Mortara

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REF 9515-170-50-ENG Rev G1

ELI 10

12-LEAD RESTING ELECTROCARDIOGRAPH

USER MANUAL

Manufactured by Mortara Instrument, Inc., Milwaukee, Wisconsin U.S.A.

CE 0459

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

TECHNICAL SUPPORT AND SERVICE

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Extended Warranties/Service Contracts

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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.

Copyright and Trademark Notices

Other Important Information

The information in this document is subject to change without notice.

Mortara Instrument, Inc. makes no warranty of any kind with regard to this material including, but not limited to, implied warranties of merchantability and fitness for a particular purpose. Mortara Instrument, Inc. assumes no responsibility for any errors or omissions that may appear in this document. Mortara Instrument, Inc. makes no commitment to update or to keep current the information contained in this document.

WARRANTY INFORMATION

Your Mortara Warranty

MORTARA INSTRUMENT, INC. (hereinafter referred to as "Mortara") hereby warrants that Mortara products (hereinafter referred to as "Product/s") shall be free from defects in material and workmanship under normal use, service, and maintenance for the warranty period of such Product/s from Mortara or an authorized distributor or representative of Mortara. The warranty period is defined as twenty-four (24) months following the date of shipment from Mortara. Normal use, service, and maintenance means operation and maintenance in accordance with appropriate instructions and/or information guides. This warranty does not apply to damage to the Product/s caused by any or all of the following circumstances or conditions:

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.

THE REMEDY UNDER THIS WARRANTY IS LIMITED TO THE REPAIR OR REPLACEMENT WITHOUT CHARGE FOR LABOR OR MATERIALS, OR ANY PRODUCT/S FOUND UPON EXAMINATION BY MORTARA TO HAVE BEEN DEFECTIVE. This remedy shall be conditioned upon receipt of notice by Mortara of any alleged defects promptly after discovery thereof within the warranty period. Mortara's obligations under the foregoing warranty will further be conditioned upon the assumption by the purchaser of the Product/s (i) of all carrier charges with respect to any Product/s returned to Mortara's principal place or any other place as specifically designated by Mortara or an authorized distributor or representative of Mortara, and (ii) all risk of loss in transit. It is expressly agreed that the liability of Mortara is limited and that Mortara does not function as an insurer. A purchaser of a Product/s, by its acceptance and purchase thereof, acknowledges and agrees that Mortara is not liable for loss, harm, or damage due directly or indirectly to an occurrence or consequence therefrom relating to the Product/s. If Mortara should be found liable to anyone under any theory (except the expressed warranty set forth herein) for loss, harm, or damage, the liability of Mortara shall be limited to the lesser of the actual loss, harm, or damage, or the original purchase price of the Product/s when sold.

EXCLUDED FROM THE LIMITED WARRANTY SET FORTH ABOVE ARE CONSUMABLE ITEMS SUCH AS PAPER, BLOOD PRESSURE CUFFS, BLOOD PRESSURE HOSES, BATTERIES, ELECTRODES, PATIENT CABLES, LEAD WIRES, AND MAGNETIC STORAGE MEDIUMS.

EXCEPT AS SET FORTH HEREIN WITH RESPECT TO REIMBURSEMENT OF LABOR CHARGES, A PURCHASER'S SOLE EXCLUSIVE REMEDY AGAINST MORTARA FOR CLAIMS RELATING TO THE PRODUCT/S FOR ANY AND ALL LOSSES AND DAMAGES RESULTING FROM ANY CAUSE SHALL BE THE REPAIR OR REPLACEMENT OF DEFECTIVE PRODUCT/S TO THE EXTENT THAT THE DEFECT IS NOTICED AND MORTARA IS NOTIFIED WITHIN THE WARRANTY PERIOD. IN NO EVENT, INCLUDING THE CLAIM FOR NEGLIGENCE, SHALL MORTARA BE LIABLE FOR INCIDENTAL, SPECIAL, OR CONSEQUENTIAL DAMAGES, OR FOR ANY OTHER LOSS, DAMAGE, OR EXPENSE OF ANY KIND, INCLUDING LOSS OF PROFITS, WHETHER UNDER TORT, NEGLIGENCE OR STRICT LIABILITY THEORIES OF LAW, OR OTHERWISE. THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO THE IMPLIED WARRANTY OF MERCHANTABILITY AND THE WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE.

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.

- To maintain operator and patient safety when connected to an AC Mains power source, only the following AC/DC power converters should be attached to the cradle PWR (power) receptacle:
  - Ault, Inc., Model MW117, Type: xx0503Fxx (x = variations not affecting safety)
  - Globtek, Inc., Model GTM21089-1305-T3

- Device 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. Contact Mortara service for additional training options.

- To ensure that electrical safety is maintained during operation from AC (~) power, the device must be plugged into a hospital-grade outlet. Where the integrity of external protective earth conductor arrangement is in doubt, the device shall be operated from its internal electrical power source.

- 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.

- 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 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.

- Patient cables intended for use with the device include series resistance (7 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 electrodes, 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.
- 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. The docking station and/or cradle, and connected peripheral equipment must be located outside of this area.
- A possible explosion hazard exists. Do not use the device in the presence of a flammable anesthetic mixture.
- There is a potential pinch hazard when inserting the device into its docking station and/or cradle that could result in minor injury. Care should be taken to avoid entrapment of fingers when performing this operation.
- To improve immunity to potential interfering electromagnetic signals, shielded cabling is recommended when connecting the device to a network.
- 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 was designed for handheld or tabletop use. Only slight pressure is required to operate keys on the keyboard. To help avoid possible fatigue and related stress injuries, do not exert excessive force when pushing keys or continuously operate the device using the same finger and hand motions for long periods of time.

- Some Mortara electrocardiographs can be equipped with 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): 900/1800 or 850/1900 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 (model subject to change without notice)
- 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 transmitter 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. RF exposure to wrists and hands within the 20 cm distance while operating the device in the normal handheld position is not subject to the same distance restriction and is believed to be safe. 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 except for installation of SIM card. 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 lithium ion 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.
- Risk of fire and burns. Do not open, crush, heat above 60C or incinerate. Follow manufacturer's instructions.

Note(s)

- Patient movements may generate excessive noise that may affect the quality of the ECG traces and the proper analysis performed by 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 an electrode is not connected properly to the patient, or one or more of the patient cable lead wires are damaged, the display will indicate a lead fault for the lead(s) where the condition is present.
- Operation of the ELI 10 Mobile with an AC Mains power source connected to the PWR (power) receptacle on the cradle may produce unwanted noise in the ECG signal during acquisition. Disconnect the power source and operate from the internal battery when acquiring ECG data.
- As defined by IEC 60601-1 and IEC 60601-2-25, the device is classified as follows:
  - Class I equipment (applies to entire product when the handheld unit is docked, and to the docking station and/or cradle alone) or internally powered (applies to handheld unit when not docked).
  - Type CF defibrillation-proof applied parts.
  - Ordinary equipment.
  - Equipment not suitable for use in the presence of a flammable anesthetic mixture.
  - 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 on the docking station and/or cradle 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 primarily intended for use in hospitals but may be used in mobile environments (including pre-hospital, emergency medical services, ambulance and patient transport), medical clinics and offices of any size and should be used and stored according to the environmental conditions specified below:

Operating temperature:	>0° to +40°C (>+32° to +104°F)
Operating humidity:	10% to 95% RH, non-condensing
Storage temperature:	-20° to +60°C (-4° to +140°F)
Storage humidity:	5% 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 recharge the device. This ensures that the batteries will be automatically recharged for the next time you use the device. The display will indicate that the device is charging.
- 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

- When necessary, dispose of the device, its components and accessories (e.g., batteries, cables, electrodes), and/or packing materials in accordance with local regulations.
- Do not dismantle, open or shred batteries or secondary cells.
- Do not expose cells or batteries to heat or fire. Avoid storage in direct sunlight.
- Do not short-circuit a cell or a battery.
- Do not subject cells or batteries to mechanical shock.
- In the event of a cell leaking, do not allow the liquid to come in contact with the skin or eyes. If contact has been made, wash the affected area with copious amounts of water and seek medical advice.
- Do not use any cell or battery which is not designed for use with the equipment.
- Seek medical advice immediately if a cell or a battery has been swallowed.
- Always purchase the correct cell or battery for the equipment.
- Keep cells and batteries clean and dry.
- Retain the original product literature for future reference.
- Use only the cell or battery in the application for which it was intended.
- Dispose of properly.

Wireless Data Transmission

- Some Mortara electrocardiographs 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 such 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.

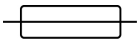
EQUIPMENT SYMBOLS AND MARKINGS

Symbol Delineation

Attention, consult accompanying documents

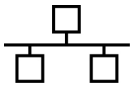
Alternating current

Protective earth



Fuse

Telephone line (modem)



Network (LAN)

Defibrillator-proof type CF applied part

ON/OFF (power)

Shift key (to enter upper case text)

Space key

Enter key (accept data/return)

Universal Serial Bus (USB)

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

Antenna

Indicates compliance to applicable European Union directives

Indicates power receptacle on the cradle accepts an AC/DC power converter. See Warnings for additional information.

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 Cables

1. Remove cables and lead wires from device before cleaning.
2. 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.
3. 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.
4. Use caution with excess liquid as contact with metal parts may cause corrosion.
5. Do not immerse cable ends or lead wires; immersion can cause metal corrosion.
6. 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, transducers, and cables other than those specified by Mortara Instrument may result in increased emissions or decreased immunity of the equipment.

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.

<table>
<tr><th>Emissions Test</th><th>IEC 60601 Test Level</th><th>Compliance Level</th><th>Electromagnetic Environment: Guidance</th></tr>
<tr><td>Conducted RF
IEC 61000-4-6</td><td>3 Vrms
150 kHz to
80 MHz</td><td>3 Vrms
150 kHz to
80 MHz</td><td rowspan="2">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

$d = \left[\frac{3.5}{3Vrms}\right]\sqrt{P}$

$d = \left[\frac{3.5}{3V/m}\right]\sqrt{P}$ 80 MHz to 800 MHz

$d = \left[\frac{7}{3V/m}\right]\sqrt{P}$ 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:

  </td></tr>
<tr><td>Radiated RF
IEC 61000-4-3</td><td>3 V/m
80 MHz to
2.5 GHz</td><td>3 V/m
80 MHz to
2.5 GHz</td></tr>
</table>

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.*

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INTRODUCTION

Manual Purpose

This manual is intended to provide the user with information about:

- Using and understanding the ELI™ 10 electrocardiograph, the function and feature keys, and the display screen.
- Preparing the ELI 10 for use. (Section 2)
- Acquiring, viewing, printing, and storing an ECG. (Section 3)
- Connectivity and transmitting ECGs. (Section 4)
- Maintaining the ECG directory. (Section 5)
- System settings. (Section 6)
- Maintenance and troubleshooting. (Appendix A)

***NOTE**: This manual may contain screen shots. Any screen shots are provided for reference only and are not intended to convey actual operating techniques. Consult the actual screen in the host language for specific wording.*

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.

Intended Use

The ELI 10 is intended to be a high-performance, multi-channel, multifunctional electrocardiograph. As a resting electrocardiograph, ELI 10 simultaneously acquires data from multiple channels. Once the data is acquired, it can be reviewed, stored, transmitted and/or printed. It will be a device primarily intended for use in hospitals, but may be used in mobile environments (including pre-hospital, emergency medical services, ambulance and patient transport), medical clinics and offices of any size.

Indications for Use

- The device is indicated for use to acquire, analyze, display, transmit, print, record and store electrocardiograms.
- The device is indicated for use to provide interpretation of the data for consideration by a physician.
- The device is indicated for use in a clinical setting, or mobile environments (including pre-hospital, emergency medical services, ambulance and patient transport), 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 offered by the device are only significant when used in conjunction with a physician over-read as well as consideration of all other relevant patient data.
- The device is indicated for use on adult and pediatric populations.
- The device is not intended to be used as a vital signs physiological monitor.

System Description

The ELI 10 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 6) the VERITAS algorithm can provide an over-reading physician with a silent second opinion through diagnostic statements. Resting ECG Interpretation accuracies have not been validated under patient transport conditions. Noise generated during patient transport may impact the accuracy of interpretation. For additional information on the VERITAS algorithm, please refer to the *Physician's Guide to VERITAS with Adult and Pediatric Resting ECG Interpretation.* (See Accessories.)

