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Cadwell®

Operator Manual

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CHAPTER 1

CHAPTER

1

Easy Ambulatory 2 Introduction

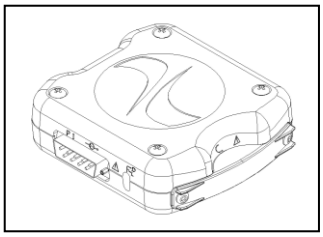
This chapter will provide an overview of the Easy Ambulatory 2 components. Read this chapter to understand the basic features of the system.

Easy Ambulatory 2 Introduction

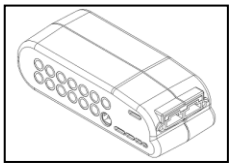
The Cadwell® Easy® Ambulatory 2 is a multi-channel EEG recording system designed and manufactured by Cadwell in Kennewick, WA. The Easy Ambulatory 2 integrates high performance amplifier hardware in a lightweight, rugged EEG system.

The Easy Ambulatory 2 system is comprised of three different modules:

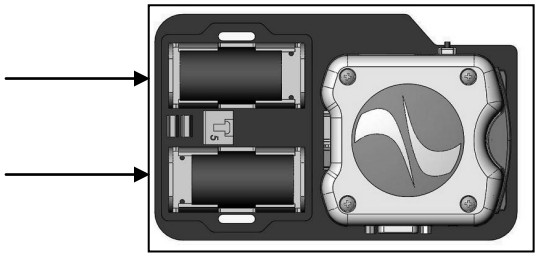
1. **The Recorder** – A small, lightweight module that uses compact flash memory to record patient data. The recorder utilizes EasyNet™ technology to connect to multiple amplifier modules used to amplify EEG and other physiological channels. The recorder is worn by the patient in a small waist mounted pouch.



2. **The Amplifier** – A compact module that serves as a connector box and amplifier for EEG and other physiological channels. The amplifier uses EasyNet technology to send data to the recorder. The amplifier has multiple EEG inputs and active reference pair inputs. Additionally, the amplifier has a connector for a voice event microphone. The amplifier can be worn by the patient on a small chest/shoulder strap or on the waist belt provided with the Easy system.



3. **The Battery Holder** – A lightweight module used to hold the batteries that power the recorder and amplifier. Batteries can be quickly replaced by removing the battery cover from the battery holder. Note for clarity the battery holder displayed to the right is shown without the battery cover. The recorder is mounted on the battery holder, and then placed in the Ambulatory recorder pouch for data collection.



This manual applies to the Cadwell Easy Ambulatory 2 system. Read this manual carefully before use. Sections marked with an exclamation mark should be read carefully before using the Easy Ambulatory 2 system.

CHAPTER 2

General Warning and Cautions and Intended Use Statement

CHAPTER

2

Read this chapter to understand the general warnings and cautions associated with the Easy Ambulatory 2 system. It is important that the user/operator understand all warnings and cautions associated with the system.

Warnings, Cautions

	Federal law restricts sale of this system to, or on the order of, a physician.
	High levels of static discharge can cause a momentary pause in data collection.
	No user serviceable parts inside. Service by Cadwell. and other authorized bodies only.
	Inspect EasyNet cables before and after each use. Discard cable if insulation is damaged or if the cable or connectors are damaged in any manner.
	Inspect battery cable before and after each use. Discard cable if insulation is damaged or if the cable or connectors are damaged in any manner.
	Do not immerse the recorder in liquid. Do not attempt to use the Ambulatory system if it has been immersed in liquid. The system is not water resistant or splash proof. The contact of liquids with the internal parts and connectors of the Cadwell Easy Ambulatory 2 system should be avoided at all times.
	Caution must be taken to ensure that cables do not encircle the patient's neck or entangle the patient in any way.
	The operator must be trained to be able to recognize the difference between signal artifact and valid bio-signals caused by movements, interference, or misplacement of sensors or electrodes.
	The system is not defibrillator proof.
	Do not use the system in an MRI environment.
	Cleaning instructions in this manual need to be strictly adhered to.
	When applying the stockinet to the patient, verify that the stockinet is not covering the patient’s eyes, nose, mouth, or ears. Verify that the stockinet does not entangle the patient’s neck, restrict airflow, or restrict circulation.
	When attaching the Easy Ambulatory 2 system to a recording subject, verify that the subject will not become entangled in the wires. Do not allow the electrode wires to wrap around the subject’s neck. Instruct the patient in the proper way to wear the Easy Ambulatory system and not become entangled.
	The system is not designed to operate in an explosive environment.

Intended Use

The Easy Ambulatory 2 system is intended for use by a physician or trained technician under the supervision of a physician for the acquisition of EEG and other polygraphic channels. The intended recording environment for the Easy Ambulatory 2 is the home, hospital, and other testing environments.

CHAPTER 3

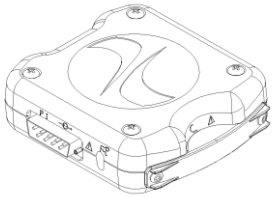
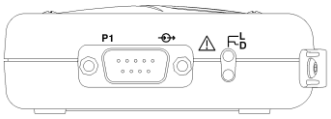
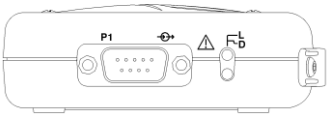
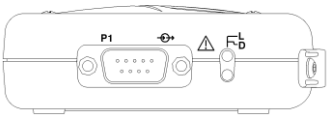
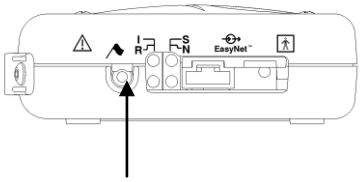
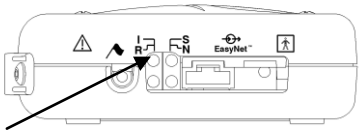
Easy Ambulatory 2 Hardware Components

CHAPTER

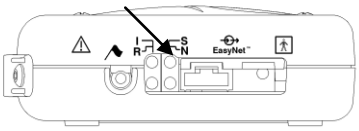
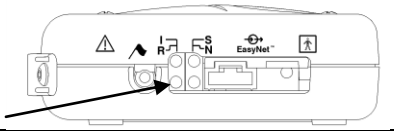
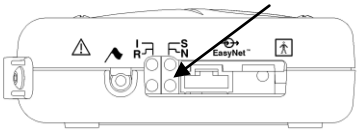
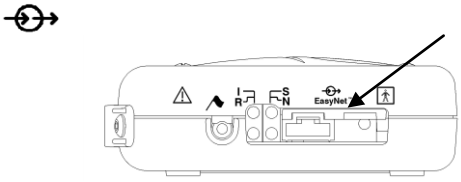
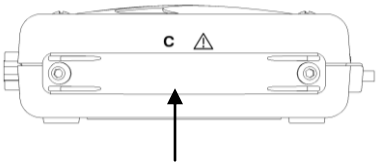
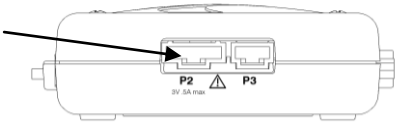
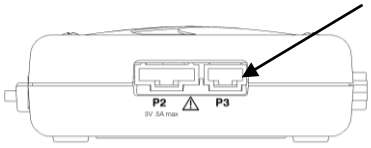
3

This chapter will provide an overview of the Easy Ambulatory 2 hardware components. Read this chapter to understand the symbols, LEDs, and warnings and cautions specifically related to each hardware component.

Easy Ambulatory 2 – Recorder Features, LEDs, Connectors

Recorder – 3 Dimensional View	
Recorder – P1 Ethernet Connector An ethernet adapter is attached to this connector for data downloading and data review.	
Recorder – 'D' LED The Data (D) LED indicates data is being transferred between the recorder and the computer.	
Recorder – 'L' LED The Link (L) LED indicates that the recorder has established an ethernet connection to the computer.	
Recorder – Event Button The event button allows the patient to time synchronize an event during data collection. For each button press, the recorder will record a time-synchronized event during data collection. If the button is pressed for 4 seconds while the recorder is attached to a computer, a signal will be sent to the network card identifying the recorder.	
Recorder – 'I' LED The 'I' LED indicates that the recorder is receiving power from the batteries.	

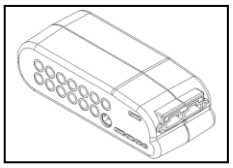
Recorder Features, LEDs, Connectors - continued

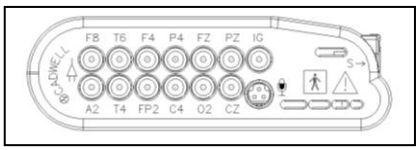
Recorder – 'S' LED The Status (S) LED flashes when an error condition is detected.	
Recorder – 'R' LED The EasyNet (R) LED flashes one time per second during data collection.	
Recorder – 'N' LED The EasyNet (N) LED flashes when an EasyNet error condition is detected.	
Recorder – EasyNet Connector The EasyNet connector allows a cable connection from the recorder to other modules such as the Amplifier/Connector module.	
Recorder – 'C' Door The Compact (C) Door can be removed to access the compact flash card. Cadwell recommends that the compact flash door remain attached to the recorder during data collection.	
Recorder – P2 Connector The P2 Connector is for the battery connection. Connect the battery cable from the battery holder to the P2 connector on the recorder.	
Recorder – P3 Connector The P3 connector is reserved for future use.	

Recorder Warnings and Cautions

	Do not attempt to use the Easy Ambulatory 2 unit in an MRI environment.
	Do not immerse the recorder in liquid.
	Do not autoclave recorder.
	Do not attempt to use recorder if it has been immersed in liquid.
	Inspect EasyNet cables before and after each use. Discard cable if cable insulation is damaged or if the cable or connectors are damaged in any manner.
	Do not remove compact flash card if the recorder has power or is actively collecting data.
	The system is not designed to operate in an explosive environment.
	Do not place recorder on a television, radio, or CPAP device.
	The system is not defibrillator proof.
	Use only Cadwell authorized cables and accessories.
	High levels of static discharge can cause a momentary pause in data collection.
	Always place the recorder and battery holder in the Easy Ambulatory Pouch when collecting patient data.
	Type BF, IC601 Isolation

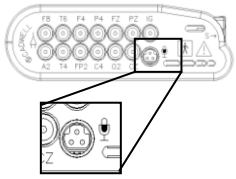
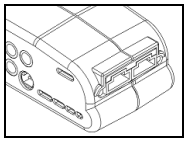
Amplifier/Connector Box – Symbol Description





FP1, FP2, F3, F4, F7,F8, T3,T4, T5, T6, A1, A2, C3, C4, P3, P4, O1, O2, FZ, CZ, PZ	International 10-20 lead placement descriptors used on the Easy Amplifier
IG x2, 1A, 1R, 2A, 2R, Voice Event	Additional input descriptors placed on the Easy Amplifier. IG - Isolated Ground (x 2) 1A – 1R – Active Reference Pair 2A – 2R – Active Reference Pair
	Type BF, IC601 Isolation
	Use only Cadwell authorized EasyNet cables.
	Do not use cables that appear broken or have exposed wire.
	The EEG electrode connectors are only designed for 1.5 mm touch proof connectors.
	Do not immerse in any liquid.
	Do not autoclave.
	Do not connect more than one Amplifier/Connector box to the Recorder.
	Inspect EasyNet cables before and after each use. Discard cable if insulation is damaged or if the cable is damaged in any manner.

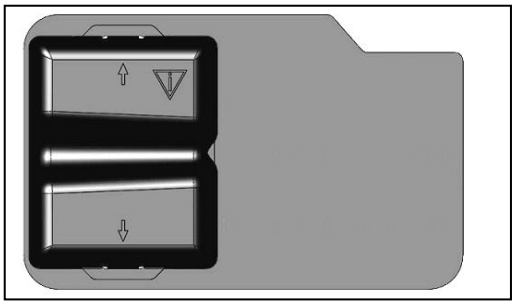
Amplifier/Connector Box – continued

	Voice event connector – Input for microphone  Voice Event
EasyNet cable connector	
S	Yellow Status LED. Lights or flashes to indicate error condition.
I	Green LED. Flashes to indicate power is being received from the recorder.
	Electrode input connectors

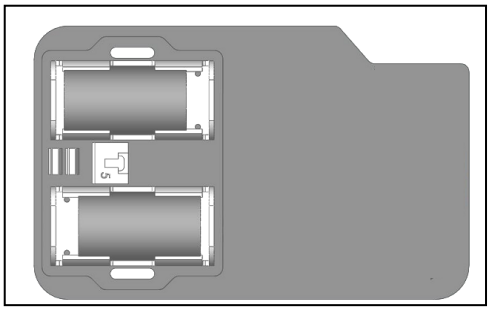
Amplifier Warnings and Cautions

	Do not attempt to use the Easy Ambulatory 2 unit in an MRI environment.
	Do not immerse the amplifier in liquid.
	Do not autoclave the amplifier.
	Inspect EasyNet cables before and after each use. Discard cable if insulation is damaged or if the cable is damaged in any manner.
	Use only Cadwell authorized EEG electrodes and connectors with 1.5 mm touch proof connectors.
	When using the amplifier to collect data, verify that the amplifier has been placed in a Cadwell authorized pouch. Verify the amplifier has been securely attached to the amplifier belt or chest/shoulder strap.
	Do not place the amplifier on a television, radio, or CPAP device.

Battery Holder



'C' Cell Battery Holder with Cover



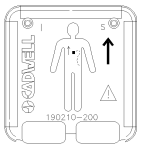
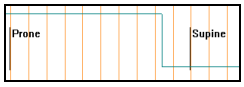
'C' Cell Battery Holder without Cover

Battery Holder Warnings and Cautions

	Use only alkaline batteries, or those recommended by Cadwell.
	Do not mix battery types.
	Do not re-use old batteries.
	Only use batteries authorized by Cadwell.
	Do not store batteries in battery holder. Remove batteries after use.
	Inspect battery cable before and after each use. Discard cable if insulation is damaged or if the cable or connectors are damaged in any manner.
	Do not autoclave.
	Do not re-use battery holder if battery leakage has occurred.
	Use only replacement fuses authorized by Cadwell. An extra fuse is located on the battery holder.
	Do not immerse battery holder in liquid.
	Do not use the battery holder without the battery cover.

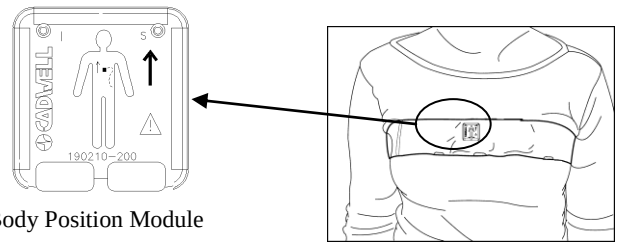
Easy III EasyNet Modules
The Easy Ambulatory 2 system can be configured to collect multiple channels such as body position, limb movements, and SpO2 data concurrently with EEG data.

Body Position Module Details

EasyNet Module Name	Module Appearance	Module Placement	Description
Body Position Module		Placed on front of chest, sternum area. **Sample Body Position Data** 	Used to determine body position during recording. The module has an internal body position sensor that will detect supine, prone, left, right, and upright body positions. **Connectors** Two EasyNet connectors are located on the bottom of the module. Either connector can be used. **Sampling Rate** Sampling rate is 1 Hz.

