MAC®15

Operator's Manual

marquette®

NOTE: This manual reflects software programs 006 and 106.

CAUTION FEDERAL LAW RESTRICTS THIS DEVICE TO SALE BY OR ON THE ORDER OF A PHYSICIAN.

ATTENTION: This electrocardiographic device utilizes a computerized ECG analysis (12 simultaneous lead or 12SL) program. This program can be utilized as a tool in the diagnosis of an ECG tracing which is significant only when interpreted in conjunction with clinical findings. All computer-generated tracings should be overread by a qualified physician.

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How to Reach Us...

Following are telephone numbers and addresses for contacting various Service, Supplies, and Sales personnel.

Service Calls

To open a service call with Marquette Service, contact Service Dispatch at 1-800-558-7044.

Supply Products

Supply products are generally those items used up in the normal operation of the product. Lead-wires, electrode paste, patient cables, and thermal printer paper are examples of supply products.

Order supplies from MEI Service and Supplies, P.O. Box 9100, 100 Marquette Drive, Jupiter, FL, 33468-9100, Attn: Supplies. Telephone: 1-800-558-5102.

Service Parts and All Manuals

Service parts are items that are not expended in the normal operation of the product. They are generally replacements for defective or malfunctioning items inside the product. Service parts include circuit board assemblies, electronic components, internal cables and harnesses, software or firmware, and operator and service manuals. When ordering additional operator manuals, remember to get the software version from either the back of the title page or a printed report.

A part number for the item to be replaced is necessary for ordering a service part. If the part number for the desired item is unobtainable, the following will be necessary to order the item:

- 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, U32).

Order service parts and manuals from MEI Service and Supplies, P.O. Box 9100, 100 Marquette Drive, Jupiter, FL, 33468-9100, Attn: Service Parts. Telephone: 1-800-551-1957.

Tech Support—

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

Carts/Stress: 1-800-558-7072

MUSE Software: 1-800-558-7070

Holter: 1-800-558-6802

MUSE Hardware: 1-800-654-1242

48-Hour Turnaround Repair

Some Marquette products (MAC PC, acquisition modules, and Holter recorders) are repaired on a 48-hour turnaround basis. Send items for 48-hour repair to MEI Service and Supplies, P.O. Box 9100, 100 Marquette Drive, Jupiter, FL, 33468-9100, Attn: 48-Hour Turnaround Repair. Telephone: 1-800-552-3246.

Diagnostic Hardware Repair

Send all items except 48-hour turnaround repair items to MEI Service and Supplies, P.O. Box 9100, 100 Marquette Drive, Jupiter, FL, 33468-9100, Attn: Diagnostic Hardware Repair. Telephone: 1-800-552-3247.

Sales Offices

For all sales-related inquiries contact the offices listed below.

Eastern District

Marquette Electronics, Inc, Eastern District Office, 230 Commercial Street, Boston, Massachusettes, 02109. Telephone: (617) 523-2320 or (800) 262-4556. FAX: (617) 523-1759.

Southern District

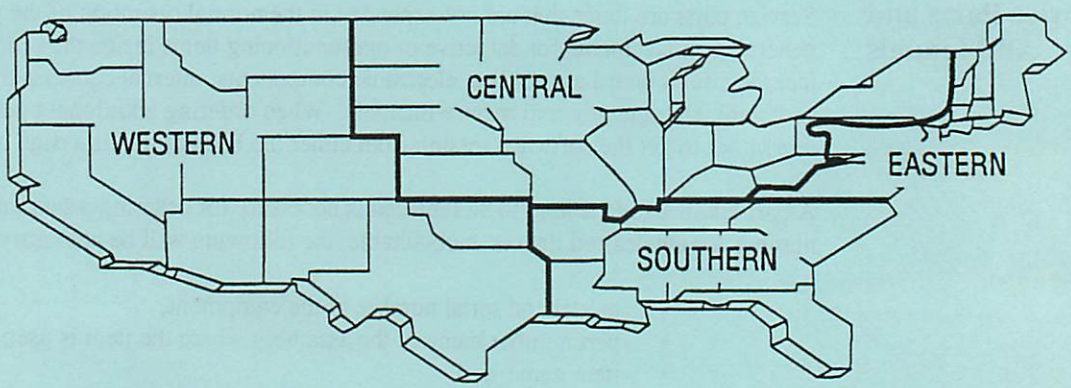
Marquette Electronics, Inc, Southern District Office, 4000 DeKalb Technology Center, Building 400, Suite 430, Atlanta, Georgia, 30340. Telephone: (404) 986-0106 or (800) 822-9950. FAX: (404) 986-0244.

Central District

Marquette Electronics, Inc, Central District Office, 165 North Arlington Heights Road, Suite 180, Buffalo Grove (Chicago), Illinois, 60089. Telephone: (708) 520-2390, (800) 558-3408 (except Illinois) or (800) 225-7150 (in Illinois). FAX: (708) 520-2398.

Western District

Marquette Electronics, Inc, Western District Office, 1060-G North Batavia Street, Orange (Los Angeles), California, 92667. Telephone: (714) 771-5741, (800) 762-0606 (except California) or (800) 537-9960 (in California). FAX: (714) 771-2426.



Canadian Region

Marquette Electronics, Inc, Canadian Regional Office, 20 Bond Avenue, Don Mills, Ontario, M3B 1L9 CANADA. Telephone: (416) 444-7381. FAX: (416) 444-3894. TELEX: 3896966622 INGBELL TOR.

European/North African District

Marquette Electronics, Inc, European/North African District Office, 15 rue Rougemont, 75009 Paris, France. Telephone: (33) (1) 42 46 00 19. FAX: (33)(1) 48 01 04 44. TELEX: (842) 532463F PARTNER.

Asian/Pacific District

Marquette Electronics, Inc, Asian/Pacific District Office, 1009-1010 Tai Yau Building, 181 Johnston Road, Wanchai, Hong Kong. Telephone: (852) 8381398. FAX: (852) 8381507. TELEX: 78069393 MEIAP HX.

Middle Eastern, South American, African Region

Marquette Electronics, Inc, 8200 West Tower Avenue, Milwaukee, Wisconsin, 53223. Telephone: 1-414-355-5000. FAX: 1-414-355-3790. TELEX: 297991 MEI MIL.

Other Questions or Problems

For any other questions or problems, contact the main switchboard operator in Milwaukee, Wisconsin at 1-800-558-5120 or (414) 355-5000. The operator will direct your call to the person most able to assist you.

ADDENDUM 1
for MAC 12/15 Hi-Res Operation

Enhancing Signal Quality on the MAC 12/15 (software versions 005 and 106) With the High Resolution Option

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 MAC 12/15 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.**

   Locate the MAC 12/15 several feet away from the patient. This will reduce possible interference from the power supply of the MAC 12/15.

2. **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.

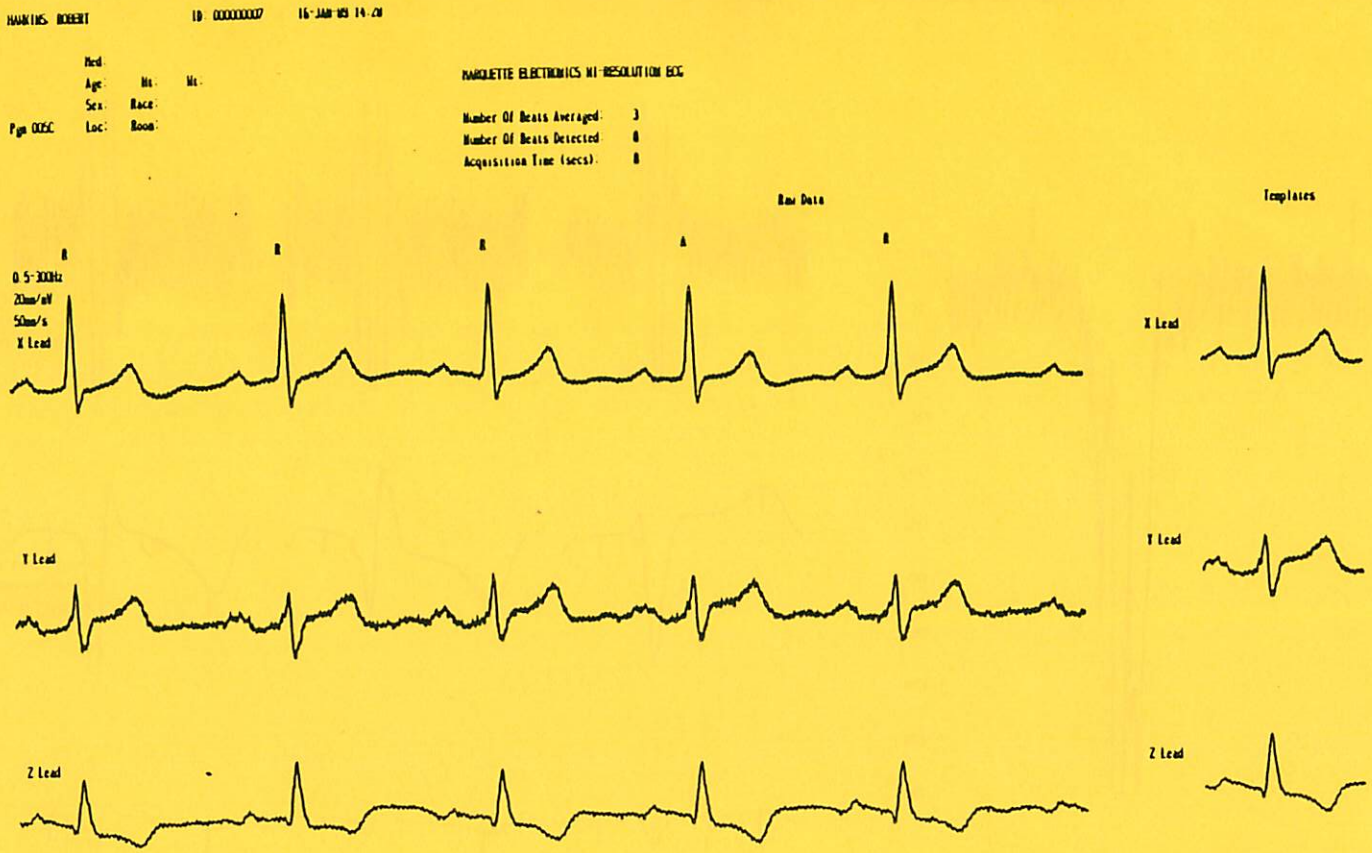


Figure 1—Hi-Res Template Report.

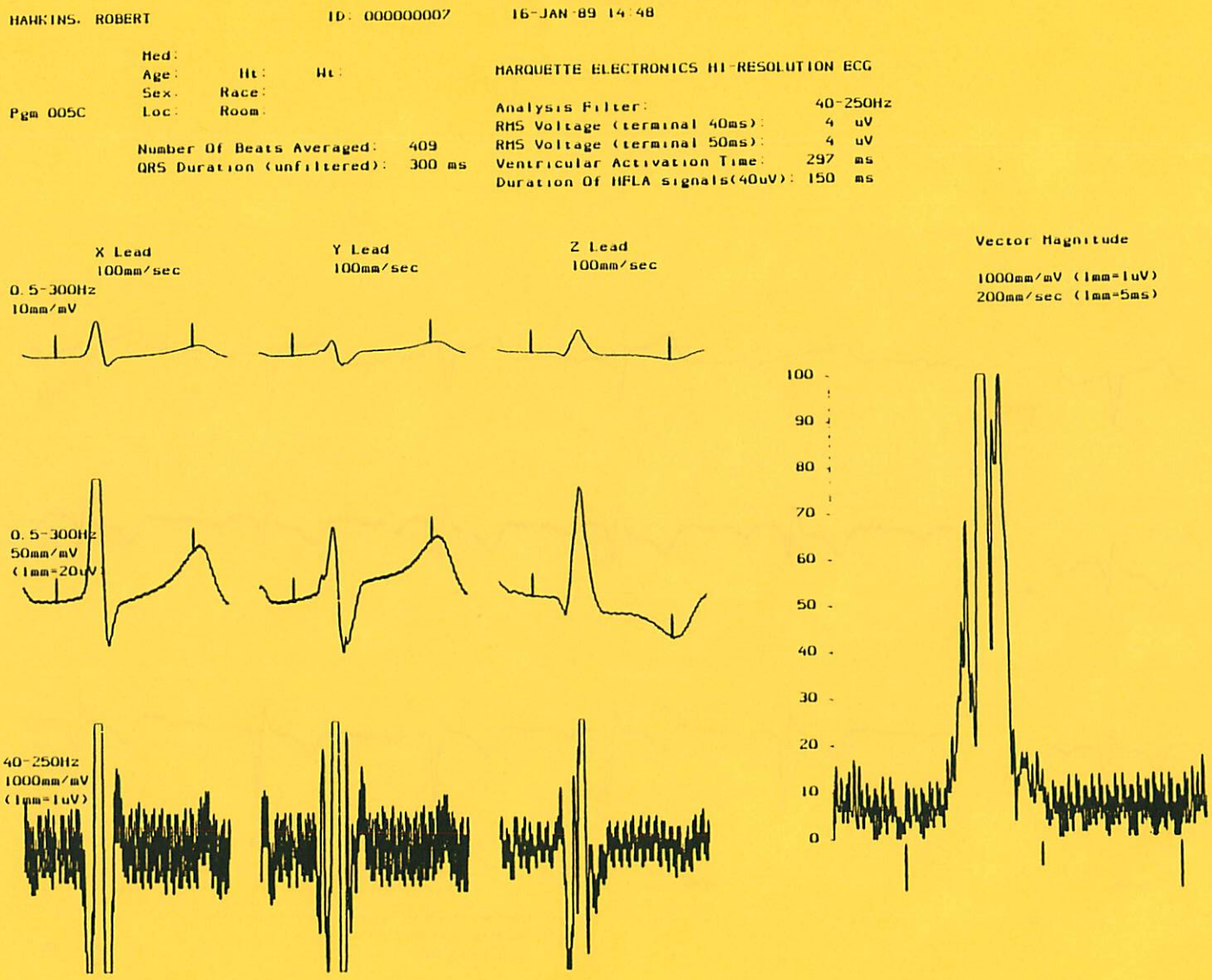


Figure 2—Hi-Res Final Report (40-250 Hz Filter).

Notices

Responsibility of the Manufacturer

Marquette Electronics, Inc is responsible for the effects on 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; and
- the MAC 15 is used in accordance with the instructions for use.

Transmitting Data to a MUSE System

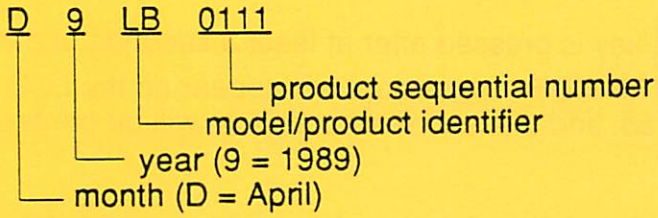
The MAC 15 can transmit to and receive data from a MUSE system by telephone. However, data can NOT be transferred using a "local" hookup. (Refer to "Chapter 5– Transmitting an ECG.")

Receiving MUSE Data

When you receive MUSE data during Reverse Transmission on the MAC 15, the data will NOT be saved to the MAC 15's diskette. Also, the type of report format that is printed on the MAC 15 will depend on the MUSE settings. (Refer to "Chapter 5– Transmitting an ECG" for details on receiving an ECG.)

Equipment Identification

Marquette equipment is identified by a serial number on a nameplate that is attached to the unit. The serial number is actually a code that identifies the product, time of manufacture, and the product sequential number. An example of a serial number is:



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 display 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 MAC 15 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, and AM-3)

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 display similar to **** V1 DISCONNECTED **** or **** LL DISCONNECTED ****.

The message will remain on the LCD display until either (1) the leadwire fail is corrected, or (2) the RECORD ECG key is pressed after at least 3 seconds of data acquisition.

If the leadwire fail is corrected, then the lead message will 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 display message will appear.

Rhythm Report Printing

Normally, when you press the RECORD RHYTHM key, a rhythm report will be printed until the STOP key is pressed to stop the report. However, if the rhythm report does not stop, then turn the MAC 15 off and then on again.

STOP Key Use

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

Losing Setup Information

If the MAC 15 is left unplugged for an extended period of time, all setup information can be lost. (Refer to "Chapter 12–Cart Setup" for a description of setup information.) To prevent this from occurring, *at least once a week* plug the MAC 15 into an appropriate wall outlet, turn the unit on, and leave it on overnight.

Daylight Savings Time

The MAC 15 will change to daylight savings time at 2:00 am on April 26—which reflects the old daylight savings law. Therefore, the time on your MAC 15 reports may be inaccurate. To correct the time, refer to "Chapter 12–Cart Setup."

Editing Files and Serial Comparison Analysis

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

User's Comments

Your comments and suggestions will help us in our continuous effort to improve the quality and usefulness of our manual. Please take a minute to fill out this survey and return it to us. Check (✓) only one box for each question. Thank you.

	Very Good	Good	Fair	Poor
What is your overall rating of this manual?	☐	☐	☐	☐
How would you rate the organization of the entire manual?	☐	☐	☐	☐
How would you rate the arrangement of information/illustrations on each page?	☐	☐	☐	☐
How would you rate the accuracy of the information?	☐	☐	☐	☐
How would you rate the completeness of the information?	☐	☐	☐	☐
How would you rate the readability of the text?	☐	☐	☐	☐
How would you rate the manual's overall usability?	☐	☐	☐	☐

How often have you used this manual? ☐ Very often ☐ Very little

When did you use It? ☐ Calibration ☐ Maintenance ☐ Repair
(Service manuals only–Check all that apply) ☐ Other _____

Was anything missing that should be added? ☐ Yes ☐ No

If yes, describe _____

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Introduction

The Marquette MAC 15 represents the latest and most sophisticated technology in electrocardiography. An outgrowth of the earlier MAC I and MAC II, this new instrument is designed to perform rapid, accurate analysis of both morphology and rhythm on a patient's 12-lead ECG. The MAC 15 also stores and/or transmits these analyses and waveforms to central processors via telephone, cellular telephone, or satellite.

The MAC 15 contains a complete computer system which will rapidly perform the well-accepted Marquette 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 MAC 15 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 MAC 15 acquisition module acquires, amplifies, and digitizes the patient's signals and is connected to the electrocardiograph with a telephone-type cord.

How to Use This Manual

The best way to use this manual is first to become familiar with its various chapters. To do this, take a moment to flip through the pages of this manual and briefly scan its contents.

This manual is made up of 20 chapters.

Below are chapter summaries...

Chapter Summaries

Chapter 1–Preparing the Equipment shows you how to connect the MAC 15 to a power outlet and the acquisition module, replace paper in the MAC 15's writer, and format or prepare a diskette for first-time use.

Chapter 2–Preparing the Patient gives details on preparing a patient for a resting ECG.

Chapter 3–Taking a Resting ECG presents the steps necessary to take a patient's resting ECG and to store the ECG data on a diskette.

Chapter 4–Printing a Rhythm Strip explains the steps necessary to plot (print) a patient's rhythm strip.

Chapter 5–Transmitting an ECG shows you how to transmit or receive ECG reports to or from a diskette. Transmission or reception may be done using either a modem or direct connection (locally).

Chapter 6–Editing ECG Reports explains how to change information on a patient's ECG report once you have the ECG on diskette.

Chapter 7–Plotting ECG Reports gives step-by-step directions on how to plot (print) a patient's ECG that has been stored on a diskette.

Chapter 8–Directory shows you how to display or print the contents of a diskette to either the MAC 15's LCD (Liquid Crystal Display) or writer.

Chapter 9–Deleting an ECG shows you how to erase one or more patient files from diskette.

Chapter 10–Analog Output shows you how to use the cardiograph to send up to three channels of ECG data to either a scope or a personal computer.

Chapter 11–Holter explains how to receive Holter transmissions on the cardiograph.

Chapter 12–Cart Setup shows you how to change any of the factory presettings or "defaults."

Chapter 13–Report Formats presents examples of all the report formats, such as CGR or RMR, available on the cardiograph.

Chapter 14–Pacemaker is an option that permits local or remote evaluation of either single or dual chamber pacemakers using standard surface electrodes and a special "Pace" acquisition module. The remote pacemaker option also requires a remote pacemaker acquisition center, a transmitter, and an interface cable.

Chapter 15–Hi-Res is a cardiograph option which analyzes high-frequency low-amplitude (HFLA) ECG information using a special "Hi-Res" acquisition module.

Chapter 16–Troubleshooting presents answers to common questions or problems you might have with the cardiograph.

Chapter 17–Maintenance contains preventive maintenance instructions for the unit.

Chapter 18–Supplies lists relevant cardiograph supplies, such as electrodes and recording paper.

Chapter 19–Miscellaneous includes information about the **Diag** (nostic) and **Loadtask** functions and Marquette sales offices.

Chapter 20–Glossary and Index contains a glossary of terms used in this manual and an index of the manual.

FCC Requirements

Type of Service

Your cardiograph 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 cardiograph. 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.

User Information

Service Requirements

In the event repairs are ever needed on your cardiograph, they should be performed by Marquette Electronics, Inc or an authorized representative of Marquette Electronics, Inc. For information contact:

Marquette Electronics, Inc
8000 West Tower Avenue
Milwaukee, Wisconsin 53223

Safety

DANGER: Possible explosion hazard. Do NOT use in the presence of flammable anesthetics.

WARNING For continued safe use of this equipment, it is necessary that the listed instructions are followed. However, instructions listed in this manual in no way supercede established medical procedures concerning patient care.

WARNING Risk of fire. Replace fuses as marked.

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

CAUTION Federal law restricts this device to sale by or on the order of a physician.

ATTENTION: This electrocardiographic device utilizes a computerized ECG analysis (12 simultaneous lead or 12SL) program. This program can be utilized as a tool in the diagnosis of an ECG tracing which is significant only when interpreted in conjunction with clinical findings. All computer-generated tracings should be overread by a qualified physician.

Equipment Symbols

M13668-95

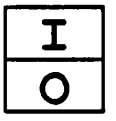
CAUTION To reduce the risk of electric shock, do NOT remove cover (or back). Refer servicing to qualified service personnel.

M13668-96

Type BF equipment is suitable for intentional external and internal application to the patient, excluding direct cardiac application. Type BF equipment is type B equipment with an F-type isolated (floating) applied part. The paddles indicate that the device is defibrillator proof.

M13668-139

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

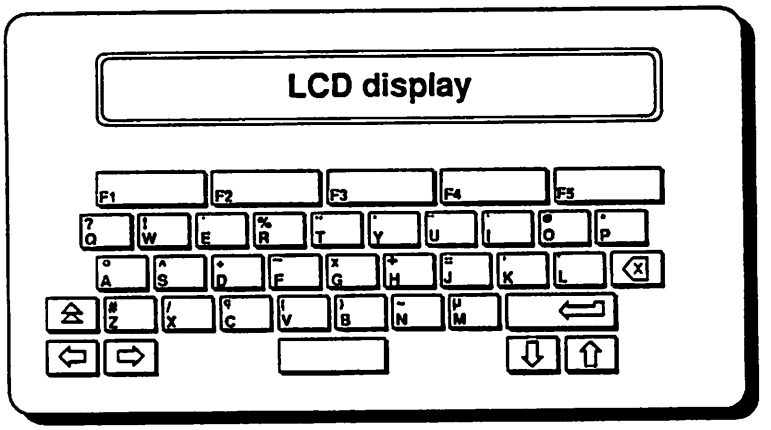


M13668-163

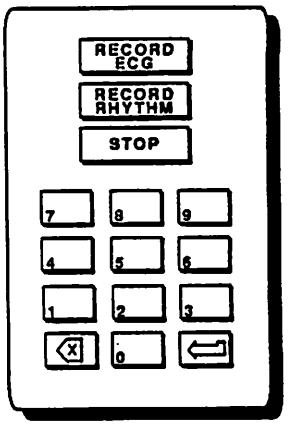
The "I" is the on position of this switch. The "O" is the off position of this switch.

~ Alternating current (AC).

Keyboard Description



M13278-1



M13278-2

F1
F2
F3
F4
F5

Function keys select an LCD display function that is directly above the key. For example, in the LCD display below,

pressing the F1 key selects the **Delete** function,

pressing the F2 key selects the **Format** function,

pressing the F5 key selects **More** which allows you to review additional menu functions.

```
          Diskette Functions
Delete  Format                    More
```

F1 F2 F5

NOTE: As in the example above, LCD displays in this guide will show only those function keys that can actually be used.

OR

ENTER key. After typing information on the keyboard, it is usually necessary to press this key to enter or store what you have typed.

SHIFT key. Used to type shifted characters or to access special functions.

DELETE key. Press this key to erase a character that you have typed on the keyboard.

SPACE BAR key. Press this key to create a space on the LCD display.

CURSOR LEFT key. Press this key to move the LCD display cursor left.

CURSOR RIGHT key. Press this key to move the LCD display cursor right.

BACK UP key. Pressing this key causes the prior LCD display prompt to appear.

RECORD ECG key. Pressing this key acquires an ECG from a patient and prints a 3-, 6-, 12-, and/or 15-lead report depending on cart setup. *The Main Menu must be displayed before you can record an ECG.*

RECORD RHYTHM key. Prints either a 3-, 6-, or 12-lead rhythm report depending on cart setup. *The Main Menu must be displayed before you can record a rhythm report.*

STOP key. In most cases, pressing this key returns the LCD display to the *Main Menu* and also stops the printing of a report.

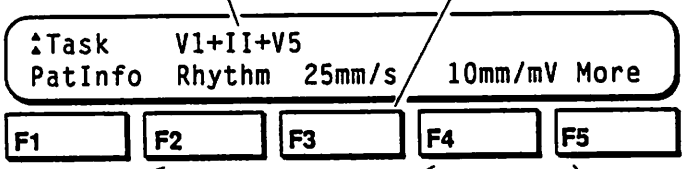
The *Main Menu*

When you first turn the cardiograph on, the *Main Menu* is the first LCD display you see. If the *Main Menu* is not displayed, then you can press the STOP key to return to it. The *Main Menu* is the starting point for most of the functions of the cardiograph and its features are described below:

Press the F1 key to enter Patient Information—such as patient name, age, etc.

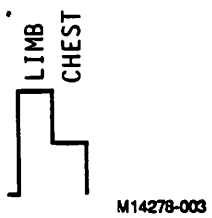
Rhythm leads. The default or startup Automatic Rhythm leads are shown here.

Press the F3 key to change the writer's speed—either 1, 5, 25, or 50 mm/s. (1 and 5 mm/s apply only to rhythm reports.)



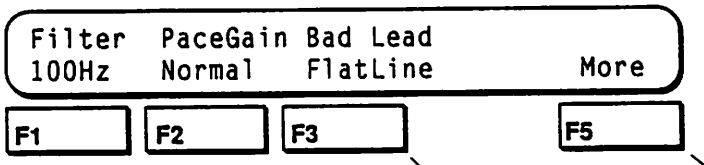
Press the F2 key to change the rhythm leads—either Automatic Rhythm, Group 1, Group 2, Group 3, or Group 4. The leads used in each of these selections may be changed in the **Ld Grp** (Lead Group) section of the **Cart Setup** menu which is described in "Chapter 12 – Cart Setup."

Press the F4 key to change the writer's gain—either 2.5, 5, 10, or 20 mm/mV. 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:



NOTE: Adjusting the gain only affects the output traces. Data for the12SL analysis program are always measured at the 10 mm/mV setting.

Press the F5 key to advance to the second display of the *Main Menu*.



Press the **F1** key to change the writer filter—either 40 or 100 Hz.

NOTE: The filter selection only affects the output traces. The 12SL analysis program always analyzes the data at 100 Hz.

Press the **F2** key to enable or disable the PaceGain feature. Selecting **Enhance** will enable **PaceGain**. Selecting **Normal** will disable **PaceGain**.

NOTE: When **PaceGain** is enabled, the pacemaker spike on ECG report is enhanced, thus making it more obvious. **PaceGain** will only function when an AM-3 is being used for data acquisition.

Press the **F3** key to enable or disable the **Bad Lead** feature. Selecting **FlatLine** will result in a flat line report if an override of an "XX Disconnected " lead error message occurred during data acquisition. Selecting **Use** will print a report of raw data and no lead error messages will be displayed during data acquisition.

NOTE: The ability to print a report of raw data without having to override any lead error messages is only possible when an AM-3 is used for data acquisition.

Press the **F5** key to return to the first display of the *Main Menu* as shown on the previous page.

NOTE: Press the ⇧ and the **F5** keys at the same time to print a rhythm Recall report. This report consists of 10 seconds of 3-lead ECG rhythm data and can be obtained from either of the *Main Menu* displays.

Abbreviations

Abbreviation	Meaning
%	percent
&	and
<	less than
12SL	12 simultaneous leads
A-ang	antianginal
A-arh	antiarrhythmic
A-coa	antocoagulants
A-hyp	antihypertensive
A1 – A8	auxiliary leads
Abnorm	abnormal
AC	alternating current
AHA	American Heart Association
am, AM	ante meridiem
AM-1	Acquisition Module-1
AM-2	Acquisition Module-2
AM-3	Acquisition Module-3
Ampl	amplitude
Attn	attention
Auto	automatic
AutoRhym	automatic rhythm
AUX	auxiliary
aVF	left foot augmented lead
aVL	left arm augmented lead
aVR	right arm augmented lead
BetaB	beta blockers
Blvd	boulevard
BP	blood pressure
BPM	beats per minute
c/o	in care of
CalcBlk	calcium blockers
Catoprl	Catopril
Cauc	Caucasian
CGR	Computer Graphic Record
Clonid	Clonidine
cm	centimeter
Comprs	compressed
Confrmd	confirmed
Cont	continue
Coumadn	Coumadin

Abbreviation	Meaning
D	day
Dat/Tim	date/time
DD	double density or day
Diag	diagnostic
Digital	Digitalis
Digitox	Digitoxin
Digox	digoxin
Digoxin	Digoxin-Lanoxin
Dirctry	directory
Diurt	diuretics
DOB	Date Of Birth
DR	doctor
DS	double sided
Dysopyr	Dysopyramide
E	vector lead
ECG	electrocardiogram
etc	et cetera
F1 – F5	function keys
FCC	Federal Communications Commission
Furosem	Furosemide
H	vector lead
HFLA	high frequency low amplitude
HH	hour
Hi-Res	high resolution ECG analysis
Hisp	Hispanic
Hr	hour
Hydral	Hydralazine
Hz	Hertz
I	vector lead
II, II, and III	limb leads
ID	identification
IEC	International Electrotechnical Commission
in	inch
Inc	incorporated
Int	interval
Isosorb	Isosorbide

Abbreviation	Meaning
K	kilo
Kg	kilogram
LA	Left Arm
lb	pound
lbs	pounds
LCD	Liquid Crystal Display
LclLine	local line
Ld Grp	lead group
Lidoca	Lidocaine
LL	Left Leg
Loc	location
Loc PC	local MAC PC
Ltd	limited
M	vector lead
MAC	Microcomputer Augmented Cardiograph
Med	medications
min	minute
Misc	miscellaneous
MMM	month
mm/mV	millimeter per millivolt
mm/s	millimeter per second
ms	millisecond
MUSE	Marquette Universal System for Electrocardiography
mVR	minus (inverted) aVR
mY	minus (inverted) Y
mZ	minus (inverted) Z
Nitrate	nitrates
Orig	original
P	P wave
PA	P wave amplitude
Pace	pacemaker
Passwds	passwords
PatData	patient data
PatInfo	patient information
Pgm	program (the software version)

Abbreviation	Meaning
Phenoth	Phenothiazine
Phenytn	Phenytoin
PID	Patient Identification Number
pm, PM	post meridiem
Poff	P wave offset
Pon	P wave onset
PPA	P' wave amplitude
PPM	pulses per minute
PR	ECG signal interval
Procain	Procainamide
Propran	Propranolol
Psych	psychotropic
PVC	polyvinyl chloride
PW	pulse width
QA	Q wave amplitude
QC	Quality Control
QD	Q wave duration
Qoff	Q wave offset
Qon	Q wave onset
QRS	interval of ventricular depolarization
QT	QRS interval
QTc	QRS interval
Quinid	Quinidine
RA	Right Arm or R wave amplitude
RAM	Random Access Memory
RD	R wave duration
REN	Ringer Equivalence Number
Rcvd	received
Reserp	Reserpine
RevdBy	reviewed by
RevXmit	reverse transmission
RL	Right Leg
RMR	Rhythm and Morphology Report
RMS	root mean square
RPA	R' wave amplitude
RPD	R' wave duration
Rpt	report

Abbreviation	Meaning
S	seconds
SA	S wave amplitude
SD	S wave duration
SPA	S' wave amplitude
ST	electrocardiogram interval
Standrd	standard
STE	ST segment displacement at the end
STJ	ST segment displacement at the J point
STM	ST segment displacement at the mid-point between STJ and STE
Stmts	statements
T	T wave
T/L	trailing to leading edge
TA	T wave amplitude
Thiazid	Thiazide
Toff	T wave offset
TPA	T' wave amplitude
Tricyli	Tricylic antidepressent
Unconf	unconfirmed
v	version
V1 – V7	precordial leads
V3R	precordial lead
V4R	precordial lead
Vent.	ventricular
w	week
Warfar	Warfarin
x	by (as in "1 x 10")
Xmit	transmission
XYZ	orthogonal leads
yr	year
yrs	years
Y	year
YY	year

Chapter 1
Preparing the Equipment

Chapter Summary

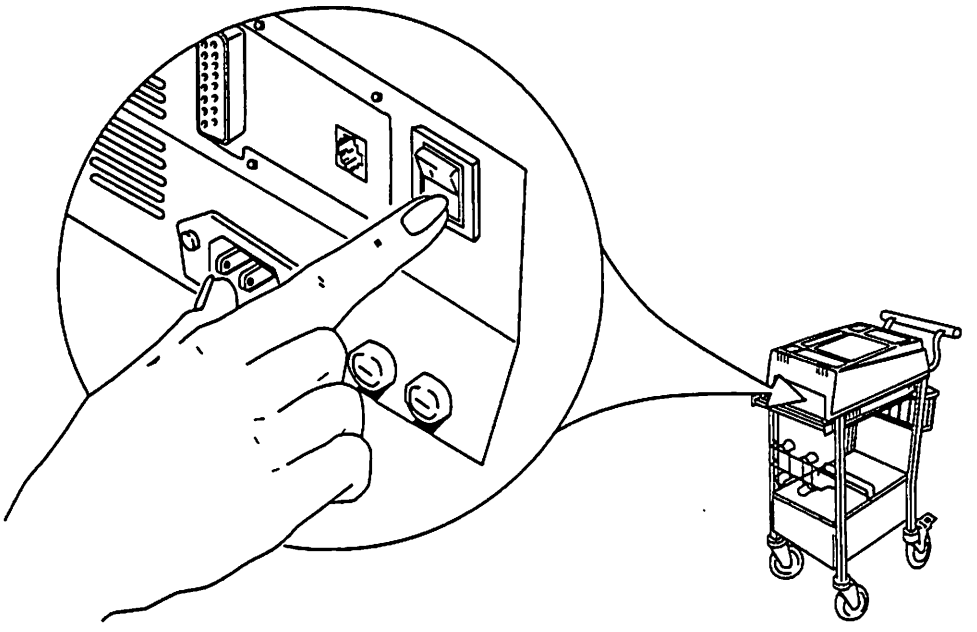
This chapter consists of three sections:

- **Installing the Cardiograph** shows you how to prepare the cardiograph for use,
- **Replacing Writer Paper** shows you how to put new writer paper in the cardiograph, and
- **Formatting a Diskette** shows you how to format or prepare a diskette for first-time use.

Installing the Cardiograph

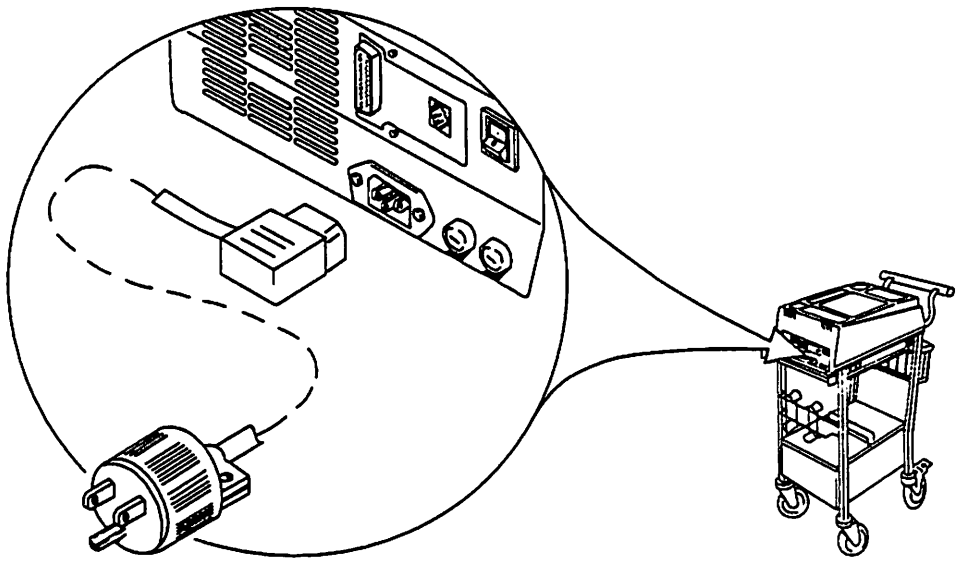
To prepare the cardiograph for use, follow these steps:

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



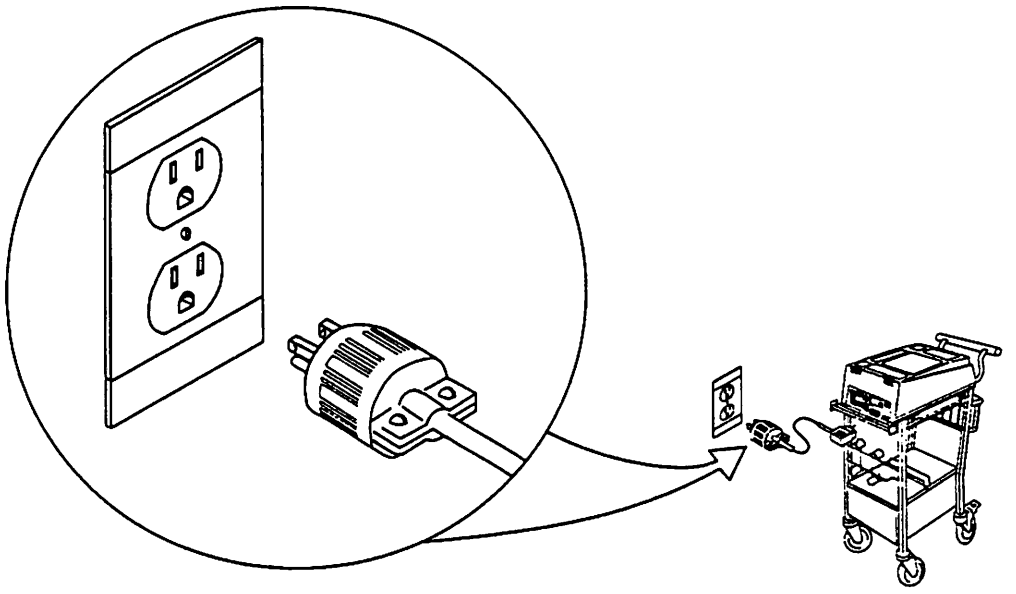
M14445

② Connect one end of the power cord to the cardiograph:



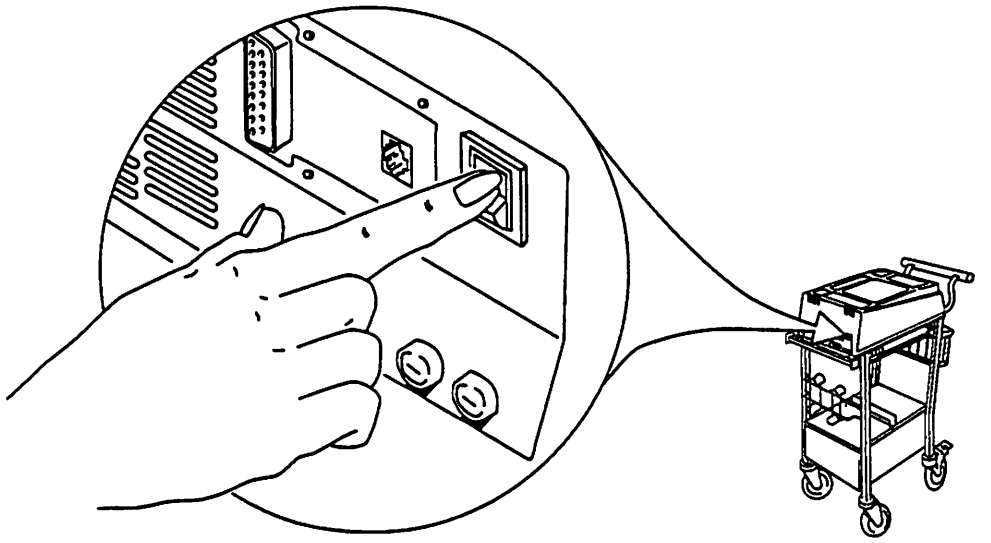
M14446

③ Connect the other side of the power cord to an appropriate, grounded power outlet:



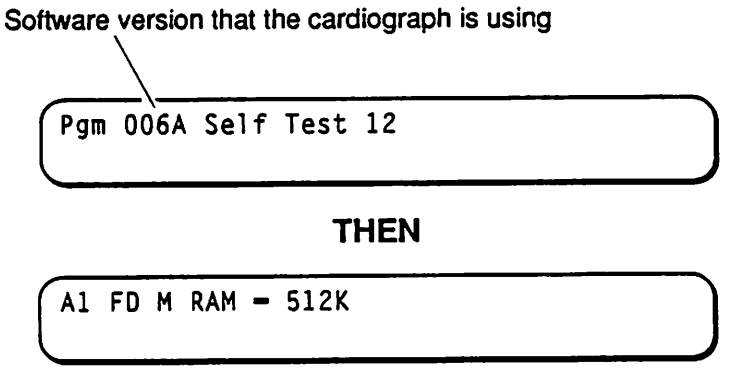
M14447

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



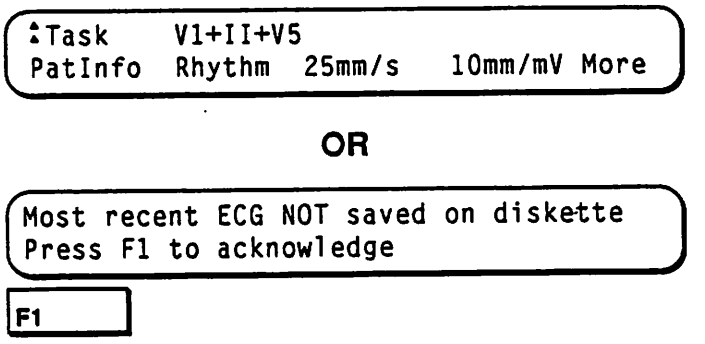
M14448

⑤ The cardiograph does a short selftest and displays similar to the following will appear:



The "512K" in the LCD display above is the amount of memory available in the unit, 512 kilobytes in this case.

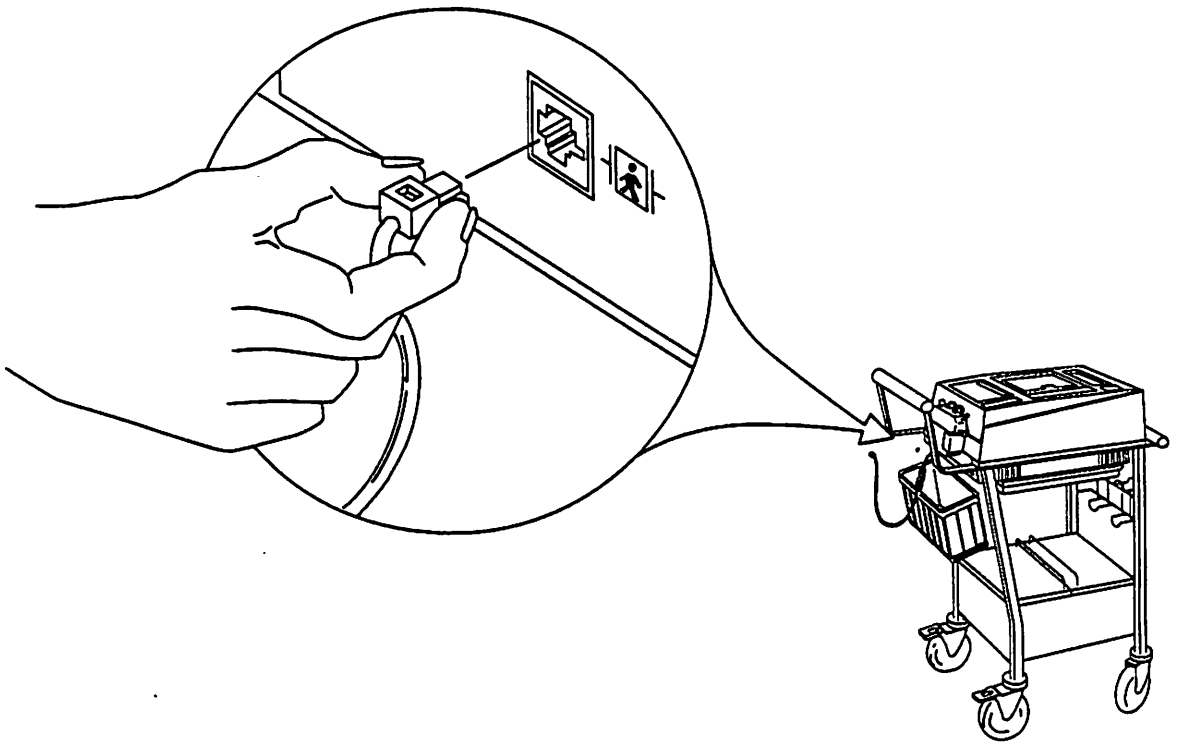
After the selftest, one of the following two LCD displays will appear:



Normally, the first LCD display above—the *Main Menu*—will appear.

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

⑥ Connect the telephone-type connector end of the acquisition module to the connector on the front of the cardiograph:

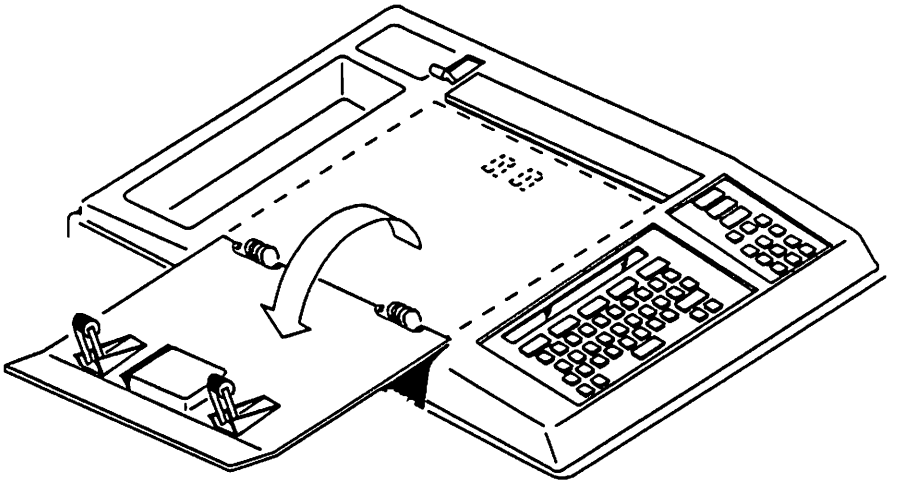


M14449

Replacing Writer Paper

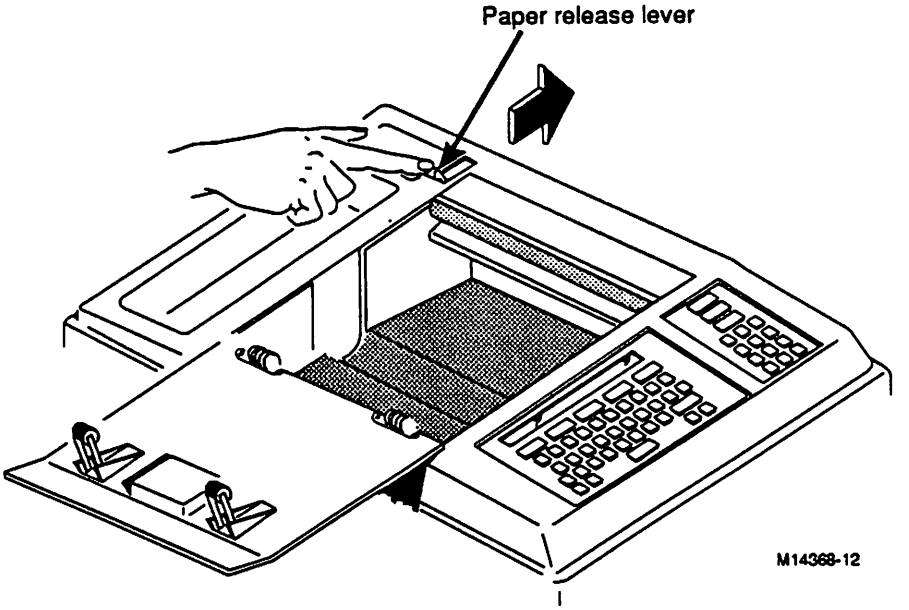
To replace the paper in the cardiograph's writer, follow these steps:

① Open the paper compartment lid:



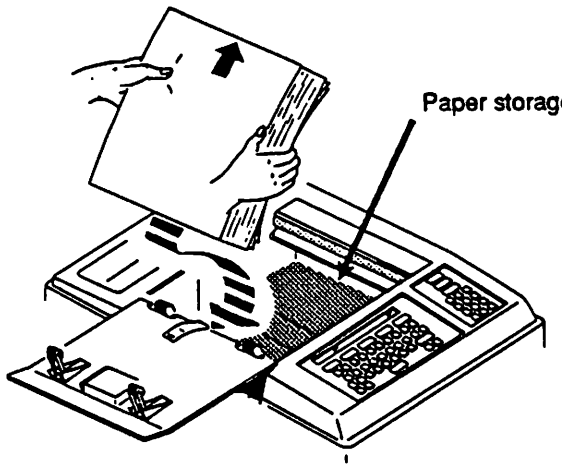
M14367-12

② Press the paper release lever:

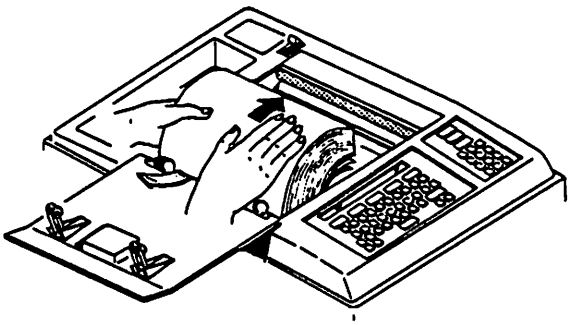


M14368-12

③ Place the fanfold paper in the storage compartment:

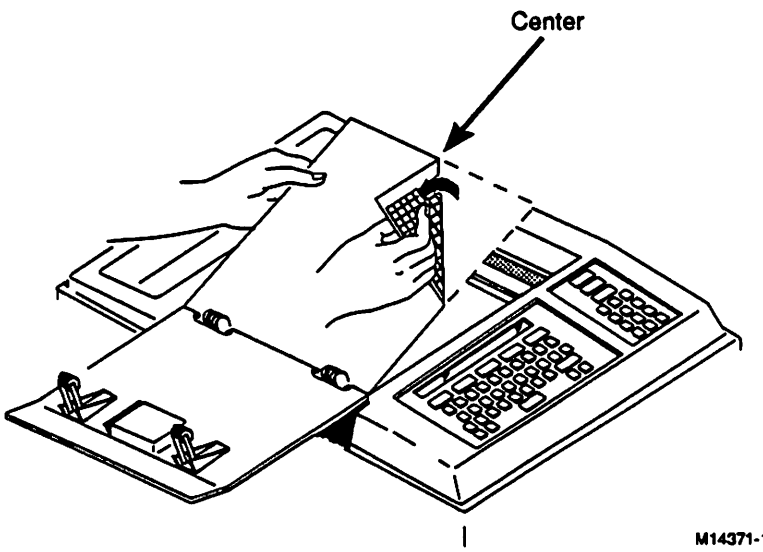


M14369-12



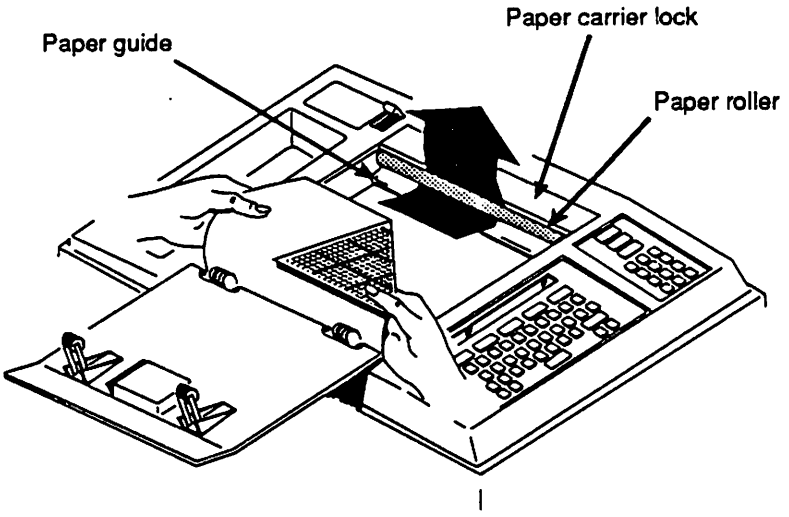
M14370-12

④ Fold the corner over of the top sheet of paper:



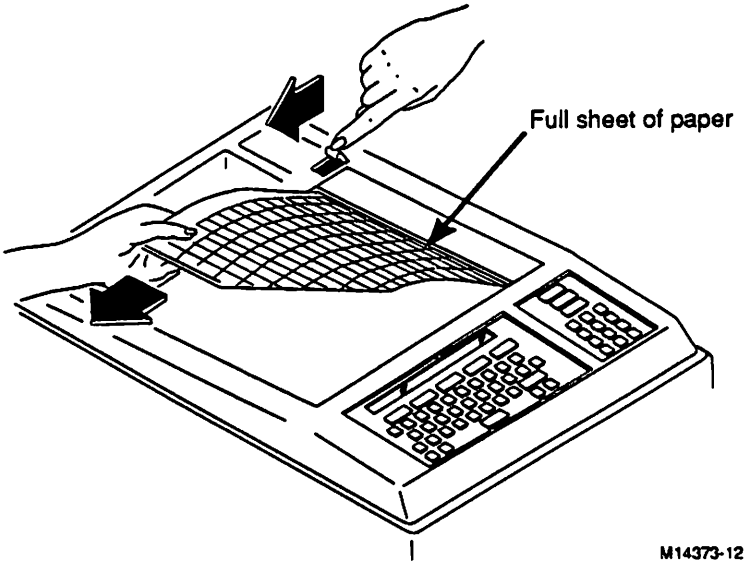
M14371-12

⑤ Gently push the paper under the paper roller:



M14372-12

⑥ Gently pull on the paper out until a full sheet of paper is through the roller. Then push the paper release lever as shown. Finally, close the paper compartment lid.



M14373-12

Thermal Paper Storage

To avoid deterioration or fading of traces on the thermal paper used in the cardiograph, follow these precautions:

NOTE: The following precautions apply to both unused paper and to paper that has already been run through the writer.

- ❑ Store in a cool, dry, and dark place. The paper should be stored in a location where the temperature is below 27.6° Centigrade (80° Fahrenheit) and where the relative humidity is between 40% and 65%.

- ❑ The thermal paper should NOT be in a location where it will be exposed to bright light or ultraviolet sources such as sunlight, fluorescent and similar lighting which cause yellowing of paper and fading of tracings.

- ❑ Avoid contact with cleaning fluids and solvents such as alcohols, ketones, esters, ether, etc.

- ❑ Do NOT use mounting forms, pressure-sensitive tapes or labels containing solvent-based adhesives. Use only mounting forms and pressure sensitive tapes made with starch or water-based adhesives.

- ❑ Do NOT store thermal paper 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;
  - document protectors, envelopes and sheet separators containing PVC or other vinyl chlorides.

- ❑ DO store thermal paper separately in either manilla folders or 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 sources.*

- ❑ The thermal paper should retain its traces when proerly imaged and stored for about 3-5 years. If your retention requirements exceed these guidelines, we recommend you consider alternate image storage technologies.

Formatting a Diskette

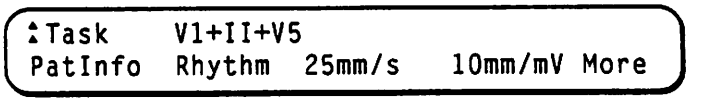
The cardiograph can store ECGs on 3.5-inch diskettes. However, a diskette must be formatted before any files can be stored on it. Formatting simply prepares a diskette for first-time use.

NOTE: Use only high quality, double-sided, double-density 3.5-inch diskettes in the cardiograph.

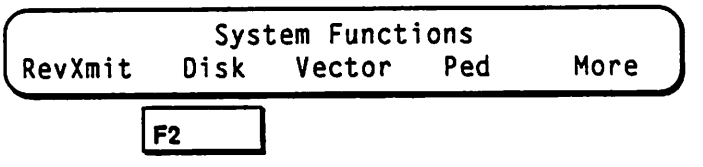
NOTE: A diskette only needs to be formatted once. Since formatting erases everything on a diskette, be careful not to format the wrong diskette. Also, if you want to delete one or more ECGs from a diskette, it is not necessary to format the diskette. (Refer to "Chapter 9–Deleting an ECG.")

① Make sure that the cardiograph has been installed as previously described in this chapter.

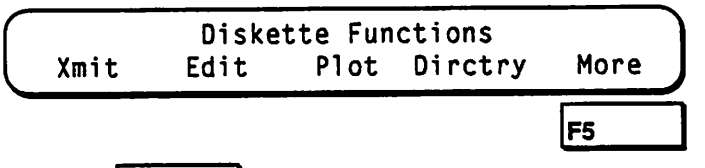
② If the *Main Menu* is not already displayed, then press the STOP key to return to the *Main Menu*:



③ Press the ⇧ and F1 keys at the same time to display the **System Functions** menu:



④ Then press the F2 key for **Disk** and the following will appear:



Press the F5 key for **More**.

⑤ The following will appear:

```
                Diskette Functions
Delete    Format                          More
```

F2

Press the F2 key for **Format.**

⑥ Then this password prompt will appear:

```
Password:  L1
```

Type in either the Level 1 or Level 2 password. (The default passwords are "L1" and "L2.") Then press the ⇦ key.

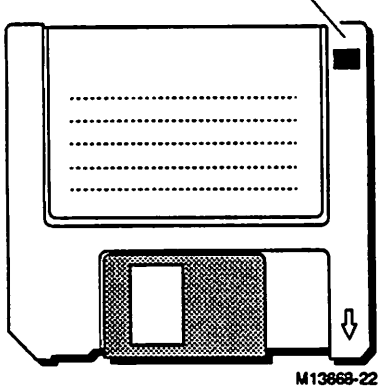
⑦ Then the following message will appear:

```
Insert Diskette to be Formatted in Drive
Type Any Key to Continue
```

⑧ If you have not already done so, make sure that the diskette you wish to format is <u>not</u> write protected. To do this, cover the write-protect hole:

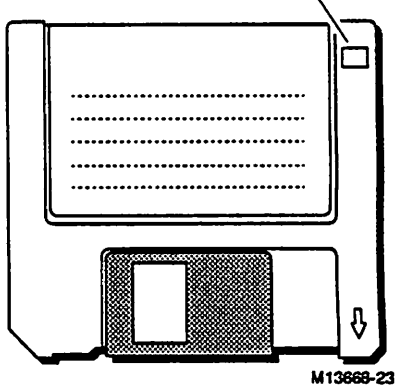
• Front of Diskette •

Not write protected (hole covered)



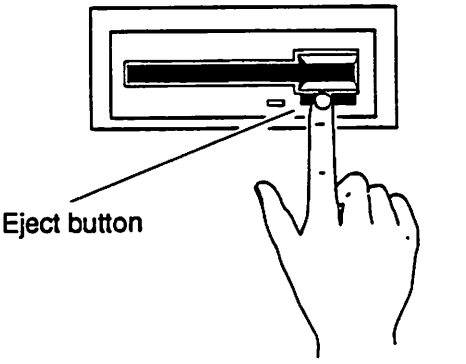
M13668-22

Write protected (hole uncovered)

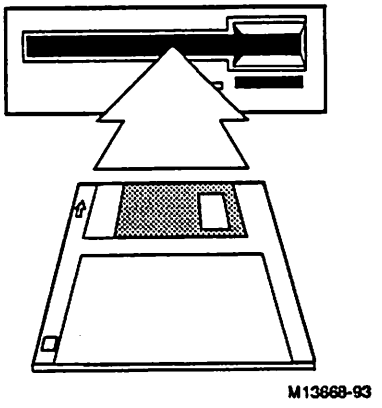


M13668-23

NOTE: If there already is a diskette in the diskette drive slot, remove it by pressing the eject button:



⑨ Insert the diskette—label side up—that you want to format into the diskette drive slot:



⑩ After the diskette is inserted, press any key. Then the following messages will 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
```

Press any key to continue.

⑪ While the cardiograph formats your diskette, the following series of messages will appear:

NOTE: The numbers on the displays will 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 **
```

⑫ If less than 20% of the diskette has errors, then the following message appears:

```
Diskette Format Complete
Type Any Key to Continue
```

Pressing any key displays the following:

```
          Diskette Functions
 Delete  Format                    More
```

Then press the STOP key to return to the *Main Menu.*

⑬ If more than 20% of the diskette has errors, then the following message appears:

```
Do Not Use Diskette - Too Many Errors
Type Any Key to Continue
```

discard diskette and format another diskette.

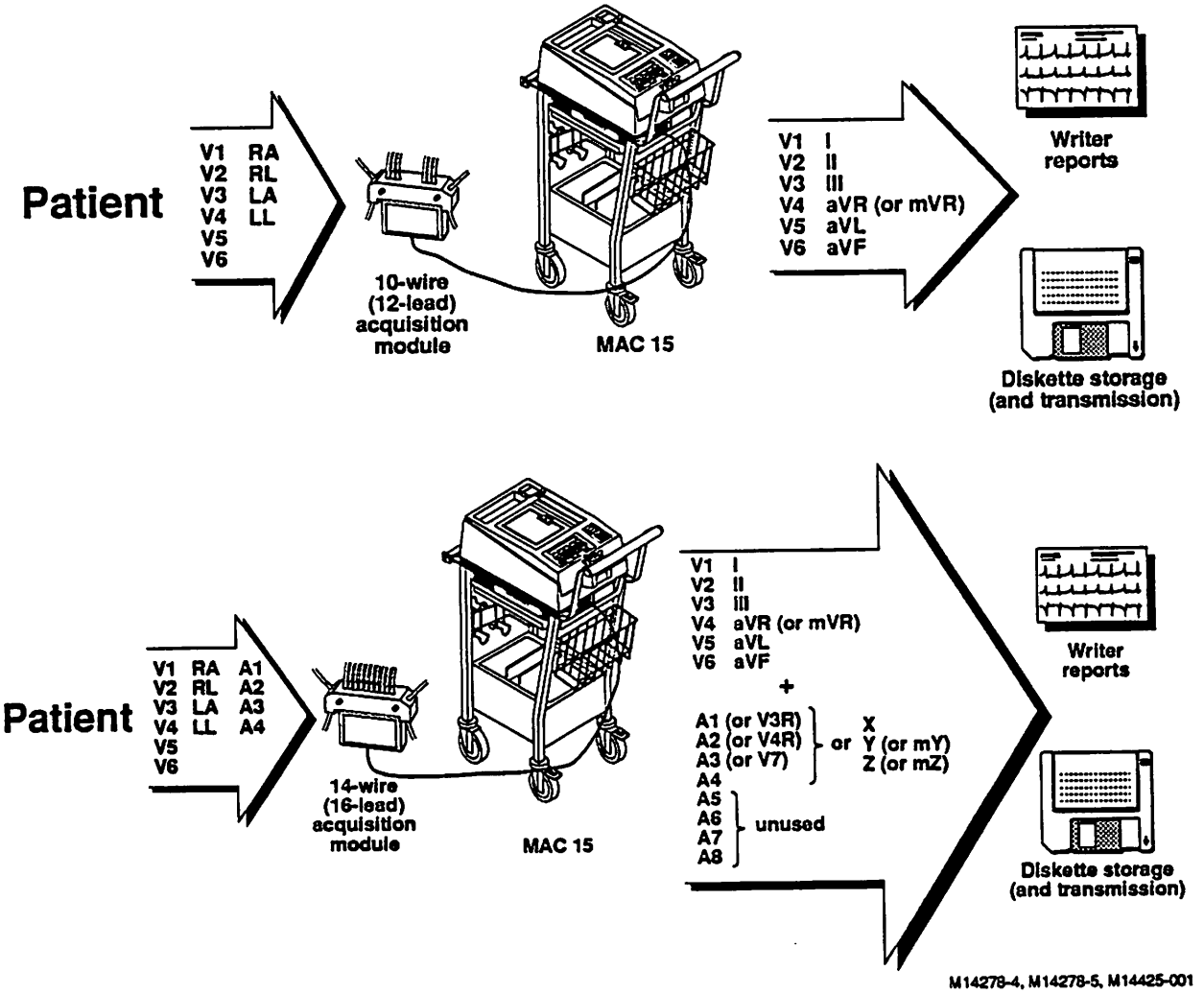
Chapter 2
Preparing the Patient

Chapter Summary

This chapter consists of two sections:

- **10-wire (12-lead) Acquisition Module Use** shows the patient/acquisition module/cardiograph connections using the standard limb and precordial electrode placement, and
- **14-wire (16-lead) Acquisition Module Use** shows the patient/acquisition module/cardiograph connections using the 16-lead acquisition module.

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



M14278-4, M14278-5, M14425-001

10-Wire (12-Lead) Acquisition Module Use

When using the 12-lead acquisition module with the cardiograph, follow these steps to prepare the patient:

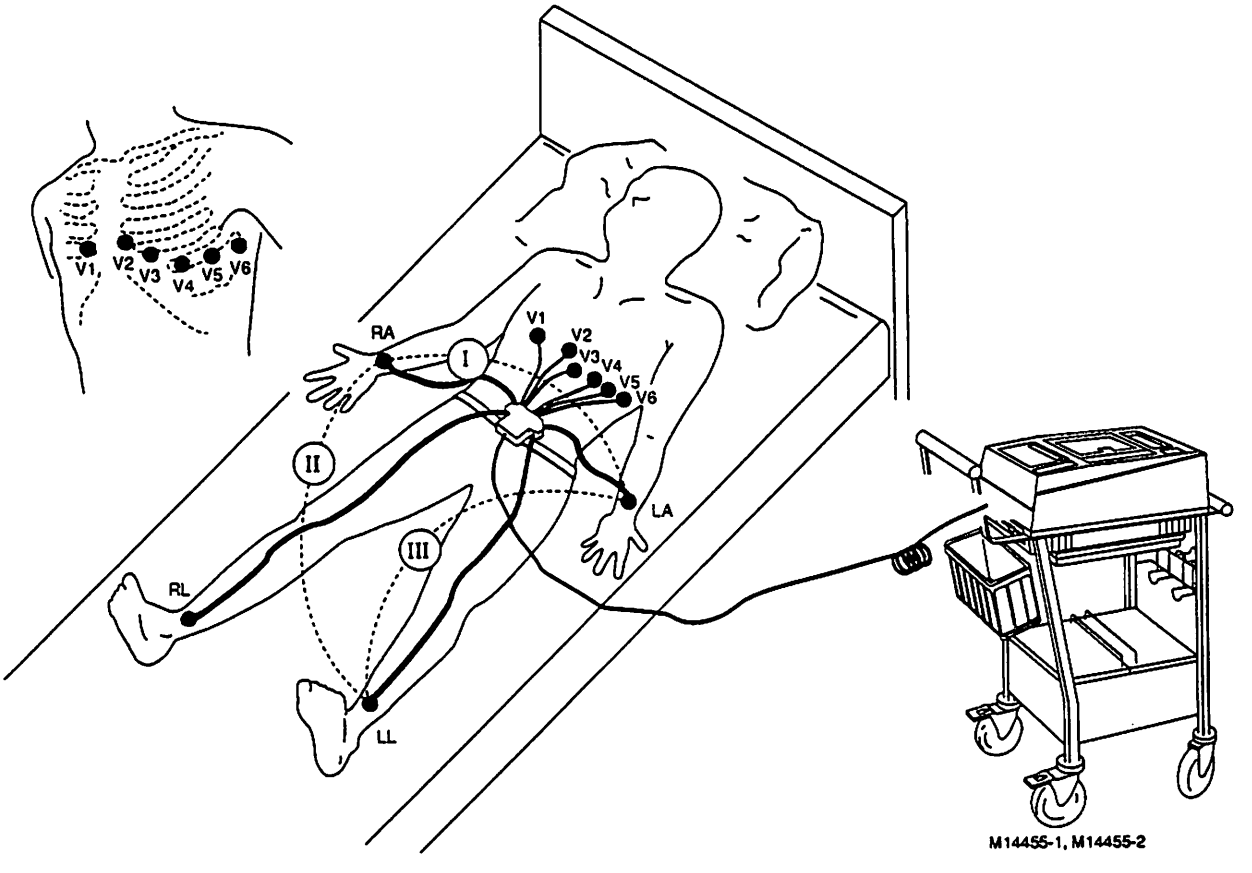
① Make sure you set **10 Wire** in the **AM Type** section of the **Lead Grps** menu. (Refer to "Lead Groups Setup" in "Chapter 12–Cart Setup.")

