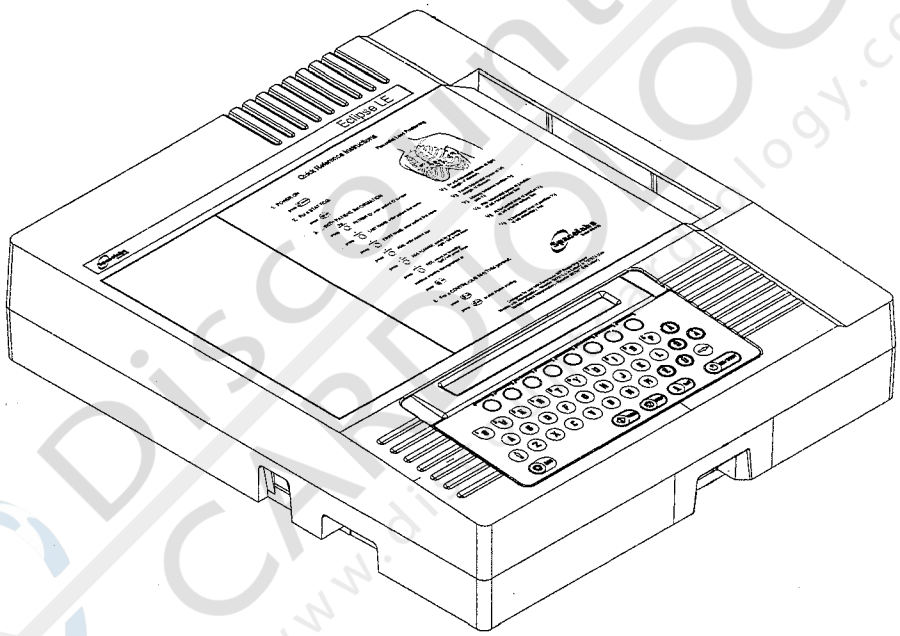
Operating Instructions



Eclipse™ LE/LE II (Model 92304) Electrocardiograph

Operating Instructions Part No. 086646
Revision 0602

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Burdick, Inc.
500 Burdick Parkway
Deerfield, Wisconsin 53531 U.S.A.
(800) 777-1777 (608) 764-1919

Authorized EC Representative
Medical Device Safety Service, GmbH
Burckhardtstr. 1
D-30163 Hannover
GERMANY

Contact: Ludger Moeller
E-mail: lmoeller@mdss.com
Telephone: +49 511 62628630
Fax: +49 511 62628633

ADDENDUM

Eclipse™ LE/LEII (Model 92304) Electrocardiograph

DIRECTORY FULL

The Eclipse LE/LEII (Model 92304) electrocardiograph has storage for one (1) ECG. After the Eclipse acquires an ECG, the Eclipse automatically saves and prints the ECG. If the Eclipse fails to print the ECG (for example, if the unit is out of paper), then the message DIRECTORY FULL will appear. The Eclipse will retain the ECG in memory until the ECG is printed. Although you can continue to acquire ECGs, this message will appear each time you acquire a new ECG.

In order to clear this message you must print the ECG that is saved in the directory. To print the record, press Edit from the INITIAL menu, then press Print from the EDIT menu.

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070-0913-00 Rev. B

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ADDENDUM
Pacer Detection Suspension

Eclipse LE/LEII (92304)

Unlike ECG signals, pacer signals are sharp and narrow impulses. External interference spikes sometimes mimic the shape of pacer impulses. Although this is a rare occurrence, it can obstruct accurate pacer detection.

When interference occurs, it causes an over-detection of possible pacer events, and could result in interpretation errors. Pacer detection suspension is designed to prevent possible interpretation errors due to interference.

> **NOTE:** If spikes appear while pacer detection is suspended, refer to the Operating Instructions for information on eliminating electrical interference. Once you have eliminated the source of the interference, proceed with ECG acquisition.

Pacer Detection Suspension

If any of the following appear on the printout or the screen, then pacemaker detection has been suspended due to excessive noise:

- ✔ **PS** (for Pacer Suspended). This small marking appears in the lower right corner of the printout.
- ✔ **Pacer detection suspended due to external noise - REVIEW ADVISED**. This statement appears as the top line of the interpretation on the printout. If this statement has been printed then one of the following situations also exists: IMPLANTED PACER was entered for the class field in the Patient Demographics; or the Eclipse detected valid pacer activity and did not suspend pacer detection for the entire 10 seconds.
- ✔ **NOISE—PACER DETECTION SUSPENDED**. This message is displayed in the electrode status area, near the bottom of the screen.

> **NOTE:** This message does not appear in full on the Eclipse LE/LEII screen (92304).

If the patient has a pacemaker, pacer enhancement markings (in the waveforms) will not appear during pacer detection suspension.

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Quick Reference Instructions

CONNECT PATIENT

Refer to lead placement chart

POWER ON...

Press (ON/STBY) *Wait for initial menu and confirm*

"SENSORS OK" message, If no response or "LB" appears, plug power cord into AC outlet.

FOR A STAT ECG...

Press (ECG)

ECG W/PATIENT INFORMATION...

Press (Pat) *Type patient's ID#*

Press *Type patient's LAST NAME*

Press *Type patient's FIRST NAME*

Press *Type patient's AGE*

Press *Select AGE FORMAT by pressing right / left arrow keys*

Press *Select SEX by pressing right/left arrow keys*

Enter remaining patient information

Press *Verify "SENSORS OK"*

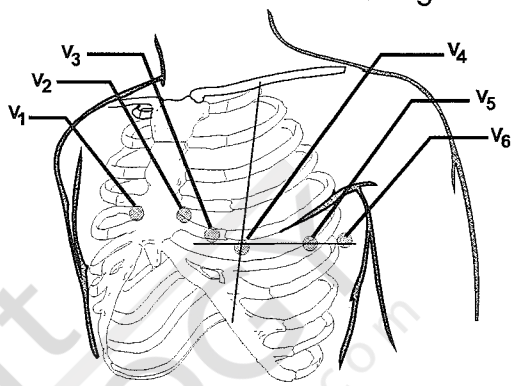
Press (ECG)

FOR A CONTINUOUS RHYTHM PRINTOUT...

Press (MAN)

Press (STOP) *To stop rhythm printing*

Precordial Lead Positioning



V_1 Fourth intercostal space at right margin of sternum

V_2 Fourth intercostal space at left margin of sternum

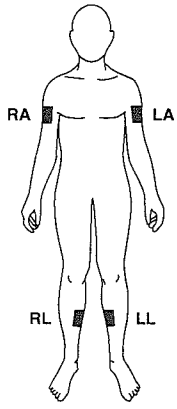
V_4 Fifth intercostal space at junction of left midclavicular line

V_3 Midway between position V_2 and position V_4

V_5 At horizontal level of position V_4 at left anterior axillary line

V_6 At horizontal level of position V_4 at left midaxillary line

LIMB LEAD PLACEMENT



Spacelabs medical

Designed for use with Assurance 50® recording paper
Reorder 007976 (US Letter) or 007974 (A4)

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Intended Use

Under the supervision of a qualified physician trained in the subject of ECG interpretation the Eclipse™ electrocardiograph can be used to record the electrical activity of the heart for the purpose of correlating the resultant waveforms with the health of the heart muscle tissue structures.

This equipment produces a 12 lead electrocardiogram which can be used as a first step for assessment of patients with cardiac arrythmias, intraventricular conduction block, pre-excitation syndrome and ischemic heart disease. Records stored and used during the life of the patient can assist physicians in the diagnosis and natural history of heart related illnesses (such as coronary artery disease).

With appropriate support equipment this product can also be used in the evaluation of exercise induced ischemia of the heart typically referred to as an exercise stress test. The resultant electrical activity of the heart can be recorded as a 12 lead and further analyzed for ischemic episodes.

This equipment is not designed to produce a definitive interpretation nor exhaustive evaluation of the patient's heart but rather provide an effective beginning for evaluation of patients with heart abnormalities.

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Warnings, Cautions & Notices

Warnings

WARNING: This device is NOT intended for unattended or continuous patient monitoring. It is intended for short-term ECG waveform acquisition. There are no audible or visible alarms.

WARNING: Never remove the battery pack and attempt to recharge it using an external battery charger. Fire or explosion may result.

WARNING: Explosion hazard. Do NOT use in the presence of flammable anesthetics.

WARNING: Electrical shock hazard. Do NOT contact unit or patient during defibrillation. Otherwise, serious injury or death could result.

WARNING: NEVER position defibrillator paddles very close to or over ECG sensors. Remove all chest sensors (V-Leads/C-Leads) from a patient before defibrillation to allow proper paddle placement. Severe burns may result from improper placement of defibrillator paddles. Before using any defibrillator, consult the operating instructions for that equipment.

WARNING: Electrical shock hazard. Operate the unit from its battery supply if the integrity of the protective earth conductor is in doubt. Otherwise, serious injury or death could result.

WARNING: Hazardous voltage. To reduce the risk of electrical shock, do not attempt to remove the cover under any circumstances. Refer servicing to a qualified technician.

WARNING: If safety procedures not performed, increased risk to patient and device can occur.

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Cautions

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

CAUTION: The unit must be operated only at the line voltage and frequency specified on the rating plate.

CAUTION: Although the Eclipse is designed to meet IEC 601-1-2 EMC immunity requirements, the presence of strong EMI fields generated by electronic, surgical or diathermy instruments in close proximity to the unit may cause trace noise or input overload conditions.

CAUTION: Fire and explosion hazard. Use only approved battery packs. Replace the Eclipse battery pack with the battery specified on the label inside the battery compartment. Dispose of used batteries according to the manufacturer's instructions.

Notices

NOTICE: Do not place used battery pack in your regular trash. The incineration, landfilling, or mixing of NiCad batteries with municipal waste is PROHIBITED BY LAW in most areas. Return this battery pack to a government-approved battery recycler. Contact your local waste management officials for more information.

NOTICE: Computer assisted interpretation is a valuable tool when used properly. However, no automated interpretation is completely reliable and interpretations should be reviewed by a qualified physician before treatment, or non-treatment, of any patient.

NOTICE: Because the Eclipse offers different lead configurations, always ensure that the appropriate lead placement is employed for the lead configuration selected.

NOTICE: Damage caused by using unapproved recording paper may void your warranty.Your Eclipse Electrocardiograph is intended for use with approved ECG supplies; its reliability and performance are directly affected by the supplies you use.

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Definitions of Symbols Used


Attention. Consult accompanying documents.


Danger! High voltage.


Hazardous voltage.


Defibrillation-Protected Type CF Equipment.


Equipotentiality (used to label the grounding lug).


Alternating Current (AC).


Automatic Operation.


Input/Output Connection.


Manual Operation.


On/Standby.


Stop Function.

Serial port.


Heart Rate


Complies with the EMC/Radiocommunications requirements set out by the Australian Communication Authority under Radiocommunications Act, 1992.

Meets or exceeds Council Directive 93/42/EEC, MDD, Class IIa.

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Chapter 1 General Information

Congratulations on your purchase of a top quality Eclipse ECG.

By listening to our customers, we have designed the Eclipse to suit your specific needs, incorporating features that people like yourself have requested.

Your business is important to us. If you would like more information or if you have any questions, contact your local representative or call Customer Service at **(800) 284-4362** or **(608) 764-1919**.

> ***CAUTION:*** ***U.S. federal law restricts this device to sale by or on the order of a physician.***

Inspection Upon Delivery

Your new Eclipse was carefully inspected before shipment. Please inspect your unit upon delivery for any damage which may have occurred in transit. If you notice any damage, please contact your shipping agent.

If items are missing, contact your local representative or Spacelabs Burdick Technical Support Department at (800) 522-7025, (425) 882-3700 or (608)764-1919.

> **NOTE:** Your Eclipse electrocardiograph is intended for use with approved ECG supplies; its reliability and performance are directly affected by the supplies you use.

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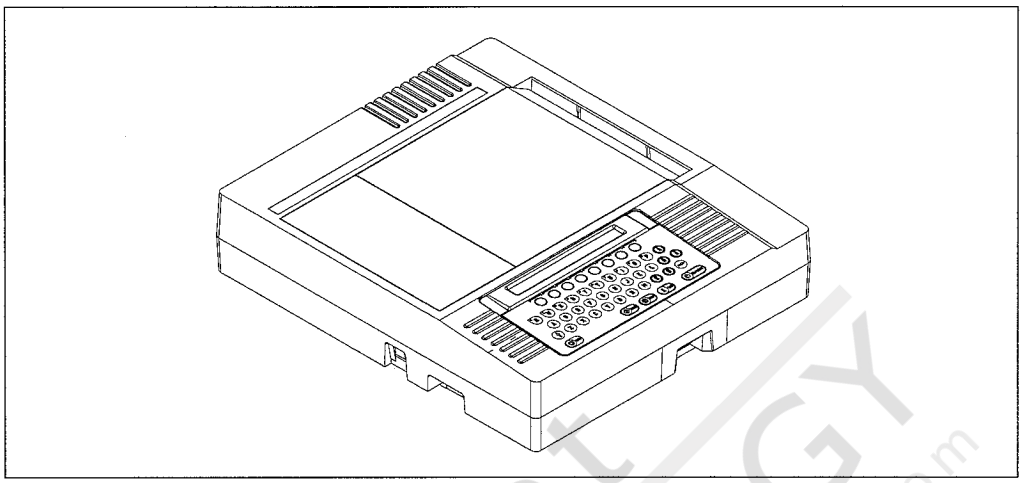
General Description

Figure 1-1
Eclipse LE/LE II



- Portable; may be operated from battery or AC line power.
- Features a 2x40 character LCD.
- Prints using a thermal printer and thermosensitive, Z-fold paper.
- Operates in manual and automatic modes.
- Records in either standard or Cabrera lead formats.
- Stores and, with interpretive models, analyzes waveforms acquired in automatic mode.
- Prints at least 200 pages at 25 mm/s recording speed when the internal battery is fully charged.
- Continuously recharges the battery whenever the unit is connected to AC line power.
- Features selectable patient demographic fields that you may use to suit your needs.

Interpretive Analysis Program

About the program

The Eclipse is available with an interpretive analysis program. This program is widely respected as one of the most accurate available today. It was developed by Prof. Peter MacFarlane of the Glasgow Royal Infirmary who has been involved in computerized ECG interpretation since its inception in the 1960s.

The ECG Interpretation Criteria Physician's Guide outlines the criteria used by the analysis program.

Features of the interpretive analysis program

- DEVELOPED IN A HOSPITAL ENVIRONMENT
  The interpretive program was developed in the University Department of Medical Cardiology in the Glasgow Royal Infirmary. Unlike many products which are developed with the aid of outside consultants, this program was developed in the environment for which it is intended.
- USES AGE, SEX AND RACE DATA EXTENSIVELY
  More than 500 measurements, plus the patient's age, sex, clinical classification and medications are factored into each analysis. Several criteria for abnormalities are age, race and sex dependent.
- PRODUCES CLEAR REASON STATEMENTS
  Reasons appending abnormalities are given in conversational language. For example, wording like, "High voltages in limb leads," is used rather than, "R in I > 1.4 mV."
- USES CLINICAL HISTORY
  The program is the first to use clinical class as an integral part of analysis just as a physician would consider clinical class in his or her evaluation.
- UNDER CONTINUOUS DEVELOPMENT & ENHANCEMENT
  The program has been clinically tested against more than 80,000 ECGs and is continuously under development.
- ACCURATELY DETECTS NORMAL ECGs
  Normal ECGs are easily identified and sorted so the physician may quickly verify results.

Safety Features

WARNING: Electrical shock hazard. Do NOT contact unit or patient during defibrillation. Otherwise, serious injury or death could result.

WARNING: NEVER position defibrillator paddles very close to or over ECG sensors. Remove all chest sensors (V-Leads/ C-Leads) from a patient before defibrillation to allow proper paddle placement. Severe burns may result from improper placement of defibrillator paddles. Before using any defibrillator, consult the operating instructions for that equipment.

Includes a 3-conductor, hospital-grade power cable. Includes an electrically isolated, DB-15 style patient cable. This conforms to IEC safety, pinout and mechanical requirements.

CE 0123

This symbol which appears on the rear panel of some units, indicates this equipment meets the requirements of Council Directive 93/42/EEC, MDD, Class IIa.

This symbol next to the patient cable connector indicates this equipment is classified as defibrillation-protected, Type CF equipment. The patient cable and input circuits are designed to prevent damage to the recorder if the unit is connected to a patient during defibrillation.

Using Multiple Electrical Apparatus

Use caution when monitoring patients who must be protected from very small electrical currents. Susceptible patients include patients with cardiac catheters or pacemakers. Consult a qualified technician before using multiple electrical apparatus in this patient environment.

The Eclipse patient leads are electrically isolated from ground and the device meets the most stringent IEC and ANSI/AAMI medical standards for leakage currents.

However, a potential hazard may occur if the enclosure leakage currents from multiple pieces of equipment combine and are inadvertently routed directly to a patient's heart via a catheter or pacemaker lead. Only equipment which is certified to IEC and ANSI/AAMI medical standards should be used in this environment. Use of certified equipment does not, however, completely eliminate this possible hazard.

Another potential hazard may occur if two devices near a patient are powered from different circuits. If the grounds of the two circuits are at different potentials, which can occur under certain fault conditions, then a ground loop can exist between the enclosures of the two devices. If devices must be powered from separate circuits in the vicinity of a susceptible patient, then the grounding lugs on the devices should be electrically connected via an equipotential cable.