The ELI 10 includes:

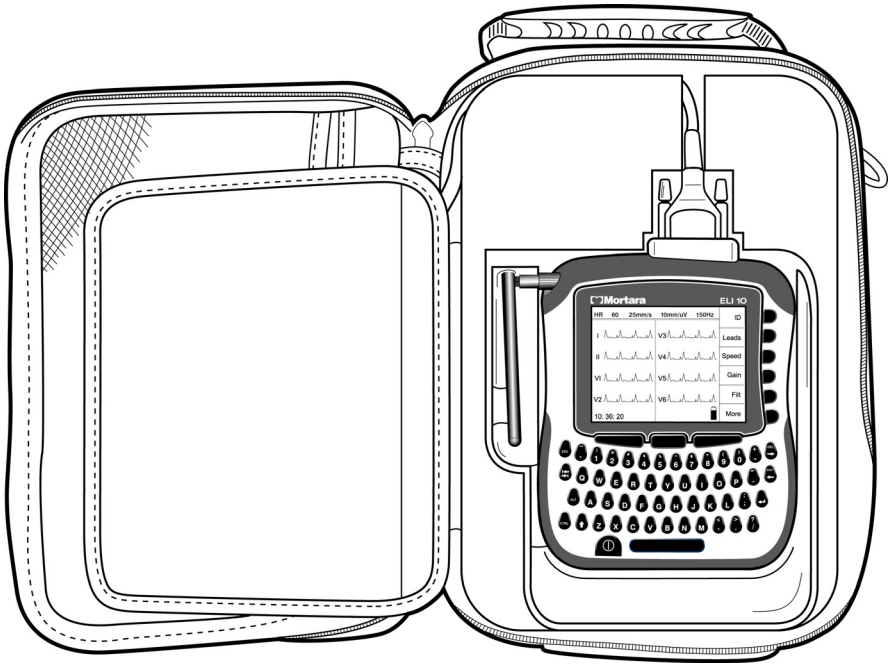
- Patient cable
- Docking station with hospital grade power cord, or cradle with AC/DC power converter and mobile carrying case
- Antenna (with WLAN or GSM/GPRS mobile)
- Physician's Guide to VERITAS with Adult and Pediatric Resting ECG Interpretation
- User manual CD
- Accessory starter kit

ELI 10 with Docking Station

Figure 1-1

ELI 10 with Cradle and Carry Case

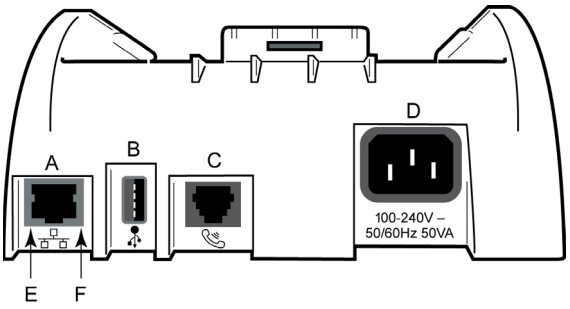
Figure 1-2



Rear of Docking Station

Figure 1-3

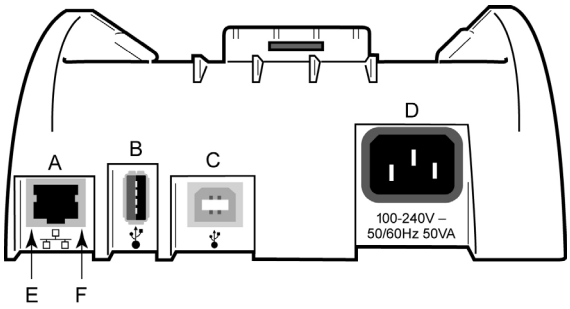
Docking Station with Modem Option



System Connectors

A. LAN connector.
B. USB connector for optional barcode scanner, removable data storage, or laser printer.
C. **Phone line connector for optional modem.**
D. AC power inlet.
E. Green LED indicating power on.
F. Flashing yellow LED indicating LAN connection.

Docking Station with No Modem Option



System Connectors

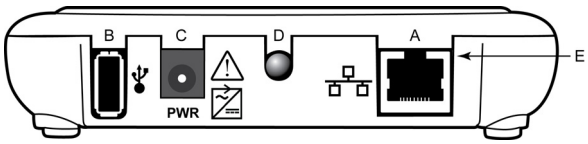
A. LAN connector.
B. USB connector for optional barcode scanner, removable data storage, or laser printer.
C. **USB connector for host computer.**
D. AC power inlet.
E. Green LED indicating power on.
F. Flashing yellow LED indicating LAN connection.

***NOTE**: Two AC line fuses are installed on your ELI 10 docking station.*

***NOTE**: The AC inlet and power cord serve as the AC Mains disconnect for the ELI 10. To remove AC Mains, disconnect the power cord from the AC inlet.*

Bottom of Cradle

Figure 1-4



System Connectors

A. LAN connector.
B. USB connector for optional barcode scanner, removable data storage, or laser printer.
C. DC power inlet.
D. Green LED indicating power on.
E. Flashing yellow LED indicating LAN connection.

***NOTE**: The AC/DC converter and power cord serve as the AC Mains connection for the ELI 10. To remove AC Mains, disconnect the power cord from the socket or AC/DC converter cable from the ELI 10 Mobile DC power inlet.*

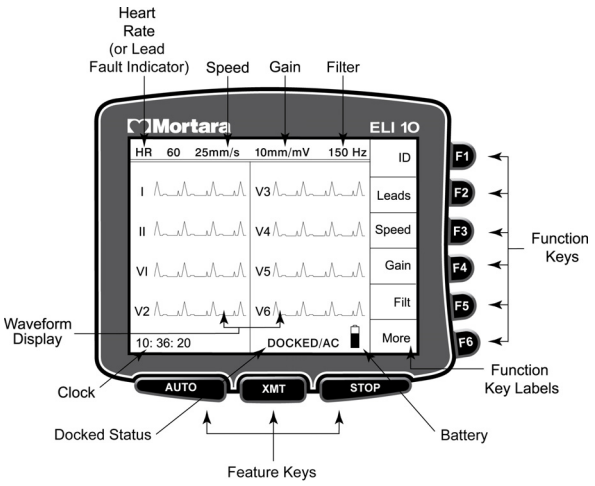
***NOTE**: The AC/DC converter is meant for charging only. It is not sufficient for continuous use.*

***WARNING**: Only the specified AC/DC power converters should be used. See Warnings in the cover section.*

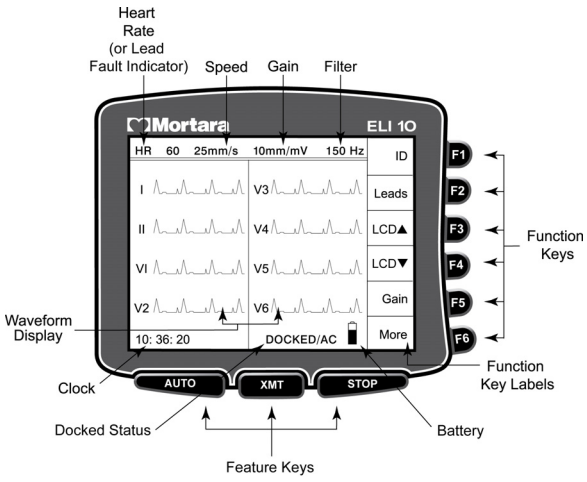
Display Overview (8-Lead Real-Time ECG View)

Figure 1-5

Standard Interface



Mobile Interface



***NOTE**: Device display defaults to real-time ECG view.*

Function Keys

Function keys activate the 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. View additional available functions by using **F6 (More).**

Feature Keys

Feature keys are used as a one-touch operation for:

AUTO	ECG ACQUISITION
XMT	INITIATE TRANSMISSION/SYNC
STOP	STOP

The ELI 10 features a 320 x 240 pixel LCD display for preview of ECG waveform, function-key labels, and other parameters as explained below:

Heart rate (HR):

When a patient is connected to the electrocardiograph, his/her heart rate (HR) is displayed in real time. The HR is the average ventricular rate measured over the 10-second rhythm on a standard ECG. HR is displayed in the upper left corner of the display screen.

> ***NOTE:*** *If a lead fault occurs, the lead name flashes in this location until fault is corrected. In the event all leads are disconnected, "LEADS OFF" will flash until the fault is corrected.*

Speed:

For Standard interface, use **F3 (Speed)** to select waveform viewing speed : 5 mm/s, 10 mm/s, 25 mm/s, or 50 mm/s. For Mobile interface; set the waveform viewing speed in the configuration menu. Though not actually measured in millimeters, speed in millimeters per second is displayed to the right of HR. Regardless of the setting, the ECG will always print to an attached USB printer at 25 mm/s.

Gain:

For Standard interface, use **F4 (Gain)** to select waveform amplitude for display and printing: 5 mm/mV, 10 mm/mV, or 20 mm/mV. For Mobile interface, use **F5 (Gain)**. Gain is displayed in the top center portion of the display screen to the right of speed. Though not actually measured in millimeters, the waveform gain setting can be used to relate the gain to the selected speed. The printed gain will match the selected gain in millimeters per second.

Filter:

For Standard interface, use **F5 (Filt)** to select the filter setting for display and printing: 40 Hz, 150 Hz, or 300 Hz. For Mobile interface, set the filter in the configuration menu.

Battery:

Battery charge availability displays in increments of 25% in the bottom right-hand corner. When charging in its docking station or in its cradle, the device's battery gauge will be replaced with a flashing charging symbol indicating the device is charging. Once fully charged, the battery gauge displays at 100%.

ID:

Use **F1 (ID)** to enter patient demographic information.

Leads:

Use **F2 (Leads)** to toggle between the eight initial default leads, a 12-lead view, leads I, II, III; aVR, aVL, aVF; V1, V2, V3; and V4, V5, V6.

LCD ▲

For Mobile interface, use **F3 (LCD ▲)** to darken the display. (For Standard interface, see Section 2 for adjusting the LCD display.)

LCD ▼

For Mobile interface, use **F4 (LCD ▼)** to lighten the display. (For Standard interface, see Section 2 for adjusting the LCD display.)

Clock:

Time display with hour, minutes, and seconds resolution in 24-hour format. (See Section 2 for setting a new time.)

DOCKED/AC:

"DOCKED/AC" is continuously displayed when the ELI 10 is properly seated in its docking station or in its cradle, and the docking station or cradle is powered. This message disappears once the ELI 10 is removed. If the device is not properly docked, "Attention: ELI 10 not properly docked." is displayed until the error is corrected.

DOCKED:

"DOCKED" is continuously displayed when the ELI 10 is properly seated in its docking station or in its cradle, but the docking station or cradle is not powered.

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, ¼ VGA LCD (320 x 240) 3-lead groups, 8 or 12-lead presentation
Import 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 the 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
USB Printer	Requires PCL3 and 300 dpi USB printer. Not all commercially available printers with these characteristics may be compatible with the ELI 10. Printing not available with Mobile interface.
Paper Speed	25 mm/sec
Gain Setting	5, 10, or 20 mm/mV
Report Print Formats	Standard or Cabrera; 3+1, 3+3, 6, 6+6, or 12 channel
Special Functions	Optional Mortara VERITAS resting ECG interpretation with age and gender specific algorithm; connectivity options for bidirectional communication
Keyboard Type	Elastomer keyboard with complete alphanumeric keys, soft-key menu, and dedicated function keys
Frequency Response	0.05 to 300 Hz
Filters	High-performance baseline filter; AC interference filter 50/60 Hz; low-pass filters 40, 150 Hz, or 300 Hz
A/D Conversion	20 bits (1.17 microvolt LSB)
Device Classification	Class I, Type CF defibrillation-proof applied parts
ECG Storage	Internal storage up to 60 ECGs; optional expanded up to 150 ECGs
Weight	1.2 lbs. (0.54 kg) including battery
Dimensions	6.72 x 5.32 x 1.50" (17.2 x 13.5 x 3.8 cm) (without docking station or cradle)
Power Requirements (version with docking station)	Universal AC power supply (100-240 VAC at 50/60 Hz) 50 VA; internally rechargeable battery
Power Requirements (version with cradle)	External AC/DC converter (100-240 VAC at 50/60 Hz) 15 VA; internally rechargeable battery

Accessories

Cables and Docking Stations

Part Number	Description
9293-032-50	PAT CBL 10WIRE AHA BANANA JSCREW
9293-032-51	PAT CBL 10WIRE IEC BANANA JSCREW
9293-033-50	PAT CBL 10WIRE AHA SNAP JSCREW
9293-033-51	PAT CBL 10WIRE IEC SNAP JSCREW
9293-040-50	ECG CABLE RDS 10 WIRE BANANA AHA
9293-040-51	ECG CABLE RDS 10 WIRE BANANA IEC
9281-002-50	ADAPTER 4mm BAN PLG TO SNAP LDWIRE PK/10
34000-029-1000	ELI 10 DOCKING STATION W/O MODEM
34000-029-1001	ELI 10 DOCKING STATION WITH MODEM
34000-029-2000	ELI 10 SERIES 2 DOCKING STATION (CRADLE)
34000-029-3000	ELI 10 USB DEVICE DOCKING STATION
4101-007	POWER SUPPLY MED GRD IEC320 5V 2A

Electrodes

Part Number	Description
9325-001-50	ELECTRODE CLIP 4mm SET OF 10
9300-033-51	ELECTRODE RESTING TAB BOX/500

Power Cords

Part Number	Description
3181-008	POWER CORD US/CAN HOSPITAL 5-15P+320-C13
3181-002	POWER CORD INTN'L CEE7/7+IEC320-C13

Manuals

Part Number	Description
9515-170-50-CD	ELI 10 USER MANUALS
9516-170-50	ELI 10 SERVICE MANUAL
9515-001-50	PHYSICIAN'S GUIDE ADULT & PEDIATRIC USER MANUAL
9503-170-01	ELI 10 MOBILE SHORT FORM INSTRUCTION CARD

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

EQUIPMENT PREPARATION

Connecting the Patient Cable

Connect patient cable to the top connector.

Charging the ELI 10

Plug the ELI 10 power cord into the back of the docking station and then connect cord to the AC power source. The power indicator on the front lower-center portion of the docking station will illuminate. When using the cradle, plug the AC/DC converter into the bottom of the cradle and then connect the power cord to the AC power source. The power indicator on the cradle will illuminate when the ELI 10 is securely placed into the cradle and there is an AC/DC power connection.

Place the ELI 10 into the docking station or cradle by sliding the device gently down the guides on the left and right-hand sides of the docking station or cradle. When using the docking station, the ELI 10 will seat itself into the adapter at the base of the docking station and fit snuggly into place. When using the cradle, the ELI 10 will seat itself into the adapter at the base of the cradle and snap into place. The ELI 10 and its cradle should be placed into the mobile carrying case. Turn the device on and look at the display screen for an indicator that states "DOCKED/AC." This indicates the ELI 10 is seated correctly; a flashing charging symbol indicates the device is charging. If the device is not seated correctly, "Attention: ELI 10 not properly docked." will appear, and there will be no flashing charging symbol. If this happens, gently push the ELI 10 into the docking station or cradle to ensure it is properly seated.

