SEER® Light
Ambulatory Recorder/Controller
Service Manual

Software Version 1

2019818-008 Revision B

Service Instructions for:

SEER Light/SEER Light Extend Compact Digital Holter Recorder

SEER Light/SEER Light Extend Controller

SEER Light Connect

GE Medical Systems
Information Technologies

gemedicalsystems.com

NOTE: The information in this manual only applies to SEER Light devices software version 1. It does not apply to earlier software versions. Due to continuing product innovation, specifications in this manual are subject to change without notice.

Contents

1 Introduction

For your notes

Manual Information

Revision History

Each page of the document has the document part number followed by a revision letter at the bottom of the page. This letter identifies the document's update level. The latest letter of the alphabet corresponds to the most current revision of the document.

The revision history of this document is summarized in the table below.

Table 1. Revision History 2019818-008

Revision	Date	Comment
A	15 May 2005	Initial release of manual.
B	15 July 2005	Manual updated for clarity.

Manual Purpose

This manual supplies technical information for service representative and technical personnel so they can maintain the equipment. Use it as a guide for maintenance and electrical repairs considered field repairable. Where necessary the manual identifies additional sources of relevant information and or technical assistance.

See the operator manual for the instructions necessary to operate the equipment safely in accordance with its function and intended use.

Definitions

- Items shown in **Black** text are keys on the keyboard, text to be entered, or hardware items such as buttons or switches on the equipment.
- Items shown in *Italicized* text are software terms which identify menu items, buttons, or options in various windows.
- To perform an operation which appears with a plus (+)sign between the names of two keys, you press and hold the first key while pressing the second key once. This is called a keystroke combination.

  For example, "Press **Ctrl + Esc**" means to press and hold down the **Ctrl** key while pressing the **Esc** key.
- When instructions are given for typing a precise text string with one or more spaces, the point where the spacebar must be pressed is indicated as: <Space>. The purpose of the < > brackets is to ensure you press the spacebar when required.

- **Enter** means to press the “Enter” or “Return” key on the keyboard. Do not type “enter”.

Related Manuals

See the documents listed below for additional information.

Table 2. SEER Light Documents	
Part Number	**Name**
2019818-007	SEER Light Ambulatory Recorder/Controller Operator's Manual

Safety Information

Intended Use

The SEER Light recorder is a two and three channel digital Holter ECG recorder that records the electrical signals associated with cardiac activity for 24 or 48 hours. It is used in diagnosing cardiac abnormalities and revealing trends or changes in heart function. This device is for the use of trained personnel only.

This device is not intended for use on infants weighing less than 10 kg (22 lbs).

Definitions

The terms danger, warning, and caution are used throughout this manual to point out hazards and to designate a degree or level of seriousness. Familiarize yourself with their definitions and significance.

Hazard is defined as a source of potential injury to a person.

DANGER indicates an imminent hazard which, if not avoided, will result in death or serious injury.

WARNING indicates a potential hazard or unsafe practice which, if not avoided, could result in death or serious injury.

CAUTION indicates a potential hazard or unsafe practice which, if not avoided, could result in minor personal injury or product/property damage.

NOTE provides application tips or other useful information.

Warnings

WARNINGS

ACCIDENTAL SPILLS — If liquids have entered a device, take it out of service and have it checked by a service technician before it is used again. To avoid electric shock or device malfunction liquids must not be allowed to enter the device.

CABLES — To avoid possible strangulation, route all cables away from patient's throat.

CARDIAC APPLICATION — This device cannot be used for direct cardiac application.

CONDUCTIVITY — Keep the conductive parts of lead electrodes and associated parts away from other conductive parts, including earth.

DEFIBRILLATOR PRECAUTIONS — Do not come into

contact with patients during defibrillation. Otherwise, serious injury or death could result. Patient signal inputs labeled with the CF and BF symbols with paddles are protected against damage resulting from defibrillation voltages. To ensure proper defibrillator protection, use only the recommended cables and leadwires. Proper placement of defibrillator paddles in relation to the electrodes is required to ensure successful defibrillation.

ELECTROSURGERY — If an electrosurgery device is used, it is necessary to disconnect the patient cable from the SEER Light recorder. Take precautions to reduce risks of burns and injury to the patient.

LEAKAGE CURRENT — Electrical shock to patient could result from component failure and lack of power isolation.

In the event this system is used in the patient vicinity, it must be configured in such a way that it and all of its electrically-connected peripheral devices are isolated from mains power to prevent excessive leakage current to the patient. This can be accomplished through the use of isolated mains power, or a medical grade isolation transformer (in compliance with UL 60601, CAN/CSA C22.2 No. 601.1, IEC 60601-1) with this system. All non-medical peripheral devices shall comply with IEC and ISO safety standards that are relevant to that equipment (i.e., IEC 60950, UL 60950).

Use of the SEER Light Connect device in the patient vicinity requires that these measures are observed.

PACEMAKER PATIENTS — Take precautions to avoid risks of hazard due to the operation of a cardiac pacemaker or other electrical stimulators.

SUPERVISED USE — This device is intended for use under the direct supervision of a licensed health care practitioner.

Cautions

CAUTIONS

RESTRICTED SALE — U.S. federal law restricts this device to sale by or on the order of a physician.

BEFORE OPERATION — Check that the instrument operates properly.

DISPOSAL — At the end of its service life, the product described in this manual, as well as its accessories, must be disposed of in compliance with local, state, or federal

guidelines regulating the disposal of such products. If you have questions concerning disposal of the product, please contact GE or its representatives.

MODIFICATIONS — Do not make any modifications to the device.

AFTER DEVICE USE — Clean the device after each use to ensure trouble-free operation for the next use.

- Use a piece of damp cloth with alcohol to clean the device and the patient cable.
- The device cannot be sterilized.
- Do not use xylene and petrol related liquid for cleaning the device.
- To ensure proper operation of the device, it is necessary to periodically have the device checked by authorized service personnel.
- Check the patient cable and connectors every month by connecting them to an ECG simulator.

INSTALLATION — Adhere to the following recommendations during installation:

- Install and keep device away from splashing water.
- Do not install the device where it may be affected by humidity, ventilation, direct sunlight, air conditioning, dust, salt, sulfur, etc.
- Prevent the device from tilting, and protect it from the possibility of vibration or shock.
- Do not install the device in a chemical storage area or where gas is generated.

Serial Number

Every GE Medical Systems *Information Technologies* device has a unique serial number for identification. The serial number appears on the device label similar to the one shown below.

50A

Disposal of the Device

When disposing the device, follow the applicable national rules and regulations of disposal of medical equipment.

When disposing the recyclable battery, follow the applicable national rules and regulations concerning the environmental issues.

Responsibility of the Manufacturer

GE is responsible for the effects of safety, reliability, and performance only if:

- Assembly operations, extensions, readjustments, modifications, or repairs are carried out by persons authorized by GE Medical Systems *Information Technologies*.
- The equipment is used in accordance with the instructions for use.

General

Refer equipment servicing to GE authorized service personnel only. Any unauthorized attempt to repair equipment under warranty voids that warranty.

It is the user's responsibility to report the need for service to GE or to one of its authorized agents.

This device is intended for use under the direct supervision of a licensed health care practitioner.

To ensure patient safety, use only parts and accessories manufactured or recommended by GE.

Contact GE for information before connecting any devices to this equipment that are not recommended in this manual.

Parts and accessories used must meet the requirements of the applicable IEC 60601 series safety standards, and/or the system configuration must meet the requirements of the IEC 60601-1-1 medical electrical systems standard.

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 and/or IEC 60601-1-1 harmonized national standard.

Information Technology Equipment

The hardware components supplied by GE for the MARS® Holter analysis workstation, on which the SEER Light Connect application runs, are considered to be Information Technology Equipment (ITE). These individual components have been found to comply with the standard for Safety of Information Technology Equipment, including Electrical Business Equipment EN60950 (UL 60950).

The software used in the MARS® Holter analysis workstation is considered as medical software. The software has been designed and manufactured to the appropriate medical regulations and controls.

In order for the MARS® Holter analysis workstation to comply with medical equipment standard leakage current requirements, a medical grade uninterruptible power supply (UPS) must be used (UL 60601-1, CSA 22.2 No. 60601-1, EN 60601-1) to power all non-medical equipment.

In addition, non-medical electrical equipment must comply with IEC and ISO safety standards that are relevant to that equipment (i.e., IEC 60950, Safety of Information Technology Equipment.)

Equipment Symbols

The following symbols may appear on the equipment.

Attention. Consult accompanying documents.

Event.

This symbol indicates the polarity orientation that each battery should have when you insert it into the unit. This unit requires you to insert the batteries so that the polarities are oriented in alternating directions.

Power.

Stop.

Input connector.

Output connector.

This symbol indicates that the waste of electrical and electronic equipment must not be disposed as unsorted municipal waste and must be collected separately. Please contact an authorized representative of the manufacturer for information concerning the decommissioning of your equipment.

2 SEER Light/SEER Light Extend Recorder

For your notes

Component Names and Locations

Structure

The SEER Light ambulatory recorder is shown and described below.

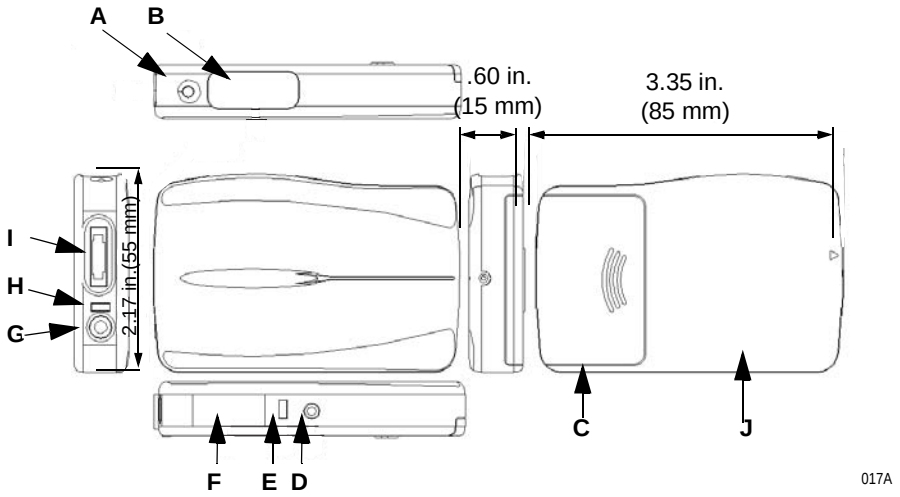


Table 3. SEER Light Ambulatory Recorder		
Item	**Name**	**Description**
A	**REC** LED	To display operation conditions: ■ After pressing the start/event button, the LED will flash twice per second for three minutes. During this time data is not recorded. ■ During recording, the LED will flash every second.
B	start/event button	■ Use to start recording. ■ Use to mark events during recording.
C	battery compartment cover	Slide the cover to open and set the batteries in the battery compartment.
D	**A** data output connector	For transfer of data to the SEER Light controller or to the SEER Light Connect device.
E	access LED	Will flash during communication with the SEER Light controller.
F	infrared terminal (I.R. Window)	■ Used to receive the signal from the SEER Light controller to begin ECG recording. ■ Used to receive patient information and ECG recording starting time. ■ Used to confirm the ECG waveform recorded by the recorder (ECG preview).
G	**B** output connector	Not used.
H	**DATA** LED	The LED flashes while transferring data to the SEER Light controller.

Table 3. SEER Light Ambulatory Recorder (Continued)		
I	patient cable connector	Used to connect patient cable for ECG input.
J	Stop button	Push to stop recording

Troubleshooting

Self-Test Mode

A self-test can be done on the following functions.

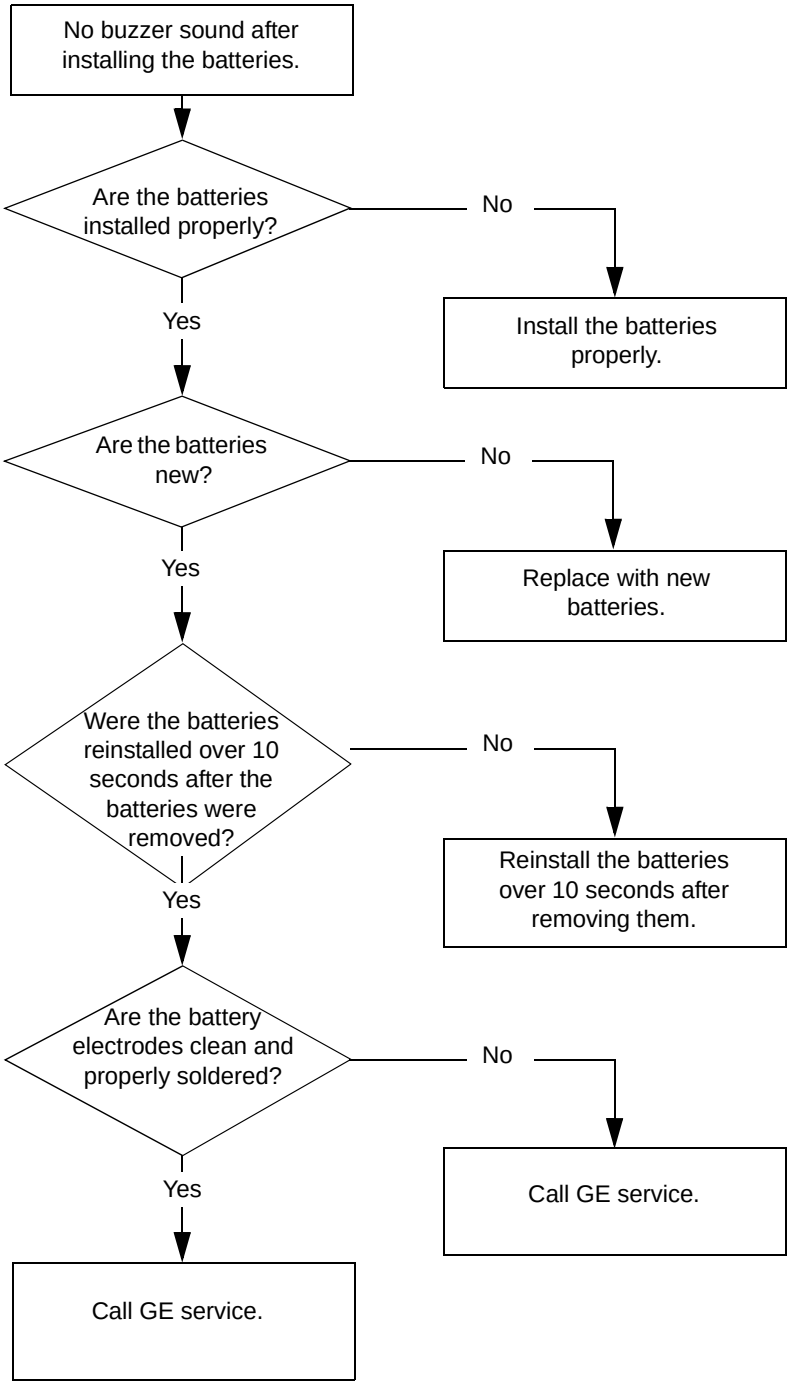
1. Self-test I (pacemaker detection check mode)

- Provide a pacemaker signal to the recorder with an ECG simulator.
- To enter the pacemaker detection mode, set the batteries while pressing the **STOP** button.
  - Confirm the audible sound synchronizes with the pacemaker signal input through the patient input connector.
- Remove the batteries to end the self-test.

