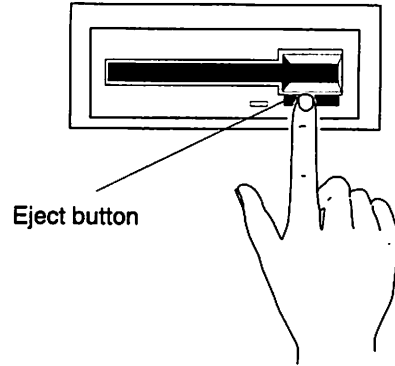
TASKS

Inserting and Removing Diskettes	3
Applying Write Protection to a Diskette	4
Formatting a Diskette	5
Using the Order Manager Function	7
What is Order Manager	7
Receiving Orders by Direct Connection	7
Recording ECGs Using the Order Manager	9
How to Delete Orders	10
Receiving a Holter Transmission	12
Sending ECG Data to an Oscilloscope	13
Oscilloscope	13
Special Use Functions	15

Inserting and Removing Diskettes

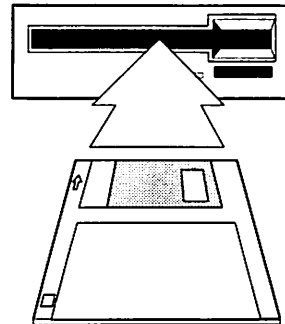
You can insert and remove diskettes with the press of a button.

1. Press the eject button to remove a diskette from the diskette drive slot.



MD1020-28

2. Insert the diskette - label side up - into the diskette drive slot.



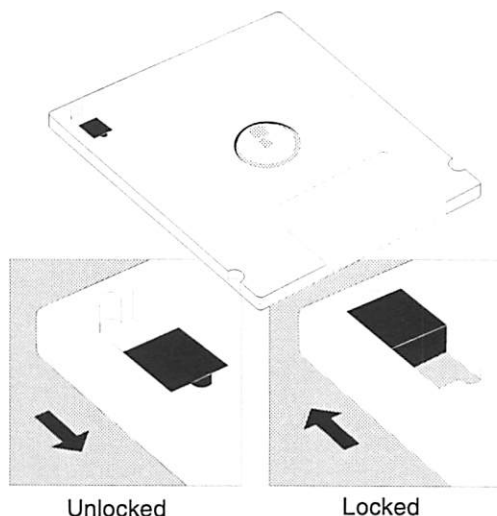
MD1020-29

Applying Write Protection to a Diskette

Before performing any diskette utility functions (copying, deleting, plotting, transmitting, etc) which involve the floppy diskette, check the position of the write-protect tab to determine whether or not the floppy diskette is locked.

When the write-protect tab is in the “locked” position, you cannot format, copy files to, or delete files from the floppy diskette. Therefore, if you want to perform any of these operations, the floppy diskette must be unlocked. For all other diskette utility functions, the floppy diskette can be “locked.”

To unlock the diskette, move the diskette tab toward the center of the diskette so that the hole in the diskette is covered by the tab.



MD1003-060

Formatting a Diskette

The MAC 12/15 system stores ECGs on 3.5-inch diskettes. However, a diskette must be formatted before any files can be stored on it. Formatting simply prepares a diskette for first-time use. Use only high quality, double-sided, double-density 3.5-inch diskettes in the system. A diskette only needs to be formatted once.

Since formatting erases everything on a diskette, be careful not to format the wrong diskette. To delete single ECGs from a diskette, see chapter 10, "Deleting an ECG."

1. Make sure that the system has been setup as described in "Preparing for Use," chapter 2, "Equipment Overview."
2. If the *Main Menu* is not displayed, press the **STOP** key.

```
↑Task   V1+II+V5
PatInfo Rhythm 25mm/s  10mm/mV   More
```

3. Press the **SHIFT** key and the **F1** key at the same time to display the *System Functions* menu.
4. Select *Disk*.

```
                Diskette Functions
Xmit   Edit   Plot   Dirctry   More
```

5. Select *More*.

```
                Diskette Functions
Delete  Format                               More
```

6. Select *Format*.

```
Password:
```

7. Enter the Level 1 or Level 2 password. (The default passwords are "L1" and "L2".)
8. Press the **ENTER** key.

```
Insert Diskette to be Formatted in Drive
Type Any Key to Continue
```

9. Make sure that the diskette you wish to format is not write protected. (See "Applying Write Protection to a Diskette.")
10. If there is a diskette in the diskette drive slot, press the eject button to remove it.
11. Insert the diskette - label side up - into the diskette drive slot.