② Prepare the limb and precordial electrodes.

③ The figure below shows the classical electrode connections. *Better data quality is generally recorded from limb lead positions closer to the trunk.*

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

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



M14455-1, M14455-2

14-Wire (16-Lead) Acquisition Module Use

When using the 16-lead acquisition module with the cardiograph, follow these steps to prepare the patient:

① Make sure you set **14 Wire** in the **AM Type** section of the **Lead Grps** menu. (Refer to "Lead Groups Setup" in "chapter 12–Cart Setup.")

NOTE: The cardiograph has been designed to allow you to select additional lead groups defined as A1, A2, A3, and A4. When selected, the lead group is defined as the difference of electrode site and (RA+LA+LL)/3.

② Prepare the electrodes.

③ Connect the electrodes to the patient.

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

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

XYZ Connection

When operating the cardiograph to obtain XYZ, the A1 through A4 leads must be set to XYZ. To do this, use the **AM Type** function by returning to the *Main Menu*, pressing the [⌂] and [F1] keys at the same time to display the **System Functions** menu, and selecting **Setup**.

After selecting **Setup**, the following password prompt will appear:

```
Password:
```

You'll have to enter a Level 1 password at this point. (The default password is "L1.") Then follow the sequence outlined below:

```
                Cart Setup
Dat/Tim  Phone  Ld Grps Reports   More
```

F3

```
                Lead Groups
 Rhythm Standrd CGR/RMR    S1   AM Type
```

F5

```
AM Type:
10 Wire 14 Wire
```

F2

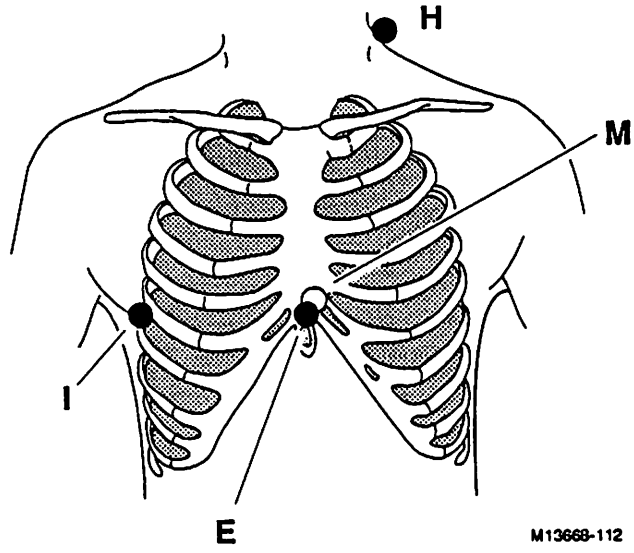
```
Set A1-A4 leads as:
 unused  A1-A4    XYZ  V3R,V4R,V7
```

F3

In an additional prompt, you must decide whether or not the XYZ leads will be stored.

WARNING 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.

The auxiliary (A1 through A4) leadwires from the acquisition module should be connected to the patient as follows: A1 = H position, A2 = E position, A3 = I position, and A4 = M position as shown in the figure below:



H on either side of the neck or anywhere above the shoulders.

E over the mid-sternum at the same horizontal level as V4, V5, and V6.

I at the right mid-axillary line (opposite and on the same level with V6).

M center of the back (opposite E) or slightly off the spine.

V3R, V4R, V7 Connection

When operating the cardiograph to obtain V3R, V4R, and V7, the A1 through A4 leads must be set to V3R, V4R, and V7. To do this, use the **AM Type** function by returning to the *Main Menu*, pressing the [⌂] and [F1] keys at the same time to display the **System Functions** menu, and selecting **Setup**.

After selecting **Setup**, the following password prompt will appear:

```
Password:
```

You'll have to enter a Level 1 password at this point. (The default password is "L1.") Then follow the sequence outlined below:

```
                Cart Setup
Dat/Tim  Phone  Ld Grps Reports   More
```

[F3]

```
                Lead Groups
 Rhythm Standrd CGR/RMR    S1    AM Type
```

[F5]

```
AM Type:
10 Wire 14 Wire
```

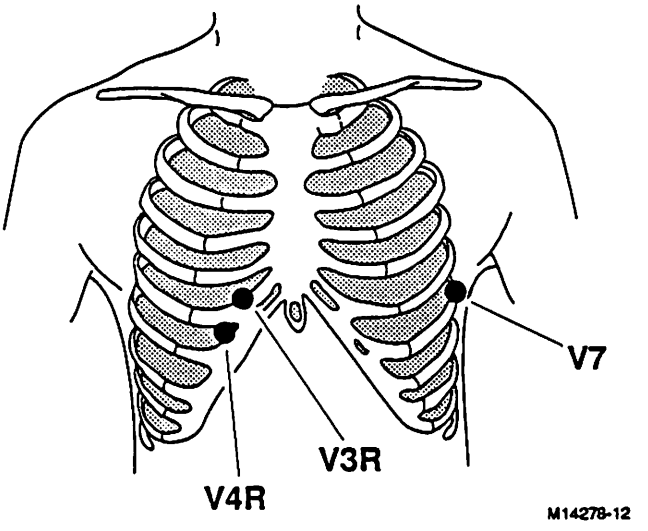
[F2]

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

[F4]

In additional prompts, you must decide which leads—V3R, V4R, and/or V7—will be used, and whether or not these leads will be stored.

The auxiliary (A1 through A4) leadwires from the acquisition module should be connected to the patient as follows: A1 = V3R, A2 = V4R, A3 = V7, and A4 = unused as shown in the figure below:



Chapter 3
Taking a Resting ECG

Chapter Summary

This chapter consists of two parts:

- **Entering Patient Information** shows you how to enter each item found in **PatInfo** (patient information), and
- **Recording an ECG** presents the steps necessary to take a resting ECG.

Pediatric Analysis

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

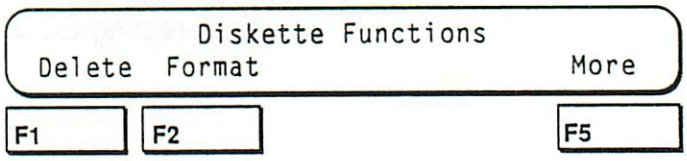
However, if no age is entered, then the cardiograph will always perform an *adult* analysis.

Before you begin...

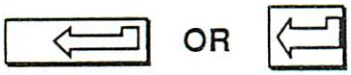
Before you begin entering patient information there are a few special keys you should be familiar with. These keys are explained below.

F1
F2
F3
F4
F5

Function keys select an LCD display function that is directly above the key. For example, in the LCD display below, pressing the F1 key selects the **Delete** function, pressing the F2 key selects the **Format** function, and pressing the F5 key selects **More** which allows you to review additional menu functions.



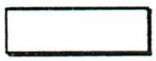
NOTE: As in the example above, LCD displays in this manual will show only those function keys that can actually be used.



ENTER key. After typing information on the keyboard, it is usually necessary to press this key to enter or store what you have typed.

SHIFT key. Used to type shifted characters or to access special functions.

DELETE key. Press this key to erase a character that you have typed on the keyboard.



SPACE BAR key. Press this key to create a space on the LCD display.

CURSOR LEFT key. Press this key to move the LCD display cursor left.

CURSOR RIGHT key. Press this key to move the LCD display cursor right.

BACK UP key. Pressing this key causes the prior LCD display prompt to appear.

STOP key. In most cases, pressing this key returns the LCD display to the *Main Menu* and also stops the printing of a report.

Entering Patient Information

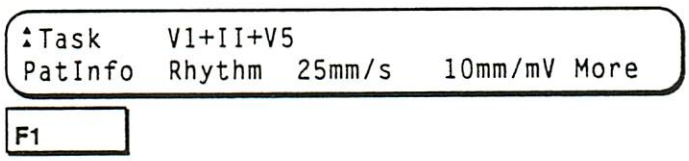
*The items noted with ✻ are the **Patient Info** questions that will appear if **Short** is selected for **Patient Info format** in **Cart Setup**.*

NOTE: It is NOT necessary to enter any of the following information in order to take a resting ECG. You can record an ECG at any time—if the *Main Menu* is displayed—by just pressing the RECORD ECG key.

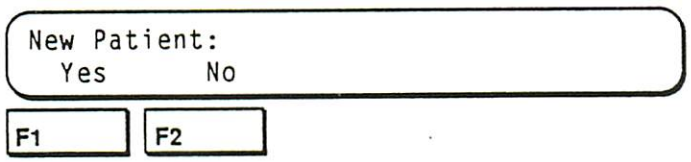
If you do not enter a patient's name and identification number, the patient will be identified by the date and time that the ECG was taken.

Follow these steps to enter patient information:

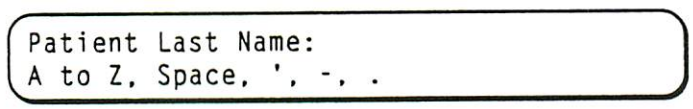
① If the *Main Menu* is not already displayed, then press the STOP key to return to it:



✻ ② Press the F1 key to select **PatInfo**. One of the following two displays will appear:



OR



If the first display appears, select either **Yes** or **No** by pressing the appropriate function key. Then press the ⇦ key.

If the second display appears, type in the patient's last name. Then press the ⇦ key.

✻ ③ The following prompt will appear:

```
Patient First Name:
A to Z, 0 to 9, Space, ', -, .
```

Type in the patient's first name. Then press the ⇦ key.

✻ ④ Next, the following prompt will appear:

```
Patient ID:
Digits 0 To 9
```

Type in the patient's identification number (PID). Then press the ⇦ key.

NOTE: The number of digits used for the patient ID can be changed in the **Cart Setup** menu.

⑤ The following prompt will then appear:

```
Referred By:
(Physician Name)
```

Type in the name of the referring physician. Then press the ⇦ key.

✻ ⑥ The following prompt will then appear:

*If **Short** is selected for **Patient Information format**, this prompt appears at a later point.*

```
Location Number:
0 - 99
```

Type in the location number. Then press the ⇦ key.

⑦ After entering location number, the following prompt will appear:

```
Room Number:
Any 5 characters
```

Type in the patient's room number using either letters and/or numbers. Then press the ⇦ key.

✻ ⑧ After entering a room number, one of the following two displays will appear:

```
Date of Birth (DD MMM YY):
DD-Day, MMM-Month Name, YY-Year
```

OR

```
Patient Over 1 Year Old:
  Yes      No
```

F1 F2

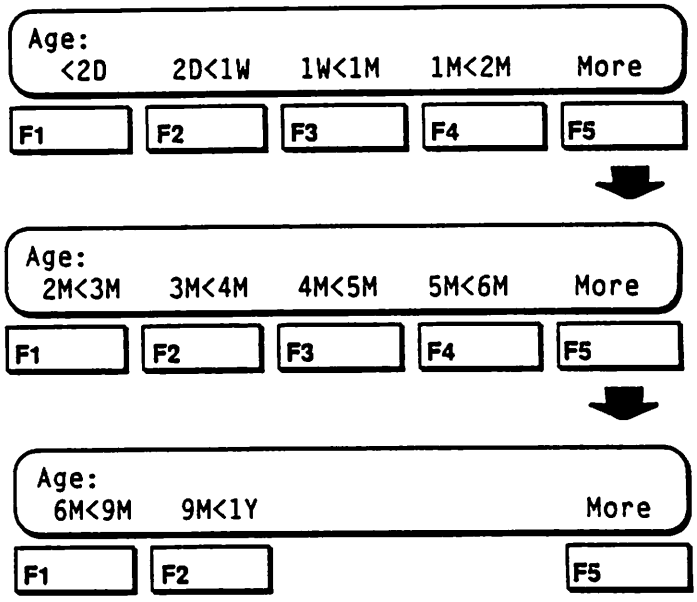
NOTE: Use the **Cart Setup** menu to set whether a patient's age is represented as a date of birth or in years.

NOTE: If an age of 15 years or less is entered, then the 12SL analysis program will perform a pediatric analysis. *If no age is entered, then an adult analysis will be performed.*

If the first display appears (**Date of Birth**), type in the patient's date of birth in day-month-year order (for example, 23 MAR 45), and be sure to type a space after the day and after the month. Then press the ⇦ key and go to step ⑩.

NOTE: DOB will not work for patients born before 1900.

If the second display appears (**Patient Over 1 Year Old**), then select either **Yes** or **No**. If you select **Yes**, then go to step ⑨. If you select **No**, then choose the child's age from one of the following displays and go to step ⑩.



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

✻ ⑨ If you are entering the age for a patient who is <u>over</u> 1 year old, then the following display will appear:

Type in the patient's age. Then press the ⇦ key.

⑩ After entering a patient's age, one of the following two displays will appear:

```
Height (in inches):
0 to 999
```

OR

```
Height (in cm):
0 to 999
```

Type in a number for the patient's height. Then press the ⇦ key.

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

⑪ After entering a patient's height, one of the following two displays will appear:

```
Weight (in lbs):
0 to 999
```

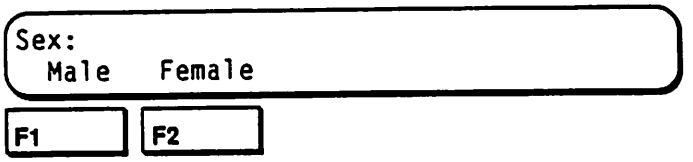
OR

```
Weight (in kg):
0 to 999
```

Type in a number for the patient's weight. Then press the ⇦ key.

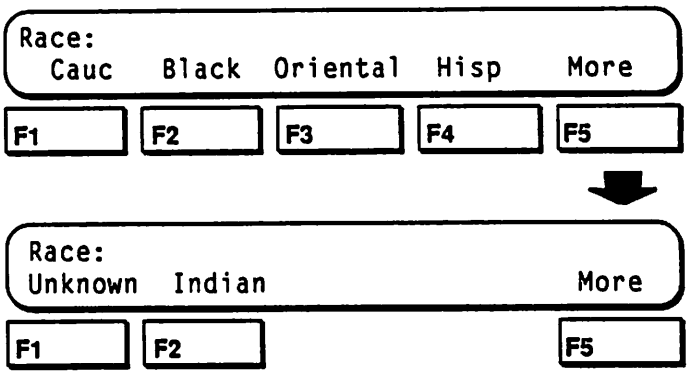
NOTE: The **Cart Setup** menu can be used to represent weight in either pounds or kilograms.

✻ ⑫ After entering the patient's weight, the following prompt will appear:



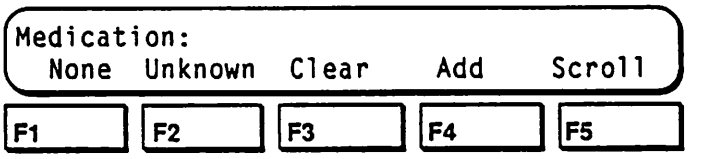
Select the patient's sex by pressing the appropriate function key. Then press the ⇦ key.

⑬ The following prompt will then appear:



Select the patient's race by pressing the appropriate function key. Then press the ⇦ key.

⑭ The next prompt that appears allows you to add to, clear, or review a patient's medications:



None means that the patient is taking no medications.

Unknown should be used if you don't know what medications the patient is taking.

Clear will erase all medications that are currently entered for the patient.

Add can be used to add a medication that the patient is taking.

Scroll allows you to review the patient's medications one at a time.

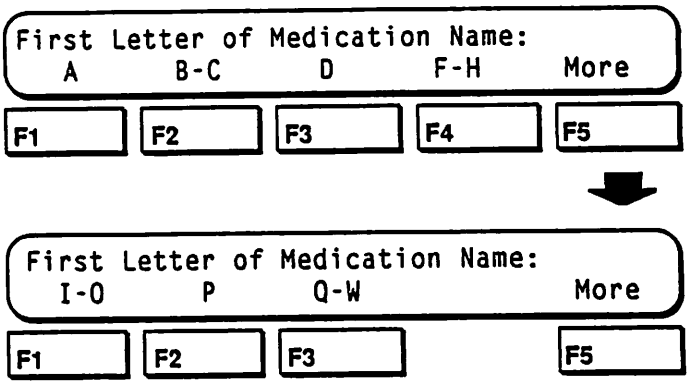
Press the appropriate function key and then press the ⇦ key.

If you selected either **None**, **Unknown**, or **Clear**, then go to step ⑯.

If you selected **Add**, then go to step ⑮.

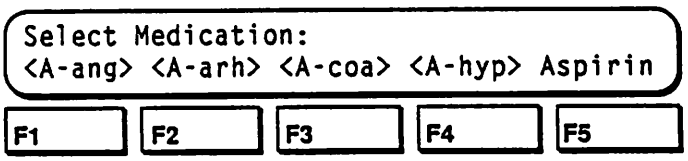
If you selected **Scroll**, then each time you press the F5 key for **Scroll**, the next medication that the patient is taking will appear on the display. After reviewing all medications, press the ⇦ key to continue. Then go to step ⑯.

⑮ After selecting **Add**, the following display will appear:



To add a medication, first press the function 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 ⇦ key.

Next, select a medication from the list that appears. For example, if you pressed the F1 key to select medications that begin with the letter **A**, the following display would appear:



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

NOTE: The major medical groups are displayed between the < > symbols.

A list of the medications you can add is presented on the next page.

The following is a list of medications that you can add:

A

<A-ang> (antianginal)
<A-arh> (antiarrhythmic)
<A-coa> (anticoagulants)
<A-hyp> (antihypertensive)
Aspirin

B-C

<BetaB> (beta blockers)
CalcBlk (calcium blockers)
Catopri (Catopril)
Clonid (Clonidine)
Coumadn (Coumadin)

D

Digital (Digitalis)
Digitox (Digitoxin)
Digoxin (Digoxin-Lanoxin)
<Digox> (digoxin)
<Diurt> (diuretics)
Dysopyr (Dysopyramide)

F-H

Furosem (Furosemide)
Heparin
Hydral (Hydralazine)

I-O

Isosorb (Isosorbide)
Lidoca (Lidocaine)
Nitrate (nitrates)
Other

P

Phenoth (Phenothiazine)
Phenytn (Phenytoin)
Procain (Procainamide)
Propran (Propranolol)
<Psych> (psychotropic)

Q-W

Quinid (Quinidine)
Reserp (Reserpine)
Thiazid (Thiazide)
Tricyli (Tricylic antidepressent)
Warfar (Warfarin)

✻ ⑯ The following prompt will only appear if you answered yes to the **Ask Options Question** prompt in the **Cart Setup** menu:

```
Option Number:
0 to 99
```

Type in a number from 0 to 99. *You determine what option numbers stand for. For example, these numbers could be used to identify technicians, for quality control, etc.* Then press the ⇦ key.

✻ ⑰ 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
```

Type in the systolic blood pressure number. Then press the ⇦ key and the next blood pressure prompt will appear:

```
Diastolic Blood Pressure:
0 - 199
```

Type in the diastolic blood pressure number. Then press the ⇦ key.

⑱ The *Main Menu* will then reappear:

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

Recording an ECG

*The **Vector** or **Pediatric** functions can also be used to record an ECG. (Refer to "Vector Function" or "Pediatric Function" at the end of this chapter.)*

To record an ECG, follow the steps below:

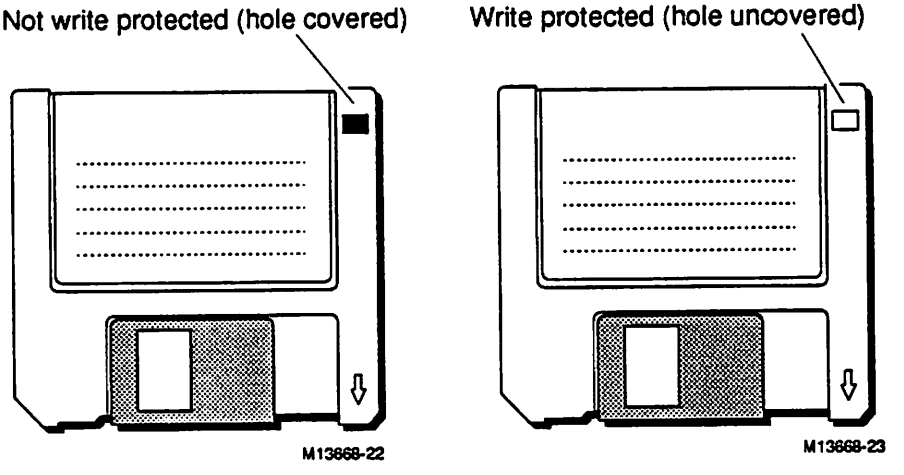
① Prepare the cardiograph as described in chapter 1.

② Prepare the patient as described in chapter 2.

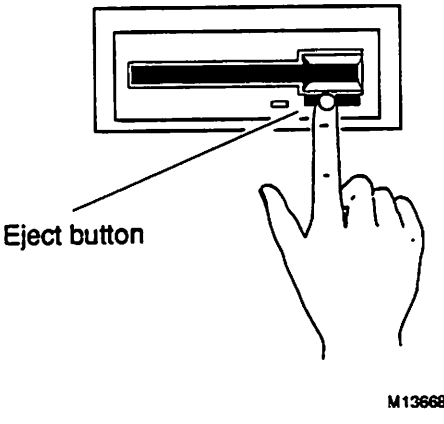
③ If you want, enter patient information (**PatInfo**) as described in the previous section. You do NOT have to enter patient information in order to record an ECG.

④ If you do not want to save the ECGs that you will record, 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 (as shown below):

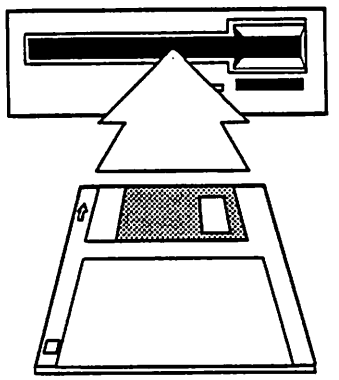
• Front of Diskette •



NOTE: If there already is a diskette in the diskette drive slot, remove it by pressing the eject button:



⑤ Insert the diskette—label side up—that you want to save the ECGs on into the diskette drive slot:



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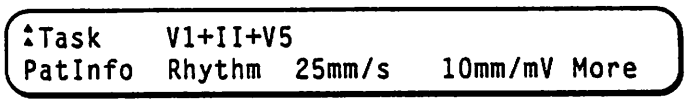
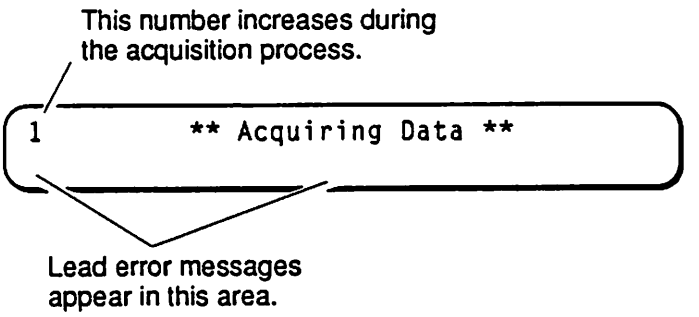
⑥ If the *Main Menu* is not already displayed, then press the STOP key to return to it:



⑦ Press the RECORD ECG key. The following display will appear:



If no lead error messages appears, then go to step ⑧.

However, 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 **** and the like.)

If you correct the lead error, the lead error message will disappear, and 10 seconds of data will be acquired by the cardiograph. In this case, go to step ⑧.

If you override the lead error by pressing the RECORD ECG *key*, a display similar to the following will appear:

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

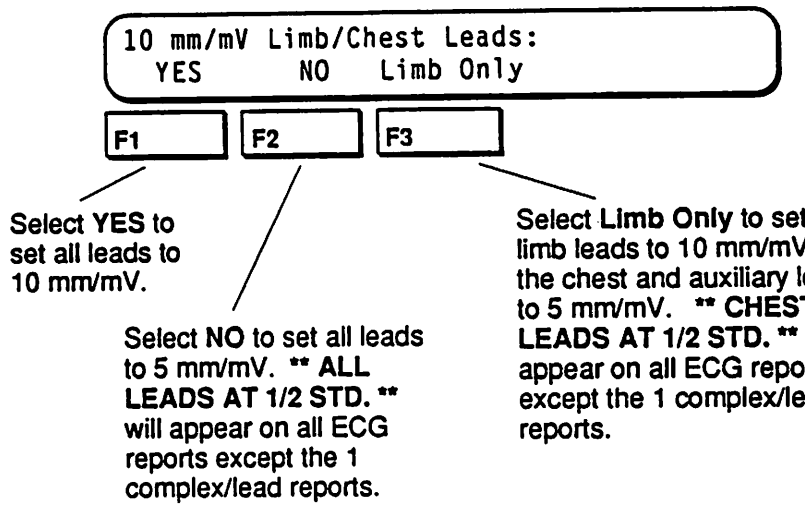
The override message and the error condition will appear on all ECG reports printed immediately after acquisition. However, the override message and the error condition will not be stored to diskette or transmitted.

⑧ When the cardiograph has acquired the ECG, the following prompt will appear:

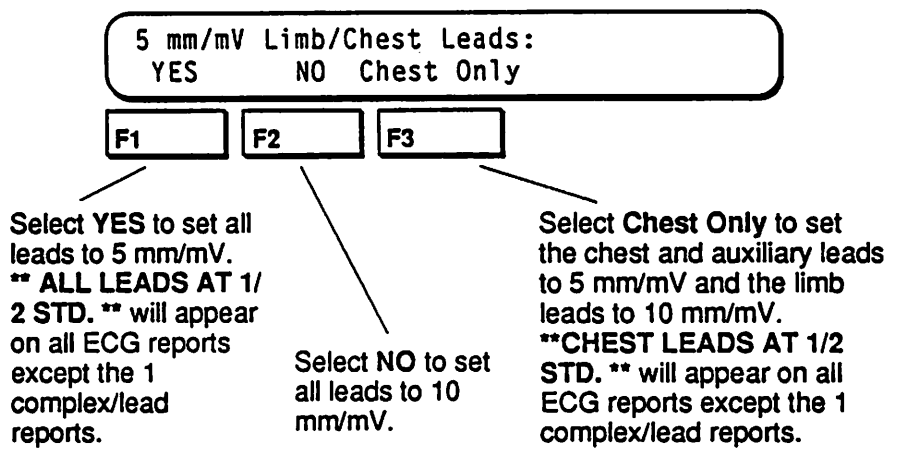
```
** ECG Acquisition Complete **
```

⑨ If you answered yes to the **Disable Automatic Gain Check** prompt in the **Cart Setup** menu, go to step ⑩.

If the *Main Menu* gain is set to 5 mm/mV and a normal or low amplitude ECG was just acquired, the following display will appear:



If the *Main Menu* gain is set to 10 mm/mV and a high amplitude ECG was just acquired, the following display will appear:



⑩ Next, the cardiograph will process the ECG and then begin printing reports.

```
** Analyzing ECG **
```

THEN

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

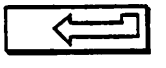
These numbers will vary according to how many unconfirmed reports you have selected to print.

If you answered no to the **Ask for Extra Copies of Plots** prompt in the **Cart Setup** menu, then go to step ⑫ .

However, if you asked for the extra copies prompt, then the following display will appear after all reports have been printed:

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

Type in the number of copies you want.

Then press the  key.

⑪ The following prompt will then appear:

```
Change Writer Setting for Reports?:
  Yes      No
```

F1 F2

Press the appropriate function key.

Then press the ⇦ key.

If you selected **No**, then the cardiograph will use the current writer settings (speed, gain, and filter) to print the copies. Then go to step ⑫.

If you selected **Yes**, then the following will appear:

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

F1 F2 F3 F4 F5

Press the F1 key for **PRINT** to begin printing the report copies.

OR

Press the F2 key for **NoPrint** to cancel printing.

OR

Press the F3 key to change the writer speed.

OR

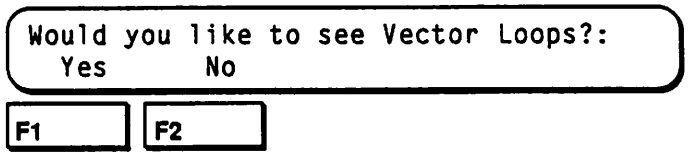
Press the F4 key to change the writer gain.

OR

Press the F5 key to change the writer filter.

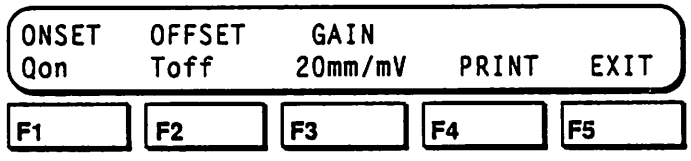
This prompt only appears when using software versions 006A or 106A

⑫ If the acquisition module type is set to **14 Wire** and the auxiliary leads are defined as **XYZ**, then the following vector loop report prompt will appear. Otherwise, go to step ⑬.



If you selected **No**, go to step ⑬.

If you selected **Yes**, then the following will appear:



- Press the F1 key to change the vector loop onset {for example, **Qon** (Q onset), **Qoff** (Q offset), etc} or clear any onset increment value (for example, **Qon+8**).

OR

- Press the F2 key to change the vector loop offset {for example, **Poff** (P offset), **Toff** (T offset), etc} or clear any onset increment value (for example, **Toff+8**).

OR

Press the F3 key to change the vector loop gain.

OR

Press the F4 key to print a vector loop plot. (If the cardiograph "beeps" instead of printing a report, make sure the onset and offset locations are not in error.)

OR

Press the F5 key to exit this prompt and continue with the next step.

- Press the ⇧ and F1 keys at the same time to add 4 milliseconds to the onset increment value.
  Press the ⇧ and F2 keys at the same time to add 4 milliseconds to the offset increment value.

⑬ After all reports have been printed, the following displays will appear:

```
** Processing ECG For Storage **
```

THEN

```
** Write To Diskette **
```

THEN

If a diskette error occurs, go to step ⑭.

If no diskette error occurs, the following will appear:

```
Storage to Diskette Complete
Type Any Key to Continue
```

Typing any key returns you to the *Main Menu*:

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

⑭ If a diskette error occurs, a display similar the following will appear:

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

Then a display similar to one of the following will appear:

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

OR

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

F1 F2

The first display will only appear if your cardiograph is equipped with a modem. In this case the cardiograph will try to transmit the recently acquired ECG using the **Cart Setup** phone number. (Refer to "Phone 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 (if your cardiograph is equipped with a modem.) Otherwise, select **No**, and the recently acquired ECG will be lost.

Vector Function

The method just 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 easier method for recording a 14-lead XYZ ECG because:

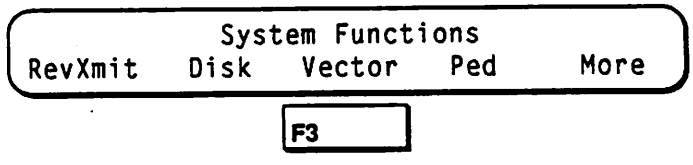
- *XYZ configuration is assumed for the A1 through A4 leadwires.* Therefore, it is not necessary to use the **Cart Setup** menu to set XYZ for the A1 through A4 leadwires.
- *XYZ leads are automatically stored/transmitted after acquisition.* Therefore, it is not necessary to use the **Cart Setup** menu 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, the [RECORD ECG] key must be pressed 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 ⑥ of the previous "Recording an ECG" section.

② From the *Main Menu*, press the [⌂] and [F1] keys at the same time to display the **System Functions** menu:



③ Select **Vector** by pressing the [F3] key, and a display similar to the following will appear:

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

The ECG will be acquired, reports printed, and the ECG stored/transmitted as described in steps ⑦ through ⑭ of the previous "Recording an ECG."

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 because:

- *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, the [RECORD ECG] key must be pressed to override a lead error.

*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 analysis program to do a Pediatric Analysis, the patient's age entered in **PatInfo** must be 15 years or less. If the age entered is 16 years or more or if no age is entered, an adult analysis will be performed.*

1. Follow steps 1 through 6 of the previous "Recording an ECG" section.

2. From the *Main Menu*, press the [△△] and [F1] keys at the same time to display the **System Functions** menu:

```
                System Functions
RevXmit   Disk   Vector   Ped     More
                                  [F4]
```

3. Select **Ped** (Pediatric) by pressing the [F4] key, and a display similar to the following will appear:

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

The ECG will be acquired, a report in the Pediatric format will be printed, and the ECG stored/transmitted as described in steps 7 through 14 of the previous "Recording an ECG."

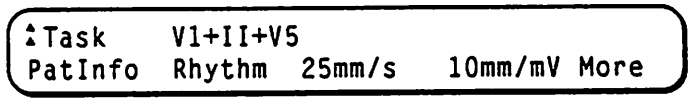
Chapter 4
Printing a Rhythm Strip

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

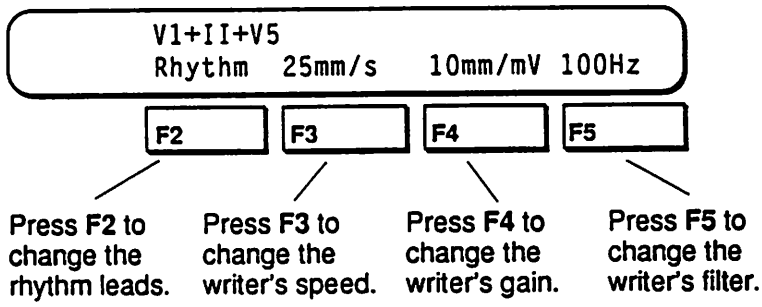
① Prepare the cardiograph as described in chapter 1.

② Prepare the patient as described in chapter 2.

③ If the *Main Menu* is not already displayed, then press the [STOP] key to return to it:



④ Next, press the [RECORD RHYTHM] key. The writer will start printing a rhythm report, and the *Main Menu* will change to the following:



If no lead error occurs, then go to step ⑤.

However, if a lead error occurs, a lead error message will appear on the *Main Menu*, similar to the following:

The lead error may be corrected or overridden.

If you correct the lead error, the lead error message will disappear. In this case, go to step ⑤.

If you override the lead error by pressing the RECORD RHYTHM *key*, the following will appear:

```
** LEAD ERROR OVERRIDE **
    Rhythm  25mm/s   10mm/mV 100Hz
```

⑤ To stop the printing of a rhythm report, press the STOP key.

Chapter 5
Transmitting an ECG

Chapter Summary

This chapter is divided into five sections:

- **Receiving an ECG by Telephone** shows you how to use the cardiograph's optional modem to receive ECGs over a telephone line,
- **Receiving an ECG Locally** shows how to receive ECGs from another unit by using a special cable to connect the cardiograph to the other unit,
- **Transmitting an ECG by Telephone** shows you how to use the cardiograph's optional modem to send reports over a telephone line,
- **Transmitting an ECG Locally** shows you how to send ECGs to another unit using a special cable to connect the cardiograph to the other unit, and
- **Receiving an ECG from a MAC PC** shows you how to receive ECGs from a MAC PC using a cable to connect the MAC PC to the cardiograph.

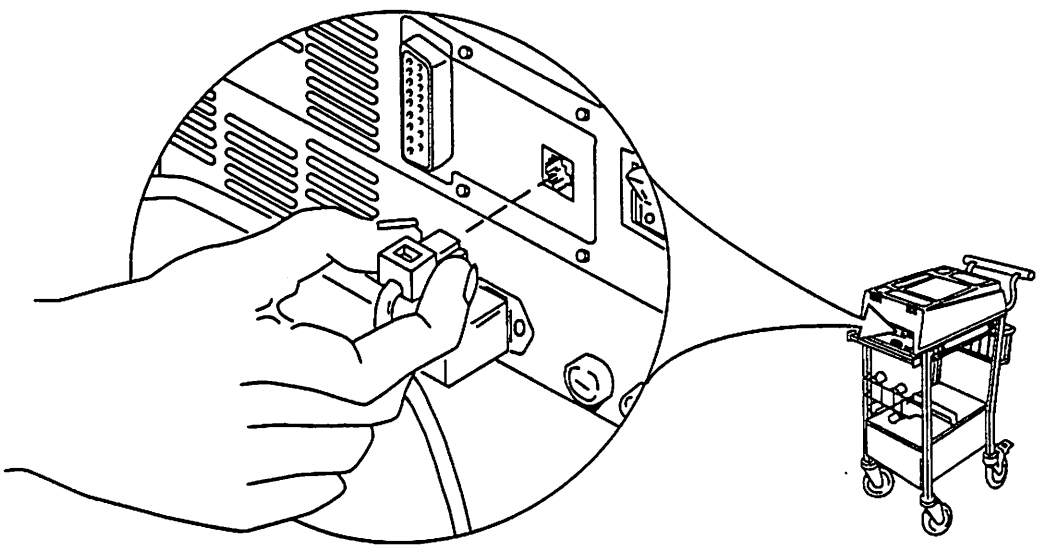
Receiving an ECG by Telephone

NOTE: You can only receive ECGs by telephone if your cardiograph has been equipped with a modem.

To receive ECGs by telephone, follow these steps:

① Prepare the cardiograph as described in chapter 1.

② Connect a phone line from a telephone wall jack to the phone jack on the back of the cardiograph (as shown below):



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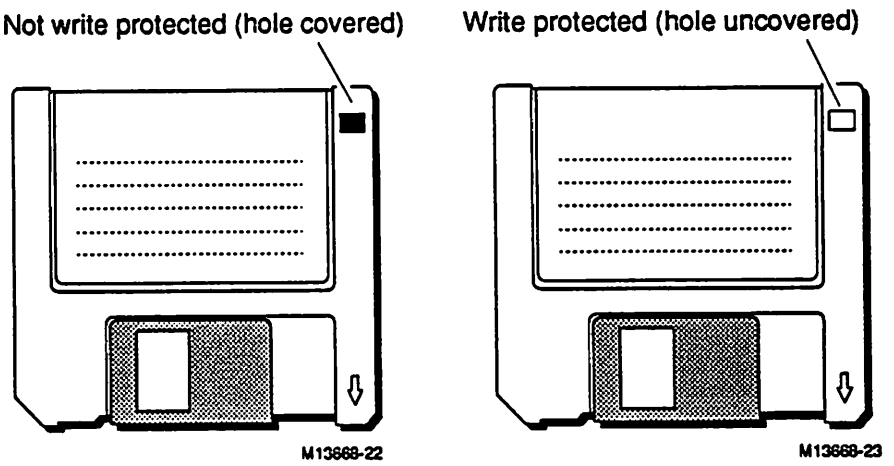
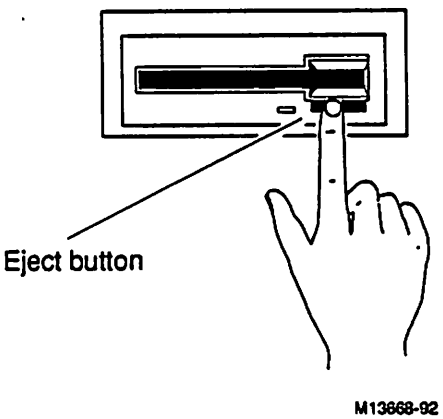
③ If you do not want to save the ECGs that you will receive, remove any diskette that is in the diskette drive, and go to step ⑤. Otherwise, make sure you have a diskette that can be used to save the ECGs. Also, make sure that this diskette is not write protected (as shown below):

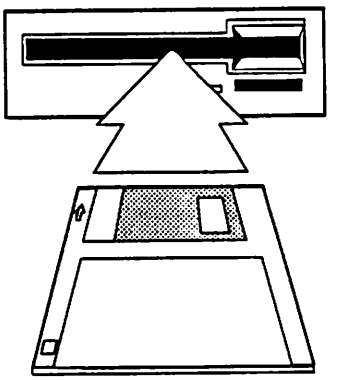
• Front of Diskette •



NOTE: If there already is a diskette in the diskette drive slot, remove it by pressing the eject button:



④ Insert the diskette—label side up—that you want to save the ECGs on into the diskette drive slot:



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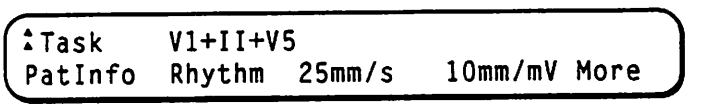
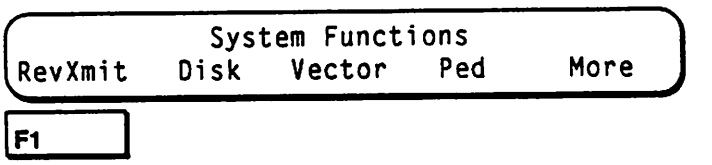
⑤ If the *Main Menu* is not already displayed, then press the STOP key to return to it:



⑥ Next, press the ⇧ and F1 keys at the same time to display the **System Functions** menu:



⑦ Next, press the [F1] key for **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, then go to step ⑧ . Otherwise, the following display will appear:

```
Receiving Device:
 Phone  Local
```

[F1]

Since you will be receiving by telephone, press the [F1] key for **Phone**. Then press the [⇦] key.

⑧ The cardiograph will now check for a diskette in the diskette drive and the following display will appear:

```
      ** Reverse Transmission **
Check the Diskette
```

If there is no diskette in the disk drive, then the cardiograph will only be able to print the reports you will receive. The following message will appear:

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

Then 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 by pressing the [STOP] key.

⑨ After checking for a diskette, the cardiograph will check the phone line. This message will appear:

```
      ** Reverse Transmission **
Check the Phone Line
```

One the following two messages will then 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 cardiograph, and then restart this procedure.

If the **Ready to Receive** message appears, then continue with the next step.

⑩ The **Ready to Receive** message will remain on the display until your cardiograph receives a telephone call from the unit that will be sending the ECGs. Then this message will appear:

```
      ** Reverse Transmission **
Answering the Phone
```

⑪ For each ECG received, the following two displays will be repeated:

```
      ** Reverse Transmission **
Receiving Data
```

THEN

```
      ** Reverse Transmission **
End of Data Packet
```

⑫ When all ECGs have been received, the following message will appear:

```
      ** Reverse Transmission **
End of Transmission
```

The cardiograph will now begin printing ECG reports. This display will appear:

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

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

⑬ When the last ECG report has been printed, the following will appear:

```
      ** Reverse Transmission **
Ready to Receive
```

Press the [STOP] key to return to the *Main Menu*.

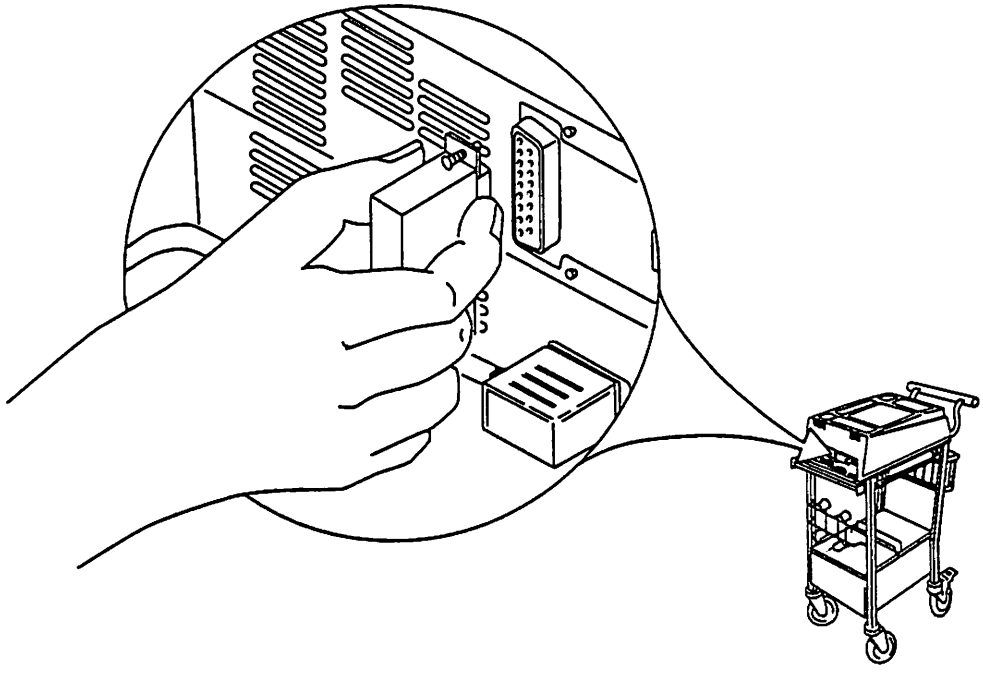
Receiving an ECG Locally

NOTE: You can only receive ECGs locally if you have a serial transmission cable. (Refer to the **MAC 15 Service Manual** for details.)

To receive ECGs locally, follow these steps:

① Prepare the cardiograph as described in chapter 1.

② Connect the serial transmission cable from the other unit (for example, another cardiograph) to the AUX DATA (RS232) port at the back of your cardiograph (as shown below):



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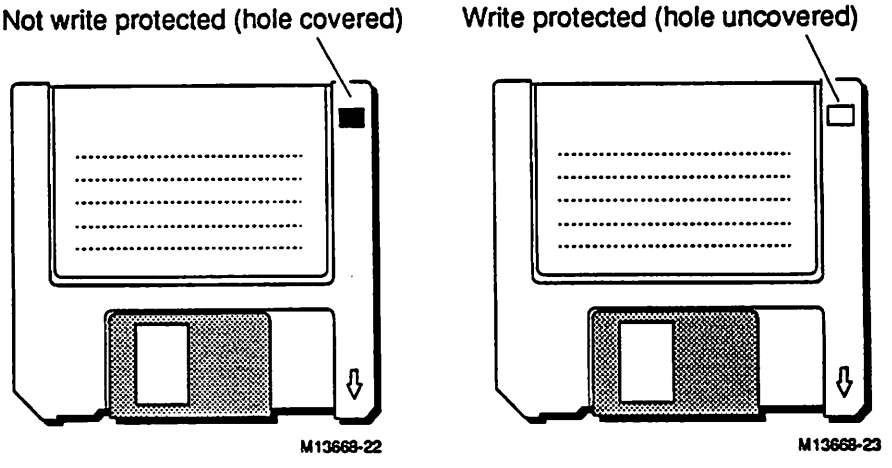
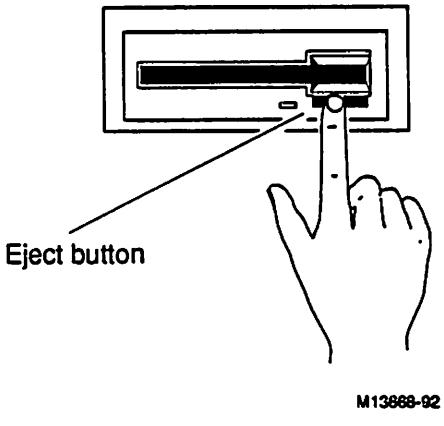
③ If you do not want to save the ECGs that you will receive, remove any diskette that is in the diskette drive, and go to step ⑤. Otherwise, make sure you have a diskette that can be used to save the ECGs. Also, make sure that this diskette is not write protected (as shown below):

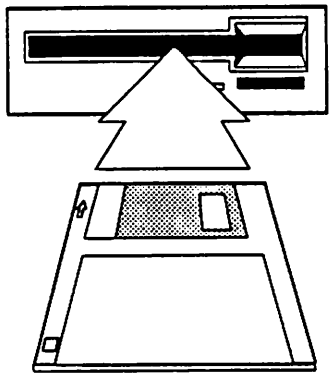
• Front of Diskette •



NOTE: If there already is a diskette in the diskette drive slot, remove it by pressing the eject button:



④ Insert the diskette—label side up—that you want to save the ECGs on into the diskette drive slot:



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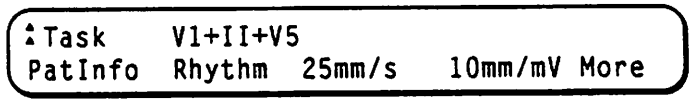
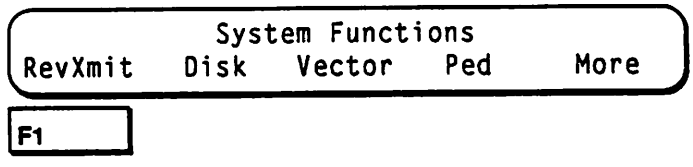
⑤ Make sure that you answered yes to the **Will the Local Line be Used** prompt in the **LclLine** section of the **Cart Setup** menu.

⑥ If the *Main Menu* is not already displayed, then press the STOP key to return to it:



⑦ Next, press the ⇧ and F1 keys at the same time to display the **System Functions** menu:



⑧ Next, press the F1 key for **RevXmit** (Reverse Transmission). The following display will appear:

```
Receiving Device:
 Phone  Local
```

F2

Since you will be receiving locally, press the F2 key for **Local**. Then press the ⇦ key.

⑨ This message will briefly appear:

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

⑩ For each ECG received, messages similar to the following will be displayed:

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

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

THEN

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

THEN

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

⑪ After all ECGs have been received, the following display will appear:

```
    ** Local Reverse Transmission **
Waiting #13                    Retry #0
```

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

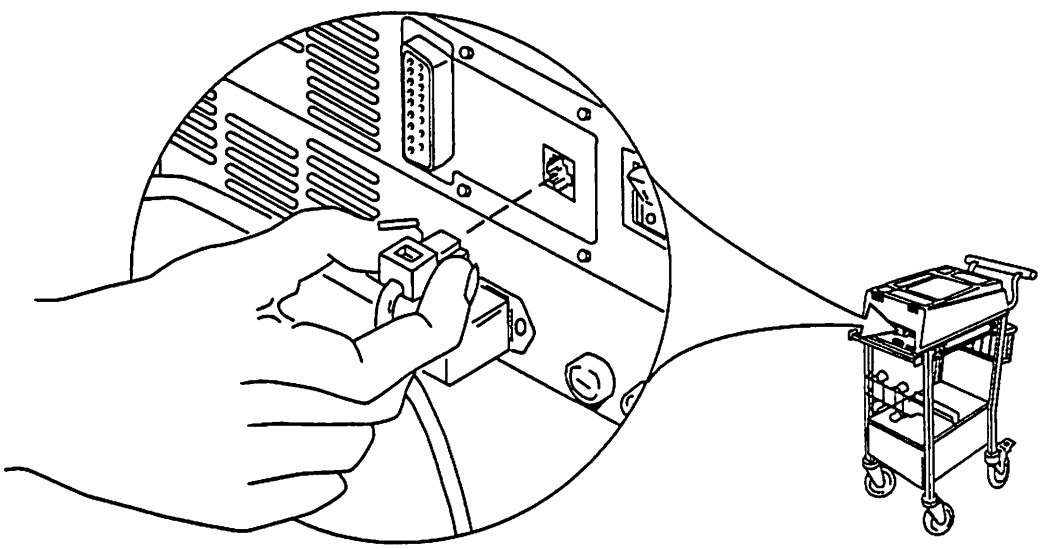
Transmitting an ECG by Telephone

NOTE: You can only transmit ECGs by telephone if your cardiograph has been equipped with a modem.

To transmit ECGs by telephone, follow these steps:

① Prepare the cardiograph as described in chapter 1.

② Connect a phone line from a telephone wall jack to the telephone jack on the back of the cardiograph (as shown below):



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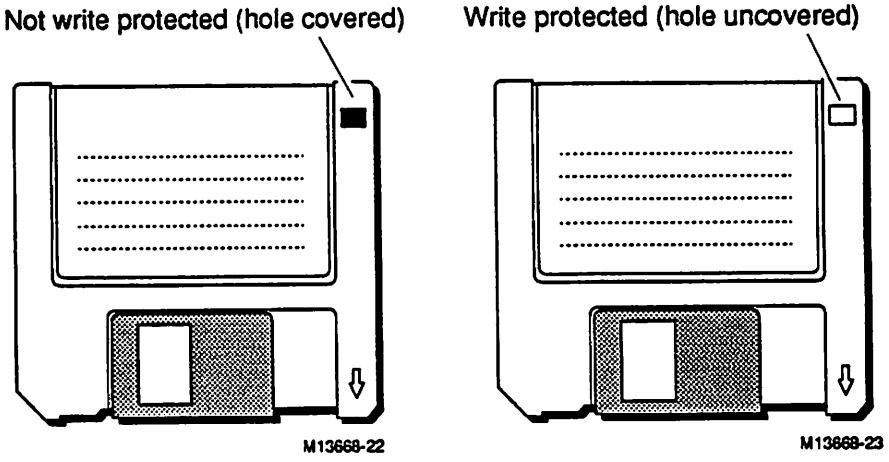
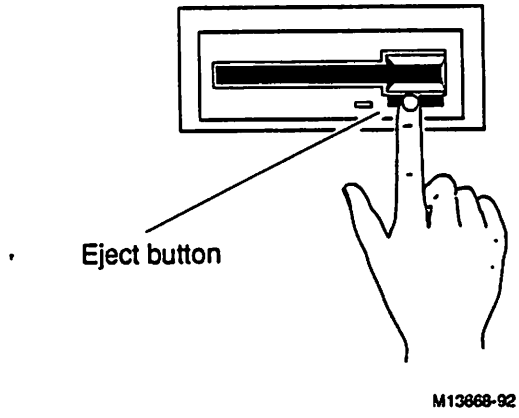
③ When an ECG is transmitted, the cardiograph will try to delete the ECG it just transmitted. If you do not want the ECGs on diskette deleted, then make sure your ECG diskette is write protected with the write-protect tab exposing the small hole on the diskette:

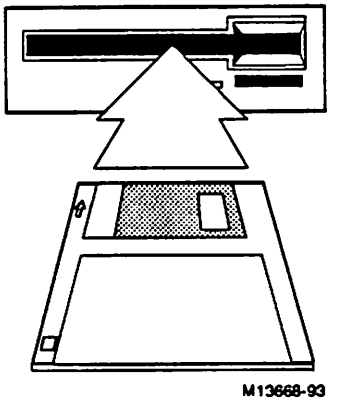
• Front of Diskette •



NOTE: If there already is a diskette in the diskette drive slot, remove it by pressing the eject button:



④ Insert the diskette—label side up—that contains the ECGs for transmitting into the diskette drive slot:



⑤ If the *Main Menu* is not already displayed, then press the STOP key to return to it:

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

⑥ Next, press the ⇧ and F1 keys at the same time to display the **System Functions** menu:

```
            System Functions
RevXmit   Disk   Vector   Ped      More
```

F2

Press the F2 key for **Disk**.

⑦ The following display will appear:

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

F1

Press the F1 key for **Xmit** (Transmission).

⑧ If you answered no to the **Will the Local Line be Used** prompt in the **LclLine** section of the **Cart Setup** menu, then go to step ⑨. Otherwise, the following display will appear:

```
Transmission Device:
 Phone  Local
```

F1

Since you will be transmitting by phone, press the F1 key for **Phone**. Then press the ⇦ key.

⑨ This message will briefly appear:

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

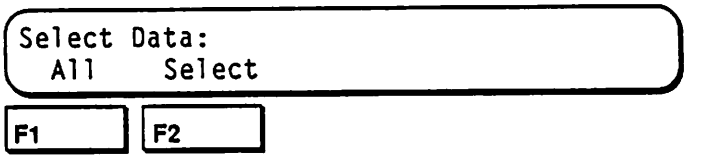
⑩ Next, a phone number prompt will appear:

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

If you have not already entered a phone number, then type in one. Do <u>not</u> use spaces or dashes (-) in the number. However, 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.

After typing the number, press the ⇦ key.

⑪ The next prompt allows you to send either all or just some of the ECGs on your diskette:

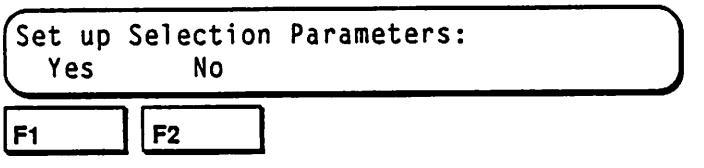


Choose **All** to transmit all the ECGs on your diskette, and then go to step ⑳.

OR

Choose **Select** to select which ECGs to transmit from your diskette, and then continue with the next step.

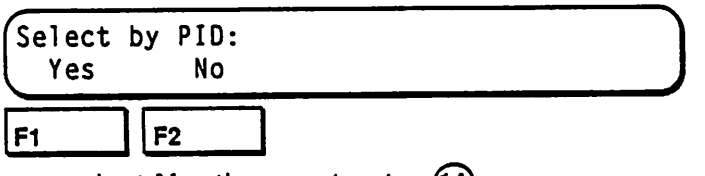
⑫ After choosing **Select**, the following will appear:



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

If you select **No**, then go to step ⑱.

⑬ After selecting **Yes**, the first selection prompt will appear:



If you select **No**, then go to step ⑭.

If you select **Yes**, then the following display will appear:

Type in the patient's identification number (PID) that will be used to select ECGs. Then press the ⇦ key.

⑭ Next, a prompt will appear that allows you to select those ECGs that have the same MUSE site number:

```
Select by Site:
  Yes      No
```

F1 F2

If you select **No**, then go to step ⑮.

If you select **Yes**, then the following display will appear:

```
Site Number:
1 - 255
```

Type in the MUSE site number that will be used to select ECGs. Then press the ⇦ key.

⑮ The next prompt that appears allows you to select ECGs by their MUSE location number:

```
Select by Location:
  Yes      No
```

F1 F2

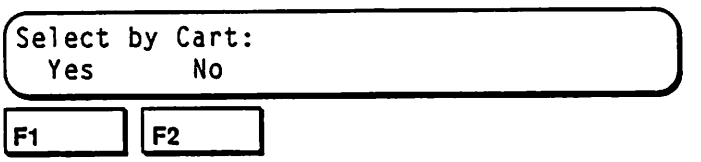
If you select **No**, then go to step ⑯.

If you select **Yes**, then the following display will appear:

```
Location Number:
0 - 99
```

Type in the MUSE location number that will be used to select ECGs. Then press the ⇦ key.

⑯ The next prompt that appears allows you to select ECGs by their cart number:

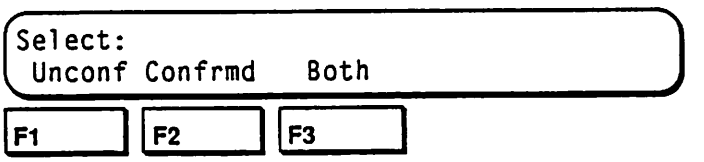


If you select **No**, then go to step ⑰.

If you select **Yes**, then the following display will appear:

Type in the cart number that will be used to select ECGs. Then press the ⇦ key.

⑰ Then the following prompt will appear:



Choose **Unconf** if you want only unconfirmed ECGs to be transmitted.

OR

Choose **Confrmd** if you want only confirmed ECGs to be transmitted.

OR

Choose **Both** if you want unconfirmed and confirmed ECGs to be transmitted.

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

⑱ Next, one of the following two displays, or one very similar, will appear:

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

OR

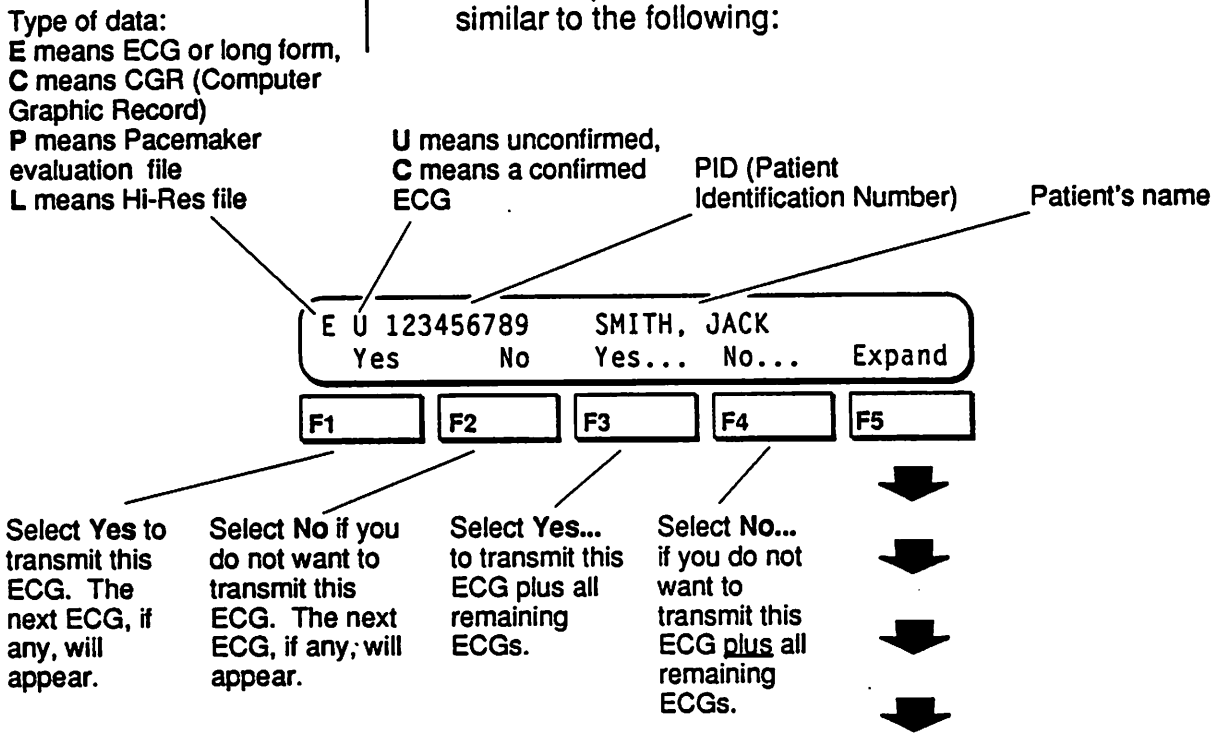
```
E U 123456789     SMITH, JACK
  Yes       No     Yes...  No...   Expand
```

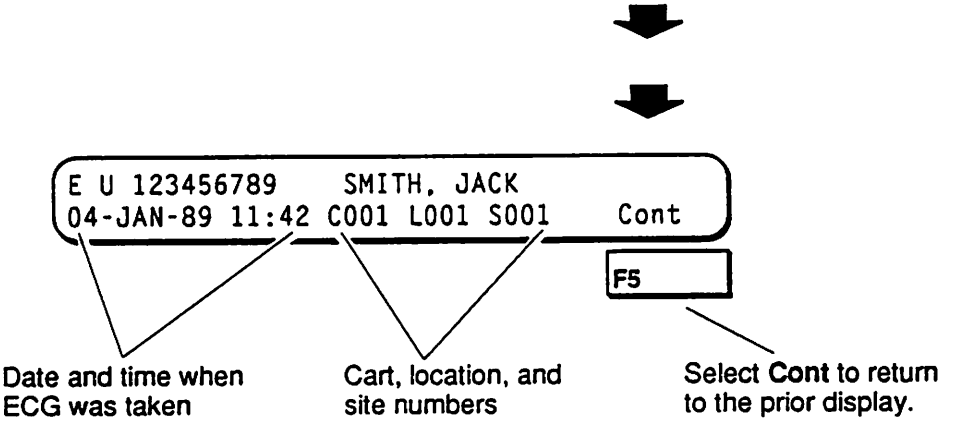
F1 F2 F3 F4 F5

If the first display appears, then 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, then 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.

⑲ Select which ECGs you wish to transmit. Each ECG on your diskette or each ECG on diskette that fits your selection parameters will be displayed in a manner similar to the following:





⑳ Next, messages similar to the following will appear:

```
        ** Batch Transmission **
Reading Diskette Data
```

THEN

```
        ** Batch Transmission **
Dialing - 1112345
```

㉑ For each ECG transmitted, displays similar to the following will 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 **
Diskette Error - Write Protected
```

this just means that the cardiograph could not delete an ECG. This is <u>not</u> an error because the cardiograph will still keep transmitting.

(22) After all ECGs have been transmitted, the following message will appear:

```
Transmission Complete
Type Any Key to Continue
```

Press any key to return to the following:

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

To return to the *Main Menu*, press the STOP key.

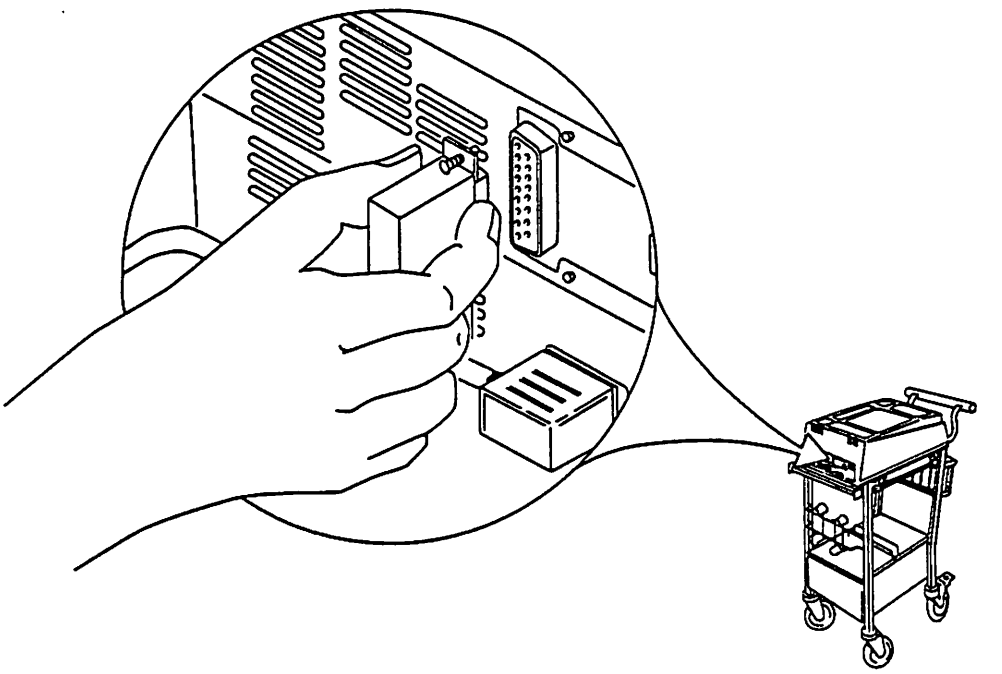
Transmitting an ECG Locally

NOTE: You can only transmit ECGs locally if you have a serial transmission cable. (Refer to the **MAC 15 Service Manual** for details.)

To transmit ECGs locally, follow these steps:

① Prepare the cardiograph as described in chapter 1.

