Mortara

ELI 150 Rx

12-LEAD RESTING ELECTROCARDIOGRAPH

USER MANUAL

$C\epsilon$
0459

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

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NOTICES

Manufacturer's Responsibility

Mortara Instrument, Inc. is responsible for the effects on safety and performance only if:

• Assembly operations, extensions, readjustments, modifications, or repairs are carried out only by persons authorized by Mortara Instrument, Inc.

• The device is used in accordance with the instructions for use.

Responsibility of the Customer

The user of this device is responsible for ensuring the implementation of a satisfactory maintenance schedule. Failure to do so may cause undue failure and possible health hazards.

Equipment Identification

Mortara Instrument, Inc. equipment is identified by a serial and reference number on the back of the device. Care should be taken so that these numbers are not defaced.

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a) Freight damage;

b) Parts and/or accessories of the Product/s not obtained from or approved by Mortara;

c) Misapplication, misuse, abuse, and/or failure to follow the Product/s instruction sheets and/or information guides;

d) Accident; a disaster affecting the Product/s;

e) Alterations and/or modifications to the Product/s not authorized by Mortara;

f) Other events outside of Mortara's reasonable control or not arising under normal operating conditions.

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USER SAFETY INFORMATION

⚠ **Warning:**   Means there is the possibility of personal injury to you or others.

⚠ **Caution:**   Means there is the possibility of damage to the device.

Note: Provides information to further assist in the use of the device.

⚠ **Warning(s)**

- This manual gives important information about the use and safety of this device. Deviating from operating procedures, misuse or misapplication of the device, or ignoring specifications and recommendations could result in increased risk of harm to users, patients and bystanders, or damage to the device.

- Device (electrocardiograph, Class I) captures and presents data reflecting a patient's physiological condition that when reviewed by a trained physician or clinician can be useful in determining a diagnosis;. however, the data should not be used as a sole means for determining a patient's diagnosis.

- Users are expected to be licensed clinical professionals knowledgeable about medical procedures and patient care, and adequately trained in the use of this device. Before attempting to use this device for clinical applications, the operator must read and understand the contents of the user manual and other accompanying documents. Inadequate knowledge or training could result in increased risk of harm to users, patients and bystanders, or damage to the device.

- To ensure that electrical safety is maintained during operation from AC (~) power, the device must be plugged into a hospital-grade outlet.

- To maintain designed operator and patient safety, peripheral equipment and accessories used that can come in direct patient contact must be in compliance with UL 60601-1, IEC 60601-1, and IEC 60601-2-25. Only use parts and accessories supplied with the device and available through Mortara Instrument, Inc.

- Patient cables intended for use with the device include series resistance (9 Kohm minimum) in each lead for defibrillation protection. Patient cables should be checked for cracks or breakage prior to use.

- Conductive parts of the patient cable, electrodes, and associated connections of type CF applied parts, including the neutral conductor of the patient cable and electrode, should not come into contact with other conductive parts including earth ground.

- ECG electrodes could cause skin irritation; patients should be examined for signs of irritation or inflammation.

- To avoid the possibility of serious injury or death during patient defibrillation, do not come into contact with device or patient cables. Additionally, proper placement of defibrillator paddles in relation to the electrodes is required to minimize harm to the patient.

- This device was designed to use the electrodes specified in this manual. Proper clinical procedure must be employed to prep the electrode sites and to monitor the patient for excessive skin irritation, inflammation, or other adverse reactions. Electrodes are intended for short-term use and should be removed from the patient promptly following testing.

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- To avoid potential for spread of disease or infection, single-use disposable components (e.g., electrodes) must not be reused. To maintain safety and effectiveness, electrodes must not be used beyond their expiration date.

- To ensure the safety of both the patient and the device, 1.5 meters (5') of open area should surround the patient.

- A possible explosion hazard exists. Do not use the device in the presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide.

- Where the integrity of external protective earth conductor arrangement is in doubt, the device shall be operated from its internal electrical power source.

- All signal input and output (I/O) connectors are intended for connection of only those devices complying with IEC 60601-1, or other IEC standards (e.g., IEC 60950) as appropriate to the device. Connecting additional devices to the device may increase chassis and/or patient leakage currents. To maintain operator and patient safety, consideration should be given to the requirements of IEC 60601-1-1, and leakage currents should be measured to confirm no electric shock hazard exists.

- To improve immunity to potential interfering electromagnetic signals, shielded cabling is recommended when connecting the device to a network.

- To maintain operator and patient safety, equipment connected to the same network as the device must meet the requirements of IEC 60950 or IEC 60601-1.

- To prevent electric shock due to unequal ground potentials that may exist between points of a distributed network system or fault conditions in external network connected equipment, network cable shielding (where used) must be connected to protective earth ground appropriate to the area where the device is used.

- The device has not been designed for use with high-frequency (HF) surgical equipment and does not provide a protective means against hazards to the patient.

- The quality of the signal produced by the device may be adversely affected by the use of other medical equipment, including but not limited to defibrillators and ultrasound machines.

- For proper operation and the safety of users or patients and bystanders, equipment and accessories must be connected only as described in this manual. Do not connect a telephone line cable to the LAN connector.

- This device may contain a GSM/GPRS (cellular modem) or wireless LAN (WLAN) module for transmitting ECG records. Device labeling and the presence of an antenna port will indicate if your device is equipped with such a module. If so equipped, the following notices apply:

    - The GSM/GPRS module operates in allocated frequency bands depending on the model. Identification of the installed GSM/GPRS module can be found on a label on the bottom of the device.
        - MultiTech Systems, Inc. Model MTSMC-G-F1 (Europe and elsewhere): 900/1800 MHz
        - MultiTech Systems, Inc. Model MTSMC-G-F2 (U.S. and elsewhere): 850/1900 MHz
        - MultiTech Systems, Inc. Model MTSMC-G-F4 (Quad Band): 850/900/1800/1900 MHz, user selectable

    - The WLAN identification can be found on a label on the bottom of the device.
        - Quatech, Inc. Model WLNG-AN-DP101: 2400 MHz

- Use of the GSM/GPRS or WLAN module may interfere with other equipment operating in the vicinity. Check with local authorities or spectrum management officials in your facility to determine if restrictions apply to the use of this feature in your area.

- Do not transmit via the GSM/GPRS or WLAN module with a missing or damaged antenna. Replace a damaged antenna immediately.

- Use only the antenna supplied for use with this device. Unauthorized antennas, modifications, or attachments could damage the GSM module and may contravene local RF emission regulations or invalidate type approval.

- To ensure compliance with current regulations limiting both maximum RF output power and human exposure to radio frequency radiation, a separation distance of at least 20 cm must be maintained between the device's antenna and the head and body of the user and any nearby persons at all times. To help prevent degradation of RF signal and to avoid excess RF energy absorption, do not touch the antenna during data transmission.

- The GSM/GPRS and WLAN modules comply with applicable RF safety standards including standards and recommendations for the protection of public exposure to RF electromagnetic energy that have been established by governmental bodies and other qualified organizations, such as the following:
  - Federal Communications Commission (FCC)
  - Directives of the European Community
  - Directorate General V in Matters of Radio Frequency Electromagnetic Energy

⚠ **Caution(s)**

- To prevent possible damage to the keyboard, do not use sharp or hard objects to depress keys, only use fingertips.

- Do not attempt to clean the device or patient cables by submersing into a liquid, autoclaving, or steam cleaning as this may damage equipment or reduce its usable life. Wipe the exterior surfaces with a warm water and mild detergent solution and then dry with a clean cloth. Use of unspecified cleaning/disinfecting agents, failure to follow recommended procedures, or contact with unspecified materials could result in increased risk of harm to users, patients and bystanders, or damage to the device.

- No user-serviceable parts inside. Screw removal by qualified service personnel only. Damaged or suspected inoperative equipment must be immediately removed from use and must be checked/repaired by qualified service personnel prior to continued use.

- The rechargeable internal battery is a sealed lead-acid type and it is totally maintenance free. If the battery appears to become defective, refer to Mortara Instrument Service Department.

- Do not pull or stretch patient cables as this could result in mechanical and/or electrical failures. Patient cables should be stored after forming them into a loose loop.

- No calibration or special equipments are needed for the proper operation or maintenance of the device.

- When necessary, dispose of the device, its components and accessories (e.g., batteries, cables, electrodes), and/or packing materials in accordance with local regulations.

Note(s)

- Excessive patient movement could interfere with the operation of the device.

- Proper patient preparation is important to proper application of ECG electrodes and operation of the device.

- There is no known safety hazard if other equipment, such as pacemakers or other stimulators, is used simultaneously with the device; however, disturbance to the signal may occur.

- If the ECG amplifier input is out of normal operating range, the display will indicate a lead fail for the lead(s) where this condition is present and if the signal is being printed, the respective lead(s) will print out as a square wave.

- As defined by IEC 60601-1 and IEC 60601-2-25, the device is classified as follows:
    - Class I equipment or internally powered.
    - Type CF defibrillation-proof applied parts.
    - Ordinary equipment.
    - Equipment not suitable for use in the presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide.
    - Continuous operation.

    NOTE: From a safety perspective, per IEC 60601-1 and derivative standards/norms, this device is declared to be "Class I" and uses a three-prong inlet to ensure an earth connection is made along with mains. The ground terminal on the mains inlet is the only protective earth point in the device. Exposed metal accessible during normal operation is double insulated from mains. Internal connections to earth ground are functional earth.

- This device is intended to be used in a hospital or doctor's office setting, and should be used and stored according to the environmental conditions specified below:

Operating temperature:	+10° to +40° C (+50° to +104° F)
Operating humidity:	10% to 95% RH, non-condensing
Storage temperature:	-40° to +70° C (-40° to +158° F)
Storage humidity:	10% to 95% RH, non-condensing
Atmospheric pressure:	500 hPa to 1060 hPa

- The device will automatically turn off (blank screen) if the batteries have been severely discharged and the AC mains is disconnected from the device.

- After operating the device using battery power, always reconnect the power cord. This ensures that the batteries will be automatically recharged for the next time you use the device. A light next to the on/off switch will illuminate, indicating that the device is charging. This light will turn off when the battery is fully charged.

- The device is UL classified:

WITH RESPECT TO ELECTRIC SHOCK,
FIRE AND MECHANICAL HAZARDS ONLY IN ACCORDANCE
WITH UL2601-1, IEC60601-1, CAN/CSA CC22.2 No. 601.1,
AND IEC60601-2-25

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Wireless Data Transmission

- The device can be equipped with an optional wireless data transmission module (WLAN or GSM/GPRS mobile). Both these technologies use radios to transmit data to a Mortara receiving application. Due to the nature of radio transmissions, it's possible that, due to the characteristics of the environment where the device is located, some other RF sources may interfere with the transmission generated by the device. Mortara Instrument has tested the coexistence of the device with other devices that can interfere such as devices using WLAN, Bluetooth radio, and/or cell phones. Although the current technology allows a very successful rate of transmission, it's possible that in some rare occurrences, the system may not perform at its best resulting in a "failed transmission." When this occurs, patient data will not be erased from the device nor stored in the receiving application, ensuring that partial or corrupted data are not made available to the receiving station. If the failure mode persists the user should move to a position where the RF signals may propagate better and allow successful transmissions.

WLAN Option

- Wireless options transmit at 2.4 GHz. Other nearby wireless devices may cause interference. If possible, move or turn off other devices to minimize potential interference.

- The following table shows the channels allocated in different geographic areas in the world. Please consult with your IT personnel in order to set the device on the proper channels.

Specification	Description
Technology	IEEE 802.11 b/g DSSS, WiFi compliant
Frequency	2.400 – 2.4835 GHz (U.S./CAN/Japan/Europe) 2.471 – 2.497 GHz (Japan)
Channels	U.S.A./CANADA: 11 channels (1-11) Europe:　　　13 channels (1-13) Japan:　　　　14 channels (1-14) France:　　　　4 channels (10-13)
RF Power	+15dBm (typical) approx. 32 mW

- The following table lists the frequency allocated for each channel used by the WLAN option.

Channel	Center Frequency	Frequency Spread
1	2412 MHz	2399.5 MHz - 2424.5 MHz
2	2417 MHz	2404.5 MHz - 2429.5 MHz
3	2422 MHz	2409.5 MHz - 2434.5 MHz
4	2427 MHz	2414.5 MHz - 2439.5 MHz
5	2432 MHz	2419.5 MHz - 2444.5 MHz
6	2437 MHz	2424.5 MHz - 2449.5 MHz
7	2442 MHz	2429.5 MHz - 2454.5 MHz
8	2447 MHz	2434.5 MHz - 2459.5 MHz
9	2452 MHz	2439.5 MHz - 2464.5 MHz
10	2457 MHz	2444.5 MHz - 2469.5 MHz
11	2462 MHz	2449.5 MHz - 2474.5 MHz
12	2467 MHz	2454.5 MHz - 2479.5 MHz
13	2472 MHz	2459.5 MHz - 2484.5 MHz
14	2484 MHz	2471.5 MHz – 2496.5 MHz

- In order to achieve the best transmission rate, it is necessary that the facility where the device is operated can provide good area coverage. Please consult the IT personnel of the facility to verify the proper WLAN availability in the area where the device will be used.

- RF wave propagation may be blocked or reduced by the environment where the device is used. Most common areas where this may occur are: shielded rooms, elevators, underground rooms. In all the above situations, it is recommended to move the device to a proper location and verify with the IT personnel of the facility the areas where the WLAN signals are available.

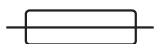# EQUIPMENT SYMBOLS AND MARKINGS

Symbol Delineation

Attention, consult accompanying documents
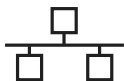
Alternating current

Protective earth

Fuse

Telephone line (modem)

Network (LAN)

Defibrillator-proof type CF applied part

Output/Transmit

Input

ON/OFF (power)

Stop (of action)

Shift key (to enter uppercase text)

Space key

Enter key (accept data/return)

Initiate printing of 12-lead ECG

Initiate printing of continuous rhythm strip

Do not dispose as unsorted municipal waste. Per EC Directive 2002/96, requires separate handling for waste disposal according to national requirements

Antenna

Indicates compliance to applicable EEC directives

GENERAL CARE

Precautions
- Turn off the device before inspecting or cleaning.
- Do not immerse the device in water.
- Do not use organic solvents, ammonia-based solutions, or abrasive cleaning agents which may damage equipment surfaces.

Inspection

Inspect your equipment daily prior to operation. If you notice anything that requires repair, contact an authorized service person to make the repairs.

