Braemar, Inc.

ER910, 920
And
ER910, 920 AF

Arrhythmia Event Monitor

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

Braemar Limited Warranty

Braemar products are warranted to be free from manufacturing and material defects for a period of one (1) year from the date of shipment from Braemar to the original purchaser.

Excluded from this warranty are expendable supply items including, but not limited to, electrodes, lead wires, patient cables and batteries. This warranty does not apply to any product which Braemar determines has been modified or damaged by the customer.

Except for the express warranties stated above, Braemar disclaims all warranties including implied warranties of merchantability and fitness. The stated express warranties are in lieu of all obligations of liabilities on the part of Braemar for damages, including but not limited to, special indirect or consequential, arising out of or in connection with the use or performance of Braemar products.

Any action for breach of warranty shall be commenced within one (1) year of said breach or be forever barred. Any repairs made to the product which are not covered by the warranty shall be billed to the customer.

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Table of Contents

Overview

The ER910/920 and ER910/920 AF Event Monitors are battery operated, solid state, looping event recorders designed to record symptomatic heart arrhythmias. Event recording is activated by the patient or by automatic event detection.

The ER910 (1 channel) and ER920 (2 channel) event monitors provide up to 30 minutes of total recording time and will operate as a simple looping event recorder for a minimum of 30 days with two AAA Alkaline batteries. They offer multiple programmed recording options allowing the physician to determine their own parameters. Selectable parameters include number of events, pre-event time, post-event time, audible operation, pacemaker detection, and arrhythmia detection.

The ER910/920 Event Monitors are enhanced with Arrhythmia Detection firmware which will capture and automatically record asymptomatic, infrequent, or elusive heart arrhythmia events such as Bradycardia, Tachycardia, and Pause. The ER910/920 AF includes all of these features and in addition, Atrial Fibrillation.

Once an event is recorded, patients may transmit their ECG transtelephonically.

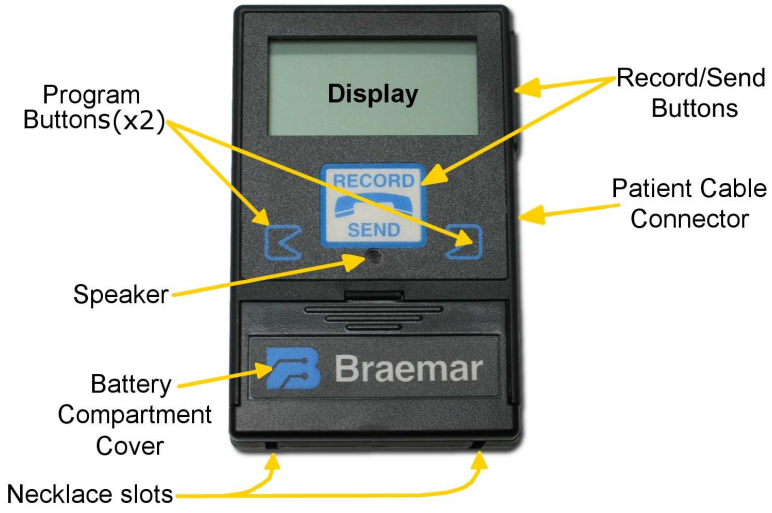
Precautions

A. Patient leads must be removed from electrodes before defibrillation.
B. Observe local laws for disposal of alkaline batteries.
C. Do not leave the batteries in the Monitor when it is not in use. Damage from corrosion could result.
D. Patient should be instructed to avoid close proximity to heavy electrical equipment or other sources of electromagnetic interference.
E. Use of rechargeable batteries is not recommended.
F. Do not use cellular phone to transmit patient data.
G. Monitor is not for infant use.
H. No automatic analysis algorithm can replace data review by a qualified physician. Review and confirmation of analysis results is required.

Additional equipment classification information as required in EN 60601-1

A. EQUIPMENT not suitable for use in the presence of a FLAMMABLE ANAESTHETIC MIXTURE WITH AIR of WITH OXYGEN OR NITROUS OXIDE
B. IPX0 Ordinary Equipment (enclosed equipment without protection against ingress of water)
C. Internally Powered Equipment
D. Mode of Operation - Continuous Operation

Monitor Components



Batteries	Two 1.5V AAA Alkaline. Insert into battery compartment observing polarity symbols.
Belt clip	To attach, snap the Monitor into the belt clip with Patient Cable oriented up and the display facing out.
Necklace	To attach, remove battery cover, insert necklace T's into slots in case. Replace battery cover.
Patient Cable	To adjust, move plastic slip rings up or down to keep leads together. To lengthen, pull leads apart.

