GRASS-TELEFACTOR

AURA® PSG

WIRELESS /AMBULATORY RECORDER

WITH **AURAPSG** AMPLIFIER SYSTEM

USERS MANUAL

Release A

GRASS TELEFACTOR ®
An Astro-Med, Inc. Product Group

AMPLIFIER SYSTEM IDENTIFICATION DATA

Congratulations. Your Grass-Telefactor purchase is an investment in the finest of state-of-the-art medical technology. The information provided below lists the model number and serial number of your Amplifier system. If, for any reason, it should be necessary for you to contact Astro–Med, Inc. regarding your purchase, please refer to the following:

Amplifier Serial Number: _____
Base Station Serial Number:_____

IMPORTANT

This manual is subject to periodic review, update, and revision. Customers are cautioned to verify that the manual's information applies to the software and hardware present in the equipment.

This product performs as described in this manual, and in accompanying labels and/or inserts, when assembled, operated, maintained, and repaired in accordance with the instructions provided.

This product must be cleaned and checked periodically. Do not use a defective product. Parts that are broken, missing, worn, or contaminated should be replaced immediately. If repair or replacement becomes necessary, call or write to request service advice from Grass-Telefactor.

This product must not be altered without the prior written approval of Grass-Telefactor. The user of this product shall have the sole responsibility for any malfunction that results from improper use, faulty maintenance, improper repair, unauthorized service, or alteration by anyone other than Grass-Telefactor.

The safety, reliability, and performance of this device can only be assured under the following conditions:
- If the device has been used according to the accompanying operating instructions.
- If changes or repairs have been carried out by Grass-Telefactor.
- If it is used in buildings having ground equalization wiring that complies with relevant UL, CSA, IEC or other local standards and regulations.

REGULATORY NOTICES

This device has been designed and certified to comply with the requirements of the international standard EN60601-1 and EN60601-2-26, EN60601-1-2, and EN60601-1-1 the United States standard UL 60601-1, and the Canadian standard CAN/CSA22.2 No.601.1.

⚠ The device is classified:
CLASS I, Type BF
100-250 VAC, 50/60 Hz, 80 VA

The above classification is based on the condition that this device is installed and configured according to the instructions supplied. In order for the complete system to maintain compliance with the relevant standards, the host computer must be approved to the IEC950 standard.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

EQUIPMENT CLASSIFICATIONS

Shock Prevention: Class 1

Degree of Protection Against Harmful Ingress of Water: Ordinary Equipment, IPX0

Degree of Safety in the Presence of Flammable Anesthetic Mixture with Air or with Oxygen or Nitrous Oxide: Equipment not suitable for use in the presence of a flammable anesthetic mixture with air, oxygen, or nitrous oxide.

Mode of Operation: Continuous

⚠ WARNINGS

ELECTRIC SHOCK HAZARD

Warning: Connect the Base Station Power Supply only to a three-wire, grounded, hospital-grade receptacle. The three-connector plug must be inserted into a properly wired three-wire receptacle. If a three-wire receptacle is not available, a qualified electrician must install one in accordance with the governing electrical code.

Warning: Do not use extension cords or adaptors of any kind. The power cord and plug must be intact and undamaged.

Warning: The appliance coupler (AC Cordset) is the means for disconnecting the Base Station from the power mains.

Warning: Measure the system's leakage current after completion of installation, after disconnect/reconnection of parts of the system, and at regular periodic intervals. For instructions on how to perform this test please contact Grass-Telefactor Technical Support. Forward and reverse polarity: 500 microamperes maximum.

EXPLOSION HAZARD

Warning: Do not use this system in the presence of flammable anesthetics or other flammable substances.

Warning: Use only the specified battery (part number 26759200) in the AURA PSG Amplifier. Use of unauthorized battery may cause explosion/fire hazard.

PATIENT SAFETY

Warning: The patient should be disconnected from the AURA PSG system when high frequency surgical equipment is used.

Warning: This system should not be used in place of electrocardiograph for vital signs monitoring.

Warning: Use only by or on the order of medically trained personnel.

Warning: Battery Charger must not be located in a patient area.

Warning: Do not use in an MRI environment.

Warning: Read manual before using.

Warning: Protect from exposure to liquids. If the Amplifier Unit is exposed to liquids during recording, discontinue use by disconnecting the electrodes from the Amplifier Unit and turning the Amplifier Unit power off. Resumption of recording is to be performed only by qualified personnel.

Warning: AURA PSG contains no user serviceable parts.

Warning: AURA PSG is not intended to be sterilized.

Warning: Use only Nonin-manufactured PureLight® pulse oximeter sensors. These sensors are manufactured to meet the accuracy specifications for Nonin pulse oximeters. Using other manufacturers' sensors can result in improper pulse oximeter performance. A list of compatible sensors is provided in CHAPTER 5: ACCESSORIES AND REPLACEMENT PARTS.

Warning: Loss of pulse oximeter monitoring can result if any objects hinder the pulse measurement. Ensure that no blood flow restrictors (e.g., blood pressure cuff) hinder pulse measurements.

Warning: As with all medical equipment, carefully route cables and connections to reduce the possibility of entanglement or strangulation.

Warning: This pulse oximetry system is designed to determine the percentage of arterial oxygen saturation of functional hemoglobin. Significant levels of dysfunctional hemoglobin, such as methemoglobin, might affect the accuracy of the measurement.

Warning: Inspect the pulse oximeter sensor application site at least every 6 to 8 hours to ensure correct sensor alignment and skin integrity. Patient sensitivity may vary due to medical status or skin condition. Discontinue use of adhesive tape strips if the patient exhibits an allergic reaction to the adhesive material.

Warning: The accuracy of the SpO2 measurement may be affected if the total pulse oximeter cable length (including extension cables) is greater than 3 meters.

INTENDED USE

The AURA PSG amplifier system is intended for recording routine electroencephalography (EEG) and polysomnography (PSG).

The device is intended to be used only by physicians, technicians, or other medical professionals that are trained in electroencephalography or polysomnography.

CAUTION

Federal law restricts this device to sale by or on the order of a licensed physician (or properly licensed practitioner).

Use only the Nonin probes as the optional pulse oximeter.

Use only accessories and electrodes identified for use with this device (see instructions for the electrodes that are being used).

Disconnect power supply before servicing.

Disconnect the AURA PSG before using a defibrillator.

The use of pulse oximeter accessories, sensors, and cables other than those specified by Grass Telefactor may result in increased emission and/or decreased immunity of this device.

The AURA PSG wireless mode uses the 2.4 GHz ISM band. Performance may be impacted by other devices using this frequency, including Wi-Fi terminals, Bluetooth PDAs and some cordless phones.

1 Specifications & Symbols Glossary

Specifications

AURA PSG SYSTEM SPECIFICATIONS

*Amplifier*_____ Grass-Telefactor AURA PSG system
13 referential electrode inputs
2 reference electrode inputs
7 differential inputs
2 DC coupled inputs
1 connection for a Nonin pulse-oximeter

AMPLIFIER SPECIFICATIONS

REFERENTIAL ELECTRODE INPUTS
Input Signal Range _ 4 mV peak to peak full-scale
Input Impedance ___ 12 Megohm or higher, all inputs including reference
Differential Input
Impedance _____ 20 Megohm or higher
*Amplitude Accuracy*_ ±2.5 % (prior to software correction)
Frequency Response 0.5 Hz to 50 Hz (-3 dB points, within 10%)
Enhanced Low
Frequency
with TWin _____ 0.1 Hz (-3 dB, within 10%)
CMR (60 Hz) _____ >80 dB (signal referenced) or >100 dB (earth reference)
Noise _____ <2 µV peak to peak
*Input Bias Current*__ <4 nA
Cross-Talk _____ 0.1% or less
Maximum Input ____ 4 mV

DIFFERENTIAL INPUTS

Input Signal Range	4 mV peak to peak full-scale
Input Impedance	12 Megohm or higher
Amplitude Accuracy	± 2.5 %
Frequency Response	0.5 Hz to 50 Hz (-3 dB points, within 10%)
Enhanced Low Frequency with TWin	0.1 Hz (-3 dB, within 10%)
CMR (60 Hz)	>80 dB (signal referenced) or >100 dB (earth reference)
Noise	<2 µV peak to peak
Input Bias Current	<350 nA
Cross-Talk	0.1% or less
Maximum Input	4 mV

ISOLATED DC INPUTS

Input Signal Range	±2.0 V
Frequency Response	50 Hz (-3 dB points, within 10%)
Cross-Talk	1% or less

Impedance

Test Mode	*Referential inputs only:* 1 kohms to 100 kohms, 10%
Calibration Signal	*Referential inputs only:* 500 µV peak to peak ±2%
Sampling Rate	200 samples / second / channel
Power	Rechargeable 3.6 V lithium battery
	Capacity: 10 hours in the wireless mode, 12 hours in the tethered mode
	Charging: The battery must only be charged with the external Grass-Telefactor 42050100 Battery Charger that operates from a DC voltage supplied by the external RPS-21903 Power Supply (see the separate Battery Charger operating instructions)
Physical Size	*Amplifier Unit approximately:*
	3.5" W x 5.9" H x 1.0" D (8.9 cm x 14.9 cm x 2.5 cm)
	Weight: 10 ozs. (280 g)