- Verify that all cords and connectors are securely seated.
- Check the case and chassis for any visible damage.
- Inspect cords and connectors for any visible damage.
- Inspect keys and controls for proper function and appearance.

Cleaning Exterior Surfaces and Patient Cable

❶ Remove cables and lead wires from device before cleaning.

❷ For general cleaning of cables and lead wires, use a soft, lint-free cloth lightly moistened with a mild soap and water solution. Wipe and air dry.

❸ For disinfecting the cables and lead wires, wipe exterior with a soft, lint-free cloth using a solution of Sodium Hypochlorite (10% household bleach and water solution) minimum 1:500 dilution (minimum 100 ppm free chlorine) and maximum 1:10 dilution as recommended by the APIC Guidelines for Selection and Use of Disinfectants.

❹ Use caution with excess liquid as contact with metal parts may cause corrosion.

❺ Do not immerse cable ends or lead wires; immersion can cause metal corrosion.

❻ Do not use excessive drying techniques such as forced heat.

WARNING: Do not attempt to clean/disinfect the device or patient cables by submerging into a liquid, autoclaving, or steam cleaning. Never expose cables to strong ultra-violet radiation.

Cleaning the Device

Disconnect the power source. Clean the exterior surface of the device with a damp, soft, lint-free cloth using a solution of mild detergent diluted in water. After washing, thoroughly dry off the device with a clean, soft cloth or paper towel.

Sterilization

EtO sterilization is not recommended but may be required for cables and lead wires. Frequent sterilization will reduce the useful life of cables and lead wires. If required, sterilize with ethylene oxide gas (EtO) at a maximum temperature of 50°C/122°F. After EtO sterilization, follow the recommendations from the sterilizer manufacturer for required aeration.

Cautions

Improper cleaning products and processes can damage the device, produce brittle lead wires and cables, corrode the metal, and void the warranty. Use care and proper procedure whenever cleaning or maintaining the device.

ELECTROMAGNETIC COMPATIBILITY (EMC)

Electromagnetic compatibility with surrounding devices should be assessed when using the device.

An electronic device can either generate or receive electromagnetic interference. Testing for electromagnetic compatibility (EMC) has been performed on the device according to the international standard for EMC for medical devices (IEC 60601-1-2). This IEC standard has been adopted in Europe as the European Norm (EN 60601-1-2).

The device should not be used adjacent to, or stacked on top of other equipment. If the device must be used adjacent to or stacked on top of other equipment, verify that the device operates in an acceptable manner in the configuration in which it will be used.

Fixed, portable, and mobile radio frequency communications equipment can affect the performance of medical equipment. See Table X-4 for recommended separation distances between the radio equipment and the device.

The use of accessories and cables other than those specified below, may result in increased emissions or decreased immunity of the device.

9293-032-50	ELI standard patient cable, 12-lead, banana - AHA
9293-032-51	ELI standard patient cable, 12-lead, banana - IEC
9293-033-50	ELI standard patient cable, 12-lead, snap - AHA
9293-033-51	ELI standard patient cable, 12-lead, snap - IEC
9281-002-50	Banana plug to snap lead wire, 4 mm, set of 10
3181-008	Power cord, hospital grade, 8' U.S.
3181-002	Power cord, hospital grade, 8' International

Table X-1 Guidance and Manufacturer's Declaration: Electromagnetic Emissions

The equipment is intended for use in the electromagnetic environment specified in the table below. The customer or the user of the equipment should ensure that it is used in such an environment.

Emissions Test	Compliance	Electromagnetic Environment: Guidance
RF Emissions CISPR 11	Group 1	The equipment uses RF energy only for its internal function. Therefore, its RF emissions are very low and not likely to cause any interference in nearby electronic equipment.
RF Emissions CISPR 11	Class A	The equipment is suitable for use in all establishments other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic Emissions IEC 61000-3-2	Complies	
Voltage Fluctuations/Flicker Emissions IEC 61000-3-3	Complies	

Table X-2 Guidance and Manufacturer's Declaration: Electromagnetic Immunity

The equipment is intended for use in the electromagnetic environment specified in the table below. The customer or the user of the equipment should ensure that it is used in such an environment.

Emissions Test	Compliance	Compliance Level	Electromagnetic Environment: Guidance
Electrostatic discharge (ESD) IEC 61000-4-2	+/- 6 kV contact +/- 8 kV air	+/- 6 kV contact +/- 8 kV air	Floors should be wood, concrete, or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000-4-4	+/- 2 kV for power supply lines +/- 1 kV for input/output lines	+/- 2 kV for power supply lines +/- 1 kV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	+/- 1 kV differential mode +/- 2 kV common mode	+/- 1 kV differential mode +/- 2 kV common mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions, and voltage variations on power supply input lines IEC 61000-4-11	<5% UT (>95% dip in UT) for 0.5 cycle 40% UT (60% dip in UT) for 5 cycles	<5% UT (>95% dip in UT) for 0.5 cycle 40% UT (60% dip in UT) for 5 cycles	Mains power quality should be that of a typical commercial or hospital environment.
Power frequency (50/60 Hz) magnetic field	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.

NOTE: *UT is the AC Mains voltage prior to application of the test level.*

Table X-3 Guidance and Manufacturer's Declaration: Electromagnetic Immunity

The equipment is intended for use in the electromagnetic environment specified in the table below. The customer or the user of the equipment should ensure that it is used in such an environment.

Emissions Test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environment: Guidance
			Portable and mobile RF communications equipment should be used no closer to any part of the equipment, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter.
			Recommended separation distance
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz	3 Vrms 150 kHz to 80 MHz	$d = \left[\dfrac{3.5}{3Vrms}\right]\sqrt{P}$
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m 80 MHz to 2.5 GHz	$d = \left[\dfrac{3.5}{3V/m}\right]\sqrt{P}$ 80 MHz to 800 MHz $d = \left[\dfrac{7}{3V/m}\right]\sqrt{P}$ 800 MHz to 2.5 GHz
			Where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m).
			Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey[a], should be less than the compliance level in each frequency range[b].
			Interference may occur in the vicinity of equipment marked with the following symbol:

a. Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radios, AM and FM radio broadcast, and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the equipment is used exceeds the applicable RF compliance level above, the equipment should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the equipment.

b. Over the frequency range 150 kHz to 80 MHz, field strengths should be less than [3] V/m.

Table X-4 Recommended Separation Distances Between Portable and Mobile RF Communications Equipment and the Equipment

The equipment is intended for use in the electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the equipment can help to prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the equipment as recommended in the table below, according to the maximum output power of the communications equipment.

Rated Maximum Output Power of Transmitter W	Separation Distance According to Frequency of Transmitter (m)	
	150 KHz to 800 MHz	800 MHz to 2.5 GHz
	$d = 1.2 \sqrt{P}$	$d = 2.3 \sqrt{P}$
0.01	0.1 m	0.2 m
0.1	0.4 m	0.7 m
1	1.2 m	2.3 m
10	4.0 m	7.0 m
100	12.0 m	23.0 m

For transmitters rated at a maximum output power not listed above, the recommended separation distance d in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

> ***NOTE 1:*** *At 800 MHz, the separation distance for the higher frequency range applies.*

> ***NOTE 2:*** *These guidelines may not apply in all situations. Electromagnetic propagation is affected by the absorption and reflection from structures, objects, and people.*

TABLE OF CONTENTS

INTRODUCTION

Manual Purpose

This manual is intended to provide the user with information about:
- Using and understanding the ELI™ 150 Rx electrocardiograph, the function and feature keys, and the display screen.
- Preparing the ELI 150 Rx for use. (Section 2)
- Acquiring, printing, and storing an ECG. (Section 3)
- System settings. (Section 4)
- Connectivity and transmitting ECGs. (Appendix A)
- Maintenance and troubleshooting. (Appendix B)

Audience

This manual is written for clinical professionals. They are expected to have working knowledge of medical procedures and terminology as required for monitoring cardiac patients.

Indications for Use

The ELI 150 Rx is indicated for use in a clinical setting by qualified medical professionals only for recording ECG data of patients.
- The device is indicated for use to acquire, analyze, display, and print ECG data for consideration by physicians.
- The device is indicated for use in a clinical setting by a physician, or by trained personnel who are acting on the orders of a licensed physician. It is not intended as a sole means of diagnosis.
- The interpretations of ECG data by the device are only significant when used in conjunction with physician over-read as well as consideration of all other relevant patient data.
- The device is indicated for use on adult populations, typically symptomatic.
- The device is not intended to be used as a vital signs physiological monitor.

System Description

The ELI 150 Rx is a 12-lead diagnostic electrocardiograph capable of acquiring, viewing, transmitting, printing, and storing ECG data. The device is optionally equipped with Mortara Instrument's VERITAS™ resting ECG interpretation algorithm with age and gender specific criteria. If this option is enabled (see Section 4) the VERITAS algorithm can provide an over-reading physician with a silent second opinion through diagnostic statements output on the ECG report. For additional information on the VERITAS algorithm, please refer to the *Physician's Guide to ECG Interpretation*. (See Accessories.)

Supported print formats include: 3, 3+1, or 3+3 channels in automatic mode, and 3 or 6 channels during rhythm recording. The device can operate on battery or line power.

The ELI 150 Rx includes:
- Patient cable
- Hospital-grade power cord
- Antenna (with WLAN or GSM/GPRS mobile)
- 1 pack paper (standard or A4)
- User's manual
- Accessory starter kit

ELI 150 Rx, System Illustration

Figure 1-1
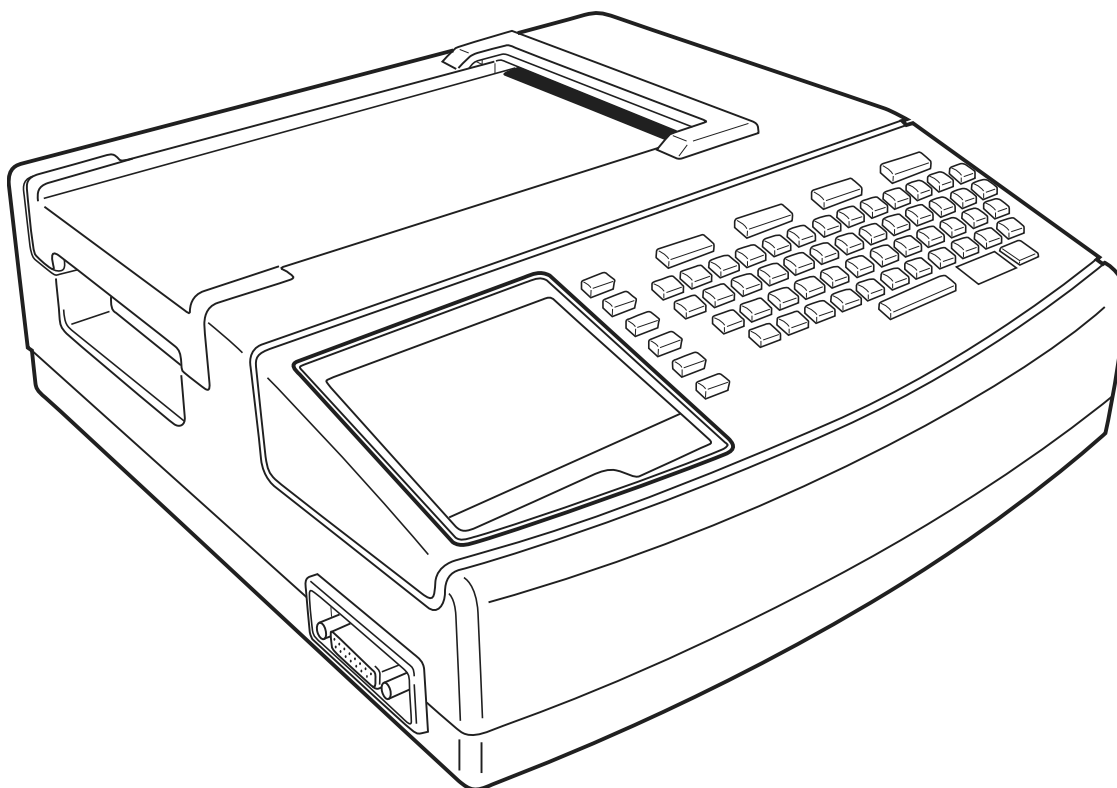
ELI 150 Rx, Left Side

Figure 1-2

Writer Cover Handle

Input Connector
(Patient Cable Connector)

