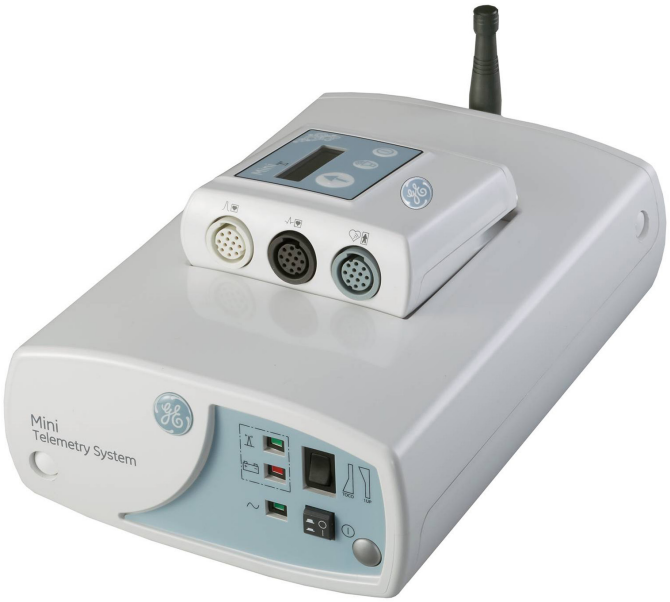
GE Healthcare

# Mini Telemetry

## Operation and Maintenance Manual




To order this manual, please refer Appendix A for correct language listing.



2049809-001 Rev B.

# Contents

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# About this Manual

Before using the Mini Telemetry System with your Corometrics Fetal Monitor, read this entire manual. As with all medical equipment, attempting to use this device without a thorough understanding of its operation may result in patient or user injury. This device should only be operated by personnel trained in its operation and familiar with the risks and benefits of this type of device. Additional precautions specific to certain procedures are found in the text of this manual.

## User Responsibility

This Product will perform in conformity with the description contained in this Operation and Maintenance manual and accompanying labels and/or inserts, when assembled, operated, maintained and repaired in accordance with the instructions provided. This Product must be checked periodically. A defective Product should not be used. Parts that are broken, missing, partially worn, distorted, or contaminated should be replaced immediately. Should such repair or replacement become necessary, GE Healthcare recommends that a telephonic or written request for service advice be made to the nearest GE Healthcare Regional Service Center. This Product or any of its parts should not be repaired other than in accordance with written instructions provided by GE Healthcare and by GE Healthcare trained personnel. The Product must not be altered without GE Healthcare's prior written approval. The user of this Product shall have the sole responsibility for any malfunction that results from improper use, faulty maintenance, improper repair, damage, or alteration by anyone other than GE Healthcare. Do not use this product without prior site survey and awareness of the standard medical frequency bands that can be configured for this Telemetry system.

| | |
|---|---|
| CE 0459 | GE Healthcare has declared that this product conforms with the European Council Directive 93/42/EEC Medical Device Directive when used in accordance with the instructions provided in this Operation and Maintenance Manual. |
|  | U.S. Federal law restricts this device to sale by or on the order of a licensed medical practitioner.<br>For professional use only |

## Conventions

Various types of pictures or icons are used in this manual wherever they reinforce the printed message to alert you to potential safety hazards.

The warnings and cautions in this section relate to the equipment in general and apply to all aspects of the equipment. Be sure to read the other chapters as they contain additional warnings and cautions that relate to specific features of the equipment.

When grouped, warnings and cautions are listed alphabetically and do not imply any order of importance.

| | |
|---|---|
|  | **WARNING:**<br>A **DANGER** notice indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. |
|  | **CAUTION:**<br>A **CAUTION** indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. Cautions are also used to avoid damage to equipment. |
|  | **SENSITIVE TO ELECTROSTATIC DISCHARGE CAUTION**<br>An Electrostatic Discharge (ESD) Susceptibility symbol is displayed to alert service personnel that the part(s) are sensitive to electrostatic discharge and that ESD control guidelines must be followed to prevent damage to the equipment. |

**NOTE:** A Note provides important information about an item or a procedure. Information contained in Notes can often save you time or effort.

## Definition of Terms Used

The definitions of terms used in this manual are listed in the following table:

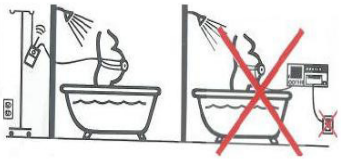
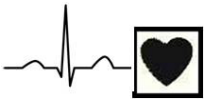
| Term | Definition |
|---|---|
| ECG | Electrocardiogram |
| MECG | Maternal Electrocardiogram |
| FHR | Fetal Heart Rate |
| UA | Uterine Activity |
| TOCO | Non invasive method of measuring uterine activity |
| IUPC | Intra-Uterine Pressure Catheter |
| RF | Radio Frequency |
| BPM | Beats Per Minute |
| FECG | Fetal Electrocardiogram |
| WMTS | Wireless Medical Telemetry System |

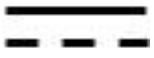
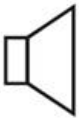
| Term | Definition |
|---|---|
| ESD | Electro Static Discharge |
| BNC | Bayonet Nut Connector |

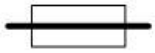
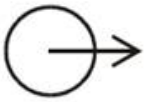
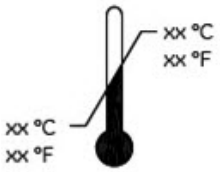
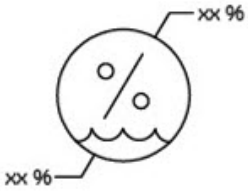
## Symbol Definitions

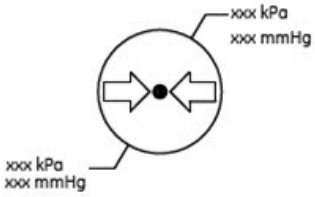
This section identifies the symbols that are displayed on the Mini Telemetry.

| Symbol | Definition |
|---|---|
|  | Refer to instruction manual / booklet. |
|  | Protective earth terminal |
|  | Alternating current |
|   | European Union representative |
|   | Serial number |
|  | Manufacturer |
|   | Equipment shall be used only by qualified, trained medical personnel |
|   | Non-sterile |
|  | Waste of electrical and electronic equipment must not be disposed as unsorted municipal waste and must be collected separately |
|  | Ground Equalization Potential Post |

| Symbol | Definition |
|---|---|
|  | Battery Runtime Indicator |
|  | IEC TYPE B EQUIPMENT. Type B equipment is suitable for intentional, external and internal application to the patient, excluding direct cardiac application. |
|  | IEC TYPE BF EQUIPMENT. Type BF equipment is suitable for intentional external and internal application to the patient, excluding direct cardiac application. Type BF equipment has an F-type applied part. |
|  | IEC TYPE CF EQUIPMENT: Type CF equipments provide the highest degree of patient protection. This degree of protection is achieved by increased isolation from earthed parts and other accessible parts of the equipment, further limiting the magnitude of possible current flow through the patient. Type CF applied parts are suitable for direct cardiac application. |
|  | DEFIBRILLATOR-PROOF TYPE BF EQUIPMENT: Type BF equipment is suitable for intentional external and internal application to the patient, excluding direct cardiac appliction. Type BF equipment is type B equipment with an F-type isolated (floating) part. The paddles indicate the equipment is defibrillator proof. |
| 0 | POWER OFF: disconnection from the mains. |
| \| | POWER ON: connection to the mains. |
|  | 1. Use Transducer in a watery environment only when connected to a telemetry system. Do not allow the telemetry system to get wet.<br>2. Do not use transducer in a watery environment when directly connected to a fetal/maternal monitor that is directly connected to AC line power. |
|  | Date of Manufacture (in "YYYY-MM" format) |
|  | Elevated, potentially hazardous levels of non-ionizing radiation. |
|  | Ultrasound |
|  | ECG |

| Symbol | Definition |
|---|---|
|  | Uterine Activity |
|  | Class II equipment according to IEC 61140. |
|  | CE Mark for devices to be sold in the EU. |
|  | Electrical equipment which is not suitable for a residential area (e.g. equipment which produces radio interference when in operation). |
|  | Prescription Device Label for United States. |
| FCC ID: YOMMINITEL2010<br>IC:9136A-MINITEL2010 | Unique Identification number from FCC and Industry Canada. |
|  | Medical Equipment<br><br>With respect to electric shock, fire and mechanical hazard only in accordance with UL. |
|  | Direct Current for products to be powered from DC supply. |
|  | Mark key symbol. |
|  | Speaker Symbol ( IEC 5080 symbol). |

| | |
|---|---|
|  | Transmitter Power ON / OFF (IEC 5010 symbol). |
|  | Audio head set (IEC 5077 symbol). |
|  | Fuse Symbol (IEC 5016 symbol). |
|  | Antenna Symbol (IEC 5039 symbol). |
|  | To identify a connector for a serial data connection.<br><br>Named as " J2 " on the Receiver back panel (IEC 5850 symbol). |
|  | To identify an output terminal when it is necessary to distinguish between inputs and outputs.<br><br>Named as "J1 "on the Receiver back panel (IEC 5035 symbol). |
|  | Signal Strength Indicator on receiver front panel. |
|  | Battery Symbol on Receiver front panel (ISO 0247 symbol). |
|  | Temperature limitations in which the transport package has to be kept and handled. |
|  | Humidity limitations in which the transport package has to be kept and handled. |

| | |
|---|---|
|  | Pressure limitations in which the transport package has to be kept and handled. |

NOTE: Mini-telemetry system is not made with natural rubber latex.

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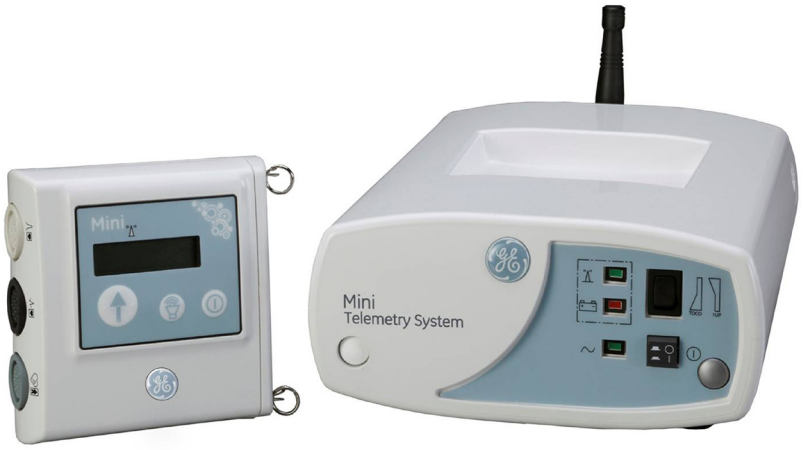
# Chapter 1: Product Description




## Product Definition

The Mini Telemetry System includes receiver and transmitter. It provides a wireless means of transmitting heart rate and uterine activity signals from an ambulatory[1] mother to a fetal or maternal/fetal monitor. The system operates with the following Corometrics brand monitors:

- 120 Series
- 170 Series
- 250 Series
- 250cx Series

The transmitter is also sold separately, it is compatible with 340 telemetry receiver. All the connections remain the same.

**NOTE:** The operator will identify fetal movements with the **MARK** button instead of the automatic fetal movement detection support of the fetal monitor system. The system monitors fetal heart rate through ultrasound doppler technology, ECG (FECG or MECG), and uterine activity (TOCO or IUPC) signals individually or in combination—depending on the available parameter in the fetal or maternal/ fetal monitor. Refer to your monitor's operation manual as needed.

## Indications for Use

The Mini Telemetry system is intended to transmit fetal heart rate and uterine activity signals from an ambulatory mother to a fetal or maternal fetal monitor during the ante partum period and during labor. The system allows ultrasound fetal heart rate, FECG, MECG and uterine activity signals to be monitored individually or in combination.