② Connect the serial transmission cable from the other unit (for example, another MAC 15) to the AUX DATA (RS232) port at the back of your cardiograph (as shown below):

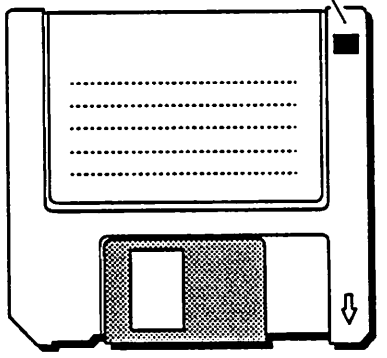


M14453

③ When an ECG is transmitted, the cardiograph will try to delete the ECG it just transmitted. If you do not want the ECGs on diskette deleted, then make sure your ECG diskette is write protected with the write-protect tab exposing the small hole on the diskette:

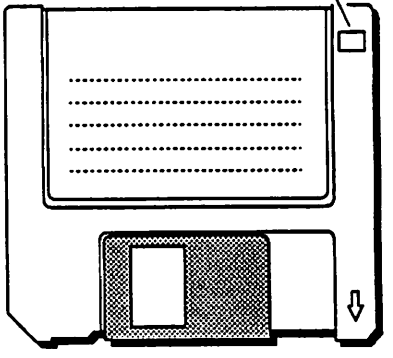
• Front of Diskette •

Not write protected (hole covered)



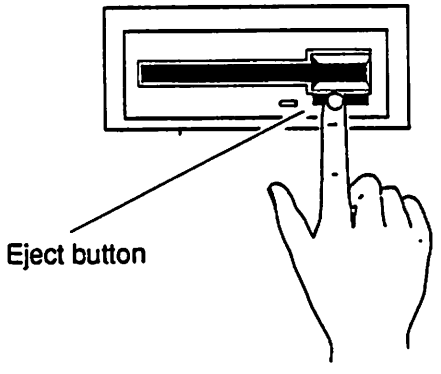
M13668-22

Write protected (hole uncovered)



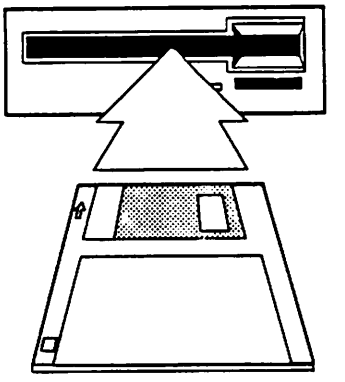
M13668-23

NOTE: If there already is a diskette in the diskette drive slot, remove it by pressing the eject button:



M13668-92

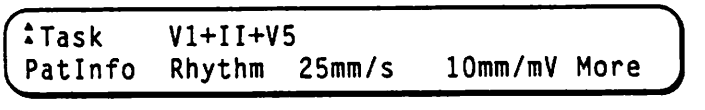
④ Insert the diskette—label side up—that contains the ECGs for transmitting into the diskette drive slot:



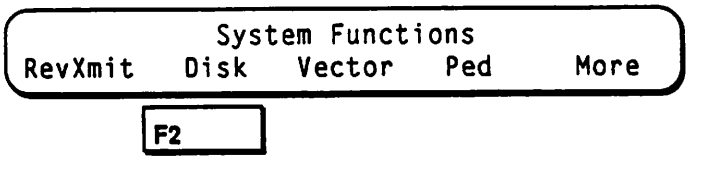
M13668-93

⑤ Make sure that you answered yes to the **Will the Local Line be Used** prompt in the **LclLine** section of the **Cart Setup** menu.

⑥ If the *Main Menu* is not already displayed, then press the STOP key to return to it:



⑦ Next, press the ⇧ and F1 keys at the same time to display the **System Functions** menu:



F2

Press the F2 key for **Disk** .

⑧ The following display will appear:

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

F1

Press the F1 key for **Xmit** (Transmission).

⑨ Then this prompt will appear:

```
Transmission Device:
 Phone  Local
```

F2

Since you will be transmitting locally, press the F2 key for **Local.** Then press the ⇦ key.

⑩ Next, select whether or not the ECG should be sent in a compressed format:

```
Data Format:
  All    Comprs
```

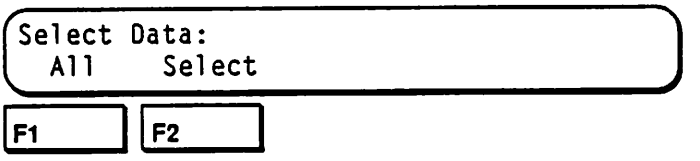
F1 F2

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

⑪ This message will briefly appear:

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

⑫ The next prompt allows you to send either all or just some of the ECGs on your diskette:

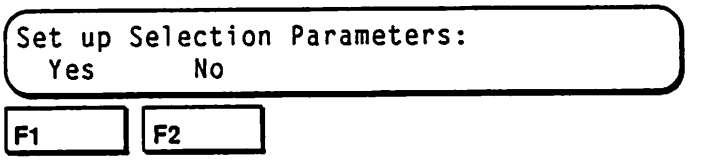


Choose **All** to send all the ECGs on your diskette, and then go to step ㉑.

OR

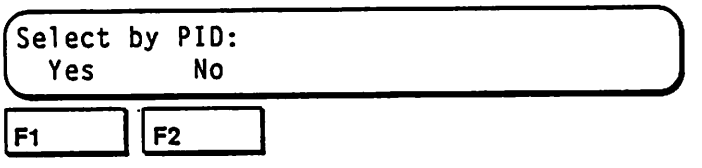
Choose **Select** to select which ECGs to send from your diskette, and then continue with the next step.

⑬ After choosing **Select**, the following will appear:



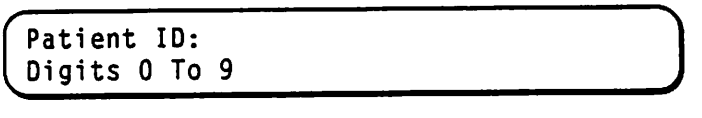
Select **No** if you want to skip the following selection prompts and view the first ECG on your diskette. If you select **No**, then go to step ⑲.

⑭ After selecting **Yes**, the first selection prompt will appear:



If you select **No**, then go to step ⑮.

If you select **Yes**, then the following display will appear:



Type in the patient's identification number (PID) that will be used to select ECGs. Then press the ⇦ key.

⑮ Next, a prompt will appear that allows you to select those ECGs that have the same MUSE site number:

```
Select by Site:
  Yes      No
```

F1 F2

If you select **No**, then go to step ⑯.

If you select **Yes**, the following display will appear:

```
Site Number:
1 - 255
```

Type in the MUSE site number that will be used to select ECGs. Then press the ⇦ key.

⑯ The next prompt that appears allows you to select ECGs by their MUSE location number:

```
Select by Location:
  Yes      No
```

F1 F2

If you select **No**, then go to step ⑰.

If you select **Yes**, the following display will appear:

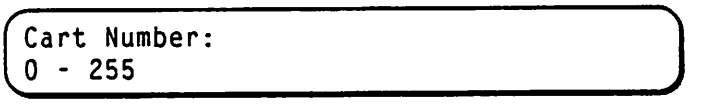
```
Location Number:
0 - 99
```

Type in the MUSE location number that will be used to select ECGs. Then press the ⇦ key.

⑰ The next prompt that appears allows you to select ECGs by their cart number:

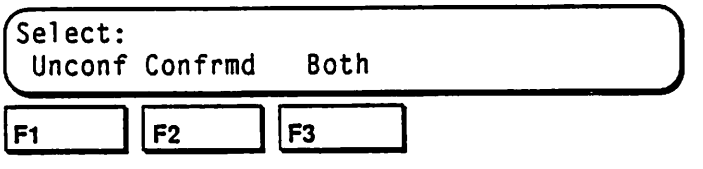
If you select **No**, then go to step ⑱.

If you select **Yes**, then the following display will appear:



Type in the cart number that will be used to select ECGs. Then press the ⇦ key.

⑱ Then the following prompt will appear:



Choose **Unconf** if you want only unconfirmed ECGs to be transmitted.

OR

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

Choose **Confrmd** if you want only confirmed ECGs to be transmitted.

OR

Choose **Both** if you want unconfirmed and confirmed ECGs to be transmitted.

⑲ Next, one of the following two displays, or one very similar, will appear:

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

OR

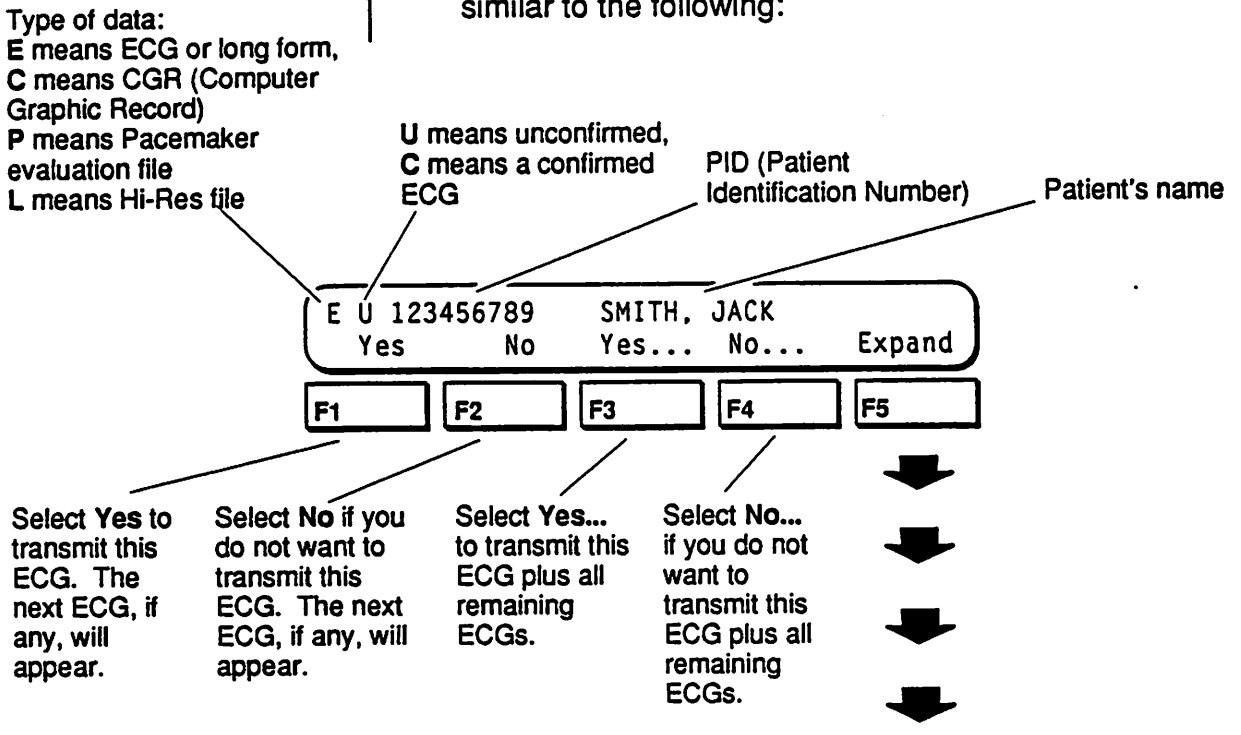
```
E U 123456789    SMITH, JACK
  Yes      No    Yes...  No...   Expand
```

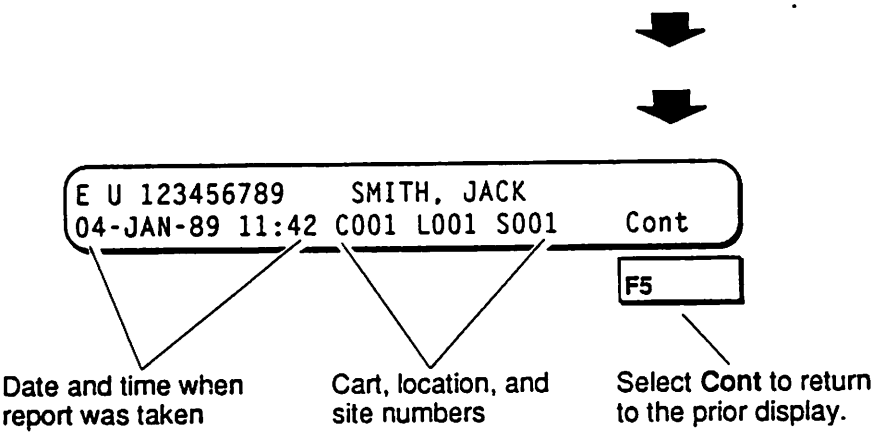
F1 F2 F3 F4 F5

If the first display appears, then 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, then 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.

⑳ Select which ECGs you wish to transmit. Each ECG on your diskette or each ECG on diskette that fits your selection parameters will be displayed in a manner similar to the following:





㉑ Next, for <u>each</u> ECG transmitted, displays similar to the following will appear:

NOTE: The first message will only appear if the cardiograph is waiting for the receiving unit.

```
** 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,

```
** Transmitting Diskette Data **
Diskette Error - Write Protected
```

this just means that the cardiograph could not delete an ECG. This is <u>not</u> an error because the cardiograph will still keep transmitting.

(22) After all ECGs have been sent, the following two messages will appear:

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

THEN

```
Transmission Complete
Type Any Key to Continue
```

Press any key to return to the following:

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

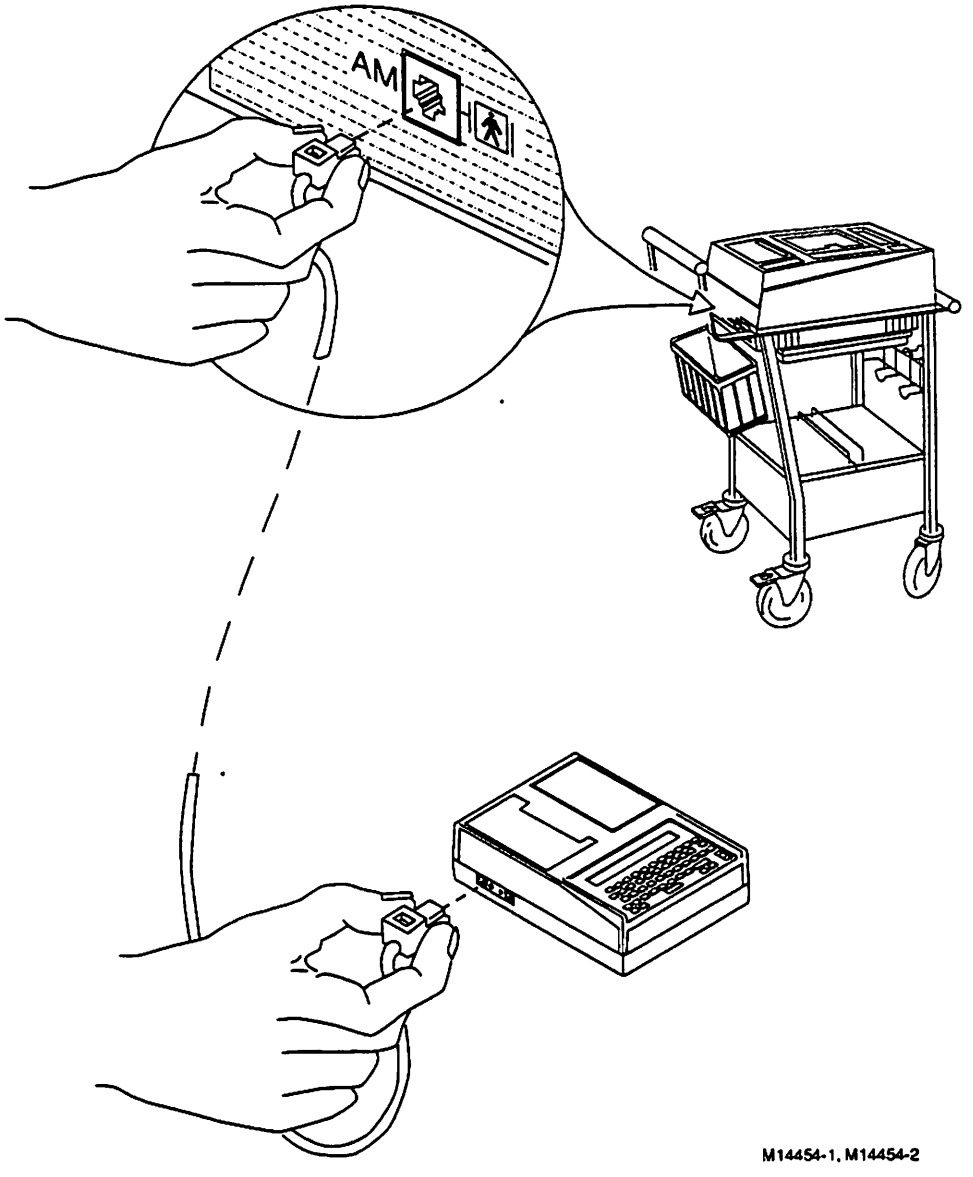
To return to the *Main Menu*, press the STOP key.

Receiving an ECG from a MAC PC

To locally receive ECGs from a MAC PC, follow these steps:

① Prepare the cardiograph as described in chapter 1.

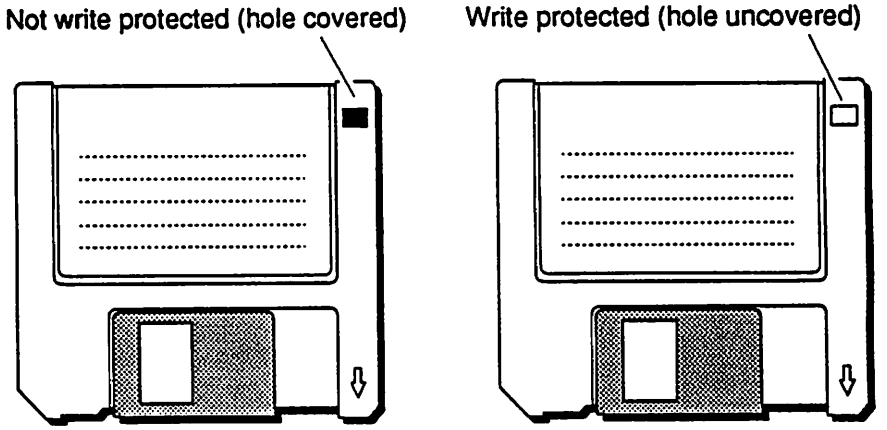
② Using a straight cable, plug one end into the auxiliary jack on the side of the MAC PC and the other end into the acquisition module (AM) jack located on the front of the receiving cardiograph (as shown below):



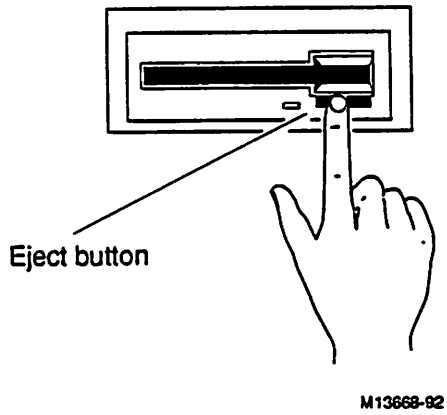
M14454-1, M14454-2

③ If you do not want to save ECGs that are received from the MAC PC, then go to step ⑤. Otherwise, make sure you have a diskette that can be used to save the ECGs. Also, make sure that the diskette is not write protected (as shown below):

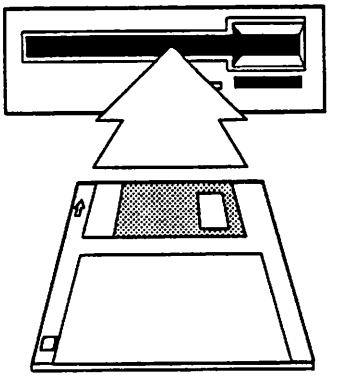
• Front of Diskette •



NOTE: If there already is a diskette in the diskette drive slot, remove it by pressing the eject button:



④ Insert the diskette—label side up—that you want to save the ECGs on into the diskette drive slot:



⑤ If the *Main Menu* is not already displayed, then press the STOP key to return to it:

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

⑥ Next, press the ⇧ and F1 keys at the same time to display the **System Functions** menu and select **Loc PC** (Local MAC PC).

⑦ When the following display appears, if you haven't already done so, use a straight cable to connect the MAC PC to the cardiograph as shown in step ②.

```
Disconnect AM & Connect MAC PC
Type Any Key to Continue
```

Also, make sure that the MAC PC has been set up to locally transmit ECGs. (Refer to section 5 of the **Operator's Guide for MAC PC**.)

Press any key when you are ready to continue.

⑧ One of the following two displays will 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 a key to continue.

If the second display appears, just continue with the next step.

⑨ For each ECG received, displays similar to the following will appear:

```
***        Transfer in Progress        ***
```

THEN

```
          ** Printing Report **
Page 1 of 3
```

THEN

```
**          Record Transferred          **
```

THEN

```
Waiting to establish ON LINE
communication with MAC PC
```

⑩ When the last ECG has been sent, press the STOP key to return to the *Main Menu.*

Chapter 6
Editing ECG Reports

Chapter Summary

This chapter is divided into three 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; and
- **12SL Analysis Program Library** shows you the entire 12SL analysis program library statements and acronyms.

Pediatric Analysis

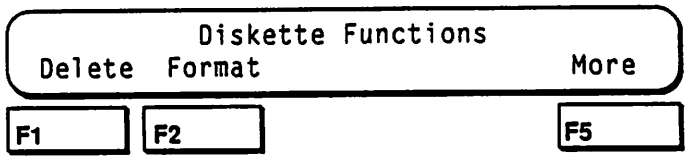
The cardiograph's 12SL analysis program will perform a pediatric analysis on patients who are 15 years old or younger. (The phrase ** **Pediatric ECG Analysis** ** will appear on these reports.) Since the 12SL analysis program analyzes ECG data when it is first acquired, a pediatric analysis can not be changed to an adult analysis—or vice versa—using the cardiograph'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 cardiograph 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.*

Before you begin...

Before you begin entering patient information there are a few special keys you should be familiar with. These keys are explained below.

F1
F2
F3
F4
F5

Function keys select an LCD display function that is directly above the key. For example, in the LCD display below, pressing the F1 key selects the **Delete** function, pressing the F2 key selects the **Format** function, and pressing the F5 key selects **More** which allows you to review additional menu functions.



NOTE: As in the example above, LCD displays in this manual will show only those function keys that can actually be used.

OR

ENTER key. After typing information on the keyboard, it is usually necessary to press this key to enter or store what you have typed.

SHIFT key. Used to type shifted characters or to access special functions.

DELETE key. Press this key to erase a character that you have typed on the keyboard.

SPACE BAR key. Press this key to create a space on the LCD display.

CURSOR LEFT key. Press this key to move the LCD display cursor left.

CURSOR RIGHT key. Press this key to move the LCD display cursor right.

BACK UP key. Pressing this key causes the prior LCD display prompt to appear.

STOP

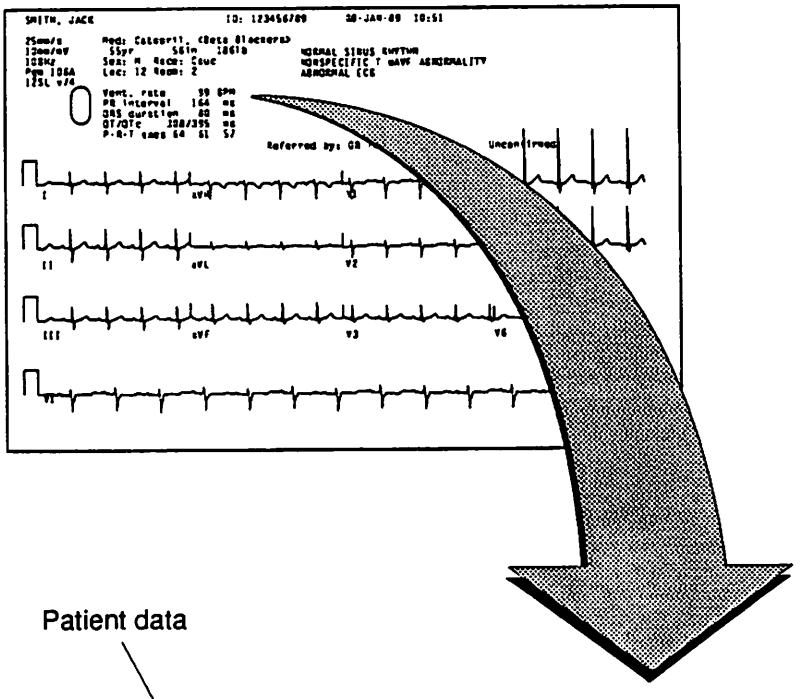
STOP key. In most cases, pressing this key returns the LCD display to the *Main Menu* and also stops the printing of a report.

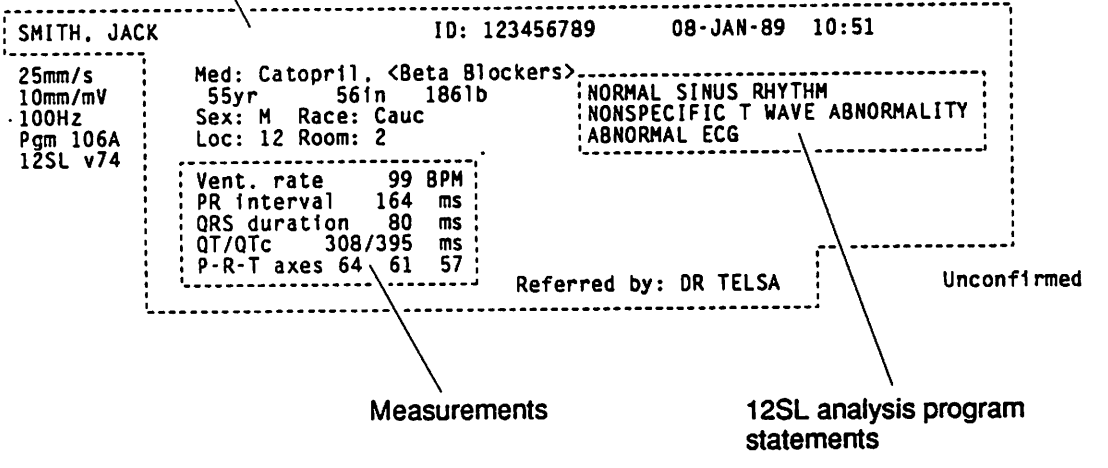
Full Edit

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

Your cardiograph 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:





M14278-11, M14278-7

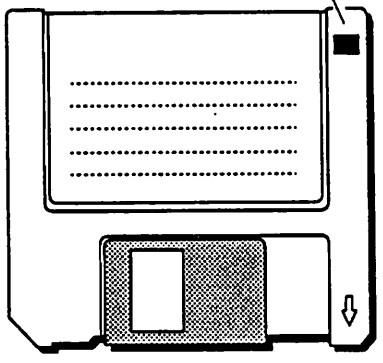
To perform a full edit, follow these steps:

NOTE: Only ECG(s) stored on a diskette can be edited.

① Make sure that the diskette containing the ECGs you want to edit is <u>not</u> write protected (as shown below):

• Front of Diskette •

Not write protected (hole covered)



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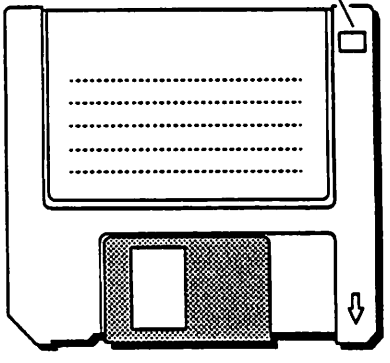
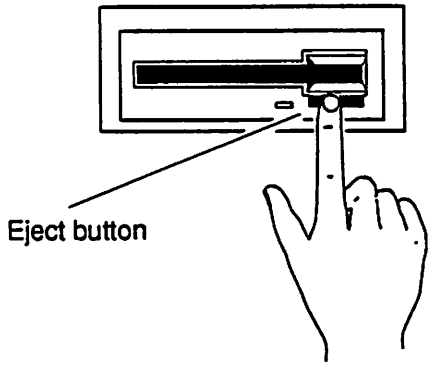
Write protected (hole uncovered)



M13668-23

NOTE: If there already is a diskette in the diskette drive slot, remove it by pressing the eject button:



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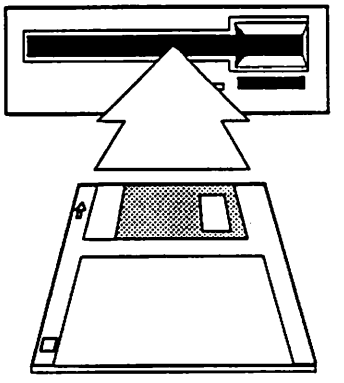
② If you haven't already done so, gently slide the diskette—label side up—containing the ECGs you wish to edit into the diskette drive slot:



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③ If the *Main Menu* is not already displayed, then press the STOP key to return to it:

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

④ Next, press the ⇧ and F1 keys at the same time to display the **System Functions** menu:

```
          System Functions
RevXmit   Disk   Vector   Ped      More
```

F2

Press the F2 key for **Disk**.

⑤ The following display will appear:

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

F2

Press the F2 key for **Edit.**

⑥ Next, the following prompt will appear:

```
Edit Function:
  Full  PatData
```

F1

Since you will be performing a full edit, press the F1 key. Then press the ⇦ key.

⑦ Then this password prompt will appear:

```
Password:
```

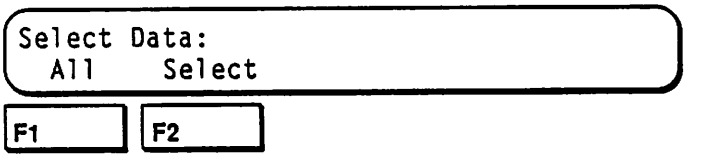
Type in either the Level 1 or Level 2 password. (The default passwords are "L1" and "L2.") Then press the ⇦ key.

⑧ The cardiograph will check your ECG diskette and the following message will briefly appear:

```
          ** Editor **
Reading Diskette
```

NOTE: If a diskette error message appears, make sure your ECG diskette is <u>not</u> write protected.

⑨ The next prompt allows you to edit either all or just some of the ECGs on your diskette:

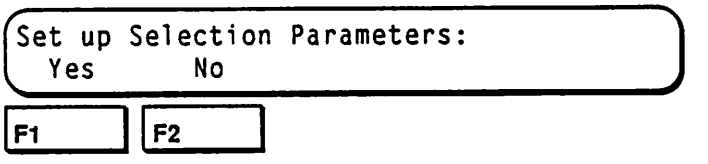


Choose **All** to edit all the ECGs on your diskette, and then go to step ⑱.

OR

Choose **Select** to select which ECGs to edit on your diskette, and then continue with the next step.

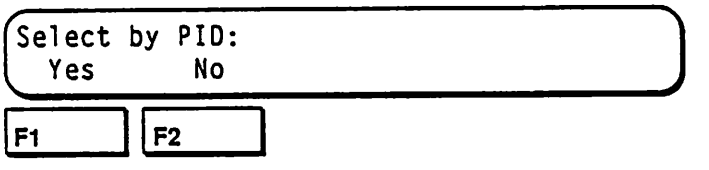
⑩ After choosing **Select**, the following will appear:



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

If you select **No**, then go to step ⑯.

⑪ After selecting **Yes**, the first selection prompt will appear:



If you select **No**, then go to step ⑫.

If you select **Yes**, the following display will appear:

Type in the patient's identification number (PID) that will be used to select ECGs. Then press the ⇦ key.

⑫ Next, a prompt will appear that allows you to select those ECGs that have the same MUSE site number:

```
Select by Site:
  Yes      No
```

F1 F2

If you select **No**, then go to step ⑬.

If you select **Yes**, the following display will appear:

```
Site Number:
1 - 255
```

Type in the MUSE site number that will be used to select ECGs. Then press the ⇦ key.

⑬ The next prompt that appears allows you to select ECGs by their MUSE location number:

```
Select by Location:
  Yes      No
```

F1 F2

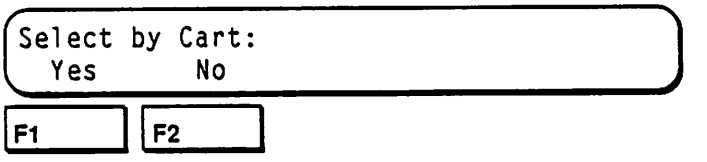
If you select **No**, then go to step ⑭.

If you select **Yes**, the following display will appear:

```
Location Number:
0 - 99
```

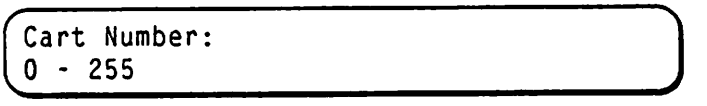
Type in the MUSE location number that will be used to select ECGs. Then press the ⇦ key.

⑭ The next prompt that appears allows you to select ECGs by their cart number:



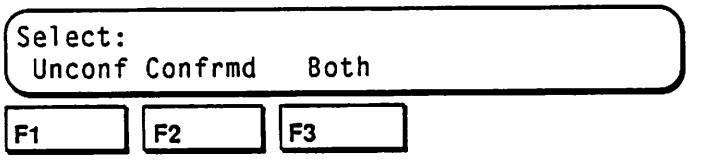
If you select **No**, then go to step ⑮.

If you select **Yes**, the following display will appear:



Type in the cart number that will be used to select ECGs. Then press the ⇦ key.

⑮ Then the following prompt will appear:



Choose **Unconf** if you only want to edit unconfirmed ECG reports.

OR

Choose **Confrmd** if you only want to edit confirmed ECG reports.

OR

Choose **Both** if you want to edit both unconfirmed and confirmed ECG reports.

⑯ Next, one of the following two displays, or one very similar, will appear:

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

OR

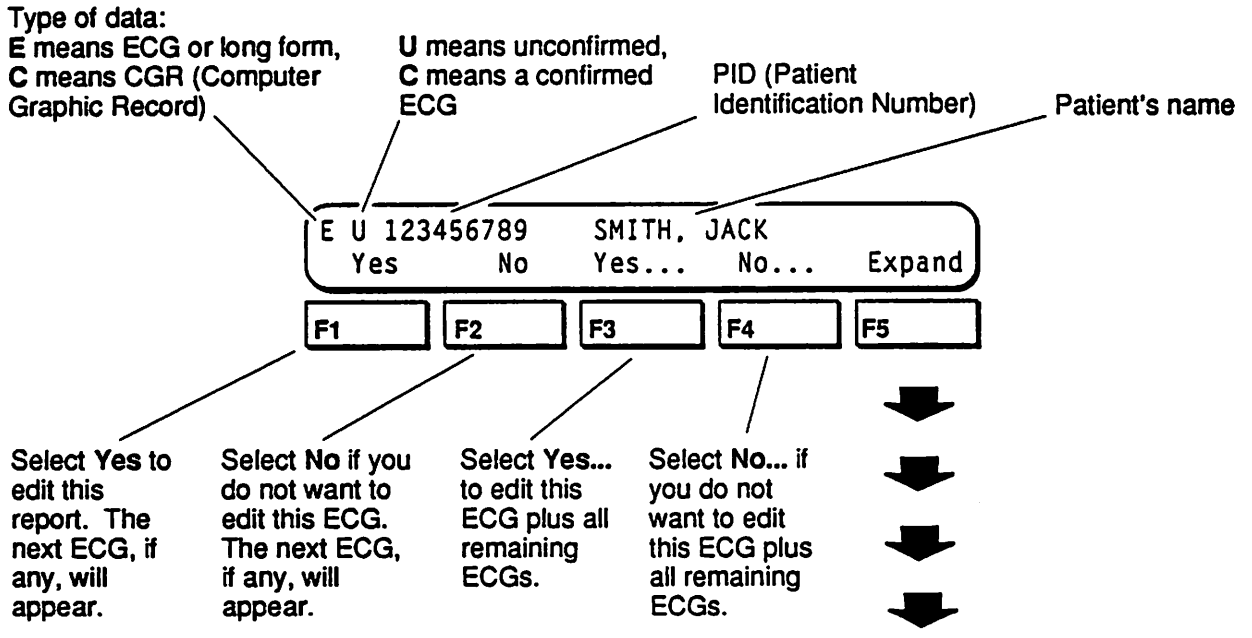
```
E U 123456789    SMITH, JACK
  Yes      No    Yes...  No...   Expand
```

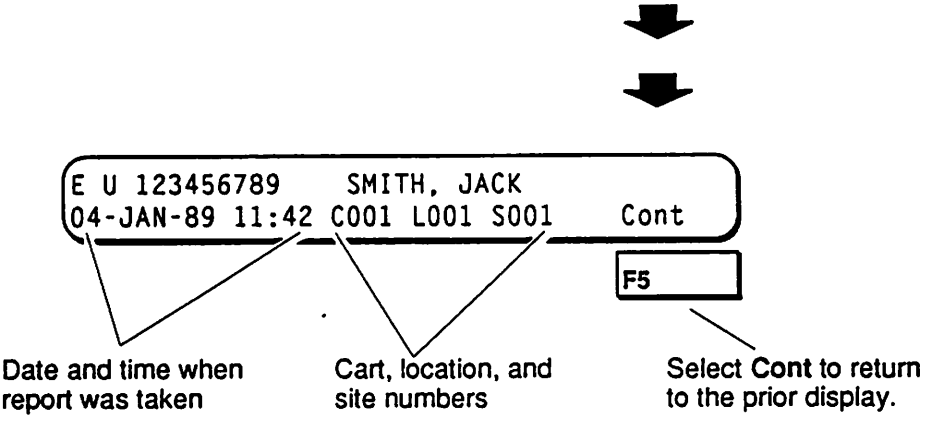
F1 | F2 | F3 | F4 | F5

If the first display appears, then 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, then 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.

⑰ Select which ECGs you wish to edit. Each ECG on your diskette or each ECG on diskette that fits your selection parameters will be displayed in a manner similar to the following:





⑱ Next, displays similar to the following two will appear:

```
                ** Editor **
Reading Diskette
```

THEN

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

Press the ⇦ key to edit this ECG.

⑲ The following prompt will appear:

```
Reviewer Number:
1 - 999
```

Type in your reviewer number. Then press the ⇦ key.

⑳ Next, a reviewer name prompt will appear:

```
Reviewer Name:
Any 24 Characters
```

Type in your name. Then press the ⇦ key.

㉑ A display similar to the following will appear:

```
NSR
 Insert  Delete  Expand  Measure  More
```

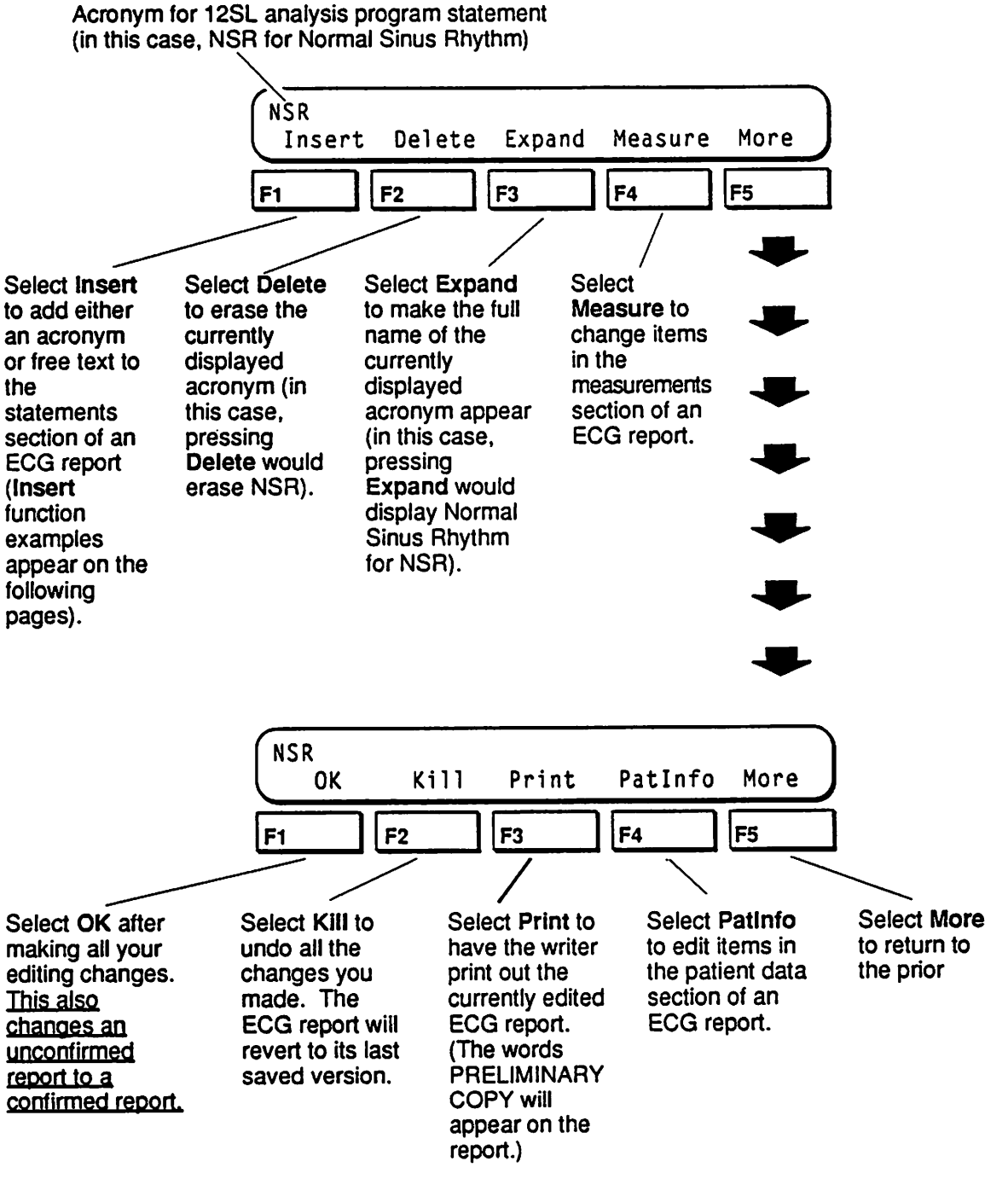
F1 F2 F3 F4 F5

```
NSR
   OK     Kill   Print   PatInfo  More
```

F1 F2 F3 F4 F5

Press the ⇦ key to see the next statement.
The above displays are explained in the next step.

(22) For each ECG report, the following displays allow you to change the 12SL analysis program statements (using the **Statemts** function), measurements (using the **Measure** function), or patient data (using the **PatData** function):



Insert Function Examples

NOTE: The following examples are provided as a supplement to the directions. If you understand how the **Insert** function works, then go to the next step.

NOTE: In the following examples, we will assume that the only acronym in the statement section of the ECG report is NSR (Normal Sinus Rhythm).

Press the [F1] key for **Insert** to display the **Insert** menu:

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

'Free Text' means that free-form text or comments must be enclosed by apostrophes. Press the [⇧] and [' Y] keys at the same time to create an apostrophe. (Refer to example 4, 5, 6, 7, or 8.)

/=new means that a slash (/) may be used to place inserted material on new or different lines. Press the [⇧] and [/ X] keys at the same time to create a slash. (Refer to example 3, 6, or 8.)

,=same means that a comma (,) may be used to place inserted material on the same line. Press the [⇧] and [' K] keys at the same time to create a comma. (Refer to example 2, 5, or 7.)

NOTE: A list of acronyms for all the 12SL analysis program statements is at the end of this chapter.

Where Inserted Material Will Appear on a Report

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

ANTERIOR INFARCT
NORMAL SINUS RHYTHM

and you used the **Insert** function to add the SMI (Septal Infarct) acronym, then the following would appear:

SEPTAL INFARCT
ANTERIOR INFARCT
NORMAL SINUS RHYTHM

Example 1–How to insert a single acronym: Assume you want to add the acronym **AB** (Abnormal ECG). First, type **AB:**

```
AB
Acronyms &/or 'Free Text' /-new .-same
```

Next, press the ⇦ key. When an ECG report is printed, the following will appear in the statements section of the report:

ABNORMAL ECG
NORMAL SINUS RHYTHM

Example 2–How to insert multiple acronyms on the same line: Assume you want the acronyms **PO** (Possible) and **FLUT** (Atrial Flutter) to both appear on the same line above **NSR.** First, type **PO,** a comma (,), and then **FLUT:**

```
PO,FLUT
Acronyms &/or 'Free Text' /-new .-same
```

Next, press the ⇦ key. When the ECG report is printed, the following will appear in the statements section of the report:

POSSIBLE ATRIAL FLUTTER
NORMAL SINUS RHYTHM

Example 3–How to insert multiple acronyms on different lines: Assume you want the acronyms **SMI** (Septal Infarct) and **AMI** (Anterior Infarct) to each appear on its own line above **NSR.** First, type **SMI,** a slash (/), and then **AMI:**

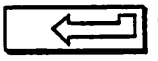
```
SMI/AMI
Acronyms &/or 'Free Text' /-new .-same
```

Next, press the ⇦ key. When the ECG report is printed, the following will appear in the statements section of the report:

SEPTAL INFARCT
ANTERIOR INFARCT
NORMAL SINUS RHYTHM

Example 4–How to insert a single comment: Assume you want to add the comment **UNCHANGED SINCE 6-12-88** on the line above **NSR.** First, type in this comment using apostrophes to enclose it:

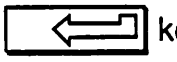
```
'UNCHANGED SINCE 6-12-88'
Acronyms &/or 'Free Text' /-new ,-same
```

Next, press the  key. When the ECG report is printed, the following will appear in the statements section of the report:

UNCHANGED SINCE 6-12-88
NORMAL SINUS RHYTHM

Example 5–How to insert multiple comments on the same line: Assume you want the comments **UNCHANGED SINCE 6-12-88** and **DIABETIC** to both appear on the line above **NSR.** First, type in both comments using a comma (,) to separate them:

```
'UNCHANGED SINCE 6-12-88','DIABETIC'
Acronyms &/or 'Free Text' /-new ,-same
```

Next, press the  key. When the ECG report is printed, the following will appear in the statements section of the report:

UNCHANGED SINCE 6-12-88 DIABETIC
NORMAL SINUS RHYTHM

Example 6–How to insert multiple comments on different lines: Assume you want the comments **UNCHANGED SINCE 6-12-88** and **DIABETIC** to appear on different lines above **NSR**. First, type in both comments using a slash (/) to separate them:

```
'UNCHANGED SINCE 6-12-88'/'DIABETIC'
Acronyms &/or 'Free Text' /=new ,=same
```

Next, press the ⇦ key. When the ECG report is printed, the following will appear in the statements section of the report:

UNCHANGED SINCE 6-12-88
DIABETIC
NORMAL SINUS RHYTHM

Example 7–How to insert an acronym and a comment on the same line: Assume you want the acronym AB (Abnormal ECG) followed by the comment **SINCE 6-12-88** to appear on the same line above **NSR**. First, type **AB**, a comma (,), and then the comment:

```
AB,'SINCE 6-12-88'
Acronyms &/or 'Free Text' /=new ,=same
```

Next, press the ⇦ key. When the ECG report is printed, the following will appear in the statements section of the report:

ABNORMAL ECG SINCE 6-12-88
NORMAL SINUS RHYTHM

Example 8–How to insert an acronym and a comment on different lines: Assume you want the acronym **AB** (Abnormal ECG) and the comment **UNCHANGED SINCE 6-12-88** to appear on two separate lines above **NSR**. First, type AB, a slash (/), and then the comment:

```
 AB/'UNCHANGED SINCE 6-12-88'
Acronyms &/or 'Free Text' /-new ,-same
```

Next, press the ⇦ key. When the ECG report is printed, the following will appear in the statements section of the report:

ABNORMAL ECG
UNCHANGED SINCE 6-12-88
NORMAL SINUS RHYTHM

Example 9–How to correct a mistake: If you make a mistake while entering inserted material, a display similar to the following will appear:

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

The "^" points to where the mistake was made. To correct the mistake, press the ⇦ key to return to what you were typing. Then correct your typing error.

(23) After you've finished editing the 12SL analysis program statements, measurements, and/or patient data, one of the following messages will appear:

<< End of Patient Data >>

OR

<< End of Statements >>

OR

<< End of Measurement Data >>

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, or select **Print** to print a preliminary copy of the edited ECG report. However, if you are finished editing this patient's ECG, then select **OK** and continue with the next step.

(24) If you select **OK**, the following prompt will appear:

```
Print a Final Report:
  Yes       No
```

F1 F2

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 step (18). Otherwise, if the ECG you just edited was the last one on diskette, then go to step (27).

If you select **Yes**, then the following display will appear:

```
                ** Editor **
Writing Diskette
```

THEN

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

F1 F2 F3 F4 F5

Press the appropriate function key to change writer settings. Press **NoPrint** to cancel printing. Press **PRINT** to start printing the ECG report.

㉕ If you select **PRINT**, then a display similar to the following will appear:

```
        ** Printing Reports **
Page 1 of 2
```

㉖ If you answered yes to the **Ask for Exta Copies of Plots** prompt in the **Reports** function of the **Cart Setup** menu, then the following prompt will appear:

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

Just press the ⇦ key if you do not want any extra copies.

OR

Type in the number of extra copies. Then press the ⇦ key.

㉗ If the auxiliary leads were stored after the ECG was acquired, then the following prompt will appear:

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

F1 F2

If you selected **No**, go to step ㉘.

If you selected **Yes**, then the following will appear:

```
ONSET   OFFSET    GAIN
Qon     Toff      20mm/mV   PRINT   EXIT
```

F1 F2 F3 F4 F5

- Press the F1 key to change the vector loop onset {for example, **Qon** (Q onset), **Qoff** (Q offset), etc} or clear any onset increment value (for example, **Qon+8**).

OR

- Press the F2 key to change the vector loop offset {for example, **Poff** (P offset), **Toff** (T offset), etc} or clear any onset increment value (for example,**Toff+8**).

OR

Press the F3 key to change the vector loop gain.

OR

Press the F4 key to print a vector loop plot. (If the cardiograph "beeps" instead of printing a report, make sure the onset and offset locations are not in error.)

OR

Press the F5 key to exit this prompt and continue with the next step.

(28) The following message will then appear:

```
Editing Complete
Type Any Key to Continue
```

Pressing any key causes the following to appear:

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

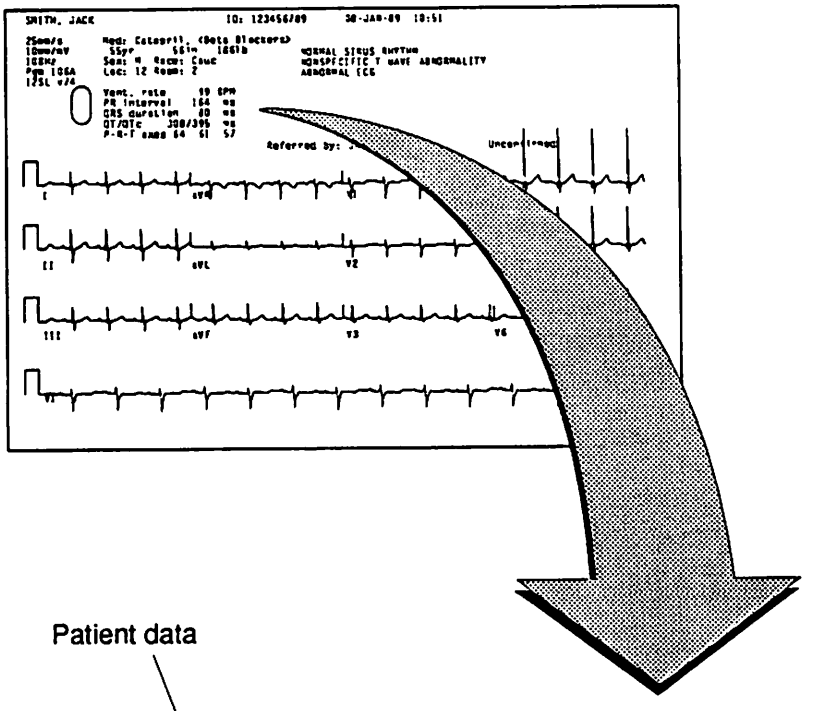
Press the STOP key to return to the *Main Menu*.

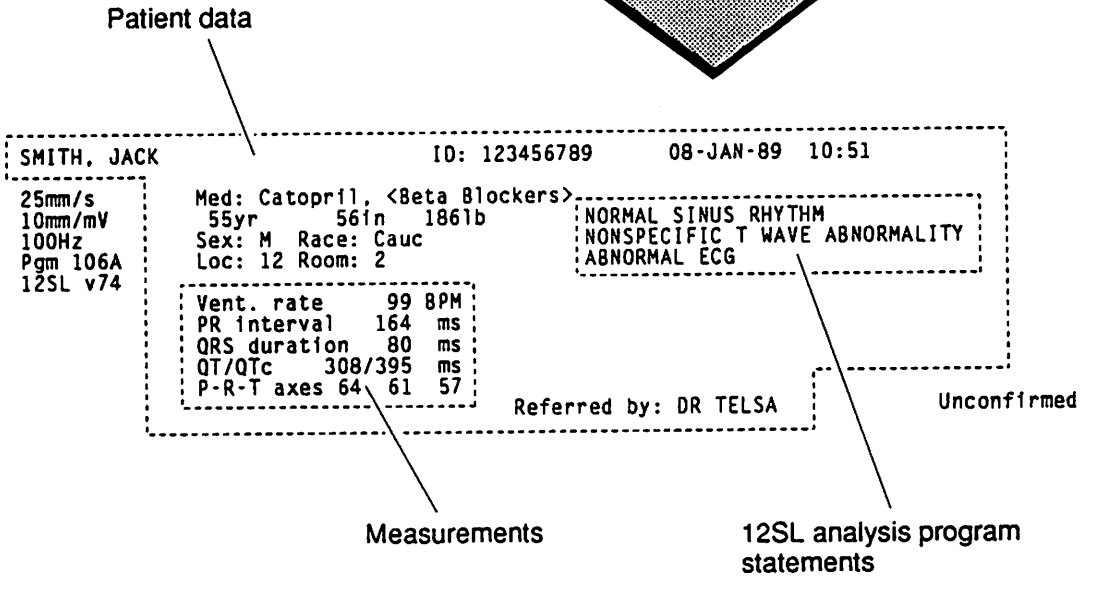
- Press the ⇧ and F1 keys at the same time to add 4 milliseconds to the onset increment value.
  Press the ⇧ and F2 keys at the same time to add 4 milliseconds to the offset increment value.

Patient Data Edit

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

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





M14278-11, M14278-7

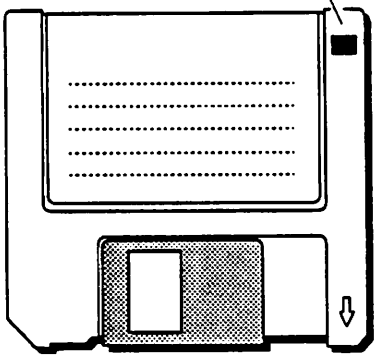
To perform a patient edit, follow these steps:

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 (as shown below):

• Front of Diskette •

Not write protected (hole covered)



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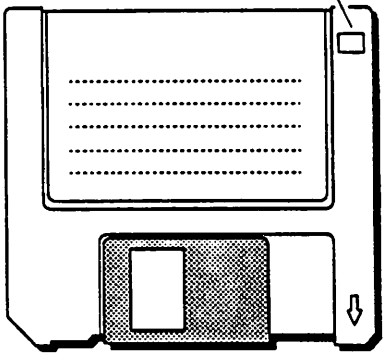
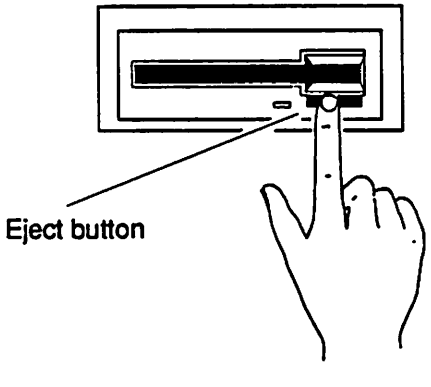
Write protected (hole uncovered)



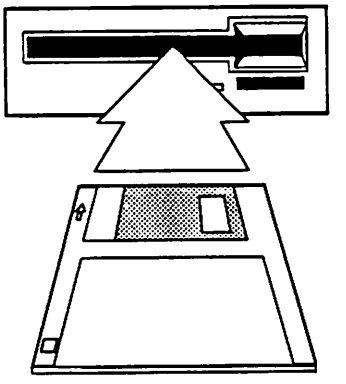
M13668-23

NOTE: If there already is a diskette in the diskette drive slot, remove it by pressing the eject button:



M13668-92

② If you haven't already done so, gently slide the diskette—label side up—containing the ECGs you wish to edit into the diskette drive slot:



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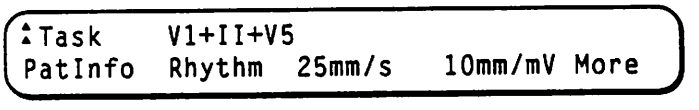
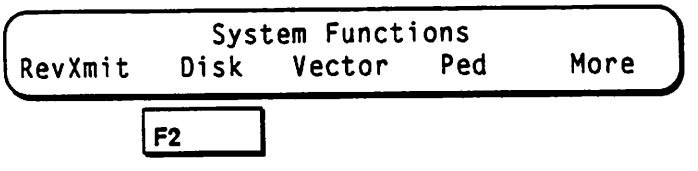
③ If the *Main Menu* is not already displayed, then press the STOP key to return to it:



④ Next, press the ⇧ and F1 keys at the same time to display the **System Functions** menu:



F2

Press the F2 key for **Disk**.

⑤ The following display will appear:

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

F2

Press the F2 key for **Edit.**

⑥ Next, the following prompt will appear:

```
Edit Function:
  Full  PatData
```

F2

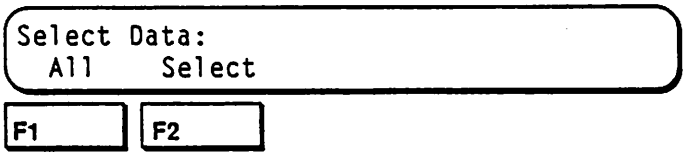
Since you will be performing a patient data edit, press the F2 key. Then press the ⇦ key.

⑦ The cardiograph will check your ECG diskette and the following message will briefly appear:

```
              ** Editor **
Reading Diskette
```

NOTE: If a diskette error message appears, make sure your ECG diskette is <u>not</u> write protected.

⑧ The next prompt allows you to edit either all or just some of the ECGs on your diskette:

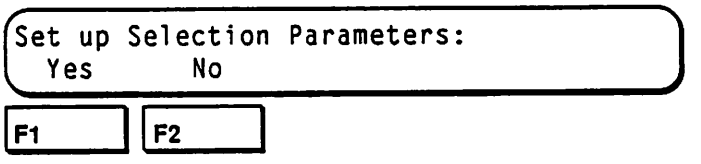


Choose **All** to edit all the ECGs on your diskette, and then go to step ⑰.

OR

Choose **Select** to select which ECGs to edit on your diskette, and then continue with the next step.

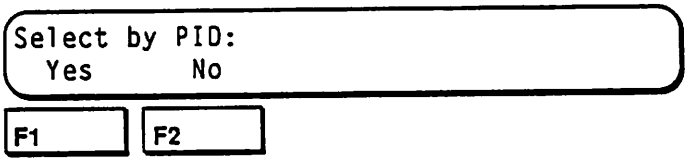
⑨ After choosing **Select,** the following will appear:



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

If you select **No**, then go to step ⑮.

⑩ After selecting **Yes**, the first selection prompt will appear:

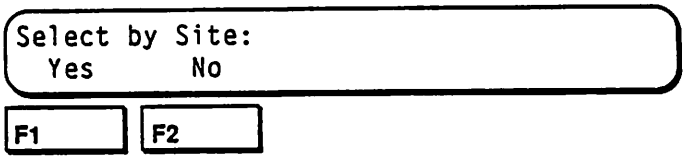


If you select **No**, then go to step ⑪.

If you select **Yes**, the following display will appear:

Type in the patient's identification number (PID) that will be used to select ECGs. Then press the ⇦ key.

⑪ Next, a prompt will appear that allows you to select those ECGs that have the same MUSE site number:

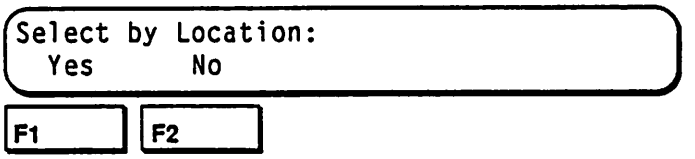


If you select **No**, then go to step ⑫.

If you select **Yes**, the following display will appear:

Type in the MUSE site number that will be used to select ECGs. Then press the ⇦ key.

⑫ The next prompt that appears allows you to select ECGs by their MUSE location number:

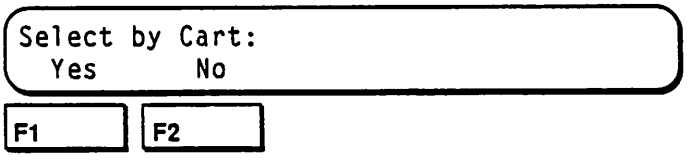


If you select **No**, then go to step ⑬.

If you select **Yes**, the following display will appear:

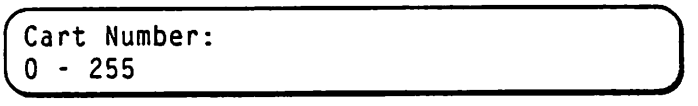
Type in the MUSE location number that will be used to select ECGs. Then press the ⇦ key.

⑬ The next prompt that appears allows you to select ECGs by their cart number:



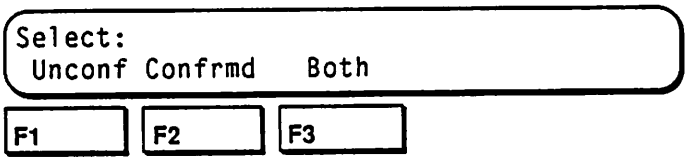
If you select **No**, then go to step ⑭.

If you select **Yes**, the following display will appear:



Type in the cart number that will be used to select ECGs. Then press the ⇦ key.

⑭ Then the following prompt will appear:



Choose **Unconf** if you only want to edit unconfirmed ECG reports.

OR

Choose **Confrmd** if you only want to edit confirmed ECG reports.

OR

Choose **Both** if you want to edit both unconfirmed and confirmed ECG reports.

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

⑮ Next, one of the following two displays, or one very similar, will appear:

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

OR

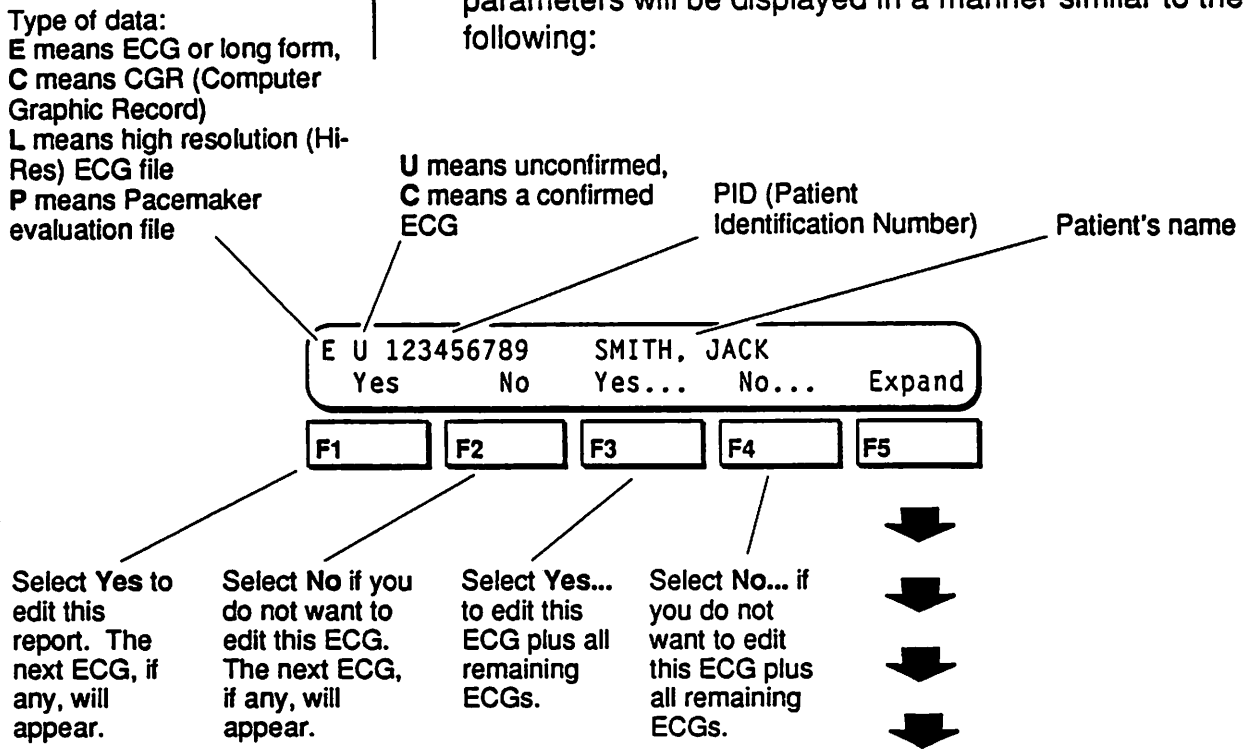
```
E U 123456789    SMITH, JACK
  Yes      No    Yes...  No...   Expand
```

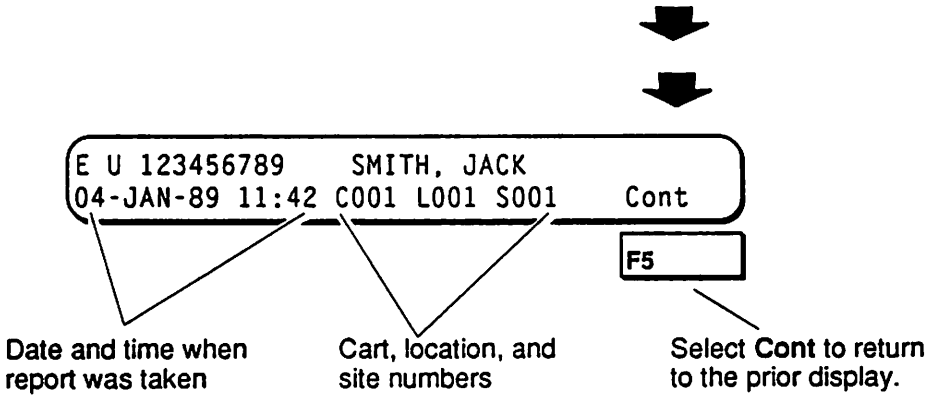
F1 | F2 | F3 | F4 | F5

If the first display appears, then 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, then 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.

⑯ Select which ECGs you wish to edit. Each ECG on your diskette or each ECG on diskette that fits your selection parameters will be displayed in a manner similar to the following:





⑰ Next, displays similar to the following two will appear:

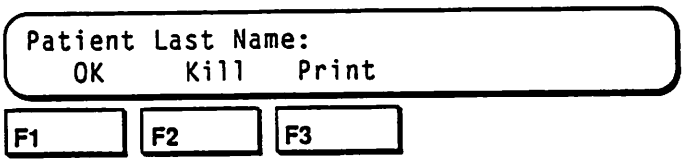
```
                ** Editor **
Reading Diskette
```

THEN

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

Press the ⇦ key to edit this ECG.

⑱ The first patient information item will then appear:



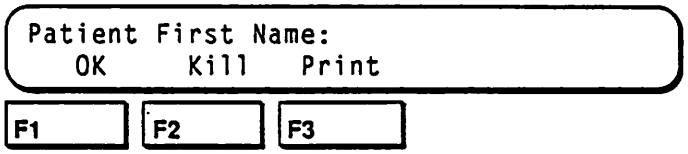
The current patient last name will appear, if any. If you want to leave the last name as it appears, then just press the ⇦ key. If you want to change the name, type in the new last name, and then press the ⇦ key. This process applies to all of the following prompts.

NOTE: 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.

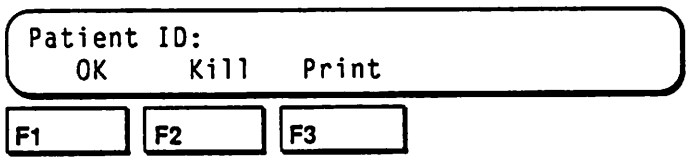
Select **Kill** to undo all the changes you made while editing patient information. The ECG report will revert to its last saved version.

Select **Print** to have the writer print out the currently edited ECG report. This is an easy way to review the changes you have made before selecting **OK**.

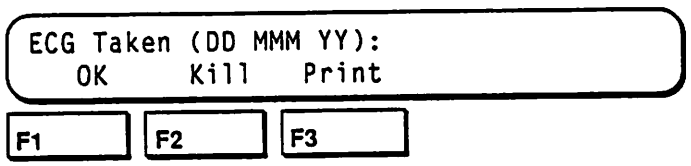
⑲ The following prompt allows you to change the patient's first name:



⑳ The next prompt allows you to change the patient's identification number:

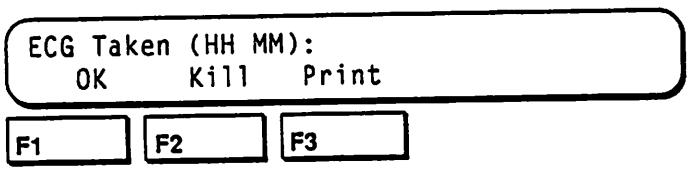


㉑ The following prompt lets you change the date the patient's ECG was taken:



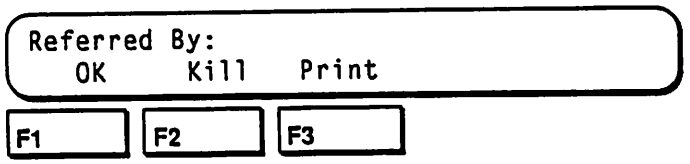
If you change the date, remember to type the date in day-month-year format. For example, January 4, 1989 would be typed in as 04 JAN 89.

㉒ The following prompt allows you to change the time the patient's ECG was taken:

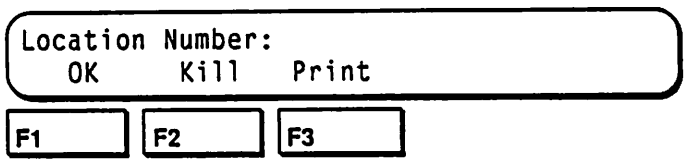


If you change the time, remember to type the time in hour-minute format using a 24-hour clock. For example, 8:10 AM would be typed in as 08 10. However, 8:10 PM would be typed in as 20 10.

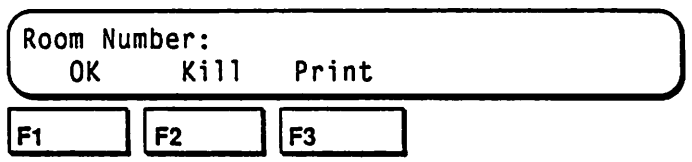
㉓ The name of the referring physician may be changed in the following prompt:



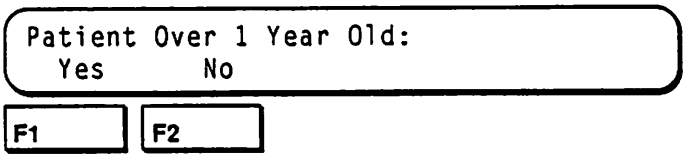
㉔ The following prompt allows you to change the location number:



㉕ Next, the patient's room number can be changed:

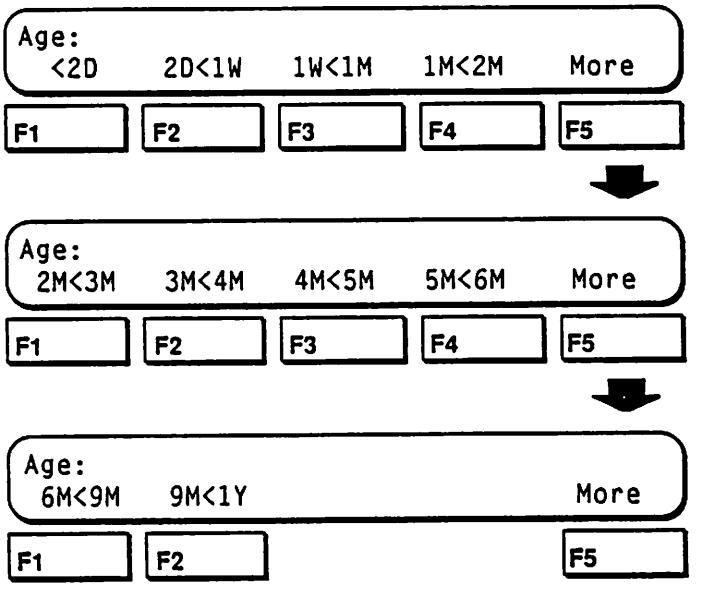


㉖ The next prompt allows you to change the patient's age:



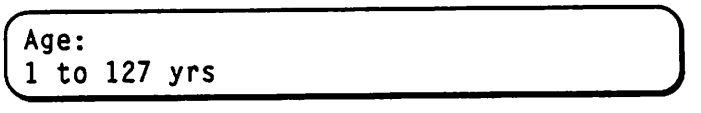
If you select **Yes**, then go to step ㉗.

If you select **No**, then choose the child's age from one of the following displays. Then go to step ㉘.



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

㉗ If you are entering the age for a patient who is <u>over</u> 1 year old, then the following display will appear:



(28) 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** menu can be used to represent height in either inches or centimeters.

(29) Next, one of the following two prompts will appear, and you may change the patient's weight:

```
Weight (in lbs):
0 to 999
```

OR

```
Weight (in kg):
0 to 999
```

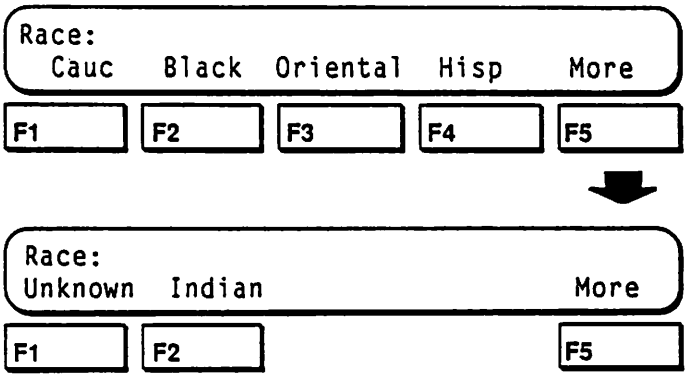
NOTE: The **Cart Setup** menu can be used to represent weight in either pounds or kilograms.

(30) The next prompt allows you to change what you entered for the patient's sex:

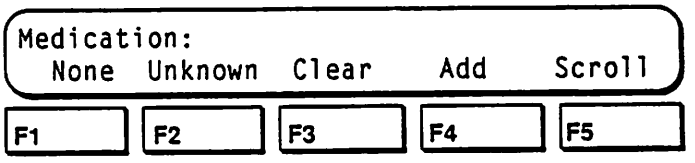
```
Sex:
  Male   Female
```

F1 F2

(31) Next, you may change what you entered for the patient's race:



(32) The following prompts allow you to change the medications the patient is taking:



None means that the patient is taking no medications.

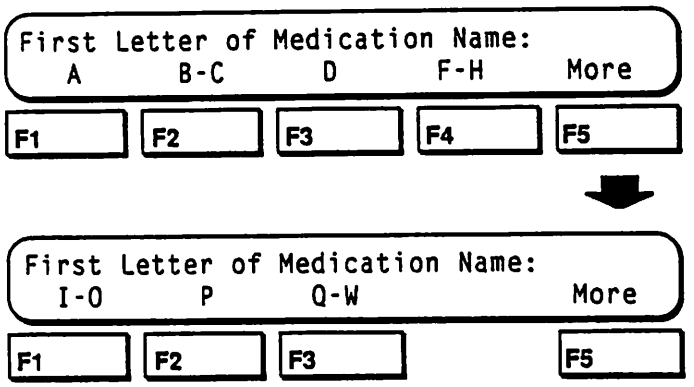
Unknown should be used if you don't know what medications the patient is taking.

Clear will erase all medications that are currently entered for the patient.

Add can be used to add a medication that the patient is taking.

Scroll allows you to review the patient's medications one at a time.

If you select the **Add** function, the following displays allow you to add medications:



The following is a list of medications that you can add:

A

<A-ang> (antianginal)
<A-arh> (antiarrhythmic)
<A-coa> (anticoagulants)
<A-hyp> (antihypertensive)
Aspirin

B-C

<BetaB> (beta blockers)
CalcBlk (calcium blockers)
Catopril (Catopril)
Clonid (Clonidine)
Coumadn (Coumadin)

D

Digital (Digitalis)
Digitox (Digitoxin)
Digoxin (Digoxin-Lanoxin)
<Digox> (digoxin)
<Diurt> (diuretics)
Dysopyr (Dysopyramide)

F-H

Furosem (Furosemide)
Heparin
Hydral (Hydralazine)

I-O

Isosorb (Isosorbide)
Lidoca (Lidocaine)
Nitrate (nitrates)
Other

P

Phenoth (Phenothiazine)
Phenytn (Phenytoin)
Procain (Procainamide)
Propran (Propranolol)
<Psych> (psychotropic)

Q-W

Quinid (Quinidine)
Reserp (Reserpine)
Thiazid (Thiazide)
Tricycli (Tricylic antidepressent)
Warfar (Warfarin)

(33) 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
```

(34) 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
```

THEN

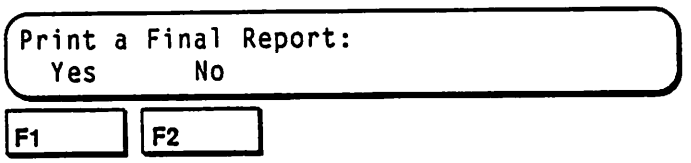
```
Diastolic Blood Pressure:
0 - 199
```

(35) 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, or select **Print** to print a preliminary copy of the edited ECG report. However, if you are finished editing this patient's ECG, then select **OK** and continue with the next step.

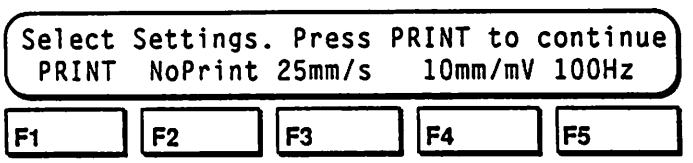
(36) If you select **OK**, the following prompt will appear:



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 step (17). Otherwise, if the ECG you just edited was the last one on diskette, then go to step (39).

If you select **Yes**, then the following display will appear:

THEN



Press the appropriate function key to change writer settings. Press **NoPrint** to cancel printing. Press **PRINT** to start printing the ECG report.

(37) If you select **PRINT**, then a display similar to the following will appear:

```
        ** Printing Reports **
Page 1 of 4
```

(38) If you answered yes to the **Ask for Exta Copies of Plots** prompt in the **Reports** function of the **Cart Setup** menu, then the following prompt will appear:

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

Just press the ⇦ key if you do not want any extra copies.

OR

Type in the number of extra copies. Then press the ⇦ key.

(39) If the auxiliary leads were stored after the ECG was acquired, then the following prompt will appear:

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

F1 F2

If you selected **No**, go to step (40).

If you selected **Yes**, then the following will appear:

```
ONSET    OFFSET     GAIN
Qon      Toff       20mm/mV    PRINT    EXIT
```

F1 F2 F3 F4 F5

- Press the [F1] key to change the vector loop onset {for example, **Qon** (Q onset), **Qoff** (Q offset), etc} or clear any onset increment value (for example, **Qon+8**).

OR

- Press the [F2] key to change the vector loop offset {for example, **Poff** (P offset), **Toff** (T offset), etc} or clear any onset increment value (example, **Toff+8**).

OR

Press the [F3] key to change the vector loop gain.

OR

Press the [F4] key to print a vector loop plot. (If the cardiograph "beeps" instead of printing a report, make sure the onset and offset locations are not in error.)

OR

Press the [F5] key to exit this prompt and continue with the next step.

(40) The following message will then appear:

```
Editing Complete
Type Any Key to Continue
```

Pressing any key causes the following to appear:

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

Press the [STOP] key to return to the *Main Menu.*

- Press the [⇧] and [F1] keys at the same time to add 4 milliseconds to the onset increment value.
  Press the [⇧] and [F2] keys at the same time to add 4 milliseconds to the offset increment value.

12SL Analysis Program Library

Acronym	Statement
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

Acronym	Statement
Atrial Rhythms (Cont)	
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
SVT	Supraventricular tachycardia
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

Ventricular (Cont)

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
S1S2S3	S1-S2-S3 pattern, consider pulmonary disease, RVH or normal variant

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

Fasicular Blocks

AFB	Left anterior fasicular block
BIFB	*** Bifasicular block ***
MAFB	(Masked by fasicular block?)
PFB	Left posterior fasicular 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

AIOHAI	ST elevation consider anterior injury or acute infarct
ALIHAI	ST elevation consider anterolateral injury or acute infarct
ALMI	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
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

ALT	T wave abnormality, consider anterolateral ischemia
AT	T wave abnormality, consider anterior ischemia
ILT	T wave abnormality, consider inferolateral ischemia
IT	T wave abnormality, consider inferior ischemia
LT	T wave abnormality, consider lateral ischemia
MALT	Marked T wave abnormality, consider anterolateral ischemia
MAT	Marked T wave abnormality, consider anterior ischemia
MIT	Marked T wave abnormality, consider inferior ischemia
MILT	Marked T wave abnormality, consider inferolateral ischemia
MLT	Marked T wave abnormality, consider lateral ischemia

Repolarization

2ST	With repolarization abnormality
LNGQT	Prolonged QT
QRSW-2ST	With QRS widening and repolarization abnormality
REPOL	Early repolarization
SNDQA	, maybe secondary to QRS abnormality
SPR	With short PR
WSTR	With strain pattern

S-T Segments

JST	Junctional ST depression, probably abnormal
JSTN	Junctional ST depression, probably normal
NST	Nonspecific ST abnormality
NSTT	Nonspecific ST and T wave abnormality
SERYR1	ST elevation, consider early repolarization, pericarditis, or injury
SERYR2	ST elevation, probably due to early repolarization
ST	ST &
STABAND	ST abnormality and
STDPIN	ST depression in
STELIN	ST elevation in

T Waves

NT	Nonspecific T wave abnormality
QRST	Abnormal QRS-T angle, consider primary T wave abnormality
TINVIN	T-wave inversion in

Pacemakers

APCK	Electronic atrial pacemaker
AVPCK	AV sequential or dual chamber electronic pacemaker
CJP	With a competing junctional pacemaker
DPCK	Demand pacemaker, interpretation is based on intrinsic rhythm
PCK	Electronic ventricular pacemaker

Chemical Effects

ODIG	Or digitalis effect
PDIG	, probably digitalis effect
STDIG	ST abnormality, possible digitalis effect
STDEP	ST depression, consider subendocardial injury or digitalis effect

Anatomical Variants

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
DXTRO	Dextrocardia

General Statements, Modifiers

Leads

ANT	Anterior leads
ANTLAT	Anterolateral leads
ANTSEP	Anteroseptal leads
ARM	*** Suspect arm lead reversal, interpretation assumes no reversal
IFLAT	Inferolateral leads
INF	Inferior leads
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

NOTE: If the acronym SNF appears on a pediatric report, selecting **Expand** should cause **** Pediatric Analysis **** to appear on the LCD display.

Chapter 7
Plotting ECG Reports

Chapter Summary

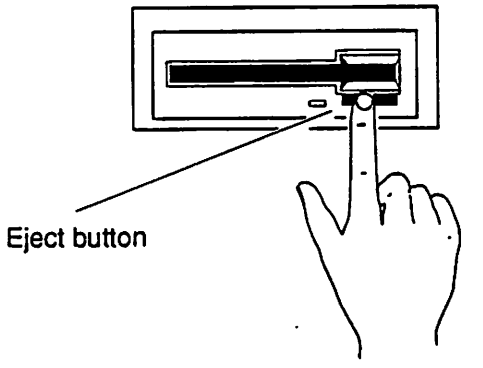
This chapter is divided into two sections:

- **Plot All ECGs** shows you how to print all the ECG reports contained on a diskette, and
- **Plot Selected ECGs** shows you how to print just the ECGs you select from a diskette.

Plot All ECGs

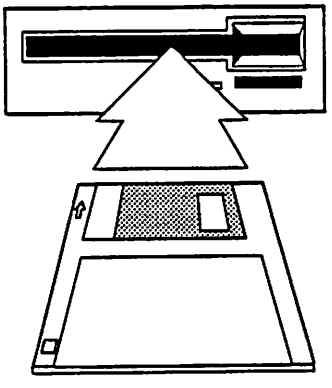
To plot all the ECGs on a diskette, follow these steps:

① If there is a diskette in the diskette drive slot, remove it by pressing the eject button:



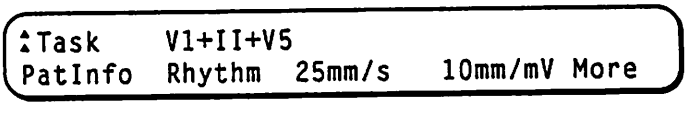
M13668-92

② If you haven't already done so, gently slide the diskette—label side up—containing the ECGs you wish to plot into the diskette drive slot:



M13668-93

③ If the *Main Menu* is not already displayed, then press the STOP key to return to it:



④ Next, press the ⇧ and F1 keys at the same time to display the **System Functions** menu:

```
          System Functions
RevXmit   Disk   Vector   Ped     More
```

F2

Press the F2 key for **Disk.**

⑤ The following display will appear:

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

F3

Press the F3 key for **Plot.**

⑥ The following message will briefly appear:

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

⑦ The next prompt allows you to plot either all or just some of the ECGs on your diskette:

```
Select Data:
  All    Select
```

F1

Since you will be plotting all ECGs on your diskette, press the F1 key for **All.** Then press the ⇦ key.

⑧ If you answered yes to the **Ask for Extra Copies of Plots** prompt in the **Reports** function of the **Cart Setup** menu, then the following prompt will appear:

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

Just press the ⇦ key if you do not want any extra copies.

OR

Type in the number of extra copies. Then press the ⇦ key.

⑨ Next, the following display will appear:

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

F1 | F2 | F3 | F4 | F5

Press the appropriate function key to change the writer settings. Press **NoPrint** to cancel plotting. Press **PRINT** to start plotting ECG reports.

⑩ If you selected **PRINT**, then a display similar to one of the following will 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 plotted, and you can continue with the next step.

⑪ As each ECG on your diskette is plotted, displays similar to the following two will appear:

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

THEN

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

⑫ After all ECGs have been plotted, the following display will appear:

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

Pressing any key causes the following to appear:

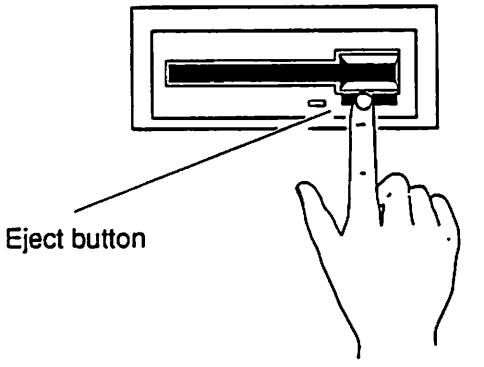
```
            Diskette Functions
  Xmit    Edit    Plot  Dirctry   More
```

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

Plot Selected ECGs

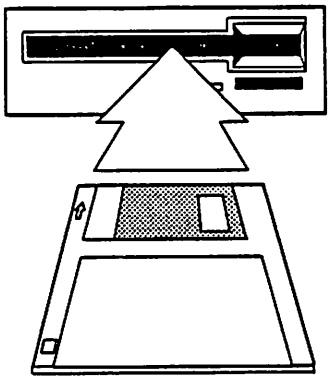
To plot a selection of ECGs on a diskette, follow these steps:

① If there is a diskette in the diskette drive slot, remove it by pressing the eject button:



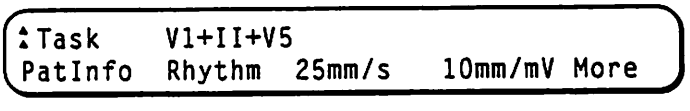
M13668-92

② If you haven't already done so, gently slide the diskette—label side up—containing the ECGs you wish to plot into the diskette drive slot:



M13668-93

③ If the *Main Menu* is not already displayed, then press the STOP key to return to it:



④ Next, press the [⇧] and [F1] keys at the same time to display the **System Functions** menu:

```
          System Functions
RevXmit   Disk   Vector   Ped     More
```

[F2]

Press the [F2] key for **Disk**.

⑤ The following display will appear:

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

[F3]

Press the [F3] key for **Plot**.

⑥ The following message will briefly appear:

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

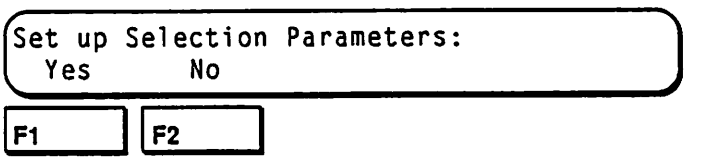
⑦ The next prompt allows you to plot either all or just some of the ECGs from your diskette:

```
Select Data:
  All    Select
```

[F2]

Since you will be selecting which ECGs to plot, press the [F2] for **Select**. Then press the [⇦] key.

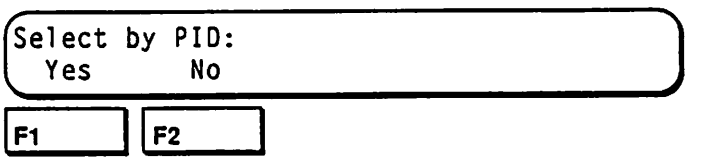
⑧ After choosing **Select**, the following display will appear:



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

If you select **No**, then go to step ⑭.

⑨ After selecting **Yes**, the first selection prompt will appear:

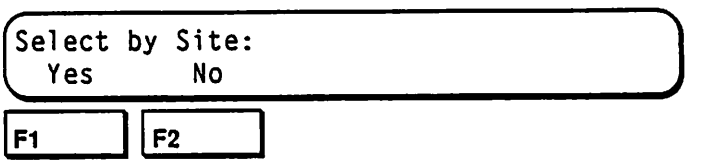


If you select **No**, then go to step ⑩.

If you select **Yes**, then the following display will appear:

Type in the patient's identification number (PID) that will be used to select ECGs. Then press the ⇦ key.

⑩ Next, a prompt will appear that allows you to select those ECGs that have the same MUSE site number:

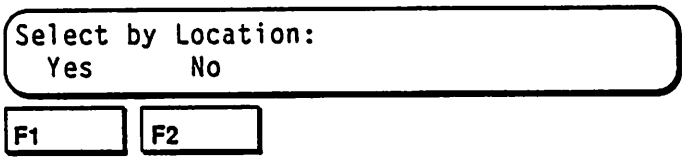


If you select **No**, then go to step ⑪.

If you select **Yes**, the following display will appear:

Type in the MUSE site number that will be used to select ECGs. Then press the ⇦ key.

⑪ The next prompt that appears allows you to select ECGs by their MUSE location number:

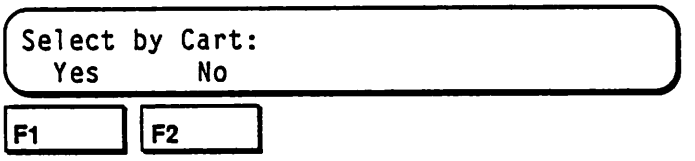


If you select **No**, then go to step ⑫.

If you select **Yes**, the following display will appear:

Type in the MUSE location number that will be used to select ECGs. Then press the ⇦ key.

⑫ The next prompt that appears allows you to select ECGs by their cart number:

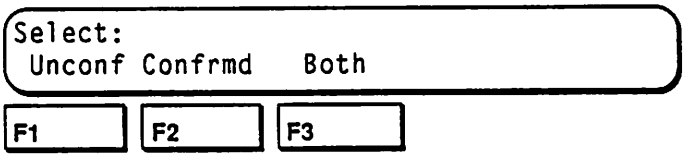


If you select **No**, then go to step ⑬.

If you select **Yes**, the following display will appear:

Type in the cart number that will be used to select ECGs. Then press the ⇦ key.

⑬ Then the following prompt will appear:



Choose **Unconf** if you only want to plot unconfirmed ECG reports.

OR

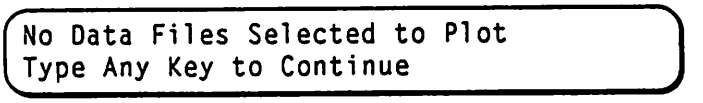
Choose **Confrmd** if you only want to plot confirmed ECG reports.

OR

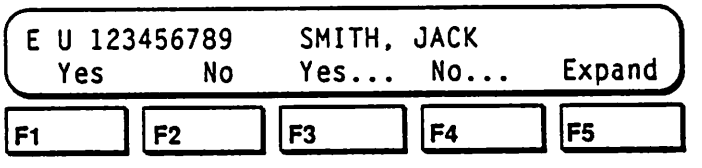
Choose **Both** if you want to plot both unconfirmed and ECG confirmed reports.

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

⑭ Next, one of the following two displays, or ones very similar, will appear:



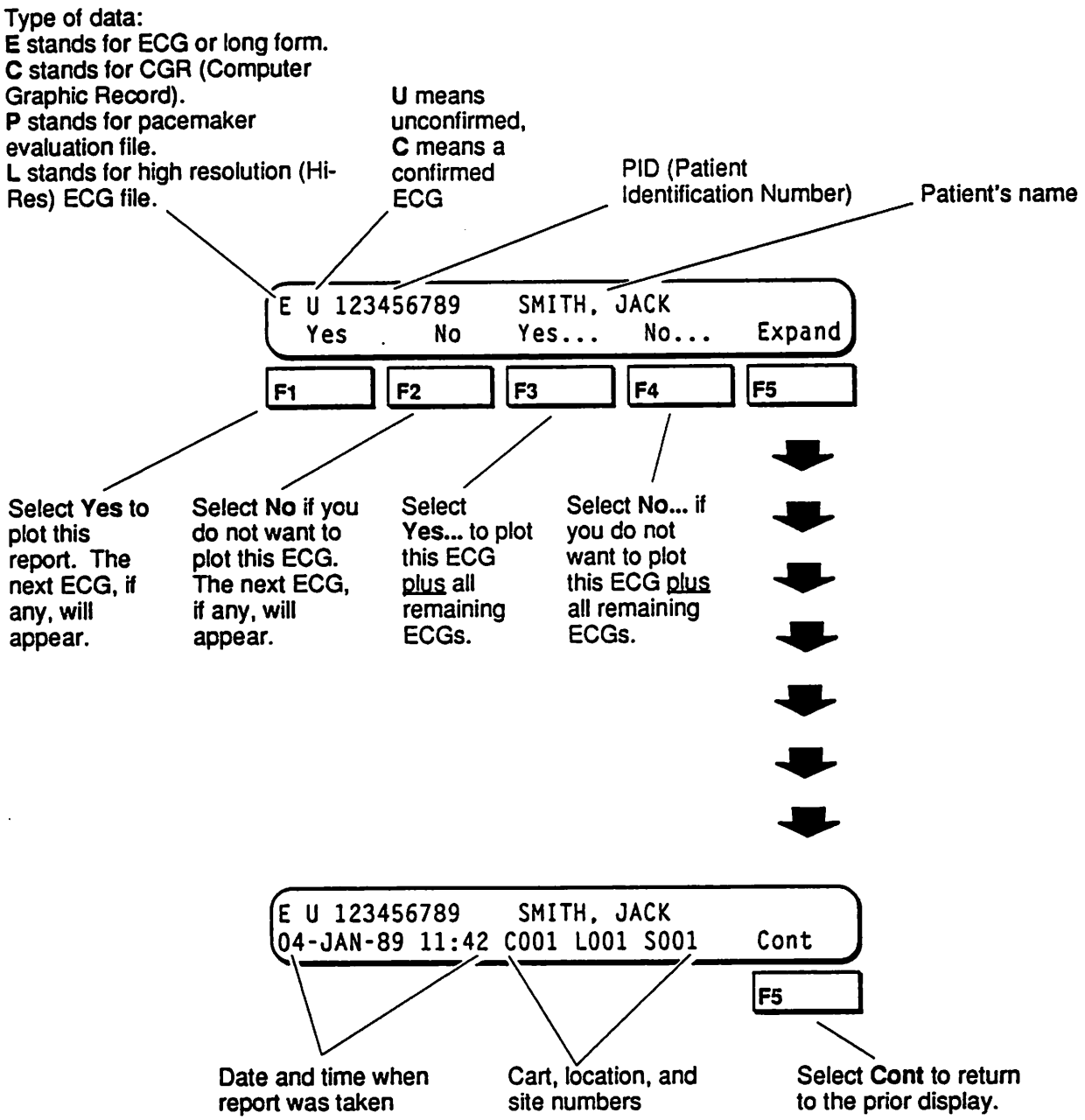
OR



If the first display appears, then 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, then 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.

⑮ Select which ECGs you wish to plot. Each ECG on your diskette or each ECG on diskette that fits your selection parameters will be displayed in a manner similar to the following:



⑯ If you answered yes to the **Ask for Extra Copies of Plots** prompt in the **Reports** function of the **Cart Setup** menu, then the following prompt will appear:

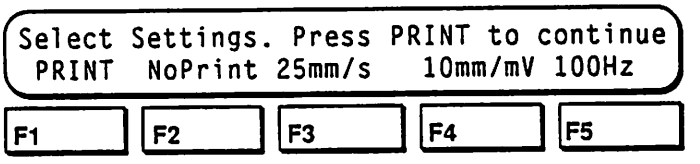
```
Number of Extra Copies:
0 to 99
```

Just press the ⇦ key if you do not want any extra copies.

OR

Type in the number of extra copies. Then press the ⇦ key.

⑰ Next, the following display will appear:



Press the appropriate function key to change the writer settings. Press **NoPrint** to cancel plotting. Press **PRINT** to start plotting ECG reports.

⑱ If you selected **PRINT**, then a display similar to one of the following will 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 plotted, and you can continue with the next step.

⑲ As each ECG on your diskette is plotted, displays similar to the following two will appear:

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

THEN

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

⑳ If the auxiliary leads were stored after the ECG was acquired, then the following prompt will appear:

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

F1	F2

If you selected **No**, go to step ㉑.

If you selected **Yes**, then the following will appear:

```
ONSET   OFFSET    GAIN
Qon     Toff      20mm/mV   PRINT   EXIT
```

F1	F2	F3	F4	F5

- Press the F1 key to change the vector loop onset {for example, **Qon** (Q onset), **Qoff** (Q offset), etc} or clear any onset increment value (for example, **Qon+8**).

OR

- Press the F2 key to change the vector loop offset {for example, **Poff** (P offset), **Toff** (T offset), etc} or clear any onset increment value (for example, **Toff+8**).

OR

Press the F3 key to change the vector loop gain.

OR

Press the F4 key to print a vector loop plot. (If the cardiograph "beeps" instead of printing a report, make sure the onset and offset locations are not in error.)

OR

Press the F5 key to exit this prompt and continue with the next step.

(21) After all ECGs have been plotted, the following display will appear:

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

Pressing any key causes the following to appear:

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

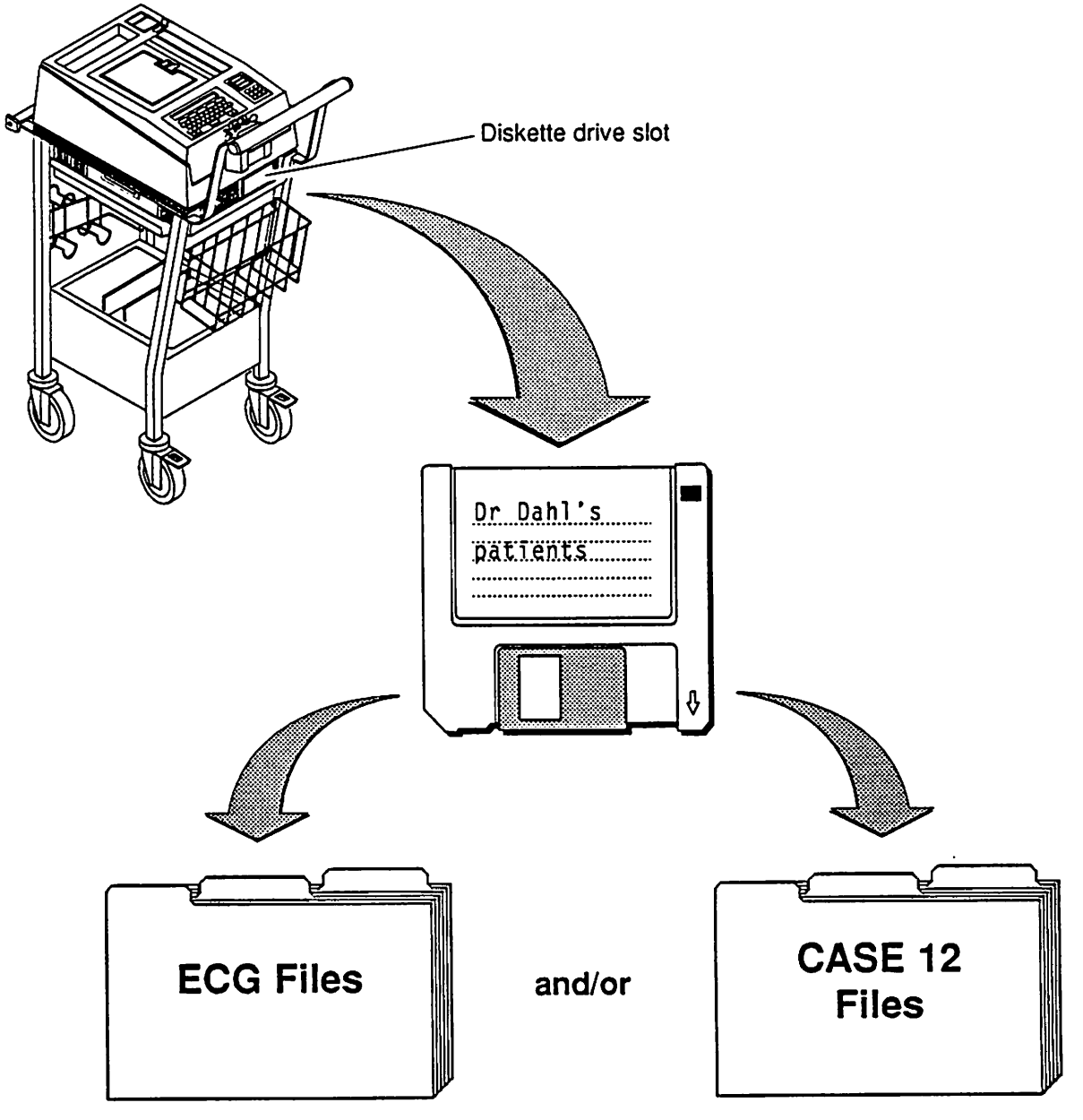
Press the STOP key to return to the *Main Menu.*

- Press the ⇧ and F1 keys at the same time to add 4 milliseconds to the onset increment value.
  Press the ⇧ and F2 keys at the same time to add 4 milliseconds to the offset increment value.

Chapter 8
Directory

Chapter Summary

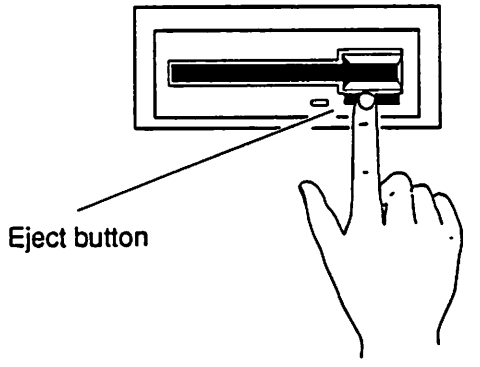
This chapter shows you how to either print or display all the files stored on a diskette.



M13668-22, M14425-01, M14278-9

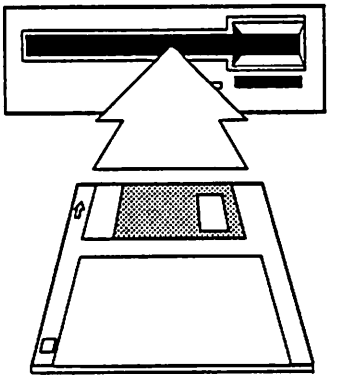
To print or display a diskette directory, follow these steps:

① If there is a diskette in the diskette drive slot, remove it by pressing the eject button:



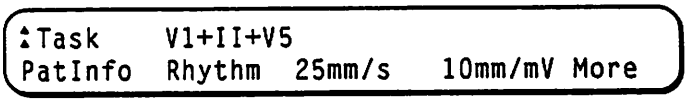
M13668-92

② If you haven't already done so, gently slide the diskette—label side up—containing the files you wish to view into the diskette drive slot:

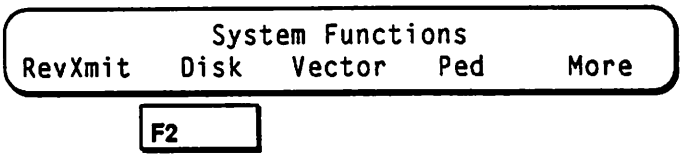


M13668-93

③ If the *Main Menu* is not already displayed, then press the STOP key to return to it:

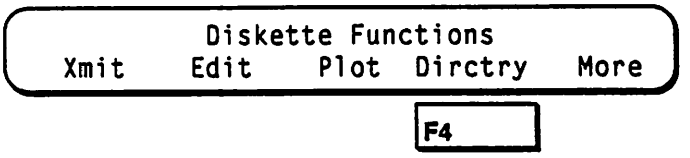


④ Next, press the [⇧] and [F1] keys at the same time to display the **System Functions** menu:



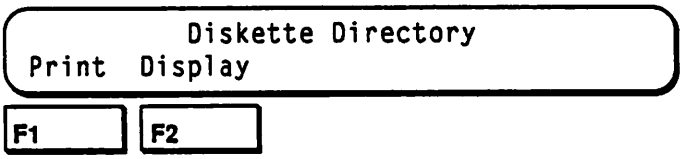
Press the [F2] key for **Disk**.

⑤ The following display will then appear:



Press the [F4] key for **Dirctry** (Directory).

⑥ The following display will appear:



Select **Print** to have a paper copy of all the files on your diskette. Then go to step ⑨.

OR

Select **Display** to view each diskette file on the LCD display. Then continue with the next step.

⑦ After selecting **Display**, the following display appears:

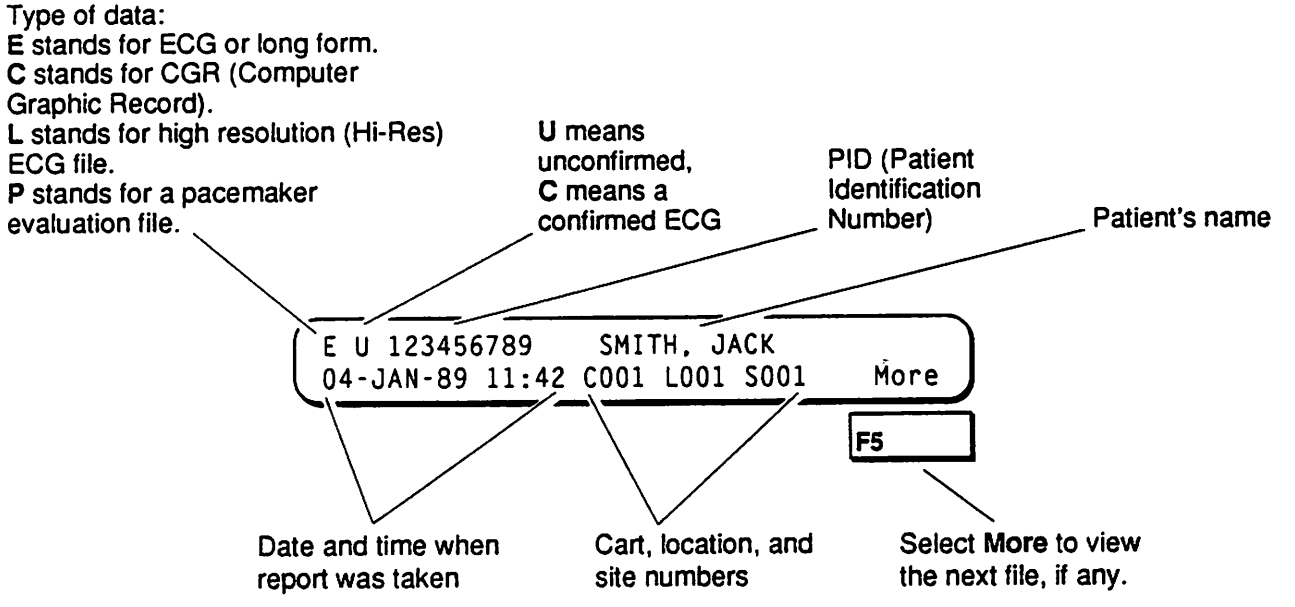
```
** Diskette Directory **
```

followed by a display similar to the following:

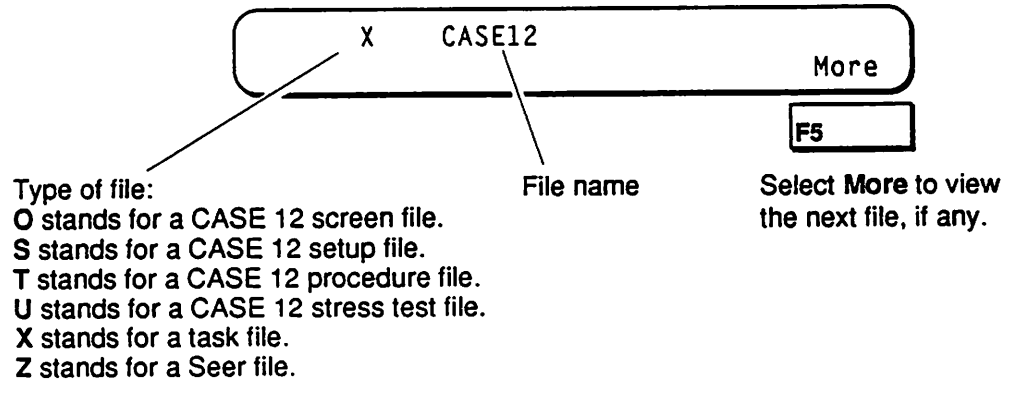
```
** Diskette Directory **
Available storage space: 75 ECGs  More
                                   F5
```

Press F5 for **More** and a record of the first file on diskette will appear. Files will be displayed in the ECG file format or the non-ECG file format:

• ECG File Format •



• Non-ECG File Format •



⑧ Press the [F5] key for **More** to view the next file. When the last file has been displayed, the following will appear:

```
          Diskette Directory
Print  Display
```

Press the [STOP] key to return to the *Main Menu*.

⑨ If you selected **Print,** messages similar to the following two will be briefly displayed:

```
** Diskette Directory **
```

THEN

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

The second display will change repeatedly because the cardiograph displays each file on the LCD 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:

```
     Diskette Directory          Available storage space:     75 ECGs

                                                    10-JAN-89 11:34 Pgm 106A

Seq  Type U/C PID          Name              Date      Time   Cart Loc  Site
 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
 9    T                    ANALOGOUT
```

M14278-108

⑩ After all files have been printed, the following will appear:

```
          Diskette Directory
Print  Display
```

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

Chapter 9
Deleting an ECG

Chapter Summary

This chapter shows you how to delete one or more files from a diskette. The chapter is divided into two parts:

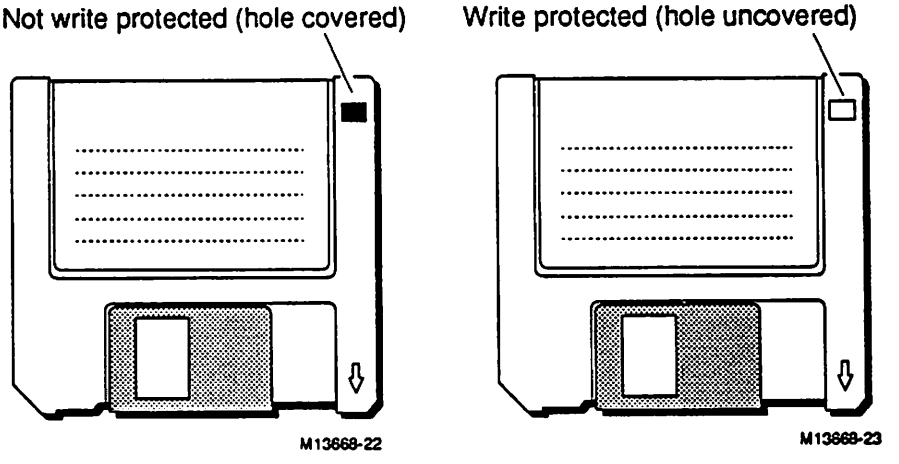
- **Delete All Files** shows you how to delete every file on a diskette, and
- **Delete Selected Files** explains how you can pick and choose the files you wish to delete.

Delete All Files

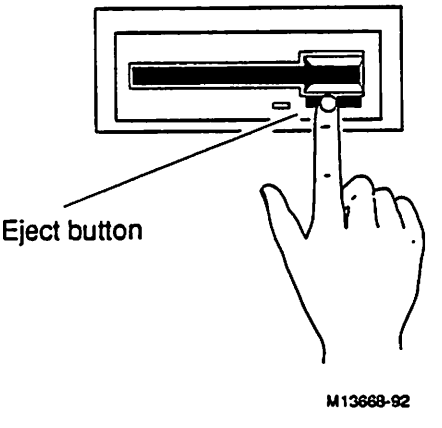
To delete all files on a diskette, follow these steps:

① Make sure that the diskette containing the files you wish to delete is <u>not</u> write protected (as shown below):

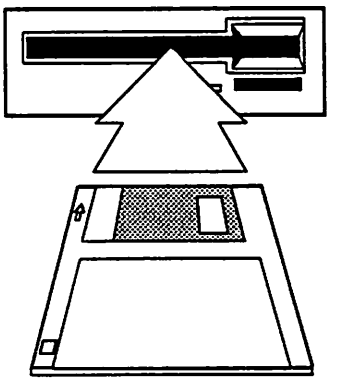
• Front of Diskette •



NOTE: If there already is a diskette in the diskette drive slot, remove it by pressing the eject button:

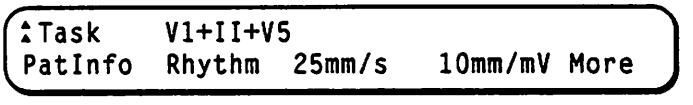


② If you haven't already done so, gently slide the diskette—label side up—containing the files you wish to delete into the diskette drive slot:

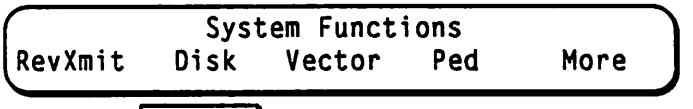


M13668-93

③ If the *Main Menu* is not already displayed, then press the STOP key to return to it:



④ Next, press the ⇧ and F1 keys at the same time to display the **System Functions** menu:



F2

Press the F2 key for **Disk.**

⑤ The following display will appear:

```
          Diskette Functions
 Xmit    Edit    Plot  Dirctry   More
                                  F5
```

Press the F5 key for **More**.

⑥ Next, the following prompt will appear:

```
          Diskette Functions
 Delete  Format                   More
 F1
```

Press the F1 key for **Delete**.

⑦ Then this password prompt will appear:

```
Password:
```

Type in either the Level 1 or Level 2 password. (The default passwords are "L1" and "L2.") Then press the ⇦ key.

⑧ The following message will briefly appear:

```
** Delete Diskette Data **
```

NOTE: If a diskette error message appears, make sure your diskette is <u>not</u> write protected.

⑨ Next, this prompt will appear:

```
Select Data:
 All     Select
```

F1

Since you will be deleting every file on your diskette, press the F1 key for **All**. Then press the ⇦ key.

⑩ The following prompt allows you to change your mind before deleting:

```
Delete Data Files Now!!:
  Yes      No
```

F1 F2

Select the appropriate function key.

⑪ If you select **Yes**, then a display similar to the following will appear:

```
Deleting PID: 123456789
```

⑫ When all files have been deleted, the following will appear:

```
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.*

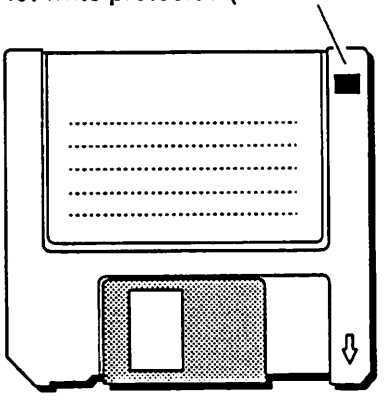
Delete Selected Files

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 <u>not</u> write protected (as shown below):

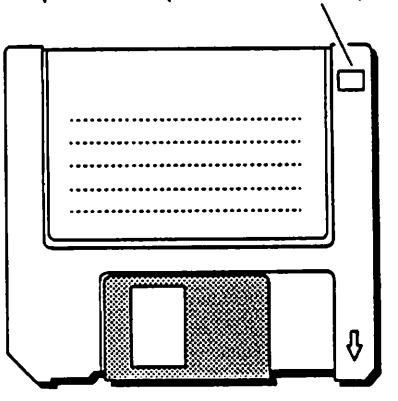
• Front of Diskette •

Not write protected (hole covered)



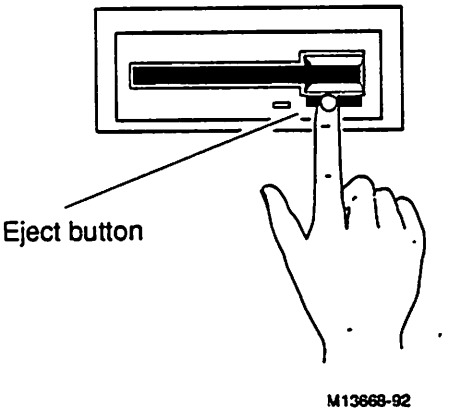
M13668-22

Write protected (hole uncovered)



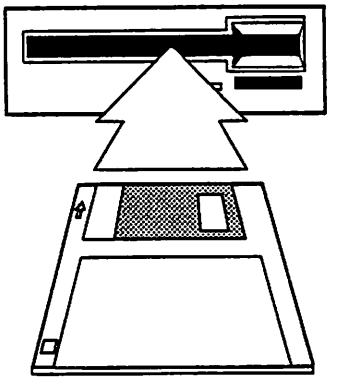
M13668-23

NOTE: If there already is a diskette in the diskette drive slot, remove it by pressing the eject button:



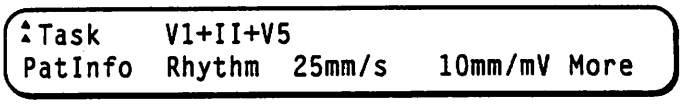
M13668-92

② If you haven't already done so, gently slide the diskette—label side up—containing the files you wish to delete into the diskette drive slot:

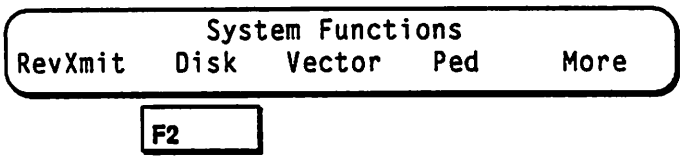


M13668-93

③ If the *Main Menu* is not already displayed, then press the STOP key to return to it:



④ Next, press the ⇧ and F1 keys at the same time to display the **System Functions** menu:



Press the F2 key for **Disk.**

⑤ The following display will appear:

```
          Diskette Functions
 Xmit    Edit    Plot  Dirctry   More
                                  F5
```

Press the F5 key for **More**.

⑥ Next, the following prompt will appear:

```
          Diskette Functions
 Delete  Format                   More
 F1
```

Press the F1 key for **Delete**.

⑦ Then this password prompt will appear:

```
Password:
```

Type in either the Level 1 or Level 2 password. (The default passwords are "L1" and "L2.") Then press the ⇦ key.

⑧ The following message will briefly appear:

```
      ** Delete Diskette Data **
```

NOTE: If a diskette error message appears, make sure your diskette is <u>not</u> write protected.

⑨ The next prompt allows you to delete either all or just some of the files on your diskette:

```
Select Data:
  All    Select
```

F2

Since you will be selecting which files to delete, press the F2 key for **Select**. Then press the ⇦ key.

⑩ After choosing **Select**, the following will appear:

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

F1 F2

Select **No** if you want to skip the following selection prompts and view the first file on your diskette.

If you select **No**, then go to step ⑯.

⑪ After selecting **Yes**, the first selection prompt will appear:

```
Select by PID:
  Yes      No
```

F1 F2

If you select **No**, then go to step ⑫.

If you select **Yes**, then the following display will appear:

```
Patient ID:
Digits 0 To 9
```

Type in the patient's identification number (PID) that will be used to select ECGs. Then press the ⇦ key.

⑫ Next, a prompt will appear that allows you to select those ECGs that have the same MUSE site number:

```
Select by Site:
  Yes      No
```

F1 F2

If you select **No**, then go to step ⑬.

If you select **Yes**, the following display will appear:

```
Site Number:
1 - 255
```

Type in the MUSE site number that will be used to select ECGs. Then press the ⏎ key.

⑬ The next prompt that appears allows you to select ECGs by their MUSE location number:

```
Select by Location:
  Yes      No
```

F1 F2

If you select **No**, then go to step ⑭.

If you select **Yes**, the following display will appear:

```
Location Number:
0 - 99
```

Type in the MUSE location number that will be used to select ECGs. Then press the ⏎ key.

⑭ The next prompt that appears allows you to select ECGs by their cart number:

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

F1 F2

If you select **No**, then go to step ⑮.

If you select **Yes**, the following display will appear:

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

Type in the cart number that will be used to select ECGs. Then press the ⇦ key.

⑮ Then the following prompt will appear:

```
Select:
 Unconf Confrmd   Both
```

F1 F2 F3

Choose **Unconf** if you only want to delete unconfirmed ECG reports.

OR

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

Choose **Confrmd** if you only want to delete confirmed ECG reports.

OR

Choose **Both** if you want to delete both unconfirmed and confirmed ECG reports.

⑯ Next, one of the following two displays, or ones very similar, will appear:

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

OR

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

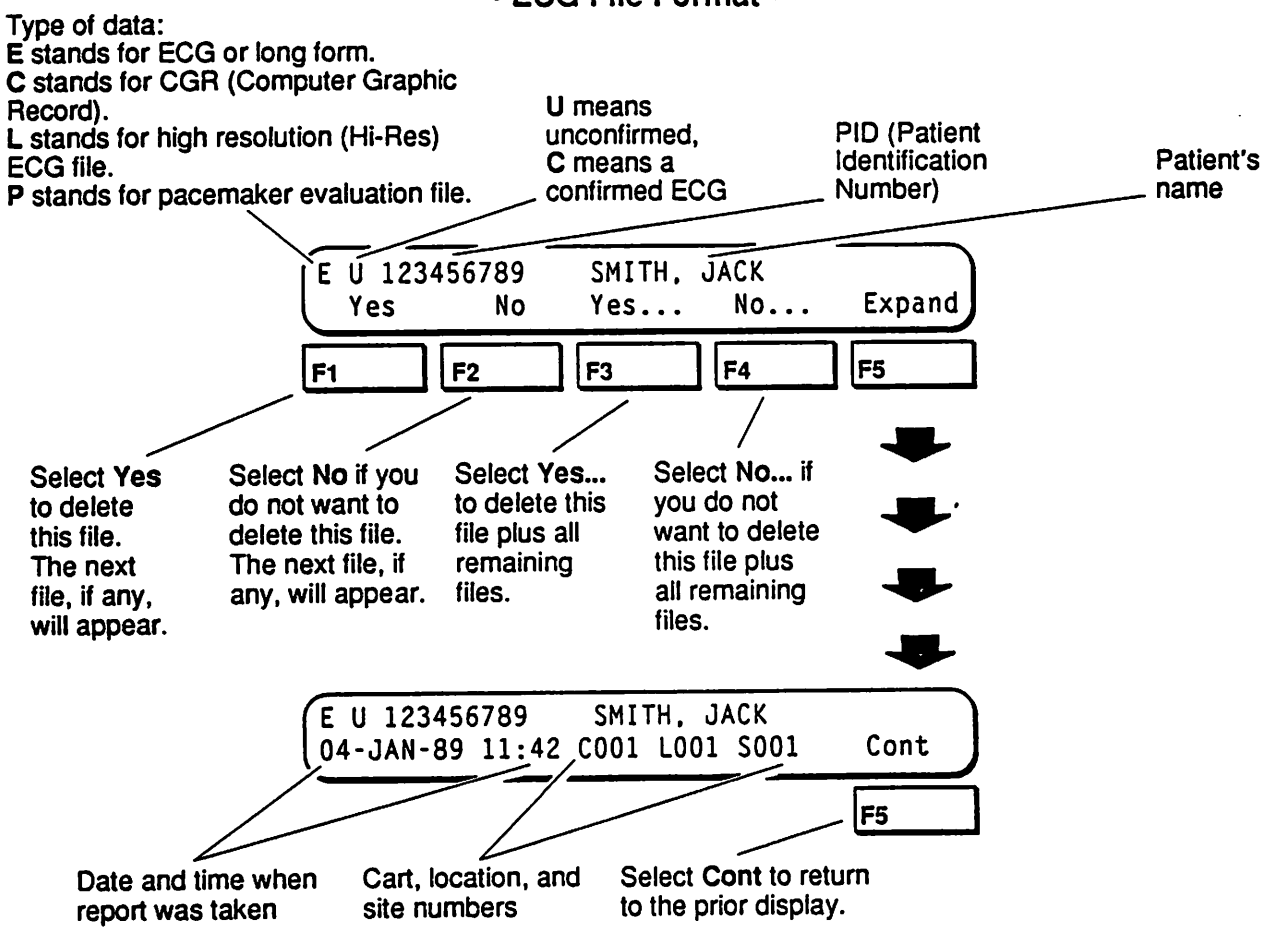
F1 | F2 | F3 | F4 | F5

If the first display appears, then either there are no files on your diskette, or there are no files that fit your selection parameters. In either case, press any key and start this procedure again.

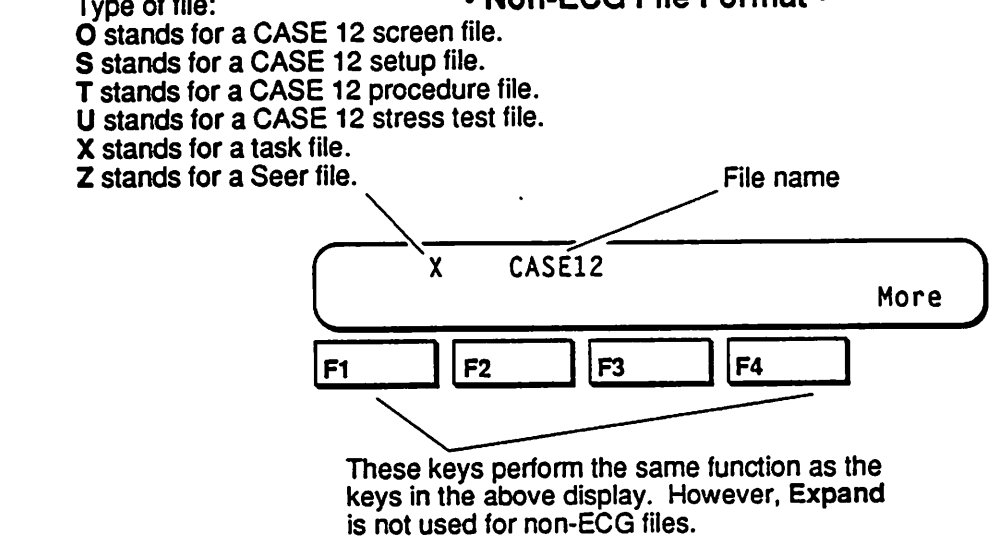
If the second display appears, then this is the first file on your diskette or the first file that fits your selection parameters. This second display is explained in detail in the next step.

⑰ Select which files you wish to delete. Each file on your diskette or each file that fits your selection parameters will appear on the LCD display. Files will be displayed in the ECG file format or the non-ECG file format:

• ECG File Format •



• Non-ECG File Format •



⑱ After selecting which files to delete, the following prompt allows you to change your mind before deleting:

```
Delete Data Files Now!!:
  Yes       No
```

F1 F2

Select the appropriate function key.

⑲ If you select **Yes**, then a display similar to the following will appear:

```
Deleting PID: 123456789
```

⑳ When all files have been deleted, the following will appear:

```
Delete Complete
Type Any Key to Continue
```

Typing any key displays the following:

```
              Diskette Functions
 Delete  Format                    More
```

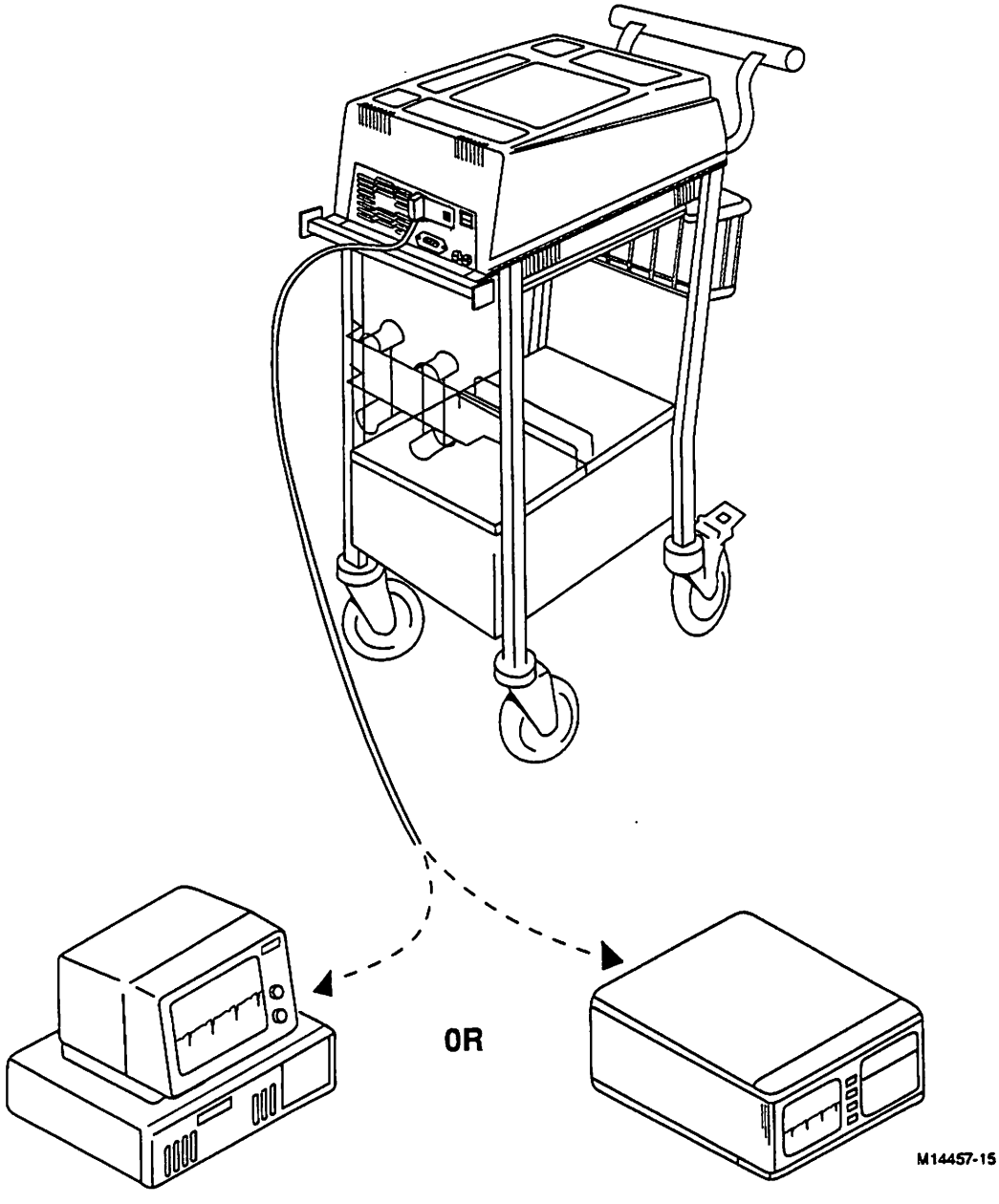
Press the STOP key to return to the *Main Menu.*

Chapter 10
Analog Output

Chapter Summary

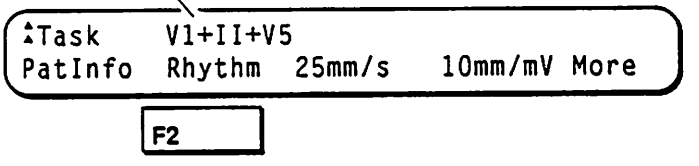
This chapter shows you how to use the cardiograph analog output option to send up to three channels of ECG data to either a scope or a personal computer

NOTE: The data is transmitted to a scope or personal computer through the AUX jack located on the back of the cardiograph.



The three channels that are output are set from the cardiograph's *Main Menu*. Data will be output continuously as long as an acquisition module is attached to the cardiograph, and the *Main Menu* is displayed.

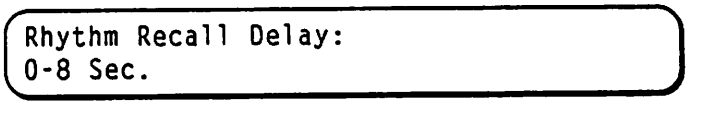
Press the [F2] key for **Rhythm** to change the data output. (If more than three rhythm channels appear on the *Main Menu*, the first three channels will be output—leads V1, II, and V5 in this case.)



NOTE: 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 12 – Cart Setup.")

NOTE: When the *Main Menu* is displayed, press the [⇧] and [F5] keys at the same time to print a rhythm Recall report. This report consists of 10 seconds of 3-lead ECG rhythm data.

NOTE: A prompt (shown below) in the **Cart Setup** menu allows data going to the rhythm Recall report to be delayed up to 8 seconds. (Refer to "Chapter 12 – Cart Setup.")



Chapter 11
Holter

Chapter Summary

Receiving a Holter transmisison on the cardiograph is treated the same way as receiving an ECG by telephone. The Holter will transmit rhythm strips and text to your cardiograph. Refer to the "Receiving an ECG by Telephone" section of chapter 5 and follow the steps.

Chapter 12
Cart Setup

Chapter Summary

Although your cardiograph 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. Once these are set, the cardiograph will retain all of these instructions as long as you own it—or until you change instructions.

These are the things that you can "set up" or change:

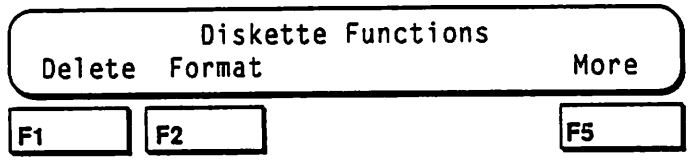
- **Dat/Tim** (date and time),
- **Phone** (phone number),
- **Ld Grps** (lead groups),
- **Reports** (report formats),
- **Passwds** (Level 1 and Level 2 passwords),
- **Modem**,
- **LclLine** (local line settings),
- **Misc** (miscellaneous parameters),
- **Defaults** (the original Marquette settings), and
- **Hi-Res** (high resolution ECG analysis option).

Before you begin...

Before you begin entering patient information there are a few special keys you should be familiar with. These keys are explained below.

F1
F2
F3
F4
F5

Function keys select an LCD display function that is directly above the key. For example, in the LCD display below, pressing the F1 key selects the **Delete** function, pressing the F2 key selects the **Format** function, and pressing the F5 key selects **More** which allows you to review additional menu functions.



NOTE: As in the example above, LCD displays in this manual will show only those function keys that can actually be used.

OR

ENTER key. After typing information on the keyboard, it is usually necessary to press this key to enter or store what you have typed.