If the device states "DOCKED" vs. "DOCKED/AC," verify the power indicator on the docking station or cradle is illuminated.

Battery Power

The battery power indicator, showing the charge remaining, is displayed in the lower right corner of the screen. When remaining charge is very low, "BATT LOW" will be displayed instead. **When the battery charge is below 20%, transmission of ECG records by GSM/GPRS mobile or WLAN is not possible. Below 10%, transmission of ECG records by LAN or modem is not possible.** When the battery charge is depleted to its lowest level, the device will automatically power down. Seat the ELI 10 in its powered docking station or cradle to transmit ECG data and recharge the battery.

The ELI 10 should be seated in its docking station or cradle for recharging when not in use. To maintain an accurate battery-level indicator, occasionally use the device without recharging until it reports "BATT LOW," then recharge fully.

- Operating time on a new, fully charged battery (ECG acquisition only): approximately 8 hours
- Maximum time to fully recharge battery: approximately 4 hours

***NOTE**: Battery charge level can be checked at any time by selecting* **F6 (More)** *followed by selecting* **3 (Set Time/Date)**.

Setting LCD Contrast

Standard Interface

1. From real-time ECG view, select **F6 (More)**.
2. Use **F1 (Lcd▲)** and **F2 (Lcd▼)** to adjust the LCD contrast.
3. Select **F6 (Exit)** to return to real-time ECG view.

Mobile Interface

1. From real-time ECG view, use **F3 (LCD▲)** and **F4 (LCD▼)** to adjust the LCD contrast.

Setting Time and Date (without Time Server)

1. From real-time ECG view, select **F6 (More)**.
2. Using the keyboard, select **3 (Set Time/Date)** (Standard interface) or **2 (Set Time/Date)** (Mobile interface) from the application menu**.**
3. The current date and time is displayed. To make changes, enter the correct date and time values. The year must be entered as a 4-digit value. Month, day, hour, and minute must be entered as 2-digit values; use a leading 0 when necessary. Use **F1 (▲)** and **F2 (▼)** to move the cursor between fields. Use the backspace key **BKSP** ← to erase entry errors.
4. Select **F5 (Save)** to save changes before exiting.
5. Select **F6 (Exit)** to return to real-time ECG view. If you did not save before selecting Exit, changes made to time or date will be lost.

Setting Time and Date (with Time Server)

The ELI 10 can be configured to synchronize its internal clock with a time server. (See Section 6 for details on how to configure the network connection to a time server.)

1. From real-time ECG view, select **F6 (More)**.
2. Using the keyboard, select **3 (Set Time/Date)** (Standard interface) or **2 (Set Time/Date)** (Mobile interface) from the application menu**.**
3. Select **XMT** to cause the ELI 10 to retrieve the current date and time from the time server. The message "Time Synchronized" will display when it is done.
4. The ELI 10 will automatically return to real-time ECG view.

Setting Date Format, Time Zone, and Daylight Saving Time

For the date/time synch function to work, the ELI 10 must be configured with the proper time zone and daylight saving mode.

1. From real-time ECG view, select **F6 (More)**.
2. Using the keyboard, select **3 (Set Time/Date)** (Standard interface) or **2 (Set Time/Date)** (Mobile interface) from the application menu**.**
3. Select **F4 (More)** to display the first page of settings.
4. To set the Date Format use **F3 (▶)** to cycle between MM/DD/YYYY or DD.MM.YYYY.
5. Use **F1 (▲)** and **F2 (▼)** to move the cursor to the DST and Time Zone fields.
6. For DST (Daylight Saving Time), use **F3 (▶)** to cycle between Off, On, or Auto. When **Off** is selected, the ELI 10 will not make any adjustments to the local time. When **On** is selected, the ELI 10 will add one hour to the local time. When **Auto** is selected, the ELI 10 will adjust for DST according to the Time Zone table.
7. For Time Zone, use **F3 (▶)** to cycle between the time zones. The Time Zone table lists the available time zones and their corresponding time adjustments.
8. Select **F4 (More)** to display the automatic DST time period settings.
9. Use **F1 (▲)** and **F2 (▼)** to move the cursor between fields.
10. Use **F3 (▶)** to cycle between options in each field. Enter time values in 24-hour HH:MM format. Use leading 0's when necessary.
11. Select **F6 (Exit)** to return to the date and time settings.
12. Select **F5 (Save)** to save changes.
13. Select **F6 (Exit)** to return to real-time ECG view.

Time Zones

Time Adjustment	Time Zone	Location
GMT-12:00	Dateline Standard Time	International Date Line West
GMT-11:00	Samoa Standard Time	Midway Island, Samoa
GMT-10:00	Hawaiian Standard Time	Hawaii
GMT-09:00	Alaskan Standard Time	Alaska
GMT-08:00	Pacific Standard Time	Pacific Time (US & Canada); Tijuana
GMT-07:00	Mountain Standard Time	Mountain Time (US & Canada)
GMT-07:00	Mexico Standard Time 2	Chihuahua, La Paz, Mazatlan

Time Adjustment	Time Zone	Location
GMT-07:00	US Mountain Standard Time	Arizona
GMT-06:00	Central Standard Time	Central Time (US & Canada)
GMT-06:00	Canada Central Standard Time	Saskatchewan
GMT-06:00	Mexico Standard Time	Guadalajara, Mexico City, Monterrey
GMT-06:00	Central America Standard Time	Central America
GMT-05:00	Eastern Standard Time	Eastern Time (US & Canada)
GMT-05:00	US Eastern Standard Time	Indiana (East)
GMT-05:00	SA Pacific Standard Time	Bogota, Lima, Quito
GMT-04:00	Atlantic Standard Time	Atlantic Time (Canada)
GMT-04:00	SA Western Standard Time	Caracas, La Paz
GMT-04:00	Pacific SA Standard Time	Santiago
GMT-03:30	Newfoundland Standard Time	Newfoundland
GMT-03:00	E. South America Standard Time	Brasilia
GMT-03:00	SA Eastern Standard Time	Buenos Aires, Georgetown
GMT-03:00	Greenland Standard Time	Greenland
GMT-02:00	Mid-Atlantic Standard Time	Mid-Atlantic
GMT-01:00	Azores Standard Time	Azores
GMT-01:00	Cape Verde Standard Time	Cape Verde Is.
GMT	GMT Standard Time	Greenwich Mean Time : Dublin, Edinburgh, Lisbon, London
GMT	Greenwich Standard Time	Casablanca, Monrovia
GMT+01:00	Central Europe Standard Time	Belgrade, Bratislava, Budapest, Ljubljana, Prague
GMT+01:00	Central European Standard Time	Sarajevo, Skopje, Warsaw, Zagreb
GMT+01:00	Romance Standard Time	Brussels, Copenhagen, Madrid, Paris
GMT+01:00	W. Europe Standard Time	Amsterdam, Berlin, Bern, Rome, Stockholm, Vienna
GMT+01:00	W. Central Africa Standard Time	West Central Africa
GMT+02:00	E. Europe Standard Time	Bucharest
GMT+02:00	Egypt Standard Time	Cairo
GMT+02:00	FLE Standard Time	Helsinki, Kyiv, Riga, Sofia, Tallinn, Vilnius
GMT+02:00	GTB Standard Time	Athens, Istanbul, Minsk
GMT+02:00	Jerusalem Standard Time	Jerusalem
GMT+02:00	South Africa Standard Time	Harare, Pretoria
GMT+03:00	Russian Standard Time	Moscow, St. Petersburg, Volgograd
GMT+03:00	Arab Standard Time	Kuwait, Riyadh
GMT+03:00	E. Africa Standard Time	Nairobi
GMT+03:00	Arabic Standard Time	Baghdad
GMT+03:30	Iran Standard Time	Tehran
GMT+04:00	Arabian Standard Time	Abu Dhabi, Muscat
GMT+04:00	Caucasus Standard Time	Baku, Tbilisi, Yerevan

Time Adjustment	Time Zone	Location
GMT+04:30	Afghanistan Standard Time	Kabul
GMT+05:00	Ekaterinburg Standard Time	Ekaterinburg
GMT+05:00	West Asia Standard Time	Islamabad, Karachi, Tashkent
GMT+05:30	India Standard Time	Chennai, Kolkata, Mumbai, New Delhi
GMT+05:45	Nepal Standard Time	Kathmandu
GMT+06:00	Central Asia Standard Time	Astana, Dhaka
GMT+06:00	Sri Lanka Standard Time	Sri Jayawardenepura
GMT+06:00	N. Central Asia Standard Time	Almaty, Novosibirsk
GMT+06:30	Myanmar Standard Time	Rangoon
GMT+07:00	SE Asia Standard Time	Bangkok, Hanoi, Jakarta
GMT+07:00	North Asia Standard Time	Krasnoyarsk
GMT+08:00	China Standard Time	Beijing, Chongqing, Hong Kong, Urumqi
GMT+08:00	Malay Peninsula Standard Time	Kuala Lumpur, Singapore
GMT+08:00	Taipei Standard Time	Taipei
GMT+08:00	W. Australia Standard Time	Perth
GMT+08:00	North Asia East Standard Time	Irkutsk, Ulaan Bataar
GMT+09:00	Korea Standard Time	Seoul
GMT+09:00	Tokyo Standard Time	Osaka, Sapporo, Tokyo
GMT+09:00	Yakutsk Standard Time	Yakutsk
GMT+09:30	AUS Central Standard Time	Darwin
GMT+09:30	Cen. Australia Standard Time	Adelaide
GMT+10:00	AUS Eastern Standard Time	Canberra, Melbourne, Sydney
GMT+10:00	E. Australia Standard Time	Brisbane
GMT+10:00	Tasmania Standard Time	Hobart
GMT+10:00	Vladivostok Standard Time	Vladivostok
GMT+10:00	West Pacific Standard Time	Guam, Port Moresby
GMT+11:00	Central Pacific Standard Time	Magadan, Solomon Is., New Caledonia
GMT+12:00	Fiji Standard Time	Fiji, Kamchatka, Marshall Is.
GMT+12:00	New Zealand Standard Time	Auckland, Wellington
GMT+13:00	Tonga Standard Time	Nuku'alofa

RECORD AN ECG

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 and maximize the quality of the ECG signal.

To prepare the skin:

- Shave hair from electrode sites if necessary.
- Wash area with warm, soapy water.
- Dry skin vigorously with a pad such as 2 x 2 or 4 x 4 gauze to remove dead skin cells and oil, and to increase capillary blood flow.

  ***NOTE**: With elderly or frail patients take care to not abrade the skin causing discomfort or bruising. Clinical discretion should always be used in patient preparation.*

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.*

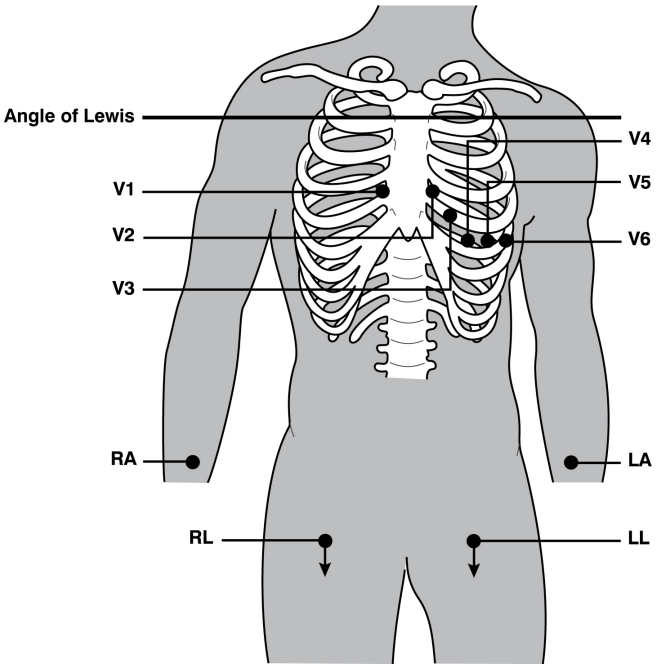
To Attach the Electrodes

1. Expose the arms and legs of the patient to attach the limb leads.
2. Place the electrodes on flat, fleshy parts of the arms and legs.
3. If a limb site is not available, place the electrodes on a perfused area of the stump.
4. 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.

Patient Hookup Summary Table

AAMI Lead	IEC Lead	Electrode Position
V1 Red	C1 Red	On the 4th intercostal space at the right sternal border.
V2 Yellow	C2 Yellow	On the 4th intercostal space at the left sternal border.
V3 Green	C3 Green	Midway between V2/C2 and V4/C4 electrodes.
V4 Blue	C4 Brown	On the 5th intercostal space at the left midclavicular line.
V5 Orange	C5 Black	Midway between V4 and V6 electrodes.
V6 Violet	C6 Violet	On the left midaxillary line, horizontal with V4 electrode.
LA Black RA White	L Yellow R Red	On the deltoid, forearm, or wrist.
LL Red RL Green	F Green N Black	On the thigh or ankle.



Patient Demographic Entry

Patient demographic information can be entered before acquisition. The entered demographic 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. The patient demographic labels available are determined by the ID format selected in the configuration settings.

> ***NOTE**: The Standard interface supports short, standard, long, or custom ID patient formats. Custom demographic labels designed in your ELI Link or E-Scribe™ data management system can be downloaded to the device. (See Section 4.) The Mobile interface supports short, standard, and long formats only and will not support a Custom ID format.*

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. If no date of birth is entered, and if no age is entered, the interpretation algorithm defaults to a 40 year old male.

