WITT BIOMEDICAL

STATE-OF-THE-ART PRODUCTS FOR ANALYSIS MONITORING IMAGING

Service Manual

Physiomonitoring and Information System

Rev 9

May 2006

Part Number NMANS4S

Witt Biomedical ® Corporation
305 North Drive
Melbourne, FL 32934
Phone: 800.669.1328 * Fax 321.253.0372

Copyright Notice

Trademarks

Microsoft, Windows, SQL Server, and Windows Server are either registered trademarks or trademarks of the Microsoft corporation in the United States and/or other countries. PcAnyWhere is a trademark of Symantec corporation. DATAMED is a registered trademark of Engineering Solutions Incorporated. Backup MyPC is a trademark of StompSoft Incorporated. Emory Cardiac Toolbox Network (ECTb Network) is a trademark of Syntermed Incorporated. DivX and DivX Pro are either registered trademarks or trademarks of DivXNetworks Incorporated. Disk Drive TuneUp and Write DVD are trademarks of Software Architects Incorporated. MUSE is a trademark of the General Electric Corporation. SilverBack DataCenter Enterprise is a trademark of SilverBack Technologies, Inc. Freeland AccessPoint is a trademark of Freeland systems, LLC.

Standard Limited Warranty

WITT warrants that (a) system software will perform substantially in accordance with accompanying written literature and in–service training of the system, for a period of one (1) year from the date of receipt of such software, and (b) any WITT hardware components will be free from defects in material and workmanship under normal use and service for a period of one (1) year from the date of receipt of such hardware.

This warranty covers manufacturing defects in materials and workmanship (excluding reusable or disposable patient cables or parts meant to upgrade or enhance device performance) encountered in normal use of the product, and as determined by SELLER, shall not apply to the following, including but not limited to: applications and uses for which SYSTEM was not intended; failures or problems which are caused by products or equipment not supplied by SELLER; accidents; misuse; abuse; neglect; misapplication; fire, water, lightning or other acts of nature; incorrect electrical line voltage, fluctuations or surges; product alteration or modification; improper or unauthorized repair; cosmetic damage; product with altered serial number; damage caused by virus, Trojan horse or other invading software code.

Except for the above expressed warranties, WITT makes and customer receives no other warranties or conditions, expressed, implied or statutory. WITT specifically disclaims any implied warranties of merchantability or fitness for a particular purpose. WITT DOES NOT WARRANT THAT THE OPERATION OF THE SOFTWARE WILL BE UNINTERRUPTED OR ERROR FREE. WITT SPECIFICALLY DOES NOT GUARANTEE THE SAFETY OF ANY DATA OF ANY KIND OR ANY SYSTEM THIS SOFTWARE MAY OPERATE ON. IT IS THE USER’S RESPONSIBILITY TO ENSURE THAT ADEQUATE BACKUP PROCEDURES EXIST TO PROVIDE FOR THE SAFETY OF THE USER’S DATA.

Customer Remedies

WITT’s entire liability and the customer’s sole remedy shall be repair or replacement of the non-conforming software or hardware that does not meet WITT’s Limited Warranty. The Limited Warranty is void if it is determined that performance failure has arisen from system misapplication, abuse, or accident. Any replacement software or hardware is warranted for the remainder of the currently enforced customer warranty or thirty (30) days, whichever is greater.

No Liability For Consequential Damages

To the maximum extend permitted by applicable law, in no event shall WITT be liable for any damages whatsoever (including, without limitation, damages for loss of business, business interruption, loss of information, or any financial loss), emerging from the inability to use or the use of any WITT product, even if WITT has been advised of the possibility of such inconsistencies.

Contents

Appendixes

Introduction:

About this manual

This manual is intended for biomedical engineers responsible for installing, troubleshooting, and repairing Witt's CALYSTO Series IV Physiomonitoring and Information system. The engineers are assumed to have a solid background in analog, digital, and microprocessor electronics, and experience in biomedical equipment repair.

The manual provides everything they'll need to install and maintain the Witt Series IV system.

How this manual is organized

We've divided the manual into seven chapters, 3 appendixes, and an index. In general, the manual is arranged in a linear fashion that follows the evolution of the new system from shipment and installation through maintenance.

Chapter 1 General Information
Provides an overall description of the system and its options.

Chapter 2 Installation
Describes installation procedures from unpacking to locating and setting up the units.

Chapter 3 System Checkout
Describes how to boot-up and check out the system to ensure that it's working properly.

Chapter 4 Theory of Operation
Provides an in-depth functional description of the system to prepare technicians for the following chapters on troubleshooting and maintenance.

Chapter 5 Troubleshooting
Provides guidance on fault isolation.

Chapter 6 System Maintenance
Describes how to remove and replace the system components found to be faulty.

Chapter 7 Parts List
Provides the data needed to order replaceable parts.

Appendix A—-Pre-installation Checklist, Guidelines, and Training Assessment Forms

Appendix B—System Schematics

Appendix C—Glossary of Terms

Appendix D—Application Authorization Window
Describes the window and how to generate authorization codes.

Index

Related Manuals

- CALYSTO Series IV Physiomonitoring and Information System User’s Guide
- CALYSTO Image IV Image Archival System User’s Guide
- CALYSTO Patient Care Monitor and Central Station User’s Guide

System Information

The following table addresses the applicable UL requirements for this product.

Requirement Item	Description/Compliance
Technical description	See chapter 4, CALYSTO Series IV Service Manual
Address user can refer to	Witt Biomedical Corporation 305 North Drive Melbourne, FL 32934
Type of protection against electric shock	Class 1 internally powered equipment
Degree of protection against electrical shock	BF (cardiac output), CF (ECG)
Degree of protection against ingress of water	IPX0
Flammable anesthetic mixture suitability	This equipment is not suitable for use in the presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide.
Mode of operation	Continuous
Manufacturer name and model	Witt Biomedical Corporation CALYSTO Series IV Physiomonitoring and Information System
Voltage range; type of current; frequency; power input--watts, amps, VA	Power supply -- R/C (QQHM), Ram Technologies, Model PFC310 PC Rated: Input -- 100-240V, 47-63 Hz, 3.75A max Output -- +3.3V, 14A; +5V, 22A; +12V, 19A; -12V, 1.2A; +5VSB, 10mA
Instructions for use	CALYSTO Series IV Physiomonitoring and Information System User's Guide
Function and intended application of the Equipment	The CALYSTO Series IV is intended for complete physiologic/hemodynamic monitoring, clinical data acquisition, and analytical assessment for cardiac catheterization, invasive radiology, and electrophysiology laboratories. Its users, responsible to interpret the data made available, will be professional health care providers. CALYSTO Series IV provides the ability to transmit patient data files for storage, analysis, and viewing at distributed locations within the clinical facility via intranet or internet, or may function as a standalone device. Use of CALYSTO Series IV is not intended where unattended patient monitoring is desired or in situations where arrhythmia detection is required. The CALYSTO Series IV ECG Management system is intended for receiving and storing resting, stress, and holter ECG data from source devices. ECG data is stored, unaltered, in its original format, and made available for review and procedural report generation purposes. CALYSTO Series IV does not provide interpretive functions, but does store interpretive statements generated by the source device in an integrated and expandable database. Its users, responsible to interpret the data made available, will be professional health care providers. CALYSTO Series IV provides the ability to transmit ECG data files for storage, analysis, and viewing at distributed locations within the clinical facility via intranet or internet, or may function as a standalone device.
SIP/SOPs intended for connection to specified equipment described	Peripheral equipment
Cleaning and maintenance, with frequency	See chapter 6 CALYSTO Series IV Service manual
Warning statement for mains operated equipment with additional power source	On equipment
Warning statements/explanation of abbreviations, figures, & symbols	See Warnings, Cautions, and Notes below

Conventions

The following conventions are used in this manual.

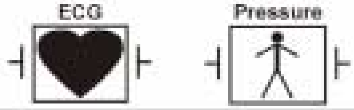
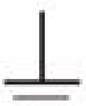
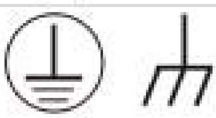
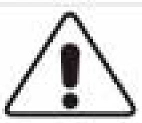
WARNING messages indicate a potentially hazardous situation, which, if not avoided, COULD result in death or serious injury.

CAUTION messages indicate a potentially hazardous situation, which, if not avoided, may result in minor or moderate injury.

NOTE messages provide additional user information.

Warnings, Cautions, and Notes

The following table describes safety messages that may appear in your manual or on the equipment. Please read and obey them carefully.

ECG Pressure 	Type CF Equipment that is Defibrillator Proof Type CF applied Part: Isolated (Floating) applied part suitable for international external and internal applications to the patient excluding direct cardiac applications. The "paddles" outside of the box indicate that the part is Defibrillator Proof.
	Equipment not suitable for use in the presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide.
	This symbol is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that poses the risk of electrical shock.
	This symbol indicates a functional earth terminal.
	These symbols indicate the following, in the order shown: - Protective earth terminal - Functional earth terminal
	This symbol is intended to alert the user to the presence of important operating or maintenance instructions in the manual.
Note 	This symbol indicates additional information in the manual that can help you avoid problems.
C UL US CLASSIFIED 329M ELECTRICAL EQUIPMENT WITH RESPECT TO ELECTRIC SHOCK, FIRE, MECHANICAL, AND OTHER SPECIFIED HAZARDS ONLY IN ACCORDANCE WITH UL 2601-1 AND CAN/CSA C22.2 NO. 601.1	This symbol indicates that the equipment conforms to Underwriters Laboratory standards with respect to electric shock, fire, mechanical, and other specified hazards in accordance with UL 2601-1 and CAN/CSA C22.2 NO. 601.1.
Rx ONLY	Federal law restricts this device to sale by or on the order of a licensed healthcare practitioner.
CE 0120	
	This symbol indicates that this equipment is not to be disposed of as unsorted municipal waste.

Special Safety Messages

1. **Parts and Accessories**

To ensure patient safety, use and/or connect only parts and accessories specified by Witt Biomedical as part of the CALYSTO Series IV system and supplied by or recommended by Witt Biomedical. The use and/or connection of parts and accessories not specified by Witt Biomedical as part of the CALYSTO Series IV system and not meeting Witt Biomedical requirements/specifications may negatively impact system safety.

2. **Emissions and Immunity**

Warning

RFI WARNING!!!
This is a Class A product. In a domestic environment this product may cause radio interference, in which case the user may be required to take adequate measures.

CALYSTO Series IV has been tested and found to comply with the limits for medical devices to EN55011, EN55022, and CISPR22. These limits are designed to provide reasonable protection against harmful interference in a typical medical installation. The use of accessories, sensors and cables other than those specified may result in increased emission and/or decreased immunity of the CALYSTO Series IV.

3. **Electrical Connection**

CALYSTO Series IV is powered from AC current and requires 120VAC, 15AMP. Hospital grade line cords are required and proper grounding reliability is achieved when CALYSTO Series IV devices are connected to an equivalent hospital grade receptacle. Witt Biomedical Corp. recommends the use of hospital grade line cords.

CALYSTO Series IV Host/Front End devices are powered through a separate medical grade UPS/Line Conditioner, which is independently connected to a wall outlet. Laser printers should not be powered through the UPS/Line Conditioner, but should be connected directly to a wall outlet, otherwise the printer may draw enough current away from the system to cause it to reboot.

CALYSTO Series IV devices are Class 1 devices suitable for connection to public mains, and do not require a separate connection to a (ground) Potential Equalization Conductor.

4. **Pacemaker Rejection**

The 12-Lead CALYSTO Series IV does not include pacemaker rejection.

5. **Front End Connectors**

The connectors extending from the signal acquisition unit (Front End) are not designed to support weight and can be broken if stepped on. Keep the rear of the Front End out of high traffic areas.

6. **G5 Reset**

The CALYSTO Series IV is equipped with a G5 reset function that causes/enables the live waveform screen to be reset. If you are required to utilize the G5 reset function, quickly press and release the button. Do not hold the G5 reset button for more than 2 to 3 seconds in duration.

7. **Defibrillator Protection**

The CALYSTO Series IV has been designed with defibrillator protection. Patient signal inputs labeled with the CF and BF symbols with paddles are protected against damage resulting from defibrillation. CALYSTO Series IV may remain attached to the patient during defibrillation or while an electrosurgical unit is in use, but the readings and waveforms displayed may be inaccurate during the defibrillation and shortly thereafter. To ensure proper defibrillator protection, use only the recommended ECG cables and lead wires.

8. **Eye Protection**

EYE CAUTION!!!
Light emitting diode. Do not look into fiber optic cable.

9. **Latex Sensitivity**

ECG cables and wires, SpO2 finger probes, ETCO2 masks, surface body temp probes, and reusable NIBP cuffs and hoses provided with CALYSTO are all latex free.

10. **Heart Rate Determination**

The CALYSTO Series IV utilizes an adaptive peak detector methodology to calculate heart rate. The CALYSTO Series IV does not distinguish between normal and ectopic beats and may include both in determining a patient's heart rate. This may result in erroneous heart rate readings. Reported values should be verified by a qualified health care professional.

11. **Accidental Spills**

If fluids/liquids of any kind should leak into a CALYSTO Series IV device, discontinue use of the device and have it checked by a Witt Biomedical Service Technician, or other qualified individual, before using the device again. To avoid electric shock or device malfunction, fluids/liquids must not be allowed to enter CALYSTO Series IV devices.

12. **Installation**

Installation of CALYSTO Series IV systems should be performed by Witt Biomedical Service Technicians, or other qualified individuals, and in a manner that allows users to achieve optimal use of the system.

13. Electric Shock

To reduce the risk of electric shock, do not come in contact with any patient when removing covers, connectors, etc., during the performance of tasks such as routine maintenance and calibration. When disconnecting CALYSTO Series IV devices from power lines, remove the plug from the wall outlet first, and then disconnect the cable from the device. Do not disable the power cord grounding feature. This device is designed for connection to a grounded (earth) power outlet.

14. Patient Environment

Series IV/PCM equipment that has its power cord connected directly to the medical grade UPS/ line conditioner that is provided with the system (e.g. Host/PCM computer, Front End, desk monitors, boom monitor) is suitable to be placed within the patient environment. Equipment that does not have its power cord connected directly to a medical grade UPS/line conditioner (e.g. laser printer, review computer, etc.) should be placed outside of the patient environment.

15. Operating Instructions

The CALYSTO Series IV system utilizes components, including but not limited to monitors, printers, UPS/line conditioners, etc., whose operation may not be fully described within this User's Guide. Complete operating instructions for these components are contained in the documentation offered by their manufacturer, such documentation being provided to you at the time each CALYSTO Series IV system was installed.

16. Battery Backup

The CALYSTO Series IV Host/Front End is supplied with a medical grade UPS/Line conditioner that will sustain uninterrupted operation of the system in the event of a supply mains failure. The UPS/Line Conditioner can provide power for approximately 15 minutes.

17. Use of Electrosurgical Equipment

Use of electrosurgical equipment may cause some level of interference with the CALYSTO Series IV. The CALYSTO Series IV does not offer protection against burns to patients when using electrosurgical equipment. To help avoid unintentional burns to patients during delivery of energy:

- Place ECG monitoring electrodes as far away from high frequency surgical electrodes as possible.
- Minimize skin to skin contact between parts of the patient's body.
- Avoid using needle electrodes. Use conventional adhesive electrodes.

18. Single Patient Use

Use of the CALYSTO Series IV system is restricted to one patient at a time. Do not attempt to connect cables to multiple patients simultaneously.

19. **Other Monitoring Equipment**

The CALYSTO Series IV includes all usual and customary monitoring devices required in the Cardiac Cath Lab environment and is not intended to be used with other monitoring devices during normal operation.

20. **Multiple Electrical Instruments**

Use caution when monitoring patients with cardiac catheters or pacemakers, who require protection from electrical currents. When connecting CALYSTO Series IV equipment to any instrument, verify proper operation before clinical use. All combinations of equipment must be in compliance with IEC standard 60601-1-1 requirements. A potential hazard may occur if the leakage currents from multiple instruments combine and are inadvertently routed directly to a patient's heart via a catheter or pacemaker lead. Leakage current must be kept within acceptable limits and must be checked by a qualified individual.

21. **Single Use Devices**

Devices or accessories labeled as disposable or single use should not be reused. Reuse of such items may cause performance to degrade or cause contamination to occur.

22. **Operating Environment**

CALYSTO Series IV is to be transported, stored and used in environments with a temperature range of 5 to 25° C and relative humidity of 20 to 80%, non-condensing. Transport, storage and use of CALYSTO Series IV outside of these environmental conditions may result in improper function and system accuracy.

23. **Detachable Parts**

CALYSTO Series IV is connected to patients during normal operation. Detachable parts (cables, probes, sensors, etc.) are subject to deterioration and wear and tear during normal use. Users are responsible to inspect and test detachable parts for integrity and proper operation on a regular basis and to replace such parts as necessary. Failure to perform such inspection, testing and replacement of detachable parts may result in improper system function and accuracy and may impact system safety.

24. **Serviceable Parts**

CALYSTO Series IV contains no user serviceable or repairable parts. Refer servicing to Witt Biomedical Service Technicians or other qualified individuals.

25. **Consumption of Materials**

Other than disposable items commonly used in the Cardiac Cath Lab environment (catheters, transducers, ECG electrodes, etc.), which Witt Biomedical does not supply, CALYSTO Series IV devices do not consume any materials during normal operation.

26. Surface ECG Monitoring

- Keep the conductive portions of ECG lead electrodes and cables away from other energy conducting parts, including the earth.
- Use only Conmed ECG cables and lead wires, available exclusively from Witt Biomedical, to connect ECG leads to the CALYSTO Series IV system. Use of other than the recommended ECG cables and lead wires may inhibit proper defibrillation protection.
- Use only one type of ECG electrode on the same patient. Witt Biomedical recommends the use of commercially available silver/silver chloride (non-polarizing) adhesive type electrodes. Polarizing electrodes (stainless steel or silver) may cause electrodes to retain a residual charge after defibrillation, which may block reacquisition of the ECG signals.
- Make sure that lead wires are connected properly. Improper connection will cause inaccuracies in the ECG display.
- CALYSTO Series IV includes loose lead indicators to signify an inoperative ECG channel. A loose lead report is issued to 1 volt difference from RL, and the affected ECG signal is displayed with a red/white striped appearance.

27. Invasive Pressure Monitoring

- Witt Biomedical does not supply transducers or transducer cables for use with the CALYSTO Series IV system. Witt Biomedical recommends the use of commercially available, disposable 4-wire bridge type blood pressure transducers that conform to AAMI standard BP22 for performance interchangeability of resistance bridge type blood pressure transducers and/or required sections of IEC standard 60601-2. Disposable transducers are typically provided in sterile condition and should be connected, prepared and used according to the manufacturer's instructions. Disposable transducers should not be used past their expiration date as specified by the manufacturer.
- Transducer cables are typically supplied by the transducer manufacturer and must be terminated with Amp 11/8 plug — male (206434-1) or Cannon 6 pin female connectors in order to connect to the CALYSTO Series IV. Cables terminated with Cannon 6 pin female plugs require an adaptor cable provided by Witt Biomedical prior to connection.
- Transducer cables are reusable items and are subject to wear and tear. Users are responsible to inspect and test cables for integrity and proper operation on a regular basis. Failure to perform such inspection and testing may result in improper function and system accuracy.
- CALYSTO Series IV does not require warm up time for its invasive pressure components.

28. SpO2 Monitoring

The DS-100A SpO2 sensor manufactured by Tyco/Nellcor is to be used with this system. The DS-100A sensor is for use on adults greater than 40 kg in weight who are in an inactive state. The DS-100A sensor is contraindicated for prolonged use; it may be used on the same site for a maximum of 4 hours.

Warning

Warnings

- Before using the DS-100A SpO2 sensor, carefully read the directions for use provided in the package by the manufacturer.

- Check the DS-100A SpO2 sensor for damage before use. Do not use the sensor if it appears damaged.
- Do not wet or immerse the DS-100A SpO2 sensor.
- Failure to apply the DS-100A properly may cause incorrect measurements.
- Using the DS-100A in the presence of bright lights may result in inaccurate measurements. In such cases, cover the sensor site with an opaque material.
- Reusable sensors must be moved to a new site at least every 4 hours. Because individual skin condition affects the ability of the skin to tolerate sensor placement, it may be necessary to change the sensor site more frequently with some patients. If skin integrity changes, move the sensor to another site.
- Intravascular dyes or externally applied coloring such as nail polish, dye, or pigmented cream, may lead to inaccurate measurements.
- The performance of the DS-100A is compromised by motion; use of this sensor is contraindicated for active patients.
- Do not apply tape to secure the sensor in place or to tape it shut; venous pulsations may lead to inaccurate saturation measurements.
- As with all medical equipment, carefully route cables to reduce the possibility of patient entanglement or strangulation.
- Do not use the DS-100A or other oximetry sensors during MRI scanning. Conducted current may cause burns. Also, the DS-100A may affect the MRI image, and the MRI unit may affect the accuracy of oximetry measurements.
- Do not alter or modify the DS-100A. Alternations or modifications may affect performance or accuracy.
- Do not use NIBP or constricting instruments on the same appendage as the DS-100A sensor.
- Significant amounts of dysfunctional hemoglobins (e.g. carboxyhemoglobin, methemoglobin, etc.) may adversely affect oximetry performance.
- Oximetry performance may be impaired when patient perfusion is low or signal attenuation is high.
- Oximetry performance may be impaired when in the presence of electromagnetic interference such as from defibrillators, MRI or electrosurgical units.
- The NELL-3 oximetry module has not been tested in the presence of flammable anesthetics or gases.

If you have questions regarding any of this information, contact Nellcor's Technical Services Department, or your local Nellcor representative.

Contact and ordering information for Tyco/Nellcor is contained in appendix D.

NOTE FROM NELLCOR PURITAN BENNETT:

Purchase of this instrument confers no express or implied license under any Nellcor Puritan Bennett patent to use this instrument with any oximetry sensor that is not manufactured or licensed by Nellcor Puritan Bennett.

29. ETCO2 Monitoring

Only ETCO2 supplies manufactured by Novametrix are to be used with this system. Ordering information for Novametrix ETCO2 supplies is contained in appendix D.

Precautions for Use

WARNING

- Always verify that the opening of the airway adapter assembly is unobstructed. There is no provision for entrainment of room air should the opening become occluded.
- Check the Capnostat sensor cable for damage before use. Do not use a damaged sensor or one with exposed electrical contacts.

CAUTION

- Do not wet or immerse the Capnostat sensor cable.
- No tension should be applied to the Capnostat sensor cable.
- Minimum oxygen flow is 6 LPM.
- Monitor patient ventilation during use.
- Inspect mask, ensure all components are secure and undamaged.
- Verify proper mask, tubing connection and placement during use.
- Verify flow.
- Clean or replace mask if occluded from patient secretions or fluids.
- Do not use mask for O_2 delivery without active CO_2 monitoring.
- Mask is not to be used for any respiratory application other than described.
- NOTE: Turn on the CO_2 monitor prior to using the mask to minimize delay in CO_2 measurement.

30. Non-Invasive Blood Pressure (NIBP) Monitoring

Performance

Blood pressure measurements determined by the CALYSTO Series IV are equivalent to those obtained by a trained observer using the cuff/stethoscope auscultation method, within the limits prescribed by the American National Standard, Electronic or Automated Sphygmomanometers. CALYSTO Series IV NIBP performance with common arrhythmias, such as atrial or ventricular premature beats or atrial fibrillation, has been verified by use of a patient simulator. A copy of the Report of Study Findings performed for AAMI SP10 evaluation is available upon request from Witt Biomedical Corp.

Precautions for Use

- To obtain accurate blood pressure readings, the cuff must be the correct size, and also be correctly fitted to the patient. This is especially important for neonates. *Incorrect size or incorrect fitting may result in incorrect readings and excessive pressure being applied to the limb that the cuff is applied to.*
- Blood pressure readings may also be affected by the position of the subject, and his/her physiologic condition and other factors.

- The CALYSTO Series IV NIBP module may not operate correctly if used or stored outside the relevant temperature or humidity ranges (see Specifications, page 1-10 of the Series IV Service Manual).
- The CALYSTO Series IV NIBP module will not operate correctly if the air hose is compressed or restricted. As with all medical equipment, carefully route the air hose to avoid compression and to reduce the possibility of patient entanglement or strangulation.
- The CALYSTO Series IV NIBP module is a constricting instrument. Users must check—by observation, palpation and other accepted methods—that circulation to the limb that the NIBP cuff is applied to is not impaired on a prolonged basis.
- All air hoses and cuffs used to connect the patient to the module must be approved by Witt Biomedical. Hoses of a certain material and/or durometer may cause the module to perform in an improper fashion. Also, cuffs that are extremely small or large in volume may cause errors to occur depending on the BP mode selection. Air hoses as well as cuffs are offered as accessories from Witt Biomedical.

31. Surface Body Temperature

The CALYSTO Series IV utilizes YSI 400 Series reusable probes for acquisition of body temperature data. The YSI probes are designed for continuous patient temperature measurement.

Some styles of probes have disk-shaped stainless steel tips with epoxy on one side of the disk. Please note that the metal side should be used for making measurements.

Warning

WARNING!!!
All wire-lead patient-connected transducer assemblies are subject to reading error, local heating, and possible damage from high-intensity sources of RF energy. Electrosurgical equipment represents one such source since capacitively-coupled currents may seek alternate paths to ground through probe cables and associated instruments. Patient burns may result. If possible, remove the probe from patient contact before activating the surgical unit or other RF source. If probes must be used simultaneously with electrosurgical apparatus, the instruments to which the probes are connected should be checked for adequate isolation from electrical grounds at radio frequencies. Hazards can be reduced by selecting a temperature monitoring point that is remote from the expected RF current path to the ground return pad.

Caution

CAUTION!!!
Mishandling of the probes could result in damage to the internal wires and the loss of electrical isolation or improper temperature readings.

32. Cleaning Series IV Devices and Reusable Patient Cables, Probes, and Cuffs

Series IV devices may be located in the patient environment and are therefore subject to contact with body fluids. When cleaning Series IV devices, users must observe proper body substance precautions as specified in their own internal policies and procedures. Witt Biomedical recommends that Series IV devices be cleaned with a properly diluted bleach solution and a damp cloth and that the user wear protective gear such as gloves and eye protection. Under no circumstances should Series IV devices be totally immersed in liquids. Reusable NIBP cuffs and hoses, SPO2 probes, ECG cables and leads and other reusable patient cables should be cleaned as directed in the manufacturer's instructions. These instructions may be found on the original package or as an insert included in the original package.

33. **Series IV Nurse Station**

The CALYSTO Series IV Nurse Station allows users to view waveform activity and control the front end remotely. Because the Nurse Station relies on computer network communications, it may at times lose communication with the Series IV system. The Series IV Host computer should always be used as the primary monitoring source during procedures.

34. **Series IV Front End**

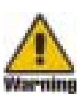
The CALYSTO Series IV Front End is typically located in an area of high fluid flow. To help keep the Front End clean, cover the entire Front End with a plastic bag that has an elastic closure with an opening for airflow.

35. **Alternate Monitoring Source**

The ACC/AHA Guidelines for Cardiac Catheterization Labs (JACC volume 18, No. 5) emphasize the importance of patient monitoring during cardiac catheterization procedures. In view of this, Witt Biomedical strongly recommends that redundant monitoring capabilities be available. CALYSTO should not be the sole means of monitoring patients during cardiac catheterization procedures.

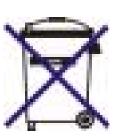
36. **Alarm Activation Responsibility**

CALYSTO monitors physiologic parameters and provides visual and audible alarms. It is not designed for unattended use. Alarms may be activated and deactivated at the user's discretion and it's the user's responsibility to configure and activate the alarms for each patient.

37. 

WARNING!!!
Inputting data into the wrong screen may result in erroneous displays.

The CALYSTO Series IV is comprised of multiple data entry and system action screens. Many screens support multiple data input methods via mouse, keyboard and/or bar-code reader. Individual keyboard keys often support different system functions in different screens. So as to assure that desired and appropriate system functions are carried out, users are responsible to be aware of which system screen is active before performing keyboard data entry.

38. 
Disposal

CALYSTO Series IV devices are computer based electronic medical equipment whose components contain materials that may be harmful to the environment if not disposed of properly. Patient contact accessories (probes, cables, sensors, etc.) are subject to contact with body fluids and pose a potential risk to system users. Patient contact accessories must be handled and/or disposed of according to manufacturer's instructions and customers own internal policies and procedures. Manufacturer instructions may be found on the original packaging or as an insert included in the original packaging.

Effective August 13, 2005, the European Union's WEEE (Waste Electrical and Electronic Equipment) Directive requires that the Producer (Importer) provide financing for the collection, treatment, recovery and/or environmentally sound disposal of all electrical and electronic equipment. The WEEE Directive applies to Series III/IV and Image IV devices and additional fees will be added to the cost of each device that is introduced into the European Union, after the effective date, in order to offset the cost of recovery.
At end-of-life, Witt Biomedical recommends that End Users not dispose of Series III/IV and Image IV devices as unsorted municipal waste, but rather make use of one of the following options:

Return to Producer (Importer)

Send your end-of-life Series III/IV and Image IV devices to your authorized Distributor for proper disposal. Your distributor will make arrangements with Witt Biomedical to cover the cost of shipment.

Recycle

If recycling is your preference, your distributor offers an environmentally friendly method to dispose of outdated Series III/IV and Image IV devices that no longer have useful life. Simply send your devices to your distributor's authorized recycler for proper disposal. The authorized recycler will make arrangements with the distributor to cover the cost of shipment.

Donate

You may donate the old computers from Series III/IV and Image IV devices to help disabled and/or economically disadvantaged children and adults in your own community. It is your responsibility to ensure that all patient data is removed from the device prior to its donation.

39. Computer Virus Protection

Witt Biomedical's CALYSTO Series IV is a computer-based medical product and is therefore subject to attack by computer viruses. The threat of a computer virus is ever expanding as new viruses are introduced almost daily. The software required to prevent attack by a computer virus must therefore be constantly monitored and updated. Witt biomedical does not write antivirus software, nor do we install it on our systems at the factory since we are in no position to constantly maintain it. To keep your system safe, Witt Biomedical strongly recommends that your biomed or hospital information systems staff installs virus protection on all Image IV computers and updates it regularly.

40. Off-the-Shelf Software

Witt Biomedical's CALYSTO Series IV products are medical devices that combine proprietary software, off-the-shelf software, and open architecture personal computer hardware.

Witt Biomedical Series IV products may utilize the following off-the-shelf software products on their local computer workstations and file servers:

- Microsoft® SQL Server® 2000
- Windows® 2000 Professional operating system
- Windows® 3.11 operating system
- Windows Server™ operating system
- Microsoft® Office 2000™
- Microsoft® Office XP™
- Symantec pcAnyWhere™
- Engineering Solutions Inc. DATAMED® Data Format Translator
- Syntermed Emory Cardiac Tool Box Network™ (ECTb Network™)
- StompSoft BackUp MyPC™
- Software Architects Disk Drive TuneUp™
- Software Architects Write DVD™
- Pinnacle Systems Instant CD/DVD
- DivXNetworks DivX Pro™ codec
- SilverBack DataCenter Enterprise™
- Freeland AccessPoint™

These off-the-shelf software products are installed and configured by factory trained technicians on all computers provided by Witt Biomedical. Each software product is installed and configured using the “typical” installation method as specified by its manufacturer. Configuration and setup of these off-the-shelf software products should not be altered except to install periodic software patches as provided by their manufacturer.

With the exception of the above mentioned off-the-shelf products, Witt Biomedical Series IV products have not been verified and validated for proper and safe operation in combination with any other off-the-shelf software products. Do not load any off-the-shelf software onto the hard drive. Loading any unauthorized off-the-shelf software products onto the hard drive may affect the safety and efficiency of the device, may lead to increased risk to users and patients, and will void any or all warranties and maintenance plans.

Licensed copies of all off-the-shelf software products used on Witt Biomedical Series IV systems are provided to the end user during shipping and installation. It is the end user’s responsibility to maintain and protect this licensed software in a safe location.

Customers may provide their own personal computer hardware for Series IV products that do not have direct patient contact, such as review stations and file servers. This hardware must meet or exceed Witt Biomedical’s minimum published specifications. Off-the-shelf software should be installed and configured using the manufacturer’s “typical” installation method.

Intended Use

The CALYSTO Series IV is intended for complete physiologic/hemodynamic monitoring, clinical data acquisition, and analytical assessment for cardiac catheterization, invasive radiology, and electrophysiology laboratories. Its users, responsible to interpret the data made available, will be professional health care providers. CALYSTO Series IV provides the ability to transmit patient data files for storage, analysis, and viewing at distributed locations within the clinical facility via intranet or internet, or may function as a standalone device.

Use of CALYSTO Series IV is not intended where unattended patient monitoring is desired or in situations where arrhythmia detection is required.

The CALYSTO Series IV ECG Management system is intended for receiving and storing resting, stress, and holter ECG data from source devices. ECG data is stored, unaltered, in its original format, and made available for review and procedural report generation purposes. CALYSTO Series IV does not provide interpretive functions, but does store interpretive statements generated by the source device in an integrated and expandable database. Its users, responsible to interpret the data made available, will be professional health care providers. CALYSTO Series IV provides the ability to transmit ECG data files for storage, analysis, and viewing at distributed locations within the clinical facility via intranet or internet, or may function as a standalone device.

Chapter 1:

General Information

System Description

The CALYSTO Series IV Physiomonitoring and Information System is specifically designed to acquire, measure, display, record, and analyze data relevant to cath lab procedures. In addition, it contains a number of modules that collect and process cath lab clinical and administrative information, making it a powerful data management tool as well.

Basic System

The basic system consists of a Host computer, Front-End Signal Acquisition Unit, two 17" monitors, one 22" monitor, a laser printer, a pedestal desk and a battery backup. The host, laser printer, 17" monitors and battery backup reside in the control room on the pedestal desk, as shown in the equipment layout illustration on page 1-3. One monitor displays the data management system while the other displays live waveforms. The host computer is directly cabled to the front end and the 22" physician's display in the procedure room. The system is networked through the hub in the server room.

- Control Room
- 1 each pedestal desk
- 1 each Host computer, with battery backup
- 2 each 17" display monitor
- 1 each laser printer

Procedure Room
- 1 each 22" display monitor
- 1 each Front End Signal Acquisition Unit

Server Room
- 1 each 100 Mbps Ethernet hub
- 1 each File Server, with battery backup
- 1 each 15" display monitor

Optional Equipment

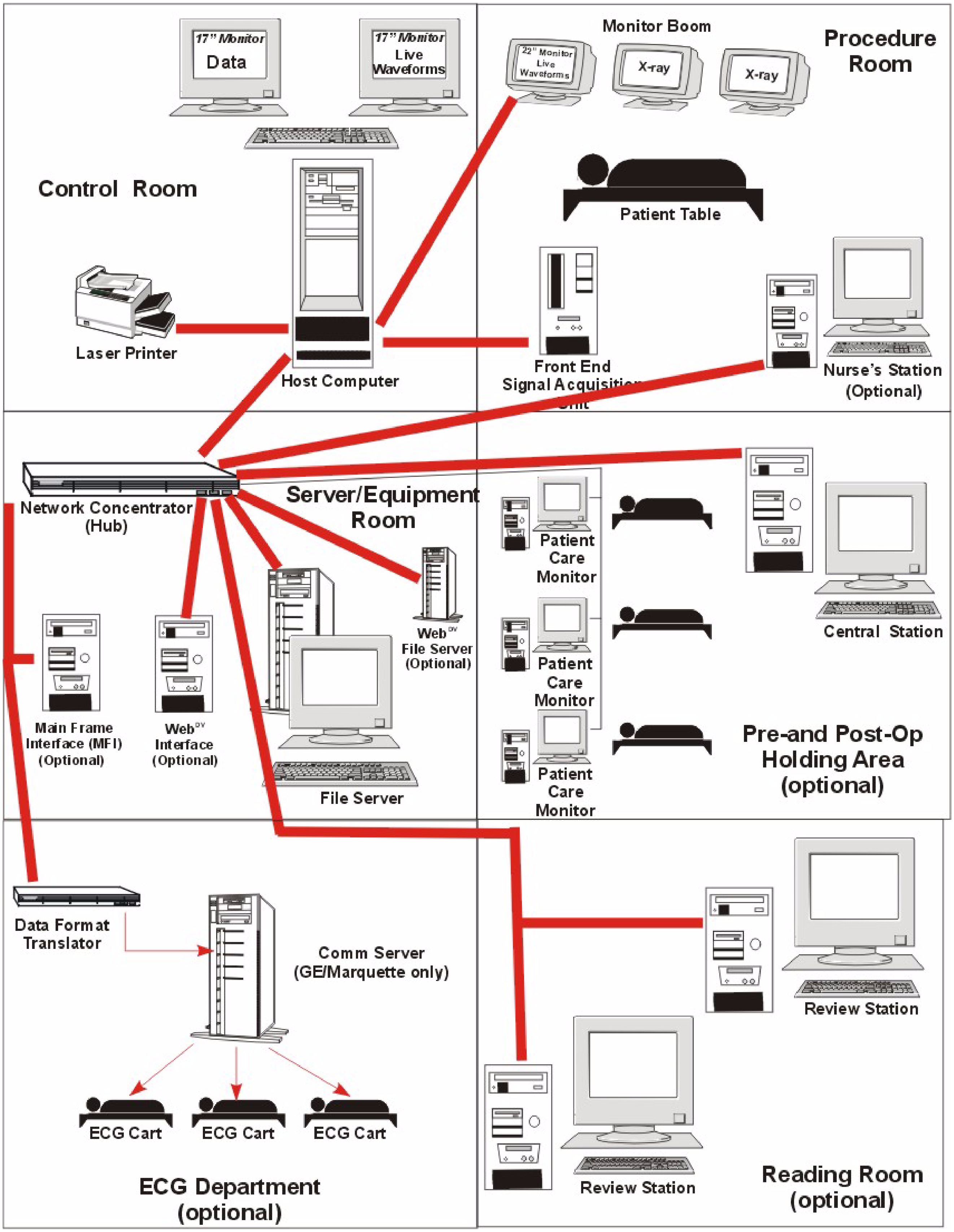
Optional equipment includes a nurse's station in the procedure room that can take control of the host if needed, a main frame interface to connect the system to the hospital's network, and any number of review stations that can review stored patient data. There is also an optional Patient Care Monitor station for use in a pre- or post-op holding area. The Patient Care Monitor can admit patients and record data and vital signs. Up to eight Patient Care Monitors can be monitored by an optional Central Station.

Procedure Room
- 1 Nurse's Station

Server Room
- 1 Main Frame Interface (MFI)

Reading Room
- Review Stations

Holding Area
- Basic or Advanced Patient Care Monitor Stations
- Central Station


17" Monitor
Data
17" Monitor
Live
Waveforms
Control Room
Laser Printer
Host Computer
Monitor Boom
22" Monitor
Live
Waveforms
X-ray
X-ray
Procedure
Room
Patient Table
Front End
Signal Acquisition
Unit
Nurse's Station
(Optional)
Network Concentrator
(Hub)
Server/Equipment
Room
Web
File Server
(Optional)
Main Frame
Interface (MFI)
(Optional)
Web
Interface
(Optional)
File Server
Patient
Care
Monitor
Patient
Care
Monitor
Patient
Care
Monitor
Central Station
Pre-and Post-Op
Holding Area
(optional)
Data Format
Translator
Comm Server
(GE/Marquette only)
ECG Cart
ECG Cart
ECG Cart
ECG Department
(optional)
Review Station
Review Station
Reading Room
(optional)

Specifications

System, General

Specification	Value
Power Consumption	1000 W nominal
Temperature	5 to 25° C
Humidity	20 to 80% non-condensing, relative
Heat Dissipation	Approximately 7500 BTUs per fully populated console

Signal	Data Resolution
Invasive Pressure ECG (Surface) ECG (intracardiac) Temperature Non-Invasive Pressure Non-Invasive SpO2	0.01 mmHg 0.15 µV 0.1 mV 0.0001° C ± 5 mmHg ± 2 %

Nurse's Station, Review Station, File Server, and MFI Computers

Specification	Value
Hardware	ATX Pentium IV Main Board BCM845DL Intel Pentium IV 2.0 GHz Processor 128 MB, PC 2100 MHz SDRAM 40 GB hard drive (C -3 GB, D-remainder) 48X CD-ROM drive reader 1.44 MB 3.5" floppy drive SVGA video – 1280 x 1024 res, 24/32 bit color 10/100 Ethernet Network Adapter (PCI) Intel EtherExpress Pro 100 Network Adapter

Host Computer

Specification	Value
Hardware	ATX Pentium IV Main Board BCM845DL Intel Pentium IV 2.0 GHz Processor 128 MB, PC 2100 MHz SDRAM 40 GB hard drive (C -3 GB, D-remainder) 48X CD-ROM drive reader 1.44 MB 3.5" floppy drive SVGA video – 1280 x 1024 res, 24/32 bit color 10/100 Ethernet Network Adapter (PCI) Intel EtherExpress Pro 100 Network Adapter
G4 PCB	I960uP @ 40 MHz, 8 MB RAM, 100 Mb 115200 baud/port (backup RS232) Host Interface: 16-bit ISA bus @ 8 MHz
G5 PCB	Pentium II @ 233 MHz, 8 MB RAM, 10 MB Ethernet 115200 baud/port (backup RS232) Host Interface: 16-bit ISA bus @ 8 MHz
G5PCI PCB	Intel Celeron Processor @ 400 MHz, 6 MB RAM, 100 MB Ethernet 115,200 Baud/port (backup RS232) Host Interface 32-bit PCI bus @ 33 MHz

Digital Front End Signal Acquisition Unit/Digital Patient Care Monitor (PCM)

Specification	Value
12-Lead DSP (as part of a system with the S5 assembly)	
Safety Items	
Patient applied risk current (per AAMI ES1 par 5.4.2.1 (a-h)	10 µA normal condition, 50µA single fault condition
Design creepage and clearances	8mm minimum
Electrical isolation	7.5 kV peak, 6.0 kV rms (1 min). No breakdown
ESU withstand	9 kV @ 0.5-4.0 mHz no damage
Defibrillator withstand	360 j (x5) with 100Ω patient load no damage
Performance items, ECG function	
Input dynamic range (dc offset + signal)	± 1.25 V
Input impedance	> 20 meg shunted by <500 pF
Input bias currents	< 0.05µA
Lead weighting	per AAMI EC11 table 7
CMRR-DC-100 Hz (per AAMI EC11 par 4.2.11	80 dB (> 90 dB @ 60 Hz)
Freq & impulse response (per AAMI EC11 par 4.2.7.2 method A-C & D)	Selectable 0.01 - 100 Hz (diagnostic mode) or 0.5 - 40 Hz (monitor mode) (-30% points)
Notch filters	Selectable 50/60 Hz and 3rd and 5th harmonic
Baseline reset after overload (per AAMI EC11 par 4.2.13)	Restore to usable in 3 seconds
Noise (per AAMI EC11 par 4.2.12)	<30 µV p-p referred to input
Loose patient lead behavior	Flatline and reported at Series IV system level
Analog output channels	2
Analog output impedance	100 ohms
Analog output channel data sources	LI, LII. Scale factor: 1V/mV
Pacer detect output	Logic level, 0 V and 2.4-5.0 V. 250 msec on pacer pulse detection
Pacer detect output impedance	100 ohms
Performance items, Respiration function	
Patient connection	RA LL
Measurement method	Transimpedance, 60 kHz
Applied current @ 60 kHz	< 200 µA
Open circuit 60 kHz voltage (loose leads)	< 5 V p-p
Noise	< 0.1 ohm
Base impedance range @ 60 kHz	2000 ohm maximum
Frequency response	0.05-2.5 Hz; 3-150/ipm
Baseline return	Provided
Digital Pressure-Temperature (as part of a system with the S5 assembly)	
All functions	
Patient applied risk current (per AAMI ES1 par 5.4.2.1 (a-h)	< 10 µA all conditions
Electrical isolation	7.5 kV peak, 6.0 kV rms (1 min) no breakdown
Design creepage and clearances	8 mm minimum
Pressure functions	
Channels	4
Transducer type	4-wire bridge
Excitation voltage	5 ± 0.1 Volts
Excitation current limit	140 mA
“No Probe” condition detection	Supported

Digital Front End Signal Acquisition Unit/ Digital PCM (continued)

Specification	Value
Transfer function	25 µV /mmHg
Resolution	Better than 0.04 mmHg
Measurement range	-100 to 400 mmHg
Frequency response	Selectable, 0-8 Hz, 0-12 Hz, 0-20 Hz, 0-40 Hz, 0-80 Hz
Zero and span adjustment	Supported
Cardiac Output function	
Injectate temperature range and accuracy	–2–25° C ± 0.3° C
Injectate probe characteristic	30 K ohms @ 25° C
Injectate temperature resolution	0.1° C
Injectate temperature "No Probe" condition detect	When measured temperature < -5° C or when probe circuit is open
Injectate temperature channel frequency response	0 - 2 Hz
Catheter	Edwards Thermodilution Catheters
Open circuit voltage	< 5.0 Vdc
Temperature range	35° C - 39° C
S5 PWB Assembly (functions not included above)	
Patient Isolation ETCO2 and SPO2 functions	
Patient applied risk current (per AAMI ES1 par 5.4.2.1 (a-h). SPO2 and ETCO2 module power	< 10 µA all conditions
Electrical isolation	7.5 kV peak, 6.0 kV rms (1 min) No breakdown
Design creepage and clearances	8 mm minimum
ETCO2 module interface	
Power supply for ETCO2 module	± 12 Vdc 0.3 A, + 5 Vdc 0.75 A
Communication interface	isolated 5 Vdc level, 9600 baud
Additional isolated signal	Module reset
Intended SPO2 module	Novametrics, Inc. Capnostat III
Note: ETCO2 power supply is isolated from SPO2 power supply to 1500 Vdc	
SPO2 Module Interface	
Power supply for SPO2 module	± 12 Vdc 0.15 A, + 5 Vdc 0.1 A
Communication interface	Isolated 5 Vdc level, 2400 baud
Additional isolated signal	Module reset
Intended SPO2 module	Nellcor MP204P, Nellcor MP506, Nellcor NELL-3
Note: SPO2 power supply is isolated from ETCO2 power supply to 1500 Vdc	
NIBP Module Interface	
Power supply for NIBP module	+ 6 Vdc, 2.0 A
Communication interface	+ 5 Vdc level, 1200 baud
Additional isolated signal	Module reset
Intended NIBP module	CAS Medical model NB, SunTech Advantage
Note: NIBP module power supply is not patient isolated	

Digital Front End Signal Acquisition Unit/ Digital PCM (continued)

Specification	Value
Analog Utility Interface	
Output channels	2
Output range	± 5 Vdc max
Output impedance	1 K ohm
Output source, channel 1	Screen trace selected as HR count. 1 mV/V
Output source, channel 2	Pressure channel I. 1.5 V/100mmHg

Front End Signal Acquisition Unit/PCM (1st Generation)

Specification	Value
Analog to Digital	
Channels	24
Resolution	16 bit
Maximum Conversion Rate	250 kHz
Max Sampling Rate per Channel	4000 Hz, 3 dB bandwidth per channel, ~ 600 Hz
Input	0 to 10 Vdc unipolar
Max Interchannel Skew Time	250 µsec
Data Transfer	100 Mb serial communication
Digital I/O	16 channels
Inherent Accuracy	15 ppm
12-Lead ECG	
Gain	1000 ± 2% monitor/diagnostic mode
Input Dynamic Range	± 5 mV monitor/diagnostic mode
Pacemaker Range	± 2 – 700 mV
Detection Range	± 2.5 mV (low)
Peak Detector Range	30 – 50 bpm
Detection Pulse	170 ms (low)
Threshold	150 µV (lead II)
Input Impedance	>50 MΩ @ 10 Hz (board) >18 MΩ @ 10 Hz (cable)
Output Impedance	100 Ω
Input Isolation	4000 V RMS 60 sec @ 60 Hz 5500 V Peak (optical)
Defibrilation	360 joules by AAMI standard
Input Leakage Current	< 5 µA RMS @ 120 Vac @ 60 Hz
Input Noise	< 20 µA p-p, 50 KΩ source
Linearity	± 0.5 %
CMR	130 dB balanced 118 dB w/ 50 KΩ imbalanced
Bandwidth/Frequency Response	0.5 – 40 Hz monitor 0.05 – 100 Hz diagnostic
Filter	60 Hz notch all modes, selectable to 50 Hz
Output Voltage	0.125 – 9.5 V, unipolar
DC to DC Clock Frequency	65 kHz ± 5 %
Power Dissipation	< 3 watts
Analog Output	1 V p-p on ECG, QRS, LII
Invasive Blood Pressure	
Pressure Range	-200 to 450 mmHg
Output Voltage	0.0 to 4.5Vdc, unipolar (10 Vdc disconnected)
Input Impedance	1.0 MΩ
Output Impedance	100Ω
Excitation	5.0 Vdc

Front End Signal Acquisition Unit/PCM (1st Generation) (continued)

Specification	Value
Offset Drift	0.1 mm/° C
Gain	5.0 µV/V/mmHg
Gain Drift	0.005%/° C
Frequency Response	0 to 40 Hz unfiltered, 0 to 8 Hz filtered
Input Isolation	4000 V RMS 60 sec @ 60 Hz
Input Isolation Optical	5500 V peak
Analog Output	1 v/100mmHg
Number of Channels	1
Cardiac Output CO1	
Temperature Range	35 to 39° C ± 0.05° C
Excitation Circuit	7.0 µA
Output Voltage	1.0 to 9.0 Vdc (9.5 Vdc disconnected)
Scale	2.0 V/° C
Catheter	Edwards Thermodilution Catheters
Isolation Output (optical)	4000 V RMS 60 sec @ 60 Hz, 5500 V peak
Cardiac Output (Injectate)	
Temperature Range	0 to 25° C
Accuracy	± 0.2° C
Output Voltage	1.0 to 9.0 Vdc (0.0 Vdc disconnected)
Scale	0.32 V/° C
Probe	YSI 700 Series equivalent
Hardware (PCM only)	ATX Pentium IV Main Board Intel Pentium 1Ghz or greater processor Memory 128MB PC2100 DDR SDRAM 48X or greater CDRW drive VGA Video (1280 x 1024 resolution, 24 or 32 bit color) 40GB or larger hard drive (C = 5GB, D = remainder) 10/100 Ethernet Network Adapter (PCI)

NIBP Module

Specification	CAS NB (used in RAM, 1st gen, digital front end, 1st gen PCM, digital PCM)	Suntech Advantage (used in digital front end, digital PCM)
Method of Measurement	Oscillometric. Relies on arterial volume changes that result from changes in transmural arterial pressure.	Oscillometric. Diastolic values correspond to Phase 5 Korotkoff sounds.
Modes	Manual or Automatic	Manual or Automatic
Blood Pressure Range, Adult	Systolic: 25 mmHg to 255 mmHg Diastolic: 10 mmHg to 220 mmHg	Systolic: 40 mmHg to 260 mmHg Diastolic: 20 mmHg to 200 mmHg
Blood Pressure Range, Neonatal	Systolic: 30 mmHg to 135 mmHg Diastolic: 15 mmHg to 110 mmHg	Systolic: 20 mmHg to 130 mmHg Diastolic: 20 mmHg to 130 mmHg
Heart Rate Range	Adult: 40 BPM to 240 BPM Neonatal: 40 BPM to 240 BPM	Adult: 20 BPM to 240 BPM Neonatal: 20 BPM to 240 BPM
Deflation Method	Stepwise	Stepwise
Initial Inflation Pressure	Adult: 150 mmHg Neonatal: 70 mmHg	Adult: 160 mmHg Neonatal: 90 mmHg
Pressure Transducer Accuracy	± 3 mmHg	± 3 mmHg
Pressure Transducer Calibration	User calibration is not required but user should check system for accuracy on a yearly basis.	The pressure transducer calibration should be verified on a yearly interval or every 10,000 readings, whichever comes first.
Operating Conditions	10 to 40° C 0 to 95% humidity, noncondensing	0 to 50° C 0 to 95% humidity
Storage Conditions	-20 to -50° C	-20 to -70° C
Determination Time (maximum)	Adult: 90 seconds Neonatal: 70 seconds	Adult: 120 seconds Neonatal: 60 seconds
Pneumatic Pressure Release	Adult: 280 mmHg Neonatal: 150 mmHg	Adult: 300 mmHg Neonatal: 150 mmHg
Accuracy	± 5 mmHg	± 5 mmHg

Respirations

Specification	Value
Respiration Range	4 to 150 ipm
Accuracy	± 3 ipm

SpO2 Module

Specification	MP 203	MP 204 P	MP 506
Saturation Range	0 to 100%	0 to 100%	1 to 100%
Accuracy (% SpO2 ± 1SD)	70 to 100% ± 3 digits	70 to 100% ± 3 digits	70 to 100% ± 3 digits
Sensors (supplied by Witt Biomedical)	DS-100A	DS-100A	DS-100A

ETCO2

Specification	Value
Measurement Range	0 to 100 mmHg
Accuracy	0 to 40 mmHg ± 2 mmHg 41 to 70 mmHg ± 5% of reading 71 to 100 mmHg ± 8% of reading

ETCO2 (continued)

Specification	Value
Step Response Time	less than 60 ms, adult less than 50 ms, neonatal less than 200 ms, sampling
Respiratory Rate	Range 0-150 bpm, Accuracy ± 1 breath
Warm Up Time	less than 15 seconds to initial Co2 indication
Calibration	No routine user calibration required 15 second airway adaptor zero performed when changing to a different airway adaptor
Accuracy Verification	Users can check with verification cell attached to sensor cable
Transducer Type	On-Airway “Mainstream”
Principle of Operation	Non-dispersive infrared (NDIR) single beam optics, dual wave length ratioing, no moving parts
Operating Temperature	Transducer: 10 to 40° C Circuit Board: 10 to 60° C
Storage Temperature	Transducer: -10 to 55° C

Body Temperature

Specification	Value
Probe Type	YSI Series 400 (reusable)
Temperature Range	29 to 45° C
Resolution	± 0.1° C
Displayed Linearity	< 0.1° C — 31° C to 41° C < 0.3° C — 29° C to 45° C

Alarms

Parameter	**HR (bpm)**	**IBP (mmHg)**	**NIBP (mmHg)**	**Body Temp (° C)**	**ETCO2 (mmHg)**	**RESP (ipm)**	**SpO2 (% sat)**
High Setting (max/min)	270/35	300/10	260/25	45° / 32° C	100/5	150/9	100/20
Low Setting (max/min)	265/30	298/0	220/10	42° / 29° C	95/0	145/4	100/20
Default Settings	N/A system restores the alarm limit settings that were in effect during last use	N/A system restores the alarm limit settings that were in effect during last use	N/A system restores the alarm limit settings that were in effect during last use	N/A system restores the alarm limit settings that were in effect during last use	N/A system restores the alarm limit settings that were in effect during last use	N/A system restores the alarm limit settings that were in effect during last use	N/A system restores the alarm limit settings that were in effect during last use
Alarm Type	Visual Audible Both	Visual Audible Both	Visual Audible Both	Visual Audible Both	Visual Audible Both	Visual Audible Both	Visual Audible Both
Audible Silence Feature	None	None	None	None	None	None	None

NOTE: For all alarms except Body Temperature, CALYSTO Series IV will not allow a parameter’s high and low limits to be set within 5 digits of each other.

For Body Temperature, CALYSTO Series IV will not allow the high and low limits to be set within 1 digit of each other.

CALYSTO Series IV has available audible alarms. Ensure that the speakers in the Host/PCM CPUs and the Front End devices are clear of obstruction. Failure to do so may result in inaudible alarm tones.

Each time the CALYSTO Series IV is used, check alarm limits to ensure that they are appropriate for the patient being monitored.

In order to turn off/deactivate an alarm, whether its manifestation was caused by a physiological occurrence or intentional disconnection of a sensor, probe or cable by the operator, perform the following:

- Click the [Switch] button (or press F12 on the keyboard)
- Click the [Setup] button on the command bar to access the Waveform Setup screen
- Click the [Edit Alarm] button in the Alarms section of the Waveform Setup screen and enter password (if enabled)
- Click the checkbox of the alarm(s) you wish to turn off/deactivate
- Click [OK] at the bottom left hand corner of the screen to return to the live monitoring screen

Tripp Lite SmartPro UPS System Model SMART700HG

Specification	Value
SYSTEM	
System overview	Medical grade tower UPS system includes built-in isolation transformer with faraday shield, line interactive voltage regulation. AC surge suppression, RS-232 and USB monitoring ports with complete software and cabling, plus hospital-grade plug and outlets. UL2601-1 listed as medical electrical equipment with less than 300 microamps combined leakage current for UPS and connected loads.
Voltage compatibility	120 Vac
Frequency compatibility	60 Hz
OUTPUT	
Output voltage amp capacity (VA)	700
Output watt capacity (watts)	450
Output nominal voltage	120 V
Output voltage regulation	Line Mode: Sine wave line voltage 120 V (-18% / +8%) Battery Mode: PWM sine wave output 120 V ± 5%
Output frequency regulation	Line Mode: Passes line frequency of 60 Hz ± 10% Battery Mode: Inverter output regulated to 60 Hz ± 0.5 Hz
Output quantity / type	4 NEMA 5-15R Hospital-grade output receptacles
Overload protection	Resettable circuit breaker
INPUT	
Maximum input amps / watts	5.5 A / 550 watts
Input connection type	NEMA 5-15P hospital grade
Input cord length	6 feet, 14 gauge
Recommended electrical service	15 A 120 V
BATTERY	
Full load run time	18 minutes (700 VA)
Half load run time	42 minutes (350 VA)
DC system voltage	36 Vdc
Typical battery lifespan	3-6 years, depending on usage
Battery recharge rate	2-4 hours to 90%
VOLTAGE REGULATION	
Voltage regulation description	Line interactive UPS offers 2 boost levels of brownout correction and a single level of overvoltage adjustment to maintain usable, computer-grade output without consuming battery power over an input voltage range of 81 to 143 Vac
Overvoltage correction	Input voltages between 126 and 143 Vac are reduced by 9%
Direct pass through	Input voltages between 105 and 125 Vac are passed through unchanged
Brownout correction	Input voltages between 96 and 106 Vac are boosted by 10%
Severe brownout correction	Input voltages between 81 and 95 Vac are boosted by 21%
LEDS, ALARMS, & SWITCHES	

Tripp Lite SmartPro UPS System Model SMART700HG (continued)

Specification	Value
Front Panel LEDs	Yes, includes 5 front panel indicator LEDs to show battery charge level, AC line voltage levels, automatic voltage regulation status, UPS load level, and replace battery warning
Alarms	3 function audible alarm indicates power failure conditions (4 short beeps every 10 seconds), overload (continuous short beeps), and low battery (continuous tone)
Switches	Yes, includes 2 front panel mounted push-button switches for system enable, self-test, and alarm cancel functions
SURGE / NOISE SUPPRESSION	
AC surge suppression	Conforms to IEEE 587 / ANSI C62.41 specifications
AC suppression response time	Instantaneous
EMI / RFI AC noise suppression	Yes
PHYSICAL	
Shipping weight	48 lbs (21.8 kg)
Unit weight	44.6 lbs (20.2 kg)
Unit dimensions (H x W x D)	12.75 x 7.5 x 9 inches (32.4 x 19.1 x 22.9 centimeters)
Material of construction	PVC
Form factors supported	Tower, wall mountable with optional UPSWM accessory
Cooling method	UPS cooling via rear exit fan
Battery access	Battery access door allows hot swap battery replacement without powering connected equipment off
ENVIRONMENTAL	
Operating temperature	+32 to +104° F (0 to +40° C)
Storage temperature	+5 to +122° F (-15 to +20° C)
Relative humidity	0 to 95%, non-condensing
COMMUNICATIONS	
Network monitoring port	Includes 2 built-in monitoring ports, 1-USB & 1-RS232
Software and cabling included	Power/alert UPS monitoring software is included on CD-ROM for all common network and standalone operating systems. Ships with 2 cables, 1 USB to USB and 1 DB9 to DB9
SNMP compatibility	Separate purchase ”SNMPWEBSOLO” external ethernet adapter allows UPS to be used as a managed network device from remote network management stations, enabled network workstations and password protected remote web browsers
LINE / BATTERY TRANSFER	
Xfer time from line pwr to batt mode	2-4 milliseconds
Low voltage transfer to battery power	81 V (resets to line power as voltage increases to 85 V)
High voltage transfer to battery power	143 V (resets to line power as voltage decreases to 139 V)
CERTIFICATIONS	
Certifications	UL1778 (USA, Series AGSM700PSR3HG), UL2601-1 (Medical), cUL (Canada), FCC Class A (emissions)
WARRANTY	
Product warranty	2 year product warranty
Optional coverage	3 year, 5 year, next day, and on-site warranty coverage available in many areas — contact Tripp Lite
SPECIAL FEATURES	
Cold start	Yes, inverter can be “cold started” to enable temporary AC output during a power failure
Appearance	Attractive gray tower UPS

Tripp Lite SmartPro UPS System Model SMART1200XLHG

Specification	Value
SYSTEM	
System overview	Medical grade tower UPS system includes built-in isolation transformer with faraday shield, line interactive voltage regulation. AC surge suppression, RS-232 and USB monitoring ports with complete software and cabling, plus hospital-grade plug and outlets. Runtime is expandable via separate purchase BP36V27 external battery packs. UL2601-1 listed as medical electrical equipment with less than 300 microamps combined leakage current for UPS and connected loads.
Voltage compatibility	120 Vac
Frequency compatibility	60 Hz
OUTPUT	
Output voltage amp capacity (VA)	1000
Output watt capacity (watts)	750
Output nominal voltage	120 V
Output voltage regulation	Line Mode: Sine wave line voltage 120 V (-18% / +8%) Battery Mode: PWM sine wave output 120 V ± 5%
Output frequency regulation	Line Mode: Passes line frequency of 60 Hz ± 10% Battery Mode: Inverter output regulated to 60 Hz ± 0.5 Hz
Output quantity / type	4 NEMA 5-15R Hospital-grade output receptacles
Overload protection	Resettable circuit breaker
INPUT	
Maximum input amps / watts	9.2 A / 860 watts
Input connection type	NEMA 5-15P hospital grade
Input cord length	6 feet, 14 gauge
Recommended electrical service	15 A 120 V
BATTERY	
Full load run time	16 minutes (1000 VA)
Half load run time	34 minutes (500 VA)
DC system voltage	36 Vdc
Typical battery lifespan	3-6 years, depending on usage
Battery recharge rate	2-4 hours to 90%
Expandable battery run time	Supports extended run time with optional BP36V27 external battery pack (multi-pack compatible)
VOLTAGE REGULATION	
Voltage regulation description	Line interactive UPS offers 2 boost levels of brownout correction and a single level of overvoltage adjustment to maintain usable, computer-grade output without consuming battery power over an input voltage range of 81 to 143 Vac
Overvoltage correction	Input voltages between 126 and 143 Vac are reduced by 9%
Direct pass through	Input voltages between 105 and 125 Vac are passed through unchanged
Brownout correction	Input voltages between 96 and 106 Vac are boosted by 10%
Severe brownout correction	Input voltages between 81 and 95 Vac are boosted by 21%
LEDS, ALARMS, & SWITCHES	
Front Panel LEDs	Yes, includes 5 front panel indicator LEDs to show battery charge level, AC line voltage levels, automatic voltage regulation status, UPS load level, and replace battery warning
Alarms	3 function audible alarm indicates power failure conditions (4 short beeps every 10 seconds), overload (continuous short beeps), and low battery (continuous tone)

Tripp Lite SmartPro UPS System Model SMART1200XLHG (continued)

Specification	Value
Switches	Yes, includes 2 front panel mounted push-button switches for system enable, self-test, and alarm cancel functions
SURGE / NOISE SUPPRESSION	
AC surge suppression	Conforms to IEEE 587 / ANSI C62.41 specifications
AC suppression response time	Instantaneous
EMI / RFI AC noise suppression	Yes
PHYSICAL	
Shipping weight	51 lbs (21.2 kg)
Unit weight	44.6 lbs (20.2 kg)
Unit dimensions (H x W x D)	12.75 x 7.5 x 9 inches (32.4 x 19.1 x 22.9 centimeters)
Material of construction	PVC
Form factors supported	Tower, wall mountable with optional UPSWM accessory
Cooling method	UPS cooling via rear exit fan
Battery access	Battery access door allows hot swap battery replacement without powering connected equipment off
ENVIRONMENTAL	
Operating temperature	+32 to +104° F (0 to +40° C)
Storage temperature	+5 to +122° F (-15 to +20° C)
Relative humidity	0 to 95%, non-condensing
COMMUNICATIONS	
Network monitoring port	Includes 2 built-in monitoring ports, 1-USB & 1-RS232
Software and cabling included	Power/alert UPS monitoring software is included on CD-ROM for all common network and standalone operating systems. Ships with 2 cables, 1 USB to USB and 1 DB9 to DB9
SNMP compatibility	Separate purchase ”SNMPWEBSOLO” external ethernet adapter allows UPS to be used as a managed network device from remote network management stations, enabled network workstations and password protected remote web browsers
LINE / BATTERY TRANSFER	
Transfer time from line power to battery mode	2-4 milliseconds
Low voltage transfer to battery power	81 V (resets to line power as voltage increases to 85 V)
High voltage transfer to battery power	143 V (resets to line power as voltage decreases to 139 V)
CERTIFICATIONS	
Certifications	UL1778 (USA, Series AGSM1200PSR3HG), UL2601-1 (Medical), cUL (Canada), FCC Class A (emissions)
WARRANTY	
Product warranty	2 year product warranty
Optional coverage	3 year, 5 year, next day, and on-site warranty coverage available in many areas — contact Tripp Lite
SPECIAL FEATURES	
Cold start	Yes, inverter can be “cold started” to enable temporary AC output during a power failure
Appearance	Attractive gray tower UPS
BATTERY PACK ACCESSORY	
Battery pack accessory (optional)	BP36V27 (optional)

ONEAC Battery Backup

Specification	Value
Input Voltage	120 Vac @ 60Hz or 230 Vac @ 50 Hz
Transfer Time (typical/max)	< 2.0 ms / 2.25 ms including decision time
On-Battery Output Voltage	Pseudo sine wave 120 Vac (170 Vpeak) 230 Vac (325 Vpeak)
ONBoost Operation	ONBoost boosts output voltage 19% above input voltage if input is
Maximum Capacity	1850 Volt-amps, 1300 Watts
Surge Voltage Withstand	6 kV/ 20 & 500 Amp, 100 kHz Ringwave
Surge Voltage Let-Through	< 10 V normal (L-N), < 0.5 V common (N-G)
Clamping Response Time	Instantaneous
Batteries	Eight 12 V, 7AH, sealed, maintenance-free lead acid, with 3-6 year typi-
Battery Recharge Time	4 hours to 60% capacity
Output Sockets	8

OPTI UPS Battery Backup

Electrical Specifications			
Product Name	**Frequency (Hz)**	**Rated Voltage**	**Max Output Current**
800 PS	50 / 60	100 /110 / 120	8.0 / 7.3 / 6.7
		220 /230 / 240	3.6 / 3.5 / 3.3
1440PS	50 / 60	100 /110 / 120	12.0
		220 /230 / 240	6.5 / 6.3 / 6.0

Input /Output Voltage		
AC Line Voltage		
Version	**Lower Limit***	**Upper Limit***
1xxV	89 / 91 / 93 / 96	141 / 145 / 148 / 151
2xxV	176 / 181 / 186 / 192	282 / 290 / 296 / 302
* transfer points are user adjustable using software		

Input /Output Frequency	
Input (AC mode)	47 Hz – 53 Hz / 57 Hz – 63 Hz
Output (Inverter mode)	50 Hz / 60 Hz ± 0.1 Hz

Wave Form	
AC Mode	sine wave
Back Up Mode	sine wave

Transfer Time	
Power Failure AC ⇒ Inverter	4 ms (typical)

Spike / Surge Protection			
Version	**Continuous Voltage Vrms**	**Single pulse 8/20µs**	
		Imax	**Joules**
100 / 110 / 120V	175V	6,500A	440
220 / 230 / 240v	385V	6,500A	440

Opti UPS Battery Back (continued)

Data-Line Surge Suppression	
Telephone Line Surge Protection	± 6KV Peak (1.2µS /50 Waveform)
10 Base-T Protection Let Through Rating	(From 6KV / 125A Normal Mode Surge)

Audible Alarm	
Battery discharge at power failure	Beep every 4 seconds
Battery approaches final discharge	Beep every second
Overload	Continuous Buzzer
UPS Faulty	Continuous Buzzer

Battery and Charger

Battery Type: Maintenance-free sealed-lead acid. Recharge time 6 to 8 hours typical from total discharge. The UPS may be used immediately after discharge but will provide shorter backup time.