The Body Position module is designed to detect the following body positions:

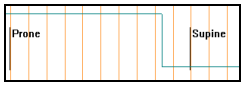
- Left Position
- Right Position
- Prone Position
- Supine Position
- Upright Position



Body Position Module

The Body Position Module has Velcro on the back side of the module. The sensor is placed inside a chest belt worn by the patient.

Body Position Module Specifications

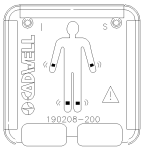
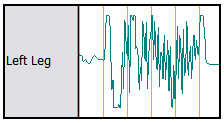
EasyNet Module Name		Module Placement	Description
Body Position Module		Placed on front of chest, sternum area. **Sample Body Position Data** 	Used to determine body position during recording. The module has an internal body position sensor that will detect supine, prone, left, right, and upright body positions. **Connectors** Two EasyNet connectors are located on the bottom of the module. Either connector can be used. **Sampling Rate** Sampling rate is 1 Hz.

Cleaning the EasyNet Body Position Module

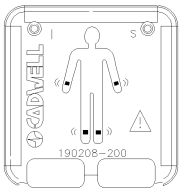
The EasyNet Body Position module may be cleaned with a damp cloth with a mild detergent or isopropyl alcohol* (IPA) only. Do not soak the module. The module may not be sterilized for reuse. The module may not be immersed, submerged, soaked or otherwise exposed to an environment where fluids may freely flow into the module. EasyNet cables may be cleaned with a damp cloth with a mild detergent or isopropyl alcohol* (IPA) only. Do not use caustic or abrasive cleaning agents.

* Antiseptic/Germicide Isopropyl Alcohol, 70% v/v alcohol swabs are recommended.

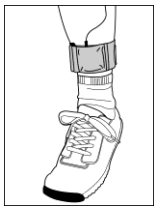
Limb Movement Module

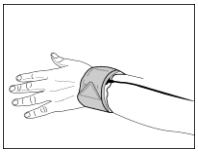
EasyNet Module Name		Module Placement	Description
Limb Movement Module		Placed on wrists or ankles. **Sample Limb Movement Data** 	Used to detect limb movements from the arms and legs. Each module has an internal accelerometer that can determine motion. **Connectors:** Two EasyNet connectors are located on the bottom of the module. Either connector can be used. **Sampling Rate:** Sampling rate is 20 Hz.

The Limb Movement module is designed to detect limb movements. The Limb Movement modules are placed in Velcro straps worn on the wrists and ankles. These modules can be used for EEG, PSG, and LTM recordings.

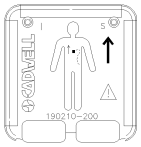
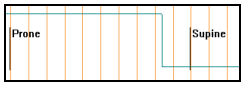


Limb Movement Module





Limb Movement Module Specifications

EasyNet Module Name		Module Placement	Description
Body Position Module		Placed on front of chest, sternum area. **Sample Body Position Data** 	Used to determine body position during recording. The module has an internal body position sensor that will detect supine, prone, left, right, and upright body positions. **Connectors** Two EasyNet connectors are located on the bottom of the module. Either connector can be used. **Sampling Rate** Sampling rate is 1 Hz.

Cleaning the EasyNet Limb Movement Module

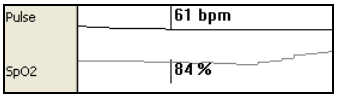
The EasyNet Limb Movement module may be cleaned with a damp cloth with a mild detergent or isopropyl alcohol* (IPA) only. Do not soak the module. The module may not be sterilized for reuse. The module may not be immersed, submerged, soaked or otherwise exposed to an environment where fluids may freely flow into the module. EasyNet cables may be cleaned with a damp cloth with a mild detergent or isopropyl alcohol* (IPA) only. Do not use caustic or abrasive cleaning agents.

* Antiseptic/Germicide Isopropyl Alcohol, 70% v/v alcohol swabs are recommended.

EasyNet SpO2 Module

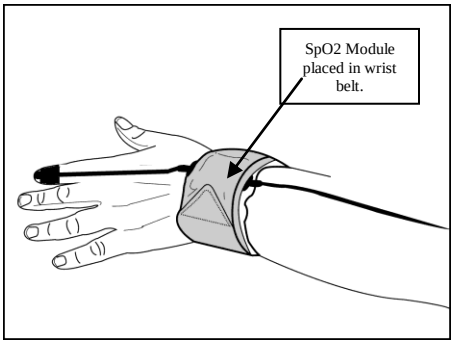
The EasyNet SpO2 module is designed to collect pulse oximetry data. The EasyNet oximeter does not have any alarming functions. The oximeter will collect and display the following signals.[1]

SpO2 – Pulse oximetry level 0-100% SpO2
Pulse Rate – Pulse rate 18 -300 bpm; Pulse waveform data is proportional to pulse volume

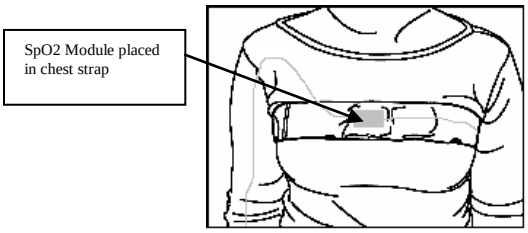
EasyNet Module Name		Module Placement	Description
SpO2 Module		Placed on wrist strap or chest strap. **Sample SpO2 Data** 	Used to determine SpO2 levels and pulse rate. The patient must wear a flexible sensor on a finger. **Connectors:** Two EasyNet connectors are located on the bottom of the module. Either connector can be used.

EasyNet SpO2 Module Placement

The EasyNet SpO2 Module is an oximeter that is designed to be worn on the wrist or chest belt. The oximeter can be used with three different length sensors (3 meter, 1 meter, 20 cm). The SpO2 Module can be used during EEG, PSG, or LTM recordings.



The illustrations to the right show the oximeter placed in a wrist strap and chest strap. The oximeter is connected to the EasyNet connector with an EasyNet cable.



[1] For detailed SpO2 oximeter specifications, see page 66.

EasyNet SpO2 Module – Sensors Placement
Cadwell provides a reusable Adult Flex Sensor (Nonin #8000J) with the EasyNet SpO2 module. Use the disposable tape wrap provided with the Nonin Flex Sensor. Verify that the sensor and tape wrap are not limiting circulation. Do not wrap the tape and sensor tightly around the finger tip. Follow all additional instructions included with the Nonin oximeter sensor.

EasyNet SpO2 Module – Sensors

Cadwell provides a reusable Adult Flex sensor (Nonin Pure-Light Sensor #8000J) with the EasyNet SpO2 module. The Adult Flex sensor is available in three cable lengths.

SpO2 Sensors	Cable Length
Reusable Adult Flex (8000J-3 m)	3 meters
Reusable Adult Flex (8000J-1 m)	1 meter
Reusable Adult Flex (8000J-20 cm)	20 cm

Using Nonin Pure-Light Oximeter Sensors

Cadwell uses a Nonin OEM III Pulse Oximeter in the Cadwell EasyNet SpO2 Oximeter module. The following sensors have been validated with the Nonin OEM III Pulse Oximeter.

- Model 8000J Flexi-wrap Sensor*
- Model 8000AA Finger Clip Sensor
- Model 7000A Disposable Sensor
- Model 8000Q Ear Clip Sensor
- Model 8000R Forehead Sensor

* Cadwell recommends using the 8000J Flexi-wrap sensor style sensor for polysomnographic testing. Cadwell has tested the 8000J Flexi-wrap sensor with the Cadwell EasyNet SpO2 Oximeter module.

Cleaning the EasyNet Oximeter and Oximeter Sensors

The EasyNet SpO2 module may be cleaned with a damp cloth with a mild detergent or isopropyl alcohol* (IPA) only. Do not soak the module. The module may not be sterilized for reuse. The module may not be immersed, submerged, soaked or otherwise exposed to an environment where fluids may freely flow into the module.
Reusable Nonin sensors may be cleaned with a damp cloth with a mild detergent or isopropyl alcohol* (IPA) only. Do not use caustic or abrasive cleaning agents on the sensors. The sensors may not be sterilized for reuse. The sensor may not be immersed, submerged, soaked or otherwise exposed to an environment where fluids may freely flow into the sensor. Allow sensors to dry before reuse.

* Antiseptic/Germicide Isopropyl Alcohol, 70% v/v alcohol swabs are recommended.

EasyNet SpO2 Module - Exposure to Water or Moisture

The EasyNet SpO2 module should not be exposed to water or moisture. The module is not water proof. The internal circuit board has been coated with a water resistant material to protect the internal circuit board components. If your SpO2 module had been exposed to a fluid, contact Cadwell for information regarding rinsing and using your SpO2 module.

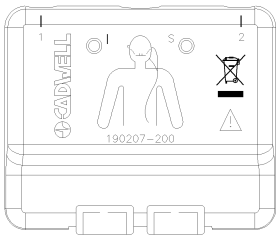
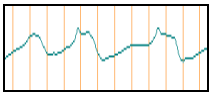
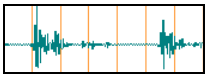
What to do if the EasyNet module has been exposed to water or moisture.

1. Disconnect the EasyNet cable that is attached to the EasyNet SpO2 module.
2. Remove the oximeter sensor from the patient.
3. Wipe down the exterior of the module and the sensor.
4. Place the module and sensor on a flat, dry surface. Allow to air dry for at least 24 hours.
5. Contact the Service Department at Cadwell. Your service technician will determine the next step. Depending on the amount of exposure to moisture, you may be able to use the module or Cadwell may request that you send it to the Cadwell Service Department for inspection.

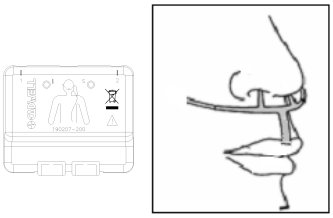
SpO2 Module – Symbols, Warnings, and Cautions

	Discontinue using the SpO2 module or oximeter sensor if it has been exposed to water or moisture.
	Do not soak the EasyNet SpO2 module or SpO2 sensors. The module and sensors may not be sterilized for reuse. Do not immerse, submerge, soak or otherwise expose the sensor and module to an environment where fluids may saturate the sensor or module.
	Instruct the patient to contact the testing laboratory if the SpO2 module or oximeter sensor is exposed to water or moisture.
	Contact Cadwell if the SpO2 module or oximeter sensor has been exposed to water or moisture.
	Clean the EasyNet SpO2 module and sensors with a damp cloth with a mild detergent or isopropyl alcohol (IPA) only.
	The SpO2 module is not intended for use for real-time monitoring of critical functions.
	Nonin has tested and validated multiple Nonin sensors for use with the Nonin OEM III Pulse Oximeter. Cadwell has tested the 8000J Flexi-wrap sensor with the Cadwell EasyNet SpO2 Oximeter module. Cadwell recommends using the 8000J Flexi-wrap sensor style sensor for polysomnographic testing.
	Follow all additional use, placement, and cleaning instructions included with the Nonin oximeter sensor.
	No alarm function

EasyNet Nasal Pressure Module

EasyNet Module Name		**Module Placement**	**Description**
Nasal Pressure Module		Placed on chest strap or shoulder strap **Sample Flow Data**  **Sample Snore Data** 	Used to detect oral/nasal airflow and snoring vibrations. The patient must wear a nasal cannula that is connected to the nasal pressure module. **Connectors:** Two EasyNet connectors are located on the bottom of the module. Either connector can be used. **Sampling Rate:** Sampling rate is 30 Hz.

The EasyNet Nasal Pressure Module (displayed below) is designed to record oral nasal airflow. The module uses a cannula (note picture) that captures pressure changes recorded at the nose and mouth. The nasal pressure module can be used during EEG, PSG, or LTM recordings.



Cleaning the EasyNet Nasal Pressure Module

The EasyNet Nasal Pressure module may be cleaned with a damp cloth with a mild detergent or isopropyl alcohol* (IPA) only. Do not soak the module or allow moisture to get in the module. The module may not be sterilized for reuse. The module may not be immersed, submerged, soaked or otherwise exposed to an environment where fluids may freely flow into the module.

EasyNet cables may be cleaned with a damp cloth with a mild detergent or isopropyl alcohol* (IPA) only. Do not use caustic or abrasive cleaning agents.

An appropriate hydrophobic safety filter should be placed in line with the nasal cannula to prevent fluids from entering the Nasal Pressure module which could cause possible moisture damage to the internal pressure transducers and cross-contamination between patients.

* Antiseptic/Germicide Isopropyl Alcohol, 70% v/v alcohol swabs are recommended.

EasyNet Nasal Pressure Module - Exposure to Water or Moisture

The EasyNet Nasal Pressure module should not be exposed to water or moisture. The module is not water proof. The internal circuit board has been coated with a water resistant material to protect the internal circuit board components. If your nasal pressure module had been exposed to a fluid, contact Cadwell for information regarding rinsing and using your nasal pressure module.

What to do if the EasyNet module has been exposed to water or moisture.

1. Disconnect the EasyNet cable that is attached to the EasyNet Nasal Pressure module.
2. Remove the module from the patient.
3. Wipe down the exterior of the module and the sensor.
4. Hold the module with the with the cannula connectors facing down. Remove the cannula.
5. Place the module and sensor on a flat, dry surface. Allow to air dry for at least 24 hours.
6. Contact the Service Department at Cadwell. Your service technician will determine the next step. Depending on the amount of exposure to moisture, you may be able to use the module or Cadwell may request that you send it to the Cadwell Service Department for inspection.

Nasal Pressure Module - Warnings and Cautions

	Discontinue using the Nasal Pressure module if it has been exposed to water or moisture.
	Do not soak the EasyNet Nasal Pressure module. The module may not be sterilized for reuse. Do not immerse, submerge, soak or otherwise expose the sensor and module to an environment where fluids may saturate the sensor or module.
	Instruct the patient to contact the testing laboratory if the Nasal Pressure module is exposed to water or moisture.
	Contact Cadwell if the Nasal Pressure module has been exposed to water or moisture.
	Clean the EasyNet Nasal Pressure module with a damp cloth with a mild detergent or isopropyl alcohol (IPA) only.

CHAPTER 4

CHAPTER

4

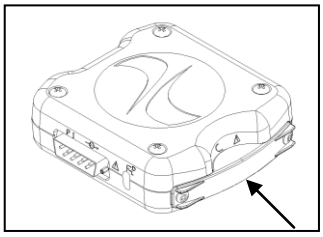
Unpacking the Easy Ambulatory 2 System

Read this chapter to understand how to unpack and prepare your Easy Ambulatory 2 system for use.

Unpacking and Equipment Setup

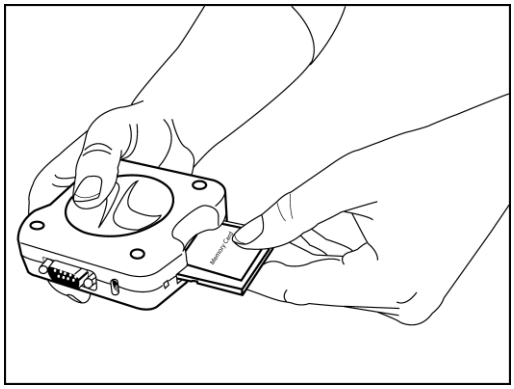
Read the instructions carefully and verify that all components are present. Cadwell recommends pre-assembly and testing of the system. Verify proper understanding of the system and its modules prior to collecting clinical data.