The Mini Telemetry system is intended for use under the direct supervision of a licensed healthcare practitioner in a defined coverage area.

The Mini Telemetry device is not intended to be operated in mobile vehicles including ambulances or other vehicles associated with health care facilities.

1 Walking/resting or on an emergency shifting process within hospitals.

## Product Features

The Mini Telemetry offers the following features:

- Battery operated transmitter which provides up to 12 hours[2] of continuous transmission when charged for a period of 4 hours.
- Low Battery indicator accompanied by an audio indicator which signals an impending low-battery condition.
- Transmitter headset which allows the patient or staff to hear the heartbeats detected ultrasonically for reassurance as well as to verify proper transducer placement.
- Signal strength indicator that verifies the strength of the radio transmission signal.
- Interchangeable Transducers: Transducers are quickly and easily interchangeable amongst the Mini Telemetry System and Corometrics brand monitors. Following is the list of monitors:
  - 120 Series: Transducers are interchangeable.[3]
  - 170 Series: Transducers are interchangeable.
  - 250 Series: Transducers are interchangeable.[3]
  - 250cx Series: Transducers are interchangeable.[3]
- Simultaneous monitoring of two heart rates (twins) when used with a monitor supporting parameters: Ultrasound FHR and FECG.
- Display to view the battery charge status, audio volume status and channel frequency.
- External power adaptor to charge the internal battery.
- Groove on the transmitter for cable management.
- In-built Mark key on the transmitter to transmit fetal movement information.
- Quick charge feature which provides up to 150 minutes of continuous transmission with just 30 minutes of charging.
- Can be used during laboring in water/showers.[4]

2 Use of the headset and the speakers will deplete the battery charge more rapidly.

3 Round connector cables are compatible whereas ECG rectangular connector cables are not compatible.

4 Refer to Warnings, Cautions and Notes section.

# Chapter 2: Safety

The information presented in this section is important for the safety of both the patient and operator and also serves to enhance equipment reliability. This chapter describes how the terms Danger, Warning, Caution, Important and Note are used throughout the manual. In addition, standard equipment symbols are defined.

## General Information

## General Use

If any equipment is cold to the touch or below ambient temperature, allow it to stabilize to ambient temperature before use.

To ensure patient safety, use only parts and accessories manufactured or recommended by GE Medical Systems Information Technologies. Parts and accessories used shall meet the requirements of IEC 60601-1.

Disposable devices are intended for single use only. They should not be reused.

Periodically and whenever the integrity of the equipment is in doubt, test all functions as indicated under the section “Chapter 4: Installation and Setup” on page 19.

Refer to the “Maternal/Fetal Monitoring Operator’s Manual” for information concerning the limitations of internal and external fetal heart rate monitoring techniques.

## Responsibility of the Manufacturer

GE Medical Systems Information Technologies (hereafter Information Technologies) is responsible for the effects on safety, reliability and performance if:

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

# Equipment Safety Information

The following table contains warnings for this manual. A Warning statement is used when the possibility of injury to the patient or the operator exists.

**WARNING**

Do not place Mini-telemetry Transmitter on Receiver's cavity while using Telemetry. There are chances of faulty/erratic parametric readings being displayed on the monitor.

**WARNING**

Periodically check for ECG QRS complex trace if the monitor has an option for displaying waveform. If random FHR / MHR / UA is observed on the strip chart paper /monitor display, please re-check the transducer position. If the base line noise of ECG trace is observed to be high, there are chances of faulty random FHR being displayed on the monitor.

**WARNING**

ACCIDENTAL SPILLS—In the event that fluids are accidentally spilled on the equipment, take the equipment out of operation and inspect for damage.

**WARNING**

CONDUCTIVE CONNECTIONS—Avoid making any conductive connections to applied parts (patient connection) which are likely to degrade safety.

**WARNING**

CONDUCTIVE PARTS—Ensure that the conductive parts of the lead electrodes and associated connectors do not contact other conductive parts including earth.

**WARNING**

DEFIBRILLATION—This equipment is not designed for use with defibrillators.

**WARNING**

ELECTRICAL SHOCK—To reduce the risk of electrical shock, do not remove equipment covers. Contact qualified personnel for servicing.

**WARNING**

ELECTROMAGNETIC INTERFERENCE—Be aware that strong electromagnetic fields may interfere with equipment operation. Interference prevents the clear reception of signals by the device. If the hospital is close to a strong transmitter such as TV, AM or FM radio, police or fire stations, a HAM radio operator, an airport, pager or cellular phone, their signals could be picked up as signals by the equipment. If you feel interference is affecting the equipment, contact your Service Representative to check the equipment in your environment.

**WARNING**

ELECTROSURGERY—The equipment is not designed for use with high-frequency surgical devices. In addition, measurements may be affected in the presence of strong electromagnetic sources such as electrosurgery equipment.

**WARNING**

EXPLOSION HAZARD—Do not use this equipment in the presence of flammable anesthetics or inside an oxygen tent.

**WARNING**

FREQUENCY ALLOCATION- Frequencies of the receiver and transmitter have to be allocated. Refer to Service Manual for the list of channel numbers.

**WARNING**

INSTRUCTIONS—For continued and safe use of this equipment, it is necessary to follow all listed instructions. However, the instructions provided in this manual in no way supersede established medical procedures concerning patient care. The device does not replace observation and evaluation of the patient, at regular intervals, by a qualified care provider who will make diagnoses and decide on treatments and interventions.

**WARNING**

INTERFACING OTHER EQUIPMENT—Monitoring equipment must be interfaced with other types of medical equipment by qualified biomedical engineering personnel. Be certain to consult manufacturers' specifications to maintain safe operation.

**WARNING**

BATTERY- Check battery low audio alarm and timely recharge the battery.

**WARNING**

ACCESSORY- Use GE recommended accessories/power adaptor as listed in the accessory list.

**WARNING**

RECEIVER PLACEMENT- Receiver has to be placed on flat surface.

**WARNING**

TRANSDUCER CABLES- Remove transducer cables while transmitter is placed on the receiver.

**WARNING**

CLEANING AGENTS- Use recommended cleaning agents.

**WARNING**

MONITORING THROUGH CENTRAL NURSING STATION - Periodic monitoring of the mother has to be done while monitoring through central nursing station.

**WARNING**

INTENDED USE- Intended use of telemetry is for ambulating mother.

**WARNING**

SPEAKER- Do not block speaker vents.

**WARNING**

LINE ISOLATION MONITOR TRANSIENTS—Line isolation monitor transients may resemble actual cardiac waveforms and thus cause incorrect heart rate determination and alarm activation (or inhibition).

**WARNING**
MRI USE—Do not use the equipment during MRI scanning, conducted current could potentially cause burns.

**WARNING**
Do not charge transmitter during shower/laboring in water.

**WARNING**
SHOWER- Keep the transmitter away from water source.

**WARNING**

LEAKAGE CURRENT TEST—The interconnection of auxiliary equipment with this device may increase the total leakage current. When interfacing with other equipment, a test for leakage current must be performed by qualified biomedical engineering personnel before using with patients. Serious injury or death could result if the leakage current exceeds applicable standards. The use of accessory equipment not complying with the equivalent safety requirements of this equipment may lead to a reduced level of safety of the resulting system. Consideration relating to the choice shall include: use of the accessory in the patient vicinity and evidence that the safety certification of the accessory has been performed in accordance with the appropriate IEC 60601-1 harmonized national standard.

**WARNING**
PATIENT CABLES AND LEADWIRES—Do not use patient cables and electrode leads that permit direct connection to electrical sources. Use only "safety" cables and lead wires . Use of non-safety patient cables and lead wires creates risk of inappropriate electrical connection which may cause patient shock or death.

**WARNING**
PACEMAKER PATIENTS—Rate meters may continue to count the pacemaker rate during occurrences of cardiac arrest or some arrhythmias. Do not rely entirely upon rate meter alarms. Keep pacemaker patients under close surveillance. Refer to your monitor's operation manual for disclosure of the pacemaker pulse rejection capability.

**WARNING**
SIMULTANEOUS DEVICES—Do not simultaneously connect more than one device that uses electrodes to detect ECG and/or respiration to the same patient. Use of more than one device in this manner may cause improper operation of one or more of the devices.

**WARNING**
STRANGULATION—Make sure all patient cables, leadwires and tubing are positioned away from the patient's head to minimize the risk of accidental strangulation.

**WARNING**
Not suggested to connect the transducer to mother while transmitter is placed on receiver/and charging, as it may result in accidental drop of the transmitter from the receivers' location

**WARNING**
LABORING IN WATER— Ensure that Mini Telemetry transmitter (excluding transducer) does not come in direct contact with water. Failure to do so may result in electrical shock hazard.

**WARNING**
EQUIPMENT MODIFICATION: No modification of this equipment is allowed. Do not modify this equipment without authorization of the manufacturer. If this equipment is modified, appropriate inspection and testing must be conducted to ensure continued safe use of the equipment.

| | |
|---|---|
|  | **WARNING**<br>RECEIVER CONNECTORS: Operator shall not touch the J1 and J2 connector at the back plate of the Receiver and the patient simultaneously |
|  | **WARNING**<br>INTERFERENCE: The use of TENS (Transcutaneous Electrical Nerve Stimulation) used for pain relief in labor can interfere with fetal/maternal monitoring with Coro monitors. |
|  | **WARNING**<br>APPLIED PARTS: Audio headset and the transducer cables can also come in contact with the patient other than the labeled applied parts. These are classified as Type B. |
|  | **WARNING**<br>BATTERY: Only GE authorized / recommended battery pack shall be used to avoid wrong mounting of battery, dangers related to polarity reversal, short circuit or flames. |

The following table contains cautions for this manual. A Caution statement is used when the possibility of damage to the equipment exists.

| | |
|---|---|
|  | **CAUTION**<br>Mini Telemetry services shall be done only by authorized service personnel. |
|  | **CAUTION**<br>ANNUAL SERVICING—For continued safety and performance of the equipment, it is recommended that the calibration, accuracy and electrical safety of the equipment be verified on an annual basis by an Information Technologies Service Representative. |
|  | **CAUTION**<br>DAILY INSPECTION—It is essential that the equipment and accessories be inspected prior to every use. |
|  | **CAUTION**<br>ENVIRONMENT—The performance of the equipment has not been tested in certain areas, such as x-ray and imaging suites. The equipment is not recommended for use in these environments. |
|  | **CAUTION**<br>PERFORMANCE—Report all problems experienced with the equipment. If the equipment is not working properly, contact your Service Representative for service. The equipment should not be used if it is not working properly. |
|  | **CAUTION**<br>Check the health of the line voltage. Few hospital sites may find noise in FECG/MECG when used with power adaptor. |
|  | **CAUTION**<br>Periodic check needs to be done for mother's parameter by the caregiver to ensure uninterrupted monitoring. |
|  | **CAUTION**<br>Avoid over charging the battery or shorting the battery terminals. |
|  | **CAUTION**<br>STANDARD MAINTENANCE: Standard maintenance must be performed by authorized service personnel for the lifetime of the product (7 years). |
|  | **CAUTION**<br>ULTRASOUND TRANSDUCER: Visually inspect the ultrasound transducer on a regular basis to ensure there are no cracks or damages around the transducer face, cable, strain relief and connector pins. |

# FCC Information (USA)

## FCC Rules Compliance

| Telemetry | FCC Rules Compliance |
|---|---|
| Mini Telemetry System | FCC 47 CFR Part 95 |

This equipment complies with the FCC rules shown in above Table. Operation is subject to the condition that this device does not cause harmful interference.

## FCC RF Exposure Compliance

**Important :** RF EXPOSURE—To comply with FCC RF exposure compliance requirements, users should avoid grasping the antenna for any extended period of time while the device is in operation.

## FCC Service Information

Servicing the radio frequency transmitter and receiver sections of the Mini Telemetry System requires an FCC General Radio Telephone License.