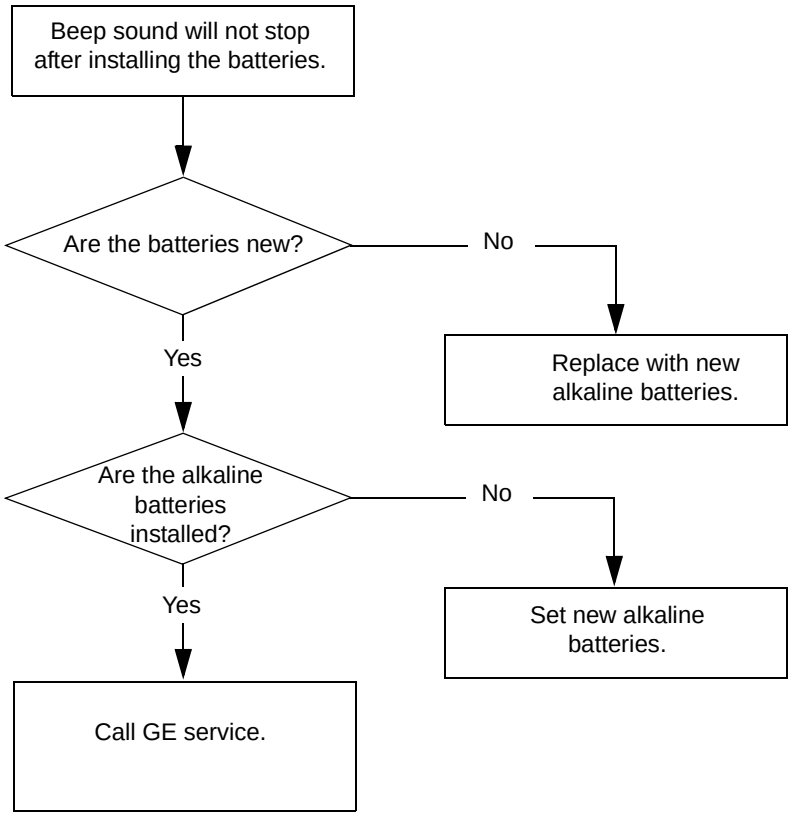
2. Self-test II (accelerometer sensor check mode)

- After setting the batteries, press the **STOP** button three times within a second.
  - Confirm the audible sound synchronizes as the recorder is moved around.
- Remove the batteries to end the self-test.

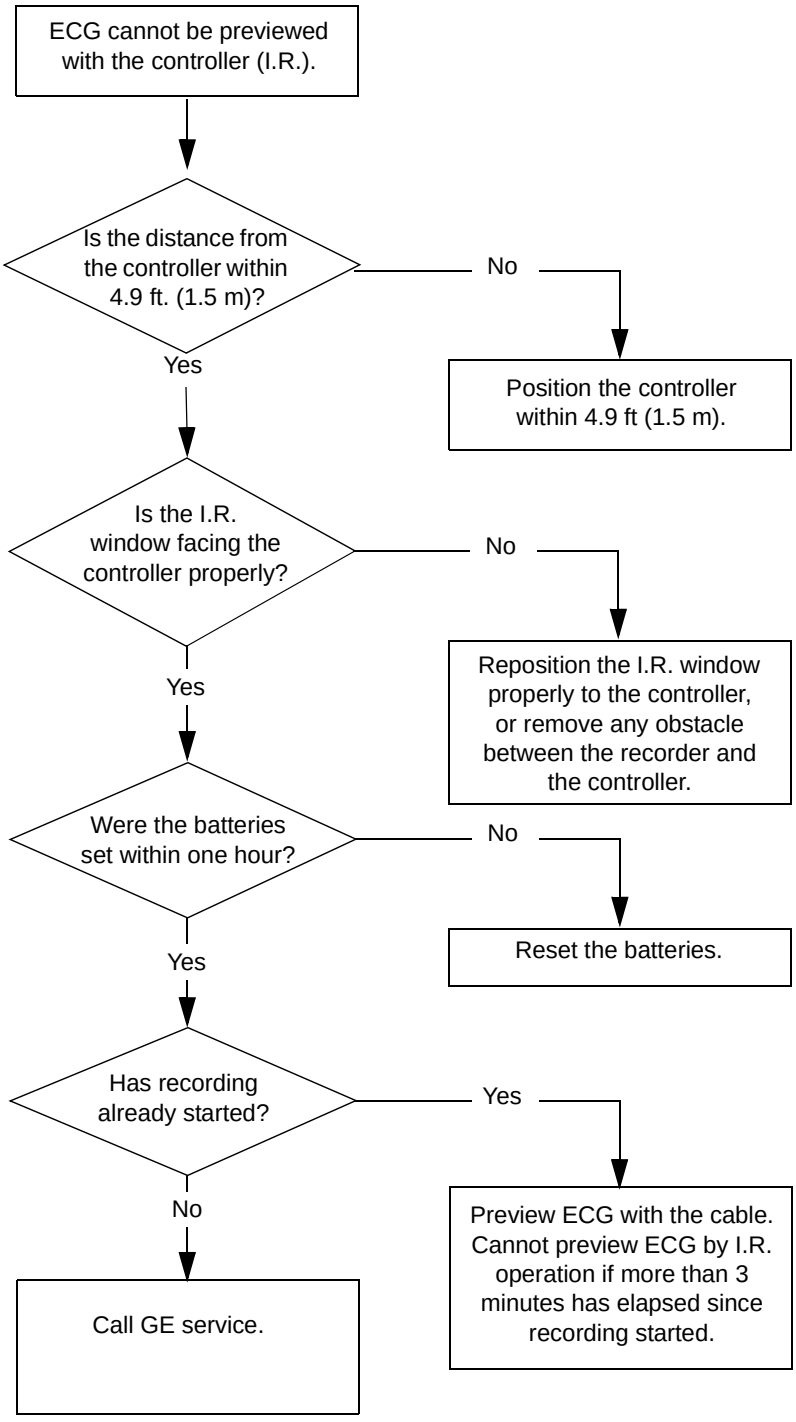
No Buzzer Sound After Installing the Batteries



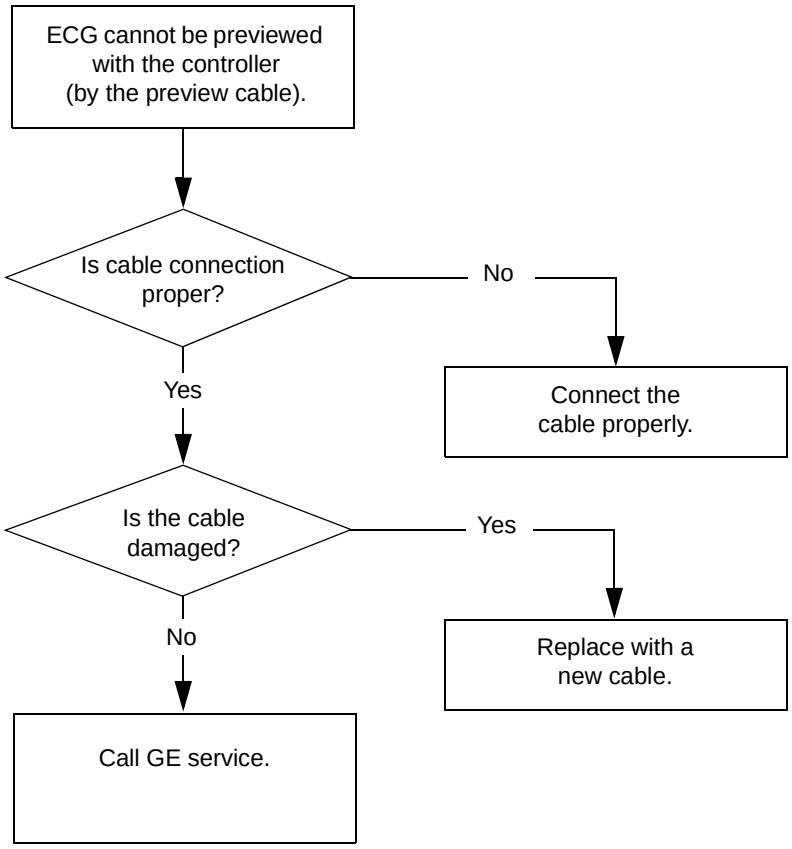
Beep Sound Will Not Stop After Installing the Batteries



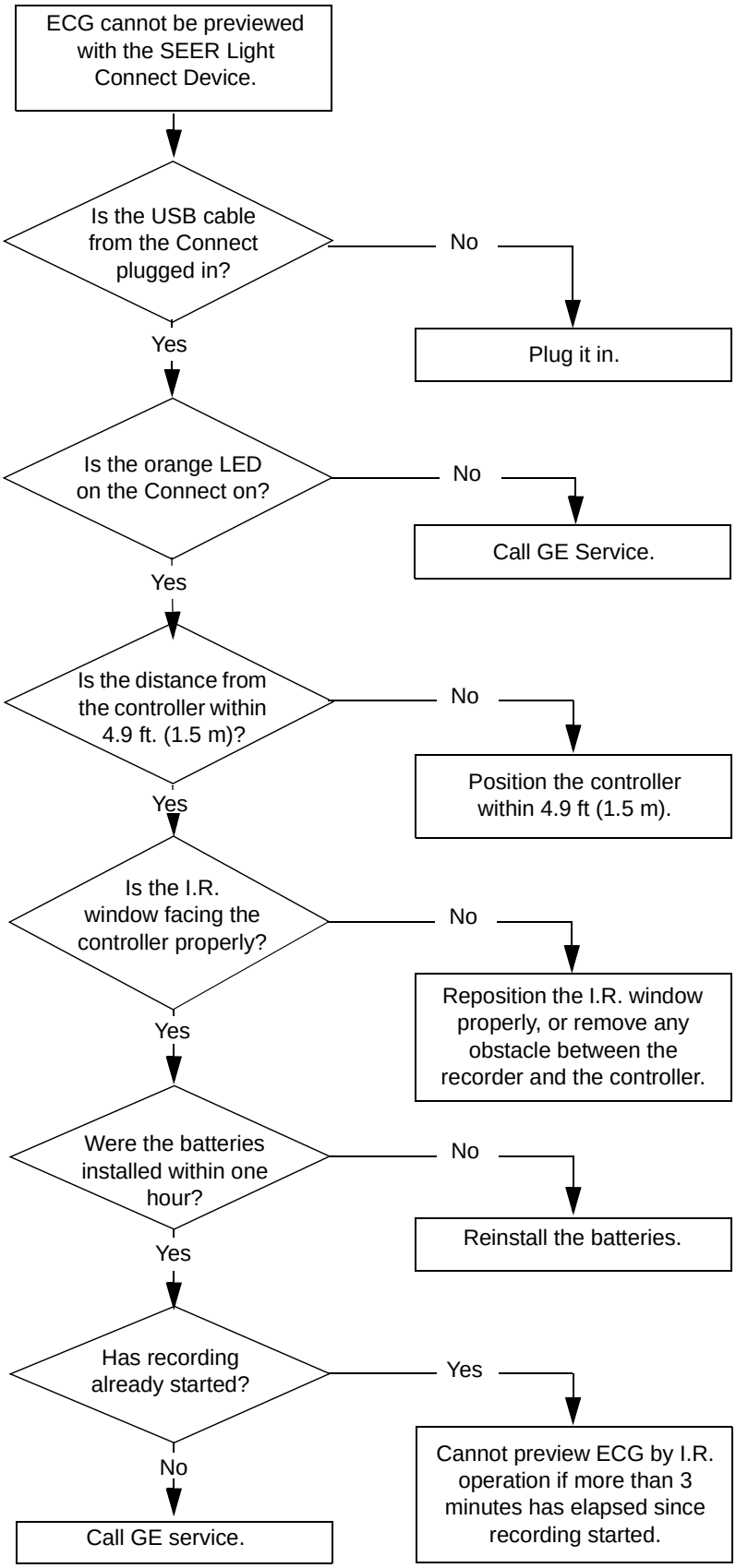
ECG Cannot Be Previewed with Controller (I.R.)