Unpacking the Recorder

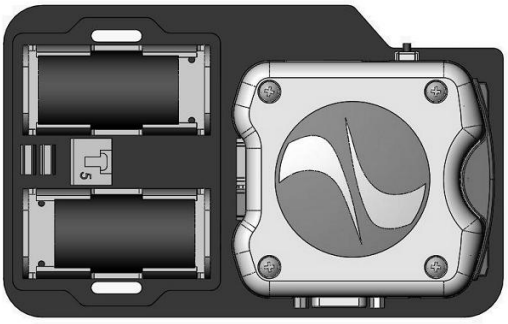


To prepare the recorder for use:

- The compact flash card should be inserted in the recorder with the top surface of the compact flash card facing up. Install the compact flash door on the recorder before using the recorder to collect patient data. As a general rule, the card does not need to be removed from the recorder. The compact flash card should remain in the recorder. The Easy software will download the data on the flash card via the Ethernet connection on the recorder.
- The compact flash card does not need to be formatted. Simply insert the card in the recorder.



Battery Holder



The Battery Holder is designed to hold the batteries used to power the Recorder and Amplifier. The unit has easy access to allow the clinician or patient to quickly replace batteries as needed. A small cable connects the battery to the recorder.

Cadwell offers two different configurations for the battery holder. The 'C' cell battery holder is for 24 hour recordings. The 'D' cell battery holder is for 48 hour recordings.

Easy Ambulatory 2 Software

The Easy software is preinstalled on computers purchased from Cadwell.

If you are utilizing your own computer, you will need to install and enable the Easy software on your computer. To install the software, you will need the Easy installation CD provided with your Easy Ambulatory 2 system.

A complete set of installation instructions can be found on the Easy installation CD in the Documents folder.

The Easy Ambulatory 2 recorder connects to the computer through a network card configured for the Easy system. Specific instructions about installing and configuring a network card for use by the Easy system can be found in Appendix A: of this document.

CHAPTER 5

CHAPTER 5

Preparing the Patient and Equipment for Data Collection

This chapter will provide an overview of the steps required to prepare the patient and equipment for data collection.

Preparing the Equipment for Data Collection

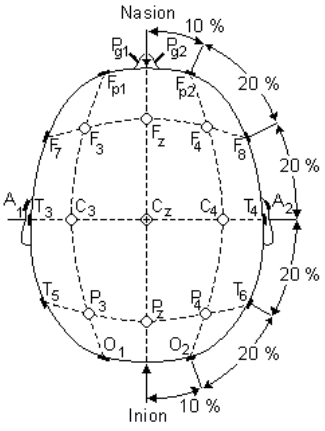
The following equipment is needed to prepare for data collection:

- Easy Ambulatory 2 Recorder With Compact Flash Card
- Easy Ambulatory 2 EEG amplifier and EEG Electrodes
- Easy Ambulatory 2 Pouch With Battery Holder and Waist Belt
- Amplifier Pouch
- Two new 'C' Cell or 'D' Cell Alkaline Batteries
- Network Adapter for Ambulatory Recorder
- Network Cable
- Chest and Limb Straps, Stockinet
- EasyNet Cable (used to connect recorder to amplifier)
- Setup Supplies (skin prep, electrode paste, gauze)
- Easy Ambulatory 2 Computer

Prior to adding patient information to the Easy Ambulatory 2 Recorder, the EEG electrodes must be attached to the patient. Follow the setup guidelines listed below to prepare the patient for data collection.

Preparing the Patient

Follow your laboratory protocols for applying the EEG electrodes to the patient. Cadwell recommends adherence to the International 10-20 standards for EEG electrode placement[2,3]. Route the EEG cables to the location where you will mount the ambulatory amplifier/connector box.



[2] Gilmore RL (1994): J. Clin. Neurophysiol RL Gilmore (ed.): American Electroencephalographic Society guidelines in electroencephalography, evoked potentials, and polysomnography, *J. Clin. Neurophysiol.* 11:(1, January) 147 pp.

[3] Jasper H. (1958) Report Of The Committee On Methods Of Clinical Examination In Electroencephalography. Electroencephalography & Clinical Neurophysiology, Vol. 10: pp 305-375.

Depending on patient comfort and preference, determine if you need to cover the amplifier, electrode cables, and the patient's scalp with stockinet. The stockinet can help minimize patient entanglement in the electrode wires. Plug the voice microphone into the connector box and clip the other end on the patient's clothing.

Caution: When attaching the Easy Ambulatory 2 system to a recording subject, verify that the subject will not become entangled in the wires. Do not allow the electrode wires to wrap around the subjects neck. Instruct the patient in the proper way to wear the Easy Ambulatory system and not become entangled.

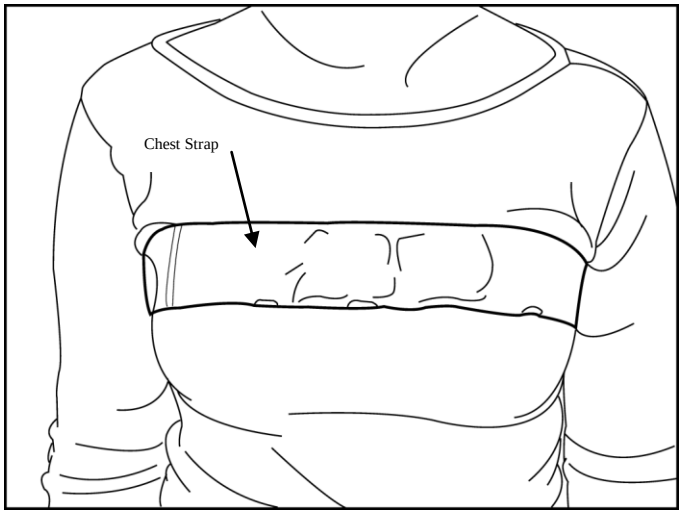
Caution: When applying the stockinet to the patient, verify that the stockinet is not covering the patient's eyes, nose, mouth, or ears. Verify that the stockinet does not entangle the patient's neck, restrict airflow, or restrict circulation.

Easy Ambulatory Chest Strap

Place the chest strap and (optional) shoulder strap on the patient if needed. The strap is most comfortable if worn over soft clothing. Nylon and satin clothing produce static electricity which affects the EEG recording and should therefore not be worn. Natural fibers such as cotton are preferred. Depending on patient comfort and the anticipated activity level of the patient during data collection, determine if the patient should wear the chest belt only or wear the chest belt with the shoulder strap.

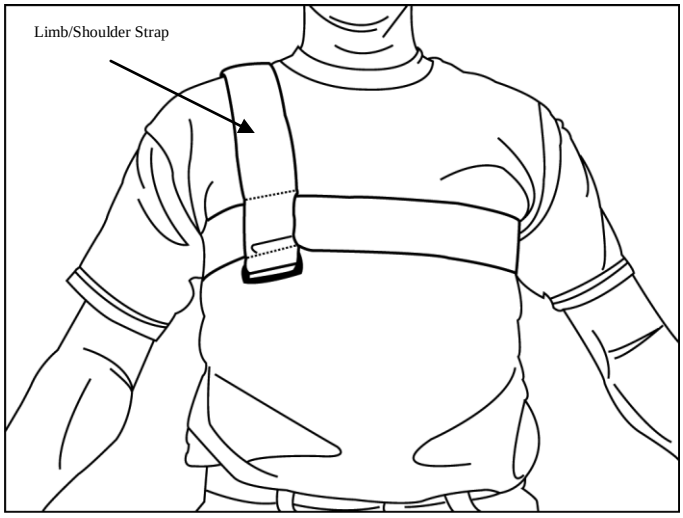
The strap has a Velcro® fastener on each end to assist in securely placing the strap around the patient's chest. The strap has a long narrow pocket used to cover cables and additional modules worn by the patient. Verify that the narrow pocket on the strap is equally centered on the front of the patient's chest.

The chest strap allows the amplifier/connector box to be mounted on the chest strap. Cadwell provides three different sizes of chest straps (small, medium, large)

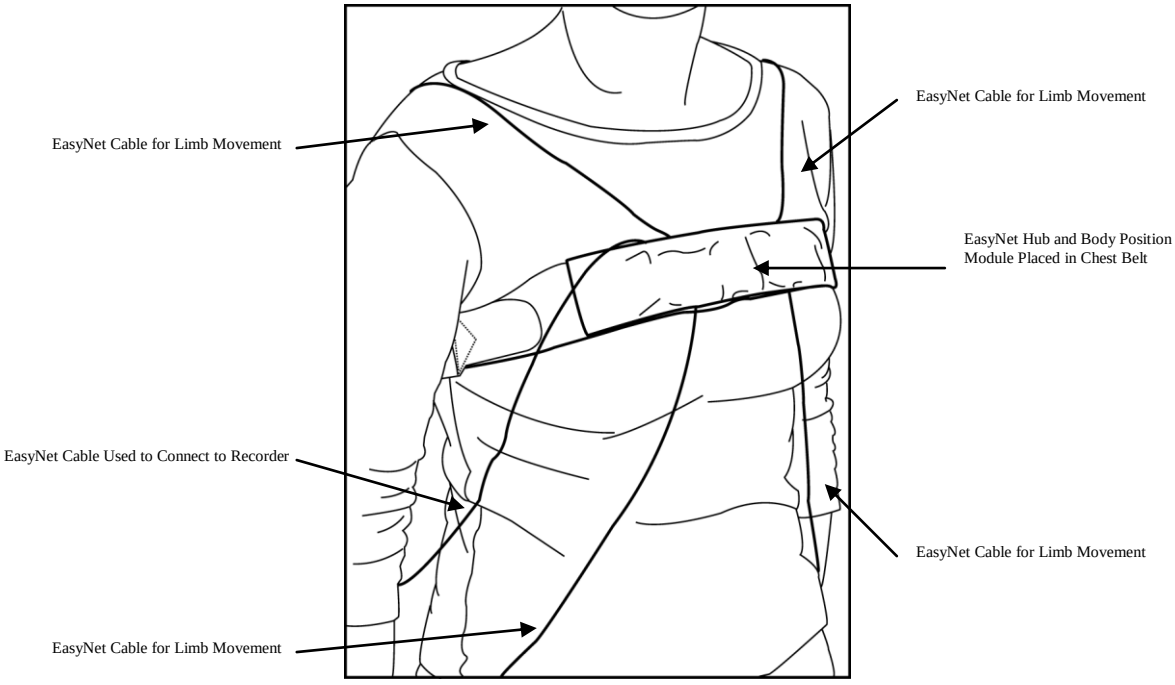


Easy Ambulatory Wide Limb/Shoulder Strap

The wide limb/shoulder strap can be used to attach movement modules to the ankles and wrists. The strap can also be attached to the chest strap to mount the amplifier/connector box.



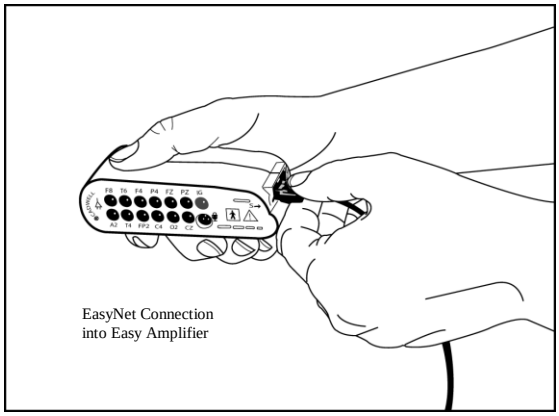
The Easy Ambulatory 2 system has multiple optional modules that can be used with the ambulatory recorder. The system can be configured with a body position module and limb movement modules placed on the patient's wrists and ankles. The position and limb movement modules all connect to an EasyNet hub placed on the chest belt.

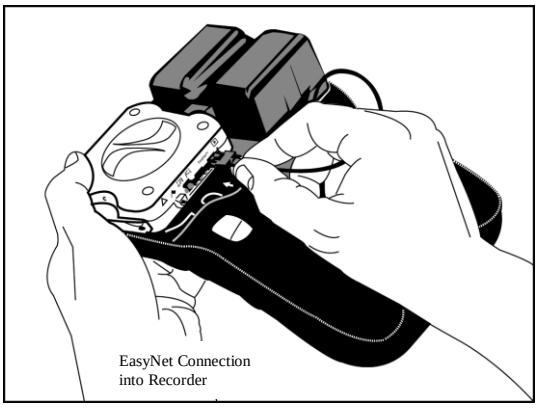


Placing the Amplifier in the Amplifier Pouch

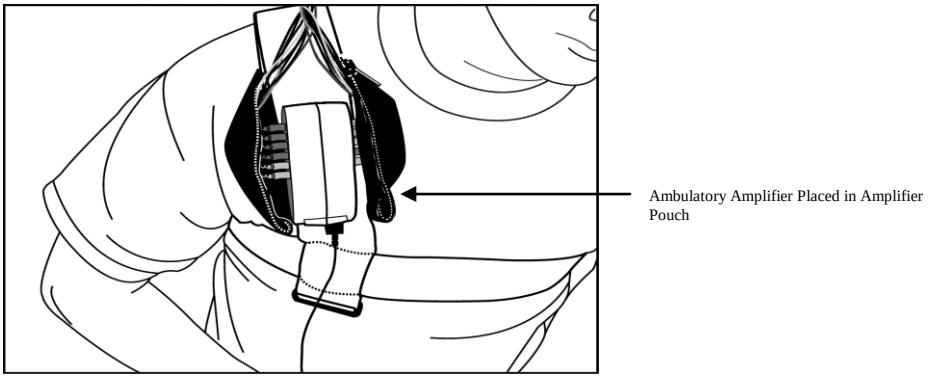
1. If stockinet is used, place the amplifier and the electrode cables through the stockinet.
2. Connect the EasyNet cable to one of the two EasyNet connectors on the Amplifier/Connector box.
3. Connect the other end of the EasyNet cable to the EasyNet connector on the Recorder.

Place the amplifier pouch on the waist belt, chest strap, or shoulder strap. Zip the pouch shut. Verify that the EEG cables and EasyNet cable are exiting out of the pouch without being crimped or caught in the zipper.

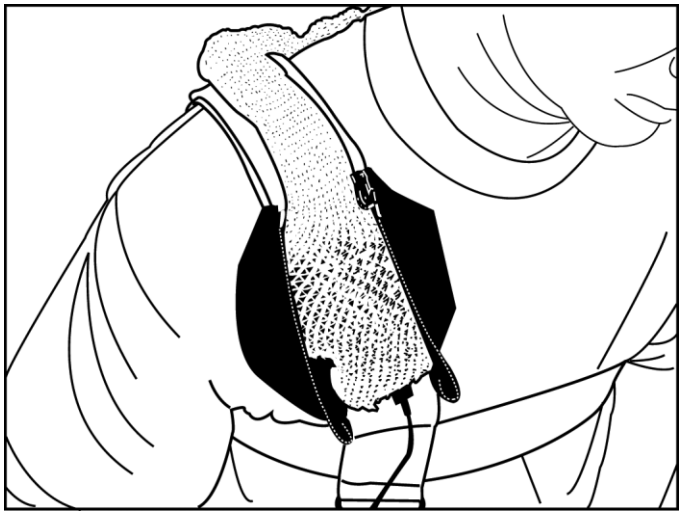




The pouch can be used with or without a stockinet cover for the amplifier and EEG cables. The amplifier pouch is designed to encase the amplifier. The pouch can be mounted on the waist belt, chest strap, or shoulder strap.