BASE STATION SPECIFICATIONS

NON-ISOLATED DC INPUTS

Input Signal Range ___ ±2.5 V
Frequency Response 50 Hz (-3 dB points, within 10%)
Cross-Talk _____ 1 % or less

DC Channels _____ 2 channels
±2.5 V

**Connectivity
    to Host PC** _____ Standard 10Base-T Ethernet, TCP/IP protocol
Power _____ Medical-grade Isolated Power Supply
Physical Size _____ *Base Station approximately:*
7" W x 7.5" H x 2.7" D (17.8 cm x 19.1 cm x 6.9 cm)
Weight: 2.3 lbs. (1.04 kg)

BUILT-IN OXIMETER: USE ONLY WITH NONIN PURELIGHT SENSORS

**Oximeter Saturation
    Range** _____ 0 to 100%
Pulse Rate Range ___ 18 to 300 pulses per minute
**Measurement
    Wavelengths** _____ *Red:* 660 nm at 3mW nominal
Infrared: 910 nm at 3mW nominal
Accuracy _____ *SpO2 (70-100%) (±1SD*):*

No Motion:	Adults, Pediatrics	±2 digits
	Neonates	±3 digits
Motion:	Adults, Pediatrics	±2 digits
	Neonates	±3 digits
Low Perfusion:	Adults, Pediatrics	±2 digits
	Neonates	±3 digits

Heart Rate:
No Motion (18-300 bpm):

Adults, Pediatrics, Neonates	±3 digits

Motion (40-240 bpm):

Adults, Pediatrics, Neonates	±5 digits

Low Perfusion (40-240 bpm):

Adults, Pediatrics, Neonates	±3 digits

* Standard Derivation is a statistical measure: up to 32% of the readings may fall outside these limits.

OTHER SPECIFICATIONS

Regulatory _____ *AURA PSG System:* certified to
UL 60601-1
CAN/CSA C22.2 No. 601.1
IEC 60601-1-1
IEC 60601-2-26
EN 60601-1-2
CE marked to EC MDD (93/42/EEC)

Warranty _____ Lifetime Limited Warranty on Grass-Telefactor
manufactured parts (see our full warranty for details)

Software _____ Fully supported by TWin

RPSAS40 MEDICAL-GRADE POWER SUPPLY

Input _____ 100 to 260 VAC
Line Frequency: 47 to 63 Hz
Ambient Operating Temperature: 0 to 40°C
IEC320 Power Inlet, Removable 8-foot (2.4 m)
Hospital-grade Cordset

Output _____ +12 VDC Regulated, 1.2 Amperes maximum
Short Circuit Protected
Line/Load Regulation: ±5% Overall
Output Cable: 6 foot (1.8 m)

Agency Approvals__ Conforms to UL2601-1 and certified to
CAN/CSA C22.2 No.601.1,
Certified to IEC60601-1 and TUV601.1 approved

Physical Size_____ 3" W x 1.89" H x 4.75" L (7.6 cm x 4.8 cm x 12 cm)
Weight: 1 lb. (0.45 kg)

SYSTEM TRANSPORT OR STORAGE SPECIFICATIONS

Ambient Temperature
Range _____ -40° C to +70° C
Relative Humidity
Range _____ 10% to 100%, including condensation
Atmospheric
Pressure Range__ 500 hPa to 1060 hPa

(All specifications subject to change without notice.)

GLOSSARY OF SYMBOLS

Direct Current
Courant Continu

On (only for a part of equipment)
Marche (seulement pour une partie de l'appareil)

Off (only for a part of equipment)
Arret (seulement pour une partie de l'appareil)

Attention, consult accompanying documents
Attention, consulter les documents d'accompagnement

Protective Earth
Terre de Protection

Isolated Inputs
Entrées Isolées

Non-ionizing electromagnetic radiation
Rayonnement   électromagnétique non ionisant

AURA® PSG Wireless/Ambulatory Recorder

2 Introduction

Product Description

The AURA PSG system is designed specifically for recording EEG and PSG. The system features a compact, wearable 24-channel Amplifier Unit and a Base Station that can be mounted in a variety of locations.

The AURA PSG system provides for patient safety isolation, signal conditioning (physiological signal amplification and filtering), and digitization. The host computer receives data according to a specific protocol.

Grass-Telefactor TWin® software can be used on the host computer to receive and process the data. The TWin software is powerful and easy to use, providing data acquisition, recording, and review capabilities in one flexible package.

By combining over 70 years of neurophysiological amplifier experience with the latest digital design techniques, the AURA PSG continues with the quality, reliability, and simplicity that have made Grass-Telefactor famous in the field of neurophysiology.

FEATURES

- Compact design that is rugged, lightweight and easy to use
- Local analog to digital conversion for interference-free recordings
- Easily connect to any PC with the on-board Ethernet connection
- Built-in impedance checking and calibrations
- Amplifier Unit is wearable for ambulatory applications
- Wireless mode allows ambulatory applications within 25 feet (without obstructions) of the Base Station.

AMPLIFIER UNIT

The unit is enclosed in a plastic housing approximately 3.5" W x 5.9" H x 1.0" D (8.9 cm x 14.9 cm x 2.5 cm) in size. It is small and light enough to be worn comfortably.

The Amplifier Unit provides 22 isolated, analog waveform inputs along with two additional channels generated by a Nonin pulse oximeter. Electrode and sensor connection is direct to the unit with no adaptor required.
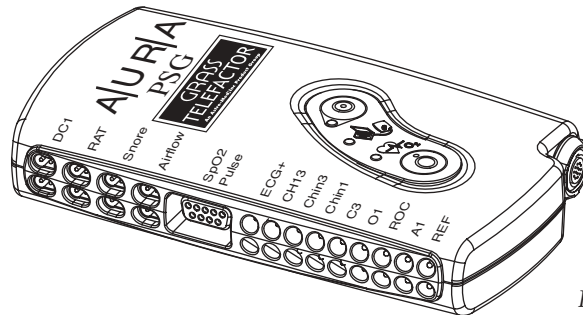

Figure 2-1: Amplifier Unit

Following is a list of the analog inputs with connector type:

13 AC Referential	*SAFELEAD* electrode connection
1 AC Differential	Pair of *SAFELEAD* electrode connections
6 AC Differential	2-pin molded connectors
2 DC	2-pin molded connectors

There are also SAFELEAD electrode connections for two Ref inputs and one GND (common). The Amplifier Unit can operate in either standard or wireless modes.

STANDARD MODE

The Amplifier Unit can be tethered to the Base Station, which streams data to a host computer. When tethered, the Amplifier Unit connects to the Base Station via a single cable that carries power and data through a proprietary serial interface.

The Amplifier Unit is also capable of operating un-tethered. When un-tethered, it will run off a battery and save data on a CompactFlash® memory card.

WIRELESS MODE

The Amplifier Unit uses Bluetooth® technology to stream data to a host computer via a wireless connection with the Base Station. The Amplifier Unit must be within 25 feet (without obstructions) of the Base Station. The Amplifier Unit is powered by a battery and does not use a CompactFlash card or Tether Cable.

BASE STATION

The Base Station is enclosed in a plastic housing approximately 7" W x 6" H x 2" D (17.8 cm x 15.3 cm x 5.1 cm) in size and it can be attached to a cart arm, mounted on a wall next to a patient bed, or sit flat on a tabletop.
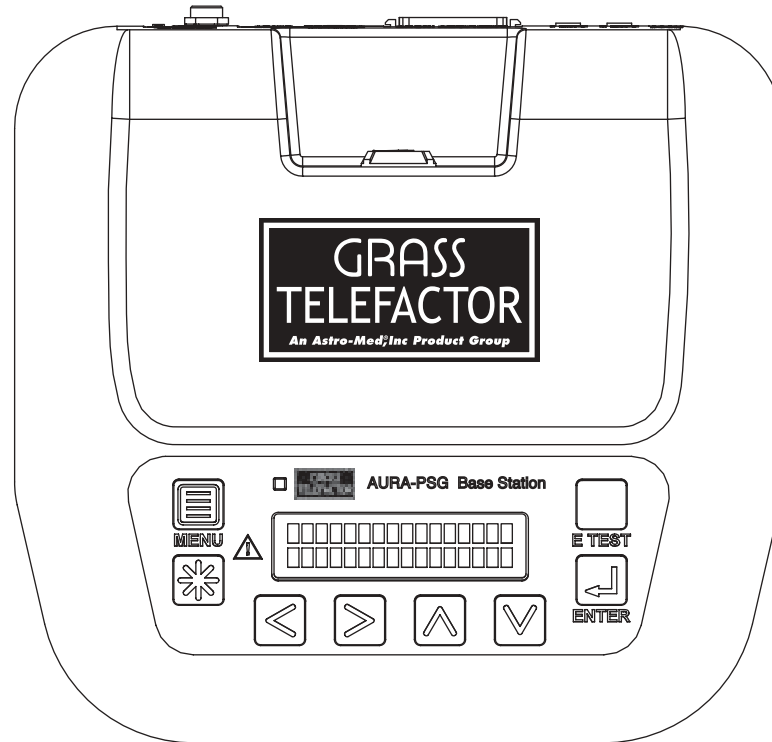

Figure 2-2: Base Station

The Base Station converts data from the Amplifier Unit to network protocols for transfer to a host computer. See CHAPTER 3 INSTALLATION, FIGURE 3-6.