Any changes or modifications made to the Mini Telemetry System that are not expressly approved by Information Technologies, could void the user's authority to operate this equipment.

## Wireless Medical Telemetry Service (USA)

This section applies to Mini Telemetry Systems used in USA only.

**IMPORTANT:**

FREQUENCY COORDINATOR—Operation of a Mini Telemetry System requires prior coordination with a frequency coordinator designated by the FCC for the Wireless Medical Telemetry Service.

In June 2000, the FCC allocated new spectrum and established rules for Wireless Medical Telemetry Service (WMTS) allowing potentially life-critical equipment to operate on an interference-protected basis.

The frequency allocation for WMTS provides spectrum where the equipment can operate on a primary basis increasing the reliability of this important service. The FCC allocated 14 MHz of spectrum for use by medical telemetry equipment in the 608–614 MHz, 1395–1400 MHz and 1429–1432 MHz bands. This allocation was based on a needs assessment conducted by the American Hospital Association (AHA).

The 608–614 MHz band, which corresponds to TV channel 37 had been reserved for radio astronomy uses, so this action elevates medical telemetry to a co-primary status with radio astronomy in this band. The 1395–1400 MHz and 1429–1432 MHz bands were government bands reallocated for non-government use.

WMTS is designated as one of the Citizen's Band Services in Part 95 of the rules and licensed by rule to eliminate the possible costs and delays to obtain individual operator's licenses. The medical telemetry equipment is

authorized under the certification procedure in Part 2 of the rules. One or more frequency coordinators maintain a database of all equipment used in conjunction with WMTS.

For more information visit http://www.fcc.gov

## Industry Canada Information

The Mini Telemetry System complies with Industry Canada RSS-210 .

### Transmitter Antenna

The Mini Telemetry Transmitter has been designed to operate with an antenna having a maximum gain of 6 dBi. Antenna having a higher gain is strictly prohibited as per regulations of Industry Canada. The required antenna impedance is 50 Ω.

### Interference

Mini-telemetry System operation is subject to the following two conditions:

1. This device may not cause interference.

2. This device must accept any interference, including interference that may cause undesired operation of the device.

### Wireless Medical Telemetry Service

The Mini Telemetry System is only permitted for installation in hospitals and health care facilities. Devices shall not be operated in mobile vehicles (even ambulances and other vehicles associated with health care facilities). The installer/user of this device shall ensure that it is at least 80 km from the Penticton radio astronomy station (British Columbia latitude: 49° 19’ 12” N: longitude: 118° 59’ 56” W). For medical telemetry systems not meeting this 80 km separation (e.g. the Okinagan valley, British Columbia) the installer/user must coordinate with and obtain the written concurrence of the Director of the Penticton radio astronomy station before the equipment can be installed or operated. The Penticton contact  is Tel: 250-493-2277/fax: 250-493-7767.

## CE Marking Information Compliance CE

The Mini Telemetry System bears CE mark CE-0459 indicating conformity with the provisions of the Council Directive 93/42/EEC concerning medical devices and fulfills the essential requirements of Annex I of this directive. The product is radio-interference protection class A in accordance with EN 55011

The country of manufacture can be found on the equipment labeling.

The product complies with the requirements of the standard EN 60601-1-2 “Medical Electrical Equipment - Part 1-2: General requirements for safety - Collateral standard: Electromagnetic compatibility - Requirement and tests.”

The safety and effectiveness of this device has been verified against previously distributed devices. Although all standards applicable to presently marketed devices may not be appropriate for prior devices (i.e. electromagnetic compatibility standards),this device will not impair the safe and effective use of those previously distributed devices.

## R&TTE directive

The Mini Telemetry transmitter and receiver system conform to the R&TTE Directive 1999/5/EC.

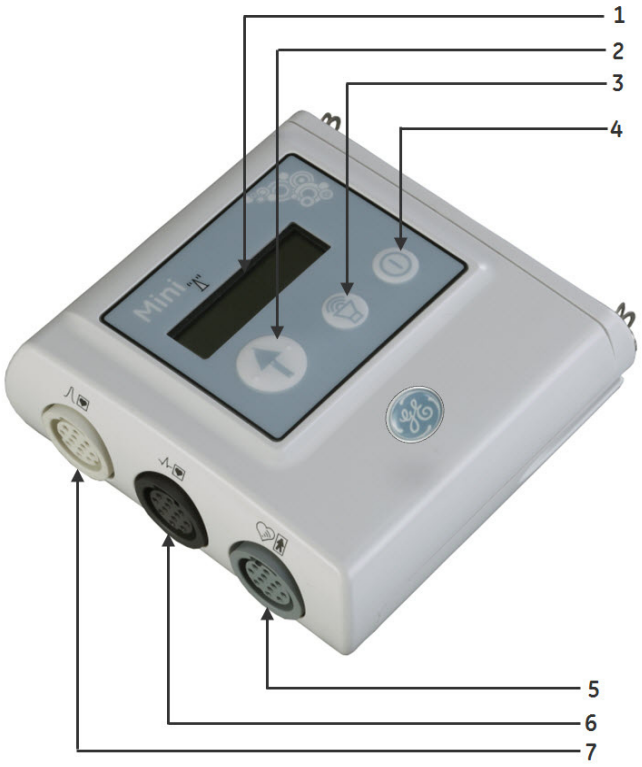
# Chapter 3: Mini Telemetry Components

This section describes all controls, indicators and connectors on a Mini Telemetry System.

## Transmitter

### Oblique View

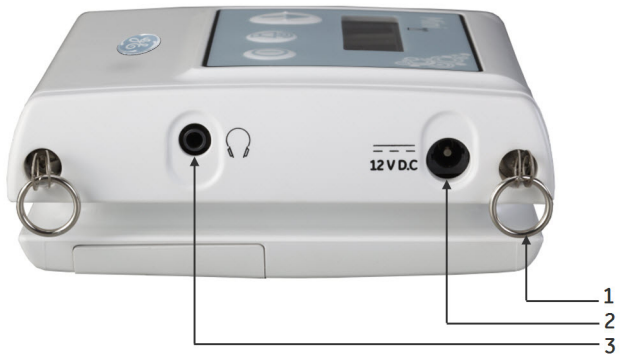
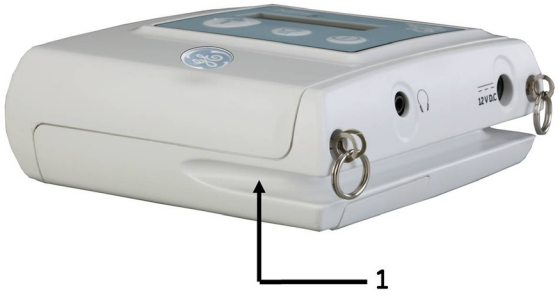
The following table describes the components of the Transmitter front panel:

| Component | Description |
|---|---|
|  | 1. **Display:**<br>A display to show the charge status of battery, volume, connectors connectivity, Channel number and mark key.<br>2. **Mark Key:**<br>When the Mark key is pressed, one of the following mark prints (depending on the type and/or setting of the Corometrics monitor) on the strip chart paper of Corometrics monitor:<br>• ⬆ : The event marker is commonly used to record an "event." This mark is available on all Corometrics brand monitors.<br>• FM⬆ : The fetal movement marker (default setting) is commonly used as an indication that the mother has perceived fetal movement. (Refer to your monitor's operator's manual to learn if your monitor supports this feature. Refer to your monitor's service manual for information about enabling the option.)<br>The event marker ⬆ is displayed on the transmitter display as long as the Mark key is pressed.<br>**NOTE**: **Mark** key functionality will work only if atleast one transducer is connected to the transmitter. |

| Component | Description |
|---|---|
| | 3. **Volume Key:**<br>If ultrasound transducer is connected, this key controls the volume of fetal heartbeat, heard on the speaker/ headphone. Multiple presses of this key will cycle the volume from mute to 5 volume levels.<br>4. **Power Key:**<br>Pressing the key once turns on the transmitter. Pressing the key for more than 2 seconds turns off the transmitter.<br>5. **Ultrasound Input:**<br>Connect a Corometrics 5700 Series pulsed Doppler ultrasound transducer to this light grey receptacle.<br>6. **ECG Input:**<br>Connect an FECG cable/legplate or MECG cable plug to this grey receptacle. This connector is compatible with all round-connector FECG/MECG patient cables used with Corometrics-brand monitors.<br>7. **UA Input:**<br>Connect a tocotransducer or IUPC transducer connector to this white receptacle. Contact your Sales Representative about compatibility. |

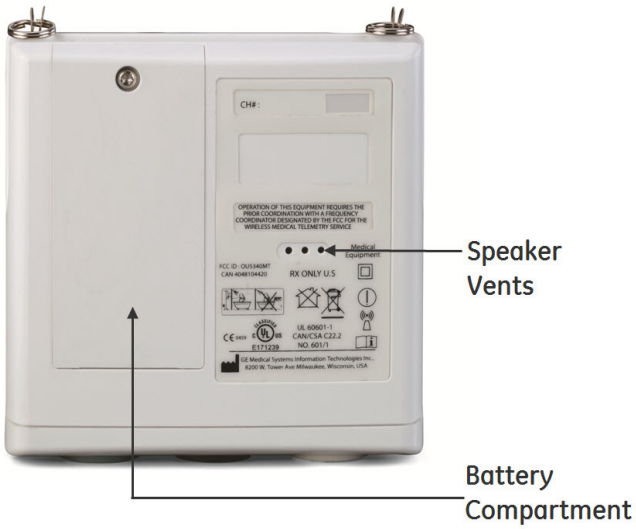
## Side View

The following table describes the components of the Transmitter side panel:

| Component | Description |
|---|---|
|  | 1. **O ring:**<br><br>Ring for attaching the carrying strap.<br><br>2. **DC in-let Connector:**<br><br>Connect the GE recommended power adaptor to this connector for charging the transmitter battery.<br><br>**WARNING:**<br><br>Always use only GE recommended power adaptor.<br><br>3. **Headset Connector:**<br><br>Connect the headset to this receptacle to listen to the fetal heart rate derived from ultrasound. |
|  | The transmitter has an option to wind transducer cables on the enclosure as a part of cable management.<br><br>1. A groove provided on the sides of transmitter to wind the long cables, especially used while mother is ambulating. |

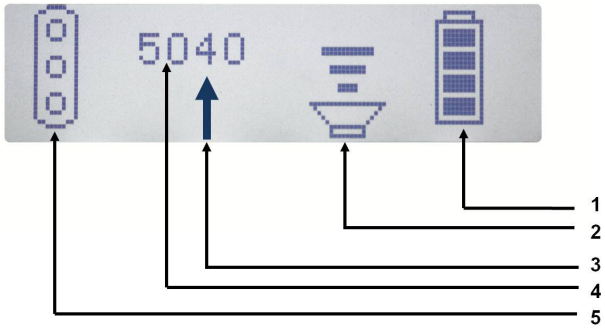
## Battery Compartment

The following table describes the components of the Transmitter battery compartment:

| Component | Description |
|---|---|
|  | The battery compartment holds 1 Lithium ion battery. Only authorized, trained personal shall open the battery compartment for any service related actions.<br>**CAUTION**<br>BATTERY STRENGTH—The transmitter emits an audible alarm when the transmitter battery is low. The onset of audio alarm indicates that, unless the transmitter battery is recharged, the transmitter will switch off in approximately 5 minutes. If the transmitter battery is not recharged, the alarm continues until the transmitter switches off.<br>**WARNING**<br>Do not block the speaker vents. |