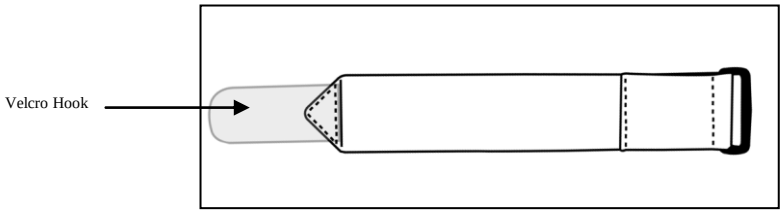


The illustration below shows the EEG amplifier covered with stockinet. The stockinet covers the EEG electrode wires to minimize patient entanglement. The amplifier pouch has Velcro fasteners on the inside of the pouch to grab onto the stockinet and reduce the chance of the amplifier and stockinet being dislodged from the pouch.

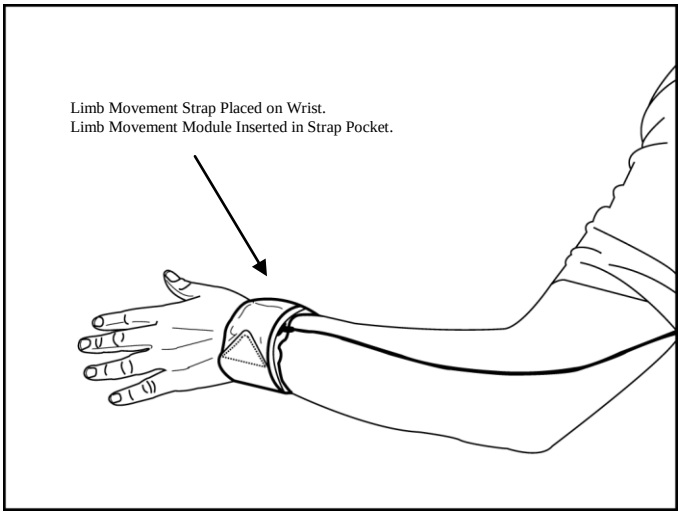


Wide Limb/Shoulder Strap

The wide limb strap is used to attach the limb movement modules to the ankle or wrist. The strap can also be used as a shoulder strap to attach the amplifier.

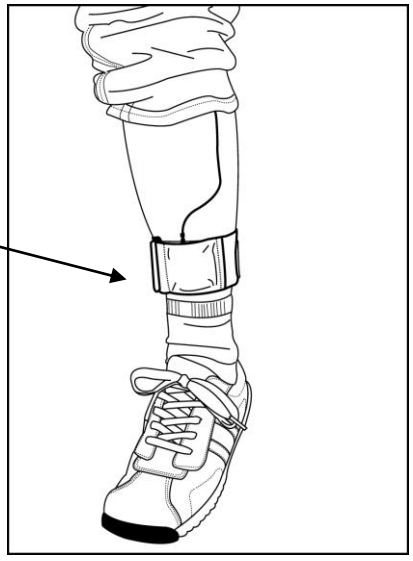


Wide Limb/Shoulder Strap On Wrist



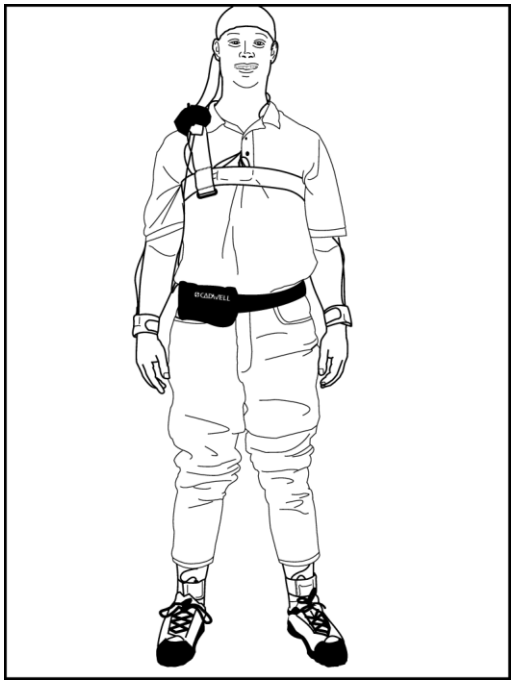
Limb/Shoulder Strap On Ankle

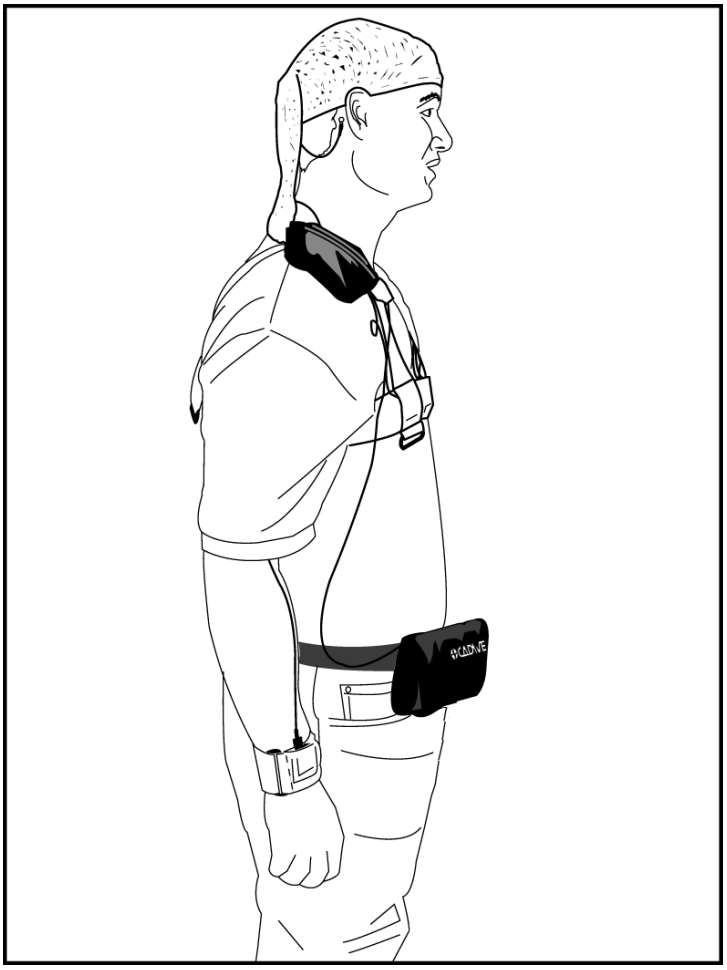
Limb Movement Strap Placed on Ankle Limb Movement Module Placed in Strap Pocket.



Complete Setup Illustration

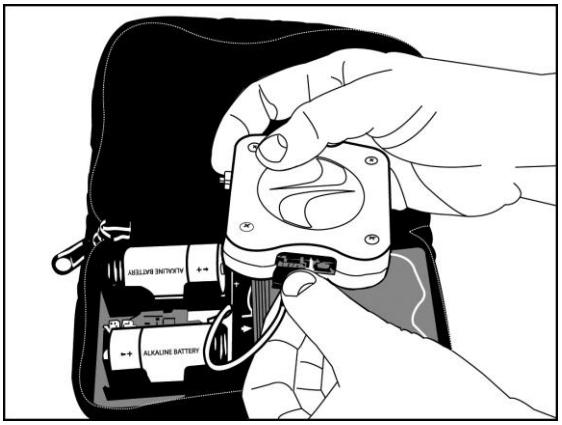
The Easy Ambulatory 2 system configured on an adult patient is displayed in the illustration below. The recorder pouch is worn on a belt placed on the waist. The amplifier is placed on a shoulder strap worn on the right shoulder. The patient is wearing limb movement straps and modules on the ankles and wrists. A body position sensor located inside the chest belt. All modules connect to a small hub connector placed inside the chest belt.



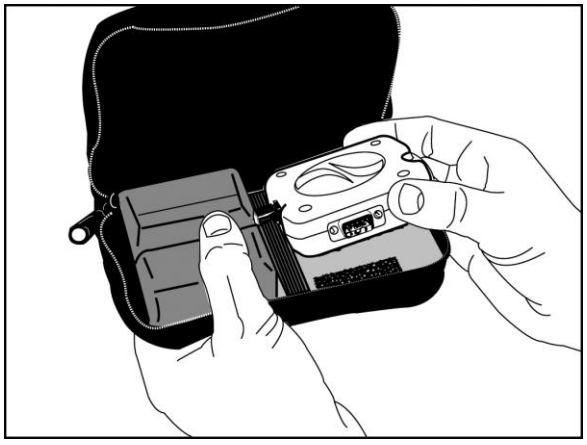


Preparing The Ambulatory Recorder For Use

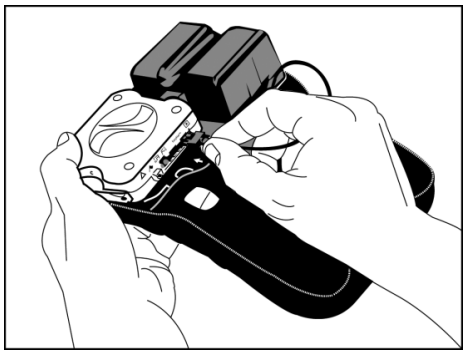
1. Insert the Battery Holder into the Pouch.
2. Install *new* alkaline 'C' or 'D' cell batteries into the battery holder. Insure that the batteries have been inserted into the battery holder in the correct direction/polarity.
3. Connect the battery cable to the Recorder.



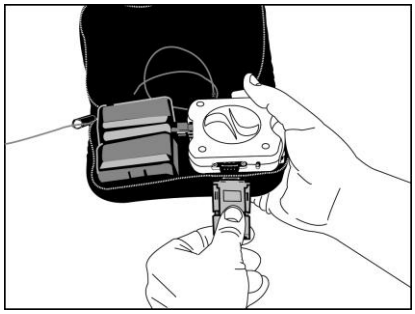
4. Attach the recorder to the Battery Holder with the Velcro fasteners.



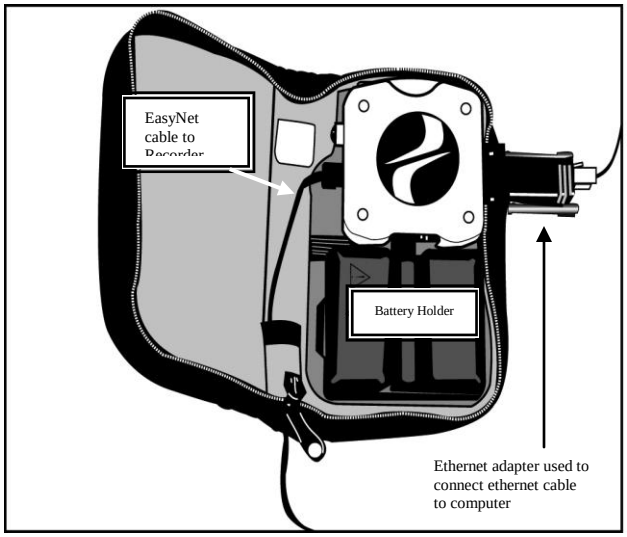
5. Attach the EasyNet cable to the EasyNet connector on the side of the recorder.



6. Connect the network cable from the Recorder to the computer.



Note: Warranty coverage on the Ambulatory Recorder is provided only with the use of alkaline batteries. The use of other batteries may void your warranty. Remove batteries when the recording is complete and dispose of properly. DO NOT REUSE BATTERIES



CHAPTER

6

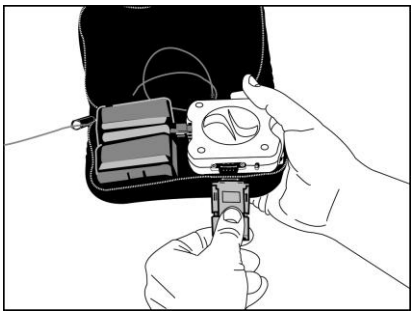
CHAPTER 6

Starting, Monitoring, Ending, and Downloading a Recording

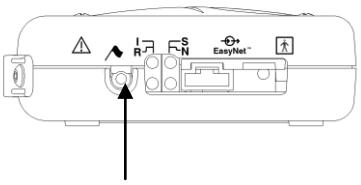
This chapter will provide an overview of how to start a recording, monitor a recording during data collection, and end a recording. This chapter will also provide instruction about downloading patient data and clearing data from the compact flash card.

Starting a Recording

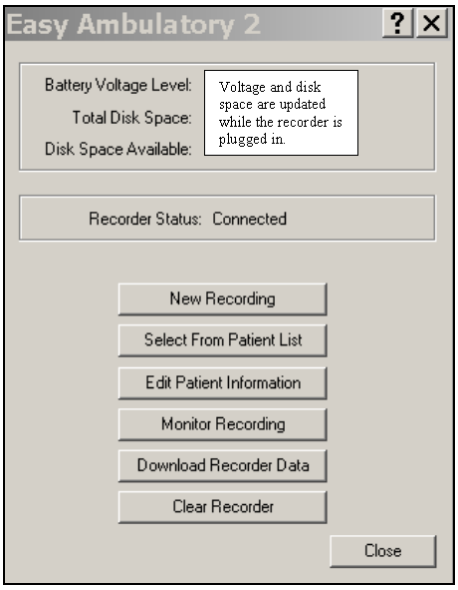
Enter the Easy Software by double clicking on the desktop shortcut, or by clicking on Start/All Programs/Cadwell/Easy Ver 2.1. Connect the Easy Ambulatory 2 recorder to the computer via the ethernet connection (with power supplied from the batteries).

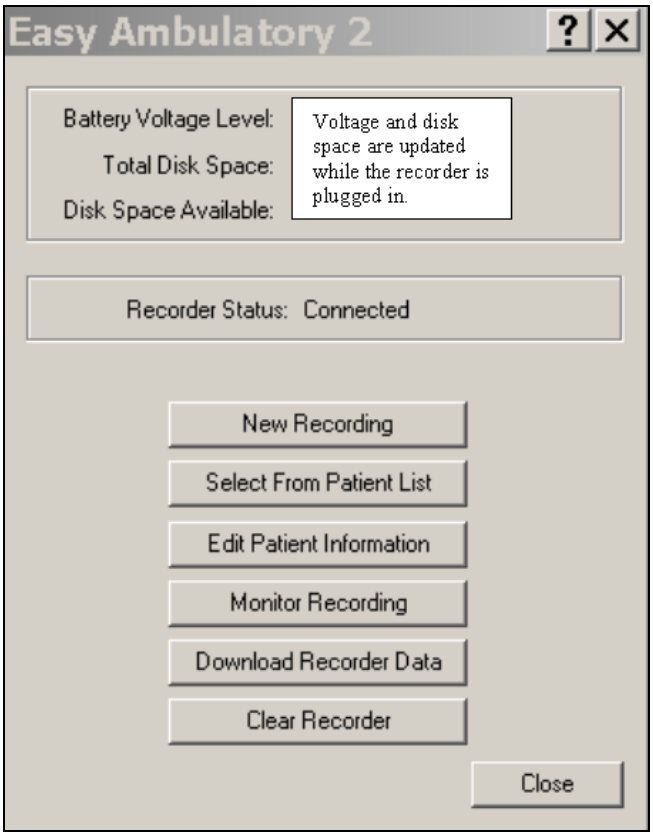


Press and hold the event button on the side of the recorder for 4 seconds.