The LCD display with menu controls is located on the top surface of the Base Station. Menu selections can be made for configuring the unit, communicating with the host computer, and implementing the electrode impedance test. The LCD also displays status information such as electrode impedance test values.

A Tether Cable connection port is also located on the top surface of the Base Station. This is used to connect the Amplifier Unit to the Base Station via the Tether Cable in standard mode. The Base Station also contains Bluetooth technology to receive data from the Amplifier Unit in wireless mode.

Power is supplied to the Base Station through a rear side connector that attaches to the RPSAS40 Medical-grade Power Supply (+12 VDC). The RPSAS40 Power Supply module provides low-voltage (+12 VDC) to power the Base Station. Only certified Grass-Telefactor regulated power supplies can be used with the AURA PSG system.

A 36-pin connector is also located on the rear side and it allows for the connection of an optional Patient Eventbutton (CAB-21648-10). Two Auxiliary DC inputs are available for recording external voltage sources. All other connections are also located on the rear side of the Base Station.
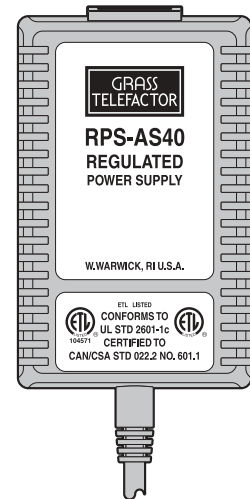
Figure 2-3: RPSAS40 Power Supply

BATTERY & BATTERY CHARGER

A rechargeable 3.6 V lithium ion battery (267592000) provides power to the Amplifier Unit. The Battery Charger is a free-standing unit that can charge a single battery. The Battery Charger is external and operates from a DC voltage supplied by an external power supply.

See the separate operating instructions for the Battery Charger.

Warning: Battery Charger must not be located in a patient area.

AUXILIARY DC INPUT MODULE (DCM8)

The auxiliary DC Input Module, DCM8, is a small plastic enclosure with eight non-isolated 3.5 mm input jacks for DC inputs and one 3.5 mm input jack for an event pushbutton. Four of the DC inputs are single ended and four are differential to allow for the greatest flexibility when connecting auxiliary device outputs.

Figure 2-5: DCM8 DC Input Module
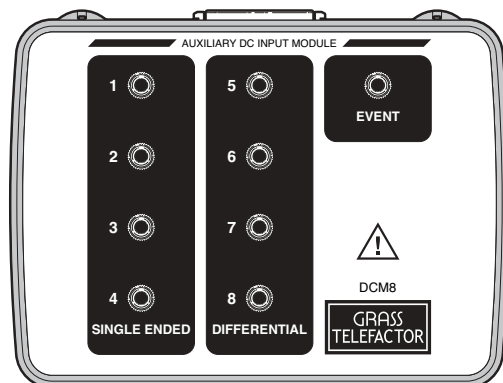
The DCM8 is supplied standard with the Model AUXL-P AURA PSG System, but is an opion with the Model AU-P AURA PSG *Portable* System.

For more information regarding the compatibility of a device with the AURA PSG system, please contact Grass-Telefactor, Technical Support Services Department. The optional Nonin PureLight® Pulse Oximeter Sensors can be connected directly to the Amplifier Unit.

System Components

Standard System Components

The following components are included in the Model AUXL-P AURA PSG PC-based system:
- AURA PSG Amplifier System with
    - Built-in Oximeter
    - CompactFlash card and reader
    - Amplifier Battery (2) with battery charger and power supply
    - Pouch for AURA PSG Amplifier and 4 sizes of straps
- Base Station with
    - Wall-mount bracket
    - RPSAS40 Medical-grade Power Supply
    - Tether cable (CAB-21916)
- NET-CKIT Network cabling kit (Base Station to Host)
- DCM8 DC Input Module with wall-mount bracket
- 20-button programmable keypad for notation entry and system operation
- Medical-grade Isolated Power System

The following components are included in the Model AU-P AURA PSG Portable Laptop-based system:
- AURA PSG Amplifier System with
    - Built-in Oximeter
    - CompactFlash card and reader
    - Amplifier Battery (2) with battery charger and power supply
    - Pouch for AURA PSG Amplifier and 4 sizes of straps
- Base Station with
    - Wall-mount bracket
    - RPSAS40 Medical-grade Power Supply
    - Tether cable (CAB-21916)
- NET-CKIT Network cabling kit (Base Station to Host)

Optional System Components

Refer to Chapter 5: Accessories & Replacement Parts, for a list of optional system components.

3 Installation

Setting Up for Operation

The AURA PSG System is designed to be located in the vicinity of the test subject, but with the ability to allow patient mobility for periods of time. The Amplifier Unit can be placed inside a pouch worn by the patient.

The Base Station itself, and the associated power supply, can be attached to a cart or stand for routine EEG or PSG studies.

Grass-Telefactor provides a full line of mobile carts and mounting brackets. Please consult Grass-Telefactor Customer Support for further details.

Take care to locate these components away from dirt, dust, high-temperatures, and liquid spill hazards. Avoid locating the unit where the power switches or controls or cables could be bumped inadvertently.

INSTALLATION

Refer to the interconnection diagram (Figure 3-6) for connection details and cable part numbers. To install the AURA PSG system, proceed with the following steps.

STEP 1: INSTALLING CABLING
STEP 2: INSTALLING THE NETWORK INTERFACE CARD FOR ASSOCIATED COMPUTERS
STEP 3: SETTING UP THE RPSAS40 REGULATED POWER SUPPLY
STEP 4: SETTING UP THE BASE STATION
STEP 5: CONNECTING THE TETHER CABLE
STEP 6: CONNECTING AMPLIFIER UNIT INPUTS
STEP 7: CONNECTING OPTIONAL EQUIPMENT TO THE BASE STATION
STEP 8: SETTING UP THE BATTERY CHARGER
STEP 9: SETTING UP WIRELESS COMMUNICATION (WIRELESS MODE ONLY)

STEP 1: INSTALLING CABLING

Grass-Telefactor recommends that all cabling, network, video cabling, intercom cabling, and any other cabling for auxiliary instrumentation be run by qualified personnel under hospital supervision and according to local standards and regulations.

It is good practice to use an approved isolation transformer when interconnecting multiple pieces of equipment to the AURA PSG system to avoid summation of leakage currents. The use of an isolation transformer reduces the leakage current to that of the isolation transformer. If an isolation transformer is to be used it should be EN60601-1 approved and rated for 115/240 VAC, 50/60 Hz, 600-800 VA.

STEP 2: INSTALLING THE NETWORK INTERFACE CARD FOR ASSOCIATED COMPUTERS

The AURA PSG system may be supplied with an optional network interface card for computers associated with the AURA PSG system. Follow the instructions that are supplied with this card to install and test the interface card before connecting to the AURA PSG system.

Step 3: Setting up the RPSAS40 Regulated Power Supply

Select an appropriate location that will allow for ventilation around the unit and the outlet to be within safe reach of the Base Station. The power cable should be run so as it will be out of the way and not be a tripping hazard.

Power Supply Line Voltage
The RPSAS40 will operate with line voltage within the range of 100 to 250 volts, covering both 115 and 230 volts operation with no user intervention. The proper hospital-grade AC power cord is required.

Step 4: Setting up the Base Station

The Base Station can be located remotely from or locally to the host computer. Depending on the setup, the network cable required will be either a cross-over or patch 10BaseT Ethernet cable rated category 5 or higher.

If a direct connection is used, a single cross-over cable is required (CAB-20576-03). If going through a dedicated hub or switch, a patch cable is required (CAB-21064-025 or CAB-21064-010). A networking cable connector (CON-20486) is also provided. Select the appropriate cable and connect the Base Station to the host computer.

STEP 5: CONNECTING THE TETHER CABLE

Connect one end of the tether cable to the Base Station by inserting the connector into place, as indicated below. To disconnect the tether cable (26802001), pull on the outer sleeve of the connector to unlock it from the unit.
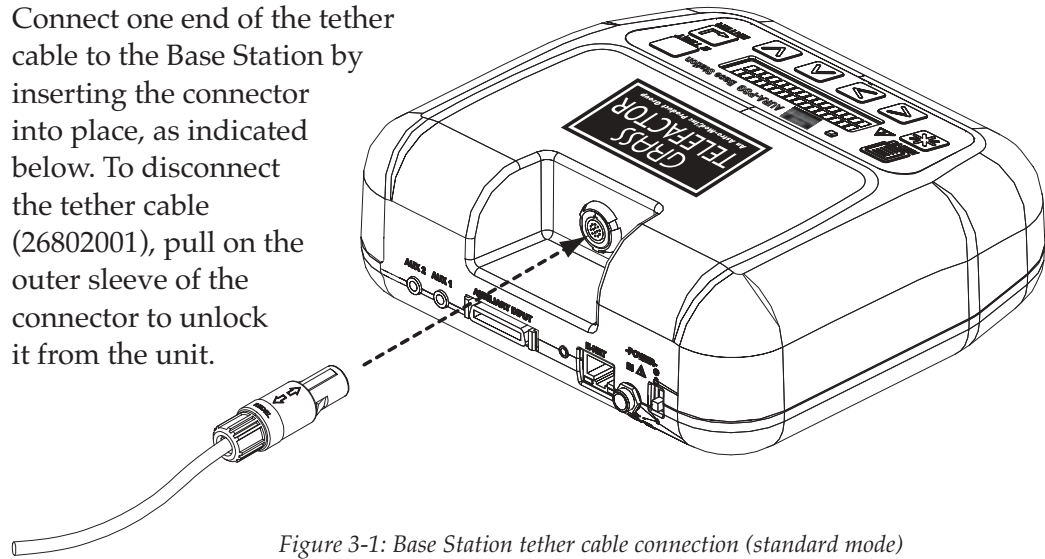
Figure 3-1: Base Station tether cable connection (standard mode)

Note: Do not twist the connector or damage will result.