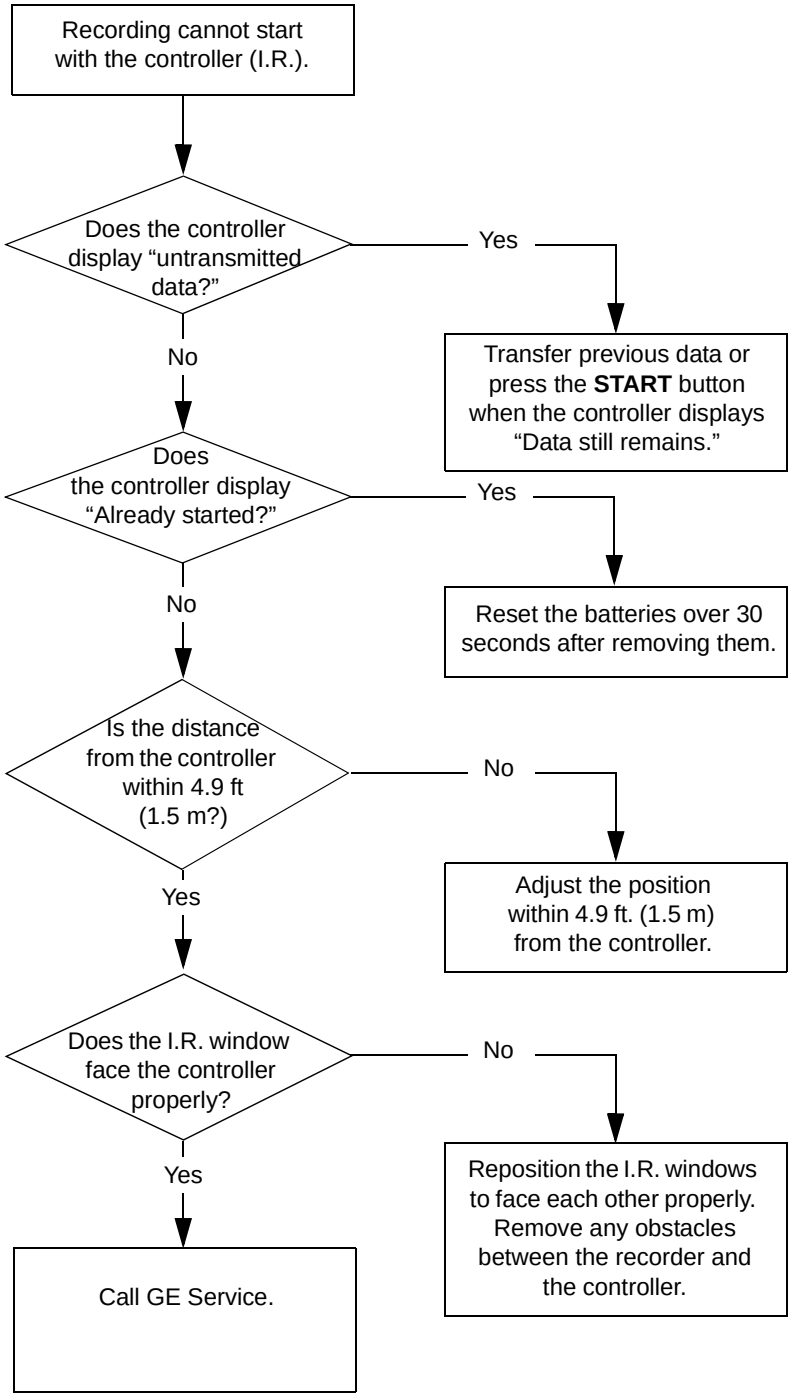
ECG Cannot be Previewed with Controller (Cable)



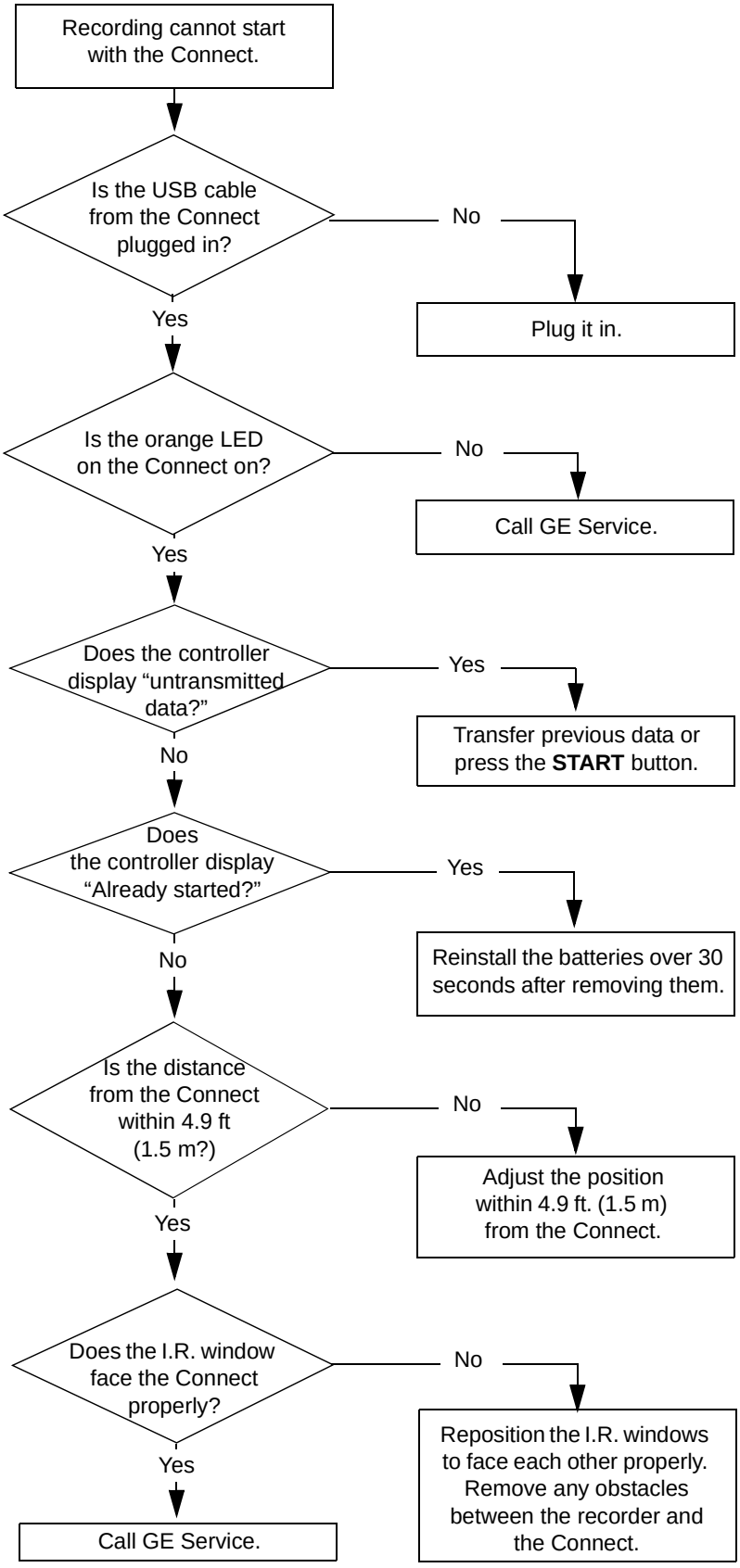
ECG Cannot Be Previewed with SEER Light Connect Device



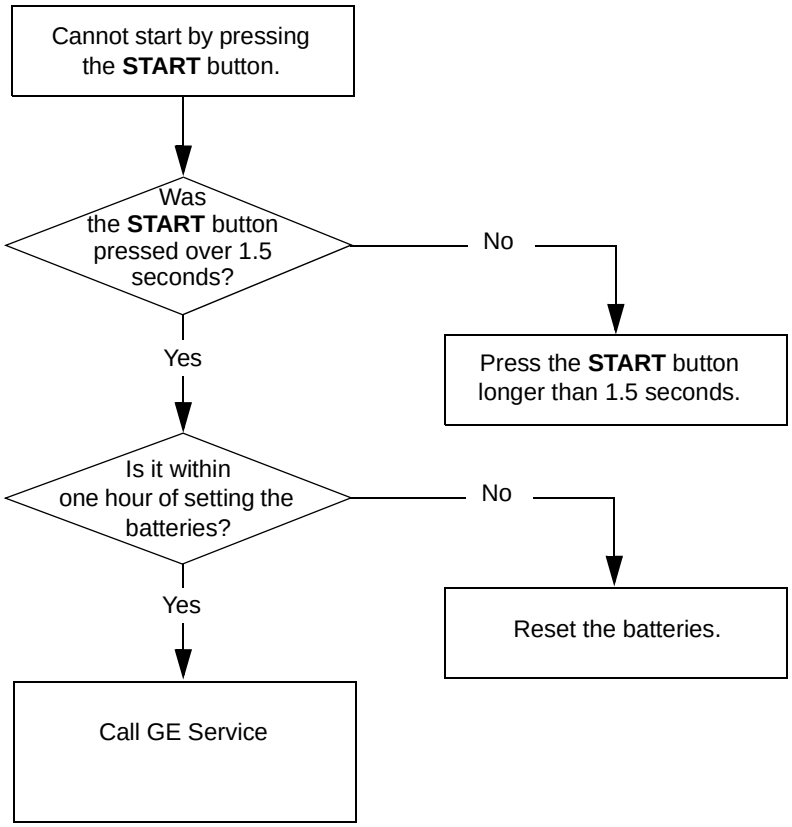
Recording Cannot Start with the Controller (I.R.)



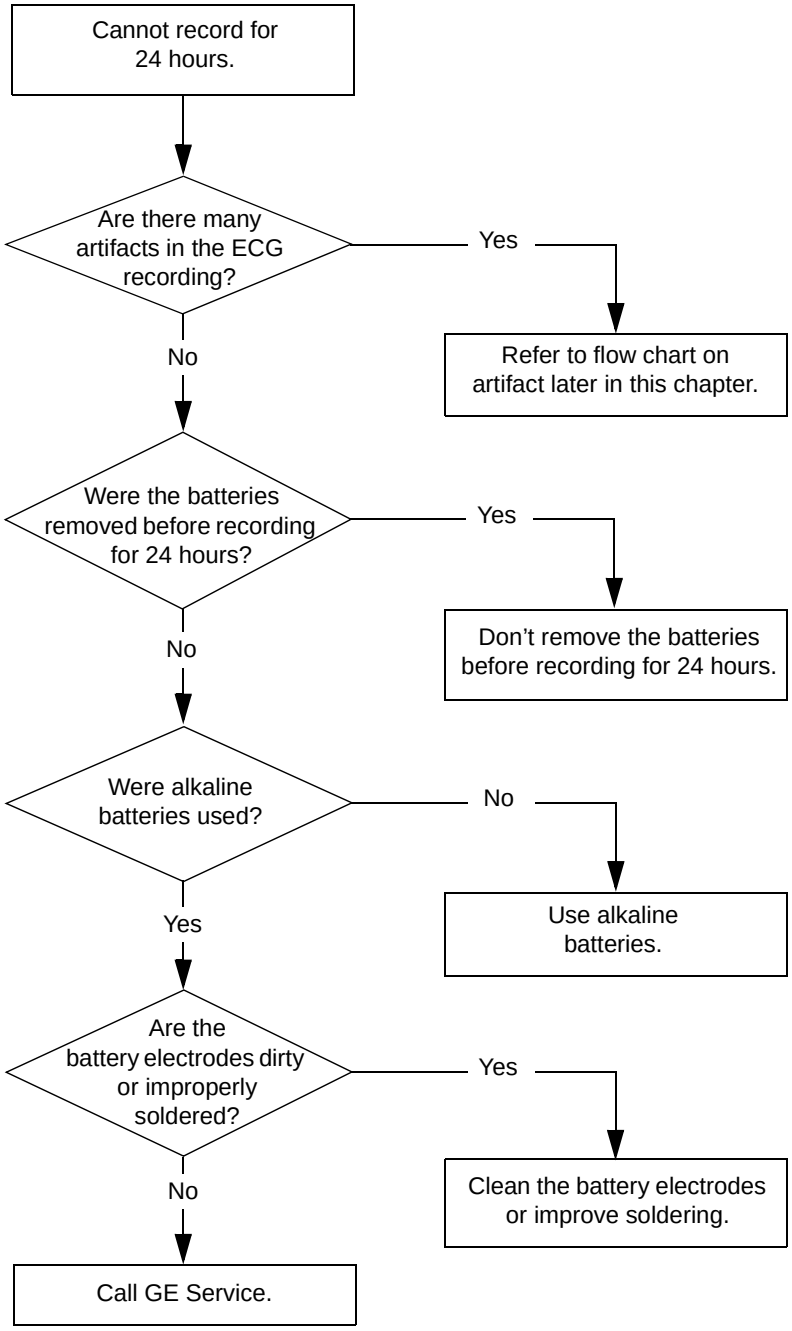
Recording Cannot Start with the SEER Light Connect Device



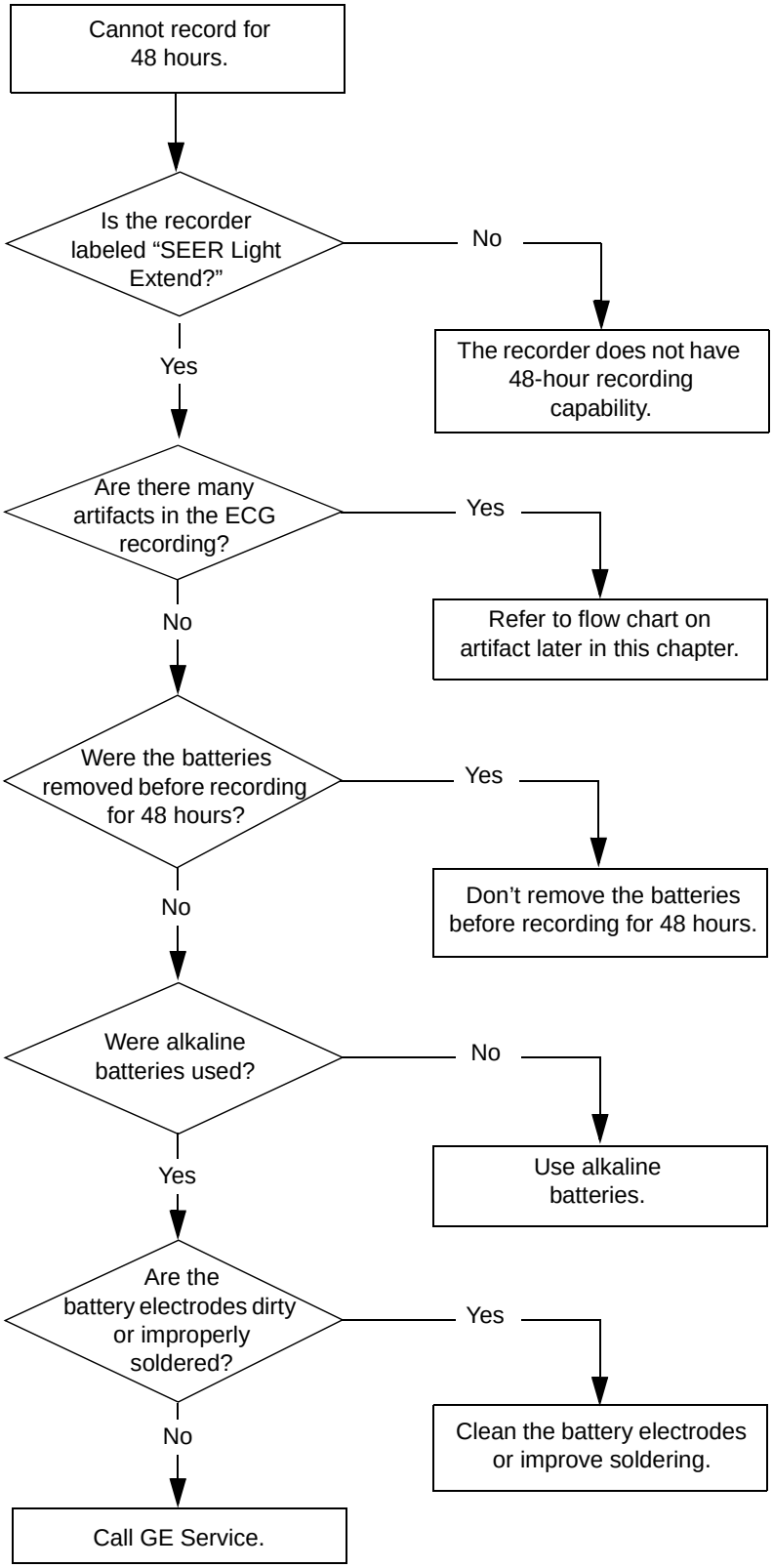
Cannot Start by Pressing the Start Button