Battery Specifications		
	800PS	**1440PS**
DC Voltage	24V	24V
Type	12V	12V
Quantity	2	4
Recharge Time	4 Hours (typical)	

Environmental Specifications		
	Operating	**Storage and Shipment**
Temperature	0° ~ 40°C (32° ~ 104°F)	-20° ~ +60°C (-4° ~ +140°F)
Humidity	5 ~ 90% (non-condensing)	5 ~ 90% (non-condensing)
Altitude	3,000 m (10,000 ft) (Max.)	12,000 m (40,000 ft) (Max.)

Power Supplies

Specification	Value
Condor AT 210 Watt	100 –120 / 220 – 240V 4.6 / 2.3A 47 – 63 Hz
RAM AT 210 Watt	Input — 100-240V, 47-63 Hz, 3.75A max Output — +5V, 22A;+12V, 17 A; -12V, 1.2A; -5V, 0.5A
RAM ATX 230 Watt (P3 — P4) 310 Watt	Input — 100-240V, 47-63 Hz, 3.75A max Output — +5V, 22A;+12V, 17 A; -12V, 1.2A; -5V, 0.5A
STD-Generic	Input — 120 VAC 7A 50 / 60 Hz 240 VAC 3.5A 50 / 60Hz Output — +5V @ 23A; +12V @ 9A; -5V @ 0.5A; -12V @ 0.5A
Digital Front End Supply RAM — ML75	Input — 120 VAC, 47-63 Hz, 3.75A max Output — +5V, 22A;+12V, 19 A; -12V, 1.2A; -5V, 0.5A

Wasp Barcode Scanner

Specification	Value
Manufacturer Part Number	Informatics Wasp 633808121013
Scanner Type Scanning Element Light Source Decode Capability Scanning Speed	 Handheld Barcode Scanner Laser 680 nm Code 39, Code 93, Code 128, UCC-128, UPC-A, UPC-E, EAN/JAN-8, EAN/JAN-13, Interleaved 2 of 5, Codabar 42 scans per second
Barcode Max Working Distance	 20 inches
Connectivity	PS/2
System Requirements Type	 PC
Compliant Standards	FCC-A, EN 55022-B, BCIQ, CNS 13438
Power Requirements Voltage	 45 Vdc to 14 Vdc
Operating Conditions Temperature	 32 °F to 122 °F
Dimensions, Unit	4.23” H x 2.76” W x 6.5” D
Weight, Unit	6.0 oz
Warranty	1 year parts and labor

Gryphon Barcode Scanner

Specification	Value
Gryphon D & Gryphon M Models	
Case Material	ABS and Polycarbonate, plus co-moulded rubber
Enhanced Features	Puzzle Solver^{TM}, data editing and data concatenation
Drop Resistance	IEC 68-2-32 Test ED; withstands repeated drops from 1.8 m onto a concrete surface
Environmental Protection	IP30
Storage Temperature	-20 to 70 °C (-4 to 158 °F) without batteries
Humidity	90% non condensing
Max. Resolution	0.076 mm (3 mils)
Print Contrast Ratio (min.)	15%
Sensor	CCD Solid State (3648 pixels)
Max. Scan Rate	270 Scans/sec
Barcodes	2/5 family, Code 39 (plus Code 32, Cip 39), EAN/UPC, ISBN/ISSN, EAN 128, Code 128, ISBT 128, Code 93, Code 11, CODABAR, TELEPEN, PLESSEY, Code MSI, Code Delta IBM, CODABLOCK (D100/D110/D200/M100/M200 only), Code 16, Code 49, PDF417 (D200/D220/M200 only), RSS variants (D120/D220 only)
Programming Method	Manual: Reading special barcodes Automatic: (with RS232): S/W commands through the serial port Sm@rtSet: Windows configuration program
Reading Angle	Skew ±80°; Pitch 65°; Tilt ±35° (EAN13, M=0.8, PCS=0.9)

Gryphon Barcode Scanner (continued)

Specification	Value
Reading Indicators	Good Read LED, "green spot" on the code, adjustable tone "beeper"
Gryphon D Models	
Weight	180 g
Warranty Period	5 years
Operating Temperature	0 to 55 °C (32 to 131 °F)
Power Supply	5 Vdc ±5%
Consumption	250 mA operating, 330 mA max
Gryphon M Models	
Effective Radiated Power	<10 mW Europe <1 mW USA
Bit Rate	19,200 Baud Europe 36,800 Baud USA
Radio Range	30 m Open Air Europe 15 m Open Air USA
Weight	280 g with batteries
Max. Number Coexisting Systems	2048
Recharge Time	3 hours max
Battery Type	2 AA NiMh batteries
Operating Autonomy	25,000 reads - NiMh
Radio Frequency	433.92 MHz Europe 910 MHz USA
Operating Temperature	0 to 40 °C (32 to 104 °F)
Warranty Period	2 years
OM Gryphon Models	
Weight	250 g
Multi-Point Configuration	Up to 16 readers connected to the same cradle
Max Number Coexisting Systems	2048
Warranty Period	2 years
Case Material	ABS
Dimensions	208 x 107 x 55.5 mm
Effective Radiated Power	<10 mW Europe <1 mW USA
Reading Indicators	Battery charging (red); Charge completed (green); Power/Data (yellow)
Power Consumption	8 W max (charging)
Power Supply	9 to 28 Vdc
Bit Rate	19,200 Baud Europe 36,800 Baud USA
Radio Frequency	433.92 MHz Europe 910 MHz USA
Recharge Time	3 hours max

HP Laser Jet 4250

Specification	Value
Speed/Monthly Volume	
Print Speed, Black (best quality mode)	Up to 45 ppm
First Page Out, Black	Less than 8 seconds
Processor Speed	460 MHz
Recommended Monthly Volume, max	200,000 pages
Print Quality/Technology	
Print Technology	Laser EP
Print Quality, Black	Up to 1200 x 1200 dpi
Resolution Technology	HP ProRes 1200, HP FastRes 1200, Resolution Enhancement technology (REt)
Paper Handling/Media	
Paper Trays, Std	2
Paper Trays, max	5
Input Capacity, std	Up to 600 sheets
Input Capacity, max	Up to 3100 sheets
Standard Envelope Capacity	Up to 10 Envelopes
Envelope Feeder	Yes, 75
Output Capacity, std	Up to 300 (250 face down, 50 face up) sheets
Output Capacity, max	Up to 800 sheets
Duplex Printing (printing on both sides of paper)	Optional (with the purchase of an automatic duplex unit)
Paper Handling, Input, standard	100-sheet multipurpose Tray 1, 500-sheet input Tray 2
Paper Handling, Input, optional	500-sheet input tray, 1500-sheet input tray (up to 3 additional trays for up to 3100-sheet input capacity), two-sided printing accessory, 75-envelope feeder
Paper Handling, Output, standard	50-sheet rear output bin, 250-sheet top output bin
Paper Handling, Output, optional	500-sheet stacker or 15-sheet stapler/500-sheet stacker
Media Sizes, standard	Letter, Legal, Executive, Statement, 8.5 x 13 inch, envelopes (number 10 Monarch)
Media Sizes, custom	Multipurpose Tray 1: 3 x 5 to 8.5 x 14 inch; Trays 2 and 3: 5.8 x 8.3 to 8.5 x 14 inch
Media Weight, recommended	Multipurpose Tray 1: 16 to 53 lb; Trays 2 and 3, optional 1500-sheet HCI tray, two-sided printing accessory: 16 to 32 lb; optional envelope feeder: 20 to 28 lb
Media Types	Paper (plain, preprinted, letterhead, prepunched, bond, recycled, color, rough), transparencies, labels, envelopes, cardstock, user-defined
Memory/Print Languages	
Memory, std	48 MB
Memory, max	512 MB
Memory Slots	Two 100-pin DDR DIMM slots, two open industry-standard CompactFlash slots
Hard Disk	Optional, 20 GB HP High-performance EIO hard disk
Print Languages, std	HP PCL 6, HP PCL 5e, HP Postscript Level 3 emulation, direct PDF (v 1.3) printing (with at least 128 MB printer memory)

HP Laser Jet 4250 (continued)

Specification	Value
Connectivity	
Connectivity,. standard	Hi-Speed USB 2.0 port, IEEE 1284-B compliant parallel port, 2 open EIO slots
Connectivity, optional	HP Jetdirect EIO internal print servers, HP Jetdirect external print servers, HP wireless print servers, HP Jetdirect EIO connectivity card for USB/Serial/LocalTalk, Bluetooth wireless
Print Drivers, standard	HP PCL 6, HP PCL 5e, HP PostScript Level 3 emulation, HP-GL/2
Dimensions/Weight/Warranty	
Dimensions (W x D x H)	16.5 x 17.8 x 14.8 inches
Weight, U.S.	45 lb
Warranty, standard	One-year, return to HP authorized service center warranty
Power	
Power Supply Device	Power supply internal
Operational Power Consumption	680 W
Operational Power Consumption (standby)	25 W
Environmental Parameters	
Minimum Operating Temperature	50 °F
Maximum Operating Temperature	89.6 °F
Operating Humidity Range	20 - 80%
Conforms to the following Product Specifications	
Safety	IEC 60950:1999 / EN60950: 2000 IEC 60825-1:1993 + A1 + A2 / EN 60825-1:1994 + A11 + A2 (class 1 Laser/LED Product) GB4943-2001
EMC	CISPR 22:1997 / EN 55022:1998 Class B[1] EN 61000-3-2:1995 + A14 EN 61000-3-3:1995 + A1 EN 55024:1998 FCC Title 47 CFR, Part 15 Class B[2] / ICES-003, Issue 4 GB9254-1998, GB17625.1-1998
Safety Statements	
Laser Safety Statement	The Center for Devices and Radiological Health (CDRH) of the U.S. Food and Drug Administration has implemented regulations for laser products manufactured since August 1, 1976. Compliance is mandatory for products marketed in the United States. The printer is certified as a “Class 1” laser product under the U.S. Department of Health and Human Services (DHHS) Radiation Performance Standard according to the Radiation Control for Health and Safety Act of 1968. Since radiation emitted inside the printer is completely confined within protective housings and external covers, the laser beam cannot escape during any phase of normal user operation.

HP Laser Jet 4250 (continued)

Specification	Value
What's In The Box	
What's in the box	HP LaserJet 4250 Printer, right-angle power cord, control panel overlay, print cartridge, software and documentation on CD-ROM, Getting Started Guide, support flyer
Software included	Print drivers and installation software on CD-ROM (HP PCL 6, HP PCL 5e, PS, PPDs, HP LaserJet Utility, HP LaserJet Toolbox, Macintosh software)

Physical Specifications

Specification	Value
Host, Nurse's Station, Review Station, File Server, MFI	
Height x Width x Depth	17" x 7.25" x 18"
Weight	25 lbs
Digital Patient Care Monitor (PCM)	
Height x Width x Depth	13.5" x 7.75" x 20.5"
Weight	34 lbs
Digital Front End Signal Acquisition Unit	
Height	15" with base, 11" without base
Width	10" with base, 8" without base
Depth	22"
Weight	25 lbs
First Generation Front End Signal Acquisition Unit	
Height x Width x Depth	13.5" x 7" x 18.5"
Weight	25 lbs
15" Monitor E55	
Height x Width x Depth	14.4" x 14.5" x 15.5"
Weight	32 lbs
17" Monitor P75F+	
Height x Width x Depth	15.8" x 16.1" x 16.6"
Weight	45 lbs
17" Flat Panel	
Height x Width x Depth	17.5" x 17.5" x 8"
Weight	20.9 lbs
20"/21" Monitor P220F	
Height x Width x Depth	19.8" x 20" x 19.7"
Weight	78.1 lbs
ONEAC Battery Backup/Line Cond	
Height x Width x Depth	12" x 8.3" x 20.3"
Weight	119 lbs
Opti UPS Battery Backup/Line Cond	
Height 800W / 1440W	7.9" / 8.3"
Width 800W / 1440W	5.4" / 7.3"
Depth 800W / 1440W	16.8" / 17.7"
Weight 800W / 1440W	31.5 lbs / 53 lbs
Tripp Lite Smart700HG	
Height x Width x Depth	12.75" x 7.5" x 9"
Weight	44.6 lbs

Physical Specifications (continued)

Specification	Value
Informatics Wasp Barcode Scanner	
Height x Width x Depth	14.23” H x 2.76” W x 6.5” D
Weight	6.0 oz

General Safety Specifications

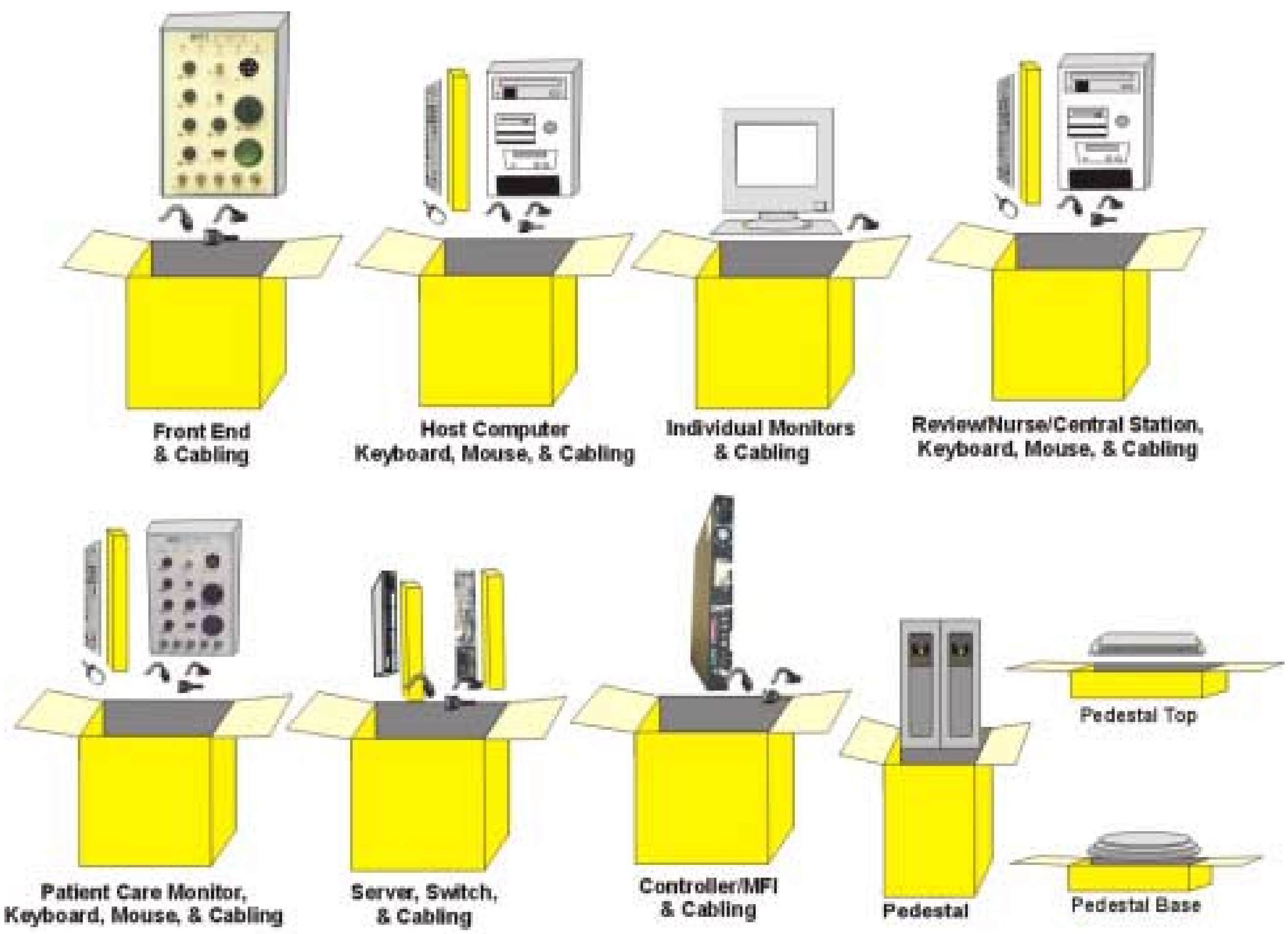
Specification	Type
Protection against electrical shock	Class I
Protection against electrical shock	(CF) Applied Parts
Protection against ingress of water	IPXO
Mode of operation	Continuous
Packing requirements	
Classifications from Clause 5	

Chapter 2:

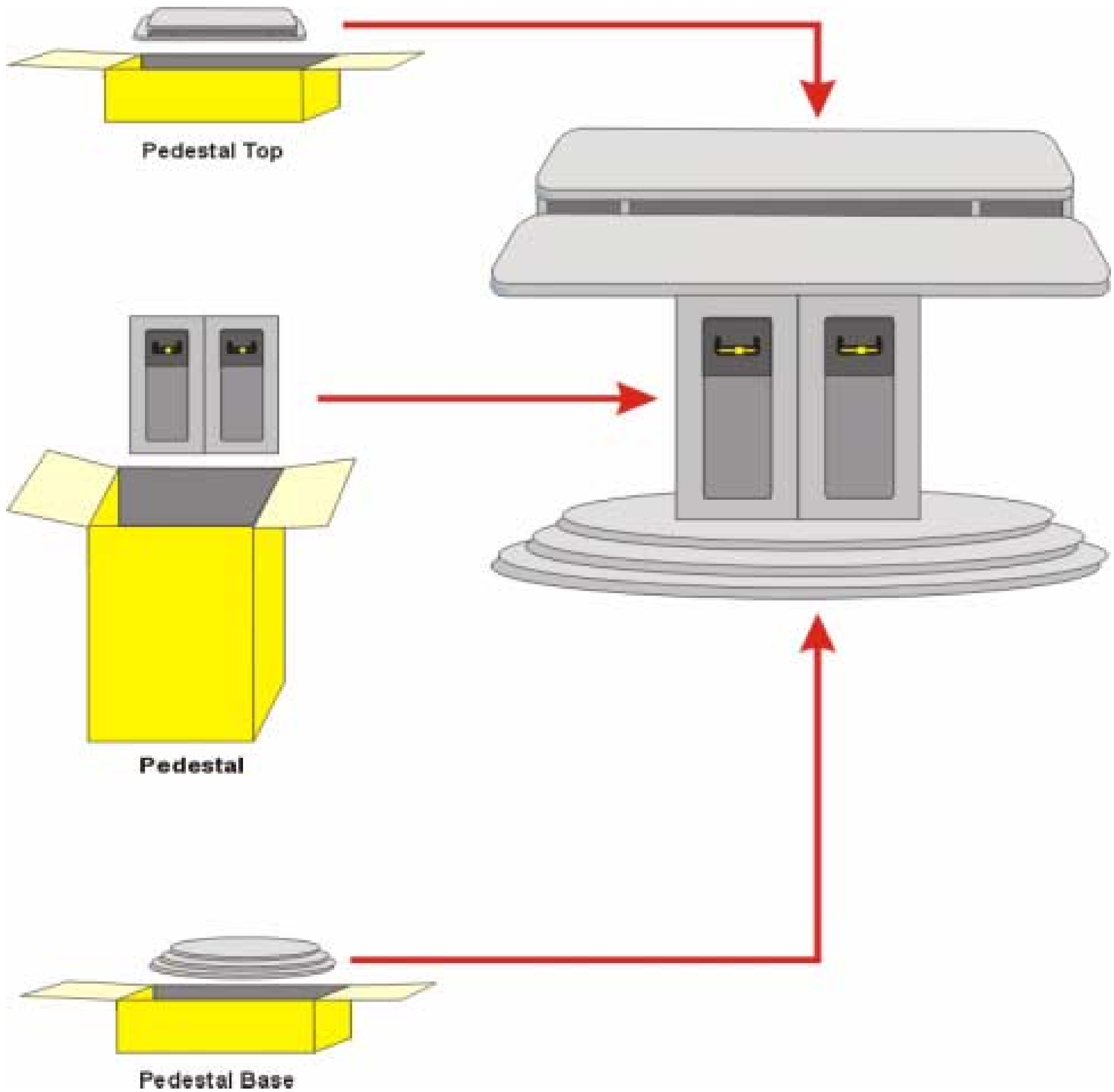
Installation

Unpacking the Units

We've packed the CALYSTO Series IV units with enough padding to prevent damage in all but the most extreme situations. Computers and monitors are shipped in boxes with special foam inserts. Cabling, keyboards, and mice are packed inside the computer box. Monitor cabling is bundled inside the monitor box. The printer stand, the front end stand, and the line conditioner(s) are boxed in a wooden crate with the pedestal desk.



The pedestal arrives in three cartons—one for the top, one for the base, and one for the main pedestal. Open the three cartons and remove the units. Assemble the top, base, and pedestal with the screws provided.



Installation Cabling

Normally there's a shipment that arrives earlier than the CALYSTO System IV shipment. This contains the cabling necessary to connect the system through any walls and floors required by the design. The hospital or clinic is responsible for installing these cables, and they should be in place when the CALYSTO Series IV units arrive.

Taking Inventory

Each shipping container contains a packing list, showing each item contained in the box. Compare the list to the item(s) in the box. If any items are missing or damaged contact Witt customer service at 1-800-669-1328.

Electrical Safety Test — Thorough electrical safety testing has been done on each device at the factory prior to shipment. Electrical safety tests must be performed on the complete configuration with all peripherals attached.

Staging the Equipment

As you remove the units from their shipping containers, place them in the approximate location where they will be installed.

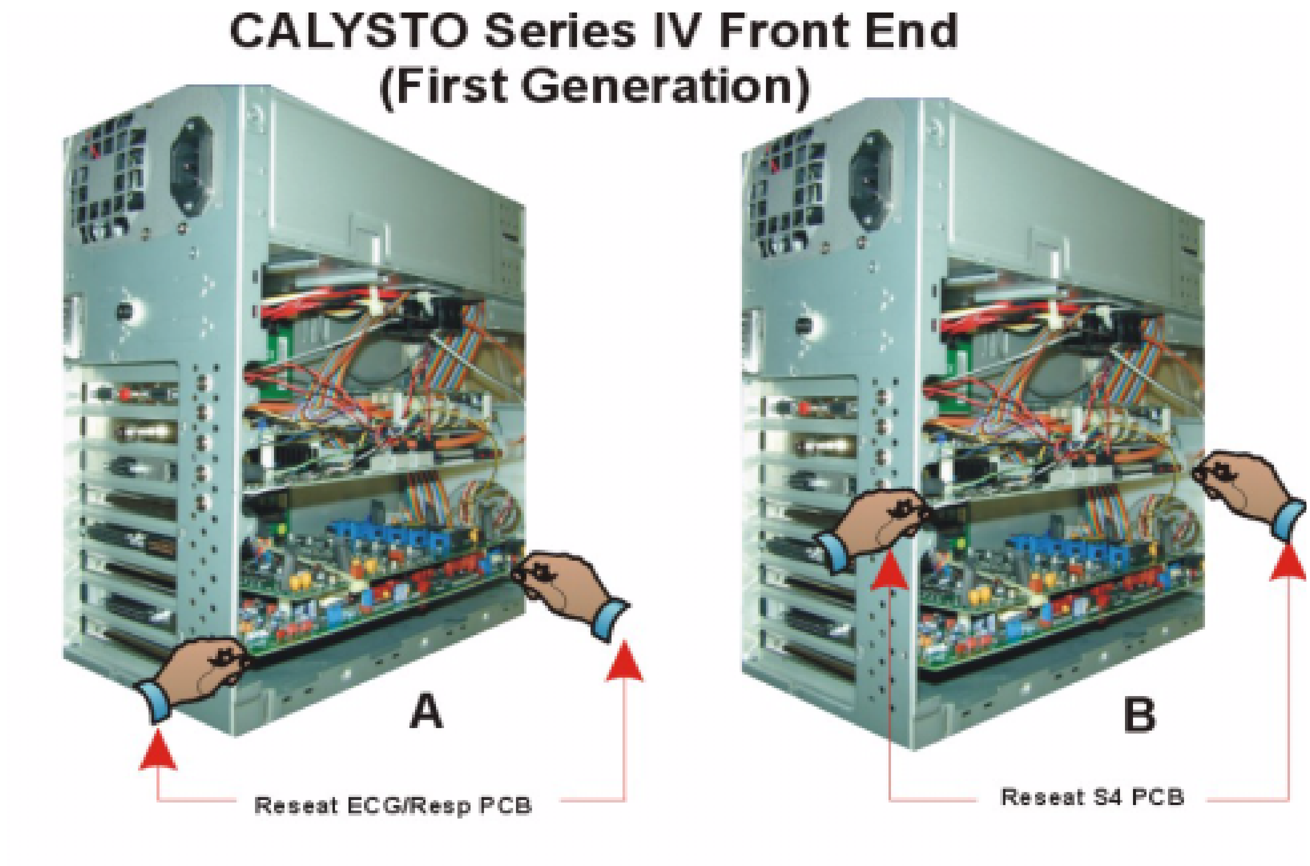
Setting up the System

Once all the units have been unpacked, inventoried, and staged, compile your installation paperwork. This would consist of the engineering drawings, the site plan, and the pre-installation checklist. Set up the units in their exact locations, using the pre-installation checklist and the site plan as a guide.

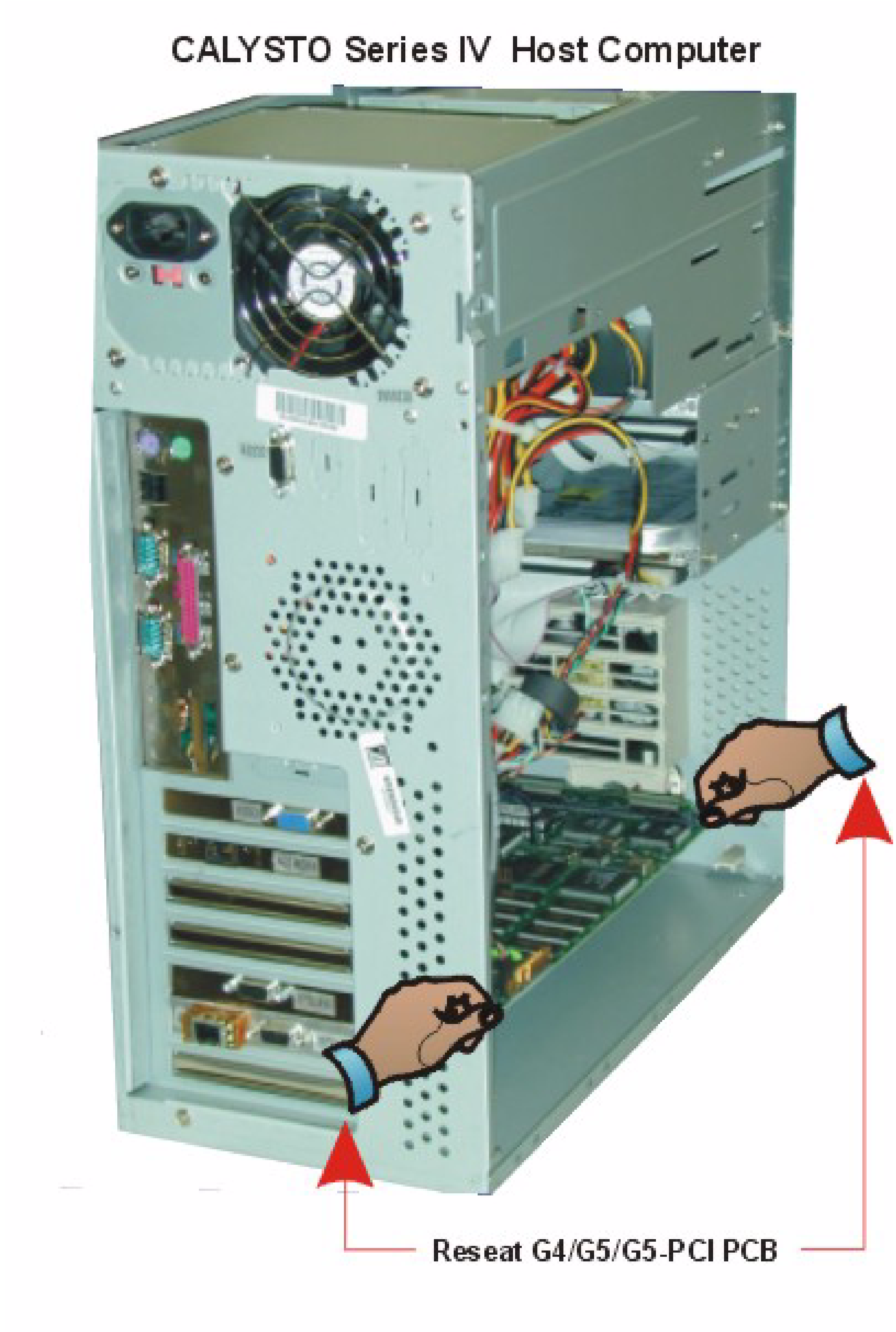
Reseating the Boards

Sometimes the larger PCBs (S4/S5, G4/G5, and 12-lead ECG) become dislodged from their sockets during shipment. Once the units are in place, open the Front End and Host computers by removing the tower cover, and ensure the boards are properly seated as shown in the following illustrations. Tip: when holding the board by its edges as shown, if you can rock the board from side to side it's dislodged.

PCBs are sensitive to damage by electrostatic discharge (ESD). Use a wriststrap or touch ground before making contact with a board. Handle the board only by its edges and push it gently when reseating it in its socket.

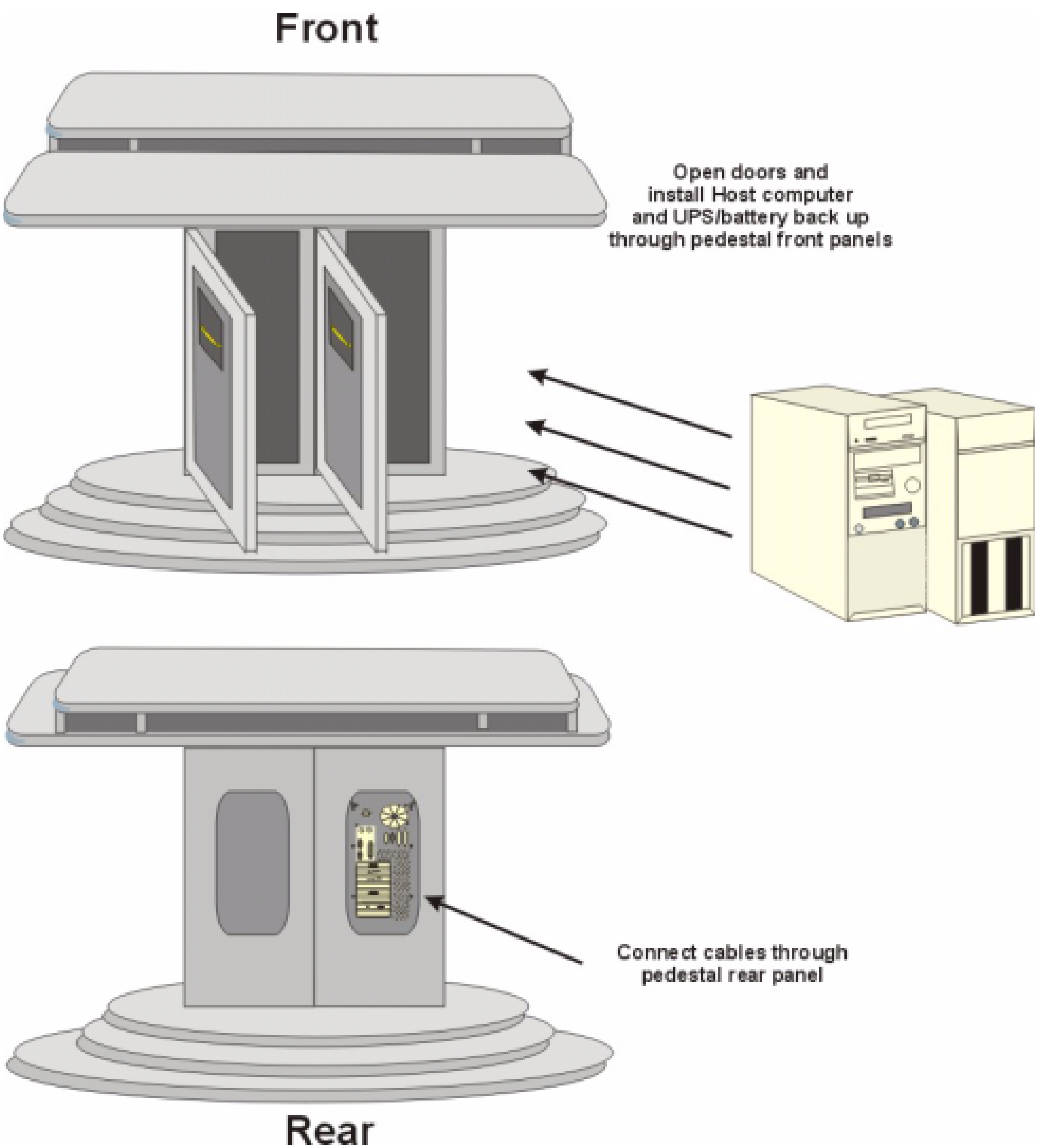

CALYSTO Series IV Front End
(First Generation)
A
B
Reseat ECG/Resp PCB
Reseat S4 PCB


CALYSTO Series IV Digital Front End
A
B
Reseat 12-Lead DSP PCB
Reseat S5 PCB


CALYSTO Series IV Host Computer
Reseat G4/G5/G5-PCI PCB

Installing the Host Computer in the Pedestal

The front of the pedestal has two access doors. Insert the host computer and the UPS/battery backup through these doors. Connect all cabling through the rear of the pedestal as shown below.



Setting up the Equipment Rack

When customers purchase peripheral devices such as switches, servers and tape drives, they may also order an equipment rack to hold the devices. In these cases the equipment rack is populated with the peripheral devices at the factory and is shipped intact. Customers merely have to unpack the equipment rack, and cable the peripheral devices as described in the following section.

Server Rack, populated

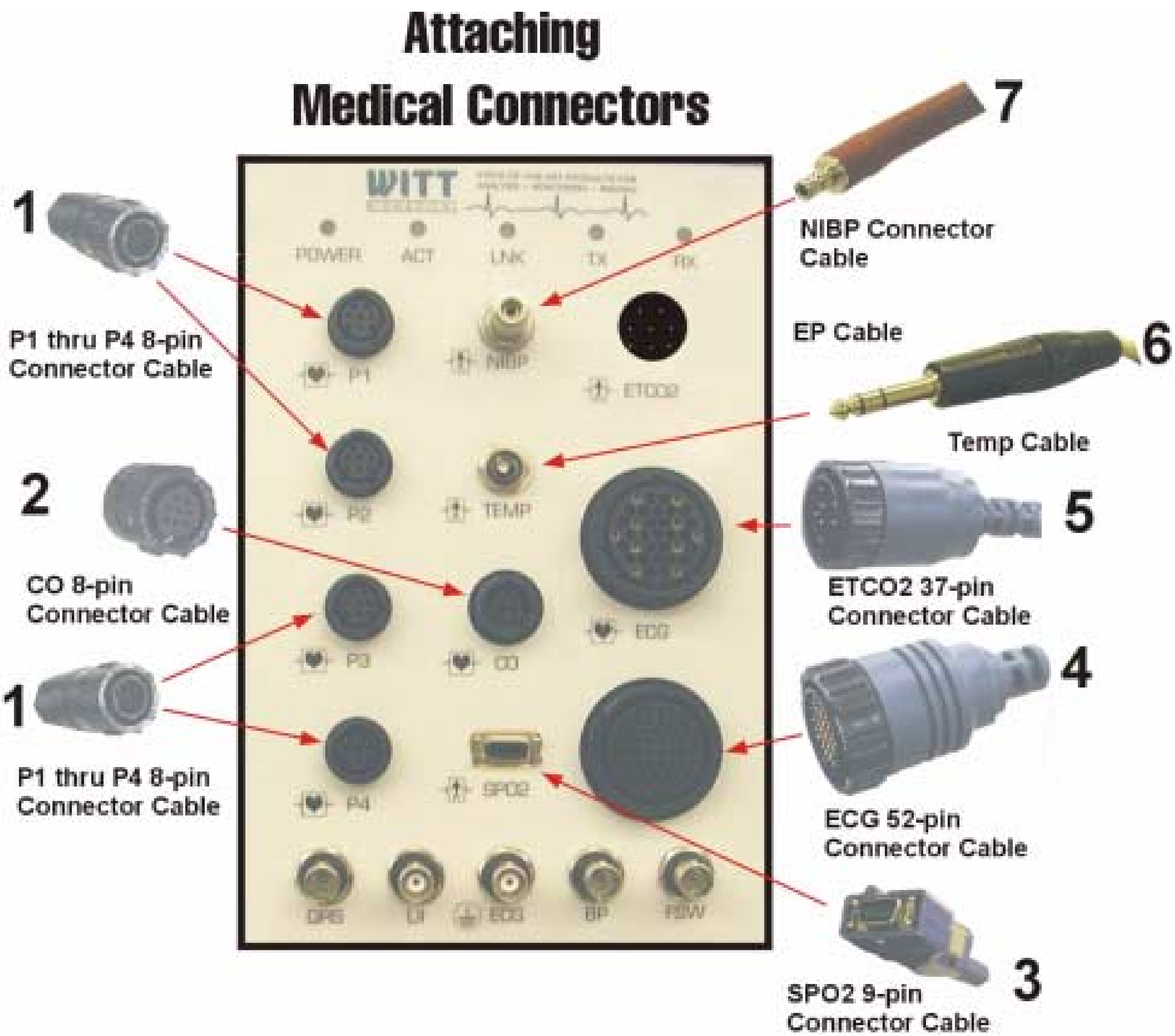
Cabling the Units

At this point, all installation cables—those required to be run between rooms and terminated in wall outlet boxes—should be installed. This task is the customer's responsibility.

Attaching Medical Connectors

Use the accompanying illustration to attach the respective medical connector in the following steps.

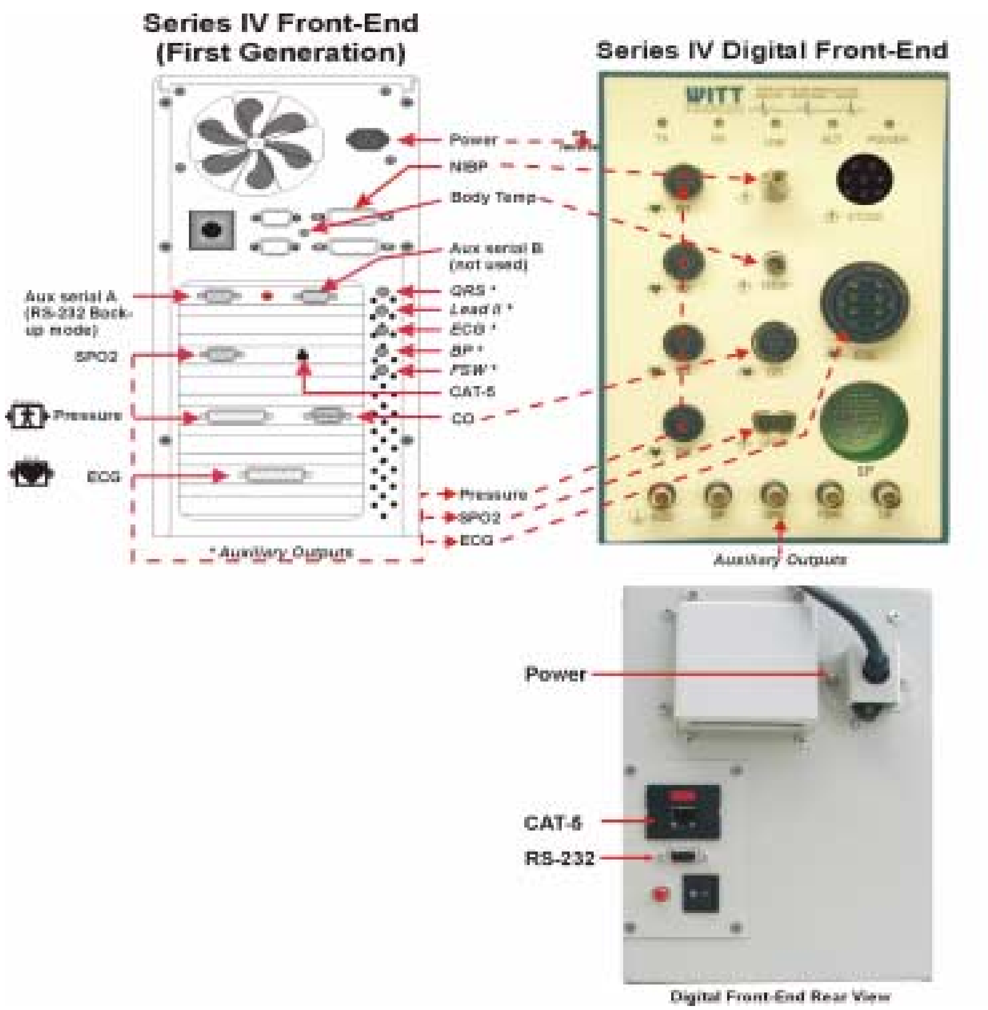
1. Attach the P1 thru P4 connectors by orienting the pin sets and pushing them firmly into place, then twisting the connector clockwise to lock the connection.
2. Attach the 8-pin CO (cardiac output) connector by orienting the pin sets and pushing them firmly into place, then twisting the connector clockwise to lock the connection.
3. Attach the 9-pin SPO2 connector by orienting the pin sets and pushing them firmly into place.
4. Attach the 52-pin ECG connector by orienting the pin sets and pushing them firmly into place, then twisting the connector clockwise to lock the connection.



Cabling the Front End

All cables are to be pinned out by the service department in accordance with Appendix B.

Each of the Front End cables, with the exception of the power cable, is marked with a connector name. Attach each cable to its respective connector using the cable markings and the following illustration as a guide. After connecting the power cable to the Power connector, connect its other end to the Line Conditioner/Battery Backup. Connect the CAT-5 connector to the rear of Front End as labeled. Connect RS232 to marked connector DB9. No cables are provided for auxiliary outputs.



Cabling the Host Computer

The installation cabling for the Host computer should already be in place, terminating in a junction box where the computer will be located. Installation cabling consists of four standard equipment cables and one optional cable. These cables are:

- Network cable, (Ethernet category 5).
- RS232 Signal cable with DB-9 connector (Ethernet category 5).
- Primary Signal cable with RJ-45 connector (Ethernet category 5).

- Video cable with 15-pin connector (comprehensive video shielded RGBVGA) for the 21" Slave Monitor in the procedure room.
- Video Capture cable, optional, (RG59).

All cables are to be pinned out by the service department in accordance with Appendix B.

Attach the Host cables as follows:

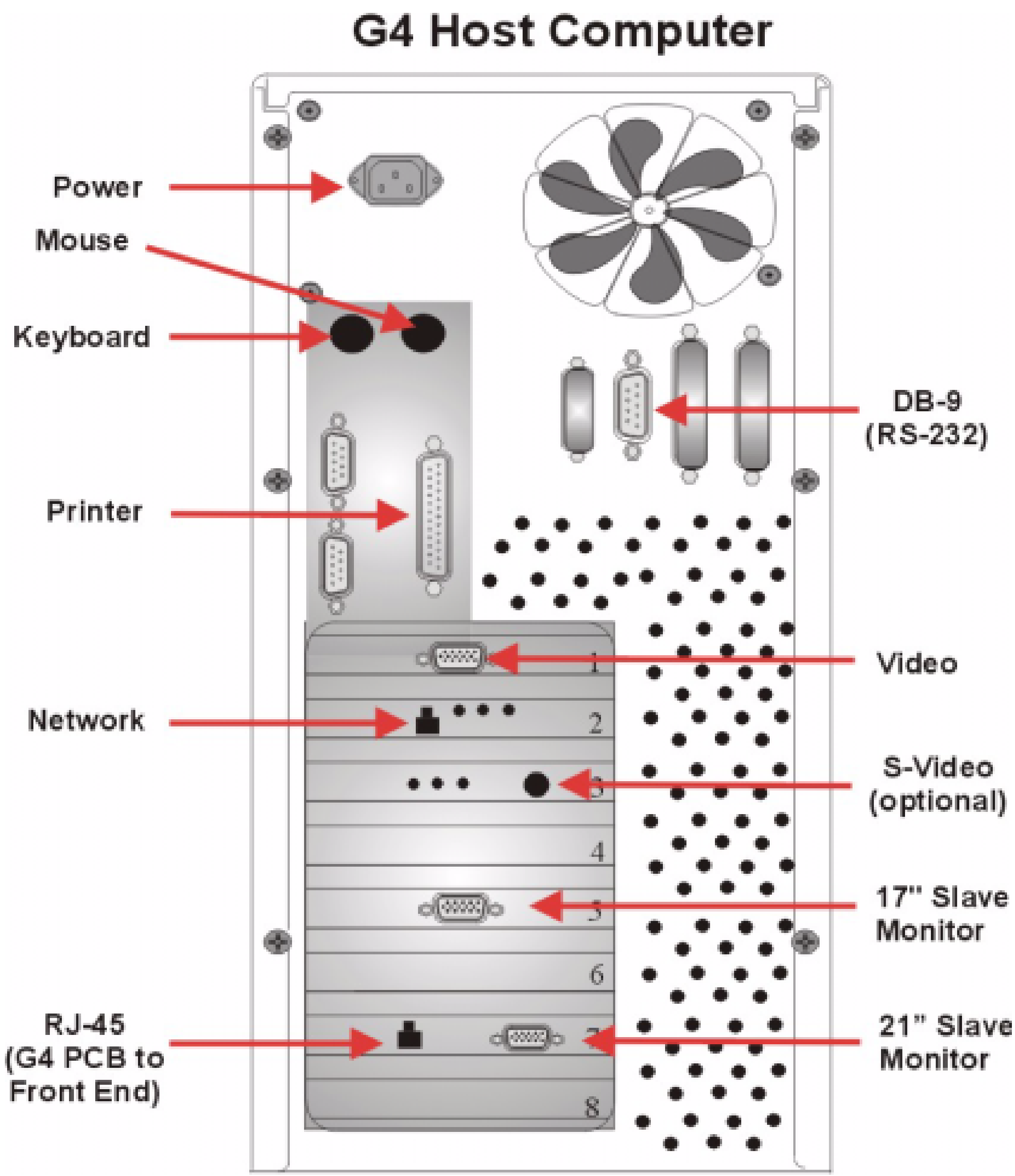
- Connect the mouse, keyboard, and hospital grade power cables to the Mouse, Keyboard, and Power connectors. Connect the other end of the hospital grade power cable to the Battery Backup/ Line Conditioner.
- Connect printer data cable (in the printer box) to the Printer connector.

To avoid a quick and total power drain of the ONEAC, the printer power cable should not be plugged into the Battery Backup/Line Conditioner. It must be plugged into a wall outlet on a separate circuit.

- Connect one 17" monitor cable (in the monitor box) to Video connector.
- Connect second 17" monitor cable to the 17" Slave Monitor connector.
- Connect the monitor power cables to the Battery Backup/Line Conditioner.
- Connect the network cable from the wall patch unit to the Network connector on the back of the Host CPU.
- Connect the Primary Signal (RJ45) connector cable between the G4/G5 Board and the S4/S5 Board in the Front End.

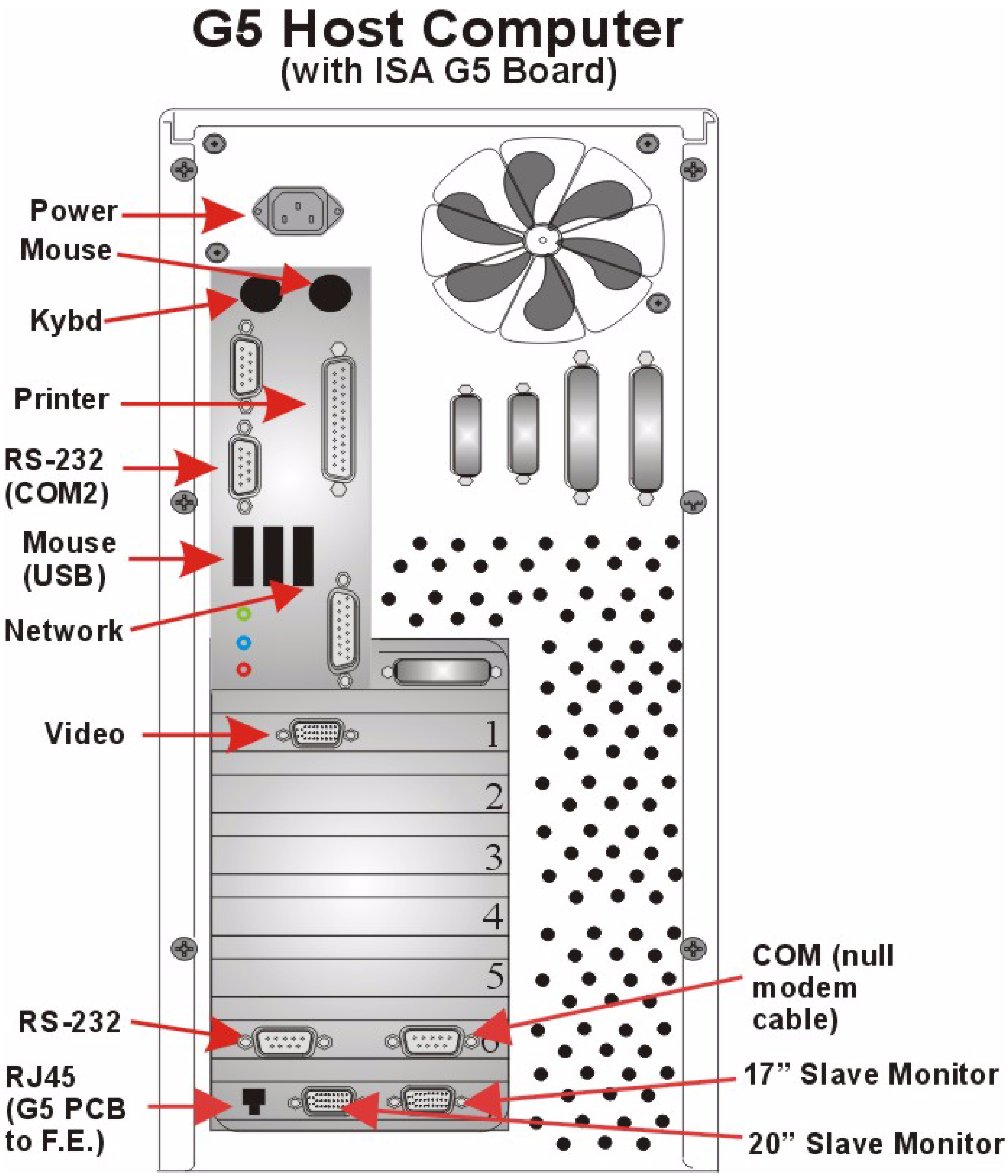
The primary signal RJ45 connector and network connectors look the same. Be sure that you are connecting the proper cables.

- Connect the RS-232 Signal connector cable between the Host and the Front-End Serial A RS-232 connector.
- Connect the 15-pin video connector cable between the 22" Slave Monitor connector on the back of the Host CPU and the boom mounted Slave Monitor.
- If you have the Video Capture option, connect one end of the S-Video cable (provided in the box with the Host) to the S-Video connector. Connect the yellow BNC at the other end to the x-ray output cable in the junction box.

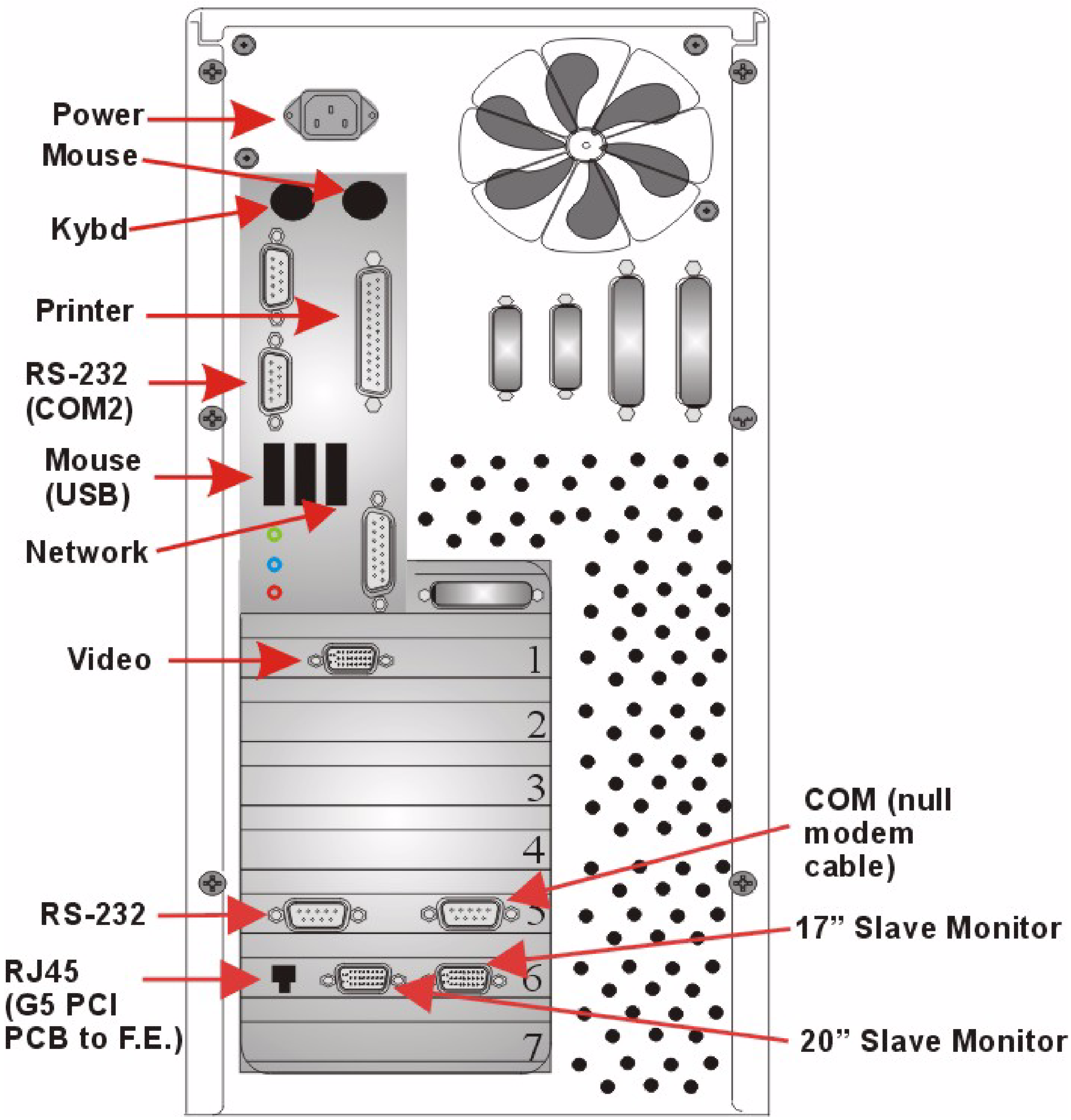


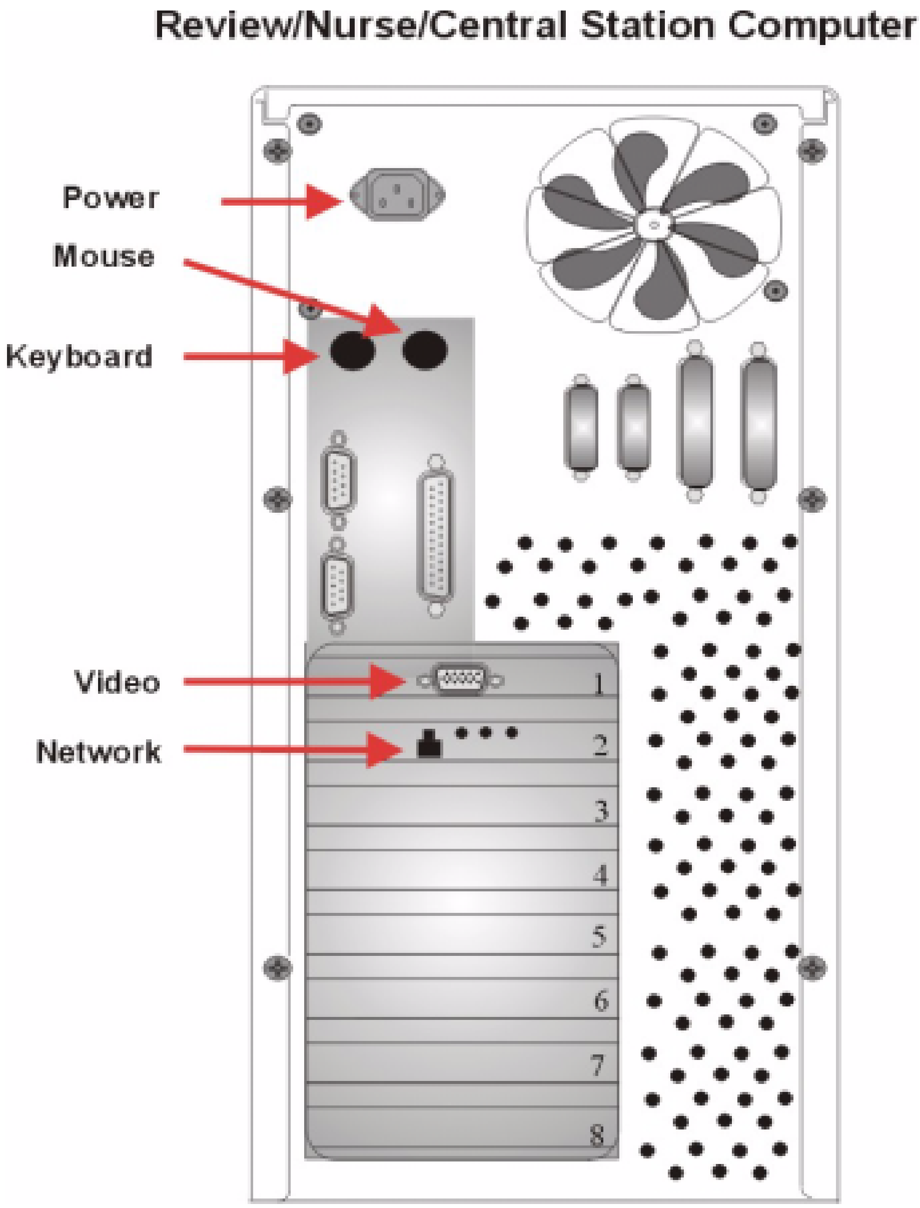
Cabling the Review, Nurse's, and Central Station Computers

- Connect the mouse and the keyboard cables to the Mouse and Keyboard connectors.
- Connect the monitor cable (in the monitor box) to the Video connector.
- Connect the network cable from the wall patch unit to the CPU Network connector.
- Connect one end of the hospital grade power cable to the Power connector. Connect the other end to a Battery Backup/Line Conditioner (optional) or wall outlet.