## Display GUI

The following table describes the Transmitter display GUI:

| Figure | Description |
|---|---|
|  | **1. Battery Charge Status:**<br><br>Indicates battery level and charge status. Indications continuously move while the battery is being charged.<br><br>**2. Speaker Volume Status:**<br><br>5 levels of volume and mute are indicated.<br><br>**3. Mark Indicator:**<br><br>Arrow mark is visible for an additional second after the Mark key is released.<br><br>**4. Channel Number:**<br><br>Channel number of the transmitter is displayed. Refer to the frequency chart in the service manual.<br><br>**5. Transducer Connection Status:**<br><br>Indicates the connection status of the parametric connectors. Filled circle indicates connector plugged in, empty circle indicates connector not plugged in. |

## Display Indications

The following table shows the transmitter display indications:

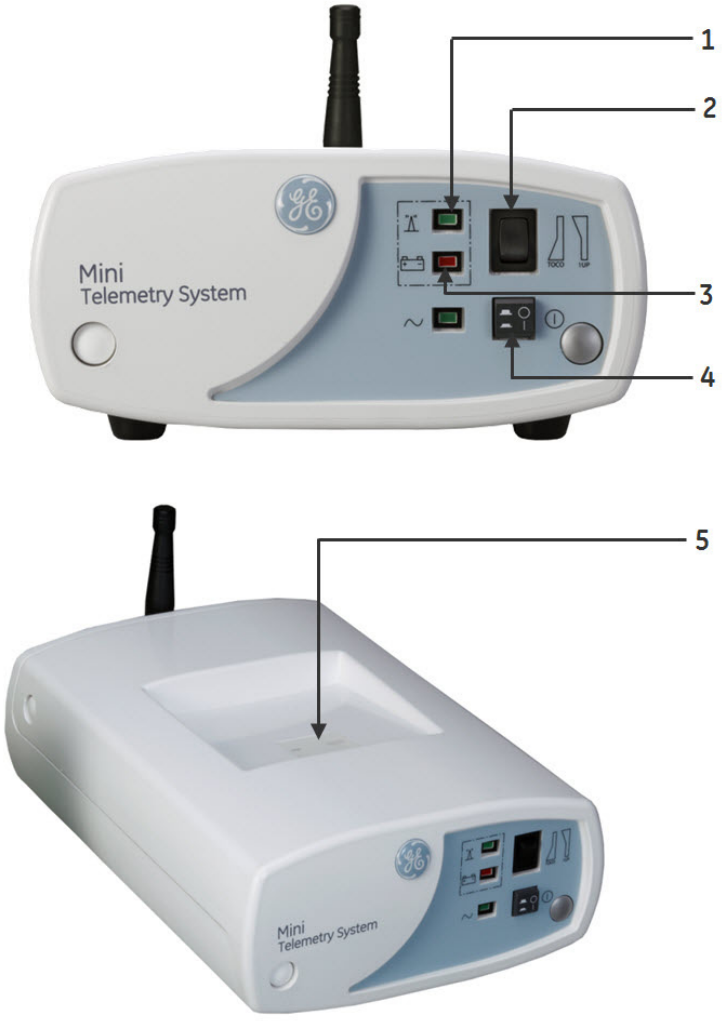
| Indication | Description |
|---|---|
|  | Indicates speaker is mute. |
|  | Indicates battery error. |
|  | Indicates radio module error. |

The transmitter unit generates three distinct audio alerts in case of low battery conditions. A short beep alarm is generated when the battery charge goes below the low-charge limit. A long beep alarm is generated when the battery charge level is critical and immediate recharging is required. The alarm will be generated at a faster rate when the battery run-time left is about one minute until the battery is completely depleted and the unit automatically turns off. Alarm tones will be deactivated when the Mini Telemetry transmitter is connected to the external power adaptor for charging.

# Receiver

## Receiver Front Panel

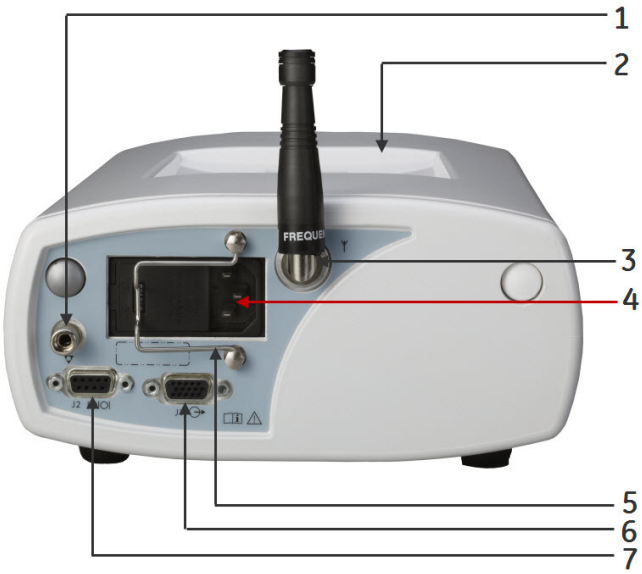
The following table describes the components of the Receiver front panel:

| Component | Description |
|---|---|
|  | 1. **Signal Indicator**<br>The green Signal indicator lights continuously when the receiver is accepting radio frequency signals from the transmitter. The Signal indicator flashes if the signal strength is weak or marginal.<br>2. **UA Mode Selector :**<br>This switch communicates the active uterine activity mode to the fetal or maternal/fetal monitor:<br>• When monitoring with a tocotransducer, set the switch to the TOCO position.<br>• When monitoring with an intrauterine pressure catheter, set the switch to the IUP position.<br>3. **Low Battery Indicator**<br>The red battery indicator shows that the transmitter's battery is low.<br>4. **Power Switch**<br>The Power switch turns the receiver on (I) and off (O). When it is set to on, the green Power indicator illuminates. |

| Component | Description |
|---|---|
| | 5. **Channel Number:**<br>The channel number is the customer-designated frequency of the receiver. For each telemetry system, the channel number of the receiver must be identical to the channel number of the transmitter. Also, if you have more than one telemetry system, or other RF devices, each system must have a unique channel number. |

## Receiver Rear Panel

The following table describes the components of the Receiver rear panel:

| Component | Description |
|---|---|
|  | 1. **Equipotential Lug:**<br>Binding post terminal, which is directly connected to chassis, for use as an equipotentiality connector.<br>2. **Transmitter Placeholder:**<br>Placeholder provided for the transmitter.<br>3. **Antenna Connector:**<br>Twist-on connector for attaching the receiver antenna.<br>4. **AC Line Connector and Fuseholder Module:**<br>This module houses the AC-line input connector and the main fuses for the receiver:<br>• 100-120 VAC: requires two, 0.25 A slow-blow fuses.<br>• 220-240 VAC: requires two, 0.25 A slow-blow fuses. |

| Component | Description |
|---|---|
| | 5. **Power cord holder clamp:**<br><br>To hold the power cord**.**<br><br>6. **Auxiliary Output Connector**<br><br>This connector outputs the US, ECG, UA and Mark signals acquired by telemetry to a compatible fetal/fetal-maternal Monitor. See “Connecting the Receiver and Monitor” on page 19 for complete interconnection details.<br><br>As soon as any telemetry mode is detected, the front panel of the compatible fetal/fetal-maternal monitor is disabled and all front panel inputs are ignored. In other words, telemetry and monitor modes cannot be mixed and matched, you must use either telemetry or direct monitoring only.<br><br>For proper operation with 120, 170, 250 or 250cx Series monitors, disconnect all transducers from the front panel of the monitor.<br><br>7. **Programming Connector**<br><br>The channel number of receiver can be changed through the transmitter using programming connector. For more details, refer to Appendix B.2 of Mini-telemetry service manual. |

# Chapter 4: Installation and Setup

This section contains step-by-step instructions for connecting and testing your Mini Telemetry System.

**IMPORTANT**

CHANNEL NUMBERS—Ensure that the receiver and transmitter are operating on the same frequency, the channel numbers must be identical. The channel number label is located on the top of the receiver and on the back panel of the transmitter.

If you have more than one Telemetry system, make sure that each transmitter/receiver pair operates on a unique frequency.

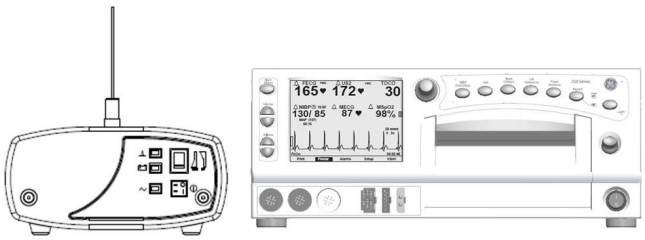
## Connecting the Receiver and Monitor

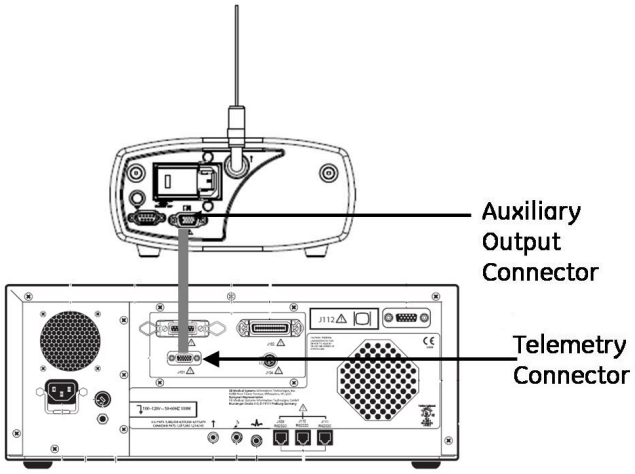
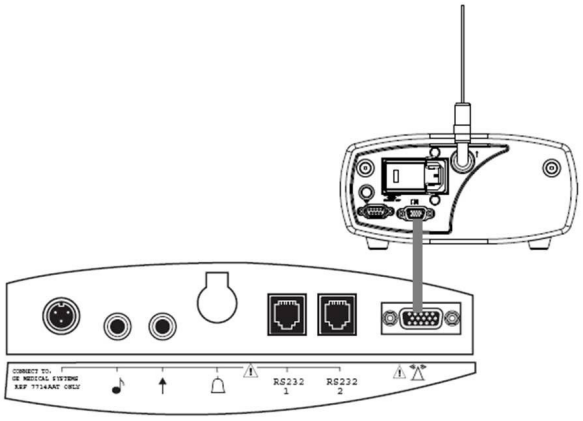
There is a single way of interconnection method between Telemetry receiver and fetal or maternal/fetal monitor. Check your monitor model number prior to making any connections.

Models 126, 128, 129, 171, 172, 173, 174, 256, 259, 256cx, 259cx

**IMPORTANT:** 120 SERIES COMMUNICATIONS OPTION — A 120 series monitor requires a communications Board in order to interface to a Mini Telemetry system. If your monitor does not have this option, an upgrade kit is available as cat. no. (REF) 1559BAO. Contact your service representative for more information.