SHIFT key. Used to type shifted characters or to access special functions.

DELETE key. Press this key to erase a character that you have typed on the keyboard.

SPACE BAR key. Press this key to create a space on the LCD display.

CURSOR LEFT key. Press this key to move the LCD display cursor left.

CURSOR RIGHT key. Press this key to move the LCD display cursor right.

BACK UP key. Pressing this key causes the prior LCD display prompt to appear.

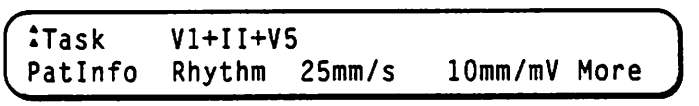
STOP

STOP key. In most cases, pressing this key returns the LCD display to the *Main Menu* and also stops the printing of a report.

Date and Time Setup

The cardiograph has an internal calendar and clock which is used to print the date and time on reports. To set the cardiograph's internal calendar and clock, follow these steps:

① If the *Main Menu* is not already displayed, then press the STOP key to return to it:



② Next, press the ⇧ and F1 keys at the same time to display the **System Functions** menu and select **Setup**.

③ After selecting **Setup**, the following password prompt will appear:

Type in the Level 1 password. (The default password is "L1.") Then press the ↵ key.

④ This causes the first **Cart Setup** menu to appear:

F1

⑤ Press the F1 key to select **Dat/Tim** and the following will appear:

```
          Date and Time Setup
  Date    Time
```

F1 F2

⑥ To change the **Date**, press the F1 key and go to step ⑨.

Otherwise, press the F2 key to change the **Time** .

Time

⑦ After selecting **Time**, the following will appear:

```
Observe Daylight Savings Time:
  Yes      No
```

F1 F2

Press the F1 key if you wish to observe daylight savings time. Or, press the F2 key if you do <u>not</u> wish to observe daylight savings time. Then press the ⇦ key.

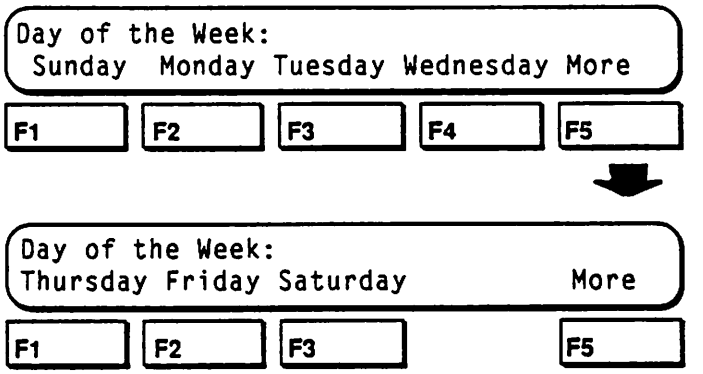
⑧ After answering the daylight savings prompt, the following will appear:

```
Time (HH MM):
HH=Hour, MM=Minute (24 Hr Clock)
```

Type in the time using a 24-hour clock. For example, type 08 10 for 8:10 am and 20 10 for 8:10 pm. After typing in the time, then press the ⇦ key. Then go to step ⑪.

Date

⑨ After selecting **Date**, the following will appear:



Select the current day of the week by pressing the appropriate function key. Then press the ⇦ key.

⑩ Then the following will appear:

```
Today's Date (DD MMM YY):
DD-Day, MMM-Month Name, YY-Year
```

Type in the current date. For example, if today is January 12, 1989, then type 12 JAN 89. Then press the ⇦ key.

⑪ After pressing the ⇦ key, the following will appear on the LCD display:

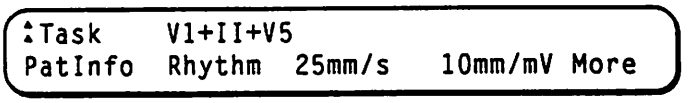
```
        Date and Time Setup
Date    Time
```

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

Phone Setup

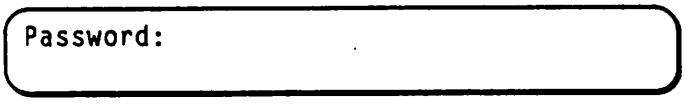
If you will be frequently calling a single location to transmit cardiograph reports, then it's smart to enter the telephone number of this location. This will save time because the number will not have to be entered again and again. To enter a telephone number, follow these steps:

① If the *Main Menu* is not already displayed, then press the STOP key to return to it:



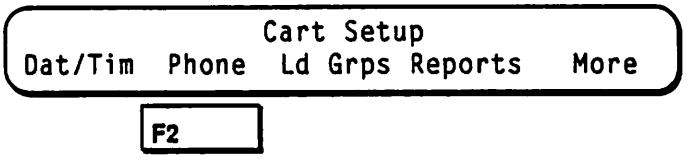
② Next, press the ⇧ and F1 keys at the same time to display the **System Functions** menu and select **Setup**.

③ Then the following password prompt will appear:



Type in the Level 1 password. (The default password is "L1.") Then press the ↵ key.

④ This causes the first **Cart Setup** menu to appear:



⑤ Press the [F2] key. The following will then appear:

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

Type in the telephone number. Use the equal (=) sign in the number for a pause in dialing. For example, in the telephone number 1=2345678, there would be a pause between numbers 1 and 2. Then press the [⇦] key.

⑥ The **Cart Setup** menu will appear:

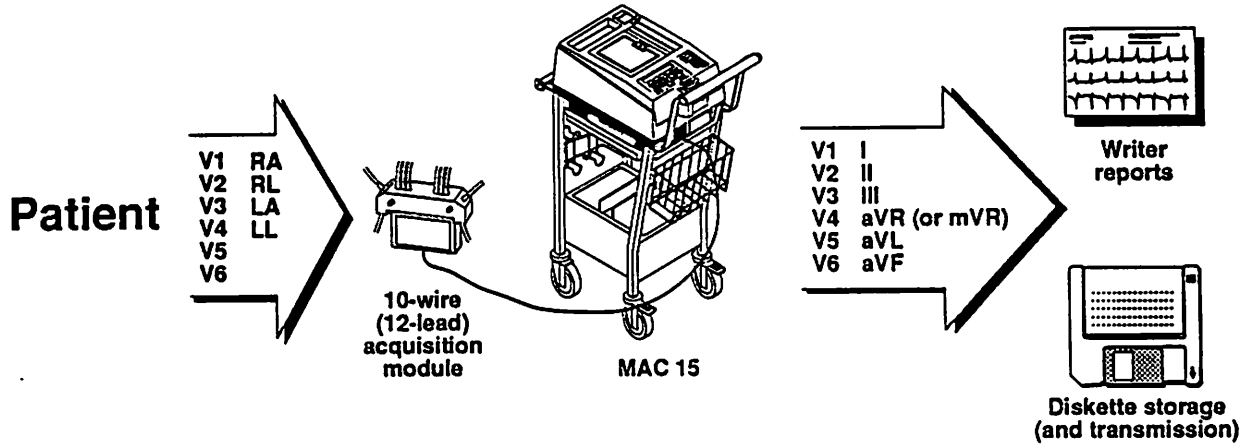
```
                Cart Setup
Dat/Tim  Phone  Ld Grps Reports   More
```

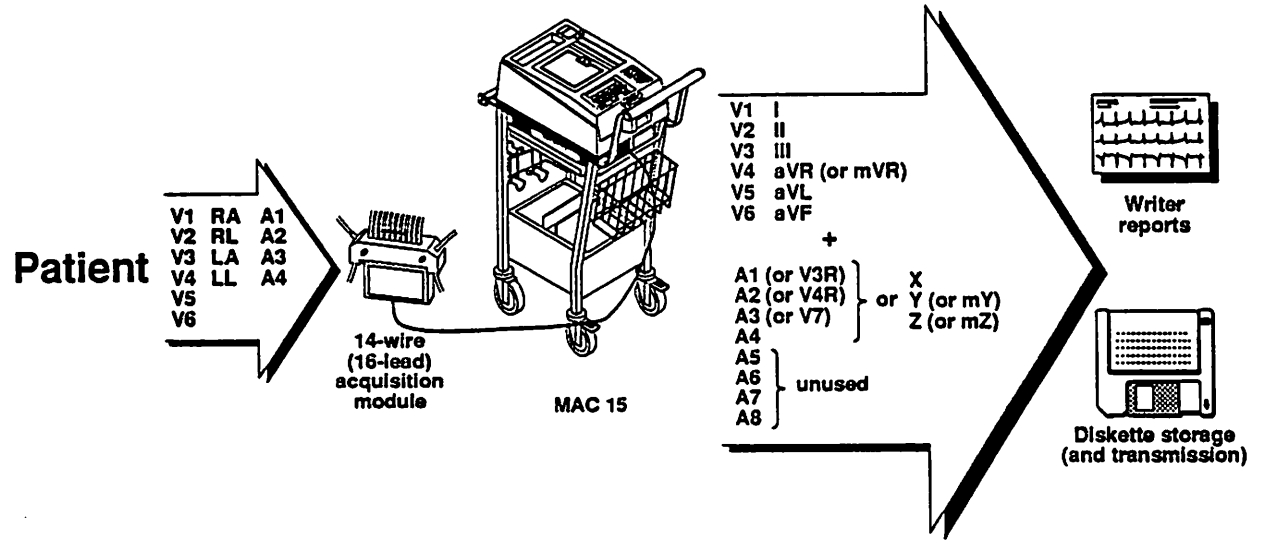
Press the [STOP] key to return to the *Main Menu*.

Lead Groups

Rhythm, Standrd (standard), **CGR/RMR** (computer graphic record/rhythm and morphology), or **S1** 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 cardiograph.

The differences between the 10-wire (12-lead) and 14-wire (16-lead) acquisition modules are shown below:

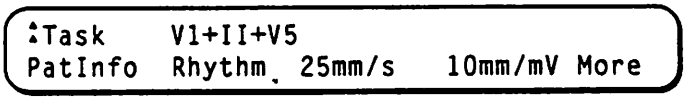




M14278-4, M14278-5, M14425-001

Follow the steps below to set leads:

- If the *Main Menu* is not already displayed, then press the STOP key to return to it:



- Next, press the ⇧ and F1 keys at the same time to display the **System Functions** menu and select **Setup**.

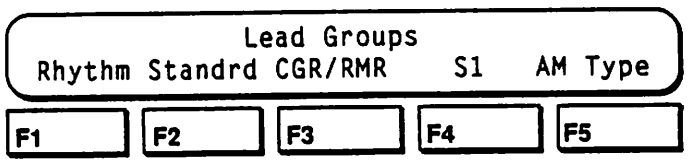
- After selecting **Setup**, the following password prompt will appear:

Type in the Level 1 password. (The default password is "L1.") Then press the ↵ key.

- This causes the first **Cart Setup** menu to appear:

F3

- Press the F3 key to select **Ld Grps** and the following will appear:



- Press the F1 key to set the **Rhythm** leads and then go to the **Setting Rhythm Leads** section.

OR

- Press the F2 key to set the **Standrd** leads and then go to the **Setting Standard Leads** section.

OR

- Press the F3 key to set the **CGR/RMR** leads and then go to the **Setting CGR/RMR Leads** section.

OR

- Press the F4 key to set the **S1** leads and then go to the **Setting S1 Leads** section.

OR

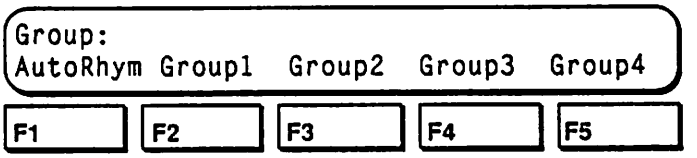
- Press the F5 key for **AM Type** to set the type of acquisition module that you have attached to the cardiograph (either 12- or 16-lead). Then go to the **Setting Acquisition Module Type** section.

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.

Setting Rhythm Leads

*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.*

① After selecting **Rhythm**, the following display will appear:

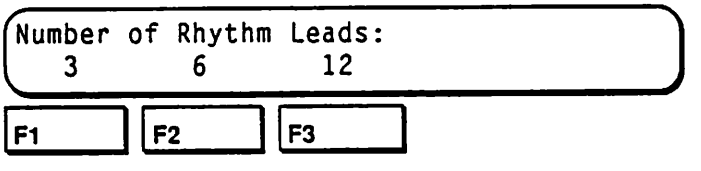


Press the appropriate function key to see the leads chosen for each group. For example, if you want to see the leads for **AutoRhym** (Automatic Rhythm), then press the [F1] key. Then, if you were satisfied with the leads chosen for **AutoRhym** , you would press the [STOP] key to return to the *Main Menu.* However, if you wished to change the leads, then after selecting a group, you would press the [⇦] key and continue with the next step.

Default 3-Lead Rhythm Lead Settings

AutoRhym: V1, II, and V5.
Group1: I, II, and III.
Group2: aVR, aVL, and aVF.
Group3: V1, V2, and V3.
Group4: V4, V5, and V6.

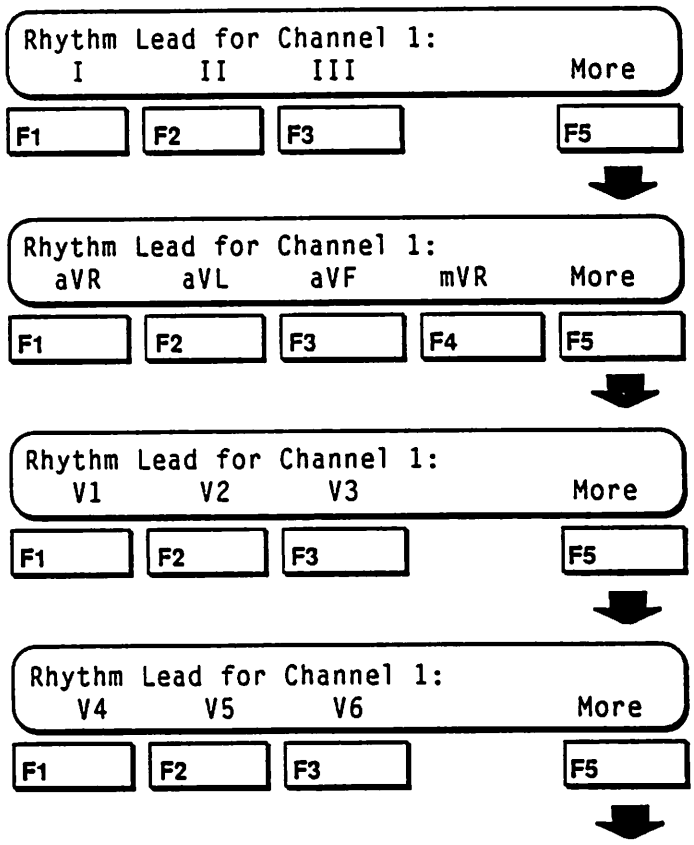
② After selecting a lead group to change, the following will appear:



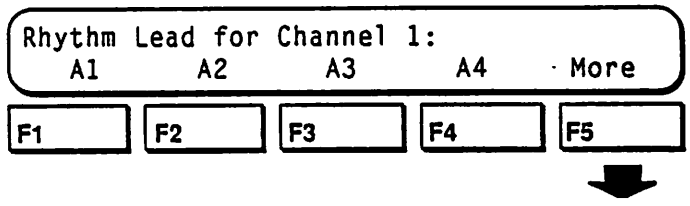
Select the desired number of leads by pressing the appropriate function key. Then press the [⇦] key.

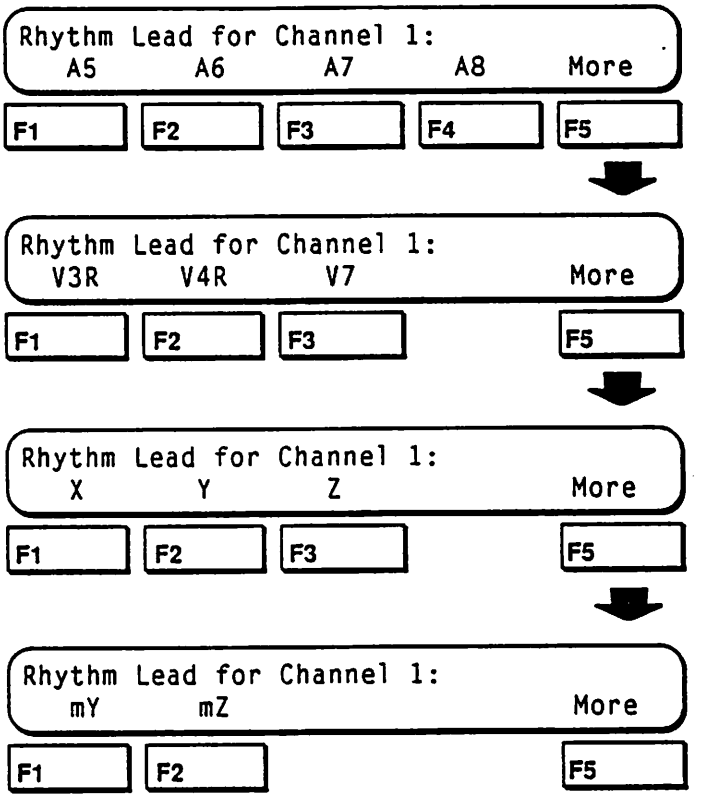
③ After selecting the number of leads, choose one of the possible leads for each channel by pressing the appropriate function key and then pressing the ⇦ key. A series of prompts will appear similar to the following:

NOTE: If the number of leads you selected was 12, then the **Standrd** (Standard) lead settings will be used. In this case, go to step ④.



NOTE: The following lead selections are only available if you have set 16-lead acquisition module in **AM Type.**





④ After selecting a lead for each channel, the following will appear:

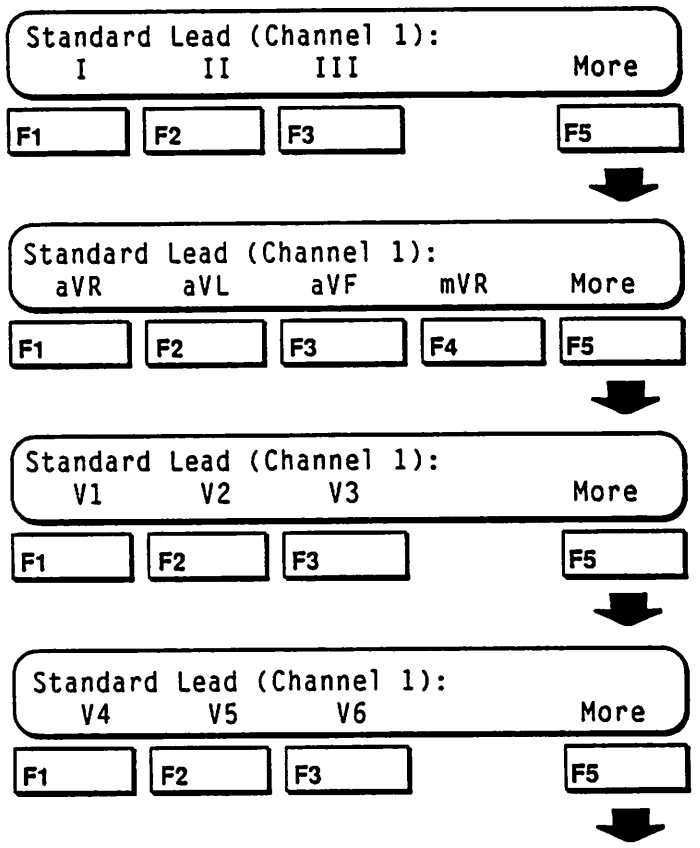
```
                Lead Groups
Rhythm Standrd CGR/RMR    S1    AM Type
```

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

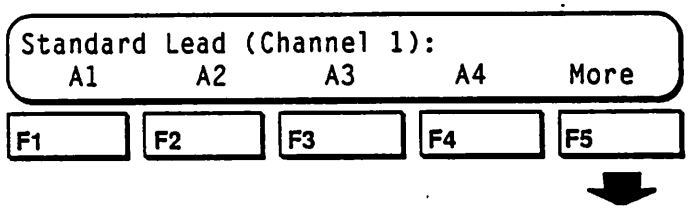
NOTE: In addition to CGR and RMR report formats, use **Setting CGR/RMR Leads** to set the rhythm leads for the following report formats:
1-page 4 x 2.5 with 3 rhythm channels,
1-page 4 x 2.5 with 1 rhythm channel, and
pediatric.

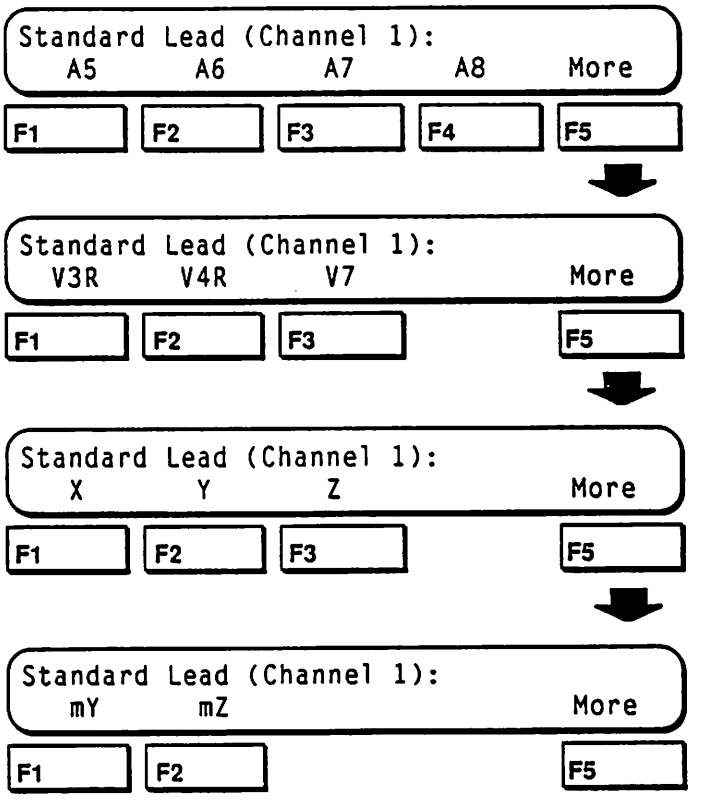
Setting Standard Leads

① After selecting **Standrd**, choose one of the possible leads for each of the channels by pressing the appropriate function key. Then press the ⇦ key. A series of prompts will appear similar to the following:



NOTE: The following lead selections are only available if you have set 16-lead acquisition module in **AM Type** .





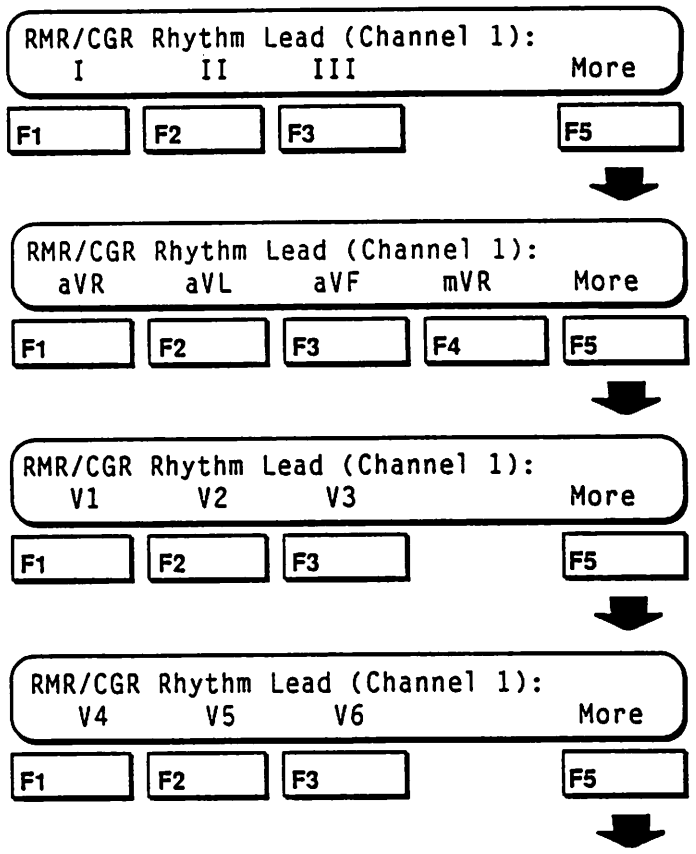
② After selecting a lead for each channel, the following will appear:

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

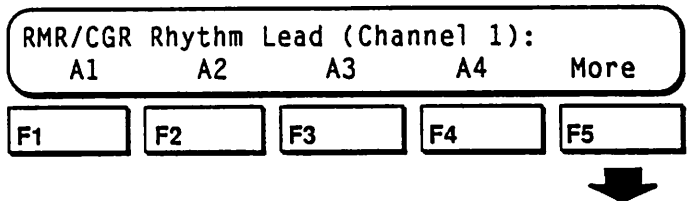
Setting CGR/RMR Leads

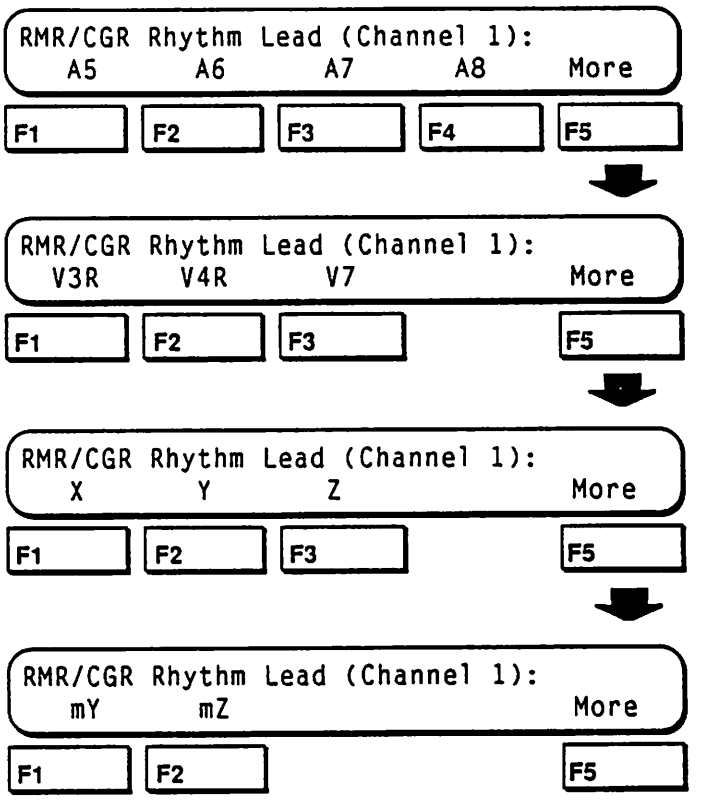
In addition to setting CGR/RMR rhythm leads, use ***Setting CGR/RMR Leads*** *to set the rhythm leads for the following report formats: 1-page 4 x 2.5 with 3 rhythm channels, 1-page 4 x 2.5 with 1 rhythm channel, and pediatric.*

① After selecting **CGR/RMR**, choose one of the possible leads for each of the three channels by pressing the appropriate function key. Then press the ⇦ key. A series of prompts will appear similar to the following:



NOTE: The following lead selections are only available if you have set 16-lead acquisition module in **AM Type** .



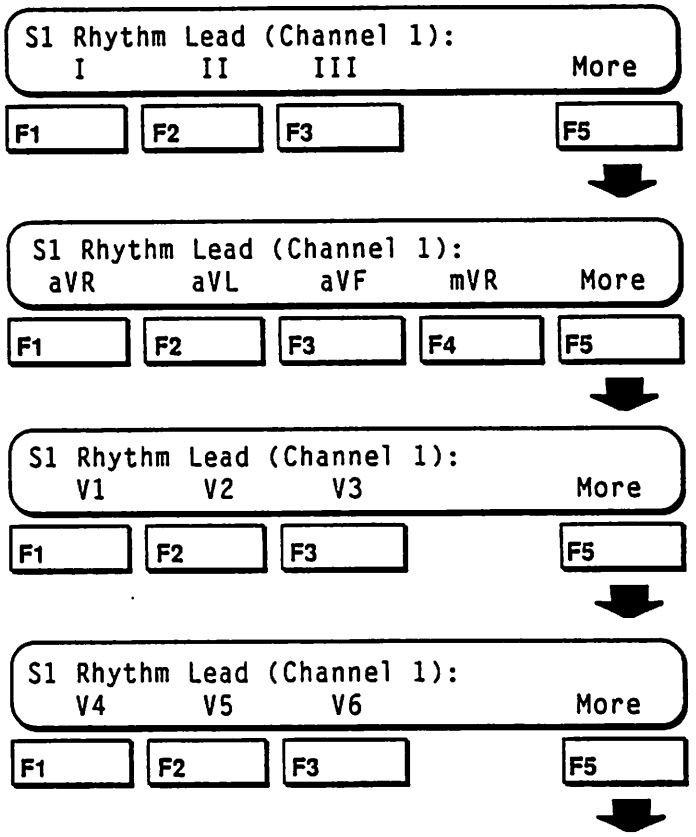


② After selecting a lead for each channel, the following will appear:

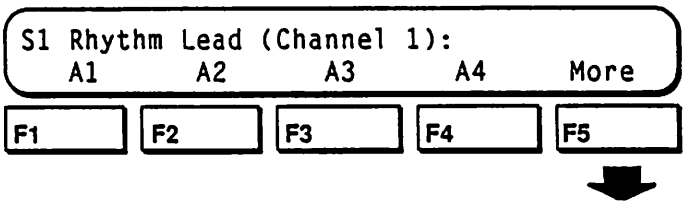
Press the STOP key to return to the *Main Menu.*

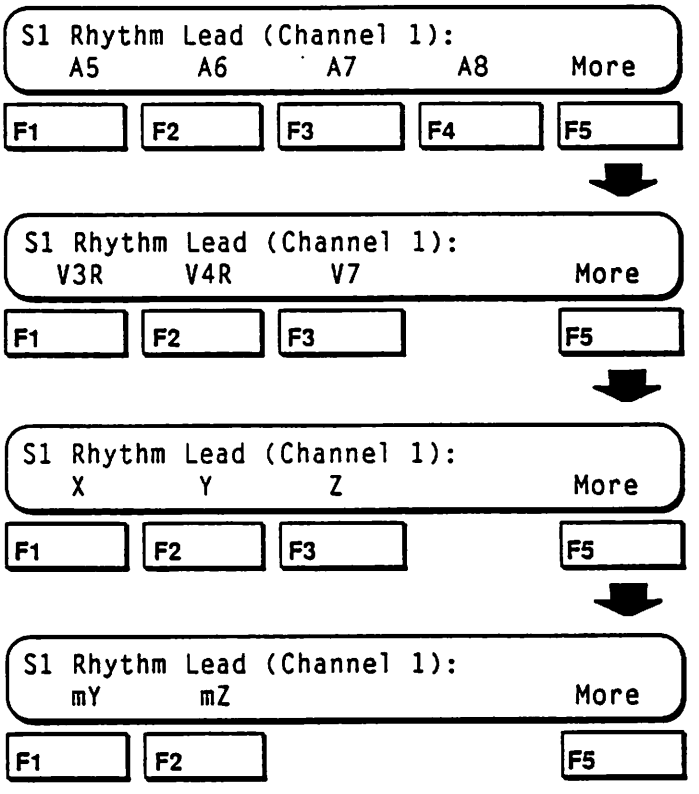
Setting S1 Leads

① After selecting **S1**, choose one of the possible leads for each of the six channels by pressing the appropriate function key. Then press the [⇦] key. A series of prompts will appear similar to the following:



NOTE: The following lead selections are only available if you have set 16-lead acquisition module in **AM Type**.





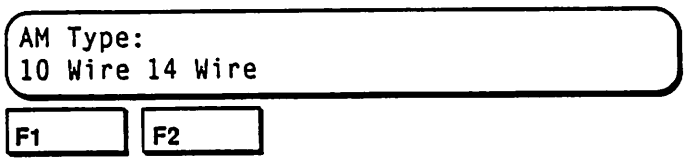
② After selecting a lead for each channel, the following will appear:

```
                Lead Groups
Rhythm Standrd CGR/RMR    S1    AM Type
```

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

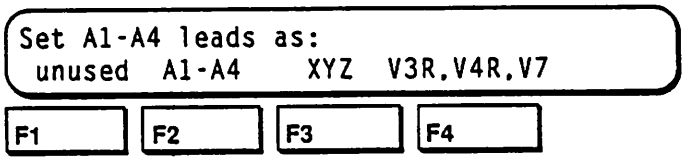
Setting Acquisition Module Type

① After selecting **AM Type**, the following display will appear:



Press the appropriate function key. Then press the ⇦ key. If you select **10 Wire** (12-lead), then go to step ⑤.

② Otherwise, if you selected **14 Wire** (16-lead), then the following display will appear:

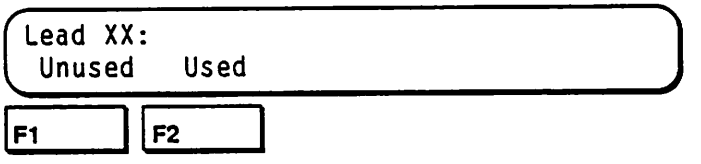


Press the appropriate function key. Then press the ⇦ key.

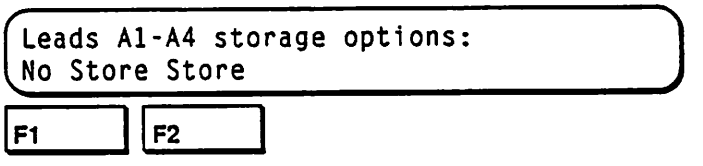
- If you selected **unused**, go to step ⑤.
- If you selected **A1-A4**, go to step ③.
- If you selected **XYZ**, go to step ④.
- If you selected **V3R, V4R, V7**, go to step ③.

③ Select the leads you wish to use:

NOTE: The **XX** in the following display represents A1, A2, A3, A4, V3R, V4R, or V7—depending on what you selected in step ②.



④ Next, select whether or not you want to store the data from the auxiliary (A) leads:



⑤ The following display will then appear:

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

Report Format Setup

The cardiograph allows you to select from a variety of report formats. You are free to choose as many of these formats as desired:

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.

- **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.

1 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. Also, tic marks may be added to each complex on the report. *If you select 1 Complex/Lead with abnormals, then this report will only be printed 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 will only be printed 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 will only be printed if an abnormal rhythm is detected.*

S1 report (1 page). Consists of a single median complex for each of the 12 leads at twice writer speed, combined with 5 seconds of 6-lead rhythm at half writer speed. Text is on the bottom of the page.

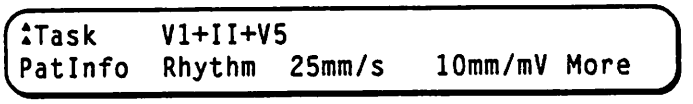
S2 report (2 pages). Consists of 10 seconds for each of 12 leads at twice writer speed. Text is on the bottom of page.

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. (Refer to "Setting CGR/RMR Leads" to set the rhythm lead or leads for this report.)

To set the type of report formats you want, follow these steps:

① If the *Main Menu* is not already displayed, then press the STOP key to return to it:

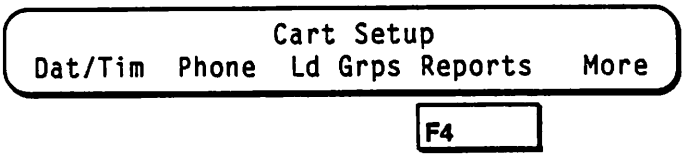


② Next, press the ⇧ and F1 keys at the same time to display the **System Functions** menu and select **Setup**.

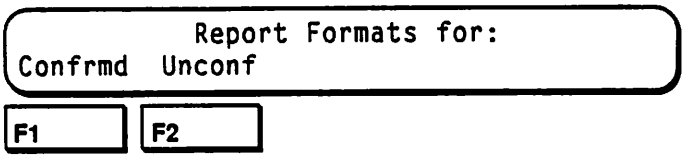
③ Then the following password prompt will appear:

Type in the Level 1 password. (The default password is "L1.") Then press the ↵ key.

④ The first **Cart Setup** menu will appear:



⑤ Press the F4 key to select **Reports** and the following will appear:



*Reports printed just after recording an ECG are unconfirmed. A report becomes confirmed when it is edited using the **Edit** function.*

⑥ Press the F1 key to select **Confrmd** which allows you to set the type of writer reports you want for confirmed reports. (Confirmed reports are reports that have been edited. To change an unconfirmed to a confirmed report, select **OK** when editing a report. (Refer to "Chapter 6–Editing ECG Reports.")

OR

Press the F2 key to select **Unconf** which allows you to set the type of writer reports you want for unconfirmed reports.

If you selected **Confrmd**, then go to step ⑧.

⑦ If you selected **Unconf**, the following prompt will appear:

```
Ask for Extra Copies of Plots:
  Yes      No
```

F1 F2

If you would like to be prompted for extra copies of writer reports, then select **Yes**.

⑧ If you do not want the 12SL analysis interpretation to appear on the original copy of writer reports, then select **Yes** to the following:

```
Suppress Orig Rpt Interpretation:
  Yes      No
```

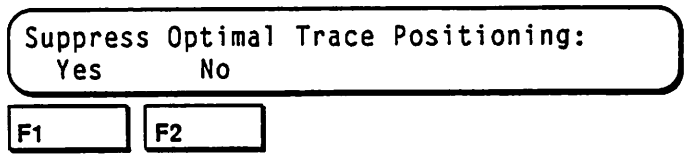
F1 F2

⑨ If you do not want the 12SL analysis interpretation to appear on copies of writer reports, then select **Yes** from the next prompt:

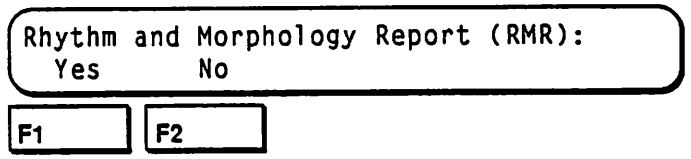
```
Suppress Copy Interpretation:
  Yes      No
```

F1 F2

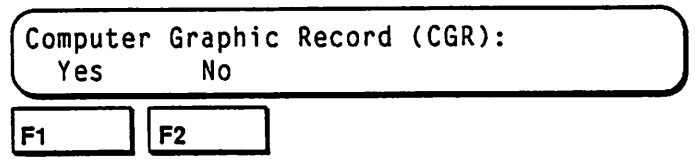
⑩ In the following prompt, if optimal trace positioning is <u>not</u> suppressed, then the baseline of a large magnitude signal will automatically be moved on a writer report so that the signal waveform will not interfere with text or another waveform:



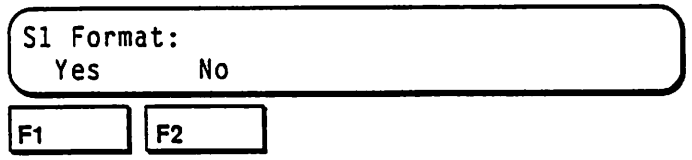
⑪ If you want the RMR writer report format, select **Yes** to the following prompt:



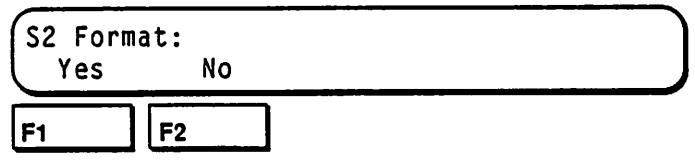
⑫ If you want the CGR writer report format, select **Yes** to the following prompt:



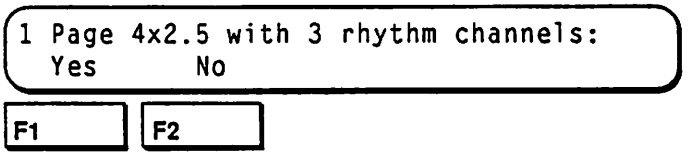
⑬ If you want the S1 writer report format, select **Yes** to the following prompt:



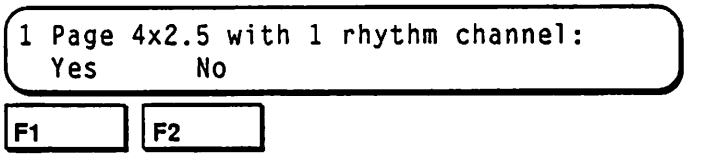
⑭ If you want the S2 writer report format, select **Yes** to the following prompt:



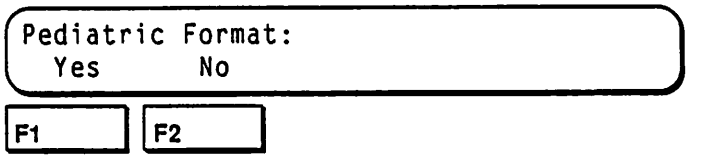
⑮ If you want the 1-page 4 x 2.5 with 3 rhythm channels writer report format, select **Yes** to the following prompt:



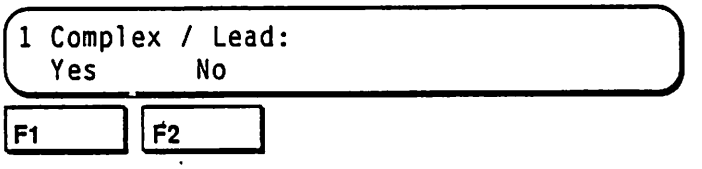
⑯ If you want the 1-page 4 x 2.5 with 1 rhythm channel writer report format, select **Yes** to the following prompt:



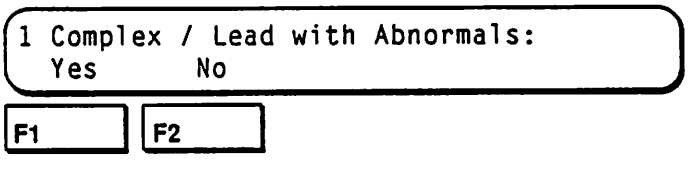
⑰ If you want the pediatric format writer report, select **Yes** to the following prompt:



⑱ If you want the 1 complex/lead writer report format, select **Yes** to the following prompt:



⑲ If you have already selected the 1 complex/lead report format above or you previously selected **Confrmd** (confirmed), then go to step ⑳. Otherwise, select **Yes** if you want the 1 complex/lead with abnormals report format:



⑳ If you have not selected the 1 complex/lead or the 1 complex/lead with abnormals report format, then go to step ㉒. Otherwise, if you want tic marks on the median complexes of the 1 complex/lead report, then select **Yes** from the following display:

```
Add Tic to Complexes:
  Yes       No
```

F1 F2

NOTE: The five tic marks on each median complex appear at P onset, P offset, QRS onset, QRS offset, and T offset as shown in the following sample waveform:

㉑ You can double the gain of the 1 complex/lead report that you choose by selecting **Yes** in the following prompt:

```
Times 2 Complexes:
  Yes       No
```

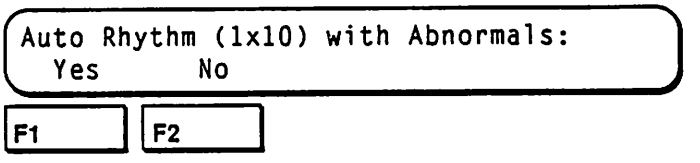
F1 F2

㉒ If you want the automatic rhythm (1 x 10) report format, then select **Yes** from the following prompt:

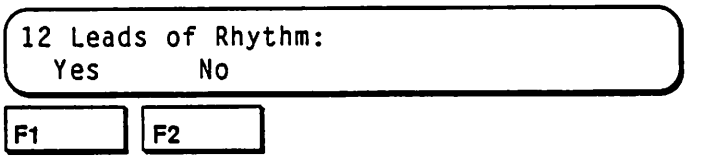
```
Automatic Rhythm (1x10):
  Yes       No
```

F1 F2

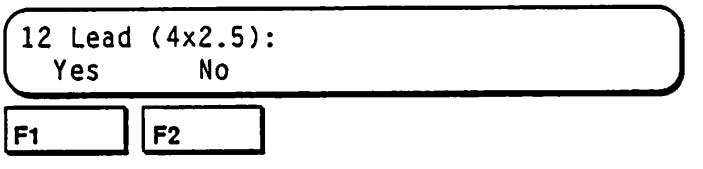
(23) If you have already selected the automatic rhythm (1 x 10) report format or you previously selected **Confrmd** (confirmed), then go to step (24). Otherwise, select **Yes** if you want the automatic rhythm (1 x 10) with abnormals report format:



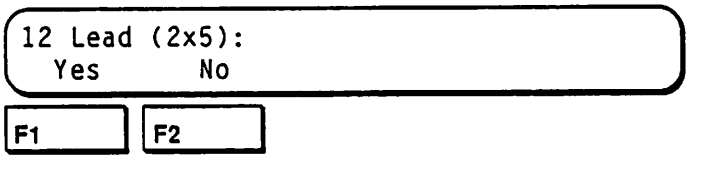
(24) If you want the 12 leads of rhythm writer report format, then select **Yes** at the following prompt:



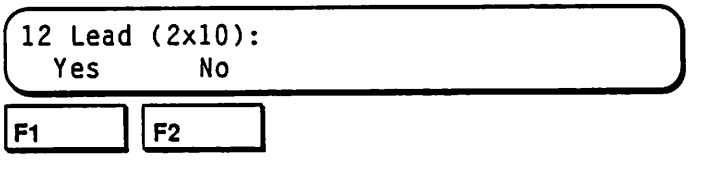
(25) If you want the 12-lead 4 x 2.5 writer report format, then select **Yes** at the following prompt:



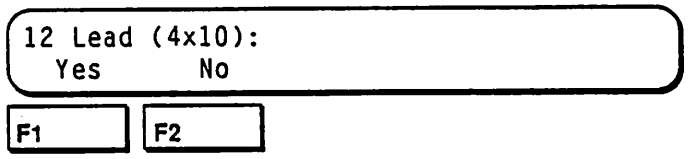
(26) If you want the 12-lead 2 x 5 writer report format, then select **Yes** at the following prompt:



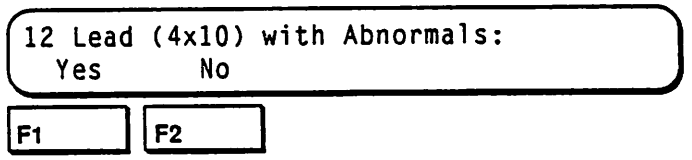
(27) If you want the 12-lead 2 x 10 writer report format, then select **Yes** at the following prompt:



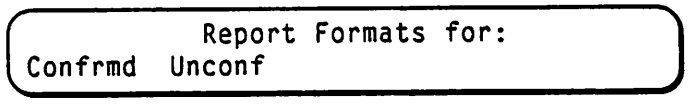
㉘ If you want the 12-lead 4 x 10 writer report format, then select **Yes** at the following prompt:



㉙ If you have already chosen the 12-lead (4 x 10) report format from above or have previously selected **Confrmd** (confirmed) reports, then go to step ㉚. Otherwise, you can choose the 12-lead (4 x 10) with abnormals report format by selecting **Yes** at the following prompt:



㉚ After pressing the ⇦ key, the following will appear:



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

Passwords Setup

The cardiograph allows a user to set two passwords called Level 1 and Level 2 that can be used to restrict access into various cardiograph functions. For example, the **Setup** menu itself can be password protected.

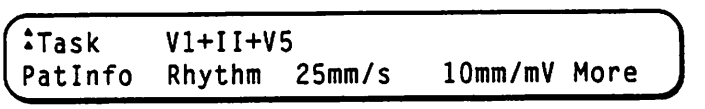
The following chart shows what functions are password protected:

Level 1 Password	Level 2 Password
Setup	—
Edit	**Edit**
Format	**Format**

Whenever you see the **Password** prompt, this means that either a Level 1 or Level 2 password must be entered before proceeding.

Follow the steps below to set the Level 1 and Level 2 passwords:

① If the *Main Menu* is not already displayed, then press the [STOP] key to return to it:



② Next, press the [⇧] and [F1] keys at the same time to display the **System Functions** menu and select **Setup**.

③ After selecting **Setup**, the following password prompt will appear:

```
Password:
```

Type in the Level 1 password. (The default password is "L1.") Then press the ⇦ key.

④ The first **Cart Setup** menu will appear:

```
                Cart Setup
Dat/Tim  Phone  Ld Grps Reports   More
                                   F5
```

⑤ Next, press the F5 key for **More** and the following display will appear:

```
                Cart Setup
Passwds  Modem  LclLine   Misc    More
F1
```

⑥ Press the F1 key for **Passwds** and the following will appear:

```
              System Passwords
Level 1  Level 2
F1       F2
```

Press the F1 key to change the **Level 1** password.

OR

Press the F2 key to change the **Level 2** password.

Then press the ⇦ key.

⑦ The following prompt will appear. Type in up to a six-character password using either letters and/or numbers:

```
Password:
Any 6 characters (A-Z, 0-9)
```

Then press the ⇦ key.

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.

⑧ After entering a password, the following display will appear:

```
                System Passwords
Level 1  Level 2
```

F1 F2

You may now change the other password or press the STOP key to return to the *Main Menu.*

Modem Setup

This section is intentionally left blank.

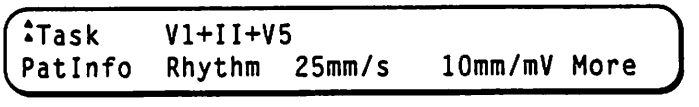
If your cardiograph is equipped with a modem, and you are having problems either transmitting or receiving reports over a telephone, reset your cardiograph by using the **Defaults** part of the **Cart Setup** menu. Then try transmitting/receiving again. (Refer to "Chapter 5–Transmitting an ECG" for further details.) If you still experience problems, then contact Marquette Service.

Local Line Setup

The cardiograph has the ability to transmit and receive data either over the telephone lines using a modem (if you have purchased that option) or "locally." Local transmission and reception is done using a special cable to connect your cardiograph to another unit.

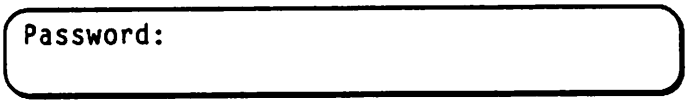
When the cardiograph leaves Marquette, it is already set up to communicate locally. However, you may find it necessary to change one or more of the local line values. The following steps show you how to change local line values:

① If the *Main Menu* is not already displayed, then press the [STOP] key to return to it:



② Next, press the [⇧] and [F1] keys at the same time to display the **System Functions** menu and select **Setup**.

③ After selecting **Setup**, the following password prompt will appear:



Type in the Level 1 password. (The default password is "L1.") Then press the [⇦] key.

④ The first **Cart Setup** menu will appear:

```
                Cart Setup
Dat/Tim  Phone  Ld Grps Reports   More
                                   F5
```

⑤ Next, press the F5 key for **More** and the following display will appear:

```
                Cart Setup
Passwds  Modem  LclLine   Misc    More
                 F3
```

⑥ Press the F3 key for **LclLine** and the following display will appear:

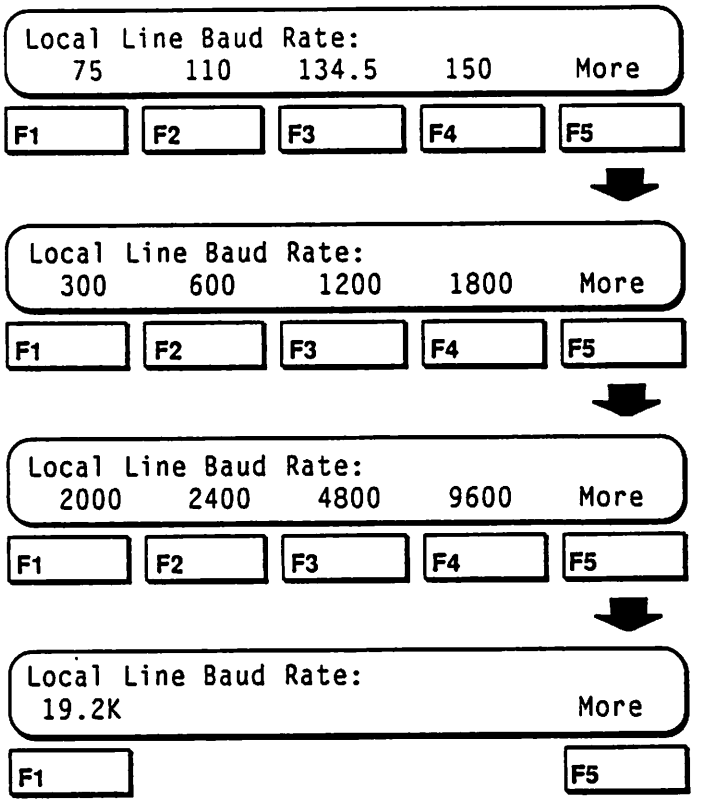
```
Will the Local Line be Used:
  Yes       No
F1          F2
```

If you do not plan on using the local transmit/receive function of the cardiograph, then select **No** and the second **Cart Setup** menu will appear. Otherwise, select **Yes**.

Then press the ⇦ key.

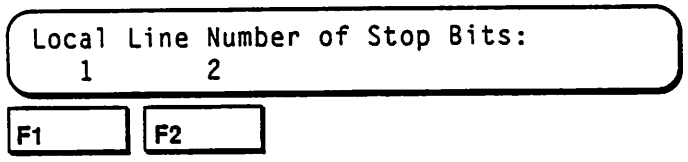
⑦ If you selected **Yes**, you have the option of changing the baud rate used in local transmission/reception. Select the baud rate you want and then press the key.

NOTE: The unit you are transmitting to or receiving data from must be set at the same baud rate as your cardiograph.



⑧ After setting the baud rate, a stop bit prompt will appear. Press the appropriate function key to select the number of stop bits used in local line transmission/reception. Then press the [⇦] key.

NOTE: The unit you are transmitting to or receiving data from must be using the same number of stop bits as your cardiograph.



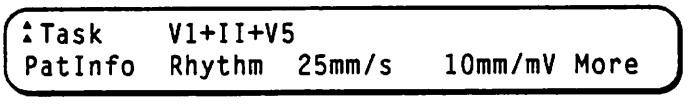
⑨ The following will then appear:

Press the [STOP] key to return to the *Main Menu.*

Miscellaneous Setup

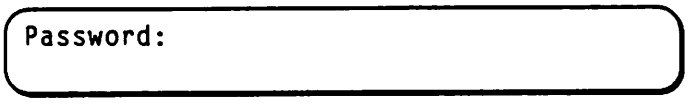
The following are a variety of items that you may want to set up before starting to use the cardiograph. Many of these items, such as institution name, will only have to be entered once.

① If the *Main Menu* is not already displayed, then press the STOP key to return to it:



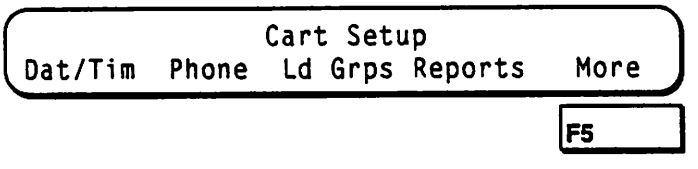
② Next, press the ⇧ and F1 keys at the same time to display the **System Functions** menu and select **Setup**.

③ After selecting **Setup**, the following password prompt will appear:

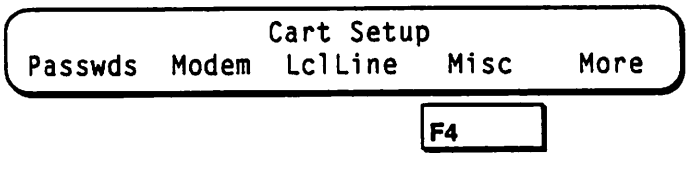


Type in the Level 1 password. (The default password is "L1.") Then press the ↵ key.

④ The first **Cart Setup** menu will appear:



⑤ Next, press the F5 key for **More** and the following display will appear:



⑥ Press the F4 key for **Misc** and a line frequency prompt will appear. Select a line frequency by pressing the appropriate function key.

Then press the ⇦ key.

```
Line Frequency:
  60Hz     50Hz
```

F1 F2

NOTE: Line frequency refers to the frequency of the power source connected to your cardiograph. 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.

⑦ Next, the patient information format prompt will appear:

```
Patient Info format:
  Long   Short
```

F1 F2

Select a patient information format by pressing the appropriate key.

Then press the ⇦ key.

⑧ Next, a location prompt will appear:

```
Location:
0-99
```

Type in a number from 0 to 99 that will be used to identify this location.

Then press the ⇦ key.

⑨ Next, a cart identification prompt will appear:

```
Cart ID:
0-255
```

Type in a number from 0 to 255 that will be used to identify this cardiograph.

Then press the ⇦ key.

⑩ A MUSE site identification prompt will appear:

```
Site ID:
1-255
```

Type in the MUSE site number, if any. A "site" has access to the ECG data acquired from the locations that are defined within it. The data from each site is kept separate. 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.

Then press the ⇦ key.

⑪ An institution name prompt will appear:

```
Institution Name:
Up to 40 Characters
```

Type in the name of your institution—up to 40 characters.

Then press the ⇦ key.

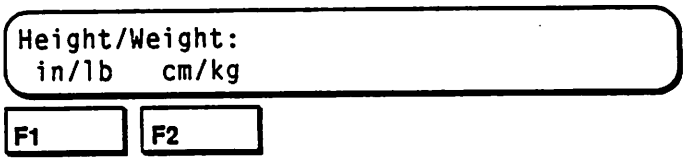
⑫ Next, a prompt will appear that allows you to set the number of digits used in a patient's identification number:

```
Number of Patient ID Digits:
1-12
```

Type in a number from 1 to 12.

Then press the ⇦ key.

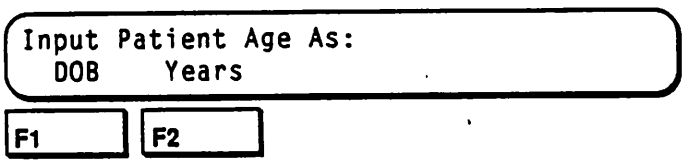
⑬ A prompt will appear that allows you to represent a patient's height and weight in either inches and pounds, or centimeters and kilograms:



Press the appropriate function key.

Then press the ⇦ key.

⑭ The following prompt allows you to set whether a patient's age will be input as a date of birth in day-month-year order (for example, 23 MAR 45) or in years.

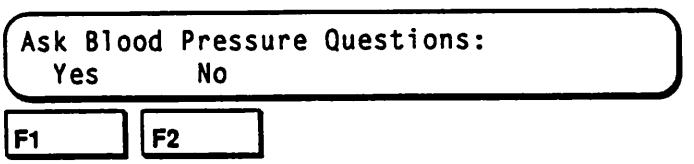


Press the appropriate function key.

Then press the ⇦ key.

NOTE: DOB will not work for patients born before 1900.

⑮ The next prompt allows you to include systolic and diastolic blood pressure questions each time you enter patient information:



Press the appropriate function key.

Then press the ⇦ key.

⑯ Next, the following prompt allows you to include an option number question each time you enter patient information. *You determine what option numbers stand for. For example, these numbers could be used to identify technicians, for quality control, etc.*

```
Ask Options Question:
  Yes       No
```

F1 F2

Press the appropriate function key.

Then press the ⇦ key.

⑰ The following prompt will appear only if you answered **Yes** to the **Ask Options Question** prompt:

```
Option:
0-99
```

Type in an option number.

Then press the ⇦ key.

⑱ Next, you can choose whether you want either "Confirmed" or "Unconfirmed," or "Reviewed By" to appear on reports:

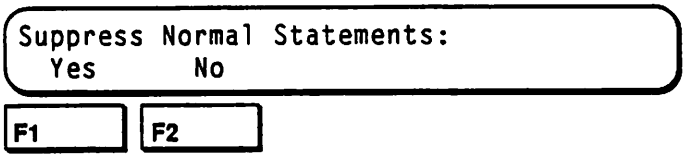
```
Confirmation Text:
 Unconf  RevdBy
```

F1 F2

Press the appropriate function key.

Then press the ⇦ key.

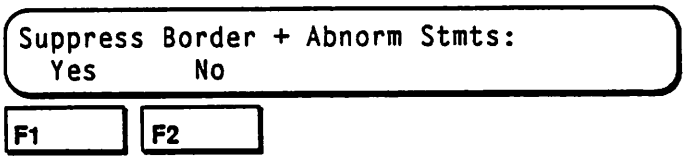
⑲ The following prompt allows you to "alter" the 12SL analysis program library:



IF YOU SELECT **Yes**, THEN 12SL STATEMENTS BEGINNING WITH THE WORD "NORMAL" **WILL BE PREVENTED** FROM APPEARING ON WRITER REPORTS. However, "Normal" statements will still be stored/transmitted as usual.

After selecting, press the ⇦ key.

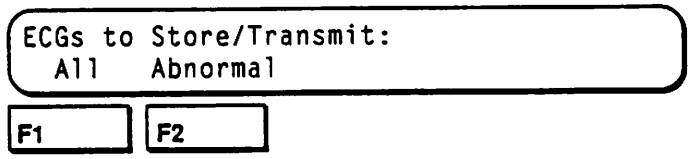
⑳ The following prompt allows you to "alter" the 12SL analysis program library:



IF YOU SELECT **Yes**, THEN 12SL STATEMENTS BEGINNING WITH THE WORD "BORDERLINE" OR "ABNORMAL" **WILL BE PREVENTED** FROM APPEARING ON WRITER REPORTS. However, "Borderline" and "Abnormal" statements will still be stored/transmitted as usual.

After selecting, press the ⇦ key.

㉑ The following prompt will then appear:



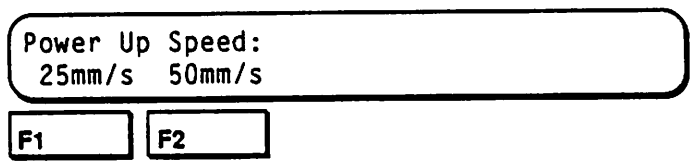
After recording an ECG, the cardiograph will attempt to save the ECG data to diskette. If it cannot save to diskette, then the cardiograph will try to transmit the data over a phone line to a phone number you specified previously in "Phone Setup." (The cardiograph will only be able to transmit data by phone if it has a modem installed.)

The prompt above lets you specify whether all ECGs or just abnormal ECGs will be stored or transmitted.

Press the appropriate function key.

Then press the ⇦ key.

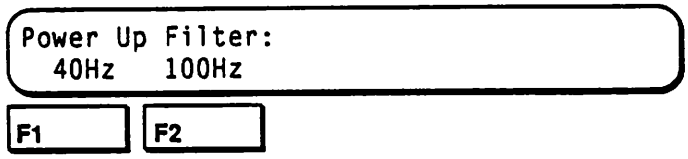
㉒ The next prompt allows you set the writer speed that will appear on the *Main Menu* when power is first applied to the cardiograph:



Press the appropriate function key.

Then press the ⇦ key.

㉓ The next prompt allows you to set the writer filter that will appear on the *Main Menu* when power is first applied to the cardiograph:

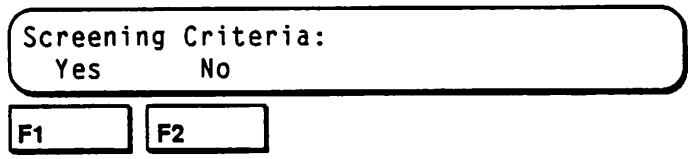


Press the appropriate function key.

Then press the ⇦ key.

NOTE: 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.

(24) The following screen criteria prompt allows you to suppress certain 12SL statements:



If you select **Yes**, then the following 12SL statements will be suppressed and not appear in the statements area of a report:

- Cannot rule out anterior infarction,
- Cannot rule out inferior infarction,
- Nonspecific ST wave abnormality,
- Nonspecific T wave abnormality, and
- Abnormal QRS-T angle, consider T wave abnormality.

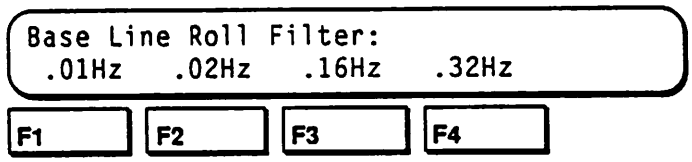
Press the appropriate function key.

Then press the ⇦ key.

NOTE: If you use screening criteria, the letter **"S"** will appear under the 12SL version number on a report (as shown below):

Pgm 106A
12SL v74
S

(25) The next prompt allows you to set the baseline roll filter which is used to suppress electrode drift and respiratory roll. The higher the setting, the more aggressively the filter smooths out a wandering baseline:



Press the appropriate function key.

Then press the ⇦ key.

㉖ The pace pulse gain prompt will appear:

```
Pace Pulse Gain (AM-3):
 Normal Enhance
```

F1 F2

Select a *Main Menu* default for **Pace Pulse Gain** by pressing the appropriate function key.

Then press the ⇦ key.

㉗ The bad lead handling prompt will appear:

```
Bad Lead Handling (AM-3):
Use     FlatLine
```

F1 F2

Select a *Main Menu* default for **Bad Lead Handling** by pressing the appropriate function key.

Then press the ⇦ key.

㉘ The following prompt allows you to enable or disable messages relating to baseline drift:

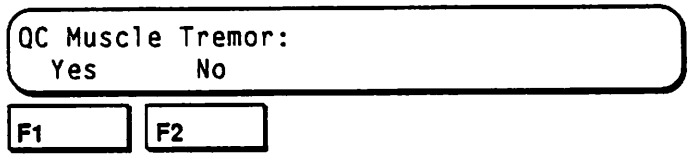
```
QC Baseline Drift:
  Yes      No
```

F1 F2

Press the appropriate function key.

Then press the ⇦ key.

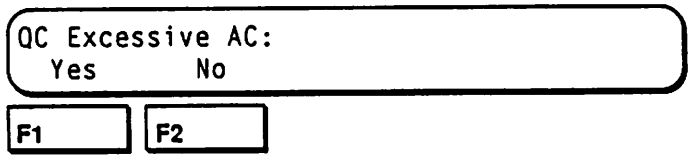
(29) The following prompt allows you to enable or disable messages relating to muscle tremor:



Press the appropriate function key.

Then press the ⇦ key.

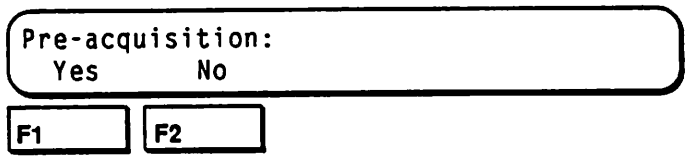
(30) In the following prompt, if you select **Yes**, then the cardiograph will check for AC (alternating current) interference during ECG acquisition. If you select **No**, then the cardiograph will not check—*which could be helpful in determining the cause of a bad lead message.*



Press the appropriate function key.

Then press the ⇦ key.

(31) Next, the preacquisition prompt will appear:



If you select **No**, the cardiograph will only begin acquiring ECG data when the RECORD ECG key is pressed.

If you select **Yes**, the cardiograph will begin acquiring ECG data as soon as the leadwires are connected to the patient. In other words, the cardiograph will not wait until you press the RECORD ECG key before it starts acquiring data. When preacquisition is on, the cardiograph will always have the latest 10 seconds of ECG data stored for analysis.

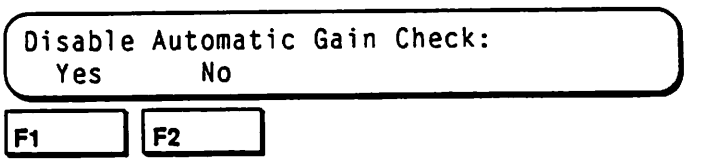
Press the appropriate function key.

Then press the ⇦ key.

NOTE: One advantage of preacquisition is that it allows you to capture a relatively infrequent event. For instance, you can record an arrhythmia that is difficult to capture in the 10-second window. Simply press the RECORD RHYTHM 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 will be captured and analyzed.

NOTE: If you are having difficulties with electrode stabilization, you may want to select **No**.