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

Populating the demographics from an existing patient record can only be done when using the Standard interface. 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)**.

> ***NOTE**: 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 ELI 10 will automatically populate the demographic fields from a matching ECG in the directory. After the patient ID is entered and followed by ↵ **(Enter)** or **F2 (▼),** the ELI 10 will automatically scan its directory of ECGs. If an ECG record with the same patient ID is found, its demographics are used to fill some of the demographic fields of the new ECG. 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 "No matching records found" 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.*

> ***NOTE**: All ECG records are scanned regardless of deletion status.*

> ***WARNING**: The auto-fill feature is available with both the Standard and Mobile interface; however, it should not be enabled when being used in a mobile environment.*

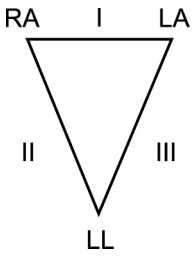
ECG Acquisition/Viewing/Printing/Storage

Acquisition

Once the patient is connected, the ELI 10 continuously collects and displays ECG data; therefore, before you press **AUTO** 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 10 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.

Examine the display for artifact or baseline drift. Re-prep and replace electrodes if necessary to obtain satisfactory waveforms. (See *Patient Preparation*.) If an electrode fault occurs, square waves appear on the display for the effected leads, and the electrodes 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 or left leg tremor
Lead I and II artifact	Poor RA electrode or right arm tremor
Lead I and III artifact	Poor LA electrode or left arm tremor
V Leads	Re-prep site & replace electrode

***NOTE**: LCD label functions are not available during acquisition.*

Press **AUTO**. 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. (The interpretation function key will only be available if the option is enabled.)*

Viewing Acquired Waveforms

A view of the full 10 seconds of ECG waveform is available in the acquired ECG view. (When using the Mobile interface, the VERITAS interpretation statements will display first; use **F4 (View)** to see the waveforms.) Viewing the acquired waveforms assists in ensuring a quality ECG acquisition prior to transmitting. The first 5 seconds of three leads are shown on the initial page (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). Move through all 12 leads of the acquired ECG by repeatedly using **F2 (Leads)**. The presentation order depends on the default print format selected in the configuration. If standard print format was chosen, leads I, II, and III are presented first, followed by aVR, aVL, aVF, followed by V1, V2, V3, followed by V4, V5, V6. If Cabrera print format was chosen, leads aVL, I, and –aVR are presented first, followed by II, aVF, III, followed by V1, V2, V3, followed by V4, V5, V6.

Select **F5 (More)** to view additional options: **F1 (Speed)** toggles the display between 25 mm/s and 50 mm/s, **F2 (Gain)** toggles the display between 5 mm/mV, 10 mm/mV, and 20 mm/m, and **F3 (Filt)** toggles the display filter between 40 Hz, 150 Hz, and 300 Hz. These additional options are available with the Standard interface only.

F6 (Done) exits the acquired ECG view and returns to the real-time display.

Viewing Measurements and Interpretation

When using the Mobile interface, the VERITAS interpretation statements will display first. Use **F1 (▲)** and **F2 (▼)** to scroll through the statements if there is more than one page. Use **F3 (Page)** to scroll a page at a time. Use **F4 (View)** to view the waveforms, and **F5 (Meas)** to view the measurements. Use **F6 (Home)** to return to real-time ECG display.

For devices using the Standard interface with the VERITAS interpretation option included, use **F5 (More)** from the acquired ECG waveform page to view the ECG measurements. Select **F5 (More)** again to view the interpretation statements. Use **F1 (▲)** and **F2 (▼)** to scroll through the statements if there is more than one page. Use **F3 (►)** and **F4 (◄)** to scroll horizontally if the interpretation statements are wider than the display. Use **F5 (Back)** to return to the measurements page. Use **F6 (Exit)** to return to the acquired ECG waveform page.

Printing

Printing is only available when using the Standard interface. While the ELI 10 does not have an auto-print configuration, an ECG can be manually printed after acquisition by returning the device to the docking station with an attached printer, or connecting a printer to the USB port on the cradle. If the ELI 10 has the VERITAS interpretation option, select **F4 (Interp)** from acquired ECG view followed by **F1 (Print)**. If the ELI 10 does not have the interpretation option, select **F4 (Print)** from the acquired ECG view.

> ***NOTE**: In order for the ELI 10 to print, the device must be securely placed in the docking station or cradle.*
>
> ***NOTE**: Do NOT remove the ELI 10 from the docking station or cradle while printing is in process.*
>
> ***NOTE**: The ELI 10 is compatible with most printers having at least a 300 dpi resolution and supporting the HP PCL 3 printer command language.*

ECGs will always print at 25 mm/s regardless of the speed setting. The printed lead format will default to the one selected in the configuration menu; however, the lead format can be changed by selecting **F5 (More)** from the acquired ECG page followed by **F4 (Fmt)**. The ELI 10 will display several format options: **F1 (3+1)**, **F2 (6Ch)**, **F3 (3+3)**, **F4 (12Ch)**, and **F5 (6+6)**. If the default lead format set in the configuration is a standard format, the newly selected lead format will also be in a standard format. If the default lead format is Cabrera, the newly selected lead format will also be in Cabrera. After selecting the print format, the display automatically returns to the acquired ECG view.

Saving (Storage)

The ELI 10 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. When the auto-save configuration option is disabled, the user is prompted to save the ECG after pressing **F6 (Done)** or **F6 (Home)**. At that time, the user can also choose to delete the record and it will not be added to the directory.

> ***NOTE**: ECGs cannot be transmitted until saved. If XMT is pressed when viewing an unsaved ECG, the ELI 10 will prompt to save the record first.*

CONNECTIVITY AND ECG TRANSMISSION

ECG Transmission

You may transmit ECGs to an E-Scribe system, to ELI Link, or to a compatible third party information management system. Transmissions can be made using LAN[1], WLAN[2], analog modem, GSM, GPRS, USB memory[3], or direct-connect USB cable depending on the configuration of the ELI 10. Remote printing of ECGs on a compatible Mortara electrocardiograph is possible when the ELI 10 has an analog modem. The WLAN, GSM, and GPRS transmission media can be used without a docking station or cradle; all other transmission media require a docking station or cradle.

Transmission with the Standard Interface

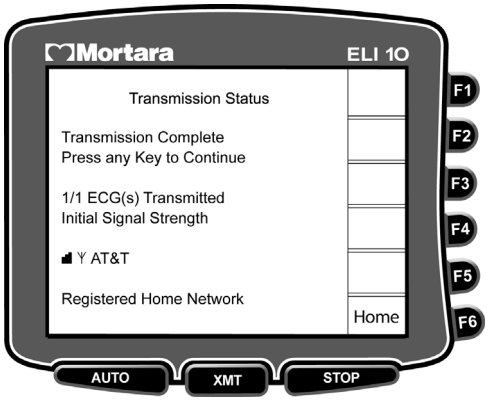
Single Record Transmission

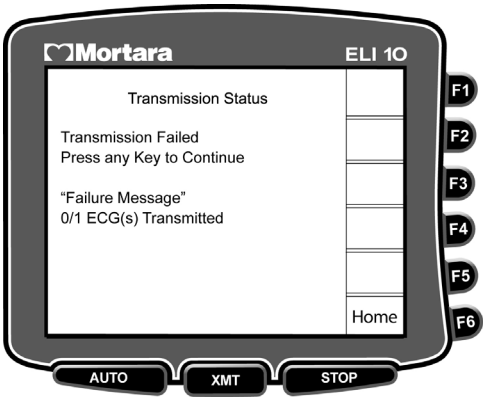
To transmit a single ECG record from the ELI 10 directory, press **XMT** from real-time ECG view and then press **F2 (Selec)**. Use **F1 (▼/▲)** to navigate by line down the directory list; use ⬆ **(Shift), F1 (▼/▲)** to move up. Similarly, use **F2 (▼▼/▲▲)** to page down the directory list; use ⬆ **(Shift), F2 (▼▼/▲▲)** to page up. To quickly find and select a patient name, use the keyboard to enter the first few letters of the last name. The letters will be displayed on the lower left corner of the display screen and the desired ECG record will automatically be highlighted. Once the desired record is highlighted, press **XMT** again to transmit it.

> ***NOTE**: Previously transmitted records are denoted with a "**T**" in the far right-hand column of the directory.*

Batch Transmission

To transmit all new ECG records, press **XMT** from real-time ECG view and then press **F1 (Batch)**. After the transmission is complete, pressing any key will return to the previous screen.





[1] IEEE 802.3 10/100 Mbit/s Ethernet
[2] IEEE 802.11b/g
[3] 2 GB maximum capacity, FAT file system

Transmission with the Mobile Interface

ECGs are normally transmitted from acquired ECG view immediately after acquisition. To transmit one or more ECGs from the ELI 10 directory, press **F6 (More)** from real-time ECG view and then press **1 (Directory of Stored ECGs)**. The ELI 10 displays a list of Patient Sessions. Each Session organizes all the ECGs collected from a patient during a hookup session. If the patient's name was entered, the ELI 10 displays "last name, first name" from the last ECG acquired in the Session. If the patient's name was not entered, the ELI 10 displays the automatically assigned Session ID.

Sessions are listed in order of time with the most recent listed first. Use **F1 (▲)** and **F2 (▼)** to move to and highlight the Session containing the ECG(s) to transmit. The time and date of the first ECG acquired in the highlighted Session will display at the top. After the Session is highlighted, press **F4 (Selec)** to select the Session. The Session ID, the site name of the currently selected destination, and a list of all un-transmitted ECGs in the Session will display. Press **F1 (Send)** to transmit all the un-transmitted ECGs to the selected destination. To transmit an ECG already transmitted, press **F4 (List)** to list all the ECGs in the Session. Select the ECG to retransmit using **F4 (Selec)**. If the ECG needs to be sent to a different destination, use **F5 (Dest)** to select another destination before transmitting.

USB Memory Stick Transmission

The ELI 10 can transmit ECG records to a USB memory stick. It is recommend that this transmission media be used only if none of the other transmission media are available. The memory stick must be no larger than 2 GB, and must be formatted with the FAT file system. It must not be a "U3 smart drive" that tries to launch Microsoft® Windows™ applications when inserted.

Preparing the ELI 10 for USB Memory Stick Transmission

Set the Comm. Media to **USB Memory (**see Section 6**)**. All subsequent ECG transmissions will use this setting until changed in the configuration settings.

Before transmitting the ECG records insert a compatible USB memory stick into the appropriate USB port on the docking station or cradle (see Section 1, *figures 1-3 and 1-4*). Dock the ELI 10. Wait at least 30 seconds after docking to give the ELI 10 time to recognize the memory and load the drivers.

Transmitting ECGs to the USB Memory Stick

Follow the Single and Batch transmission instructions in this section. ECG records will be stored on the USB memory stick.

Unloading ECGs from USB Memory Stick

Remove the USB memory stick from the ELI 10 docking station or cradle and insert it into an open USB port on a host computer running ELI Link. The ECG records must be manually copied from the USB memory stick into the ELI Link import folder. Refer to the ELI Link user manual for instructions to configure the import folder and export formats.

1. Insert the USB memory stick into an open USB port on the host computer running ELI Link.
2. Launch **Windows Explorer**. (Right click on the Windows **Start** button and select **Explore**.)
3. Browse to the USB memory stick folders.
4. Open the **Mortara** folder, and then the **Records** folder. There will be folders named **FolderNN**, where NN is a number from 00 to 99.
5. **Copy** all the UNIPRO files (files ending with the .uni file extension) from **Folder00** and paste them into the ELI Link import folder.
6. Then **copy** all the UNIPRO files from **Folder01** and paste them into the ELI Link import folder.
7. **Repeat** for folders 02, 03, etc. until the folders are empty.
8. ELI Link will process all the UNIPRO files copied into its import folder and export the configured formats.
9. After all the UNIPRO files have been successfully processed by ELI Link, **delete the entire Records folder** from the USB memory stick.

USB Direct Transmission

If the ELI 10 docking station is situated near the host computer running ELI Link, you can directly transmit ECGs using a standard USB serial cable. Direct transmission requires use of a docking station with the USB device port (see Section 1, *figure 1-3*).

Preparing the ELI 10 for USB Direct Transmission

The Windows device drivers must be loaded on the ELI Link host computer prior to USB direct transmission. This procedure only needs to be performed one time.

1. Dock the ELI 10 on a docking station with the USB device port.
2. Connect the USB cable to the docking station and the host computer.
3. Ensure the host computer is on and you are logged in with administrative privileges. *ELI Link V3.10 or later must have already been installed.*
4. Turn on the ELI 10.
5. From the main menu, press **F6 (More)**.
6. Press and hold **SHIFT+ALT+S**. "USB Device power on." will display on the bottom of the ELI 10 screen.
7. If this is the first time the host computer has been connected to an ELI 10, Windows should display a dialog box "Welcome to the Found New Hardware Wizard". Windows will ask, "Can Windows connect to Windows Update to search for software?" Select "No, not this time" and click **Next >**.
8. Select "Install from a list or specific location (Advanced)." and click **Next >**.
9. Select "Search for the best driver in these locations." and check "Include this location in the search:". Browse to the ELI Link USB Drivers folder. The default location is C:\Mortara Instrument Inc\ELI Link\USB Drivers. Click **Next >**.
10. When the driver is installed, click **Finish**.
11. Windows will then detect a second device and run through the same Wizard. **Follow steps 7 through 10 again**.