After pressing the event button for 4 seconds, the recorder will send a signal to the network card in the computer. The signal from the recorder will command the Easy software to display the Easy Ambulatory 2 popup menu.





The Easy Ambulatory 2 popup menu displays the status information about the recorder.

Battery Voltage Level – The voltage level for the batteries should be in the 3 Volt range. If the batteries are less than 3 volts when data collection is started the recording duration will be reduced.

To install new batteries, disconnect the recorder from the ethernet connection. Remove the battery cover and replace the batteries. Then reconnect the ethernet cable from the computer.

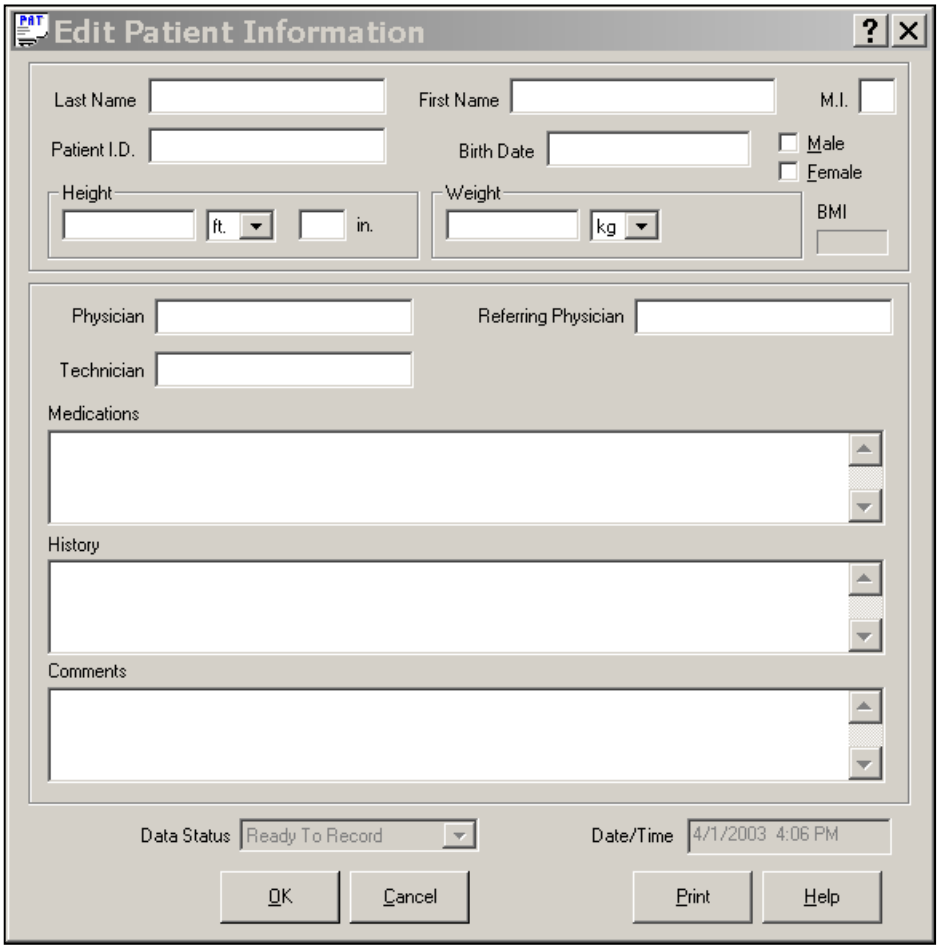
Total Disk Space and Total Disk Space Available – The standard configuration of the Easy Ambulatory 2 recorder includes a 1 GB compact flash card. The total disk space information provides direct feedback to the user about the total memory available for data collection.

Select New Recording

Select 'New Recording' to initialize the recorder with patient information. The Easy software will examine the compact flash card in the recorder to determine if a previously collected study is present. If a study is present, the software will prompt the user with the name and date of the study. The user will have the option to delete the study, or stop the process of entering new patient data. If necessary, the user can download the record by selecting the Download Recorder Data menu option and then return to entering new patient data in the recorder.

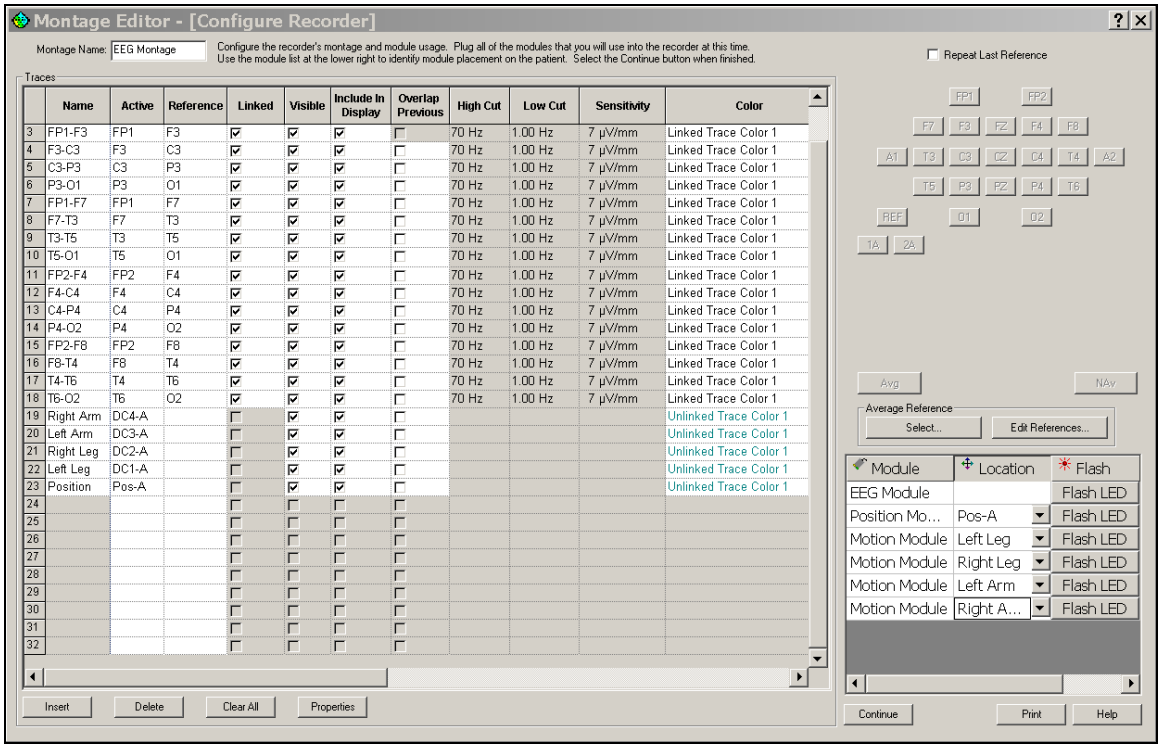
Note: When downloading patient data from the recorder, the Easy system does not delete the patient data from the recorder. The process of deleting the recorder data will occur when the recorder is initialized for the next recording or when the user specifically selects the Clear Recorder option available in the Easy Ambulatory 2 menu.

Enter patient data and then click the OK button.

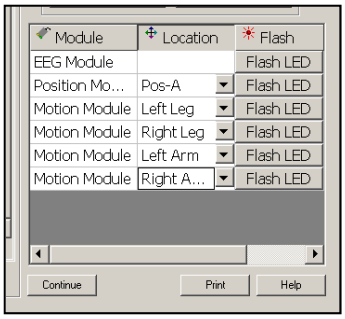


Select the Montage for Use

After entering new patient information, the user will be prompted with the following montage menu. Select the order and number of channels that will be used to collect data.



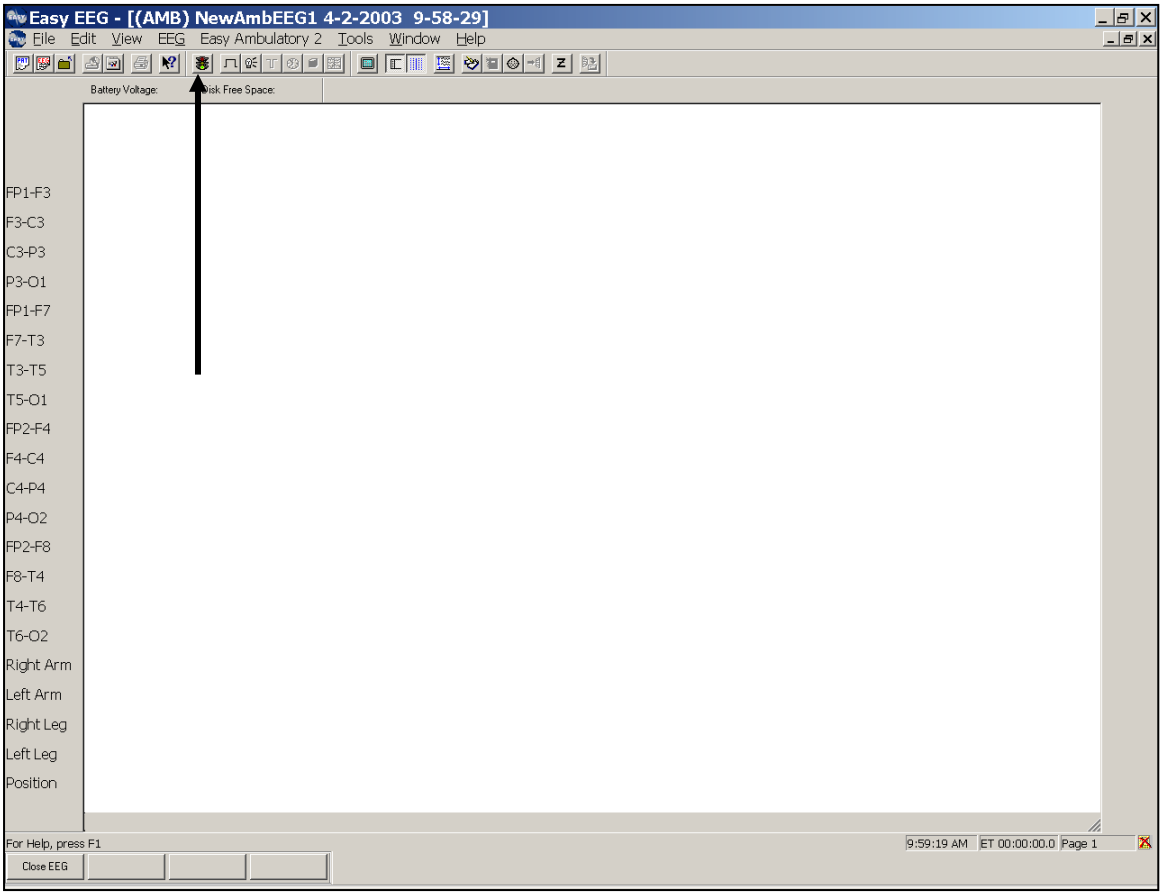
The module information displayed in the lower right hand corner of the menu reflects the modules that are currently connected to the Easy Ambulatory 2 recorder. The standard Easy Ambulatory 2 system is configured with an EEG module. Optional modules for body position and limb movement will be displayed in the module information table if they are connected to the recorder. The user can specify the *location* a particular module will be used. For example, a motion module can be placed on the right leg. *The user can select that location in the module table by clicking on the location setting*. To verify which module is to be used on the right leg, the user can click on the flash LED option in the module table. The right leg module has an LED that will flash for 3 seconds after clicking on the Flash LED option.



Clicking on the continue button will save the current montage on the Easy computer as the default ambulatory montage. This montage will appear (by default) when the user initializes the next ambulatory recorder for data collection.

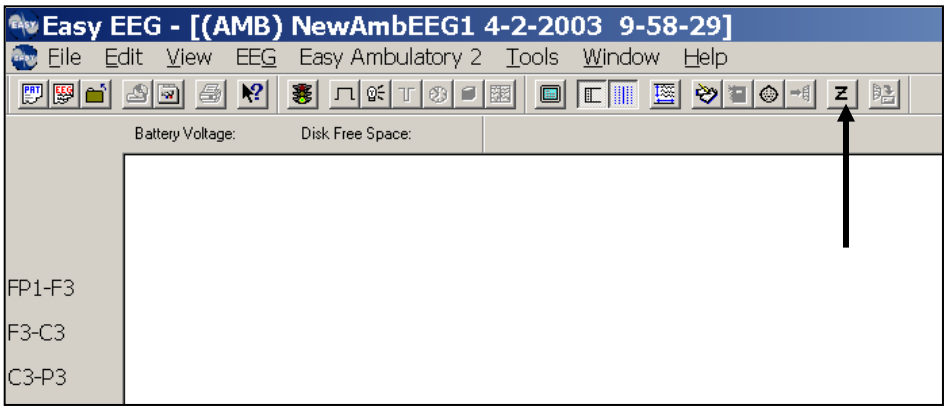
Reviewing Real Time Data

Click on the Stop/Run option to start reviewing waveforms.



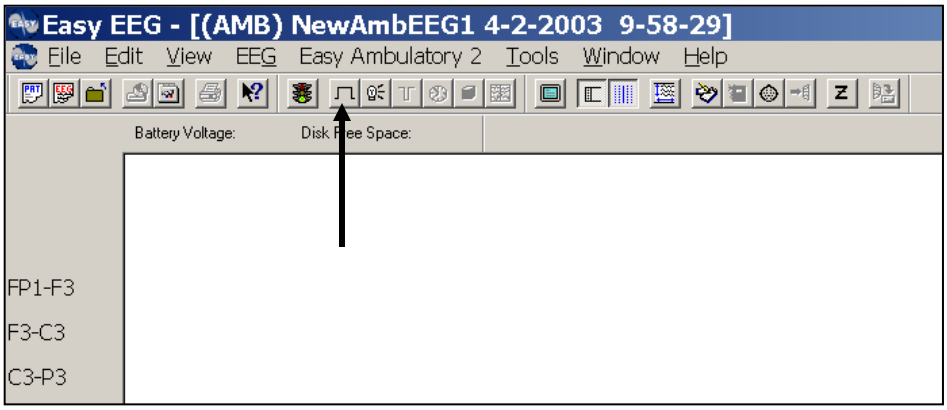
Reviewing Impedance Values

Click on the Impedance button to review impedance values.



Initiating Channel Calibrations

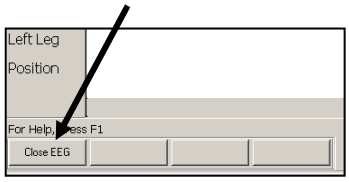
Click on the Calibration button to view calibration waveforms.



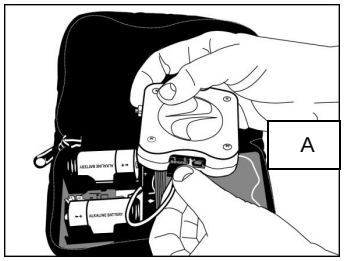
Ending Real Time Review

1. Disconnect the recorder from the computer.
2. Click on the Close EEG to stop reviewing data.

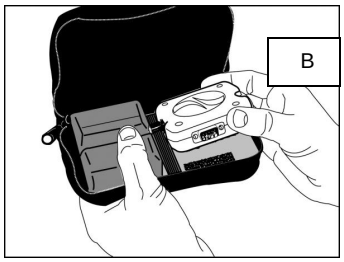
NOTE: This will not stop the recorder from collecting data. The recording will continue. The power and recording LEDs should be flashing at 1 Hz.