Perform the following steps to connect the receiver and monitor:

| Step | Instructions |
|---|---|
| | **Instructions to position the Receiver:**<br>1. Turn off both the monitor and the receiver. |
|  | 2. Place the receiver on the cart, or on top of, or near, the monitor.<br>Note: Model 250/250cx shown. |

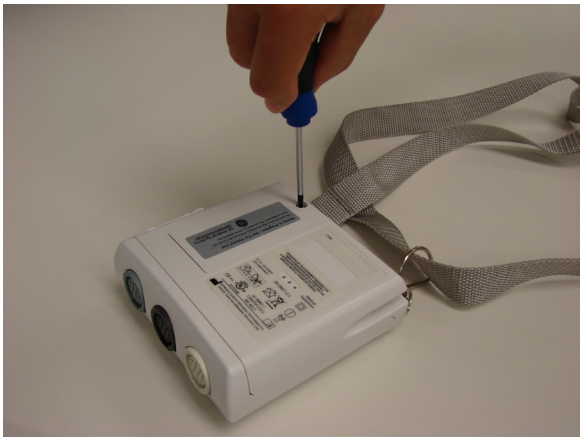
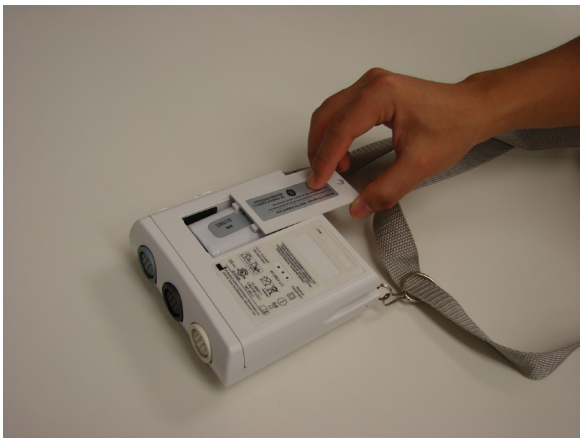
| Step | Instructions |
|---|---|
|  | **Instructions to attach the Receiver Antenna:**<br>1. Insert the receiver antenna into the antenna connector on the receiver rear panel as shown in the figure. Rotate the attachment collar in a clockwise direction until snug.<br><br>**NOTE:** A Remote Antenna Bracket, cat. no. (REF) 1441AAO, is available for attaching the antenna when the receiver will be enclosed in a cart or cabinet. Refer to the Installation Instructions, part no. (REF) 14153AA, included with the bracket or contact your Biomedical Engineering Department for assistance. To attach the antenna to the BNC connector on the bracket, rotate the antenna attachment collar in a clockwise direction until snug. |
|  | **Instructions to attach the Monitor Interconnect Cable to a 120, 250 or 250cx Series Monitor:**<br>1. Plug one end of the interconnection cable into the Auxiliary Output connector on the receiver rear panel.<br><br>2. Plug the other end into J101 telemetry connector on the rear panel of the monitor. |
|  | **Instructions to attach the Monitor Interconnect Cable to a 170 Series Monitor:**<br>1. Connect to the receptacle labeled  <br><br>**Note:** Use 1563AAO interconnect cable. |

# Setting up the Transmitter

## Connecting Battery to Circuit Board

**NOTE**: The battery of Mini-telemetry transmitter is shipped without being connected to the circuit board. Before using the telemetry transmitter, ensure that battery is connected to the circuit board.

**SENSITIVE TO ELECTROSTATIC DISCHARGE CAUTION**
This procedure involves handling of ESD sensitive parts. ESD control guidelines must be followed during this procedure to ensure that static charges are safely conducted to the ground and not through the sensitive device, to prevent damage to the equipment.

| Step | Instructions |
|---|---|
|  | **Instructions to connect battery to circuit board:**<br><br>1. Use a T10 Torx screwdriver to remove the battery compartment screw and washer. |
|  | 2. Slide the battery cover out. |

| Step | Instructions |
|---|---|
|  | 3. Connect the battery to the Battery Connector on the circuit board. Perform step 2 and 1 in reverse order to complete the battery installation. |

## Connecting Power Adaptor

Perform the following steps to connect the power adaptor.

| Step | Instructions |
|---|---|
|  | **Instructions to connect the power adaptor:**<br>1. Turn off the transmitter. |
| | 2. Locate the DC inlet jack and connect the DC adaptor and plug the adaptor to AC mains socket.<br>3. Switch on the AC mains with specified AC voltage indicated in the specifications. Charge the internal battery for 4hrs before using the Transmitter. Check for battery charge/full indication on the display.<br>IMPORTANT : Power Adaptor —Use only the appropriate country specific plug attachments to the Adaptor. The Mini Telemetry system's Adaptor comes with global plugin options. |

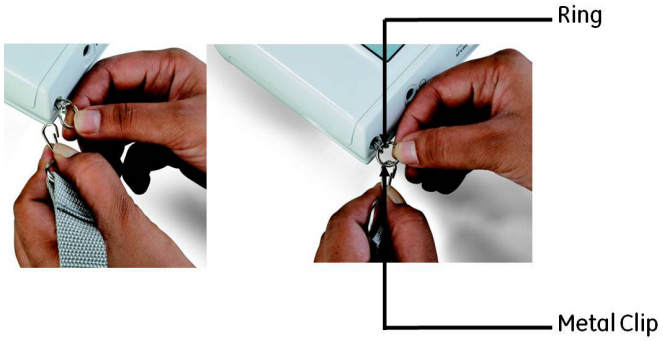
## Replacing the Plug Attachments

Perform the following steps to replace the plug attachments.

| Step | Instructions |
|---|---|
|  1 2 | **Instructions to replace the plug attachment:**<br>1. Press and hold the **Release** button as shown in figure 1 and rotate the plug attachment anti-clockwise to release it from the adaptor.<br>2. Place the desired plug attachment on the adaptor. Press and hold the **Release** button as shown in figure 2 and rotate clockwise to attach the plug to the adaptor. |

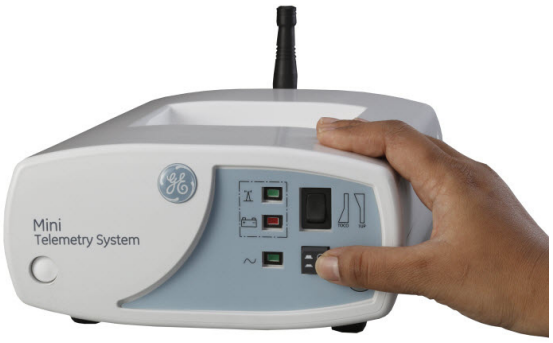
## Attaching the Carrying Strap

Perform the following steps to attach the carrying strap.

| Step | Instructions |
|---|---|
|  1 2 | **Instructions to attach the carrying strap:**<br>1. Secure the metal clips at each end of the carrying strap to the belt attachment loops on each side of the transmitter as shown in figures 1 and 2.<br>2. Adjust the strap length as per mother's comfort for easy carrying. |

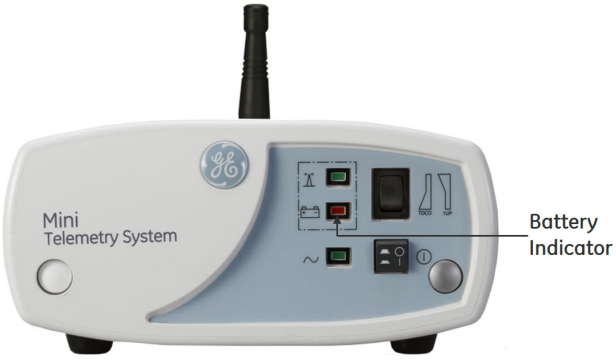
# Performing a Functional Checkout

## Initial Conditions

| Step | Instructions |
|---|---|
|  | Connect the receiver to the monitor as described in "Connecting the Receiver and Monitor" section earlier in this chapter.<br>Turn on the transmitter, receiver and monitor attached to the receiver. |

## Testing the Radio Frequency

Perform the following steps to test the radio frequency.

| Step | Instructions |
|---|---|
|  | **Instructions to Test the Radio Frequency:**<br>1. Check the status of the Signal indicator  on the receiver:<br>• **Continuous Green:** Indicates that the receiver is accepting the radio frequency signals from the transmitter and the signal strength is good.<br>• **Flashing Green**: Indicates the signal strength is weak or marginal. |
|  | 2. Check the status of the Battery indicator  on the receiver:<br>• **Off** : The transmitter battery is adequately charged.<br>• **Blinking/Continuous Red:** The transmitter battery is low and should be recharged before further patient use. |

## Testing the Ultrasound Functions

**NOTE**: TRANSDUCER TYPE—Use only Corometrics 5700 Series Ultrasound Transducers with the Mini Telemetry System.

Perform the following steps to test the ultrasound functions:

| Step | Instructions |
|---|---|
|  | **Instructions to Test Ultrasound Functions:**<br>1. Plug an ultrasound transducer into the Ultrasound connector on the transmitter as shown in the figure.<br>2. Verify the following:<br>• Ultrasound transducer connector status indication is reflected on the transmitter display.<br>• FHR value on the monitor shows "– – –".<br>• Telemetry connected symbol will be printed on the strip chart paper. Additionally, Telemetry symbol will be displayed on Corometrics 120, 250 and 250cx series monitor.<br>If "_ _ _" is not displayed on the monitor, ensure that the corresponding interconnection cable is firmly attached to both the monitor and the receiver.<br>3. Use your finger to gently rub the ultrasound transducer surface in a rhythmic manner to simulate a FHR. Try to maintain a steady rate and verify the following on the monitor: (Alternative method – place the transducer in the palm of your hand and rhythmically tap the top of your hand to simulate heartbeat.)<br>• The corresponding FHR display value responds to the rubbing.<br>• The corresponding FHR heartbeat indicator responds to the input.<br>• The ultrasound audio tones are synchronous with the transducer stroking. |

| Step | Instructions |
|---|---|
|  | 4. Plug the headset into the transmitter's headset connector 🎧<br><br>5. Rub the face of the ultrasound transducer. Verify that you hear ultrasound audio tones from both sides of the headset or in the internal speakers (if head set is not connected) |

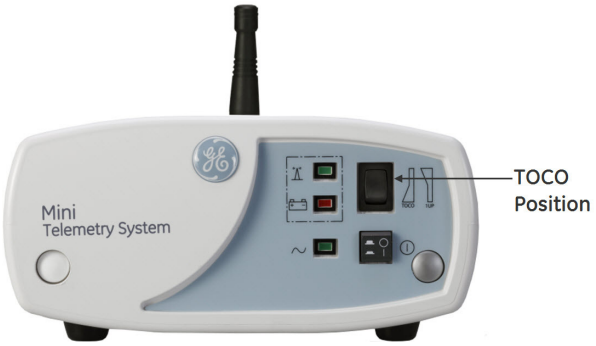
## Testing the ECG Functions

Perform the following steps to test the ECG functions.

| Step | Instructions |
|---|---|
|  | **Instructions to test the ECG functions:**<br><br>1. Plug an ECG transducer into the ECG connector on the transmitter as shown in the figure.<br><br>2. Verify the following on the monitor:<br>• ECG transducer connector status indication is reflected on the transmitter display.<br>• Telemetry connected symbol will be printed on the strip chart paper. Additionally, Telemetry symbol will be displayed on Corometrics 120, 250 and 250cx series monitor. |

## Testing the UA Functions

Perform the following steps to test the UA functions.

| Step | Instructions |
|---|---|
|  | **Instructions to test UA functions:**<br>1. Place the receiver's UA Mode Selector switch in the TOCO position.<br>**IMPORTANT :**<br>TRIMLINE TOCOTRANSDUCERS—If the monitor is on when you connect or re-connect a Trimline Tocotransducer to the UA connector, you must wait at least 10 seconds before pressing the UA Reference button. If the monitor is off, you must wait at least 10 seconds from the time the monitor is powered on. |
|  | 2. Plug a tocotransducer into the transmitter's UA connector as shown in the figure. Verify that,<br>• UA transducer connector status indication is reflected on the transmitter display.<br>• Telemetry connected symbol will be printed on the strip chart paper. Additionally, Telemetry symbol will be displayed on Corometrics 120, 250 and 250cx series monitor.<br>• An arbitrary pressure value is displayed on the monitor.<br>**IMPORTANT:**<br>DEFAULT REFERENCE VALUE—Most monitors have a default UA reference of 10 relative units. Take into consideration that newer model monitor's can be configured to store a custom default value.<br>3. Press the monitor's UA Reference button to set the UA value to 10 relative units. Verify that Toco value on the monitor display shows 10 relative units. |

| Step | Instructions |
|---|---|
| | 4. Apply gentle pressure to the tocotransducer pressure sensing button and verify that the monitor (display or uterine activity trace) responds to the pressure input. Increasing force should produce an increasing value and vice versa. If no pressure changes are recorded, ensure that the corresponding interconnection cable is firmly attached to both the monitor and the receiver.<br><br>NOTE: Refer respective operator manual of the fetal monitor. |
| | 5. This step applies to monitors which support IUP monitoring. Place the receiver's UA Mode Selector switch in the IUP position. Verify the following on the monitor:<br><br>• **Corometrics 120, 250, 250cx series monito**r: "IUP" will be displayed on the monitor as the UA mode.<br>• **Corometrics 170 series monitor**: Turn on the strip chart recorder and check that the "IUP" annotation is printed on the paper.<br><br>**NOTE:** Place the UA Mode Selector switch back in the TOCO position unless you plan to monitor with an IUPC. |

## Testing the Event Marker Function

Perform the following steps to test the event marker function.

| Step | Instructions |
|---|---|
| | **Instructions to test the event marker function:**<br>1. Connect any transducer to the Mini-telemetry transmitter. Turn on the monitor's strip chart recorder.<br><br>**NOTE**: **Mark** key functionality will work only if atleast one transducer is connected to the transmitter. |
|  | 2. Press the **Mark** key on the transmitter for at least one second. Verify that an appropriate mark is printed on the paper and ⬆ appears on the transmitter display.<br><br>**NOTE**: The settings for the mark should to be done in the monitor.<br>• ⬆: This annotation is commonly used to record an event. This mark is available on all Corometrics-brand monitors.<br>• FM⬆: This annotation is commonly used as an indication that the mother has perceived fetal movement. (Refer to the operator's manual for your monitor to learn if your monitor supports this feature. Refer to the service manual of your monitor for information about enabling the option.) |

## Testing the Environment

Decide on which areas of your facility will be used for ambulatory monitoring. Test each location separately to rule out rooms that are restricted due to solid concrete walls, metal structures blocking signal transmission. Biomedical engineer or installation team will identify and manage distance measurements to ensure optimal signal clarity.