12. Press any key. The following messages appear.

** Looking for bad block data **

THEN

Bad block data found
Type Any Key to Continue

OR

No bad block data found
Type Any Key to Continue

13. Press any key to continue.

14. While the system formats your diskette, the following series of messages appear. The numbers on the displays change.

*** Writing the Tracks **
Track:1 Side:0

THEN

** Looking for Bad Sectors **
Track:1 Side:0 Sector:11

THEN

** Writing the Bitmap **

THEN

** Writing the Directory **

THEN

** Writing the ID Sector **

15. If less than 20% of the diskette has errors (bad sectors), the following message appears.

Diskette Format Complete
Type Any Key to Continue

◆ If more than 20% of the diskette has errors, the following message appears.

Do Not Use Diskette - Too Many Errors
Type Any Key to Continue

◆ Discard the diskette and format another diskette.

16. Press any key.

Diskette Functions
Delete Format More

17. Press the **STOP** key to return to the *Main Menu*.

Using the Order Manager Function

What is Order Manager

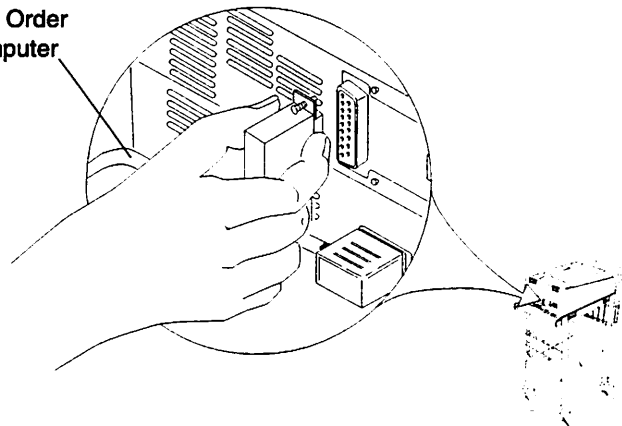
Instead of entering patient information on the system keyboard each time you record an ECG, you can use the order manager to transfer sets of patient information – called “orders” – from the Marquette Order Manager computer to the system.

To transfer the orders, connect the computer to the system using a special cable.

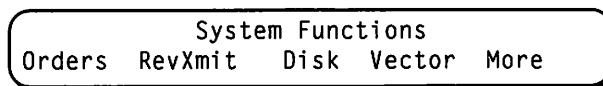
Receiving Orders by Direct Connection

1. Connect the cable from the system’s **AUX DATA** (RS232) port to the Marquette Order Manager computer as shown:

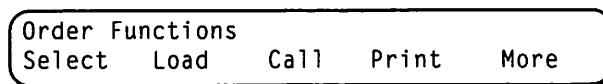
To Marquette Order Manager computer



2. Make sure you have a diskette that can be used to save the orders. Also, make sure that this diskette is not write protected. (See “Applying Write Protection to a Diskette.”)
3. If there already is a diskette in the diskette drive slot, press the eject button to remove it.
4. Insert the diskette - label side up - into the diskette drive slot.
5. If the *Main Menu* is not displayed, press the **STOP** key.
6. Press the **SHIFT** key and the **F1** key at the same time to display the *System Functions* menu.



7. Select *Orders*.



8. Select *Load*. A display similar to the following appears.

A maximum of 100 orders can be stored in the system.

Space available for 100 orders.
Type Any Key to Continue

9. Press a key to continue. Orders will now be sent to the system from the Marquette Order Manager computer. The number of orders sent to the system is set by the Order Manager computer.

10. After all orders are sent, a display similar to the following appears.

Download complete: 26 orders stored
Type Any Key to Continue

11. Press a key and the following appears.

Order Functions
Select Load Call Print More

12. Print a list of the orders the system received by selecting *Print*. The writer will print a list similar to the following.

Diskette Directory - Orders

12-DEC-91 15:30 Pgm 108A

Seq.	Order #	Test type	Scheduled for:	Loc.	Room	Used	PID	Name
1	7-181-002	12 lead ECG	20-JUL-91 08:00	04	101	*	321456789	WEEN, H
2	7-181-004	12 lead ECG	20-JUL-91 08:00	04	101		321456789	WEEN, H
3	7-181-006	12 lead ECG	20-JUL-91 08:00	04	101		321456789	WEEN, H
4	7-181-008	12 lead ECG	20-JUL-91 08:00	04	101		321456789	WEEN, H
5	7-181-010	12 lead ECG	20-JUL-91 08:00	04	101		321456789	WEEN, H

An asterisk (*) will appear under *Used* when an ECG has been recorded for an order.