Setup Steps

This manual is designed to allow a technician to follow the instructions page by page to setup the ER910/920 and ER910/920 AF Monitor. Here is the general layout:

1. Connect leads and electrodes to patient.
2. Prepare Monitor for recording.
   A. Choose/Setup program you want to use.
   B. Erase all previous events.
3. Connect Patient Cable to Monitor.

Electrode Application and Placement

For each electrode lead wire:

1. Snap the electrode onto the lead wire.
2. Remove the protective backing from the adhesive side of the electrode.
3. Apply the electrode to the patient's skin per Electrode Placement diagram in this manual or as instructed by the physician.

Notes:

A. You must use a Patient Cable that the Monitor is able to recognize. As an example, you cannot use a 2 channel cable with a 1 channel Monitor.

B. It is recommended that trained medical personnel instruct the patient in the proper application of electrodes.

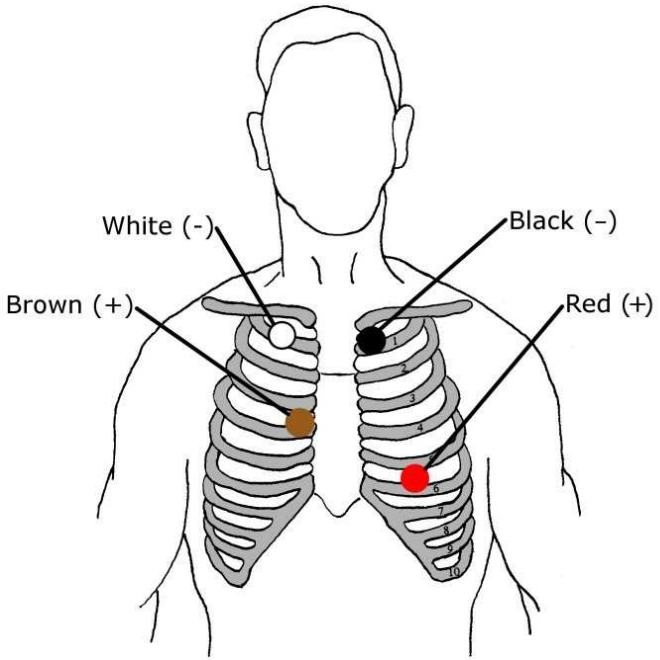
C. Use good quality long term electrodes. Braemar recommends the use of low impedance Holter electrodes. Instruct patient to apply fresh electrodes regularly. (Usually on a daily basis.)

D. Proper preparation of the patient's skin is absolutely essential for obtaining a quality ECG recording. The skin surface where the electrodes will be placed should be cleaned with alcohol, allowed to dry, and abraeded.

E. Any loose electrode needs to be replaced.

1 and 2 Channel (4 Lead) Electrode Placement

This is a typical electrode placement. Refer to Analysis System software and the physician for recommended positioning.



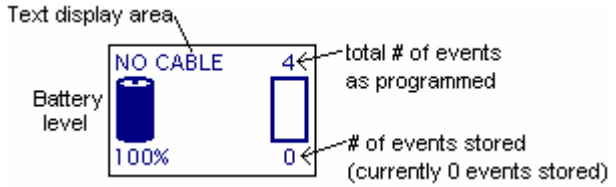
1 and 2 Channel Electrode Placement
Use only Channel 1 if you have a single channel cable.

Channel 1 = White and Red (V5 vector)
Channel 2 = Black and Brown (V1 vector)

Monitor Preparation

1. **General setup: Remove the Patient Cable if it is connected to the Monitor.** Open the battery compartment by sliding battery door downward. Install two fresh AAA Alkaline batteries. Observe proper battery polarity. The Monitor will sound rising tones after completion of power up. After a few seconds, the display will show the battery level and number of events stored.

   The battery level should be near 100%. The number of events stored does not matter at this point.



2. **Enter programming mode:**
   A. Push and hold **both** program buttons on the front of the Monitor for **two seconds** until an audible tone is heard.
   B. The Monitor will then display an information screen. Press the RECORD/SEND button to get to the programming mode screen.