Connect the other end of the tether cable to the Amplifier Unit.
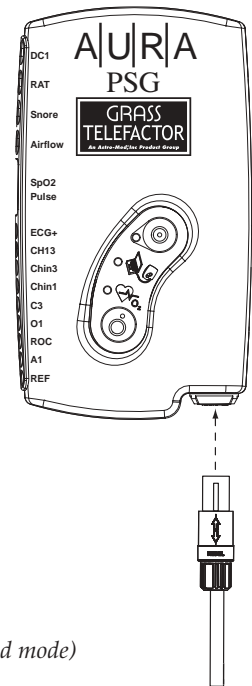
Figure 3-2: Amplifier Unit tether cable connection (standard mode)

STEP 6: CONNECTING AMPLIFIER UNIT INPUTS

Attach the inputs to the Amplifier Unit.
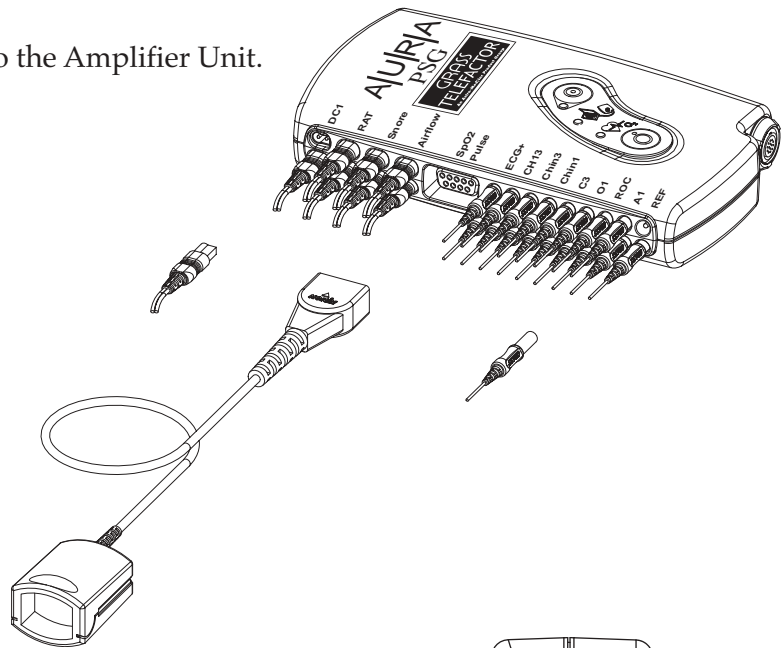
Figure 3-3:
Amplifier Unit
connections

The following inputs are available
through the Amplifier Unit:

- 13 referential electrode inputs
- 2 reference electrode inputs
- 7 differential inputs
- 2 DC coupled inputs
- 1 connection for a Nonin
  PureLight® pulse-oximeter

A list of compatible sensors is
provided in CHAPTER 5: ACCESSORIES
AND REPLACEMENT PARTS.

Figure 3-4: Amplifier Unit inputs

AURA® PSG Wireless / Ambulatory Recorder

STEP 7: CONNECTING OPTIONAL EQUIPMENT TO THE BASE STATION

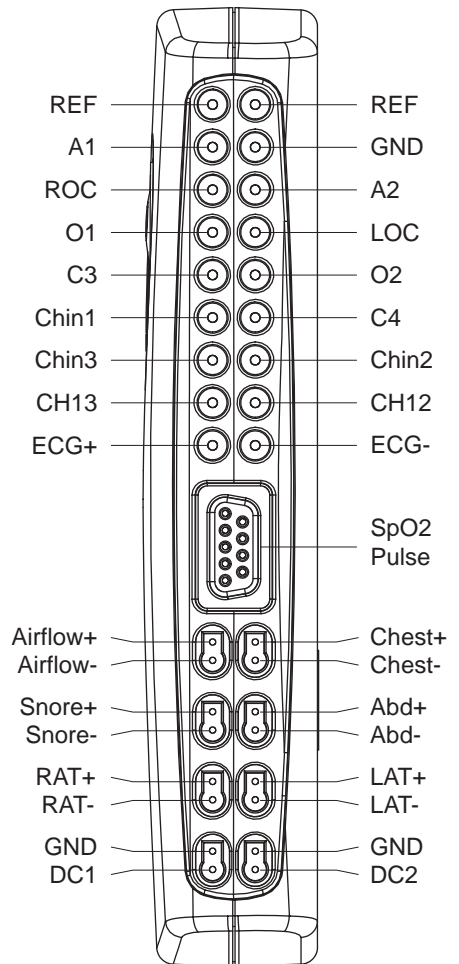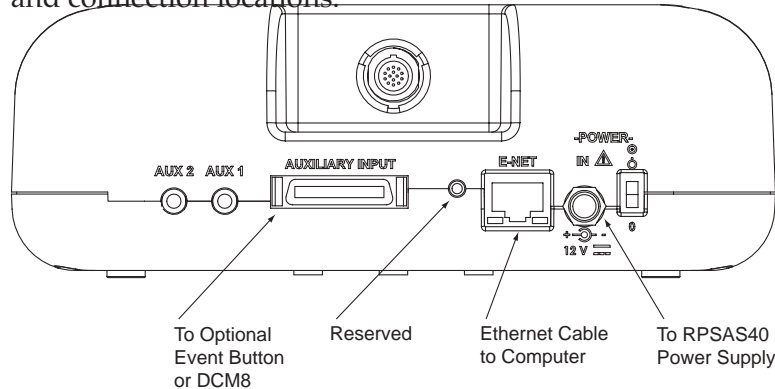Attach any additional equipment. Refer to Figure 3-6 for required cable numbers and connection locations.

Figure 3-5: Base Station Connections

Waveforms from AUX 1 and AUX 2 DC input ports are only recorded when the Amplifier Unit is tethered to the Base Station. Some connections are reserved and should not be used.

STEP 8: SETTING UP THE BATTERY CHARGER
See the separate operating instructions for the Battery Charger.

STEP 9: SETTING UP WIRELESS COMMUNICATION (WIRELESS MODE ONLY)

If the Amplifier Unit is used in wireless mode, the wireless connection between it and the Base Station must be established. This process is not required for the Amplifier Unit in standard mode.

need info on the antenna

1. Connect the tether cable between the Base Station and Amplifier Unit, as indicated in STEP 5 CONNECTING THE TETHER CABLE.
2. Turn on the Base Station power.
3. Turn on the Amplifier Unit power.
4. Select Set Wireless Pairing on the Base Station menu. Then press the ENTER key.
5. The Base Station will display Setting up Wireless.
6. The Base Station will exchange wireless device addresses with the Amplifier Unit automatically, and then confirm the wireless connection.
7. The Base Station will display Wireless Confirmed.
8. Any time the Base Station and Amplifier Unit are both on and no tether cable is connected, the paired units will attempt to connect with each other. They will connect only with each other, and attempts by a third