MD1022-96A

Recording ECGs Using the Order Manager

1. Prepare the system as described in chapter 2, "Equipment Overview."
2. Prepare the patient as described in chapter 3, "Preparing the Patient."
3. If the *Main Menu* is not displayed, press the **STOP** key.
4. Load orders into the system from the Order Manager Computer as previously described in this chapter.
5. Press the **SHIFT** key and the **F1** key at the same time to display the *System Functions* menu.

```

System Functions
Orders  RevXmit  Disk  Vector More
    
```

6. Select *Orders*.

```

Order Functions
Select  Load  Call  Print  More
    
```

7. Choose *Select*.
8. The following display appears.

```

Select order:
Seq.#  Order #  ID      List
    
```

- ◆ Select *Seq. #* to select an order by the sequence number.
- ◆ Select *Order #* to select an order by the order number.
- ◆ Select *ID* to select an order using patient identification numbers.
- ◆ Select *List* to select an order by patient name. If you select *List*, a display similar to the following appears.

```

Order:  07-180      Hawkins
Yes     No     No...      Expand
A       B       C         D
    
```

Table E-1. Selection Orders

Item	Prompt	Description
A	<i>Yes</i>	Loads the order from this patient.
B	<i>No</i>	Looks at the next patient.
C	<i>No...</i>	Skips this patient and all remaining patients.
D	<i>Expand</i>	Gives more information on this patient.

9. Once an order is selected, you will be prompted to enter a technician ID number. Type a number and press the **ENTER** key.

10. If you wish to check or change any patient information from the order, select *PatInfo* from the *Main Menu*.
11. Press the **RECORD ECG** key. ECG data will be acquired and stored. Also, reports will be printed. (See "Recording an ECG" in chapter 4, "Taking a Resting ECG" for more information.)

How to Delete Orders

Because there is space for 100 orders, at some time, you have to delete orders from the system. To delete one or more orders, follow these steps.

1. If the *Main Menu* is not displayed, press the **STOP** key.
2. Press the **SHIFT** key and the **F1** key at the same time to display the *System Functions* menu.

```

System Functions
Orders  RevXmit  Disk  Vector  More
    
```

3. Select *Orders*.

```

Order Functions
Select  Load  Call  Print  More
    
```

4. Select *More*.

```

Order Functions
Delete  Phone
    
```

5. Select *Delete*.
6. The following display appears.

```

Select orders for deletion:
Open      Used
    
```

- ◆ Select *Open* if you want to delete only those orders stored on the diskette that have not had ECGs taken.
- ◆ Select *Used* if you want to delete only those orders stored on the diskette that have had ECGs taken.

7. After selecting *Open* or *Used*, the following display appears.

Select order:			
Seq.#	Order #	ID	List

- ◆ Select *Seq. #* to select an order by the sequence number.
- ◆ Select *Order #* to select an order by the order number.
- ◆ Select *ID* to select an order using patient identification numbers.
- ◆ Select *List* to select an order by patient name. If you select *List*, a display similar to the following appears.

Order:	07-180	Hawkins		
Delete	Save	Save...	Delete...	Expand
A	B	C	D	E

Table E-2. Deleting Orders

Item	Prompt	Description
A	<i>Delete</i>	Deletes the order shown.
B	<i>Save</i>	Saves the order shown.
C	<i>Save...</i>	Saves the order shown and all remaining orders.
D	<i>Delete...</i>	Deletes the order shown and all remaining orders.
E	<i>Expand</i>	Gives more information on this patient.

Receiving a Holter Transmission

Receiving a Holter transmission on the system is treated the same way as receiving an ECG by telephone.

The Holter will transmit rhythm strips and text to your system. Refer to "Receiving by Telephone" in chapter 6, "Receiving and Transmitting an ECG" and follow the steps.