Chapter 2 *Equipment Setup*

Equipment Connections

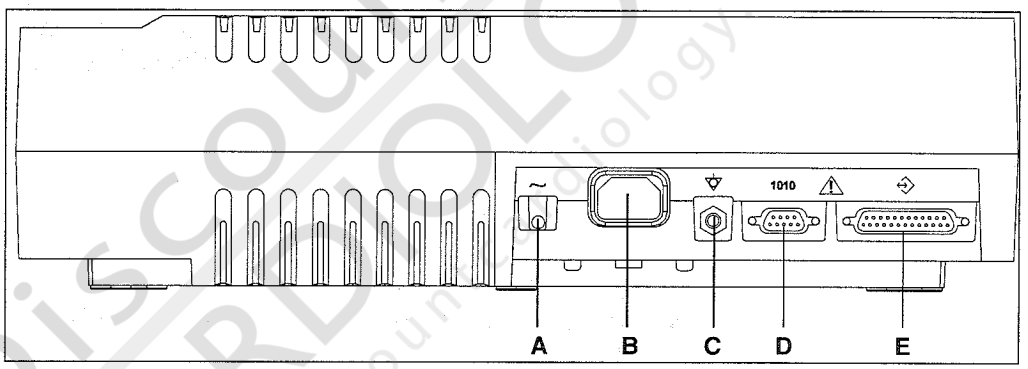
Connecting power cord and peripheral equipment

⚠ *CAUTION: The unit must be operated only at the line voltage and frequency specified on the rating plate.*

Connect AC line power and external equipment via the connectors on the back panel (see Figure 2-2).

For patient safety, all equipment in patient environment should be IEC 601-1 approved. All connected equipment should be IEC 950 approved or equivalent. Consult a qualified technician to verify equipment compatibility.

Figure 2-2
Back Panel



~ **(A) POWER INDICATOR**

Verify that the unit is receiving AC line power when this green light is on.

(B) AC POWER

Use the supplied power cord to connect the unit to AC line power here.

There is no switch to disconnect AC line power. To do this you must unplug the unit. The battery is automatically charged whenever the unit is connected to AC line power.

(C) EQUIPOTENTIAL GROUNDING

Connect peripheral equipment directly to the Eclipse protective earth ground via this jack. This is necessary only if peripheral equipment requires equipotential grounding.

1010 **(D) SERIAL PORT (NOT USED)**

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(E) ANALOG OUTPUT/STRESS INTERFACE

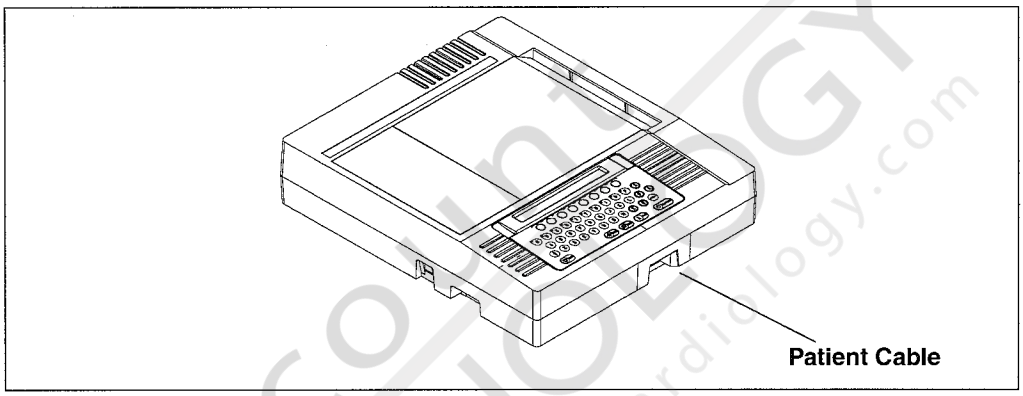
Use an approved monitor cable to connect a monitor via this **DB 25 connector.**

NOTE: For information on approved monitor cables, contact Spacelabs Burdick Technical Support Department at (800) 522-7025, (425) 882-3700 or (608)764-1919.

Connecting the Patient Cable

Connect the Patient Cable via connectors on the front of the unit (see Figure 2-3).

Figure 2-3
Patient Cable Connector



Make sure the connector on the cable is arrow-side-up then firmly push the connector until the arrow point is aligned with the edge of the Eclipse.

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Equipment Setup

Grounding

⚠ *WARNING: Electrical shock hazard. Operate the unit from its battery supply if the integrity of the protective earth conductor is in doubt. Otherwise, serious injury or death could result.*

⚠ *CAUTION: The unit must be operated only at the line voltage and frequency specified on the rating plate.*

Maximum patient and operator safety is ensured only when the Eclipse is properly grounded. To do this, connect the power cable to the AC Power connector (see Figure 2-2 on pg. 2-1) and connect the other end to a properly grounded, AC line outlet.

Using the Battery

WHEN TO CHARGE THE BATTERY

When battery power is being used, the letter "b" is displayed in the INITIAL menu. When the unit is connected to AC line power, "ac" is displayed in the INITIAL menu.

The message, "LOW BATTERY" flashes when fewer than 15 minutes of operating time remain. The unit will also "beep" every 30 seconds to remind you. If the charge level drops too low, the unit displays the message, "POWERING DOWN." Then, after 5 seconds, the unit shuts off. Connect the unit to AC line voltage at this point to operate the unit and recharge the battery.

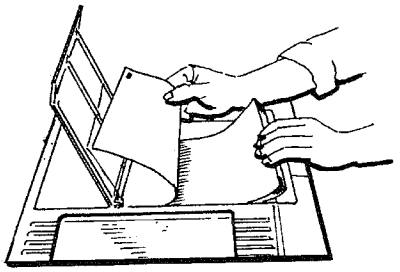
NOTE: Under extreme conditions, the unit may not have enough battery power to power up. If the unit beeps 3 times or displays the message, "Battery Low-Please Charge" when powering up, then plug the unit into AC line power and recharge the battery for 5 hours.

Quick Reference-Loading Recording Paper

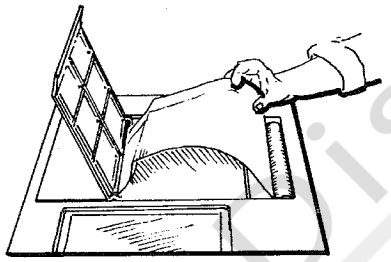
NOTE: Damage caused by using unapproved recording paper may void your warranty.

Use only approved, thermally responsive ECG paper. The following ECG papers are recommended:

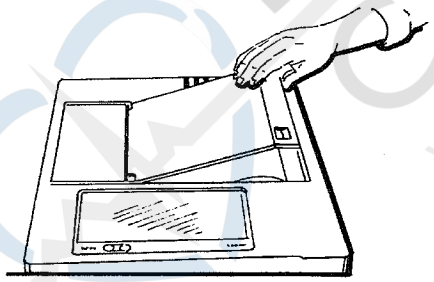
- Assurance 50™. Permanent trace, Z-fold. Thermal image integrity guaranteed for 50 years.
- Standard trace, Z-fold. Thermal image integrity guaranteed for 5 years when stored in accordance with manufacturer's specifications.



1. Lift the paper compartment cover on the top of the housing.



2. Remove the new paper from its package and place the new stack of paper into the compartment as shown. Make sure the queue hole is toward the top of the unit.



3. Lift the top sheet and feed it into the slot in front of the print roller.

4. Close the compartment cover.

To advance the paper to the start of the next sheet, ready for use, proceed as follows:

1. Make sure the unit is plugged in to a functional AC outlet (unless battery is installed.) Press the ON/STANDBY key on the front panel. The INITIAL menu will be displayed.
2. Press the PAGE soft function key on the INITIAL menu. Press the LOAD soft function key on the PAGE menu. The paper will advance to the start of the next sheet and stop.

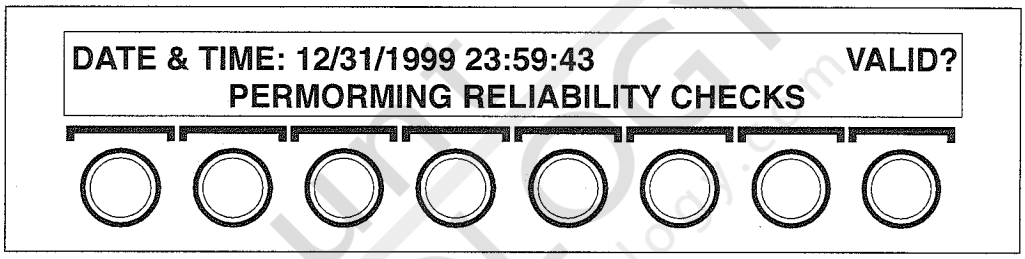
You can feed the paper forward or backward in small increments, if necessary. In the PAGE menu, press the FORWARD soft function key to advance the paper forward. Press the REVERSE soft function key to reverse feed the paper.

Turning the Unit On and Off

Press the On/Standby key to turn the Eclipse on. The unit performs self-tests and displays the following (see Figure 2-4):

- Current date and time
- A message prompting you to check date and time accuracy
- Any error detected during the self-tests

Figure 2-4
The Power Up Screen



After completing self-tests, the unit displays the INITIAL menu.

Standby Mode

NOTE: The Eclipse will automatically power down to Standby mode after 15 minutes of inactivity.

To power down to Standby mode at any time during operation, press the On/Standby key (there is no switch to disconnect power).

The unit is not operational in Standby mode; however, the internal battery charges in Standby mode if connected to AC power.

The Auto Power Down feature may be temporarily turned off by putting the unit in Battery Exercise Mode.

Power Indicator

This green light on the back of the unit (see Figure 2-2 on pg. 2-1) is on whenever the unit is receiving AC line power.

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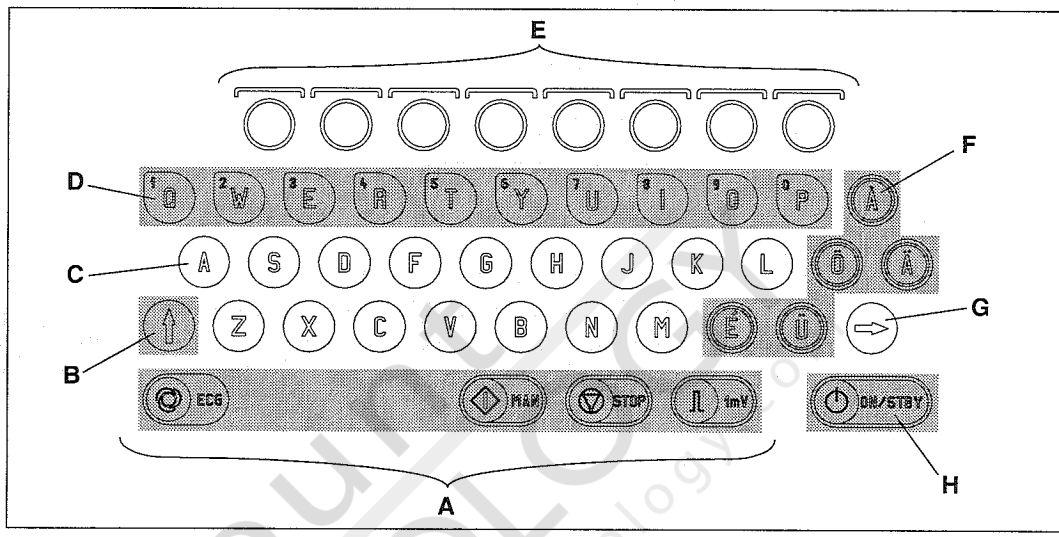
Chapter 3 *Keyboard and Displays*

Understanding the Keyboard

Figure 3-1
The Keyboard and Key Types



(A) FUNCTION

Provide 1-key printing operations.

The "ECG" key acquires and prints a 12-lead Auto ECG. This is a series of reports using pre-programmed lead sequences and settings.

The "MAN" key acquires a Manual Rhythm report. This is a continuous rhythm strip of the leads currently selected in the MANUAL menu.

The "STOP" key halts any of the above functions. Also returns the display to the PREVIOUS menu without saving changes from most other menus.

The "1mV" key produces a 1 mV Calibration Pulse on the manual rhythm reports.

(B) SHIFT

Provides access to the numeric keys.

(C) ALPHABETIC

Provide letters when entering data.

If the "P" key is pressed while the INITIAL screen is displayed, the paper will advance to the beginning of the next sheet.

(D) NUMERIC CONTROL

When entering data, these keys - along with the shift key - are used to enter numbers.

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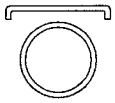

(E) MENU CONTROL

When entering data, these soft function keys are used to select menu options.

(F) SPECIAL CHARACTERS

Provide letters when entering data. They provide the following characters: Å, Ü, Ö, Ä and É.

(G) SPACE

Inserts a space.

(H) ON/STANDBY

Turns the unit on and returns the unit to standby mode.

May also be used if the Eclipse "freezes." If the unit is unresponsive to key strokes and the LCD display is not changing, press and hold the On/Standby key for at least 5 seconds then release. The unit shuts off. To continue with normal operation, press the On/Standby key again and the unit will turn on.

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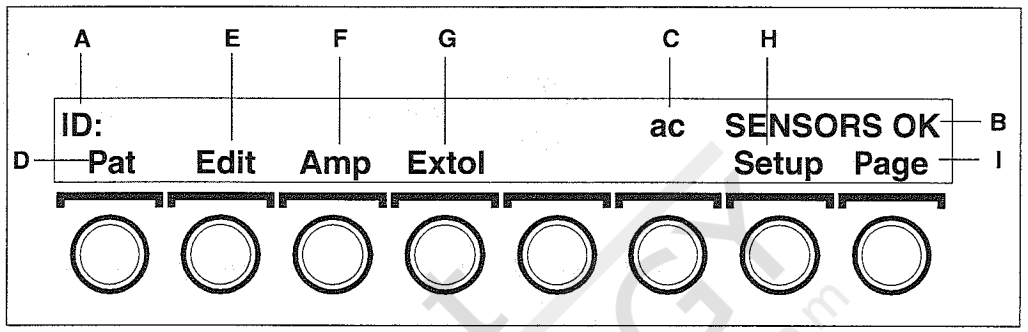
Understanding the Displays

The INITIAL Menu

After the Eclipse has been turned on and performs self-tests, the INITIAL menu is displayed (see Figure 3-2). Its features are described below.

Figure 3-2
The Initial Menu



(A) PATIENT ID

Identification number of the current patient.

(B) SENSOR STATUS

Indicates signal quality. If all sensors are producing good signals, the display reads:

SENSORS OK

If one or more sensors produce a poor signal, the problem is indicated by one of the following messages:

FAIL
DRIFT
NOISE

The message is followed by the label for the affected sensor.

> **NOTE:** To ensure accurate sensor status indication, the RL electrode must be connected. Refer to "Troubleshooting" on pg. 9-1 for information on correcting signal problems.

(C) POWER STATUS

Indicates power source and status.

ac	(connected to an outlet.)
lb	(low battery)
b	(battery operation)

(D) PATIENT DEMOGRAPHICS

Enter new patient demographic data.

(E) EDIT PATIENT DEMOGRAPHICS

Modify patient demographic data for a previously collected patient record.

(F) AMP

Temporary adjustment of Speed, Gain and Artifact Filter settings. To permanently modify these settings, see"Configuring the POWER-UP DEFAULTS menu" on pg. 4-5.

(G) EXTOL

Enter the exercise stress mode on the unit.

> **NOTE:** This option will not be displayed in the Initial menu if the unit has not previously been set up to communicate with EXTOL.

(H) SETUP

Allow access to the Setup menu (see Chapter 4, "Program Setup").

(I) PAGE

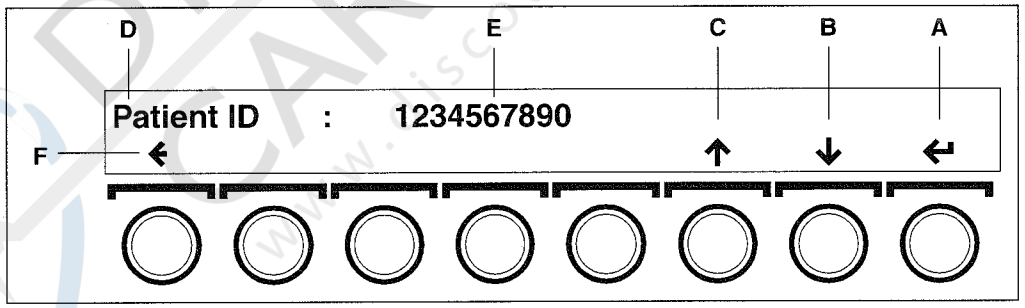
Allow access to the Page menu (see "Paper Advance" on pg. 6-3).

A sample menu—the EDIT menu

Most of the Eclipse displays are menus. For example, the PATIENT menu is used to enter patient demographics.

To go to the PATIENT menu, press the menu control key under PAT in the INITIAL menu. The PATIENT menu will be displayed (see Figure 3-3). Following is a description of basic menu features.

Figure 3-3
The PATIENT Menu



(A) RETURN TO PREVIOUS MENU

(B) NEXT MENU

(C) PREVIOUS MENU

(D) MENU PROMPT

(E) CURRENT ENTRY/SELECTION

(F) BACKSPACE

Using Menus

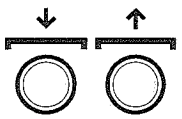


Figure 3-4
Arrow Soft Function Keys

The up and down arrow keys are used to scroll between menus and options. Arrow soft function keys always appear in the same place on the LCD and always have the same function assigned to them. The arrow soft function keys do not appear on the LCD when they are not available.

→	**Right Arrow**
←	**Left Arrow**
↓	**Down Arrow**
↑	**Up Arrow**
↵	**Return Arrow**

Menus are composed of fields. There are three kinds of fields:

1. Alphanumeric
2. Numeric
3. List

ALPHANUMERIC FIELDS

When active, alphanumeric fields may be filled by typing alphabetic or numeric keys. You may also type spaces, punctuation, and non-English characters.