Set the Comm. Media to **USB Device** (see Section 6). All subsequent ECG transmissions will use this setting until changed in the configuration settings.

Check the box next to "Enable Direct Serial Comm" in ELI Link, and select the "USB" port. See the ELI Link installation instructions for more details.

Transmitting ECGs to the Host Computer

Dock the ELI 10 on a docking station that is connected to the ELI Link host computer via USB cable. Follow the Single and Batch transmission instructions in this section. ECGs will be transmitted directly to the host computer.

Modem Transmission

Analog modem transmissions can be used to send ECGs to a remote ECG management system that is not accessible through a LAN, WLAN, or GPRS connection. Modem transmission requires use of a docking station with an analog modem (see Section 1, *figure 1-3*).

Preparing the ELI 10 for Modem Transmission

Set the Comm. Media to **Modem** (see Section 6). All subsequent ECG transmissions will use this setting until changed in the configuration settings.

Configure the telephone number of the ECG management system making sure to include any prefixes to get an outside line. See Appendix B to verify the modem is configured for your country's telephone system.

Use a telephone cable to connect the docking station to an analog telephone jack. If your facility uses a digital phone system, request an analog port be installed for use with the ELI 10.

Transmitting ECGs via Modem

Dock the ELI 10 on a docking station that is connected to an analog phone line. Follow the Single and Batch transmission instructions in this section. ECGs will be transmitted to the remote ECG management system.

LAN Transmission

ECGs may be transmitted over a local area network (10/100 Mbit/s Ethernet LAN) to an ELI Link computer, E-Scribe system, or other compatible ECG management system. The remote system must be reachable via TCP/IP. LAN transmissions are possible with any ELI 10 docking device.

Preparing the ELI 10 for LAN Transmission

Set the Comm. Media to **LAN** (see Section 6). All subsequent ECG transmissions will use this setting until changed in the configuration settings.

ELI 10 Setting	Description
Comm Media:	**LAN**
DHCP:	**Yes** – if the local network will dynamically assign the ELI 10 a new IP address for each transmission. **No** – if the ELI 10 should keep a fixed IP address for all transmissions.
IP Address:	If DHCP is Yes, ignore this setting. If DHCP is No, this is the static IP address assigned to the ELI 10. Ask the local IT Manager for the address. The address is entered as a 12-digit number. Use leading 0's to pad 1- and 2-digit numbers. For example, if the assigned address is 192.168.1.27, the "1" needs to be padded to be "001", and the "27" needs to be padded to be "027". You would enter "192168001027".
Def. Gateway:	If DHCP is Yes, ignore this setting. If DHCP is No, this is the default gateway IP address. Consult the local IT Manager for the address. For help entering the address, see "IP Address".
Sub Net Mask:	If DHCP is Yes, ignore this setting. If DHCP is No, this is the subnet mask for the network. Consult the local IT Manager for the mask. For help entering the mask, see "IP Address".
Host IP:	This is the IP address of the ELI Link, E-Scribe, or other compatible ECG management system. Consult the local IT Manager for the IP address of the server. For help entering the address, see "IP Address".
Port Number:	This is the TCP port number the server is listening on for ECG transmissions. Consult the local IT Manager for the port number.

LAN Status LEDs

Two status LEDs (light emitting diodes) are part of the LAN connector on the docking station and cradle (see Section 1, *figures 1-3 and 1-4*). The lights are activated only when the ELI 10 is actively communicating with the server. When it is not communicating, the port is powered off to conserve battery power. The LAN port can take up to 6 seconds to activate after the user initiates communication with the server (e.g. Custom ID download, ECG transmissions).

The green LED gives the link status. This light remains solid to indicate a good electrical connection to the network. The flashing yellow LED indicates network traffic; the more it flashes, the more network traffic it is sending and receiving.

Transmitting ECGs via LAN

Dock the ELI 10 on a docking device connected to the LAN. Follow the Single and Batch transmission instructions in this section. ECGs will be transmitted to the remote ECG management system. During the transmission, the ELI 10 will display the IP address assigned to it by the DHCP server. This can be helpful information when troubleshooting transmission problems.

WLAN Transmission

ECGs may be transmitted over a wireless network (802.11b/g WLAN) to an ELI Link computer, E-Scribe system, or other compatible ECG management system. The remote system must be reachable via TCP/IP. WLAN transmissions are possible with or without a docking device.

Preparing the ELI 10 for WLAN Transmission

Set the Comm. Media to **WLAN** (see Section 6). All subsequent ECG transmissions will use this setting until changed in the configuration settings.

ELI 10 Setting	Description
Comm Media:	**WLAN**
DHCP:	**Yes** – if the local network will dynamically assign the ELI 10 a new IP address for each transmission. **No** – if the ELI 10 should keep a fixed IP address for all transmissions.
IP Address:	If DHCP is Yes, ignore this setting. If DHCP is No, this is the static IP address assigned to the ELI 10. Ask the local IT Manager for the address. The address is entered as a 12-digit number. Use leading 0's to pad 1- and 2-digit numbers. For example, if the assigned address is 192.168.1.27, the "1" needs to be padded to be "001", and the "27" needs to be padded to be "027". You would enter "192168001027".
Def. Gateway:	If DHCP is Yes, ignore this setting. If DHCP is No, this is the default gateway IP address. Consult the local IT Manager for the address. For help entering the address, see "IP Address".
Sub Net Mask:	If DHCP is Yes, ignore this setting. If DHCP is No, this is the subnet mask for the network. Consult the local IT Manager for the mask. For help entering the mask, see "IP Address".
Host IP:	This is the IP address of the ELI Link, E-Scribe, or other compatible ECG management server. Consult the local IT Manager for the IP address of the server. For help entering the address, see "IP Address".
Port Number:	This is the TCP port number the server is listening on for ECG transmissions. Consult the local IT Manager for the port number.
SSID:	This is the Service Set Identifier, the name of the wireless network to be used by the ELI 10. Consult the local IT Manager for the SSID. Occasionally special characters not supported by the ELI 10 keyboard must be entered (i.e., underscore). In this case, a standard USB keyboard may be used to enter the value. ***NOTE**: Characters will not display until **Enter** is pressed at the end.*

ELI 10 Setting	Description
Security:	Consult the local IT Manager for the type of security and device authentication used on the WLAN. Chose the appropriate setting: **None** – no security used **WEP64** – Wired Equivalent Privacy with a 64-bit key (aka WEP-40) **WEP128** – Wired Equivalent Privacy with a 128-bit key (aka WEP-104) **WPA-PSK** – Wi-Fi Protected Access with TKIP encryption and a pre-shared key (aka Personal mode) **WPA-LEAP** – Wi-Fi Protect Privacy with TKIP encryption and Cisco® LEAP (Lightweight Extensible Authentication Protocol) **WPA2-PSK** – WPA2 with AES-CCMP encryption and a pre-shared key (aka WPA2 personal). **WPA2-PEAP** – WPA2 with AES-CCMP encryption and Protected Extensible Authentication Protocol **WPA-PSK64** – Migration mode with TKIP+40-bit WEP using pre-shared key. **WPA-PSK128** – Migration mode with TKIP+104-bit WEP using pre-shared key. **WPA-LEAP64** – Migration mode with TKIP+40-bit WEP using Cisco LEAP. **WPA-LEAP128** – Migration mode with TKIP+104-bit WEP using Cisco LEAP.
WEP Key:	When WEP64 or WEP128 security is used, this specifies the key number being configured. Values range from 1 to 4.
WEP Key ID:	When WEP64 or WEP128 security is used, enter the key here.
PSK Passphrase:	This is the pre-shared key used in all the PSK security modes. Occasionally special characters not supported by the ELI 10 keyboard must be entered (i.e., underscore). In this case, a standard USB keyboard may be used to enter the value ***NOTE**: Characters will not display until **Enter** is pressed at the end.*
LEAP User Name:	When LEAP security is used, specify the account username.
LEAP Password:	When LEAP security is used, specify the account password.
PEAP User Name:	When PEAP security is used, specify the account username.
PEAP Password:	When PEAP security is used, specify the account password.

Transmitting ECGs via WLAN

Follow the Single and Batch transmission instructions in this section. ECGs will be transmitted to the remote ECG management system via the wireless network. During the transmission, the ELI 10 will display the IP address assigned to it by the DHCP server. This can be helpful information when troubleshooting transmission problems. If transmissions tend to fail in certain areas of the facility, the WLAN signal may be too weak in those areas. Move to another location and try the transmissions again.

GSM/GPRS Mobile Transmission

GSM (Global System for Mobile communications) is a world standard for digital cellular communications using narrowband TDMA (Time Division Multiple Access). GPRS (General Packet Radio Service) is a packet oriented mobile data service running over 2G and 3G GSM networks. These wireless services are offered by many cellular service providers around the world, mainly in support of mobile phones.

Data network plans and SIM cards are not offered for sale by Mortara Instrument and must be purchased separately from your local provider.

Arranging Service with a Local Provider

Determine the communication capabilities of the remote ECG management system the ELI 10 will be communicating with. If the remote system is accessible through the Internet, GPRS services must be arranged with service provider. GPRS is similar to a WLAN, and the ELI 10 uses TCP/IP to communicate with the remote system. If the remote system is accessible by analog modem, CSD (Circuit Switched Data) service must be arranged with the provider. CSD enables the ELI 10 to connect to the Public Switched Telephone Network (PSTN) and place a call to the analog modem. In both cases, voice and data services must be enabled and security options like cell phone lock must be disabled

SIM Card Installation

When service is arranged, a SIM card (Subscriber Identity Module) will be provided to you. This card must be inserted into the ELI 10.

Power off the ELI 10. Open the battery cover on the back of the device by removing the Phillips screw. Insert the SIM card by holding the card with the metal contacts facing downward. Slide the SIM card into the socket so the angled corner is still visible after insertion. Do not force the insertion. If there is resistance, remove the card and check the orientation before trying again. Be sure the card is fully seated in the socket before replacing the battery cover.

Preparing the ELI 10 for GSM Transmission

Set the Comm. Media to **GSM** (see Section 6). All subsequent ECG transmissions will use this setting until changed in the configuration settings.

ELI 10 Setting	Description
Comm Media:	**GSM**
Band Mode:	**850/1900MHz(US)** – for North America **900/1800MHz(EU)** – for all other regions outside North America
GSM Mode:	**Fast** – In this mode, the ELI 10 continues to power the GSM module so it remains connected to the cellular network and connections to the remote server are much faster. **Low**– In this mode, the ELI 10 conserves battery power and powers off the GSM module between transmissions to the remote server. A new connection to the cellular network will be required at the beginning of each transmission.
Tel No:	Enter the phone number of the remote system's analog modem.

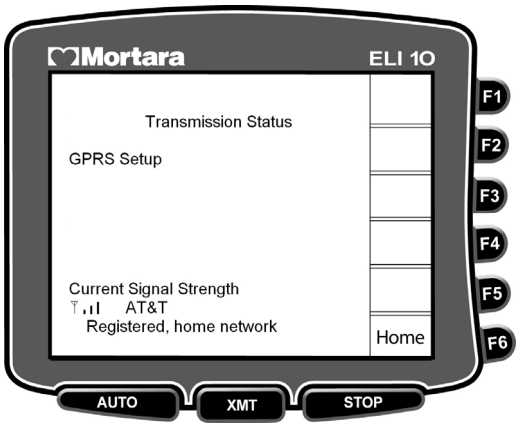
Preparing the ELI 10 for GPRS Transmission

Set the Comm. Media to **GPRS** (see Section 6). All subsequent ECG transmissions will use this setting until changed in the configuration settings.

ELI 10 Setting	Description
Comm Media:	**GPRS**
Host IP:	Enter the IP address of the remote ECG management system. If the system is accessible from the Internet, this will be a public IP address. Otherwise, you must setup a private network between the ELI 10 and the remote system with your local service provider. Consult the system's IT Manager for the IP address of the server. The address is entered as a 12-digit number. Use leading 0's to pad 1- and 2-digit numbers. For example, if the assigned address is 192.168.1.27, the "1" needs to be padded to be "001", and the "27" needs to be padded to be "027". You would enter "192168001027".
Port Number:	Enter the TCP port number the server is listening on for ECG transmissions. Consult the system's IT Manager for the port number.
Band Mode:	**850/1900MHz(US)** – for North America **900/1800MHz(EU)** – for all other regions outside North America
Retries:	**0** – do not retry failed transmissions. **3** – retry a transmission up to 3 times. **10** – retry a transmission up to 10 times. **Unlimited** – retry a transmission until successful or the user presses the STOP button.
Access Point Name:	See Appendix C for a partial listing of wireless access point (WAP) names used by providers around the world.
Access Point Username:	Provided by the service provider when necessary.
Access Point Password:	Provided by the service provider when necessary.
Allow GPRS Roaming:	**Yes** – allow the ELI 10 to connect to other provider networks other than its home provider. **No** – only connect to the home network provider.
GSM Mode:	**Fast** – In this mode, the ELI 10 continues to power the GSM module so it remains connected to the cellular network and connections to the remote server are much faster. **Low**– In this mode, the ELI 10 conserves batter power and powers off the GSM module between transmissions to the remote server. A new connection to the cellular network will be required at the beginning of each transmission.
Create Socket Wait (Sec):	Enter the number of seconds, up to 120, to wait for creating the socket.
Time Sync. Enabled:	**Yes** – When the ELI 10 is powered on, contact the time sync server and set the ELI 10's clock to match the server's clock. **No** – The ELI 10 clock will be set manually by the user.
Sync. Port Number:	Enter the time sync server's port.
Sync. IP:	Enter the time sync server's IP address.