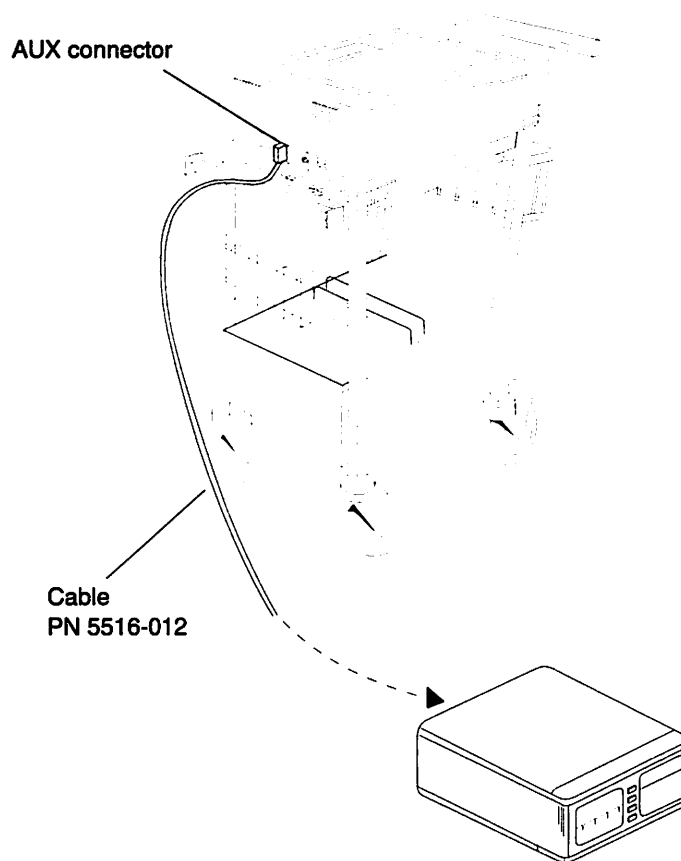
Sending ECG Data to an Oscilloscope

Oscilloscope

This section shows you how to use the system analog output option to send up to three channels of ECG data and display the ECG waveform on an oscilloscope.

NOTE

The data is transmitted to an oscilloscope or personal computer through the **AUX** connector located on the back of the system.



MD1020-45B

The three channels that are output are set from the system's *Main Menu*. Data will be output continuously as long as an acquisition module is attached to the system, and the *Main Menu* is displayed.

Select *Rhythm* to change the data output. (If more than three rhythm channels appear on the *Main Menu*, the first three channels will be output - leads V1, II, and V5 in this case.)

```
↑Task    V1+II+V5
PatInfo  Rhythm 25mm/s  10mm/mV  More
```

The speed (or rate), gain, and 40/100 Hz filter of the data that is output can not be changed. However, the baseline roll filtering can be changed. (Refer to chapter 13, "Setup".)

When the *Main Menu* is displayed, press the **SHIFT** key and **F5** key at the same time to print a rhythm Recall report. This reports consists of 10 seconds of 3-lead ECG rhythm data.

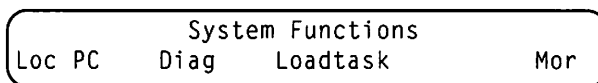
A prompt (shown below) in the *Cart Setup* menu allows data going to the rhythm Recall report to be delayed up to 8 seconds. (See chapter 13, "Setup".)

```
Rhythm Recall Delay:
0 - 8 Sec.
```

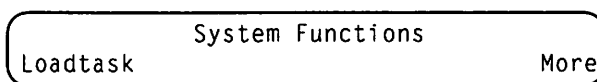
Special Use Functions

There are two special use functions that have not been described - *Diag* (Diagnostic) and *Loadtask*. These two functions are both found in the *System Functions* menu.

This menu is used with software version 108.



This menu is used with software version 008.



- *Diag* is intended for use by service technicians, not the ordinary equipment user. This function allows a technician to test various parts of the system, such as the writer.
- *Loadtask* allows the system to load and run other tasks with special system options.

APPENDIX F 12SL ANALYSIS PROGRAM LIBRARY

12SL Analysis Program Library3

12SL Analysis Program Library

ECG Quality
 QCERR ***Poor data quality, interpretation may be adversely affected.