NOTE: To enter numbers in alphanumeric fields, press the number and the shift key simultaneously.

Press the up or down arrow key after filling fields to accept data and move to the next or previous field.

NUMERIC FIELDS

When active, numeric fields may be filled by typing numeric keys only. The Eclipse will produce a "beep" sound if you try to type letters or other inappropriate data into a numeric field.

Press the up or down arrow key after filling fields to accept data and move to the next or previous field.

DEFAULTS

Every field has a default setting.

For example, if you skip the ***Age Format** field it will be filled in with "YEARS." Unless you make another choice, the Eclipse always uses defaults. Most often, fields are left blank.

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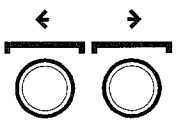
Lists and System Notes

LISTS



Lists give you all the choices for a particular field. For example, scroll to **Medication 1**. The field is filled with the current choice from the list. Use the right and left arrow keys to scroll within the list.

SYSTEM NOTES

System notes give you additional information as needed. For example, a system note appears if you enter data that exceeds an allowed range.

To see a system note, scroll to the ***Age** field. This is a numeric field that accepts only data between 0 and 364. Try typing a larger number such as 500. A system note box appears.

You have just practiced the basics of using the Eclipse. More information accompanies sections for specific functions such as acquiring an Auto ECG.

Press the return arrow key to return to the INITIAL menu and continue working.

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Chapter 4 *Program Setup*

Configuring SYSTEM SETUP Menu

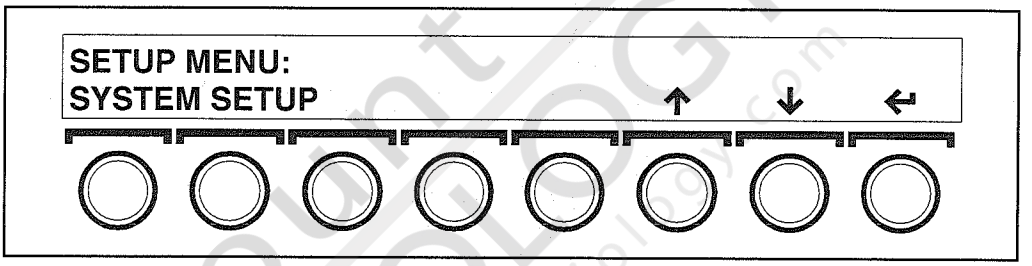
Go to SYSTEM SETUP menu

Press the On/Standby key to power up to the INITIAL menu.

Press the soft function key under SETUP to go to the SETUP menu.

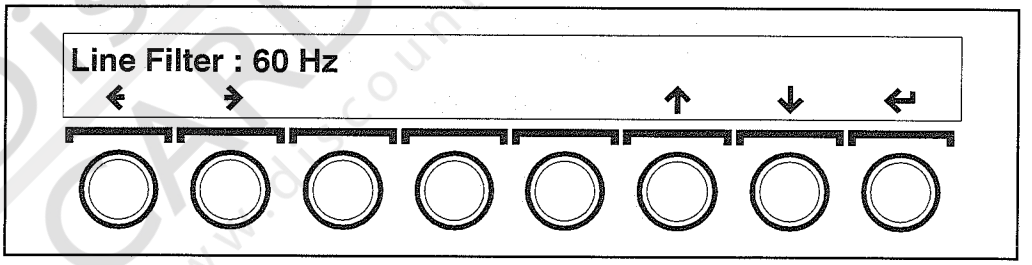
Press the Up arrow soft function key. The selection for the SYSTEM SETUP menu will appear (see Figure 4-5).

Figure 4-5
The SYSTEM SETUP Menu



Press either of the soft function keys under SYSTEM SETUP. The first menu field in SYSTEM SETUP will appear (see Figure 4-6).

Figure 4-6
The LINE FILTER Menu



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Configure SYSTEM SETUP menu

Following is a description of the SYSTEM SETUP menu fields.

As you scroll through this menu, some fields have lists. Select the appropriate item from a list by pressing the Right or Left arrow soft function key. In this chapter, the available choices are listed under the field name.

When you scroll to other fields in this menu, the cursor blinks. In these fields, type the appropriate information from the keyboard. In this chapter, the type of information and the number of characters allowed are listed in brackets under the field name.

LINE FILTER

50 Hz
60 Hz
OFF

Filters electrical interference from AC line voltage.

DATE FORMAT

MM/DD/YY
DD.MM.YY
YY.MM.DD

DATE

[Up to 20 alphanumeric characters]

Use spaces, hyphens or periods to separate the day, month and year. Some acceptable ways to type the date are:

1. 10 10 1997
2. 10–10–1997
3. 10.10.1997

NOTE: Remember that the period character (.) is typed by holding down the Shift key and pressing the "N" key. The hyphen character (-) is typed by holding down the Shift key and pressing the "M" key.

TIME

[Alphanumeric field displayed in 24-hour format]

Use a space to separate the hour from the minutes.

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LANGUAGE

DEUTSCH
ESPAÑOL
FRANCAIS
ITALIANO
ENGLISH

Selects language for printed and displayed text. You should not have to adjust this field.

> **NOTE:** The unit automatically turns off and on again whenever you change the Language selection. This ensures that all changes take effect.

HEIGHT UNITS

CM.
IN.

Selects units for expressing patient height.

> **NOTE:** The unit automatically turns off and on again whenever you change the Units selection. This ensures that all changes take effect.

WEIGHT UNITS

KG.
LB.

Selects units for expressing patient weight.

> **NOTE:** The unit automatically turns off and on again whenever you change the Units selection. This ensures that all changes take effect.

INST. NAME

[Up to 30 alphanumeric characters]

Refers to the institution.

ANALYSIS STATEMENTS

BRIEF
FULL

Selects the format of the ECG analysis statements. Selecting BRIEF will result in short, concise analysis statements with minimal explanations, presented in mixed case nomenclature for ease of reading (for example, "Short QTc"). Selecting FULL results in lengthier analysis statements—presented in upper case nomenclature (for example, "SHORT QTc: POSSIBLE HYPERCALCEMIA/DIGITALIS EFFECT")— and reason statements, which precede the analysis statements.

PASSWORD

Determines whether a password is required to access the user setup menus and the SYSTEM SETUP menu. The password is set in the MISCELLANEOUS menu (see "Password" on pg. 4-11).

Return to INITIAL menu

Press the Return arrow soft function key to return to SETUP menu.

Press the Return arrow soft function key again to return to the INITIAL menu.

Verify calendar & clock settings

To verify the date and time, press the On/Standby key to put the unit in Standby mode. Then press the On/Standby key again to turn the unit on.

Check the date and time on the POWER-UP screen.

Configuring the User Setup Menus

There are 6 user setup menus.

Following is a description of the user setup menus:

POWER-UP DEFAULTS
AUTO ECG SETUP
CUSTOM LEAD 1
CUSTOM LEAD 2
MISCELLANEOUS
PATIENT FIELDS ENABLE

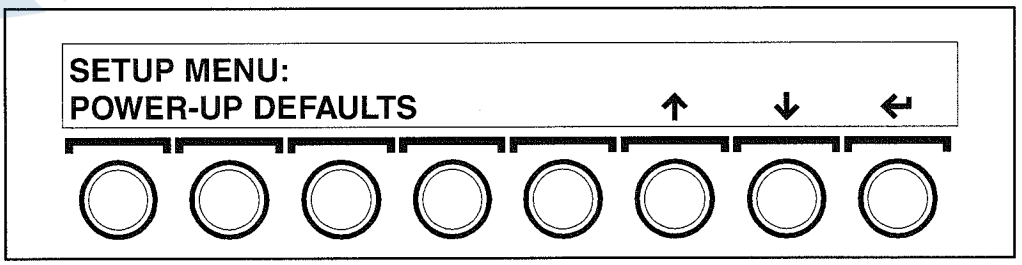
Go to user setup menus

Press the On/Standby key to power up to the INITIAL menu.

Press the soft function key under SETUP to go to the SETUP menu.

Press the Down arrow soft function key. The POWER-UP DEFAULTS menu appears. This is the first of the 6 user setup menus.

Figure 4-7
The POWER-UP DEFAULTS Menu



To select a different user setup menu, continue pressing the Down arrow soft function key until the desired menu appears.

To open a user setup menu, press any of the soft function keys under the menu name. The following field appears when the POWER-UP DEFAULTS menu is opened.

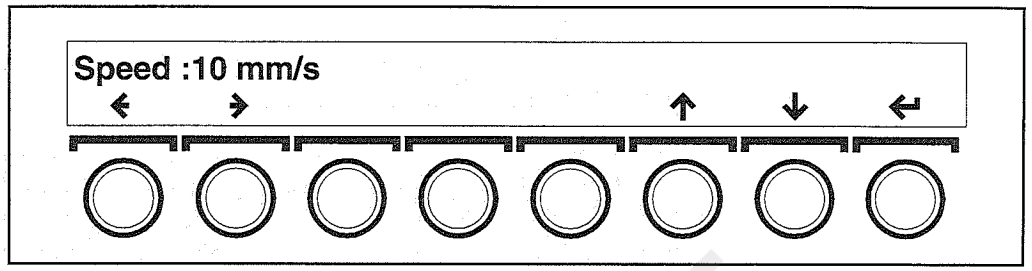


Figure 4-8
The first field in the POWER-UP DEFAULTS Menu

As you scroll through these menus, some fields have lists. Select the appropriate item from a list by pressing the Right or Left arrow soft function key (see Figure 4-8). In this chapter, the available choices are listed under the field name.

When you scroll to other fields in these menus, the cursor blinks. In these fields, type the appropriate information from the keyboard. In this chapter, the type of information and the number of characters allowed are listed in brackets under the field name.

Configuring the POWER-UP DEFAULTS menu

The fields in this menu affect paper speed and waveform printing. The settings in this menu are in effect whenever the Eclipse is powered on with the On/Standby key. Settings in this menu are different from the temporary changes made by pressing menu control keys (see "Understanding the Keyboard" on pg. 3-1). When the soft function keys are used to change the settings for Speed, Gain and Filter in the MANUAL RHYTHM menu, the changes are not saved when the unit powers down.

To save changes in the POWER-UP DEFAULTS menu, press the Return arrow soft function key. The changes go into effect the next time the Eclipse is powered on.

SPEED

10 mm/s
25 mm/s
50 mm/s

Refers to chart paper speed.

GAIN

5 mm/mV
10 mm/mV
20 mm/mV
L10,C5 mm/mV
L20,C10 mm/mV

Determines the amplitude of printed and displayed waveforms.

ARTIFACT FILTER

150 Hz
40 Hz

Sets the upper frequency response.

Selecting 150 Hz provides the highest fidelity recording and should be used when little or no noise is present.

The American Heart Association's 1990 Recommendations (Recommendations for Standardization and Specifications in Automated Electrocardiography: Bandwidth and Signal Processing) pertaining to high-frequency response for both adult and pediatric recordings are met or exceeded when using the 150 Hz setting.

Selecting 40 Hz will reduce the muscle tremor and patient movement artifacts in the ECG recording. It will result in a smoother looking trace at the expense of losing some of the fine detail. **This filter is applied only to the printed report. The data analyzed by the measurement and interpretation software is not affected when using the 40 Hz setting.**

Configuring the AUTO ECG SETUP menu

NOTE: The ANALYSIS-ORIGINAL and ANALYSIS COPIES fields are available only on units with interpretive capabilities.

12 LEAD FORMAT

STANDARD, 4 CHANNEL
STANDARD, 3 CHANNEL
STANDARD, 3 CH. + 3
STANDARD, 6 CH 5S/LD
STANDARD, 6 CH 10S/LD
CABRERA, 4 CHANNEL
CABRERA, 3 CHANNEL
CABRERA, 3 CH. + 3
CABRERA, 6 CH 5S/LD
CABRERA, 6 CH 10S/LD

Sets printout format. For sample printouts, see Chapter 8.

NOTE: If you select a 4-channel or a 3-channel plus 3 rhythm format, select a lead or leads for the rhythm printout.

RHYTHM LEADS CH. 1

LEAD I
LEAD II
LEAD III
aVR
aVL
aVF
V1
V2
V3
V4
V5
V6
-aVR

Selects leads used if a rhythm printout is selected for **12 Lead Format** above.

RHYTHM LEADS CH. 2

Same as Channel 1

RHYTHM LEADS CH. 3

Same as Channel 1

RHYTHM PAGE

CUSTOM LEAD 1 AT 25 mm/s
CUSTOM LEAD 1 AT 50 mm/s
OFF

Enables a separate 10-second rhythm report as part of an Auto ECG report. This is not available if Custom Lead 1 is set to Frank or Nehb.

ANALYSIS-ORIGINAL

ON WITH REASONS
ON W/O REASONS
OFF

Determines whether analysis statements appear on Auto ECG reports. If analysis statements are printed, this field also determines whether the supporting reason statements are printed.

These options are not available if Analysis Statements is set to Brief.

ANALYSIS-COPIES

ON WITH REASONS
ON W/O REASONS
OFF

Determines whether analysis statements appear on copies of Auto ECG reports. If analysis statements are printed, this field also determines whether the supporting reason statements are printed.

These options are not available if Analysis Statements is set to Brief.

NUMBER OF COPIES

[Numeric. Range = 0-5]

Sets the number of complete report copies to print in addition to the automatic printout.

MEDIAN COMPLEX PAGE

ON
OFF

Enables Median Complex printout as part of an Auto ECG report.

WAIT FOR GOOD DATA

ON
OFF

When ON, Auto ECG reports are delayed until ten seconds of ECG data—without muscle artifact and wandering baseline—has been collected (all electrodes must be connected). An immediate report can be forced by pressing ECG a second time. In this case, the report will state "Warning: Data quality may affect computer interpretation."

When OFF, the Auto ECG report starts once at least 10 seconds of ECG waveform has been collected, regardless of the quality of the collected waveform data. No warning message is printed in this case.

> **NOTE:** If any electrodes are disconnected the report will show a flat baseline for those leads. ("Overload" conditions will also produce a flat baseline.) Leads with disconnected electrodes will not be used in the ECG analysis.

Configuring CUSTOM LEAD 1 & CUSTOM LEAD 2 menus

These two menus each format a group of leads. These groups can later be selected in the MANUAL menu by pressing the soft function key under LEAD.

Custom Lead Group 1 is also used for the rhythm page of an Auto ECG report. Only Standard or Cabrera configurations are acceptable for this purpose. Do not select Frank or Nehb if you want a rhythm page as part of an Auto ECG.

NOTICE: Because the Eclipse offers different lead configurations, always ensure that the appropriate lead placement is employed for the lead configuration selected.

CUSTOM LEAD 1

STANDARD, 3 CHANNEL
STANDARD, 6 CHANNEL
STANDARD, 12 CHANNEL
CABRERA, 3 CHANNEL
CABRERA, 6 CHANNEL
CABRERA, 12 CHANNEL
FRANK, 3 CHANNEL
NEHB, 3 CHANNEL

Format Custom Lead 1 to suit your needs.

If you have selected Standard or Cabrera, select leads for the appropriate channels. Lead availability is affected by the selected lead configuration.

CHANNEL 1

Standard

LEAD I
LEAD II
LEAD III
aVR
aVL
aVF
V1
V2
V3
V4
V5
V6
-aVR

Cabrera

LEAD I
LEAD II
LEAD III
-aVR
aVL
aVF
V1
V2
V3
V4
V5
V6
aVR

Frank

X
Y
Z

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Nehb

D
A
I

CHANNEL 2

Same as Channel 1

CHANNEL 3

Same as Channel 1

CHANNEL 4

Same as Channel 1

CHANNEL 5

Same as Channel 1

CHANNEL 6

Same as Channel 1

CUSTOM LEAD 2

Custom Lead Group 2 is similar to Custom Lead Group 1. It is set up in the same manner. It is also accessed by pressing the soft function key under LEAD in the MANUAL menu.

Configuring the MISCELLANEOUS menu

NOTE: The BRADYCARDIA LIMIT and TACHYCARDIA LIMIT fields are available only on units with interpretive capabilities.

BASELINE FILTER

0.05 Hz
STABLE

Sets the low frequency response.

Selecting 0.05 Hz provides the greatest low-frequency response with no delay and should be used when no baseline drift is present.

Selecting STABLE (Baseline Stabilization Filter) will effectively suppress most baseline wander interference while providing an accurate ECG reproduction (no distortion of the ST segment.) Use of the Baseline Stabilization Filter will result in an approximately 1.5 second delay in the displayed ECG. This filter is applied to the printed report and the data analyzed.

The American Heart Association's 1990 Recommendations (Recommendations for Standardization and Specifications in Automated Electrocardiography: Bandwidth and Signal Processing) pertaining to low-frequency response in electrocardiography are met or exceeded by both the 0.05 Hz and STABLE selections.

PACER ENHANCEMENT

ON
OFF

Enables pacemaker enhancement. This feature makes pacemaker signals show up as prominent spikes on the display and on printouts. An enhanced pacer is printed as a spike that is at least 10 mm tall and of positive polarity.

RHYTHM MODE PAGES

[Numeric. Range = 1-10]

Sets the number of pages printed during an Auto Rhythm.

BRADYCARDIA LIMIT

[Numeric. Range = 41-69]

Reports for adult patients with heart rates below this limit are labelled "BRADYCARDIA." For more information on heart rate limits refer to the Physician's Guide.

NOTE: This feature is available on interpretive units only.

TACHYCARDIA LIMIT

[Numeric. Range = 81-129]

Reports for adult patients with heart rates above this limit are labelled "TACHYCARDIA." For more information on heart rate limits refer to the Physician's Guide.

NOTE: This feature is available on interpretive units only.

PASSWORD

[Up to 15 alphanumeric characters]

NOTE: Write down the password and keep it in a secure place. You will be able to change or remove the password protection only after you have entered the correct password.