General notes:

- **A. To leave the programming mode without saving your changes, remove the batteries.**
- **B. If you enter the programming mode, events stored in the Monitor are always erased when the Monitor restarts and a Patient Cable is connected.**
- **C. All previously stored events and settings are erased when you select EXIT on the last programming screen.**
- D. The Monitor always highlights the DEFAULT option when entering programming mode even if the CUSTOM option was last used. This is only visual. Whatever option was used for a previous recording will continue to be used.
- E. Previously saved settings are displayed when in the CUSTOM option.
- F. Factory default settings are indicated by a " ⋕ " in front of the setting.
- G. Use the program buttons to change the program settings and press the RECORD/SEND button to confirm the setting you have chosen. Pressing RECORD/SEND also advances the screen to the next program setting.
- H. Lead loss detection is on all the time.
- I. The number of channels a Patient Cable contains will determine the number of channels the Monitor will record.

Note about Arrhythmia and AFIB detection:

- A. To change Arrhythmia and AFIB settings you must access the CUSTOM program option.
- B. The Arrhythmia and AFIB algorithms can be used independently of each other.
- C. Although the device detection algorithms are very sophisticated, there is no guarantee that the device will catch all episodes of arrhythmia. For maximum efficacy, use the most sensitive settings.

Notes about sound:

- A. Lead loss sound overrides the POST-EVENT SOUND setting.
- B. If the Monitor has lead loss during a recording, the Monitor will produce an audible sound of the event until the recording is complete. You can mute this sound by using the AUDIO setting **after** the recording is complete.
- C. The AUDIO setting can only be accessed **before or after** an event is recorded. **Trying to access the AUDIO setting during a recording will cause the recording to stop.**
- D. The AUDIO setting controls many of the sounds the patient will hear while wearing the Monitor and may be turned ON or OFF. The AUDIO screen can be accessed during normal monitoring conditions (Patient Cable inserted) by pressing only one of the programming buttons for two seconds. The AUDIO screen will exit after 10 seconds of inactivity.
- E. The AUDIO setting defaults to ON every time the Monitor is powered up.
- F. The AUDIO setting defaults to ON every time the Patient Cable is removed. This is to enable the Monitor to send events to the receiving center.
- G. Table of sound settings:

(number indicates importance, 1st, 2nd, 3rd)

	Screen Setting ↓	
Monitor Sound ↓	POST-EVENT	AUDIO
Power on tones	NA	NA
Cable detect	NA	NA
Auto event record	2nd	1st
Manual event record	2nd	1st
Prog button press	NA	1st
Phone ring at end of a recording	NA	1st
Phone ring for memory full	NA	1st
Lead loss during recording	LL overrides	1st

3. **Choose program:**

   Choose either the DEFAULT or CUSTOM option. The DEFAULT option only allows you to change the Contrast of the display. The CUSTOM option allows changes to all of the following settings.

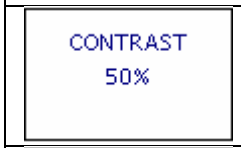
   Note:

   A. Factory default settings in the Monitor are indicated by a "⌘" in front of the setting.

   B. To see the default values for the Monitor, enter the programming mode and choose DEFAULT. The Monitor will restart. Enter the programming mode again and choose CUSTOM. All the values displayed will be the defaults. There is space available on the next pages to write the default of the Monitor.

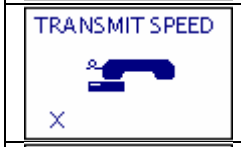
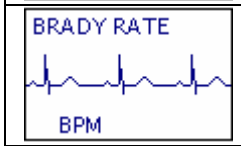
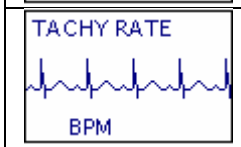
   C. Choosing the DEFAULT option will program the monitor with the factory default values, erase previous patient data, and restart the monitor.

Programming settings:

Display	Option	Description
	DISPLAY CONTRAST Default = NA	Set the contrast of the display. A higher number will cause darker text on the screen.
	PRE-EVENT TIME Default = 60 sec	Seconds of ECG data stored before event activation time. 300 seconds total can be split between Pre and Post events. (minimum of 5 sec)
	POST-EVENT TIME Default = 30 sec	Seconds of ECG data stored after event activation time. (minimum of 5 sec)
	# OF EVENTS Default = 5	Total number of events the Monitor will store. The maximum number allowed is dependent on Pre and Post Event times.