Figure 3-6: AURA PSG connections

AURA PSG Setup

need info on the antenna

Amplifier Unit

Wireless Mode Requires No Tether Cable

26802001
Tether Cable

Optional Event Button
CAB-21648-10

Base Station

DCM8

RPSAS40 Regulated
Power Supply

AC Power
Line In

To Grounded
Wall Outlet

Optional Event Pushbutton
CAB-21648-10

CAB-21617

or

CON-20486 Networking
Cable Connector

To PC
Ethernet
Card

CAB-20576-03
Ethernet Cross-over
Cable

CAB-21064
Ethernet Patch
Cable

or

To Ethernet Hub or Switch
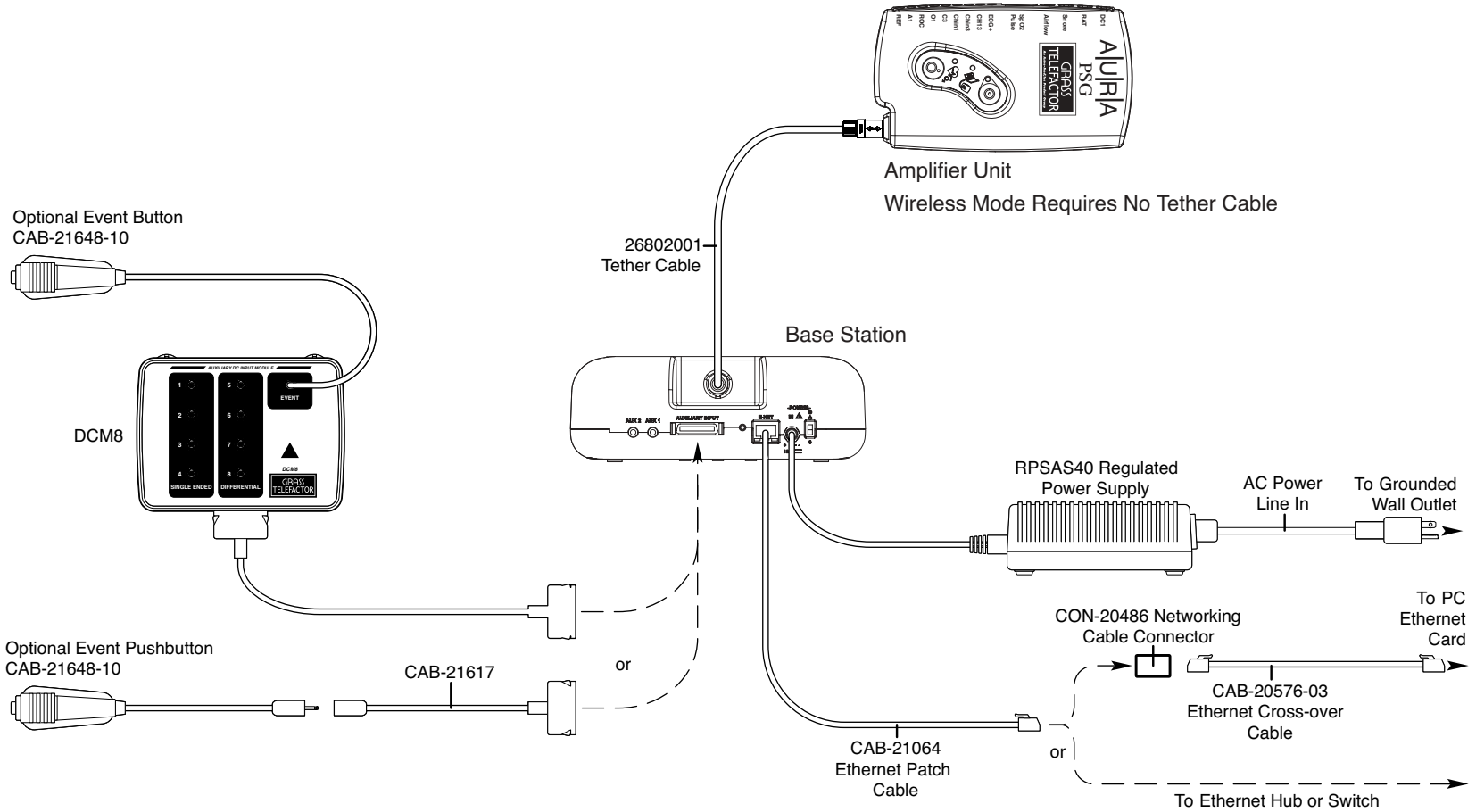
device to connect will be rejected.

SIGNAL DEFINITIONS

The Amplifier Unit includes labels for each input as a convenience to the user. The connector marked SpO2 Pulse is intended for a Pulse Oximeter sensor. Only those sensors listed in the Accessories section of this manual should be used.

Other connector labels match the default montage used by TWin software for the AURA PSG. Following are signal definitions associated with these.

Referential Inputs (AC coupled) with SAFELEAD® connections	
O1 & O2	Occipital electrodes as defined by the 10/20 standard
C3 & C4	Central electrodes as defined by the 10/20 standard
A1 & A2	Auricular electrodes as defined by the 10/20 standard
LOC & ROC	Left and Right Outer Canthus electrodes
Chin	There are three electrodes provided for the chin
CH12 & CH13	Optional electrodes

The Referential Inputs are designed for surface electrodes such as those manufactured by Grass and suggested in ACNS 1994 Guideline 1 (2.1). The REF connects to the electrode used as the reference for Referential Inputs. The two inputs with this label are connected together inside the device so that redundant electrodes can be used.

Differential Inputs (AC coupled)	
ECG	ECG electrode pair (SAFELEAD)
Chest & Abd	Respiratory effort sensors (such as belts)
Airflow	Airflow sensor (such as thermocouples and thermistors)
Snore	Snore sensor (such as a microphone)
LAT & RAT	Left and Right Anterior Tibialis muscle electrodes

The Differential Inputs are intended for electrodes and sensors specifically designed for use with electrode compatible inputs. Appropriate electrodes and compatible sleep sensors are available from Grass-Telefactor as well as other vendors. Additional guidance can be found in ACNS 1994 Guideline 15.

Auxiliary Inputs (DC coupled)	
DC1 & DC2	Optional signal inputs

Warning: All these inputs are connected to the patient side of the isolation barrier. Never connect any of these inputs to a monitor or other device unless it is fully isolated for patient safety.

Warning: ECG and pulse oximetry measurements are not intended for use in vital signs monitoring. In any critical care environments, an independent monitor must be provided.

HOST COMPUTER SETUP

Power up the Base Station and enter a valid IP address for the unit. Computers associated with the AURA PSG system should have the recording application software installed and configured to work with this IP address to control the Base Station. See below for more information.

If Grass-Telefactor TWin software is used on the host computer, refer to the TWin software manual for details on the operation of the system. A system calibration and test recording should be preformed following the instructions supplied in the TWin manual.

AURA PSG IP ADDRESS SETUP

This section will provide instructions on programming the IP address of the AURA PSG system. If applicable, it is possible choose an IP address that is consistent with the existing networking scheme of the hospital.

1. Make sure the Base Station is powered on.
2. On the Base Station, push the MENU key four times to display the Set IP Address option, and then press the ENTER key.
3. Use the left and right keys to toggle to the next numeric entry.
4. Use the up and down keys to change the numeric value.
   An example IP address is: 172.016.008.200
5. When the IP address is finished, push the ENTER key to accept the entry.

Note: If the MENU key is pressed while changing the IP address, the modifications will not be saved.

SUBNET MASK SETUP

This section will provide instructions on programming the Subnet Mask of the AURA PSG system.

1. Make sure the Base Station is powered on.
2. On the Base Station, push the MENU button five times to display the Set Subnet Mask option, and then press the ENTER button.
3. Use the up and down buttons to change the numeric value.
   An example Subnet Mask is: 255.255.255.000
4. When the Subnet Mask is finished, push the ENTER button to accept the entry.

AURA VERSION

To check the version of the AURA amplifier before connection to application software on the host computer:

1. Make sure the Base Station is powered on.
2. On the Base Station, push the MENU button six times to display the AURA Version option, and then press the ENTER button.
3. The version of firmware and software will be displayed.

NETWORK INTERFACE CARD (NIC) IP ADDRESS SETUP

This section will provide instructions on configuring computers associated with the AURA PSG system. The IP address used for this section is different than the one entered in the previous section. If applicable, it is possible to choose an IP address consistent with the existing networking scheme of the hospital.

1. From the Windows task bar, select **Start** > Settings > *Control Panel*.
2. Double-click on the Network and Dial up Connections icon.
3. In the Network and Dial up Connections window, double-click on the icon that represents your NIC. This may be listed as Local Area Connection.
4. In the Status window, click on the Properties button.
5. Highlight Internet TCP/IP protocol by clicking on it once, then click Properties. The Internet Protocol (TCP/IP) Properties window will appear.
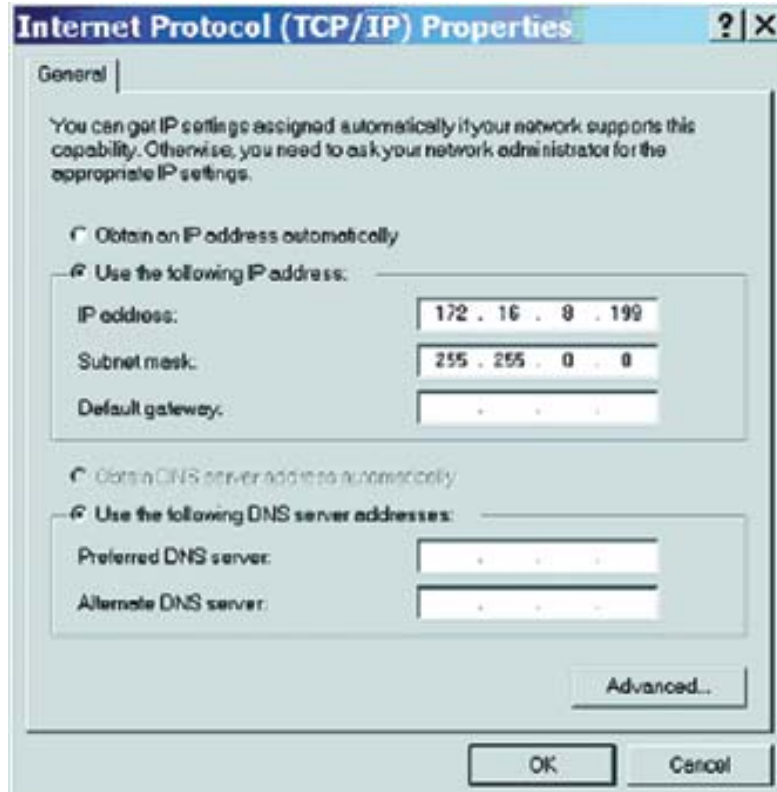
Figure 3-8: Internet Protocol (TCP/IP) Properties window

6. Select Use the following IP address.
7. Enter an IP address that fits within the same series as the AURA PSG.
    Remember, the IP address here cannot be the same as the one used in the
    AURA PSG IP Address. *An example IP address is:* 172.16.8.199, or
    172.16.8.201.
8. It may be necessary to change the Subnet Mask to 255.255.0.0.
9. Click OK when finished.
10. Close all windows and reboot the computer.