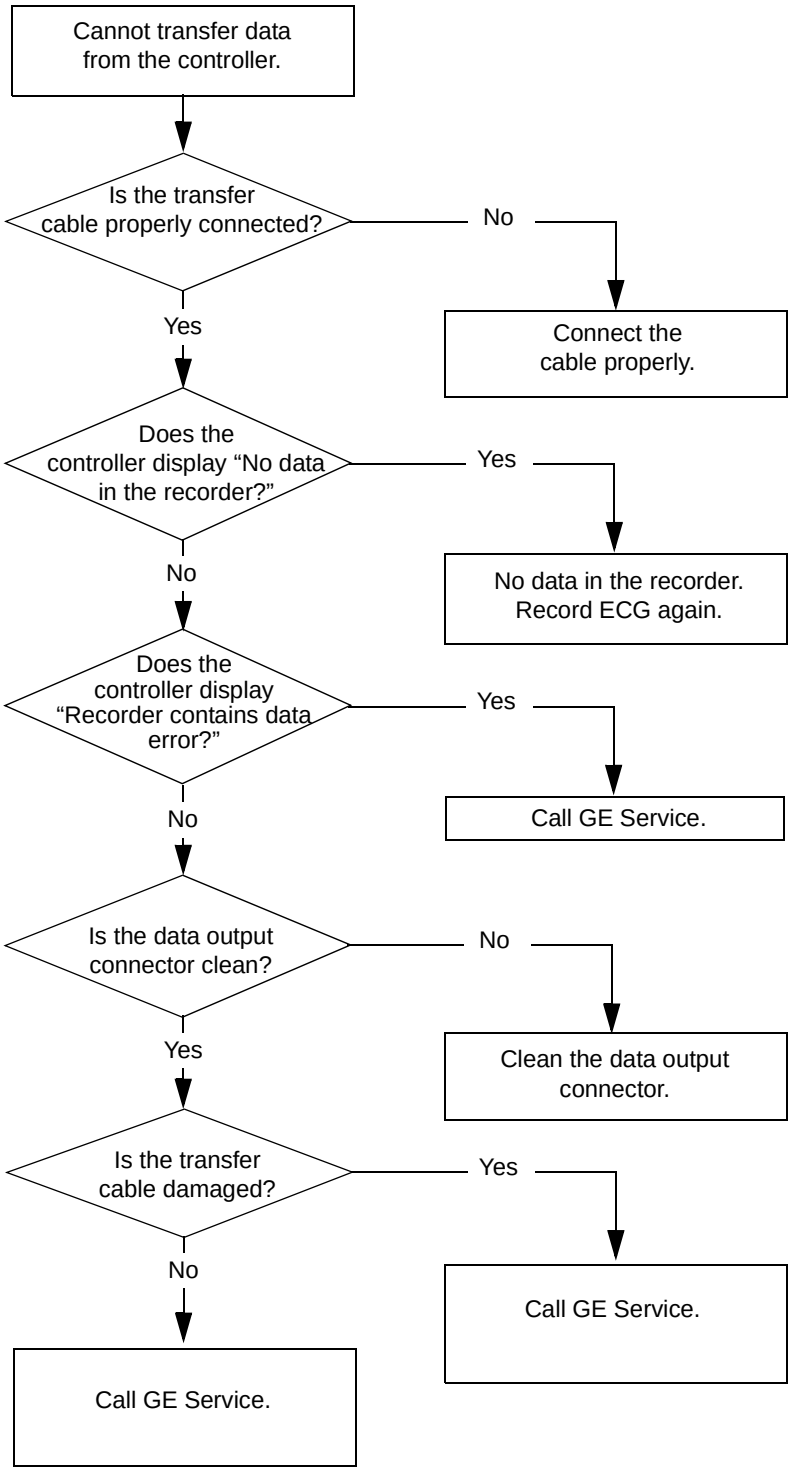
Cannot Record for 24 Hours



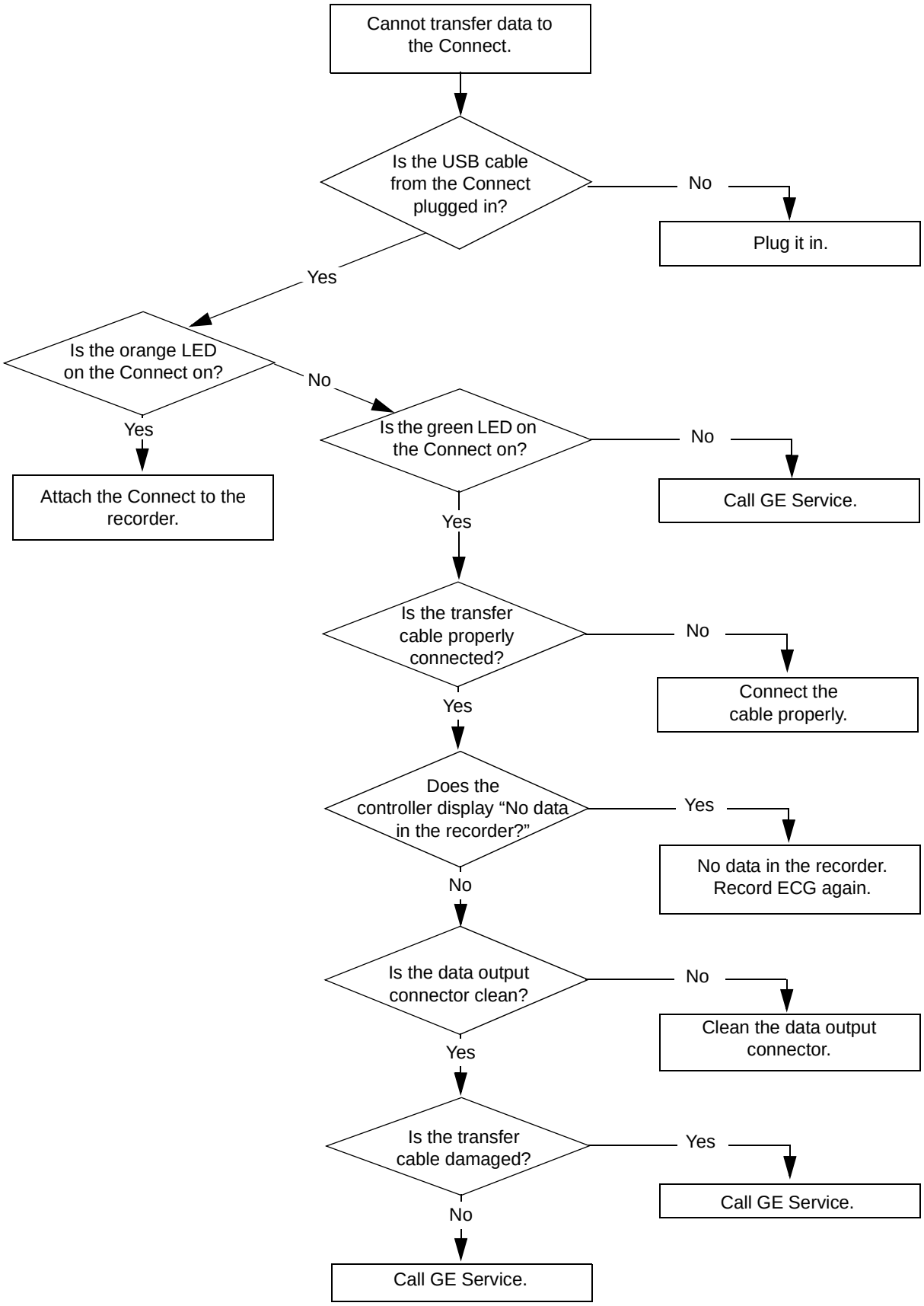
Cannot Record for 48 Hours



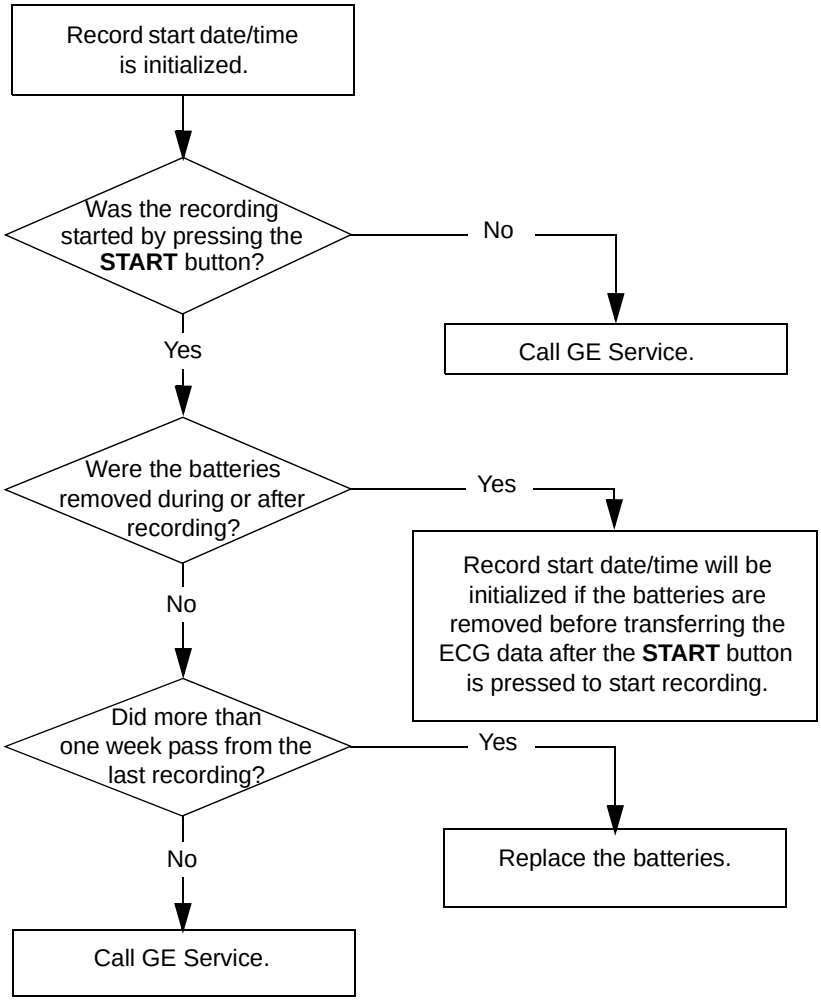
Cannot Transfer Data from the Controller



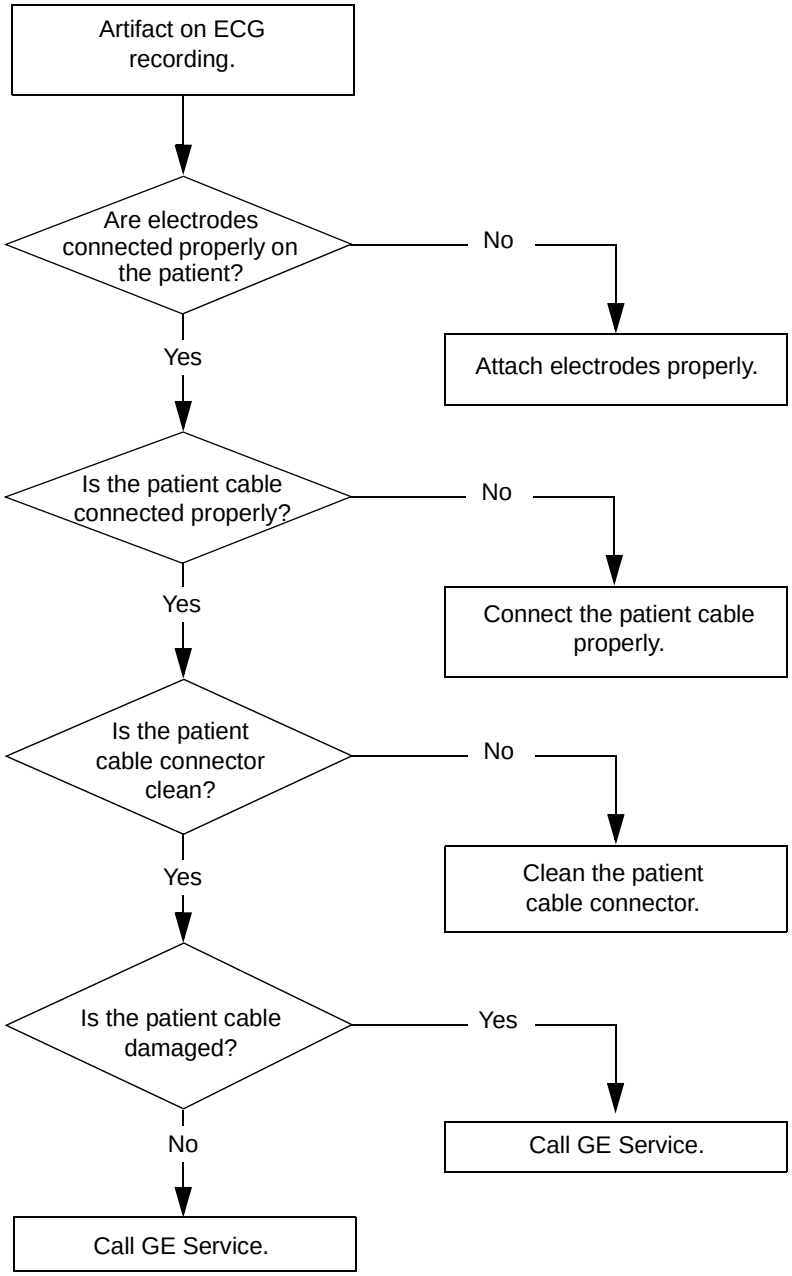
Cannot Transfer Data from the Recorder to the SEER Light Connect Device