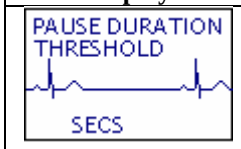
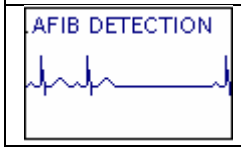
Continue on next page

User Defined options continued

Display	Option	Description
	POST-EVENT SOUND Default = ON	ON = Sound on while recording during the Post-Event time. OFF = Sound off while recording an event. See Notes about sound for additional information.
	HOURLY REMINDER Default = ON	ON = Ring every hour when an event is stored in memory. OFF = Do not remind patient an event is stored in memory.
	PREVIEW TIME Default = 10 sec	The number of seconds the ECG signal is displayed for each channel when a Patient Cable is inserted.
	TRANSMIT SPEED Default = 3X	The speed used for transmission of data to the receiving center.
	PACEMAKER DETECTION Default = OFF	Turn Pacemaker stimulus detection ON/OFF
	ARRHYTHMIA DETECTION Default = ON	Turn Arrhythmia Detection ON/OFF. When ON, The Brady Rate, Tachy Rate, and Pause Duration Threshold can be set.
	BRADY RATE Default = 45 bpm	(Arrhythmia Detection must be on to access this function)
	TACHY RATE Default = 140 bpm	(Arrhythmia Detection must be on to access this function)

Continue on next page

User Defined options continued

Display	Option	Description
	PAUSE DURATION THRESHOLD Default = 3.0 sec	(Arrhythmia Detection must be on to access this function)
	AFIB DETECTION Default = ON	-ER910/920 AF devices only-
	EXIT OR REVIEW PROGRAM	See step about leaving programming mode for information.

4. **Leave programming mode and erase events:**

   Choose EXIT from the last programming mode screen and press the RECORD/SEND button. The Monitor will restart

   Note:

   A. Choosing EXIT will erase all stored events and save your settings over the top of previous program settings. Choosing REVIEW will allow you to changes program settings.

   Alternate way to erase events:

   If you don't want to enter the programming mode, you can also erase events by the following sequence.

   A. Remove the Patient Cable.

   B. Hold the RECORD/SEND button for **two seconds** until audible tone is heard. You will hear the transmission of any events stored in the Monitor. At the end of the transmission you will hear a falling tone and the Monitor will display STOPPED in the upper left.

   C. Inserting the Patient Cable at this time will erase all events and restart the Monitor.

5. **Connect the patient:**

   A. At this time, the patient leads should be connected to the electrodes and the electrodes should be connected to the patient.

   B. Insert the Patient Cable into the Monitor.

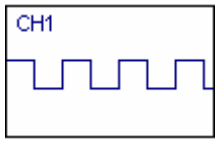
   Notes:

   - If the patient is connected correctly, the Monitor will sound one beep for a single channel cable or two beeps for a two channel cable

   C. View the display just after the Patient Cable is connected. It will show the signal from each channel of the cable.

   Notes:

   - There will be an accompanying beep for the channel number displayed.
   - The Monitor will not respond to any button presses during the preview time.
   - A square wave will continue to be displayed if there is not a good connection to the patient. A good ECG signal must be found before the Monitor will start to look for events.



6. **The Monitor is ready to record events.**

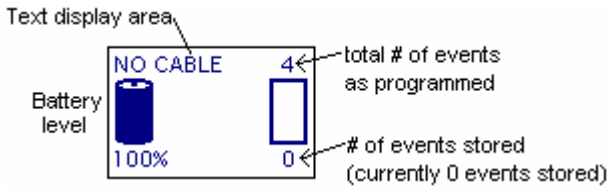
   A. The general settings of the Monitor are displayed during operation by the number of dots after the word "MONITORING".

Display	Setting
MONITORING	No Arrhythmia or AFIB
MONITORING**.**	Arrhythmia only
MONITORING**..**	Arrhythmia and AFIB
MONITORING**…**	AFIB only

Patient Operating Instructions

The Monitor should be ready when you receive it from the technician. If there are any problems, refer to the Troubleshooting section.

Display overview:



To Hookup:

1. Snap lead wires onto electrodes first, then apply electrodes according to physician instructions.
2. **Reapply fresh electrodes daily.**
3. Insert the Patient Cable into the Monitor.