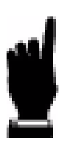

G5 Host Computer
(with ISA G5 Board)
Power
Mouse
Kybd
Printer
RS-232
(COM2)
Mouse
(USB)
Network
Video
1
2
3
4
5
RS-232
RJ45
(G5 PCB
to F.E.)
COM (null
modem
cable)
17" Slave Monitor
20" Slave Monitor

G5 Host Computer
(with PCI G5 Board)





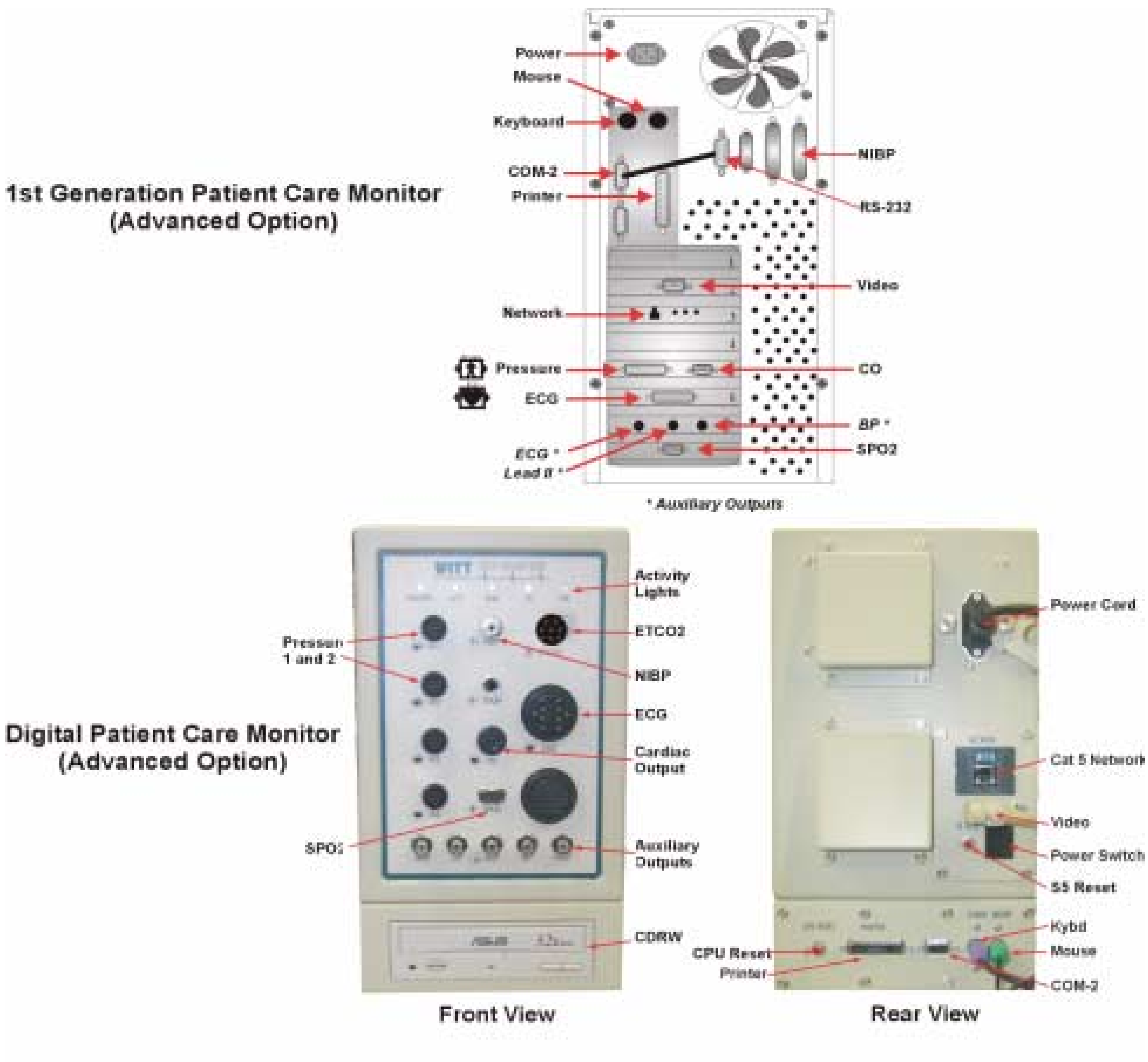
Cabling the Patient Care Monitor Computer



This describes the Patient Care Monitor advanced option. The basic option does not have Pressure or CO connectors.

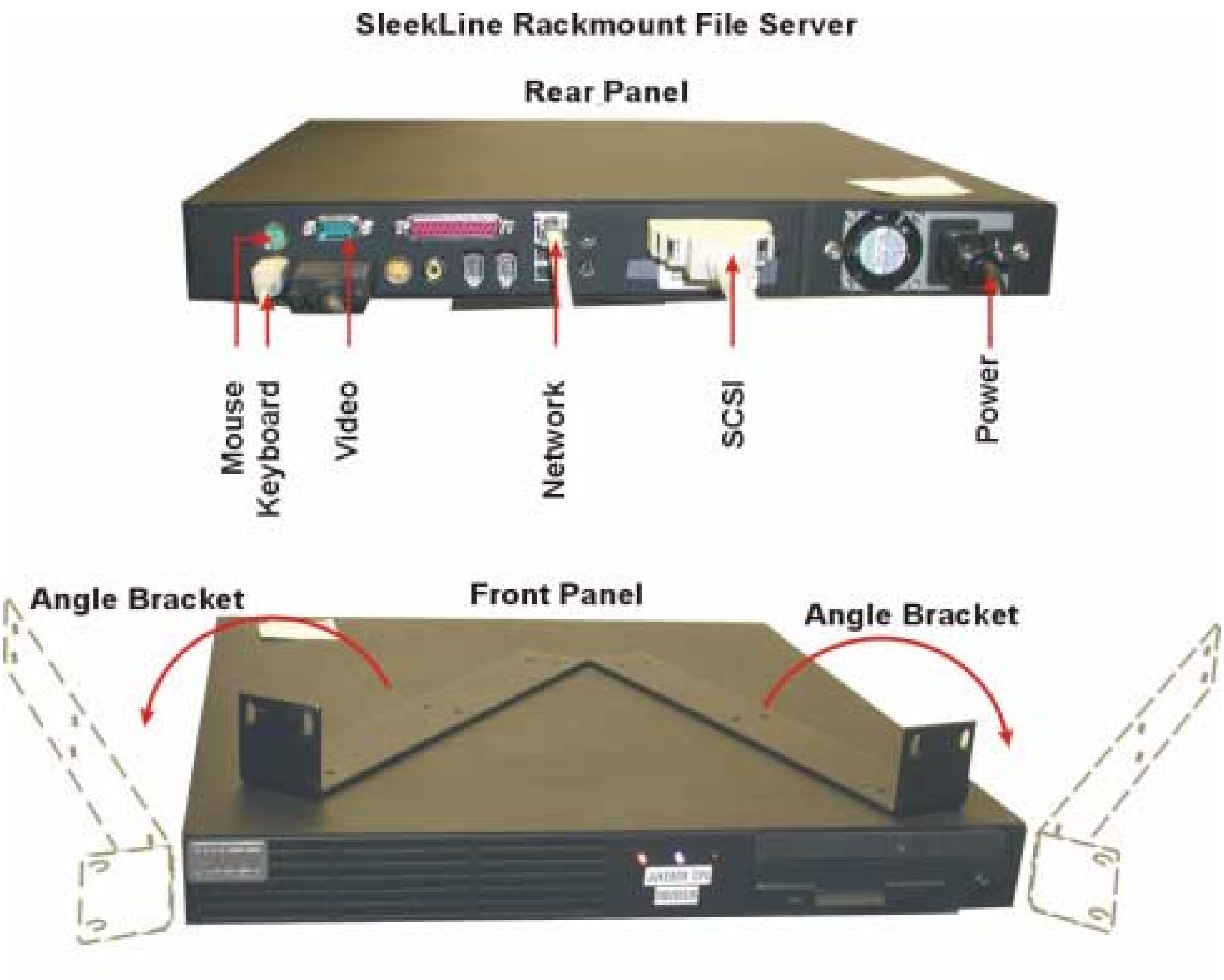
- Connect the mouse and keyboard cables to the Mouse and Keyboard connectors.
- Connect the monitor cable (in the monitor box) to the Video connector.
- Connect network cable from the wall patch unit to the Network connector on the back of the CPU.
- Connect the cable labeled NIBP to the NIBP connector.
- Connect the cables labeled Pressure to the Pressure 1 and 2 connector.

- Connect the cable labeled ECG to the ECG connector.
- Connect the cable labeled CO to the Cardiac Output connector.
- Connect one end of the hospital grade power cable to the Power connector. Connect the other end to a Battery Backup/Line Conditioner (optional) or wall outlet.
- No cables are provided for auxiliary outputs.



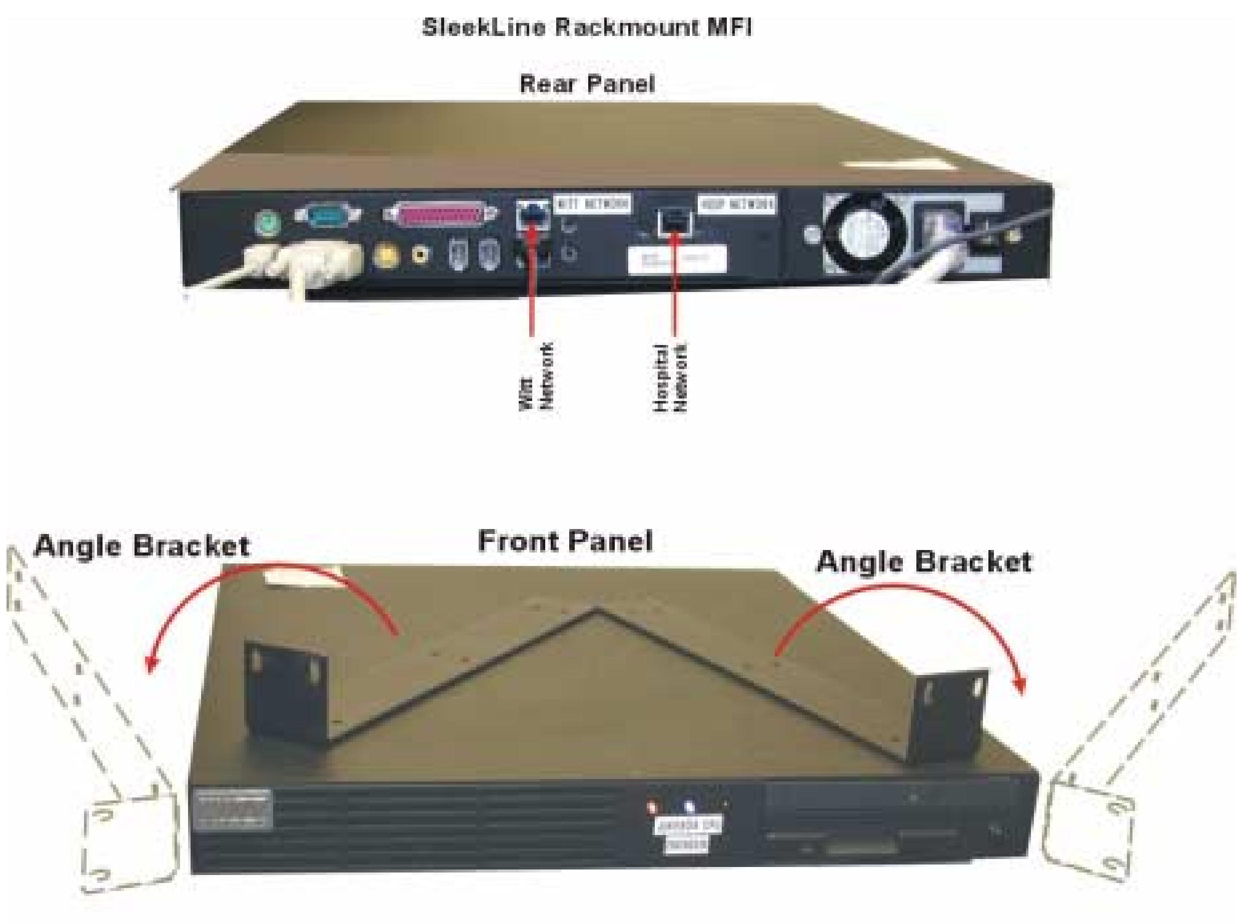
Cabling the File Server Computer

- Connect the mouse and the keyboard cables to the Mouse and Keyboard connectors.
- Connect the monitor cable (in the monitor box) to the Video connector.
- Connect the network cable from the wall patch unit to the Network connector on the back of the CPU.
- Connect one end of the hospital grade power cable to the Power connector. Connect the other end to the Battery Backup/Line Conditioner.
- Do not connect any external devices to the SCSI connector on the File Servers.



Cabling the Main Frame Interface (MFI) Computer

- Connect the mouse and the keyboard cables to the Mouse and Keyboard connectors.
- Connect the monitor cable (in the monitor box) to the Video connector.
- Connect the network cable from the wall patch unit to the Network connector on the back of the CPU.
- Connect the hospital cable from the wall patch unit to the Hospital Network connector on the back of the CPU.
- Connect one end of the hospital grade power cable to the Power connector. Connect the other end to a Battery Backup/Line Conditioner (optional) or wall outlet.



Chapter 3:

System Checkout

System Checkout

System checkout consists of powering up all system devices, launching the software, and using cath lab simulators to mimic patient input. System checkout will verify that all of the system's features and options are performing as they should be.

Powering Up Hardware Devices

- Turn on all Battery Backup/Line Conditioners
- Turn on the Ethernet Hub
- Turn on the File Server and its display monitor
- Turn on all Front Ends
- Turn on all Host Computers and their display monitors
- Turn on all Nurse Station Computers and their display monitors
- Turn on all Review Station Computers and their display monitors
- Turn on all Patient Care Monitors and their display monitors
- Turn on all Central Station Computers and their display monitors
- Turn on the Mainframe Interface Computer and its display monitor
- Turn on all Laser Printers

Booting the System

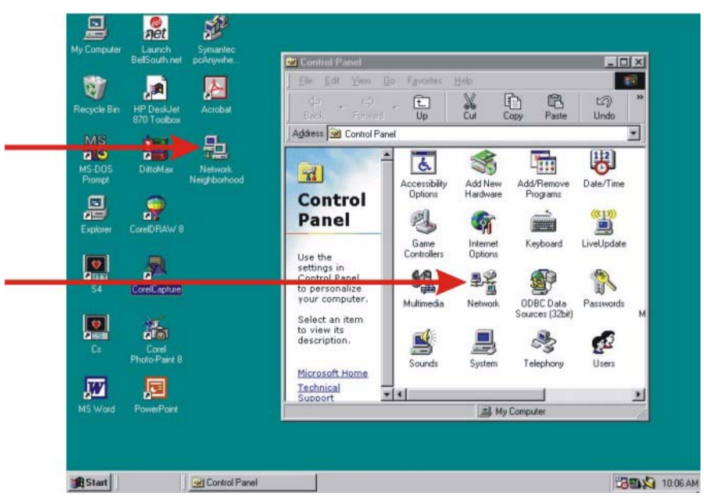
Once power is applied, observe the boot-up process.

1. Each computer will go through its basic startup.
2. On Host computers, the G4/G5 PCB loads the Host Interface Program (HIP), which interfaces with the system bus. The G4/G5 PCB also generates an overlay waveform screen on both the 17″ and 22″ slave monitors. With no ECG input to the Front End you'll have flat waveforms.
3. Windows operating system will launch and the desktop will display.
4. PC Anywhere will launch and will minimize in the desktop taskbar.
5. The system will automatically log onto the server.
6. The CALYSTO Series IV application will launch and display the CALYSTO Series IV Main screen. The system is now ready for the first command.

Checking the TCP/IP and Network Data

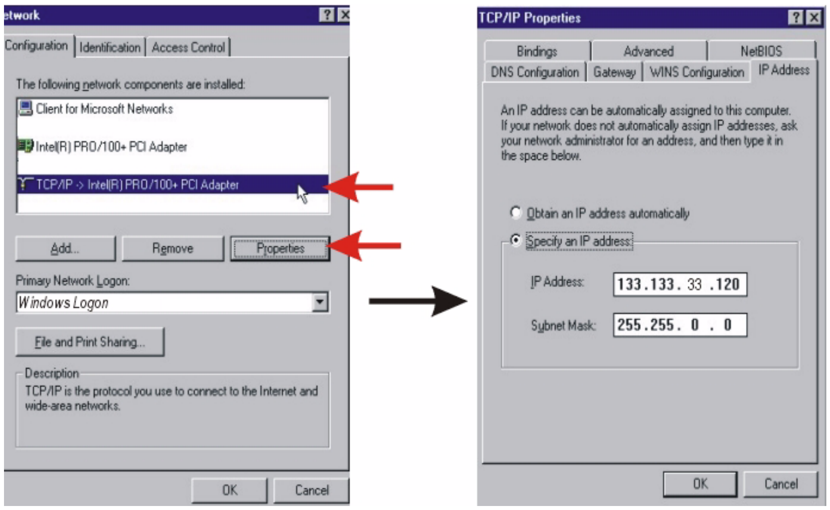
While you're at the desktop, ensure that the TCP/IP address, Subnet Mask, and network configuration are correct.

1. Open the Network properties window by right-clicking Network Neighborhood (or My Network Places for Windows 2000). Then right-click Local Area Connection and choose properties.



2. Under the Configuration tab, select TCP/IP and Properties, then click the tab for IP Address and confirm the address and Subnet Mask numbers. If the system is connected directly to the backbone of the hospital's server you'll have to check with your IS department for the correct numbers.

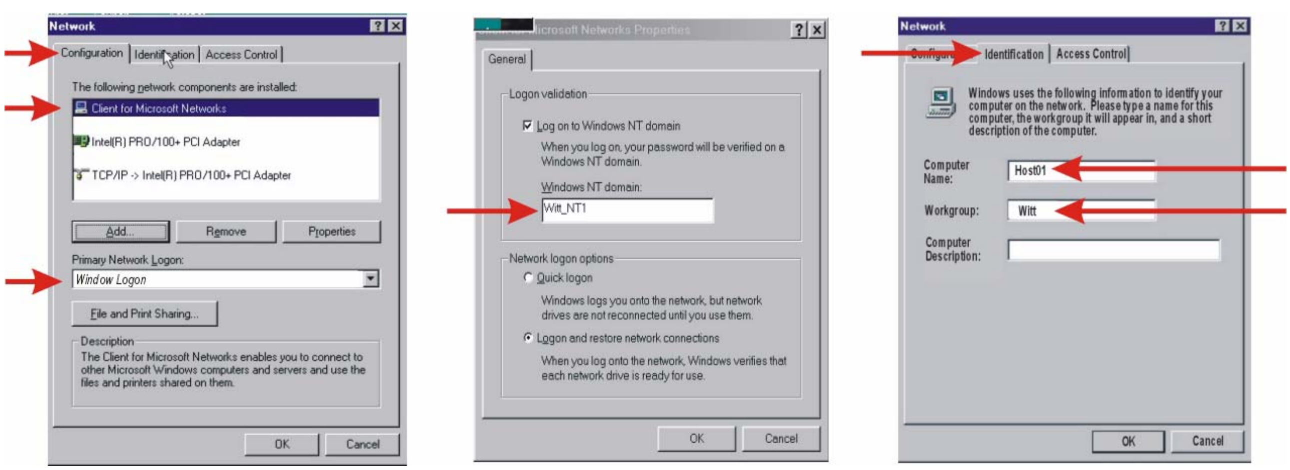
For a stand-alone Witt network, the correct TCP/IP and Subnet Mask numbers are shown below. The fourth number in the IP address represents the station you are using. If the numbers are correct, click Cancel. If not, enter the correct numbers and click OK.



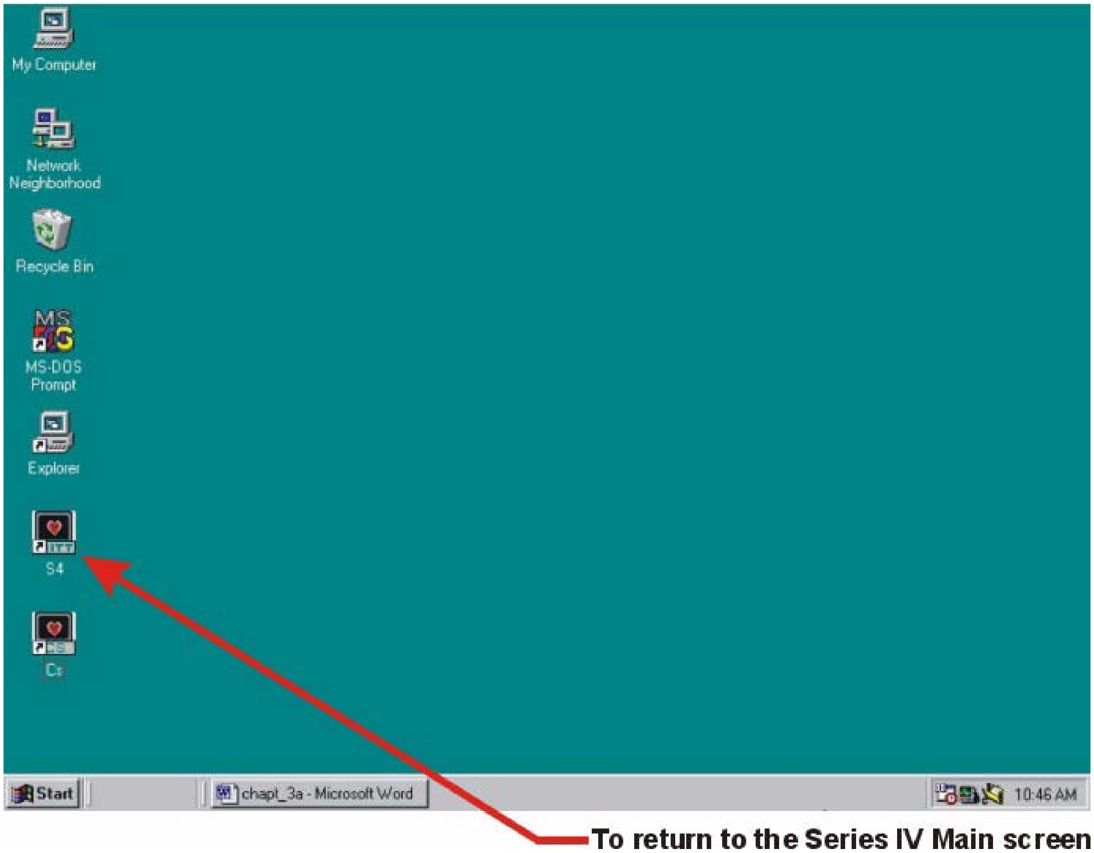
Witt Standard IP Scheme

133.133.33.1 – 10	Host
133.133.33.11 – 29	PCM
133.133.33.30 – 31	File Server
133.133.33.32 – 60	S4 Review
133.133.33.61 – 70	I4 Recorder
133.133.33.71 – 90	I4 Review
133.133.33.91 –100	Jukebox/CS
133.133.33.101	MFI
133.133.33.102–105	FTP Connect

3. Under the Configuration tab, double-click Client for Microsoft Networks. Confirm that the Domain name is Witt_NT1, as shown below, then click ok. Also select *Windows Logon* as the Primary Network Logon. Click on the Identification tab and verify that the Computer Name matches that of the computer you are using, e.g. Host1, and that the Workgroup is Witt. If the data is correct, click Cancel. If not, enter the correct data and click OK.

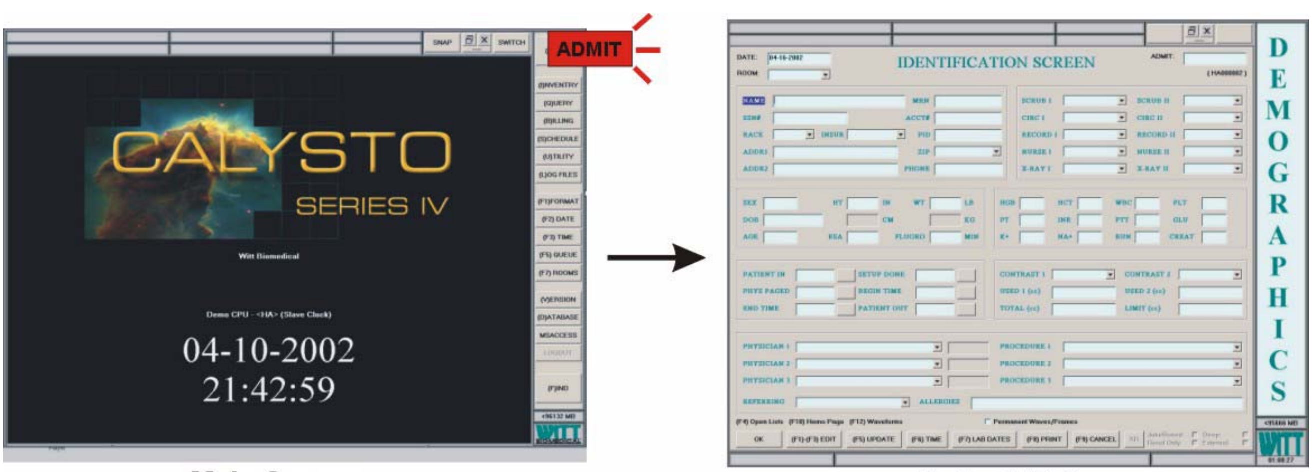


4. Return to the CALYSTO Series IV Main screen by double-clicking the desktop icon.



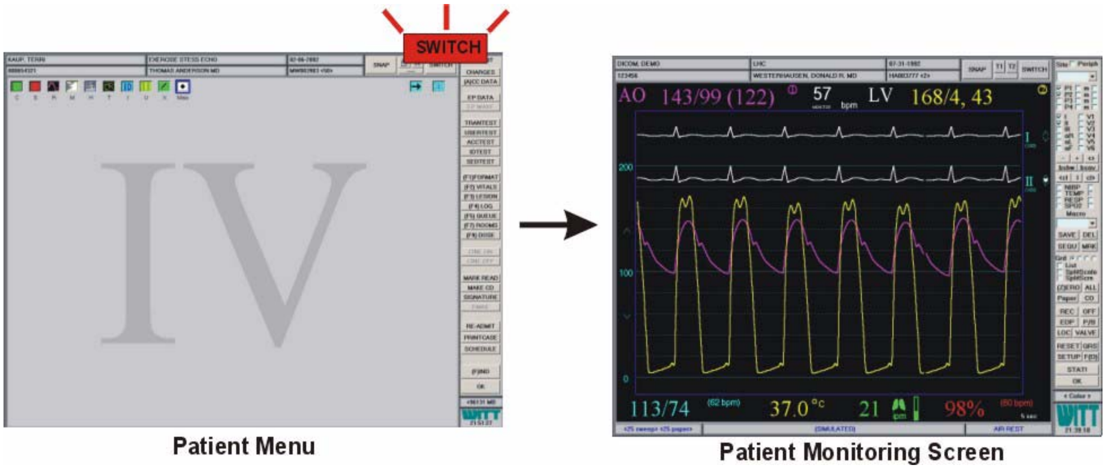
Testing the System with Patient and Cardiac Output Simulators

1. Click the ADMIT button at the top of the Main screen.
2. The system will query, “Are You Sure?” Click OK.
3. The Patient ID screen will open.
4. Enter the patient’s name as “Test, Case.”
5. Click the (ESC) EXIT button at the bottom of the screen to exit the Patient ID screen and enter the Patient Menu screen.



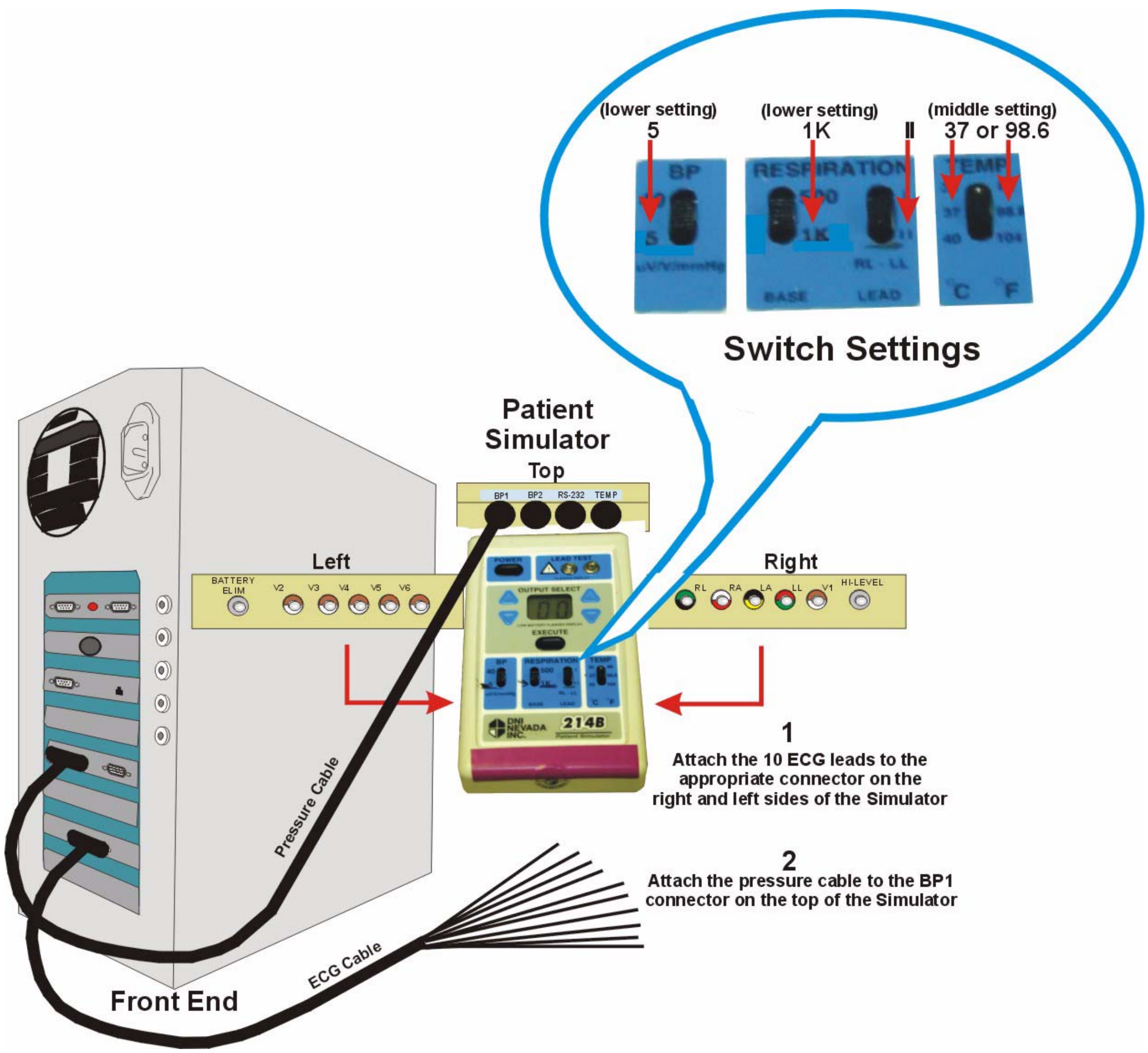
Main Screen Patient ID Screen

6. When the Patient Menu appears, click the SWITCH button to open the Patient Monitoring screen.

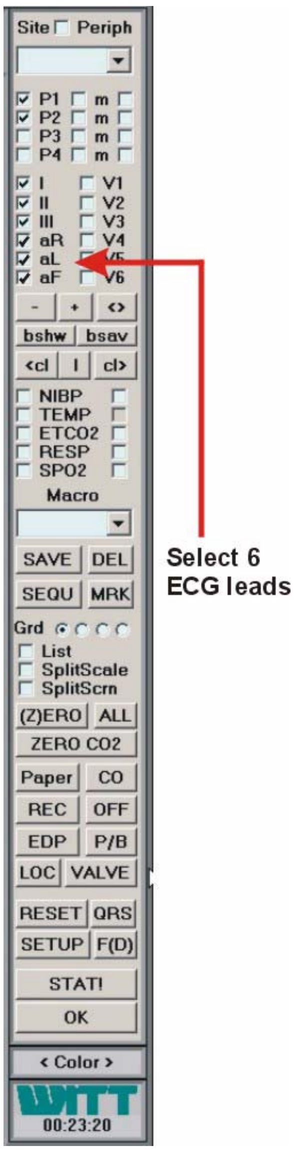


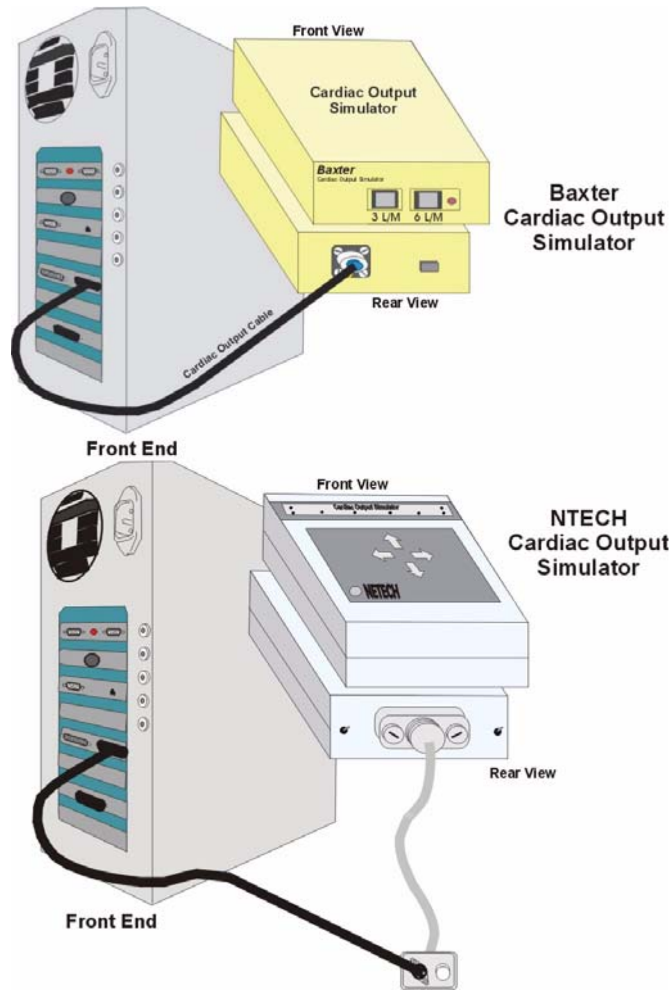
7. Attach the ECG cable from the ECG connector on the Front End, to the appropriate 10 ECG leads on the Patient Simulator. For demonstration purposes, we’re using a DNI Nevada 214B Patient Simulator.

8. Attach the pressure cable from the pressure connector on the Front End to the BP1 connector on the Patient Simulator.

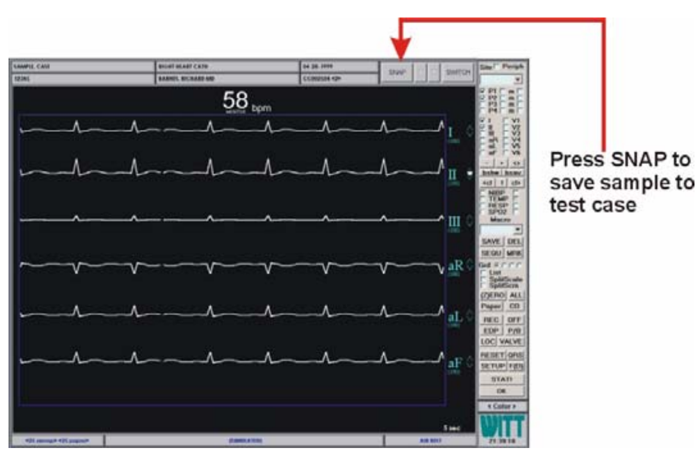


9. Attach the cardiac output probe from the cardiac output connector on the Front End, to the input on the Cardiac Output Simulator. Ensure the Bath Temp probe is disconnected. For demonstration purposes, we're using Baxter and NETECH Cardiac Output simulators. Both are described.

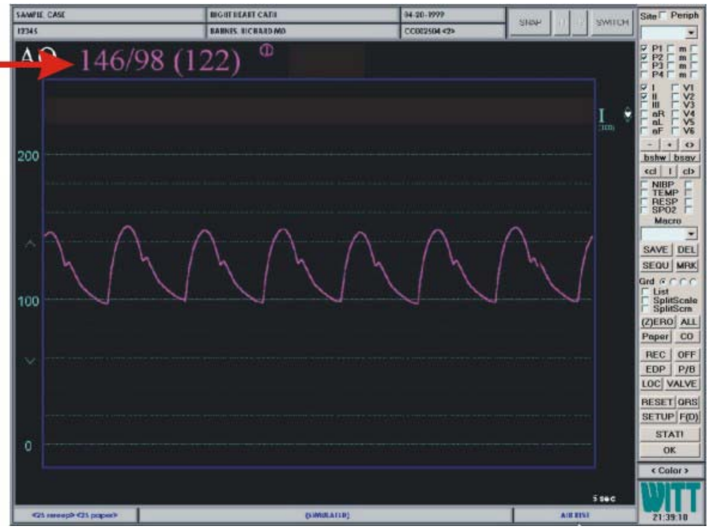




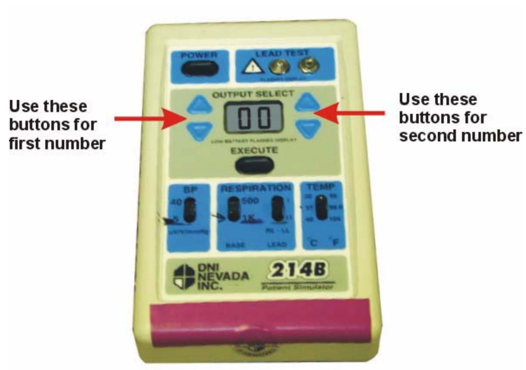
10. Turn on the simulator. It will default to a normal sinus rhythm ECG output that will be displayed on the Patient Monitoring screen. Let the output stabilize, then select 6 leads of ECG on the command bar and press the SNAP function button. This will record the screen to the test case.



11. Turn on pressure channel 1 on the Patient Monitoring screen. It should go from a NODUCER reading to some number.

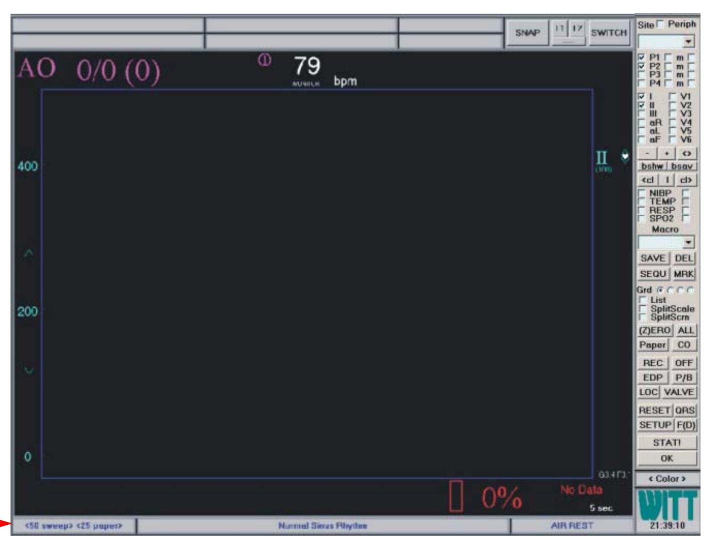


12. At the simulator, set the Output Select to a zero level.



13. At the Patient Monitoring screen, with channel 1 selected, press the ZERO button on the command bar. This will give us a zero reference.

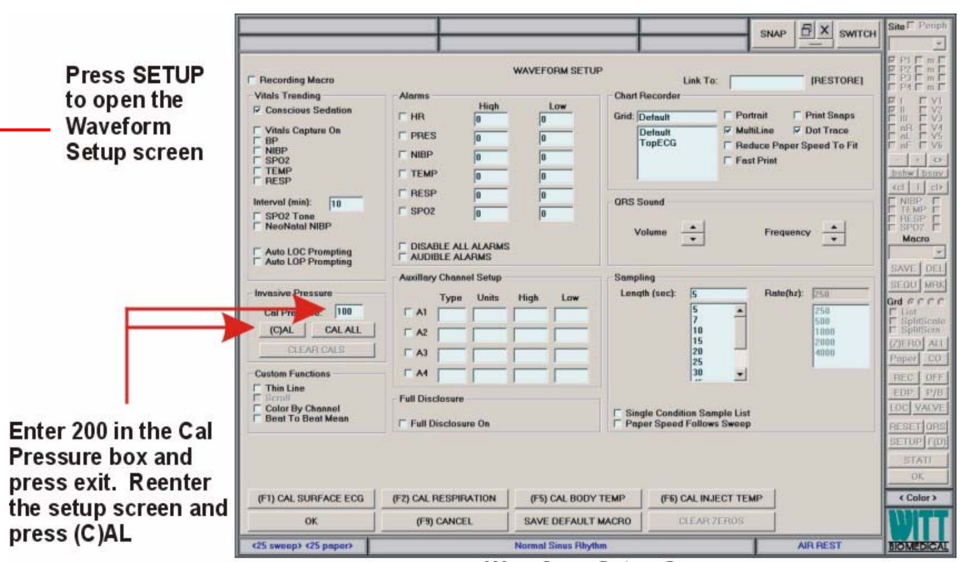
Press ZERO function button for zero reference



14. Once the zero reference is established, go back to the simulator and enter a static pressure of 200 mmHg. Do this by entering the code 15 in the Output Select window.

15. Check the pressure on the Patient Monitoring screen. The allowable tolerance is ±2 mmHg, so if our pressure is outside 198 mmHg to 202 mmHg, it will be necessary to calibrate.

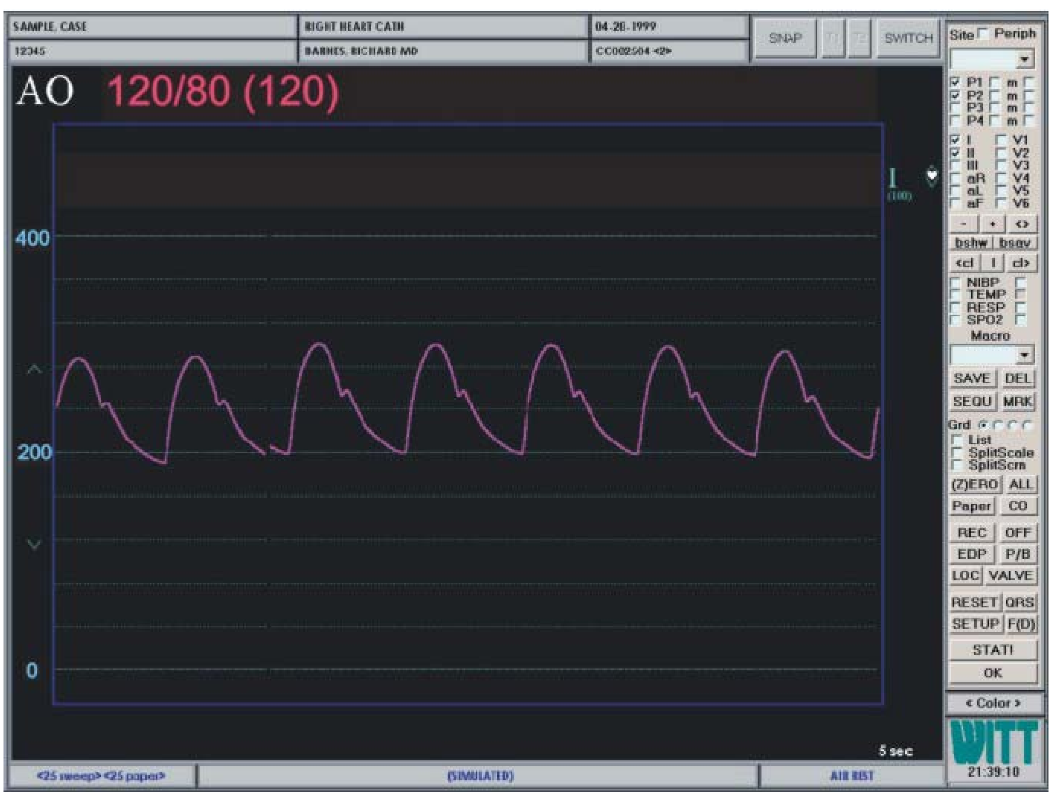
16. To calibrate, press the [SETUP] button on the command bar. This brings up the Waveform Setup screen. In the screen's Calibration section, type in 200 in the [Cal Pressure] box and then click exit to save the setting. Reenter the Waveform Setup screen and press the [(C)AL] button. This will calibrate the CALYSTO Series IV to the 200 mmHg given to us by the simulator. Press [EXIT] to return to the Monitoring screen.



Waveform Setup Screen

17. The static line should now be right at 200 and the numbers representing the waveform should be 200 over 200, with a mean of 200 ±2 mmHg as shown below.

18. Set the simulator for a normal AO pressure output. Do this by entering the code 00 in the Output Select window. We should now be getting a 120/80 pressure waveform from the simulator. Let that run for a moment so the computer can analyze it. Then repeat the entire procedure for all four channels.

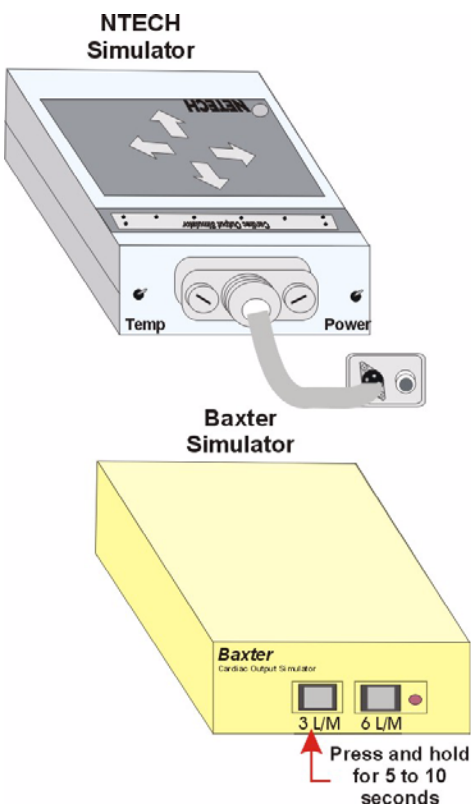


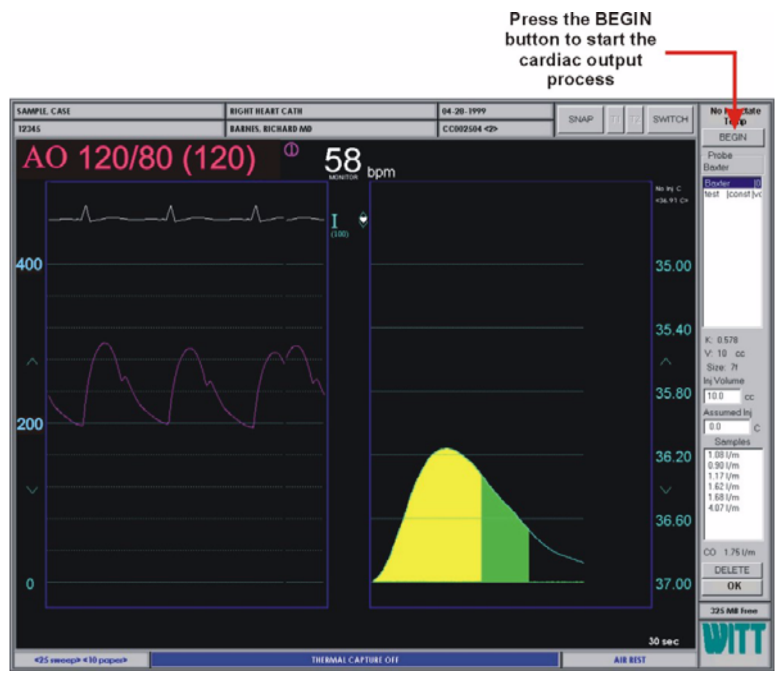
19. After all four pressure channels have been checked it’s time to check cardiac output. Once again, ensure the Bath Temp probe is disconnected from the cardiac output cable. If you disconnect the temperature thermistor from that cable and plug your cardiac output into the probe side you’ll be set up to test cardiac output. Also bear in mind that you’ll have to have an ECG active in channel 1.

20. Press the CO function button on the Patient Monitoring screen to bring up the Cardiac Output screen. In the Probe window, select the “Test” probe and verify that the constant is .470. Set the injectate volume at 10 cc and the temperature at 0. “No Injectate Temp” should appear in the upper right hand corner of the screen. This indicates that the Bath Temp probe has been disconnected.

21. If you're using the NETECH Simulator: Turn on the power and set the temperature toggle switch to 0× C. With the right/left arrows on the simulator's top, choose 3 liters per minute. In the Probe window, select the "NETECH" probe and verify that the constant is .542. Press the BEGIN function button on the Cardiac Output screen to enable thermal capture. Press the up arrow on the simulator to start the cardiac output process. The system will go through its simulation and display 3 liters per minute ± 10 %.

22. If you're using the Baxter Simulator: In the probe window select the "Baxter" probe and verify that the constant is .470. Press and hold the 3 liters per minute (3 L/M) button, and have someone else press the BEGIN function button on the Cardiac Output screen to enable thermal capture. Continue holding the 3 L/M button for 5 to 10 seconds, then release it. The system will go through its simulation and display 3 liters per minute ± 10 %.

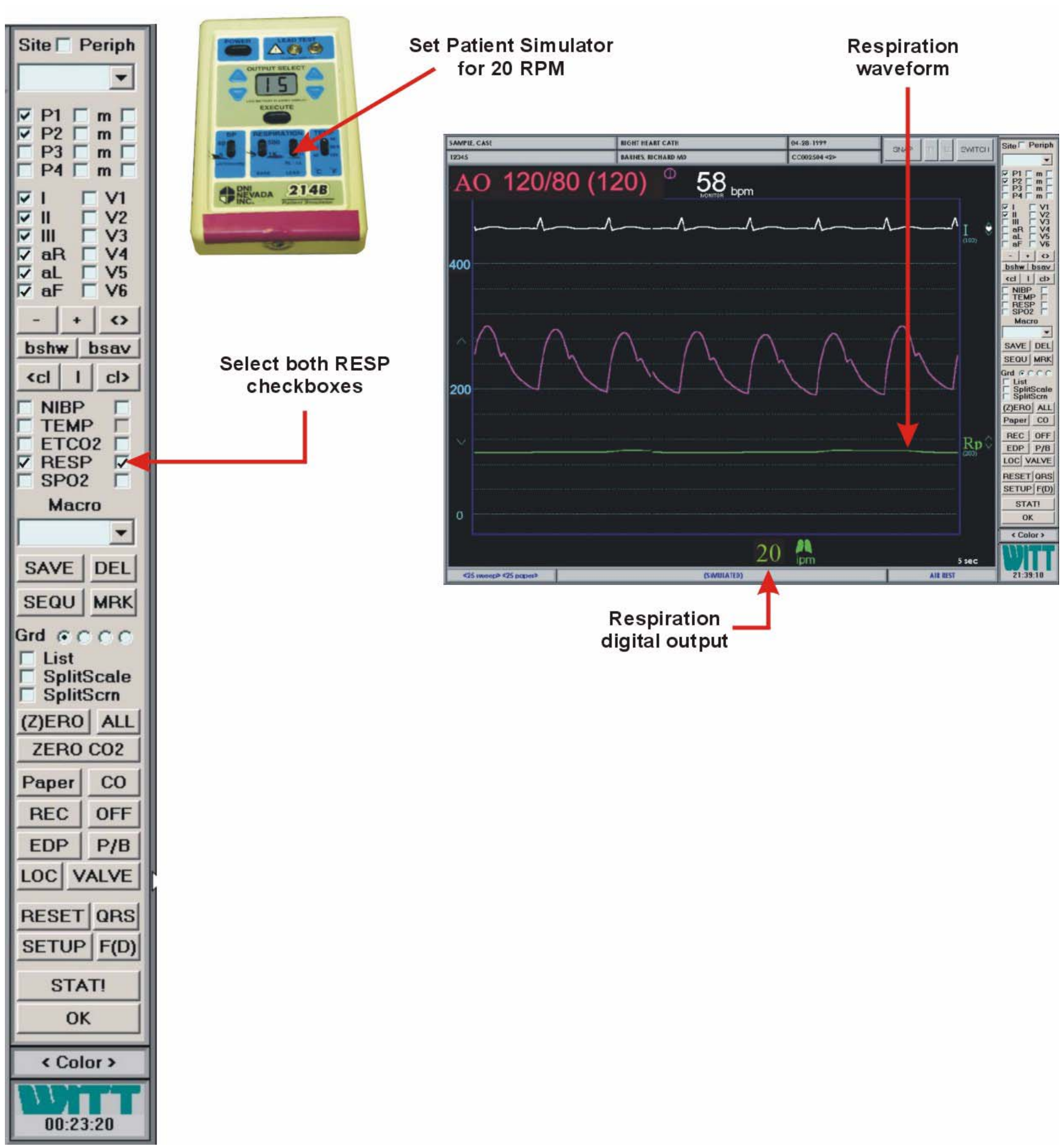




23. Repeat the process for 6 liters per minute. As these steps take place, the waveform screen will automatically record to the test case.

24. Do 2 or 3 tests for each selection (3 L/M and 6 L/M) to make sure the readings are consistent over a given period of time. This completes the cardiac output test.

25. Now check respiration. Set the Patient Simulator for 20 respirations per minute (RPM). On the Patient Monitoring screen select both RESP checkboxes. The left checkbox displays the digital output at the bottom of the screen; the right checkbox displays the respiration waveform. Respiration tolerance is ± 10%, so anything between 18 and 22 RPM will pass. As with all checks, SNAP the screen to create a record of it in the test case.



Testing the SpO2 Probe

SpO2 is a Pass/Fail test.

1. Attach the SpO2 cable to the SpO2 connector.
2. Connect a Nellcor SRC-2 simulator to the sensor connector. Ensure that the SRC-2 IR and RED LED indicators are both lit.
3. Set the RCAL/MODE switch to RCAL 63/Local.
4. Set the LIGHT and MODULATION switches as required by the following four tests:

Test 1

1. Set the LIGHT switch to HIGH 1.
2. Set the MODULATION switch to HIGH.
3. Set the RATE switch to 112.
4. Verify the following readings:
   a. Saturation (%): 81 ± 2
   b. Rate (bpm): 112 ± 2% (110 to 114)

Test 2

1. Set the LIGHT switch to LOW.
2. Set the MODULATION switch to LOW.
3. Set the RATE switch to 201.
4. Verify the following readings:
   a. Saturation (%): 81 ± 2
   b. Rate (bpm): 201 ± 3% (195 to 207)

Test 3

1. Set the LIGHT switch to HIGH 2.
2. Set the MODULATION switch to LOW.
3. Set the RATE switch to 38.
4. Verify the following readings:
   a. Saturation (%): 81 ± 2
   b. Rate (bpm): 38 ± 2% (37 to 39)

Test 4

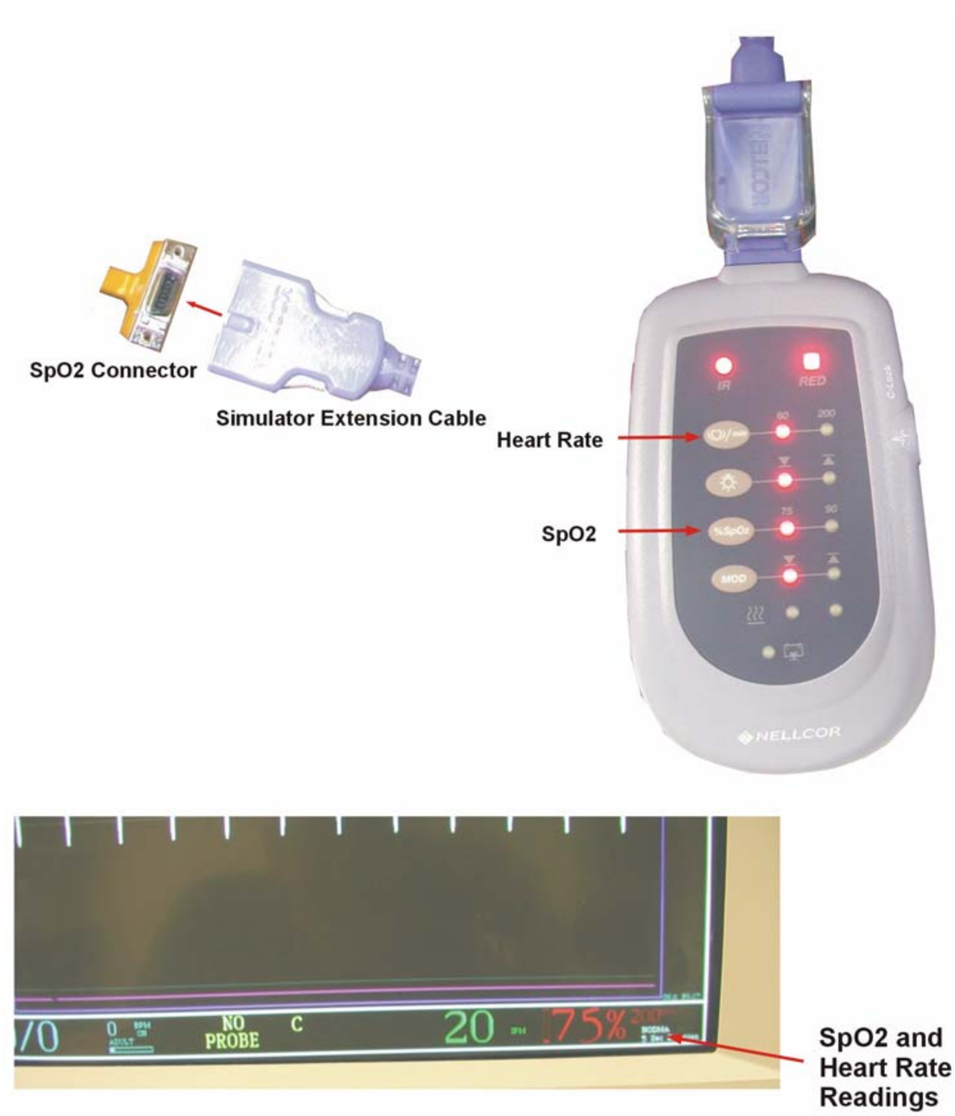
1. Set the LIGHT switch to LOW.
2. Set the MODULATION switch to HIGH.
3. Set the RATE switch to 201.
4. Verify the following readings:
   a. Saturation (%): 81 ± 2
   b. Rate (bpm): 201 ± 3% (195 yo 207)

Testing the SpO2 Probes when using MP506 or NELL-3 PCBs

A different Nellcor simulator is used to test SpO2 probes on computers with an MP506 or NELL-3 PCB. Test these devices as follows:

SpO2 is a Pass/Fail test.

1. Attach the SpO2 cable to the Nellcor extension cable.
2. Connect the Nellcor extension cable to the Nellcor simulator. Ensure the RED LED indicators light.
3. Observe Waveform Monitor screen as you press the Heart Rate and SpO2 toggle buttons on the simulator as shown below. The heart rate reading should toggle between 60 and 200. The SpO2 reading should toggle between 75 and 90.



Testing NIBP

NIBP is a Pass/Fail test.

1. Attach the NIBP cable to the NIBP connector.
2. Put the cuff on your arm and take a pressure.
3. If you get a systolic and a diastolic reading, it passes. If not, it fails.
4. Verify NIBP deflation using the F5 keyboard key.

Testing Body Temperature

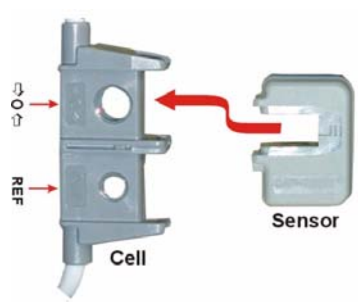
Body Temperature is a Pass/Fail test.

1. Attach the Body Temp cable to the Body Temp connector.
2. Wait 30 seconds.
3. You should get a reading of approximately 25.2°C, which is normal hospital room temperature.
4. Put the temperature probe in your hand and you should get a reading of about 32°C.
5. Disconnect the probe. The reading should now be NOPROBE.

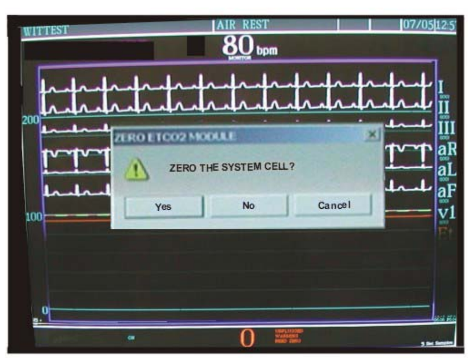
Testing ETCO2

ETCO2 is a Pass/Fail test.

1. Plug the capnostat connector into the Front End or PCM.
2. Wait 30 seconds. You'll get an "UNPLUGGED, WARMING, NEED ZERO" message at the bottom of the monitoring screen.
3. When system is warmed up, slide the capnostat sensor over the ⇨ **0** ⇦ (larger) window of the cell, as shown below, and click [ZERO CO2] (*23*) on the command bar.

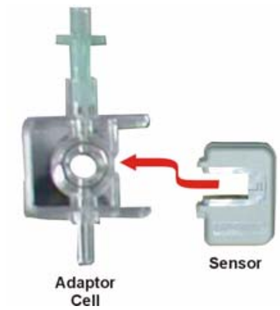


4. You're asked if you want to zero the cell. Click YES.

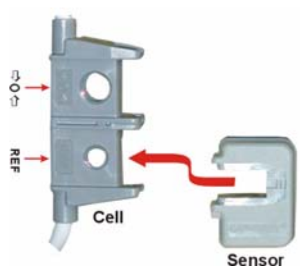


5. Once the cell is zeroed, you're prompted to attach and zero the adaptor you're going to use. For discussion purposes, we'll use a face mask.

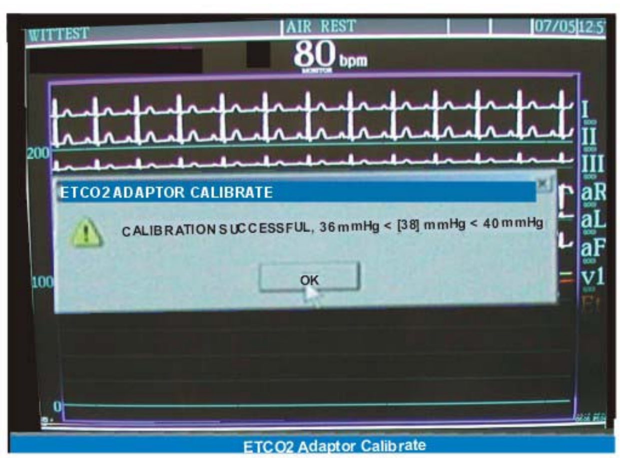
6. The face mask has a cell window like the cell on the capnostat. Slide the capnostat sensor over this window, as shown, and click OK.



7. When the adaptor is zeroed, you're directed to attach the sensor to the capnostat cell's REF window to determine if the adaptor and capnostat have been zeroed correctly. Slide the capnostat sensor over the REF (smaller) window of the cell, as shown below, and click OK.



8. If the zeroing is correct, the system will display a reading of 38 mmHg +/- 2. If the reading is incorrect, repeat the process.