Transmitting ECGs via GSM/GPRS

Follow the Single and Batch transmission instructions in this section. The ELI 10 will display status messages while it looks for a network signal, establishes a link to the network, and then communicates with the remote ECG management system. Under normal conditions, it may take up to a minute to establish a link with the network. In areas with a poor signal, the unit will continue searching until it finds a strong enough signal. If a GPRS transmission is interrupted at any point, the unit will retry the connection and transmission according to the Retries setting. Interrupted GSM transmissions must always be restarted by the user.



Orders Download

> ***NOTE**: A custom ID must be downloaded before downloading the orders. Please reference the E-Scribe or ELI Link user manuals, and Custom ID Download in this section.*
>
> ***NOTE**: Orders are only available when using the Standard interface.*

The ELI 10 can download and process a physician's order or prescription for a patient to have an ECG recording from E-Scribe or another compatible information management system. An ECG order list is then viewable on the ELI 10.

Order lists containing the demographic information of patients requiring an ECG are designed in ELI Link or an E-Scribe 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 10, the ECG list for the selected order code is stored in the device as the order list (similar to the patient directory). As with ECG data transmissions, 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 **4 (Orders 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 (Yes)** or **F4 (No)**. "Attempting Network Connection" will be displayed for approximately 10 seconds followed by "Connected."

Once connected, the screen will indicate the number of orders (ECGs) received for the order code. Pressing any key will return you to the previous screen.

ECG Order List

To display the ECG order list, first select **F1 (ID)** from the real-time ECG view, then 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 (see Section 5).

Use **F1 (▼/▲)** to navigate by line down the ECG order list; use ⬆ **(Shift), F1 (▼/▲)** to move up. Similarly, use **F2 (▼▼/▲▲)** to page down the ECG order 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 on 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)**.

Once the ECG is acquired, the patient name will be automatically removed from the ECG order list and the ECG will be stored in the ECG directory.

Custom ID Download

***NOTE**: Custom ID is only available when using the Standard interface.*

Custom ID formats are uniquely defined by your facility's needs. This customized ECG header information is designed in ELI Link or an E-Scribe system and downloaded to the ELI 10. Using the keyboard, select **4** (**Custom ID Download)** from the Application menu. "Attempting Network Connection" followed by "Connection" will appear before the completion screen.

The custom ID remains the new header format for all future ECGs until you select a different ID format in the configuration settings (see Section 6). 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.

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

ECG DIRECTORY

The standard ECG directory saves up to 60 individual ECG records. The optional expanded memory permits up to 150 individual ECG records.

ECG Directory with the Standard Interface

To access the ECG directory, select **F6 (More)** from the real-time ECG view. Using the keyboard, select **1 (Directory of Stored ECGs)**.

> ***NOTE:*** *A password may be required in order to enter the ECG directory. Enter the ECG Technician password if prompted for one.*
>
> ***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, 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 on 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 "deleted 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 *System Settings*, Section 6). 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 ECG record 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 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 ECG directory.

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 (ID and time/date are displayed on the top row).
- Select **F2** to sort the directory by patient ID (name and ECG status are displayed on the top row).
- Select **F3** to sort the directory by acquisition date (name and ECG status are displayed on the top row).
- Select **F4** to print all existing patient ECGs stored in the directory.
- Select **F5** to batch print all of the selected ECGs.
- Select **F6** to return to the ECG directory.

Session Directory with the Mobile Interface

To access the Session directory, select **F6 (More)** from the real-time ECG view. Using the keyboard, select **1 (Directory of Stored ECGs)**.

> ***NOTE:*** *A password may be required to enter the Session directory. Enter the ECG Technician password if prompted for one.*
>
> ***NOTE:*** *In the Session directory, "***T***" indicates that all ECGs in the Session have been transmitted. "***T***" also indicates if an individual ECG has already been transmitted.*

ECGs are organized by Patient Sessions. Each Session organizes all the ECGs collected from a patient during a hookup session. If the patient's name was entered, the ELI 10 displays "last name, first name" from the last ECG acquired in the Session. If the patient's name was not entered, the ELI 10 displays the automatically assigned Session ID.

Sessions are listed in order of time with the most recent listed first. Use **F1 (▲)** and **F2 (▼)** to move to and highlight the Session containing the ECG(s) you want to view, transmit, or delete. The time and date of the first ECG acquired in the highlighted Session will display at the top. After the Session is highlighted, press **F3 (ID)** to view the demographics of the last acquired ECG in the Session; press **F6 (Back)** to return. To delete the Session, press **F5 (Delet)** and then **F1 (Yes)**.

Press **F4 (Selec)** to view and transmit ECGs in the highlighted Session. The Session ID, the site name of the currently selected destination, and the most recent un-transmitted ECG in the Session will display. Press **F1 (Send)** to transmit the listed ECG to the selected destination. If other ECGs in the Session need to be transmitted, press **F4 (List)** to select the other ECGs. If the ECG needs to be sent to a different destination, use **F5 (Dest)** to select another destination before transmitting.

When all the ECGs in the Session are listed, use **F1 (▲)** and **F2 (▼)** to highlight an ECG you want to view or transmit. Use **F3 (Page)** to jump one page at a time. Use **F4 (Selec)** to add or remove the ECG from the set of ECGs to transmit. An asterisk (*) will display next to the ECG if it is in the set of ECGs to transmit. Selecting **ALL** at the top of the ECG list will select all the ECGs for transmission. Use **F5 (View)** to view the highlighted ECG. Press **F1 (ID)** to view the demographics, **F2 (Leads)** and **F3 (Page)** to view the leads, **F4 (Intrp)** to view the interpretation statements, and **F5 (Meas)** to view the measurements.

SYSTEM SETTINGS

Setting Admin and Technician Passwords

1. From real-time ECG view, select **F6 (More)**.
2. When using the Standard interface, press **3 (Set Time/Date)** from the application menu. When using the Mobile interface, press **4 (Configuration)**.
3. While holding down ⬆ **(SHIFT)**, depress **ALT** and **P** simultaneously.
4. Using the keyboard, enter the Admin password (factory default is "admin", lowercase; no quotation marks. This will automatically advance you to the set passwords display.
5. Enter the new Technician and/or Admin passwords. Enter a second time to confirm.

   NOTE: *Passwords are case sensitive and alphanumeric.*

6. From this display, select **F6 (Exit)** to return to real-time ECG view.

Technician Configuration Menu (Mobile Interface Only)

The technician configuration options are a subset of the full configuration options in the administrator's configuration menus. To access the technician configuration menu:

1. Select **F6 (More)** from real-time ECG view.
2. Using the keyboard, select **3** (**Destination Config.)** from the application menu.
3. Using the keyboard, enter the Technician password (the factory default configuration ships without a Technician password).

Use **F1 (▲)** and **F2 (▼)** to move through each technician configuration option.

- Site Name
- Volume
- Battery Timeout
- Prompt if Empty ID
- Auto-send ECG
- Allow GPRS Roaming
- GPRS Retries

Administrator 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:

Standard Interface

1. Select **F6 (More)** from the real-time ECG view.
2. Using the keyboard, select **3** (**Set Time/Date)** from the application menu.
3. From the Set Time/Date screen, simultaneously press ⬆ **(SHIFT) + ALT + C.**
4. Using the keyboard, enter the Admin password (factory default is "admin", lowercase; no quotation marks.
5. The first configuration screen will appear. Notice the page indicator in the upper right-hand corner.

Mobile Interface

1. Select **F6 (More)** from the real-time ECG view.
2. Using the keyboard, select **4** (**Configuration)** from the application menu.
3. Using the keyboard, enter the Technician or Admin password.
4. From the technician configuration page, simultaneously press ⬆ **(SHIFT) + ALT + C.**
5. Using the keyboard, enter the Admin password (factory default is "admin", lowercase; no quotation marks.
6. The first configuration screen will appear. Notice the page indicator in the upper right-hand corner.

To navigate the 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 the **BKSP**⬅ key to erase entry errors.

General Settings

Software Version

Identifies the software version of your electrocardiograph.

Cart Number

Indicates which electrocardiograph acquired a particular ECG.

Site Number (Second and Third site as well)

Identifies the site where your ELI 10 operates. The Site Number designates the department, care area, hospital, clinic, office, or institution where the ECG was acquired. The Site Number is often used by the ECG management system for workflow management and administrative purposes. When using a Mortara E-Scribe ECG management system, the Site Number must already be defined in the E-Scribe before transmitting the ECG record. Site Numbers can range from 0 to 4095. Some ELI 10 configurations allow up to three sites to be defined.

Site Name

Names the department, care area, clinic, hospital, office, or institution where the ELI 10 operates and acquires ECGs. Enter up to 30 alphanumeric characters. The Site Name prints in the middle of the bottom edge of the ECG printout. Some ELI 10 configurations allow up to three sites to be defined.

Flash Size

Indicates the ECG storage capacity. Normal indicates standard memory capacity. Expanded indicates the optional expanded memory has been installed.

User Interface Settings

Language

There are several languages available on the ELI 10: Dutch, English, Finnish, French, German, Hungarian, Italian, Polish, Portuguese, Spanish, and Swedish. Use **F3 (►)** to select the desired language.

> ***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 select a different language:

1. From the real-time ECG view, press **F6 (More)**.
2. Press **3** for **Set Time/Date**.
3. While holding down ⬆ **(SHIFT)**, depress **ALT** and **C** simultaneously.
4. Using the keyboard, enter the Admin password (factory default is “admin”, lowercase, no quotation marks.
5. Use **F1 (▲)** or **F2 (▼)** to move to language.
6. Press **F3 (►)** until the desired language appears.
7. Press **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**. When several diacritical marks are available for the same letter, press **ALT + the letter** multiple times to scroll through the available symbols. Example: For Spanish, ñ is entered by selecting **ALT + n** twice. The table below shows the available symbols in each supported language.

Language	Key	ALT Symbols
Dutch	A	ú ù Ú Ù u
	E	è é ë e
	I	ï i
	O	ö o
	U	ü u
Finnish	A	å ä Å Ä a
	O	ö Ö o
French	A	À Â à â a
	C	Ç ç c
	E	È É Ê Ë è é ê ë e
	I	Î Ï î ï i
	O	Ô ô o
	U	Ù Û ù û u
German	A	Ä ä a
	B	ß b
	O	Ö ö o
	U	Ü ü u
Hungarian	A	Á á a
	E	É é e
	I	í Í i
	O	ö ó Q Ö Ó P o
	U	ü ú q Ü Ú p u
Italian	A	À à a
	E	È É è é e
	I	Ì Í Î ì í î i
	O	Ò Ó ò ó o
	U	Ù Ú ù ú u

Language	Key	ALT Symbols
Polish	A	Ą ą a
	C	Ć ć c
	E	Ę ę e
	L	Ł ł l
	N	Ń ń n
	O	Ó ó o
	S	Ś ś s
	Z	Ź ź Ż ż z
Portuguese	A	Ã à á ã â À Á Â a
	C	Ç ç c
	E	È É Ê è é ê e
	I	í ì Ì Í i
	O	ó ó ô õ Ò Ó Õ Ô o
	U	ú ù Ú Ù u
Spanish	A	À Á à á a
	C	Ç ç c
	E	È É è é e
	I	Í í i
	N	Ñ ñ n
	O	Ò Ó ò ó o
	U	Ú Ü ú ü u
Swedish	A	Å å a
	O	Ö ö o
	S	Ä ä s

Volume

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

Battery Timeout

Determines when the electrocardiograph will switch off in order to conserve the battery life of the device. The ELI 10 will switch off if the keyboard has not been depressed for the time specified; however, it will not timeout while an ECG signal is detected or when it is communicating with the host.

AC Off Timeout

Determines when the electrocardiograph will switch off while on AC power. The ELI 10 will switch off when the keyboard has not been depressed for the time specified; however, it will not timeout while an ECG signal is detected or when it is communicating with the host.

Backlight Timeout

Determines when the electrocardiograph will switch off the backlight. The backlight will switch off when the keyboard has not been depressed for the time specified; however, it will not timeout while an ECG signal is detected or when it is communicating with the host.

Mobile MI

An ELI 10 configured for mobile use supports both the Standard and Mobile user interfaces. Use **F3 (►)** to select "Yes or No" for the Mobile interface. If set to No, the Standard interface will be used.

Caps Lock

Use **F3 (►)** to select "Yes" if you want all character entry to be translated to uppercase.

Patient Demographics Settings

ID Format

Defines the format for the patient demographic information prompts. There are three built-in formats: short, standard, and long. A Custom ID format can be downloaded from ELI Link or an E-Scribe system. See Section 4 to download a Custom ID.

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

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

The long format includes all the fields from the standard format in addition to the patient's first name, room, and comment fields.

Auto-Fill ID

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

Ht/Wt (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.

U.S. Date Format:	MM/DD/YYYY
European Date Format:	DD.MM.YYYY

ECG Acquisition, Display, and Print Settings

Acquisition Time

When set to "Pre Auto", the ELI 10 starts acquiring ECG data once the patient is connected to the electrocardiograph. When the clinician depresses Auto, the ELI 10 will take the prior 10 seconds of ECG data and use it for the ECG analysis. If the ELI 10 does not have a full 10 seconds of ECG data for the analysis, it will wait until 10 seconds of data is available.

When set to "Post Auto", the ELI 10 starts acquiring 10 seconds of ECG data once the Auto button is depressed.

AC Filter

The ELI 10 removes 60 Hz or 50 Hz interference from the device. Use **F3 (►)** to select the power 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.