ECG Classification
 AB Abnormal ECG
 ABR Otherwise normal ECG
 BORDE Borderline ECG
 NML Normal ECG

Rhythm Statements
 UR Undetermined rhythm

Atrial Rhythms

AFIB Atrial fibrillation
 ARAT (Atrial rate =
 ATAC Atrial tachycardia

EABRAD Unusual P axis, possible ectopic atrial bradycardia
 EATACH Unusual P axis, possible ectopic atrial tachycardia
 EAR Unusual P axis, possible ectopic atrial rhythm
 FLUT Atrial flutter
 LABRAD Left atrial bradycardia
 LAR Left atrial rhythm
 LATACH Left atrial tachycardia
 RABRAD Low right atrial bradycardia
 RAR Low right atrial rhythm
 RATACH Low right atrial tachycardia
 WPW Wolff-Parkinson-White

Sinus Rhythms

MSBRAD Marked sinus bradycardia
 NSR Normal sinus rhythm
 SBRAD Sinus bradycardia
 STACH Sinus tachycardia

Junctional Rhythms

JBRAD Unusual P axis and short PR, probable junctional bradycardia
 JR Unusual P axis and short PR, probable junctional rhythm
 JTACH Unusual P axis and short PR, probable junctional tachycardia
 JUNBRAD Junctional bradycardia
 JUNCT-R Junctional rhythm

Ventricular Rhythms

ALTWPW With fusion or intermittent ventricular pre-excitation (WPW)
 BIGEM In a pattern of bigeminy
 WPWA Ventricular pre-excitation, WPW pattern type A
 WPWB Ventricular pre-excitation, WPW pattern type B

Statements to Modify Rhythms

ABER With premature ventricular or aberrantly conducted complexes
 AVDIS With AV dissociation
 IRREG With undetermined rhythm irregularity
 JESC With junctional escape complexes
 MSAR With marked sinus arrhythmia
 NQTACH Narrow QRS tachycardia
 PAUSE with sinus pause
 PSVC Premature supraventricular complexes
 PVCF Premature ventricular and fusion complexes
 PAC Premature atrial complexes
 PEC Premature ectopic complexes
 PJC Premature junctional complexes
 PVC Premature ventricular complexes
 RVR With rapid ventricular response
 SAR With sinus arrhythmia
 SVR With slow ventricular response
 VESC With ventricular escape complexes
 WQTACH Wide QRS tachycardia

Sino-Atrial and Atrio-Ventricular Blocks

CHB	With complete heart block
S-A Blocks	
SABI	With 2nd degree SA block (Mobitz I)
SABII	With 2nd degree SA block (Mobitz II)
A-V Blocks	
FAV	With 1st degree AV block
MBZI	With 2nd degree AV block (Mobitz I)
MBZII	With 2nd degree AV block (Mobitz II)
SAV	With 2nd degree AV block
VAVB	With variable AV block
W2T1	With 2:1 AV conduction
W3T1	With 3:1 AV conduction
W4T1	With 4:1 AV conduction
W5T1	With 5:1 AV conduction

Enlargements, Hypertrophies

Atrial	
BAE	Biatrial enlargement
LAE	Left atrial enlargement
RAE	Right atrial enlargement
Ventricular	
BIVH	Biventricular hypertrophy
LVH	Voltage criteria for left ventricular hypertrophy
LVH2	Left ventricular hypertrophy
LVH3	Moderate voltage criteria for LVH, may be normal variant
PLV	Prominent lateral voltage
PPV	Prominent posterior voltage
PMDPV	Prominent mid-precordial voltage
QRSV	Minimal voltage criteria for LVH, may be normal variant
RBBRVH	Right bundle branch block -or- right ventricular hypertrophy
RVE+	„ plus right ventricular enlargement
RVH	Right ventricular hypertrophy

QRS Complexes

Axis	
ALAD	Abnormal left axis deviation
ARAD	Abnormal right axis deviation
INDAX	Indeterminate axis
LAD	Leftward axis
LAD3	Left axis deviation
NWA	Northwest axis
RAD	Rightward axis
RAD4	Right axis deviation
RAD5	Right superior axis deviation
RSAD	Abnormal right superior axis deviation

Progression	
LOWV	Low voltage QRS
NOPF	(No P-waves found)
QRSW	With QRS widening
QV6	Deep Q-wave in lead V6

Pulmonary Disease, Pericarditis	
PCARD	Acute pericarditis
PULD	Pulmonary disease pattern
SERYR1	ST elevation, consider early repolarization, pericarditis, or injury
S1S2S3	S1-S2-S3 pattern, consider pulmonary disease, RVH, or normal variant

Conduction Defects**Bundle Branch Blocks**

IRBBB	Incomplete right bundle branch block
ILBBB	Incomplete left bundle branch block
LBBB	Left bundle branch block
RBBB	Right bundle branch block
RBBRVH	Right bundle branch block -or- right ventricular hypertrophy