ELI 150 Rx, Rear

Figure 1-3

Network
Connector

Antenna for
GSM/GPRS
or WLAN

AC (Powercord)
Connector

RS 232

T5A
250V

100-240V~
50/60Hz 50VA

Serial
Connector

Modem
Connector

AC Fuses

ELI 150 Rx, Base

Figure 1-4

Cart Mounting

Battery Fuse

Cart Mounting

ECG Input
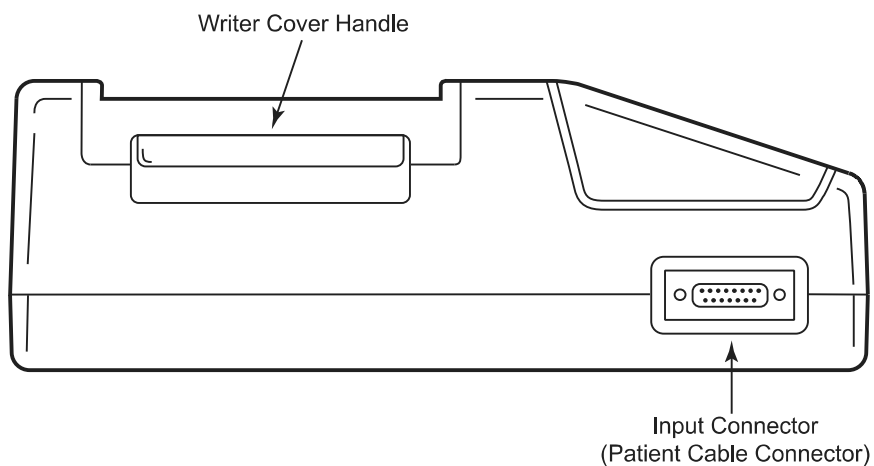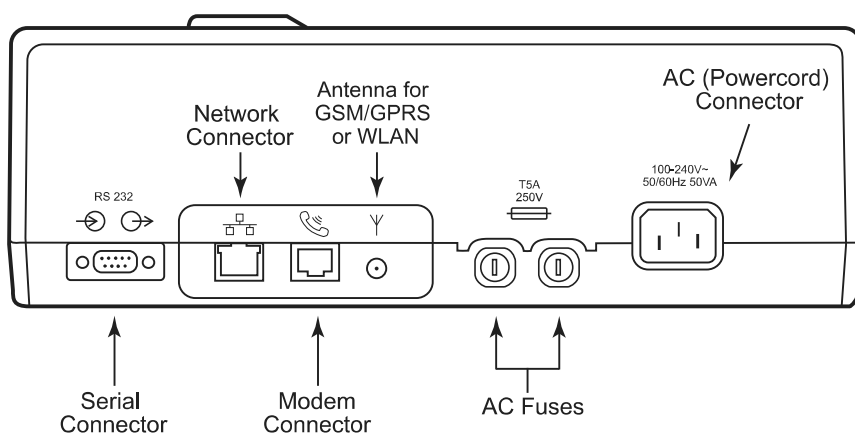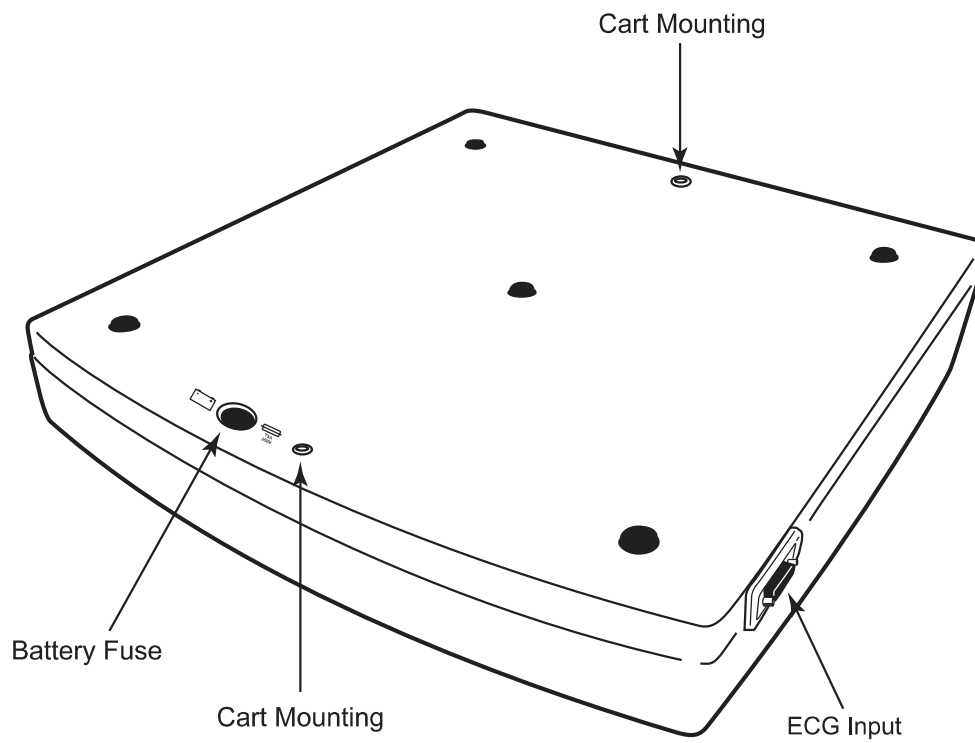
ELI 150 Rx, Display and Keyboard

Figure 1-5
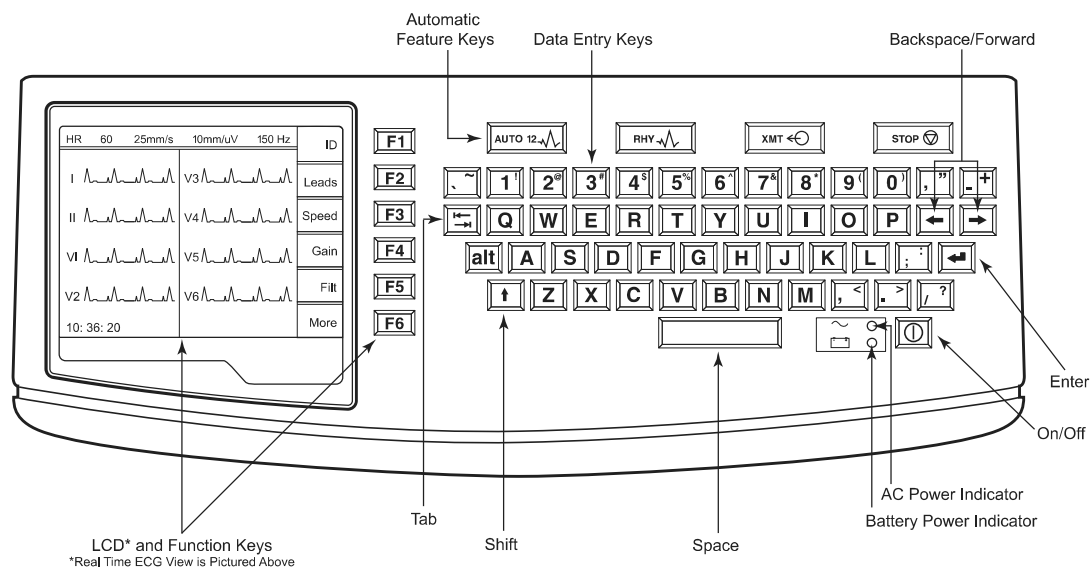
Automatic Feature Keys

Automatic feature keys are used as a one-touch operation for:
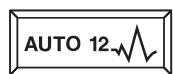
AUTO 12 — ECG Acquisition

RHY — Rhythm Printing

XMT — Transmitting

STOP — Stop

Display Overview

The ELI 150 Rx features a 320 x 240 pixel LCD display for valuable preview of ECG waveform, function key labels, and other parameters as explained below:

- Heart Rate (HR): When a patient is connected to the ELI 150 Rx, his/her HR is displayed in real time. The HR is the average ventricular rate measured over an average of the patient's last five beats.

Figure 1-6

Waveform Display
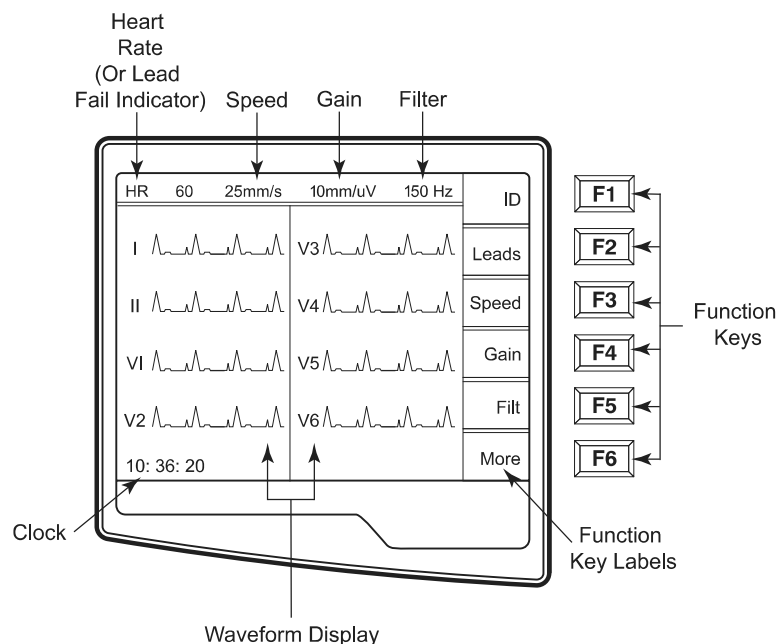
> *NOTE:* *If a lead fail occurs, an indicator flashes in this location.*

- Speed: Use **Speed** (**F3**) to select one of the various options for display speed or rhythm printout speed: 5 mm/s, 10 mm/s, 25 mm/s, or 50mm/s. Paper speed is printed at the bottom right corner of the ECG printout.

  > *NOTE:* *ECG paper speed is configured in page two of the configuration menus. (See Section 4.)*

- Gain: Use **F4** (**Gain**) to select waveform amplitude for display and printout: 5 mm/mV, 10 mm/mV, or 20 mm/mV. Gain is printed at the bottom right corner of the ECG printout.

- Filter: Use **F5** (**Filt**) to select the low-pass filter options: 40 Hz, 150 Hz, or 300 Hz for ECG printouts. Filter is printed at the bottom right corner of the ECG printout.

- Clock: Time display with hour, minutes, and seconds resolution. (See Section 2 for setting a new time and date.) When the ECG is acquired, the time displayed is the printed ECG acquisition time.

Function Keys

Function keys activate the liquid crystal display (LCD) label adjacent to each function key. LCD labels/functions change depending upon the screen displayed. If the label is blank, the adjacent function key is not active.

ELI 150 Rx Specifications

Feature	Specifications
Instrument Type	12-lead electrocardiograph
Input Channels	Simultaneous acquisition of all 12 leads
Standard Leads Acquired	I, II, III, aVR, aVL, aVF, V1, V2, V3, V4, V5, V6
Waveform Display	Backlit, 1/4 VGA LCD 3-lead groups, 8 or 12-lead presentation
Input Impedance Input Dynamic Range Electrode Offset Tolerance Common Mode Rejection	Meets or exceeds the requirements of ANSI/AAMI EC11
Patient Leakage Current Chassis Leakage Current	Meets or exceeds requirements of ANSI/AAMI ES1
Digital Sampling Rate	10,000 s/sec/channel used for pacemaker spike detection; 1000 s/sec/channel used for recording and analysis
Special Functions	Optional Mortara VERITAS resting ECG interpretation with age and gender specific algorithm; connectivity options for bi-directional communication; flash memory storage of ECGs
Paper Type	Z-fold thermal paper; 108 mm (4") wide, perforated double Z-fold, 200 double Z-fold sheets
Thermal Recorder	Computer-controlled dot array; 8 dots/mm
Thermal Writer Speeds	5, 10, 25, or 50 mm/s
Gain Settings	5, 10, or 20 mm/mV
Report Print Formats	Standard or Cabrera; 3, 3+1, or 3+3 channel
Rhythm Print Formats	3-channel or 6-channel with configurable lead groups
Keyboard Type	Elastomer keyboard with complete alphanumeric keys, soft-key menu, and dedicated function keys
Frequency Response	0.05 – 40 Hz, 0.05 – 150 Hz, or 0.05 to 300 Hz
Filters	High-performance baseline filter; AC interference filter 50/60 Hz; low-pass filters 40 Hz or 150 Hz
A/D Conversion	20 bits (1.17 microvolt LSB)
Device Classification	Class I, type CF defibrillation-proof applied parts
ECG Storage	Up to 60 ECGs; optional expanded up to 150 ECGs
Weight	7.2 lbs. (3.3 kg) including battery (without paper)
Dimensions	11.25" x 11.5" x 3.75" (29.2 cm x 30.5 cm x 10.2 cm)
Power Requirements	Universal AC power supply (100-240 VAC at 50/60 Hz) 50 VA; internally rechargeable battery

Accessories

Part Number	Description
9100-028-01	ELI 150 Rx 4.25" x 5.5" thermal paper, cued Z-fold, full grid
9293-032-50	ELI standard patient cable, 12-lead, banana – AHA
9293-032-51	ELI standard patient cable, 12-lead, banana – IEC
9293-033-50	ELI standard patient cable, 12-lead, snap – AHA
9293-033-51	ELI standard patient cable, 12-lead, snap – IEC
9293-039-50	ELI patient replacement cable without lead wires
9293-040-50	ELI standard patient cable, 12-lead, detachable, banana - AHA
9293-040-51	ELI standard patient cable, 12-lead, detachable, banana - IEC
9293-041-50	ELI replacement lead wire set, banana adapter - AHA
9293-041-51	ELI replacement lead wire set, banana adaptor - IEC
9293-042-50	ELI standard patient cable, 12-lead, detachable, medi-clip - AHA
9293-042-51	ELI standard patient cable, 12-lead, detachable, medi-clip - IEC
9293-043-50	Replacement lead set, medi-clip - AHA
9293-043-51	Replacement lead set, medi-clip - IEC
9325-001-50	Alligator clip adapter, 4 mm, set of 10
9281-002-50	Banana clip to snap lead wire, 4 mm, set of 10
9300-033-51	Electrodes, resting, tab type, box of 500
9300-033-52	Electrodes, resting, tab type, case of 5000
9300-036	Suction electrodes, 6 pk.
9300-037	Limb-lead clamps, 4 pk.
3181-008	Power cord, hospital grade, 8' US
3181-002	Power cord, hospital grade, 8' International
25000-027-61	ELI to CPU cable
9911-013-50	ELI transport cart with tray
9911-013-51	ELI transport cart with bins
9911-013-71	ELI hospital-grade transport cart with dual bins
9911-013-63	ELI transport cart, cable arm with adapter
9515-167-51-xxx	ELI 150 Rx user manual (xxx=language)
9516-167-50-xxx	ELI 150 service manual (xxx=language)
9501-001-50	Physicians Guide to ECG Analysis
34999-003-1000	ELI 150 Rx carry case
9903-021-50	Bar code reader
88056-005-50	ELI external modem kit

Contact your dealer or go to www.mortara.com for more information.

EQUIPMENT PREPARATION

Section Purpose

This section is intended to provide the user with information about:
- Connecting the patient cable.
- Loading paper.
- Applying power.
- Setting time, date, and LCD contrast.