Determines the password required to access the user setup menus and the SYSTEM SETUP menu. You can set a different password for both User 1 and User 2. This field is enabled in the SYSTEM SETUP menu (see "password" on pg. 4-4).

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Enabling patient demographic fields

The last user setup menu determines which patient demographic fields are used. An asterisk (*) indicates that information in these fields directly affects Eclipse analysis.

Select "**ON**," "**ON, CLEAR**" or "**ON, HOLD**" to make each demographic field appear in the EDIT menu. These fields also appear on printouts.

Select **ON, HOLD** if you want every patient file to have the same information in this field. Until the information is typed over, the EDIT menu will keep the information in these fields even if the Eclipse is turned off. For example, you may want every patient record to be labeled with the same Department name.

"**ON**" and "**ON, CLEAR**" act the same. Fields that are enabled with these are cleared for every new patient or when the unit returns to Standby mode.

***V3 PLACEMENT**

ON, CLEAR
ON, HOLD
OFF

Used for pediatric recording only.

LAST NAME

ON
OFF

FIRST NAME

ON
OFF

***AGE**

ON
OFF

***AGE FORMAT**

ON
OFF

***SEX**

ON
OFF

***RACE**

ON
OFF

***MEDICATION 1**

ON
OFF

***MEDICATION 2**

ON
OFF

*** CLASS 1**

ON
OFF

*** CLASS 2**

ON
OFF

HEIGHT

ON
OFF

WEIGHT

ON
OFF

SYSTOLIC BP

ON
OFF

DIASTOLIC BP

ON
OFF

DEPARTMENT

ON, CLEAR
ON, HOLD
OFF

ROOM

ON, CLEAR
ON, HOLD
OFF

TECHNICIAN

ON, CLEAR
ON, HOLD
OFF

PHYSICIAN

ON, CLEAR
ON, HOLD
OFF

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USER FIELD

ON, CLEAR
ON, HOLD
OFF

USER FIELD LABEL

[Up to 15 alphanumeric characters]

Renames the above field. The new label is displayed in the PAT menu and printed on patient demographics reports. The User Field may be used for anything. For example, you may want to use the field for the referring physician's name.

COMMENTS

ON
OFF

Press the Return arrow soft function key to return to the SETUP menu.

Press the Return arrow soft function key again to return to the INITIAL menu.

Acquiring a Printout of Eclipse Settings

You may print a list of all current Eclipse settings. Please see "Print Setup Report" on pg. 8-1 for examples which were printed using settings configured at the factory.

1. Press the On/Standby key to power up to the INITIAL menu.
2. Press the soft function key under SETUP to go to the SETUP menu.
3. Press the soft function key under PRINT SETUP REPORT to print the list.
4. Press the Return arrow soft function key to return to the INITIAL menu.

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Chapter 5 Patient Preparation

Choosing the environment

⚠ *WARNING: Explosion hazard. Do NOT use in the presence of flammable anesthetics.*

CAUTION: Although the Eclipse is designed to meet IEC 601-1-2 EMC immunity requirements, the presence of strong EMI fields generated by electronic, surgical or diathermy instruments close to the unit, may cause trace noise or input overload conditions.

The Eclipse is a high fidelity instrument which responds to the minute voltages of the heart. Since it is such a sensitive instrument, take care to avoid interference which can be produced by muscle tremor and AC signals. To minimize interference, locate the electrocardiograph and patient away from power cords and other electrical devices.

Preparing Patients for Resting ECGs

To minimize muscle artifact, make sure your patient is comfortable and relaxed. Assure the patient that there is no danger or pain involved, and that his or her cooperation will assist in producing a valuable diagnostic record.

Make the patient comfortable on a cot or padded table which is large enough to support arms and legs. The patient's arms should rest at his or her sides and the legs should lie flat, not touching one another. Use a pillow to support the patient's head. Also, try to avoid factors like cold drafts which could cause discomfort. Leaving the chest and sensor sites exposed, cover your patient with a blanket to prevent shivering.

Apply sensors and connect lead wires before entering patient information into the Eclipse. This allows time for the sensors to adhere and improves conductivity.

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Preparing the Skin

Refer to the "Resting ECG Lead Placement & Coding Chart" on pg. 5-3 for details on where sensor sites are located.

> **NOTE:** For information on alternate chest lead and other lead placements, see "Alternative Lead Placements" on pg. 5-7.

If the patient has oily or sweaty skin, or has recently applied lotion to their skin, clean the sensor sites with alcohol. Allow the sensor sites to dry completely before applying sensors.

When applying sensors to sites with a lot of hair, the following techniques may improve contact:

1. Use the thumb and forefinger to spread the hair before applying the sensor to the skin.
2. If the sensor does not adhere well, it may be necessary to shave the site.

> **NOTE:** In some cases skin irritation can occur from site preparation and sensor electrolyte solutions.

Applying Sensors

Apply sensors according to the instructions on the following pages. For information on using disposable sensors, see "Disposable Resting ECG Sensors" on pg. 5-4. For information on using reusable sensors, see "Reusable ECG Sensors" on pg. 5-5.

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Resting ECG Lead Placement & Coding Chart

LEAD CODING AND MEASUREMENTS

AHA

STANDARD LIMB LEADS

LEAD	SENSORS CONNECTED / MEASURED
LEAD I	LA-RA
LEAD II	LL-RA
LEAD III	LL-LA

AUGMENTED LIMB LEADS

LEAD	SENSORS CONNECTED / MEASURED
aVR	RA and (LA-LL)
aVL	LA and (RA-LL)
aVF	LL and (RA-LA)

CHEST LEADS

LEAD	SENSORS CONNECTED / MEASURED
V_1	V_1 and (LA-RA-LL)
V_2	V_2 and (LA-RA-LL)
V_3	V_3 and (LA-RA-LL)
V_4	V_4 and (LA-RA-LL)
V_5	V_5 and (LA-RA-LL)
V_6	V_6 and (LA-RA-LL)

AHA COLOR CODE

LEAD	LOCATION	BAND	LABEL
RL	RIGHT LEG	GREEN	
LL	LEFT LEG	RED	
RA	RIGHT ARM	WHITE	
LA	LEFT ARM	BLACK	
V_1	CHEST	BROWN	RED
V_2	CHEST	BROWN	YELLOW
V_3	CHEST	BROWN	GREEN
V_4	CHEST	BROWN	BLUE
V_5	CHEST	BROWN	ORANGE
V_6	CHEST	BROWN	VIOLET

IEC COLOR CODE

LEAD	LOCATION	BAND	LABEL
N	RIGHT LEG	BLACK	
F	LEFT LEG	GREEN	
R	RIGHT ARM	RED	
L	LEFT ARM	YELLOW	
C_1	CHEST	WHITE	RED
C_2	CHEST	WHITE	YELLOW
C_3	CHEST	WHITE	GREEN
C_4	CHEST	WHITE	BROWN
C_5	CHEST	WHITE	BLACK
C_6	CHEST	WHITE	VIOLET

IEC

STANDARD LIMB LEADS

LEAD	SENSORS CONNECTED / MEASURED
LEAD I	L-R
LEAD II	F-R
LEAD III	F-L

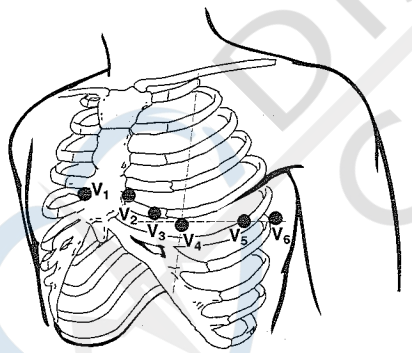
AUGMENTED LIMB LEADS

LEAD	SENSORS CONNECTED / MEASURED
aVR	R and (L-F)
aVL	L and (R-F)
aVF	F and (R-L)

CHEST LEADS

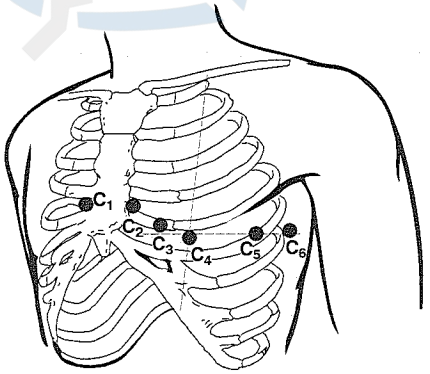
LEAD	SENSORS CONNECTED / MEASURED
C_1	C_1 and (L-R-F)
C_2	C_2 and (L-R-F)
C_3	C_3 and (L-R-F)
C_4	C_4 and (L-R-F)
C_5	C_5 and (L-R-F)
C_6	C_6 and (L-R-F)

PLACEMENT OF THE CHEST SENSORS



AHA

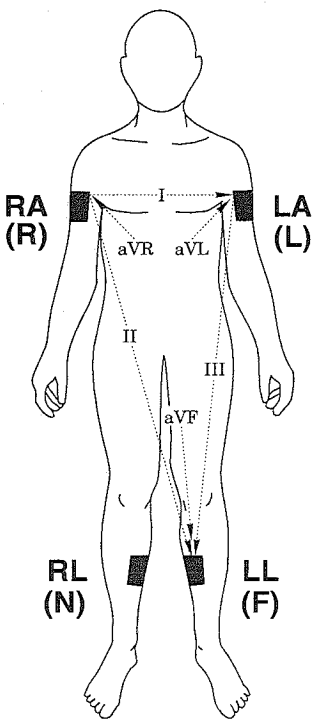
- **V_1** Fourth intercostal space at right margin of sternum
- **V_2** Fourth intercostal space at left margin of sternum
- **V_4** Fifth intercostal space at junction of left midclavicular line
- **V_3** Midway between position V_2 and position V_4
- **V_5** At horizontal level of position V_4 at left anterior axillary line
- **V_6** At horizontal level of position V_4 at left midaxillary line



IEC

- **C_1** Fourth intercostal space at right margin of sternum
- **C_2** Fourth intercostal space at left margin of sternum
- **C_4** Fifth intercostal space at junction of left midclavicular line
- **C_3** Midway between position C_2 and position C_4
- **C_5** At horizontal level of position C_4 at left anterior axillary line
- **C_6** At horizontal level of position C_4 at left midaxillary line

PLACEMENT OF THE LIMB SENSORS



Disposable Resting ECG Sensors

CardioSens® disposable sensors are a more effective alternative to bulbs, plates, straps, creams, and gels. CardioSens® disposable sensors dramatically reduce cross-contamination and infection, while helping to improve diagnostic results.

Disposable sensors should be stored according to the guidelines on the packaging and should not be used after the expiration date. Never mix sensor types or brands. Incompatibilities can cause baseline drift and can increase trace recovery time after defibrillation.

APPLYING LIMB SENSORS

1. Expose the arms and legs.
2. Place sensors firmly on the limb sites. Choose fleshy areas, not ankles or wrists (see Figure 5-9).
3. Clip leads to the sensors. Leads on arm sensors should point downward toward feet. Leads on legs should point upward toward chest.

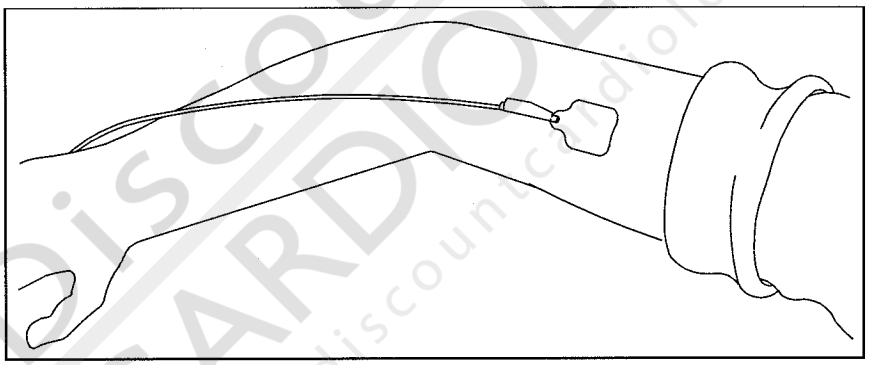


Figure 5-9
Disposable Limb Sensor on Arm

APPLYING CHEST SENSORS

1. Expose the chest.
2. Locate the 6 V-lead (C-lead) positions on the patient's chest.
3. Apply the sensors.
4. Ensure that the leads conform to body contours and that no strain is placed on the sensors.

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Reusable ECG Sensors

Never mix sensor types or brands. Dissimilar metals or other incompatibilities may cause considerable baseline drift and may increase trace recovery time after defibrillation. Do not use corroded sensors, they may give poor results.

Reusable sensors (Welsh bulbs and limb plates) should be kept clean. They should be washed after each use and scoured frequently with a light-duty kitchen cleanser. Never use a metallic pad to clean the sensors. Accumulation of electrolyte may cause drifting and degrade ECG quality.

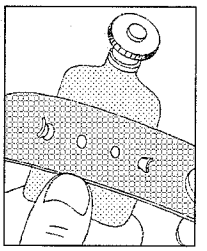
ELECTROLYTE

> **NOTE:** Watches and jewelry which could come in contact with electrolyte should be removed to avoid damage.

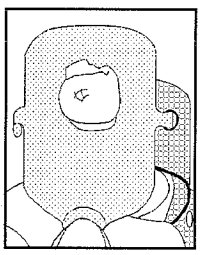
Spacelabs Burdick recommends Liqui-cor® for use with reusable sensors. Liqui-cor® provides excellent conductivity between the skin and sensor. In addition, it is nonabrasive and water soluble for easy cleanup.

APPLYING LIMB PLATES

1. Expose the arms and legs.



2. Connect sensor straps to the "ears" of the sensors.



3. Squeeze out a small amount of Liqui-cor® on sensor as illustrated. Spread it evenly over the sensor surface. Always apply the same amount of electrolyte to each sensor.
4. Place sensors firmly on the limb sites. Position them so that the sensor will not press against the body or table when the patient is relaxed. On arms, the screws should point downward toward the feet. On legs, the screws should point upward, toward chest.
5. Without stretching the strap, wrap it around the limb until a hole lines up with a sensor "ear." Then stretch the strap and fasten it with the next hole.
6. Connect the limb leads to the four sensors.

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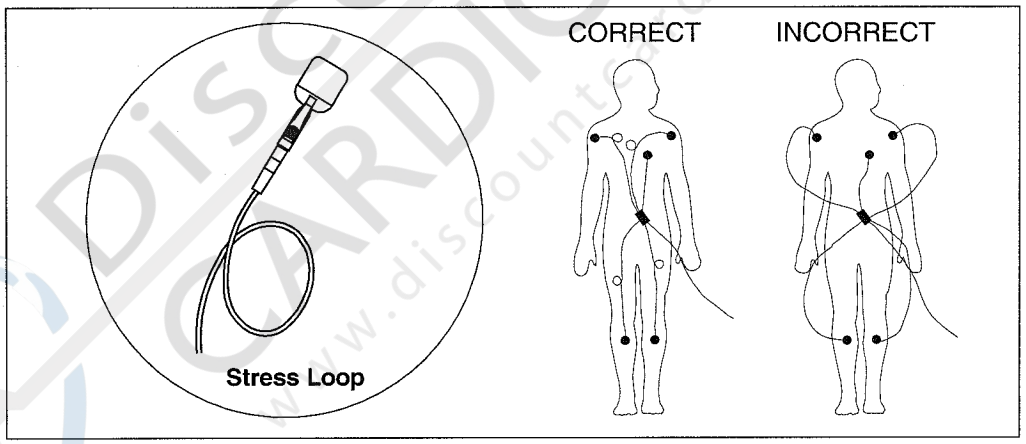
APPLYING WELSH BULB CHEST SENSORS

1. Connect the 6 Welsh bulb sensors to the V-leads (C-leads) on the patient cable.
2. Locate the 6 V-lead (C-lead) positions on the patient's chest (see "Resting ECG Lead Placement & Coding Chart" on pg. 5-3).
3. Squeeze out a drop of Liqui-cor® electrolyte at each sensor site. Use a tongue depressor to spread the electrolyte taking care that it does not touch the electrolyte from another site.
4. Apply the sensors by squeezing the rubber bulb and allowing suction to hold the sensor in place. Only a small dimple should remain on the bulb when it is released.
5. Ensure that the leads conform to the body contours and that no strain is placed on the sensors.

Connecting Cables and Lead Wires

After applying sensors, connect the lead wires from the patient cable to the sensors. Make sure the lead cables follow the contours of the patient's body and lie flat. If any lead wire is too long, as with a short patient or child, take up the length by making a small "stress loop" (see Figure 5-10).

Figure 5-10
Lead Cable Arrangement



Make sure the patient cable is plugged securely into the connector on the front of the unit. This is located under the keyboard (see "Connecting the Patient Cable" on pg. 2-2).

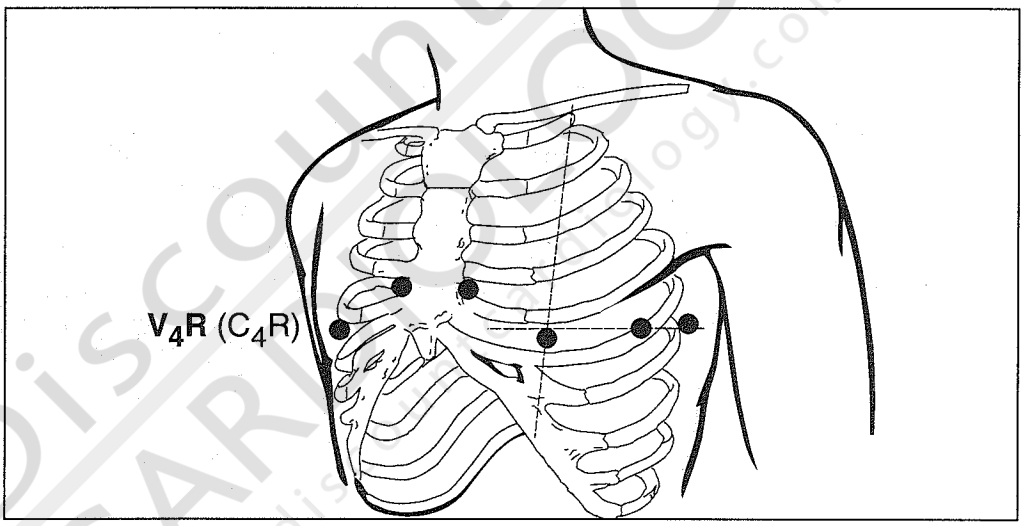
Alternative Lead Placements

Pediatric Lead Placement

When acquiring a pediatric ECG, you may use an alternative to the standard V_3 (C_3) placement. Place the sensor in the V_4R (C_4R) position. This is across the sternum from V_4 (C_4). See Figure 5-11 for location. Improper placement will result in inaccurate waveform labeling.