# Monitoring via Telemetry

This section provides a brief overview of telemetry monitoring procedures. Refer to the "Maternal/Fetal Monitoring Operator's Manual" for patient application information. Also refer to your monitor's operator manual.

## Suggestions for Ambulatory Monitoring

**IMPORTANT :**

DESIGNATED AREAS—Show the patient the areas that are within signal range and where signal reception is clear. The designated area is determined at the time of installation.

Following are the suggestions for ambulatory monitoring:

1. Instruct the patient to wear the transmitter with the enclosure faced towards the receiver when possible.

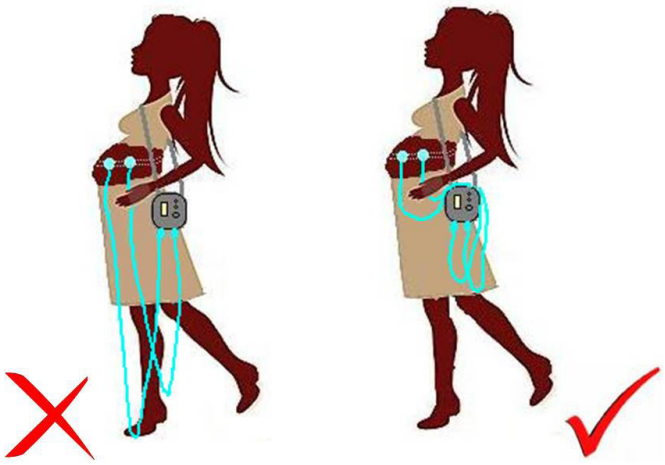
2. Adjust the carrying strap to a comfortable length.

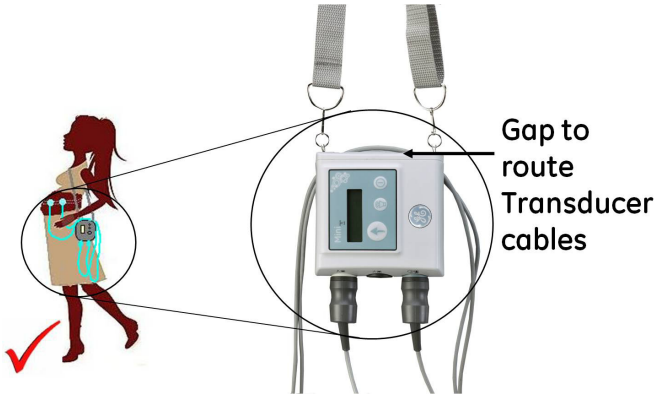
3. Encourage the patient to walk in a smooth, gliding motion. It is preferable to slide feet instead of moving quickly which may cause bouncing and artifact.

4. Instruct the patient, following each fetal movement, to listen via the headset or speaker, for continued "pickup" of fetal heart rate tones.

**NOTE**: Transducers with short cables are available. Contact your Information Technologies Sales representative

Perform the following precautionary measures during ambulatory monitoring:

| Illustration | Description |
|---|---|
|  | 1. Make sure the transducer cables are not hanging loosely, the patient is in danger of tripping over the cables. |

| Illustration | Description |
|---|---|
|  | 2. Shorten the length of the transducer cables by winding it around the transmitter as seen in the figure to avoid tripping. |
|  | 3. For additional transducer cable management use the velcro strips provided to arrest the transducer cables as shown in the figure. |

## Monitoring Reminders

### General

- Use the correct interconnection method according to your monitor model. See page 19.
- Remember to apply power to all three devices: monitor, receiver and transmitter.
- Check that each interconnection cable is firmly attached to both the receiver and the monitor.
- As soon as any telemetry mode is detected, the front panel of the 250 or 170 Series Monitor is disabled and all front panel inputs are ignored. In other words, telemetry and monitor modes cannot be “mixed and matched”, you must use telemetry only or direct monitoring only.

**IMPORTANT :**

170 SERIES—For proper operation with a 170 Series Monitor, disconnect all transducers from the front panel of the monitor.

### Ultrasound

- Use only Corometrics 5700 Series ultrasound transducers with a Mini Telemetry System.
- Remind the patient to use the headset / speaker to check for continual pickup of the fetal heart rate signal following each fetal movement.

### FECG

- You may need to tape the transducer cable to the patient to prevent excessive tension on the legplate or attachment pad.
- Though it is not suggested to use FECG during ambulation, the recommended position for the legplate is on top of the upper thigh instead of the inner thigh. This facilitates walking and minimizes fluid contacting the legplate.

### Tocotransducer

- Remember to place the receiver's UA Mode Selector switch in the TOCO position.
- When connecting or re-connecting a Corometrics Trimline Tocotransducer to the transmitter's UA connector, you must wait at least 10 seconds before pressing the monitor's UA Reference button. If any device (monitor, receiver, transmitter) is off, you must wait at least ten seconds from the time the last device is powered on.

### IUPC

- Remember to place the receiver's UA Mode Selector switch in the IUP position.

# Chapter 5: Maintenance and Cleaning

## Maintenance

This section describes general care and cleaning instructions for the Mini Telemetry System.

### Storage

Place the transmitter on the placeholder of the receiver when it is not used.

**NOTE:** The transmitter can be charged when placed on the receiver.

**CAUTION:**

Do not connect the transducer cables to the transmitter when it is placed on the receiver, this may cause the transmitter to fall off the receiver.

Use care while carrying the receiver and transmitter.

### General Cleaning Precautions

**NOTE:** Refer to your monitor's operator manual for cleaning instructions for the monitor and transducers.

**CAUTION**

SHOCK—Unplug the fetal or maternal/fetal monitor and the receiver from the AC power source and detach all accessories. Do not immerse accessories in any liquid. Do not use abrasive cloth or cleaners on the monitor, the receiver, the transmitter, or any accessories. Do not spray cleaning solutions into the vents.

### Cleaning the Transmitter and Receiver

1. Wipe any fluids from the surface of each unit.
2. Dampen a soft cloth with cleaning solution and gently rub soiled area until clean.
3. Dry with a soft, dry cloth.

The following table lists approved cleaning solutions.

| Generic Formulation | Maximum concentration level |
|---|---|
| Hydrogen peroxide | 6 % |
| Sodium hypochlorite | 100 parts per million (ppm) |
| CaviCide® | 100 % spray (apply on equipment sprayed on cloth-not directly on equipment. |

## Shoulder Strap Cleaning

1. Wipe any fluids from the surface of the shoulder strap.
2. Dampen a soft cloth with cleaning solution and gently clean the strap.
3. Wipe with cotton cloth dipped in water to remove any traces of cleaning agent.
4. Dry with a soft, dry cloth.

The following table lists approved cleaning solutions.

| Generic Formulation | Maximum concentration level | Expected life of the belt |
|---|---|---|
| Hydrogen peroxide | 6 % | Minimum 1000 cleanings |
| Sodium hypochlorite | 100 parts per million (ppm) | Minimum 1000 cleanings |
| CaviWipes™ | Not applicable for CaviWipes™ | Minimum 300 cleanings |

# Chapter 6: Troubleshooting

This section of the manual provides a troubleshooting guide for the Mini Telemetry System's operational problems. If the response to a specific question is not found, contact service department. Refer to contact details mentioned in the back cover.

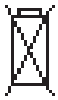
## Problem Chart

| Troubleshooting | | | |
|---|---|---|---|
| **Problem** | | **Probable Cause** | **Solution** |
| Receiver Power indicator does not light when the receiver is turned on. | | • Receiver not connected to AC receptacle.<br>• Defective AC power cord. | • Connect to AC receptacle.<br>• Replace AC power cord.<br>• Use a different AC outlet. |
|  | Signal indicator flashes with transmitter turned on. | • Transmitter antenna detached.<br>• Receiver antenna not attached. | • Contact your Service Representative. (Reattach transmitter antenna as instructed in Antenna Replacement Chapter of Service Manual).<br>• Connect receiver antenna as instructed in Chapter 4: Installation and Setup on page 19.<br>• If problem persists, contact your Information Technologies Service Representative. |

| Troubleshooting | | | |
|---|---|---|---|
| **Problem** | | **Probable Cause** | **Solution** |
|  | Signal indicator flashes intermittently as patient ambulates. | • Mom is ambulating at the edge of transmitter range.<br>• Reduced range due to shielding effect of hospital infrastructure.<br>• Transmitter antenna detached. | • Instruct patient to stay within signal range and designated areas where reception is clear.<br>• Install optional ceiling antenna system.<br>• Contact your Service Representative. (Reattach transmitter antenna as instructed in Antenna Replacement Chapter of Service Manual)<br>• If problem persists, contact your Information Technologies Service Representative. |
|  | Signal and/or Low Battery indicators light with transmitter turned off. | • External source of radio frequency interference is present.<br>• Another transmitter with the same frequency is in use within the same facility.<br>• Service required. | • Contact your Information Technologies Service Representative.<br>• Reprogram the transmitter and/or receiver to a different frequency using the procedure listed in "Appendix C" after consultation with a frequency coordinator designated by FCC.<br>• Discontinue use of one of the transmitters.<br>• If problem persists, contact your Information Technologies Service Representative. |
| | Low Battery indicator on the receiver lights continuously and Low Battery indicator is displayed on the transmitter screen and audio alarm can be heard periodically. | Battery is low | Recharge battery by connecting to the GE recommended power adaptor. |