Connecting the Patient Cable

Figure 2-1
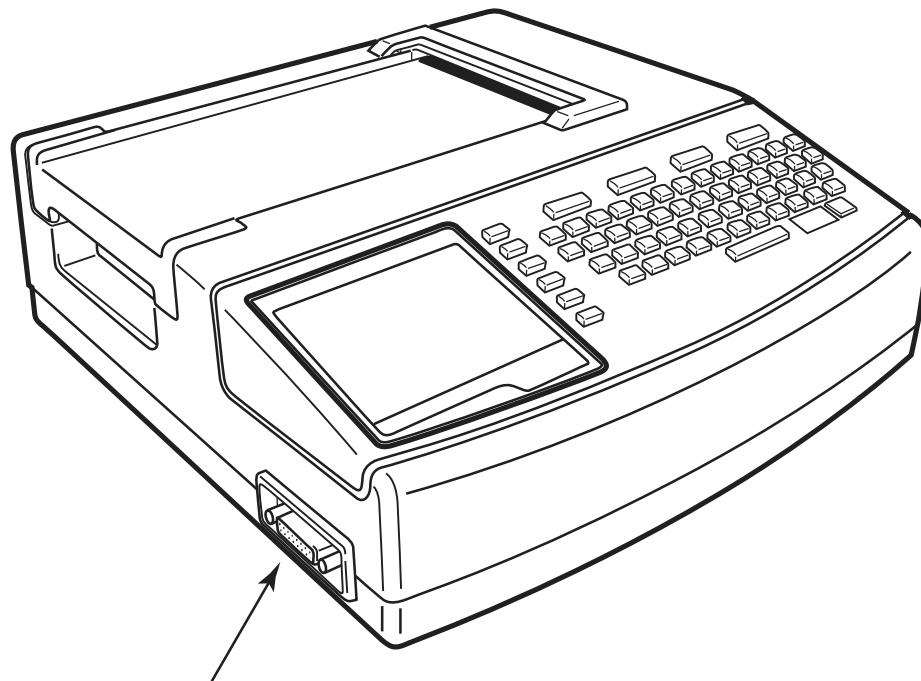
Connect patient cable to the side connector

9

Loading Paper

Figure 2-2

Paper

Paper Door Latch
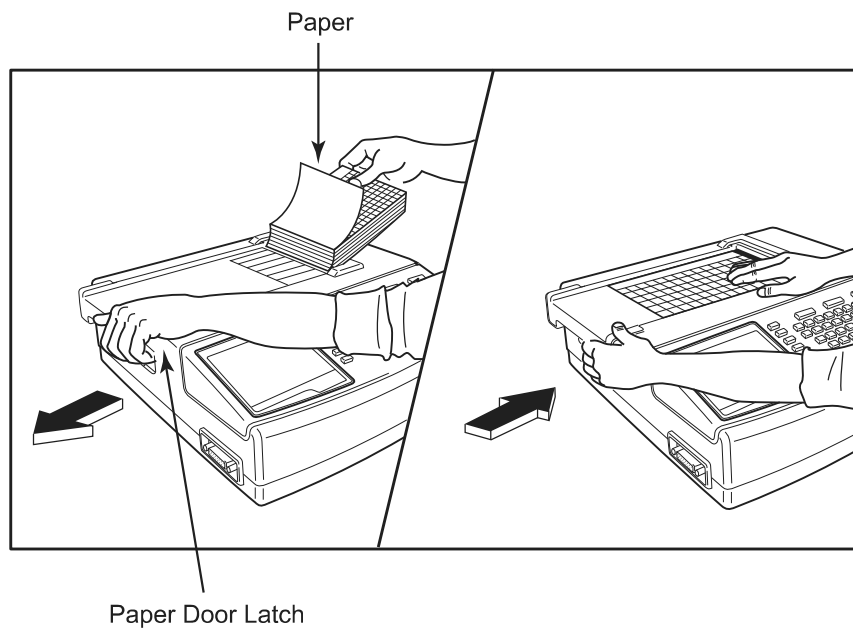
❶ Remove the outer packaging from the paper stack.

❷ Facing the front of the device, use the release latch on the left side and slide the paper tray cover to the left.

❸ Place the stack of thermal paper into the paper tray such that the grid side of the paper is up when it is pulled over the paper tray cover. The paper cue mark (a small black rectangle) should be in the lower left corner.

❹ Manually advance one page of paper beyond the closure point of the writer. Make sure the paper lays on the black roller evenly within the channel of the paper door. If paper is not manually advanced evenly, risk of jamming or queue faults increases.

❺ Slide writer cover to the right until the cover latches in a locked position. You will hear a sharp click when the door is properly latched.

> **WARNING:** *Risk of injury to fingers in writer paper door or platen drive mechanisms.*

> **NOTE:** *For proper performance of thermal writer, be certain to use Mortara recommended thermal paper.*

Applying Power

❶ Plug the power cord into an AC wall outlet and into the back of the ELI 150 Rx. (Reference Figure 1-3.) Device powers on automatically and cannot be turned off when AC is connected (device is in Standby mode).

❷ If using battery power, press the power ON/OFF button ⃝| located on the lower right side of the keyboard. (Reference Figure 1-5.)

Indicators on the keyboard will illuminate as follows:
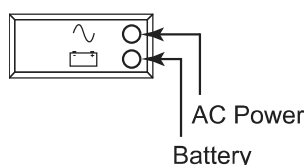
AC Power
Battery

- The AC power LED indicator illuminates when device is connected to mains (AC power).

- The battery LED indicator illuminates when charging and flashes when battery is low (below 11.0V); it will turn off when the battery is fully charged.

The ELI 150 Rx should be connected to AC power for recharging when not in use.

TIP: *Battery voltage is displayed at the bottom of Time/Date screen.*

NOTE: *For typical usage, battery charging time should be approximately 8 hours or less.*

NOTE: *Two AC line fuses and one battery fuse are installed on your ELI 150 Rx.*

CAUTION: *When the battery charge is depleted to its lowest level (10.5V), the device will automatically power down. To recharge a battery from its lowest level, 30 hours of recharging without operation may be necessary. Routinely discharging a battery to this level will severely shorten the life of the battery.*

Setting Time, Date, and LCD Contrast

❶ From real-time ECG view, select **F6** (**More**).

❷ Using the keyboard, select **3** (**Set Time/Date**) from the application menu.

❸ The preprogrammed date and time is displayed. To make changes, type in the desired date and time values (using a 24-hour clock) in the same format as displayed. Use **F1** (▲) and **F2** (▼) to move back and forth through each row.

TIP: *Use the* **BACKSPACE** ← *key to erase entry errors.*

❹ LCD contrast can be adjusted by selecting **F3** (**Lcd▲**) or **F4** (**Lcd▼**).

❺ Select **F5** (**Save**) to save changes before exiting.

❻ Select **F6** (**Exit**) to return to real-time ECG view. If you did not save before selecting Exit, any changes made to the time, date, or LCD contrast will be lost.

RECORD AN ECG

Section Purpose

This section is intended to provide the user with information about:
- Patient preparation.
- Patient hookup.
- Patient demographic entry.
- Acquiring, printing, and storing an ECG.
- Acquiring rhythm strips.
- Optional bar code scanner.

Patient Preparation

Before attaching the electrodes, assure the patient fully understands the procedure and what to expect.
- Privacy is very important in assuring the patient is relaxed.
- Reassure the patient that the procedure is painless and that the electrodes on their skin are all that they will feel.
- Make sure the patient is lying down and is comfortable. If the table is narrow, tuck the patient's hands under his/her buttocks to ensure their muscles are relaxed.
- Once all the electrodes are attached, ask the patient to lie still and to not talk. Explain this will assist you in acquiring a good ECG.

Preparing Patient Skin

Thorough skin preparation is very important. There is natural resistance on the skin surface from various sources such as hair, oil, and dry, dead skin. Skin preparation is intended to minimize these effects.

To prepare the skin:

- Shave hair from electrode sites if necessary.
- Wash area with warm, soapy water (do not use alcohol).
- Dry skin vigorously with an abrasive pad such as a 2 x 2 or 4 x 4 gauze to remove dead skin cells and oil, and to increase capillary blood flow.

Patient Hookup

Correct electrode placement is important for acquiring a successful ECG.

A good minimum-impedance pathway will provide superior noise-free waveforms. Good quality silver-silver chloride (Ag/AgCl) electrodes should be used.

> *TIP:* *Electrodes should be stored in an air-tight container. Electrodes will dry out if not stored properly which will cause loss of adhesion and conductivity.*

To Attach the Electrodes

❶ Expose the arms and legs of the patient to attach the limb leads.

❷ Place the electrodes on flat, fleshy parts of the arms and legs.

❸ Place the electrodes on the inside of each arm (between the wrist and elbow).

❹ Place the electrodes on the inside of each calf (between the ankle and knee).

❺ Place the electrodes at equal distance from the heart and at the same position on each limb.

❻ For female patients, place the precordial electrodes on top of the breast and not under the breast tissue.

❼ If a limb site is not available, place the electrodes at an equal distance from the torso, and at an equal distance on a perfused area of the stump.

❽ Attach the electrodes to the skin. A good test for firm electrode contact is to slightly tug on the electrode to check adhesion. If the electrode moves freely, it needs to be changed. If the electrode does not move easily, a good connection has been obtained.

For accurate V-lead placement and monitoring, it is important to locate the 4th intercostal space. The 4th intercostal space is determined by first locating the 1st intercostal space. Because patients vary with respect to body shape, it is difficult to palpate the 1st intercostal space with accuracy. Thus, locate the 2nd intercostal space by first palpating the little bony prominence called the **Angle of Lewis,** where the body of the sternum joins the manubrium. This rise in the sternum identifies where the second rib is attached, and the space just below it is the 2nd intercostal space. Palpate and count down the chest until you locate the 4th intercostal space.

- V1 on the 4th intercostal space at the right sternal border.
- V2 on the 4th intercostal space at the left sternal border.
- V3 midway between V2 and V4 electrodes.
- V4 on the 5th intercostal space at the left midclavicular line.
- V5 on the left anterior axillary line, horizontal with V4 electrode.
- V6 on the left midaxillary line, horizontal with V4 electrode.
- RA on the right deltoid, forearm, or wrist.
- LA on the left deltoid, forearm, or wrist.
- RL on the right thigh or ankle.
- LL on the left thigh or ankle.
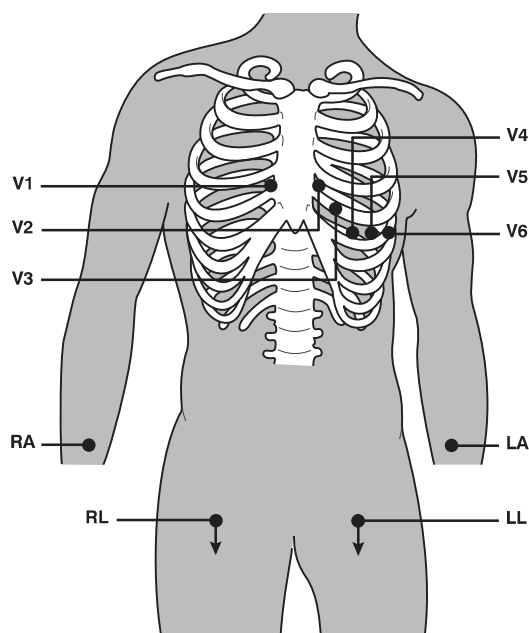
Patient Hookup Summary Table

AAMI Lead	IEC Lead	Electrode Position
V1	C1	Right side of the sternum in the 4th intercostal space.
V2	C2	Left side of the sternum in the 4th intercostal space.
V3	C3	Midway between V2/C2 and V4/C4.
V4	C4	Left midclavicular line in the 5th intercostal space.
V5	C5	Between V4/C4 and V6/C6.
V6	C6	5th intercostal space, left midaxillary.
LA / RA	L / R	Place the limb electrodes for the arm directly on the left and right mid-forearm locations.
LL	F	Place the leg-limb electrodes in the area of the left mid-calve.
RL	N	Place the leg-limb electrodes in the area of the right mid-calve.

Patient Demographic Entry

Patient demographic information can be entered before acquisition. The entered patient ID fields will remain populated until you acquire the ECG; however, if you disconnect the leads from the patient, turn off the electrocardiograph, or change a configuration setting before acquisition, the patient information will be cleared.

To access the patient demographic data entry menu, press **F1 (ID)** from real-time ECG view. If two or more sites are configured, a select study screen will appear. Select the corresponding function key for the group/study the current patient belongs to.

The patient demographic labels available are determined by the ID format selected in the configuration settings. In addition to short, standard, or long patient ID formats, the ELI 150 Rx also supports a custom ID format. The custom format, designed in an ELI LINK or E-Scribe™ Rx data management system, can be downloaded to the ELI 150 Rx. Additional information about the custom ID can be found in Appendix A.

Patient demographic entry can be completed manually or automatically using an existing patient record in the directory. To manually enter the patient demographics, use **Enter**, **Tab**, **F1 (▲)**, or **F2 (▼)** to move to each data entry field. Skipped fields will appear as a blank field on the header of the ECG printout.

> *TIP: Type **F** from the keyboard to change the gender to female; type **M** to change the gender to male.*

To automatically populate the demographics using an existing patient record, select **F5 (Direc)** from the ID screen. Use **F1 (▼/▲)** to navigate by line down the directory list; use ↑(**Shift**), **F1 (▼/▲)** to move up. Similarly, use **F2 (▼▼/▲▲)** to page down the directory list; use ↑(**Shift**), **F2 (▼▼/▲▲)** to page up. To quickly select a patient name, use the keyboard to enter the first few letters of the last name. The letters will be displayed in the lower left corner of the display screen and the desired name will automatically be highlighted. Once the desired name is highlighted, press **F3 (Selec)** and the patient ID screen will return with all demographic fields populated. Return to real-time ECG view by selecting **F6 (Done)**.

> *TIP: Automatically populating demographic fields via the directory is only possible when the ID formats are the same between records.*

Auto-Fill ID

If Auto-Fill ID is enabled in the configuration, the system will automatically populate the demographic fields in the ID screen. When the patient ID field is manually populated and followed either by selecting **Enter** or **F2 (▼)**, the system automatically scans the patient directory. If records with the exact patient ID are found, the existing data is used to fill some of the demographic fields. The auto-fill feature is designed to automatically populate last name, first name, date of birth, age, and gender only. If no matching records are found, a brief message is displayed and the user must manually enter the patient's demographics.

> *NOTE: In order to avoid the use of incorrect data, the auto-fill feature is only possible when the ID formats are the same between records.*

When time is of the essence or if patient demographics are not available, ID information can be added to the ECG after it has been acquired via the patient directory. Acquiring an emergency (STAT) or unidentified ECG is explained in *ECG Acquisition, Printing, Storage.*

ECG Acquisition, Printing, Storage

Acquisition

Once the patient is connected, the ELI 150 Rx continuously collects and displays ECG data; therefore, before you press **Auto ECG** or **Auto RHY** you should instruct the patient to relax in a supine position to ensure that the ECG is free from artifact (noise) due to patient activity.

If workflow permits patient demographic entry prior to acquisition, connect the patient to the ELI 150 Rx and enter the patient identification information as explained in *Patient Demographics*. After you complete the last data entry field, select **F6** (**Done**) to return to the real-time ECG view.

To acquire an emergency (STAT) or unidentified ECG for a new patient, press the **Auto ECG** key [AUTO 12.√√]. The real-time ECG view is replaced with the patient ID menu. Select **Enter** or **F6** (**Done**) and the ECG is acquired. "Collecting 10 seconds of data" is displayed on the top of the LCD and "captured, analyzed, formatted" is displayed on the bottom of the LCD. The real-time ECG view is then replaced with the acquired ECG view. To add patient demographics, highlight the record from the directory and select **F1** (**ID**).