You must select the corrected V_3 (C_3) placement in the EDIT menu (see "Entering Patient Demographics" on pg. 6-7). If you place V_3 (C_3) in the V_4R (C_4R) position, select "V4R" in the ***V3 Placement** field located in the ENTER ID menu for proper printout labelling.

Figure 5-11
Pediatric Chest Lead Placement



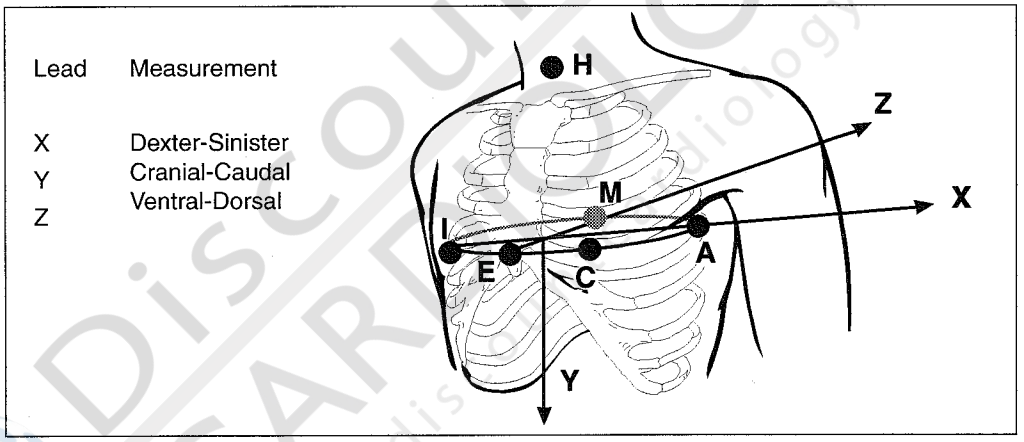
Frank: Corrected Orthogonal Leads

Attach all the limb sensors, R, L, F, and N (RA, LA, LL and RL). Please see "Resting ECG Lead Placement & Coding Chart" on pg. 5-3 for diagram.

Attach the chest sensors according to the following table. I, E, C, M and A should all be in the same horizontal plane level with the fifth intercostal space (see Figure 5-12).

V_1 (C_1)	Chest - right midaxillary line	I
V_2 (C_2)	Chest - midsternum	E
V_3 (C_3)	Chest - midclavicular line	C
V_4 (C_4)	Chest - left midaxillary line	A
V_5 (C_5)	Back - spine, opposite E	M
V_6 (C_6)	Throat or back of neck	H

Figure 5-12
Frank Lead Placement



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Nehb: Bipolar Leads

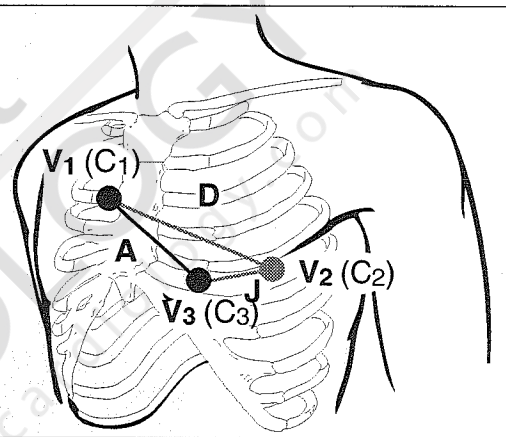
Attach all the limb sensors, RA, LA, LL and RL (R, L, N, and F). Please see "Resting ECG Lead Placement & Coding Chart" on pg. 5-3 for diagram.

Attach the chest sensors according to the following table (see Figure 5-13).

V_1 (C_1)	Chest - second rib at right sternal border	N_{st}
V_2 (C_2)	Back - left posterior axillary line on level with the bottom tip of the scapula.	N_{ax}
V_3 (C_3)	Chest - opposite the scapular apex at the same level as V_2 above.	N_{ap}

Figure 5-13
Nehb Lead Placement

Lead	Measurement
D	N_{ax} - N_{st}
A	N_{ap} - N_{st}
J	N_{ap} - N_{ax}



Preparing Patients for Exercise Stress Testing

Apply electrodes and lead wires before entering patient data into the Eclipse. This allows time for the electrodes to adhere and improves conductivity.

1. Place limb leads where movement is not a factor (see Figure 5-14).
2. Vigorous skin preparation is essential for preventing artifact during exercise stress testing:
   - ✔ Shave all hair from sensor sites
   - ✔ Cleanse sensor sites with alcohol
   - ✔ Use a Skin Rasp. Applying moderate pressure, stroke the skin 2 or 3 times at each site with the rough side of the rasp.
3. As you apply sensors, press down on the outside foam area first to avoid squeezing the gel out.
4. After applying the sensors, follow the instructions on page 5-6, "Connecting Cables and Lead Wires".

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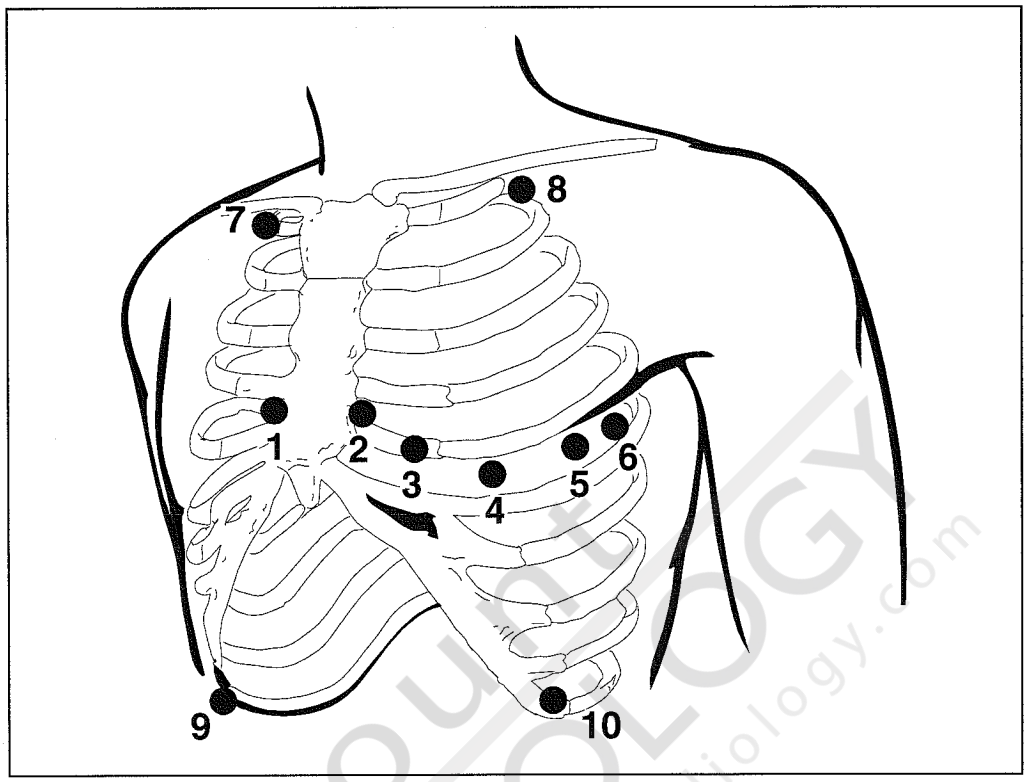
Figure 5-14
Exercise Stress Lead Placement



Key			
	AHA	IEC	
1	V_1	C_1	Fourth intercostal space at right margin of sternum.
2	V_2	C_2	Fourth intercostal space at left margin of sternum.
3	V_3	C_3	Midway between 2 and 4.
4	V_4	C_4	Fifth intercostal space at junction of left midclavicular line.
5	V_5	C_5	At horizontal level of position V4 at left anterior axillary line.
6	V_6	C_6	At horizontal level of position V4 at left midaxillary line.
7	RA	R	Beneath right clavicle.
8	LA	L	Beneath left clavicle.
9	RL	N	In line with 7.
10	LL	F	In line with 8 and 4.

Chapter 6 *Acquiring ECG Reports*

Acquiring and printing ECG reports is quite simple. Once the patient is hooked up to the Eclipse, an ECG can be acquired at any time by pressing the ECG button.

It is a good idea to enter patient demographic information before performing tests. However, patient demographic information also may be entered after the tests have been completed.

> **NOTE:** Some patient information directly affects ECG analysis. Your patient's physician uses this information when interpreting ECG reports. Likewise, interpretive Eclipse units provide more accurate and complete analysis statements when you enter patient information thoroughly. This information must be entered prior to acquiring the ECG in order to affect the interpretation.

Acquiring a Stat ECG

Sometimes it will be necessary to take an ECG and there will not be time to enter any patient demographic information. If no patient ID is entered, Eclipse units will print a 12 digit number, comprised of the date and time, in the **Patient ID** field.

> **NOTE:** Some patient information directly affects ECG analysis. Your patient's physician uses this information when interpreting ECG reports. Likewise, interpretive Eclipse units provide more accurate and complete analysis statements when you enter patient information thoroughly. This information must be entered prior to acquiring the ECG in order to affect the interpretation.

1. Prepare patient according to guidelines in Chapter 5, "Patient Preparation".
2. From Standby mode, press ON/STBY to power up to the INITIAL menu.
3. Verify that the "Sensors OK" message is displayed on the INITIAL menu.
4. Press the "ECG" function key ECG to acquire an Auto ECG report.

   NOTE: This key is active in the INITIAL menu and most menus, including the EDIT menu.

Acquiring an Auto ECG

NOTE: Some patient information directly affects ECG analysis. Your patient's physician uses this information when interpreting ECG reports. Likewise, interpretive Eclipse units provide more accurate and complete analysis statements when you enter patient information thoroughly. This information must be entered prior to acquiring the ECG in order to affect the interpretation.

NOTE: Press the "STOP" function key at any time to halt an Auto ECG.

1. Prepare the patient according to guidelines in Chapter 5, "Patient Preparation."
2. From Standby mode, press 

to power up to the INITIAL menu.
3. Press the soft function key under PAT to go to the PATIENT menu. Enter the patient's ID number, last name, first name, age, sex, and as many other fields as required or as time will allow (for more information, see "Patient Demographic Fields" on pg. 6-8).

   NOTE: Items indicated with an asterisk (*) may affect computer analysis.

4. Press the return arrow key ↵ to return to the INITIAL menu. Verify that the "Sensors OK" message is displayed on the INITIAL menu.

   NOTE: The Recorder Speed, Gain and Frequency Response settings can be temporarily modified if necessary. See "Temporarily Changing Current Settings" on pg. 6-4.

5. Press 

to acquire an Auto ECG.

   NOTE: To obtain a clean trace with very little noise, ensure that **Wait for Good Data** is set to ON in the AUTO ECG SETUP menu. If there is a problem during a recording, the Eclipse will display a message. You can override the error message and continue recording by pressing the ECG key again (for more information, see "Wait for good data" on pg. 4-8).

6. The Eclipse will automatically print and save the ECG.

Press the return arrow key to exit.

Printing Reports

NOTE: You can immediately terminate any printout by pressing the "STOP" key. The Eclipse advances the chart paper to the next page and returns to the INITIAL menu or the EDIT menu.

A formatted, 12-lead report with demographics is automatically included in any ECG printout. The following reports may also be included with the printout, depending upon system settings: a rhythm report, a median report, and an analysis report.

For more information on selecting the rhythm report and the median report, see "Configuring the AUTO ECG SETUP menu" on pg. 4-6. Analysis information will be included on the printout for interpretive units only, unless this feature has been disabled (see "Analysis Statements" on pg. 4-3).

Paper Advance

You can advance the paper, or feed it forward or backward if necessary. From the INITIAL menu, press the PAGE soft function key. Press the LOAD soft function key to advance the paper forward an entire page. Press the FORWARD or REVERSE soft function keys to feed the paper forward or backward in small increments.

Printing Problems

If the unit runs out of paper or if the paper jams, you are given the option to reload the paper and continue printing (see Figure 6-15). Alternatively, you may stop the function and return to the INITIAL menu. For paper loading instructions see "Loading Recording Paper" on pg. 2-4.

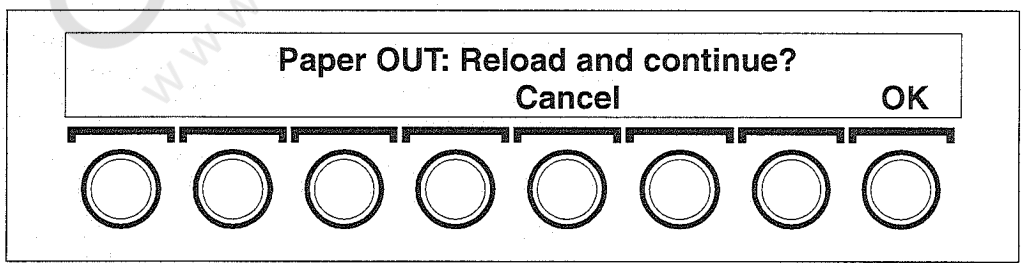


Figure 6-15
System Note Regarding a Printing Problem

Temporarily Changing Current Settings

Occasionally it may be necessary to modify the system settings for the current patient. There are several settings that you can customize before acquiring a patient's ECG. If you wish to change the below settings permanently, see "Configuring the POWER-UP DEFAULTS menu" on pg. 4-5.

Recorder Speed, Gain, Frequency Response

1. Select the soft function key under AMP in the INITIAL menu.
2. Press the up and down arrow soft function keys to move between fields.
3. Press the right and left arrow soft function keys to make a selection.

   NOTE: These settings will stay in effect until you change them or return the unit to Standby mode.

Press the return arrow key to exit.

Acquiring an Auto Rhythm or a Manual Rhythm

NOTE: REDUCED PERFORMANCE MODE. Printing performance of an Auto Rhythm or a Manual Rhythm may be reduced when the current Custom Lead format is Frank and when the printing speed is set to 50 mm/s.

NOTE: It is not possible to save Auto Rhythm or Manual Rhythm data.

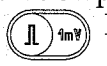
The Eclipse can be set up to automatically print a rhythm page with the 12-lead ECG. If this feature is not selected, or if an additional rhythm strip is required, you can obtain a rhythm strip by simply pressing the "MAN" function key.

1. Follow the directions for acquiring a STAT ECG or an AUTO ECG, as described earlier in this chapter (see page 6-1).

   NOTE: The Recorder Speed, Gain and Frequency Response settings can be temporarily modified if necessary. See "Temporarily Changing Current Settings" on pg. 6-4.

2. The Eclipse prints the report using the channels selected for Custom Lead 1 in the SETUP menu. You may choose different leads by using the soft function key under LEADS during printing.

3. Press the "MAN" function key  to acquire a manual rhythm strip. **In the Manual Rhythm mode, the** Eclipse **will continue to print the rhythm strip until either the "STOP" function key or another function key is pressed.**

   NOTE: While printing, you may place a 1 mV simulated calibration pulse ⎍ on the printout and display by pressing the  key.

4. To cancel printing at any time for either selection, Press the "STOP" function key  . You may also interrupt printing and begin another report by pressing any of the other function keys to the left of the keyboard.

Acquiring an ECG Using Alternative Lead Placements

At times it may be necessary to acquire an ECG using an alternative lead placement. Alternative lead placements include Frank and Nehb.

1. Configure either the CUSTOM LEAD 1 or CUSTOM LEAD 2 for the desired lead placement (see "Configuring CUSTOM LEAD 1 & CUSTOM LEAD 2 menus" on pg. 4-8).
2. Follow the directions for acquiring a STAT ECG or an AUTO ECG, as described earlier in this chapter (see page 6-1).
3. From the EDIT menu or other menu, press the return arrow key ↵ to return to the INITIAL menu.
4. Prepare the patient for the ECG according to guidelines in Chapter 5. Attach electrodes according to the specific instructions for each lead configuration.
5. Press the "MAN" function key. The ECG will begin to print out immediately, using the settings for CUSTOM LEAD 1.
6. To select CUSTOM LEAD 2, press the soft function key under LEAD.

   NOTE: The Recorder Speed, Gain and Frequency Response settings can be temporarily modified if necessary. See "Temporarily Changing Current Settings" on pg. 6-4.

The Eclipse automatically prints the ECG.

Acquiring an ECG Using Pediatric Lead Placements

NOTE: The Eclipse unit can be set up to always acquire ECGs using pediatric lead placement. Refer to "*V3 PLACEMENT"in "Enabling patient demographic fields" on pg. 4-12.

1. Prepare the patient according to guidelines in Chapter 5, "Patient Preparation."Attach electrodes according to the specific instructions for "Pediatric Lead Placement" on pg. 5-7.
2. From Standby mode, press ON/STBY to power up to the INITIAL menu.
3. **In the PATIENT menu, enter patient information. For V3 Placement, select V4R.**

   NOTE: In the PATIENT menu, change the Age Format to months and enter the patient's age in months, if desired.