9. Reconnect the adaptor to the capnostat and breath into the adaptor. You'll see your breathing waveform on the monitoring screen.

Performing Tests on the Secondary Line

CALYSTO Series IV has an RS-232 signal cable to provide redundancy to the main signal cable. To ensure that the RS-232 secondary line is working properly, all the above tests must be repeated with RS-232 active. First disconnect the Primary category 5 line. The waveforms on the Patient Monitoring screen will momentarily freeze. Then RS-232 will be displayed in the upper left hand corner of the screen.

When retesting on the RS-232 line, you won't get channel 3 or 4 on the pressure harness, and you'll get only 6 leads of ECG instead of 12.

Testing the Auxiliary Outputs

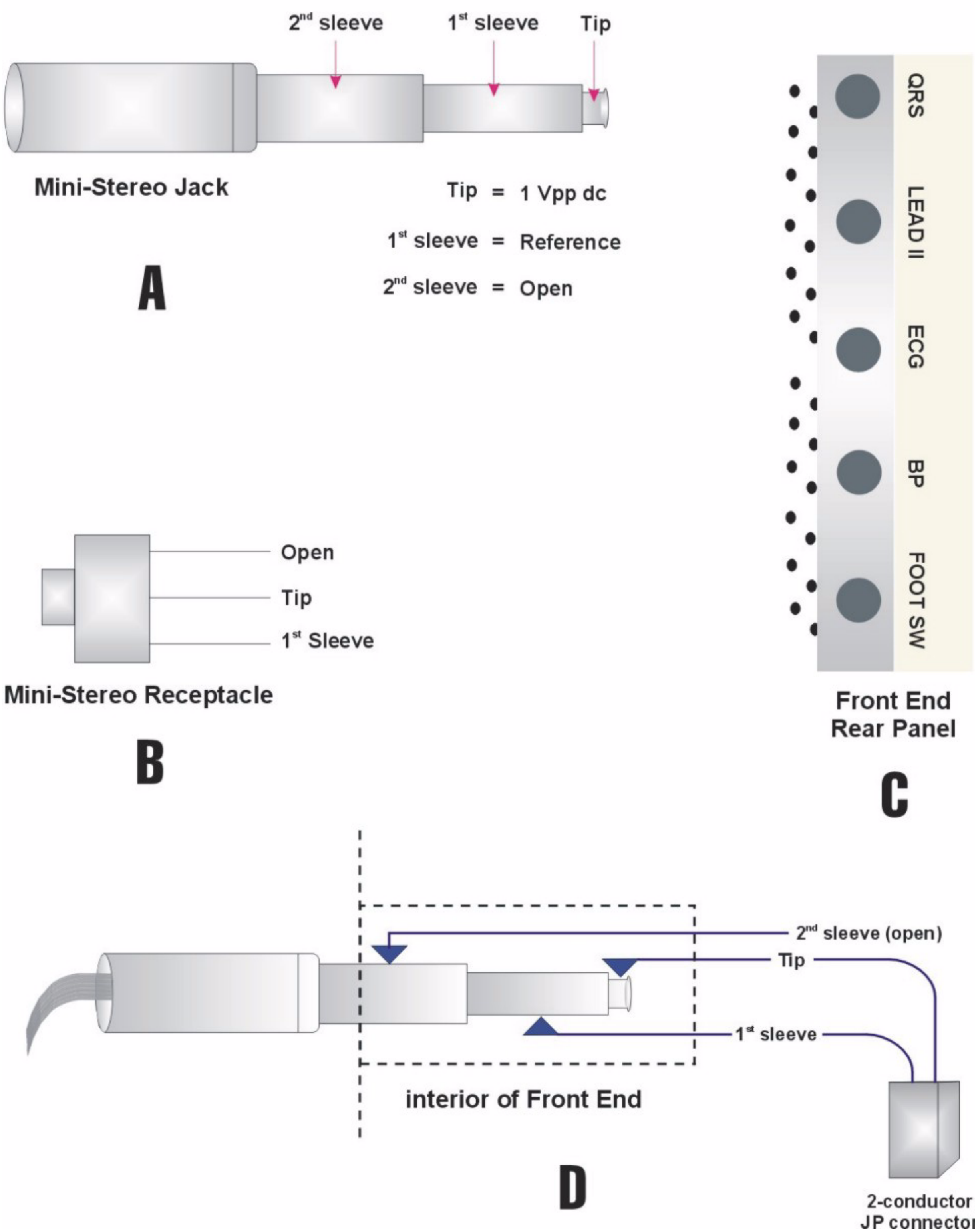
The CALYSTO Series IV auxiliary outputs are located on the rear panel of the first generation Front End Signal Acquisition Unit, and on the front panel of the Digital Front End. The outputs are shown in section C of the following illustrations. You can test and align the auxiliary outputs by connecting them to an oscilloscope with a mini-stereo jack or a BNC connector. This can help when adjusting a specific output to sync with an external device. The jack/connector specifications are shown in section A of the illustrations.

Connect the oscilloscope to the desired output and look for a signal of 1 volt peak-to-peak. The oscilloscope must be set to 1 or 2 volts/div and slowed to a speed between 250ms and 1 second in order to see the waveform. The speed setting depends on the capture of the oscilloscope (analog vs digital). Sections B and D of the first generation illustration describes connections inside the Front End.

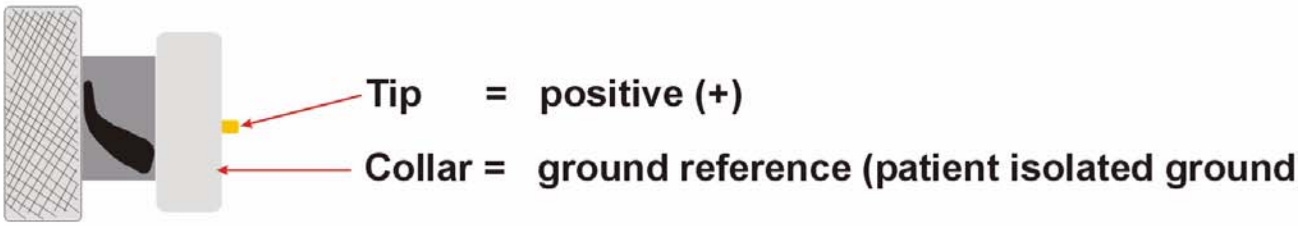
To view the output, the appropriate input signal must be present on the Witt system.

Neither the output waveform nor the output voltage can be seen with a digital multimeter.

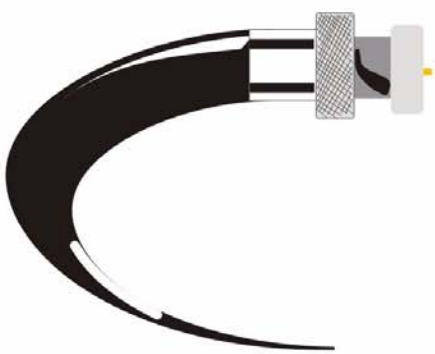
First Generation Front End



Digital Front End



A

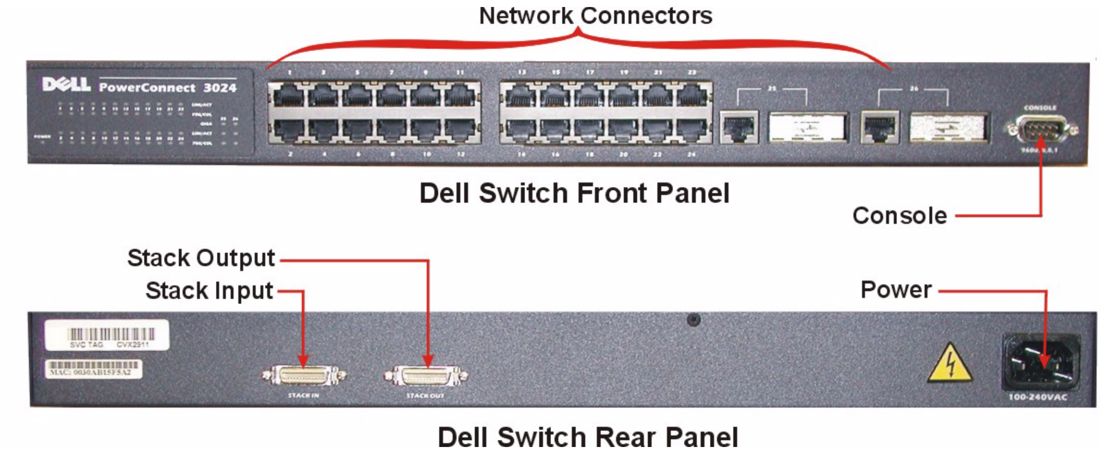


B

C

Ground reference is patient isolated ground and should not be compromised to chassis ground

Configuring the Dell PowerConnect Switch (combined CALYSTO Series IV/Image IV^{HL})



1. Do not attach power cord to Dell Switch until step 6.
2. Attach a null modem or crossover RS-232 cable to the DB-9 (Console) connector on the switch and to Comm 1 on the server.
3. Start Hyperterminal, Name Connection: Gigabit Switch. Select an icon.
4. Select Comm port and click OK. Use the following comm port settings:
   - Bits Per Second = 9600
   - Data Bits = 8
   - Parity = None
   - Stop Bits = 1
   - Flow Control = None
   - Under File, Properties, Settings Tab, select VT100 for Emulation mode
5. Click OK.
6. Attach power cord to switch and apply power.
7. Select system Manager and press Enter. Use the tab key to navigate the menu.
8. Select General Info.
   - System Name = Witt Biomedical
   - System Contact = Witt Biomedical Customer Support (800) 669-1328
   - System Location = Hospital Name
9. Select IP Settings as follows:
   - IP Address = 133.133.33.250
   - Network Mask = 255.255.0.0
   - Gateway Address = 133.133.33.251
10. Select Security Admin.
    - Web Access = Enabled
    - Press Ctrl + W to save, click Yes and press ESC back to main menu
11. Press Ctrl + W to save, click Yes and close Hyperterminal.
12. Disconnect Comm cable (Console) from switch.
13. Attach Cat 5 cable from switch (Network # 25 or 26) to server.
14. Open Internet Explorer.
15. Enter URL address 133.133.33.250 and set as home page.
16. Under System Manager, select Password Admin.

- Enable Password Protection
- Enter New Password = WITT (upper case)
- Verify password
- Click Apply and Save Configuration

17. Exit Internet Explorer.
18. To further access Web Interface:
    - User Name = root (lower case)
    - Password = WITT (upper case)

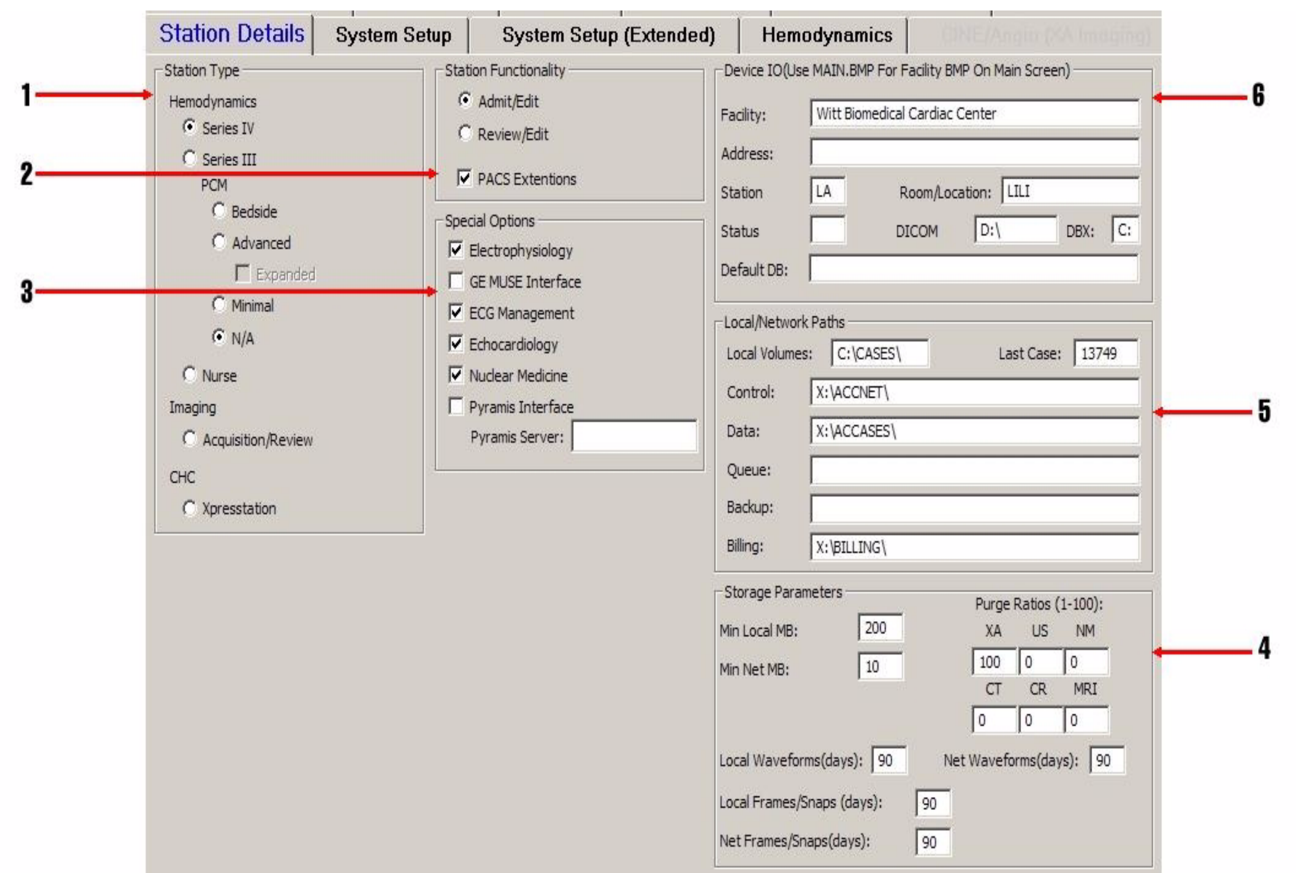
Client Software Setup

Once the system is completely checked out, the CALYSTO software is set in accordance with system options and with the specific requirements and preferences of the client. This is done through CALYSTO's Configuration screens.

CALYSTO Configuration Screens

The configuration screens are accessed by clicking the Witt logo at the bottom of the Main screen and entering an installation password. Each configuration screen consists of one or more tabs at the top and one or more sections below the tabs that require specific entries for each client. There are 19 configuration screens. The tab for the active screen is highlighted in blue. The first screen that appears when you click the Witt logo and enter your password is Station Details, which has 19 tabs. From Station Details you can open any other configuration screen by clicking its respective tab. Each configuration screen is shown below with callouts. Callouts are defined in a table following the screen.

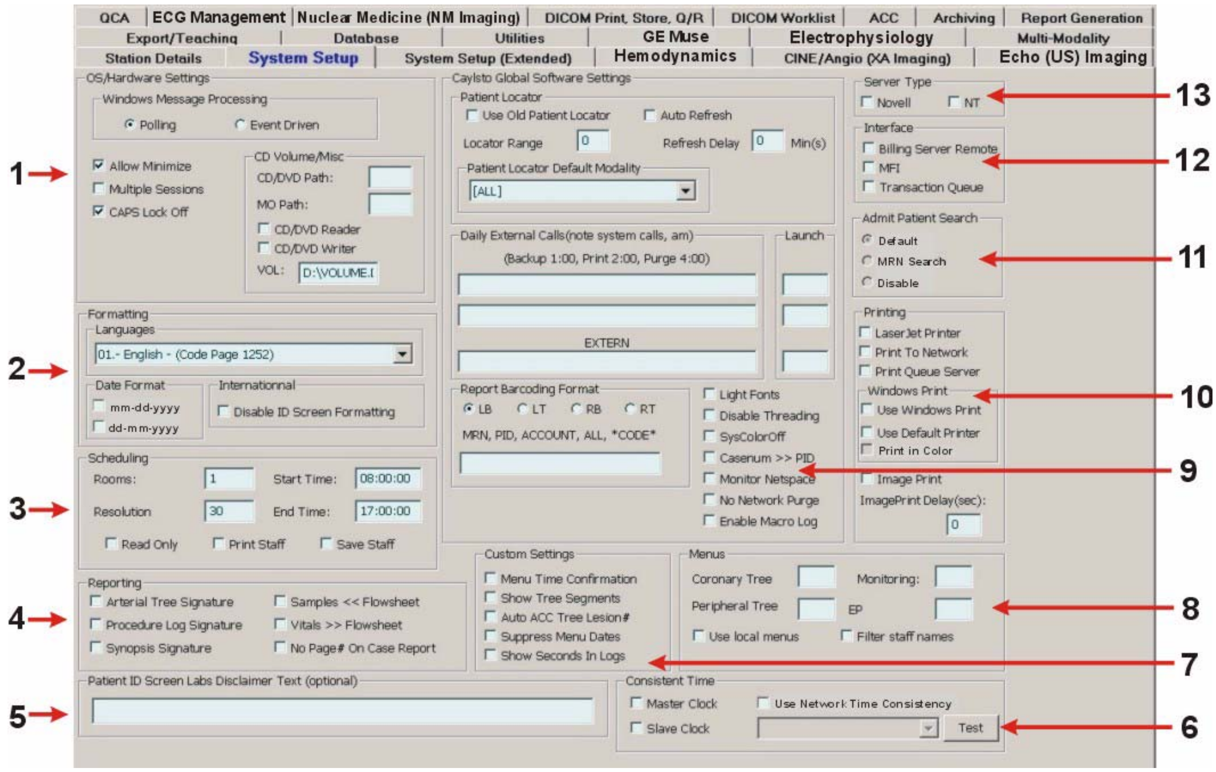
Station Details Configuration Screen



Station Details Configuration Screen

Callout	Section	Use
1	Station Type	**Hemodynamics—**Activates ADMIT function on Series III or Series IV hemo stations and allows waveform capture and image record. **PCM (Patient Care Monitor):** ● **Bedside Review—**Designates station as a basic PCM. ● **Advanced Bedside—**Designates station as advanced PCM. ● **Expanded Bedside—**Designates station as expanded PCM with 12 leads/4 pressure channels (hardware dependent). ● **Minimum Bedside—**Not currently used. ● **N/A—**Not applicable. **Nurse—**Designates station as a nurse's station. **Review/Edit—**Designates station as review-only station. **Imaging—**Designates station as an Image IV^{HL} Acquisition/Review station with single executable capabilities. **CHC—**When checked, designates station as CALYSTO Xpresstation.
2	Station Functionality	**Admit/Edit**—Designates station as admitting station. **Review/Edit**—Designates station as review-only station. **PACS Extensions—**Activates viewing capabilities for DICOM imaging modalities (Echo, NukeMed, CT, MRI, X-ray, Pyramis)
3	Special Options	**Electrophysiology—**Activates electrophysiology option for station. **GE Muse Interface—**Activates GE MUSE interface for station. **ECG Management—**Activates ECG Management option for station. **Echocardiology—**Activates Echocardiology option for station. **Nuclear Medicine—**Activates Nuke Med option for station. **Pyramis—**Activates Pyramis ECG Management option for station.
4	Storage Parameters	Controls the amount of local and network space required to open a case on the local station, the local storage time for waveforms and still frames, and the network storage time for waveforms and still frames (specified on the backup station only). Local usually set to 500 MB; Net usually 2000 MB (2 GB). Purges waveform snaps & still frames rather than case files. Also contains user-defined purge ratios for cine (XA), ultrasound (US), and nuclear medicine (NM) modalities. The system will then automatically purge files according to the chosen percentages.
5	Local Network Paths	Points to local CASES directory and identifies last case number admitted from each station (this should be "0" on new stations). Also provides paths for Control, Data, Print Queue, Backup, and Billing servers.
6	Device I/O	Identifies facility, station, node, and room. Entries appear on Main screen beneath the CALYSTO Series IV graphic. Status ID not currently used. DICOM field identifies DICOM path. DBX field identifies database drive. Default DB field allows user to name default ("0") database.

System Setup Configuration Screen



System Setup Configuration Screen

Callout	Section	Use
1	OS/Hardware Settings	**Windows Message Processing—**Provides choice of Polling or Event Driven. **Allow Minimize—**When checked, activates task-bar minimizing for Series IV **Multiple Sessions—**When checked, allows multiple active sessions of Series IV. **CAPS Lock Off—**When checked, controls CAPS lock setting. **CD Volume/Misc—**Indicates paths for CD, DVD, and MO authoring. Indicates if CD/DVD readers and/or writers are present, and default volume names.
2	Formatting	Permits drop-down list selection of English, French, or Spanish for language appearing on screen labels. Allows the selection of two date formats—month/day/year and day/month/year. On international accounts, provides for disabling of Male/Female formatting on Patient ID screen
3	Scheduling	Lists the number of rooms, establishes the scheduling module's start and stop times, and determines the amount of time allotted to each scheduling slot (Resolution). Also lists staff parameter checkboxes.

System Setup Configuration Screen (continued)

Callout	Section	Use
4	Reporting	**Arterial Tree Signature**—When checked, prints a physician signature line on the arterial tree. **Procedure Log Signature**—When checked, prints a physician signature line on the procedure log. **Synopsis Signature**—When checked, prints a physician signature line on the case synopsis. **Samples << Flowsheet**—When checked, suppresses waveform sample reporting in the procedure log. **Vitals >> Flowsheet**—When checked, sends vitals information to the procedure log. **No Page# On Case Report**—When checked, removes page numbers from case reports.
5	Patient ID Screen Labs Disclaimer Text (optional)	Allows users to add custom message up to 80 characters above the Labs section on the Patient ID screen. For conformance to JCAHO requirement.
6	Consistent Time	**Master Clock**—When checked, activates system master clock. **Slave Clock**—When checked, activates system slave clock **Use Network Time Consistency**—When checked, allows users to synchronize the system master clock with one of the listed Internet time synchronization services.
7	Custom Settings	**Auto Lesion Edit**—When checked, lesion analysis screen will default to the Edit mode after a lesion is obtained. **Auto Invoke Tree**—When checked, coronary tree screen will activate for lesion placement after a lesion is obtained in the analysis screen. **Auto Exit Tree**—When checked, lesion analysis screen will activate, following the placement of a lesion in the coronary tree screen. **Print Inverted**—When checked, prints frames in inverted format. **Enable Cine Mode**—When checked, allows switch between DICOM and analog. **Delete Cines**—When checked, allows users to delete cines (normally not a recommended feature). **Use DirectX Acceleration (Cine)**—When checked, enables Direct X video support for echo/cine, providing higher frame/second playback rates (requires Direct X ver 8.1 and compatible video card) **ATI 9xxx Support**—When checked, enables system support for ATI Radeon 9800 video card.

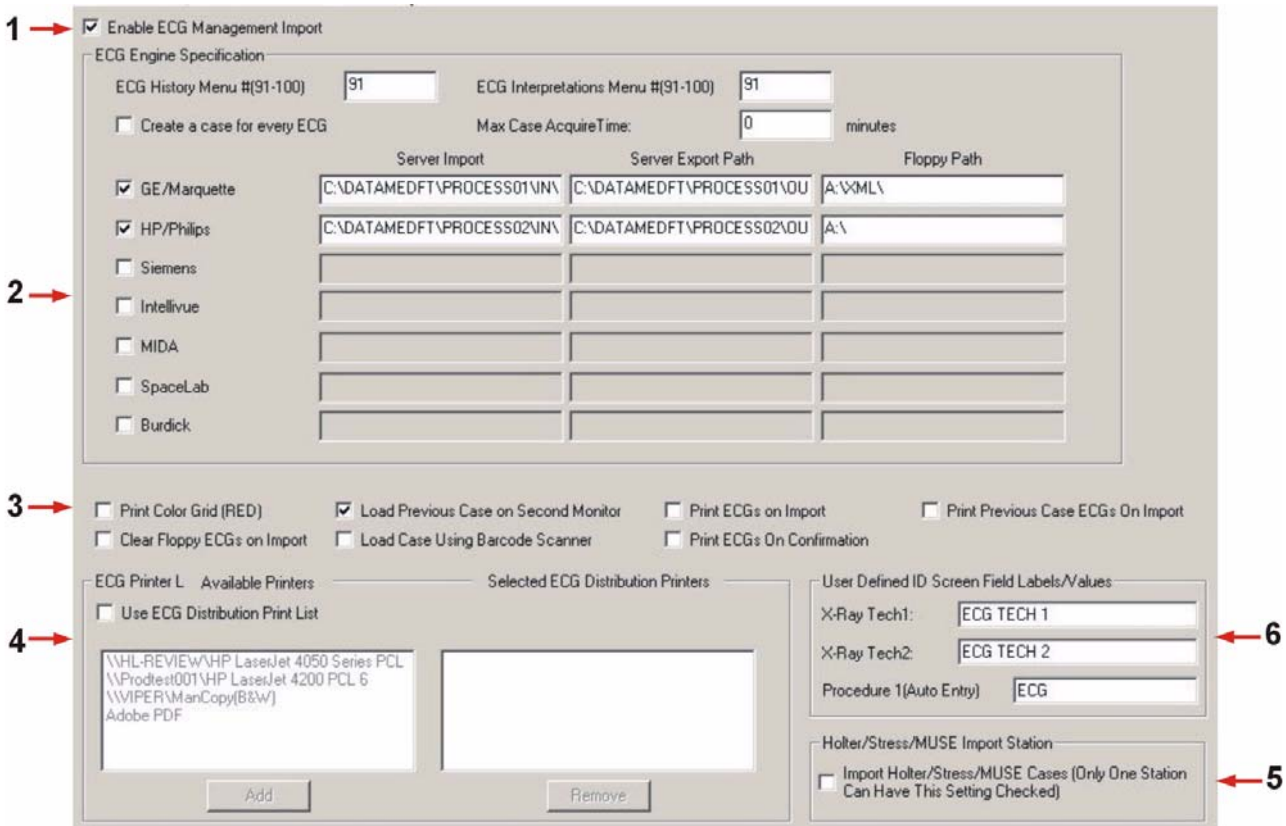
System Setup Configuration Screen (continued)

Callout	Name	Use
8	Menus	**Coronary Tree—**Indicates number for coronary tree menu. **Peripheral Tree—**Indicates number for peripheral tree menu. **Monitoring—**Indicates the menu number to be used for the MRK feature. **Use Local Menus—**When checked, inhibits the system from checking the network for menu changes. **Filter Staff Names—**Provides name filtering capability in Patient ID screen drop-down lists.
9	CALYSTO Global Software Settings	**Patient Locator:** ● **Use Old Patient Locator**—When checked, modality icon won't display. ● Auto Refresh/Delay—Allows user to set time in minutes for Patient Locator to update with new cases. ● **Locator Range—**Locator Range lets you define a time period for search tasks. ● **Patient Locator Default Modality—**Permits choice of modality initially appearing on Patient Locator screen. **Daily External Calls/Launch**—Identifies paths and launch times for daily external program executions. **Report Barcoding Format**—Specifies which patient identification number is printed as a barcode on the Patient ID screen. If "ALL" is present, the barcode prints on every page of the report. Radio buttons LB, LT, RB, RT permits choice of left or right top and bottom. **Clock**—Allows the choice between system master and slave clock. **Light Fonts**—When checked, displays button text in light font face. **Disable Threading**—For Witt Field Service personnel only. **Syscoloroff**—Disables system color, which gives a slight blue hue. **Casenum >> PID**—When checked, automatically sends Witt case number to Patient ID screen. **Monitor Netspace**—When checked, allows station to monitor free space on server. **No Network Purge**—When checked, inhibits data purge on network. For sites using non-Witt archiving systems.

System Setup Configuration Screen (continued)

Callout	Name	Use
10	Printing	**LaserJet Printer—**When checked, sends print jobs from station to local LaserJet. **Print to Network—**Sends print jobs from the station to a network print queue. **Print Queue Server—**When checked, controls network print queue locally (LaserJet printer must be present). **Use Windows Print—**Enables Windows Print option rather than PCL style. **Use Default Printer—**Uses Windows default printer for printing. If unchecked you must choose which printer to print to. **Print in Color—**Enables printing to a color printer. **Image Print/Delay—**When checked, indicates the station can print still frames (LaserJet printer required). Image Print Delay lets you print a case report before the accompanying image is compiled so the job doesn't overload the printer (usually set at 3-5 seconds).
11	Admit Patient Search	**Default—**Allows users to search by MRN, SSN, Name, Accession#, and ACCT. **MRN Search—**Allows users to limit MFI search to MRN only. **Disable—**Not currently used.
12	Interface	**Billing Server Remote—**When checked, indicates remote network billing server is present. **MFI—**When checked, indicates Mainframe Interface is present. **Transaction Queue**—When checked, activates folder used to place admitted, deleted, or modified Series IV cases awaiting disposition at the interface.
13	Server Type	**Novell—**When checked, designates Novell as system server. **NT—**When checked, designates NT as system server.

ECG Management Configuration Screen



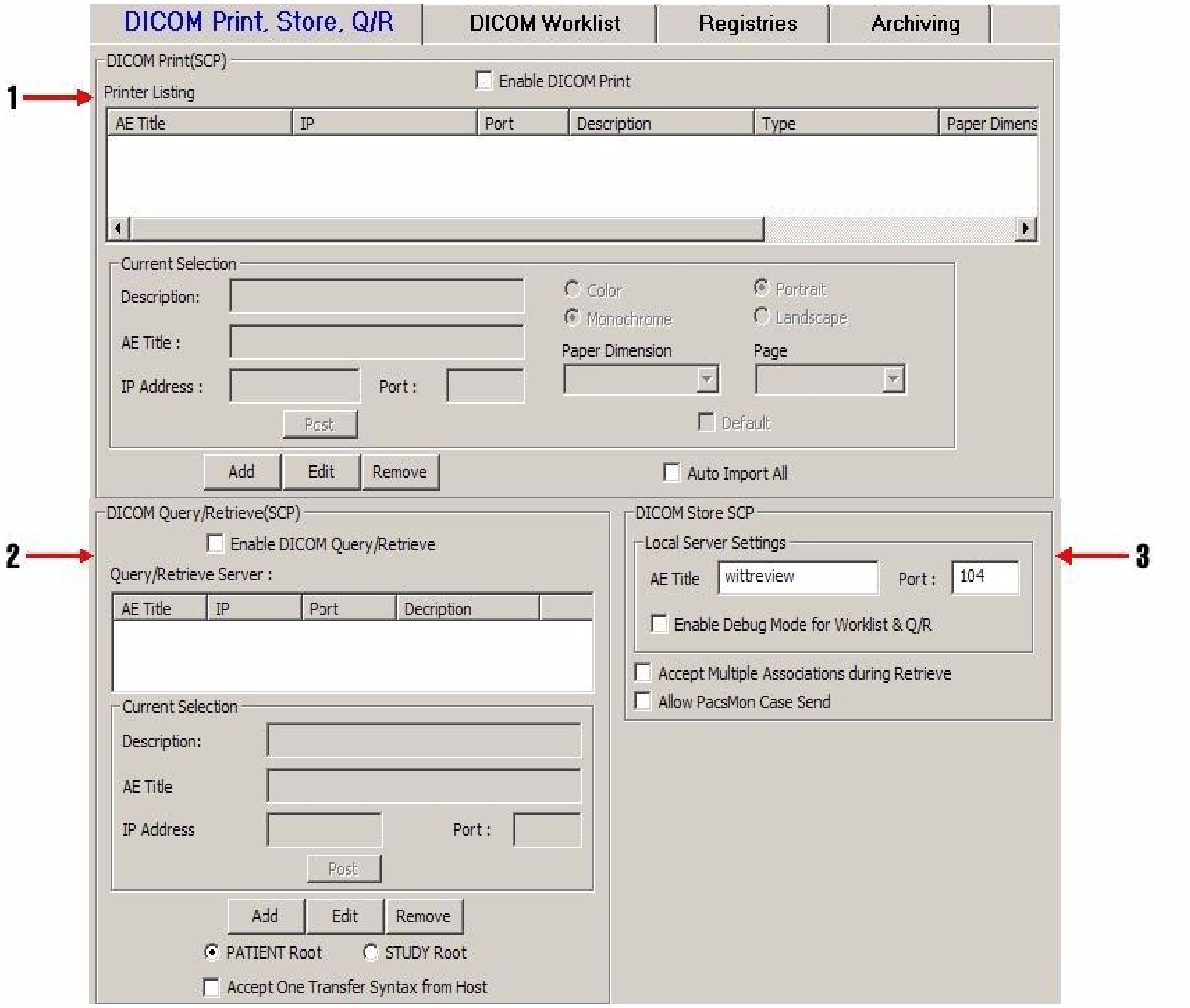
ECG Management Configuration Screen

Callout	Name	Use
1	Enable ECG Mgmt Import	When checked, ECG Management import function is active.
2	ECG Engine Specification	E**CG History/Interpretations Menus**—Defines menu number for ECG interpretation data sent by ECG cart. **Create a case for every ECG**—When checked, each imported ECG is assigned a case number. **Max Case Acquire Time**—Specifies the maximum time (in minutes) for ECGs acquired during this time to be stored as one case. **ECG Engine Provide**r—Provides for activation of any of 7 ECG cart vendors, and defines their import, export, and floppy disk paths. Selecting a vendor's checkbox activates its path fields.

ECG Management Configuration Screen (continued)

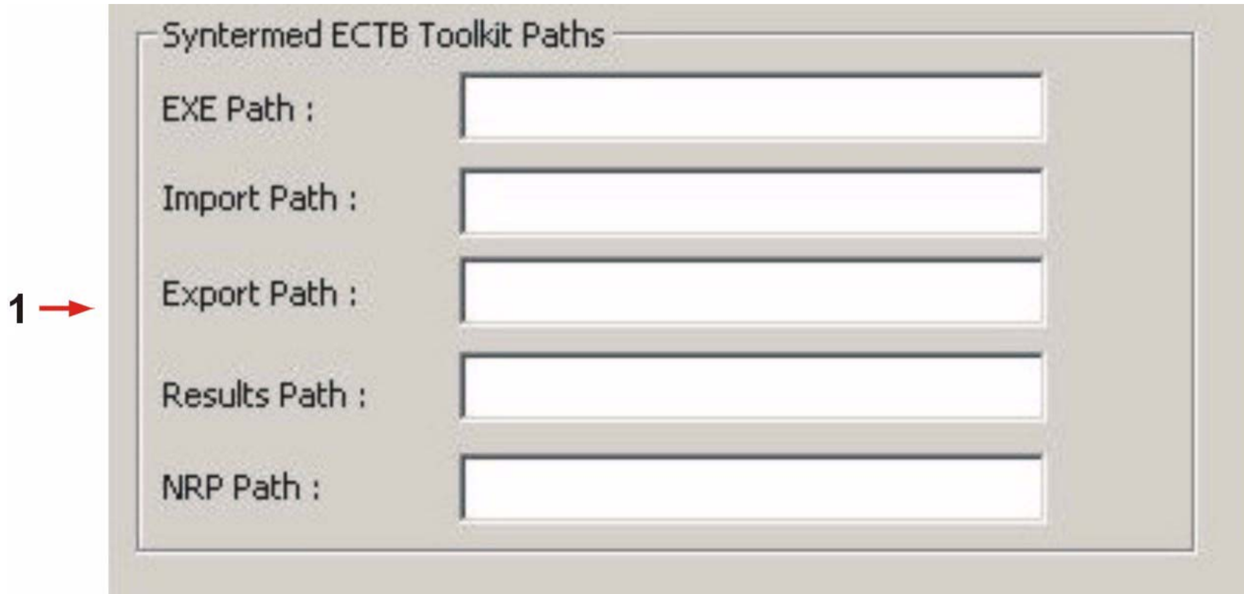
Callout	Name	Use
3	Configuration Checkboxes	**Print Color Grid (Red)**—When checked, ECG background grid prints in red; remainder of ECG prints in black. **Clear Floppy ECGs on Import**—Wen checked, deletes all ECG files from floppy when the disk has been imported. **Load Previous Case on Second Monitor**—When checked, loads previous case on slave monitor. **Load Case using Barcode Scanner**—When checked, prints case ID number in barcode format, allowing user to access case with barcode scanner. **Print ECGs on Import**—When checked, automatically prints ECG cases as they are imported from a floppy disk. **Print ECGs on Confirmation**—When checked, automatically prints cases marked Read or Confirmed. **Print Previous Case ECGs on Import**—When checked, automatically prints patient's previous ECG when imported from a floppy disk.
4	ECG Printer List	Lists all possible Windows printers. Select an Available printer in the first window and click the [Add] button to move it to the Selected (second) window. Click the **Use ECG Distribution Print List** checkbox to activate the Selected printer choice.
5	Holter/Stress/ Muse Import Station	When checked, activates import station for Holter, Stress, and Muse ECG cases.
6	User Defined ID Screen Field Labels/Values	Permits user to customize ECG screen labels.

DICOM Print, Store, Q/R Configuration Screen



DICOM Print, Store, Q/R Configuration Screen

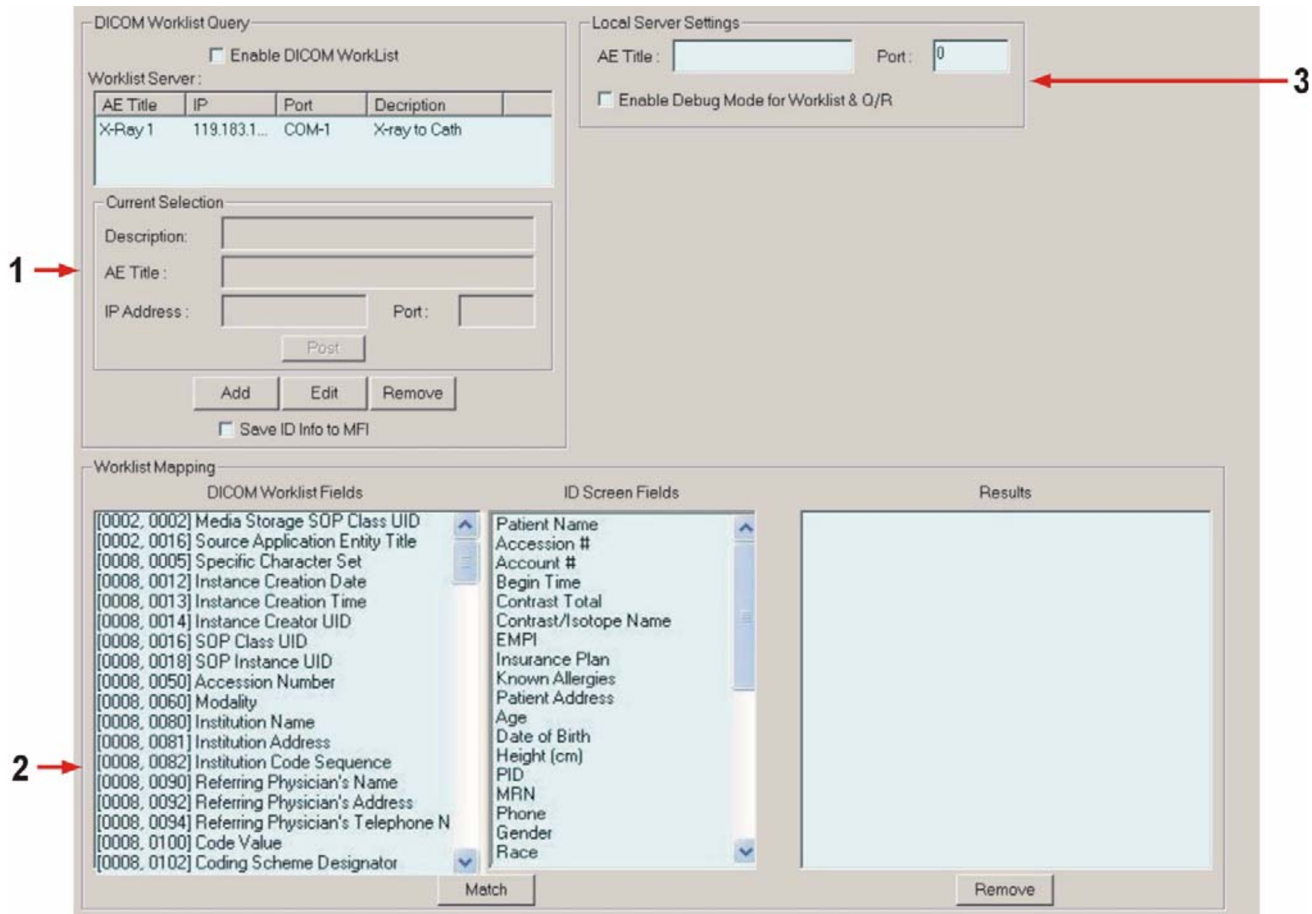
Callout	Name	Use
1	DICOM Print (SCP)	Allows configuration of DICOM Print page layout and specifications for individual printers. The printer listing section is filled out in the same manner as the DICOM Worklist Query below. Description = name given to the respective connection AE Title = programming tool IP = IP address Port = hardware connection To add a printer: • Click [Add]. This activates the [Current Selection] area. • Enter a description, AE title, IP address, and port number. • Make the radio button and drop-down list selections. • Click [Post]. This places the entry in the [Worklist Server] window. To Edit an entry: • Select the entry in the [Printer Listing] window and click [Edit]. • This opens the entry in the [Current Selection] area. • Make your changes and click [Post]. To delete a printer: • Select the printer in the [Printer Listing] window and click [Remove]. • The printer is deleted. Select the printer in the [Printer Listing] window and click the [Default] checkbox to make it the default DICOM printer.
2	DICOM Query/ Retrieve (SCP)	When the Enable checkbox is checked, the DICOM Query and Retrieve server is active. The server section is filled out in the same manner as the DICOM Print section, above. **Patient Root/Study Root:—**select STUDY root for IHE compliance. **Accept One Transfer Syntax from Host—**When enabled, CALYSTO will accept only the most favorable Query/Retrieve transfer syntax from the Host/Source system.
3	DICOM Store (SCP)	Requires an AE title for DICOM print (default is WittReview) and a port number (default is 104). Both can be changed at users discretion. **Enable Debug Mode for Worklist & Q/R—**For Witt Field Service personnel only. **Allow Pacsmon Case Send—**Transmits case to receiving application when PACS STORE function button is activated. **Accept Multiple Associations during Retrieve—**keeps retrieval process open till all associations have transferred.



Nuclear Medicine (NM Imaging) Configuration Screen

Callout	Name	Use
1	Syntermed ECTB Toolkit Paths	For Witt Field Service personnel to enter EXE, Import, Export, Results, and NRP paths for Nuclear Medicine Toolkits.

DICOM Worklist Configuration Screen



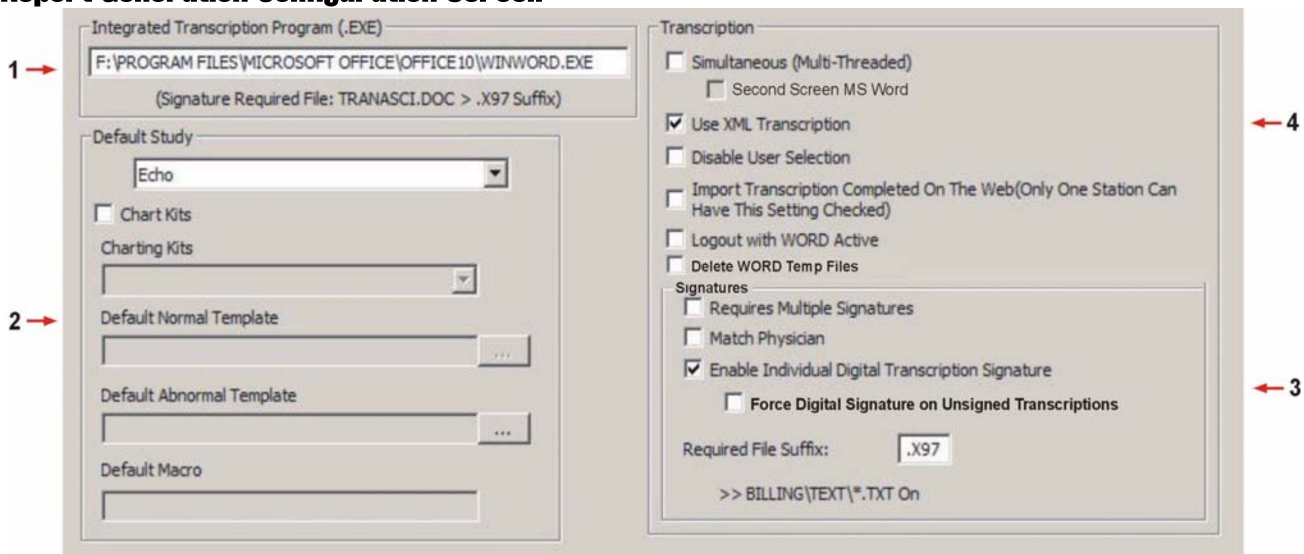
DICOM Worklist Configuration Screen

<table>
<tr><th>Callout</th><th>Name</th><th>Use</th></tr>
<tr><td>1</td><td>DICOM Worklist Query</td><td>When the Enable DICOM Worklist checkbox is checked, the system finds patients already admitted through a DICOM Worklist and automatically populates the Patient ID screen with the information (see chapter 2 CALYSTO Series/Image IV User’s Guide).
The Worklist Server section permits the user to set up parameters between DICOM Worklist users and providers (we are always the user).
AE Title = programming tool
IP = IP address
Port = hardware connection
Description = name given to the respective connection
To add a worklist server:
Click [Add]. This activates the [Current Selection] area.
Enter a description, AE title, IP address, and port number.
Click [Post]. This places the entry in the [Worklist Server] window.
To Edit an entry:
Select the entry in the [Worklist Server] window and click [Edit].
This opens the entry in the [Current Selection] area.
Make your changes and click [Post].
To delete a worklist server:
Select the server entry in the [Worklist Server] window and click [Remove].
The worklist server is deleted.
Save ID Info into MFI—When checked, saves the Patient ID screen data to the DICOM Worklist SCP.</td></tr>
<tr><td>2</td><td>Worklist Mapping</td><td>For Witt Field Service personnel only.</td></tr>
<tr><td>3</td><td>Local Server Settings</td><td>To specify server AE and Port number, and to activate the debug mode for DICOM worklist and Query and Retrieve function.</td></tr>
</table>

Archiving Configuration Screen

Callout	Name	Use
1	Configuration Checkboxes	**No Archive**—When checked, archival system is disabled. **Archive to Local CD**—When checked, system archives on local CD. **Archive to Local CD (DICOM)**—When checked, system archives on local CD in DICOM format. **Archive to Local DVD**—When checked, system archives to local DVD. **Jukebox Present**—When checked, system archives on jukebox. **Tape Present**—Used with certain tape backup systems, such as Veritas, and produces an error message on the CALYSTO^{CHC} Main screen when back system is malfunctioning. **Slave/Master**—Activates WAS with jukebox backup for those systems.

Report Generation Configuration Screen



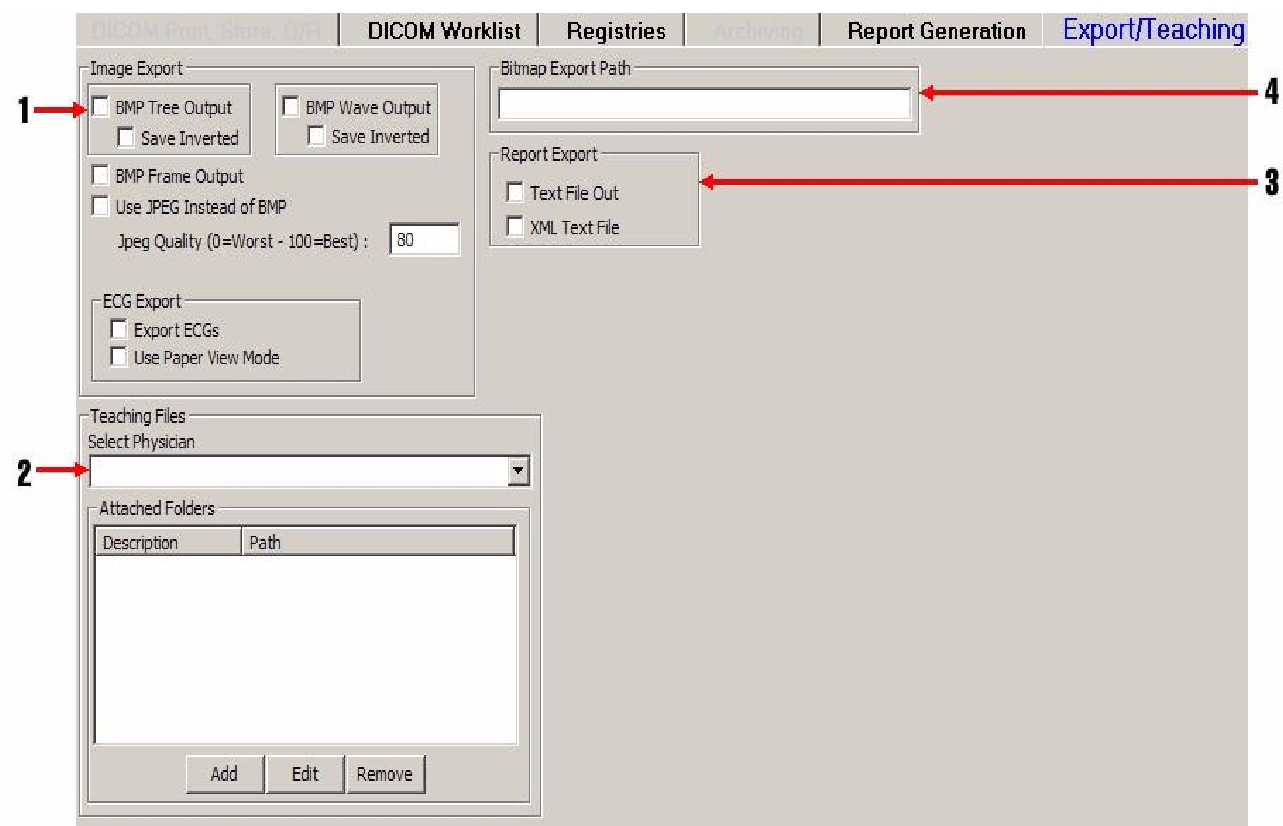
Report Generation Configuration Screen

Callout	Name	Use
1	Integrated Transcription Program (.EXE)	Defines the path for integrated transcription application, e.g., MS Word.
2	Default Study	Used to set transcription kit template defaults. • Choose the kit modality from the drop-down list. • To set transcription kit templates, click the Chart Kits checkbox and choose the default kit from the drop-down menu. • To set the normal and abnormal default template documents, click the button at the end of the respective field and choose the document name and path from the list in the pop-up window. You can also create a new name and path.
3	Signatures	**Requires Multiple Signatures**—When checked, more than one signature is required in the ID screen Physician fields 1, 2, and 3, or in fields 1 and 2 for that case to be locked. **Match Physician**—When checked, a physician must be listed on the ID screen in order for him or her to lock a specific case. **Enable Individual Digital Transcription Signature**—When checked, users can sign individual transcriptions rather than sign and lock the entire case. **Force Digital Signature on Unsigned Transcriptions**—When checked, signatures will be placed on transcription documents automatically.

Report Generation Configuration Screen (continued)

Callout	Name	Use
4	Transcription	**Simultaneous (Multi-Threaded)—**When checked, the CALYSTO[CHC] program remains active while Word transcription is open. **Second Screen MS WORD—**When checked, MS Word will launch to the second monitor if dual-screen monitoring is being used. **Use XML Transcription—**When checked, XML transcription is active. **Disable User Selection—**When checked, disables user's ability to select which Snaps, Waves, and trees are used in the transcription document. **Import transcription Completed on the Web—**When checked, allows user to import transcription documents prepared on Web[DV]. **Logout with WORD Active—**Used with Simultaneous (Multi-Threaded), above. With both boxes checked and Logins active, CALYSTO will log out to Windows if Word is left open past the log-out interval. With only the Simultaneous (Multi-Threaded) box checked, CALYSTO remains active after time limit expires. **Delete WORD Temp Files—**When checked, removes any temporary Word documents that may be open on the C: drive.

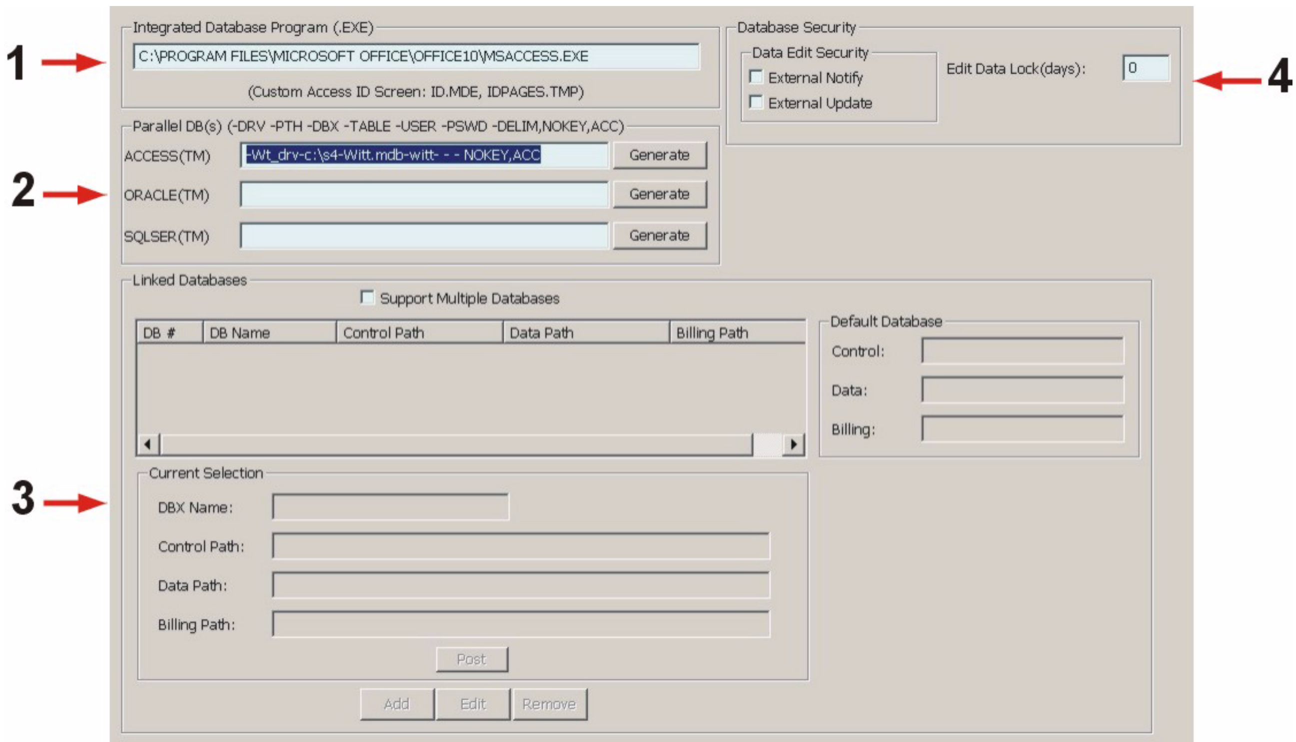
Export/Teaching Configuration Screen



Export/Teaching Configuration Screen

Callout	Name	Use
1	Image Export	Permits the selection of BMP or JPEG as the format for graphics export. Also, by checking [Save Inverted], coronary tree and/or wave form images will print black with white background on transcription reports.
2	Teaching Files	Permits the user to add, edit, and remove physician names associated with teaching files.
3	Report Export	**Text File Out**—When checked, CALYSTO creates a plain text version of the procedure log upon close of case and posts it to the Billing/Text directory for distribution to third party systems. **XML Text File**—When checked, CALYSTO creates an XML version of the procedure log upon close of case and posts it to the Billing/Text directory for distribution to third party systems.
4	Bitmap Export Path	Points to the directory where bitmap files will automatically be stored after creation.

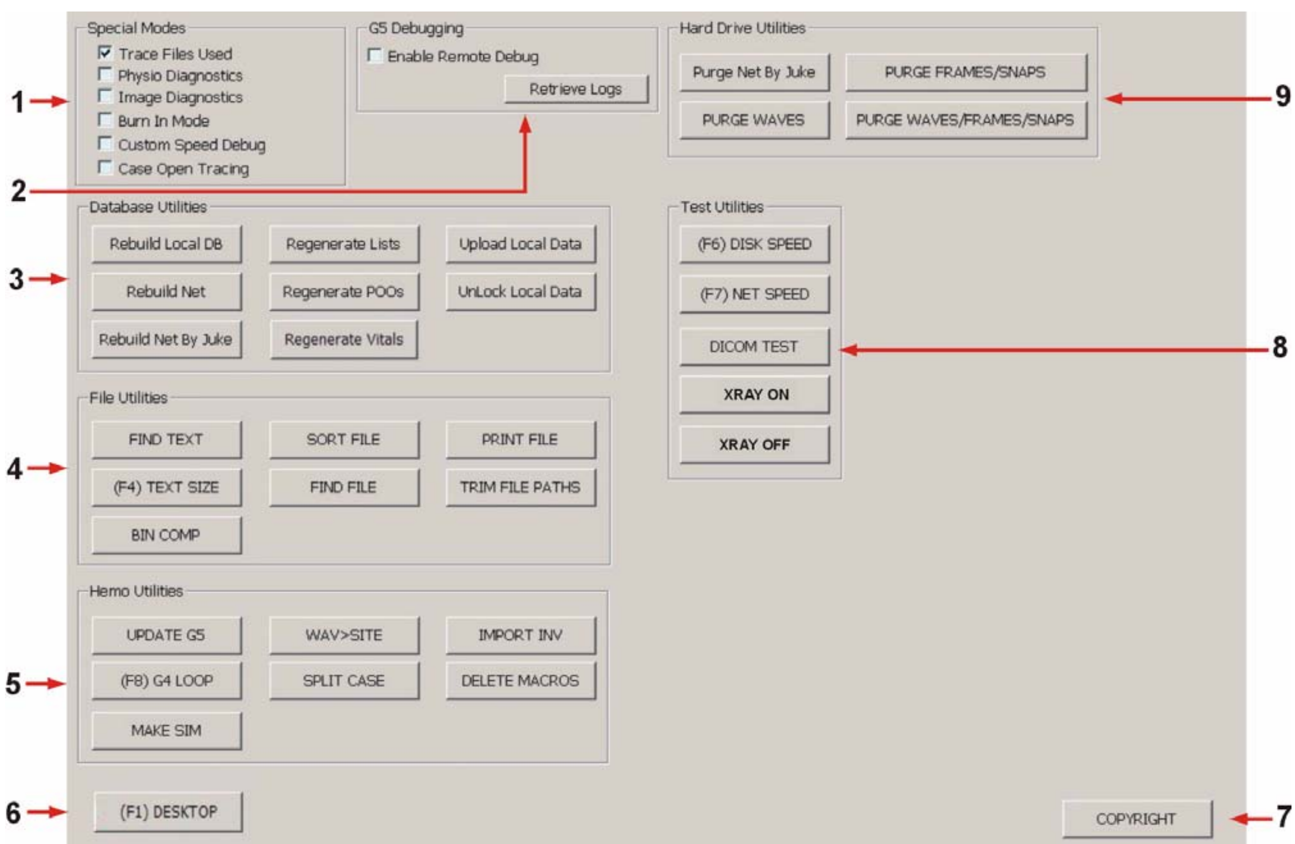
Database Configuration Screen



Database Configuration Screen

Callout	Name	Use
1	Integrated Transcription Program (.EXE)	Permits the selection of BMP or JPEG as the format for graphics export. Also, by checking [Save Inverted Tree Image], coronary tree images will print black with white background on transcription reports.
2	Parallel DBs	Permits the user to add, edit, and remove physician names associated with teaching files.
3	Linked Databases	**Support Multiple Databases**—When checked, the default Control, Data, and Billing databases will be set up under this section.
4	Database Security	**External Notify**—When checked, notifies another node if the station breaks a lock. **External Update**—When checked, permits another node to update files. **Edit Data Lock (days)**—Indicates data lockout time limit.

Utilities Configuration Screen



Utilities Configuration Screen

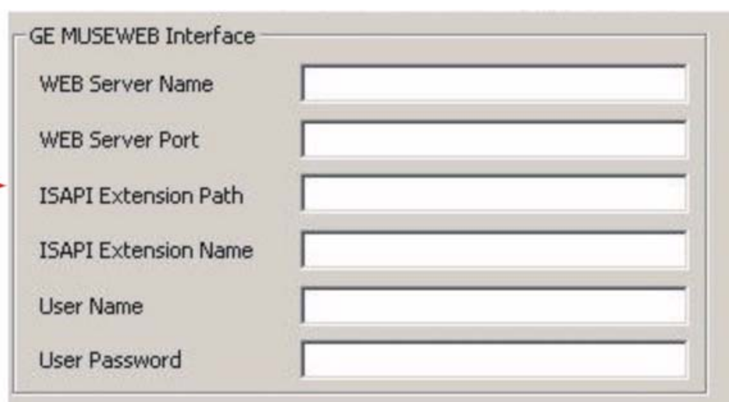
Callout	Name	Use
1	Special Modes	**Trace Files Used**—When checked, provides tech support error tracking ability. **Physio Diagnostics**—When checked, allows tech support to monitor hemo system performance. **Imaging Diagnostics**—When checked, allows tech support to monitor imaging system performance. **Burn In Mode**—When checked, provides tech support with CPU self test. **Custom Speed Debug**—For Witt Field Service personnel only. **Case Open Tracing**—For Witt Field Service personnel only.
2	G5 Debugging	For Witt Field Service personnel only.
3	Database Utilities	**Rebuild Local DB**—Rebuilds local database. **Rebuild Net**—Rebuilds network database. **Rebuild Net By Juke**—Rebuilds network database including juke-boxed cases. **Regenerate Lists**—Regenerates user lists from .POO files. **Regenerate POOs**—Resizes .POO files for database expansion (for Witt Field Service personnel only). **Regenerate Vitals**—Regenerates vitals records for database expansion (for Witt Field Service personnel only). **Upload Local Data**—Uploads local data to the network. **Unlock Local Data**—Overrides edit data lockout setting on local cases.
4	File Utilities	**Find Text**—Provides text search in specified file. **(F4) Text Size**—Finds case with most menu entries. **Bin Comp**—Provides file comparison. **Sort File**—Sorts all entries in a given file alphabetically. **Find File**—Provides file search to drive level. **Print File**—Prints file when user enters name and path. **Trim File Paths**—Removes file and path designations from a given file.
5	Hemo Utilities	**Update G5**—Allows the G5 PCB to be upgraded through the CPU Bus. **(F8) G4 Loop**—Loops back G4 PCB in older systems. Not used in newer systems. **Make SIM**—Creates simulator files to C:\Winnt. **WAV > Site**—Creates hemo site labels from specified directory. **Split Case**—Allows user to reduce file size by splitting case. **Import Inv**—Allows user to import inventory file from separate database. **Delete Macros**—Deletes all monitoring macros.
6	(F1) Desktop	Closes S4 application.

Utilities Configuration Screen

Callout	Name	Use
7	Copyright	Displays Witt Biomedical copyright and license notice.
8	Test Utilities	**(F6) Disk Speed**—Displays hard drive read and write speed. **(F7) Net Speed**—Displays network read and write speed. **DICOM Test**—Creates simulated cine runs using DICOMDIR on the DICOM export drive. **Xray On/Xray Off**—Used by Witt Field Service personnel to test and/or bypass the cine inhibit functions on systems equipped with frame capture acquisition. Activated by first checking the Xray Cine Inhibit checkbox on the Cine/Angio (XA Imaging) Configuration screen.
9	Hard Drive Utilities	**Purge Net by Juke**—Purges network of juke-boxed cases. **Purge Waves**—Purges waveforms after user-defined time period. **Purge Frames/Snaps**—Purges frames and snaps after user-defined time period. **Purge Waves/Frames/Snaps**—Purges waveforms, frames, and snaps after user-defined time period.