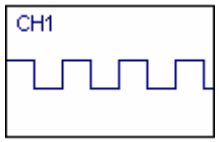
   Notes:

   A. Depending on the cable, there should be a single or double beep that indicates a good patient connection. If no beep is heard, double check cable connections.

   B. Viewing the display just after the Patient Cable is connected will show the signals from each of the channels. There will also be an accompanying beep for the channel number displayed.

   C. The Monitor will not respond to any button presses during the preview time.

   D. A square wave will continue to be displayed if there is not a good connection to the patient. A good ECG signal must be found before the Monitor will start to look for events.



4. The Monitor is now looping and ready to record.

To Record: Events to be recorded will be described by the physician.

1. Press the RECORD/SEND button for **two seconds** until an audible tone is heard, then release.

   Notes:

   A. There are two RECORD/SEND buttons, you only need to push one of them for two seconds to activate the Monitor.

   B. To stop a recording, press the RECORD/SEND button again for **two seconds.**

   C. "RECORDING" will flash in the upper left hand corner of the display.

2. Hold as still as possible during recording but continue breathing.
3. The recording is complete and ready to send when a phone ring is heard from the Monitor.

   Notes:

   A. The display will also show that an event is stored in the Monitor. If the memory is full, follow instructions To Send and Erase Events

   B. You can mute many of the sounds from the Monitor by pressing only one of the programming buttons for two seconds. This will show a screen that allows you to select whether AUDIO for the Monitor is turned ON or OFF.

   C. The AUDIO setting defaults to ON every time the Monitor is powered up.

   D. The AUDIO setting defaults to ON every time the Patient Cable is removed. This is to enable the Monitor to send events to the receiving center.

Automatic Record:

If Arrhythmia Detection is ON and an event is detected, the Monitor will beep at the start of the recording. The recording is complete and ready to send when a phone ring is heard from the Monitor. An event will also show on the display.

A. The last event location is always reserved for a manual recording.

To Send:

1. Remove the Patient Cable from the Monitor.
2. Set the Monitor on a flat surface with the speaker hole up.
3. Call the receiving center.
   A. Cell phones and VOIP phones **do not** work for the transmission.
4. Follow receiving center instructions.
   A. When instructed, place the telephone **mouthpiece** over the Monitor speaker hole.

   B. Push the RECORD/SEND button for **two seconds**. The Monitor will make audible tones and "SENDING" will be shown in the upper left hand corner of the display while the recording is being sent.
      - A falling tone will sound when the transmission is complete and "STOPPED" or "MEMORY FULL" will be shown in the upper left hand corner of the display.
      - Pressing RECORD/SEND for two seconds during transmission will abort the transmission. Pressing RECORD/SEND again will re-send the recording.
5. When instructed that the events have been sent successfully, it is OK to erase events by reinserting Patient Cable. (The Monitor will restart and you will then hear a rising tone.)

Erase Events:

1. Complete the "To Send" section above first.
2. Insert the Patient Cable. The Monitor will restart and emit a rising tone.
   A. The Monitor will display each ECG signal for 5-30 seconds and then return to the main monitoring screen.
   B. The number of events on the right hand side should display 0.
3. The Monitor is now looping and ready to record new events.

Troubleshooting (page 1 of 2)