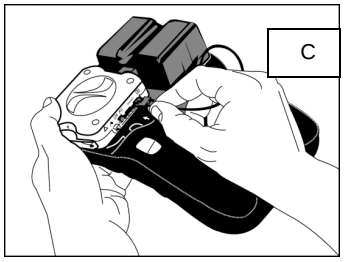
Summary of Steps for Starting a Recording:



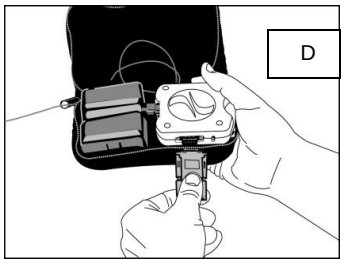
1) Start the Cadwell Easy program.
2) Prepare the patient (attach electrodes, connect electrodes to amplifier, connect amplifier to recorder).
3) Insert the Battery Holder into the recorder pouch. Open the pouch and insert the battery holder underneath the elastic strap on the right side of the pouch.
4) Insert the batteries into the Battery Holder and place the battery cover over the batteries (see illustration A & B).



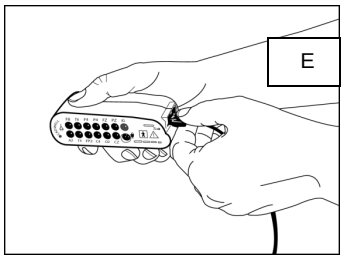
NOTE: WARRANTY COVERAGE ON THE AMBULATORY RECORDER IS PROVIDED ONLY WITH THE USE OF ALKALINE BATTERIES. THE USE OF OTHER BATTERIES MAY VOID YOUR WARRANTY. REMOVE BATTERIES WHEN THE RECORDING IS COMPLETE AND DISPOSE OF PROPERLY. DO NOT REUSE BATTERIES.



5) Verify the compact flash card is inserted into the Recorder before attempting to initialize the Recorder.
6) Connect the cable from the Battery Holder to the Recorder (see illustration A). Attach the recorder to the Velcro fasteners on the battery holder. The Power (I) LED on the recorder will flash rapidly for 60 seconds, then flash rapidly for 3 seconds, every 30 seconds.
7) Connect the network cable from the Recorder to the computer; (illustration D), and then press the event button on the side of the recorder for at least 4 seconds.
8) Note the Battery Voltage and Disk Free Space (voltage should be in the 3.0v range).
9) Select New Recording from the Ambulatory menu. If a previous recording has not been cleared from the disk you will be prompted to do this now. If you are unable to access the New Recording option from the pop up menu or drop down menu, hold down the event button on the recorder for at least 4 seconds. If the pop up menu does not appear, review the trouble shooting section on page 43.



10) Enter the patient information and then select RECORD.
11) Select the montage to be recorded.
12) Start EEG acquisition by selecting Run/Stop. Wait a few seconds for EEG to appear on-screen.
13) Check Impedance.
14) Perform Calibration.
15) Verify function of Recorder event button and microphone.
16) Disconnect the Recorder from the Ethernet cable; (illustration D).
17) Close the recording by clicking Close EEG. Make sure the trace waveform window is completely closed.
18) Verify the battery cable is connected to the recorder (illustration A). Make sure the EasyNet cable is connected to the recorder and the amplifier; (illustrations C & E)

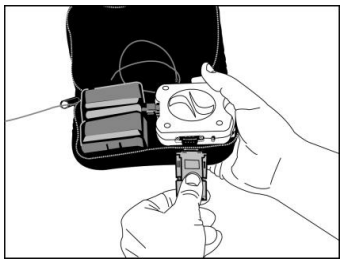


19) Verify the recorder is correctly configured by examining the status LEDs on the recorder. The Power LED (I) and the Recording LED (R) should be flashing one time per second. The green LED on the amplifier should be flashing one time per second. A yellow LED indicates an error has been detected by the amplifier.
20) Place the Recorder in its padded pouch and attach belt to patient. Additional instructions explaining how to use the moisture protection bag can be found on page 40 of this manual.

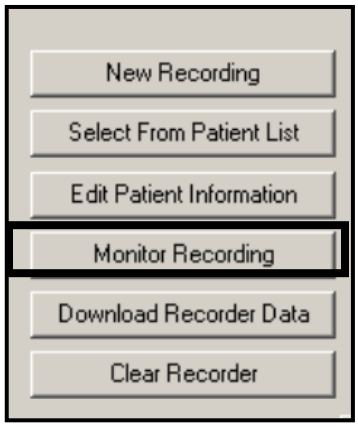
Monitor Recording:

The record can be viewed on the Cadwell Easy computer any time during the recording. For example, when the patient returns at the end of the recording period, the recorder can be connected to the Easy computer and additional calibration signals recorded.

1. Start the Easy EEG program.
2. Connect the Ethernet cable to the recorder. Press the event button for at least 4 seconds.



3. Click **Easy Ambulatory 2** on the upper menu bar.
4. Click **Monitor Recording**. The recording window opens, displaying the on-going EEG. Check impedance, or calibrate as desired. When finished, click **Close EEG.**



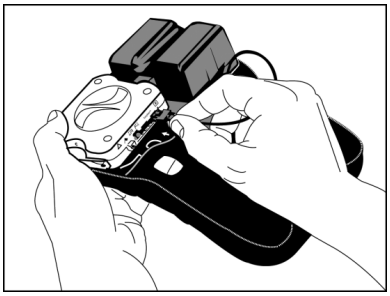
The recording either can continue if recording time remains, or can be stopped.

Ending the Recording and Disconnecting the Recorder:

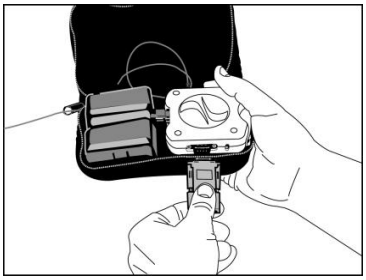
When the patient returns at the end of the recording session, there are two methods for stopping the recorder. If you want to view the EEG again or want to record Cal signals at the end of the recording, you first monitor the recording (see above) before downloading data. If you do not need to view the recording at this point, follow the following steps to download patient data.

Downloading the Easy Ambulatory 2 Recorder

1. Disconnect the amplifier from the recorder.



2. Attach the network adapter to the connector labeled P1 on the recorder. Press the event button on the recorder for at least 4 seconds.



3. Verify that the battery cable is still connected to the recorder. The green power LED labeled '▌' in the recorder should be flashing.

4. Attach the ethernet cable from the Easy computer to the Easy Ambulatory 2 recorder.

5. From the popup menu, select Download Recorder Data. The Easy software will copy the file from the compact flash card, then convert the file to an .EAS Easy file, and then copy the file to the folder specified as an Easy data folder on the computer.

Note: When downloading patient data from the recorder, the Easy system does not delete the patient data from the recorder. The process of deleting the recorder data will occur when the recorder is initialized for the next recording or when the user specifically uses the Clear Recorder options available in the Easy Ambulatory 2 menu.

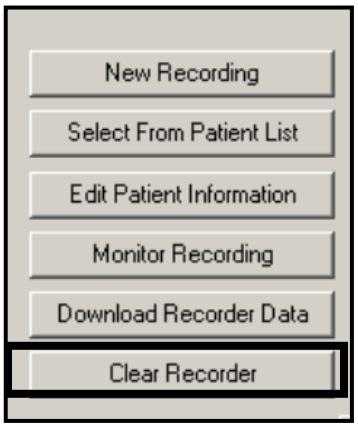
Note: Depending on the length of the recording and the condition of the batteries, it may be necessary to install new batteries in order to download the recording.

Clearing Data from the Recorder

To remove patient data from the recorder the user can select one of two options from the Clear Recorder menu option.

Quick Erase – Select this option to quickly remove all patient identifiers from the compact flash card. The next time the compact flash card is used, the new patient data will be added to the compact flash card and new waveform data will be written over the old patient waveform data.

Secure Erase – Select this option to completely remove all patient identifiers and waveform data from the compact flash card. This process will take several minutes to complete.



CHAPTER 7

Miscellaneous

CHAPTER 7

This chapter will provide an overview of the Moisture Protection Bag, Easy Ambulatory 2 trouble shooting, EasyNet cables, cleaning, environmental considerations, and list of materials used in the Easy Ambulatory 2 system.

Easy Ambulatory 2 Vented Moisture Protection Bag

Cadwell provides a Vented Moisture Protection Bag (part number 096009-000) for use with the Easy Ambulatory 2 system. The bag provides a layer of protection from moisture if the recorder is dropped in water or becomes wet. A circular vent is located on the back side of the bag to allow any gases released by the batteries to dissipate.

Vented Moisture Protection Bag

Only use vented moisture protection bags supplied by Cadwell. Do not use a bag that does not have a vent.

If the recorder is exposed to water, the Moisture Protection Bag can minimize the possibility of damage related to the exposure. However, the bag is not intended to be completely moisture proof.

Using the Vented Moisture Protection Bag

1. Remove the battery holder/recorder assembly from the soft-sided cloth pouch.
2. Prior to inserting the battery holder and recorder in to the moisture protection bag, complete the patient setup, start the recording, and verify that the system is recording data. Refer to the recorder setup instructions on page 36 of this manual if necessary.
3. Insert the battery holder/recorder into the moisture protection bag (see illustration 1). Note the orientation of the Easy Ambulatory 2 system. The recorder end of the system should be inserted first. Inspect the placement of the recorder in the bag. The recorder should be visible behind the logo printed on the outside of the bag. The vent on the moisture protection bag should be behind the battery holder.
4. Insure the EasyNet cable is routed to exit out of the moisture protection bag.
5. To seal the recorder in the moisture bag, gather the bag together and pinch it closed. Rotate the recorder assembly three complete turns to firmly twist the bag shut (see illustration 2).
6. Fold the twisted end of the bag up over the recorder. The twisted end of the bag should lie through the center of the battery cover. Place tape around the entire bag to hold tension on the twisted end of the bag (see illustration 3).
7. Gently lift the elastic strap in the recorder pouch and insert the sealed Easy Ambulatory 2 recorder back into the pouch. Tuck any excess bag behind the battery holder.
8. Feed the EasyNet cable through the pouch and then carefully zip the pouch shut.
9. Inspect the visibility of the event button through the opening on the spine of the pouch. Verify the LEDs are flashing and the event button is accessible.

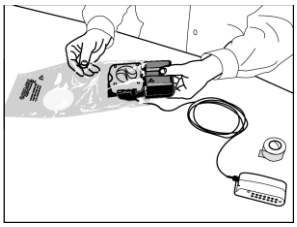


Illustration 1. Placing unit in bag

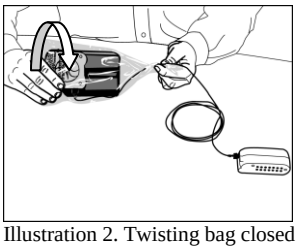


Illustration 2. Twisting bag closed

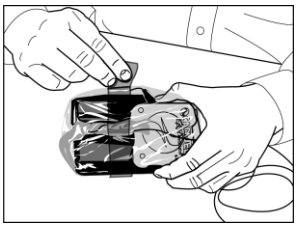


Illustration 3. Wrapping with tape

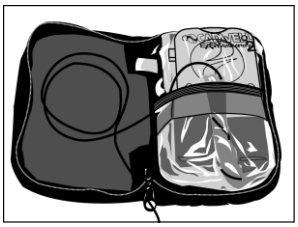


Illustration 4.Sealed unit in pouch

Exposure to Water or Moisture

The patient should be instructed to contact the testing center if the system is exposed to liquid.

Advise to patient to:

1. Remove the amplifier from the amplifier pouch (see illustration 1)
2. Disconnect the EasyNet cable that leads to the recorder (see illustration 2).
3. Remove the recorder from the pouch.
4. Wipe down the exterior of the moisture protection bag.
5. Place the equipment on a flat, dry surface until the unit is returned to the testing center.

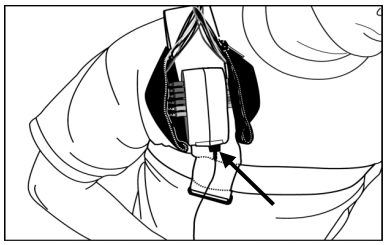


Illustration 1: Remove Amplifier

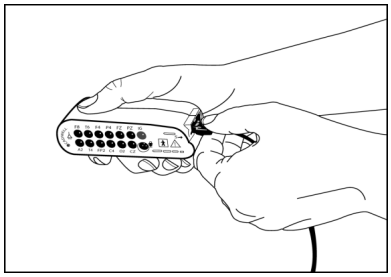


Illustration: 2: Disconnect Amplifier

Upon receiving the equipment from the patient:

1. Remove the recorder and amplifier from the pouches and wipe away any exterior moisture.
2. Before removing the bag, perform a careful inspection. If the twisted end contains trapped moisture, remove the bag by carefully cutting open the other end, verifying that you do not cut any cables or harm the recorder. Otherwise remove the bag with the usual method.
3. Disconnect the EasyNet cable from the recorder and then, taking careful note of the locations of any liquids, remove the battery cover, batteries, and the recorder from the carrier.
4. Wipe down all assemblies and place them together with the amplifier on a flat, dry surface.
5. Contact the Service Department at Cadwell. Your service technician will determine the next step. Depending on the amount of exposure to moisture, you may be able to download the recorder or you may be requested to send the recorder to Cadwell.

Vented Moisture Protection Bag Warnings and Cautions

⚠	Discontinue recording if the system has been exposed to water or moisture.
⚠	Do not immerse the recorder in liquid.
⚠	Instruct the patient to contact the testing laboratory if the recorder is exposed to water or moisture.
⚠	Contact Cadwell if the recorder has been exposed to water or moisture. Do not attempt to use the recorder or connect the batteries if the recorder has been exposed to water or moisture.
⚠	Do not re-use moisture protection bags. Bags are designed for single use.
⚠	Only use vented moisture protection bags supplied by Cadwell. Do not use a bag that does not have a vent.
⚠	The vented moisture protection bag is intended for use only with the Cadwell Easy Ambulatory 2 system hardware. The bag is not intended for any other use. Follow the instructions provided in this manual when using the vented moisture protection bag.

Troubleshooting	
The pop up menu does not appear *or* the Easy software displays a message indicating the recorder is not responding.	1. Verify the network cable is plugged into the Easy network connector on the computer and plugged into the P1 connector on the recorder. 2. Verify that new batteries are placed in the battery holder. Insure the batteries are inserted in the proper orientation. 3. Confirm the white cable from the battery holder is plugged into the P2 connector on the recorder. 4. Hold down the event button on the recorder for 4 seconds. If the pop up menu does not appear, contact Cadwell for assistance.
Recorder Power LED (⏽) is flashing, or not on.	The power LED will flash at a rate of 1 Hz during normal operation. If an error is detected, the recorder will flash the LED as follows: 1. The LED will blink rapidly if the battery power is low. 2. The LED will blink rapidly for 3 seconds, every 30 seconds if it is in the power standby mode. To trouble shoot this error, perform the following: A. Verify that new batteries are inserted in the correct orientation (positive/negative) in the battery holder. B. Verify that the battery cable from the battery holder is correctly plugged into the P2 connector on the recorder. C. Verify that the battery cable is correctly plugged into the connector on the batter holder. D. Replace the fuse located between the battery cell holders. *Remove the batteries from the battery holder; use the spare fuse from the spare fuse holder on the battery holder.*

Record LED (R) is flashing or not on	The record LED will blink at a 1 Hz rate during normal operation. The record LED will blink rapidly if there is an error associated with the recording of data. To troubleshoot an error condition, perform the following: A. Verify that a compact flash card is inserted in the recorder. Do not remove the compact flash card if the power LED (I) is on. B. Verify that new batteries are inserted in the correct orientation (positive/negative) in the battery holder. C. Start the Easy EEG program. D. Connect the Ethernet cable to the recorder. E. Click **Monitor Recording**. The recording window opens, displaying the ongoing EEG. F. When finished click Close EEG. G. Verify the Recording LED is on.
The Link LED (L) does not turn on.	The link LED will turn on when an ethernet cable is connected between the recorder and computer. To troubleshoot an error, perform the following tests: A. Verify that the ethernet cable is plugged into the adapter on the recorder and into the ethernet cable connector on the Easy computer network card. B. Verify that the cable is in good working order. Replace the network cable with another network cable if possible. C. Verify the network card is enabled correctly. Refer to Appendix A: Windows® XP Network Card Configuration contained in this manual.