4. Press the return arrow key ↵ to return to the INITIAL menu.

   NOTE: The Recorder Speed, Gain and Frequency Response settings can be temporarily modified if necessary. See "Temporarily Changing Current Settings" on pg. 6-4.

5. Verify that the "Sensors OK" message is displayed on the INITIAL menu.
6. Press ECG to acquire an Auto ECG.

   NOTE: To obtain a clean trace with very little noise, ensure that **Wait for Good Data** is set to ON in the AUTO ECG SETUP menu. If there is a problem during a recording, the Eclipse will display a message. You can override the error message and continue recording by pressing the ECG key again (for more information, see "Wait for good data" on pg. 4-8).

7. The Eclipse will automatically print and save the ECG.

Press the return arrow key to exit.

Entering Patient Demographics

NOTE: Some patient information directly affects ECG analysis. Your patient's physician uses this information when interpreting ECG reports. Likewise, interpretive Eclipse units provide more accurate and complete analysis statements when you enter patient information thoroughly. This information must be entered prior to acquiring the ECG in order to affect the interpretation.

About Patient Demographics

Before acquiring a patient's ECG, it is a good idea to enter patient information, since this information affects both physician analysis and computer analysis. Fields which directly affect computer analysis, such as the age field, are marked with an asterisk (*). In addition, patient information is used to label all ECG reports until you begin a new patient file or return the unit to Standby mode.

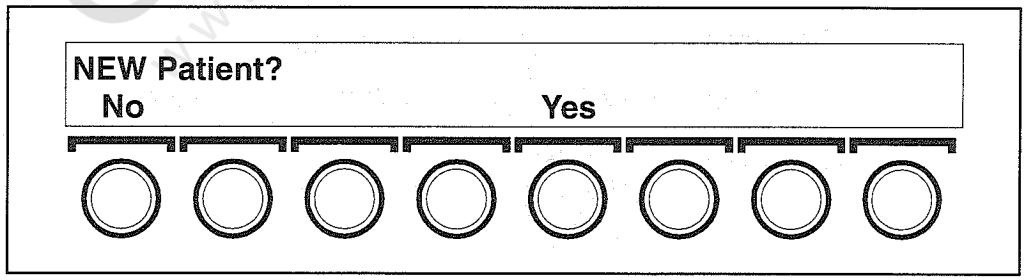
Using the PATIENT Menu

Patient information is entered using the PATIENT menu. To access the PATIENT menu press the soft function key under PAT in the INITIAL menu. The PATIENT menu will be displayed.

NOTE: You may exit the PATIENT menu at any time by pressing the return arrow key ↵ .

If demographics have been entered already, a message appears which reads, **"NEW Patient?"**. Selecting YES begins a new file. Selecting NO uses the current patient information.

Figure 6-16
The EDIT Menu



Patient Demographic Fields

Scroll through the PATIENT menu fields using the up and down arrows.

In most fields in the PATIENT menu, the cursor blinks. In these fields, type the appropriate information from the keyboard. In this chapter, the type of information and the number of characters allowed are listed in brackets next to the field name. Changes are saved when you press the up or down arrows or the return arrow key ↵ .

Other fields in the PATIENT menu have lists, indicated by left and right arrows. Press the soft function keys below the arrows to scroll between options and to make a selection. In this chapter, the available choices are listed next to the field name. Changes are saved when you press the up or down arrows or the return arrow key ↵ .

> **NOTE:** Some of the fields described here may not appear because they have been disabled in the PATIENT FIELDS ENABLE menu (see "Enabling patient demographic fields" on pg. 4-12).

The PATIENT fields are described below.

> **NOTE:** Fields which directly affect computer analysis are marked with an asterisk (*).

***V3 Placement**	STANDARD V4R Use V4R for pediatric reports only. For more information on pediatric lead placement, see "Pediatric Lead Placement" on pg. 5-7.
Patient ID	[Up to 20 alphanumeric characters]
Last Name	[Up to 20 alphanumeric characters]
First Name	[Up to 20 alphanumeric characters]
***Age**	[Up to 3 numeric characters. Range = 0-364]
***Age Format**	YEARS MONTHS DAYS
***Sex**	blank MALE FEMALE
***Race**	blank BLACK CAUCASIAN ORIENTAL OTHER RACE UNKNOWN

***Medication 1**	blank NO MEDICATION UNKNOWN DIGITALIS DIURETIC BETA BLOCKER QUINIDINE PROCAINAMIDE AMIODARONE DISOPYRAMIDE LIDOCAINE OTHER ANTIARRHYTHMIC PSYCHOTROPIC STEROID CALCIUM BLOCKERS NITRATES ACE INHIBITORS ALPHA BLOCKERS OTHER MEDICATION Select a medication type if you know the category of medication your patient is taking. For ECG waveform analysis, it is better to select NO MEDICATION or UNKNOWN than to leave this field blank.
***Medication 2**	See ***MEDICATION 1**, above **NOTE:** If you typically use just the ***Medication 1** and ***Class 1** fields, use the PATIENT FIELDS ENABLE menu to select the **OFF** setting for the ***Medication 2** and ***Class 2** fields (see "Enabling patient demographic fields" on pg. 4-12). **NOTE:** Do not use this field if blank, NO MEDICATION or UNKNOWN is selected for ***Medication 1**. These entries for ***Medication 1** cause the analysis program in interpretive Eclipse units to ignore the ***Medication 2** field.
***Class 1**	blank NORMAL UNKNOWN MYOCARDIAL INFARCTION MYOCARDIAL ISCHEMIA HYPERTENSION CONGENITAL HEART DISEASE RHEUMATIC HEART DISEASE PERICARDITIS RESPIRATORY DISEASE IMPLANTED PACER ENDOCRINE DISEASE PULMONARY EMBOLISM POST CARDIAC SURGERY CARDIOMYOPTHY OTHER Refers to the patient's cardiac, lung, or endocrine conditions. Select the appropriate diagnosis from the list if you know your patient's condition. For ECG waveform analysis, it is better to select NORMAL or UNKNOWN than to leave this field blank.
***Class 2**	See ***CLASS 1**, above **NOTE:** If you typically use just the ***Medication 1** and ***Class 1** fields, use the PATIENT FIELDS ENABLE menu to select the **OFF** setting for the ***Medication 2** and ***Class 2** fields (see "Enabling patient demographic fields" on pg. 4-12). **NOTE:** Do not use this field if blank, NORMAL or UNKNOWN is selected for ***Class 1**. These entries for ***Class 1** cause the analysis program in interpretive Eclipse units to ignore the ***Class 2** field.
Height	[Up to 3 numeric characters. Range = 0-96 in. or 0-244 cm.] Measured in either inches or centimeters as determined in the SYSTEM SETUP menu.
Weight	[Up to 3 numeric characters. Range = 0- 500 lb. or 0-227 kg.] Measured in either pounds or kilograms as determined in the SYSTEM SETUP menu.

Systolic BP (Blood Pressure)	[Up to 3 numeric characters. Range = 0 – 250]
Diastolic BP (Blood Pressure)	[Up to 3 numeric characters. Range = 0 – 250]
Department	[Up to 5 numeric characters. Range 1 – 32000] Identifies your department in the facility.
Room	[Up to 7 alphanumeric characters] Identifies your location within the facility.
Technician	[Up to 20 alphanumeric characters] Identifies the person acquiring the ECG.
Physician	[Up to 20 alphanumeric characters] Identifies the patient's physician.
User Field	[Up to 15 alphanumeric characters] Use this field to suit your needs. A possible use might be to identify the referring physician. You may label this field in the User Setup menu (see "Configuring the User Setup Menus" on pg. 4-4).
Comments	[Up to 25 alphanumeric characters] Use this field to input additional patient information as needed.

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Chapter 7 *Working with an Existing Patient File*

Once a record exists for a patient, the record and all of the information that relate to it will be stored in memory until an ECG is acquired for a new patient.

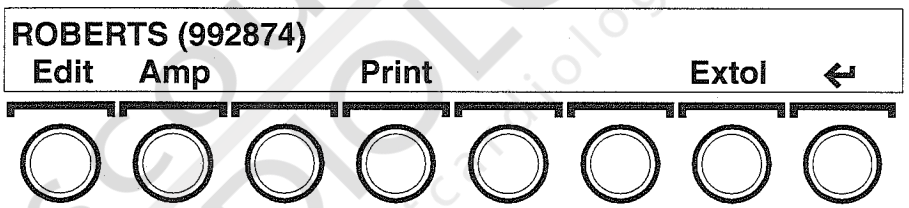
With an existing patient file you may:

- edit demographic information (except for age)
- print additional copies of the ECG
- change filter, gain and speed settings when reprinting an ECG
- record a new ECG

In order to perform addition functions with an existing patient file, you must enter the EDIT menu.

1. From the INITIAL menu, select the soft function key under EDIT. The EDIT menu is displayed:

Figure 7-17
The EDIT menu



The last name and ID of the existing patient are displayed in the upper left corner of the menu.

2. Press the soft function key under Edit to edit patient demographics. The first PATIENT menu field is displayed. Edit patient demographics as desired (for more information, see "Patient Demographic Fields" on pg. 6-8). These changes are saved when you press the return arrow key ↵ to return to the EDIT menu.
3. Press the soft function key under Print to print an additional copy of the ECG. The existing report will print out immediately, and the display will then return to the EDIT menu.

NOTE: To change filter, gain and speed settings, press the soft function key under Amp prior to reprinting the ECG. Make changes as desired to the settings; these changes are saved when you press the return arrow key ↵ to return to the EDIT menu.

4. Press  to record a new ECG for the patient. The patient ID field is displayed. Verify that the patient ID displayed is correct, then press  again. The Eclipse will automatically print and save the ECG.

Press the return arrow key to exit.

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Chapter 8 *Sample Printouts*

Print Setup Report

The Print Setup Report is a list of all current settings (see "Acquiring a Printout of Eclipse Settings" on pg. 4-14).

The example printouts below list the settings as they are set at the factory.

Some of the features listed on the Setup Report printout are not currently supported by this device and will not appear in the System Setup menu.

SETUP REPORT **08/29/2000 15:50:21** **Serial #: 21010000074**

USER SETUP

POWER-UP DEFAULTS
- Speed: 25 mm/s
- Gain: 10 mm/mV
- Artifact Filter: 40 Hz

AUTO ECG SETUP
- 12 Lead Format: STANDARD, 4 CHANNEL
- Rhythm Lead Ch.1: LEAD II
- Rhythm Lead Ch.2: aVF
- Rhythm Lead Ch.3: V5
- Rhythm Page: OFF
- Analysis-Original: ON
- Analysis-Copies: OFF
- Number Of Copies: 0
- Median Complex Page: OFF
- Save Mode: AUTO
- Wait for Good Data: ON

Custom Lead 1: STANDARD, 3 CHANNEL

Channel 1: LEAD II	Channel 7: LEAD I
Channel 2: aVF	Channel 8: LEAD I
Channel 3: V5	Channel 9: LEAD I
Channel 4: LEAD I	Channel 10: LEAD I
Channel 5: LEAD I	Channel 11: LEAD I
Channel 6: LEAD I	Channel 12: LEAD I

Custom Lead 2: STANDARD, 3 CHANNEL

Channel 1: LEAD II	Channel 7: LEAD I
Channel 2: aVF	Channel 8: LEAD I
Channel 3: V5	Channel 9: LEAD I
Channel 4: LEAD I	Channel 10: LEAD I
Channel 5: LEAD I	Channel 11: LEAD I
Channel 6: LEAD I	Channel 12: LEAD I

MISCELLANEOUS
- Baseline Filter: STABLE baseline
- Pacer Enhancement: OFF
- Rhythm Mode Pages: 1
- Bradycardia Limit: 60
- Tachycardia Limit: 100
- Custom Header ID: 0000

PATIENT FIELDS ENABLE

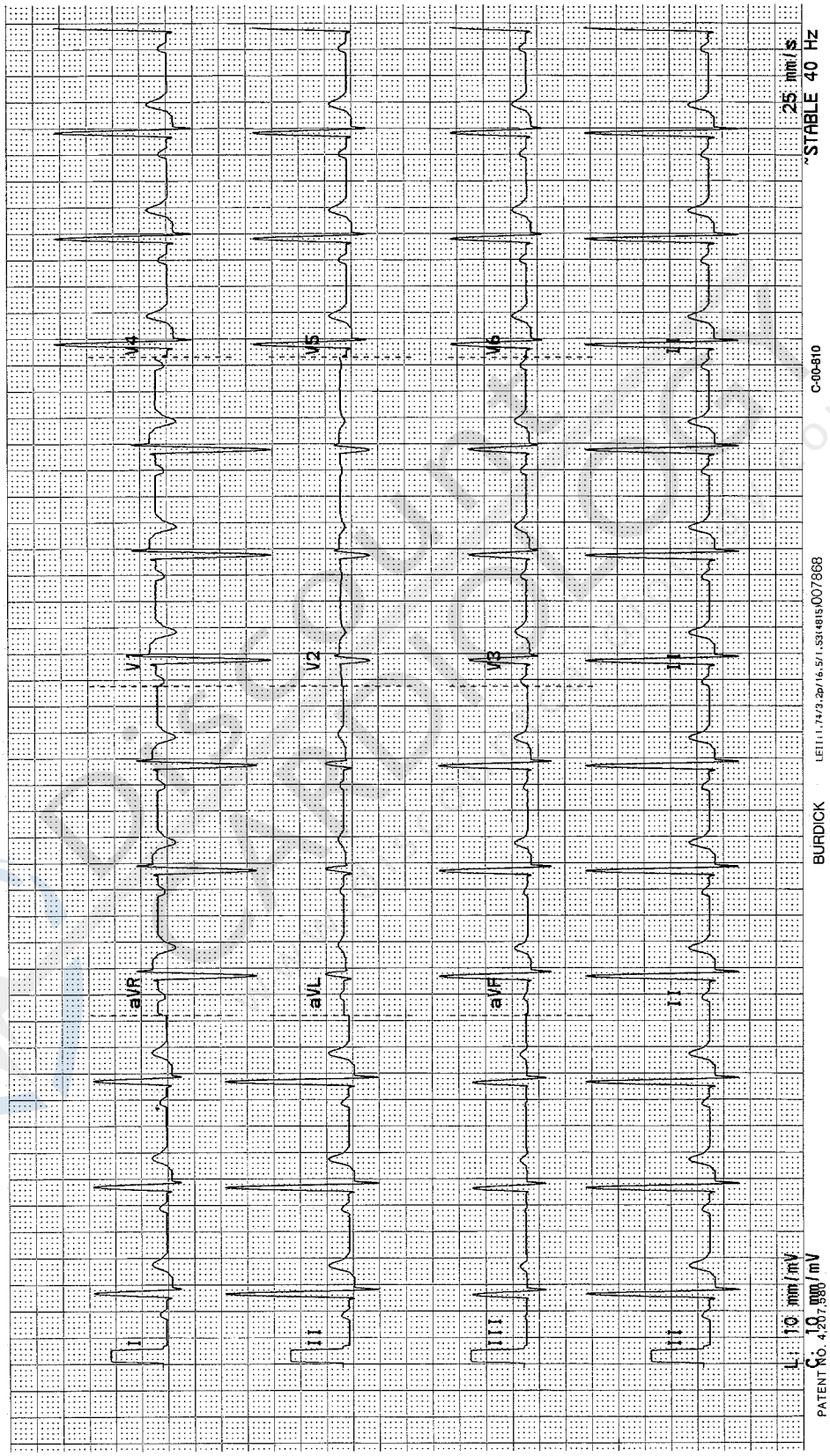
(*Items may affect computer analysis)

*V3 Placement	: ON, CLEAR	*Class 2: OFF	
Last Name	: ON	Height (in): OFF	
First Name	: ON	Weight (lbs): OFF	
		Systolic BP	: OFF
*Age	: ON	Diastolic BP	: OFF
*Age Format	: ON	Department	: ON, HOLD
*Sex	: ON	Room	: OFF
*Race	: OFF	Technician	: ON, CLEAR
*Medication 1	: ON	Physician	: ON, CLEAR
*Medication 2	: OFF	User Field	: OFF
*Class 1: ON		User Field Label: User Field:	
		Comments: ON	