Examine the display for artifact or baseline drift. Re-prep and replace electrodes if necessary to obtain satisfactory waveforms. (See *Patient Preparation*.) If a lead fault occurs, square waves appear on the display for that lead and the lead(s) in fault will display in the upper left corner of the screen one at a time. When the problem is corrected, the device waits for 10 seconds of good data before analyzing the ECG. Please refer to the following troubleshooting guide based on Einthoven's Triangle:
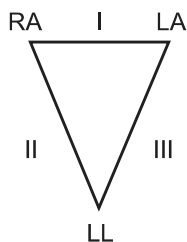
Artifact	Check Electrode
Lead II and III artifact	Poor LL electrode
Lead I and II artifact	Poor RA electrode
Lead I and III artifact	Poor LA electrode
V Leads	Re-prep site & replace electrode

Press the **Auto ECG** key [AUTO 12.√√]. The real-time ECG view is then replaced with the acquired ECG view. The default real-time ECG view is not available in the acquired ECG view for navigation purposes.

> *NOTE:* New LCD label functions are available in the acquired ECG view.

> *NOTE:* Functions are not available during acquisition.

> *NOTE:* Real-time display may also be set to 12 leads by selecting **F2** (**Leads**).

Printing

If Auto-Print is enabled in the configuration, an ECG is printed following acquisition. To print a manual printout, select **F4** (**Print**).

Toggle through the available waveform display formats (3, 8 or 12 lead) by selecting **F2** (**Leads**). A preview of the full 10-seconds of ECG waveform is available in the acquired ECG view. The first 5 seconds are shown on the initial view screen (page 1/2 is displayed in the upper right corner); the second 5 seconds is viewed by selecting **F3** (**Page**) (page 2/2 is displayed in the upper right corner). You can move through the available 10 seconds of acquired ECG waveforms for each lead by using **F2** (**Leads**) and **F3** (**Page**).

If the auto-print configuration is disabled, a 10-second preview will assist in ensuring a quality ECG acquisition prior to printing. When you acquire an ECG, the electrocardiograph captures the last 10 seconds. The relationship between the display and the printout is the same – what is displayed in the ECG acquisition view is what will be printed.

In order to change the speed, gain, filter, or printout format in the acquired ECG view, select **F5** (**More**). To manipulate the print format of the acquired ECG regardless of the plot format configuration setting, select **F4** (**Fmt**).

Select the function key corresponding to the desired print format. The acquired ECG view is then displayed and to make an ECG printout copy in the new plot format, select **F4** (**Print**). Select **F6** (**Done**) to return to the real-time ECG view.

Storage

The ELI 150 Rx manages storage in one of two ways – automatically or manually. When the auto-save configuration option is enabled, ECGs are automatically saved to the directory upon acquisition and printing. When the auto-save configuration option is disabled, the user is prompted to save the ECG after acquisition. At that time, the user can also choose to delete the record and it will not be added to the directory.

> *NOTE:* *If auto save is enabled but the ECG is not printed, the user is prompted to save.*

> *TIP:* *Manual save is possible by selecting* **F5** *(***More***) and* **F5** *(***Save***) in the acquired ECG view.*

Acquiring Rhythm Strips

Rhythm strips are printed in the format defined in the configuration (3-channel, 6-channel, or 12-channel). See Section 4 for instructions to configure rhythm leads.

Begin routine rhythm strips by connecting the patient to the ELI 150 Rx and entering the patient identification information. After the last data entry field from the ID menu is completed, select **F6** (**Done**) to return to the real-time ECG view. Select **RHY** ▢ RHY ∿ ▢ to begin rhythm printing.

> *NOTE: Rhythm printouts are only possible from the real-time ECG view.*

> *NOTE: Rhythm acquisitions are only printed and not stored in the ELI 150 Rx .*

The rhythm activity screen appears as soon as the writer begins printing the rhythm strip. The waveform display format is similar to the real-time ECG view; however, new function keys are available during rhythm printing.

In addition to manipulating **SPEED**, **GAIN**, and **FILTER**, the user can toggle different lead groups. When the default rhythm format is set to either 3-channel or 6-channel, the user can change lead groups during printing by selecting **F2** (**LEADS**). The change in lead groups is apparent on the printout whereas the waveform display will remain in the default display of 2.5 seconds of Leads I, II, and V1-V6.

During 3-channel rhythm printing, the available lead groups are:
      1. Default (user-selected in configuration)
      2. I-II-III
      3. aVR, aVL, aVF
      4. V1-V2-V3
      5. V4-V5-V6

During 6-channel rhythm printing, the available lead groups are:
      1. Default (user-selected in configuration)
      2. I-II-III-aVR-aVL-aVF
      3. V1-V2-V3-V4-V5-V6
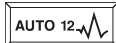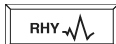
During rhythm printing, place the writer in Standby mode by pressing **F6** (**STBY**). To continue rhythm printing for the same patient without advancing to a new page, select **F6** (**CONT**). To stop the rhythm printing, press **Stop** ▢ STOP ▽ ▢ and the writer will automatically form feed in preparation for a new patient's rhythm recording or ECG.

Optional Bar Code Scanner

Mortara's optional bar code scanner is purchased separately. By connecting the bar code scanner to the ELI 150 Rx's RS-232 (serial port), all aspects of acquiring an ECG are automated for speed and accuracy of alphanumeric entry, functions, and feature processes.

In order to map the function and feature keys of the electrocardiograph to a desired bar code font, the following values and/or symbols must be available:

FEATURE KEYS		VALUE
AUTO 12	ECG Acquisition	*$B*
RHY	Rhythm Printing	*$C*
XMT	Transmitting	*$D*
STOP	Stop	*$E*

FUNCTION KEYS	SYMBOL
F1	*[*
F2	**
F3	*]*
F4	_(underscore)
F5	{
F6	}

> **NOTE:** *The ELI software will ignore* **Enter** *(carriage return) as part of a bar code; please use* **F2** *(\) instead.*

Please reference the Bar Code Scanner user manual for instructions on setup and use.

SYSTEM SETTINGS

Section Purpose

This section is intended to provide the user with information about:
- Accessing configuration menus.
- Summary of configuration options.
- Detailed descriptions of configuration settings.

Accessing Configuration Menus

The configuration pages define all operational conditions that do not change on a daily or patient-to-patient basis. Once you set these default conditions, you will rarely need to use the configuration screens again. To access the configuration menus:

❶ Select **F6** (**More**) from the real-time ECG view.

❷ Using the keyboard, select **3** (**Set Time/Date**) from the application menu.

❸ From the Set Time/Date screen, simultaneously press ↑(**SHIFT**) + **ALT** + **C**. The first configuration screen will appear. Notice the page indicator in the upper right-hand corner.

Now to Navigate Configuration Menus

- Use **F4** (**Page**) to toggle through the configuration pages.
- Use **F1** (▲) and **F2** (▼) to move back and forth through each configuration option.
- Use **F3** (▶) to toggle through pre-programmed available settings per configuration field.
- Use **F6** (**Exit**) to return to real-time ECG view. Any changes you have made will be saved.
- Use **BACKSPACE** ← to erase entry errors.

The following chart summarizes the configuration parameters and the available options for each field.

Summary of Configuration Menus

CONFIGURATION PARAMETER	DEFINITION
Software Version	The software version of the unit
Cart Number	User defined (4 digits; 0 to 9999)
Site Number	User defined (4 digits; 0 to 4095)
Site Name	User defined (up to 30 alphanumeric characters)
Telephone Number	User defined (up to 30 alphanumeric characters)
Language	Software language availability
Volume	Range from 0 – 8
Battery Timeout	10 min, 30 min, 60 min
Flash Size	Normal memory or expanded memory (optional)
ID Format	Short, long, standard, custom (optional)
Auto-Fill ID	Yes or No
AC Filter	None, 60 Hz, 50 Hz
Paper Speed	25 mm/sec or 50 mm/sec
Filter	Frequency response for printouts: 40 Hz, 150 Hz, or 300 Hz
Height/Weight Units	lb/in or kg/cm
Date Format	US (mm/dd/yyyy) or European (dd.mm.yyyy)
Interpretation	Yes or No
Reasons	Yes or No
Append	Unconfirmed Report, Reviewed by, blank
# of Copies	0 – 9
# ECGs Retrieved	0 – 7
Delete Rule	Post plot, post transmit, post plot/xmt
Storage Sensitivity	Normal or High
Auto-Save ECG	Yes or No
Auto-Print ECG	Yes or No
Baud Rate	Serial baud rates: 9600, 19200, 38400, 57600, or 115200
Caps Lock	Yes or No
Rhythm Format	3 channel or 6 channel
3 Rhythm Lead 1	V1-V6, I, II, III, aVR, aVL, aVF
3 Rhythm Lead 2	V1-V6, I, II, III, aVR, aVL, aVF
3 Rhythm Lead 3	V1-V6, I, II, III, aVR, aVL, aVF
6 Rhythm Lead 1	V1-V6, I, II, III, aVR, aVL, aVF
6 Rhythm Lead 2	V1-V6, I, II, III, aVR, aVL, aVF
6 Rhythm Lead 3	V1-V6, I, II, III, aVR, aVL, aVF

Summary of Configuration Menus (continued)

CONFIGURATION PARAMETER	DEFINITION
6 Rhythm Lead 4	V1-V6, I, II, III, aVR, aVL, aVF
6 Rhythm Lead 5	V1-V6, I, II, III, aVR, aVL, aVF
6 Rhythm Lead 6	V1-V6, I, II, III, aVR, aVL, aVF
Plot Format	Channels printed: 3, 3+1, 3+3; Cabrera or standard
3+1 Rhythm Lead	V1-V6, I, II, III, aVR, aVL, aVF
3+3 Rhythm Lead 1	V1-V6, I, II, III, aVR, aVL, aVF
3+3 Rhythm Lead 2	V1-V6, I, II, III, aVR, aVL, aVF
3+3 Rhythm Lead 3	V1-V6, I, II, III, aVR, aVL, aVF
XMT Media	RS-232, modem, GSM/GPRS, LAN, WLAN, external modem
DHCP (LAN only)	Yes or No
IP Address	XXX.XXX.XXX.XXX
Def Gateway	XXX.XXX.XXX.XXX
Sub Net Mask	XXX.XXX.XXX.XXX
Host IP	XXX.XXX.XXX.XXX
Port Number	XXX.XXX.XXX.XXX
Second Site Number	User defined (4 digits; 0 to 4095)
Second Site Name	User defined (up to 30 alphanumeric characters)
Third Site Number	User defined (4 digits; 0 to 4095)
Third Site Name	User defined (up to 30 alphanumeric characters)

Configuration Page 1

Software Version

Identifies the software version of your electrocardiograph.

Cart Number

Indicates which electrocardiograph transmitted a particular ECG.

Site Number (Second and Third site as well)

The ELI 150 Rx allows for the configuration of up to three site numbers in order to manage multiple studies. A site is defined as a location from where an ECG is transmitted. In a research environment, it is recommended that site numbers designate the investigator's site for ECG records stored in an E-Scribe Rx data management system, and must be defined for transmitting ECGs to the data management system. Up to four digits can be used for the site number; numbers from 0 – 4095 are supported

> *NOTE: If the second or third site number fields are blank, a site is not identified. The number "0" is a valid site number.*

> *NOTE: Adding, editing, or deleting any site number from the configuration will cause the unit to default to short ID format for that site number until a new custom ID format (see Appendix A) is downloaded for the new site number.*

Site Name (Second and Third site as well)

Defines your investigator site name. You can enter up to 30 alphanumeric characters. The site name prints in the middle of the bottom edge of the ECG printout at the E-Scribe Rx.

Telephone Number

Specifies the telephone number for internal modem transmission to another unit or to an E-Scribe Rx system. Enter up to 30 alphanumeric characters.

You may need to dial a **9** to get an outside line. To wait for an additional dial tone, use the letter **W**.

> EXAMPLE: 9**W**14145554321

To insert a pause use a comma (,).
To change tone dialing to pulse dialing, use the letter **P**.

> EXAMPLE: **P**14145554321

(If necessary, you can use both the letter **W** and the letter **P** in the same phone number.)

> *NOTE: It is not necessary to use alpha characters in the telephone number with GSM/GPRS mobile connectivity.*

> *TIP: To quickly delete or modify a phone number, use a shortcut. From the application screen, simultaneously press ↑ (SHIFT) + ALT + P. To edit an existing telephone number, use the Tab key.*

Language

There are several languages available on the electrocardiograph.

> ***CAUTION:*** *Function labels are immediately translated upon selecting a new language and exiting the configuration screen.*

If an unknown language is visible, use the following steps to revert to the language of your country:

1. **F6** from real-time ECG view.
2. Select number **3**.
3. Simultaneously press ↑ (**SHIFT**) + **ALT** + **C**.
4. Press **F2 (▼)** four times.
5. Press **F3 (▶)** until the desired language appears.
6. **F6** to return to real-time ECG view.

Alphabets of specific languages may require use of special characters in demographic fields. This is accomplished by selecting **ALT + the letter**. For example, ñ is entered by selecting **ALT + n**. Hold the ALT key and scroll the letter to view the available letter selections with diacritics.

Volume

Defines the keyboard click loudness. Available settings range from 0 (off) to 8 (loud).

Battery Time Out

Determines when the electrocardiograph will switch off in order to conserve the battery life of the device. The battery time out will only occur if the keyboard has not been depressed for the time specified. The battery time out setting is ignored if an active ECG signal is detected during transmission or while rhythm printing.

Configuration Page 2

Flash Size

Indicates the ECG storage capacity. Normal flash size is the standard memory capacity. If the optional expanded memory has been installed, Expanded will be displayed.

ID Format

Defines the format for the patient demographic information prompts. There are three standard formats: short, standard, or long. A custom ID format can be downloaded from an ELI LINK or E-Scribe Rx system. Please see Appendix A to download a custom ID.

The short format includes the patient's last and first name, patient ID number, date of birth (automatically calculates the age), and gender.

The standard format includes the patient's last name, patient ID number, age, height, weight, gender, race, medication 1, medication 2, and a location field.

The long format is identical to the standard format except that it includes the patient's first name, room, and comment fields.

> *NOTE: Changing the ID format will affect all configured sites.*

Auto-Fill ID

When enabled, the device will automatically populate last name, first name, date of birth, age, and gender in the ID screen if records with matching patient ID are found in the ECG directory.