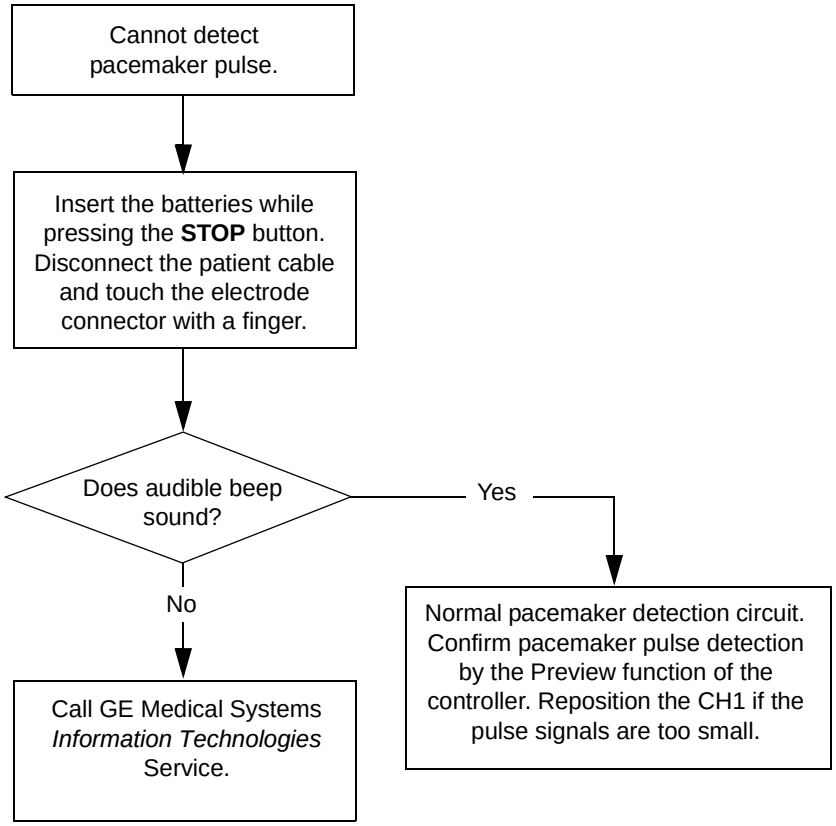
Record Start Date/Time is Initialized



Artifact on ECG Recording



Cannot Detect Pacemaker Pulse



3 SEER Light/SEER Light Extend Controller

For your notes

Component Names and Locations

Structure

Below are the names of each part on the SEER Light/SEER Light Extend Controller.

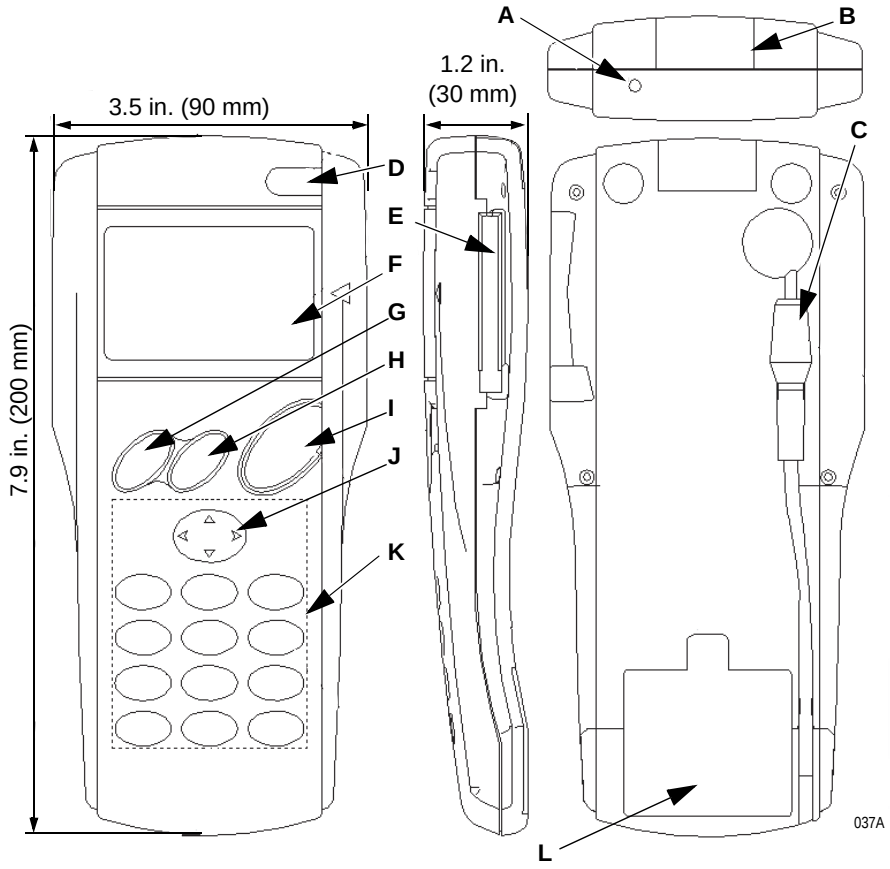


Table 4. Controller Parts List		
Item	**Name**	**Description**
A	input connector	Used to connect to the SEER Light recorder to check recording conditions. NOTE This feature is reserved for future use.
B	infrared terminal	Used to communicate with the SEER Light recorder. ■ Transfer the instructions to a SEER Light recorder before recording. ■ Receive ECG waveform recording data from a SEER Light recorder to preview.

Table 4. Controller Parts List (Continued)		
Item	**Name**	**Description**
C	data transfer cable	Used to transfer data from the SEER Light recorder. When not in use, store the cable in the guide on the backside panel.
D	power button	Used to turn the power on and off.
E	Holter card slot	Used to insert a Holter card.
F	LCD (liquid crystal display)	Displays operating conditions.
G	**F1** button	Used to enter the preview mode (wired or wireless) to confirm the quality of ECG recording.
H	**F2** button	Used to enter the data transfer mode to transmit data to a Holter card.
I	**F3** button	Used to start recording of the SEER Light recorder and to start transferring data to a Holter card.
J	set-up button (◂ ▴▾ ▸)	Used to select settings.
K	patient information entry buttons	Enter the patient's alphanumeric information.
L	battery cover	In direction indicated, slide the cover open and place four new alkaline AAA type batteries in the battery box.

Troubleshooting

Software Version

The software version of the SEER Light/SEER Light Extend Controller appears in the lower right hand corner of the display upon start up.

Self-Test

A self-test can be done on the following functions.

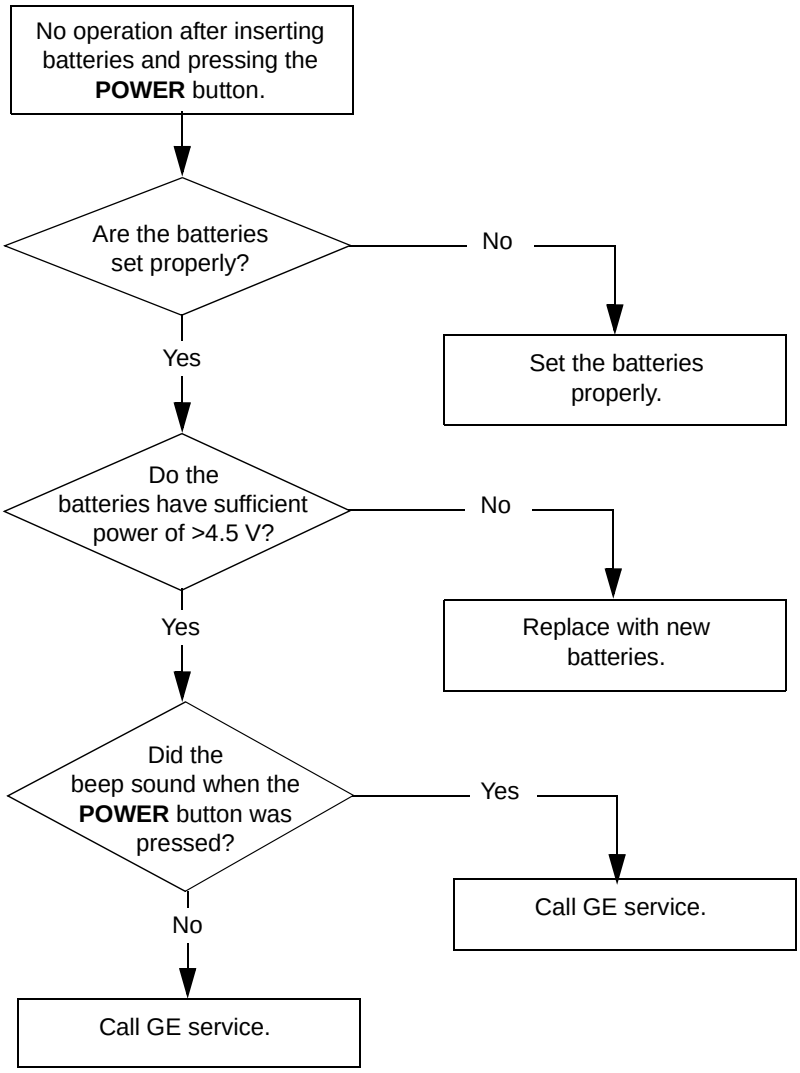
1. Button check mode:

- Enter the *Set-up Condition* display mode by pressing the **POWER** button and ▲ button simultaneously. Continue to hold the ▲ button while releasing the **POWER** button.
- Press the CLEAR button at the *Set-up Condition* display mode.
- Press the number **0** at the *Factory Settings* display mode.
  - The name of the button that was pressed will be displayed, and an audible sound will be heard when the respective button is pressed once.
    NOTE
    If the **ENTER** button is pressed three times the unit will enter into the LCD check mode.
  - Turn off the power to end this function test.

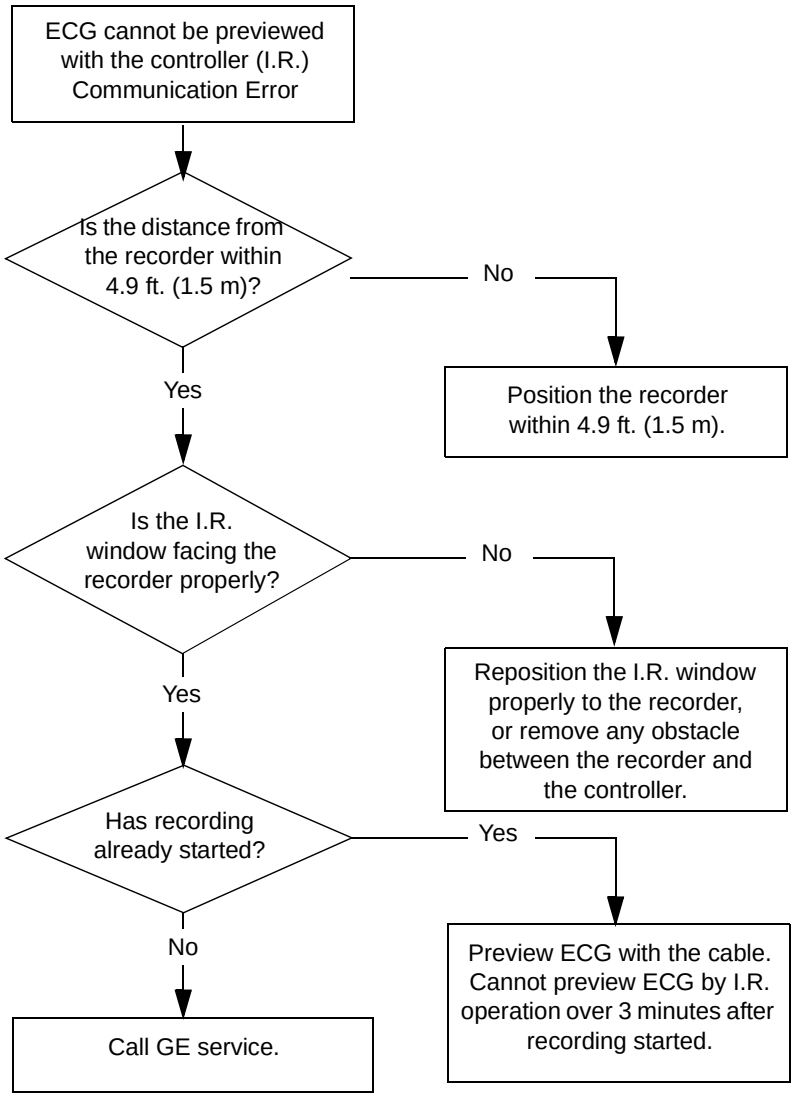
2. LCD check mode:

- Enter the *Set-up Condition* display mode by pressing the **POWER** button and ▲ button simultaneously. Continue to hold the ▲ button while releasing the **POWER** button.
- Press the CLEAR button at the *Set-up Condition* display mode.
- Press the number **0** at the *Factory Settings* display mode.
- In the button check mode display press the **ENTER** button three times, and the LCD display will appear darkened.
- Press the **POWER** button to end this function test.