| Troubleshooting | | |
|---|---|---|
| **Problem** | **Probable Cause** | **Solution** |
| Erratic FHR/MHR/UA reading. | • Transducer not properly positioned on mother's abdomen. | • Reposition transducer. |
| | • Transducer not properly connected to transmitter. | • Ensure the transducer is securely attached to the transmitter. |
| | • In case of erratic UA reading, check if TOCO/IUP switch on the receiver matches the UA transducer connected to transmitter. | • Ensure TOCO/IUP switch on the receiver matches the UA transducer connected to transmitter. |
| | • Receiver interconnection cable(s) not properly attached. | • Ensure interconnection cable(s) is firmly attached to both monitor and receiver. |
| | • Receiver interconnection cable(s) defective. | • Replace interconnection cable(s). |
| | • Wrong interconnection cable(s) in use. | • Verify interconnection method. |
| | • Radio frequency interference. | • Instruct patient to stay within signal range and designated areas where reception is clear. |
| | • Another transmitter with the same frequency is in use within the same facility. | • Discontinue use of one of the transmitters. NOTE: Mini Telemetry can be re-programmed to an alternative frequency. |
| | • Exceeding transmission range. | • Install optional ceiling antenna system. |
| | • Shielding effect of hospital structure.<br>• Transmitter front-end circuitry not working. | • If problem persists, contact your Information Technologies Service Representative. |
| | • Faulty transducer. | • Contact your Information technologies service representative. |
| FHR/MHR or UA values are not displayed on the corometrics monitor when transducers are plugged into transmitter. | • Transmitter and/or receiver off. | • Ensure all three devices are turned on. |
| | • Receiver interconnection cable(s) not properly attached. | • Ensure interconnection cable(s) firmly attached to both monitor and receiver. |
| | • Receiver interconnection cable(s) defective. | • Replace interconnection cable(s). |
| | • Wrong interconnection cable(s) in use. | • Verify interconnection method. |
| | • Faulty transducer. | • Contact your Information Technologies Service Representative. |

| Troubleshooting | | |
|---|---|---|
| **Problem** | **Probable Cause** | **Solution** |
| Noisy FHR/MHR waveforms are displayed on the corometrics monitor. | • Mom is ambulating at the edge of the transmitter range. | • Instruct patient to stay within strong signal range and designated areas where reception is clear. |
| No data received in the receiver even though both receiver and transmitter are ON | • Receiver interconnection cable(s) not properly attached.<br>• Receiver interconnection cable(s) defective.<br>• Wrong interconnection cable(s) in use.<br>• Transmitter and receiver tuned to different frequencies.<br>• Transmitter antenna detached. | • Ensure interconnection cable(s) firmly attached to both monitor and receiver.<br>• Replace interconnection cable(s).<br>• Verify interconnection method.<br>• Program the transmitter and/or receiver to the required channel number using the procedure listed in Appendix B of Service Manual after consultation with a frequency coordinator designated by FCC.<br>• Contact your Service Representative. (Reattach transmitter antenna as instructed in Antenna Replacement Chapter of Service Manual)<br>• If problem persists, contact your Information Technologies Service Representative. |
| Mini Telemetry transmitter switches off automatically | • Battery is low.<br>• Battery overheating | • Recharge battery by connecting to the GE recommended power adaptor.<br>• Contact your Information Technologies Service Representative. |
| "E1" is displayed on the transmitter screen on startup | RAM error | Contact your Information Technologies Service Representative. |
| "E2" is displayed on the transmitter screen on startup | FLASH error | Contact your Information Technologies Service Representative. |
| Mini Telemetry transmitter display is blank or shows junk data | • Defective display<br>• Software issue | Contact your Information Technologies Service Representative. |
| No audio beep is heard when EVENT or VOLUME key on the transmitter is pressed | • Audio hardware failure<br>• Software issue | Contact your Information Technologies Service Representative. |

| Troubleshooting | | | |
|---|---|---|---|
| **Problem** | | **Probable Cause** | **Solution** |
| Radio channel number does not appear in the normal user screen on transmitter display | | • Currently configured radio channel number is outside the supported range as specified in service manual.<br>• Communication between the system and the radio module is not established.<br>• Radio module is defective. | Contact your Information Technologies Service Representative. |
|  | Bad Radio Icon appears on the transmitter screen | • Transmitter frequency is outside the range of the radio module.<br>• Communication between the system and the radio module is not established.<br>• Radio module is defective. | Contact your Information Technologies Service Representative. |
|  | Bad battery icon appears on the transmitter screen | • Transmitter battery pack over discharged | • Connect the power adaptor to the transmitter and charge for 15 minutes. Disconnect the power adaptor and reconnect. Switch on the transmitter and check if bad battery symbol is replaced with the battery status.<br>• Disconnect the battery from the battery compartment. Refer to section 6.1.1 of Mini-telemetry service manual for battery replacement procedure. Reconnect the battery and repeat the previous step.<br>• Disconnect the battery from the battery compartment. Refer to section 6.1.1 of Mini-telemetry service manual for battery replacement procedure. Using an external DC source (8.5V and current limited to 1000mA), charge the battery for 5 minutes. Reconnect the battery and repeat the previous step. |
| | | • Defective battery<br>• Battery not able to charge | • Contact your Information Technologies Service Representative.<br>• Replace the battery |

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# Appendix A: Supplies and Accessories

This section provides an overall listing of supplies and accessories for use with a Corometrics Mini Telemetry System and with Corometrics Fetal or Maternal/Fetal Monitors. To order any of the supplies and accessories listed in this manual, refer to the addresses listed in the back cover.

| General Supplies | |
|---|---|
| **Item** | **Catalog Number (REF)** |
| TX Power Adaptor | 2042491-001 |
| TX Adaptor kit | 2050315-001 |
| Carrying strap | 4426AAO |
| Transmitter to Receiver PROG Cable ASSY | 2049878-001 |
| Velcro strips | 2051975-001 |
| Base Plate for Mini Telemetry Wall Mount | 2051641-001 |
| Mini Telemetry Wall mount Assembly | 2052779-001 |
| Headset for Mini Telemetry System | 3316AAO |
| System Interconnect Cable | 1563AAO |
| RXR 425MHZ MINI ANTENNA | 2052722-001 |
| RXR 435 MHz MINI ANTENNA | 2049802-001 |
| RXR 445 MHz MINI ANTENNA | 2049803-001 |
| RXR 611 MHz MINI ANTENNA | 2049804-001 |
| Power cord -UK | 2037674-001 |
| Power cord- EU | 2037672-001 |
| Power cord- US | 2037671-001 |
| Power cord- ANZ | 2037673-001 |
| Power cord-Japan | 405535-014 |
| Power cord-Italian | 2037677-001 |
| Power cord- Swiss | 401855-107 |
| Power cord- Indian | 2037676-001 |
| Mini Telemetry Service manual-English | 2049821-001 |
| Mini Telemetry Operation manual-English | 2049809-001 |
| Mini Telemetry Operation manual-German | 2049810-001 |
| Mini Telemetry Operation manual-Dutch | 2049811-001 |
| Mini Telemetry Operation manual-Italian | 2049812-001 |

| General Supplies | |
|---|---|
| **Item** | **Catalog Number (REF)** |
| Mini Telemetry Operation manual-Spanish | 2049813-001 |
| Mini Telemetry Operation manual-Greek | 2049814-001 |
| Mini Telemetry Operation manual-Polish | 2049815-001 |
| Mini Telemetry Operation manual-Russian | 2049816-001 |
| Mini Telemetry Operation manual-Japan | 2049817-001 |
| Mini Telemetry Operation manual-Korean | 2049818-001 |
| Mini Telemetry Operation manual-Portuguese | 2049819-001 |
| Mini Telemetry Operation manual- French | 2049820-001 |
| Quick Ref Guide – English | 2049966-001 |
| Quick Ref Guide - German | 2049967-001 |
| Quick Ref Guide – Dutch | 2049968-001 |
| Quick Ref Guide – Italian | 2049969-001 |
| Quick Ref Guide - Spanish | 2049970-001 |
| Quick Ref Guide – Greek | 2049971-001 |
| Quick Ref Guide – Polish | 2049972-001 |
| Quick Ref Guide - Russian | 2049973-001 |
| Quick Ref Guide – Japan | 2049974-001 |
| Quick Ref Guide – Korean | 2049975-001 |
| Quick Ref Guide - Portuguese | 2049976-001 |
| Quick Ref Guide - French | 2049977-001 |

Please refer to operator manuals of respective monitors for part numbers of the transducers.

# Appendix B: Technical Specifications

**NOTE:** Specifications are subject to change without notice.

This section contains a detailed list of the technical specifications for the Mini Telemetry System.

## B.1 Transmitter

| Transmitter | | |
|---|---|---|
| **Category** | **Technical Specifications** | |
| **Power adaptor requirements** | | |
| Input voltage range : | 100-240VAC | |
| Line frequency | 50-60Hz | |
| Power consumption (maximum) During charging | 15W | |
| Mains isolation | 4000VAC, 5656VDC Primary-Secondary | |
| **Physical Characteristics** | | |
| Height: | 1.9" ( 4.7cm) | |
| Width: | 4.7" (11.9cm) | |
| Depth: | 4.8" (12.1cm) | |
| Weight: | 1lb (0.45kg) | |
| **Environmental Conditions** | **Storage and Transport** | **Operating** |
| Ambient Temperature: | 14°F to 131°F (–10°C to 55°C) | 50°F to 104°F (10°C to 40°C) |
| Relative Humidity: | 5% to 95%, non-condensing | 5% to 95%, non-condensing |
| Atmospheric Pressure: | 700–1060 mbar (525–795 mmHg) | 700–1060 mbar (525–795 mmHg) |
| Altitude: | | Up to 3000m |

| Transmitter | |
|---|---|
| **Category** | **Technical Specifications** |
| **Certification and Compliance** | |
| UL: | UL 60601-1 |
| FCC: | United States FCC 47 CFR Part 95 |
| Industry Canada: | Canadian RSS-210 |
| EN: | European EN 300-220-1 |
| **Monitoring Modes** | |
| Fetal Heart Rate: | Ultrasound (US) and FECG |
| Uterine Activity: | External Tocotransducer (TOCO) or Internal Intrauterine Pressure Catheter (IUPC) |
| Maternal Heart Rate: | Maternal ECG (MECG) |
| **Ultrasound Mode** | |
| Technique: | Pulsed Doppler with autocorrelation processing |
| Transducer Type: | 9-crystal |
| Leakage Current: | < 100 µA, isolated by transducer (TYPE BF) |
| $I_{(sata)}$ at the transducer face | 2.7 mW/cm2* |
| Entrance beam dimensions ($A_{aprt}$) | 10.18 cm2 |
| Center frequency ($f_c$) | 1.151 MHz ± 40 Hz |
| Pulse duration | 92.5 µs |
| Pulse repetition frequency | 2 kHz ± 8 Hz |
| Global maximum value of total acoustic power ($W_0$) | 27.5 mW* |
| Spatial-average pulse-average intensity | 14.6 mW/cm2 < 20 mW/cm2 ( FDA limit) |
| Measurement uncertainties | |
| - $I_{(sata)}$ | ± 7% |
| - Ultrasonic power ($W_0$) | ± 7% |
| - Center frequency ($f_c$) | ± 5% |

*These parameters calculated as X + Ks where X is the mean value of the measurement, s = the standard deviation of the measured values, and K = 4.258 (K chosen for 90% confidence for 90% of the population for a sample size of 3).

| Transmitter | |
|---|---|
| **Category** | **Technical Specifications** |
| **ECG Mode** | |
| Input Impedance: | >1 GΩ |
| DC Tolerance: | ±1 V |
| Common Mode Rejection Ratio: | >90 dB |
| FECG Sensitivity: | 30 µ V to 1 mV |
| MECG Sensitivity: | 0.5 mV to 5 mV |
| Leakage Current: | < 10 µA (TYPE CF) |
| **TOCO Mode** | |
| Type: | Tocotransducer |
| Sensitivity: | 20 µ V/relative unit |
| Range: | 0 to +100 relative units |
| **IUPC Mode** | |
| Type: | DC Strain Gauge |
| Sensitivity | 20 µ V/mmHg |
| Range: | 0 to +100 mmHg |
| Leakage Current: | < 10 µA (TYPE CF) |
| Antenna Type: | Internal , helical |
| Control: | Power Key<br>Mark key<br>Speaker volume key (internal speaker and head set) |

| Transmitter | |
|---|---|
| **Category** | **Technical Specifications** |
| **Battery** | |
| Technology: | Li-Ion battery pack (2 cells) 7.2 VDC nominal |
| Capacity: | 2600mAh |
| Recharge time: | 4 hours |
| Backup: | Approximately 12 hours when fully charged |
| Quick charge: | 2.5 hours backup when recharged for 30 min |
| Audio Indicator: | Low Battery |
| Audio output: | Internal speaker<br>Audio head set |
| Alarms | Audio alarm for every 1.6s if battery is LOW<br>Audio alarm for every 0.8s if battery is critical. |
| Display | 132x32 resolutions in pixels.<br>Pixel 0.35x0.40mm |

| Transmitter | |
|---|---|
| **Category** | **Technical Specifications** |
| **RF Section** | |
| Power Output: | Frequency Band : Power Output<br>420.0500 - 429.7375 MHz: 1mW<br>432.0000 - 438.0000 MHz: 4mW<br>440.5625 - 449.6625 MHz: 1mW<br>608.0250 - 613.9750 MHz: 4mW |
| Channel Bandwidth: | Frequency Band : Channel Bandwidth<br>420.0500 - 429.7375 MHz : 12.5kHz<br>432.0000 - 438.0000 MHz : 25kHz<br>440.5625 - 449.6625 MHz : 12.5kHz<br>608.0250 - 613.9750 MHz : 25kHz |
| Transmission Range: | Frequency Band : Distance Coverage (Line of Sight*)<br>420.0500 - 429.7375 MHz : 100m<br>432.0000 - 438.0000 MHz : 500m<br>440.5625 - 449.6625 MHz : 100m<br>608.0250 - 613.9750 MHz : 500m |
| Connectors: | DC inlet for charger<br>Audio head set<br>3 parametric connector ( US-FHR, UA, MECG/FECG ) |
| Classification | Class IIb device under Rule 10 of Annex IX of the Council Directive 93/42/EEC |

* Un-obstructed path between transmitter and receiver antenna. Actual range may vary depending on the hospital infrastructure.