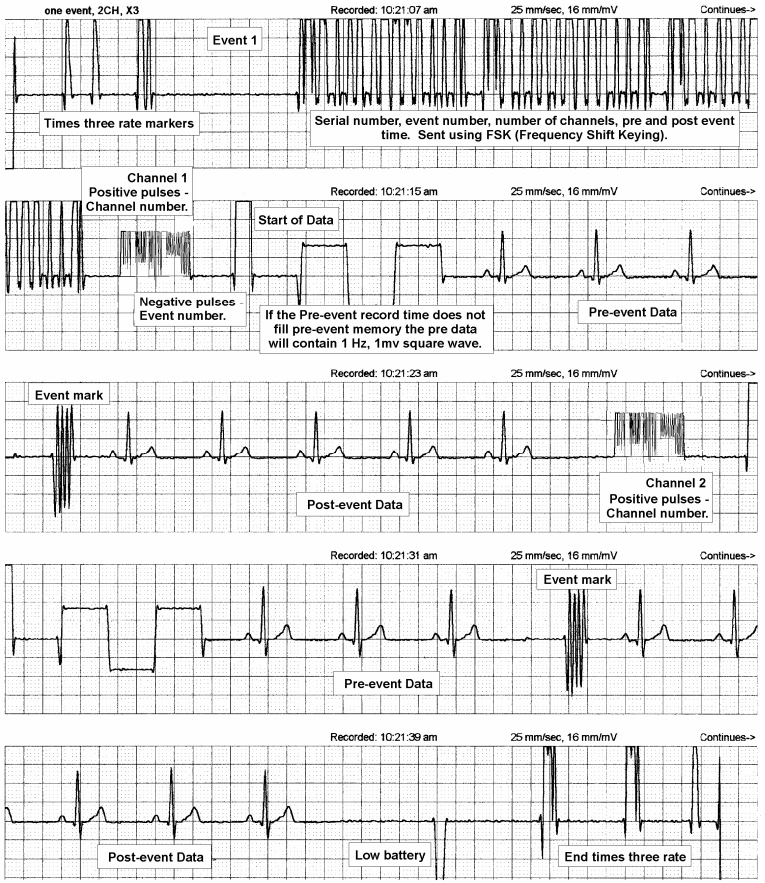
Symptom	Recommended Solution
No display	Ensure batteries are inserted with correct polarity.
Cannot enter programming mode	The Patient Cable must be removed and the batteries installed. Then follow instruction in manual.
Cannot access AUDIO setting, Patient wants to mute Monitor.	A good connection must be made from the Monitor to the patient to be able to access the AUDIO setting.
	While monitoring, press and hold **only one** of the programming buttons for two seconds to access the AUDIO setting.
	AUDIO setting cannot be accessed during a recording. Wait until end of recording, then access AUDIO screen.
No phone ring at end of recording	The AUDIO setting is turned on which mutes most sounds.
No beep when inserting Patient Cable	Ensure patient electrodes/leads are connected to patient properly. Is the Patient Cable damaged in some way?
	Ensure Patient Cable is inserted completely.
	Patient Cable has more channels than Monitor can use. Match the number channels for the cable and Monitor.
Will not record	Memory full-Phone Ring. Follow instructions To Send and Erase Events.
	Ensure Patient Cable is inserted completely.
	Ensure RECORD/SEND button is held for two seconds.
Monitor stops recording.	Holding any button for two seconds while recording will cause the Monitor to stop recording. This includes trying to access the AUDIO setting
Siren (alternating) tone while recording	There is not a good connection. Check that electrodes/leads have a good connection to patient and cable is plugged into Monitor
Monitor restarts and erases stored events	Changing the Patient Cable to a different number of channels tells the Monitor to restart and erase all events.
Phone ring sound every hour	Memory has event(s) to be transmitted to the receiving center.
Phone ring sound every minute for 10 minutes	Memory is full, follow instructions To Send and Erase Events.
Phone ring sound when RECORD/SEND button is pushed	Memory is full, follow instructions To Send and Erase Events.
Phone ring sound once	An event is already stored in memory at start up, also heard at the end of a recorded event. Follow instructions To Send and Erase Events.
Three beeps every five minutes with cable inserted	Batteries are low. Replace batteries and/or clean battery contacts

Troubleshooting (page 2 of 2)

No information received by receiving center	Make sure **mouthpiece** of phone is directly over Monitor speaker
	Ensure RECORD/SEND button is held for two seconds.
Noise artifact on recorded ECG at receiving center	Mouthpiece of phone must be close to the Monitor speaker hole.
	Check telephone connection. Listen to phone line before sending event(s) to ensure there is no noise.
	Have patient call back and send ECG again.
	Have patient try another phone.
Noise artifact on recorded ECG at patient location	Electrodes must be securely attached to patient.
	Patient should remain still while recording.
	Replace Patient Cable. Pulling on lead wires may damage cable.
	Verify the recording did not take place near a source of electromagnetic interference (fluorescent lights, computer monitors, or household appliances).
	Move electrodes slightly to the right or left of the original location.
All or groups of timestamps for recordings are the same.	If the inadvertent loss of power occurs, all the timestamps in the FSK will reset to the time the unit powered back up. Subsequent recordings will have time stamps relative to the power up time.
Falling tone	Transmission complete
Rising tone	Ready to record

Event Markings

The following shows typical event markings that are generated by the Monitor and appear on the receiving station strip chart.



Service and Maintenance

Cleaning

Remove the batteries before cleaning the recorder. Clean the battery terminals with a soft dry cloth. Dampen a soft cloth with mild detergent and water to clean the recorder, lead wires, and belt clip.