Fascicular Blocks

AFB	Left anterior fascicular block
BIFB	*** Bifascicular block ***
MAFB	(Masked by fascicular block?)
PFB	Left posterior fascicular block

Intraventricular Conduction Defects

BO-IVCD	Nonspecific intraventricular conduction delay
IVCD	Nonspecific intraventricular block
RSR	RSR' or QR pattern in V1 suggests right ventricular conduction delay

Myocardial Infarctions, Injuries, Ischemia**Infarctions**

ACUMI	*** ACUTE MI ***
AIOHAI	ST elevation, consider anterior injury or acute infarct
ALIHAI	ST elevation, consider anterolateral injury or acute infarct
ALM	Anterolateral infarct
AMI	Anterior infarct
ASMI	Anteroseptal infarct
ILIHAI	ST elevation, consider inferolateral injury or acute infarct
IIOHAI	ST elevation, consider inferior injury or acute infarct
IMI	Inferior infarct
IPMI	Inferior-posterior infarct
LIOHAI	ST elevation, consider lateral injury or acute infarct

Infarctions (cont)

LMI	Lateral Infarct
MISIZ	*** QRS contour suggests infarct size is probably
POSTMI	Posterior infarct
QESPMI	Increased R/S ratio in V1, consider early transition or posterior infarct
SMI	Septal infarct

Injury Patterns

ASBINJ	Marked ST abnormality, possible anterior subendocardial injury
AINJ	Anterior injury pattern
ALINJ	Anterolateral injury pattern
ASINJ	Anteroseptal injury pattern
IINJ	Inferior injury pattern
ILINJ	Inferolateral injury pattern
INJONV	ST elevation, consider injury or variant associated with LVH
ISBINJ	Marked ST abnormality, possible inferior subendocardial injury
LINJ	Lateral injury pattern
LSBINJ	Marked ST abnormality, possible lateral subendocardial injury
MSTDAL	Marked ST abnormality, possible anterolateral subendocardial injury
MSTDAS	Marked ST abnormality, possible anteroseptal subendocardial injury
MSTDIL	Marked ST abnormality, possible inferolateral subendocardial injury
SERYR1	ST elevation, consider early repolarization, pericarditis, or injury
SINJ	Septal injury pattern
SSBINJ	Marked ST abnormality, possible septal subendocardial injury
STDEP	ST depression, consider subendocardial injury or digitalis




Ischemia		T Waves	
ALT	T wave abnormality, consider anterolateral ischemia	NT	Nonspecific T wave abnormality
AT	T wave abnormality, consider anterior ischemia	ARST	Abnormal QRS-T angle, consider primary T wave abnormality
ILT	T wave abnormality, consider inferolateral ischemia	TINVIN	T wave inversion in
IT	T wave abnormality, consider inferior ischemia		
LT	T wave abnormality, consider lateral ischemia		Pacemakers
MALT	Marked T wave abnormality, consider anterolateral ischemia	APCK	Electronic atrial pacemaker
MAT	Marked T wave abnormality, consider anterior ischemia	AVPCK	AV sequential or dual chamber electronic pacemaker
MIT	Marked T wave abnormality, consider inferior ischemia	CJP	With a competing junctional pacemaker
MILT	Marked T wave abnormality, consider inferolateral ischemia	DPCK	Demand pacemaker, interpretation is based on intrinsic rhythm
MLT	Marked T wave abnormality, consider lateral ischemia	PCK	Electronic ventricular pacemaker
	Repolarization		Chemical Effects
2ST	With repolarization abnormality	ODIG	Or digitalis effect
LNGQT	Prolonged QT	PDIG	, probably digitalis effect
QRSW-2ST	With QRS widening and repolarization abnormality	STDIG	ST abnormality, possible digitalis effect
REPOL	Early repolarization	STDEP	ST depression, consider subendocardial injury or digitalis effect
SNDQA	, maybe secondary to QRS abnormality		
SPR	With short PR		Anatomical Variants
WSTR	With strain pattern	CCWRT	Counter clockwise rotation of the heart, may invalidate criteria for ventricular hypertrophy
		CWRT	Clockwise rotation of the heart, may invalidate criteria for ventricular hypertrophy
		DXTRA	Dextrocardia
S-T Segments			General Statements, Modifiers
JST	Junctional ST depression, probably abnormal		
JSTN	Junctional ST depression, probably normal		
NST	Nonspecific ST abnormality	Leads	
NSTT	Nonspecific ST and T wave abnormality	ANT	Anterior leads
SERYR1	ST elevation, consider early repolarization, pericarditis, or injury	ANTLAT	Anterolateral leads
SERYR2	ST elevation, probably due to early repolarization	ANTSEP	Anteroseptal leads
ST	ST &	ARM	*** Suspect arm lead reversal, interpretation assumes no reversal
STABAND	ST abnormality and	IFLAT	Inferolateral leads
STDPIN	ST depression in	INF	Inferior leads
STELIN	ST elevation in	INFPOS	Inferoposterior leads
		LAT	Lateral leads
		POS	Posterior leads
		SEP	Septal leads