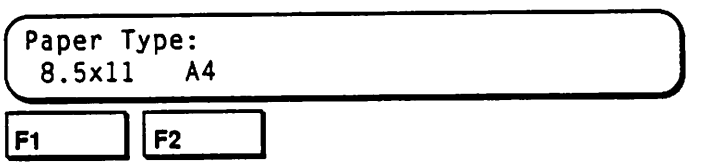
㉜ The following prompt allows you to enable or disable the automatic gain check:



Press the appropriate function key.

Then press the ⇦ key.

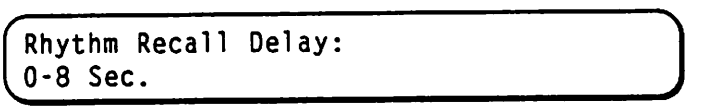
㉝ The next prompt allows you to choose paper size for the writer:



Normally, the cardiograph uses 8.5- x 11-inch paper. Press the appropriate function key.

Then press the ⇦ key.

㉞ The following prompt concerns the rhythm Recall report:



A Recall report contains 10 seconds of 3-lead ECG rhythm data. The prompt above allows data going to this report to be delayed from 0 seconds ("real time") up to 8 seconds. A long delay is beneficial if you are using a scope that is monitoring the three rhythm leads because data on the scope—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.

Enter the delay. Then press the ⇦ key.

㉟ After entering a delay time, the following will appear:

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

Defaults Setup

When you first receive your cardiograph, all the various settings in the **Cart Setup** menu are set to their defaults or "factory settings." However, you may decide to change some or all of these settings—especially in the Reports section.

The following steps show you how to set your cardiograph back to its original defaults:

① If the *Main Menu* is not already displayed, then press the STOP key to return to it:

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

② Next, press the ⇧ and F1 keys at the same time to display the **System Functions** menu and select **Setup**.

③ After selecting **Setup**, the following display will appear:

```
Password:
```

Type in the Level 1 password. (The default password is "L1.") Then press the ⇦ key.

④ The first **Cart Setup** menu will appear:

```
                Cart Setup
Dat/Tim  Phone  Ld Grps Reports   More
                                    F5
```

⑤ Next, press the F5 key for **More** and the following display will appear:

```
                Cart Setup
Passwds  Modem  LclLine   Misc    More
                                    F5
```

⑥ Press the F5 key again to display the following:

```
                Cart Setup
Defaults Hi-Res                    More
```

F1

⑦ Then press the F1 key to select **Defaults** and the following will appear:

```
Are You Sure???:
  Yes      No
```

F1 F2

Select **Yes** to change the defaults back to their original Marquette settings. Otherwise, choose **No** if you have changed your mind.

Then press the ⇦ key.

⑧ The following display will then appear:

```
                Cart Setup
Defaults Hi-Res                    More
```

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

Hi-Res Setup

In order to print a high resolution report, 1 or more of the 3 analysis filters—25-250 Hz, 40-250 Hz, and 80-250 Hz—must be selected using the **Cart Setup** menu:

① If the *Main Menu* is not already displayed, then press the [STOP] key to return to the *Main Menu*:

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

② Press the [⇧] and [F1] keys at the same time to display the **System Functions** menu and select **Setup**.

③ After selecting **Setup**, the following password prompt will appear:

```
Password:
```

Type in the Level 1 password. (The default password is "L1"). Then press the [⇦] key.

④ When the first **Cart Setup** menu—the first LCD display below—appears, press the key shown for each of the following LCD displays:

```
            Cart Setup
Dat/Tim  Phone  Ld Grps Reports   More
```

[F5]

```
            Cart Setup
Passwds  Modem  LclLine   Misc    More
```

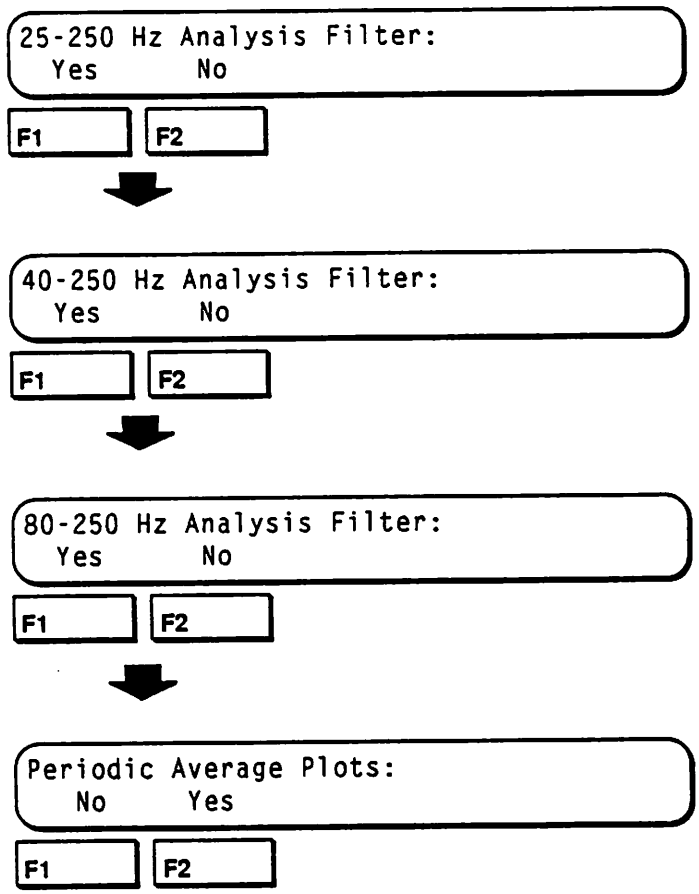
[F5]

```
            Cart Setup
Defaults Hi-Res                  More
```

[F2]

⑤ After selecting **Hi-Res**, the first of the analysis filter LCD displays will appear. For each of the following three analysis filter LCD displays, select either **Yes** or **No** by pressing the F1 or F2 key and then pressing the ⇦ key:

NOTE: At least one of the three analysis filters must be selected. Otherwise, Hi-Res reports can not be printed.



⑥ After selecting one or more analysis filters, the following will appear:

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

Chapter 13
Report Formats

Chapter Summary

This chapter contains samples of all the writer report formats that are available on the cardiograph 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. The samples included are:

- **S1 Report Format** (figure 1)—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 is on the bottom of the page.
- **S2 Report Format** (figures 2 and 3)—consists of 5 seconds for each of 12 leads at a writer speed of 50 mm/s. Text is on the bottom of the page.
- **Times 1 Complex Report Format (with Tic Marks)** (figure 4)—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. Also, tic marks are included on each median complex.
- **Times 2 Complex Report Format (with Tic Marks)** (figure 5)—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** (figure 6)—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** (figure 7)—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** (figure 8)—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** (figure 9)—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** (figure 10)—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** (figures 11 through 14)—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** (figure 15)—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** (figure 16)—consists of 2 seconds for each of 15 leads, combined with 10 seconds of 1-lead rhythm.

- **2 x 10 Report Format** (figures 17 and 18)—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.

- **12 Lead Rhythm Report Format** (figure 19)—consists of 10 seconds of 12-lead rhythm.

- **2 x 5 Report Format** (figure 20)—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** (figure 21)—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 reports can not be done with version 006 software.

- **Pacemaker Evaluation Final Report** (figures 22 and 23)—consists of 20 seconds of lead II with no magnet and 10 seconds of lead II with a magnet on page 1. Page 2 consists of 10 seconds of lead II with a magnet—the same data as page 1—and 2 channels of pacemaker artifact.

Hi-Res reports can not be done with version 006 software.

- **High-Res** (figures 24 through 27)—A Hi-Res report can be up to 5 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). Figure 24 is a sample template report and Figure 25 shows periodic average plots. Figure 26 is a 40–250 Hz final report. Figure 27 is a Hi-Res Re-Analysis Report.

NOTE: A NO DATA label and a flat line trace will appear on a report for all extra leads that are not selected to be used in the **Cart Setup** menu. This applies to real-time rhythm reports also.

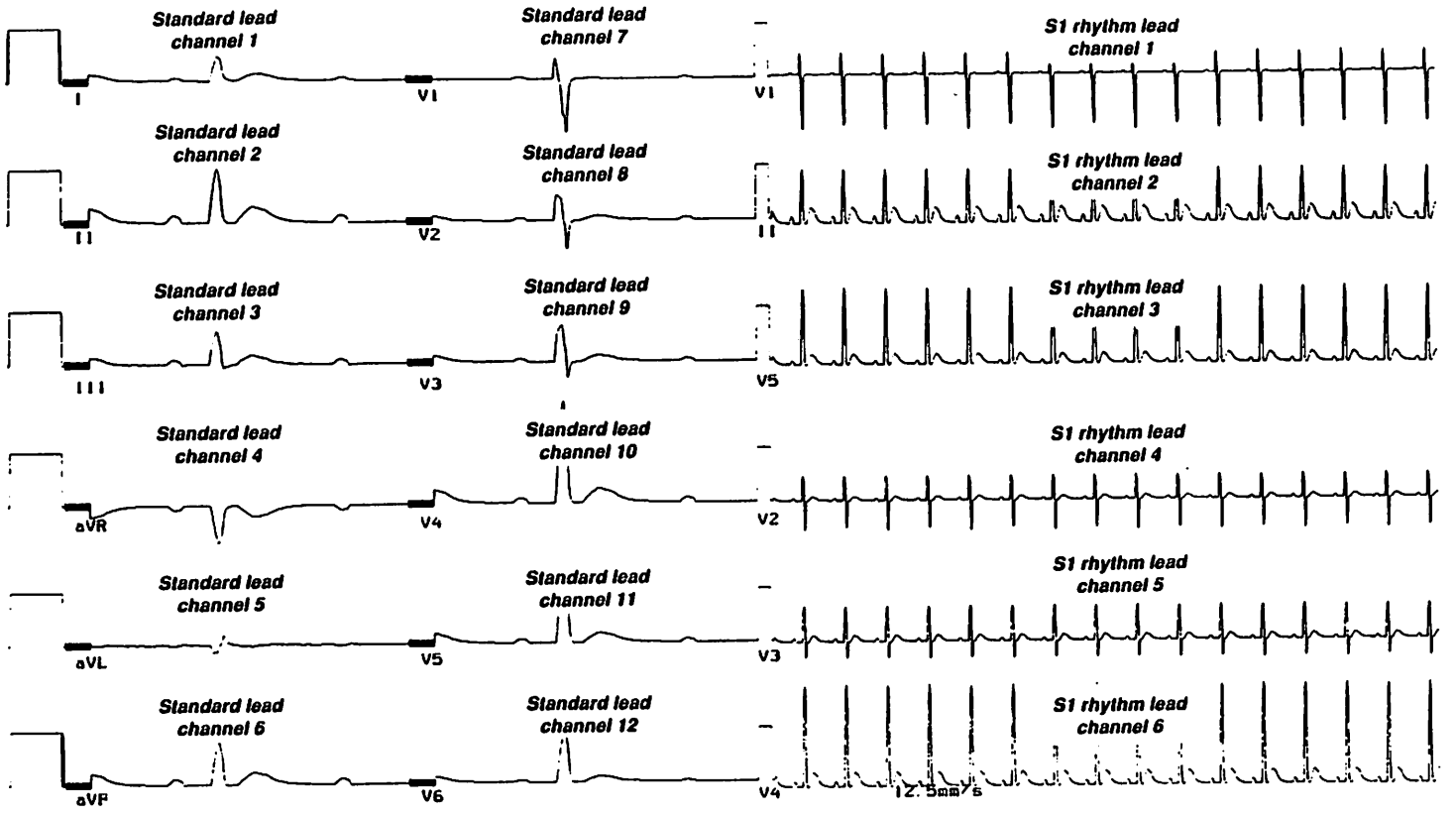
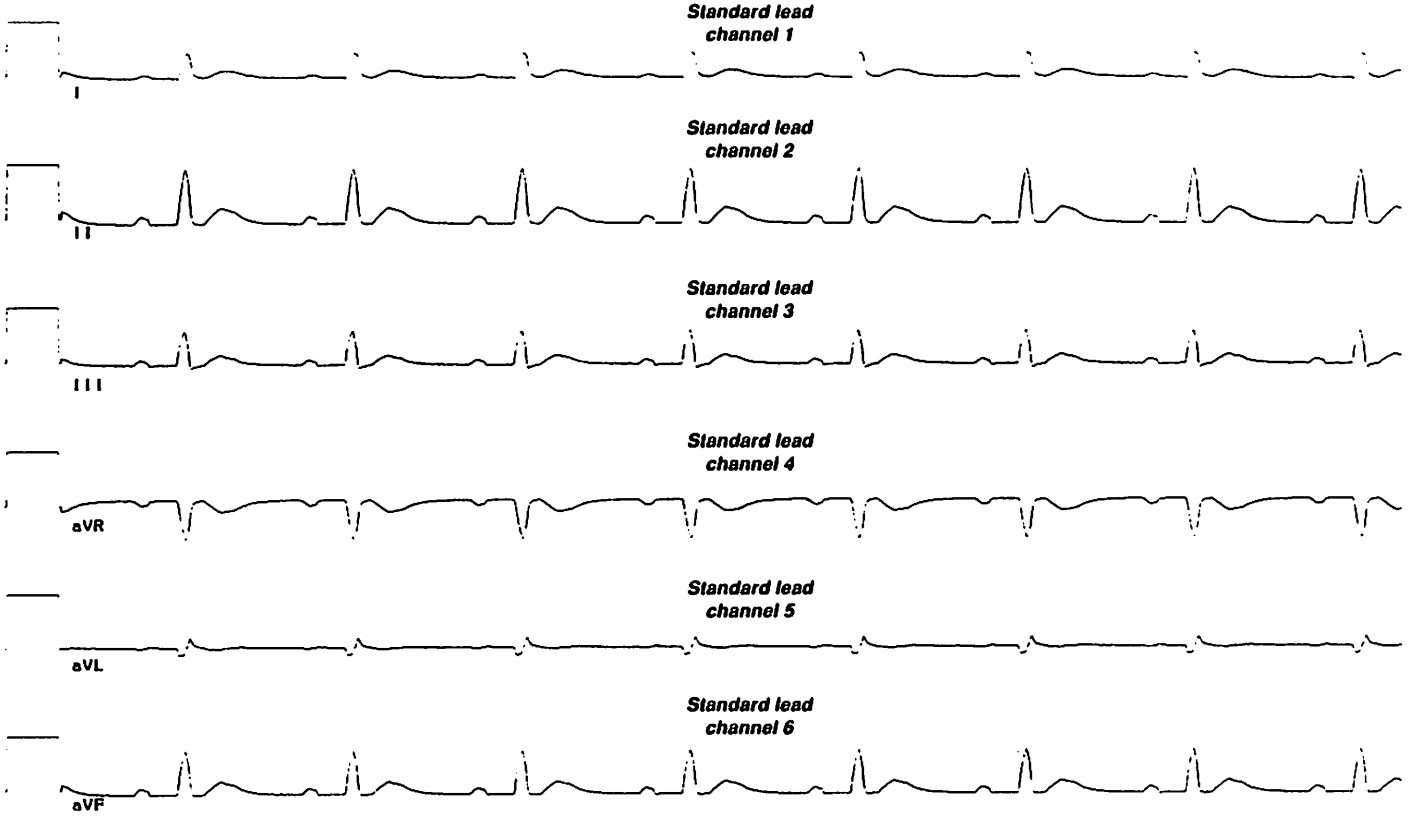


Figure 1—S1 Report Format.



HAWKINS, ROBERT ID: 213456789 14-JUN-89 14:39

50mm/s
10mm/mV
100Hz
Pgm 006A
12SLtm v74

Med: None
76yr 69in 188lb
Sex: M Race: Cauc
Loc: I Room: 202

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

Figure 2—S2 Report Format (Page 1 of 2).

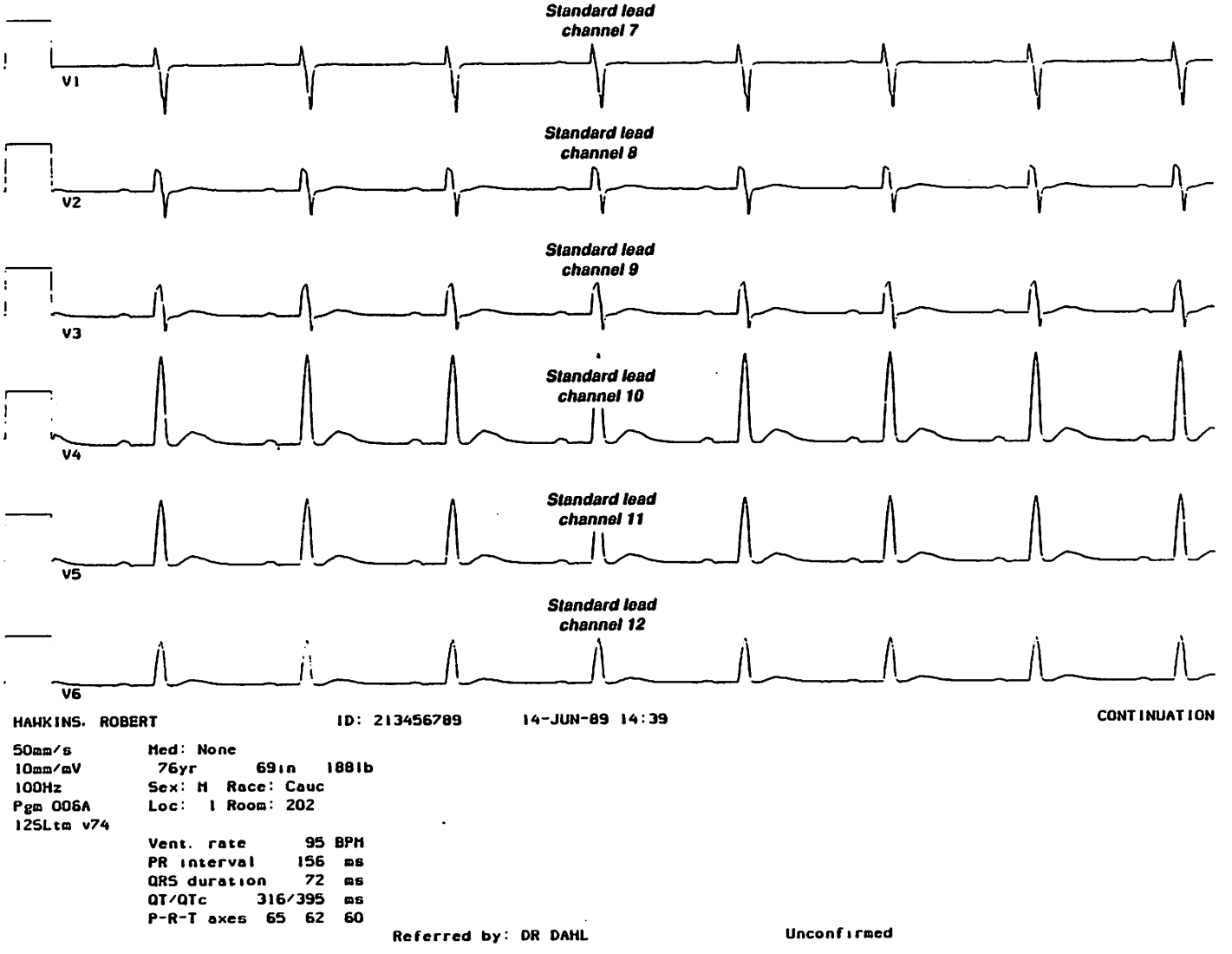


Figure 3—S2 Report Format (Page 2 of 2).

HANKINS. ROBERT ID. 213456789 14-JUN-89 14.39

50mm/s
10mm/mV
100Hz
Pgm 006A
12SLtm v74

76yr 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

	PA	PPA	QA	QD	RA	RD	SA	SD	RPA	RPD	SPA	STJ	STM	STE	TA	TPA
VI	29	0	0	0	390	25	1040	47	0	0	0	-44	0	4	0	0
V2	43	0	0	0	468	40	551	32	0	0	0	-30	4	58	78	0
V3	58	0	0	0	683	49	297	23	0	0	0	-20	9	87	117	0
V4	97	0	0	0	1909	72	0	0	0	0	0	4	9	200	273	0
V5	68	0	0	0	1411	72	0	0	0	0	0	-5	4	131	185	0
V6	34	0	0	0	937	72	0	0	0	0	0	0	9	78	107	0
I	53	0	0	0	468	72	0	0	0	0	0	48	9	78	131	0
AVL	0	0	146	40	185	32	0	0	0	0	0	43	4	-25	0	0
II	131	0	0	0	1010	72	0	0	0	0	0	9	9	205	292	0
AVF	107	0	0	0	795	72	0	0	0	0	0	-15	4	166	234	0
III	87	0	0	0	605	53	78	19	0	0	0	-40	0	126	170	0

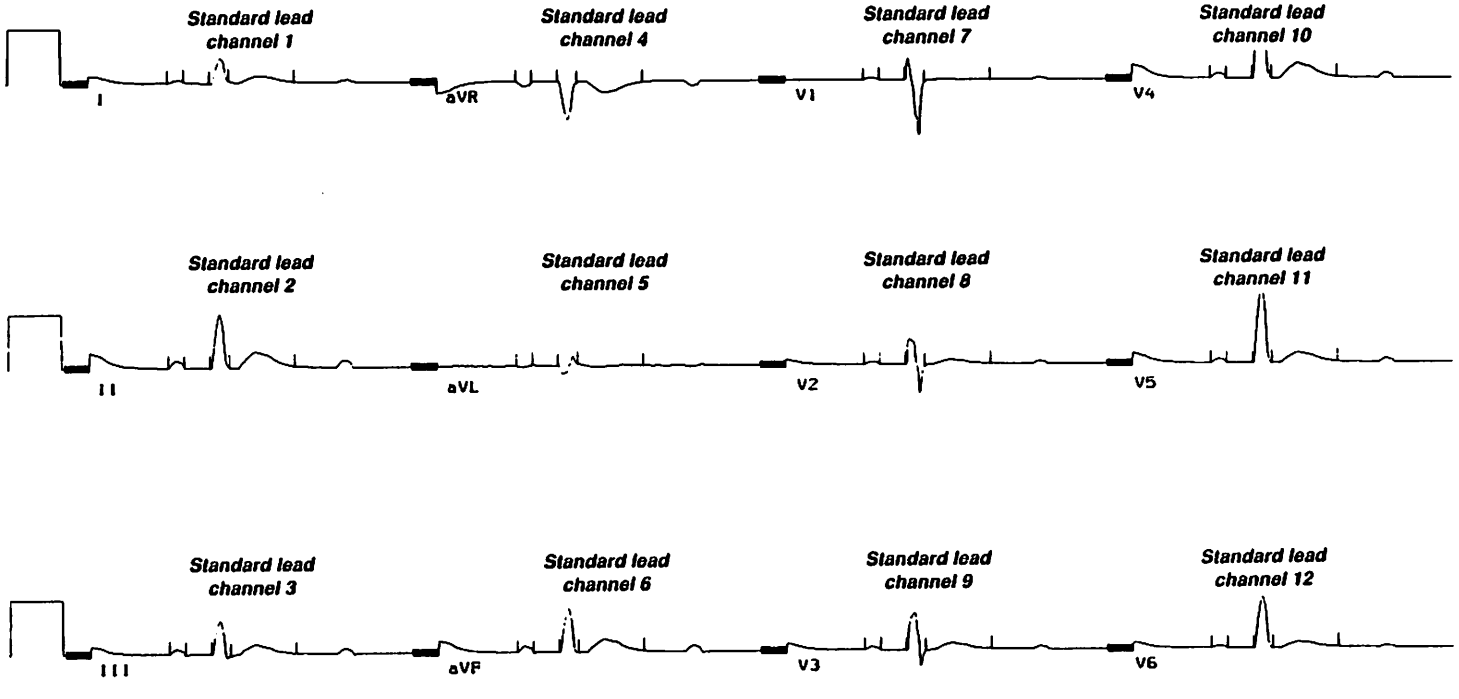


Figure 4—Times 1 Complex Report Format (with Tic Marks).

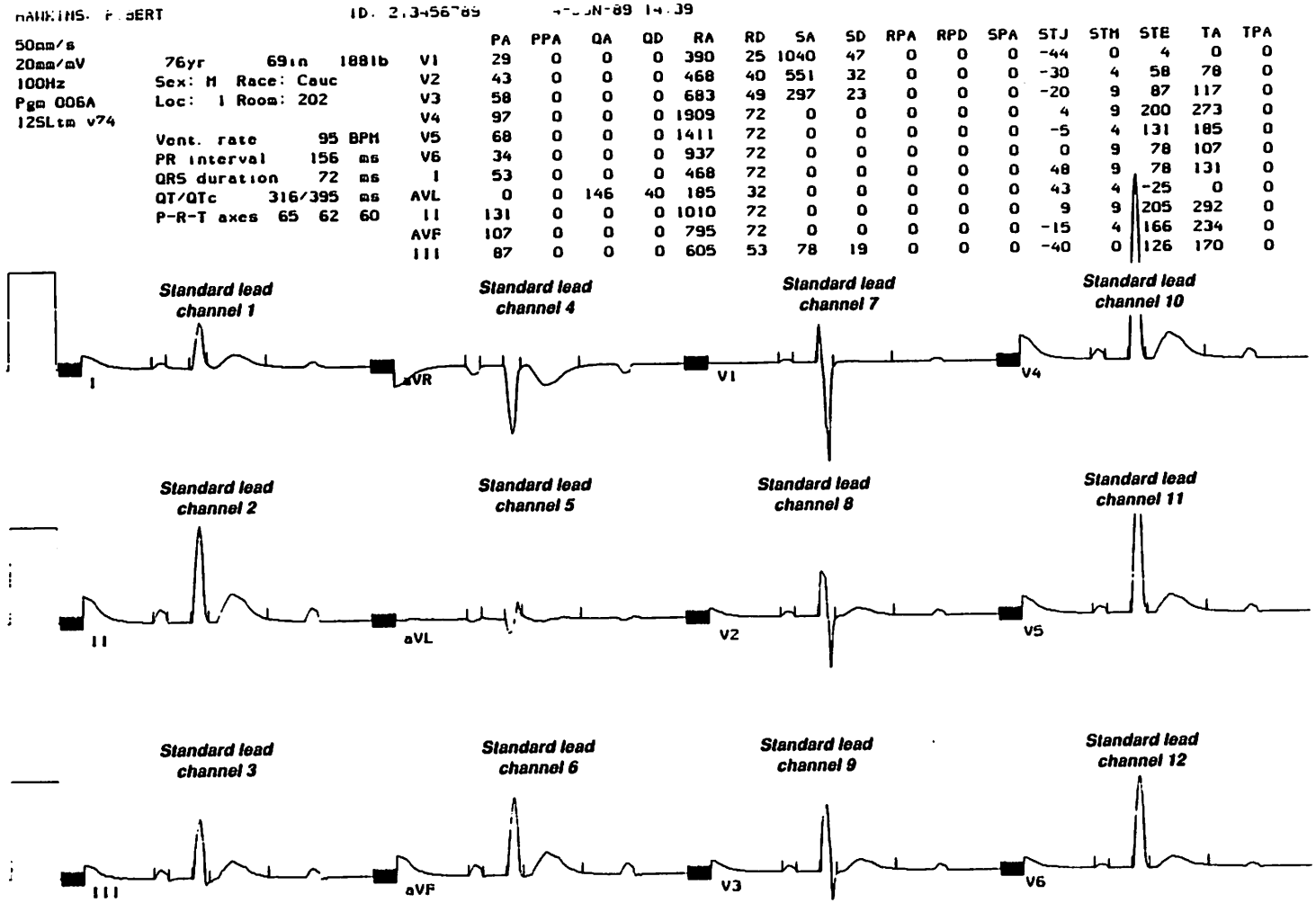


Figure 5—Times 2 Complex Report Format (with Tic Marks).

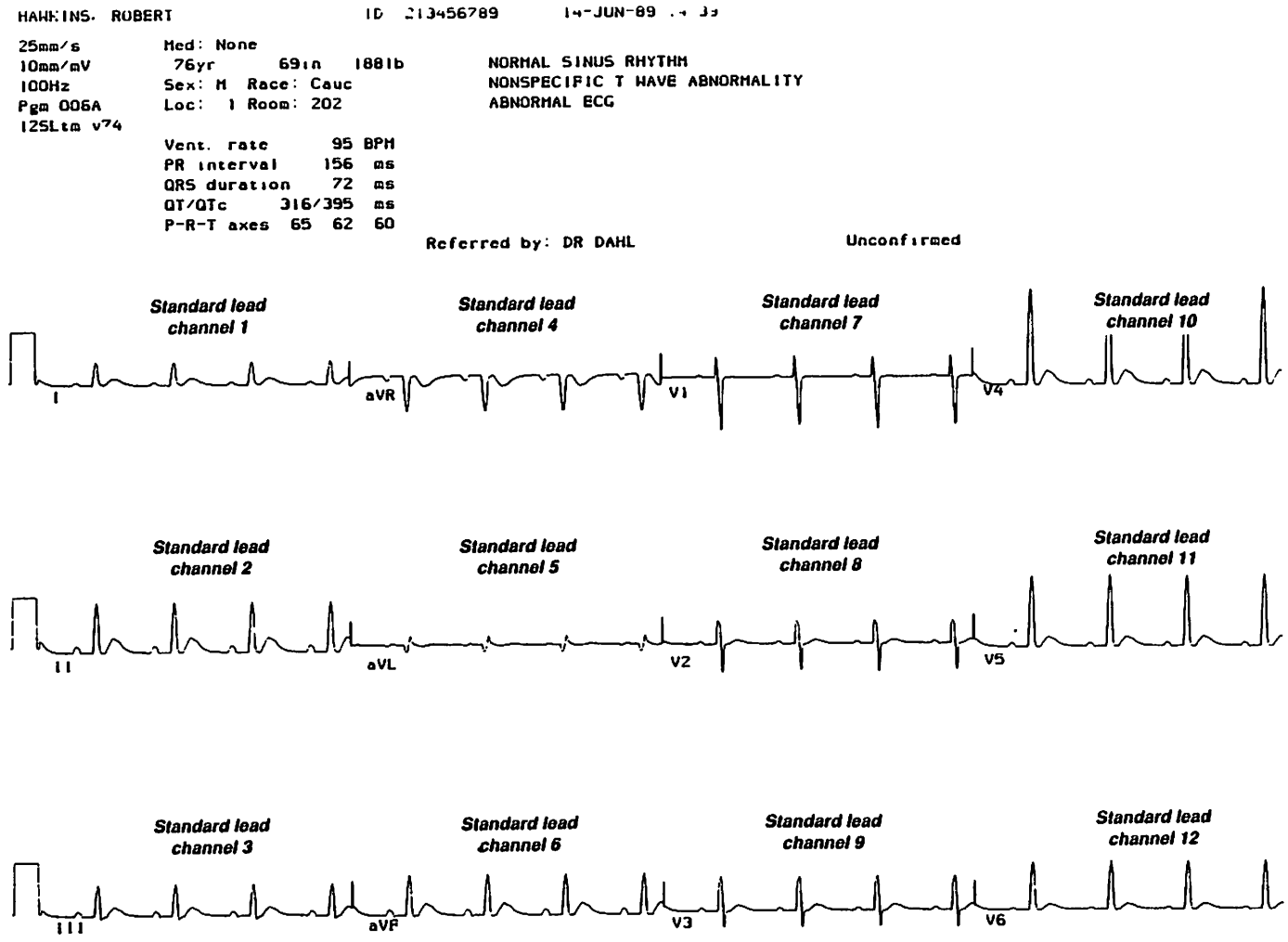


Figure 6—One-Page 4 x 2.5 Report Format.

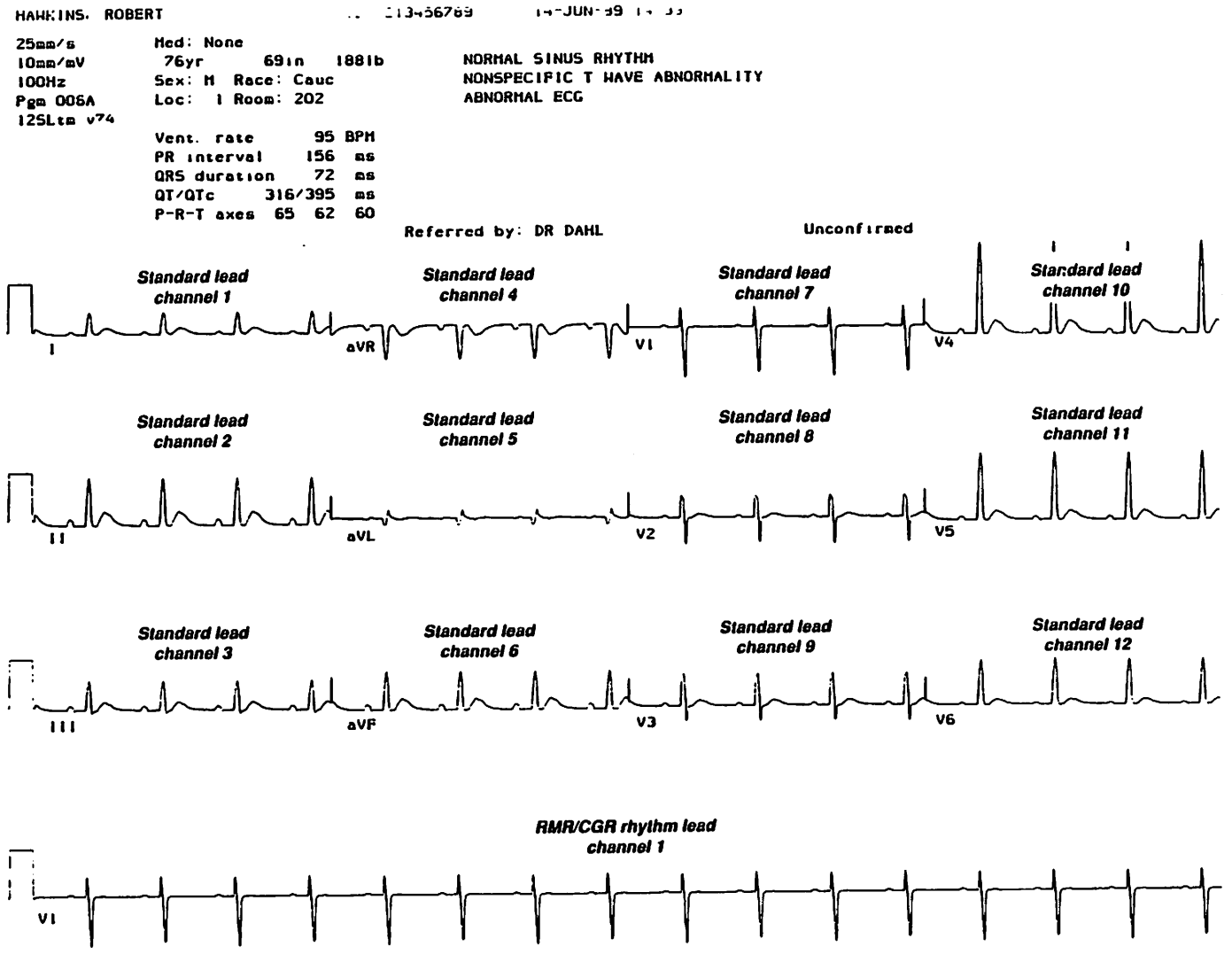


Figure 7—One-Page 4 x 2.5 with 1 Rhythm Channel Report Format.

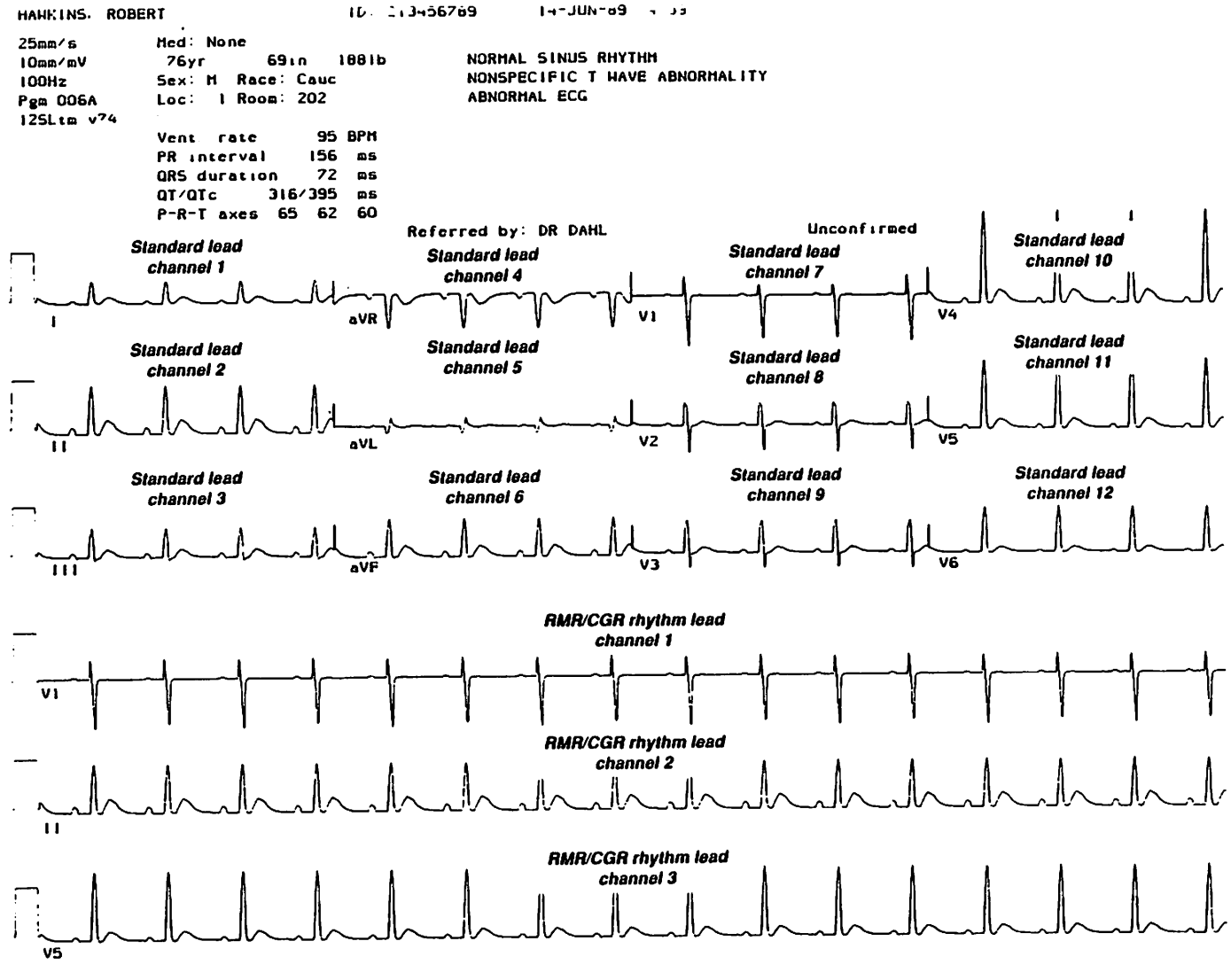


Figure 8—One-Page 4 x 2.5 with 3 Rhythm Channels Report Format.

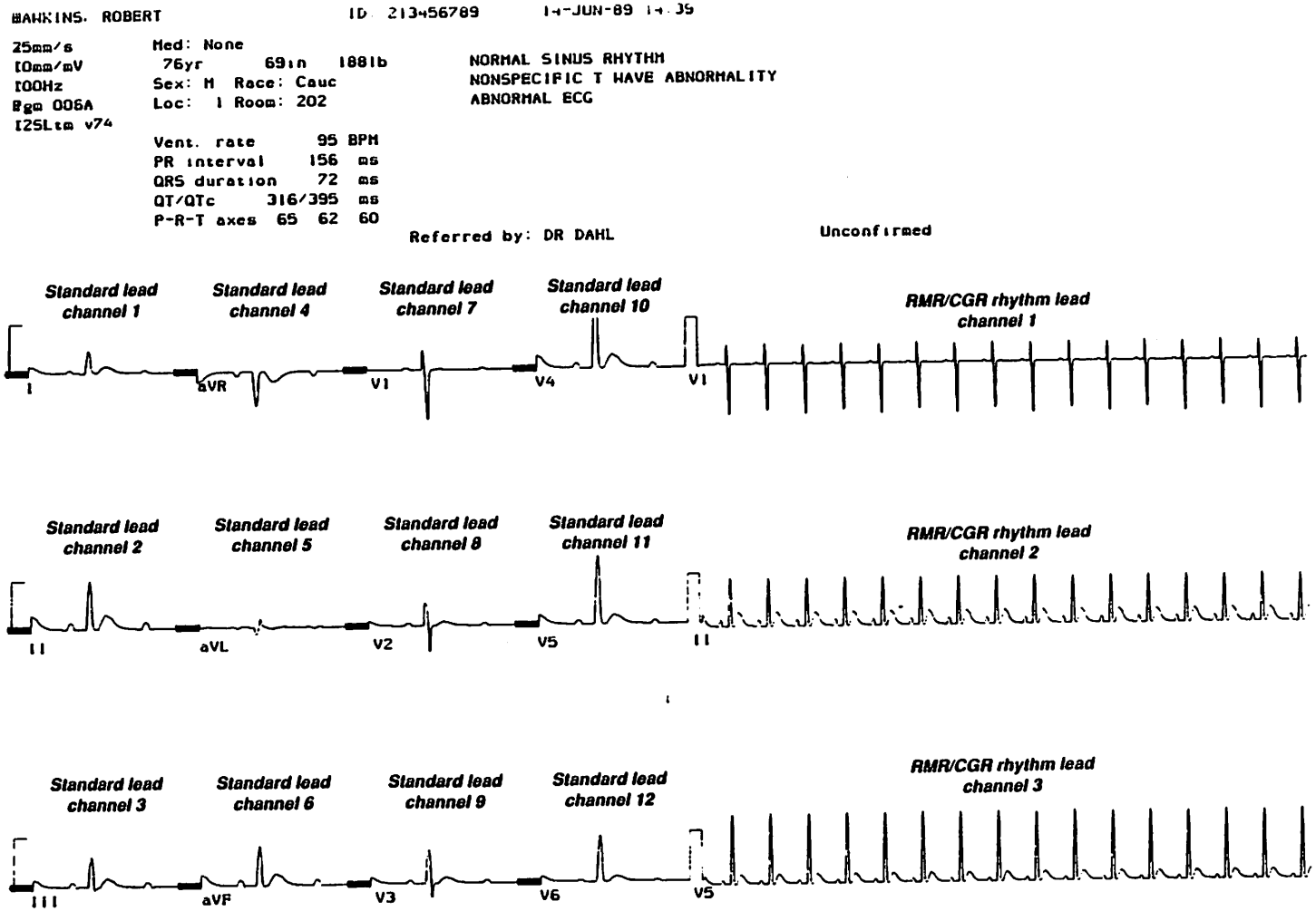


Figure 9—Computer Graphic Record (CGR) Report Format.

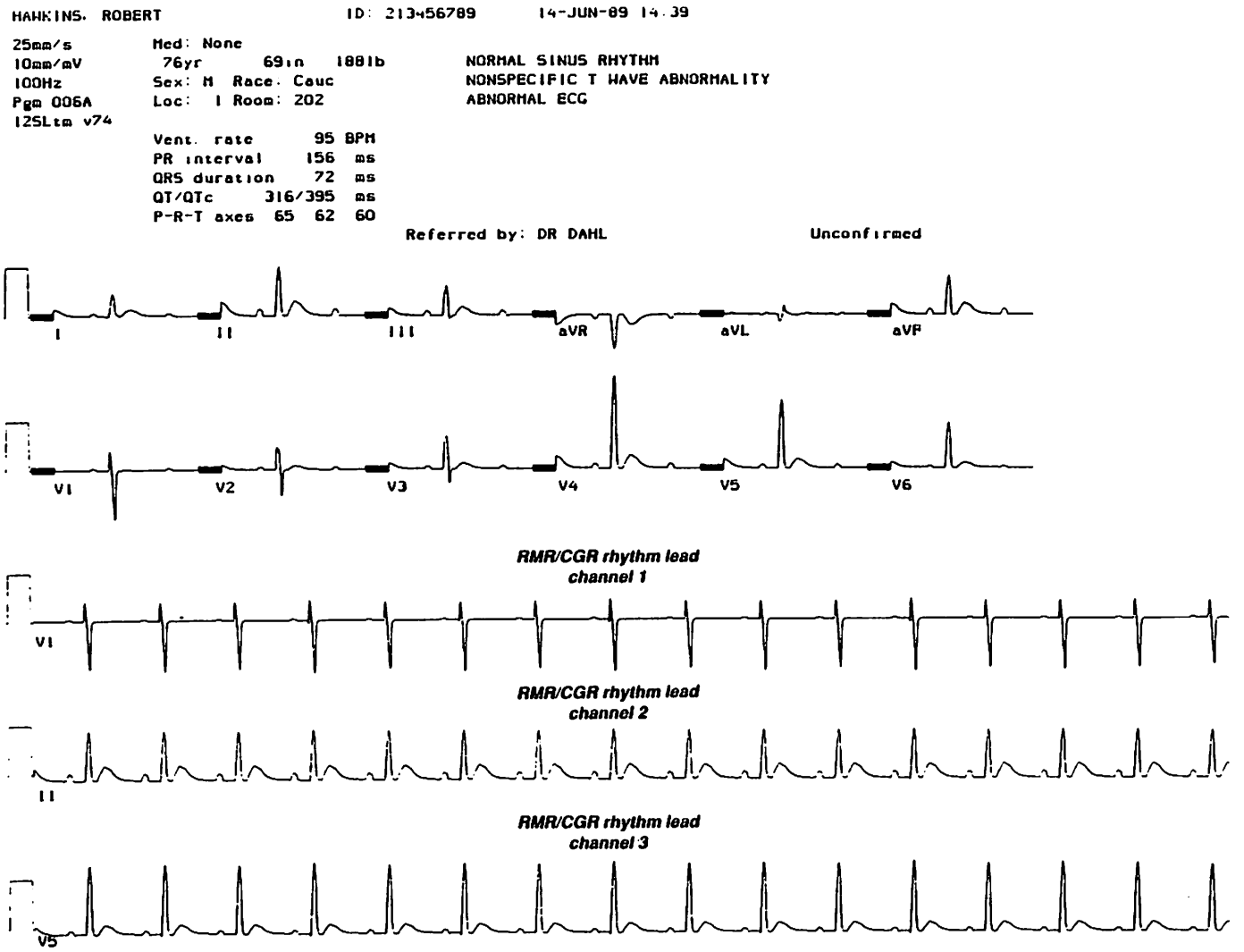


Figure 10—Rhythm and Morphology (RMR) Report Format.

HAWKINS, ROBERT ID: 213456789 14-JUN-89 4:35

25mm/s	Med: None	
10mm/mV	76yr 69in 188lb	NORMAL SINUS RHYTHM
100Hz	Sex: M Race: Cauc	NONSPECIFIC T WAVE ABNORMALITY
Pgm 006A	Loc: 1 Room: 202	ABNORMAL ECG
125Ltm v74		

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

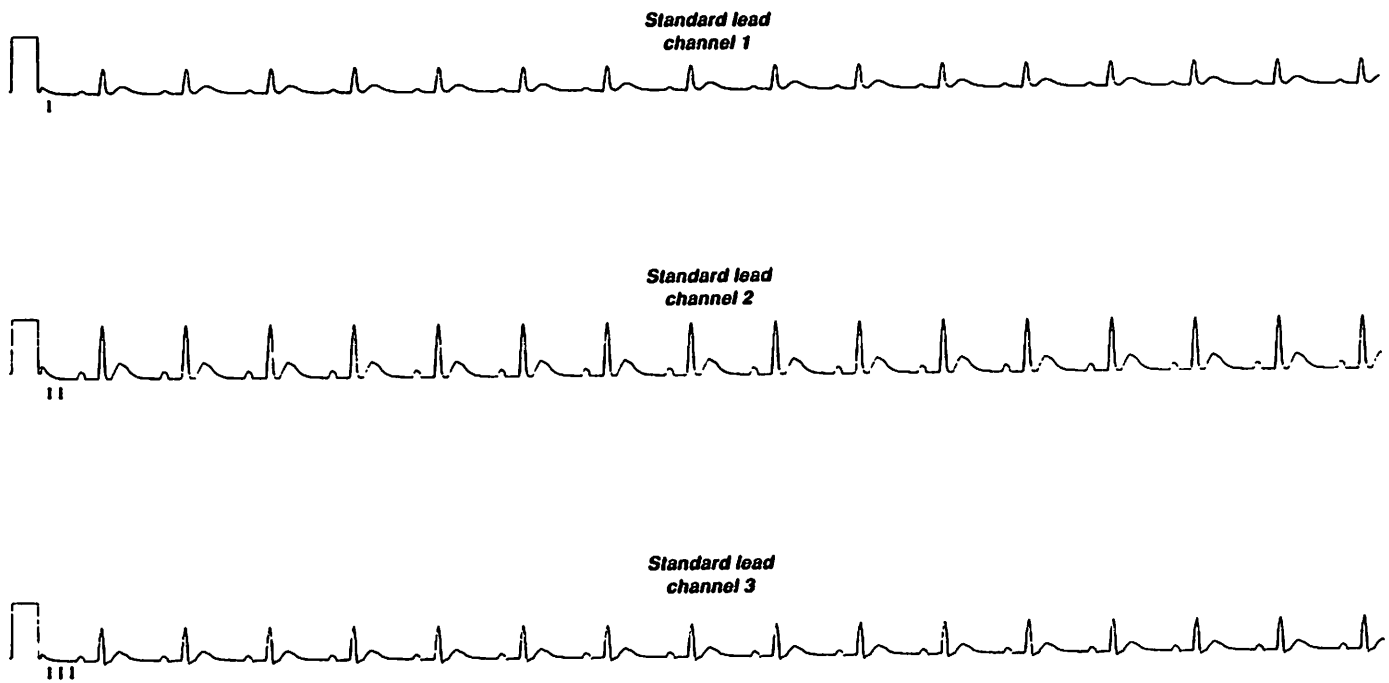


Figure 11—4 x 10 Report Format (Page 1 of 4).

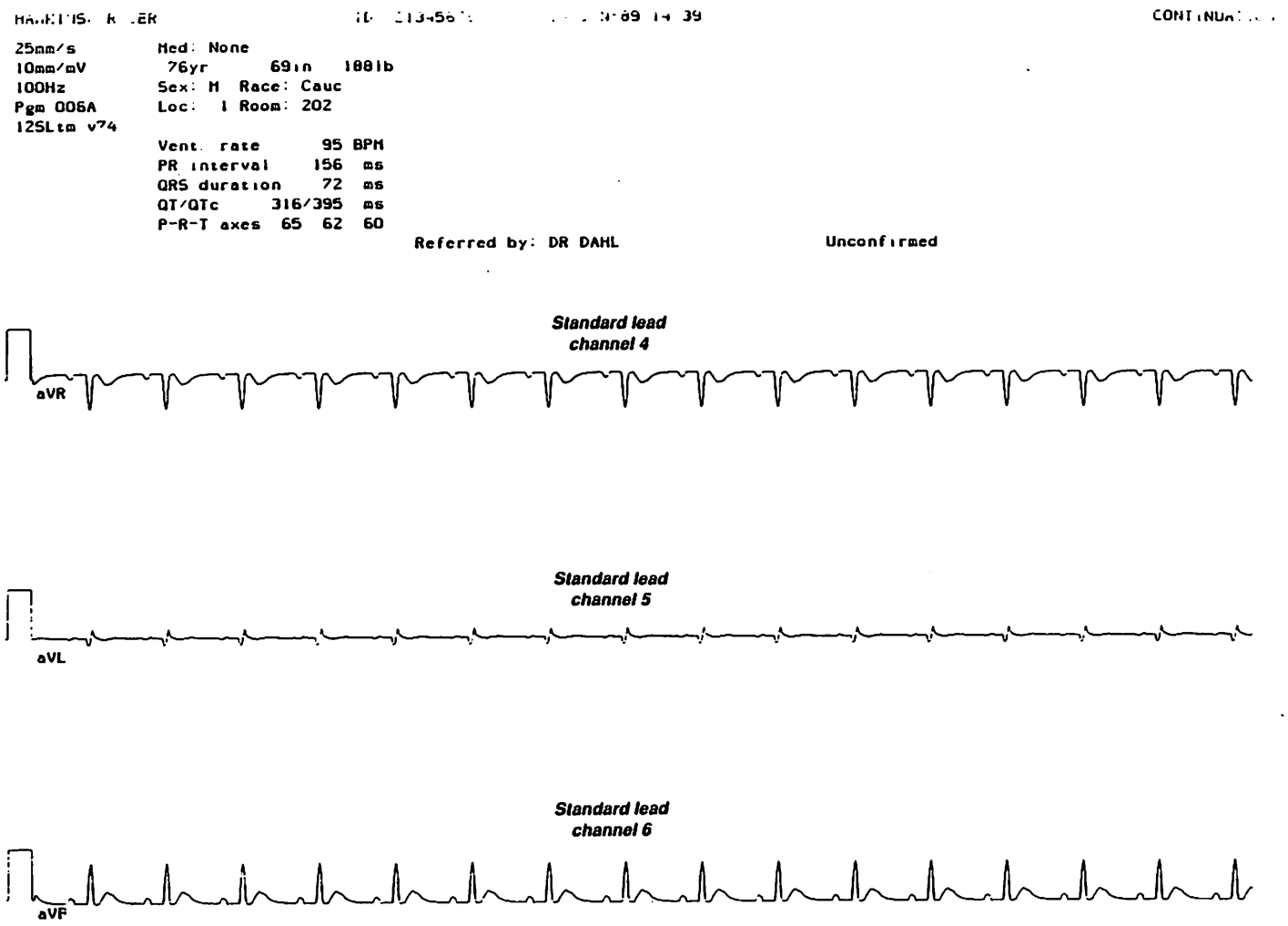


Figure 12—4 x 10 Report Format (Page 2 of 4).

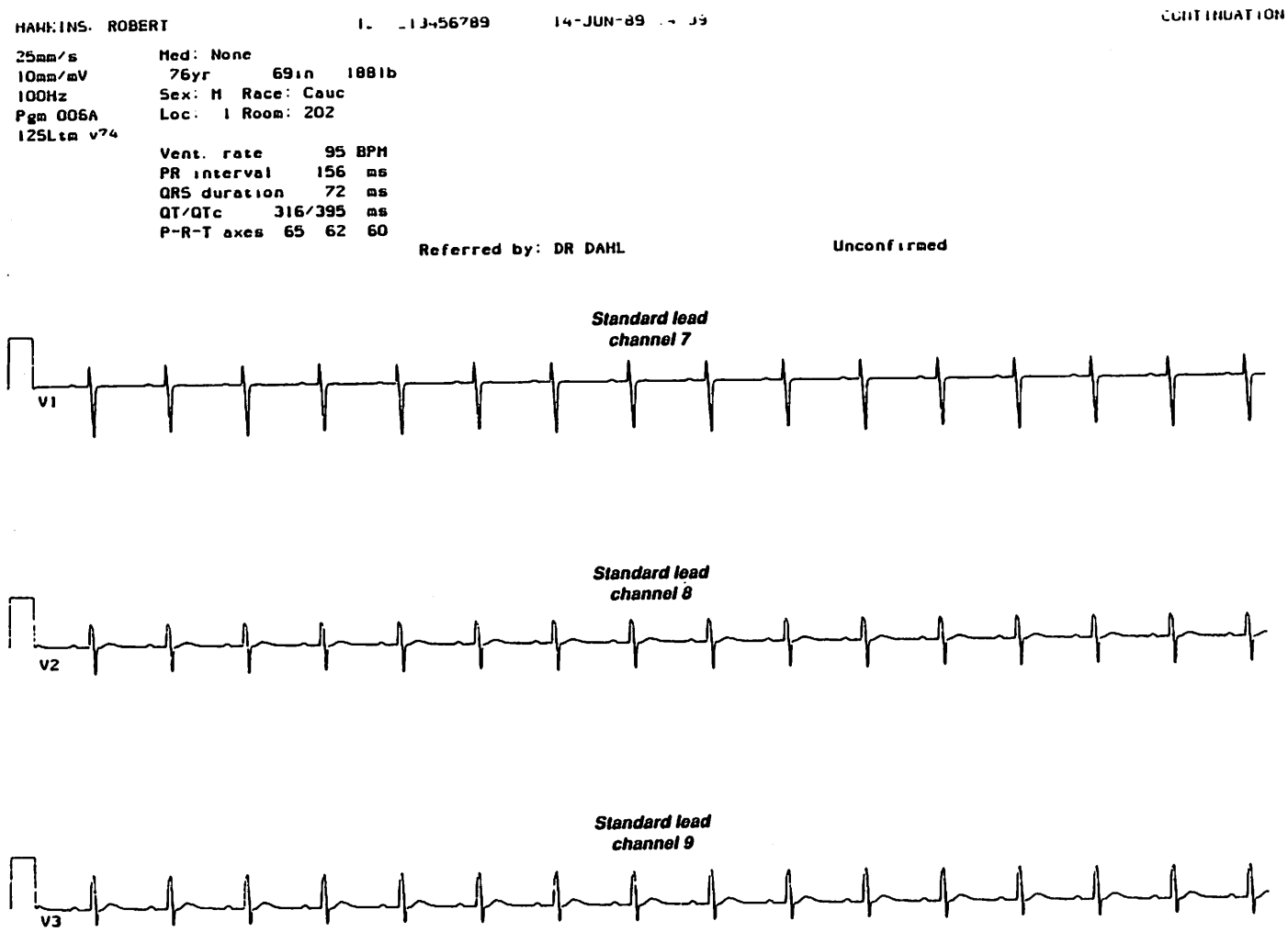


Figure 13—4 x 10 Report Format (Page 3 of 4).

HAWKINS ROBERT ID 213456789 14-JUN-89 14:39 CONTINUATION

25mm/s
10mm/mV
100Hz
Pgm 006A
125Ltm v74

Med: None
76yr 69in 188lb
Sex: M Race: Cauc
Loc: I 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

Referred by: DR DAHL

Unconfirmed

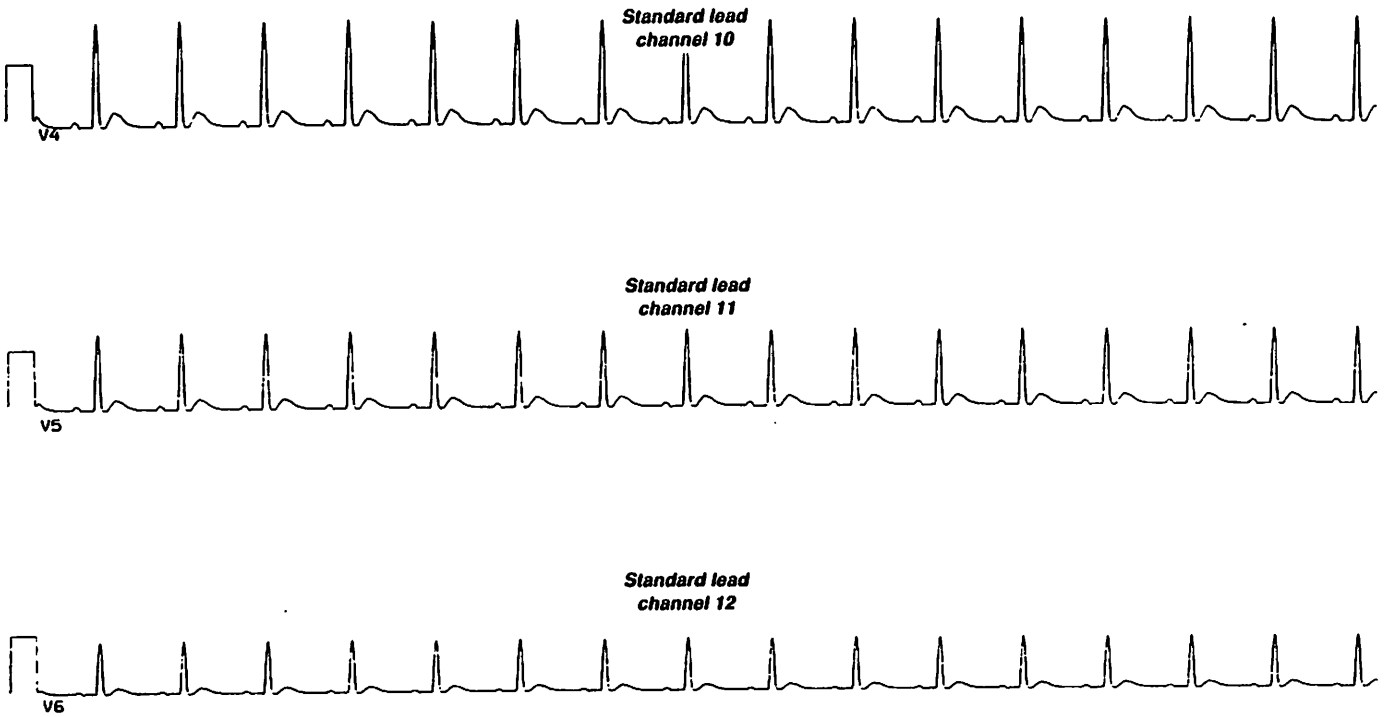


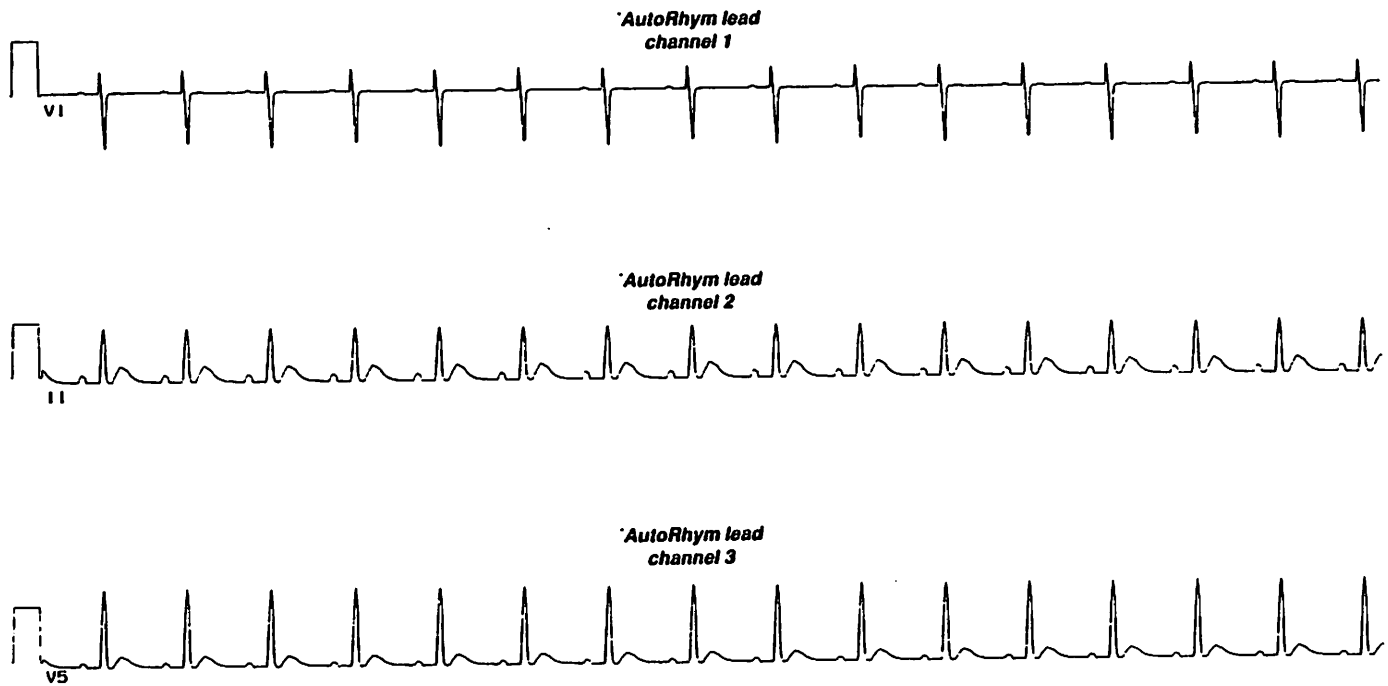
Figure 14—4 x 10 Report Format (Page 4 of 4).

HAWKINS, ROBERT ID: 213456789 14-JUN-89 14:39

25mm/s Med: None
10mm/mV 76yr 69in 188lb NORMAL SINUS RHYTHM
100Hz Sex: M Race: Cauc NONSPECIFIC T WAVE ABNORMALITY
Pgm 006A Loc: 1 Room: 202 ABNORMAL ECG
12SLtm v74

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



*In the 12-lead Automatic Rhythm report format, the leads chosen for standard leads are used.

Figure 15—Automatic Rhythm (1 x 10) Report Format.

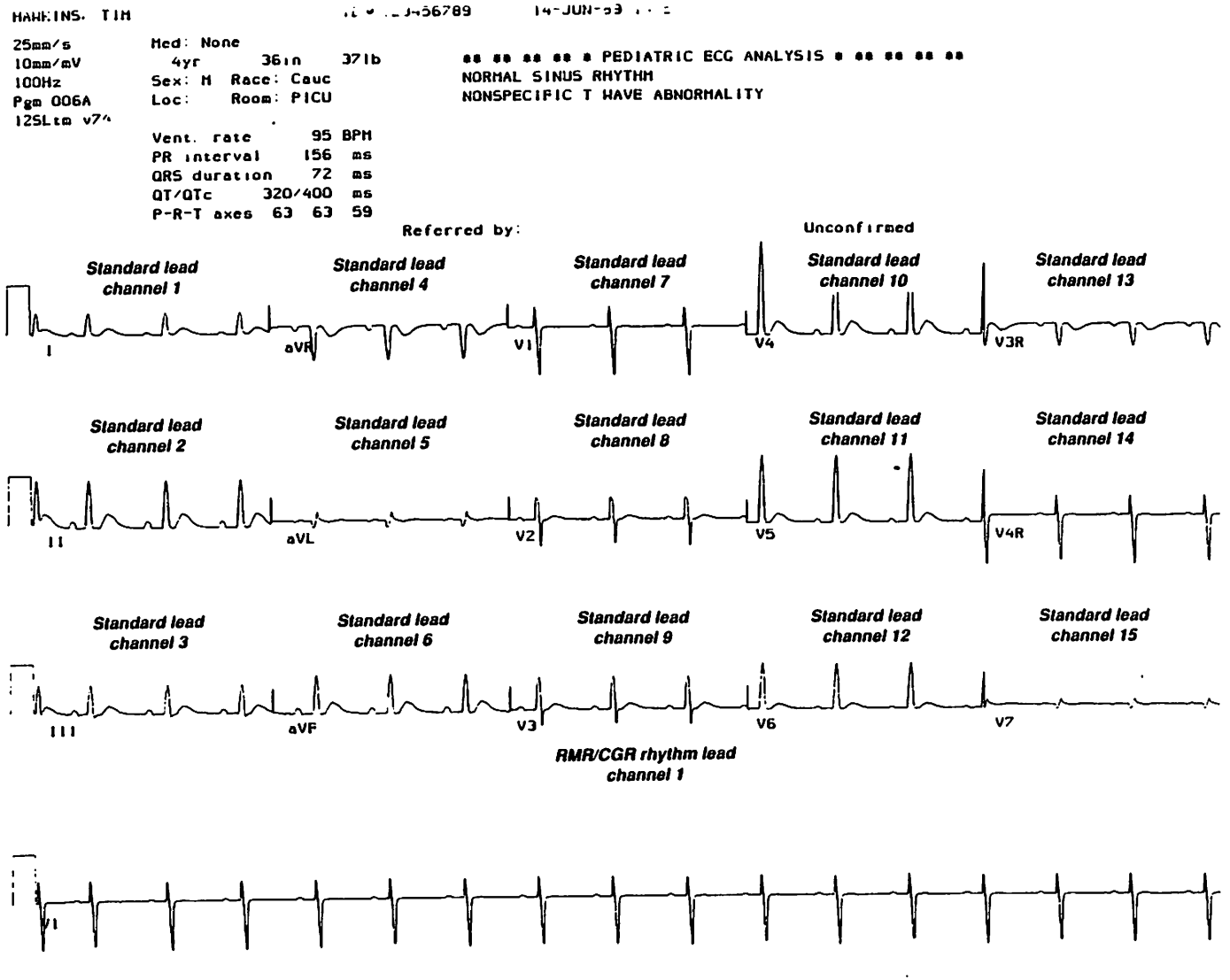


Figure 16—Pediatric Report Format.