Filter

Defines the default ECG display and print (plot) frequency filter. Use **F3 (►)** to select 40 Hz, 150 Hz, or 300 Hz. The display/print filter does not affect the stored waveforms. A 40 Hz display/print filter setting will reduce the noise above 40 Hz; a 150 Hz display/print filter setting will reduce the noise above 150 Hz; a 300 Hz display/print filter setting will not filter the waveforms. The filter setting is printed at the bottom right corner of the ECG printout.

LCD ECG Speed

Defines the default speed in which the ECG will be presented on the display. To set the speed, select **F3 (►)** to switch between 5, 10, 25, and 50 mm/second settings.

Interp

An ELI 10 with the VERITAS interpretation option will automatically analyze acquired ECGs. When set to "No", this setting suppresses the interpretation text on the ECG printout.

> ***NOTE:*** *The ECG interpretations offered by the device are only significant when used in conjunction with a physician over-read as well as consideration of all other relevant patient data.*

Reasons

Reason statements indicate why a particular interpretive statement was printed. When set to "Yes," the reason statements print enclosed in [square brackets] within the interpretive text if the interpretation option is turned on. This setting does not affect the measurements or the interpretive statements selected by VERITAS.

> **For Example:**
> Anteroseptal Infarct [40+ ms Q WAVE IN V1-V4]
>
> "Anteroseptal Infarct" is the interpretive statement and "40+ ms Q WAVE IN V1-V4" is the reason why the interpretive statement was printed.

Average RR

Enabling this option will display an averaged RR value with the global measurements.

QTcB

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

QTcF

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

Plot Format

Defines the default plot (print) format in either Standard or Cabrera presentation. Regardless of the plot format selected, 10 seconds of 12 leads are always stored.

The ECG plot format options are:

Format Option	ECG Data
3+1	2.5 seconds of standard 12 leads in a 3-channel format, plus 10-second rhythm strip of one user-selectable lead in a 1-channel format. Cabrera also available.
3+3	2.5 seconds of 12 leads in a 3-channel format, plus 10-second rhythm strip of user-selectable leads in a 3-channel format. Cabrera also available.
6Ch	5 seconds of 12 leads in a 6-channel format. Cabrera also available.
12Ch	10 seconds of 12 leads in a 12-channel format. Cabrera also available.
6+6	10 seconds of 12 leads in a 6-channel, 2-page format. Cabrera also available.

ECG Storage Settings

Delete Rule

Defines the ECG auto-delete rule for ECG records in the ELI 10 directory. ECG records marked for deletion will be automatically erased based on the date (oldest records are erased first) to make room for new ECG records. ECG records are only erased from the directory when they are marked for deletion and the directory becomes full. More than one ECG may be removed from the directory in order to make room for a new ECG 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 to the host
Post Plot/Transmit = ECG is automatically marked for deletion after transmission and printing

Storage Sensitivity

Dictates the waveform Voltage resolution of the stored ECG records. The sensitivity setting is either Normal or High. If the value is set to High, the stored ECG waveforms will have a high resolution. As a result, the record size will be larger and may reduce the number of ECG records the ELI 10 can store in its directory.

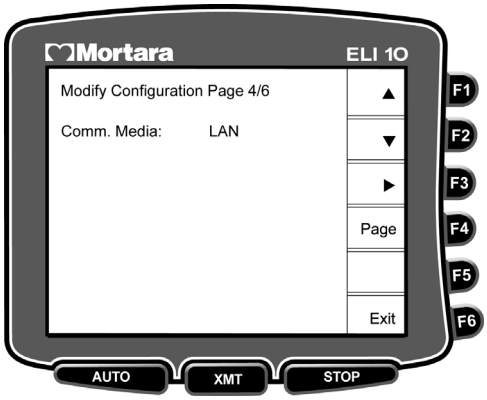
Auto-Save ECG

Defines whether or not a newly acquired ECG will be automatically saved to the directory once it is acquired and displayed. When set to "No", the ELI 10 will prompt to **F1 (Save)** or **F3 (Delet)** when you are done reviewing a newly acquired ECG.

Communications Settings

Comm. Media

Select between Modem, LAN, WLAN, GSM, GPRS, USB Device, or USB memory.



Comm Media	Description
Modem	If the docking station has a built-in analog modem, the ELI 10 will dial the phone number of an ECG management system (e.g. E-Scribe) capable of receiving modem transmissions. Connect the docking station to an analog phone port, similar to a fax machine.
LAN	The ELI 10 will communicate with the ECG management system using a TPC/IP protocol. Connect the docking station or cradle to a 10/100 Ethernet LAN port.
WLAN	The ELI 10 will communicate with the ECG management system using wireless LAN. No docking station or cradle is necessary.
GSM	The ELI 10 will dial the phone number of an ECG management system (e.g. E-Scribe) capable of receiving modem transmissions using a GSM cellular phone service. No docking station or cradle is necessary.
GPRS	The ELI 10 will communicate with the ECG management system using a TCP/IP protocol. The ELI 10 will connect with the network using a GPRS cellular data service. No docking station or cradle is necessary.
USB Device	If the docking station has a USB device port, the ELI 10 will communicate with a host computer via a direct USB cable connection. ELI Link must be running on the host computer and configured to accept USB connections.
USB Memory	USB flash memory can be used to transfer ECG records from the ELI 10 to ELI Link. ECGs transmitted to an inserted USB memory stick can later be copied into an ELI Link import folder.

Worklist Management

The ELI 10 can download and process ECG order lists from the E-Scribe 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 list will override the previously downloaded one.

Comm. Protocol

Select DICOM32 or UNIPRO32. Set to UNIPRO32 to transmit to E-Scribe, ELI Link, or compatible information management system; set to DICOM32 to transmit to a DICOM compatible information management system.

Owner Name

Displays the current E-Scribe Owner Name that gives the ELI 10 permission to communicate with restricted E-Scribes. See the E-Scribe administrator for more information.

Internal Modem and GSM Settings

Telephone Number

Specifies the telephone number for internal modem or GSM transmissions to another unit, to an E-Scribe system, or to a compatible information management system. Enter up to 45 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 number, use the* ⇆ **(Tab)** *key.*

Common Network Settings for LAN, WLAN, and GPRS

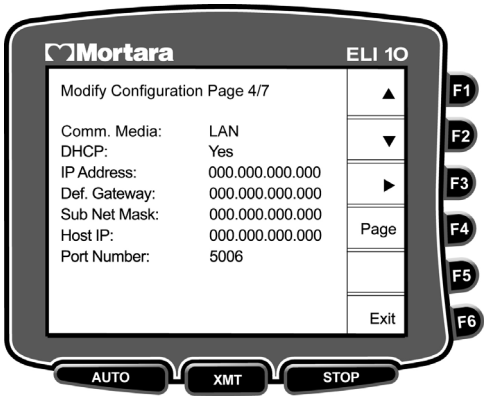
Dest Site

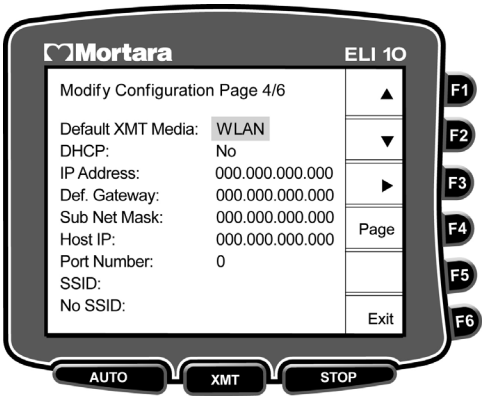
Specifies whether a selected destination site requires a name only, or a name, IP address, and TCP port number. Use **F3 (►)** to select "Name Only" or "Name-IP". This setting applies only to an ELI 10 configured for mobile use and using the Mobile interface.

DHCP

Defines whether DHCP will be used to obtain an IP address. If DHCP is YES, the network will automatically assign an IP address to the ELI 10. If DHCP is NO, you must enter the static IP address assigned to the ELI 10, the network's default gateway, and the 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 unit is installed.*





IP Address

Enter the static IP address assigned to the ELI 10 (if DHCP is NO).

Def Gateway

Enter the network's default gateway (if DHCP is NO).

Sub Net Mask

Enter the IP address sub net mask (if DHCP is NO).

Host IP

Enter the IP address of the host server running ELI Link, E-Scribe, or a compatible ECG management system.

> ***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 10 as 192.168.000.007.*

Port Number

Enter the TCP port number used by the host server.

Time Sync

Specifies when the ELI 10 should retrieve the current time from a time server, and where it should retrieve it from. Use **F3 (►)** to select one of the following options:

Time Sync	Description
No	The ELI 10 will not retrieve the time from a time server.
Network	The ELI 10 will retrieve the time from a Daytime server when it is powered on. This option only works when GPRS is used. See Appendix D for information about the Daytime server requirements.
ELI Link Pwr	The ELI 10 will retrieve the time from ELI Link when it is powered on.
ELI Link Xmt	The ELI 10 will retrieve the time from ELI Link whenever it transmits an ECG record.

Sync Port Number

Defines the time server TCP port number used when the Time Sync option is "Network" or "ELI Link Pwr".

Sync IP

Defines the time server IP address used when the Time Sync option is "Network" or "ELI Link Pwr".

> ***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 10 as 192.168.000.007.*

LAN Settings

LAN MAC

Shows the MAC address of the ELI 10's Ethernet interface. This information may be required by the network administrator.

WLAN Settings

WLAN MAC

Shows the MAC address of the ELI 10 wireless module for configuring access points.

SSID

Service Set Identifier (SSID) is the name of the wireless network to use.

Security

Select the security (encryption and authentication) protocol used by the wireless network. Use **F3 (▶)** to select from the following options:

WLAN Security	Description
None	No security used
WEP64	Wired Equivalent Privacy with a 64-bit key (aka WEP-40)
WEP128	Wired Equivalent Privacy with a 128-bit key (aka WEP-104)
WPA-PSK	Wi-Fi Protected Access with TKIP encryption and a pre-shared key (aka Personal mode)
WPA-LEAP	Wi-Fi Protect Privacy with TKIP encryption and Cisco® LEAP (Lightweight Extensible Authentication Protocol)
WPA2-PSK	WPA2 with AES-CCMP encryption and a pre-shared key (aka WPA2 personal).
WPA2-PEAP	WPA2 with AES-CCMP encryption and Protected Extensible Authentication Protocol
WPA-PSK64	Migration mode with TKIP+40-bit WEP using pre-shared key
WPA-PSK128	Migration mode with TKIP+104-bit WEP using pre-shared key
WPA-LEAP64	Migration mode with TKIP+40-bit WEP using Cisco LEAP
WPA-LEAP128	Migration mode with TKIP+104-bit WEP using Cisco LEAP

WEP Key

Access points can have multiple WEP keys stored. Each one of them is identified by a number (e.g., 0, 1, 2, 3). Enter the WEP key number.

WEP Key ID

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

PSK Passphrase

Enter the pre-shared key for WPA-PSK or WPA2-PSK.

LEAP User Name

User name can be up to 32 characters in length.

LEAP Password

Password can contain up to 32 characters.

PEAP User Name

User name can be up to 63 characters in length.

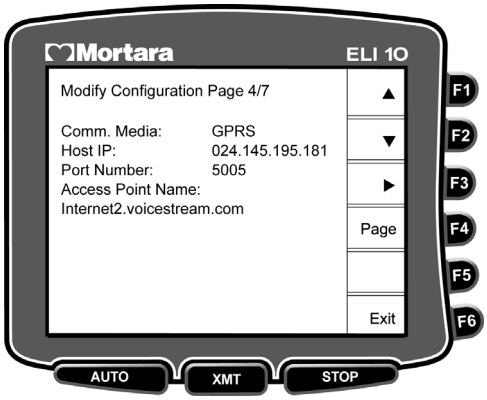
PEAP Password

Password can contain up to 63 characters.

GPRS Settings

GPRS Mode

Defines power setting for the GPRS module. When set to Low, the module will turn on when a transmission is required. When set to Fast, the module will turn on when the ELI 10 is powered up (from a cold boot or from stand-by) allowing immediate transmission when required by the user.



Allow GPRS Roaming

Allows user to turn off roaming forcing the ELI 10 to lock exclusively on the SIM card provider (in order to avoid locking on networks during roaming and not be able to transmit when necessary).

Create Socket Wait

Adjusts timeout setting to allow for delays in GPRS lines acknowledging data reception by the host facility.

Access Point Name

The GPRS access point name (APN) can contain up to 64 characters. See Appendix C for a complete list of worldwide wireless access points (WAP).

TROUBLESHOOTING AND MAINTENANCE

ECG Record Errors

LCD MESSAGE	RESOLUTION
Unable to save ECG	Ensure maximum capacity of either 60 or 150 ECGs has not been exceeded. Delete some ECG records from the directory.
Memory full: ECG not saved	Ensure maximum capacity of either 60 or 150 ECGs has not been exceeded. Delete some ECG records from the directory.
Unable to Edit Ordered ECG	Ordered ECG from electronic medical record system may not be edited.
Failed to change record status	Contact Mortara customer service.
Failed to read record	Contact Mortara customer service.

Capturing ECG Errors

LCD MESSAGE	RESOLUTION
ECG Error	Gross artifact. Re-prep and acquire new ECG.