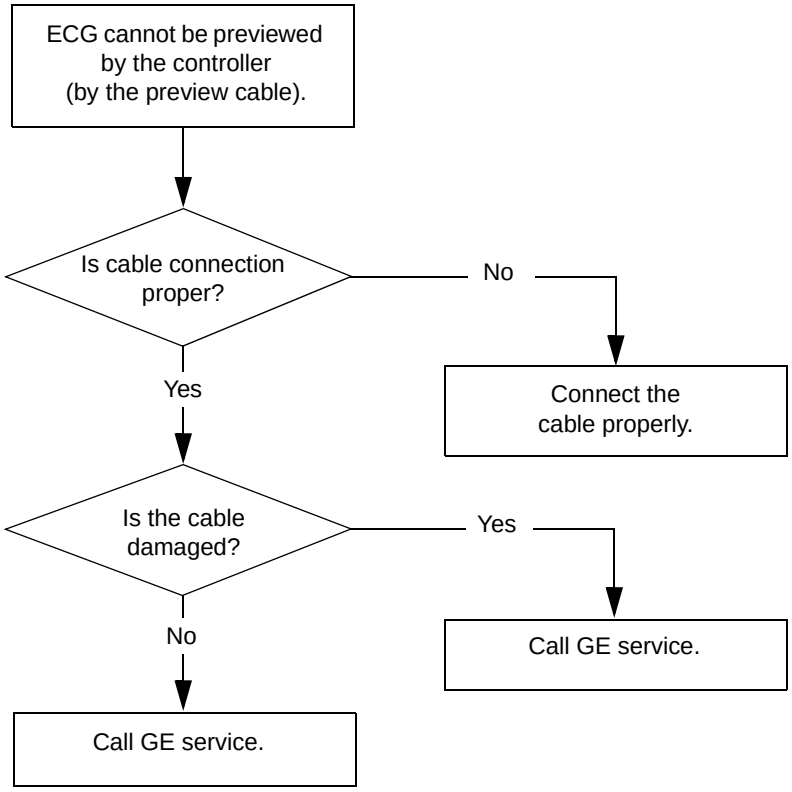
No Operation After Inserting Batteries and Pressing Power Button



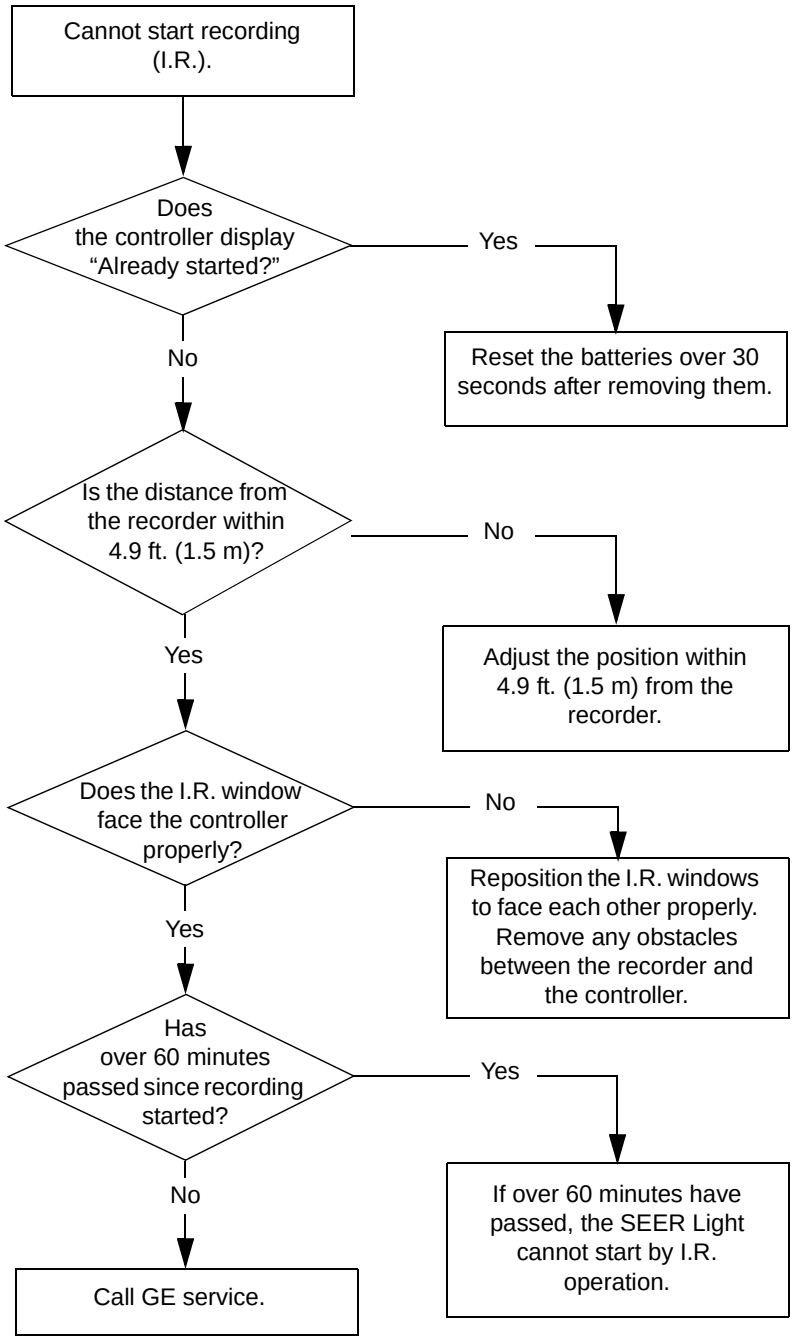
ECG Cannot be Previewed with the Controller (I.R.)



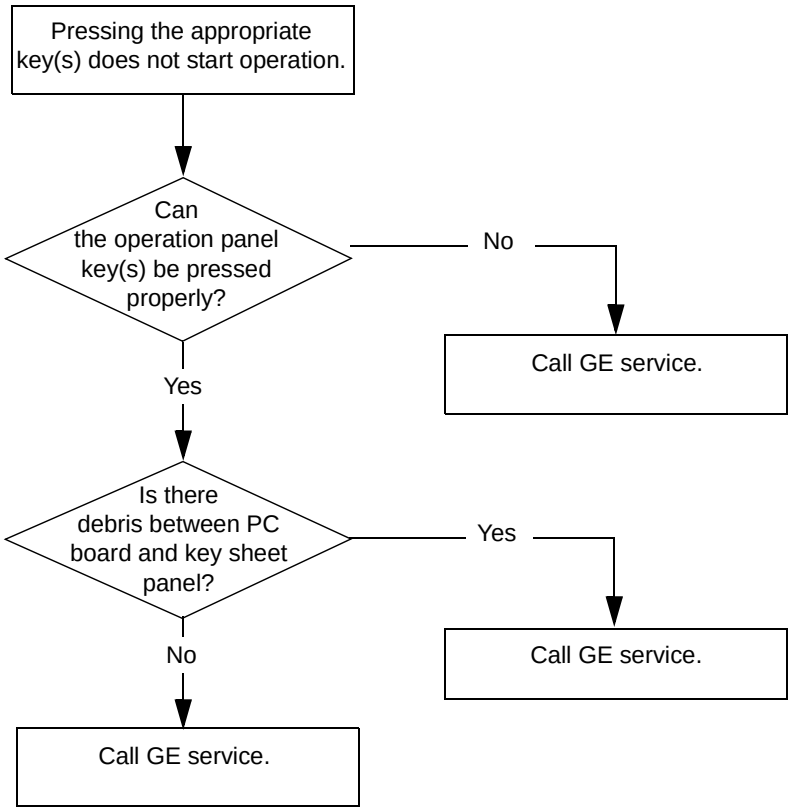
ECG Cannot be Previewed by the Controller (Cable)



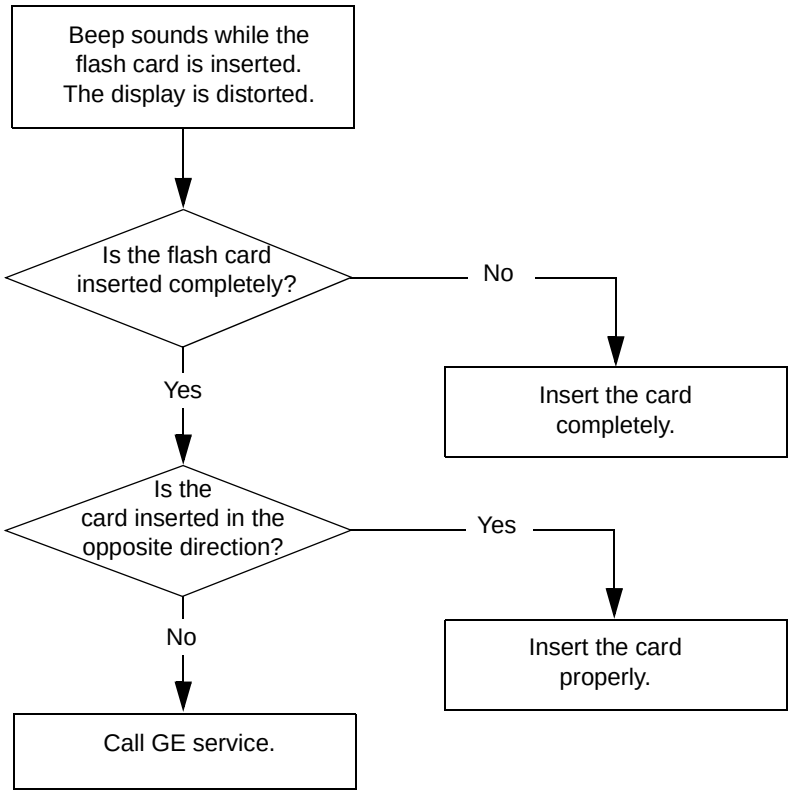
Cannot Start Recording (I.R.)



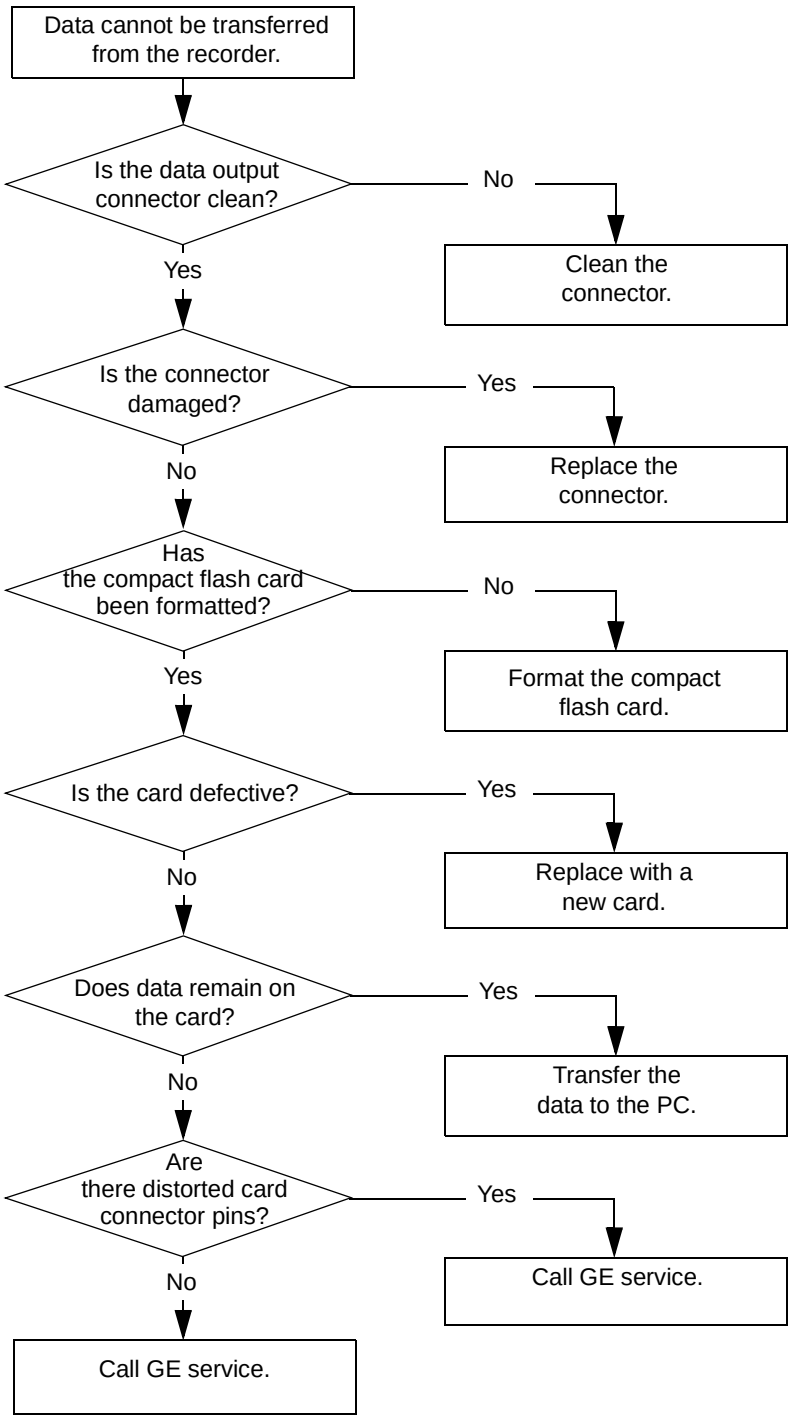
Pressing the Appropriate Key(s) Does Not Start Operation



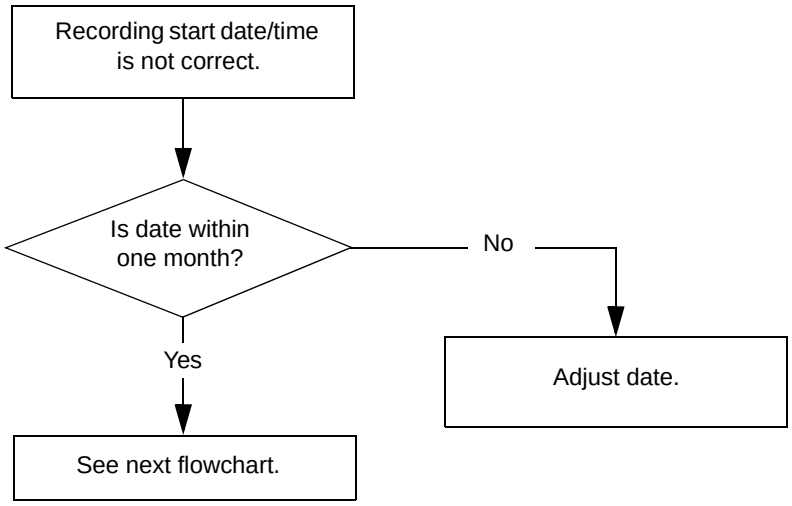
Beep Sounds While the Flash Card is Inserted



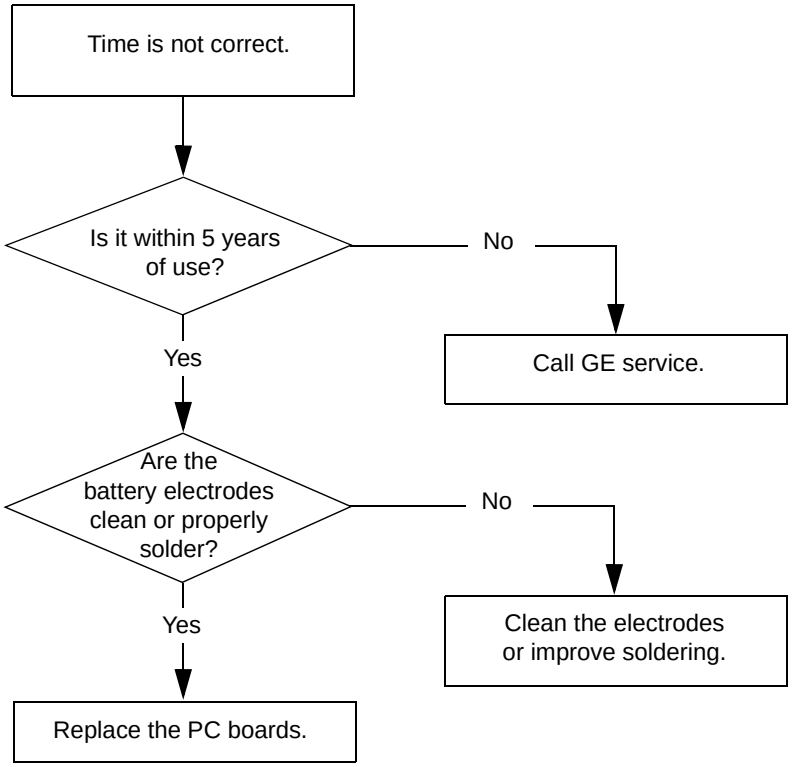
Data Cannot be Transferred from the Recorder



Recording Start Date/Time is Not Correct



Time is Not Correct



Inspection

Production process inspection sheet and inspection procedure.