GE Muse Configuration Screen

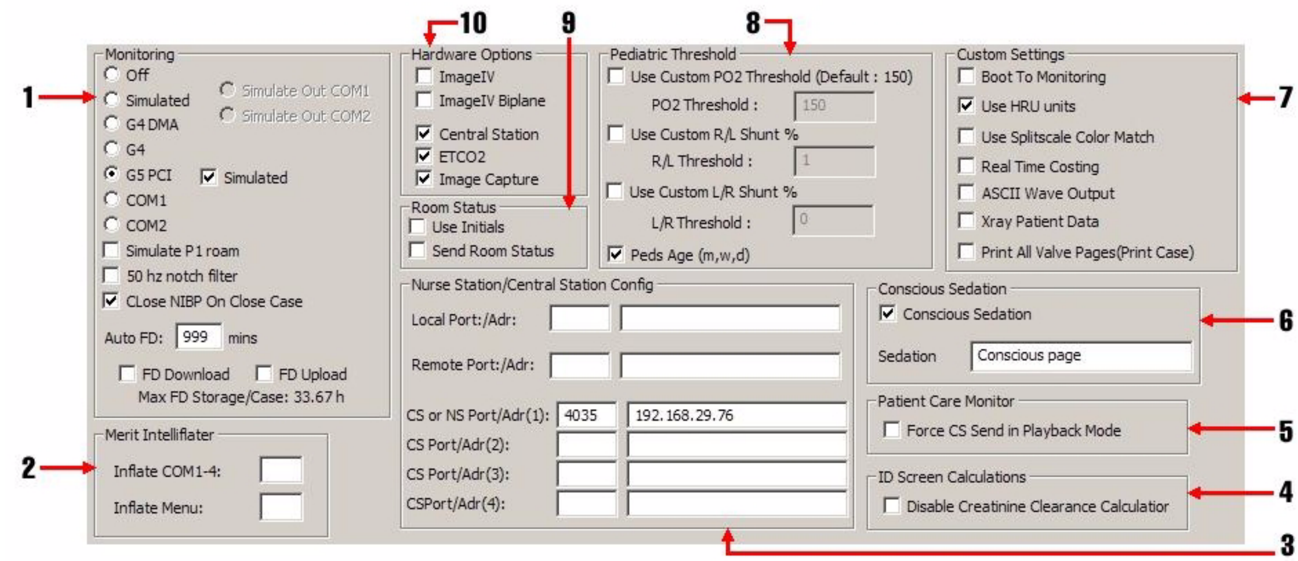
1



GE Muse Configuration Screen

Callout	Name	Use
1	GE Muse Web Interface	**Web Server Name**—Used to enter Web Server IP address (name). **Web Server Port**—Used to enter Web Server port number. **ISAPI Extension Path**—Used to enter name of ISAPI extension path. **ISAPI Extension Name**—Used to enter ISAPI extension name. **User Name**—Used to enter specific user name. **User Password**—Used to enter specific user password.

Hemodynamics Configuration Screen



Hemodynamics Configuration Screen

Callout	Name	Use
1	Monitoring	**Off**—When checked, all monitoring functions are off. **Simulated**—When checked, system displays simulated waveforms. **G4 DMA**—When checked, system monitors through DMA buffer. **G4**—When checked, system monitors through G4 PCB (older versions). **G5 PCI**—When checked, system monitors through G5 PCI. **COM1**—When checked, system monitors through COM1. **COM2**—When checked, system monitors through COM2. **Simulate P1Roam—**When checked, system cycles through simulated waveforms. **50 hz notch filte**r—When checked, activates an ECG noise reduction algorithm for accounts (non-US) that run on 50 Hz. **Close NIBP on Close Case**—When checked, system automatically closes NIBP on case exit. **Simulated Out COM1—**When checked, system displays simulated waveforms through COM1. **Simulated Out COM2—**When checked, system displays simulated waveforms through COM2. **Auto FD**—Specifies the time limit for automatic full disclosure activation. **FD Download**—Activates full disclosure download for file review. **FD Upload**—Permits full disclosure file uploading to the network.
2	Merit Intelliflator	**Inflate COM1-4—**Indicates that a Merit Intelliflator interface is present on the corresponding COM port. **Inflate—**Indicates menu number Merit Intelliflator interface reports to.

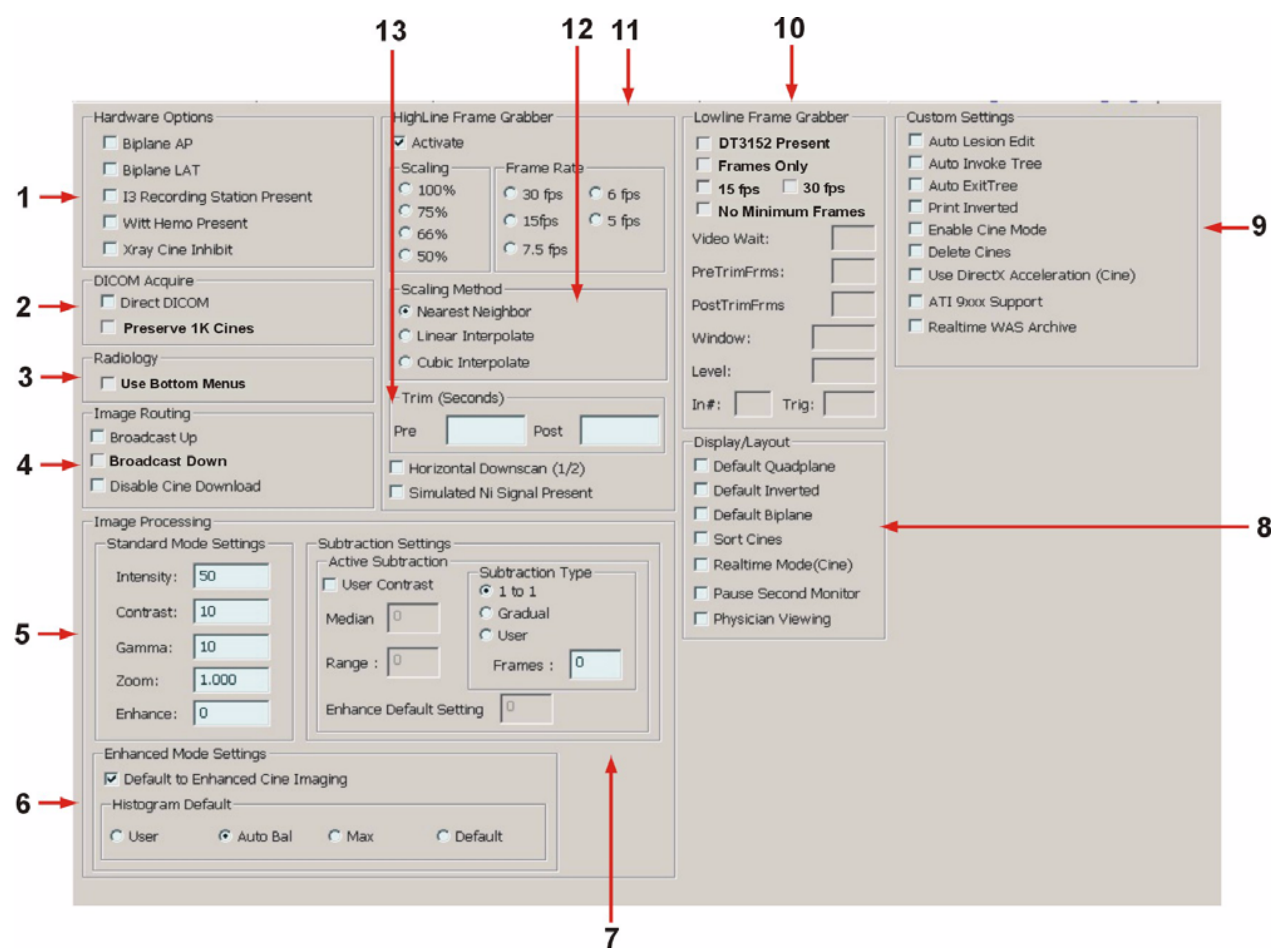
Hemodynamics Configuration Screen (continued)

Callout	Name	Use
3	Nurse Station/ Central Station Config	Lists the settings for TCP/IP ports and addresses (necessary for Host-Nurse & Central Station-Bedside functions). Port is derived as 40 plus last 2 digits of TCP/IP address (e.g., 4001 in 1st box). Allows PCMs to send to up to 4 Central Stations at once.
4	ID Screen Calculations	**Disable Creatinine Clearance Calculation**—disables Creatinine Clearance calculation for cath cases on Patient ID screen.
5	Patient Care Monitor	**Force CS Send in Playback Mode**—disables CS alarms activated by playing cine runs at bedside review stations.
6	Conscious Sedation	**Conscious Sedation—**When checked, sets vitals page to conscious sedation format. **Sedation—**Permits title change of the vitals capture page by the user.
7	Custom Settings	**Boot to Monitoring—**When checked, system displays the Waveform Monitoring screen on reboot. **Use HRU Units—**When checked, system reports venous resistance in HRU units on the hemodynamic page. **Use Splitscale Color Match—**When checked, pressure scale indicator colors match pressure wave and label colors. **Real Time Costing—**When checked, provides real-time cost of current procedure. **ASCII Wave Out—**When checked, automatically creates ASCII file of each waveform. **Xray Patient Data—**When checked, allows activation of Philips interface (demographics sent to Philips, still frames received by Witt). **Print all Valve Pages (Print Case)—**When checked, prints a valve page for any valve calculation performed. If unchecked, prints first calculation only.
8	Pediatric Threshold	**Use Custom PO2 Threshold (Default: 150)—**Provides user-defined PO2 threshold. **Use Custom R/L Shunt %—**Provides user-defined R/L shunt % threshold. **Use Custom L/R Shunt %—**Provides user-defined L/R shunt % threshold. **Peds Age—**When checked, displays age of pediatric patients in months, weeks, or days.
9	Room Status	**Use Initials** —Permits use of initials on PCMs. **Send Room Status** —When checked, sends case status to network.

Hemodynamics Configuration Screen (continued)

Callout	Name	Use
10	Hardware Options	**Image IV**—When checked, informs Series IV Host that Image IV is present and activates demographics interface (image record activated from Series IV). **Image IV Biplane**—When checked, informs Series IV Host that biplane Image IV is present and activates demographics interface (image record activated from Series IV). **Central Station**—When checked, indicates Central Station monitoring is available on Patient Care Monitors. **ETCO2**—When checked, activates End Tidal CO2 in Front End for patient monitoring. **Image Capture**—When checked, indicates that the station has image capture capability.

Cine/Angio (XA Imaging) Configuration Screen



Cine/Angio (XA Imaging) Configuration Screen

Callout	Name	Use
1	Hardware Options	**Biplane AP**—When checked, indicates that Image IV^{HL} Acquisition is AP plane of a biplane x-ray system. **Biplane LAT**—When checked, indicates that Image IV^{HL} Acquisition is LAT plane of a biplane x-ray system. **I3 Recording Station Present**—When checked, informs Image IV Acquisition that Image III is present and activates demographics interface (image record activated from Series IV). **Witt Hemo Present**—When checked, informs Image IV Acquisition that Series IV is present and activates demographics interface (image record activated from Series IV). **Xray Cine Inhibit**—When checked, activates the cine inhibit feature. X-ray system will not cine if Image IV^{HL} Acquisition is not in record mode.
2	DICOM Acquire	**Direct DICOM**—When checked, activates the Digital DICOM interface. **Preserve 1K Cines**—When checked, the system will receive and archive direct DICOM digital images in 1024 x 1024 format (requires additional storage space).
3	Radiology	**Use Bottom Menus**—When checked, moves command bars to bottom of review screens for clients, such as radiology departments, using portrait style monitors.
4	Image Routing	**Broadcast Up**—When checked, Acquisition will simultaneously write to local and network storage during image acquisition. **Broadcast Down**—When checked, review stations will automatically receive (download) images being broadcast to network during recording. **Disable Cine Download**—Used with manager stations that do not want to view cine or echo data.
5	Image Processing: Standard Mode Settings	**Intensity** —Indicates intensity level for Review screen Process toolbar. **Contrast**—Indicates default contrast level on Process toolbar. **Gamma**—Indicates default for gamma measurement on Process toolbar. **Zoom**—Indicates default for zoom level on Process toolbar. **Enhance**—Indicates default enhanced setting from -10 to +10 in standard viewing mode.
6	Enhanced Mode Settings	**Default to Enhanced Cine Imaging**—When checked, activates “enhanced” algorithm, which improves image quality. **Histogram Default—User, Auto Bal, Max, Default** allows selection of User, Auto Bal, Max, or Default as histogram adjustment default on Cine Review screen.
7	Subtraction Settings/Active Subtraction	Allows parameter settings for subtracted x-ray images received via DICOM.

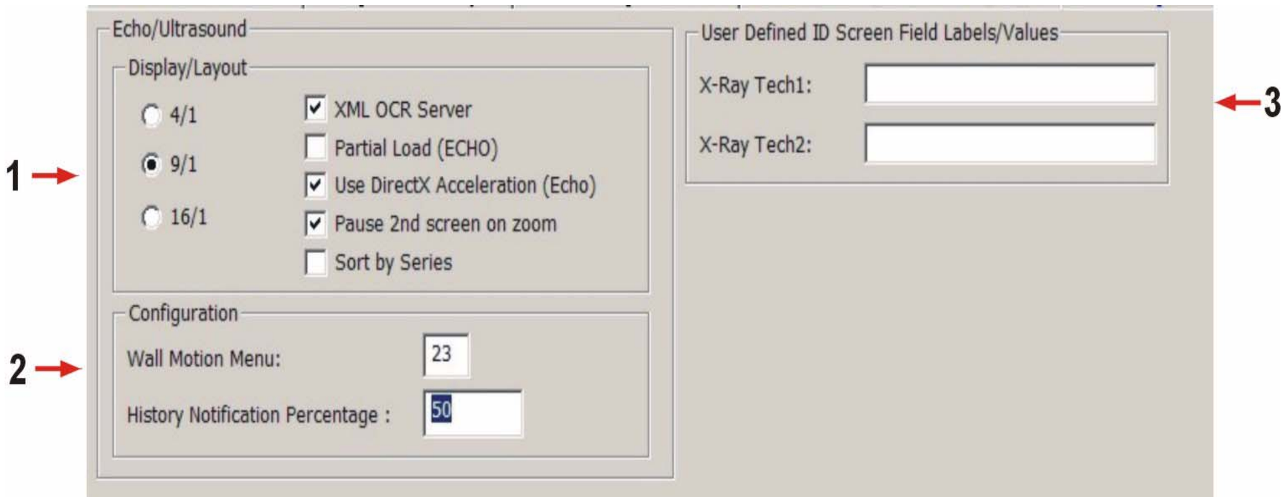
Cine/Angio (XA Imaging) Configuration Screen (continued)

Callout	Name	Use
8	Display/Layout	**Default Quadplane—**When checked, sets 4-plane display mode as default. **Default Inverted—**When checked, sets inverted image playback format as default. **Default Biplane—**When checked, sets biplane display mode as default. **Sort Cines—**When checked, sorts cines by DICOM header. **Realtime Mode (Cine)—**Plays cine at actual acquisition rate. **Pause Second Monitor—**When checked, pauses the second monitor during cine load. **No Auto Image Load—**When checked, case opens at Patient Menu, not image. **Physician Viewing—**When checked, eliminates all functions not needed for physician viewing.
9	Custom Settings	**Auto Lesion Edit—**When checked, lesion analysis screen will default to the Edit mode after a lesion is obtained. **Auto Invoke Tree—**When checked, coronary tree screen will activate for lesion placement after a lesion is obtained in the analysis screen. **Auto Exit Tree—**When checked, lesion analysis screen will activate, following the placement of a lesion in the coronary tree screen. **Print Inverted—**When checked, prints frames in inverted format. **Enable Cine Mode—**When checked, allows switch between DICOM and analog. **Delete Cines—**When checked, allows users to delete cines (normally not a recommended feature). **Use DirectX Acceleration (Cine)—**When checked, enables Direct X video support for echo/cine, providing higher frame/second playback rates (requires Direct X ver 8.1 and compatible video card) **ATI 9xxx Support—**When checked, enables system support for ATI Radeon 9800 video card. **Realtime WAS Archive—**When checked, cases will be archived to the Witt Archival System (WAS) as the case is uploaded to the net.

Cine/Angio (XA Imaging) Configuration Screen (continued)

Callout	Name	Use
10	Lowline Frame Grabber	**Activate—**Activates lowline frame grabber. **DT3152 Present—**When checked, indicates that a DT3152 PCB is installed (image Acquisition). **Frames Only—**When checked, captures images as still frames. **15 fps—**When checked, captures images at 15 frames per second. **30 fps—**When checked, captures images at 30 frames per second. **No Minimum Frames—**When checked, removes the one-second lag feature used when pre-trimming frames. Permits the capture of one-frame increments. **Video Wait**—Specifies how long Image IV^{HL} will wait to receive video signal after foot pedal activation. **PreTrimFrms—**Indicates the number of frames to trim from beginning of run when cine record is activated. **PostTrimFrms**—Indicates the number of frames to trim from end of run when cine record is terminated. **Window—**Indicates current image contrast setting. **Level—**Indicates current image brightness setting. **In #**—Indicates video card input. **Trig—**Indicates video threshold.
11	Highline Frame Grabber	**Activate**—Activates highline frame grabber. **Scaling—**Permits selection of output resolution from 50 to 100% (or DPIs of 512 x 512, 680 x 680, 768 x 768, 1K x 1K). **Frame Rate—**Permits selection of frame rate from 5 to 30 frames per second. **Scaling Method—**Permits selection of one of three algorithms for best image quality. **Trim—**Permits selection of image recording time. **Horizontal Downscan (1/2)—**Used by Witt Field Service personnel for particular x-ray equipment.**Activate—**Activates highline frame grabber. **Simulated NI Signal Present—**Used by Witt Field Service personnel for particular x-ray equipment.
12	Scaling Method	**P**ermits selection of one of three algorithms for best image quality.
13	Trim (seconds)	Permits selection of image recording time.

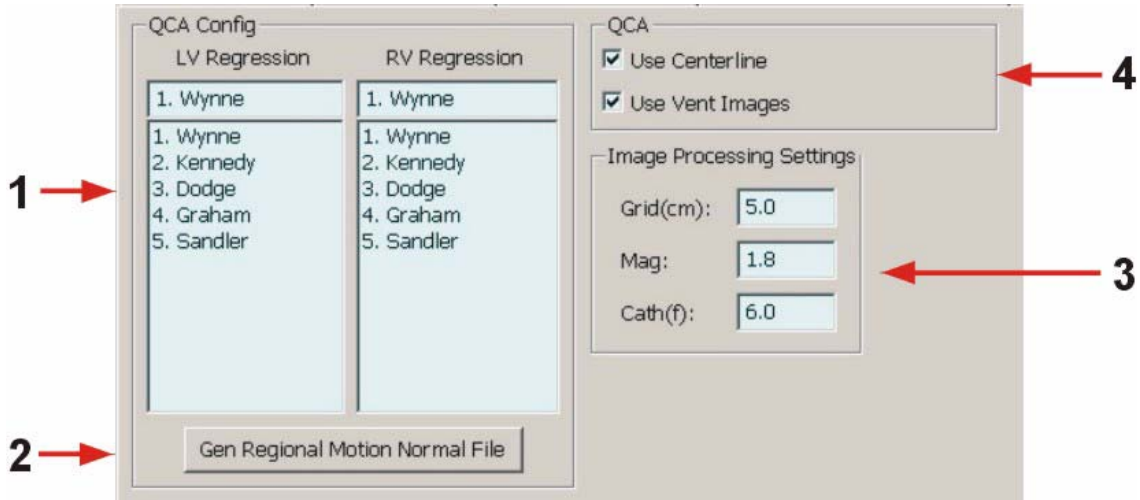
Echo (US Imaging) Configuration Screen



Echo (US Imaging) Configuration Screen

Callout	Name	Use
1	Display/Layout	**4/1**—When checked, sets Echo Review screen default to 4 images per page. **9/1**—When checked, sets default to 9 images per page. **16/1**—When checked, sets default to 16 images per page. **XML OCR Server**—When checked, enables a third-party OCR converter for echocardiology review. **Partial Load (ECHO)**—When checked, lightens processor load by displaying only key frames as run in icon mode. **Use DirectX Acceleration (Echo/Cine)—**When checked, enables Direct X video support for echo/cine, providing higher frame/second playback rates (requires Direct X ver 8.1 and compatible video card) **Pause 2nd Screen on Zoom—**When checked, improves playback rates on zoomed image. (Zooming in requires extra processing power). **Sort By Queries—**When checked, performs a second layer of sorting to echo cases, once by image number, and once by series number.
2	Configuration	**Wall Motion Menu**—Denotes the menu to be used for echo wall motion. **History Notification Percentage**—Permits the user to define the percentage of change between similar ultrasound cases before visual notification (highlighting) is activated.
3	User Defined ID Screen Field Labels/ Values	Allows users to customize labels for XRAY1 and XRAY2 fields on Patient ID screen of an echo case.

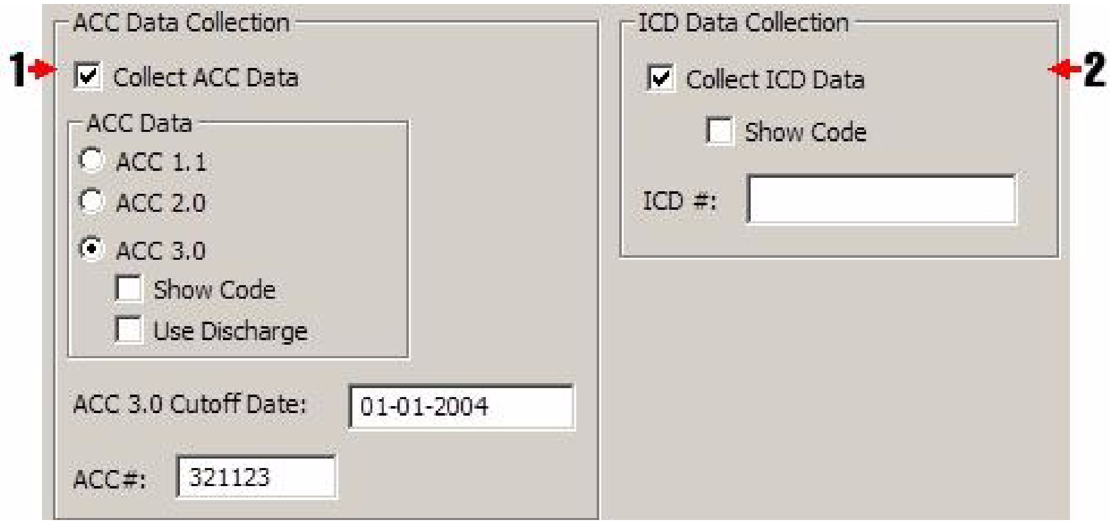
QCA Configuration Screen



QCA Configuration Screen

Callout	Name	Use
1	QCA Config	**LV Regression**—Reports left ventricular function using selected protocol. **RV Regression**—Reports right ventricular function using selected protocol.
2	Gen Regional Motion Normal File	Creates normal wall motion parameter file.
3	Image Processing Settings	**Grid(cm):**—Indicates default grid size on Review screen Process toolbar. **Mag:**—Indicates default magnification factor for lesion/ventricular analysis on Review screen Process toolbar. **Cath(f):**—Indicates default catheter French size on Process toolbar.
4	QCA	**Use Centerline**—When checked, system defaults to Centerline Analysis after ejection fraction is obtained. **Use Vent Images**—System defaults to ventricular image for printing.

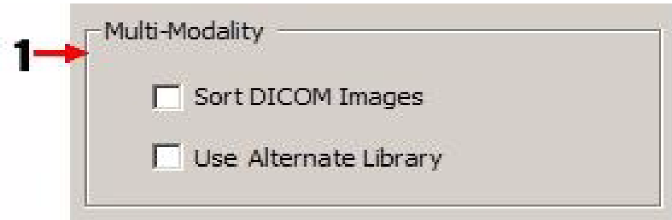
Registries Configuration Screen



ACC Configuration Screen

Callout	Name	Use
1	ACC Data Collection	**Collect ACC Data**—When checked, activates ACC data collection feature. **ACC Data radio buttons**—Allows user to choose between 3 ACC versions. **Show Code**—Displays ACC code for the HL7 interface. **Use Discharge**—Displays discharge code for the HL7 interface. **ACC Cutoff Date**—Allows user to enter cutoff date beyond version 3.0 activation date of 06/01/04. **ACC #**—Indicates facility ACC number.
2	ICD Data Collection	**Collect ICD Data**—When checked, activates ICD data collection feature. **Show Code**—Displays ICD code for the HL7 interface. **ICD #**—Indicates facility ICD number.

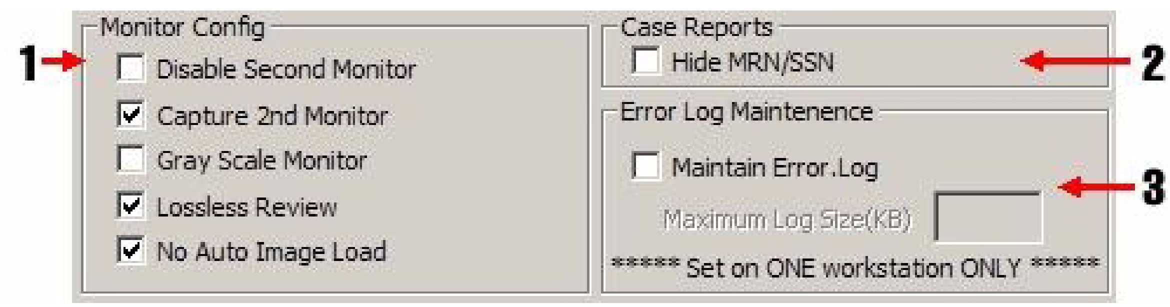
Multi Modality Configuration Screen



Multi Modality Configuration Screen

Callout	Name	Use
1	Multi-Modality	**Sort DICOM Images**—When checked, sorts DICOM CT images. **Use Alternate Library**—When checked, uses an alternate imaging library.

System Setup (Extended) Configuration Screen

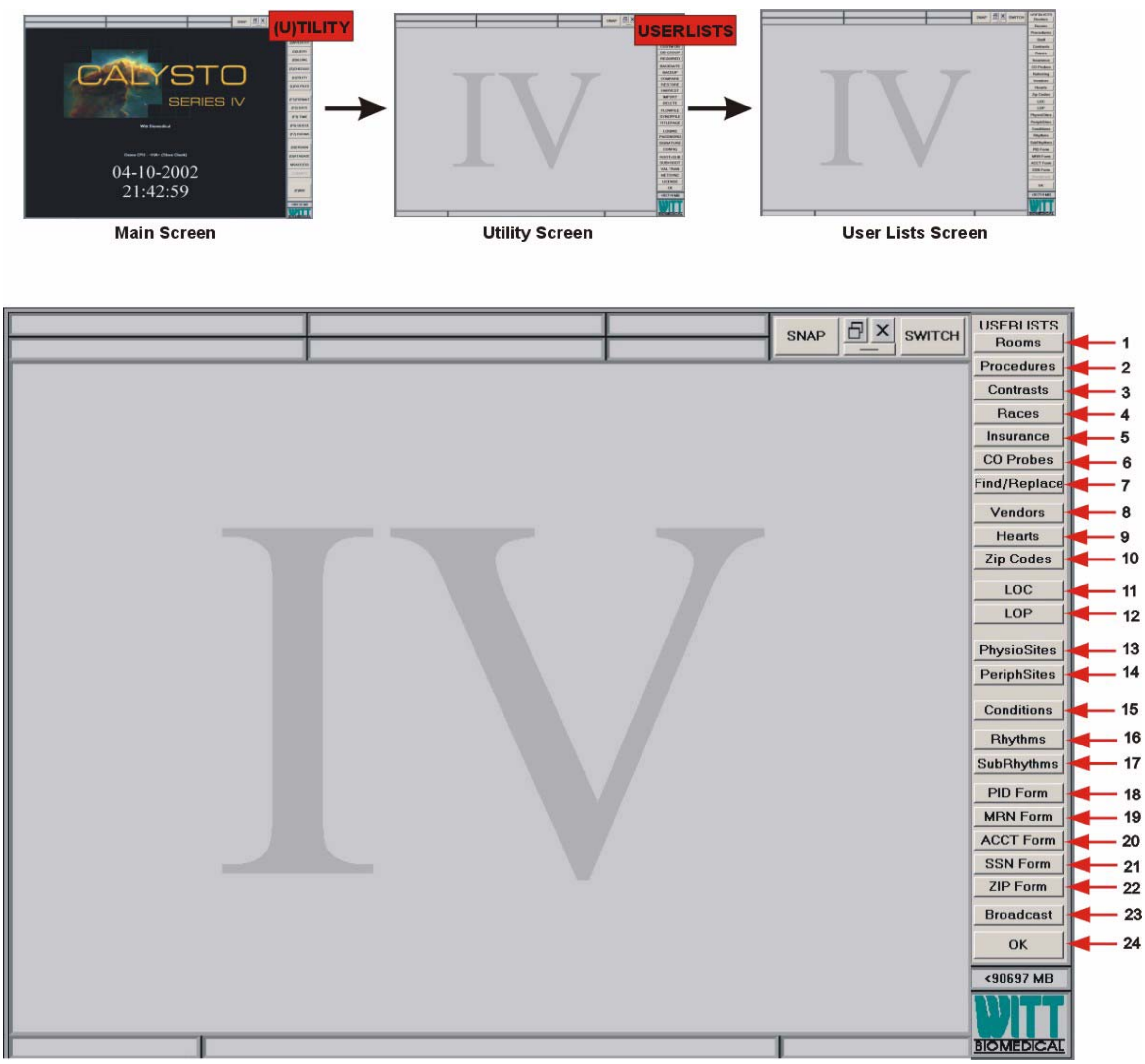


System Setup (Extended) Configuration Screen

Callout	Name	Use
1	Monitor Config	**Disable Second Monitor**—For stations using dual-head video cards—when checked, the second port on the video card is disabled. **Capture 2nd Monitor**—When checked, display is spread over two screens. **Gray Scale Monitor**—Permits the use of a gray scale display monitor. **Lossless Review**—Allows hemo stations to review cine images. **No Auto Image Load**—When checked, case opens at Patient Menu, not image.
2	Case Reports	**Hide MRN/SSN**—When checked, MRN and SSN print on ID page as asterisks.
3	Error Log Maintenance	**Maintain Error Log**—When checked, limits the size of the ERRORS.LOG file. **Maximum Log Size (KB)**—Enter the maximum file size in kilobytes.

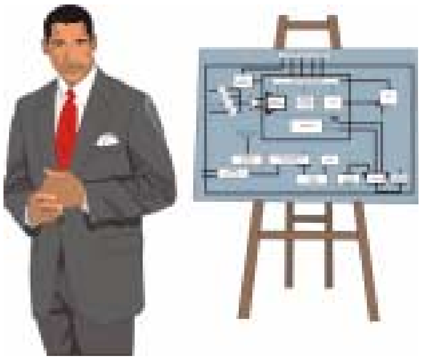
User Lists

After the Configuration screen is completed, press [(ESC)EXIT] twice to return to the Main screen. From there, access the User Lists screen through the Utility screen, as illustrated. The User Lists screen contains 25 function buttons. Clicking a function button activates the secondary screen of the user list controlled by that button. Individual user lists must be completed as required for each client. The User Lists screen is shown below with callouts. Individual user lists are described in the table on the following page.



User Lists Function Buttons

Callout	Section	Use
1	Rooms	Opens user list for names and number of labs.
2	Procedures	Opens user list for procedures to be performed.
3	Contrasts	Opens user list for contrast types.
4	Races	Opens user list for races.
5	Insurance	Opens user list for insurance types.
6	CO Probes	Opens user list for cardiac output probes.
7	Find/Replace	Opens Find/Replace list which permits text searches up to a maximum of 30 characters.
8	Vendors	Opens user list for vendors—available in Inventory module.
9	Hearts	Opens user list for heart bitmaps—available on hemodynamic page.
10	Zip Codes	Opens user list for zip codes.
11	LOC	Opens user list for level of consciousness.
12	LOP	Opens user list for level of pain.
13	PhysioSites	Opens user list for cardiac site labels.
14	PeriphSites	Opens user list for peripheral site labels.
15	Conditions	Opens user list for hemodynamic conditions.
16	Rhythms	Opens user list for ECG rhythms.
17	SubRhythms	Opens user list for ECG subrhythms or modifiers.
18	PID Form	Opens user list for Patient ID format—on Patient ID screen.
19	MRN Form	Opens user list for medical record number format—on Patient ID screen.
20	ACCT Form	Opens user list for account number format—on Patient ID screen.
21	SSN Form	Opens user list for social security number format—on Patient ID screen.
22	ZIP Form	Opens ZIP Code Format screen.
23	Broadcast	Opens user list for broadcast station selection.
24	OK	Closes User Lists screen, opens Utility screen.



Chapter 4:

Theory of Operation

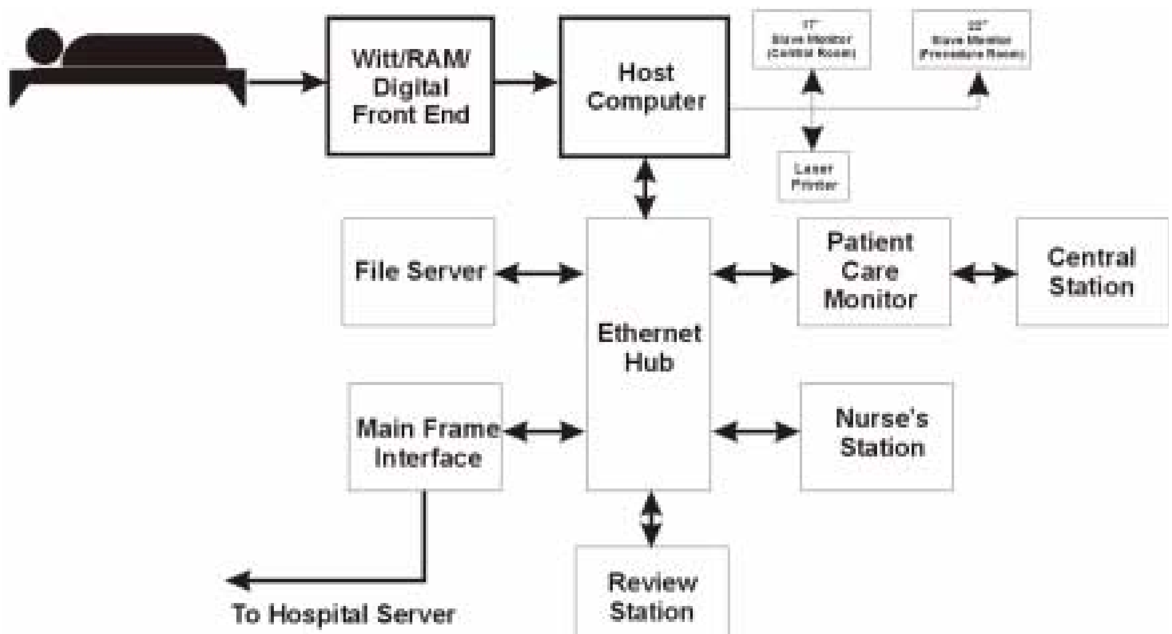
About the Chapter

In this chapter we present as much information as we can about the inner workings of the CALYSTO Series IV so that you'll be able to troubleshoot it more knowledgeably. We begin with an overview of the entire system, then describe the workings of each of the system's components. Proprietary information must obviously be excluded.

Overall Functional Description

The CALYSTO Series IV Physiomonitoring and Information System acquires, analyzes, manipulates, and displays cath lab procedural and record-keeping data. It consists of a Host computer and a proprietary Front End Signal Acquisition Unit connected together via Ethernet cabling. Analog patient data enters and is processed in the Front End. The signals are then combined and digitized, and routed into the system through a proprietary G4 or G5 PCB on the Host computer, as shown on the following page. The system uses one of three Front Ends: the Witt Digital Front End, the Witt Front End, or the older RAM Front End. All are described later.

The flow diagram on the following page is representative of all three versions of Front Ends.



Primary Signal Flow (Witt Digital Front End)

Refer to the block diagram on the following page.

Surface Body Temp, Pressure, and Cardiac Output

The Surface Body Temp, Pressure, and Cardiac Output signals input directly to the Pressure Temperature board. The signals are filtered and amplified, then routed via a pass-through bus into the S5 PCB. In the S5 the signals are multiplexed with the other patient signals, digitized, and sent to the G5 PCB in the Host over a Category 5 signal cable.

Respiration and ECG

The Respiration and ECG signals input directly to the 12-Lead DSP PCB. The signals are filtered and amplified, then routed into the S5 PCB. In the S5 they're multiplexed with the other patient signals, digitized, and sent to the G5 PCB in the Host over a Category 5 signal cable.

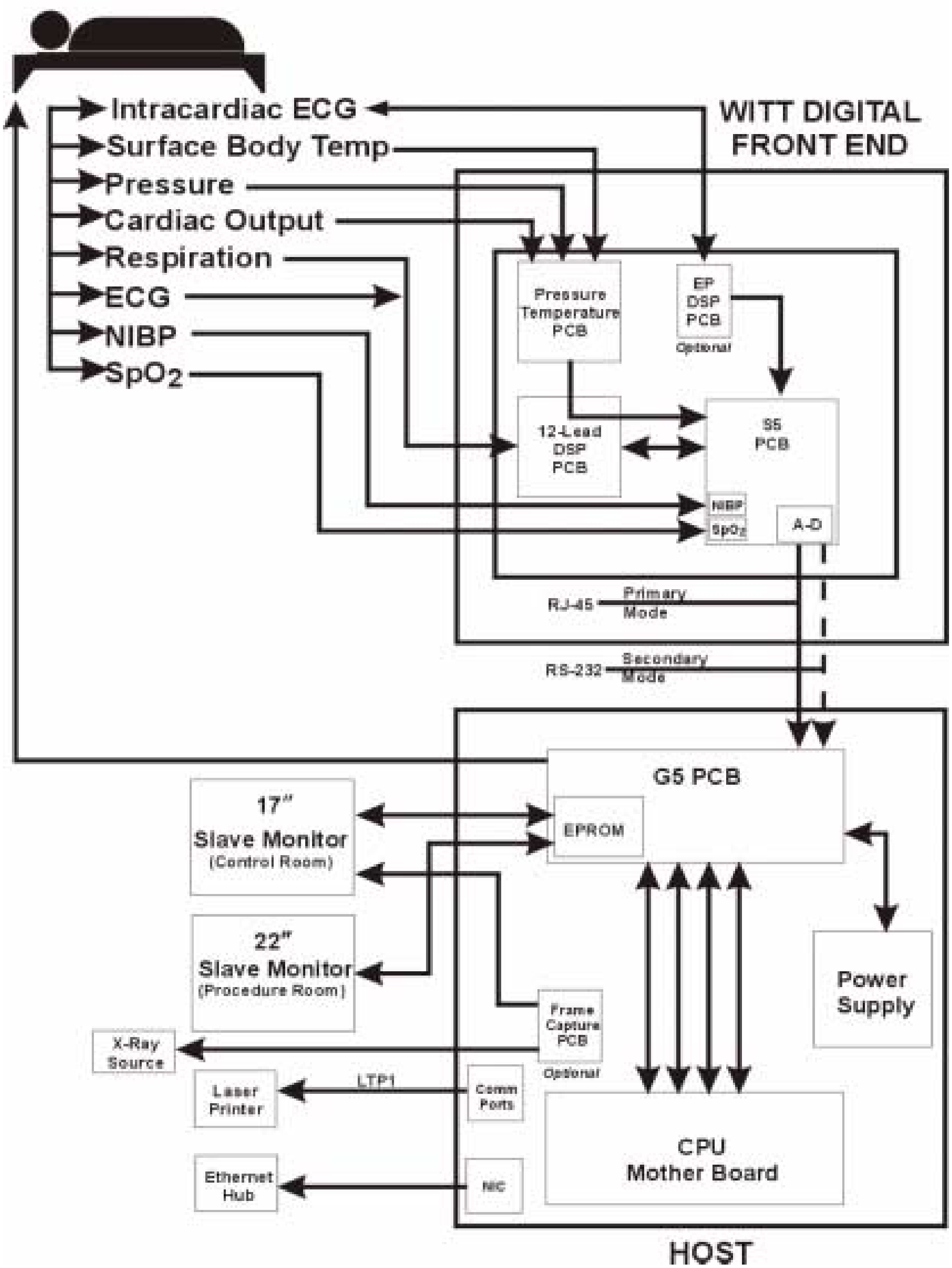
NIBP, SpO_2, and $ETCO_2$

The NIBP, SpO_2, and $ETCO_2$ signals input directly into their own modules within the Front End case. Signals are then sent to the S5 PCB where they're filtered and amplified, then multiplexed with other patient signals, digitized, and sent to the G5 PCB in the Host over a Category 5 signal cable.

First generation Witt and RAM Front Ends are not compatible with the G5 Host.

Host

Patient signals arrive in the G5 PCB, where they're demultiplexed before being routed to the Host CPU. The G5 PCB is actually another computer that resides in and gets its power from the Host. It has its own CPU and RAM. It provides a video output for both the 17″ and 22″ slave monitors. Its main purpose, though, is to provide an interface between the Front End and the Host, which communicates with the rest of the system through the Ethernet.



Primary Signal Flow (Witt Front End)

Refer to the block diagram on the following page.

Surface Body Temp, Pressure, and Cardiac Output

The Surface Body Temp, Pressure, and Cardiac Output signals input directly to the Pressure Daughter board, which is attached to the 12-lead ECG PCB. The signals are filtered and amplified, then routed via a pass-through bus into the S4 PCB. In the S4 the signals are multiplexed with the other patient signals, digitized, and sent to the G4 PCB in the Host over a Category 5 signal cable.

Respiration and ECG

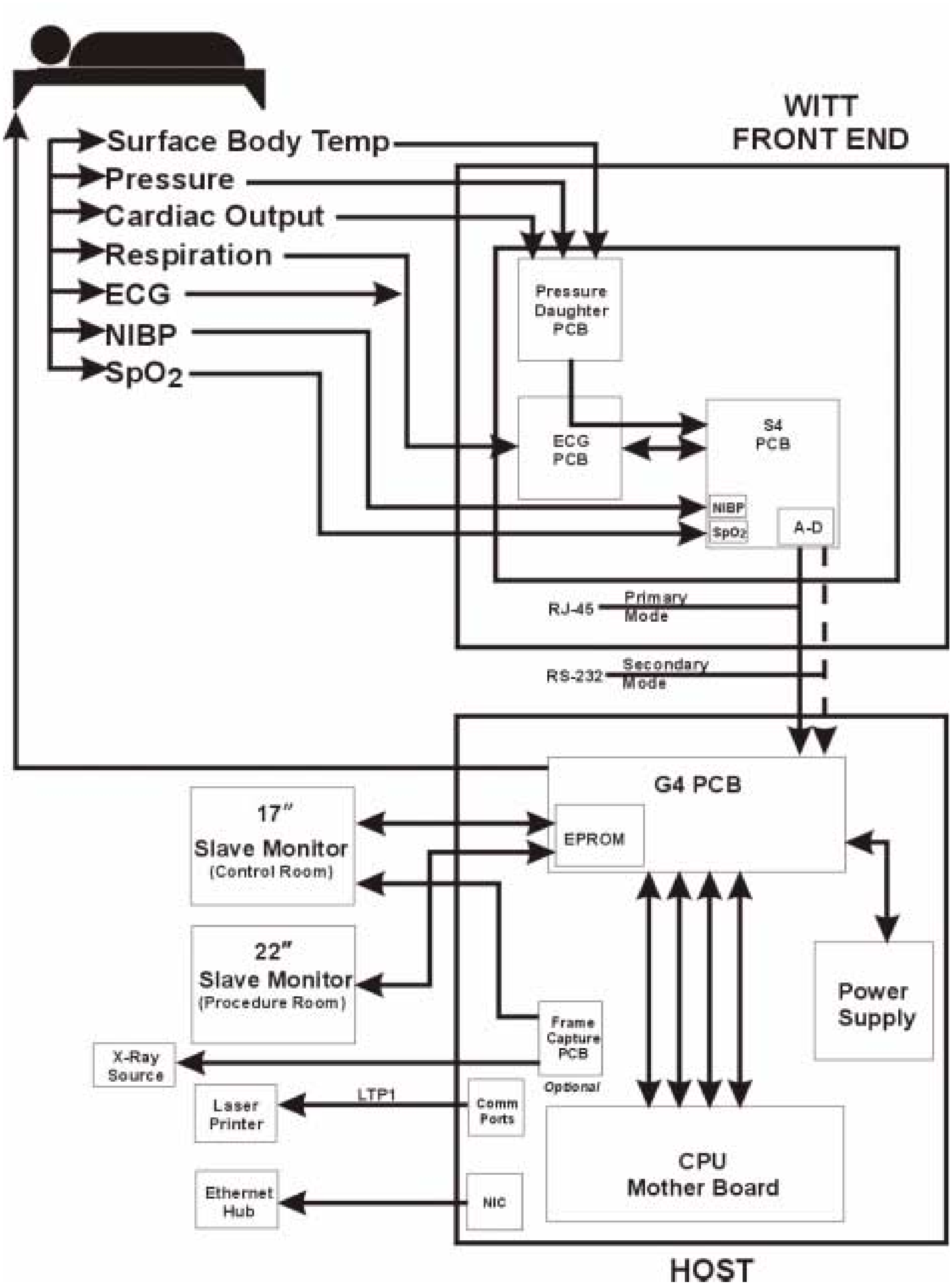
The Respiration and ECG signals input directly to the ECG PCB. The signals are filtered and amplified, then routed into the S4 PCB. In the S4 they're multiplexed with the other patient signals, digitized, and sent to the G4 PCB in the Host over a Category 5 signal cable.

NIBP and SpO_2

The NIBP and SpO_2 signals input directly into their own modules in the S4 PCB. Here they're filtered and amplified, then multiplexed with other patient signals, digitized, and sent to the G45 PCB in the Host over a Category 5 signal cable.

Host

Patient signals arrive in the G4 PCB, where they're demultiplexed before being routed to the Host CPU. The G4 PCB is actually another computer that resides in and gets its power from the Host. It has its own CPU and RAM. It provides a video output for both the 17″ and 21″ slave monitors. Its main purpose, though, is to provide an interface between the Front End and the Host, which communicates with the rest of the system through the Ethernet.


WITT
FRONT END
Surface Body Temp
Pressure
Cardiac Output
Respiration
ECG
NIBP
SpO2
Pressure Daughter PCB
ECG PCB
S4 PCB
NIBP
SpO2
A-D
RJ-45
Primary Mode
RS-232
Secondary Mode
G4 PCB
EPROM
17" Slave Monitor (Control Room)
22" Slave Monitor (Procedure Room)
Frame Capture PCB
Optional
X-Ray Source
Laser Printer
LTP1
Comm Ports
Ethernet Hub
NIC
CPU Mother Board
Power Supply
HOST

Primary Signal Flow (RAM Front End)

Refer to the block diagram on the following page.

Surface Body Temp, Pressure, and Cardiac Output

Pressure, Cardiac Output, and Surface Body Temp signals input directly to the Pressure PCB, which is connected to the Filter PCB via a ribbon cable. The signals are amplified in the Pressure PCB and are then routed into the Filter PCB for filtering. After filtering, the signals go into the S4 PCB where they're multiplexed with the other patient signals, digitized, and then sent to the G4 PCB in the Host.

Respiration and ECG

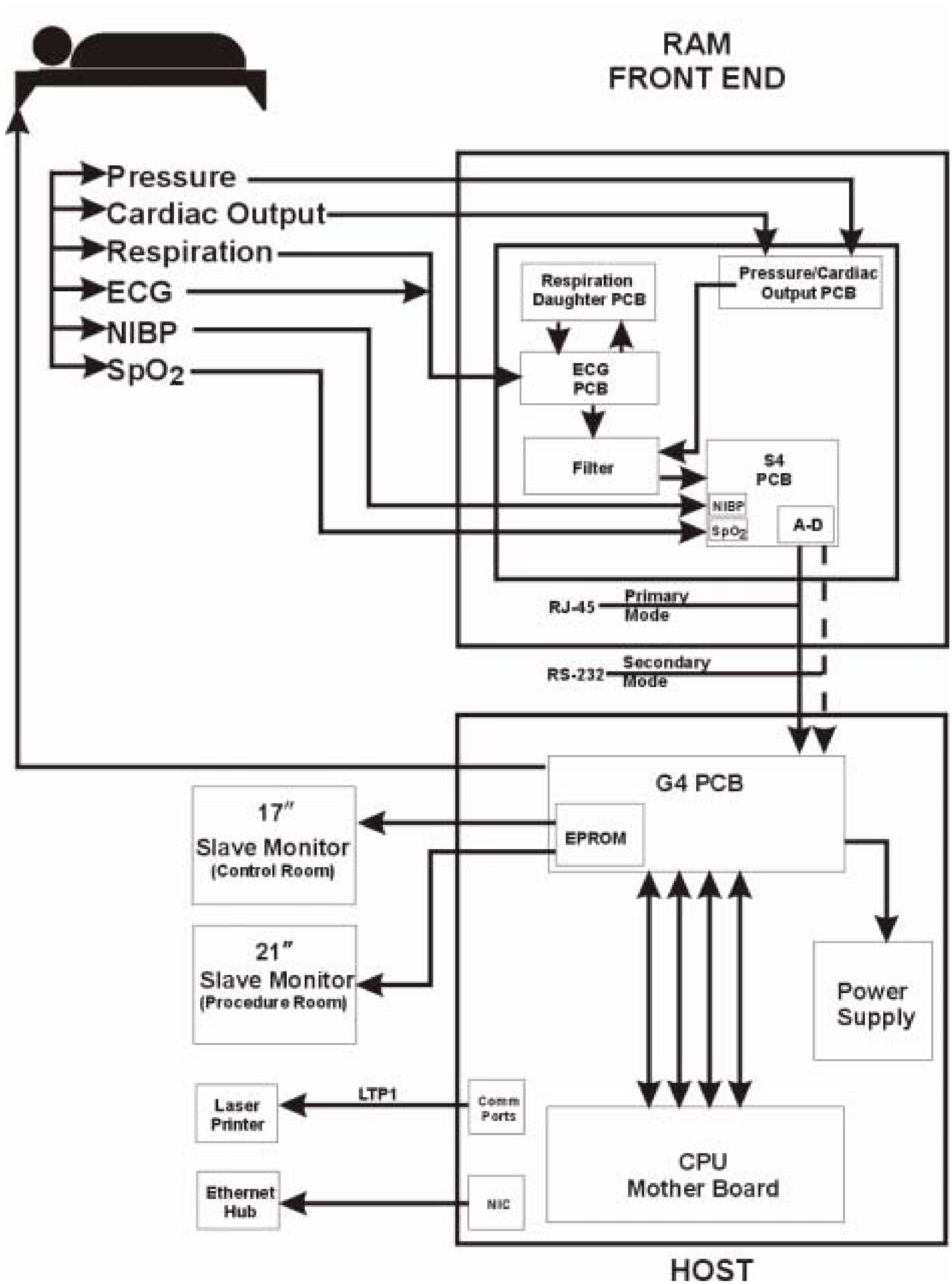
Respiration and ECG signals input directly into the Respiration PCB and ECG PCB respectively. The ECG signal is amplified on the ECG board. The Respiration signal goes into the Respiration Daughter card for processing and then returns to the ECG PCB. Both signals are then sent into the Filter PCB for filtering, and are then routed into the S4 PCB. In the S4 they're multiplexed with the other patient signals, digitized, and sent to the G4 PCB in the Host.

NIBP and SpO_2

NIBP and SpO_2 signals input directly into their own modules in the S4 PCB. Here they're filtered and amplified, then multiplexed with other patient signals, digitized, and sent to the G4 PCB in the Host.

Host

Patient signals arrive in the G4 PCB, where they're demultiplexed before being routed to the Host CPU. The G4 PCB is actually another computer that resides in and gets its power from the Host. It has its own CPU and RAM. It provides a video output for both the 17″ and 22″ slave monitors. Its main purpose, though, is to provide an interface between the Front End and the Host, which communicates with the rest of the system through the Ethernet.

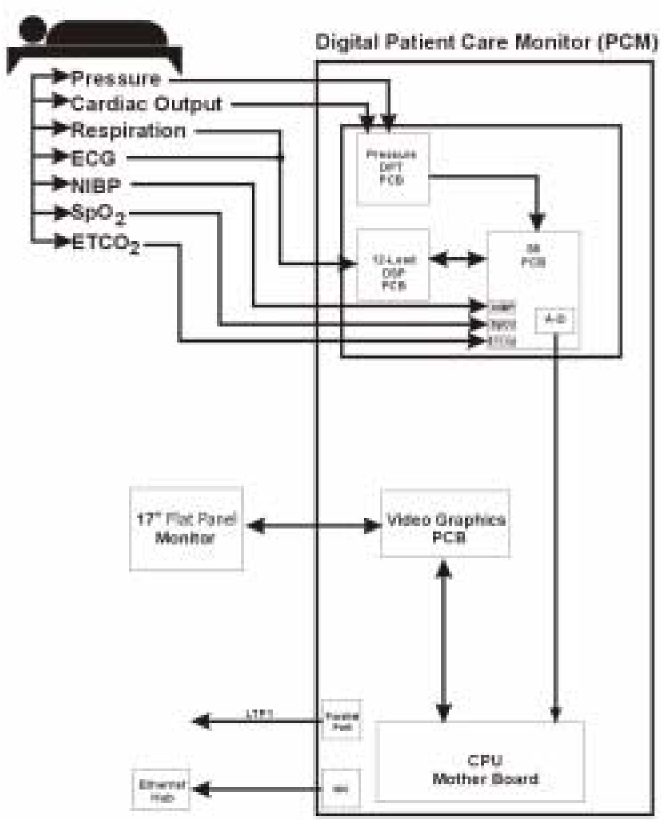


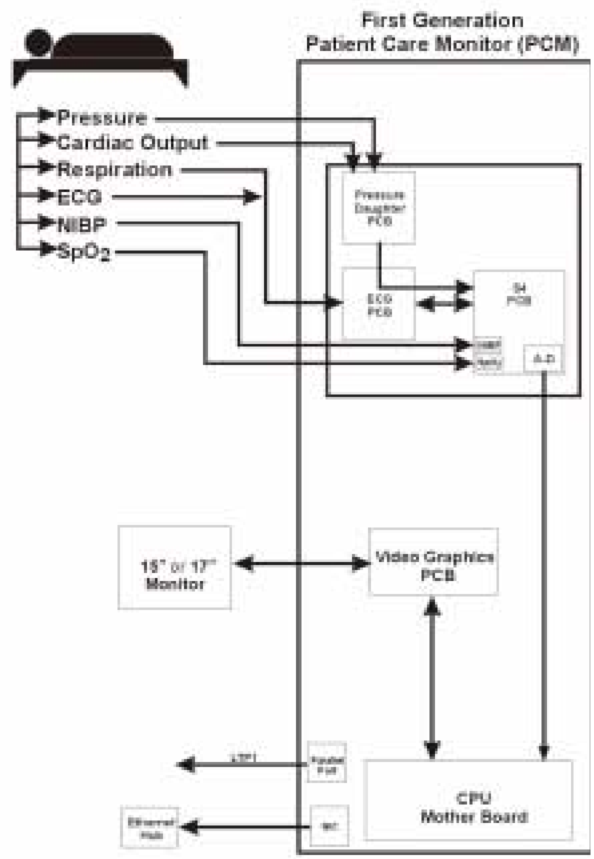
RAM
FRONT END
Pressure
Cardiac Output
Respiration
ECG
NIBP
SpO2
Respiration Daughter PCB
Pressure/Cardiac Output PCB
ECG PCB
Filter
S4 PCB
NIBP
SpO2
A-D
RJ-45
Primary Mode
RS-232
Secondary Mode
G4 PCB
EPROM
17" Slave Monitor (Control Room)
21" Slave Monitor (Procedure Room)
Power Supply
Laser Printer
LTP1
Comm Ports
Ethernet Hub
NIC
CPU Mother Board
HOST

Primary Signal Flow Patient Care Monitor (PCM), Digital and 1st Generation

Refer to the block diagrams below.

Patient vital signals are multiplexed in the S4/S5 PCB, digitized in the A-D converter, and routed to the mother board. In the mother board they're processed and sent through the video graphics PCB for display on a 15" or 17" monitor.





Circuit Board Description (Witt Digital Front End and Digital PCM)

12-Lead DSP PCB

The 12-lead DSP PCB receives analog input from the 12-lead ECG harness attached to the patient. The PCB calculates respirations using the RA to LL lead wires, and measures the resistance across the chest to determine rise and fall of the chest wall. The analog signal is then sent to the S5 PCB for digitizing and communication to the Host CPU. The output of the signals to the S5 PCB takes place at JP2. There is also a connector located at JP3 for analog output of the Lead II ECG signal.

Pressure DPT PCB

The Witt Pressure DPT PCB receives analog input stimulation from the pressure transducers. A transducer is attached to the Front End and provides stimulation for the pressure waveform. The input invasive pressure waveform is processed and sent to the S5 PCB for digitizing. The Pressure Temperature PCB also provides cardiac output stimulation via a Baxter Cardiac Output cable and transducer. The excitation is processed on the Pressure PCB and sent to the Host CPU for calculation and waveform curve representation at the display monitor. No cardiac output calculation is performed on the Pressure PCB.

S5 PCB

The S5 PCB interfaces with the G5 PCB in the Host CPU for communications of the pressure waveforms, ECG waveforms, NIBP output data, SpO_2 data, and $ETCO_2$ data. The S5 PCB collects the ECG and pressure analog signals, digitizes and combines them, and transmits the combined signal to the G5 PCB via the Cat-5 cable identified by the RJ-45 connector. The Cat-5 cable is the primary channel for communications. In the event of Cat-5 failure, the S5 PCB has a secondary means of communication via the RS-232 cable. NIBP, SpO_2, and $ETCO_2$ data are packaged and transmitted in the same manner. The NIBP and $ETCO_2$ are the only components in the Front End that require two-way communication.

NIBP Module

The NIBP module is sourced from CAS Medical Systems, Inc. or SunTech. For a detailed description of the PCB refer to the manufacturer’s documentation (provided by manufacturer upon request).

SpO_2 Module

The SpO_2 module is sourced from Tyco/Nellcor. For a detailed description of the PCB refer to the manufacturer’s documentation (provided by the manufacturer upon request).

$ETCO_2$ Module

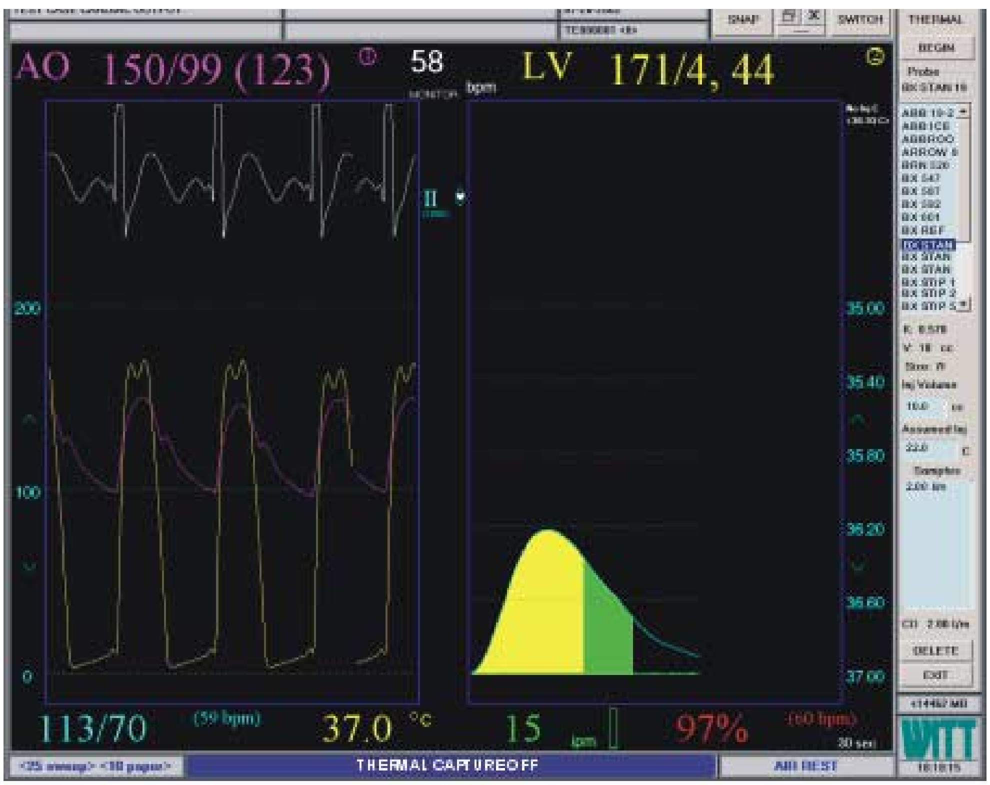
The $ETCO_2$ module is sourced from Novemetrix. For a detailed description of the PCB refer to the manufacturer’s documentation (provided by the manufacturer upon request).

G5 PCB

The G5 PCB is best described as a second motherboard in the Host CPU. It communicates with the S5 PCB in the Digital Front End and displays live waveform data to the slave monitors. It also interfaces with the main motherboard in the Host CPU to integrate waveform signals, ECG signals, NIBP, SpO_2, and $ETCO_2$ data to the Witt database for display in the patient's procedure record. The G5 PCB is the brain of the Front End.

Cardiac Output Circuit

The cardiac output circuit works by sensing a positive-going temperature waveform from the catheter thermistor after starting the thermal acquisition sequence. Once the "BEGIN" button is depressed, the baseline temperature is forced to assume 37C. The circuit then waits 30 seconds for input of the injectate as registered against a comparator network. The comparator circuit is constantly measuring the temperature during this 30-second period to sense any temperature variation outside 37C +/- 0.02C. Once the temperature breaks this threshold, the volume begins to register against a known cardiac volumetric curve. The curve represents the injectate cooling and subsequent blood warming at the thermistor site, as shown in the following graphic.



The waveform is statistically calculated based on a theoretical assumption of the shape of the waveform with reference to the mean bath temperature during this period of time. This allows for a quicker calculation and display of the cardiac volume in liters per minute as the waveform is returning to baseline. The delivery of the cardiac output data in a timely manner is important for quicker clinical response.

Circuit Board Description (Witt First Generation Front End and PCM)

ECG PCB

The 12-lead ECG PCB receives analog input from the 12-lead ECG harness attached to the patient. The PCB calculates respirations using the RA to LL lead wires, and measures the resistance across the chest to determine rise and fall of the chest wall. The analog signal is then sent to the S4 PCB for digitizing and communication to the Host CPU. The Witt 12-lead ECG PCB provides for power and signal pass-through of the Witt Pressure Daughter PCB at JP1. The output of the signals to the S4 PCB takes place at JP2. There is also a 2-pin connector located at JP3 pins 3 and 4 for analog output of the Lead II ECG signal.

Pressure Daughter PCB

The Witt Pressure Daughter PCB receives analog input stimulation from the 4-channel pressure harness. A transducer is attached to the harness and provides stimulation for the pressure waveform. The input invasive pressure waveform is processed and sent to the S4 PCB for digitizing via the Witt 12-lead pass-through circuitry. The Pressure daughter PCB also provides cardiac output stimulation via a Baxter Cardiac Output cable and transducer. The excitation is processed on the Pressure PCB and sent to the Host CPU for calculation and waveform curve representation at the display monitor. No cardiac output calculation is performed on the Pressure PCB.