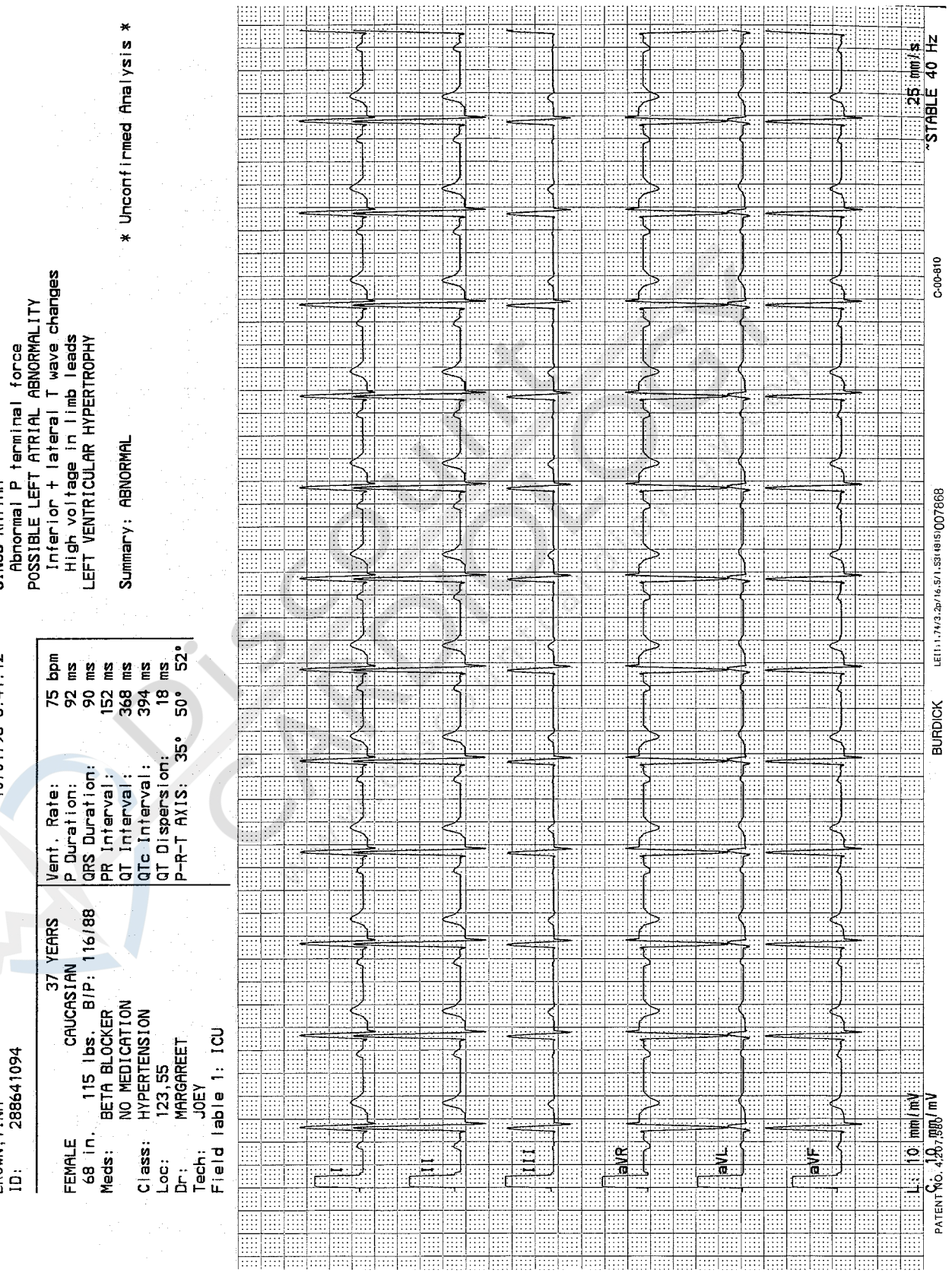
SYSTEM SETUP

- User 1-2 Select: 1
- Line Filter: 60 Hz
- Date Format: MM/DD/YY
- Date: 08/29/2000
- Time: 15:50:21
- Language: ENGLISH
- Height Units: IN.
- Weight Units: LB.
- Inst. Name:
- Phone Type: TOUCH TONE
  - Institution Number: 1
  - Device Id: 00000
  - Phone #:
  - Description:
  - Connection: NONE
  - Baud Rate: AUTO
  - AC MAINS Frequency: 60 Hz
- Analysis Statements: FULL
- Password: OFF
- FAX
  - Phone #1:
  - Description #1:
  - Phone #2:
  - Description #2:
  - Phone #3:
  - Description #3:
  - Phone #4:
  - Description #4:

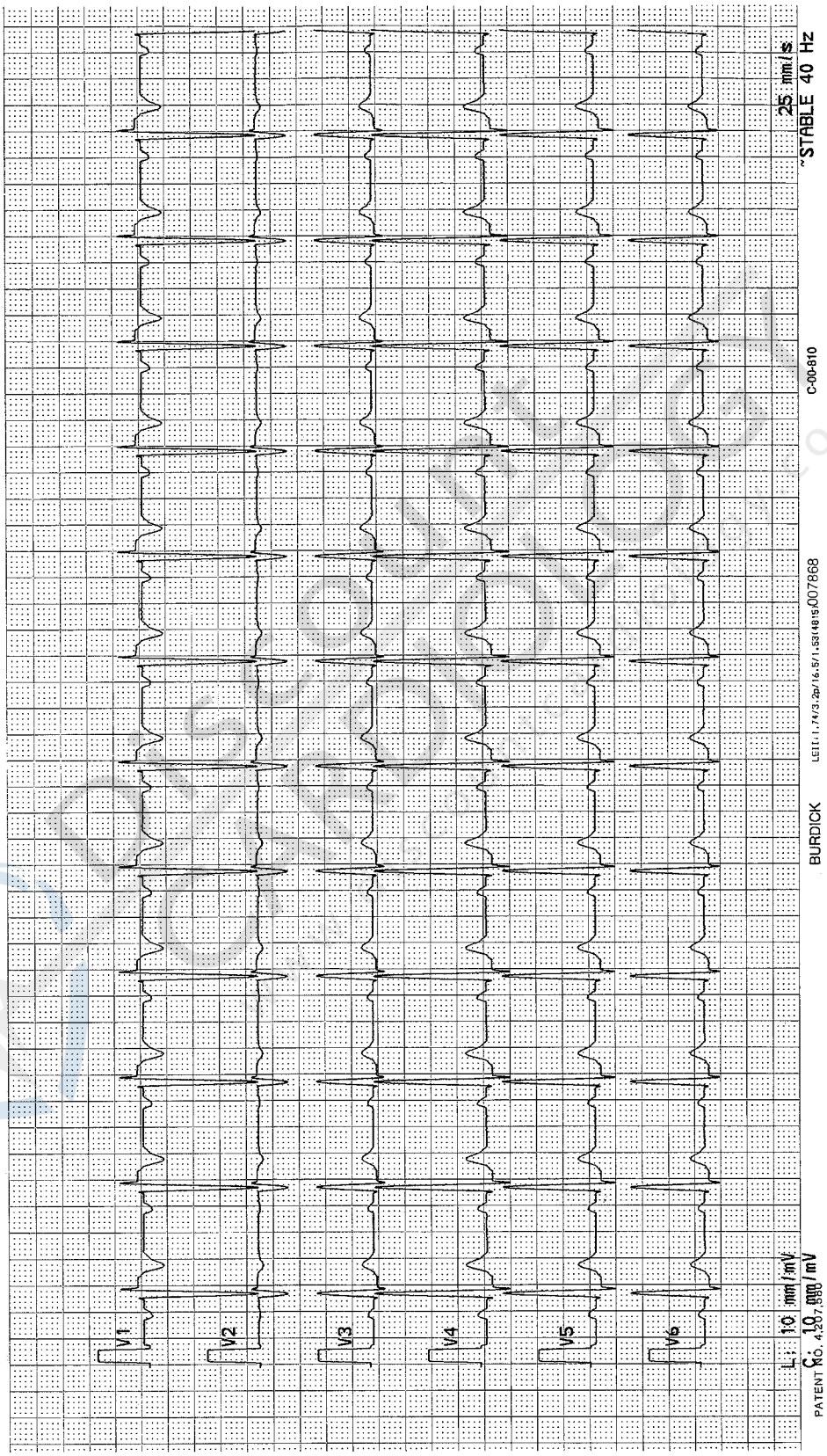
Standard 12-Lead, 4-Channel Auto ECG



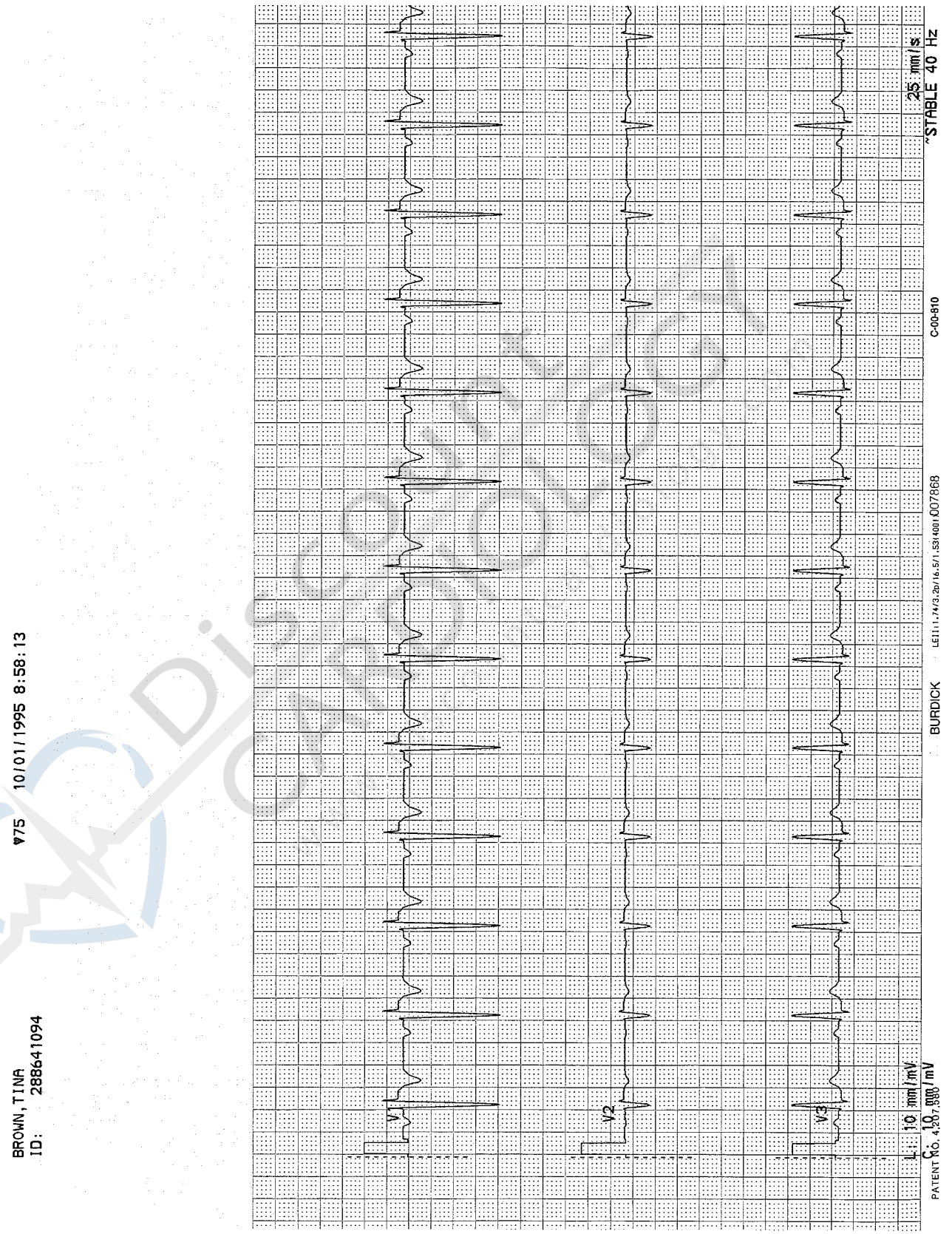
Standard 12-Lead, 6-Channel Auto ECG



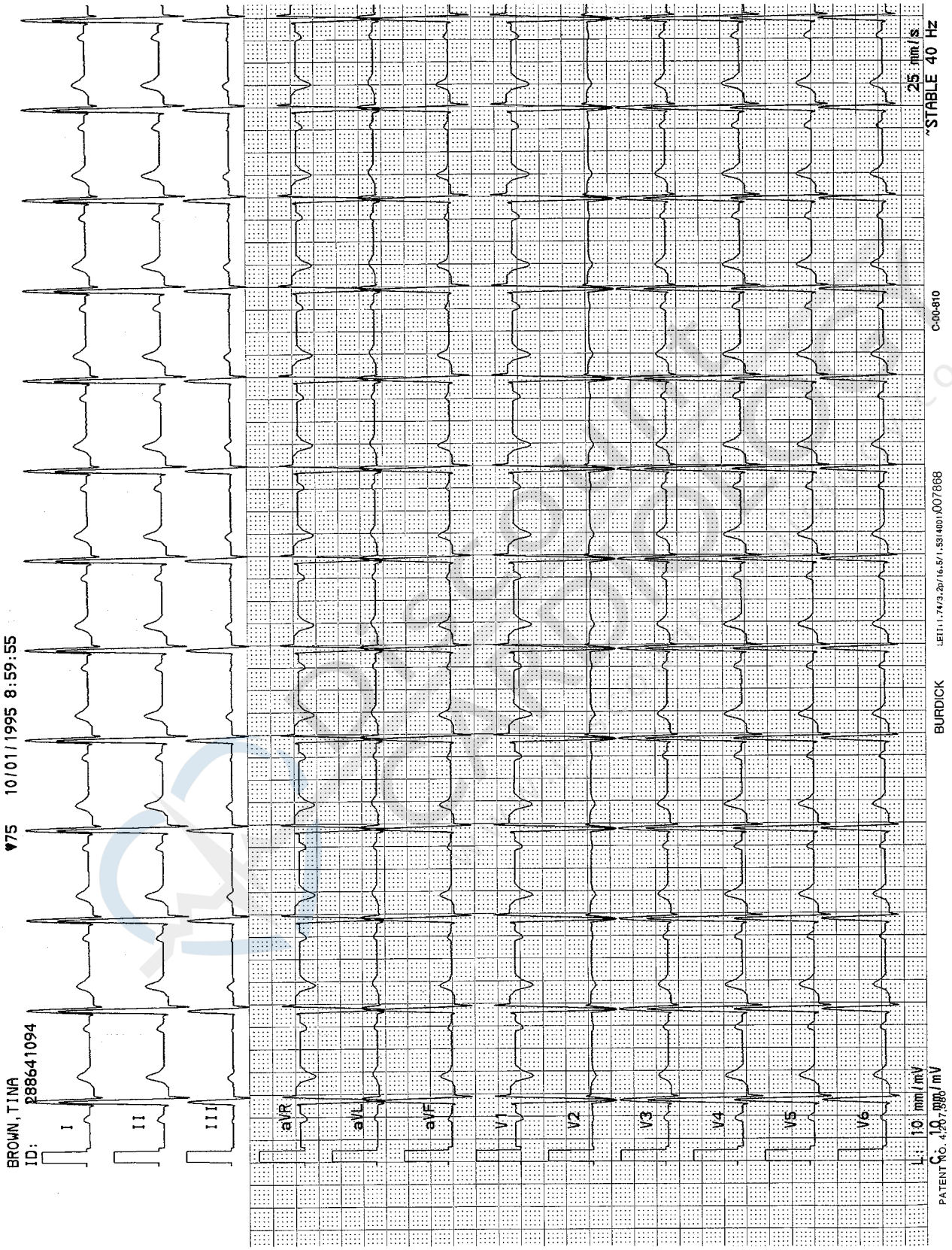
[Standard 12-Lead, 6-Channel Auto ECG (continued)]



Standard 3-Channel Rhythm & Manual ECG



Standard 12 Channel Rhythm & Manual ECG



Chapter 9 *Troubleshooting*

Troubleshooting Basic Unit Problems

PROBLEM	PROBABLE CAUSE
Unit will not turn on.	- Unit not connected to AC line voltage. - Battery is not installed or has no charge. - Faulty power cord. - AC outlet not functional.
After the battery has been fully charged, the battery status gauge indicates low battery within 30 minutes of operation.	- Battery pack may be worn out. - Battery status gauge is not calibrated (see "Using the Battery" on pg. 2-3).
Unit "beeps" when a key is pushed.	- That function or key is not an option at this time. Press another key to proceed.
Unit has "frozen." The unit does not respond to key strokes and the display does not change.	- Press the On/Standby key. After a possible delay of up to 5 seconds, the unit shuts off. To continue with normal operation, press On/Standby again to restart the Eclipse.
Unit displays a completely blank screen.	- Press the On/Standby key to restart the Eclipse.

Troubleshooting Trace Problems

PROBLEM	PROBABLE CAUSE
Waveforms are flat for all leads and/or "OVERLOAD" message will not clear.	- Electrodes not applied correctly. - Acquiring ECG too quickly; wait for the message, "SENSORS OK" before pressing the ECG key. - Patient cable not properly connected to unit. - Faulty patient cable. - Electrical interference from an external source is causing noise spikes.

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PROBLEM	PROBABLE CAUSE
Waveform is flat for one or more leads (all others are OK) and/or "OVERLOAD" message will not clear.	- Electrode not applied correctly. - Acquiring ECG too quickly; wait for the message, "SENSORS OK" before pressing the ECG key. - Electrode not adhering properly. - Electrode is being pulled, tapped or pressed. - Electrode disconnected from patient's skin. - Lead wire disconnected from electrode. - Debris in teeth of astroclip. - Faulty lead wire(s) or patient cable.
Baseline is drifting in waveform for one or more leads.	- Poor patient preparation. - Use of dissimilar sensors or sensors not recommended for use with the Eclipse . - Sensors need to sit longer on skin. - Poor sensor contact with skin.
Trace is "noisy." The waveform is not a single, clean line.	- AC interference from lighting, cables, or equipment near patient. - Improper line filter setting in SYSTEM SETUP menu.
Occasional noise or artifact in the waveform for one or more leads.	- Patient movement. - Muscle tremor noise. - Improperly applied sensors. - Electrical interference. - Sensors need to sit longer on skin. - Poor sensor contact with skin. - Ineffective baseline filter setting.
Incorrect heart rate printed and/or displayed.	- Waveform is a bigeminal rhythm. - Poor data quality. Ensure that the sensors and leads are attached properly.
Incorrect or missing measurements on the printout.	- Undetermined P-wave or P-T coupling. - Poor data quality. Ensure that the sensors and leads are attached properly. - Unusual waveform pattern.

Troubleshooting Printer Problems

PROBLEM	PROBABLE CAUSE
Paper jammed or misaligned.	- Unit not used for extended period of time with paper installed. Reload paper, see page 2-4.
REDUCED PERFORMANCE MODE Paper speed erratic. ECG printouts have unexpected breaks in the waveforms at random intervals. Breaks are accompanied by vertical dashed lines, header/footer information and lead designators.	- 50 mm/s paper speed selected. Reduce paper speed to 25 mm/s. - Artifact filter is set to 40 Hz (on). Change setting to 150 Hz. - Current Custom Lead setting is Frank. Use another Custom Lead setting or reduce paper speed and turn off Artifact Filter.