				M. No.	
Product Model Name	SEER Light Controller	**Date (Start Inspection)**		**Approval**	**Audit**
Serial No.		**Board No.**			
Production Lot No.					
Program Version		**Production Specification**			
High temperature heat run (40 to 48 hours)		**Start and End Date**			

Inspection Before Heat-Run				**Staff**	
No.	**Item**	**Inspection Procedures**	**Result**	**Accept**	**Reject**
1	Appearance	Check paint condition, no scratches or stains on LCD and cases, clear wording, etc. Check connector pin of memory card for breaks, bends, etc.			
2	Power switch	Turn ON the power switch. Ensure there are buzzer sounds and the factory reset menu appears on the LCD. Confirm program version number.			
3	Set the time	Set year, month, date, and time. Turn off the Auto Power function for heat-run inspection.			
4	Key/LCD check	Under the inspection mode, ensure the key input and LCD display are normal, LCD backlight is lit, and the keys should not stick when pressed.			
5	Leakage current	Patient leakage current is less than 10 µA.	µA		
6	Power ON	Insert the batteries and confirm buzzer one time. Press start switch, confirm to buzzer and blink red LED. Then press stop switch and check buzzer sound and LED blinking are stopped.			
7	Start test	Ensure that the SEER Light is starting (straight line: 1.5 m).			
8	IrDA preview check	Use SEER Light, which is pre-installed with ECG wave, and ensure that the displayed waveform of 1 ch, 2 ch, and 3 ch are normal under the preview function.			
9	Preview check with cable	Use SEER Light, which is pre-installed with ECG wave, and ensure that the displayed analog waveform of 1 ch, 2 ch, and 3 ch are normal.			
10	Analog output	Using inspection controller with cable, confirm analog waveforms 1 ch, 2 ch, and 3 ch are normal.			
11	Transfer test	Connect the SEER Light. Ensure that data is transferred and that the data can be installed onto the Holter card.			
12	Check settings	Check the year, month, date, and time (with ±1 minute).			
13	Reset menu	Used to initialize the settings (menu).			
14	Auto Power Off function	Turn ON the power switch. Check that the power is automatically switched off if no operation for 15 minutes continuously.			
15	Appearance	Check painting conditions such as no scratches stains on LCD cases, clear wording, etc. Check serial plate and battery mark seal (version number) is securely affixed.	Ver. No.		
16	Supply current	Start at 6 V. The supply current is 60 ±6 mA.	mA		

No.	**Visual Inspection**	**Accept**	**Reject**	**No.**	**Visual Inspection**	**Accept**	**Reject**
1	Battery mark	1 place		4	Electrode welding	2 places	
2	Ribbon	1 place		5	LCD boards, connector cutting	1 place	
3	Board installation	1 place		6	Main body assembly	4 places	
Notes:							

4 SEER Light Connect

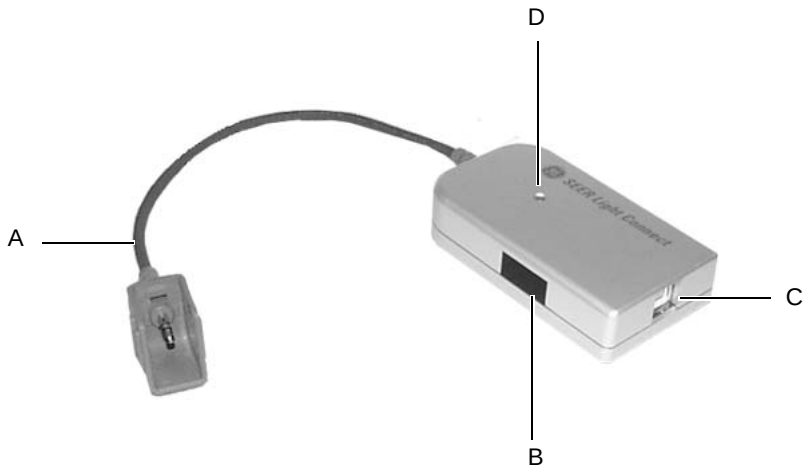
For your notes

Component Names and Locations

The SEER Light Connect is shown and described below. It is used as a direct interface connection between the recorder and the Holter analysis system. This device is also referred to as “the connect” in this document.

Structure

Below are the names of each part on the SEER Light Connect.



084A

	Name	Function
A	data transfer cable	Used to transfer data from the SEER Light recorder to the SEER Light Connect.
B	infrared terminal	Used to communicate with the SEER Light recorder. ■ Receives ECG waveform data from a SEER Light recorder to preview. ■ Transfers patient demographics to the SEER Light recorder. ■ Starts the SEER Light recorder.
C	USB Connection	Uses a USB patch cord to transfer data from the SEER Light Connect to the Holter analysis system.
D	LED indicator	■ Flashes when data is transferring. ■ Lights without flashing when a proper connection exists.

Troubleshooting

WARNING

LEAKAGE CURRENT—Electrical shock to patient could result from component failure and lack of power isolation.

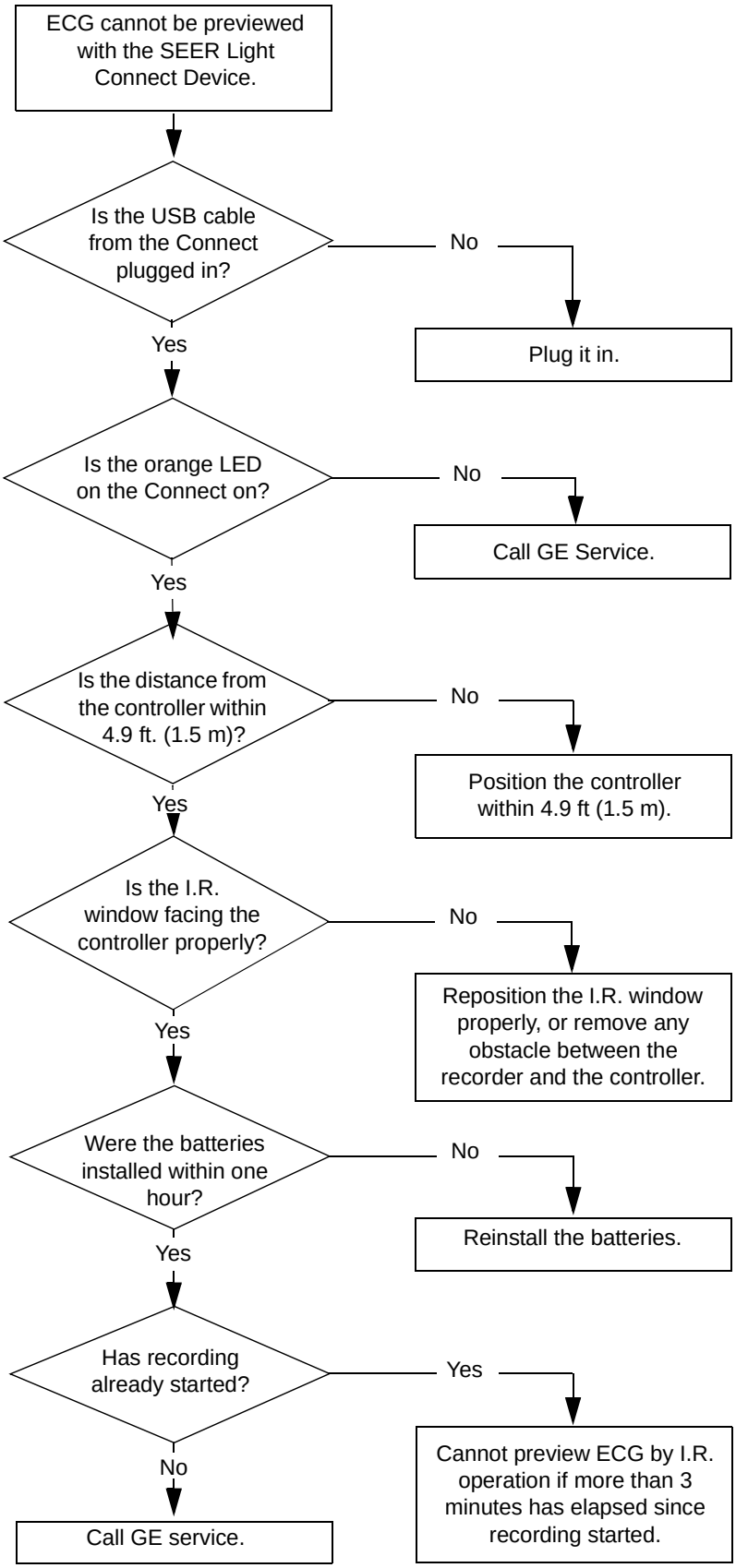
In the event this system is used in the patient vicinity, it must be configured in such a way that it and all of its electrically-connected peripheral devices are isolated from mains power to prevent excessive leakage current to the patient. This can be accomplished through the use of isolated mains power, or a medical grade isolation transformer (in compliance with UL 60601, CAN/CSA C22.2 No. 601.1, IEC 60601-1) with this system. All non-medical peripheral devices shall comply with IEC and ISO safety standards that are relevant to that equipment (i.e., IEC 60950, UL 60950).

Use of the SEER Light Connect device in the patient vicinity requires that these measures are observed.

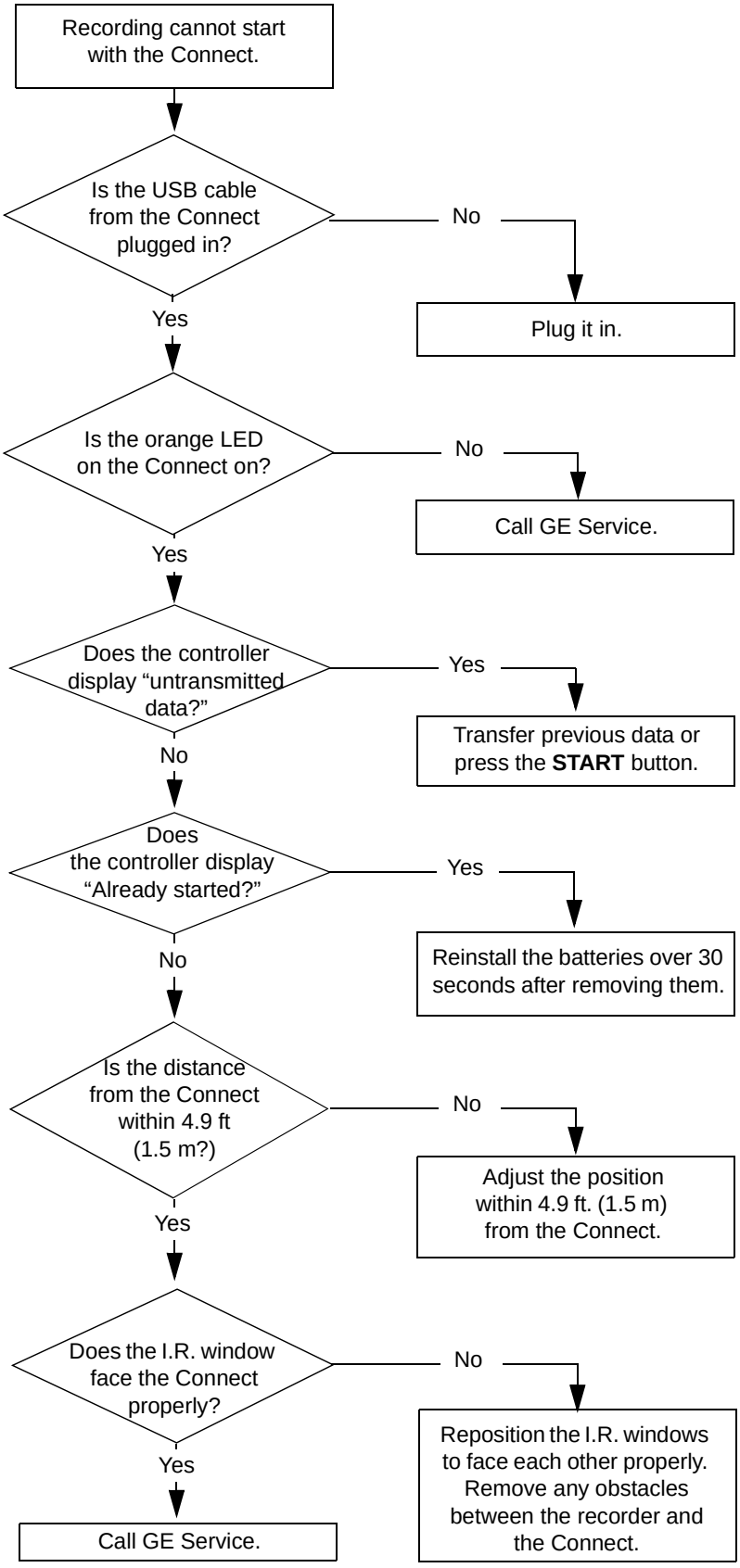
Software Version

To view the software version of the SEER Light Connect device, click *About* in the SEER Light Hookup window.