AC Filter

The ELI 150 Rx removes 60 Hz or 50 Hz interference. The setting you select depends on the line frequency in your country. Always use the 60 Hz setting in the U.S. If AC interference is present, check to see that the proper AC filter is selected.

Paper Speed

The writer speed can be configured at 25 mm/s or 50 mm/s for default ECG printouts. For rhythm printouts and display, speeds of 5 mm/s or 10 mm/s are also available. See Section 3 to change speeds for display or rhythm printing. Paper speed is printed at the bottom right corner of the ECG printout.

Filter

The ECG plot-frequency filter (or print filter) can be set to 40 Hz, 150 Hz, or 300 Hz. The plot-frequency filter does not filter the acquired digital record. A 40 Hz plot-filter setting will reduce the noise (40 Hz and higher frequencies) on the printed ECG, and a 150 Hz plot-filter setting will reduce the noise (150 Hz and higher frequencies) on the printout; a 300 Hz plot-filter setting will not filter the printed ECG. The filter setting is printed at the bottom right corner of the ECG printout.

Height/Weight Units

Defines the units of weight and height to either pounds/inches (lb/in) or kilograms/centimeters (kg/cm).

Date Format

Select either U.S. or European format for entering and displaying the patient's date of birth.

For example:	July 16th, 2003 is displayed as follows:
U.S. Date Format:	MM/DD/YYYY (07/16/2003)
European Date Format:	DD.MM.YYYY (16.07.2003)

> *NOTE: The date format option does not modify the acquisition date printed on each ECG. Using the example above, the acquisition date will print as 16-Jul-2003.*

Interpretation Option

The ELI 150 Rx automatically analyzes ECGs and prints the optional interpretation on the ECG printout. This setting allows you to select or suppress the "interpretive" text on the ECG report.

> *NOTE: A qualified physician should review the computer-generated ECG interpretation before the treatment of any patient.*

Reasons

The reasons statements indicate why a particular interpretive statement was printed. Reasons statements print enclosed in [square brackets] within the interpretive text if the interpretation option is turned on. Turning the reasons statement function on or off does not affect the measurements performed or the interpretive statements selected by the analysis program.

> **For Example:**
> Anteroseptal Infarct [40+ MS Q WAVE IN V1-V4]
> Where "Anteroseptal Infarct" is the interpretive statement,
> and "40+ MS Q WAVE IN V1-V4" is the reason statement or
> explanation as to why the interpretive statement was printed.

Configuration Page 3

Append

A status or statement phrase can be appended to the ECG and printed under the interpretive text printout. Either "unconfirmed report" or "reviewed by" can be selected; however, if you wish to have nothing appended to the ECG, select "blank".

Number of Copies

Defines the number of printed copies when an ECG is taken. A zero (0) setting prints the original only; one (1) prints the original plus 1 copy; two (2) prints the original plus 2 copies, and so on. Up to 9 copies may be selected.

ECGs Retrieved

Defines the number of ECGs retrieved from an E-Scribe Rx system. The ECGs are retrieved by ID number. A zero (0) setting retrieves the most current ECG for that ID number. Settings from one (1) to seven (7) retrieve the most current ECG plus "X" number of ECGs identified by the entered value. EXAMPLE: If you enter the number 5, you will retrieve the most current ECG plus the five preceding ECGs for that ID number. ECGs retrieved from the E-Scribe Rx are only printed at the ELI 150 Rx and not saved.

Delete Rule

Defines the rule to mark ECGs as deleted in the ECG directory. ECGs that are marked for deletion will be automatically removed or erased based on their acquisition date (a first-in/first-out philosophy) to make room for the new ECG record. ECGs are only erased from the directory when they are marked for deletion and if the directory becomes full. More than one ECG may be removed from the directory in order to make room for the new incoming record. The delete rule selections are:
- Post Plot = ECG is automatically marked for deletion after printing
- Post Transmit = ECG is automatically marked for deletion after transmission
- Post Plot/Transmit = ECG is automatically marked for deletion after transmission and printing

Storage Sensitivity

Dictates the resolution of all stored ECG records. The sensitivity setting is either Normal or High. If the value is set to High, the stored ECG will have a high resolution. As a result, the record size will be large and will reduce the storage capacity in the ECG directory.

Auto-Save ECG

Defines whether or not a newly acquired ECG will be automatically saved to the directory once it is acquired and printed. If the auto-save configuration option is set to No and the record is printed, the ELI 150 Rx will prompt you to "Save ECG?" **F1 (SAVE)** will store the ECG in the directory.

> ***NOTE:*** *Manually save ECGs by selecting* **F5** *(****More****) from the acquired ECG view and* **F5** *(****Save****).*

Auto-Print ECG

Defines whether or not the ELI 150 Rx will automatically print the ECG after acquisition. If the selected configuration option is set to No, a manual printout is possible.

Baud Rate

Determines the serial port's data transmission rate in bits per second (bps). Set the baud rate to 9600, 19200, 38400, 57600, or 115200 bps for direct data transmission between the ELI 150 Rx and another Mortara electrocardiograph; 38400 bps for a direct connection to an E-Scribe Rx system.

Caps Lock

All character entry is translated to uppercase.

Configuration Page 4

Rhythm Formats

Defines the default values for rhythm printing. It is possible to set a 3-channel or 6-channel default rhythm format. Define rhythm leads one through three to customize a 3-channel rhythm printout or define rhythm leads one through six to customize the 6-channel rhythm printout.

Configuration Page 5

Plot Format

Defines the default for one of the available plot formats in either standard or Cabrera presentation. Please note that regardless of the plot format selected, 10 seconds of 12 leads are always stored.

The ECG plot options are:

Format Option	ECG Data
3+1	2.5 seconds of 12 leads in a 3-channel format and the fourth channel is a 10-second rhythm strip of Lead II (user defined). Cabrera also available.
3	2.5 seconds of 12 leads in a 3-channel format. Cabrera also available.
3+3	2.5 seconds of 12 leads in a 3-channel format plus 10-second rhythm strip of Leads II, V1, and V5 (user defined) in a 3-channel format. Cabrera also available.

Rhythm Leads

Identifies the three user-selectable, 10-second rhythm leads for the 3+1 and 3+3 channel ECG printout.

> **NOTE:** *Rhythm acquisition is not stored in memory, only printed.*

> **NOTE:** *See Section 3 to acquire a rhythm printout.*

Bar Code Scanner

Allows a bar code scanner to be connected to the serial port on the rear of the device to allow scanned input of patient demographics information printed on the patient's wristband. The bar code scanner can also function as a keyboard wedge and input certain function commands such as AUTO, RHY, XMT, and STOP.

Average RR

Enabling this option will display an averaged RR value to appear on the report.

QTcB

Enabling this option will display a Bazett's corrected QT value on the report along with the default linear QTc value.

QTcF

Enabling this option will display a Fridericia corrected QT value on the report along with the default linear QTc value.

Configuration Page 6

The ELI 150 Rx connectivity options are RS-232 (or direct), internal or external modem, LAN, WLAN, or GSM/GPRS mobile. Configuration parameters associated with each type of transmission media will be presented in Configuration pages 6 and 7 only if those media are installed in the electrocardiograph.

XMT Media

Identifies the default transmission media; those connectivity options which have been optionally purchased and installed will be available for default selection.

DHCP

Defines whether the Dynamic Host Communication Protocol (DHCP) will be used to obtain an IP address. If DHCP is Yes, the network will automatically and dynamically assign an IP address. If DHCP is No, you must enter the IP address, def gateway, and sub net mask.

> *NOTE: All parameters related to network connection must be entered under the direction of the IT Manager of the facility where the device is installed.*

IP Address

Enter the fixed IP address for network transmissions (if DHCP is not selected).

Def Gateway

Enter the address of the default gateway (if DHCP is not selected).

Sub Net Mask

Enter the sub net address (if DHCP is not selected).

Host IP

Enter the IP address of the host server.

> *NOTE: Addresses are always entered as 4 sets of 3 digits; therefore, an address of 192.168.0.7 must be entered as 192.168.000.007.*

Port Number

Enter the port number used by the host server.

SSID

Service Set Identifier (SSID) is the name of the wireless network. All ELI 150 Rx electrocardiographs that will transmit to the same network must have the same SSID name. This field is case sensitive.

Configuration Page 7

Security (WEP)

Wired Equivalent Privacy (WEP) is an encrypted security protocol (part of the 802.11 standard). Access points can have multiple WEP keys stored. Each one of them is identified by a number (e.g., 0, 1, 2, 3).

WEP Key

Enter the WEP key number.

WEP Key ID

Enter the 128-bit WEP key ID value (26 digits in 13 sets of two digits).

WLAN MAC

Shows the MAC address of the ELI 150 Rx wireless module for configuring access points.

WPA-PSK

WPA (Wi-Fi Protected Access) PSK (Pre-Shared Key) security allows for implementation of the "personal mode" of WPA. This mode of encryption employs Temporal Key Integrity Protocol (TKIP) which dynamically changes keys as the system is used.

PSK Passphrase

The passphrase may be from eight to 63 ASCII characters or 64 hexadecimal digits (256 bits).

WPA-LEAP

Cisco® LEAP (Light Extensible Authorization Protocol) enables use of the device with wireless networks employing the LEAP encryption protocol.

LEAP User Name

The LEAP user name can be up to 64 characters in length.

LEAP Password

The LEAP password can contain up to 64 characters.

Configuration Page 8

Technician Password

Enter technician password.

Worklist Management

The ELI 150 Rx can download and process ECG order lists from the E-Scribe Rx or another compatible information management system which identifies the ECGs (or ECG orders) needed for particular patients. Implementation of an order-based workflow can significantly reduce demographic data entry errors at the electrocardiograph. Orders are deleted from the list when the ordered ECG is acquired.

When set to Standard, new order lists are appended to the remaining list. When set to Refresh, each new order will override the previously downloaded one.

XMT Protocol

Select DICOM® or UNIPRO.

ECG DIRECTORY

Section Purpose

This section is intended to provide the user with information about:
- ECG directory and directory maintenance.
- Print configuration.

The ELI 150 Rx offers several special functions available through the application menu. Select **F6** (**More**) from the real-time ECG view and the application menu is displayed.

The following chart summarizes the application functions available.

Application	Definition
Directory of Stored ECGs (ECG Directory)	List of ECGs stored in the internal memory
Print Configuration	Printout of the configuration settings
Set Time/Date	Current time and date; LCD contrast – see Section 2
Receive ECGs	Receive ECGs from another electrocardiograph – see Appendix A
Retrieve ECGs	Retrieve ECGs from an E-Scribe Rx – See Appendix A
Orders Download	Download ECG order list from E-Scribe Rx – See Appendix A
Custom ID Download	Download custom-designed patient demographic format – See Appendix A

ECG Directory

The standard ECG directory saves up to 60 ECGs depending on the storage space required for individual records. The optional expanded memory permits up to 150 ECGs. The HR, storage sensitivity, and signal quality determine the ECG file size and, ultimately, how much memory is needed to store each record.

From the application menu, use the keyboard to select **1** and display the ECG directory list.

> **NOTE:** In the ECG directory list, "**P**" represents the record has been printed, "**X**" represents the record has a delete status, and "**T**" represents the record has been transmitted.

Management of the ECG record is performed within the directory of stored ECGs. The desired record must be highlighted in order to view, print, edit, add demographics, or to change delete status.

Use **F1** (▼/▲) to navigate by line down the ECG directory; use ↑ (**Shift**), **F1** (▼/▲) to move up. Similarly, use **F2** (▼▼/▲▲) to page down the ECG directory; use ↑ (**Shift**), **F2** (▼▼/▲▲) to page up. To quickly select a patient name, use the keyboard to enter the first few letters of the last name. The letters will be displayed in the lower left corner of the display screen and the desired name will automatically be highlighted.

An ECG may be stored in the directory but have a "delete status" (indicated by "X"). The directory saves records marked for deletion in the event that you may want to recover the ECG at a later time. Records are automatically marked for deletion based on the delete rule configuration (see Section 4). To manually mark an ECG record for deletion, highlight a name from the ECG directory and select **F4** (**Delet**). An "**X**" will appear in the far right-hand column of the directory. To remove the delete status, re-highlight the name and select **F4** again. All stored ECGs will remain in the directory until it becomes full. When necessary to store a newly acquired ECG, only those records that have been marked for deletion will be removed.

To view a specific ECG record, highlight the desired name from the directory list and press **F3** (**Selec**). The selected ECG is presented in acquired ECG view. Toggle through the available waveform formats by selecting **F2** (**Leads**) and **F3** (**Page**). To make an additional copy of the ECG, select **F4** (**Print**). To return to the ECG directory, select **F6** (**Done**).

In order to change the speed, gain, filter, or printout format in the acquired ECG view, select **F5** (**More**). To manipulate the print format of the acquired ECG regardless of the plot format configuration setting, select **F4** (**Fmt**). Select **F6** (**Done**) to return to the acquired ECG view.

The directory is easily sorted either by name, ID, or date. To sort the ECG records, select **F5 (More)** from the ECG directory.

- Select **F1** to sort the directory by patient name (patient ID and time/date are displayed in the top row)
- Select **F2** to sort the directory by patient ID (patient name is displayed in the top row)
- Select **F3** to sort the directory by acquisition date (patient name is displayed in the top row)

To make a printout of the ECG directory, select **F4** (**Print Requests**). The directory lists stored ECGs based on how you have the directory sorted. The printout indicates if the ECGs have been printed, marked delete, or transmitted (with an "X" in the appropriate column). **F6** (**Exit**) to return to the ECG directory.

Print Configuration

In order to verify the ELI 150 Rx's configuration settings, a printout of the device's configuration is possible from the application menu by selecting **2** (**Print Configuration**). The configuration printout captures every configuration setting: the software version, the cart number of the device, and the date and time that the configuration printout occurred.

CONNECTIVITY AND ECG TRANSMISSION

Section Purpose

This section is intended to provide the user with information about:
- Transmitting ECGs.
- Receiving ECGs.
- Retrieving ECGs.
- Orders download.
- ECG order list.
- Custom ID download.

ECG Transmission

You may transmit ECGs to another Mortara Instrument electrocardiograph, to an E-Scribe Rx system, or to ELI LINK using a direct connection, optional factory installed internal modem, external modem, WLAN, LAN, or optional integrated GSM/GPRS mobile connection.

Before transmitting ECGs, certain configuration options must be set in system settings depending upon the transmission media used (see Section 4).