4   Operation

The AURA PSG requires a host computer with appropriate software to be attached via a network cable to setup the system parameters. This section is an overview of the controls, indicators, and other features available for use on the unit.

BASE STATION

The controls available on the Base Station include the DC power switch on the rear and eight keys associated with the LCD. There are eight pushbuttons, or keys, for interacting with the Base Station and the host computer. Some of the selections in the menu require the host computer to be connected to the Base Station.
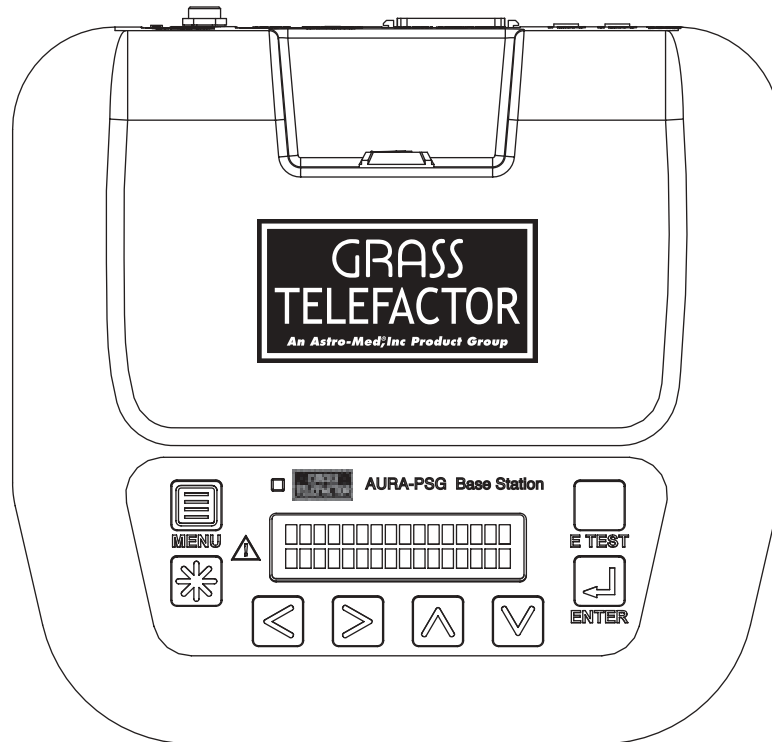

*Figure 4-1: Base Station Front Panel Controls*

MENU SYSTEM

The MENU key is used to toggle through the main menu items or to back out of a menu selection or submenu. ENTER selects the item to execute or proceed to a submenu item. The following list describes each key on the Base Station and a brief description of its use.

MENU — MENU key toggles through the menu items or backs out of a menu selection back to the previous level. While in a submenu or selection the MENU key can be used to cancel and return back to the main menu.

Provides no function for AURA PSG.
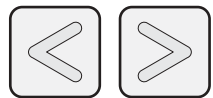
The left/right arrows are used to navigate through a submenu list.

The up/down arrows are used to scroll through status information such as electrode impedance results.
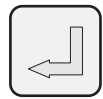
ENTER — The ENTER key selects the item to execute or proceeds to a submenu.

E TEST — E-TEST provides a shortcut to turn the electrode test function on without going through the menu selection process.

The following menu options are available:

Status — Reports communication errors with the data transfer.

Oximeter Display* — Displays the current readings of the Nonin PureLight® Pulse Oximeter on the LCD.

Set IP Address** — Allows an IP address for the device to be entered. Used to set the IP address of the Base Station. The left/right keys activate the number in IP address to be changed and the up/down keys increment/decrement the active number. ENTER accepts the IP address.

Check Impedances*	Requests the host computer monitoring software to perform an electrode test and return the results for display. Z limit impedance selections include: 0.1, 0.5, 1, 2, 5, 10, 20, 100 kohm.
	Press ENTER to select and use the left/right keys in the Z limit selection menu. ENTER to execute the request. Use the up/down keys to scroll through the results returned from the application software on the host computer. MENU returns to the main menu item list.
	E-TEST key executes a request to the application software on the host computer to perform an impedance test using the last Z limit selected. Press ENTER to begin calibration.

Warning:	The electrode impedance test should not be used with intra-cranial electrodes.

Calibrate*	Requests the host computer monitoring software to perform a calibration for each channel.

* Only available when connected to application software on host computer.

** Only available when not connected to application software on host computer.

INDICATORS

A power indicator is located above the LCD and is green when the Base Station power is on. The LCD displays the menus, electrode impedance results, connection status, and any error messages that may occur.

Additionally, two indicator lights are used by the Ethernet connection on the back of the Base Station. The green light indicates the Base Station is attached to an active node, and the yellow light indicates communication activity over the connection.

AMPLIFIER UNIT

The controls on the Amplifier Unit are used to turn the power on and off.

POWER BUTTONS

Turns the Amplifier Unit power off. *The button must be held for up to twenty seconds to turn the power off.* This feature helps ensure the power is not turned off accidentally.

In error conditions, it may be necessary to hold the Power Off button in for a minimum of 30 seconds to turn off the Amplifier Unit power.
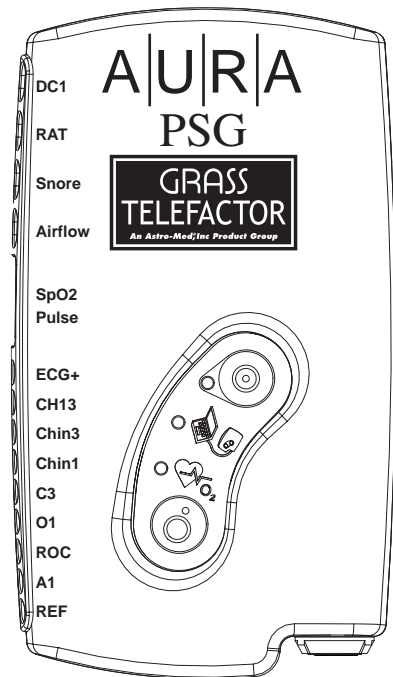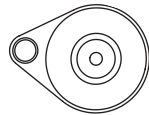
Turns the Amplifier Unit power on.

Figure 4-2: Amplifier Unit Controls

INDICATORS

There are three indicator lights on the Amplifier Unit. One green indicator light provides information about the power status of the Amplifier Unit. Two amber indicator lights are provided. One amber light provides information about the connection between the Amplifier Unit and Base Station. The other amber light provides information about the Nonin pulse oximeter.

GREEN POWER INDICATOR

Steady	Amplifier Unit is powered by the tether cable (standard mode).
Flashing	Amplifier Unit is powered by battery.
Off	Amplifier Unit is not functioning.

AMBER LINK INDICATOR

Steady	The Amplifier Unit is connected to the Base Station via the tether cable (standard mode).
Flashing	*Once every two seconds:* The Amplifier Unit is recording to a CompactFlash Card (standard mode).
Flashing	*Once per second:* The Amplifier Unit is within range of the Base Station (wireless mode).
Flashing	*Faster than once per second:* The Amplifier Unit is finishing writing data to the CompactFlash Card (standard mode). This happens when the CompactFlash has filled or if the user is attempting to turn off the amplifier while it is writing data to the CompactFlash. In the latter case the user can release the power off button, the amplifier will turn off when it is finished, usually within 30 seconds.

AMBER PULSE OXIMETER INDICATOR

Flashing	The pulse oximeter is reading a pulse between 20 and 200.

COMPACTFLASH CARD & BATTERY

The Amplifier Unit in *standard mode,* when untethered, is powered by an internal battery and saves data on a CompactFlash memory card. CompactFlash is an industry standard removable storage media. The battery is capable of running the Amplifier Unit in standard mode for approximately 12 hours.

The Amplifier Unit in *wireless mode* is powered by the same internal battery, but does not use a CompactFlash card. The battery is capable of running the Amplifier Unit in wireless mode for approximately 10 hours.

To open the CompactFlash/Battery compartment, press the tab on the battery cover and slide the cover outward. Set the cover aside.
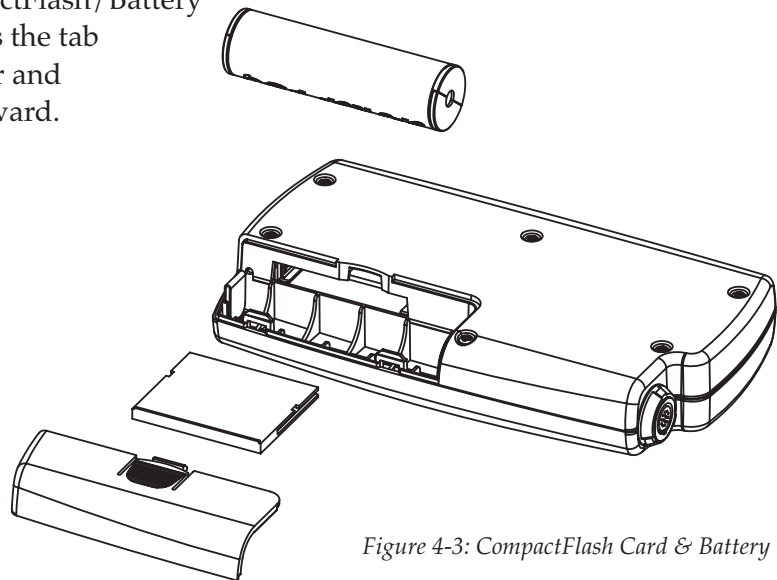
Figure 4-3: CompactFlash Card & Battery

The CompactFlash card drive is located behind the battery compartment. For standard mode operation, slide the CompactFlash card into the drive. The top of the card must face the bottom of the Amplifier Unit to be oriented properly for insertion (see Figure 4-3). To remove the card, simply pull it out of the drive. For wireless mode operation, do not insert a CompactFlash card.