## B.2 Receiver

| Receiver | | |
|---|---|---|
| **Category** | **Technical Specifications** | |
| **Power Requirements** | | |
| Nominal Line Voltage: | 100-120VAC 220-240VAC | |
| | Fuse 0.25A T Fuse 0.25A T | |
| Line Frequency: | 50/60Hz | |
| Power Consumption (maximum): | 30 W | |
| Touch current: | <300µA | |
| **Physical Characteristics** | | |
| Height: | 4” (10.2cm) | |
| Width: | 8.1” (20.6cm) | |
| Depth: | 11.9” ( 30.2cm) | |
| Weight: | 5.6 lbs (2.55kg) | |
| **Environmental Conditions** | **Storage and Transport** | **Operating** |
| Ambient Temperature: | 14°F to 131°F (–10°C to 55°C) | 50°F to 104°F (10°C to 40°C) |
| Relative Humidity: | 5% to 95%, non-condensing | 5% to 95%, non-condensing |
| Atmospheric Pressure: | 700–1060 mbar (525–795 mmHg) | 700–1060 mbar (525–795 mmHg) |
| Altitude: | | Up to 3000m |
| **Certification and Compliance** | | |
| UL: | UL 60601-1 | |
| FCC: | United States FCC 47 CFR part 95 | |
| Industry Canada: | Canadian RSS-210 | |
| EN: | European EN 300-220-1 | |
| Output Signals: | US, FECG, MECG, TOCO, IUPC and Mark | |

| Receiver | |
|---|---|
| **Category** | **Technical Specifications** |
| **RF Section**<br><br>Input Impedance:<br><br>Input Sensitivity: | <br><br>50 Ω<br><br><0.4 µ V for 12 dB SINAD |
| Antenna Type: | Flexible, detachable, BNC interconnect<br><br>(Other factory-approved external antennas or antenna systems may be used. Contact your Information Technologies Service Representative for more information.) |
| Controls: | Power Switch, UA Mode Switch |
| **Visual Indicators:**<br><br>Power:<br><br>Signal Strength:<br><br>Transmitter Low/Depleted Battery: | <br><br>Green LED<br><br>Green LED<br><br>Red LED |
| **Connectors:**<br><br>AC Line Input:<br><br>Auxiliary Output: | <br>3-Prong, IEC-Style<br><br>Use only with Series 250 and 170 Monitors. |
| Classification | Class IIb device under Rule 10 of Annex IX of the Council Directive 93/42/EEC |

## Product Compatibility

The system operates with the following Corometrics brand monitors. If your monitor is not listed, check with your salesperson or service representative for a more current list.

- 120 Series
- 170 Series
- 250 Series
- 250cx Series

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# Appendix C: Electromagnetic Compatibility

## C.1 Electromagnetic compatibility (EMC) guidance

**Safety Standards:** IEC 60601-1, IEC 60601-2-37, IEC 60601-2-49

**EMC Standards:** IEC 60601-1-2

**WARNING:**
Medical Electrical Equipment needs special precautions regarding EMC and needs to be installed and put into service according to the EMC information provided below.

**WARNING:**
Portable and mobile RF communication equipment can affect Medical Electrical Equipment. Caution should be use when operating such devices around Medical Electrical Equipment

**WARNING:**
This equipment/system is intended for use by healthcare professionals only. This equipment system may cause radio interference or may disrupt the operation of nearby equipment. It may be necessary to take mitigation measures, such as re-orienting or relocating the equipment/system or shielding the location.

## C.2 Manufacturer's guidance and declaration regarding electromagnetic immunity

The unit is intended for use in the electronic environment specified below. The user of the unit should ensure that it is used in such an environment.

| **Electromagnetic immunity** | | | |
|---|---|---|---|
| **Immunity Test** | **IEC 60601 Test Level** | **Compliance level** | **Electromagnetic environment guidance** |
| Electrostatic discharge (ESD) IEC 61000-4-2 | ± 6kV contact<br>± 8kV air | ± 6kV contact<br>± 8kV air | Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material the relative humidity should be at least 30%. |

| Electromagnetic immunity | | | |
|---|---|---|---|
| **Immunity Test** | **IEC 60601 Test Level** | **Compliance level** | **Electromagnetic environment guidance** |
| Electrical fast transient/burst IEC 61000-4-4 | ± 2kV for power supply line.<br>± 1kV for input/output line. | ± 2kV for power supply line.<br>± 1kV for input/output line. | Mains power quality should be that of a typical commercial or hospital environment. |
| Surge<br>IEC 61000-4-5 | ± 1kV differential Mode.<br>± 2kV common mode line. | ± 1kV differential Mode.<br>± 2kV common mode line. | 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<br><br>40 %Ut (60 % dip in Ut) for 5 cycles<br><br>70 % Ut(30 % dip in Ut) for 25 cycles<br><br><5% Ut(>95% dip in Ut) for 5 sec. | <5 % Ut(>95 % dip in Ut) for 0.5 cycle<br><br>40 %Ut(60 % dip in Ut) for 5 cycles<br><br>70 % Ut (30 % dip in Ut) for 25 cycles<br><br><5% Ut (>95% dip in Ut) for 5 sec. | Mains power quality should be that of a typical commercial or hospital environment. If the user of the unit requires continued operation during power mains interruptions, it is recommended that the unit be powered from an uninterruptible power supply or a battery. |
| Power frequency (50/60 Hz) magnetic field environment<br>IEC 61000-4-8 | 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. |

**NOTE:** Ut is the main voltage before application of the test level.

**International Electrotechnical Commission (IEC) guidance and manufacturer's declaration regarding electronic immunity**

The unit is intended for use in the electronic environment specified below. The user of the unit should ensure that it is used in such an environment.

| **Electromagnetic immunity** | | | |
|---|---|---|---|
| **Immunity Test** | **IEC 60601 Test Level** | **Compliance level** | **Electromagnetic environment guidance** |
| | | | Portable and mobile RF communications equipment should be used no closer to any part of the unit, including cables, than the recommended separation distance calculated from the equation applicable for the frequency of the transmitter. |
| Conducted RF IEC 61000-4-6 | 3 $V_{rms}$<br>150 KHz to 80 MHz | 3V | Recommended separation distance<br>$d = 1.2\sqrt{P}$ |
| Radiated RF IEC 61000-4-3 | 3 V/m<br>80 MHz to 6 GHz | 3 V/m | Radiated RF can affect the accuracy of in-bed-scale readings. However, the in-bed-scale is not critical to the performance of the unit (see Note 1, below). |
| IEC 60601-2-37 | 3 V/m<br>80 MHz to 6 GHz | 3V/m | $d = 1.2\sqrt{P}$ = 26 MHz to 800 MHz<br>$d = 1.2\sqrt{P}$ = 800 MHz to 2.5 GHz<br>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).<br>Field strengths for fixed RF transmitters as determined by an electromagnetic site survey (see Note a) should be less than the compliance level in each frequency range (see Note b on the following page).<br>Interference may occur in the vicinity of equipment. Marked with the following symbol:<br>(((•))) ▲ |

**NOTE 1:** Portable and mobile equipment can affect medical electronic equipment.

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

**NOTE 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 broadcasts and TV broadcasts 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 unit is used exceeds the applicable RF compliance level above, the unit should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the unit.

**NOTE b:** Over the frequency range 150 KHz to 80 MHz field strengths should be less than 3 V/m.

**Recommended separation distance between portable and mobile RF communications equipment and the Mini Telemetry**

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

| **Rated maximum output power of transmitter (W)** | **Separation distance in meters (m) according to frequency of transmitter** | | |
|---|---|---|---|
| | **150 kHz to 80 MHz** $d = 1.2\sqrt{P}$ | **80 MHz to 800 MHz** $d = 1.2\sqrt{P}$ | **800 MHz to 2.5 GHz** $d = 1.2\sqrt{P}$ |
| 0.01 | 0.12 | 0.12 | 0.23 |
| 0.1 | 0.38 | 0.38 | 0.73 |
| 1.0 | 1.2 | 1.2 | 2.3 |
| 10.0 | 3.8 | 3.8 | 7.3 |
| 100.0 | 12.0 | 12.0 | 23.0 |

For transmitters rated at a maximum output power not listed above, the recommended separation distance (*d*) in meters (m) can be determined 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:** At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

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

# Appendix D: Warranty

This Product is sold by GE Healthcare under the warranties set forth in the following paragraphs.

Such warranties are extended only with respect to the purchase of this Product directly from GE Healthcare or GE Healthcare's Authorized Dealers as new merchandise and are extended to the Buyer thereof, other than for the purpose of resale. For a period of twelve (12) months for the product from the date of original delivery to Buyer or to Buyer's order, but in no event for a period of more than two years from the date of original delivery by GE Healthcare to an GE Healthcare Authorized Dealer, this Product, other than its expendable parts, is warranted to be free from functional defects in materials and workmanship and to conform to the description of the Product contained in this operation manual and accompanying labels and/or inserts, provided that the same is properly operated under the conditions of normal use, that regular periodic maintenance and service is performed and that replacements and repairs are made in accordance with the instructions provided. This same warranty is made for a period of thirty (30) days with respect to expendable parts such as batteries.

The foregoing warranties shall not apply if the Product has been repaired other than by GE Healthcare or in accordance with written instructions provided by GE Healthcare, or altered by anyone other than GE Healthcare, or if the Product has been subject to abuse, misuse, negligence, or accident. GE Healthcare's sole and exclusive obligation and Buyer's sole and exclusive remedy under the above warranties is limited to repairing or replacing, free of charge, at GE Healthcare's option, a Product, which is telephonically reported to the nearest GE Healthcare Regional Service Office and which, if so advised by GE Healthcare, is thereafter returned with a statement of the observed deficiency, not later than seven (7) days after the expiration date of the applicable warranty, to the designated GE Healthcare Service Center during normal business hours, transportation charges prepaid and which, upon GE Healthcare's examination, is found not to conform with above warranties.

GE Healthcare shall not be otherwise liable for any damages including but not limited to incidental damages, consequential damages, or special damages. There are no express or implied warranties that extend beyond the warranties hereinabove set forth. GE Healthcare makes no warranty of merchantability or fitness for a particular purpose with respect to the product or parts thereof.

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