Remove any adhesives from the patient lead wires with an adhesive tape remover solution or swab. Use a mild disinfectant. Do not use alcohol or acetone on the lead wires since they could stiffen and the insulating plastic could crack.

Service

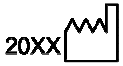
If there is a problem with the Monitor, review the problem descriptions and solutions listed on the next page. If additional assistance is required contact customer support via phone, Fax or E-mail listed below. Call customer support before returning a Monitor to make shipping arrangements.

A. Note there isn't any preventative inspection or maintenance that can be performed by the end user.

Service Items and Accessories

Description	Part Number
Patient lead, 1 channel	350-0173-01
Patient lead, 2 channel	350-0173-02
Monitor belt clip / Holster	100-1764-002
Necklace	350-0180-00
Operator manual	600-0606-00
AAA I.E.C. LR03 Alkaline Battery	200-2492-001

Equipment Symbols

Symbol	Description
	Type B Applied Part
	Consult manual.
SN	Serial Number
CE 0086	Complies with the Medical Device Directive of the European Union.
	Waste Electrical and Electronic Equipment (WEEE) It is the responsibility of the end user to dispose of this equipment at a designated collection point for recycling.
	Date of Manufacture

Manufacturer:
Braemar, Inc.
1285 Corporate Center Drive, Suite 150
Eagan, MN 55121 USA

Phone: 800.328.2719
651.286.8620
Fax: 651.286.8630
E-mail: service@braemarinc.com
Web: http://www.braemarinc.com

Contact Braemar for further technical information.

Authorized European Rep:
QNET BV
EC REP
Hommerterweg 286
6436 AM Amstenrade
The Netherlands

Specifications

Functional

ER910	1 channel only
ER920	1 or 2 channel
Max Number of events	30
Sample rate	256 samples per second
User interface	LCD display and sound

Memory

Max event time	
One channel	30 minutes
Two channel	30 minutes
Max total record time	
One channel	30 minutes
Two channel	30 minutes
Type	Flash
Data retention	Non-volatile

Physical

Dimensions	3.5"x 2.125"x .65" (89.9mm x 54.0mm x 15.7mm)
Weight with batteries	3.5 oz.
Enclosure	Molded plastic
Operating position	Any orientation

Electrical

Input impedance	2M min.
CMR ratio	60dB
AC signal range	+/- 3mV
DC signal range	+/- 300mV
Resolution	23uV (8bits)
Frequency response	.05Hz to 40Hz

Environmental

Operating temperature	0°C to +45°C
Non-operating temperature	-20°C to +65°C
Operating humidity	10% to 95% (non-condensing)
Non-Operating humidity	5% to 95%

Transtelephonic Transmission

Transmit carrier	1900Hz
Carrier deviation	100Hz/mV

Battery

Type	(2) AAA Alkaline IEC-LR3
Life	30 days min. during looping recording Remove batteries during storage

Warranty 12 months from shipment

Electromagnetic Emissions

Emissions test	Compliance	Electromagnetic environment - guidance
RF emissions CISPR 11	Group 1	The ER9xx 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 CISPR 11	Class B	The ER9xx 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.

Electromagnetic Immunity

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - guidance
Electrostatic discharge (ESD) IEC 61000-4-2	±6 kV contact ±8 kV air	±6 kV contact ±8 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Power frequency (50/60 Hz) magnetic field 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 environment.

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 to the frequency of the transmitter. Recommended separation distance
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz	3 V	$d = 1.2\sqrt{P}$
Radiated RF IEC 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 metres (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 800MHz, the higher frequency range applies.

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

[a] Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur 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 unit is used exceeds the applicable RF compliance level above, then the unit should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the unit.

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

Recommended Separation Distances

Refer to the following table for recommended separation distances between the ER9xx and portable and mobile RF communications equipment.

The ER9xx is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The user of the ER9xx can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the ER9xx as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power of transmitter W	Separation distance according to frequency of transmitter		
	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** $d = 2.3\sqrt{P}$
0,01	0,12	0,12	0,23
0,1	0,38	0,38	0,73
1	1,2	1,2	2,3
10	3,8	3,8	7,3
100	12	12	23

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

NOTE1: At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

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

Braemar Inc.

1285 Corporate Center Drive, Suite 150
Eagan, MN 55121 USA

Phone: 800.328.2719
Fax: 651.286.8630
E-Mail: Service@BraemarInc.com