Two batteries are shipped with each Amplifier Unit and will need to be charged prior to each use. Insert a fully-charged battery into the battery compartment. Be sure to orient the battery correctly (see Figure 4-3).

Warning:

Use only the specified battery (26759200) in the AURA PSG. Use of unauthorized battery may cause explosion/fire hazard.

To reattach the cover, slide the cover back into position. The tab will lock the cover in place.

BATTERY CHARGER

The battery must be charged prior to each use. See the separate operating instructions for the Battery Charger.

Warning: Battery Charger must not be located in a patient area.

⚠

CALIBRATION

The AURA PSG system includes a built-in calibration signal generator and the means to connect this generator to the referential amplifier inputs at the first stage preamplifier. The generator outputs a 5 Hz, 500 µV peak-to-peak square wave. The frequency of this source can be set by the host computer but is generally 5 Hz. Gain calibration and correction is critical to the accurate creation of montages from the referentially recorded data. ***It is recommended that a calibration procedure be performed prior to every recording as standard practice.***

Calibration controls are only available in the application software. However a request can be sent from the Base Station via a menu item to have the application software automatically perform a calibration. Refer to the instructions for calibrating the amplifier hardware in the TWin software manual for more details. Typically calibration involves starting the recorder software, putting the AURA PSG into calibration mode, recording a segment of the calibration signal then confirming the peak-to-peak value of the AC calibration signal. This data is then used to automatically generate a list of correction values for both offset and gain.

ELECTRODE IMPEDANCE TEST

The AURA PSG system includes a built-in electrode test circuit that tests the impedance of each electrode, including the reference, for referential inputs. This function can be executed from either the application software or at the Base Station itself. The E-TEST key on the Base Station calls this function and the results are displayed on the LCD, based on the preferences set in the application software. If the application software is not present this function cannot be selected.

Warning: The electrode impedance test should not be used with
⚠ intra-cranial electrodes.

RECORDING OVERVIEW

TETHERED RECORDING

During tethered recording, the Amplifier Unit is used in standard mode. It operates while connected to the Base Station via a tether cable. Signals are streamed to the host via this connection.

During tethered recording, use caution to avoid contact with the Amplifier Unit "Off" button. The "Off" button must be held for 10 to 20 seconds to turn the power off. This feature helps ensure the power is not turned off accidentally.

Ensure the following components are available for tethered recording:

- **Amplifier Unit with Tether Cable** — The Amplifier Unit with Tether Cable will be used to send signals to the Base Station.
- **Base Station** — The Base Station is used to configure the Amplifier Unit.
- **Host Computer with TWin Software** — The computer and TWin software is used to initiate remote recording and review recordings.
- **Electrodes & Sensors** — These measurement components will be used to connect the patient input signals to the Amplifier Unit.

STARTING TETHERED RECORDING
The process for starting tethered recording requires the following steps:
1. Connect the Amplifier Unit to the Base Station via the Tether Cable.
2. Connect the patient electrodes to the Amplifier unit.
3. Configure the Amplifier Unit using the Base Station and associated TWin host software.
4. Initiate recording using the TWin Recording feature. Waveforms will display in the TWin software waveform area.

Warning: Protect the Amplifier Unit from exposure to liquids. If the Amplifier Unit is exposed to liquids during recording, discontinue use by disconnecting the electrodes from the Amplifier unit and turning off the Amplifier Unit power. Resumption of recording is to be performed only by qualified personnel.

STOPPING TETHERED RECORDING
Recording is stopped using the TWin software.

AMBULATORY RECORDING

During ambulatory recording, the Amplifier Unit is used in standard mode. When untethered, the Amplifier Unit will run off a battery and save data on a CompactFlash® memory card. The battery is capable of running the Amplifier Unit for approximately 12 hours.

During untethered recording, use caution to avoid contact with the Amplifier Unit *Off* button. The *Off* button must be held for 10 to 20 seconds to turn the power off. This feature helps ensure the power is not turned off accidentally.

Ensure the following components are available for tethered recording:

- **Amplifier Unit with Tether Cable** — The Amplifier Unit with Tether Cable will be used to set up and initiate the recording.
- **CompactFlash Card & Battery** — A CompactFlash card and fully-charged battery should be installed in the Amplifier Unit prior to recording.
- **Base Station** — The Base Station is used to configure the Amplifier Unit.
- **Host Computer with TWin Software** — The computer and TWin software is used to initiate remote recording and review recordings.
- **Electrodes & Sensors** — These measurement components will be used to connect the patient input signals to the Amplifier Unit.

STARTING AMBULATORY RECORDING

The process for starting ambulatory recording requires the following steps:
1. Connect the Amplifier Unit to the Base Station via the Tether Cable.
2. Connect the patient electrodes to the Amplifier Unit.
3. Configure the Amplifier Unit using the Base Station and associated TWin host software.
4. Initiate recording using the TWin Recording feature.
5. Turn the Amplifier Unit power off and disconnect it from the Base Station.
6. To start ambulatory recording, turn the Amplifier Unit power on

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Warning: Protect the Amplifier Unit from exposure to liquids. If the Amplifier Unit is exposed to liquids during recording, the patient should discontinue use by disconnecting the electrodes from the Amplifier Unit and turning off the Amplifier Unit power. Resumption of recording is to be performed only by qualified personnel.

STOPPING AMBULATORY RECORDING

To stop ambulatory recording, press and hold the *Off* button on the
Amplifier Unit until the Amplifier Unit is turned off. This process may require
up to 30 seconds. The Amplifier Unit will turn off and recording will stop.

READING AMBULATORY DATA

The process for reading ambulatory data requires a computer with a
CompactFlash Card reader and software that can open the data files on the
card. The Base Station cannot be used to *upload* the data to the computer.

When the extended ambulatory recording process is complete, the resulting
data files will be stored on the CompactFlash Card in the Amplifier Unit. The
data is stored using a specific protocol.

Grass-Telefactor TWin software can be used on the host computer to read the
file and process the data. The TWin software is powerful and easy to use,
providing data acquisition, recording, and review capabilities in one flexible
package.

Remove the CompactFlash Card from the Amplifier Unit. Then insert it into the
CompactFlash Card reader on the computer. Although TWin software can read
directly from the CompactFlash Card, it is recommended that data files be
copied to a different medium such as the computer's hard disk for further
review and analysis.

WIRELESS RECORDING

The Amplifier Unit in wireless mode uses Bluetooth® technology to stream data to a host computer via a wireless connection with the Base Station. The Amplifier Unit must be within 25-feet (7.5 m), without obstructions, of the Base Station.

The Amplifier Unit in wireless mode is powered by a battery and must not have a CompactFlash Card or Tether Cable attached.

Ensure the following components are available for recording:

- **Amplifier Unit —** The Amplifier Unit will be used to send signals to the Base Station.
- **Battery —** A fully-charged battery should be installed in the wireless Amplifier Unit prior to recording.
- **Base Station —** The Base Station is used to configure the Amplifier Unit.
- **Host Computer with TWin Software —** The computer and TWin software is used to initiate remote recording and review recordings.
- **Electrodes & Sensors —** These measurement components will be used to connect the patient input signals to the Amplifier Unit.

STARTING RECORDING

The process for starting recording requires the following steps:

1. Ensure the Amplifier Unit is within 25-feet (7.5 m) of the Base Station.
2. Connect the patient electrodes to the Amplifier Unit.
3. Configure the Amplifier Unit using the Base Station and associated TWin host software.
4. Initiate recording using the TWin Recording feature. Waveforms will display in the TWin software waveform area.

Warning: ⚠	Protect the Amplifier Unit from exposure to liquids. If the Amplifier Unit is exposed to liquids during recording, discontinue use by disconnecting the electrodes from the Amplifier Unit and turning off the Amplifier Unit power. Resumption of recording is to be performed only by qualified personnel.

STOPPING RECORDING

Recording is stopped using the TWin software.