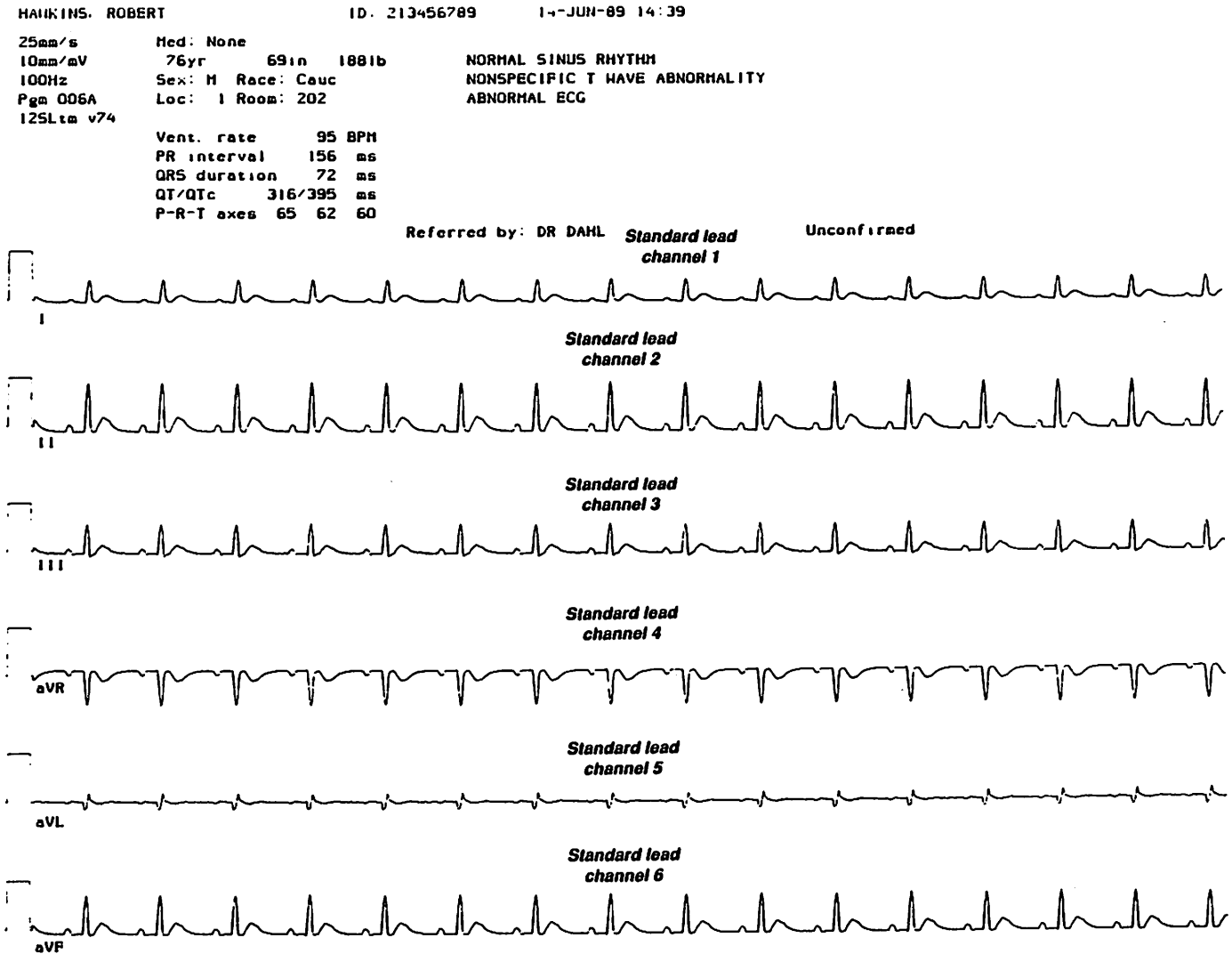


Figure 17—2 x 10 Report Format (Page 1 of 2).

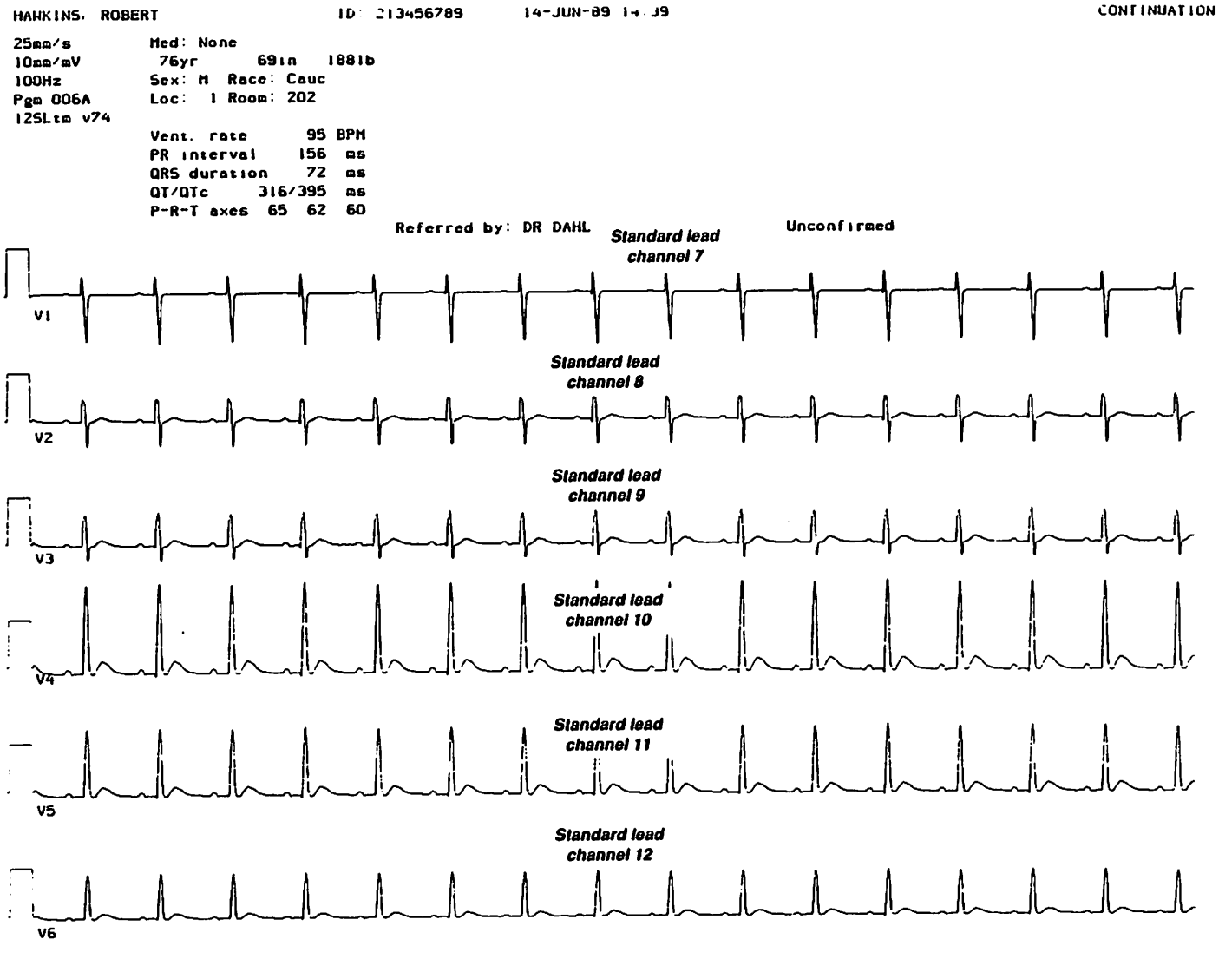


Figure 18—2 x 10 Report Format (Page 2 of 2).

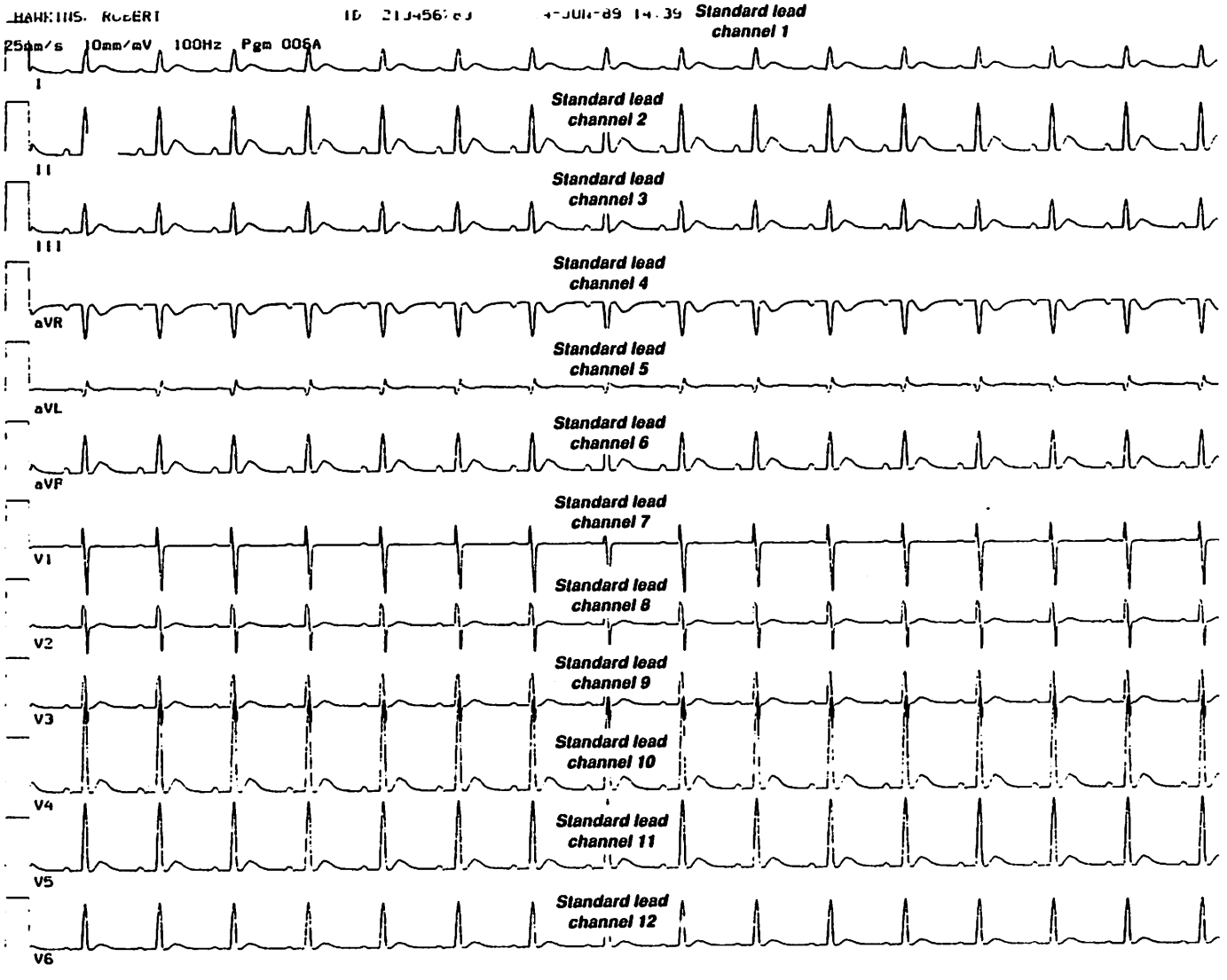


Figure 19—12-Lead Rhythm Report Format.

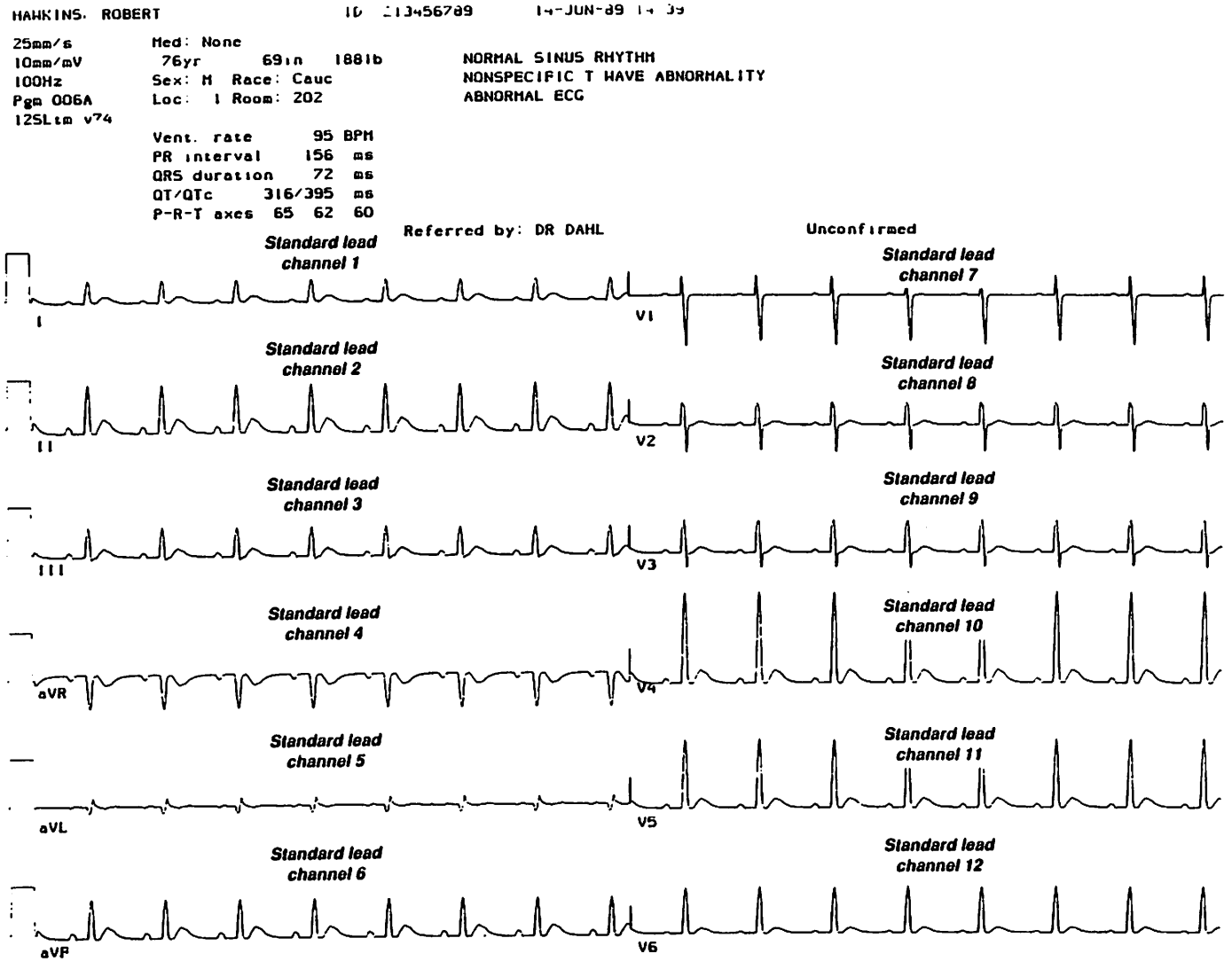


Figure 20—2 x 5 Report Format.

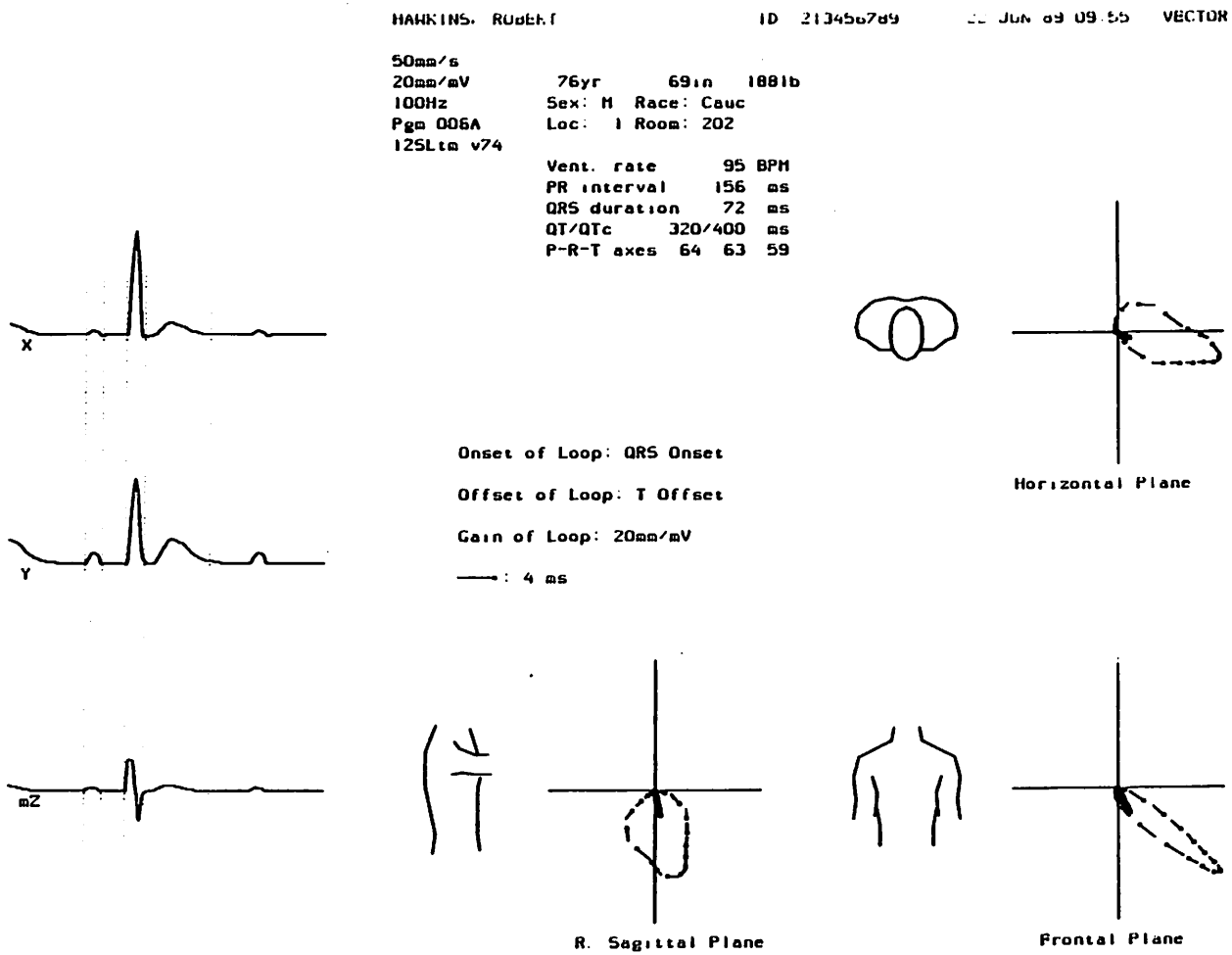


Figure 21—Vector Loops Report Format.

HAWKINS. ROBERT ID. 000000002 18-JUN-89 08:42

25mm/s Med: None
10mm/mV 76yr 69in 188lb
0.5-100Hz Sex: M Race: Cauc
Pgm 106A Loc: I Room: 202
Local Pace

	No Magnet	Magnet
Int I-I/I-2	857/ 214 ms	857/ 214 ms
PW I/2	.52/ .52 ms	.52/ .52 ms
Ampl I/2	5/ 5 mV	5/ 5 mV
T/L Ratio I/2	1.0/ 1.0	1.0/ 1.0
Rate	70.0 PPM	70.0 PPM

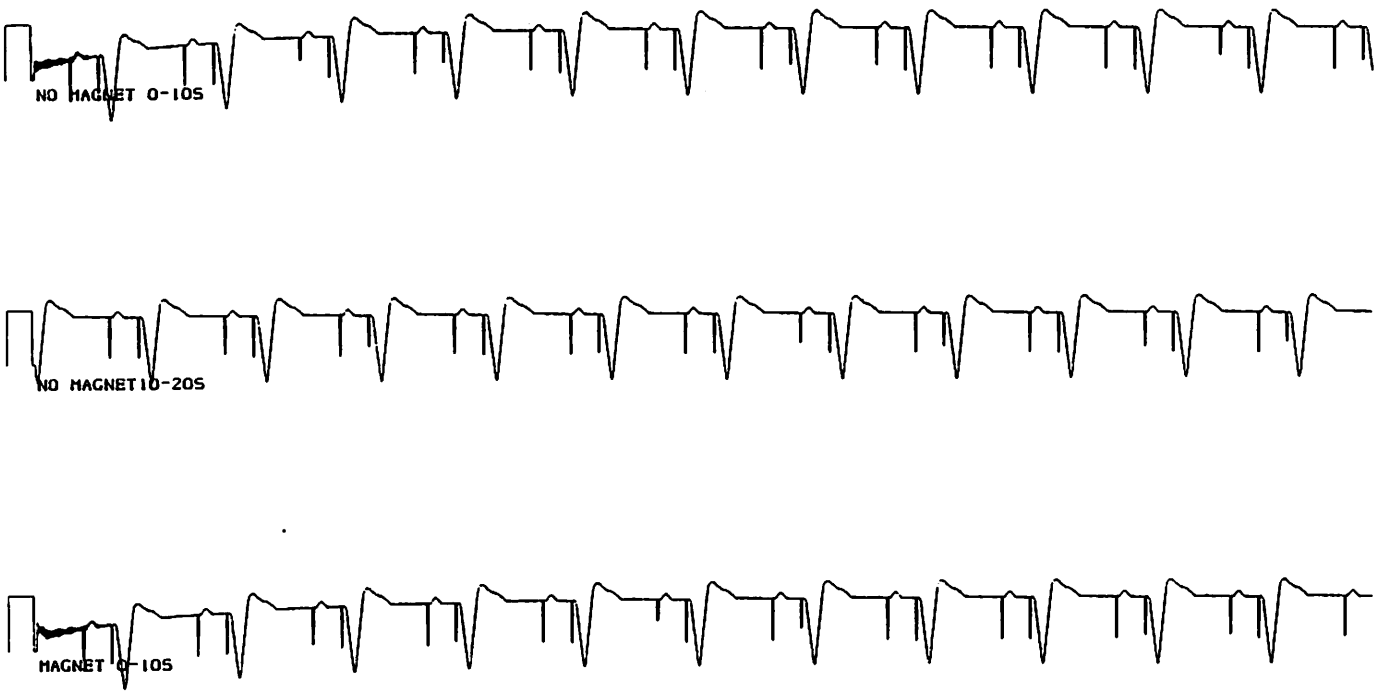


Figure 22—Pacemaker Evaluation Final Report (Page 1 of 2).

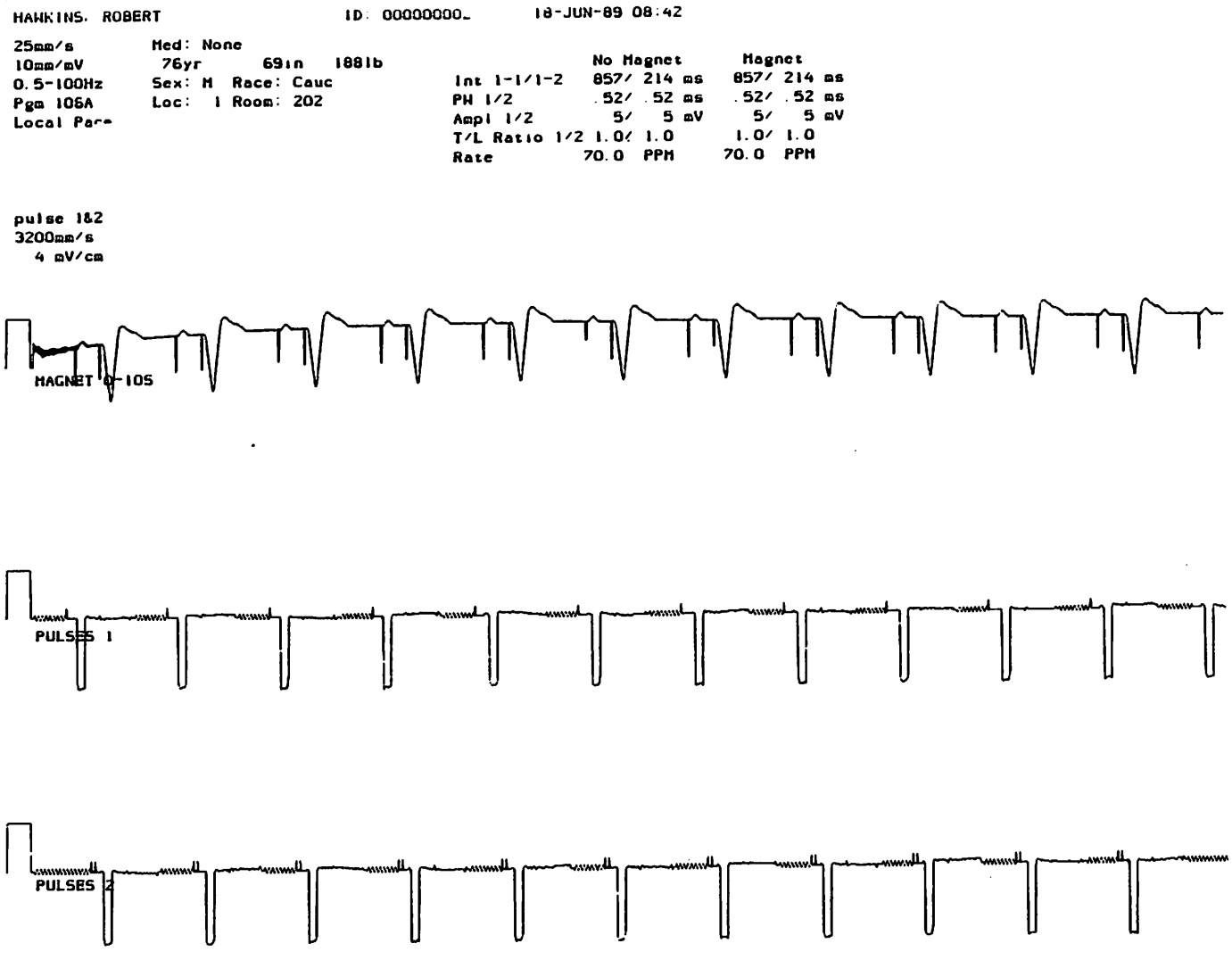


Figure 23—Pacemaker Evaluation Final Report (Page 2 of 2).

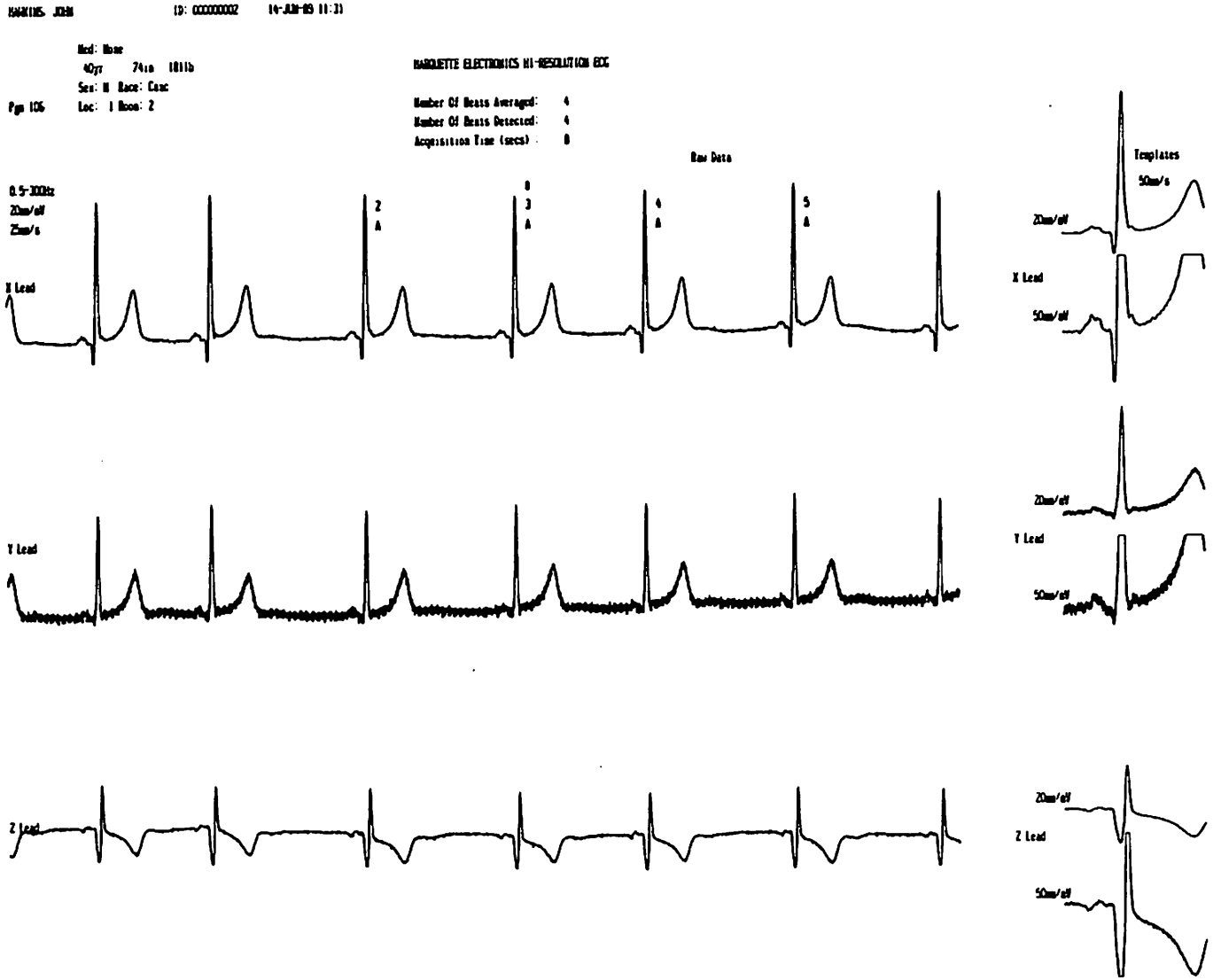


Figure 24—Hi-Res Template Report.

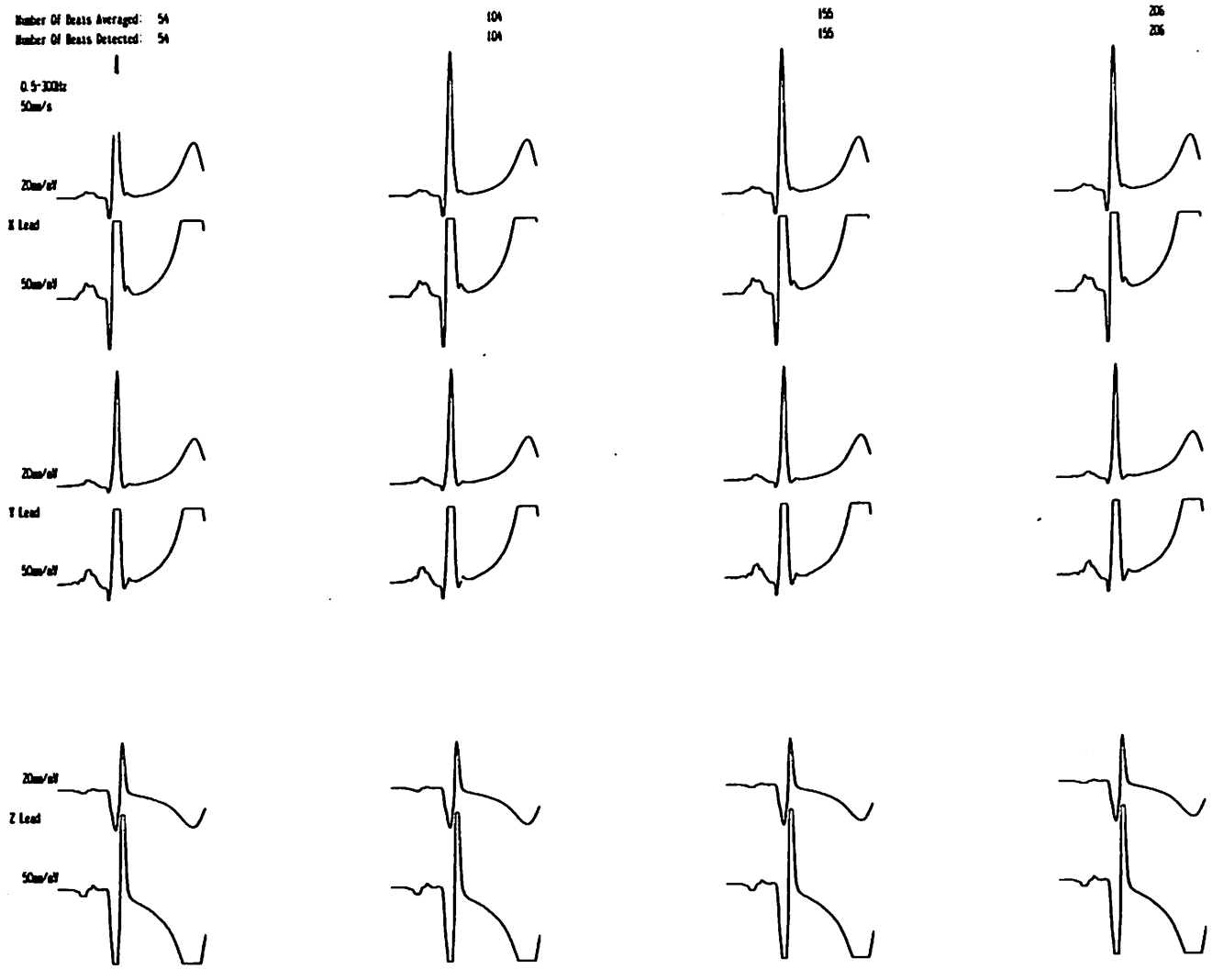


Figure 25—Periodic Average Plots.

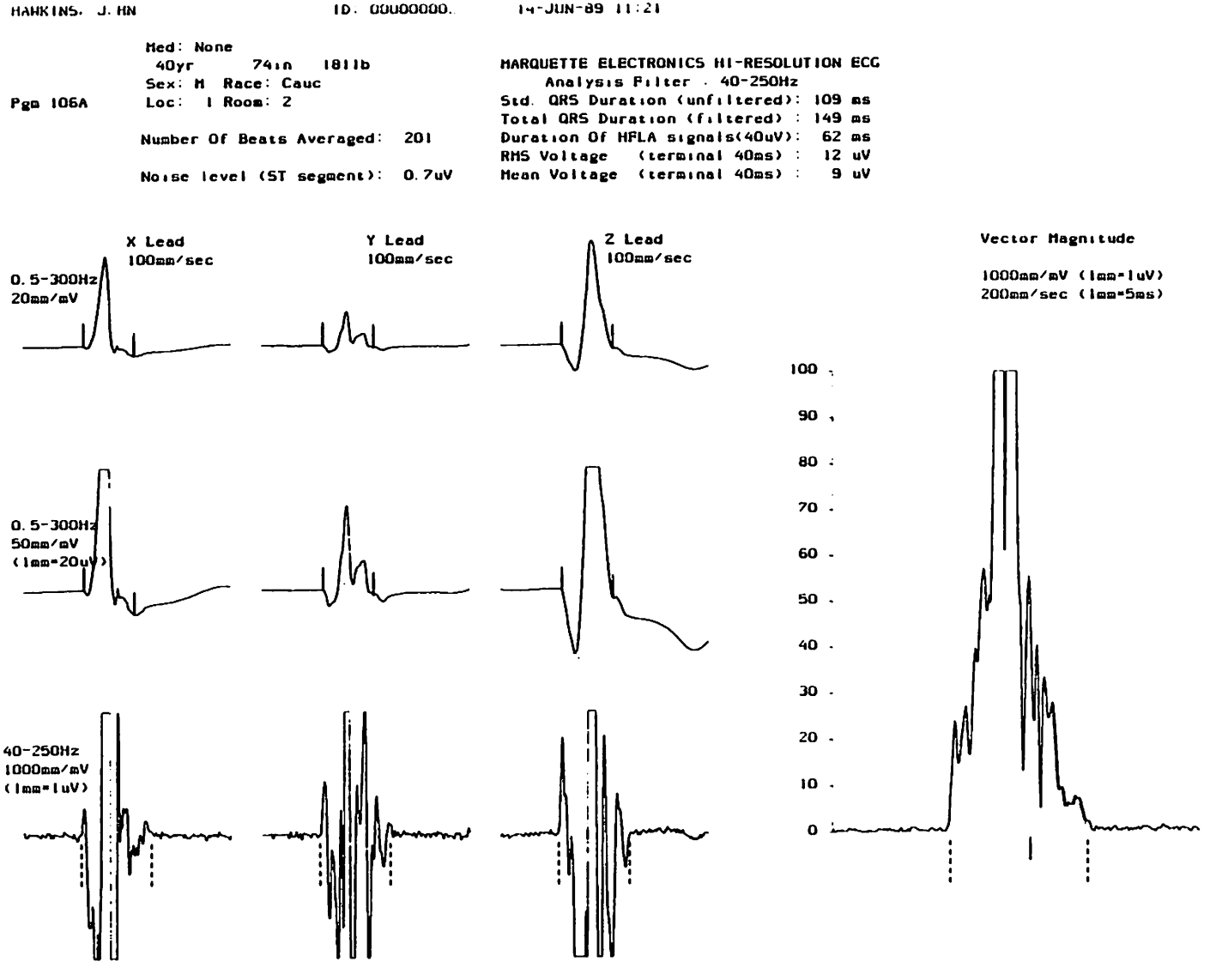


Figure 26—Hi-Res Final Report (40-250 Hz Filter).

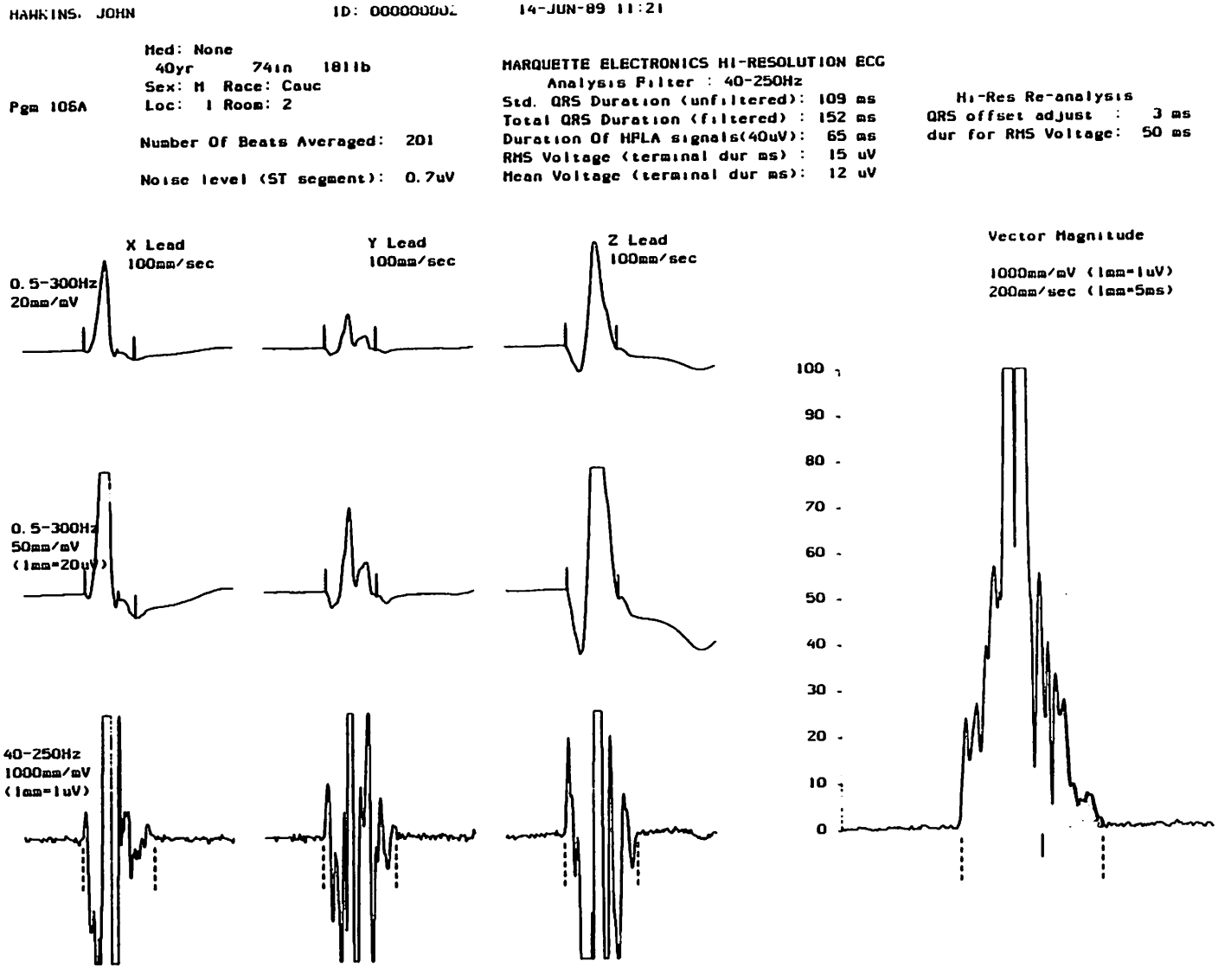


Figure 27—HI-Res Re-Analysis Report.

Chapter 14
Pacemaker

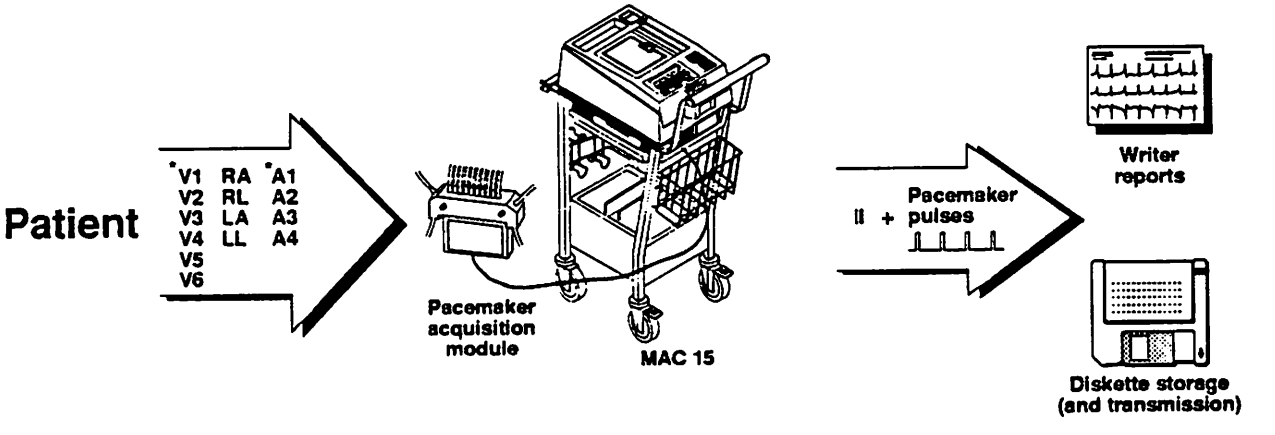
Chapter Summary

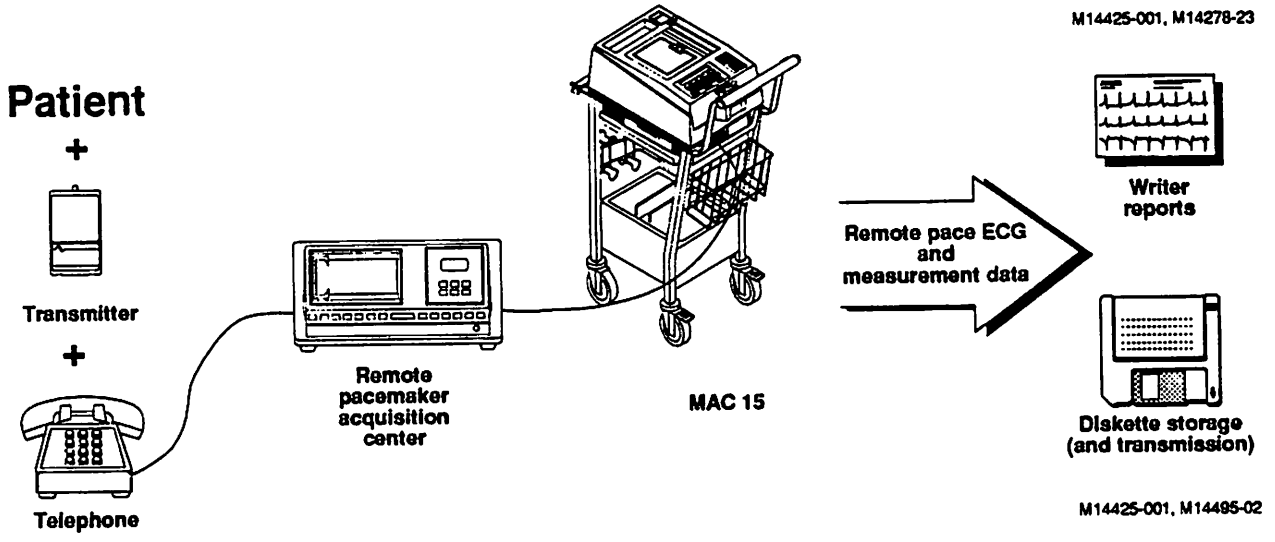
Pacemaker evaluation reports can not be done with version 006 software.

This chapter consists of two sections.

- **The local pacemaker option** enables the cardiograph 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 cardiograph 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.





* The chest and auxiliary leads do not have to be connected to the patient in order to perform a local pacemaker evaluation.

Local Pacemaker Option

The local pacemaker option provides a means to evaluate an implanted single or dual chamber pacemaker using standard surface limb electrodes.

Data for the local 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 pacemaker and lead II ECG data is acquired with a magnet. Using the **No Mag** function, 20 seconds of pacemaker and lead II ECG data is acquired without a magnet.

After local acquisition of pacemaker and ECG data, a final report can be 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:

- 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.

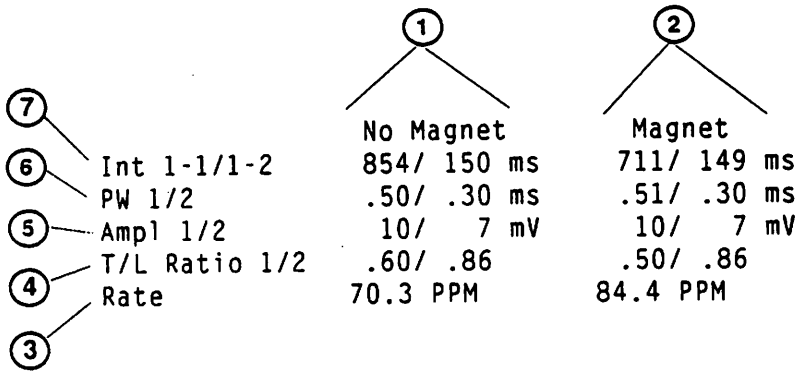
Page two of the final report:

- 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 or 6400 millimeters per second.
- Channel 3—type 2 pacemaker pulses at *3200 or 6400 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. (A sample of these measurements is shown on the following page.)

* If *Main Menu* writer speed is 25 mm/s, pacemaker pulses will be at 3200 mm/s. If *Main Menu* writer speed is 50 mm/s, pacemaker pulses will be at 6400 mm/s.

Final Report Sample Measurement Data Acquired Using Local Pacemaker Option



(1) Pacemaker artifact with no magnet applied.

(2) Pacemaker artifact with magnet applied.

(3) Pulses per minute (PPM)—the number of pulses that occur during a 1-minute period computed as follows:

$$PPM = \frac{60}{\text{interval 1-1}}$$

(4) 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.

(5) Amplitude—the measurement of the electrical potential. The amplitude is measured in millivolts.

(6) Pulse width—the length of time that current flows during each electrical impulse. The width is measured in milliseconds ±5 microseconds.

(7) 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.

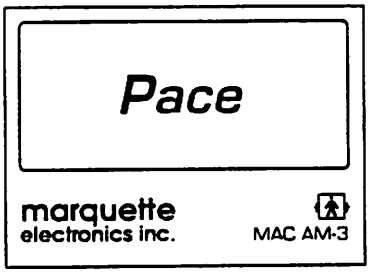
Recording a Local Pacemaker Evaluation

To locally evaluate an implanted pacemaker, follow these steps:

① Prepare the cardiograph as described in chapter 1.

② Prepare the patient as described in chapter 2. However, only the limb leadwires need to be attached to the patient.

NOTE: A Pace acquisition module must be used in order to perform a pacemaker evaluation:



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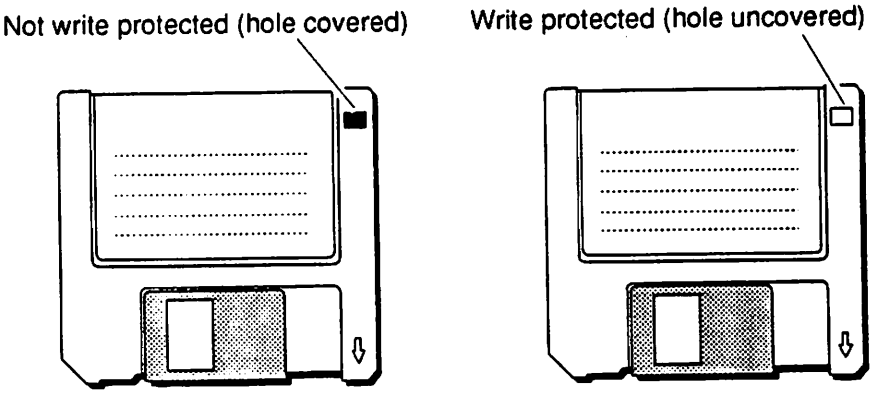
③ If you want, enter patient information (**PatInfo**) as described in "Entering Patient Information" in chapter 3. You do NOT have to enter patient information in order to evaluate a pacemaker.

④ If you do not want to save the pacemaker evaluation that you will record, 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 pacemaker evaluation. Also, make sure that this diskette is not write protected (as shown below):

• Front of Diskette •



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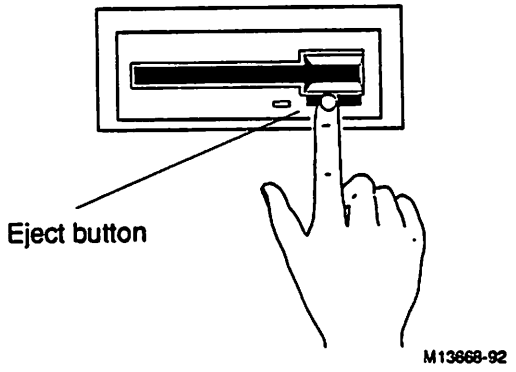
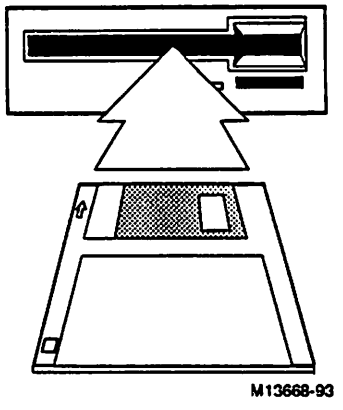
M13668-23

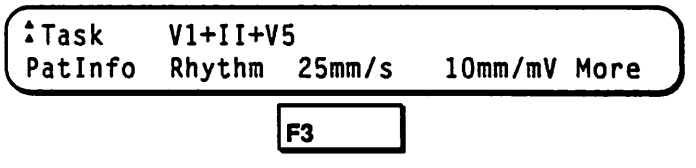
NOTE: If there already is a diskette in the diskette drive slot, remove it by pressing the eject button:



⑤ Select a diskette to which you want to save the pacemaker evaluation file. With the label side up, insert the diskette into the diskette drive slot.



⑥ If the *Main Menu* is not already displayed, then press the STOP key to return to it:



Although the ECG and pulse data speeds can be changed, the ECG and pulse gains can not be changed.

Press the F3 key to change the *Main Menu* writer speed. The *Main Menu* writer speed is used to set the writer speed for pacemaker rhythm strips and the pacemaker final report:

For pacemaker rhythm strips...

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...

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

⑦ Next, press the [⇧] and [F1] keys at the same time to display the **System Functions** menu and follow the sequence outlined below:

```
          System Functions
RevXmit   Disk   Vector   Ped     More
```

[F5]

```
          System Functions
  Pace   Hi-Res  Setup   Loc PC   More
```

[F1]

⑧ Press the [F1] key for **Pace**, and the following display will appear:

```
              Pacemaker
 Local    Remote
```

[F1]

⑨ Press the [F1] key for **Local**, and one of the following three displays will 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 step ⑩.

If the second display appears, make sure the correct acquisition module is attached to the cardiograph.

If the third display appears, make sure you are using the AM-3 *pacemaker* acquisition module.

⑩ Data for the pacemaker evaluation will now be acquired.

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

[F1] [F2]

Press the [F1] key for **Magnet** to acquire 10 seconds of pacemaker and lead II ECG data *with a magnet* over the pacemaker. Place the magnet over the pacemaker before selecting **Magnet**.

THEN

Press the [F2] key for **No Mag** to acquire 20 seconds of pacemaker and lead II ECG data *without a magnet* over the pacemaker. Remove the magnet from over the pacemaker before selecting **No Mag**.

NOTE: Either **Magnet** or **No Mag** may be selected first.

⑪ When either **Magnet** or **No Mag** is selected, the following display will appear:

```
** Press RECORD ECG or RECORD RHYTHM **
```

If the [RECORD ECG] key is pressed, pacemaker and lead II data will be acquired for the final report.

OR

If the [RECORD RHYTHM] key is pressed, pacemaker and lead II data will be printed as it is acquired on a rhythm strip. However, this data is <u>not</u> acquired for the final report, and measurement data will <u>not</u> appear on rhythm strips.

⑫ After pressing either the [RECORD ECG] or [RECORD RHYTHM] key, a display similar to the following will appear:

Acquisition time. The number of seconds data has been acquired. This will only appear if the [RECORD ECG] key was pressed.

This will be **No Magnet** if **No Mag** was selected.

```
1  ** Local Pace Acq.- With Magnet **
```

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.

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 LCD 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.

⑬ After acquiring pacemaker and lead II data with and without a magnet using the **Magnet** and **No Mag** functions, the following display should appear:

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

F3

Press the F3 key for **Report** to print the two-page pacemaker evaluation final report, and the following display will appear:

```
        ** Printing Reports **
Page 1 of 2
```

If you answered **No** to the **Ask for Extra Copies of Plots** prompt in the **Cart Setup** menu, then go to step ⑭.

However, if you asked for the extra copies prompt, then the following display will appear after the final report has been printed:

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

Type in the number of copies you want,
Then press the [⇦] key, and a display similar to the following will appear:

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

⑭ After all reports have been printed, the following displays will appear:

```
    ** Processing ECG For Storage **
```

THEN

```
        ** Write To Diskette **
```

THEN

If a diskette error occurs, go to step ⑮.

If no diskette error occurs, the following will appear:

```
Storage to Diskette Complete
Type Any Key to Continue
```

Typing any key returns you to the *Main Menu*:

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

⑮ If a diskette error occurs, a display similar the following will appear:

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

Then a display similar to one of the following will appear:

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

OR

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

F1 F2

The first display will only appear if your cardiograph is equipped with a modem. In this case the cardiograph will try to transmit the recently acquired pacemaker evaluation final report using the **Cart Setup** phone number. (Refer to "Phone 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 pacemaker evaluation final report to diskette or transmitting it over a telephone line (if your cardiograph is equipped with a modem.) Otherwise, select **No**, and the recently acquired pacemaker evaluation final report will be lost.

Remote Pacemaker Option

The remote pacemaker option provides a means to evaluate an implanted single or dual chamber pacemaker using telephonic transmission.

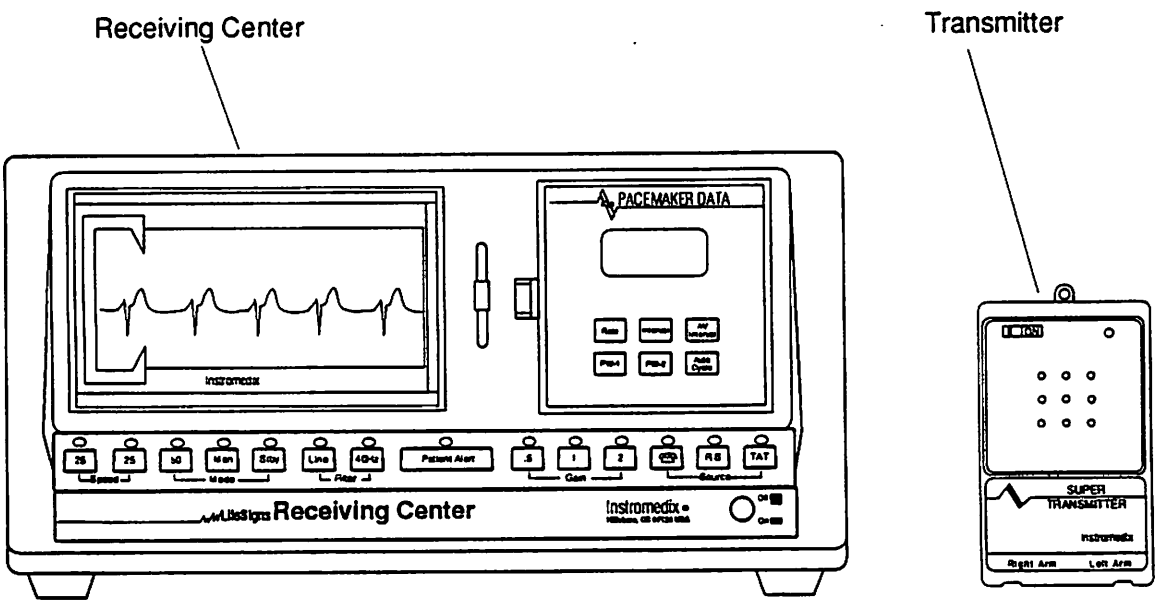
Data for the remote pacemaker evaluation is acquired in two separate phases: with a magnet and without a magnet placed over the pacemaker. Using the **Magnet** function, 10 seconds of remote pacemaker ECG data is acquired with a magnet. Using the **No Mag** function, 20 seconds of remote pacemaker ECG 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 of these measurements is shown on the following page.)

NOTE: In order to perform a remote pacemaker evaluation, a transmitter, receiving center, and remote pace interface cable are required.



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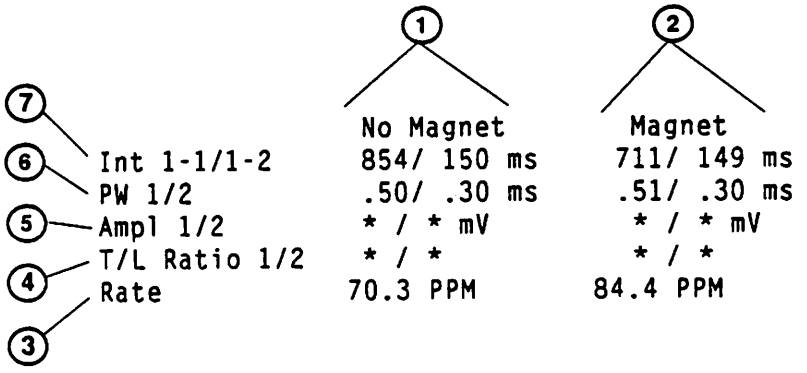
Final Report Sample Measurement Data Acquired Using Remote Pacemaker Option



(1) Pacemaker artifact with no magnet applied.

(2) Pacemaker artifact with magnet applied.

(3) Pulses per minute (PPM)—the number of pulses that occur during a 1-minute period computed as follows:

$$PPM = \frac{60}{\text{interval 1-1}}$$

(4) 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.)

(5) 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.)

(6) Pulse width—the length of time that current flows during each electrical impulse. The width is measured in milliseconds ±5 microseconds.

(7) 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

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

① Prepare the cardiograph as described in chapter 1.

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

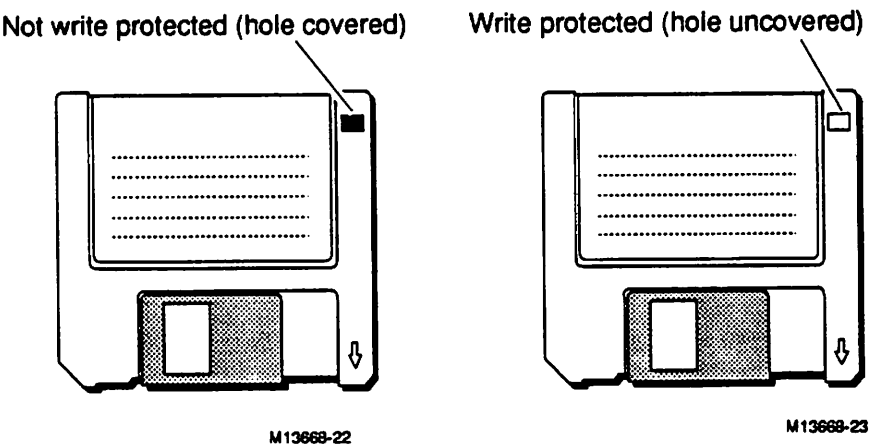
② Prepare the remote receiving center as described in its operation and service manual. Connect the remote pace interface cable from the cardiograph to the remote receiving center.

③ Prepare and instruct the patient in the use of the telephone transmitter.

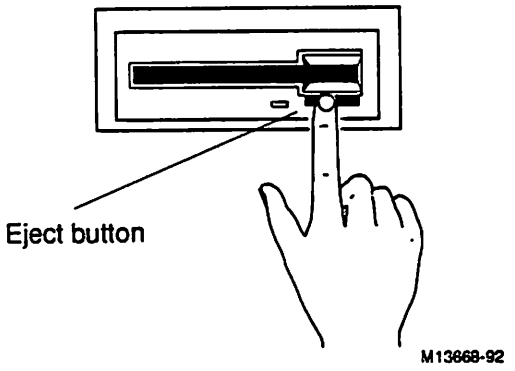
④ If you want, enter patient information (**PatInfo**) as described in "Entering Patient Information" in chapter 3. You do NOT have to enter patient information in order to evaluate a pacemaker.

⑤ If you do not want to save the pacemaker evaluation that you will record, 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 (as shown below):

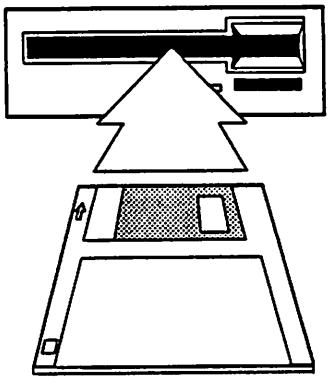
• Front of Diskette •



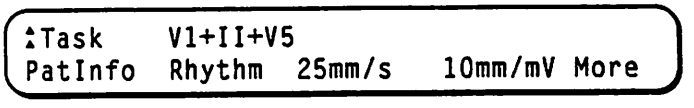
NOTE: If there already is a diskette in the diskette drive slot, remove it by pressing the eject button:



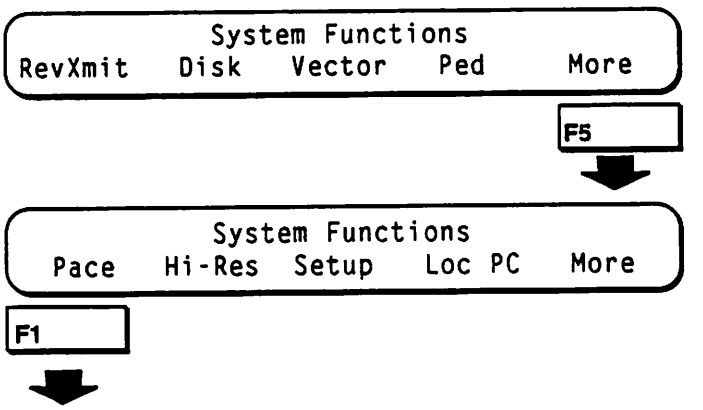
⑥ Select a diskette to which you want to save the pacemaker evaluation file. With the label side up, insert the diskette into the diskette drive slot.



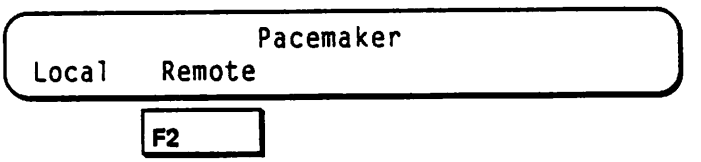
⑦ If the *Main Menu* is not already displayed, then press the STOP key to return to it:



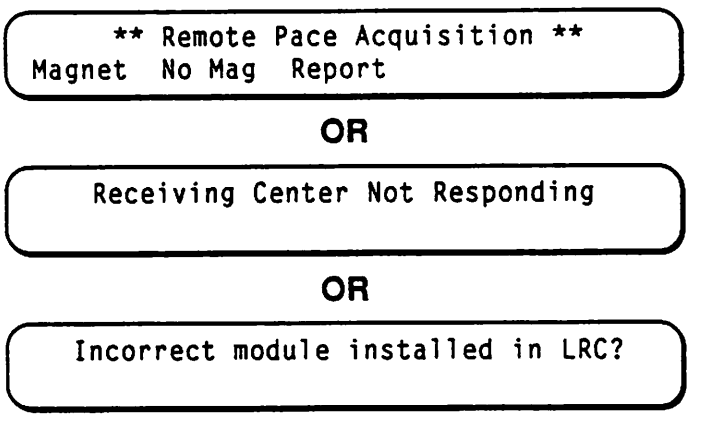
⑧ Next, press the [⇧] and [F1] keys at the same time to display the **System Functions** menu and follow the sequence outlined below:



⑨ Press the [F1] key for **Pace**, and the following display will appear:



⑩ Press the [F2] key for **Remote**, and one of the following three displays will appear:

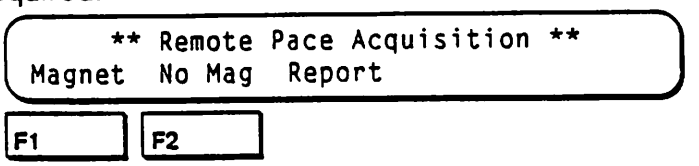


If the <u>first</u> display appears, go to step ⑪.

If the <u>second</u> display appears, make sure the remote pacemaker receiving center is attached to the cardiograph and is turned on.

If the <u>third</u> display appears, make sure you are using the correct data module in the remote pacemaker receiving center.

⑪ Data for the remote pacemaker evaluation can now be acquired.



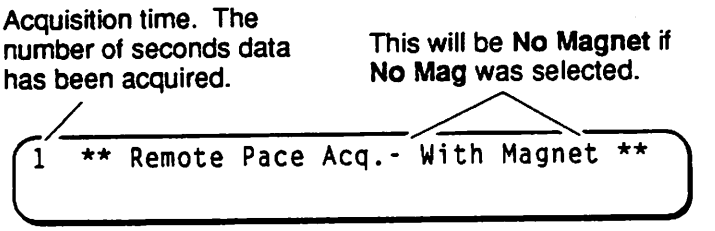
Before selecting **Magnet**, instruct the patient to place the magnet over the pacemaker and begin transmitting data. Use the strip recorder on the remote receiving center to insure a stable ECG is being received before selecting **Magnet**. Press the F1 key for **Magnet**, to acquire 10 seconds of remote pacemaker ECG data *with a magnet* over the pacemaker.