> *NOTE: Telephone transmission is available with GSM/GPRS mobile or internal modem only.*

> *NOTE: In order to properly connect to telephone lines, the ELI 150 Rx internal modem needs to be set on the proper country code. This is an internal setting and should not be confused with International calling codes.*

To transmit records, select **XMT** [XMT ←○].

To transmit one ECG, select **F2** (**Selec**) to choose a record from the patient directory. Use **F1** (▼/▲) to navigate by line down the directory list; use ↑(**Shift**), **F1** (▼/▲) to move up. Similarly, use **F2** (▼▼/▲▲) to page down the directory list; use ↑(**Shift**), **F2** (▼▼/▲▲) to page up. To quickly select a patient name, use the keyboard to enter the first few letters of the last name. The letters will be displayed in the lower left corner of the display screen and the desired name will automatically be highlighted. When the desired record is highlighted, use **F3** (**XMT**) to transmit the individual ECG.

To batch transmit all records in the directory, select **F1** (**Batch**). In a batch transmission, only those records which have not been previously transmitted or marked for deletion will be transmitted. After the transmission of your record(s), the real-time ECG view is displayed

Direct Connection (RS-232)

For a direct connection, set the XMT media to RS-232. Connect the ELI 150 Rx to another Mortara Instrument electrocardiograph, to an E-Scribe Rx, or to ELI LINK with a direct connect serial cable.

In the configuration setting, select matching baud rates for both units. Use 38400 bps for a direct connection to E-Scribe Rx.

Modem Transmission

For a modem transmission, set the XMT media to modem. Connect the ELI 150 Rx to a standard telephone jack with the provided phone line cable. Plug the cable into the telephone jack located on the back of the electrocardiograph and the other end into a telephone wall jack. Confirm telephone number in the configuration settings.

Modem Initialization

The modem initialization string is country specific. At the time of production, the modem initialization string is configured for the country of purchase; however, if the unit is relocated to a different country, the modem initialization string will need to be modified.

From real-time ECG view, select **F6** (**More**) to display the application menu. From the application menu, simultaneously press **ALT+SHIFT+M** to access the modem initialization string.

From the Configure Modem screen, select **F2** (**+GCI=**) to populate the prefix "**AT+GCI**" of the modem command.

> **TIP:** *"AT+GCI" will be highlighted – cursor is not present – use keypad to enter country code.*

The type of modem installed in your electrocardiograph is displayed at the bottom of the Configure Modem screen. Use the External Country Code List to enter your country code. Select **F1** (**Send**) to change your country code. "Sending…." and "Command stored" will be displayed. Select **F6** (**Exit**) to return to the application menu.

External Modem

Before using the external modem, modem command(s) must be entered and two configuration settings must be defined. In the configuration, select "external modem" for the XMT media and set the baud rate to 57600.

From the Configure Modem screen, enter and send the initialization command as AT&FEQX4&K.

If a country specific code is necessary, the following list of countries require "%T19,0,XX" to be added to the modem initialization string. Where "XX" is replaced by the country code number in the following table:

EXTERNAL MODEM COUNTRY CODE LIST:

Country	Code	Country	Code
Afghanistan(AF)	B5	Chile(CL)	99
Albania(AL)	B5	China(CN)	B5
Algeria(DZ)	B5	Christmas Island(CX)	B5
American Samoa(AS)	B5	Cocos (Keeling) Islands(CC)	B5
Andorra(AD)	B5	Colombia(CO)	B5
Angola(AO)	B5	Comoros(KM)	B5
Anguilla(AI)	B5	Congo(CG)	B5
Antarctica(AQ)	B5	Cook Islands(CK)	B5
Antigua and Barbuda(AG)	B5	Costa Rica(CR)	B5
Argentina(AR)	07	Cote D'Ivoire(CI)	B5
Armenia(AM)	B5	Croatia(HR)	B5
Aruba(AW)	B5	Cuba(CU)	B5
Australia(AU)	09	Cyprus(CY)	FD
Austria(AT)	FD	Czech Republic(CZ)	FD
Azerbaijan(AZ)	B5	Denmark(DK)	FD
Bahamas(BS)	B5	Djibouti(DJ)	B5
Bahrain(BH)	B5	Dominica(DM)	B5
Bangladesh(BD)	B5	Dominican Republic(DO)	B5
Barbados(BB)	B5	East Timor(TP)	B5
Belarus(BY)	B5	Ecuador(EC)	B5
Belgium(BE)	FD	Egypt(EG)	B5
Belize(BZ)	B5	El Salvador(SV)	B5
Benin(BJ)	B5	Equatorial Guinea(GQ)	B5
Bermuda(BM)	B5	Eritrea(ER)	B5
Bhutan(BT)	B5	Estonia(EE)	FD
Bolivia(BO)	B5	Ethiopia(ET)	B5
Bosnia and Herzegowina(BA)	B5	Falkland Islands (Malvinas)(FK)	B5
Botswana(BW)	B5	Faroe Islands(FO)	B5
Bouvet Island(BV)	B5	Fiji(FJ)	B5
Brazil(BR)	16	Finland(FI)	FD
British Indian Ocean Territory(IO)	B5	France(FR)	FD
Brunei Darussalam(BN)	B5	France-Metropolitan(FX)	FD
Bulgaria(BG)	FD	French Guiana(GF)	B5
Burkina Faso(BF)	B5	French Polynesia(PF)	B5
Burundi(BI)	B5	French Southern Territories(TF)	B5
Cambodia(KH)	B5	Gabon(GA)	B5
Cameroon(CM)	B5	Gambia(GM)	B5
Canada(CA)	B5	Georgia(GE)	B5
Cape Verde(CV)	B5	Germany(DE)	FD
Cayman Islands(KY)	B5	Ghana(GH)	B5
Central African Republic(CF)	B5	Gibraltar(GI)	B5
Chad(TD)	B5	Greece(GR)	FD

Country	Code	Country	Code
Greenland(GL)	B5	Mali(ML)	B5
Grenada(GD)	B5	Malta(MT)	FD
Guadeloupe(GP)	B5	Marshall Islands(MH)	B5
Guam(GU)	B5	Martinique(MQ)	B5
Guatemala(GT)	B5	Mauritania(MR)	B5
Guinea(GN)	B5	Mauritius(MU)	B5
Guinea-Bissau(GW)	B5	Mayotte(YT)	B5
Guyana(GY)	B5	Mexico(MX)	B5
Haiti(HT)	B5	Micronesia(Federated States of)(FM)	B5
Heard and Mc Donald Islands(HM)	B5	Moldova-Republic of(MD)	B5
Honduras(HN)	B5	Monaco(MC)	B5
Hong Kong(HK)	99	Mongolia(MN)	B5
Hungary(HU)	FD	Montserrat(MS)	B5
Iceland(IS)	FD	Morocco(MA)	FD
India(IN)	99	Mozambique(MZ)	B5
Indonesia(ID)	99	Myanmar(MM)	B5
Iran(Islamic Republic of)(IR)	B5	Namibia(NA)	B5
Iraq(IQ)	B5	Nauru(NR)	B5
Ireland(IE)	FD	Nepal(NP)	B5
Israel(IL)	B5	Netherlands(NL)	FD
Italy(IT)	FD	Netherlands Antilles(AN)	FD
Jamaica(JM)	B5	New Caledonia(NC)	B5
Japan(JP)	00	New Zealand(NZ)	7E
Jordan(JO)	B5	Nicaragua(NI)	B5
Kazakhstan(KZ)	B5	Niger(NE)	B5
Kenya(KE)	B5	Nigeria(NG)	B5
Kiribati(KI)	B5	Niue(NU)	B5
Korea-Democratic People's Republic of(KP)	B5	Norfolk Island(NF)	B5
Korea-Republic of(KR)	B5	Northern Mariana Islands(MP)	B5
Kuwait(KW)	B5	Norway(NO)	FD
Kyrgyzstan(KG)	B5	Oman(OM)	B5
Lao People's Democratic Republic(LA)	B5	Pakistan(PK)	B5
Latvia(LV)	FD	Palau(PW)	B5
Lebanon(LB)	B5	Panama(PA)	B5
Lesotho(LS)	B5	Papua New Guinea(PG)	B5
Liberia(LR)	B5	Paraguay(PY)	B5
Libyan Arab Jamahiriya(LY)	B5	Peru(PE)	B5
Liechtenstein(LI)	FD	Philippines(PH)	B5
Lithuania(LT)	FD	Pitcairn(PN)	B5
Luxembourg(LU)	FD	Poland(PL)	FD
Macau(MO)	B5	Portugal(PT)	FD
Macedonia-The Former Yugoslav Republic of(MK)	B5	Puerto Rico(PR)	B5
Madagascar(MG)	B5	Qatar(QA)	B5
Malawi(MW)	B5	Reunion(RE)	B5
Malaysia(MY)	6C	Romania(RO)	FD
Maldives(MV)	B5	Russian Federation(RU)	FD

Country	Code	Country	Code
Rwanda(RW)	B5	Thailand(TH)	B5
St. Helena(SH)	B5	Togo(TG)	B5
Saint Kitts and Nevis(KN)	B5	Tokelau(TK)	B5
Saint Lucia(LC)	B5	Tonga(TO)	B5
St. Pierre and Miquelon(PM)	B5	Trinidad and Tobago(TT)	B5
Saint Vincent and the Grenadines(VC)	B5	Tunisia(TN)	B5
Samoa(WS)	B5	Turkey(TR)	FD
San Marino(SM)	B5	Turkmenistan(TM)	B5
Sao Tome and Principe(ST)	B5	Turks and Caicos Islands(TC)	B5
Saudi Arabia(SA)	B5	Tuvalu(TV)	B5
Senegal(SN)	B5	Uganda(UG)	B5
Seychelles(SC)	B5	Ukraine(UA)	FD
Sierra Leone(SL)	B5	United Arab Emirates(AE)	B5
Singapore(SG)	9C	United Kingdom(UK)	FD
Slovakia(SK)	FD	United States(US)	B5
Slovenia(SI)	FD	United States Minor Outlying Islands(UM)	B5
Solomon Islands(SB)	B5	Uruguay(UY)	B5
Somalia(SO)	B5	Uzbekistan(UZ)	B5
South Africa(ZA)	9F	Vanuatu(VU)	B5
South Georgia and the South Sandwich Islands(GS)	B5	Vatican City State (Holy See)(VA)	B5
Spain(ES)	FD	Venezuela(VE)	B5
Sri Lanka(LK)	B5	Vietnam(VN)	99
Sudan(SD)	B5	Virgin Islands (British)(VG)	B5
Suriname(SR)	B5	Virgin Islands (U.S.)(VI)	B5
Svalbard and Jan Mayen Islands(SJ)	B5	Wallis and Futuna Islands(WF)	B5
Swaziland(SZ)	B5	Western Sahara(EH)	B5
Sweden(SE)	FD	Yemen(YE)	B5
Switzerland(CH)	FD	Yugoslavia(YU)	B5
Syrian Arab Republic(SY)	B5	Zaire(ZR)	B5
Taiwan-Province of China(TW)	FE	Zambia(ZW)	B5
Tajikistan(TJ)		Zimbabwe(ZW)	B5
Tanzania-United Republic of(TZ)	B5		

WLAN Transmission

For a WLAN transmission, set the XMT media to WLAN. It is necessary that the IT Manager of your facility configure the wireless access point(s) and E-Scribe Rx workstation. It is also required that your IT Manager provide the ELI 150 Rx WLAN configuration values. The ELI 150 Rx can be configured for Dynamic Host Communication Protocol (DHCP) or static IP. Wireless security encryption options include WEP, WPA, and LEAP.

> **NOTE:** *Environmental conditions may affect the reliability of WLAN transmissions.*

If DHCP is set to NO, your wireless access point will have a static network setting and the following parameters must be configured in the device:
IP Address
Default Gateway
Sub Net Mask

If DHCP is set to YES, your wireless access point will have an automatic network setting and IP address; default gateway and sub net mask do not need to be configured.

In either DHCP setting, the following wireless network parameters must be provided by your IT Manager:
Host IP
Port Number
SSID
Channel Number

> **NOTE:** *Addresses are always entered as 4 sets of 3 digits; therefore, an address of 192.168.0.7 must be entered on the ELI 150 Rx as 192.168.000.007.*

If WEP security is disabled on your access point, set security (WEP) to NO. If WEP security is enabled on your access point, the following wireless network parameters must be configured in the device by the IT Manager:
Security: WEP
WEP Key
WEP Key ID

> **NOTE:** *The range for the WEP key is 0-3. If the range on your access point is 1-4, then 0 at the ELI 150 Rx maps to 1 on the access point; 1 maps to 2 on the access point, etc.*

If your wireless security environment is WPA (Wi-fi Protected Access) then you will need to enter:
Security: WPA-PSK
Passphrase:

> **NOTE:** *The passphrase length is limited to 64 digital Hex Value characters or 63 ASCII characters.*

If your wireless security environment is LEAP then you will need to enter:
Security: WPA-LEAP
LEAP User Name
LEAP Password

> **NOTE:** *LEAP user name and password are limited to 63 characters.*

LAN Transmission

For a LAN transmission, connect the ethernet cable to the LAN connection at the rear of the ELI 150 Rx and set the XMT media to LAN in the configuration. It is necessary that the IT Manager of your facility set the ELI 150 Rx LAN configuration values.

> *NOTE: Addresses are always entered as 4 sets of 3 digits; therefore, an address of 192.168.0.7 must be entered on the ELI 150 Rx as 192.168.000.007.*

> *CAUTION: Possible damage to the electrocardiograph may occur if telephone cable is connected to the LAN connector.*

> *NOTE: The location for antenna for GSM/GPRS and WLAN are interchangeable.*

Ethernet Status LEDs

At the external LAN interface connector, the user is presented with two LEDs (Light Emitting Diodes). The two status indicator LEDs provide signals for "link status" and "packet transmit/receive". As the external connector is viewed from the outside rear of the ELI 150 Rx, the left LED remains illuminated when the network link is detected. The ELI 150 Rx LAN will support signaling rates of 10 and 100 MBPS. The right LED flashes when a transmit or receive packet occurs or any traffic on the network is detected. The electrocardiograph conserves power by only turning on the LAN module at time of transmission. Therefore, the link status LEDs remain OFF until you push the final button to transmit the record. At this point the module is powered on, configured, and begins to communicate to the network. It takes approximately 6 seconds from the final button push until you see the link status LEDs illuminate.