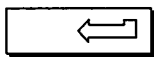
Combine or Modify Statements

AC	, possibly acute
ACCEL	Accelerated
AU	, age undetermined
BLKED	Blocked
BO	Borderline
CRO	Cannot rule out
CRS	Coarse
CSEC	, and consecutive
FREQ	With frequent
IRR	Irregular
LARG	Large
MOD	Moderate
OCC	With occasional
PO	Possible
PXT	, with posterior extension
SMA	Small
VLAR	Very large
VSMA	Very small

APPENDIX G

GLOSSARY

1 complex/lead report format	a type of report format that consists of a single median complex for each of the 12 leads. A "measurement matrix" of ECG data is included at the top of the report. This report format permits the "Times 2" option which allows the waveform gain to be doubled. Also, tic marks may be added to each complex on the report.
1 x 10 report format	a type of report format that is also called an Automatic Rhythm report. This format consists of 10 seconds of 3-lead rhythm. The "1 x 10" means that the 3 leads of rhythm make up a 10-second group.
12SL	an abbreviation for Marquette's 12 simultaneous lead analysis program
2 x 5 report format	a type of report format that consists of 5 seconds for each of 12 leads. The "2 x 5" means that the 12 leads are divided into 2 groups of 5 seconds each.
2 x 10 report format	a type of report format that consists of 10 seconds for each of 12 leads. The "2 x 10" means that the 12 leads are divided into 2 groups of 10 seconds each.
4 x 2.5 report format	a type of report format that consists of 2.5 seconds for each of 12 leads. Also, a rhythm channel may be included on the report. The "4 x 2.5" means that the 12 leads are divided into 4 groups of 2.5 seconds each.
4 x 10 report format	a type of report format that consists of 10 seconds for each of 12 leads. The "4 x 10" means that the 12 leads are divided into 4 groups of 10 seconds each.
12 leads of rhythm acquisition module	a type of report format that consists of 10 seconds of 12-lead rhythm. the interface or "link" between a patient and the system. There are 10-wire (12-lead) and 14-wire (16-lead) acquisition modules. There are 3 types of acquisition modules: AM-1, AM-2, and AM-3. Even though AM-2 and AM-3 have 14-wire (or 16-lead) capabilities, you can only use the 10-wire (or 12-lead) capabilities with your system. Resistive and non-resistive leadwires should not be mixed on an acquisition module.
acronym	short abbreviations used to represent statements in Marquette's 12SL analysis library, such as NSR for Normal Sinus Rhythm.
Computer Graphic Record (CGR)	a type of report format that consist of a single median complex for each of the 12 leads, combined with 10 seconds of 3-lead rhythm at half writer speed.
channel	describes a lead's position on a writer report. (See appendix D, "Sample Reports".)
confirmed report	an edited report. To change an unconfirmed report to a confirmed report, select OK when editing a report. (See chapter 7, "Editing ECG Reports".)
Correlation Threshold	the degree to which a beat detected during the Hi-Res signal averaging must correspond to the template in order to be accepted and thereby included in the averaged signal.
	DELETE key if the LCD cursor is displayed, pressing this key erases the last-typed character.
directory	a list of all the stored ECGs.
 MD1020-26	diskette a 3.5-inch, double-sided, double-density (DS DD) diskette.
	DOWN/UP ARROWS keys <ul style="list-style-type: none"> ■ Lightens or darkens LCD contrast when pressed with the SHIFT key. ■ Press the UP ARROW to return the LCD to the previous display, if any.

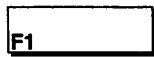


ENTER key

after typing information after an LCD prompt or pressing a function key, it is usually necessary to press this key to continue.

formatting

necessary to prepare a diskette for the first-time. Formatting is normally only done once. Since formatting erases all the information stored on a diskette, care should be taken to format the correct diskette.