The Data LED (D) does not turn on.	The data LED indicates that data is being sent between the recorder and the computer. To troubleshoot an error, perform the following tests: A. Verify that the ethernet cable is plugged into the adapter on the recorder and into the ethernet cable connector on the Easy computer network card. B. Verify that the cable is in good working order. Replace the network cable with another network cable if possible. C. Verify the network card is enabled correctly. Refer to Appendix A: Windows XP Network Card Configuration contained in this manual.
The Status LED (S) is blinking	This indicates an error condition. The recorder will flash the status LED if an error is detected at startup. If the Status LED flashes rapidly, an error with the internal RAM or ethernet controller has been encountered. Contact Cadwell.
The (N) LED is blinking	This indicates an error condition associated with the EasyNet connection. 1. Verify that you are using only one EEG amplifier. Trying to use two amplifiers can overload the bandwidth capability of the recorder. 2. If a module has been disconnected, or has a defective cable, the 'N' LED will flash. 3. If moisture has been detected in a module, the 'N' LED will flash.

Easy Ambulatory 2 Cables

EasyNet Cable
The EasyNet cable is provided in multiple lengths. The EasyNet cable is used to connect the multiple modules to the Easy Ambulatory Recorder.

Cable Length	Cable Use	Part Number
5" EasyNet Cable	Used to connect the position sensor module to the EasyHub	199237-200
10" EasyNet Cable	Used to connect the position sensor or limb movement modules to the EasyHub	199238-200
20" EasyNet Cable	Used to connect the position sensor or limb movement modules to the EasyHub	199239-200
35" EasyNet Cable	Used to connect the position sensor or limb movement modules to the EasyHub	199240-200
40" EasyNet Cable	Used to connect the position sensor or limb movement modules to the EasyHub	199241-200
70" EasyNet Cable	Used to connect the position sensor or limb movement modules to the EasyHub	199242-200
96" EasyNet Cable	Used to connect the Easy amplifier to the EasyHub	199236-200-096
180" EasyNet Cable	Used to connect the Easy amplifier to the EasyHub	199236-200-180

Cleaning the Easy Ambulatory 2 System

Clean the recorder and amplifier after each use with a damp cloth. Ethanol may also be used for the exterior of the system units. Do not allow direct contact of liquids to the inner parts of the Easy Ambulatory system.

Do not use acetone to clean the surface of the system components.

Reusable Items

Clean reusable items after each use. The Cadwell EEG electrodes can be washed with a hospital grade cleaner such as Envirocide®. Allow the electrodes to air dry prior to use.

The EasyNet cables can be wiped down with a damp cloth or ethanol. Do not allow direct contact of liquids to the connectors on the EasyNet cables.

The chest and limb straps may be washed in a washing machine with hospital grade laundry detergent, and allowed to air dry. Remove all sensors, modules, and cables prior to washing the straps.

The recorder pouch may be washed in a hospital grade laundry detergent and air-dried. Do not use the pouch for recording data if it is damp. Remove all sensors, modules, battery holder, and cables prior to washing the straps.

Environment

The Easy Ambulatory system should be stored in a clean, dry place. Handle the system with care. The ambulatory system is not waterproof, splash proof or dirt proof.

Transport and Storage Limits (ambient conditions)

Temperature:	-20º C (-4º F) to 65º C (149º F)
Relative Humidity:	10% - 90% non-condensing
Atmospheric Pressure:	500 hPa to 1060 hPa

Operational Limits (ambient conditions)

Temperature:	+10º C (+50º F) to +40º C (+104º F)
Relative Humidity:	30% - 75%
Atmospheric Pressure:	700 hPa to 1060 hPa

Factory Calibration, Preventive Inspection, Maintenance

The Easy Ambulatory 2 system is calibrated at Cadwell. No additional hardware calibration is needed. Inspect all cables before and after each use. Use the Easy Ambulatory 2, EasyNet Cable Tester to test EasyNet cables (see Appendix C). Discard cables if insulation is damaged or if the cable or connectors are damaged in any manner. Discard EasyNet cables if they do not lock in place when connected. Contact the Cadwell Service department if any errors are reported by the Easy Ambulatory 2 system.

Disposal

The Easy Ambulatory 2 system uses standard alkaline batteries. Dispose of batteries properly.

List of Materials in the Easy Ambulatory 2 System

Easy Recorder	*ABS/PC*
Easy Amplifier	*ABS/PC*
Easy Battery Holder	*ABS/PVC*
Easy Battery Holder Cover	*ABS*
Easy Recorder/Battery Pouch	*Latex Free, Nylon*
Easy Chest/Limb Straps	*Latex Free, Nylon*
Easy Amplifier Pouch	*Nylon, Velcro®*
Stockinet	*Latex Free, Nylon*
Cadwell EEG Electrodes	*Nylon*

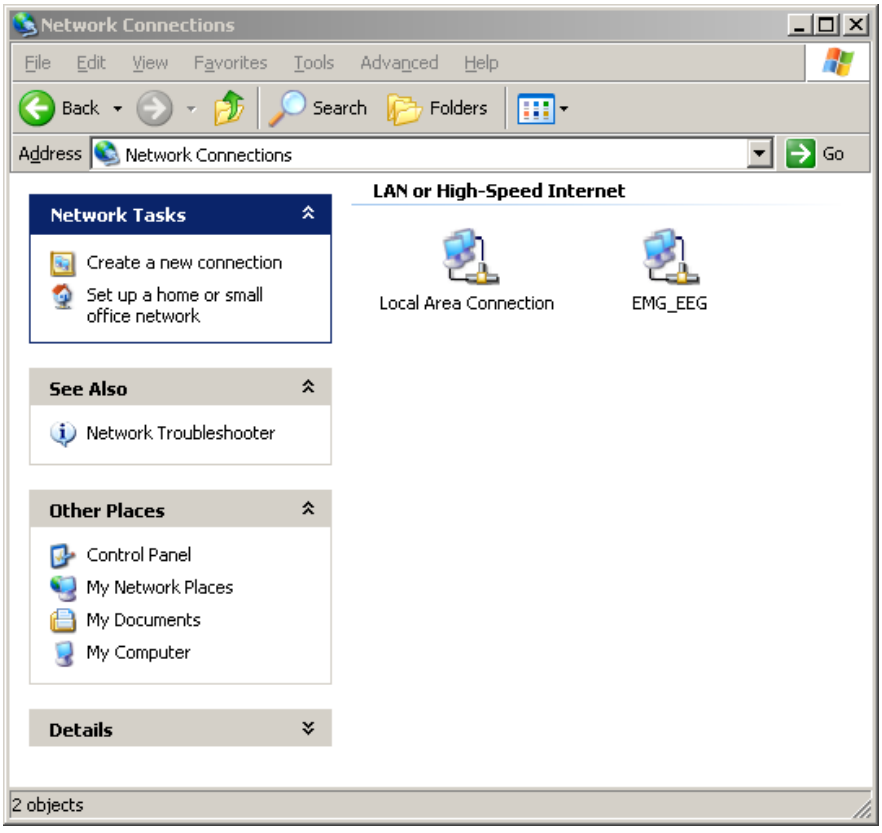
Appendix A: Windows XP Network Card Configuration

If necessary, install a network card in the computer. Follow the manufacturer's installation instructions.

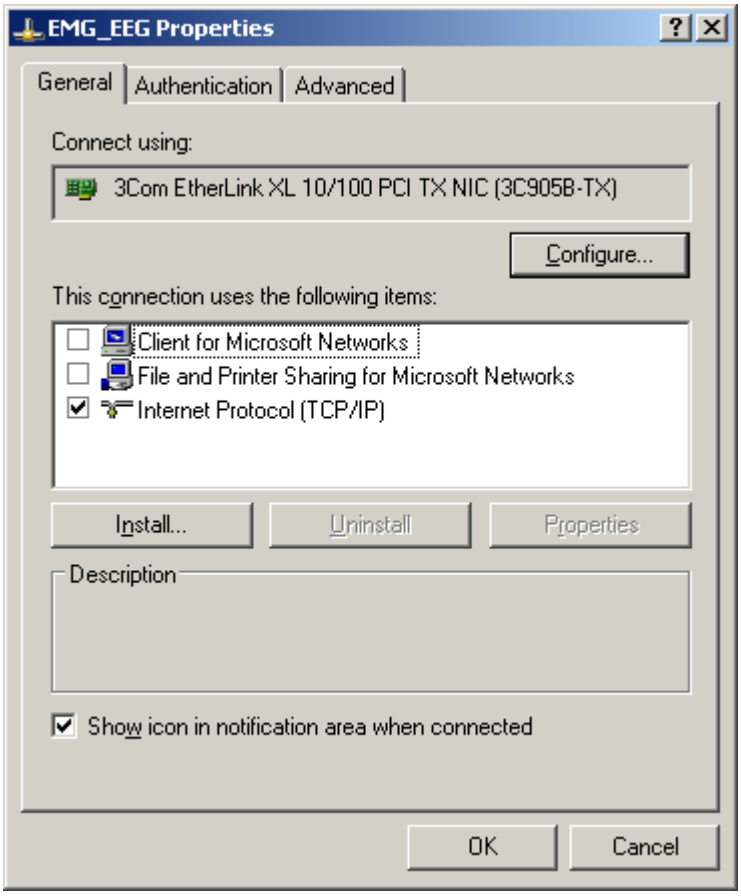
Login as a User that has administrative access rights.

Click **Start**, then **Control Panel**, then **Network and Internet Connections**.

Click on **Network Connections**. The Network Connections window will be displayed. A separate icon will be displayed for each network card that is installed in the PC. By default, the name given to each network card is "Local Area Connection". You can rename the icons to something more descriptive by right clicking on the icon and then selecting Rename. For example, you might want to change the name to EMG_EEG as shown in the picture below.



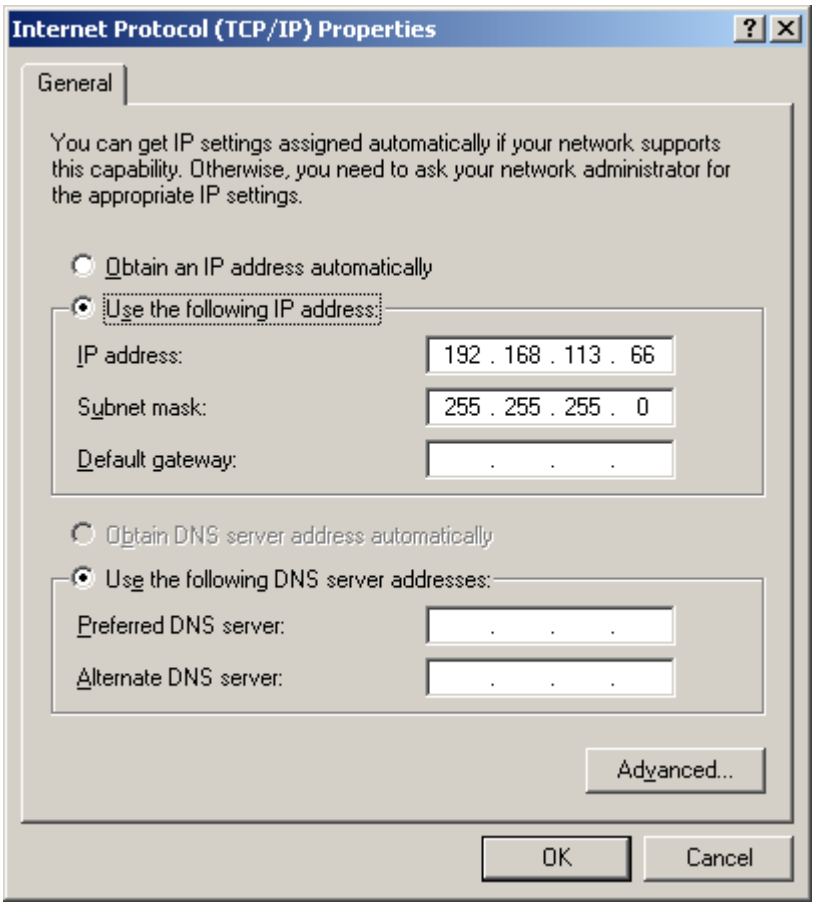
To configure the network properties; **Right click** over the appropriate icon and then select **Properties**. The properties window will be displayed as shown in the next picture.



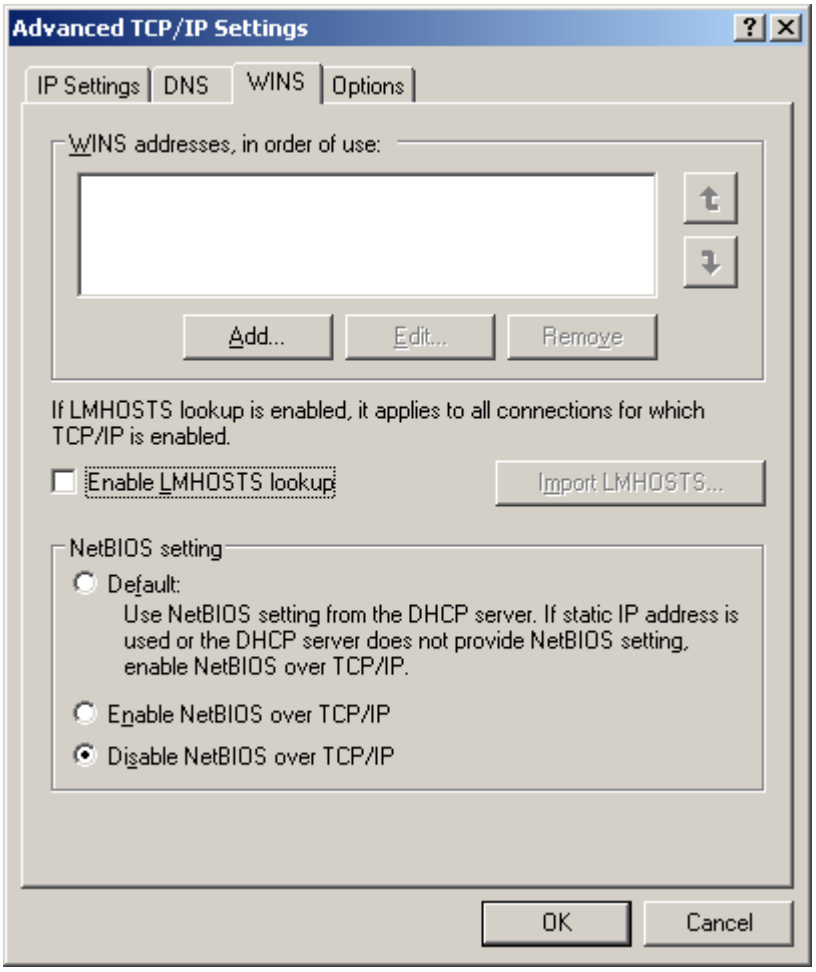
First, **remove the check marks** next to Client for Microsoft Networks, File and Printer Sharing for Microsoft Networks, and QoS Packet Scheduler. Be sure to **leave the check mark** next to Internet Protocol (TCP/IP).