GSM/GPRS Mobile Transmission

> *CAUTION: GSM/GPRS mobile hookup time will vary depending on location. It may require between 5 and 60 seconds to initiate a communication link. Signal loss at the onset of transmission or during transmission may occur due to environmental variables.*

GPRS (Global System for Mobile communications) is a world standard for digital cellular communications using narrowband TDMA (Time Division Multiple Access). Similar to GSM cellular phones, the ELI 150 Rx GPRS mobile connectivity option requires a Subscriber Identity Module (SIM) smart card. A SIM comprises a microcontroller, ROM for programs, and EPROM for information. Information stored on the SIM includes the International Mobile Subscriber Identity (IMSI) which is a unique identifying number, plus various network-specific user and security data.

> *CAUTION: The GSM SIM card must be configured for **Circuit Switched Data (CSD**) capabilities.*

SIM cards and data network plans are not offered for sale by Mortara Instrument and must be purchased separately from your local provider. The ELI 150 Rx GSM/GPRS mobile connectivity option is factory installed. Please note that for GSM/GPRS mobile transmission, the SIM card must have voice and data capabilities enabled and security options (cell phone lock) must be disabled.

For a GSM/GPRS mobile transmission, set the XMT media to GSM/GPRS in the configuration. Confirm a valid telephone number in the configuration and install your SIM card.

SIM Card Installation

Power off the ELI 150 Rx. Open the writer cover and remove the pack of thermal paper. There is a small access panel on the floor of the writer tray. Remove the screw and lift off the access panel.

Using your finger, slide the SIM card socket towards the back of the unit (follow the arrow printed on the circuit board to the "open position"). Again, using your finger, lift the socket upright. To insert the SIM card, hold the SIM card so the gold contact is facing you and the key (angle-notched corner) is in the upper right. Slide the SIM card in between the two recessed notches of the socket. Lower the socket so the SIM card key appears in the lower right corner. Slide the socket towards the front of the unit (follow the arrow on the circuit board to the "lock position").

> *NOTE: Notched corner of SIM card must be located properly in socket. Do not force socket connector if SIM is not seated properly.*

Replace access panel, screw, and thermal paper. Power on the electrocardiograph.

If a wireless network carrier is not detected at the time of transmission (due to environmental conditions, i.e., poor signal), relocate or reposition the unit for a better signal and reattempt transmission.

In order to change a network carrier, you must scan the wireless network to determine what is detected and available for use. Select **F5** (**Scan**), a "scanning networks…" message will appear on the LCD. Once the scanning process is completed, the Select Networks screen is available. Highlight the desired network and press **F3** (**Selec**).

Receiving ECGs

To receive ECGs from another Mortara Instrument electrocardiograph select **4** (**Receive ECGs**) from the application menu. When the LCD displays "Press STOP to terminate", the unit is ready to receive the ECGs from the transmitting electrocardiograph. Follow the instructions on transmitting records as described in this section. The receiving unit only acts as a printer. Received ECGs will not be viewed or stored. To terminate the receiving mode, press the **STOP** key.

> *NOTE: The ELI 150 Rx will receive records from Mortara model electrocardiographs except for Mortara's Portrait. The Mortara model electrocardiographs ELI 100, ELI 200, Landscape, and Portrait will not receive the ELI 150 Rx records.*

Retrieving ECGs

It is possible to retrieve ECGs from an E-Scribe Rx system using any of the connectivity options. Before attempting to retrieve ECGs, configure the XMT media, the telephone number (if using modem transmission), and the site number. Select **5** (**Retrieve ECGs**) from the application menu.

ECGs are retrieved by ID number. Enter the desired ID and select **F1**. E-Scribe Rx transmits the most recent ECG with the specified ID number (or the configured number of ECGs retrieved – refer to Section 4). The ELI 150 Rx prints the retrieved ECG(s) and returns to the real-time ECG view. Viewing and storing retrieved ECGs is not possible.

> *NOTE: The ID field defaults the last acquired ECG.*

Orders Download

> *NOTE: A custom ID must be downloaded before downloading the orders. Please reference the E-Scribe Rx or ELI LINK user manual, and Custom ID Download.*

The ELI 150 Rx can download and process an ECG order list from E-Scribe Rx.

Order lists containing the demographic information of patients requiring an ECG are designed in your E-Scribe Rx system. The technician at the electrocardiograph selects the desired order code (e.g., a code specific to a department or floor) and the patients belonging to the order list. Once downloaded to the ELI 150 Rx, the ECG list for the selected order code is stored in the device as the order list (similar to the ECG directory). As with ECG data transmission, you can use any of the connectivity options to download the order list.

From real-time ECG view, select **F6** (**More**) to display the application menu. Using the keyboard, select **6** (**Requests Download**) to display the available order code(s).

Use **F1** (▲) and **F2** (▼) to scroll through the list; use **F3** (**Selec**) to select the desired order code. Confirm or deny your download by selecting **F2** or **F3**.

"Transmission Status" will be displayed for approximately 10 seconds followed by "Dialing: telephone number", "Waiting for Response", and "Connected". Once connected, the screen indicates the number of orders (ECGs) received for the order code. This only appears briefly before returning to the real-time ECG view. When the order list has been downloaded, you may select the patients who need ECGs. Select **F1** (**ID**) from the real-time ECG view.

ECG Order List

To display the ECG order list, select **F4** (**Req**) from the patient ID screen. The ECG order list is comparable to the ECG directory in looks and in practice; you can sort the list by name, ID, or date. To sort the orders, first select **F5** (**More**):

Select **F1** to sort the orders by patient name (ID, time, and date are displayed in the top row)
Select **F2** to sort the orders by patient ID (name is displayed in the top row)
Select **F3** to sort the orders by acquisition date (name is displayed in the top row)

To make a printout of the orders list, select **F4** (**Print Requests**). **F6** (**Exit**) to return to the ECG order list.

Custom ID Download

Custom ID formats are uniquely defined by your facility's needs. This customized ECG header information is designed in an ELI LINK or E-Scribe Rx system and downloaded to the ELI 150 Rx. Up to three custom ID formats can be downloaded.

From the application menu, select **7 (Custom ID Download)**. "Transmission Status" will remain visible for approximately 10 seconds followed by "Waiting for Response", "Connected", and "Custom ID downloaded". A return to the real-time ECG view indicates the custom ID download is complete. The custom ID remains the new header format for all future ECGs until you select a different ID format in the configuration settings. You may alter the ID format configuration to short, standard, long, or custom based on your patient demographic entry needs. The custom ID is only deleted upon downloading a new custom ID or on the rare occasion of downloading software – it will not be lost due to power loss or switching to a different ID format.

> ***TIP:*** *Upon custom ID download, the ID format will assume the group name as designed in ELI LINK or E-Scribe Rx.*

> ***NOTE:*** *The site number must be configured in the electrocardiograph and recognized as an established, valid site number at the E-Scribe Rx before downloading the custom ID.*

> ***TIP:*** *Confirm the baud rate in the configuration settings before downloading the custom ID from ELI LINK or E-Scribe Rx .*

MAINTENANCE AND TROUBLESHOOTING

System Troubleshooting Chart

LCD Message	Problem	Correction
BATTERY LOW – CHARGE UNIT	Unable to acquire ECG or unable to print.	Charge the battery with AC power.
LEAD FAULT, NO ECG CAPTURE	Lead fail or noisy ECG data.	Correct faulty lead or noise.
NO ANSWER	Unable to transmit ECG.	Check for correct phone number. Ensure modem and E-SCRIBE RX are online.

ECG Troubleshooting Chart

Affected Leads	Problem	Correction
LEADS OFF OR ONE OR MORE OF THE FOLLOWING: RA, LA, LL, V1, V2, V3, V4, V5, V6	Lead fail.	Indication of RL/RA/LA/LL/V1/V2/V3/V4/V5/V6. Check limb leads. Correct faulty lead(s).
Lead I	Missing/Noisy RA/LA.	Check patient prep; re-prep if necessary with new electrode.
Lead II	Missing/Noisy RA/LL.	Check patient prep; re-prep if necessary with new electrode.
Lead III	Missing/Noisy LA/LL.	Check patient prep; re-prep if necessary with new electrode.
All	High Freq. Noise.	Notch down filter from 300 Hz to 150 Hz; check proximity to power cables.

Transmission Troubleshooting Chart

LCD Message	Problem	Correction
TRANSMIT FAILED	Unable to transmit ECG.	Check phone line. Ensure site number is valid. Try again.
ERROR-DICOM Not Enabled	A DICOM communication was attempted, but the unit is not configured for DICOM.	Configure the system to DICOM and reboot.
UNABLE TO SAVE ECG	No available memory. ECG data too noisy to store.	Press stop to continue. Transmit or mark records for deletion in the directory. Correct noise and try aquisition/storage again.
DHCP FAILURE	The WLAN module failed to get an address from DHCP.	Contact Mortara Technical Service.
DPAC FAILURE	WLAN failed to initialize.	Contact Mortara Technical Service.
CAN'T CONNECT TO ACCESS POINT	A link to the access point could not be established.	Ensure the IP address is correct. If problem persists, contact Mortara Technical Service.
CAN'T CONNECT TO REMOTE LINK	A link to the access point was established, but the link to the destination failed.	Ensure the IP address is correct. If problem persists, contact Mortara Technical Service.
UNABLE TO SAVE ORDER	Order storage failed.	Attempt to retransmit orders.
UNABLE TO SAVE WORK ITEM	DICOM order storage failed.	Directory full; mark records for deletion or delete records.
INCORRECT RESPONSE	Connection established, then failed.	Connection started but failed; attempt to reconnect.
NO CUSTOM ID	Received orders failed.	Previous Custom ID not compatible with current Custom ID, or no Custom ID.
PAPER QUEUE FAULT	Unable to print. Paper queue mark not detected as expected.	Add paper; manually advance page evenly past closure point of writer and close writer cover and press STOP.
CONNECTION FAILED	Unable to transmit or receive ECGs.	Check for correct baud rate, phone number, and cable connections or site number.
None	File not successfully transmitted via LAN.	Check share permissions on host device.
None	Unable to connect with LAN with crossover cable.	Implement hub vs. crossover cable.

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Test Operation

After cleaning and inspecting the ELI 150 Rx, proper operation of the unit may be confirmed by using an ECG simulator to acquire and print a standard 12-lead ECG of known amplitude. Printing should be dark and even across the page. There should be no evidence of print head dot failure (e.g., breaks in printing forming horizontal streaks). Paper motion should be smooth and consistent during printing. Waveforms should appear normal with proper amplitude and without distortion or excessive noise. Paper should stop with perforations near the tear bar (indicating proper cue sensor operation).

Recommendations to Biomedical Staff

Following any service to the ELI 150 Rx or when non-compliant operation is suspected, Mortara Instrument, Inc. recommends the following procedures:
* Confirm proper operation.
* Perform testing to ensure continued electrical safety of the device
  (use IEC 60601-1 or ANSI/AAMI ES1 methods and limits).
  * patient leakage current
  * chassis leakage current
  * earth leakage current
  * dielectric strength (mains and patient circuits)

Battery Maintenance

The ELI 150 Rx houses an internal, sealed lead-acid battery. When installed, the battery has a shelf life of approximately six months without recharging. If the battery has been stored for a long period in a discharged state, it may not be able to regain its capacity even if it is recharged.

For information about replacing the battery, please refer to the ELI 150 service manual.

Mortara Instrument, Inc. recommends that the ELI 150 Rx be plugged into AC power whenever possible to maximize battery life and for the user to develop a habit of recharging the battery before the unit indicates a "low battery" condition. (That is, reduced depth of discharge.) Battery life varies by how the battery is maintained and how much it is used. For improved battery life, keep the electrocardiograph plugged in when not in use.

The sealed lead-acid battery will provide optimum life when the unit is fully charged after each use. The ELI 150 Rx will charge a depleted battery to 90% of its capacity in approximately 8 hours or less. To recharge a battery from its lowest level, 30 hours of recharging without operation will be necessary.

GLOSSARY

TERM	DEFINITION
AAMI	ECG lead names and identifying colors recommended by the Association for the Advancement of Medical Instrumentation.
AC filter	The configurable filter which screens out ECG artifact caused by power line interference.
Artifact	ECG waveform distortion that may diminish the quality of the ECG signal and may be caused by electrical interference, poor electrodes, poor patient prep, or poor connection.
Augmented lead	(aVL, aVR, aVF) The difference between one site and the average of the potential of two other sites; unipolar extremity leads.
Baseline drift or wander	The QRS complexes are present, but the baseline wanders due to poor skin/electrode contact and/or patient movement.
Bradycardia	A slow heart rate.
Cabrera	In alternative limb lead order in which aVR is inverted and shown as -aVR. Lead order is aVL, I, -aVR, III, V1 / C1 through V6 / C6.
Calibration pulse	Standardization pulse. A base to compare the relationship of QRS complexes to one another.
Chest leads	Precordial leads V1 through V6 (AAMI) or C1 through C6 (IEC).
GSM	Global System for Mobile Communication
GPRS	General Packet Radio Service
Hertz (Hz)	A unit of frequency measurement equal to one cycle per second.
IEC leads	Lead names identifying colors recommended by the International Electrotechnical Commission standard.
J point	The end of the QRS complex; the point where the QRS ends and the ST segment begins (QRS offset).
Leads off	One or more lead names appearing on the top of the display under the heart rate. These messages reflect a faulty lead or disconnected lead.
Limb lead	Bipolar lead that represents the differences of electrical potential between two selected sites (leads I, II, III).
Modem	A device that converts data from an electronic device into signals that can be carried via a telephone line to another location and received on a modem and converted back to an electronic signal or data for use.
Muscle noise	Grossly uneven baseline caused by patient body tremor or other muscle movement.

TERM	DEFINITION
Order	Term for a physicians request for a 12-lead electrocardiogram.
Power saving mode	Term used for the electrocardiograph turning itself into a standby mode. The factory default is 10 minutes without operation or any ECG signal being detected.
Precordial leads	See Chest Leads.
Premature Atrial Complex (PAC)	An arrhythmia that has its origin in the atrium.
Premature Ventricular Complex (PVC)	An arrhythmia that has its origin in the ventricle.
Preview function	Preview screen shows the ECG traces as they will appear on the printed ECG report.
ST depression	The amount of ST deviation below the baseline.
ST elevation	The amount of ST deviation above the baseline.
ST level	The numerical value of the measured ST segment in microvolts.
ST segment	Ventricular repolarization. The end of the S wave (J point) to the beginning of the T wave.
Tachycardia	A rapid heart rate.