Recognizing and Reducing ECG Artifacts

"OVERLOAD" message

Defibrillating the patient will interfere with the Eclipse sensors. This may result in loss of the trace or erratic trace deflections. An "OVERLOAD" message alerts you that waveforms may not be accurate. To speed recovery time after defibrillation press the "B" key to activate the Defibrillation Recovery filter (see "The Defibrillation Recovery filter" on pg. 9-6).

A broken wire in a patient lead or a poorly applied sensor may also cause an "OVERLOAD" message. This condition must be corrected before the overload condition clears.

Rapid, large and erratic deflections

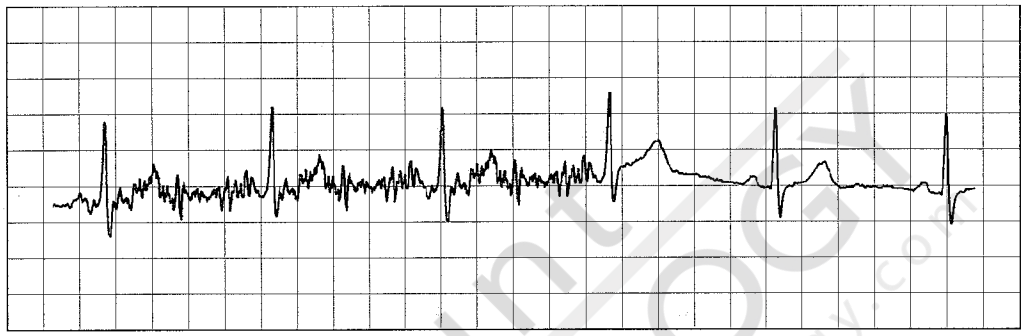
A broken wire in the patient lead or a poorly applied sensor may cause rapid, large and erratic trace deflections.

Irregular frequency or amplitude

Patient movement and muscle tremor may result in abnormal traces. To minimize this artifact, toggle the artifact filter to 40 Hz with the "9" machine control key.

In addition, try to gain the patient's cooperation in staying very relaxed and still. Sometimes, somatic tremor is unavoidable but its effects may be minimized by having the patient place his/her hands under the buttocks.

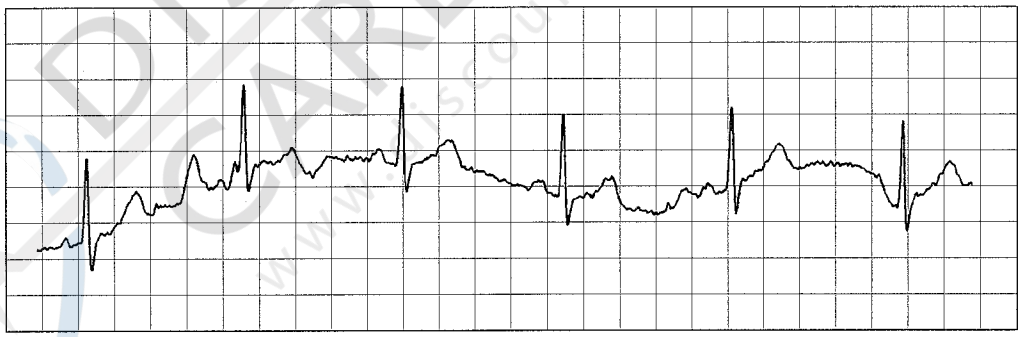
Figure 9-18
Somatic Tremor and Patient Movement Artifact



Baseline wander

Poorly affixed sensors may cause the baseline to wander. Normally, the baseline will stabilize within a few seconds. If the baseline shifts up and down, it may be due to the patient's breathing or to loose or corroded sensors. To minimize this condition, set the baseline filter setting to STABLE.

Figure 9-19
Poorly Affixed Sensor Artifact



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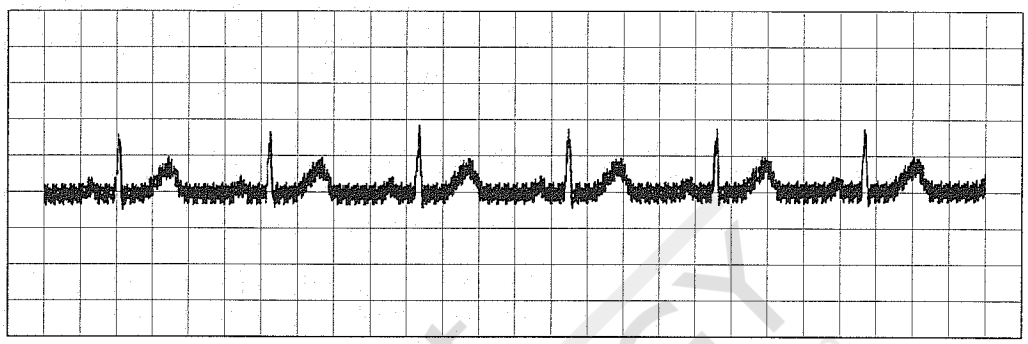
Wide baseline

Electrical interference may produce a wide baseline. Its amplitude depends on the strength of the current source and the lead being recorded. In any one lead, the amplitude of the interfering signal is uniform.

Figure 9-20
Electrical Interference Artifact



To reduce electrical interference:

- ✔ Keep the power cord away from the patient and patient cable.
- ✔ Connect the unit to a properly grounded wall outlet.
- ✔ Arrange the patient cable leads together, closely following the body contour.
- ✔ Check the line filter setting in the SYSTEM SETUP menu. For more information, see "Configuring SYSTEM SETUP Menu" on pg. 4-1.
- ✔ Ensure that Diathermy or X-ray equipment in adjacent rooms is not operating. Other electrical equipment including electric beds and lighting fixtures may also generate interference (even when not in use).
- ✔ Try moving the patient to another place in the room. Sometimes, electrical wiring in walls and ceilings causes interference.
- ✔ Operate the Eclipse from battery power.

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The Defibrillation Recovery filter

> **NOTE:** The Defibrillation Recovery filter should be used only for enhanced recovery time after defibrillation to confirm the presence of cardiac activity. While this filter is enabled, waveforms printed are not of diagnostic quality. Care must be taken by the operator to not misinterpret the patient's condition during an "OVERLOAD" condition.

The Eclipse provides a Defibrillation Recovery filter for faster recovery time from an "OVERLOAD" condition caused by defibrillation (see ""OVERLOAD" message" on pg. 9-3).

This filter is enabled by pressing the "B" key. Do this only after defibrillation and only if the trace does not recover. When the filter is enabled, the Sensor Status message in the INITIAL menu displays "FAIL" and "OVERLOAD" is printed on the report. After approximately 30 seconds, the filter clears and the Eclipse returns to normal operation.

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Chapter 10 *Maintenance and Service*

NOTE: To ensure safety of patients and operators, periodic safety checks should be performed by a qualified service technician trained in medical device safety.

Calibrating and Recharging the Battery

Whenever a new battery is placed in the Eclipse or whenever the battery is removed and re-installed, the battery should be calibrated. In addition, it is recommended that you follow this procedure every 60 days to maintain maximum battery capacity. This is especially important if the unit is infrequently operated with battery power.

1. Unplug the Eclipse from AC line power.
2. Press ON/STBY to turn the Eclipse on. Press SETUP soft function key to go to the SETUP menu. Press the Up arrow soft function key until the BATTERY EXERCISE MODE menu selection appears. Press the soft function key to activate Battery Exercise Mode.
3. Fully discharge the battery by operating the unplugged unit until the unit powers down from lack of power.
4. Ensure that the battery is discharged by pressing the On/Standby key. If the unit does not turn on or if it powers down within a few seconds, the battery is discharged.
5. Reconnect AC power to fully recharge the battery in about 5 hours.

NOTE: You may operate the Eclipse from AC line power while the battery is charging. However, this will increase charging time.

DO
Battery Replaced
12-30-05

Inspecting for Damage

WARNING: Hazardous voltage. To reduce the risk of electrical shock, do not attempt to remove the cover under any circumstances. Refer servicing to a qualified technician.

Before every use, check the power cord, power plug, power connector, and power input jack for signs of damage.

Contact an authorized service agent immediately if:

- ✔ The equipment falls from the cart or is subjected to some other extreme mechanical stress.
- ✔ Liquid is spilled on the equipment.
- ✔ The equipment is not functioning properly.
- ✔ Parts of the enclosure are cracked, missing or deteriorated.
- ✔ Any connector or cord shows signs of deterioration such as cracking.

Cleaning and Disinfecting the Eclipse

Clean and disinfect the unit any time it is deemed necessary.

The housing

NEVER use ether, benzene or similar solvents.

CLEANING

Gently rub the housing with a clean, damp cloth using a mild household detergent.

DISINFECTION

Spray the housing with INCIDIN or similar product.

The patient cable and reusable sensors

NEVER immerse cables in fluid, or use hot sterilization. Do not use ether. Do not use bleach, acetone or similar harsh chemicals or solvents.

CLEANING AND DISINFECTION

Rub with a clean cloth moistened with a formaldehyde solution such as CIDEX, SONACIDE, LYSOFORM 5% or INCIDIN 1.5%.

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Testing Equipment

The Eclipse performs a computer self-test every time it is powered up. No calibration is necessary. Complete safety and component checks should be perform at least annually by a qualified service technician.

Testing the Patient cable

If the patient cable appears damaged in any way, contact your local representative for replacement.

- Visually inspect for the cable for cracks, stress marks and broken or bent pins.
- Connect the patient cable to the ECG and attach each sensor lead to an electronic heart signal simulator. (If a simulator is not available, a test subject may be used.)
- Check the signal transmission through the cable by flexing the cable and electrode lead wires and observing the ECG rhythm for irregular tracings.

> **NOTE:** If using a test subject, be sure not to disturb the sensor site since common baseline artifact will occur. This should not be confused as a broken wire.

Testing the battery

The Eclipse monitors battery status. It is not necessary for you to perform any tests on the battery. However, if the battery does not retain a charge for more than 30 minutes of operation, you may need to condition or replace the battery pack. To condition the battery pack, perform the steps outlined in "Using the Battery" on pg. 2-3.

The battery pack in the Eclipse is not user replaceable. It must be replaced by an authorized service representative.

> ***WARNING:*** ***Never remove the battery pack and attempt to recharge it using an external battery charger. Fire or explosion may result.***

Notice to responsible service personnel

The contents of this document are not binding. If you find a significant difference between this service information and your unit, please consult your local representative. We reserve the right to improve or modify products without amending this document or advising the user.

We recommend consulting authorized personnel for all service and repairs, and using genuine parts, exclusively. Spacelabs Burdick, Inc. will not otherwise assume responsibility for material quality, workmanship or any consequences thereof.

This product has been carefully designed and manufactured to provide a high degree of safety and dependability. However, we can not guarantee against the failure or deterioration of components due to aging and normal use.

Performance Disclosures

⚠ *WARNING: Explosion hazard. Do NOT use in the presence of flammable anesthetics.*

⚠ *WARNING: This device is NOT intended for unattended or continuous patient monitoring. It is intended for short-term ECG waveform acquisition. There are no audible or visible alarms.*

CAUTION: Although the Eclipse is designed to meet IEC 601-1-2 EMC immunity requirements, the presence of strong EMI fields generated by electronic, surgical or diathermy instruments in close proximity to the unit may cause trace noise or input overload conditions.

NOTE: Deviations from the technical specification ranges listed can affect device performance.

NOTICE: Computer assisted interpretation is a valuable tool when used properly. However, no automated interpretation is completely reliable and interpretations should be reviewed by a qualified physician before treatment, or non-treatment, of any patient.

NOTICE: Because the Eclipse offers several different lead configurations, always ensure that the appropriate lead placement is employed for the lead configuration selected.

CE 0123 This symbol which appears on the rear panel of some units, indicates this equipment meets the requirements of Council Directive 93/42/EEC, MDD, Class IIa.

These units have been tested for electromagnetic compatibility in accordance with IEC 601-1-2. The failure criterion for the device is, "undetectable interference with the ECG trace which could result in misdiagnosis." While the device passes the relevant standards, it may exhibit evidence of interference when subjected to electrostatic discharges, high voltage transients or high voltage surges, as defined in IEC 801-2, IEC 801-4 and IEC 801-5. The interference from a single event will demonstrate as a sharp noise spike on the ECG trace. The clinician will not confuse such a noise spike with the heart beat waveforms and there is no hazard of misdiagnosis. In the unlikely situation that the equipment is placed in an environment where such interference events are common, either the equipment or the interference source may be moved.

Battery pack

Under normal conditions, a fully charged battery pack provides adequate power to print a minimum of 200 pages of data at paper speed of 25 mm/sec; or a minimum of 20 minutes of continuous acquisition and printing.

A fully discharged battery pack will completely recharge in approximately 5 hours.

Heart rate detection

The Eclipse heart rate meter is specified to function in the range of 30 to 250 bpm with a tolerance of ±10% or ±5 bpm, whichever is greater. Question marks (**???**) appear on the printout if the heart rate is out of the specified range.

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Technical Specifications

Dimensions:	114mm x 387mm x 457mm (15.25" x 18" x 4.5")
Weight (unit only):	6.8 kg (15.0 lbs)
Power Requirements:	
mains power requirement	115/230 V AC ±10%, 0.80/0.40 A, 50/60 Hz
battery operation	16.8 VDC NiCd battery pack
Fuses:	
F1 and F2 mains	for 115 V, 1.0 A 250 V type T for 230 V, 0.500 A 250 V type T
Environmental:	
operating temperature	10° C to 40° C
storage temperature	-20° C to 55° C
relative humidity	25% to 95% non-condensing
atmospheric pressure	7×10^4 to 10.6×10^4 Pa
Acquisition:	
lead selection	I, II, III, aVR, aVL, aVF, V1, V2, V3, V4, V5, V6 Supports Frank X,Y,Z and Nehb D,A,J
interpretation (if equipped)	diagnosis, measurements, reasons statements
modes	auto, manual
frequency response	meets or exceeds ANSI/AAMI EC11-1991 standard
input impedance	meets or exceeds ANSI/AAMI EC11-1991 standard
electrode offset tolerance	±300 mV
a/d conversion	5µV LSB
Storage Resolution:	500 samples/sec, 5µV resolution
Artifact Filter Response:	40 Hz, -3dB
Display:	2 x 40 character liquid crystal display (LCD)
Printout:	
paper type	thermal sensitive
chart speeds	10, 25, 50 mm/sec. (meets or exceeds ANSI/AAMI EC11-1991 standard)
gain	5, 10, 20 mm/mV (meets or exceeds ANSI/AAMI EC11-1991 standard)
printout formats	3, 4 or 6 channels; additional rhythm formats
printout device	216mm thermal dot array
paper dimension	8.5" x 11" 210mm x 300mm (A4)

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Input/Output:

(units with communications)	25 pin connector to EXTOL monitor

Conforms to Standards:

IEC 601-1/CSA C22.2 no. 601-1-M90

IEC 601-2-25/CSA C22.2 no. 601-2-25

IEC 601-1-2
And, by reference of IEC 601-1-2, conforms to EN 55011-Class A, IEC 801-2, IEC 801-3, IEC 801-4 and IEC 801-5.

AZ/NZS 2064.1/2

Safety:

leakage current	patient <10µA, chassis <300µA
defibrillator protection	to 5000V, 400J

Equipment Type:

Class IIa (Council Directive 93/42/EEC, MDD)

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FCC CONNECTION INFORMATION

This equipment complies with Part 68 of the FCC Rules. On the bottom of this equipment is a label that contains, among other information, the FCC Registration Number and ringer equivalence number (REN) for this equipment. If requested, this information must be provided to the telephone company.

The REN is used to determine the quantity of devices that may be connected to the telephone line. Excessive RENs on the telephone line may result in devices not ringing in response to an incoming call. In most, but not all areas, the sum of the RENs should not exceed five (5.0). To be certain of the number of devices that may be connected to the line, as determined by the total RENs, contact the telephone company to determine the total REN for the calling area.

If your Eclipse causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. But if advance notice isn't practical, you will be notified as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

The telephone company may make changes in its facilities, equipment, operations, or procedures that could effect the operation of the equipment. If this happens, the telephone company will provide advance notice in order for you to make the necessary modifications in order to maintain uninterrupted service.

If you experience trouble with your Eclipse, please contact Spacelabs Burdick, Inc., 500 Burdick Parkway, Deerfield, WI 53531, U.S.A., phone: (800) 333-7770 or (608) 764-2381 for repair/warranty information. If the trouble is causing harm to the telephone network, the telephone company may request you remove the equipment from the network until the problem is solved.

This equipment may not be used on coin service provided by the telephone company. Connection to Party Line Service is subject to state tariffs. (Contact the state public utility commission, public service commission, or corporation commission for information.)

This device is equipped with a USOC RJ11C connector

EQUIPMENT ATTACHMENT LIMITATIONS

NOTICE: The Canadian Department of Communications label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational, and safety requirements. The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, user's should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single-line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

User's should ensure for their own protection that the electrical ground connections of the power utility, telephone lines, and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

CAUTION: Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

The LOAD NUMBER (5) assigned to each terminal device denotes the percentage of the total load to be connected to a telephone loop, which is used by the device to prevent overloading. The termination on a loop may consist of any combination of devices subject only to the requirement that the total of the Load Numbers of all of the devices does not exceed 100.

SERVICE STATION: If you have any questions or trouble, please contact Spacelabs Burdick, Inc., 500 Burdick Parkway, Deerfield, WI 53531, U.S.A., phone: (800) 777-1777 or (608) 764-1919.

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