ECG Transmission Errors

LCD MESSAGE	RESOLUTION
Connection failed	Contact Mortara customer service.
Incorrect response	Connection made with the inappropriate response from receiving station. Contact Mortara customer service.
Transmission failed	Contact Mortara customer service.
NO PHONE NUMBER	No telephone number found in configuration. Enter correct phone number into configuration and attempt to transmit again.
Can't Connect to Access Point	Check WLAN settings, including DHCP, static IP address (if DHCP=No), SSID, security mode, and security passwords. Check WLAN signal strength.
Can't connect to Remote Link	Check Host IP address and Port Number.
DHCP Failure	Check with local IT to verify DHCP server is running and responsive.
ERROR – DICOM Not Enabled	Ensure DICOM has been enabled in the configuration/settings menu.
CID Download Failed	Contact Mortara customer service.
Orders Download Failed	Contact Mortara customer service.
MWL Query Failed	Contact Mortara customer service.
NO CARRIER	Ensure correct telephone number has been entered. This problem occurs when an inappropriate signal has been received from the opposing end.
NO DIALTONE	Ensure telephone line is connected and has active service.
BUSY	Re-transmit at a later time.
MODEM Timed-out	Connection made with the inappropriate response from receiving station. Contact Mortara customer service.

ECG Transmission Errors (cont'd.)

LCD MESSAGE	RESOLUTION
Error in reply	Connection made with the inappropriate response from receiving station. Contact Mortara customer service.
No MODEM in Docking Station	Move electrocardiograph to a docking station with a modem installed.
DPAC Failure	Contact Mortara customer service.
No ECG available for transmission	Attempting batch transmission with no records available.
Memory full	Will occur when 256 orders are pending in the electrocardiograph.

Battery Errors

LCD MESSAGE	RESOLUTION
PLEASE CONTACT CUSTOMER SERVICE	Contact Mortara customer service.
Battery Error	Contact Mortara customer service.

Password Errors

LCD MESSAGE	RESOLUTION
Tech Password Compare Error	Ensure correct password entry in both locations.
Admin Password Compare Error	Ensure correct password entry in both locations.
Error: Empty Administrator Password	Administrative password is required; technician password may be empty.

Configuration Errors

LCD MESSAGE	RESOLUTION
DUPLICATE SITE NUMBERS	Ensure appropriate site number has been entered.

General Errors

LCD MESSAGE	RESOLUTION
Not Properly Docked	Apply slight pressure to top of electrocardiograph ensuring a proper seat in the docking station or cradle.
ELI 10 NOT PROPERLY DOCKED	Apply slight pressure to top of electrocardiograph ensuring a proper seat in the docking station or cradle.
Battery Too Low for Operation	Return electrocardiograph to docking station or cradle and allow to charge for a minimum of 4 hours.

Printing Errors

LCD MESSAGE	RESOLUTION
No Printer Found	Ensure printer cable is plugged into docking station. Ensure electrocardiograph is properly docked in docking station or cradle. Ensure printer is turned on.
Battery Too Low For Printing	Ensure electrocardiograph is properly docked in docking station or cradle; allow battery to charge for 30 minutes.
Unit Must Be Docked To Print	Ensure electrocardiograph is properly docked in docking station or cradle.
No Printer Found	Ensure printer is powered on, and that interface A to B cable is properly attached.
Printer Error	Ensure printer has paper, cable is connected, and unit is powered on.
No Paper	Ensure printer has paper.
Printer Offline	Ensure printer is powered on.

USB Errors

LCD MESSAGE	RESOLUTION
NO USB MEMORY	USB memory device not installed. Install USB memory device to docking station or cradle and try again. If problem persists, contact Mortara Technical Service.
USB MEMORY WRITE ERROR	USB memory device has non-compatible program installed on device. Remove USB memory device and erase U3 program from USB memory device.
USB Memory Full	Delete files from USB memory device, or insert new USB memory device.
Maximum Records Exceeded	Delete files from USB memory device, or insert new USB memory device.
Duplicate Record Error	File already exists on USB memory device.

Power Off the ELI 10

To completely shutdown the ELI 10, press the ON/OFF button. Such a shutdown should always be performed prior to removal of fuses or authorized repair of the device.

Test Operation

After cleaning and inspecting the ELI 10, 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. Waveforms should appear normal, with proper amplitude, and without distortion or excessive noise.

Recommendations to Biomedical Staff

Following any service to the ELI 10 and its docking station or cradle 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 10 houses an internal lithium ion battery.

- Operating time on a full battery charge (ECG acquisition only): approximately 8 hours
- Maximum time to fully recharge battery: approximately 4 hours
- Typical AC power consumption of hand held + docking station: **idle mode**: battery already charged; acquiring ECG: 4.5W
- Typical AC power consumption of handheld + cradle: **idle mode**: battery already charged; acquiring ECG: 4.5W
- Typical AC power consumption of hand held + docking station: **charging**: full charging current, acquiring ECG: ~20W
- Maximum AC power consumption of hand held + docking station: full charge current, GSM/GPRS mobile transmitting, max USB power: ~35W
- Maximum AC power consumption of handheld + cradle: full charge current: ~15W

Mortara Instrument recommends that the ELI 10 be connected to its power supply for recharging when not in use. To maintain optimal battery capacity, occasionally use the device without recharging until it reports “BATT LOW,” then recharge again immediately.

For information about replacing the battery, please refer to the ELI 10 service manual.

Calibration of the ELI 10

The ELI 10 is calibrated at the factory. No user adjustment or periodic recalibration is required.

MODEM COUNTRY CONFIGURATION

An ELI 10 with an analog modem in its docking station will ship from the factory with the modem configured for the destination country. To verify the modem is configured correctly or to change the country configuration, follow the steps below. The modem can be configured to be compatible with most telephone networks around the world.

1. Dock the ELI 10 on a docking station with an analog modem (Mortara part number 34000-029-1001).
2. Power on the ELI 10.
3. Press **F6 (More)**.
4. Press and hold **SHIFT+ALT+M**.
5. The ELI 10 will communicate with the modem and display the configured country code on the bottom of the display screen. Verify the code using the Country Code table in this section.
6. If the configured code is correct for your country, press **F6 (Exit)**.
7. If the configured code is not correct for your country, press **F2** and enter "+CGI=".
8. Enter the correct country code for your country from the Country code table in this section (e.g., "B5" for Thailand).
9. Press **F1** to send the new code to the modem.
10. After the code has been sent, the ELI 10 will query the modem and display its current configuration. Verify the displayed country code is correct for your country.
11. Press **F6 (Exit)**.

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
Greenland(GL)	B5	Mali(ML)	B5

Country Code List (cont'd.)

COUNTRY	CODE	COUNTRY	CODE
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 List (cont'd.)

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

***NOTE**: *Internal modem is only available when using the docking station..*

GPRS SETTINGS (WAP)

Country	Wireless Operator	Access Point Name (APN)
Argentina	Personal	gprs.personal.com
Argentina	Unifon	internet.gprs.unifon.com.ar
Australia	Telstra	telstra.internet
Australia	Optus	internet
Australia	Three	3netaccess
Australia	Vodafone	internet
Austria	Max Online	gprsinternet
Austria	One	wap.one.at
Belgium	Orange	orangeinternet
Belgium	Mobistar	web.pro.be
Belgium	Proximus	internet.proximus.be
Bermuda	AT&T	proxy
Bermuda	Mobility	net.bm
Brazil	Claro	claro.com.br
Brazil	Oi	gprs.oi.com.br
Brazil	TIM	tim.br
Bulgaria	Mobiltel (Mtel)	inet-gprs.mtel.bg
Canada	Fido	internet.fido.ca
Canada	Rogers AT&T	internet.com
Chile	Entel PCS	imovil.entelpcs.cl bam.entelpcs.cl
Chile	Telefonica GSM	web.tmovil.cl
China	China Mobile	cmnet
Croatia	VIPNET	gprs.vipnet.hr
Czech Republic	Eurotel	internet
Czech Republic	Oskar	internet
Czech Republic	Oskar prepaid cards	ointernet
Czech Republic	T-Mobile	internet.t-mobile.cz
Denmark	TDCmobil	internet
Denmark	Orange	web.orange.dk
Eygpt	Vodafone	internet.vodafone.net
Dominican Republic	Orange Dominicana	orangenet.com.do
Finland	Telia Mobile	internet
Finland	DNA	internet
Finland	Sonera	internet
Finland	Radiolinja	internet
Finland	Saunalahti	saunalahti
France	Orange	orange.fr
France	SFR	websfr
France	Bouygues Telecom	eBouygTel.com
Germany	D2 Vodafone	web.vodafone.de
Germany	E-Plus	internet.eplus.de
Germany	O2	internet
Germany	Quam	quam.de
Germany	T-Mobile D1	internet.t-d1.de

Country	Wireless Operator	Access Point Name (APN)
Greece	Vodafone	internet.vodafone.gr
Greece	Telestet	gint.b-online.gr
Greece	Cosmote	internet
Hungary	Vodafone (Prepaid “Optimized”)	vitamax.internet.vodafone.net
Hungary	Vodafone (Prepaid “Standard”)	vitamax.snet.vodafone.net
Hungary	Vodafone (Postpaid “Optimized”)	internet.vodafone.net
Hungary	Vodafone (Postpaid “Standard”)	standardnet.vodafone.net
Hong Kong	CSL	internet
Hong Kong	Orange	web.orangehk.com
Hong Kong	New World	internet
Hong Kong	People	internet
Hong Kong	SmarTone	internet
Hong Kong	Sunday	internet
India	Orange, Hutch	www
Iceland	Siminn	gprs.simi.is
India	BPL Mobile	bplgprs.com
India	Airtel	airtelgprs.com
Indonesia	Telkomsel	internet
Ireland	O2	internet
Ireland	Vodafone	live.vodafone.com
Israel	Cellcom	internetg
Israel	Orange	internet
Italy	TIM	uni.tim.it ibox.tim.it
Italy	Vodafone Omnitel	web.omnitel.it
Italy	Wind	internet.wind
Latvia	Latvia Mobile Telefone	internet.lmt.lv
Luxembourg	LUXGSM	web.pt.lu
Luxembourg	Tango	internet
Malaysia	Celcom	celcom.net.my
Mexico	Telcel	internet.itelcel.com
Montenegro	Monet	gprs.monetcg.com
Netherlands	T-Mobile	internet
Netherlands	KPM Mobile	internet
Netherlands	Orange	internet
Netherlands	O2	internet
Netherlands	Vodafone (normal)	web.vodafone.nl
Netherlands	Vodafone (business)	office.vodafone.nl
New Zealand	Vodafone NZ	www.vodafone.net.nz
Norway	Netcom	internet.netcom.no
Norway	Telenor	internet
Pakistan	Ufone	ufone.internet
Paraguay	Personal	internet
Paraguay	Tigo	internet.tigo.py
Philippines	Smart	internet

Country	Wireless Operator	Access Point Name (APN)
Philippines	Globe	internet.globe.com.ph
Poland	Era	erainternet
Poland	Idea	www.idea.pl
Poland	PlusGSM	www.plusgsm.pl
Portugal	Optimus	internet
Portugal	TMN	internet
Portugal	Vodafone (Telcel)	internet.vodafone.pt
Romania	Connex	internet.connex.ro
Romania	Orange	internet
Russia	BeeLine	internet.beeline.ru
Russia	Megafon	internet.nw
Russia	MTS	internet.mts.ru
Russia	PrimTel	internet.primtel.ru
Saudi Arabia	Saudi Telecom	Jawalnet.com.sa
Serbia-Montenegro	Mobtel Srbija	internet
Serbia-Montenegro	Telekom Srbija	gprsinternet
Singapore	M1	sunsurf
Singapore	Singtel	internet
Singapore	Starhub	shwapint
Slovakia	Eurotel	internet
Slovakia	Orange	internet
South Africa	MTN	internet
Spain	Amena	amenawap
Spain	Telefonica (Movistar)	movistar.es
Spain	Vodafone	airtelnet
Sweden	Telia	online.telia.se
Sweden	Vodafone SE	internet.vodafone.net
Switzerland	Swisscom	gprs.swisscom.ch
Switzerland	Orange CH	internet
Switzerland	sunrise	internet
Switzerland	UMC	www.umc.ua
Taiwan	Chunghwa Telecom	internet
Taiwan	Far EasTone	fetnet01
Taiwan	KG Telecom	internet
Taiwan	Taiwan Cellular	internet
Thailand	AIS	internet
Thailand	DTAC	www.dtac.co.th
Turkey	Avea	internet
Turkey	Aycell	aycell
Turkey	Telsim	telsim
Turkey	Turkcell	internet
UK	BT Mobile	mobile.bt.uk
UK	Jersey Telecom	pepper
UK	O2	mobile.o2.co.uk

Country	Wireless Operator	Access Point Name (APN)
UK	T-Mobile	general.t-mobile.co.uk
UK	Tesco-Mobile	prepay.tesco-mobile.com
UK	Virgin	goto.virginmobile.uk
UK	Vodafone UK	internet
UK	Orange	orangeinternet
Ukraine	Kyivstar GSM	www.kyivstar.net
Ukraine	UMC	www.umc.ua
USA	T-Mobile	internet2.voicestream.com
USA	AT&T	wap.cingular
USA	Cingular	isp.cingular
USA	Rogers	internet.com
Venezuela	Digital TIM	gprsweb.digitel.ve
Vietnam	MobiFone	Mobi-gprs-wap

***NOTE**: Subject to change without notification*

GPRS DAYTIME SERVER SETUP

An ELI 10 communicating over GPRS can be configured to automatically set its clock to match the time on a time sync server. The time sync server must return a time stamp in the ELI 10's local time zone via the **daytime** protocol (RFC 867). The time sync server must have a public IP address, and the standard port is 13. The server must return the time in one of the following formats:

Format 1

```
day mon dd HH:mm:ss yyyy
```

Example

```
Wed Jul 15 17:05:49 2010
```

Format 2

```
hh.mm.ss tt mm/dd/yyyy
```

Example

```
02:38:51 PM 07/18/2011
```

Time sync servers running the Dimension 4 (http://www.thinkman.com/dimension4/index.htm) time sync software supports Format 1.