S4 PCB

The S4 PCB interfaces with the G4 PCB in the Host CPU for communications of the pressure waveforms, ECG waveforms, NIBP output data, and SpO_2 data. The S4 PCB collects the ECG and pressure analog signals, digitizes and combines them, and transmits the combined signal to the G4 PCB via the Cat-5 cable identified by the RJ-45 connector. The Cat-5 cable is the primary channel for communications. In the event of Cat-5 failure, the S4 PCB has a secondary means of communication via the RS-232 cable. NIBP and SpO_2 data are packaged and transmitted in the same manner. The NIBP is the only component on the S4 PCB that requires two-way communication.

NIBP Module

The NIBP module is sourced from CAS Medical Systems, Inc. and/or Suntech. For a detailed description of the PCB refer to the manufacturer's documentation (provided by manufacturer upon request).

SpO_2 Module

The SpO_2 module is sourced from Tyco/Nellcor. For a detailed description of the PCB refer to the manufacturer's documentation (provided by the manufacturer upon request).

G4 PCB

The G4 PCB is best described as a second motherboard in the Host CPU. It communicates with the S4 PCB in the Front End and displays live waveform data to the slave monitors. It also interfaces with the main motherboard in the Host CPU to integrate waveform signals, ECG signals, NIBP, and SpO_2 data to the Witt database for display in the patient's procedure record. The G4 PCB is the brain of the Front End.

Circuit Board Description (RAM Front End)

ECG PCB

The RAM 12-lead ECG PCB receives analog input from the 12-lead ECG harness attached to the patient. The signal is processed by the Filter PCB and sent to the S4 PCB for digitizing and communication to the Host CPU. The RAM 12-lead ECG provides for power and signal pass-through of the RAM Respiration Daughter PCB. The output of the signal to the S4 PCB takes place at JP101.

Respiration Daughter PCB

The RAM respiration PCB receives signal from the RAM 12-lead ECG PCB using the RA to LL lead wires. It measures the resistance across the chest to determine the rise and fall of the chest wall. This analog signal is returned to the RAM 12-lead ECG PCB, and then sent to the S4 PCB via the filter board for digitizing and communication to the Host CPU.

Pressure PCB

The RAM Pressure PCB receives analog input stimulation from the 4-channel pressure harness. The transducer is attached to the harness and provides stimulation for the pressure waveform. The input invasive pressure waveform is processed and sent to the S4 PCB for digitizing via the RAM filter board. The RAM pressure board also provides for cardiac output stimulation via a Baxter Cardiac Output cable and transducer. The excitation is processed on the Pressure Daughter PCB and sent to the Host CPU for calculation and waveform curve representation at the display monitor. No cardiac output calculation is performed on the Pressure PCB. The output signal is from J101 to the RAM Filter PCB.

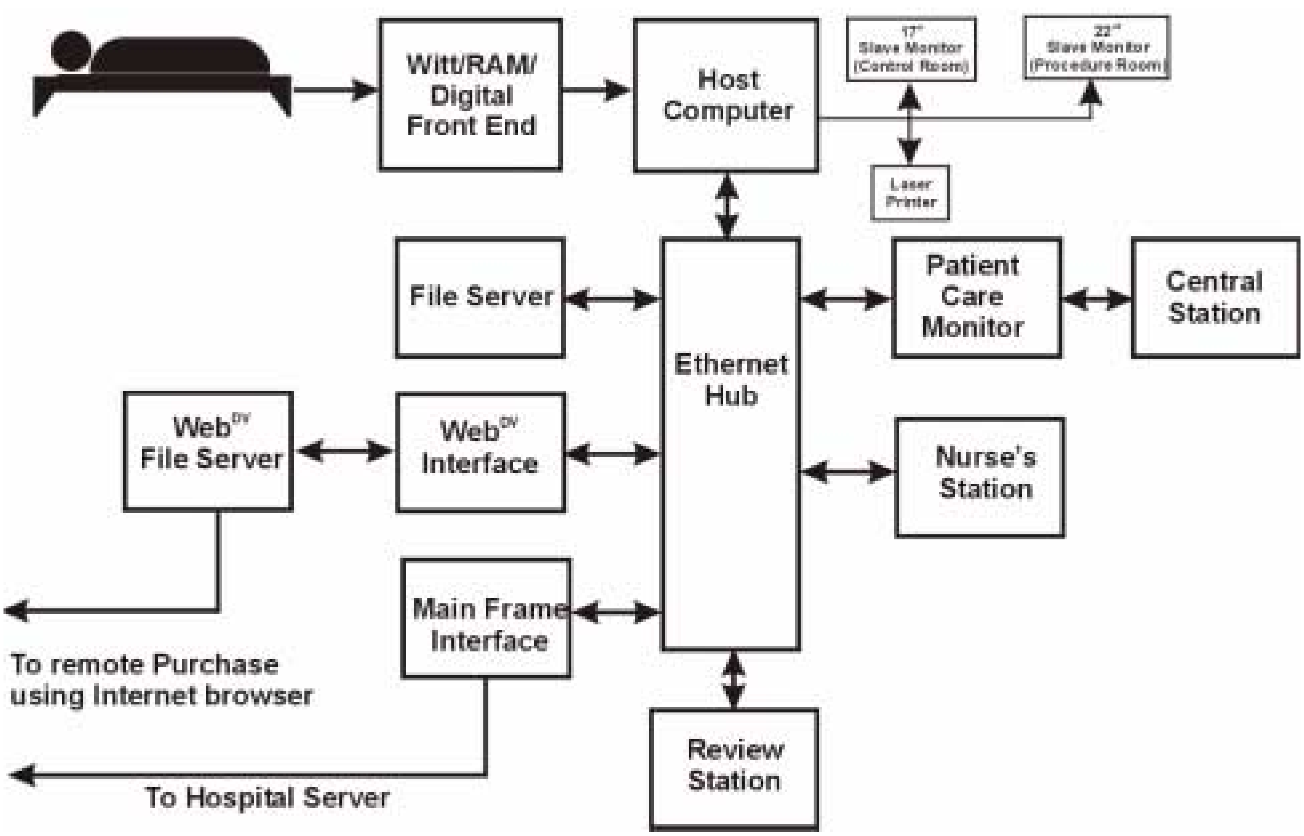
Filter PCB

The RAM Filter PCB provides for integration of the pressure waveform and ECG signals. It provides filtering and transmits the signals to the S4 board for digitizing. There is also a 2-pin connector located at L11 pins 1 and 2 for analog output of the ECG signal. The filter board receives input from the RAM 12-lead ECG PCB at J101 via internal ribbon cable. It receives input from the RAM Pressure PCB at J103 via internal ribbon cable.

Optional Features

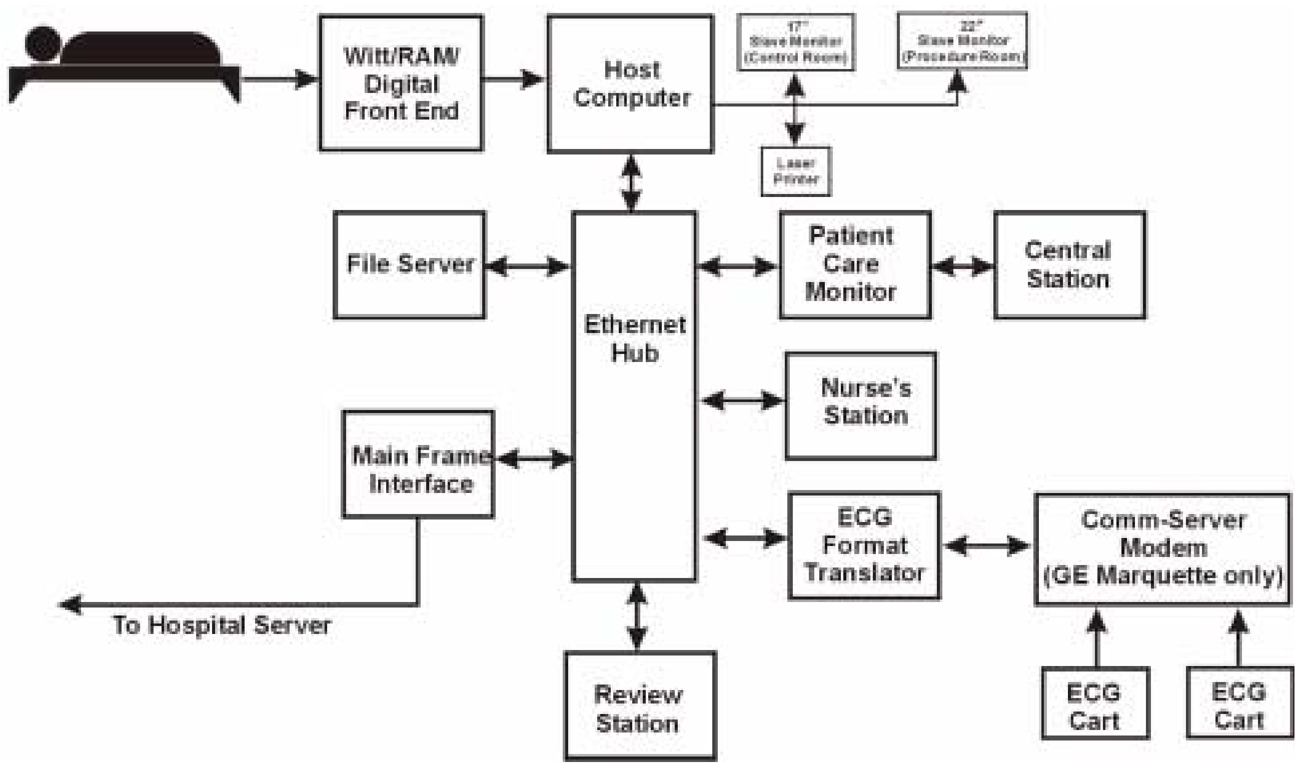
Web^{DV} Overall Functional Description

CALYSTO Web^{DV} allows all clinical and waveform data acquired by the CALYSTO Series IV Physiomonitoring and Information System to be viewed over a hospital intranet or the Internet using standard web browsers (e.g., Internet Explorer). Web^{DV} consists of an interface computer that copies data from the Series IV file server into a web-friendly format (e.g., JPEG images, SQL database) and stores it on a dedicated web file server. The Web^{DV} application is HIPAA compatible and controls access to the data to authorized users only.



ECG Management Overall Functional Description

CALYSTO ECG Management receives and stores resting stress and Holter ECG data from source ECG carts and recording devices. ECGs are transferred from the source in a proprietary digital format to a DataMed format translator which converts the ECGs to a binary “Witt Biomedical” format. ECG data is transferred from the source device to the format translator by modem, floppy disk, or serial transfer. ECG waveforms, patient demographics, measurements, and interpretive statements generated by the source device are stored in the CALYSTO database. Users may review ECGs, edit data, and confirm and print reports.



Chapter 5: Troubleshooting

As engineers and technicians, most of you have developed your own special methods for troubleshooting, but they all revolve around the principle of fault isolation—determining a problem's cause by narrowing the field of probability. We've designed the troubleshooting chapter with that in mind.

We start with a troubleshooting table that contains a list of symptoms and their possible causes. The last column of the table lists corrective action or directs you to a flowchart designed to help you isolate the problem to the lowest replaceable unit (LRU). Chapter 6 contains procedures for replacing LRUs.

The troubleshooting table is followed by a table that identifies each flowchart by number and title and directs you to the page on which the chart can be found.

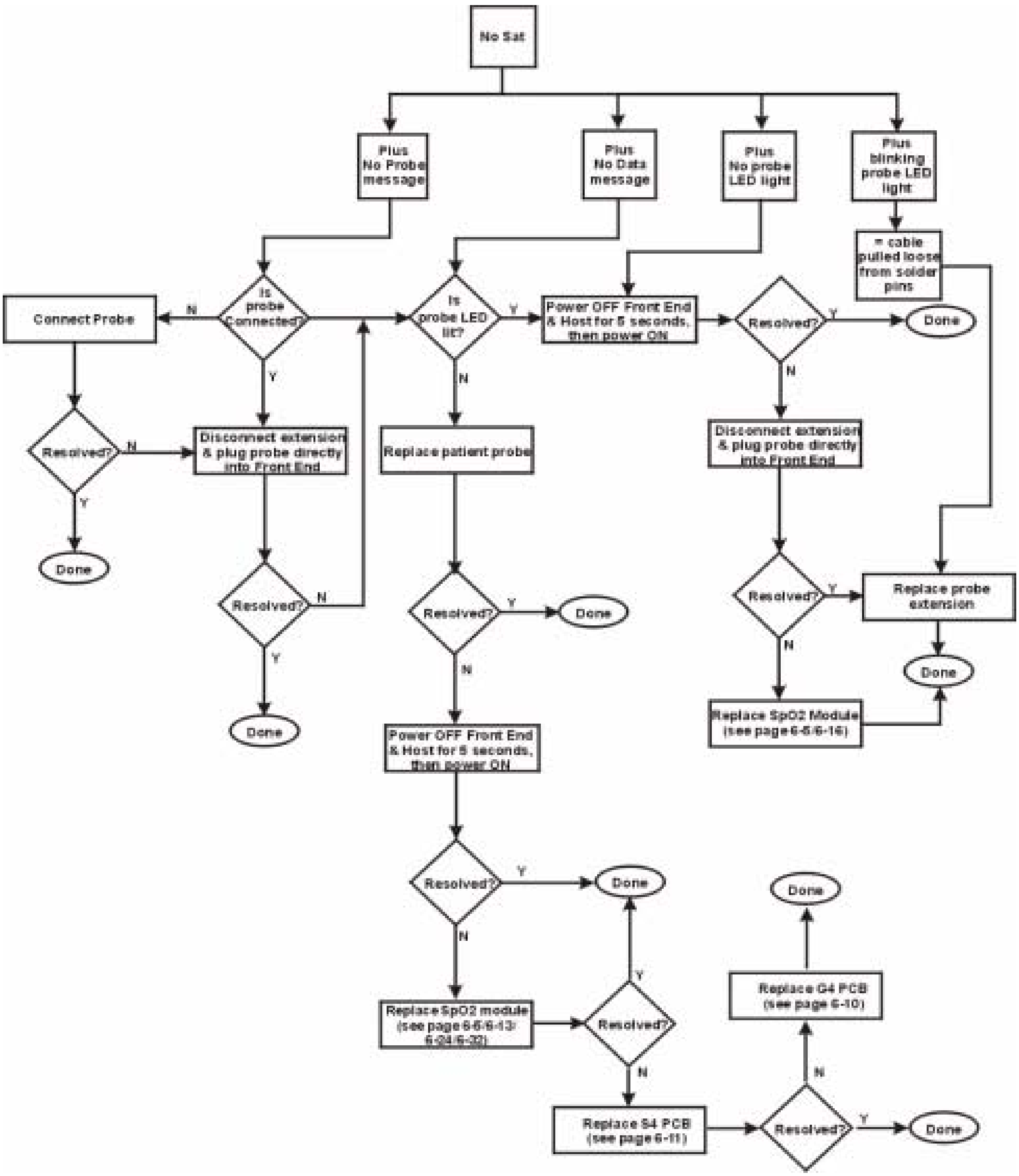
We've included error codes for the ONEAC UPS that lists error codes that are displayed on the unit, the meaning of the error codes, and the action to be taken when a specific error code is displayed. We also have a table for ETCO2 error codes that will appear on the waveform monitoring screen.

Finally, we've provided tables that list the various diagnostic LEDs that display on the S5 PCB and on the front panel of the digital Front End.

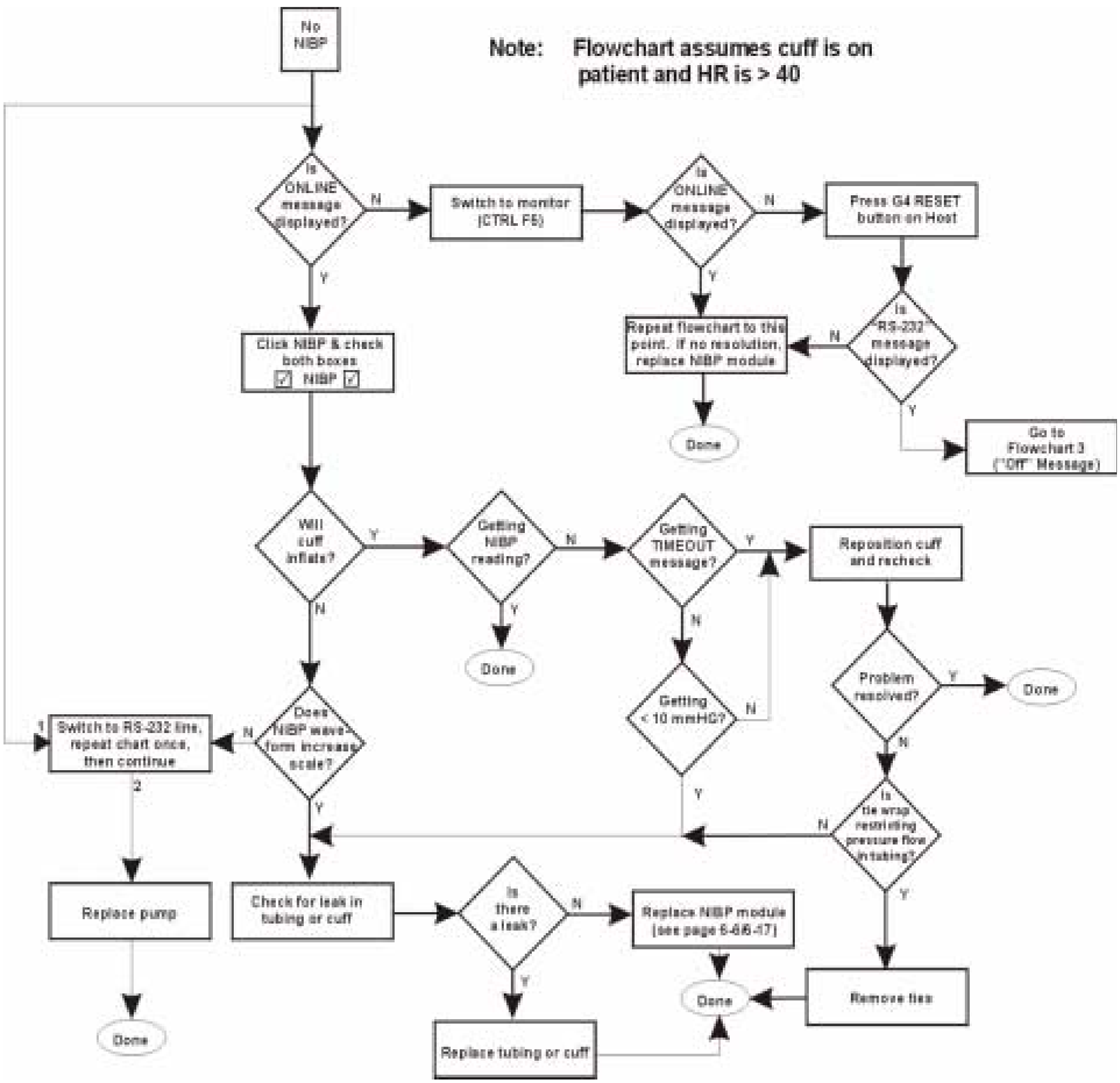
Troubleshooting Table

Symptom	Possible Cause(s)	Corrective Action
No SpO2	bad connection, probe, extension, SpO2 PCB, S4 PCB,	See Flowchart 1
No NIBP	Leak, tubing, cuff, pump	See Flowchart 2
“Off” Message	G4 PCB, S4 PCB, power supply, computer connections	See Flowchart 3
No Pressure	transducer/cable, Pressure PCB, 4-channel harness	See Flowchart 4
No ECG	wires, ECG cable, ECG PCB	See Flowchart 5
No Temp	bad connection, patient probe, cabling	See Flowchart 6
No Cardiac Output	harness, connections, Pressure PCB	See Flowchart 7
“Out Of Memory” message	computer RAM, memory settings	See Flowchart 8
Printer won’t print	print queue, printer, printer cable, print drivers, paper	See Flowchart 9
“Net Fail” message (unable to log onto network)	client drivers, cabling, NIC, hub, server down	See Flowchart 10
Computer won’t boot	hard drive, BIOS, SCSI controller, power supply, floppy in drive, software	See Flowchart 11
No slave display	monitor, terminations, G4 PCB	See Flowchart 12
No output at auxiliary output jacks	jack, connections, S4 PCB	See Flowchart 13
Abnormal ECG	ECG leadwire, ECG PCB, ECG harness, power supply, interference	See Flowchart 14
Abnormal Pressure	needs zeroing/calibration, bad channel harness, transducer or extension, Pressure PCB, power supply	See Flowchart 15
Pressure won’t calibrate	connections, cabling, Pressure PCB, G4 reset,	See Flowchart 16
Abnormal SpO2	Power supply, extension probe, S4 PCB	See Flowchart 17
Abnormal NIBP	leak, hose, cuff, S4 PCB, NIBP PCB	See Flowchart 18
No ETCO2	bad connection, calibration	See Flowchart 19

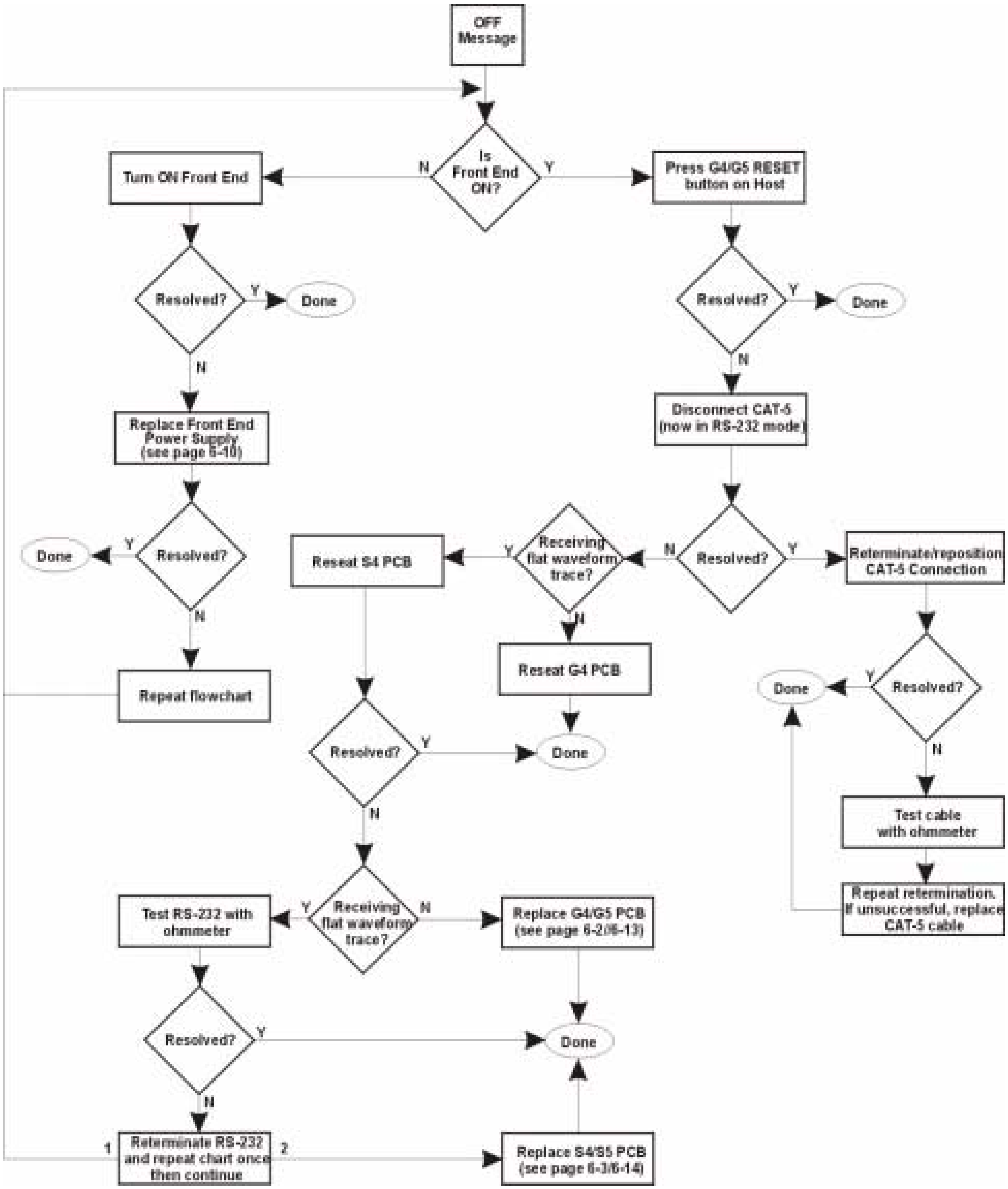
Troubleshooting Flowcharts



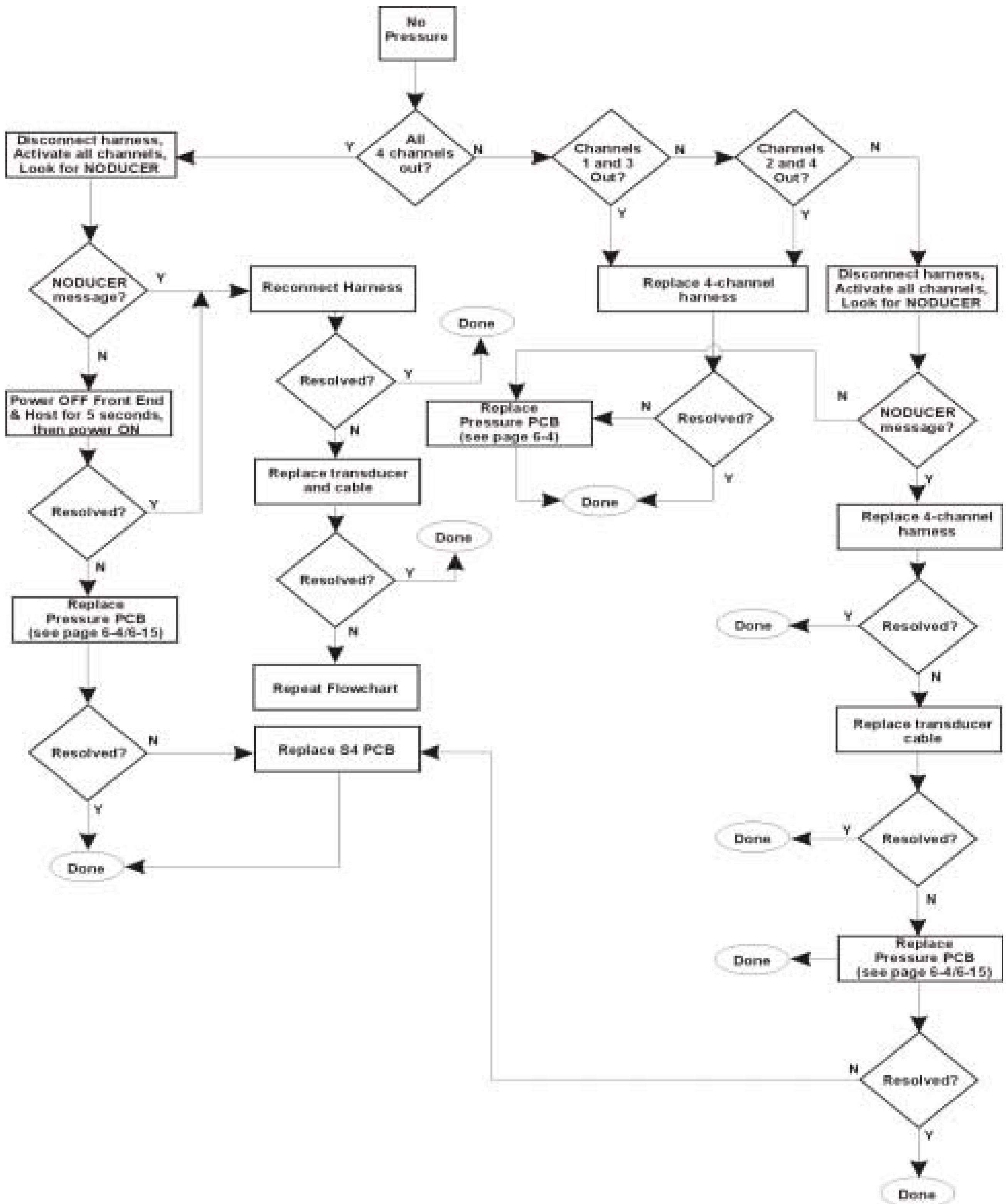
Flowchart 1. No SpO2



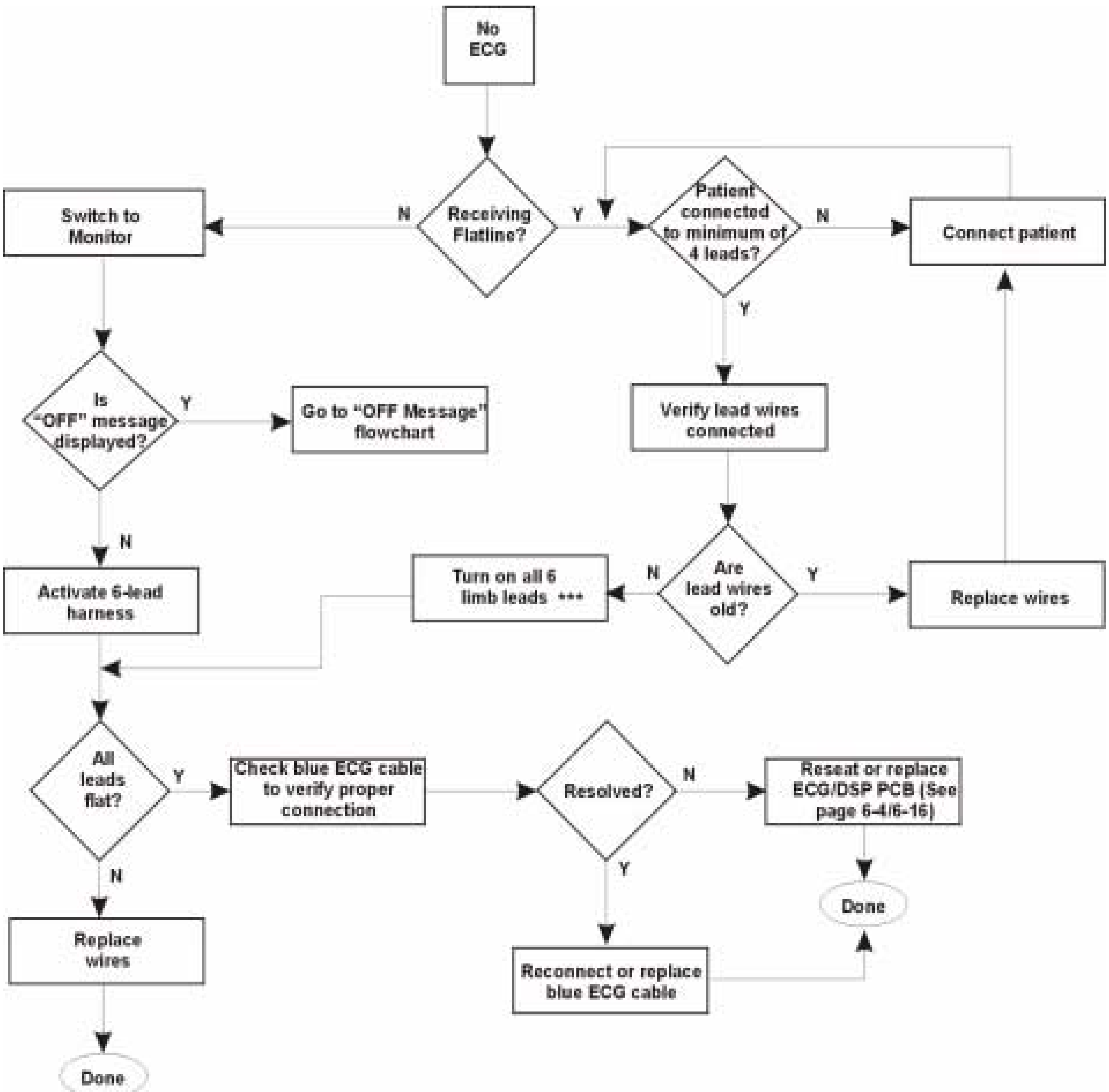
Flowchart 2. No NIBP



Flowchart 3. "Off" Message

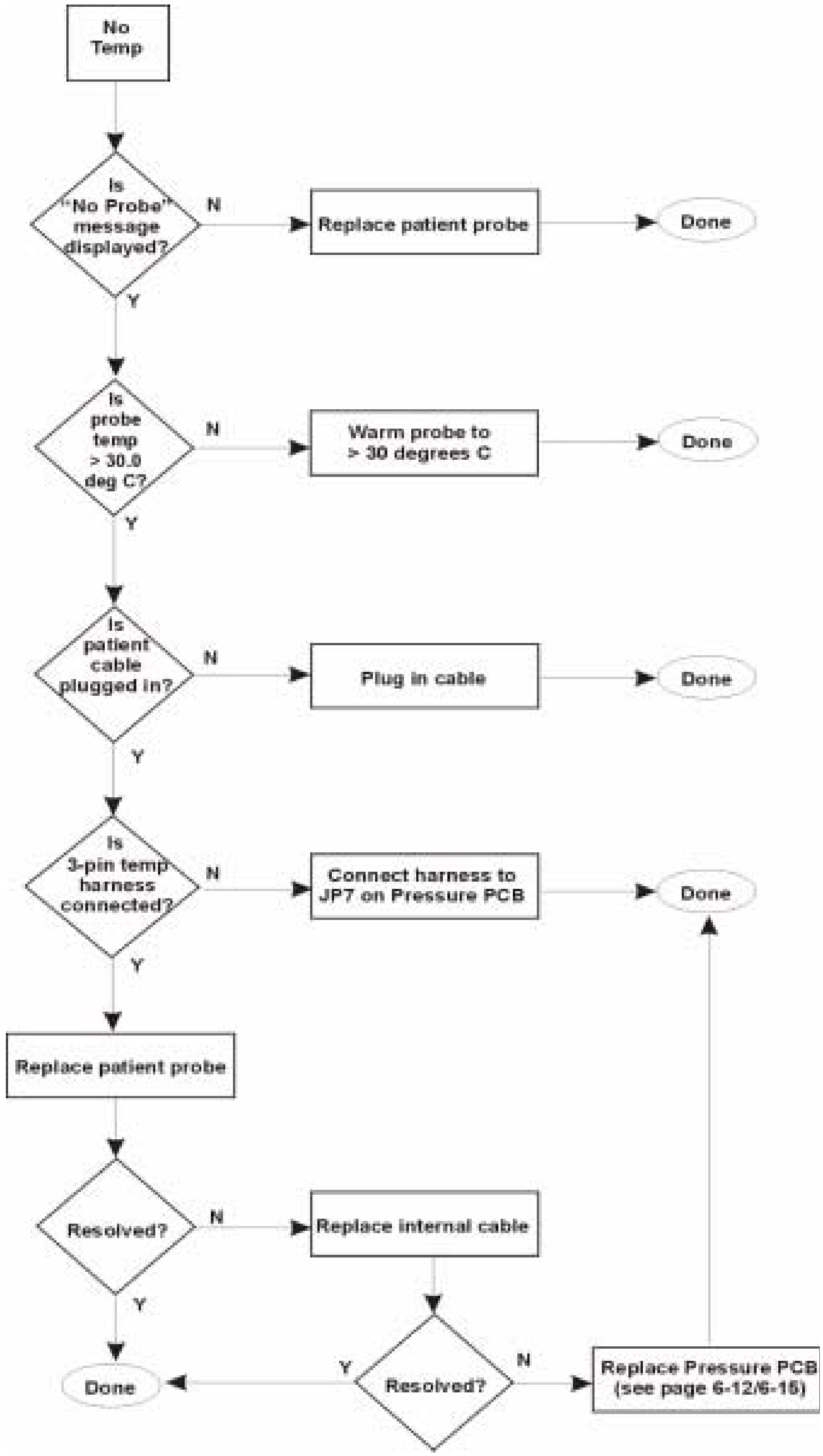


Flowchart 4. No Pressure

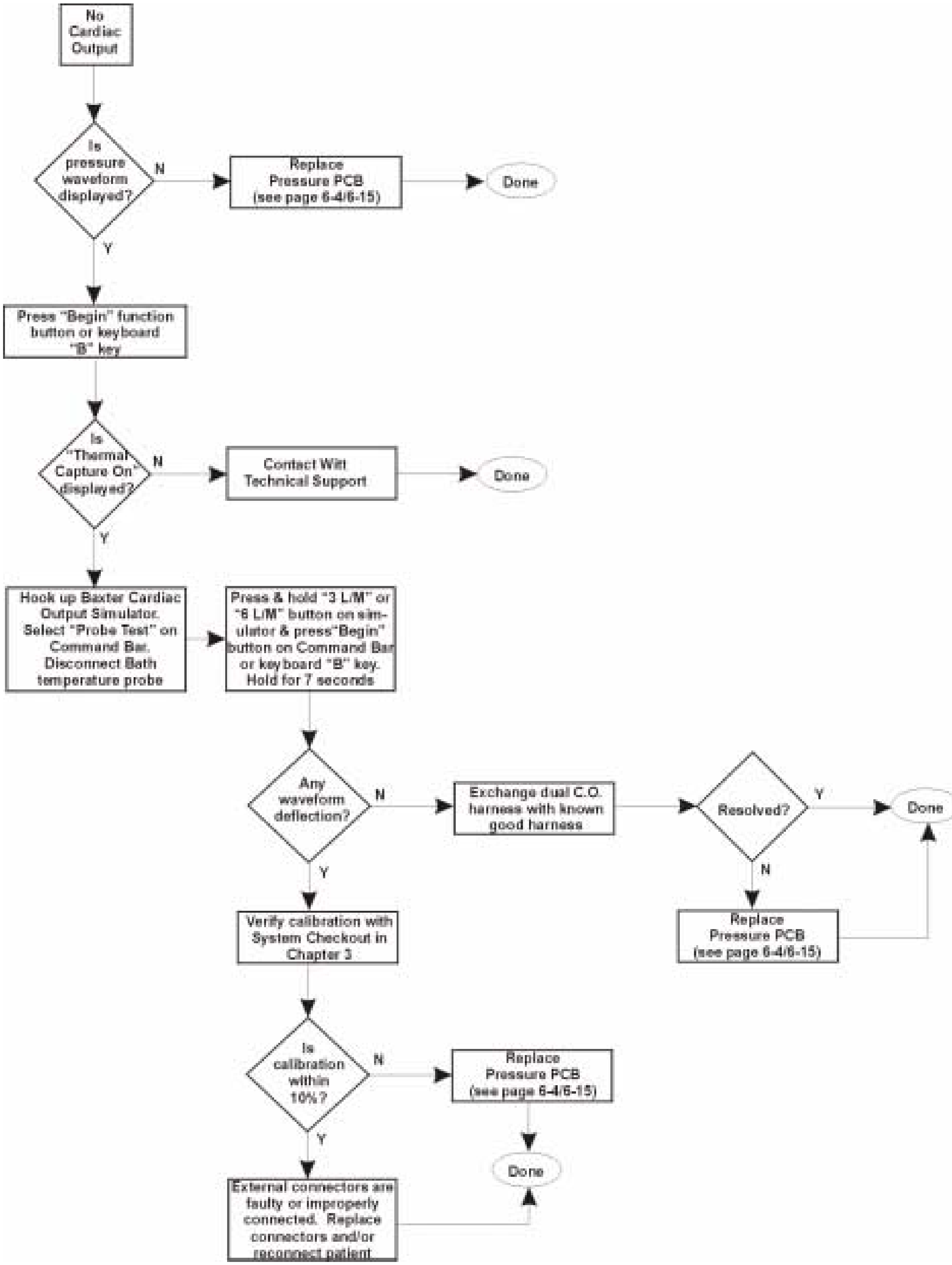


*** V-leads are displayed only in normal mode, not in RS-232 mode.

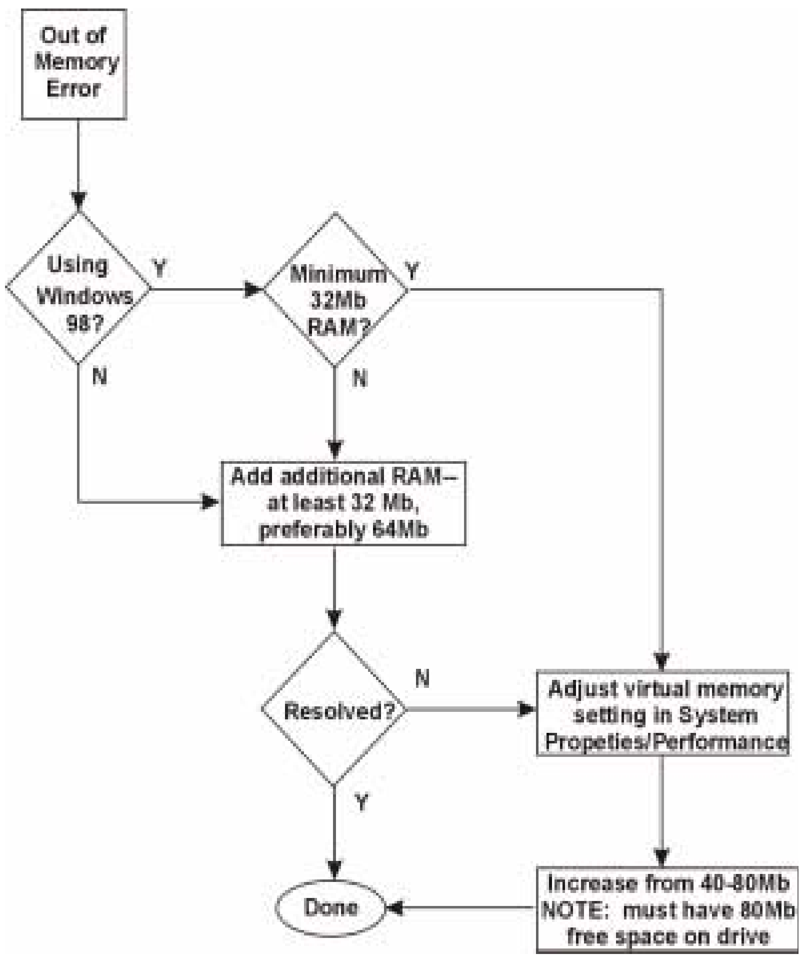
Flowchart 5. No ECG



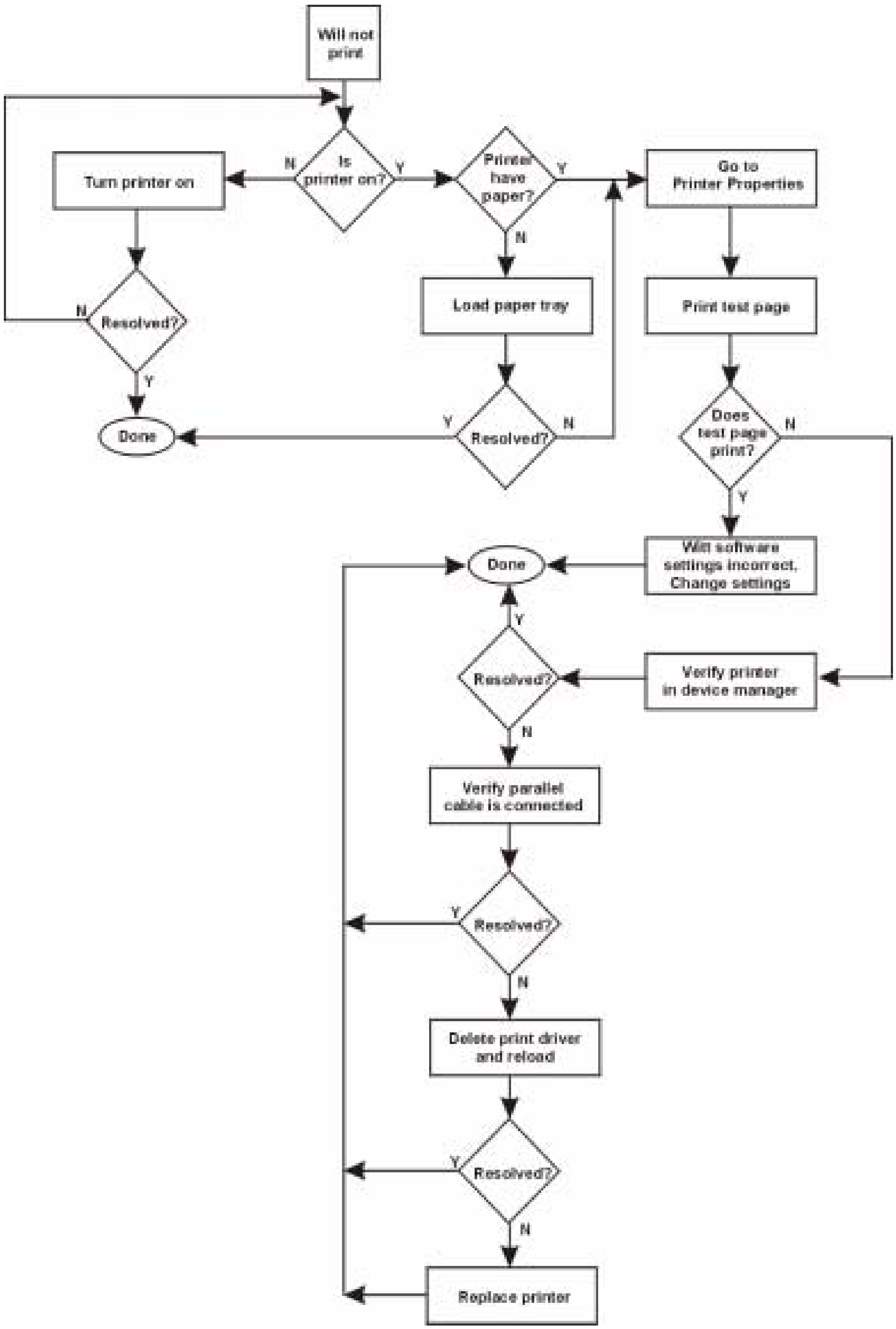
Flowchart 6. No Temp



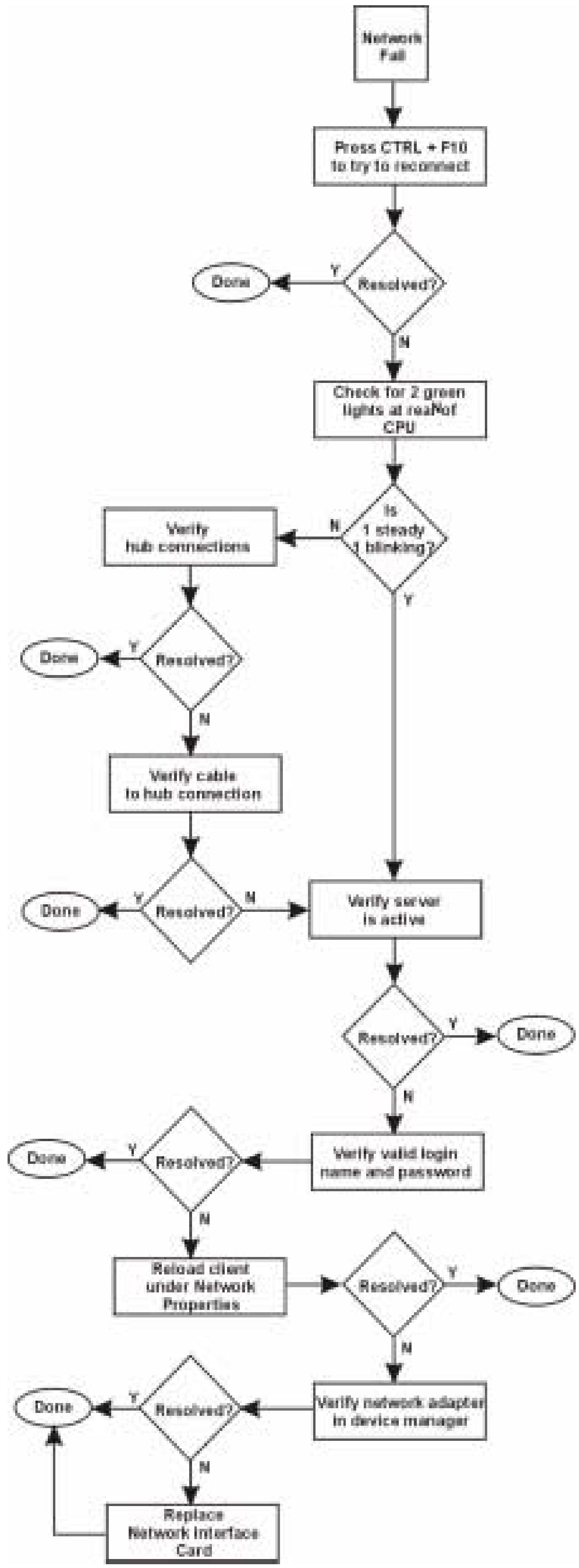
Flowchart 7. No Cardiac Output



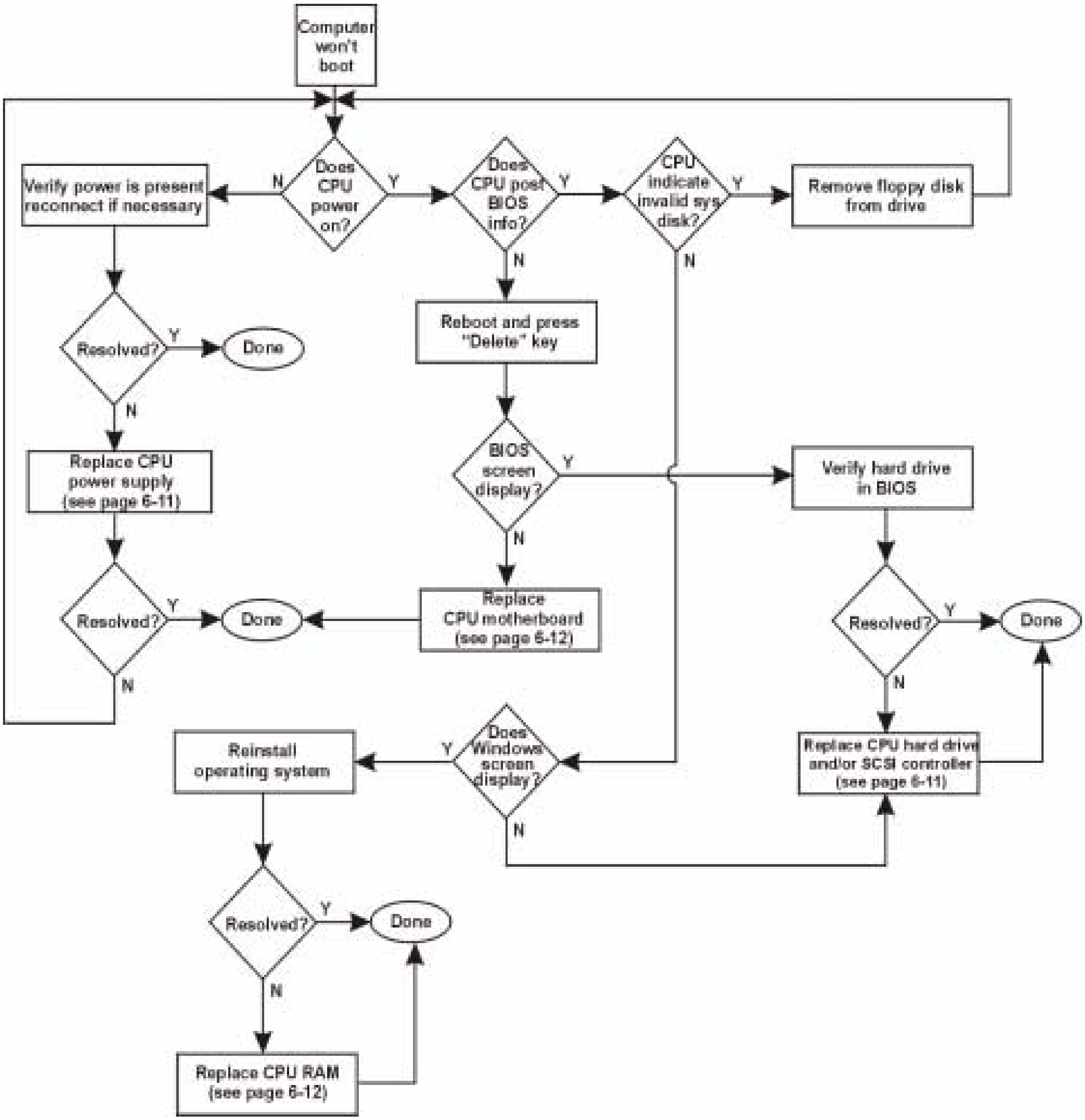
Flowchart 8. "Out of Memory" Message



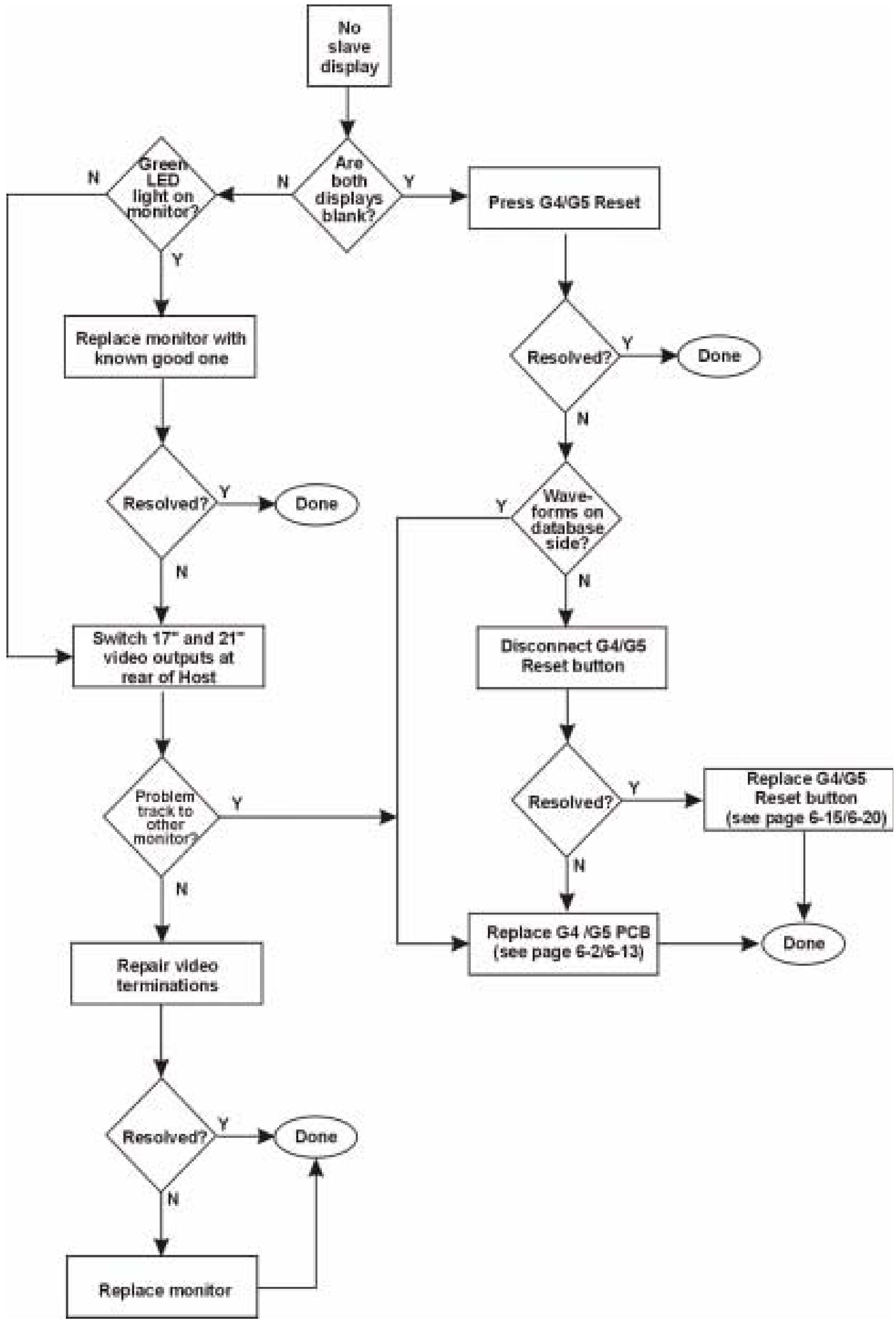
Flowchart 9. Printer Won't Print



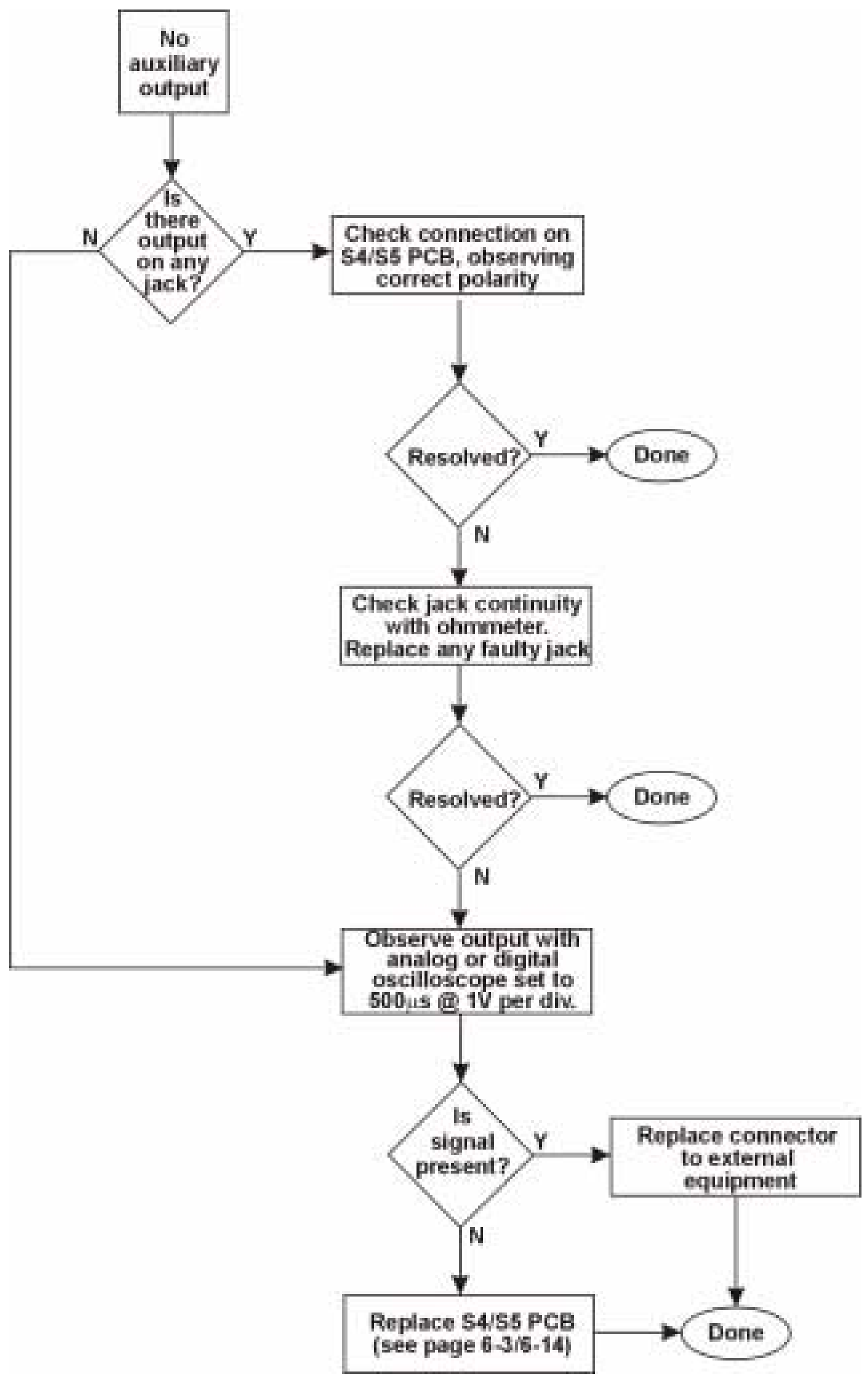
Flowchart 10. "Net Fail" Message



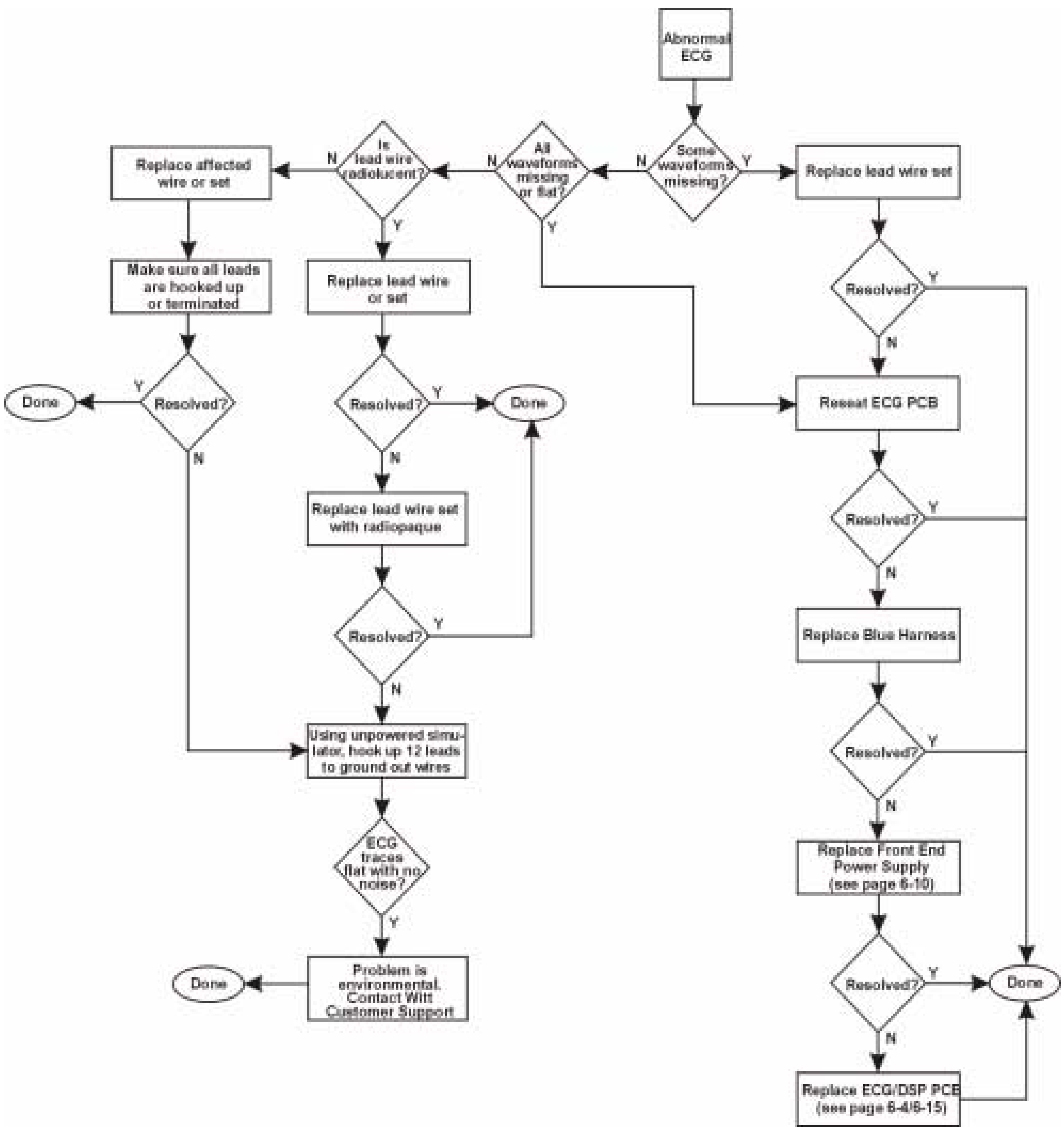
Flowchart 11. Computer Won't Boot



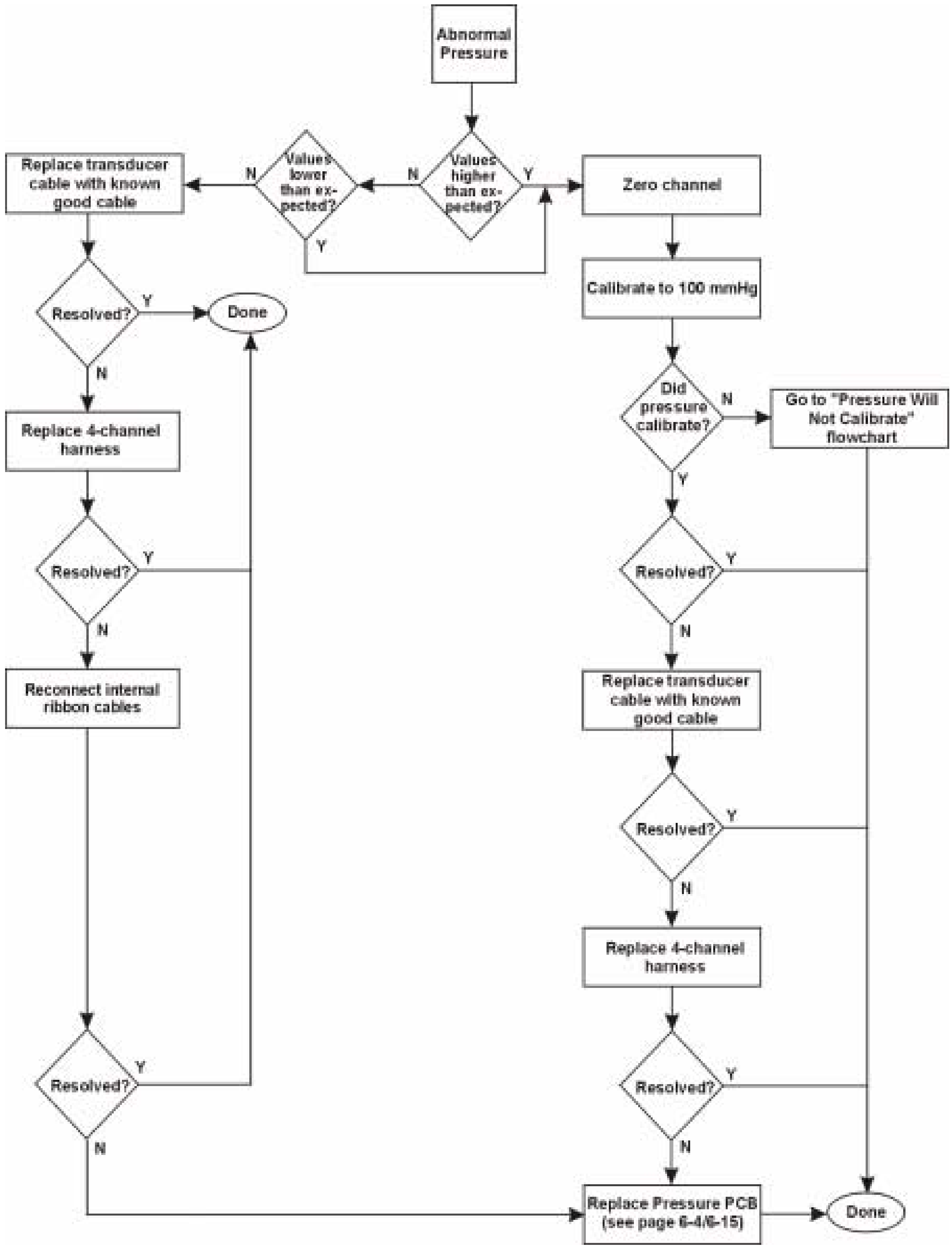
Flowchart 12. No Slave Display



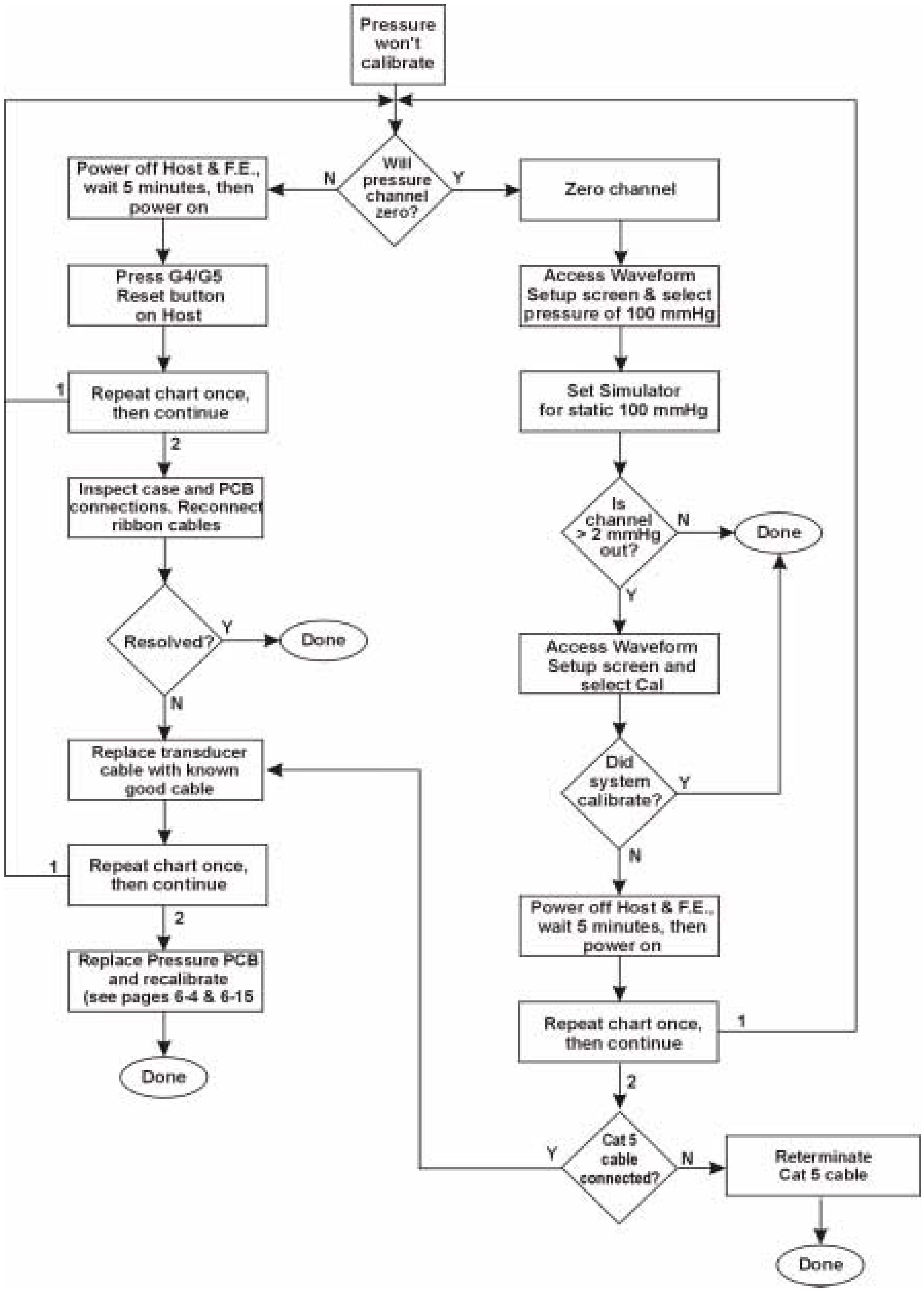
Flowchart 13. No Output at Auxiliary Output Jacks