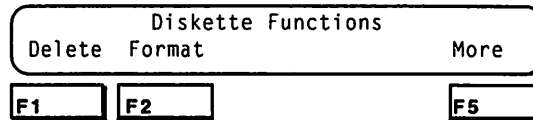


thru



function keys

used to select an LCD function that is directly above the function key. For example, in the following display,



pressing the F1 key selects *Delete*, pressing F2 key selects *Edit*, and pressing F5 key selects *More*.

interpretive option

the 12SL analysis program which may be installed in the system.

LCD

stands for Liquid Crystal Display. The LCD is on the top part of the keyboard. Used to enter information and display messages.



LEFT/RIGHT ARROWS

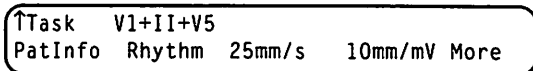
if a cursor appears on the LCD, these two keys can move the cursor left or right. If the *Main Menu* is displayed, the **LEFT ARROW** advances the writer paper.

**Level 1 OR Level 2
PASSWORDS**

two different types of passwords that may be used to restrict access to various menus or functions of the system. For example, a *Level 1* password must be used to change information in *Cart Setup*. The default *Level 1* and *Level 2* passwords are "L1" and "L2".

Main Menu









the most common LCD you will see. This menu allows access to all functions. The *Main Menu* is shown below.

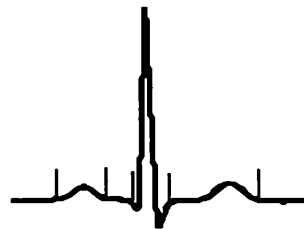


measurement matrix

a list of ECG measurements that is included on the top part of the 1 complex/lead report format. Following is a list of the measurement abbreviations and their meanings (all durations in milliseconds and all amplitudes in microvolts):

- PA P wave amplitude
- PPA P' amplitude (second phase of a biphasic P)
- QA Q wave amplitude
- QD Q wave duration
- RA R wave amplitude
- RD R wave duration
- SA S wave amplitude
- SD S wave duration
- RPA R' amplitude
- RPD R' duration
- SPA S' amplitude
- STJ ST segment displacement at J point
- STM ST segment displacement at the mid point between STJ and STE
- STE ST segment displacement at the end. This is defined as 1/8 the average R-R interval from J point.
- TA T wave amplitude
- TPA T' amplitude

- modem** a purchased option. Use to receive and transmit reports by telephone.
- noninterpretive option** the 12SL analysis program is not installed in the system.
- Pediatric report format** a type of report format on the system that consists of 2 seconds for each of 15 channels with 1, 10-second rhythm channel.
- QC** an abbreviation for Quality Control.
- QRS Offset Correction** the shift in QRS end point which shortens or lengthens the computer selected QRS duration in re-analysis of a Hi-Res ECG.
- POWER key** turns the system on or off.
-  **POWER key** turns the system on or off.
- RECORD ECG key** pressing this key acquires a 12-lead ECG from a patient and prints a 3-, 6-, and/or 12-lead report depending on cart setup.
-  OR 
- RECORD RHYTHM key** prints either a 3- or 6-lead rhythm report depending on cart setup.
-  OR 
- reverse transmission** a mode of operation that allows the system to receive reports.
- RMR or Rhythm and Morphology report format** a type of report format that consists of a single median complex for each of the 12 leads, combined with 10 seconds of 3-lead rhythm.
- seed beat** the beat selected as the one to be used for correlation with beats detected during signal averaging in a Hi-Res ECG.
-  **SHIFT key** use to type shifted characters or to access special functions.
-  **SPACE key** if an LCD prompt is displayed, pressing this key creates a space in the prompt text.
-  **STOP key** press this key to return to the *Main Menu* or to stop the printing.
- tic marks** short, vertical lines marking the P onset, P offset, QRS onset, QRS offset, and T offset on each median complex in a 1 complex/lead report format (as shown below).



- unconfirmed report** a report that has not been edited. When you acquire an ECG, the reports that are printed/transmitted immediately after the acquisition is complete will be unconfirmed. To change an unconfirmed to a confirmed report, select *OK* while editing the report. (See chapter 7, "Editing ECGs on a Diskette".)
- write protected** means that you can not save information to a diskette. A small tab on each diskette allows you to choose whether you want to write protect a diskette or not. When the write-protect tab is moved to uncover a small hole in the diskette, then the diskette will be write protected (see appendix E, "Miscellaneous Tasks").

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