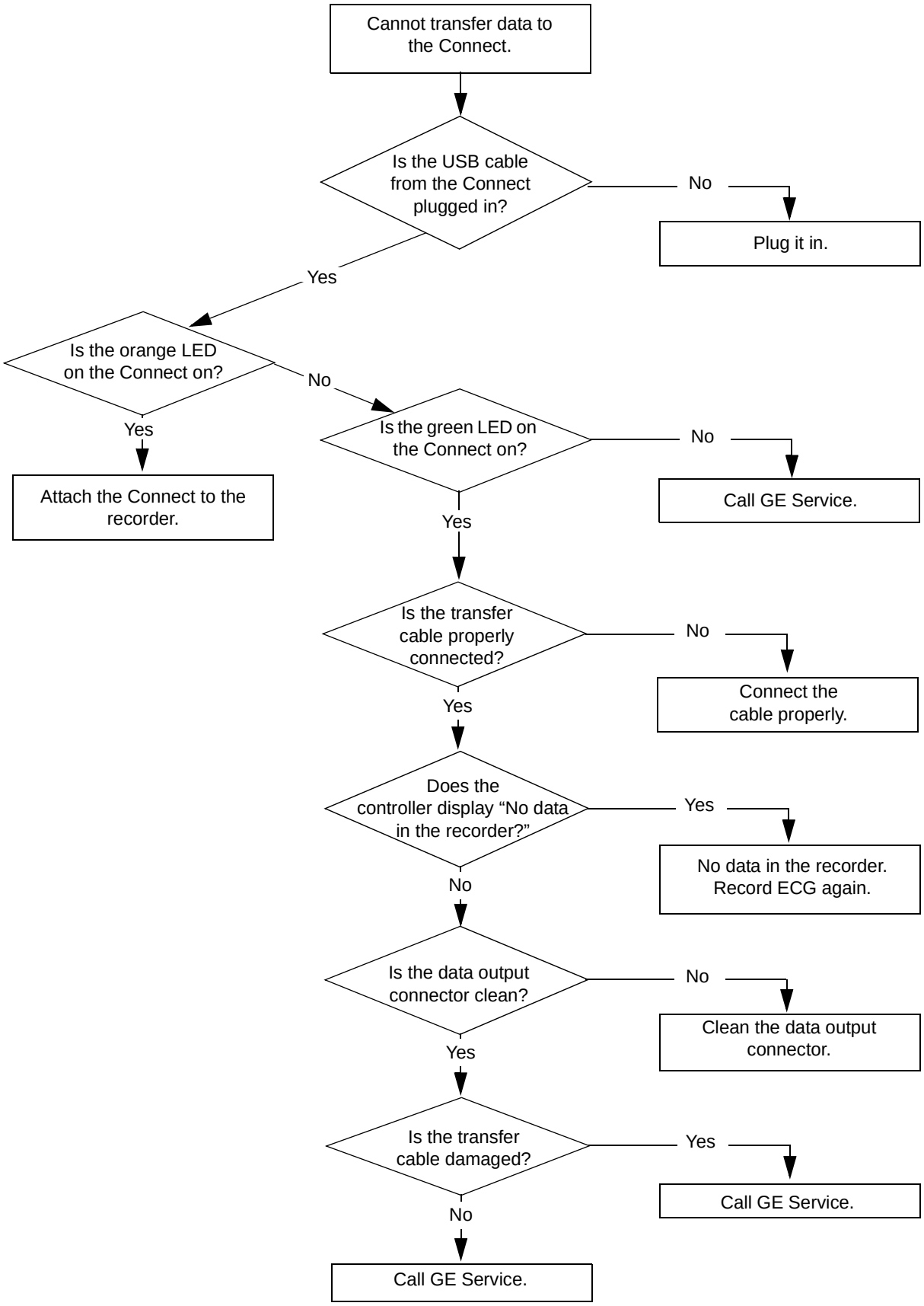
ECG Cannot Be Previewed with SEER Light Connect Device



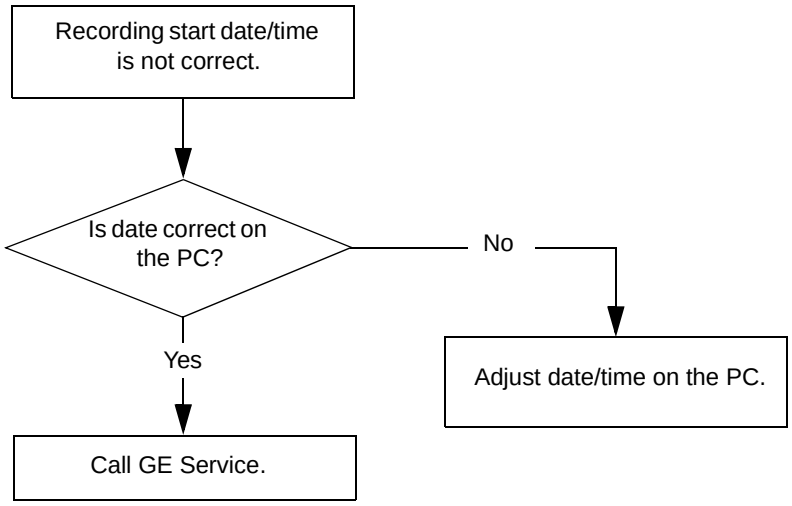
Recording Cannot Start with the SEER Light Connect Device



Cannot Transfer Data from the Recorder to the SEER Light Connect Device



Recording Start Date/Time is Not Correct



5 Maintenance

For your notes

Maintenance

Visual Inspection

Perform a visual inspection daily. If you notice any items that need repair, contact an authorized GE Medical Systems *Information Technologies* service person to make the repairs.

- Check the case and display screen for cracks or other damage.
- Regularly inspect all cords and cables for fraying or other damage.
- Inspect all plugs, cables, and connectors for bent prongs or pins.
- Verify that all cords and connectors are securely seated.
- Inspect controls for proper operation.
- Inspect the LCD to make sure all the segments function.

Precautions

Do not immerse any part of the equipment in water.

Do not use organic solvents, ammonia based solutions, or abrasive cleaning agents which may damage equipment surfaces.

NOTE

Remove the batteries before cleaning

Cleaning

Clean the exterior surfaces with a clean, soft cloth and a mild dishwashing detergent diluted in water.

- Wring the excess water from the cloth. Avoid contact with open vents, plugs, or connectors.
- Do not spray or spill fluid directly on the recorder/controller.
- Dry the surfaces with a clean cloth or paper towel.

Cleaning Frequency

With each new patient use, clean the SEER Light Recorder/Controller and the SEER Light recorder pouch, leadwires, and patient cable.

Storing the Recorder

When the SEER Light Recorder/Controller will not be in use for a period of time:

- Remove the batteries
- Disconnect and properly store any patient cables.
- Memory card may remain in the recorder.

Maintenance/Repair Log

Unit Serial Number:		
Institution Name:		
Date	**Maintenance/Repair**	**Technician**

Maintenance/Repair Log

Unit Serial Number:		
Institution Name:		
Date	**Maintenance/Repair**	**Technician**

Appendix A — Technical Specifications

For your notes

Technical Specifications

SEER Light/SEER Light Extend Ambulatory Recorder

The following table lists the specifications for the SEER Light/ SEERLight Extend Ambulatory Recorder.

Description	Specification
Dimensions	Height: 54 mm (2.1 in) Width: 85 mm (3.35 in) Depth: 15 mm (0.6 in)
Weight	72 g (2.5 oz) including batteries
Operating temperature	0 to 45°C (32 to 113°F)
Operating humidity	10 to 95% relative humidity (no condensation allowed)
Storage temperature	–20 to 65°C (-4 to 149°F)
Storage humidity	5 to 90% relative humidity (no condensation allowed)
Material	Aluminum ABSPC (main body)
Recording time	within 24 hours — SEER Light within 48 hours — SEER Light Extend
Recording method	Digital memory
Power supply	2 x AAA Alkaline battery
Recording channel	ECG: 3 channels Movement level: 1 channel Pacemaker pulse: 1 channel
Pacemaker detection channel	CH1
Memory	32 Mbyte
Input level	16 mV p-p
A/D converter	10 bit, 8 ms sampling
Frequency response	0.05 to 40 Hz
Safety	Type B
Input impedance	Over 10 M Ohms
Time data backup	Within 1 week (when started by the Cardy 301 recorder)

SEER Light Ambulatory Controller

The following table lists the specifications for the SEER Light Ambulatory Controller.

Description	Specification
Dimensions	Height: 200 mm (7.9 in) Width: 90 mm (3.5 in) Depth: 25 mm (1.2 in)
Weight	285 g (9.9 oz) including batteries
Operating temperature	10 to 35°C (50 to 95°F)
Operating humidity	10 to 95% relative humidity (no condensation allowed)
Storage temperature	–20 to 65°C (-4 to 149°F)
Storage humidity	5 to 90% relative humidity (no condensation allowed)
Power supply	4 x AAA Alkaline battery
Vibration endurance	Operation: 0.5 G (10 to 20 Hz) Non operation: 3.0 G (100 to 300 Hz)
Data transfer medium	Compact flash card
Time accuracy	± 60 seconds per month

SEER Light Connect Device

The following table lists the specifications for the SEER Light Connect device.

Description	Specification
Dimensions	Height: 13 mm (.51 in) Width: 90 mm (3.54 in) Depth: 51 mm (2.01 in) Cable length: 260 mm (10.24 in)
Weight	87 g (.19 lbs)
Operating temperature	10 to 35°C (50 to 95°F)
Operating humidity	10 to 95% relative humidity (no condensation allowed)
Storage temperature	–20 to 65°C (-4 to 149°F)
Storage humidity	5 to 90% relative humidity (no condensation allowed)
Power supply	DC 5V
Recorders	SEER Light Recorder SEER Light Extend Recorder

For your notes

Appendix B — Electromagnetic Compatibility

For your notes

Electromagnetic Compatibility (EMC)

Changes or modification to this system not expressly approved by GE Medical System could cause EMC issues with this or other equipment. This system is designed and tested to comply with applicable regulation regarding EMC and needs to be installed and put into service according to the EMC information stated as follows.

WARNING
Use of portable phones or other radio frequency (RF) emitting equipment near the system may cause unexpected or adverse operation.

WARNING
The equipment or system should not be used adjacent to, or stacked with, other equipment. If adjacent or stacked use is necessary, the equipment or system should be tested to verify normal operation in the configuration in which it is being used.

Guidance and Manufacturer's Declaration – Electromagnetic Emissions

The SEER Light recorder and controller are intended for use in the electromagnetic environment specified below. It is the responsibility of the customer or user to ensure that the SEER Light recorder and controller are used in such an environment.

Emissions Test	Compliance	Electromagnetic Environment - Guidance
RF emissions CISPR11	Group 1	The equipment uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR11	Class A	The equipment is suitable for use in all establishments including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic Emissions EN 61000-3-2	Class A	
Voltage fluctuations/ Flicker emissions EN 61000-3-3	Complies	

Guidance and Manufacturer's Declaration – Electromagnetic Immunity

The SEER Light recorder and controller are intended for use in the electromagnetic environment specified below. It is the responsibility of the customer or user to ensure that the SEER Light recorder and controller are used in such an environment.

Immunity Test	EN 60601 Test Level	Compliance Level	Electromagnetic Environment - Guidance
Electrostatic discharge (ESD) EN 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 EN 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	Not applicable. The SEER Light recorder and controller are not powered by Mains power.
Surge EN 61000-4-5	± 1 kV differential mode ± 2 kV common mode	± 1 kV differential mode ± 2 kV common mode	Not applicable. The SEER Light recorder and controller are not powered by Mains power.
Voltage dips, short interruptions and voltage variations on power supply input lines EN 61000-4-11	<5% U_t (>95% dip in U_t) for 0.5 cycles 40% U_t (60% dip in U_t) for 5 cycles 70% U_t (30% dip in U_t) for 25 cycles <5% U_t (>95% dip in U_t) for 5 sec	<5% U_t (>95% dip in U_t) for 0.5 cycles 40% U_t (60% dip in U_t) for 5 cycles 70% U_t (30% dip in U_t) for 25 cycles <5% U_t (>95% dip in U_t) for 5 sec	Not applicable. The SEER Light recorder and controller are not powered by Mains power.
Power frequency (50/60 Hz) magnetic field EN 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristics 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.

Guidance and Manufacturer's Declaration – Electromagnetic Immunity

The SEER Light recorder and controller are intended for use in the electromagnetic environment specified below. It is the responsibility of the customer or user to assure that the SEER Light recorder and controller are used in such an environment.

Immunity Test	EN 60601 Test Level	Compliance Level	Electromagnetic Environment – Guidance
			Portable and mobile RF communications equipment should not be used closer to any part of the equipment, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. **Recommended separation distance**
Conducted RF EN 61000-4-6	3 Vrms 150 KHz to 80 MHz	3 V rms	$d = 1.2\sqrt{P}$
Radiated RF EN 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m	$d = 1.2\sqrt{P}$ 80 MHz to 800 MHz $d = 2.3\sqrt{P}$ 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: 

NOTE 1: At 80 MHz and 800 MHz, the higher frequency range applies.
NOTE 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by reflection from structures, objects, and people.

[a]Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radio, 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 re-orienting or relocating the equipment.

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

Recommended Separation Distances

The table below provides the recommended separation distances (in meters) between portable and mobile RF communication equipment and the SEER Light recorder and controller.

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

	Separation Distance in Meters (m) According to Frequency of Transmitter			
Rated Maximum Output Power of Transmitter in Watts	**150 kHz to 80 MHz outside ISM bands** $d = 1.2\sqrt{P}$	**150 kHz to 80 MHz in ISM bands** $d = 1.2\sqrt{P}$	**80 MHz to 800 MHz** $d = 1.2\sqrt{P}$	**800 MHz to 2.5 GHz** $d = 2.3\sqrt{P}$
0.01	0.12	0.12	0.12	0.23
0.1	0.38	0.38	0.38	0.73
1	1.2	1.2	1.2	2.3
10	3.8	3.8	3.8	7.3
100	12	12	12	23
NOTE 1: At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.				

For transmitters rated at a maximum output power not listed above, the recommended separation distance [d] in meters (m) can 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

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

Compliant Cables and Accessories

WARNING
The use of accessories, transducers and cables other than those specified may result in increased emissions or decreased immunity performance of the equipment or system.

The table below lists cables, transducers, and other applicable accessories with which GE Medical Systems claims EMC compliance.

NOTE

Any supplied accessories that do not affect EMC compliance are not included.

Part No	Description	Maximum Lengths
2008750-002	SEER Light 64MB Compact Flash	NA
2008751-001	Compact Flash to PC Adapter	NA
2008594-00X	SEER Light Patient Cable	1m
3801-005	Battery Alkaline 1.5V AAA	NA

For your notes

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