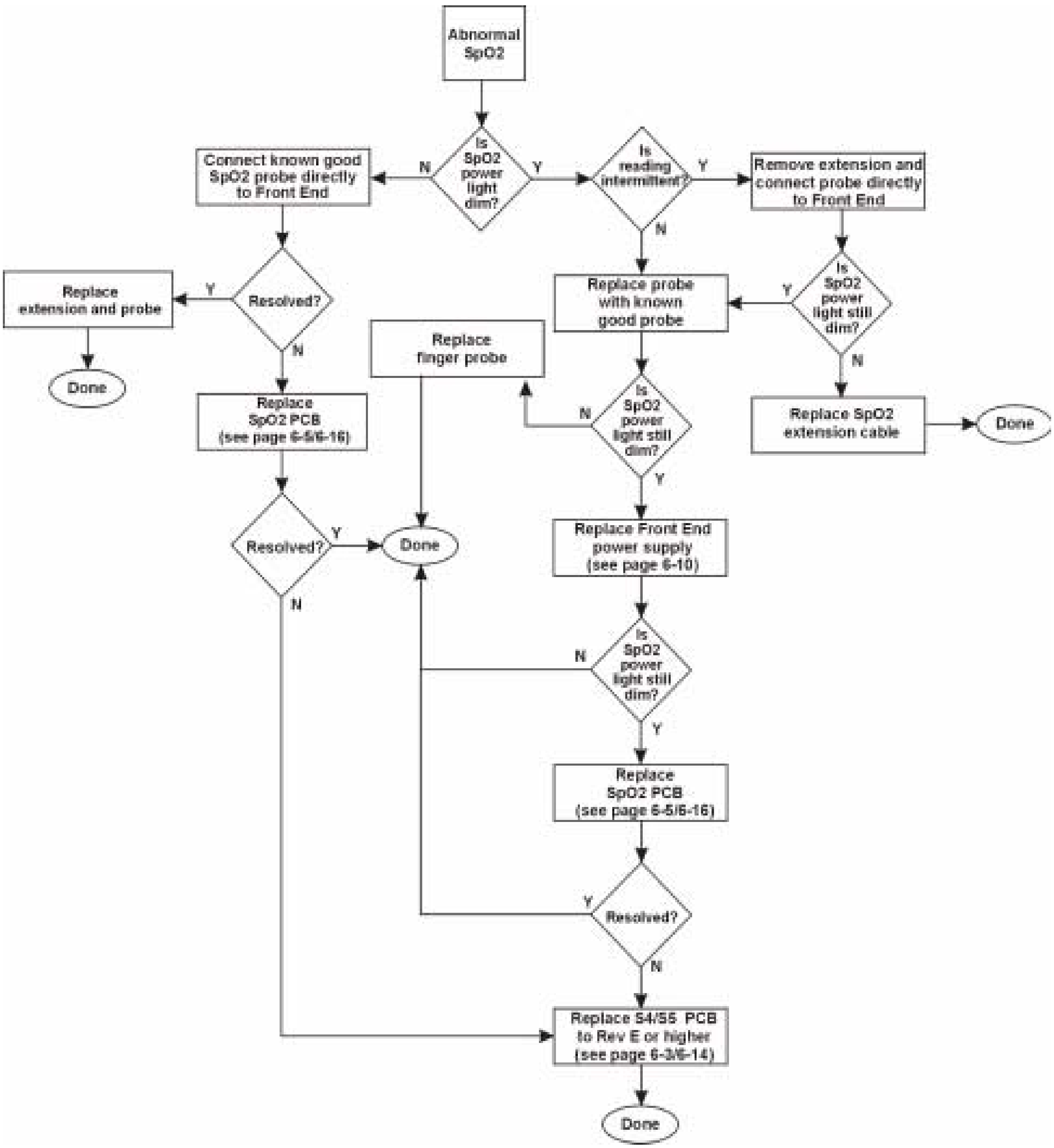
Flowchart 14. Abnormal ECG



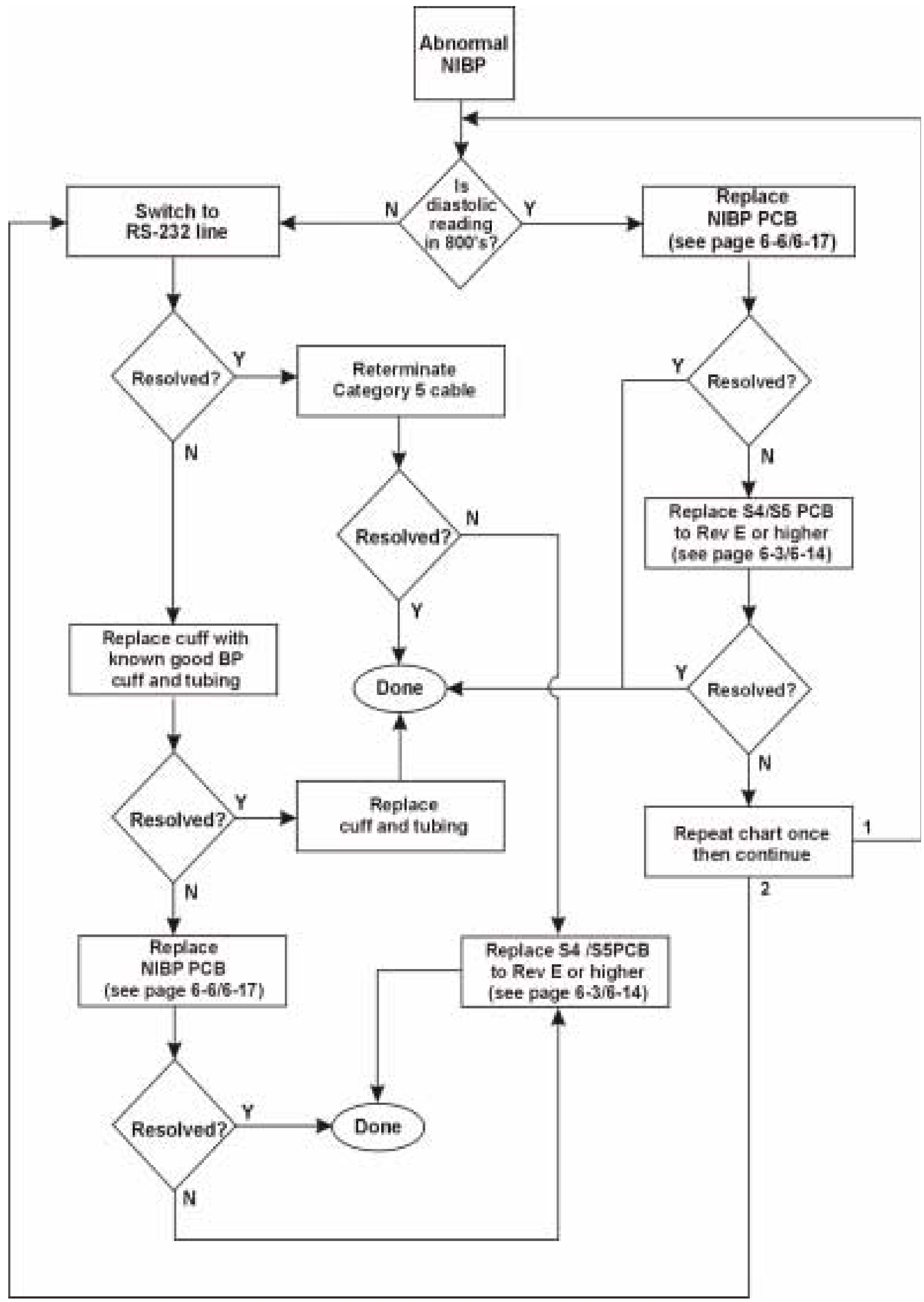
Flowchart 15. Abnormal Pressure



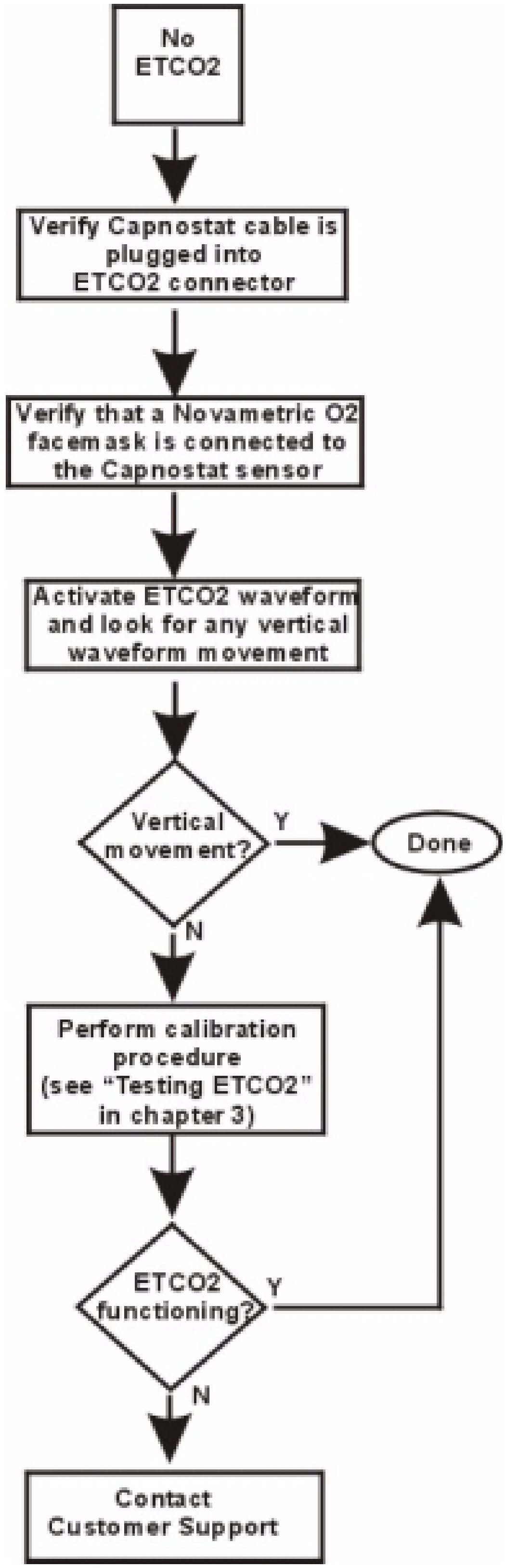
Flowchart 16. Pressure Won't Calibrate



Flowchart 17. Abnormal SpO2



Flowchart 18. Abnormal NIBP



Flowchart 19. No ETCO2

Front Panel Diagnostic LEDs

As shown on the following page, there are four diagnostic LED indicators on the front panels of the digital PCM and digital Front End. The LED signals are derived from the D-10 through D-13 outputs on the S5 board, which also contains LEDs for these signals. Use the following two tables to decipher the codes.

Troubleshooting LEDs D-10 through D-13

Table 1: Troubleshooting LEDs

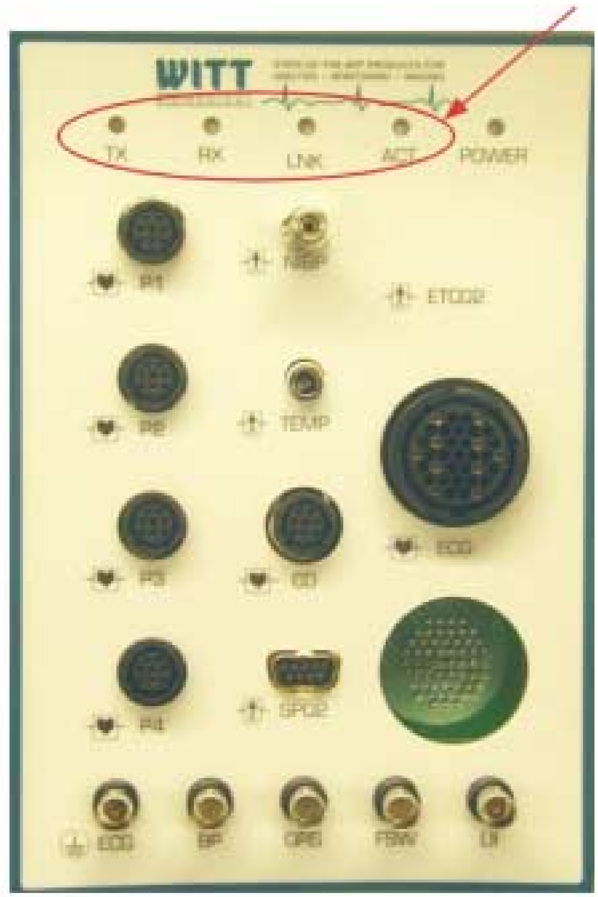
Location	Lamp/LED	Description	Connection	Normal Mode
Front Panel	LNK	Link	Onboard D13	Solid
Front Panel	TX	Transmit	Onboard D12	Solid
Front Panel	RX	Receive	Onboard D11	Blinks
Front Panel	DIAG	Diagnostic	Onboard D10	See Table 2
S5 Board			Onboard D13	Solid
S5 Board			Onboard D12	Solid
S5 Board			Onboard D11	Blinks
S5 Board			Onboard D10	See Table 2

Diagnostic LED D-10

Table 2: Diagnostic LED

Blink Position	Long Blink	Short Blink
1	12-lead DSP communicating	12-lead DSP not found
2	Pressure DPT communicating	Pressure DPT not found/Pressure Daughter Board may be present
3	EP Board 1 communicating	EP Board 1 not found
4	EP Board 2 communicating	EP Board 2 not found
5	Not used	Always blinks short
6	Not used	Always blinks short
7	Ethernet data was transmitted to G5 ***Note: Does not indicate G5 has received***	Ethernet problem/unable to transmit
8	S5 is receiving commands from G5	S5 has not received commands from G5

Digital Patient Care Monitor



Digital Front End

ONEAC UPS Troubleshooting

The following information was extracted from the ONEAC UPS User's Manual.

ONEAC System Status Codes

Code	Meaning	Corrective Action
C1	Circuit breaker open	Reseat circuit breaker at rear of ONEAC.
C2	1. Battery voltage low 1. Battery disconnected 1. Fuse blown	ONEAC battery is disconnected or damaged. Reconnect and wait 8 hours. If no change, replace ONEAC.
C3	Over Temperature. Unit is too hot	Clean any obstruction from ONEAC side vents. Provide adequate ventilation.
C4	Battery Charging	Normal indication. Ensure battery is fully charged before operation.
C5	Replace	Replace ONEAC battery
C8	Output overload	Unplug devices until unit is loaded to 99% or less.
C9	Output shut down due to overload	Reduce load. Reset unit by switching off then on again.
U1	Charge fuse blown	Replace ONEAC.

ONEAC Troubleshooting Table

Problem	Recommended Action
The UPS will not do anything.	The wall outlet may not have power available. The ONEAC ON Series UPS will not start unless it is plugged into a working electrical outlet. Make sure the outlet has power. The easiest method of checking is to use an electric lamp.
The UPS front panel lights, but there is no output.	Check the System Status Code on the digital display.
The UPS works, but a buzzer sounds.	Check the System Status Code on the digital display.
None of the above, but things are still not right.	Contact Witt Customer Service.

ETCO2 Error Codes

The ETCO2 module has seven messages that will display on the Patient Monitoring screen under the respective condition.

- **0 no resp** No respirations actively being measured.
- **46mm** **53 ipm** Normal mode. Actively measuring CO2.
- **0 no probe** Cable is disconnected from the Front End.
- **0 unplugged** There is no mask attached to the capnostat sensor.
- **38 on reff** Capnostat is attached to reference window on ETCO2 cable.
- **0 on zero** Capnostat is attached to zero window on ETCO2 cable.
- **0mm** **0 ipm** Unit is calibrated and ready to measure CO2.

Miscellaneous Troubleshooting Tips

- *System clock problems*—Locate the master clock. There must be only one. It should be on Review-1. All other clocks sync to that clock.
- *ADMIT function button on Main screen grayed out*—When ADMIT is grayed out on the Main screen, check the Record/Edit box on the Configuration screen and make sure it is selected.
- *Problems in Patient Locator*—Query won't function properly. Do Net Rebuild by pressing the [Rebuild Net] function button on the Configuration screen.
- *Waveform flatlines on overlay of slave display*—EPROM Host Interface Program (HIP) must be reinitialized. Power down Host and reboot from scratch.
- *Drive mapping problems*—Occasionally Windows 95/98 stations will lose their drive mapping after a reboot. When this happens, open the User Manager on the NT server. Select the user, right click and choose Properties for the computer station exhibiting the problem. Click the profile button. Where it asks for home directory path, select Connect To and choose X as your drive letter. Enter "\\witt_nt1\witt" for the path. Close the User Manager and reboot the problem computer. Open My Computer to see the new mapping.
- *Special Hardware and Software Problems*—Always consult the Witt Service Bulletins kept on file with Witt field service engineers when confronting special hardware and software problems not covered in this manual.

Chapter 6:

System Maintenance

Special Tools and Equipment

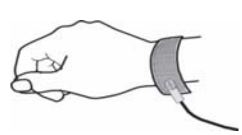
You’ll need the following tools and equipment to perform maintenance on the CALYSTO Series IV:

- Patient Simulator with Pressure and ECG capability
- SPO2 Simulator
- NIBP Simulator
- Cardiac Output Simulator
- Multimeter and Oscilloscope
- Standard Hand Tools
- Tools and equipment required to calibrate the Suntech Advantage NIBP module pressure transducer, described at end of chapter.

Removing and Replacing Components

Caution

Before removing or replacing any of the PCBs in the Host or Front End, ensure the power is removed from the unit and the technician is properly grounded with a static protective strap (e.g., ESD wrist strap).



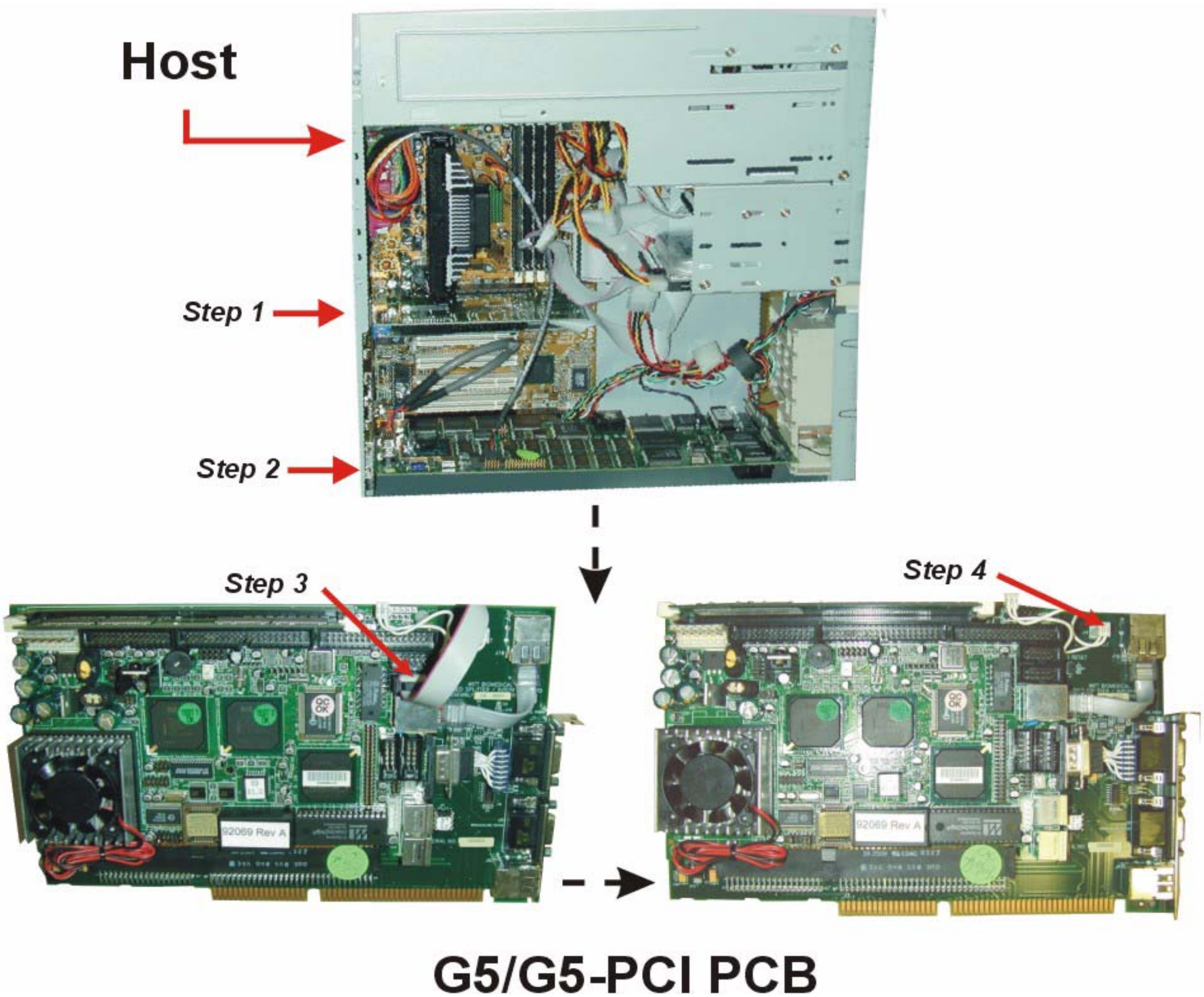
The following steps for removing and replacing CPU components assumes that the respective Host or Front End case or cover has been removed.

CALYSTO Series IV Removal and Replacement Procedures (Digital Front End)

Removing and Replacing the G5 PCB, from Host

Refer to illustration below.

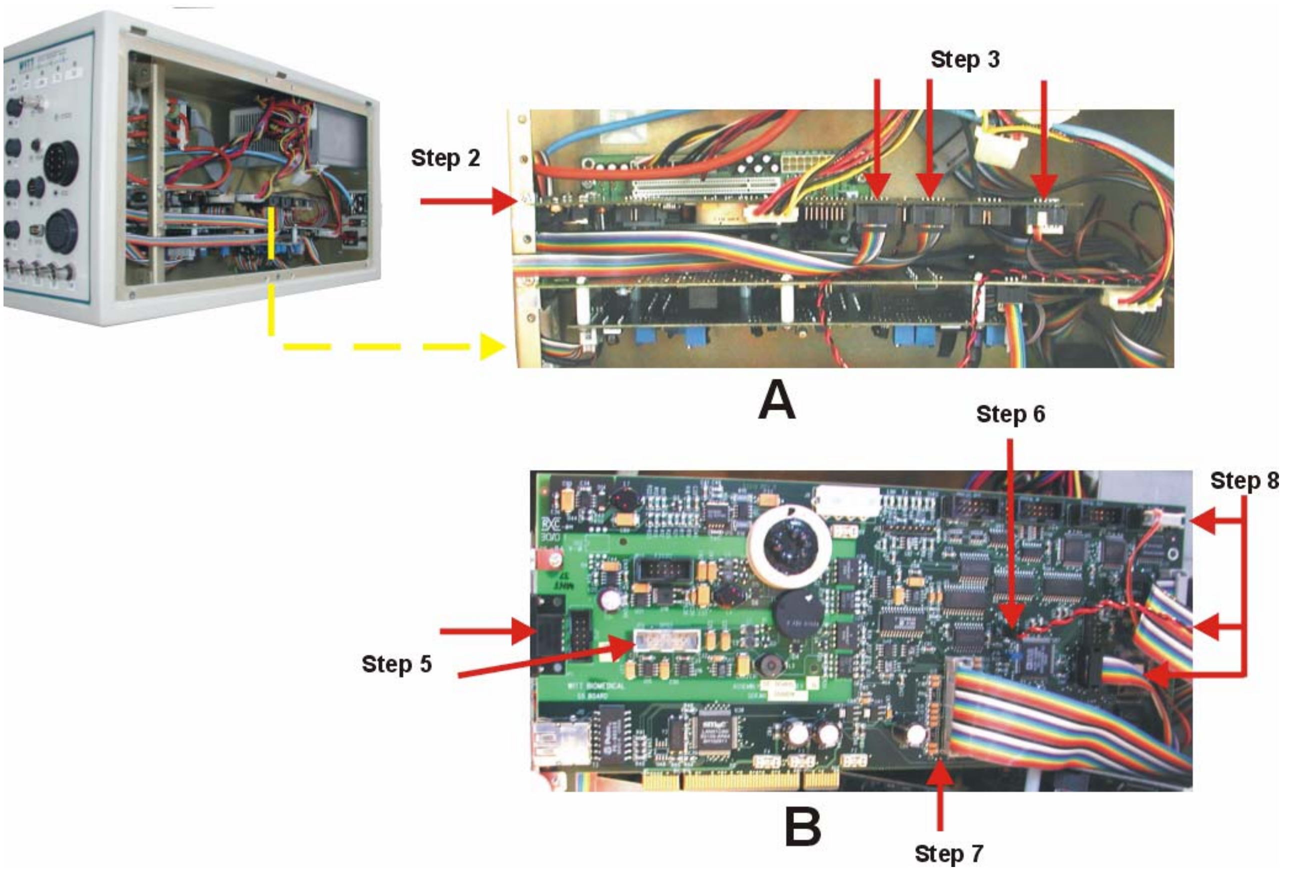
1. Disconnect all external cables plugged into the board.
2. Remove one retaining screw on left mounting plate.
3. Disconnect the RS-232 cable.
4. Disconnect the G5 Reset cable.
5. Grasp the PCB and gently pull toward you with a rocking motion until it's loosened from the motherboard slot.
6. Place the PCB on a static protected mat.
7. Replace the PCB in the reverse order of removal.



Removing and Replacing the S5 PCB, from Front End

See illustration below.

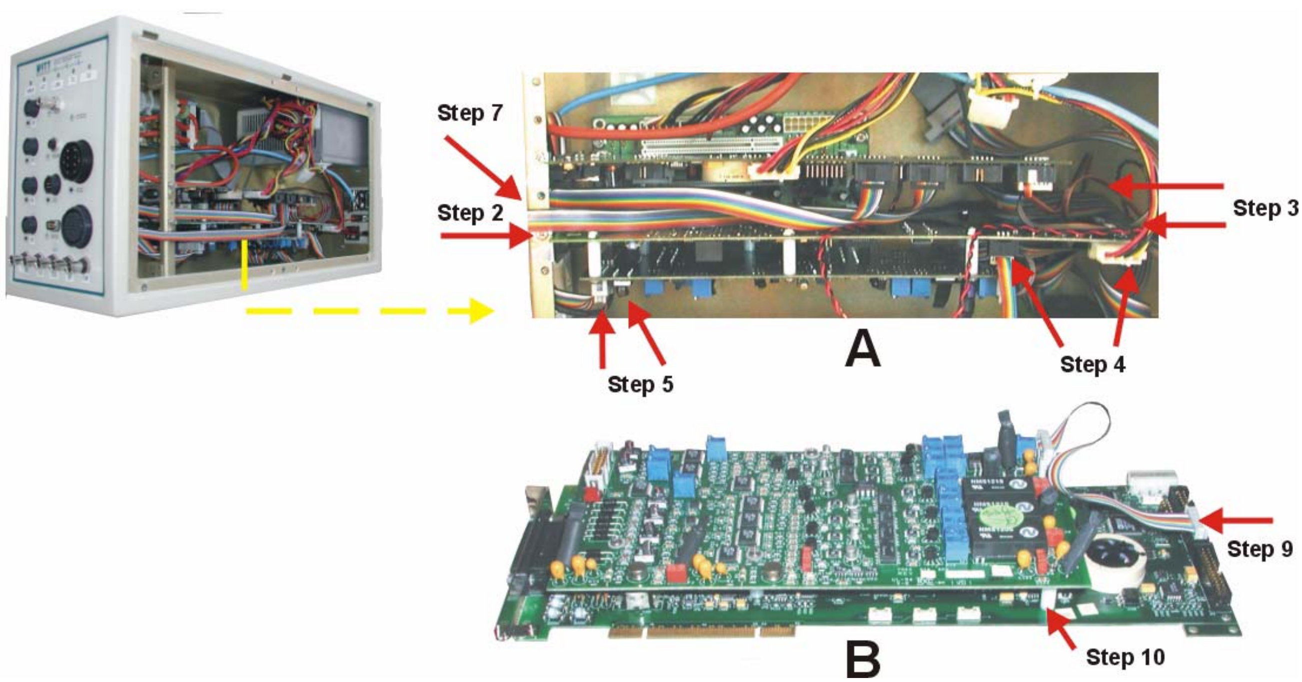
1. Disconnect any external cable plugged into the PCB.
2. Remove one retaining screw on left mounting plate.
3. Disconnect the J9, Analog Out, and Digital In cables.
4. Grasp PCB and pull it toward you with a rocking motion until it's loosened from the motherboard slot. Then tilt it upward to access the underside of the board as shown in B below.
5. Disconnect the J12 (network) and SpO2 cables.
6. Disconnect the S5 reset cable at JP5.
7. Disconnect the P11 cable.
8. Disconnect the JP4, P7, and J7 cables.
9. Place the PCB on a static protected mat.
10. Replace the PCB in the reverse order of removal.



Removing and Replacing the 12-Lead DSP and Pressure Daughter PCB, from Front End

See illustration below.

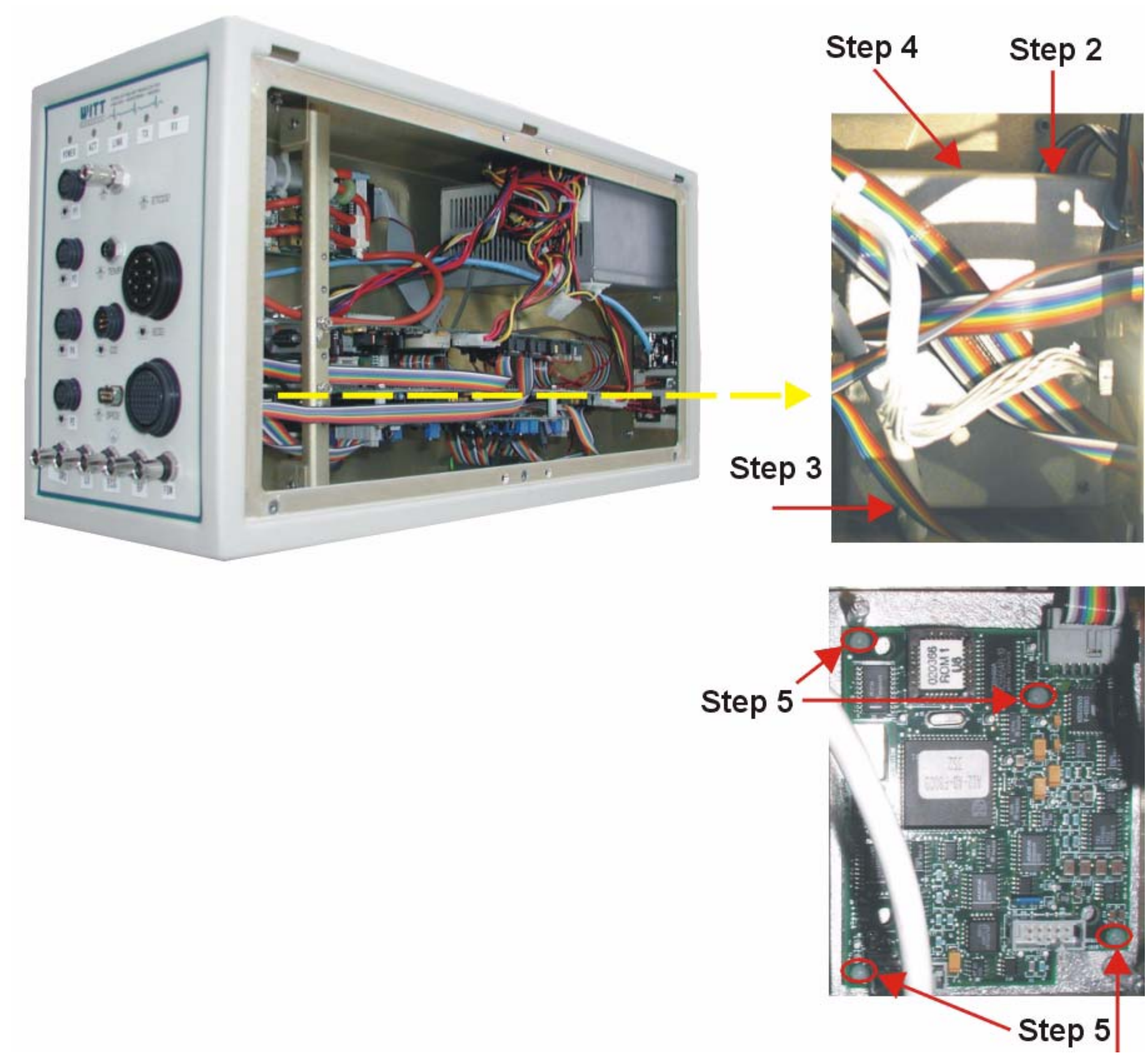
1. Disconnect any external cable plugged into the PCB.
2. Remove one retaining screw on left mounting plate.
3. Disconnect JP2 and JP5 cables.
4. Disconnect JP3 and JP4 cables.
5. Disconnect JP1 cable and 3-pin connector on daughter board.
6. Grasp the PCB and pull it toward you with a rocking motion until it's loosened from the mother-board slot.
7. Pull the PCB out as far as you can and disconnect the ECG cable by loosening the connector's 2 captive screws.
8. Place the PCB on a static protected mat.
9. To remove the daughter board from the 12-lead DSP PCB first disconnect the JP2 cable from the daughter board as shown in B below.
10. Then remove the 4 screws and standoffs.
11. Replace the PCB and daughter board in the reverse order of removal



Removing and Replacing the SpO2 Module, from Front End

See illustration below.

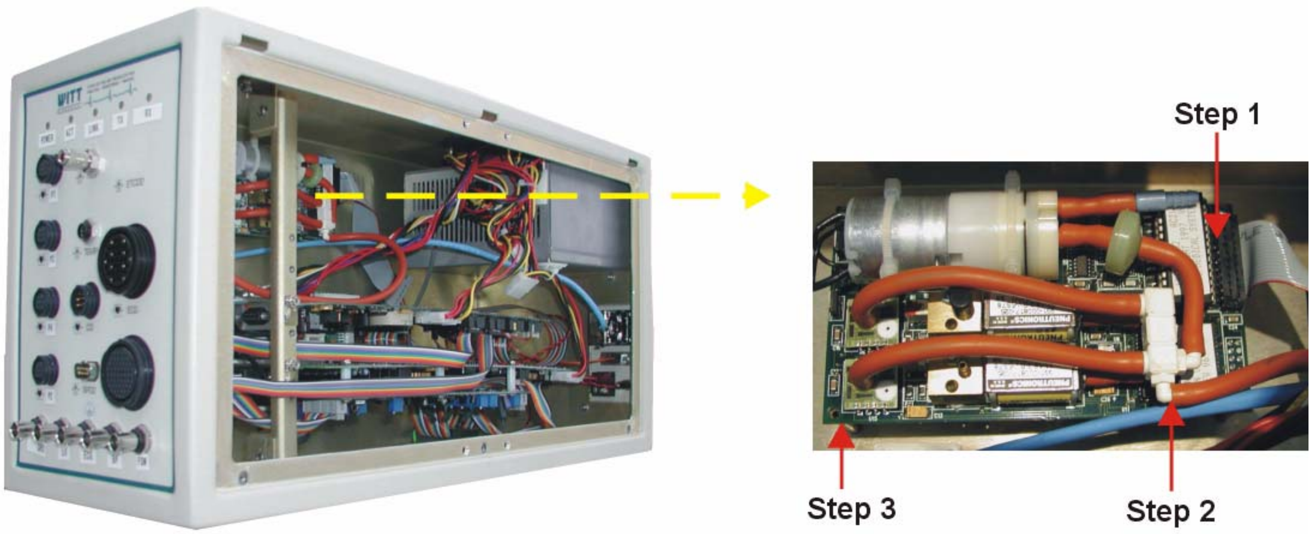
1. Disconnect the J12 (network) cable from the S5 PCB.
2. Disconnect the SpO2 cable from the S5 PCB.
3. Disconnect the SpO2 cable from the Front End Interconnect PCB.
4. Disengage module cover by twisting screwdriver blade in gap, then remove cover.
5. Remove 4 screws securing module to mounting plate and remove module.
6. Place the module on a static protected mat.
7. Replace the module in the reverse order of removal.



Removing and Replacing the NIBP Module, from Front End

See illustration below.

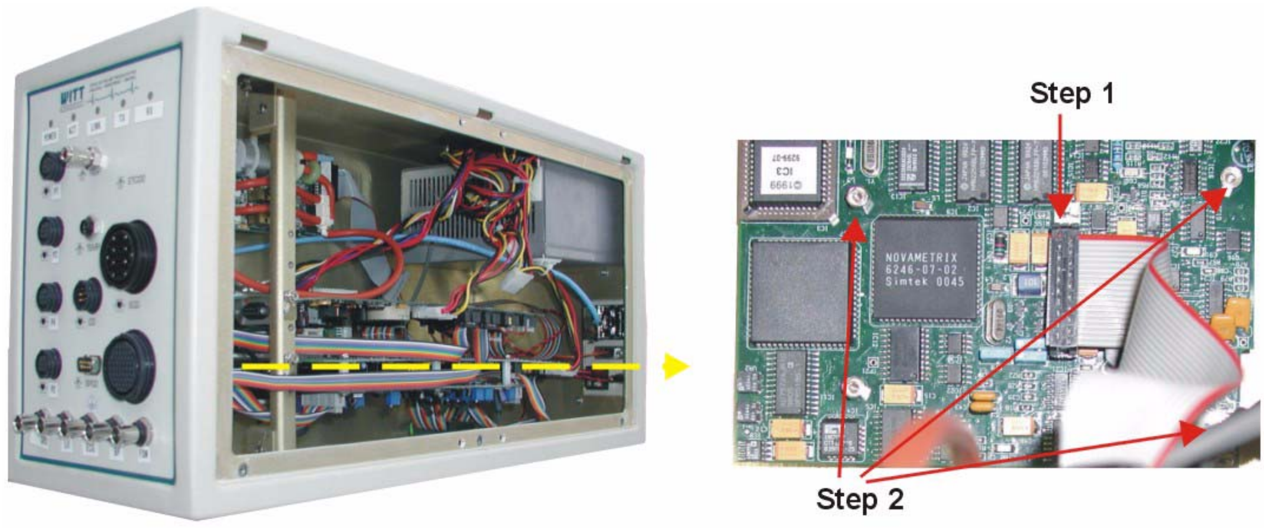
1. Disconnect S5 PCB cable.
2. Remove NIBP hose.
3. Remove 4 screws and standoffs securing module to side panel.
4. Place the PCB on a static protected mat.
5. Replace the NIBP module in the reverse order of removal.



Removing and Replacing the ETCO2 Module, from Front End

See illustration below.

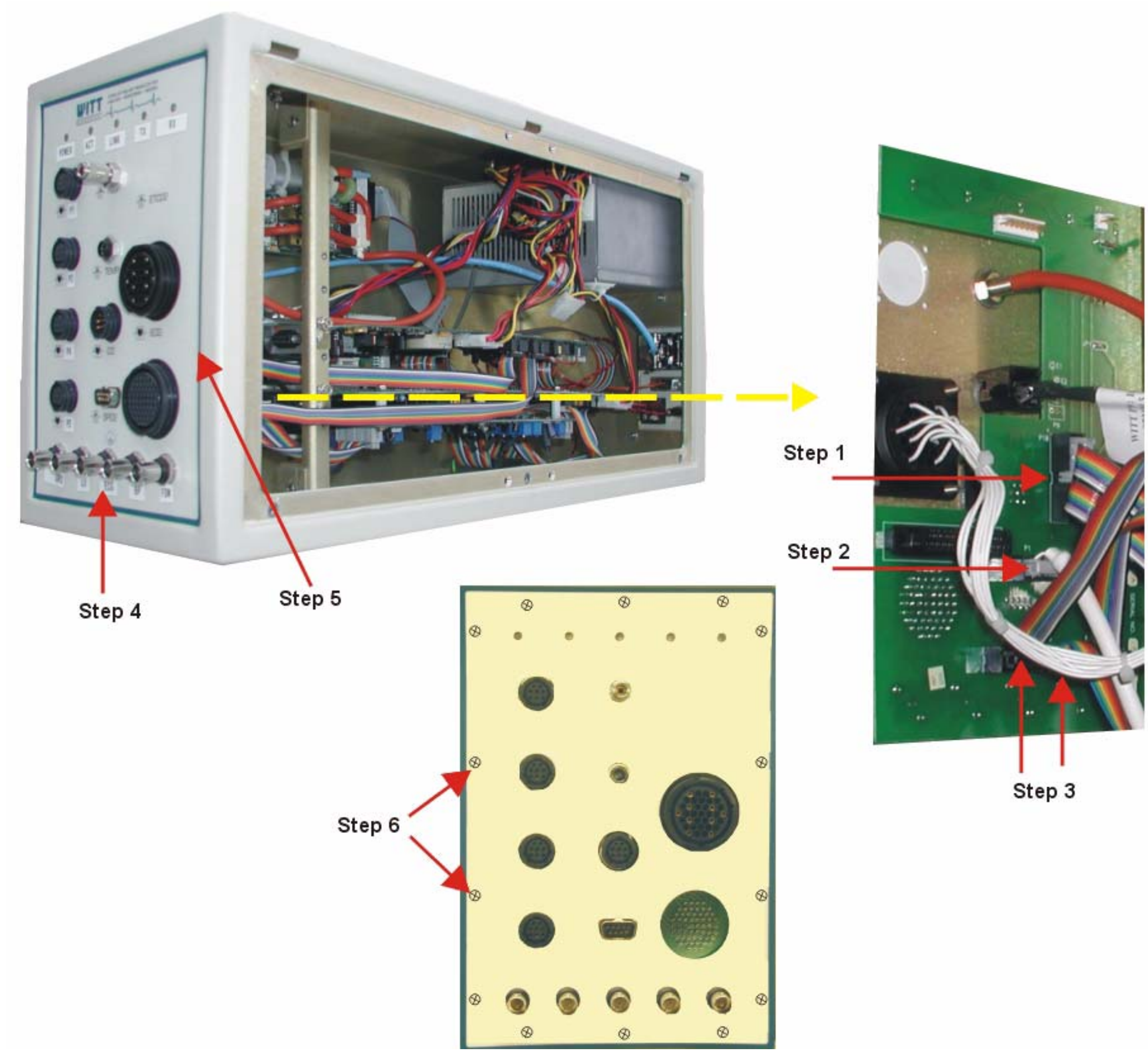
1. Disconnect two PCB cables.
2. Remove 3 screws and standoffs securing module to side panel.
3. Place the PCB on a static protected mat.
4. Replace the $ETCO_2$ module in the reverse order of removal.



Removing and Replacing the Front Panel Interconnect PCB, from Front End

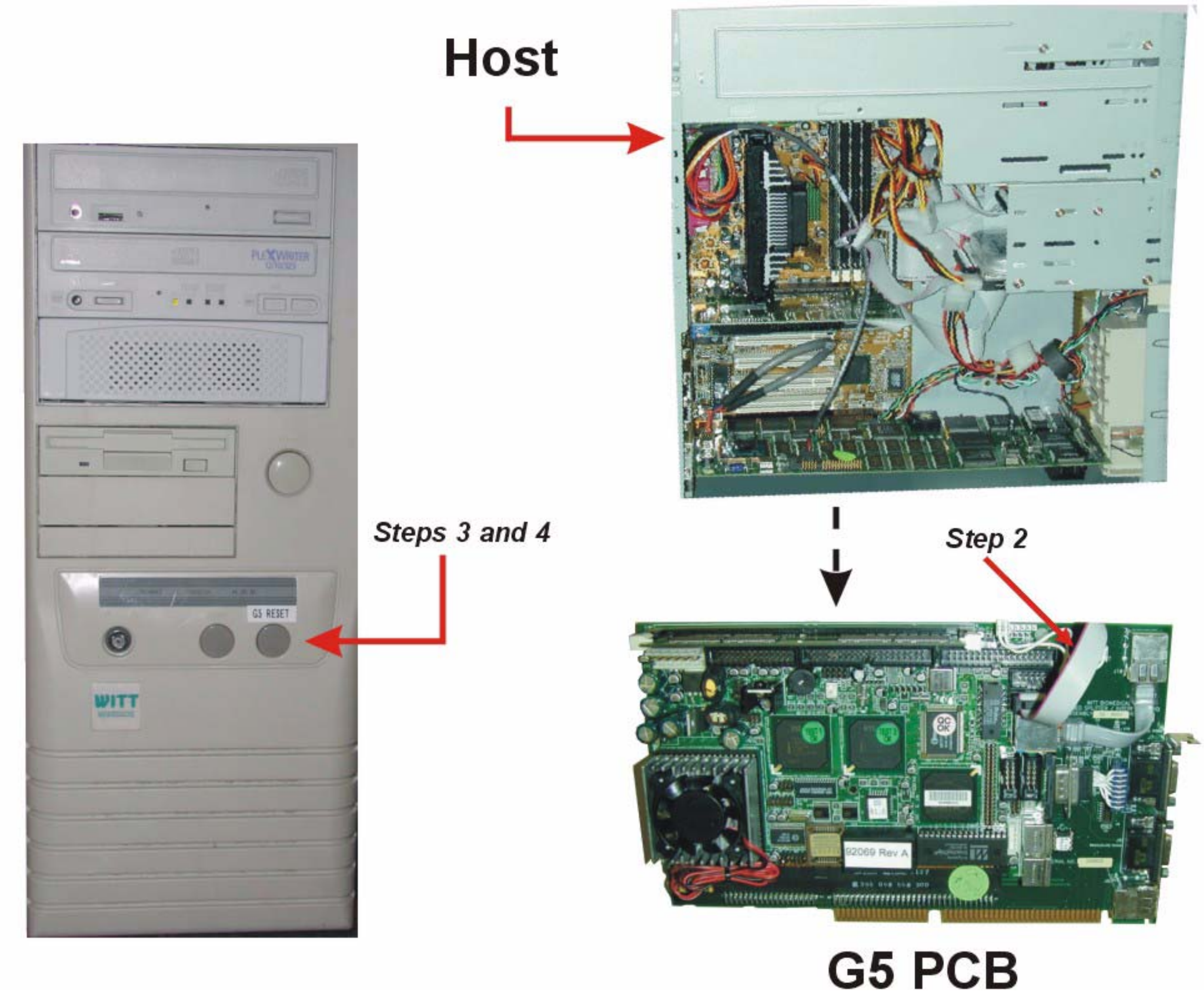
See illustration below.

1. Disconnect P10 cable.
2. Disconnect P1 (SpO2) cable.
3. Disconnect P2 and P4 cables.
4. On rear panel, remove 5 hex nuts from auxiliary outputs.
5. Peel back rear panel plastic name plate, exposing mounting screws.
6. Remove 14 screws securing Interconnect PCB to rear panel.
7. Place the PCB on a static protected mat.
8. Replace the Interconnect PCB in the reverse order of removal.



Removing and Replacing the G5 Reset Button, from Host

1. Ensure power is removed from CPU and you are properly grounded.
2. Remove the 2-pin G5 reset button cable on the G5 PCB.
3. Remove outer retaining ring from around button.
4. Retract button assembly from front panel faceplate.
5. Replace the reset button in the reverse order of removal.

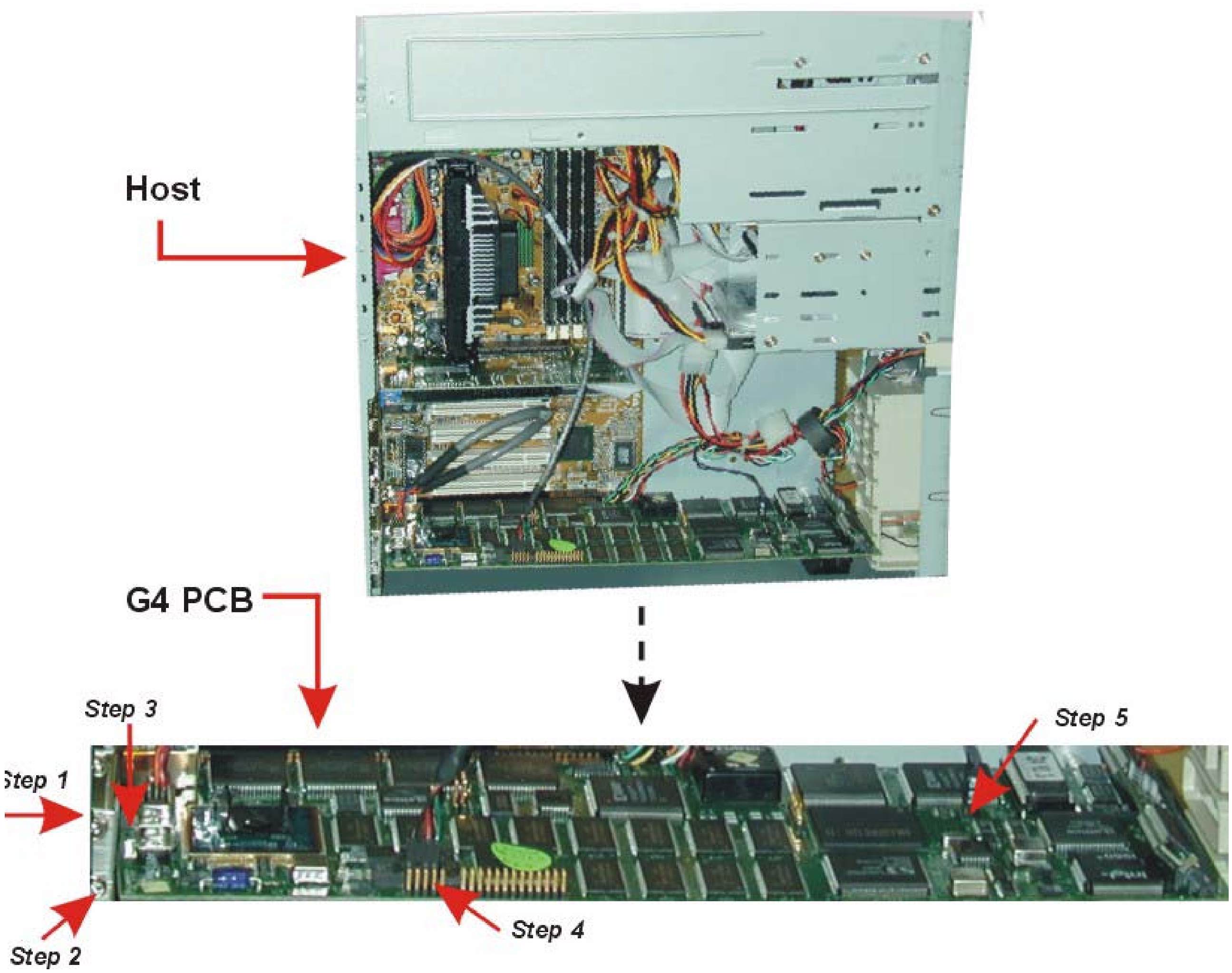


CALYSTO Series IV Removal/Replacement Procedures (First Generation Front End)

Removing and Replacing the G4 PCB, from Host

Refer to illustration below.

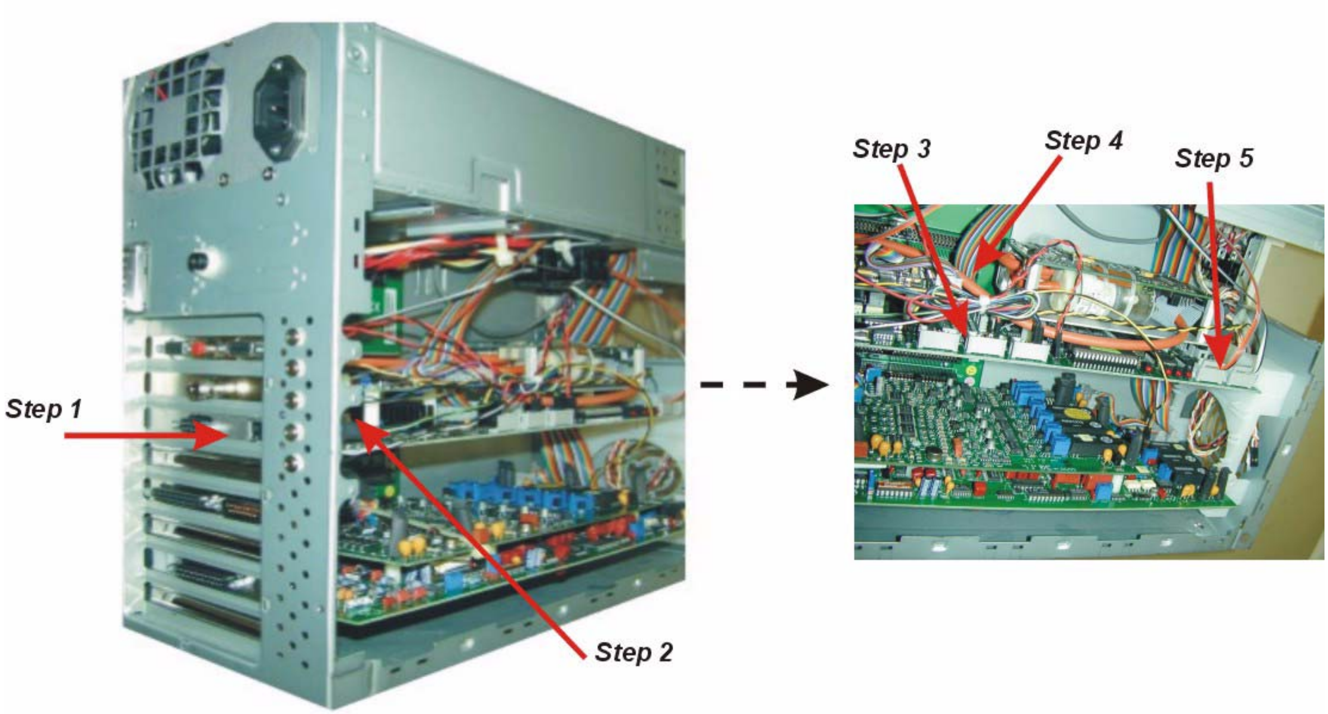
1. Disconnect all external cables plugged into the board.
2. Remove one retaining screw on left mounting plate.
3. Remove 17" unamplified video cable at J6.
4. Remove JP2, pins 3, 5, 7, and 9.
5. Remove G4 reset cable.
6. Grasp the PCB and gently pull toward you with a rocking motion until it's loosened from the motherboard slot.
7. Place the PCB on a static protected mat.
8. Replace the PCB in the reverse order of removal.



Removing and Replacing the S4 PCB, from Front End

See illustration below.