Optional: Place a check mark next to "Show icon in notification area when connected" if you want Windows to tell you when the connection to the Cadwell system has been made.

Select the **Internet Protocol (TCP/IP)** and then click on the **Properties** button.
Select "**Use the following IP address**". Enter **192.168.113.66** for the IP Address. Enter **255.255.255.0** for the subnet mask.



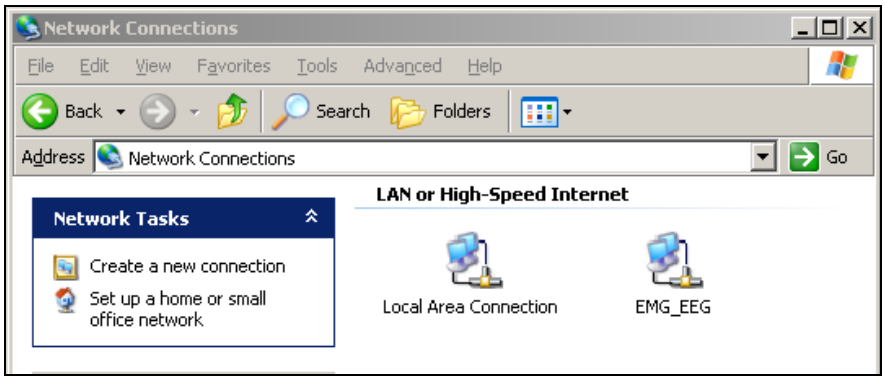
Click the **Advanced** button, and then click the **WINS tab**. **Remove the check mark** next to "**Enable LM Hosts** lookup" and then **select "Disable NetBIOS over TCP/IP"** as shown in the following picture.



Click **OK**, click **OK** again, and then click **Close**.

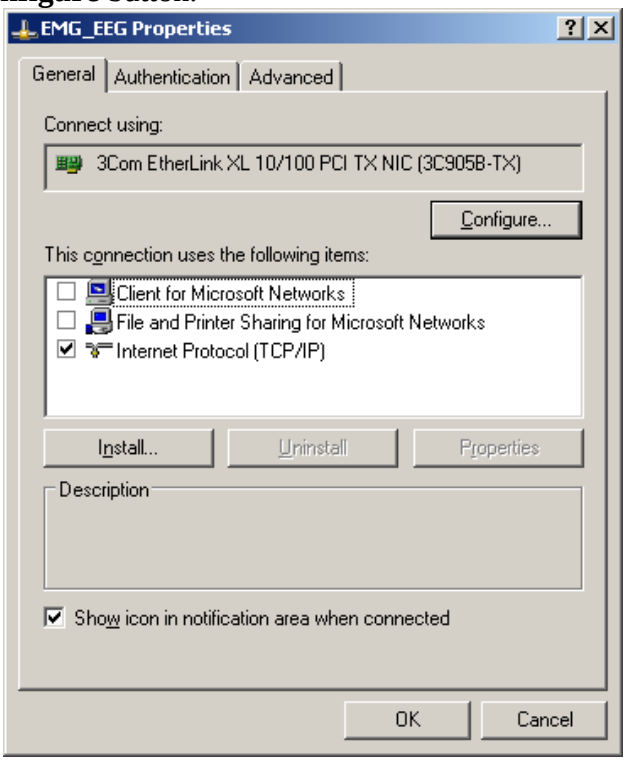
Configuring Advanced Properties for the Network Card

Click on **Network Connections**. The Network Connections window will be displayed. A separate icon will be displayed for each network card that is installed in the PC.



Right click over the appropriate icon and then select **Properties**. The properties window will be displayed as shown in the next picture.

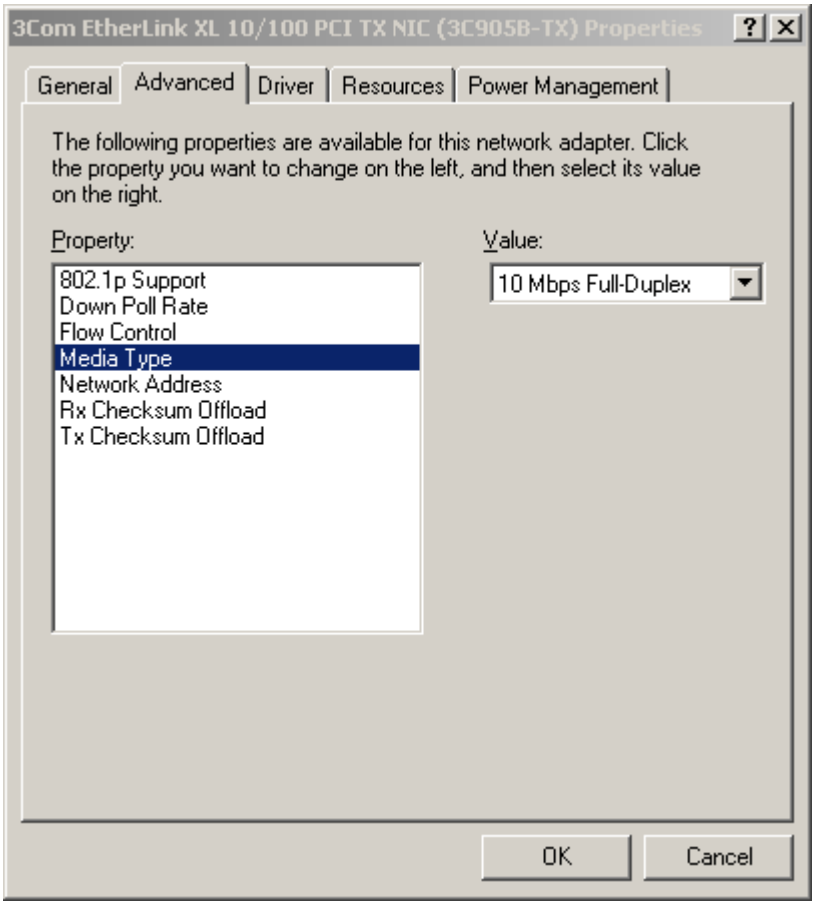
Left click on the **Configure** button.



Click on the **Advanced** tab.

1. Highlight Media Type

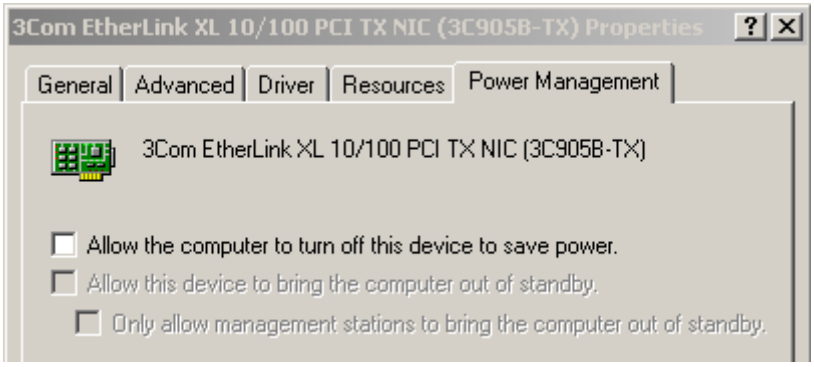
2. Select **10 Mbps Full-Duplex**



3. If a property named Auto-Power Down is present, set the value to **Disable**.

Click on the **Power Management** tab.

1. Remove the checkmark in the Allow the computer to turn off this device to save power.



2. Click **OK**, click **OK** again, and then click **Close**.

Appendix B: Additional Setup Supplies

You can purchase multiple items from Cadwell that can assist you in setting up and configuring your equipment to allow optimal patient comfort.

Cadwell recommends that you consider adding the following supplies to assist you in setting up your patients:

1. **Genuine Cadwell Gold Cup Electrodes** - Cadwell offers gold cup electrodes with various length cables. Depending on the height of the patient and the location you will place your connector box, select gold cup electrodes that are the appropriate length for your patient. Pediatric electrodes with a small gold cup disc are also available.
2. **Patch EKG Electrodes and Snap Connect Electrode Wires** – Cadwell offers various lengths of EKG snap electrode wires. Patch EKG electrodes can be used to record EKG data and leg movement data.
3. **Stockinet** – Using stockinet to cover electrode wires and electrodes can help retain the placement of EEG electrodes. Cadwell offers multiple sizes of stockinet to assist you in setting up your patients.
4. **EasyNet Cable Testing Unit** – The EasyNet cable is used to attach the amplifier to the recorder. The EasyNet cable-testing unit allows you to test a cable before it is applied to a patient. If the testing unit indicates the cable is not functioning correctly, replace the cable prior to sending your patient home.
5. **EasyNet Cables** – Cadwell offers various lengths of EasyNet cables. Purchase additional cables in various lengths to assure you always have the correct length cable.

Contact Cadwell

909 North Kellogg Street
Kennewick, WA 99336

Toll Free: 800-245-3001
Direct: 509-735-6481
Fax: 509-783-6503

Web Address: www.cadwell.com

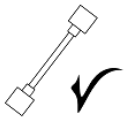
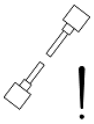
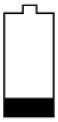
Appendix C: EasyNet™ Cable Tester

Instructions for use:

General Information:

- The cable tester may be used to test 4 pin EasyNet Module cables of any length and 5 pin battery cables.
- The cable tester turns on automatically when a cable is attached.
- The cable tester is powered by 2 AA batteries. Estimated battery life is 2 years under normal usage. Leaving a cable attached longer than is necessary for testing will shorten battery life.

Symbols used on Cable Tester:

	Indicator Not Illuminated
	Indicator Illuminated
	Power On
	Cable Good
	Cable Broken (open or shorted wires or connections)
	Low Battery

Using the Cable Tester

1. Plug both ends of cable to be tested into the appropriate connectors (4 pin EasyNet or 5 pin battery cable).
2. When the cable is plugged in, the power indicator will illuminate and the cable fault indicator will briefly illuminate. The power indicator is the one with the "Power On" symbol above it. The cable fault indicator is the one with the arrows pointing to the Cable Good and Cable Broken symbols.
3. The cable fault indicator will flash or remain illuminated when a faulty or broken cable is attached. Any time the cable fault indicator illuminates, a short or an open has been detected in the cable assembly. However, the cable fault indicator may illuminate and remain illuminated for up to one second after the cable is plugged in.
4. Lightly pulling on and wiggling the cable assembly may assist in identifying intermittent failures.

Low Battery Indicator

- The power indicator will flash to notify the user of a low battery condition.
- The cable tester may give false indications when the batteries become low and should not be used when the power indicator is flashing.
- Low batteries should be replaced as soon as possible. If it is not possible to replace the batteries, the old batteries should be removed to prevent battery leakage which can damage the cable tester.

Appendix D: Approvals and Specifications

Regulatory Approvals:	UL60601-1 2003 CSA 601.1 1990 EN 60601-1:1990 + A1:1993 + A2:1995 + A13:1996 EN 60601-1-1:2001 (medical systems) EN 60601-2-26:2002 (EEG equipment) EN 60601-1-2:2002 (EMC) EN 60601-1-4:2000 (programmable electrical medical systems) EN ISO 14971:2007 (risk)
KEMA Medical Notified Body	CE 0344
EU Authorized Reoresentitive	CEpartner4U, Esdoornlaan 13 3951 DB Maarn The Netherlands Tel: +31 6 516 536 26 URL: www.cepartner4u.nl

Easy Ambulatory 2 Specifications:

EEG Amplifier Inputs:	21 inputs
Active Reference Pairs:	2 sets of inputs
Iso Ground Connectors:	2 inputs
Voice Event Marker:	1 input
Recorder Event Marker:	1 input
Sampling Rate:	3200 Hz
Storage Rate:	200 Hz
A/D Conversion System:	16 bit A/D Conversion System
Battery Power:	2 ‘C’ alkaline cell batteries (2 ‘D’ alkaline cell batteries for extended recording)
Battery Life:	24 hours per set of ‘C’ cells (+48 hours for extended recording)
Data Storage Medium:	Compact Flash 1 GB (2 GB or higher for extended recording)
Recording Time:	Nominally 24 hours with one set of ‘C’ cells (+48 hours with one set of ‘D’ cells), depending on the condition of the battery cells and the number and type of EasyNet modules connected to the recorder.
Data Transfer Method:	Ethernet
LEDs:	Power LED Ethernet Link LED

	Ethernet Data Transfer LED EasyNet Connection LED Recording LED Status LED
Operational Limits (ambient conditions)	Temperature: +10° C (+50° F) to +40° C (104° F) Relative Humidity: 30% to 95% non-condensing

EasyNet SpO2 Module Specifications

Oxygen Saturation Range:	0-100%
Pulse Rate Range:	18-300 pulses per minute
Measurement Wavelengths: (using Nonin sensors)	Red: 660 nanometers @ 3mW Nominal Infrared: 910 nanometers @ 3mW Nominal
Accuracy: **SpO2** (70-100%) (± 1 SD) No Motion	- Adults, Pediatrics ± 2 digits - Neonates ± 3 digits
Heart Rate: No Motion	- Adults, Pediatrics, Neonates ± 3 digits
Temperature: a) Operating a) Non Operating	 0°C - 50°C -20°C - 50°C
Humidity: a) Operating a) Non Operating	 10-90% Non Condensing 10-95% Non Condensing
Power Draw:	29 mW typical operation
Voltage Input:	+3.3VDC (3.2V to 3.5V), w/50mV max. ripple
I/O Signals:	0 – 3.3VDC (nominal)
Dimensions:	W 38 x L 56 x H 20 mm (W 1.5 x L 2.2 x H 0.8 in)
Weight:	28 g
Ruggedness: a) Shock	 MIL-STD-810F, Method 516, Procedure IV, with drop height = 42” and no transit case
Sensors:	Designed to use Nonin sensors only
Shielding:	An RF shield is placed over analog components

EasyNet Nasal Pressure Module Specifications

Pressure Sensors:	Two Differential Pressure Transducers
Input Types:	Oral, Nasal, Oral/Nasal
Output Type:	Cadwell Proprietary EasyNet Communications Protocol
Input Pressure Range:	+/- 38 cm H_2O
Temperature:	
a) Operating	0°C - 50°C
a) Non Operating	-20°C - 50°C
Humidity:	
a) Operating	10-90% Non Condensing
a) Non Operating	10-95% Non Condensing
Power Draw:	11 mW typical operation
Voltage Input:	+3.3VDC (3.2V to 3.5V), w/50mV max. ripple
I/O Signals:	0 – 3.3VDC (nominal)
Dimensions:	W 50.8 x L 35.6 x H 20.3 mm (W 2 x L 1.4 x H 0.8 in)
Weight:	17 g
Ruggedness:	
a) Shock	MIL-STD-810F, Method 516, Procedure IV, with drop height = 30” and no transit case
Shielding:	None

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