THEN

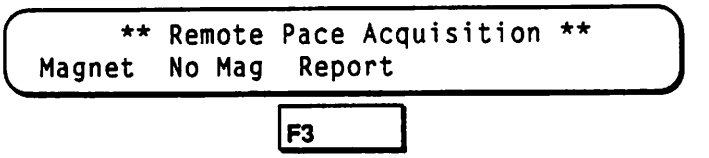
Before selecting **No Mag**, instruct the patient to remove the magnet previously held over the pacemaker and continue transmitting data. Again, use the strip recorder on the remote receiving center to insure a stable ECG is being received before selecting **No Mag**. Press the F2 key for **No Mag** to acquire 20 seconds of pacemaker ECG data without a magnet over the pacemaker.

NOTE: Either **Magnet** or **No Mag** may be selected first.

⑫ After pressing either **Magnet** or **No Mag,** a display similar to the following will appear:



⑬ After acquiring remote pacemaker data with and without a magnet using the **Magnet** and **No Mag** functions, the following display should appear:



Press the F3 key for **Report** to print the one-page pacemaker evaluation final report, and the following display will appear:

If you answered **No** to the **Ask for Extra Copies of Plots** prompt in the **Cart Setup** menu, then go to step ⑭.

However, if you asked for the extra copies prompt, then the following display will appear after the final report has been printed:

Type in the number of copies you want. Then press the ⏎ key, and a display similar to the following will appear:

```
        ** Printing Reports **
Page 1 of 1                    Copy 1
```

⑭ After the report has been printed, the following displays will appear:

```
    ** Processing ECG For Storage **
```

THEN

```
        ** Write To Diskette **
```

THEN

If a diskette error occurs, go to step ⑮.

If no diskette error occurs, the following will appear:

```
Storage to Diskette Complete
Type Any Key to Continue
```

Typing any key returns you to the *Main Menu*:

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

⑮ If a diskette error occurs, a display similar the following will appear:

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

Then a display similar to one of the following will appear:

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

OR

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

F1 F2

The first display will only appear if your cardiograph is equipped with a modem. In this case the cardiograph will try to transmit the recently acquired pacemaker evaluation final report using the **Cart Setup** phone number. (Refer to "Phone Setup.") If no phone number was entered, or you wish to cancel the transmission, press the STOP key.

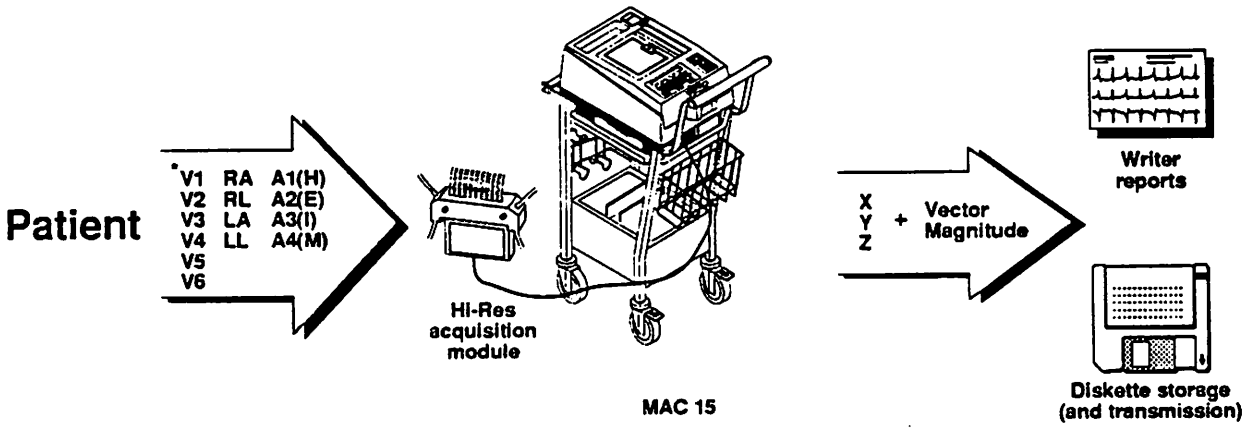
When the second display appears, select **Yes** to try saving the recently acquired pacemaker evaluation final report to diskette or transmitting it over a telephone line (if your cardiograph is equipped with a modem.) Otherwise, select **No**, and the recently acquired pacemaker evaluation final report will be lost.

Chapter 15
Hi-Res

Chapter Summary

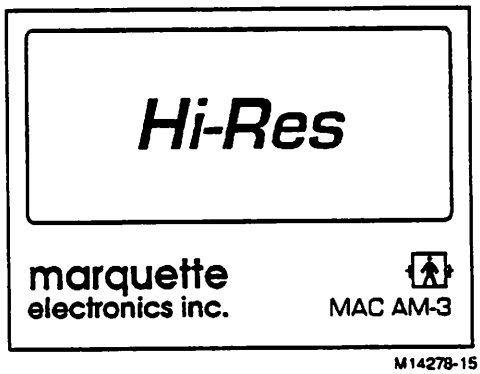
A high resolution ECG can not be done with version 006 software.

The Hi-Res acquisition process is shown below:



M14425-001, M14278-16

NOTE: A Hi-Res acquisition module must be used in order to take a Hi-Res ECG:



M14278-15

- The V1, V2, V3, and V5 leadwires do not have to be connected to the patient to obtain a Hi-Res ECG.

The High Resolution (Hi-Res) option for the cardiograph analyzes high-frequency low-amplitude (HFLA) ECG information using a special "Hi-Res" acquisition module. Of greatest interest are signals within the terminal portion of the QRS called late potentials.

The Hi-Res acquisition module acquires an orthogonal ECG at 1000 samples per second, and transmits this data to the cart. 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 ventricular late potentials. The average beat is bandpass filtered using 3 lower cutoff frequencies—25, 40, and 80 Hz—with the higher cutoff at 250 Hz. For each of these frequencies, the following features are extracted:

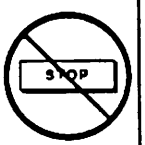
- RMS voltages in the terminal 40 milliseconds;
- total QRS duration (ie, ventricular activation time);
- duration of high-frequency, low-amplitude signals; and
- noise level in ST segment.

A Hi-Res report can be up to 5 pages long. The first page printed will be the template report, followed by a page of periodic average plots (if enabled in **Cart 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.)

The **Cart Setup** menu is used to select the analysis filters. For example, if the 25–250 Hz and 40–250Hz filters are chosen and if periodic average plots is enabled, then the Hi-Res report would consist of four pages: a template, a page of periodic average plots, and the two filtered reports.

Taking a Hi-Res ECG

Normally, pressing the STOP *key causes the Main Menu to appear on the LCD display and writer reports to stop printing. However, this is not always the case in Hi-Res mode. When pressing the* STOP *key has no effect, the following icon will appear in this column:*



M14278-14

① Prepare the cardiograph as described in chapter 1, "Preparing Equipment."

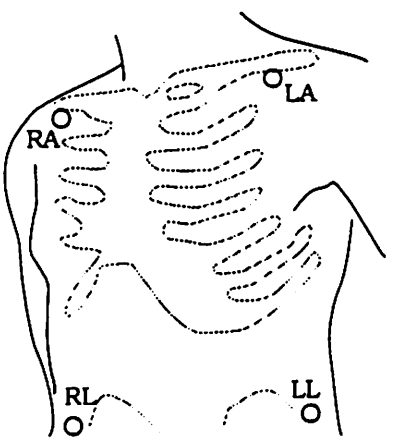
② Prepare the patient as described in chapter 2, "Preparing the Patient," using the electrode placement described in steps ③ through ⑤ as follows:

③ Attach the limb electrodes as shown in the figure below:

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

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

• Limb Electrode Placement •



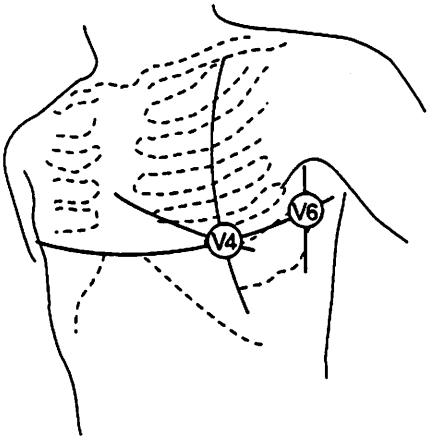
M12320-002

RA and LA electrodes should be placed just below the right and left clavicle on the midlines.

RL and LL electrodes should be placed on the pelvis, as shown.

④ Attach the chest electrodes as shown in the figure below:

• Chest Electrode Placement •



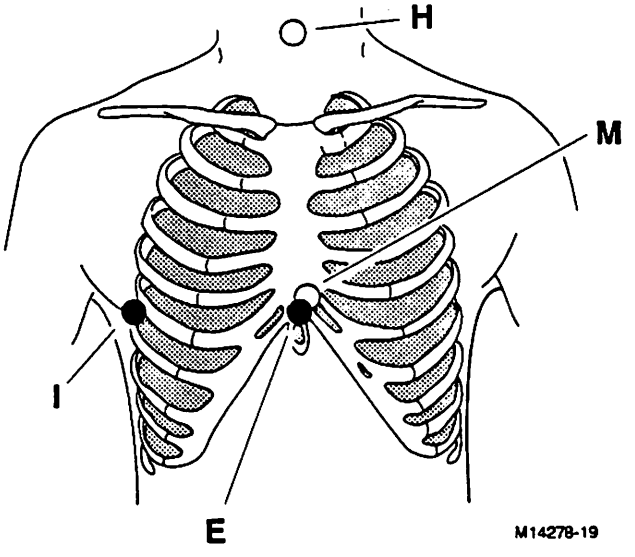
M14278-20

V4 at the mid-clavicular line in the fifth intercostal space.

V6 at the mid-axillary line on the same horizontal level as V4 and V5.

⑤ The auxiliary (A1 through A4) leadwires from the acquisition module should be connected to the patient as follows: A1 = H position, A2 = E position, A3 = I position, and A4 = M position as shown in the figure below:

• Auxiliary Electrode Placement •



H on the back of the neck.

E over the mid-sternum at the same horizontal level as V4 and V6.

I at the right mid-axillary line (opposite and on the same level with V6).

M center of the back (opposite E) or slightly off the spine.

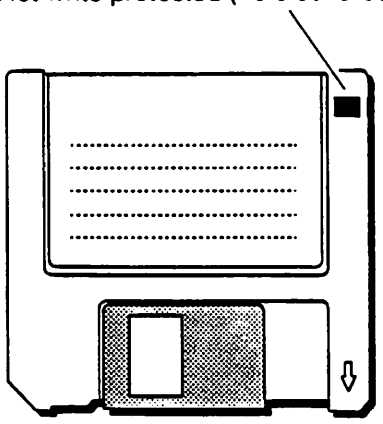
⑥ If you want, enter patient information (**PatInfo**) as described in chapter 3, "Taking a Resting ECG." You do NOT have to enter patient information in order to record a Hi-Res ECG. Patient data can be entered later using the **Diskette Functions**.

⑦ If you do not want to save the Hi-Res ECG that you will record, remove any diskette that is in the diskette drive, and go to step ⑨. Otherwise, make sure that you have a formatted diskette that can be used to save the Hi-Res ECG. Also, make sure that this diskette is not write protected (as shown below):

NOTE: A Hi-Res file acquired with software version 106 can be transmitted to another MAC 12 or 15 equipped with software version 106. If you wish to transmit and save the Hi-Res file, it is recommended the file first be saved to diskette and then transmitted from storage using Diskette Functions as described in "chapter 5–Transmitting an ECG."

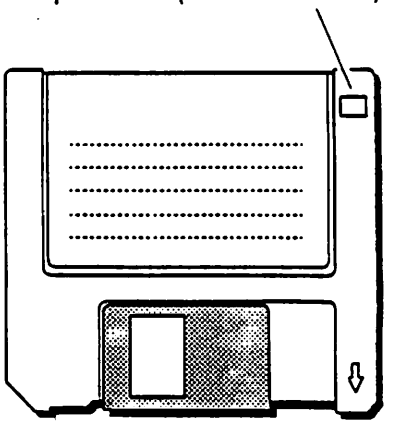
• Front of Diskette •

Not write protected (hole covered)



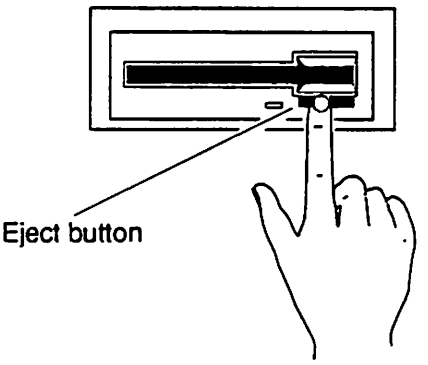
M13668-22

Write protected (hole uncovered)

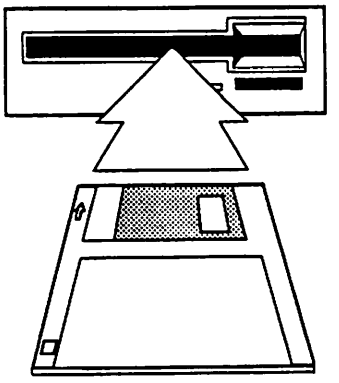


M13668-23

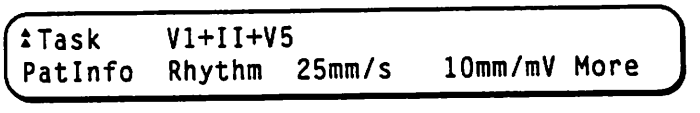
NOTE: If there already is a diskette in the diskette drive slot, remove it by pressing the eject button:



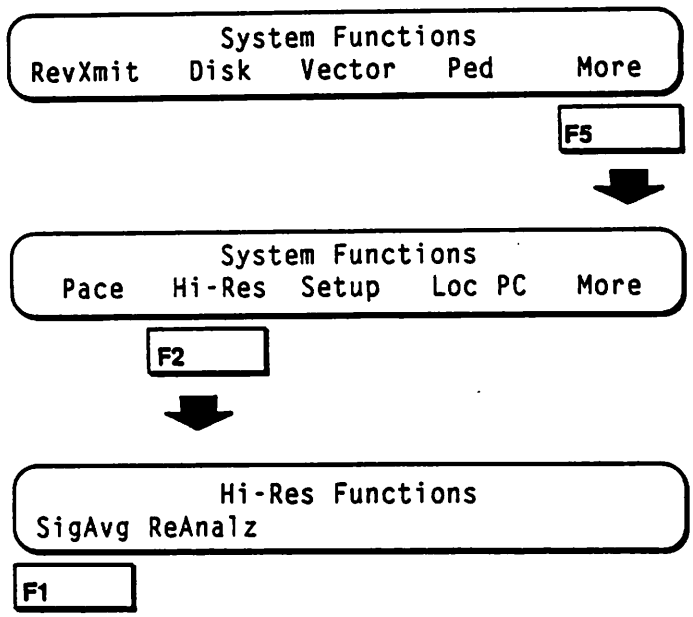
⑧ Insert the diskette—label side up—that you want to save the Hi-Res ECG on into the diskette drive slot:



⑨ If the *Main Menu* is not already displayed, then press the STOP key to return to it:

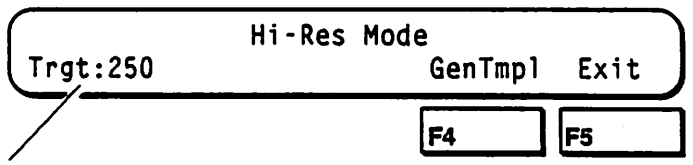


⑩ Next, press the ⇧ and F1 keys at the same time to display the first **System Functions** menu—the first LCD display shown below. Then press the key shown under each of the following LCD displays:



M14278-14

⑪ After selecting **SigAvg,** Hi-Res mode is entered, and the following will appear:



Target number of beats that will be averaged for late potential analysis. (Refer to step 13 for further details.)

Press the F4 key for **GenTmpl** (Generate Template) to start generating the template which will be used for subsequent correlation. Then go to the next step.

OR

Press the F5 key for **Exit** to quit the Hi-Res mode.

M14278-14

⑫ After selecting **GenTemp**, the following series of displays will appear, and the first page of the Hi-Res ECG report—containing the sample X, Y, and Z templates—will be printed:

```
** Acquiring Data for Template **
```

THEN

If a lead fail occurs before acquisition starts, then a display similar to the following will appear:

```
** Lead OFF - M(A4)
Override                          Exit
```

If no lead off message appears, then the following series of LCD displays will appear:

```
** Generating Templates **
```

THEN

```
** Plotting Template Data **
```

THEN

```
                Hi-Res Mode
Trgt:250 StrtAvg UsrTmpl GenTmpl   Exit
```

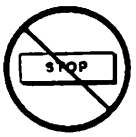
If a lead off message similar to the following appears during template acquisition,

```
** Lead OFF - M(A4)
Override                          Exit
```

F1 F5

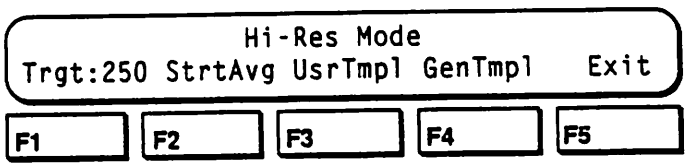
then do the following:

- first, select **Exit**. Then check all electrode and leadwire connections. Restart from step ⑪.
- 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 step ⑪.
- third, if a lead error message still appears after performing the above, then and only then should **Override** be selected.



M14278-14

⑬ The **Hi-Res Mode** display is explained below:



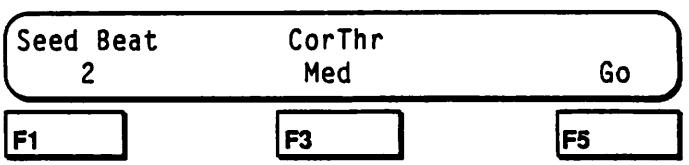
Press the F1 key for **Trgt** (Target) to add 50 beats at a time (up to 950) to the number of beats to be averaged for late potential analysis.

OR

Press the F2 key for **StrtAvg** (Start Averaging) to begin acquiring data for signal averaging. The results of late potential analysis will appear on the rest of the Hi-Res ECG report.

OR

Press the F3 key for **UsrTmpl** (User Defined Template) in order to select a Seed Beat other than the one identified on the template and change the Correlation Threshold. Selecting **UsrTmpl** will display the following menu.



Press the F1 key to change the seed beat on the next template generated.

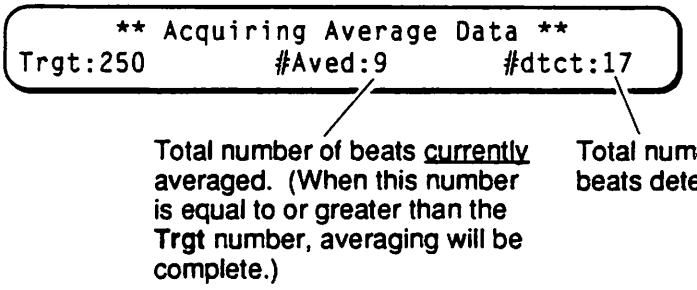
Press the F3 key to change the correlation threshold on the next template generated.

After the desired changes have been made, press the F5 key to generate another template with the changes you have selected.

OR

Selecting either **GenTmpl** or **Exit** has the same effect as in step ⑪.

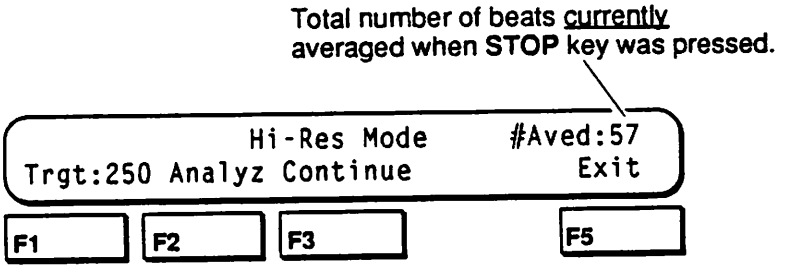
⑭ After selecting **StrtAvg**, a display similar to the following will appear:



During the averaging process, periodic average plots will be printed if you answered **Yes** to **Periodic Average Plots** in **Cart Setup**.

If the STOP key is pressed while the above display is on, then the following will appear:

THEN



Press the F1 key for **Trgt** if you want to change the number of beats to be averaged.

OR

Press the F2 key for **Analyz** (Analyze) to quit the averaging process. Then go to the next step.

OR

Press the F3 key to **Continue** the averaging process.

OR

Press the F5 key to **Exit** from Hi-Res mode.

M14278-14

⑮ When the target number of beats has been averaged or the acquisition of data has been stopped by the user and **Analyz** selected, the following displays will appear:

```
** Averaging Completed **
```

THEN

```
** Analyzing Data for Late Potentials **
```

THEN

```
** Plotting Final Report(s) **
```

THEN

If you answered yes to the **Ask for Extra Copies of Plots** prompt in the **Cart Setup** menu, then the following will appear:

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

Type in the number of copies you want and press the [⇦] key. Otherwise, just press the [⇦] key if you don't want any extra copies.

THEN

```
More Averaging?:
  Yes       No
```

[F1] [F2]

Press the [F1] key for **Yes** to acquire more beats for late potential analysis. Then go to step ⑬.

OR

Press the [F2] key for **No**. Then go to the next step.

M14278-14

⑯ After selecting **No**, the following will appear:

```
** Write To Diskette **
```

THEN

If a diskette error occurs, go to step ⑰.

If no diskette error occurs, the following will appear:

```
Storage to Diskette Complete
Type Any Key to Continue
```

After pressing a key, the following will appear:

```
                Hi-Res Functions
SigAvrg ReAnalz
```

F1 F2

Press F1 to select **SigAvrg** and go to step ⑪ in **Taking a Hi-Res ECG.**

OR

Press F2 to select **ReAnalz** and go to step ⑥ in **Hi-Res Re-Analysis.**

OR

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

M14278-14

(17) If a diskette error occurs, a display similar to the following will appear:

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

Then a displays similar to the following will appear:

```
                ** Transmit **
Dialing - 1114567
```

THEN

```
                ** Transmit **
Sending #
```

If the transmission does not take place, the following display will appear:

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

F1 F2

If your cardiograph is equipped with a modem and there is no diskette in the drive, all the displays shown above will appear. A cardiograph 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.

If your cardiograph is not equipped with a modem and there is no diskette in the drive, only the last display will appear.

In either case, once the last display appears, you still have the opportunity to save the Hi-Res file. At this point, insert a formatted diskette in the drive and press the F1 key for **Yes**. This saves the Hi-Res file to the diskette.

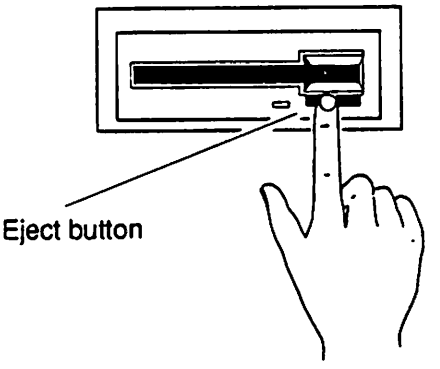
Hi-Res Report Re-Analysis

Your cardiograph gives you the ability to re-analyze Hi-Res reports stored on diskette using the **Diskette Functions** menu.

To perform a Hi-Res re-analysis follow these steps.

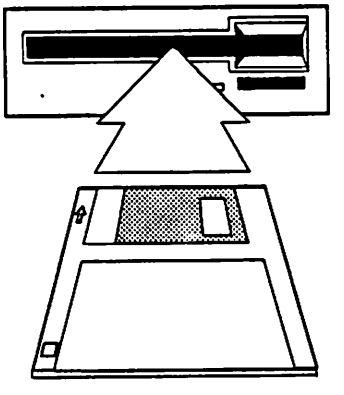
NOTE: Only Hi-Res reports stored on a diskette can be re-analyzed.

① If there already is a diskette in the diskette drive slot, remove it by pressing the eject button:



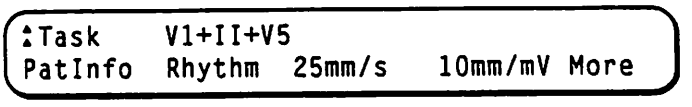
M13668-92

If you haven't already done so, gently slide the diskette—label side up—containing the ECGs you wish to edit into the diskette drive slot:

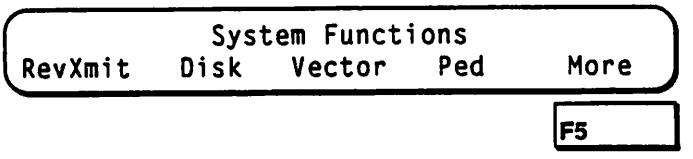


M13668-93

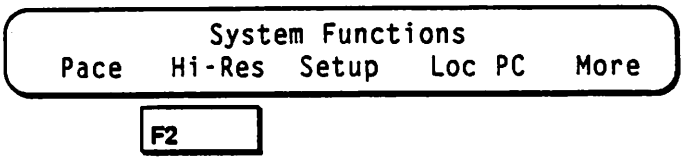
② If the *Main Menu* is not already displayed, then press the STOP key to return to it:



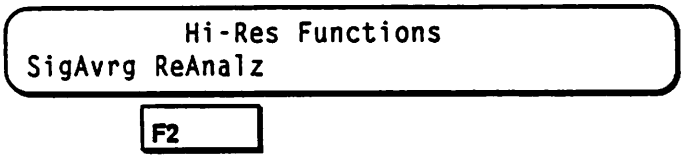
③ Next, press the ⇧ and F1 keys at the same time to display the first **System Functions** menu:



④ Press the F5 key for **More**. The following display will appear:



⑤ Press the F2 key for **Hi-Res**. The following display will appear:



⑥ Press the F2 key for **ReAnalz** (Hi-Res Re-Analysis). The following display will appear:

```
Password:
```

Type in either the Level 1 or Level 2 password. (The default passwords are "L1" and "L2.") Then press the ⏎ key.

⑦ The cardiograph will check your diskette and the following message will briefly appear:

```
        ** Hi-Res Re-analysis **
Reading Diskette
```

⑧ The next prompt allows you to re-analyze either all or just some of the Hi-Res files on your diskette:

```
Select Data:
  All    Select
```

F1 F2

Choose **All** to re-analyze all the Hi-Res files on your diskette, and then go to step ⑰ .

OR

Choose **Select** to select which Hi-Res files on your diskette to re-analyze and then continue with the next step.

⑨ After choosing **Select**, the following will appear:

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

F1 F2

Select **No** if you want to skip the following selection prompts and view the first Hi-Res file on your diskette.

If you select **No**, then go to step ⑯.

⑩ After selecting **Yes**, the first selection prompt will appear:

```
Select by PID:
  Yes       No
```

F1 F2

If you select **No**, then go to step ⑪.

If you select **Yes**, the following display will appear:

```
Patient ID:
Digits 0 To 9
```

Type in the patient's identification number (PID) that will be used to select ECGs. Then press the ⇦ key.

⑪ Next, a prompt will appear that allows you to select those ECGs that have the same MUSE site number:

```
Select by Site:
  Yes       No
```

F1 F2

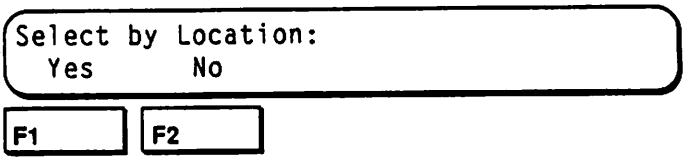
If you select **No**, then go to step ⑫.

If you select **Yes**, the following display will appear:

```
Site Number:
1 - 255
```

Type in the MUSE site number that will be used to select ECGs. Then press the ⇦ key.

⑫ The next prompt that appears allows you to select Hi-Res files by their MUSE location number:

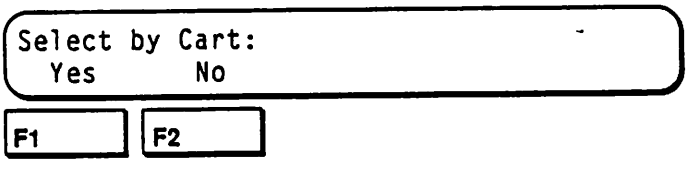


If you select **No**, then go to step ⑬.

If you select **Yes**, the following display will appear:

Type in the MUSE location number that will be used to select Hi-Res files. Then press the ⇦ key.

⑬ The next prompt that appears allows you to select Hi-Res files by their cart number:

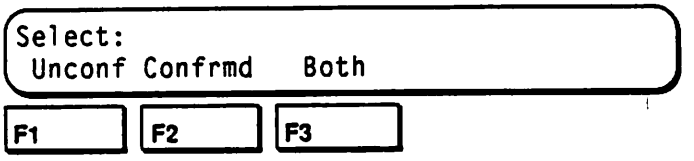


If you select **No**, then go to step ⑭.

If you select **Yes**, the following display will appear:

Type in the cart number that will be used to select Hi-Res files. Then press the ⇦ key.

⑭ Then the following prompt will appear:



Choose **Unconf** if you only want to re-analyze unconfirmed Hi-Res reports.

OR

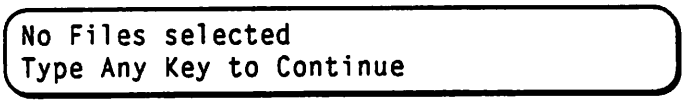
Selecting Confrmd will result in "No Files selected" message since Hi-Res files can not be confirmed.

Choose **Confrmd** if you only want to re-analyze confirmed reports.

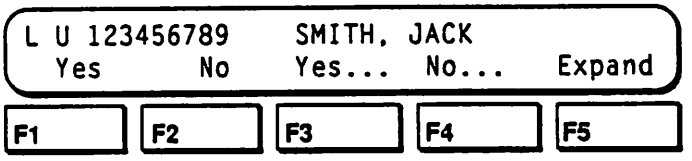
OR

Choose **Both** if you want to re-analyze both unconfirmed and confirmed Hi-Res reports.

⑮ Next, one of the following two displays, or one very similar, will appear:



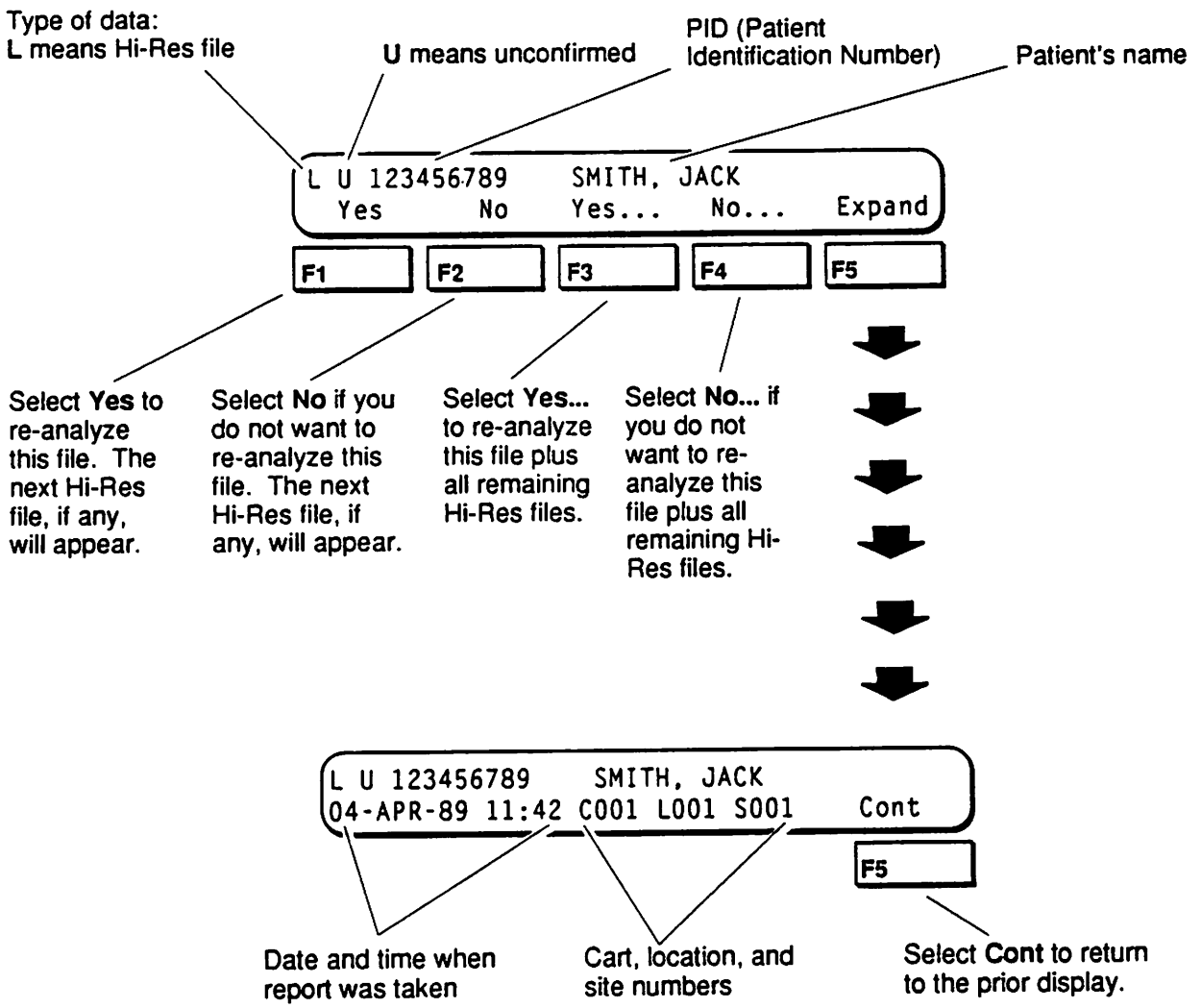
OR



If the first display appears, then 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, then 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 in the next step.

⑯ Select which 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:



⑰ Next, displays similar to the following two will appear:

```
        ** Hi-Res Re-analysis **
Reading Diskette
```

THEN

```
LU 123456789     SMITH, JACK
04-APR-89  11:42 C001 L001 S001
```

⑱ Type any key to continue and the following screen will appear.

```
            Hi-Res Re-analysis
Filter:  40        Go                  Exit
```

F2 F3 F5

Press F2 to the desired filter for the re-analysis.

THEN

Press F3 to generate the report (as stored on the diskette) with the selected filter. Then go to step ⑲.

OR

Press F5 to proceed with the re-analysis of the next file. Then return to step ⑰ .

NOTE: If no other file has been selected for re-analysis, the following display will appear:

```
Reanalysis Complete
Type Any Key to Continue
```

⑲ If you select **Go**, a copy of the stored report will be printed. Then the following prompt will appear:

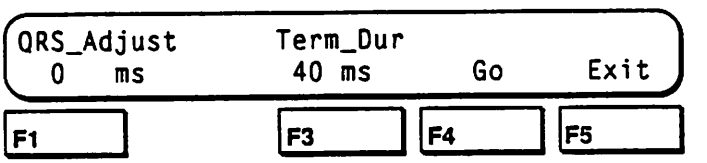
```
Number of Extra Copies:
0 to 99
```

Just press the [⇦] key if you do not want any extra copies.

OR

Type in the number of extra copies. Then press the [⇦] key

⑳ Next, the following display will appear:



Press [F1] to raise the **QRS_Adjust** (QRS Offset Adjustment) to the desired number in increments of 1 ms.

OR

Press the [⇧] and [F1] keys at the same time to lower the **QRS_Adjust** (QRS Offset Adjustment) to the desired number in increments of 1 ms.

OR

Press [F3] to raise the **Term_Dur** (Terminal Duration) to the desired number in steps of 10 ms.

OR

Press the [⇧] and [F3] keys at the same time to lower the **Term_Dur** (Terminal Duration) to the desired number in steps of 10 ms.

OR

Press [F5] to return to step ⑱.

When the desired re-analysis parameters have been selected, press [F4] to generate a Hi-Res Re-analysis report. Then go to step ㉑.

㉑ Next, the following display will appear:

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

If you want extra copies of the re-analysis report which was just printed, type in the number of copies and press the ⇦ key.

OR

If you want to perform another re-analysis of this ECG with different parameters, just press ⇦ and return to step ⑳.

㉒ When re-analysis is complete, press the STOP key to return to the *Main Menu*.

Chapter 16
Troubleshooting

Chapter Summary

This chapter is divided into four sections:

- **LCD Messages** lists and explains LCD display messages you may see,
- **Leadwire Problems** suggests ways to find the cause of bad lead messages,
- **Leadwire Replacement** shows you how to replace acquisition module leadwires, and
- **Diskette Care** presents guidelines in the care and handling of diskettes.

LCD Messages

Error Message	Recommended Solution
Bad RAM Location	Contact Marquette Service.
Checksum Error UX	Contact Marquette Service.
Data too noisy: Please re-instrument	Check the electrode site preparation and leadwires. Then start over.
DISKETTE FULL	Your diskette is full and can not store any more files. Either use another diskette or delete some files.
DISKETTE NOT IN DRIVE	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.
DISKETTE READ/WRITE ERROR	This diskette you are using is either damaged or not formatted. If damaged, some files may be accessible. Use the **Dirctry** function to print a list of all the files on the diskette. (Refer to chapter 8.) The files on this printed list will be accessible—except those files where the message **DISKETTE WRITE ACTIVITY WAS NOT FINISHED** appears. If no files are accessible, then format the diskette. (Refer to "Formatting a Diskette" in chapter 1.)
DISKETTE WRITE ACTIVITY WAS NOT FINISHED	The file you were trying to access is incomplete and can not be used.
DISKETTE WRITE PROTECTED	If you want to save data to a diskette, make sure that the diskette is not write protected. (Refer to "Delete All Files" in chapter 9.)

Error Message	Recommended Solution
FAULT TRAP-VECTOR	This message will be present along with other letters and/or digits. If possible, copy them onto a piece of paper. Then turn the cardiograph 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.
Incompatible MAC Acquisition Module	An incorrect acquisition module is connected to the cardiograph. For example, an AM-1 or AM-2 can not be used to acquire data for the **Pace** (Pacemaker) function.
Most recent ECG NOT saved to diskette	When the **Save** and **Discard** 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 **Press F1 to acknowledge** appears, then the most recently acquired ECG was lost.
No Answer Tone	Make sure that the correct phone number has been entered and that the telephone cord is properly connected.
No Confirmed Report Formats Selected!	In order to print a confirmed report, at least one confirmed report format must be selected. (Refer to "Report Format Setup" in "chapter 12–Cart Setup.")
No Data Storage–Plotter Output Only	To record or save data on a diskette, remove the write protection from your diskette, and then insert it into the disk drive slot. If this message still appears, then try using another diskette.
No Dial Tone	Make sure that the telephone cord is properly connected.
**** No MAC Acquisition Module ? ****	Connect the acquisition module to the cardiograph.

Error Message	Recommended Solution
No Overreadable Report Formats Selected	Select a report format or a different report format. (Refer to "Report Format Setup" chapter 12.)
No Report Formats Selected!	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.
No Such File	Use the **Dirctry** function to check if the file is on the diskette. (Refer to chapter 8.)
No Unconfirmed Report Formats Selected!	In order to print an unconfirmed report, at least one unconfirmed report format must be selected. (Refer to "Report Format Setup" in "chapter 12–Cart Setup.")
NoMem	Contact Marquette Service.
Not Available	The function you were trying to access is not available at this time.
Phone Line Not Attached	Make sure that the telephone cord is properly connected.
Unable to Generate Template	The Hi-Res acquisition process has stopped. Check the electrode site preparation and leadwires. Then start over.
XXXX of Bad Blocks Found	Format the diskette again. If this message still appears, then use a different diskette.

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 display. (Depending on the type of acquisition module you are using, this error message will appear either briefly or remain on the LCD display until the error is corrected or "overridden." However, in all cases, when the problem is corrected, the error message will disappear.)

The cardiograph divides lead errors into four general categories. Examples of LCD display 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 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, refer to "Lead Error Condition" in the front notices.)

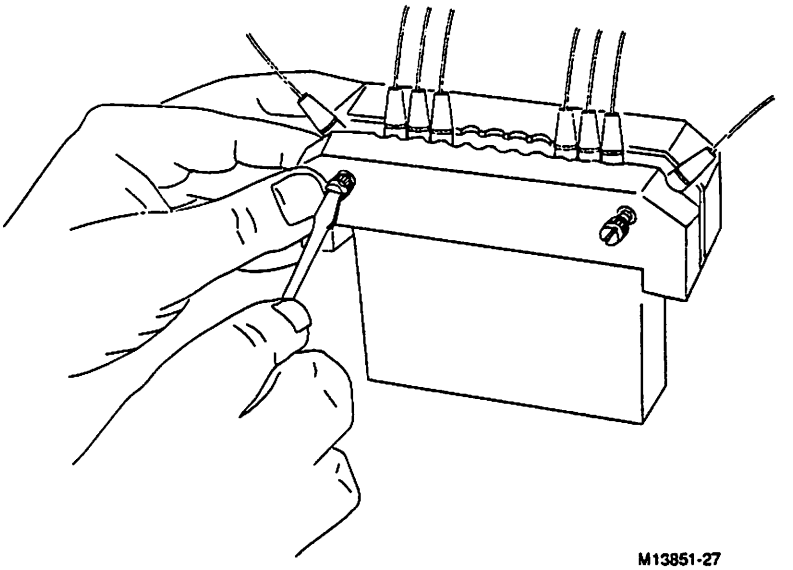
- ✓ if a low frequency noise lead error appears, check the specified electrode for a loose connection, and adjust the baseline roll filter using the **Cart Setup** menu if necessary; and

- ✓ if a high frequency noise lead error appears, check the specified electrode/leadwire.

Leadwire Replacement

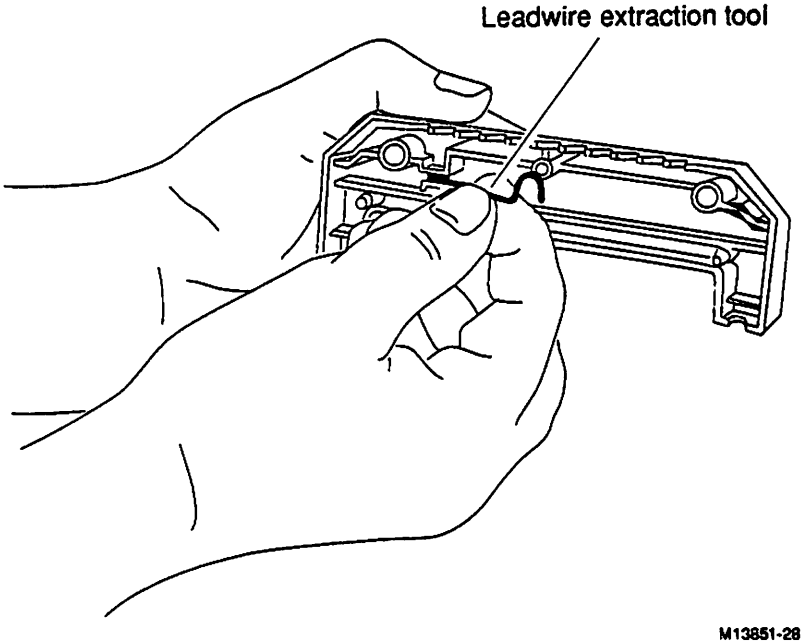
Occasionally it may become necessary to replace or change one or more of the leadwires attached to the acquisition module. In order to do this, follow the directions below:

① After disconnecting the acquisition module from the coiled cord that is attached at its base, use a screwdriver to loosen the two cover plate screws:



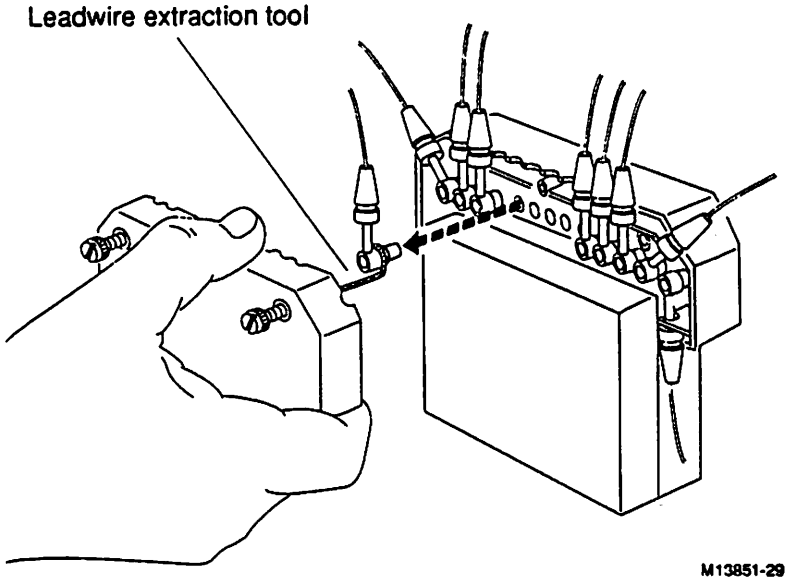
M13851-27

② After loosening the screws, remove the cover plate and gently pull out the leadwire extraction tool that is inside the cover plate:



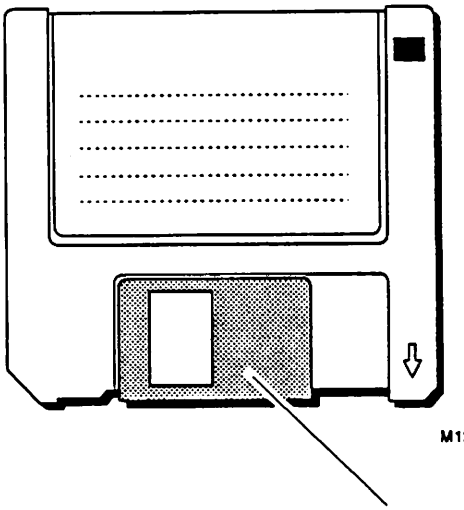
M13851-28

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.



Diskette Care

The 3.5-inch diskettes used in the cardiograph should be cared for according to the following guidelines:



- ✓ Do not attempt to move the protective cover nor take the diskette apart.
- ✓ Store diskettes in the container they came in, or purchase a container specifically designed to hold 3.5-inch diskettes.
- ✓ Do not attempt to clean the surface of a diskette, because cleaning fluid of any type can prevent the diskette drive from operating properly.
- ✓ Prevent the diskette from being exposed to dust, fingerprints, direct sunlight, and extreme heat or cold.
- ✓ Do not bend, drop, or twist a diskette.
- ✓ Do not use an eraser on a diskette label or near a diskette. Eraser dust can easily get beneath the protective cover.
- ✓ Keep diskettes away from all sources of magnetism, such as radio speakers, television sets, and motors.
- ✓ Do not place heavy objects on a diskette.
- ✓ Before moving the cardiograph, remove any diskette from the diskette drive.

Chapter 17
Maintenance

Chapter Summary

This chapter contains preventive maintenance instructions for the unit and should be followed closely to avoid unnecessary equipment failure and possible health hazard.

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

Visual Checks

Inspect all cords for fraying or other damage. Inspect all plugs and connectors for bent prongs or pins. Repair or replacement must be performed by qualified service personnel. Verify that all cords and connectors are securely seated.

Cleaning

Before starting, turn the unit off. The unit may be cleaned with a clean, soft cloth and a solution consisting of mild dishwashing detergent diluted in water. However, avoid coming into contact with open vents, plugs and jacks of any kind, the keyboard, and the writer. Thoroughly wipe the exterior of the unit and dry it with a clean, soft cloth or paper towel.

After each use, reusable electrodes should be wiped with a tissue or damp cloth to clean them of electrode paste. At the end of each day, reusable electrodes should be thoroughly washed with soap and water and dried. For suction electrodes, a toothbrush may be used to clean out the cups.

Periodic Maintenance

Periodic maintenance should only be performed by a qualified technician. *An ordinary equipment user should NOT attempt to perform any of the following.*

Every 3 months...

- Clean the thermal print head.

Every 6 months...

- Check the power supply voltage.
- Use the **Diag** function to check the writer.

Chapter 18
Supplies

Ordering Information

Telephone inquiries for supplies may be made at:
1-800-558-5102

Address an order or inquiry to:
Marquette Electronics, Inc
8000 West Tower Avenue
Milwaukee, WI 53223

Attn: Customer Service Department

Recording Paper

Recording Paper, Fanfold, 7.8-in/200-mm Grid (Case of 8)	9402-020
Recording Paper, Fanfold, A4 size (Case of 8)	9402-021
Recording Paper, Fanfold, 6-in/155-mm Grid (Case of 8)	9402-024
Recording Paper, Fanfold, Gridless (Case of 8)	9402-029

Electrolytes and Related Items

Signacreme, 148 ml/5 oz (Case of 12)	401210-001
Signacreme, 2 liter bottle (1 bottle/case)	401210-003
Dispenser Pump, Electro-Creme—for 1.9-l Bottle	9904-005
Bottle, Refillable, 118 ml/4 oz	9063-001
Electrode Gel, 251 ml/8.5 oz (Box of 12)	9812-014
Skin Preparation, Omni-Prep (Case of 12)	9812-010
Skin Preparation, Spraytrode (Case of 12)	9812-003
Skin Preparation, Prep-Trode (Case of 12)	9812-009
Analyzer, Skin Preparation	9612-001
Razor, Patient Preparation; Double Blade (Box of 100)	3704-901
Starter kit, Electrolyte	9063-901

Electrodes (Disposable)

Electrode, Pediatric (Case of 300)	9430-300
Electrode, Clear Tape, Pregelled with Snap, 5-pack (Case of 300)	9437-300
Electrode, Foam, Pregelled with Snap, 5-pack (Case of 300)	9408-300
Electrode, Foam, Radiolucent (Case of 300)	9408-401

Electrodes (Reusable) and Related Items

Electrode, Foam, Pregelled with Snap, 30-pack (Case of 300)	9408-004
Silver MACTRODE, 50-Pack, 10 Electrodes/Card (Case of 500) 400/case	✓9623-002
Silver MACTRODE, 100-Pack, 10 Electrodes/Card (Case of 1000)	9623-003
Silver MACTRODE, 100-Pack, 14 Electrodes/Card—for 14-Wire Acquisition Module Use with XYZ, Etc	9623-103
Electrode Set, Limb/Suction—Consists of 4 Limb Plate Electrodes and Straps Plus 10 Suction Electrode/Bulb Assemblies	9033-214
Electrode/Bulb, Suction	9033-015
Electrode, Suction	9033-014
Bulb, Suction	5608-003
Bulb, Suction—Fits Bowen Electrode and Others with 0.5-cm/3/16-in Post	9033-007
Electrode, Back	5621-001
Electrode, Limb	5623-202
Electrode/Boot, Clip-On (Set of 5)	9233-002
Electrode, Clip-On (Set of 5)	5880-004
Boot, Electrode (Set of 5)	5881-002
Adapter, Electrode, Banana-Plug-to-Electrode-Clip, 15 cm/6 in, Red	9459-101
Adapter, Electrode, Banana-Plug-to-Electrode-Clip, 15 cm/6 in, White	9459-102
Adapter, Electrode, Banana-Plug-to-Electrode-Clip, 15 cm/6 in, Black	9459-103
Adapter, Electrode, Banana-Plug-to-Electrode-Clip, 15 cm/6 in, Green	9459-104
Adapter, Electrode, Banana-Plug-to-Electrode-Clip, 15 cm/6 in, Brown	9459-105
Strap, Limb Electrode	9033-006
Strap, Upper Chest	56260-015
Strap, Lower Chest	56260-020
Strap, Limb	56261-010
Strap, Head	56261-024
Adapter Kit, Pediatric, 10-Leadwire	9301-010
Adapter Kit, Pediatric, 14-Leadwire	9301-014
Clip, Pediatric, Banana-Plug-to-Electrode-Clip (Set of 10)	9299-010
Clip, Pediatric, Banana-Plug-to-Electrode-Clip (Set of 14)	9299-014
Mount, Electrode, Adhesive (Box of 1000)	9235-001

Acquisition Modules

Acquisition Module-2 (AM-2)—without Leadwires	9488-014
Acquisition Module-2 (AM-2)—with 10 AHA Leadwires	9488-214
Acquisition Module-2 (AM-2)—with 10 IEC Leadwires and A1, A2, A3, and A4 Leadwires	9488-414
Acquisition Module-2 (AM-2)—with 10 IEC Leadwires	9488-614
Acquisition Module-3 (AM-3), High Resolution (Hi-Res)—with 14 AHA Leadwires	9488-217
Acquisition Module-3 (AM-3), Pacemaker (Pace)—with 14 AHA Leadwires	9488-218

Cables

Cable, Patient, Acquisition Module-to-cardiograph, 91.4 cm/3 ft	5516-001
Cable, Patient, Acquisition Module-to-cardiograph, 121.9 cm/4 ft	5516-005
Telephone Cord, Modular Plug, 427 cm/14 ft	80159-014

Leadwires

Leadwire Set, AHA, Banana Plugs, Nonresistive (Set of 10)	9488-901
RA Leadwire, White, 91 cm/36 in, AHA, Banana Plug, Nonresistive	9488-401
LA Leadwire, Black, 91 cm/36 in, AHA, Banana Plug, Nonresistive	9488-402
LL Leadwire, Red, 107 cm/42 in, AHA, Banana Plug, Nonresistive	9488-403
RL Leadwire, Green, 107 cm/42 in, AHA, Banana Plug, Nonresistive	9488-404
V1 Leadwire, Brown, 61 cm/24 in, AHA, Banana Plug, Nonresistive	9488-405
V2 Leadwire, Brown, 61 cm/24 in, AHA, Banana Plug, Nonresistive	9488-406
V3 Leadwire, Brown, 61 cm/24 in, AHA, Banana Plug, Nonresistive	9488-407
V4 Leadwire, Brown, 61 cm/24 in, AHA, Banana Plug, Nonresistive	9488-408
V5 Leadwire, Brown, 61 cm/24 in, AHA, Banana Plug, Nonresistive	9488-409
V6 Leadwire, Brown, 61 cm/24 in, AHA, Banana Plug, Nonresistive	9488-410
E Leadwire, Orange, 61 cm/24 in, AHA, Banana Plug, Nonresistive	9488-411
H Leadwire, Orange, 66 cm/26 in, AHA, Banana Plug, Nonresistive	9488-412

I Leadwire, Orange, 61 cm/24 in, AHA, Banana Plug, Nonresistive	9488-413
M Leadwire, Orange, 66 cm/26 in, AHA, Banana Plug, Nonresistive	9488-414
RA Leadwire, White, 107 cm/42 in, AHA, Banana Plug, Nonresistive	9488-415
LA Leadwire, Black, 107 cm/42 in, AHA, Banana Plug, Nonresistive	9488-416
LL Leadwire, Red, 132 cm/52 in, AHA, Banana Plug, Nonresistive	9488-417
RL Leadwire, Green, 132 cm/52 in, AHA, Banana Plug, Nonresistive	9488-418
V1 Leadwire, Brown, 91 cm/36 in, AHA, Banana Plug, Nonresistive	9488-419
V2 Leadwire, Brown, 91 cm/36 in, AHA, Banana Plug, Nonresistive	9488-420
V3 Leadwire, Brown, 91 cm/36 in, AHA, Banana Plug, Nonresistive	9488-421
V4 Leadwire, Brown, 91 cm/36 in, AHA, Banana Plug, Nonresistive	9488-422
V5 Leadwire, Brown, 91 cm/36 in, AHA, Banana Plug, Nonresistive	9488-423
V6 Leadwire, Brown, 91 cm/36 in, AHA, Banana Plug, Nonresistive	9488-424
E Leadwire, Orange, 91 cm/36 in, AHA, Banana Plug, Nonresistive	9488-425
H Leadwire, Orange, 107 cm/42 in, AHA, Banana Plug, Nonresistive	9488-426
I Leadwire, Orange, 91 cm/36 in, AHA, Banana Plug, Nonresistive	9488-427
M Leadwire, Orange, 107 cm/42 in, AHA, Banana Plug, Nonresistive	9488-428

Leadwire Set, IEC, Banana Plugs, Nonresistive (Set of 10)	9488-902
RA Leadwire, Red, 91 cm/36 in, IEC, Banana Plug, Nonresistive	9488-501
LA Leadwire, Yellow, 91 cm/36 in, IEC, Banana Plug, Nonresistive	9488-502
LL Leadwire, Green, 107 cm/42 in, IEC, Banana Plug, Nonresistive	9488-503
RL Leadwire, Black, 107 cm/42 in, IEC, Banana Plug, Nonresistive	9488-504
V1 Leadwire, White, 61 cm/24 in, IEC, Banana Plug, Nonresistive	9488-505
V2 Leadwire, White, 61 cm/24 in, IEC, Banana Plug, Nonresistive	9488-506
V3 Leadwire, White, 61 cm/24 in, IEC, Banana Plug, Nonresistive	9488-507
V4 Leadwire, White, 61 cm/24 in, IEC, Banana Plug, Nonresistive	9488-508
V5 Leadwire, White, 61 cm/24 in, IEC, Banana Plug, Nonresistive	9488-509
V6 Leadwire, White, 61 cm/24 in, IEC, Banana Plug, Nonresistive	9488-510
E Leadwire, Blue, 61 cm/24 in, IEC, Banana Plug, Nonresistive	9488-511
H Leadwire, Blue, 66 cm/26 in, IEC, Banana Plug, Nonresistive	9488-512
I Leadwire, Blue, 61 cm/24 in, IEC, Banana Plug, Nonresistive	9488-513
M Leadwire, Blue, 66 cm/26 in, IEC, Banana Plug, Nonresistive	9488-514
RA Leadwire, Red, 107 cm/42 in, IEC, Banana Plug, Nonresistive	9488-515
LA Leadwire, Yellow, 107 cm/42 in, IEC, Banana Plug, Nonresistive	9488-516
LL Leadwire, Green, 132 cm/52 in, IEC, Banana Plug, Nonresistive	9488-517
RL Leadwire, Black, 132 cm/52 in, IEC, Banana Plug, Nonresistive	9488-518
V1 Leadwire, White, 91 cm/36 in, IEC, Banana Plug, Nonresistive	9488-519
V2 Leadwire, White, 91 cm/36 in, IEC, Banana Plug, Nonresistive	9488-520
V3 Leadwire, White, 91 cm/36 in, IEC, Banana Plug, Nonresistive	9488-521
V4 Leadwire, White, 91 cm/36 in, IEC, Banana Plug, Nonresistive	9488-522
V5 Leadwire, White, 91 cm/36 in, IEC, Banana Plug, Nonresistive	9488-523
V6 Leadwire, White, 91 cm/36 in, IEC, Banana Plug, Nonresistive	9488-524

E Leadwire, Blue, 91 cm/36 in, IEC, Banana Plug, Nonresistive	9488-525
H Leadwire, Blue, 107 cm/42 in, IEC, Banana Plug, Nonresistive	9488-526
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H Leadwire, Blue, 66 cm/26 in, IEC, Banana Plug, Resistive	9566-512
I Leadwire, Blue, 61 cm/24 in, IEC, Banana Plug, Resistive	9566-513
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RL Leadwire, Black, 132 cm/52 in, IEC, Banana Plug, Resistive	9566-518
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V5 Leadwire, White, 91 cm/36 in, IEC, Banana Plug, Resistive	9566-523
V6 Leadwire, White, 91 cm/36 in, IEC, Banana Plug, Resistive	9566-524

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Leadwire Set, AHA, Banana Plugs, Nonresistive (Set of 14)	9488-910
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Chapter 19
Miscellaneous

Chapter Summary

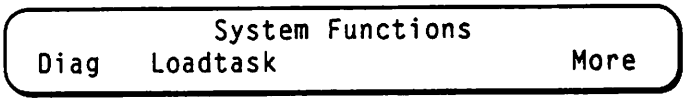
This chapter is divided into two sections:

- **The Diag and Loadtask Functions**, and
- **Marquette Sales Offices.**

The Diag and Loadtask Functions

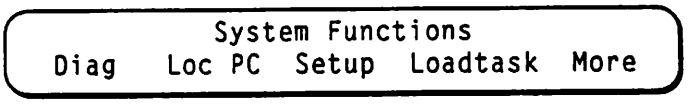
You may have noticed that there are two functions that have not been described in this manual so far—**Diag** (Diagnostic) and **Loadtask**. These two functions are both found in the **System Functions** menu:

This menu is used with software version 106.



OR

This menu is used with software version 006.



- **Diag** is intended for use by service technicians, not the ordinary equipment user. This function allows a technician to test various parts of the cardiograph, such as the writer.
- **Loadtask** allows the cardiograph to load and run other tasks. *However, this function is not currently enabled.*

Marquette Sales Offices

Domestic Regions

North Eastern	1275 Bloomfield Avenue, Suite 76, Building 9 Fairfield, NJ 07006 201-575-4051
Middle Atlantic	Babylon Office Center 405 Caredean Drive, Unit J Horsham, PA 19044 215-956-0660 800-262-4556
Southern	2500 Gateway Centre Blvd, Suite 650 Morrisville, NC 27560 919-481-2395 800-822-9950
East Central	1231 Brookwood Place Columbus, OH 43209 614-235-1400 800-531-0829 (in Ohio) 800-848-6242 (except Ohio)
North Central	165 North Arlington Heights Road, Suite 180 Buffalo Grove, IL 60089 312-520-2390 800-255-7150 (in Illinois) 800-558-3408 (except Illinois)
Southwest	12500 Network Blvd, Suite 205 San Antonio, TX 78249 512-691-2651 800-441-9268 (in Texas) 800-225-9017 (except Texas)
West Central	12649 East Caley Avenue, Suite 116 Englewood, CO 80111 303-799-4441 800-872-8994 (except Colorado)
Western	1060-G North Batavia Street Orange, CA 92667 714-771-5741 714-771-5740 (supplies only) 800-821-1632 (in California) 800-762-0606 (except California)

International Regions

Canada	c/o Ingram & Bell, Ltd 20 Bond Avenue Don Mills, Ontario M3B 1L9 416-444-7381
Europe, North Africa	11 Avenue Delcassé 75008 Paris, France 33-1-40.74.08.46
Asia, Pacific	1009-1010, Tau Yau Building 181 Johnston Road Wanchai, Hong Kong 852-5-8381398
Middle East, South America, Africa	4015 Kipling Avenue South Edina, MN 55416 612-926-0479

Chapter 20
Glossary and Index

Chapter Summary

This chapter is divided into two sections:

- **Glossary,** and
- **Index**

Glossary

1 complex/lead—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—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.

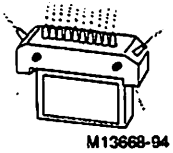
2 x 5—a type of report format that consists of 5 seconds for each of 12 leads. The "2 x 5" means that the 12 leads are divided into 2 groups of 6 leads with 5 seconds of data for each group.

2 x 10—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 6 leads with 10 seconds of data for each lead.

4 x 2.5—a type of report format that consists of 2.5 seconds for each of 12 leads. Also, 1 or 3 rhythm channels may be included on the report. 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.

4 x 10—a type of report format that consists of 10 seconds for each of 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.

12 leads of rhythm—a type of report format that consists of 10 seconds of 12-lead rhythm.


M13668-94

acquisition module—the interface or "link" between a patient and the cardiograph. There are 10-wire (12-lead) and 14-wire (16-lead) acquisition modules. (A 14-wire module is shown to the left.)

acronym—short abbreviations are used to represent statements in Marquette's 12SL analysis program library, such as NSR for Normal Sinus Rhythm.

BACKUP key—a key on the cardiograph keyboard. Pressing this key causes the prior LCD display, if any, to appear.

Computer Graphic Record (CGR)—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 at half writer speed.

channel—a term used to describe a lead's position on a writer report. (Refer to Chapter 13, "Report Formats.")

confirmed report—a report that has been edited. To change an unconfirmed report to a confirmed report, select the **OK** function when editing a report. (Refer to Chapter 6, "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.

CURSOR LEFT and **CURSOR RIGHT** keys—keys on the cardiograph keyboard. If the LCD display cursor is displayed, then pressing one of these keys causes the cursor to move left or right. No characters are erased.

DELETE key—a key on the keyboard. If the LCD display cursor is displayed, then pressing this key erases the last-typed character.

directory—a list of all the files on a diskette.

diskette—a 3.5-inch, double-sided, double-density (DS DD) diskette.

OR

ENTER keys—two keys on the cardiograph keyboard, each performing the same function. After typing information after an LCD display prompt or pressing a function key, it is usually necessary to press one of these keys to continue.

formatting—is necessary to prepare a diskette for first-time use. 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.

Hi-Res (High Resolution)—an option that uses a specialized acquisition module and software to acquire an orthogonal ECG and compute an average cardiac complex. The complex is used for analysis of late potentials, bundle of His activity, and detection of coronary artery disease using the complex's high-frequency content.

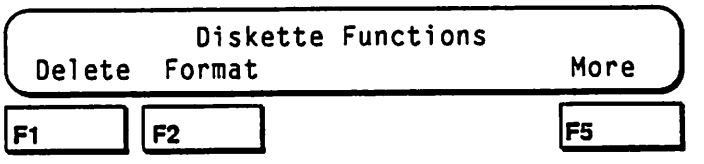
F1
F2
F3
F4
F5

function keys—are used to select an LCD display function that is directly above the function key. For example, in the following LCD display,

pressing the F1 key selects the **Delete** function,

pressing the F2 key selects the **Format** function, and

pressing the F5 key selects **More** which allows you to review additional menu functions.

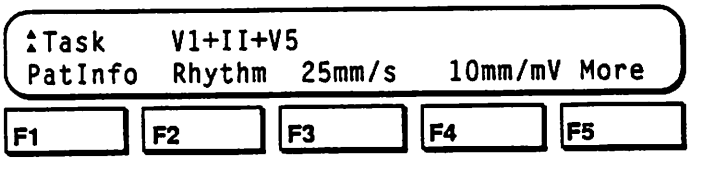


LCD display—stands for Liquid Crystal Display. The LCD display is on the top part of the keyboard and is used for displaying messages and prompts.

Level 1 or **Level 2** password—are two different types of passwords that may be used to restrict access to various menus or functions of the cardiograph. For example, if either a Level 1 or Level 2 password exists, then a password must be entered before a diskette can be formatted. The default Level 1 and Level 2 passwords are "L1" and "L2." the following chart shows what functions are password protected:

Level 1 Password	Level 2 Password
Setup	—
Edit	**Edit**
Format	**Format**

Main Menu—is the "standard" or most common LCD display you will see. This menu allows access to all cardiograph 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 the 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 the J point.
TA	T wave amplitude
TPA	T' amplitude

modem—an optional device that can be purchased with the cardiograph that allows you to receive and transmit reports by telephone.

Pediatric report format—a type of report format on the cardiograph 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.

RECORD ECG key—a key located on the keyboard. Pressing this key acquires a ECG from a patient and prints a 3-, 6-, 12-, and/or 15-lead report depending on cart setup.

RECORD RHYTHM key—a key located on the keyboard. Prints either a 3-, 6-, or 12-lead rhythm report depending on cart setup.

reverse transmission—a mode of operation that allows the cardiograph to receive reports either using a telephone line or an interconnecting cable.

Rhythm and Morphology (RMR)—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—a key located on thekeyboard. Used to type shifted characters or to access special functions.

SPACE key—a key located on the keyboard. If an LCD display prompt is displayed, pressing this key creates a space.

STOP key—a key located on the keyboard. In most cases pressing this key returns the LCD display to the *Main Menu* and stops the printing of a report.

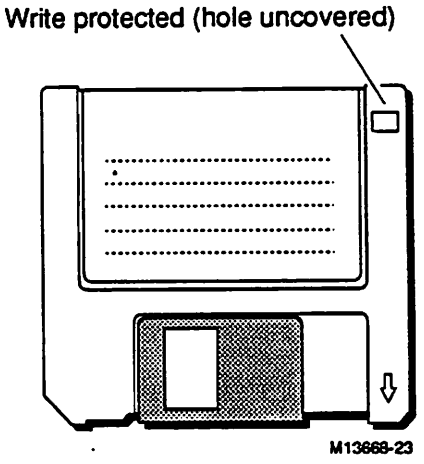
terminal duration—the amount of time (in ms) over which the RMS and mean voltage are computed in the vector magnitude of the signal average Hi-Res ECG.

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. (Refer to "Chapter 6 – Editing ECG Reports.")

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 (as shown below):

• Front of Diskette •



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