5   Accessories & Replacement Parts

Accessories & Replacement Parts

Part Number	Description
14193512	512 MByte CompactFlash Memory Card
26759200	Rechargeable 3.6 V lithium ion battery
42050100	Battery Charger
RPS-21903	Battery Charger Power Supply
RPSAS40	AURA PSG Regulated Power Supply
IPS115	Isolated power system, 115-volt operation only
IPS230	Isolated power system, 230-volt operation only
CAB-21648-10	Optional Event pushbutton, 10′ (3 m) cable length, other lengths available
DCM8	DC Input Module for up to 8 DC channels
KBD-21203-20	20-button Keypad for notation entry and system operation
KBD-21203-58	Optional 58-button Keypad for notation entry and system operation
32760200	AURA PSG Amplifier Pouch
32760404	AURA Pouch Strap, Adult Large
32760403	AURA Pouch Strap, Adult Small
32760402	AURA Pouch Strap, Pediatric Large
32760401	AURA Pouch Strap, Pediatric Small
ACS-21651	Dedicated Ethernet Card for Base Station connection for use with a PC
ACS-20944-01	Dedicated Ethernet/Modem Card for Base Station connection for lap-top use

OXIMETER SENSORS

Part Number	Description
8000J	Adult Flex Sensor, straight, 3-foot (1 m) length cable, includes a package of 25 8000JFW FlexiWrap® Sensor Wraps
8000JFW	FlexiWrap® Sensor Wraps, package of 25
8008J	Infant Flex Sensor, straight, 40" (1 m) length cable, includes a package of 25 8008JFW FlexiWrap® Sensor Wraps
8008JFW	Infant FlexiWrap® Sensor Wraps, package of 25
7000A	Adult Finger Flexi-form Disposable Sensors, 40" (1 m) length cable, package of 10
7000P	Pediatric Finger Flexi-form Disposable Sensors, 40" (1 m) length cable, package of 10
8000AA	Adult Articulated Finger Clip Sensor, 40" (1 m) length cable
8000AP	Pediatric Finger Clip Sensor, 40" (1 m) length cable
8500I	Patient Extension Cable, 40" (1 m) length cable

CABLES/ADAPTORS

Part Number	Description
26802001	Tether cable, 30-foot (10 m) length (Amplifier to Base Station)
CAB-21916	Interface cable, 1/8" phone plug to PLU-880, 5-foot (1.5 m) length (CPAP to DCM8)
CAB-21615-5	DCM8 to Base Station patch cable, 5-foot (1.5 m) cable
CAB-21616-10	Phono to 3.5 mm 10-foot (3 m) cable. Used to connect the CAB-21648 event button to the DCM8 (included with CAB-21648)
CAB-21617	Event button to Base Station adaptor, used to connect an event button directly to the base when an optional DCM8 DC Input Module is not available, 1-foot (0.3 m) cable length
MCB-21678-03	AC Cordset IEC320, 3-foot (0.9 m) cable
MCB-20018	Hospital-grade AC cordset, USA, 6-foot (1.8 m) cable
CAB-21911	Adaptor: (2) 1.5 mm SAFELEAD to Key Connector
NET-CKIT	**Network Cabling Kit includes:**
CAB-21064-010	Ethernet cable, patch. Used to connect Base Station to Host via a hub/switch, 10-foot (3 m) cable
CAB-21064-025	Ethernet cable, patch. Used to connect Base Station to Host via a hub/switch, 50-foot (15 m) cable
CAB-20576-03	Ethernet cable, cross-over. Used to directly connect Base Station to Host, 3-foot (0.9 m) cable
CON-20486	Ethernet cable connector. Used to daisy chain two Ethernet cables (RJ45 connectors) together.

CARTS & MOUNTING BRACKETS

Part Number	Description
IT8/L	Mobile Cart for use with a lap-top computer
IT9	Mobile Rack Cart with drawer for full size keyboard, for use with a desktop PC
ARM-AS40	Adjustable Arm for mounting the Base Station on a Mobile Cart
AS40WMB	Base Station wall-mount bracket
AS40WMB-QR	Optional Base Station wall-mount bracket with quick release
GRS-8399	DCM8 wall-mount bracket
ARM-AS40-QR	Optional Adjustable Quick Release Arm for mounting the AURA on a Cart

TWIN PSG REVIEW WORKSTATION

Part Number	Description
TRW-PSG	Latest high-performance PC*, network ready and modem, CD-R/RW internal, Grass-Telefactor TWin PSG Review/ Analysis software, Archive Manager, TWinLOOK, Microsoft Office, pcAnywhere software
FPM-18	18" flat-panel/LCD monitor
FPM-20	20" flat-panel/LCD monitor
ACS-21789	Flat-panel/LCD monitor wall-mount bracket

6　Maintenance

Maintenance

There is no routine maintenance required for the Grass-Telefactor AURA PSG systems other than normal periodic checks for unusual wear, cable abrasion, and routine cleaning.

CALIBRATION

The AURA PSG includes a built-in calibration signal source for verifying proper operation and to simplify cross-channel gain correction and offset adjustment. The calibration mode should be used to periodically generate a list of correction factors for use during the display and processing of the signal data. Refer to the appropriate recording software instructions for details.

CLEANING

Perform cleaning as needed.

Warning: Electric Shock Hazard. Before cleaning the AC power supply or
⚠   any AC line powered equipment, always turn off the power and
                 disconnect the power cord from the AC power supply.

Cautions
- **Do not autoclave or pressure sterilize the AURA PSG system.**
- **Do not soak or immerse the AURA PSG system in any liquid.**
- **Do not gas sterilize the AURA PSG system.**
- **Do not use petroleum based or acetone solutions, or other harsh solvents to clean the AURA PSG system.**

To clean the AURA PSG system, use a soft cloth dampened with mild soap and water solution. To disinfect the Amplifier unit use 70% isopropyl alcohol. Be sure that the components are unplugged before cleaning and that the components are completely dry before use.

ELECTRODES
Refer to the cleaning instructions supplied with the electrodes for details on cleaning, disinfection, and/or sterilization.

STORAGE & TRANSPORTATION

For storage and transportation, it is recommended that the system and its accessories be within the temperature range of -40 to 70° C, 500 to 1060 hPa, and 10 to 100% RH, including condensation. When returning from temperature extremes, allow the system to stabilize to room temperature before use.

END-OF-LIFE DISPOSAL

When disposing of the AURA PSG system components at the end of life, it is recommended that federal, state and local laws be followed for proper disposal of printed circuit boards, lithium-ion batteries, and plastic parts.

Never incinerate or dispose of lithium-ion battery cells into fire.

For disposal of non-Grass-Telefactor accessories, please follow the instructions included with these items.

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7 Troubleshooting Guide

Symptom	Probable Cause	Solution
Base Station power light not on	Base Station Power switch off	Turn on Base Station
	Base Station power cable not plugged in fully	Check that the DC power plug is fully inserted and the locking ring is hand tight
	RPSAS40 AC cord not plugged in fully	Check the RPSAS40 AC cord
No patient signals present	Amplifier unit not connecting to Base Station properly	Check Amplifier unit is seated properly For wireless mode, ensure Amplifier unit is within 25-feet (7.5 m) of the Base Station
Base Station unresponsive	Ethernet cable not plugged in	Check Ethernet cable connections on both ends
	IP address incorrect	Verify AURA PSG IP address at the unit and in the recording software is correct
No pulse or oximeter readings from the PureLight® or incorrect readings	Oximeter not plugged into Amplifier unit or sensor not plugged in	Check cable connections of the PureLight® at both the Base Station and sensor
	Sensor placement on patient incorrect	Verify sensor is placed on patient in the proper orientation and the disposal adhesive secures it to the finger
AUX inputs 1 & 2 on Base Station are not present in recording software	Cables are not plugged in fully	Verify cabling connections

Symptom	Probable Cause	Solution
Keys on Base Station not functional	Power not on	Turn on power to Base Station
	Recording software locked out	Check recording software status
E-TEST key on Base Station not functional	Recording software not running	Start recording software
Bad E-TEST results	Poor electrode application	Check electrode application and reapply if needed
	Amplifier unit not plugged in fully	Check Amplifier unit is tethered properly
Poor signal quality	Poor electrode application	Check electrode application and reapply if needed
	Amplifier unit not plugged in fully	Check Amplifier unit is tethered properly
	Interference	Locate and remove sources of interference

A Appendix A

Connector Pin-outs

ETHERNET CABLE, CROSS-OVER

Used to connect Base Station directly to the Host computer.

Connector type: RJ45

Pin 1 = Pin 3
Pin 2 = Pin 6
Pin 3 = Pin 1
Pin 4 = Pin 4
Pin 5 = Pin 5
Pin 6 = Pin 2
Pin 7 = Pin 7
Pin 8 = Pin 8

ETHERNET CABLE, PATCH

Used to connect Base Station and Host computer through a dedicated networking hub/switch.

Connector type: RJ45

Pin 1 = Pin 1
Pin 2 = Pin 2
Pin 3 = Pin 3
Pin 4 = Pin 4
Pin 5 = Pin 5
Pin 6 = Pin 6
Pin 7 = Pin 7
Pin 8 = Pin 8

B Appendix B

Service Policy & Warranty

Warranty repair and service for this system must be performed by a Grass-Telefactor service representative or at the Grass-Telefactor factory. To contact Grass-Telefactor, refer to the SERVICE AND WARRANTY on the following pages.

Do not use malfunctioning equipment. Make all necessary repairs or have the equipment repaired by a Grass-Telefactor service representative. After repair, test the complete system to verify that it complies with the published specifications.

Warning ⚠	Do not open or remove the covers of the components. An operator may only perform maintenance procedures specifically described in this manual. Refer servicing to qualified service personnel trained in the repair of this equipment.

Detailed circuit diagrams, components part lists, mechanical drawings, etc. are available for service purposes on formal request from Grass-Telefactor.