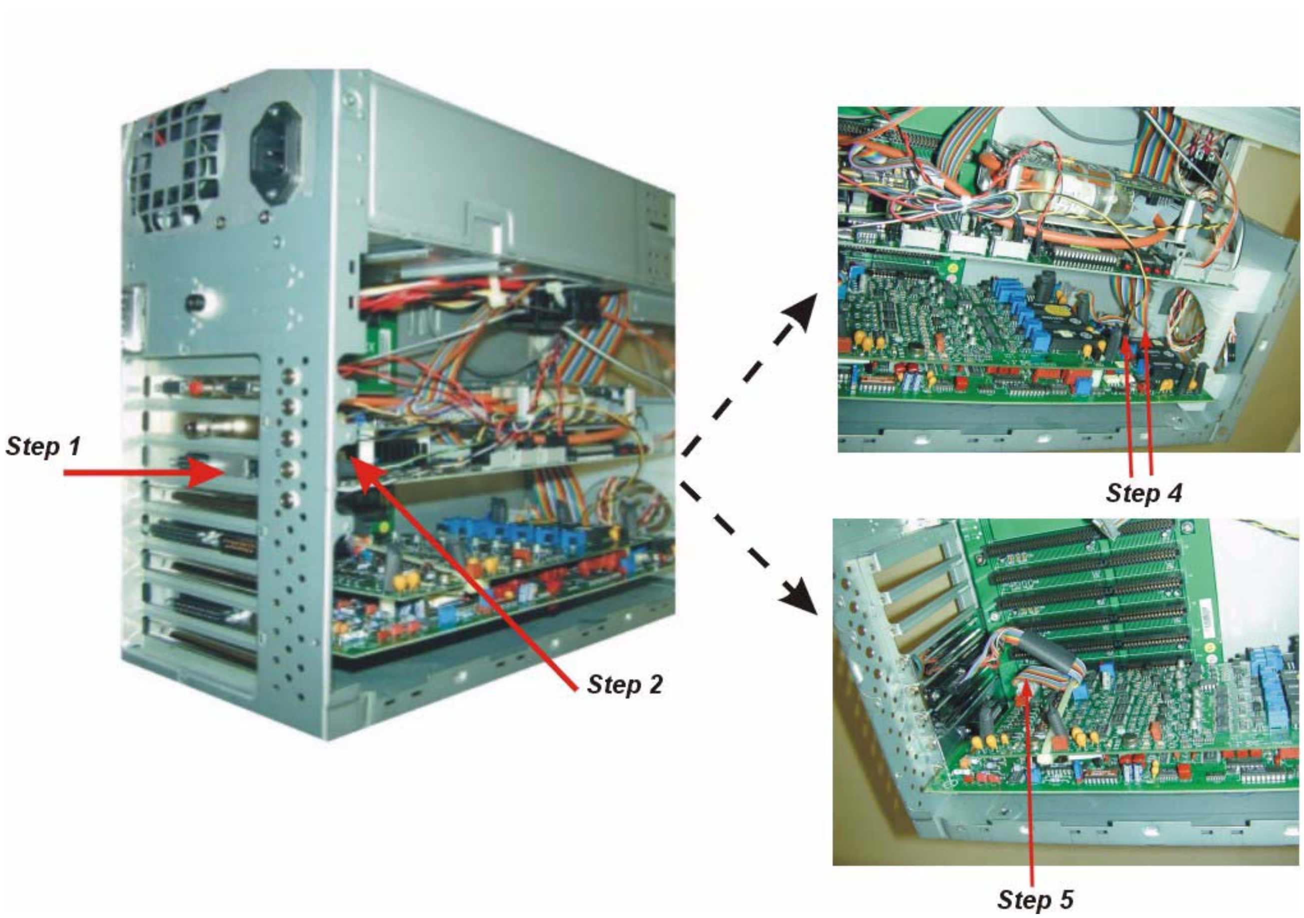
1. Disconnect any external cables plugged into the PCB.
2. Remove one retaining screw on left mounting plate.
3. Disconnect the three analog output cables from the top edge of the PCB at JP3, JP6, and JP8 (labels are on the bottom of the board).
4. Remove the 26-pin ribbon cable at JP11.
5. Remove the two 10-pin ribbon cables at JP9 and JP10 (labels are on the rear of the connectors).
6. Grasp the PCB and gently pull it toward you with a rocking motion until it's loosened from the motherboard slot.
7. Place the PCB on a static protected mat.
8. Remove the SpO2 and NIBP modules using the procedures on pages 6-13.
9. Replace the PCB in the reverse order of removal.



Removing and Replacing the ECG and Pressure Daughter PCBs, from Front End

See illustration below.

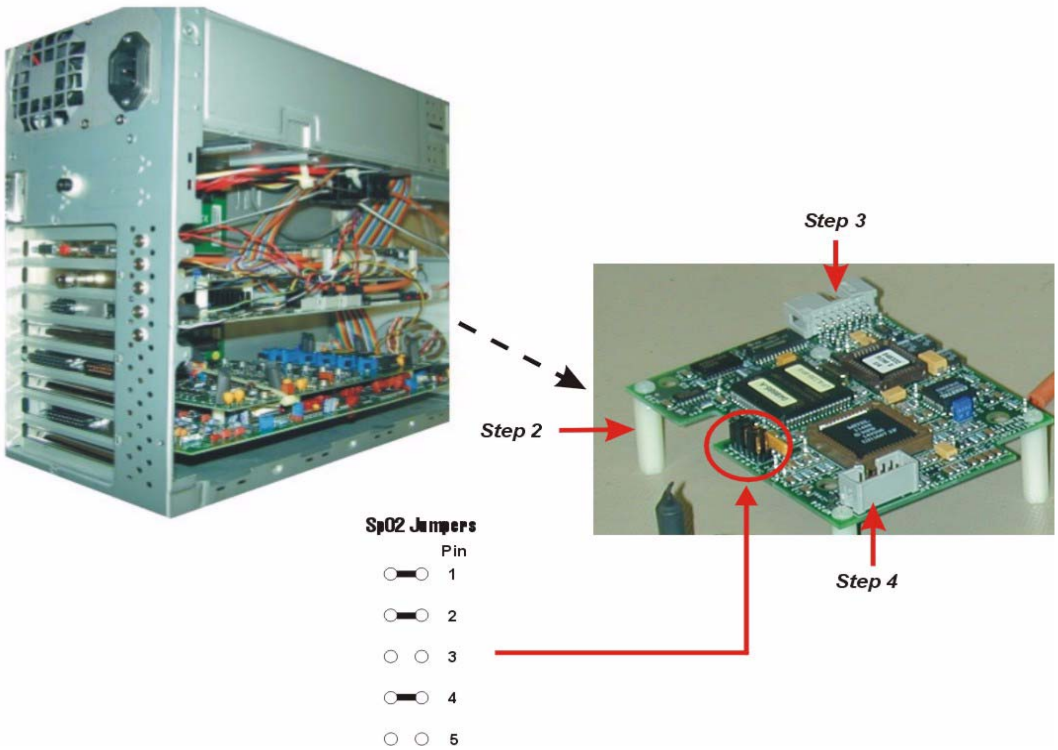
1. Disconnect the external ECG cable plugged into the PCB.
2. Remove one retaining screw on left mounting plate.
3. Grasp the PCB (with daughter board attached) and gently pull it toward you with a rocking motion until it’s loosened from the motherboard slot.
4. Disconnect the 26-pin ribbon cable at JP2 and the 2-pin connector at JP3 of the ECG PCB.
5. Remove the 20-pin ribbon cable at JP1 of the Pressure Daughter PCB.
6. Place the PCB on a static protected mat.
7. Disconnect the Pressure Daughter PCB from the ECG PCB by removing the four nylon screws and standoffs.
8. Replace the ECG and Daughter PCBs in the reverse order of removal.



Removing and Replacing the SpO2 Module, from Front End

See illustration below.

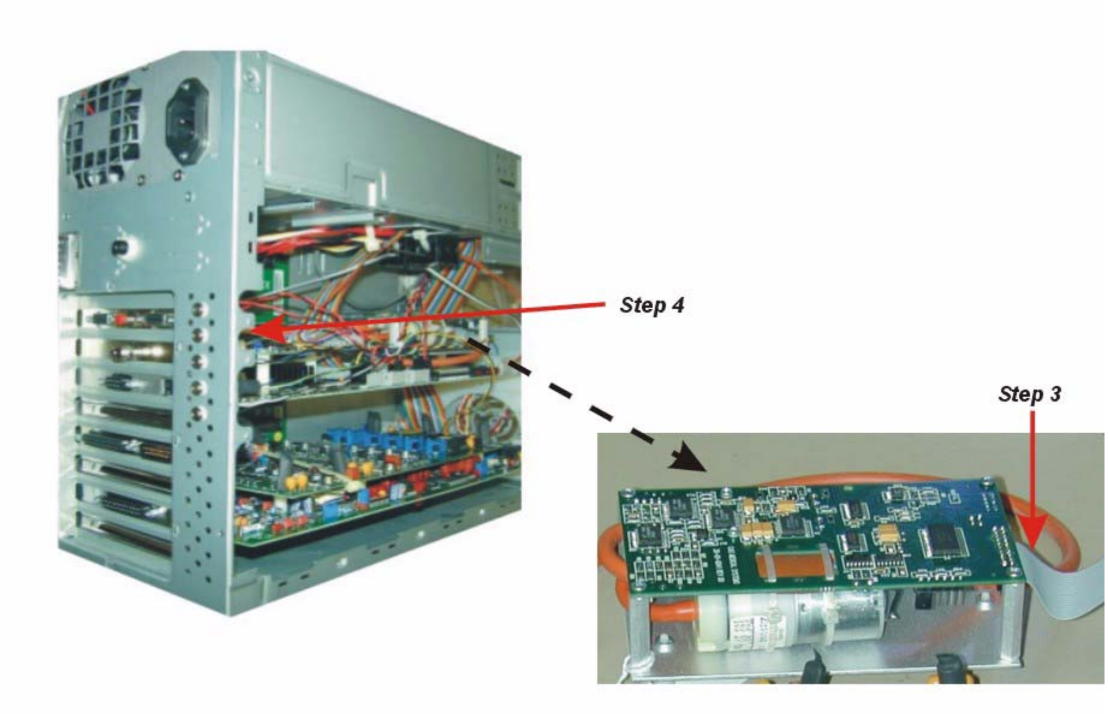
1. First, perform the removal instructions for the S4 PCB on page 6-11.
2. Then, remove the four nylon screws and standoffs securing the SpO2 Module to the S4 PCB.
3. Disconnect the 10-pin ribbon cable at JP1.
4. Disconnect the 10-pin ribbon cable at JP5.
5. Place the module on a static protected mat.
6. Replace the SpO2 Module in the reverse order of removal.
7. Set SpO2 jumpers on pins 1, 2, and 4 as shown below.



Removing and Replacing the NIBP Module, from Front End

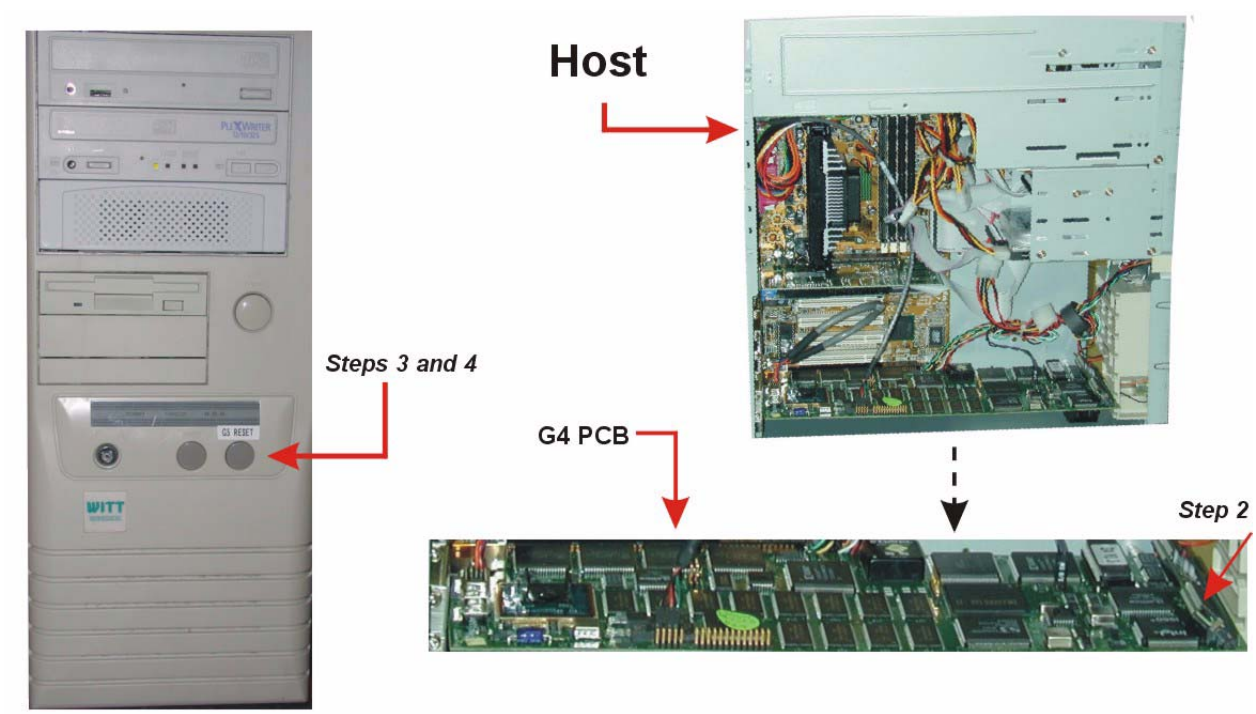
See illustration at top of following page.

1. First, perform the removal instructions for the S4 PCB on page 6-11.
2. Then, disconnect the 20-pin ribbon cable at JP7.
3. Remove the three nylon screws and standoffs securing the NIBP Module to the S4 PCB.
4. Remove the rubber tubing from the connector on the expansion slot on the CPU back plate.
5. Place the module on a static protected mat.
6. Replace the NIBP Module in the reverse order of removal.



Removing and Replacing the G4 Reset Button, from Host

1. Ensure power is removed from CPU and you are properly grounded.
2. Remove the 2-pin G4 reset button cable on the G4 PCB.
3. Remove outer retaining ring from around button.
4. Retract button assembly from front panel faceplate.
5. Replace the reset button in the reverse order of removal.

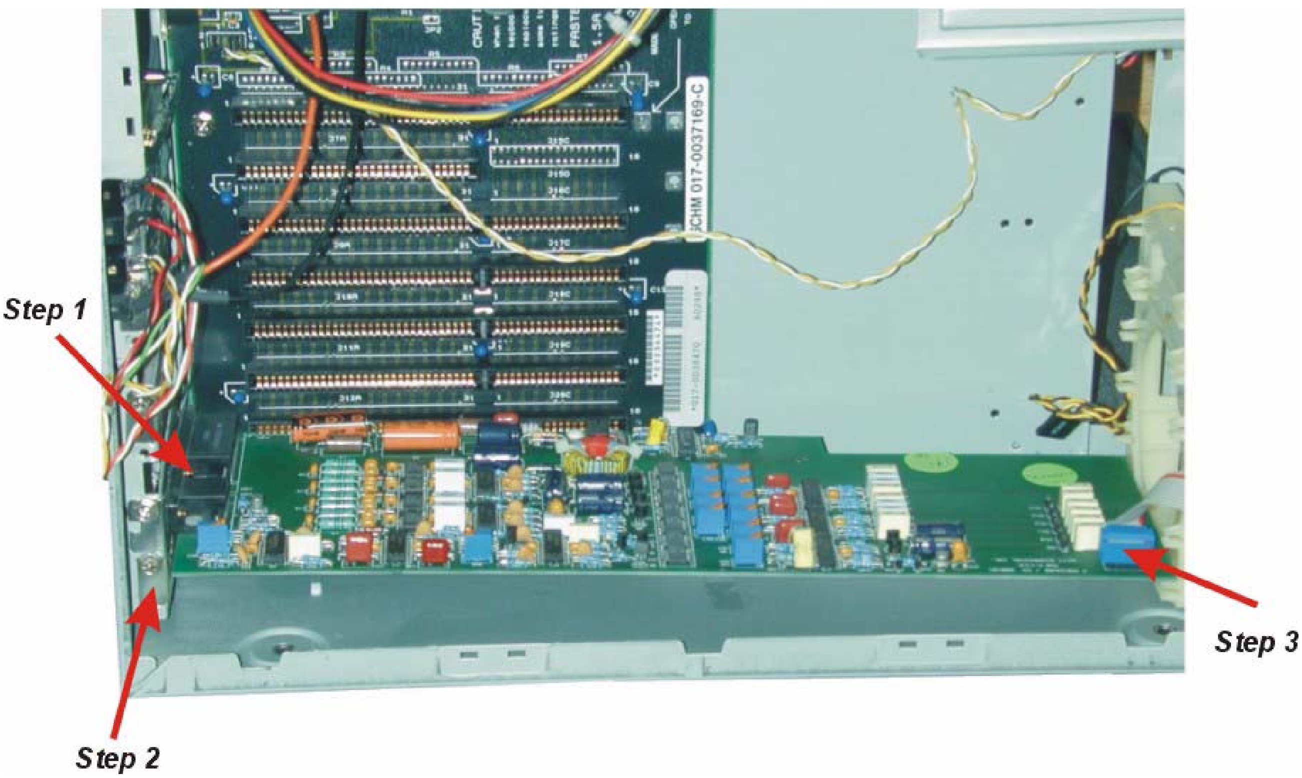


CALYSTO Series IV Removal and Replacement Procedures (RAM Front End)

Removing and Replacing the RAM Pressure PCB, from Front End

See illustration below.

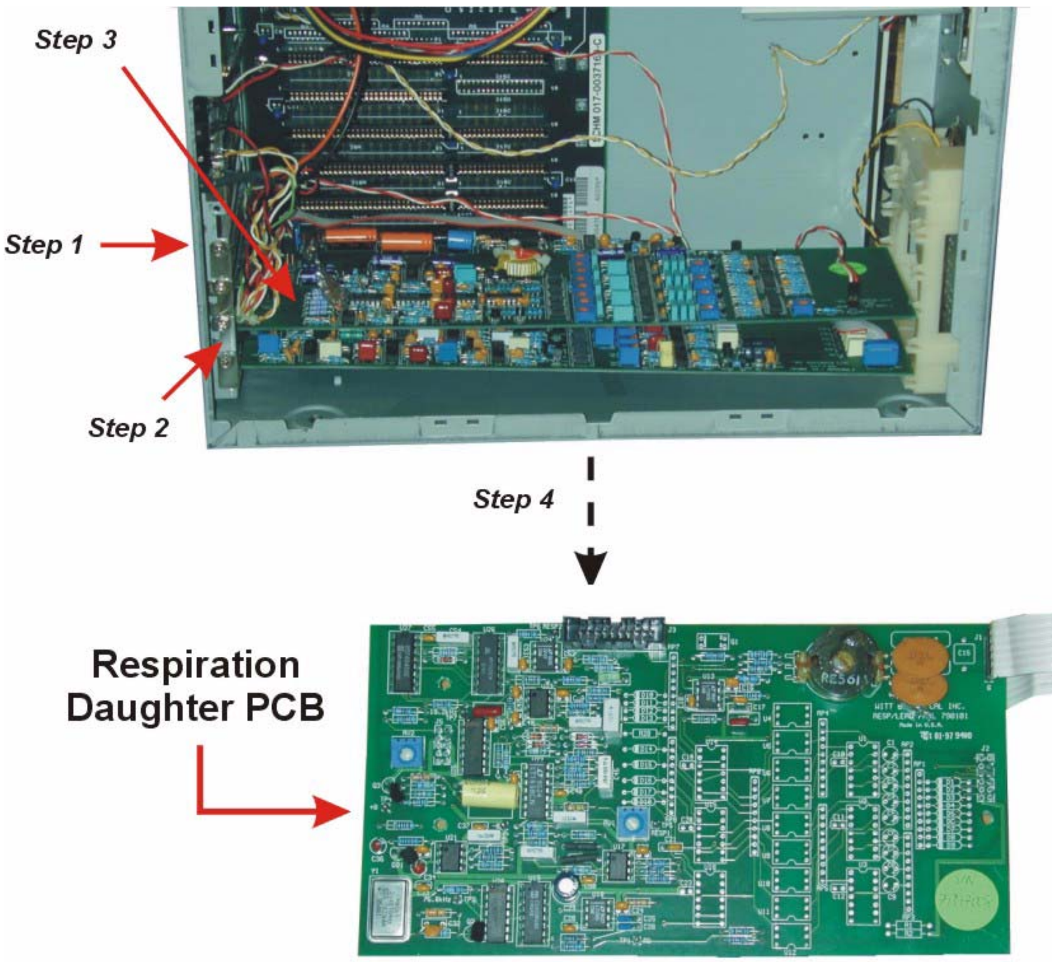
1. Disconnect the external 4-wire pressure harness cable plugged into the PCB.
2. Remove one retaining screw on left mounting plate.
3. Disconnect the 10-pin ribbon cable at JP101.
4. Grasp the PCB and gently pull it toward you with a rocking motion until it's loosened from the motherboard slot.
5. Place the module on a static protected mat.
6. Replace the RAM Pressure PCB in the reverse order of removal.



Removing and Replacing the RAM ECG and Respiration Daughter PCBs, from Front End

See illustration below.

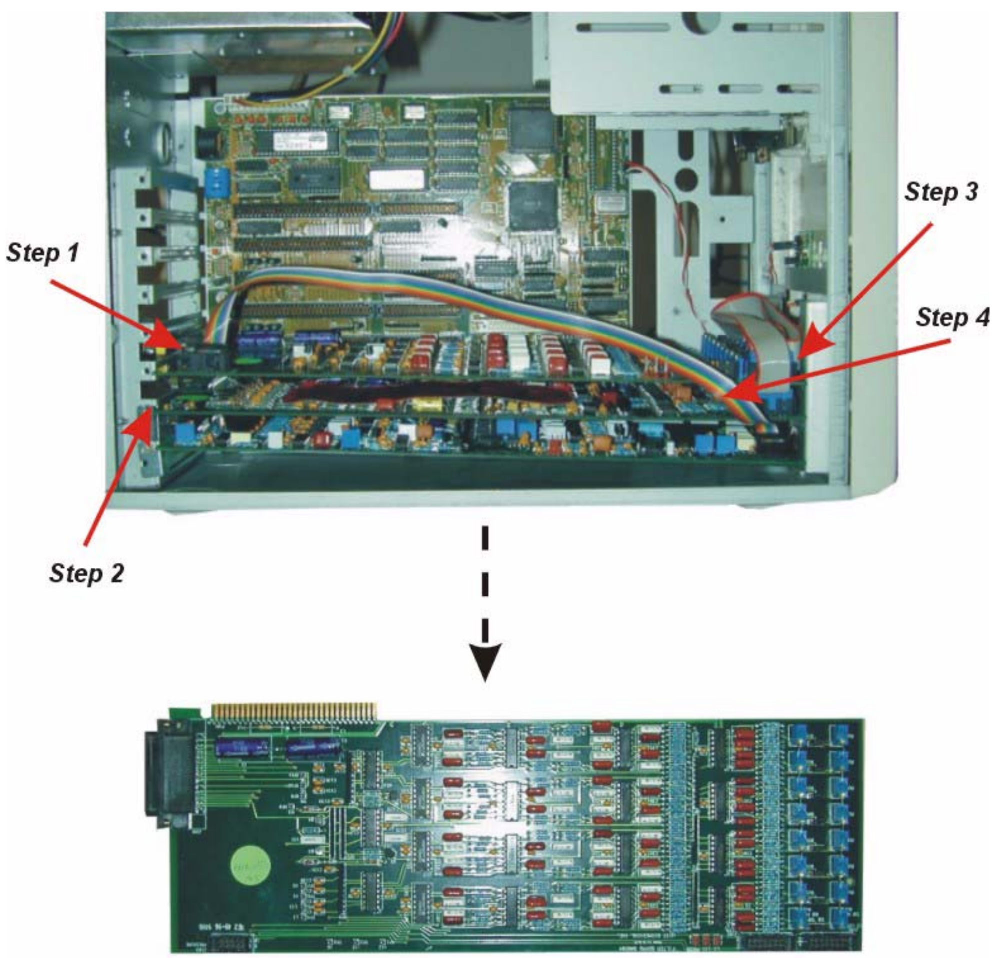
1. Disconnect the external ECG cable plugged into the PCB.
2. Remove one retaining screw on left mounting plate.
3. Disconnect the 14-pin ribbon cable at JP101.
4. Grasp the PCB (with daughter board attached) and gently pull it toward you with a rocking motion until it's loosened from the motherboard slot.
5. Place the module on a static protected mat.
6. Disconnect the Respiration Daughter PCB by removing the four nylon screws and standoffs.
7. Replace the ECG and Daughter PCBs in the reverse order of removal.



Removing and Replacing the RAM Filter PCB, from Front End

See illustration below.

1. Disconnect the external loop cable plugged into the PCB.
2. Remove one retaining screw on left mounting plate.
3. Disconnect the 10-pin ribbon cable at JP103.
4. Disconnect the 14-pin ribbon cable at JP101
5. Grasp the PCB and gently pull it toward you with a rocking motion until it's loosened from the motherboard slot.
6. Place the module on a static protected mat.
7. Replace the RAM Filter PCB in the reverse order of removal.



CALYSTO Series IV Removal/Replacement Procedures (Miscellaneous Components)

Removing and Replacing the Front End (AT) Power Supply

Warning

Dangerous voltage exists within the AT power supply that poses the risk of electrical shock.

See illustration below.

1. Ensure power is removed from CPU and you are properly grounded.
2. Remove four crosshatch screws securing power supply to CPU rear panel.
3. Disconnect the power supply cable at JP1 on CPU backplane.
4. Disconnect any unused power supply cabling secured to CPU frame.
5. Lift the AT power supply from the CPU.
6. Replace the AT power supply in the reverse order of removal.

Caution

To avoid damage to the equipment, ensure that the power cables to the backplane are oriented black-to-black.

Removing and Replacing the Host and Review (ATX) Power Supply

Warning

Dangerous voltage exists within the ATX power supply that poses the risk of electrical shock.

1. Ensure power is removed from CPU and you are properly grounded.
2. Remove four crosshatch screws securing power supply to CPU rear panel.
3. Disconnect the power supply cable at CN1 on CPU backplane.
4. Disconnect any unused power supply cabling secured to CPU frame.
5. Lift the ATX power supply from the CPU.
6. Replace the ATX power supply in the reverse order of removal.

Caution

To avoid damage to the equipment, ensure that the power cables to the backplane are oriented black-to-black.

Removing and Replacing the Host and Review CPU Hard Drives

1. Ensure power is removed from CPU and you are properly grounded.
2. Remove two crosshatch screws securing hard drive in bay.
3. Remove power supply cable from back of drive.
4. Remove data cable from back of drive.
5. Remove drive from bay.
6. Replace drive in the reverse order of removal, then power up and reconfigure.
7. Ensure the Master/Slave jumpers are set correctly.

Removing and Replacing the Host and Review CPU Motherboard

1. Ensure power is removed from CPU and you are properly grounded.
2. Remove four crosshatch screws securing power supply to CPU rear panel.
3. Disconnect the power supply cable at CN1 on CPU backplane.
4. Remove all PCBs from the motherboard.
5. Disconnect all ribbon cables from motherboard.
6. Remove mounting screws securing motherboard to CPU frame.
7. Remove motherboard.
8. Replace motherboard in the reverse order of removal.

Removing and Replacing the Host and Review CPU RAM

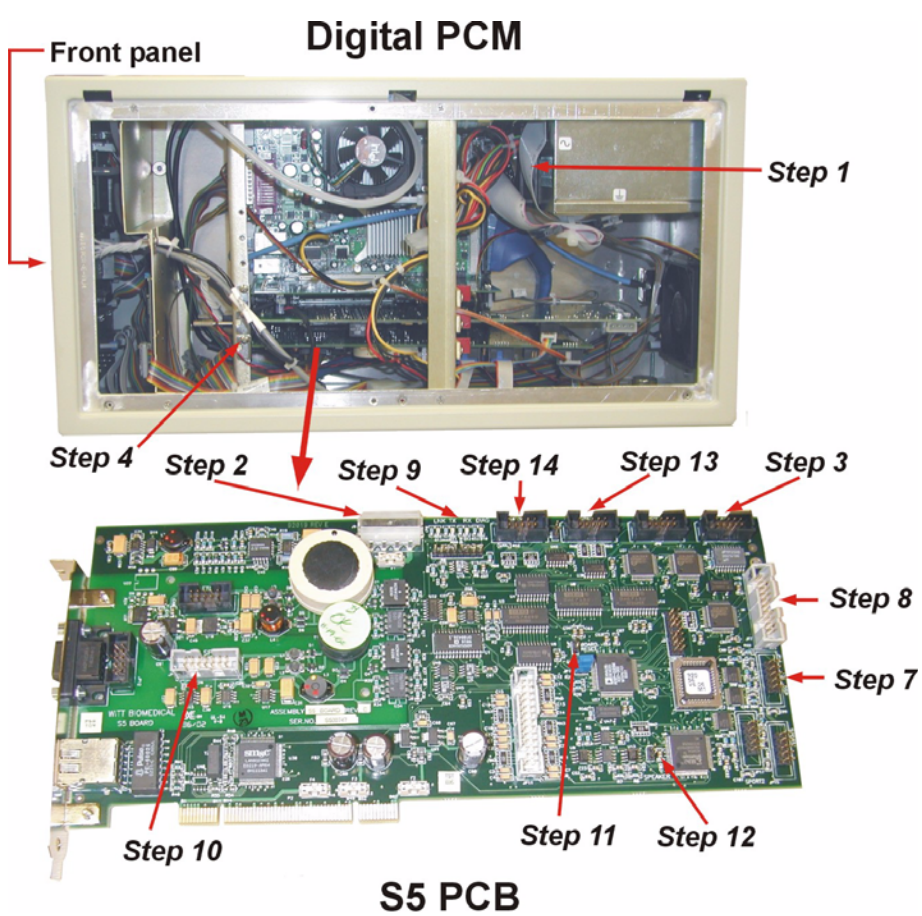
1. Ensure power is removed from CPU and you are properly grounded.
2. Locate the RAM SIMMs or DIMMs. SIMMs are 72-pin miniature boards in a white slot. DIMMs are 168-pin miniature boards in a brown or black slot.
3. If mainboard utilizes SIMMS. Insert the SIMMs at a 45-degree angle, then rock it to 90-degrees to lock it in place (pay special attention to the alignment tabs).
4. If mainboard utilizes DIMMS. Insert the DIMMs straight into the socket, then secure the locking tabs at each end (pay special attention to the alignment tabs).
5. Replace SIMMs and DIMMs in the reverse order of removal.

CALYSTO Digital Patient Care Monitor (PCM) Removal and Replacement Procedures

Removing and Replacing the S5 PCB

See illustration below.

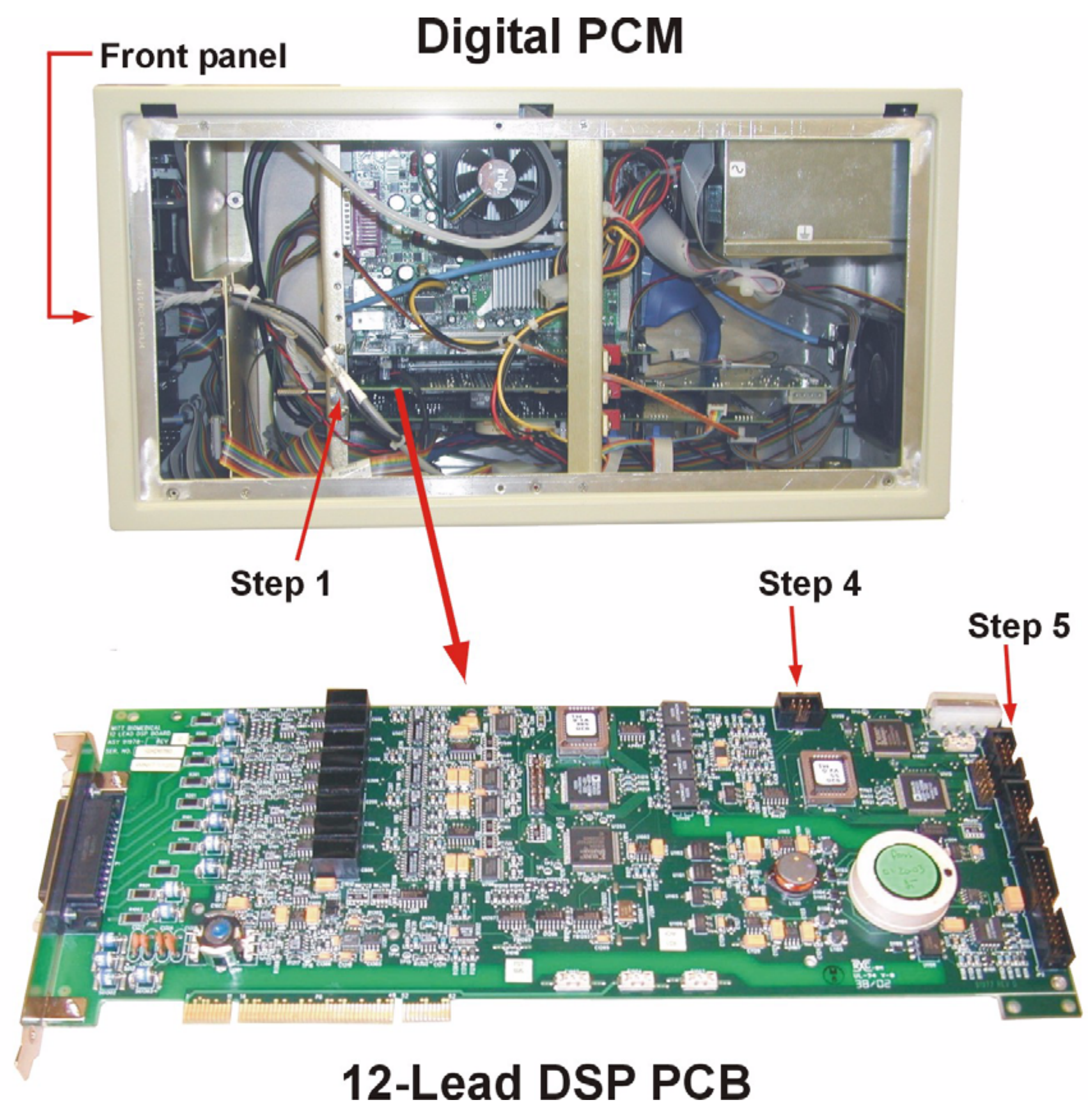
1. Disconnect the 20-pin BOGA cable from the gray cable extending from the NIBP module.
2. Disconnect the power connector from J9.
3. Disconnect the BFES4 internal serial cable from J7.
4. Remove retaining screw and star washer on left mounting plate of PCI-3 on main board.
5. Grasp the PCB and pull it toward you with a rocking motion until it's loosened from the PCI slot.
6. Place the PCB on a static protected mat.
7. Disconnect the digital pressure cable from JP14.
8. Disconnect the BOGA extension cable from JP7
9. Disconnect the LED cable from J13.
10. Disconnect the BOG cable from JP4.
11. Disconnect BHR4 reset cable from JP5.
12. Disconnect the KL speaker cable from JP1.
13. Disconnect the BISO-10 DIGITAL IN cable from JP8.
14. Disconnect the BISO-10 ANALOG OUT cable from JP3.
15. Replace the PCB in the reverse order of removal.



Removing and Replacing the 12-Lead DSP PCB

See illustration below.

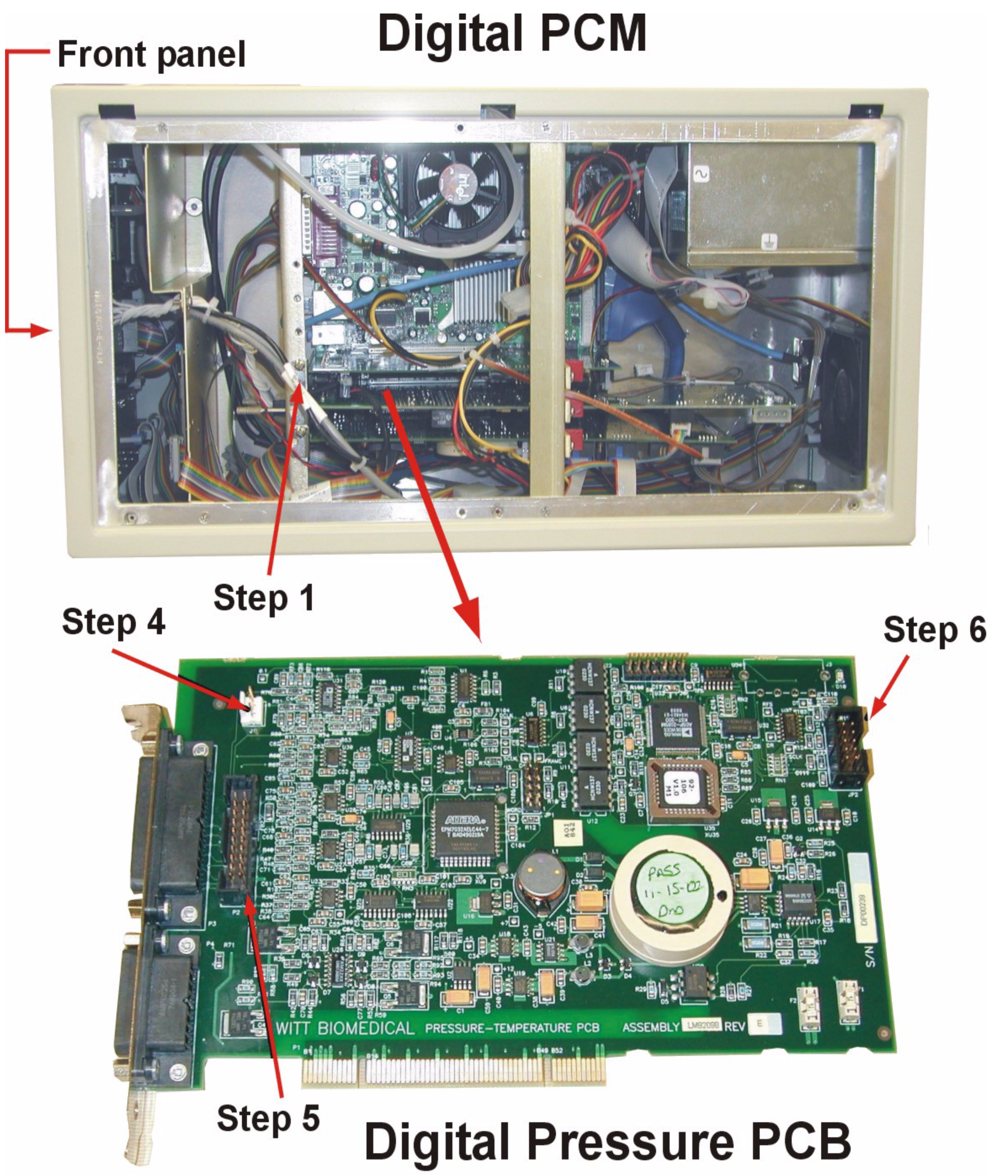
1. Remove retaining screw and star washer on left mounting plate of PCI-2 on main board.
2. Grasp the PCB and pull it toward you with a rocking motion until it's loosened from the PCI slot.
3. Place the PCB on a static protected mat.
4. Disconnect the BISO-6 cable from JP3.
5. Disconnect the BDPT cable from JP5.
6. Replace the PCB in the reverse order of removal



Removing and Replacing the Digital Pressure PCB

See illustration below.

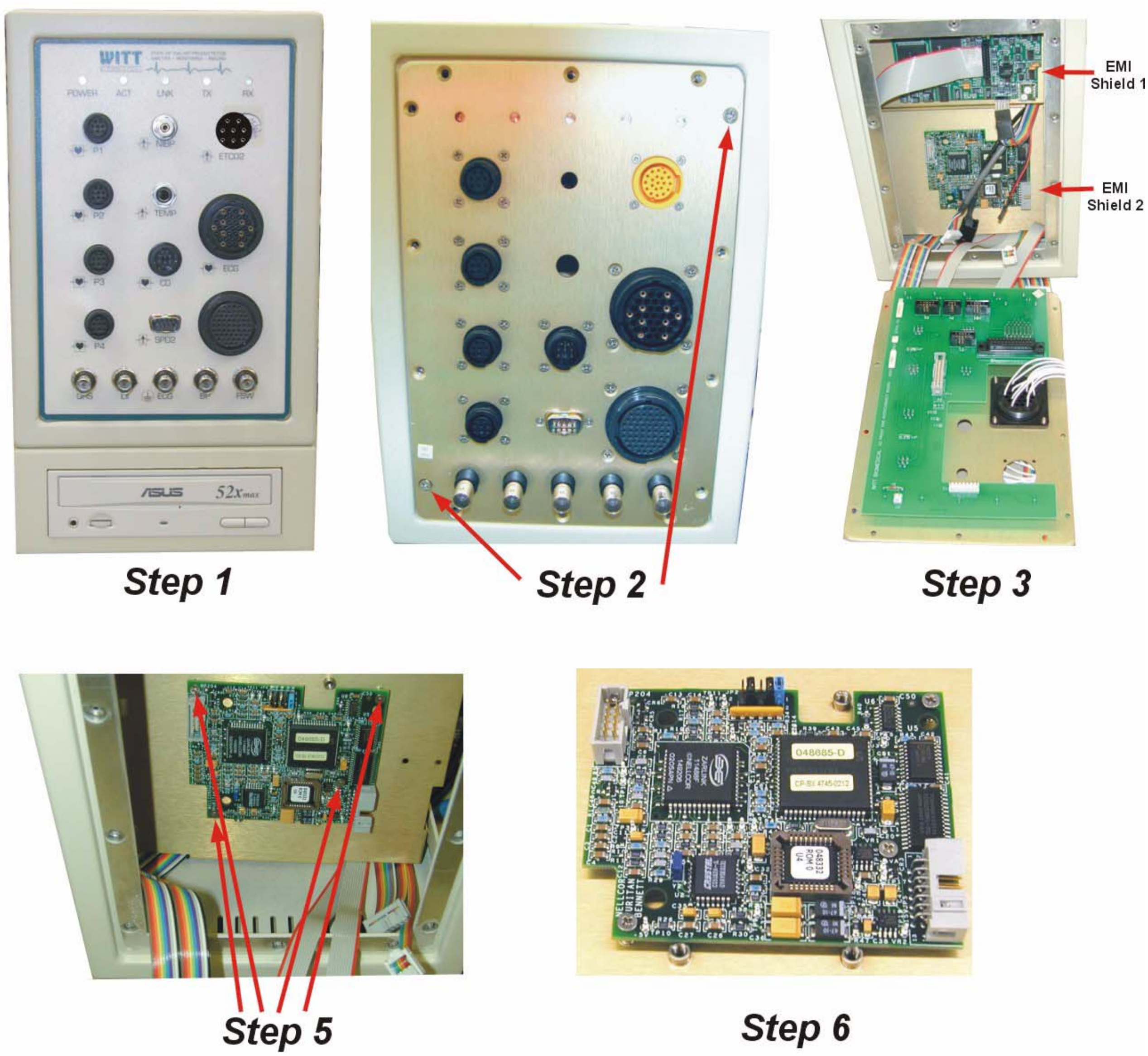
1. Remove retaining screw and star washer on left mounting plate of PCI-1 on main board.
2. Grasp the PCB and pull it toward you with a rocking motion until it's loosened from the PCI slot.
3. Place the PCB on a static protected mat.
4. Disconnect auxiliary temperature cable from J1.
5. Disconnect extension cable from P2.
6. Disconnect the DPT cable from JP2.
7. Replace the PCB and daughter board in the reverse order of removal



Removing and Replacing the SPO2 Module

See illustration below.

1. Remove locknuts on NIBP, Temp, and 5 Auxiliary connectors and remove the chassis logo panel from the PCM front panel.
2. Remove 14 perimeter screws securing QS5 assembly to chassis.
3. Set QS5 assembly down.
4. Disconnect all cabling connected to SPO2 module
5. Remove 4 screws securing module to EMI shield 2 (bottom) and remove module.
6. Place the module on a static protected mat.
7. Replace the module in the reverse order of removal.

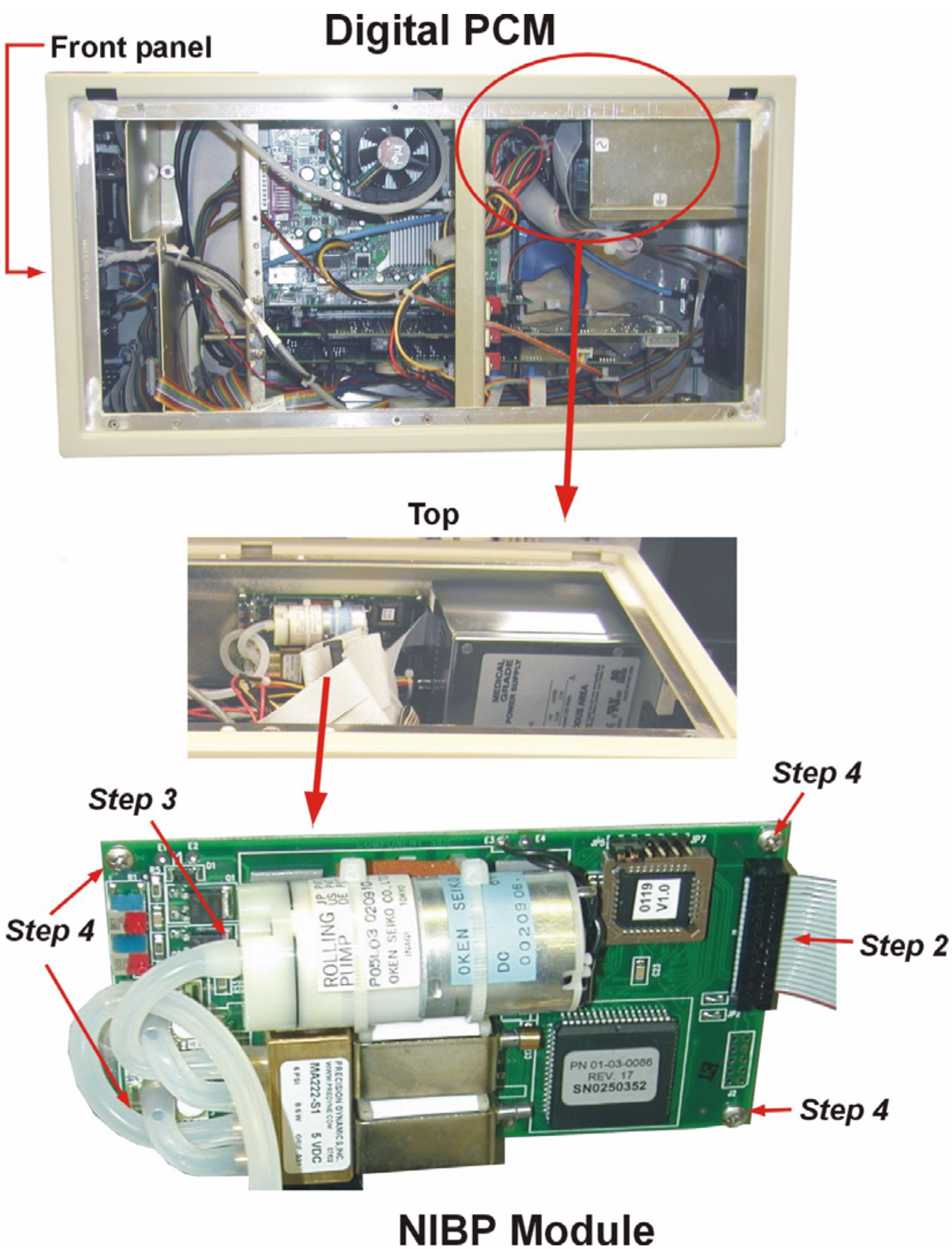


SPO2 Module

Removing and Replacing the NIBP Module

See illustration below.

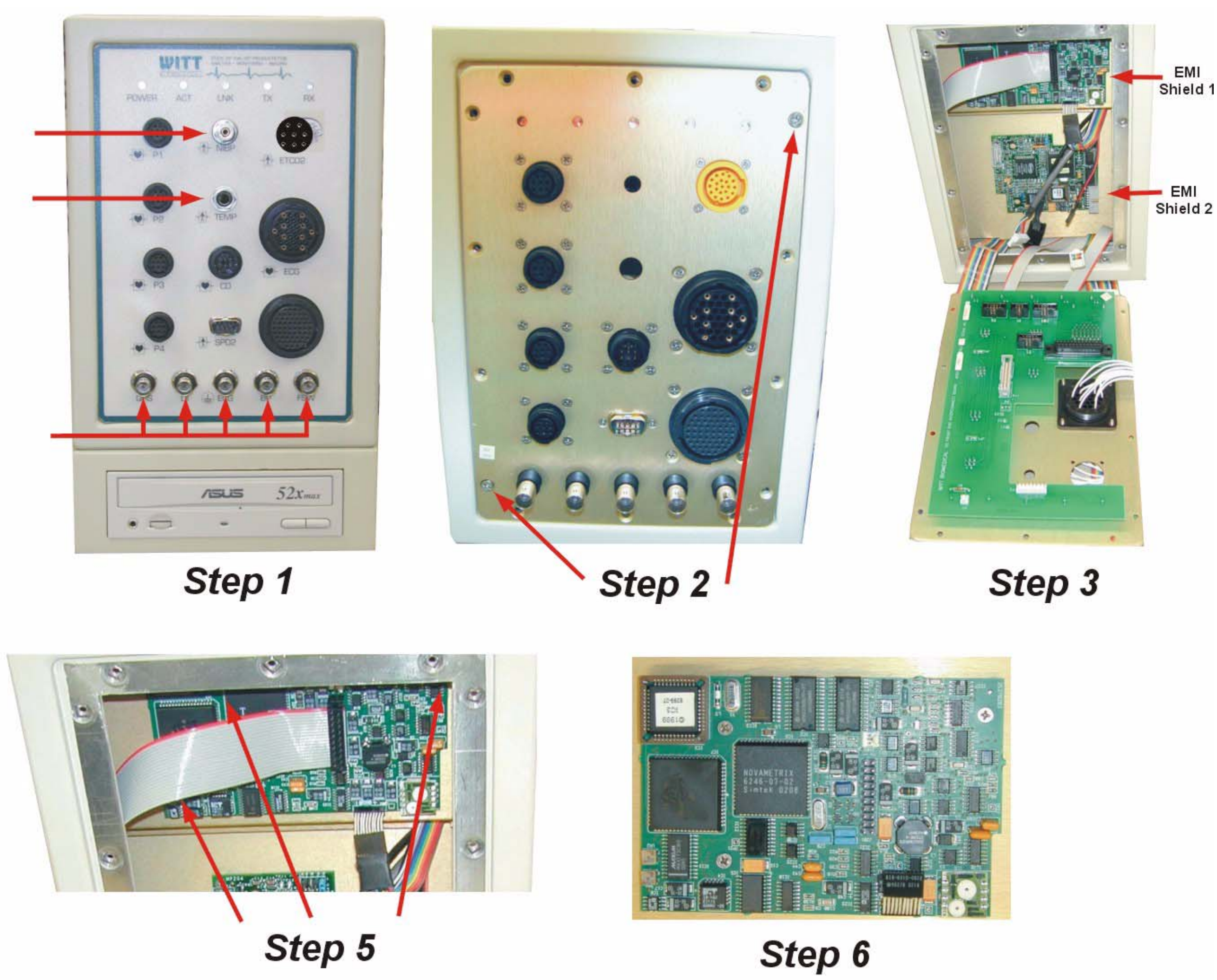
1. Locate NIBP module on inside top of chassis.
2. Disconnect ribbon cable.
3. Remove NIBP hose.
4. Remove 4 screws securing module to chassis standoffs.
5. Place the PCB on a static protected mat.
6. Replace the NIBP module in the reverse order of removal.



Removing and Replacing the ETCO2 Module

See illustration below.

1. Remove locknuts on NIBP, Temp, and 5 Auxiliary connectors and remove the chassis logo panel from the PCM front panel.
2. Remove 14 perimeter screws securing QS5 assembly to chassis.
3. Set QS5 assembly down.
4. Disconnect all cabling connected to ETCO2 module
5. Remove 3 screws securing module to EMI shield 1 (top) and remove module.
6. Place the module on a static protected mat.
7. Replace the module in the reverse order of removal.



ETCO2 Module

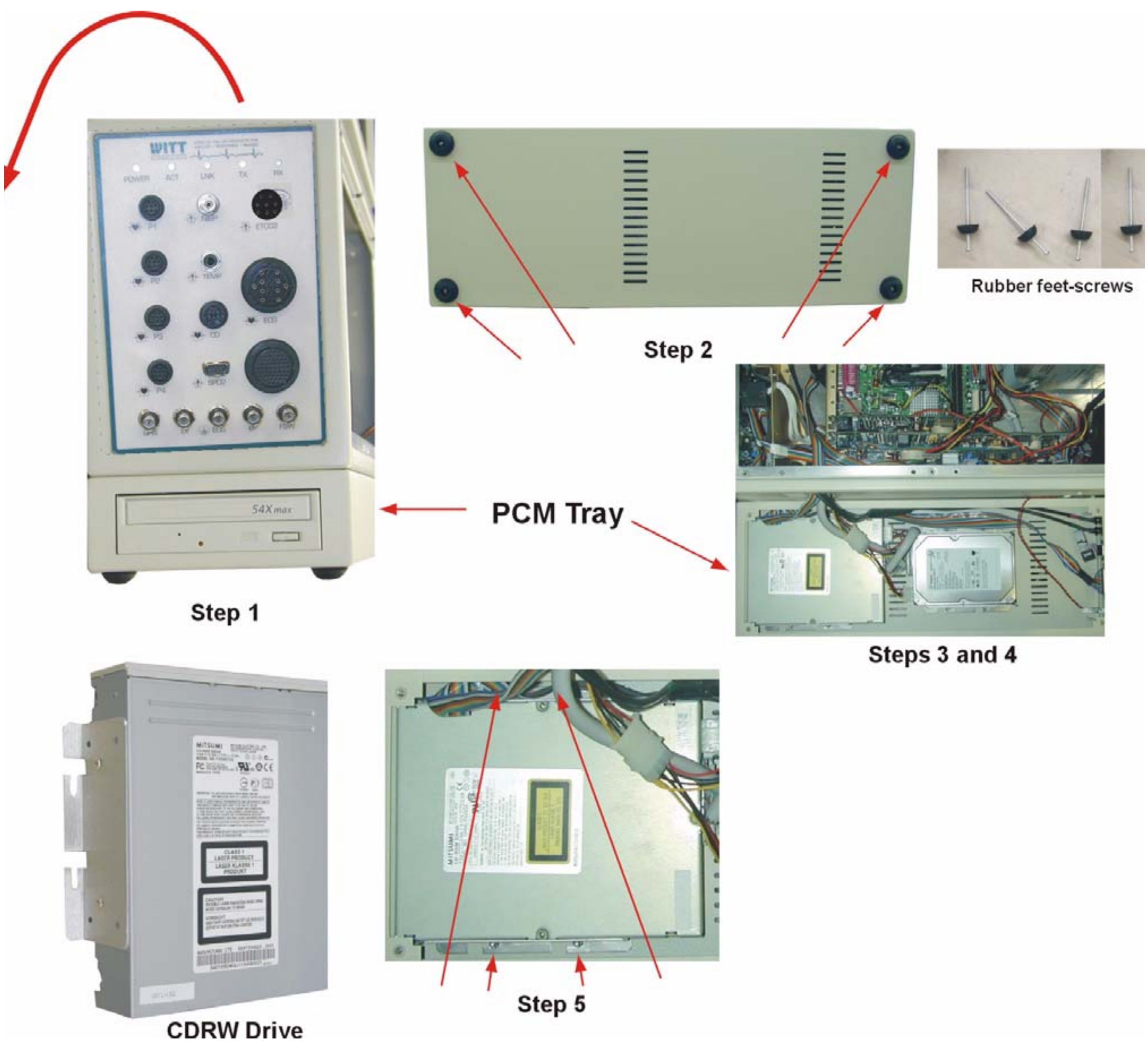
Removing and Replacing the CDRW Drive

See illustration below.

1. Set PCM on side to access bottom of tray.
2. Remove 4 rubber feet-screw combinations securing tray to PCM chassis.
3. Lower tray as far as possible, taking care not to damage cabling.
4. Disconnect all power and signal cabling attaching tray components to PCM and set tray on static protected mat.
5. Loosen the 4 nylon insert nuts on the prefab bracket screws, disconnect the CDRW drive, and remove it from the tray.
6. Replace the CDRW drive in the reverse order of removal.

Caution

During replacement, the nylon insert nuts can easily be stripped by overtightening.



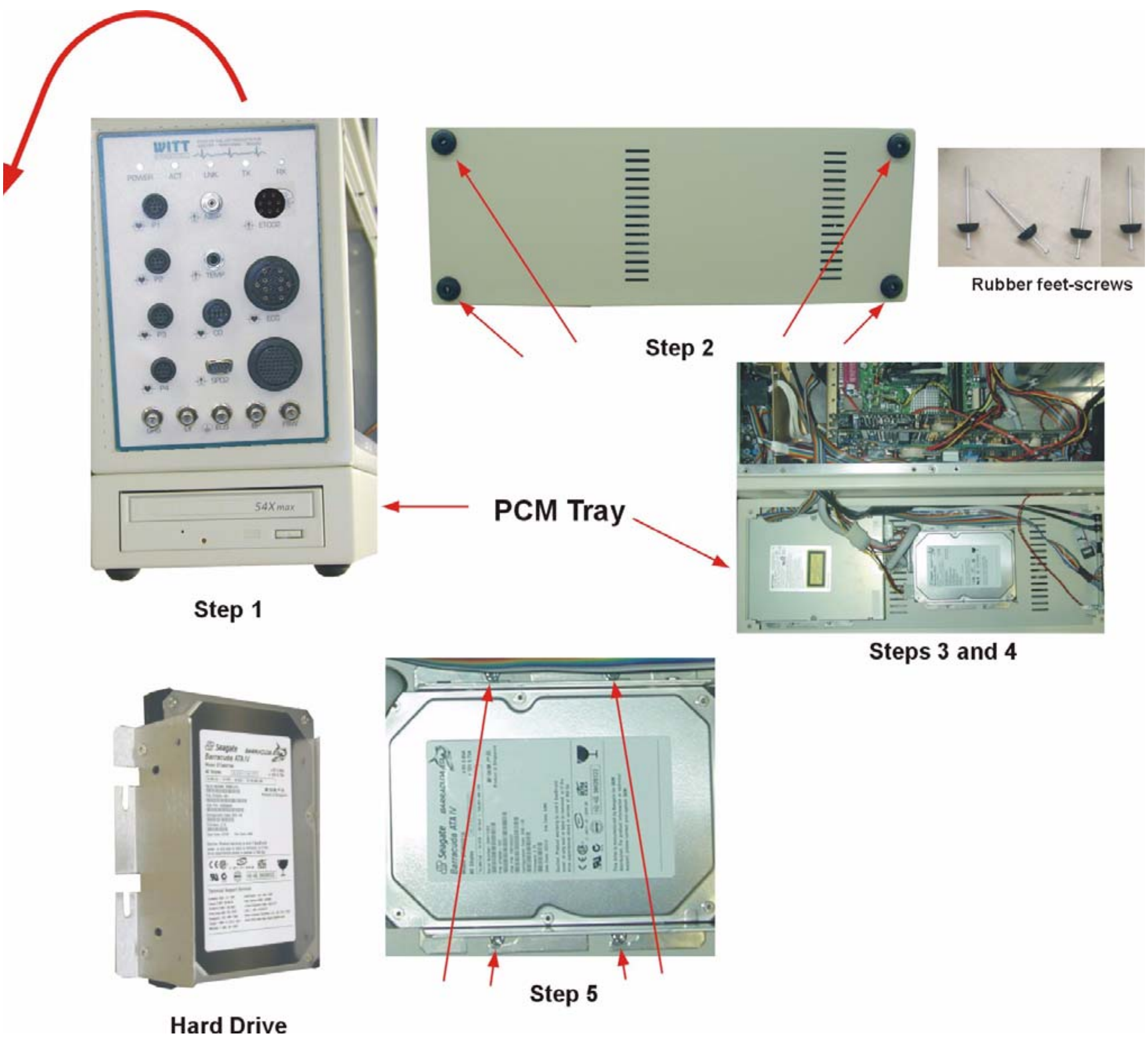
Removing and Replacing the Hard Drive

See illustration below.

1. Set PCM on side to access bottom of tray.
2. Remove 4 rubber feet-screw combinations securing tray to PCM chassis.
3. Lower tray as far as possible, taking care not to damage cabling.
4. Disconnect all power and signal cabling attaching tray components to PCM and set tray on static protected mat.
5. Loosen the 4 nylon insert nuts on the prefab bracket screws, disconnect the hard drive, and remove it from the tray.
6. Replace the hard drive in the reverse order of removal.

Caution

During replacement, the nylon insert nuts can easily be stripped by overtightening.

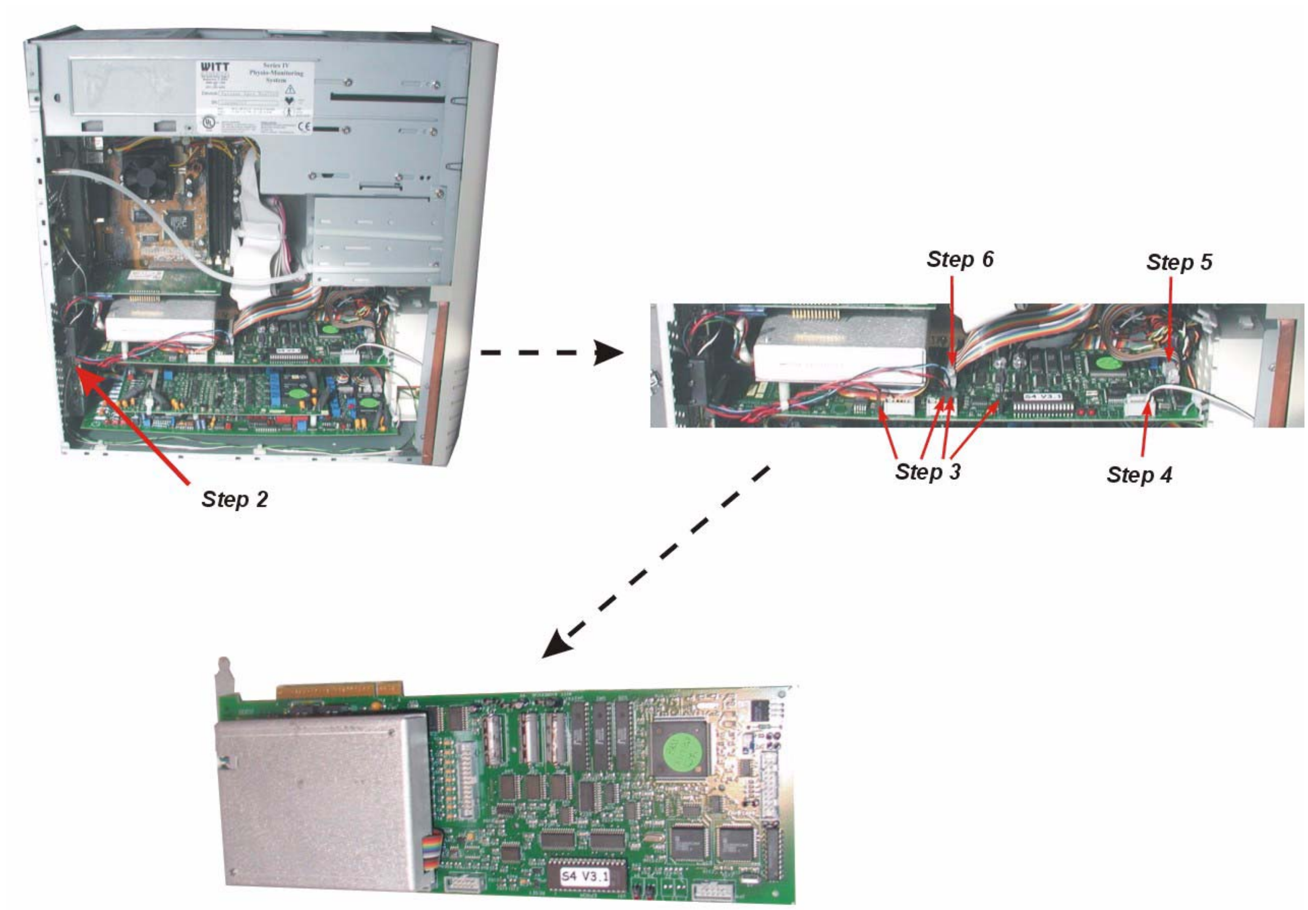


CALYSTO 1st Generation Patient Care Monitor Removal and Replacement Procedures

Removing and Replacing the S4 PCB

See illustration below.

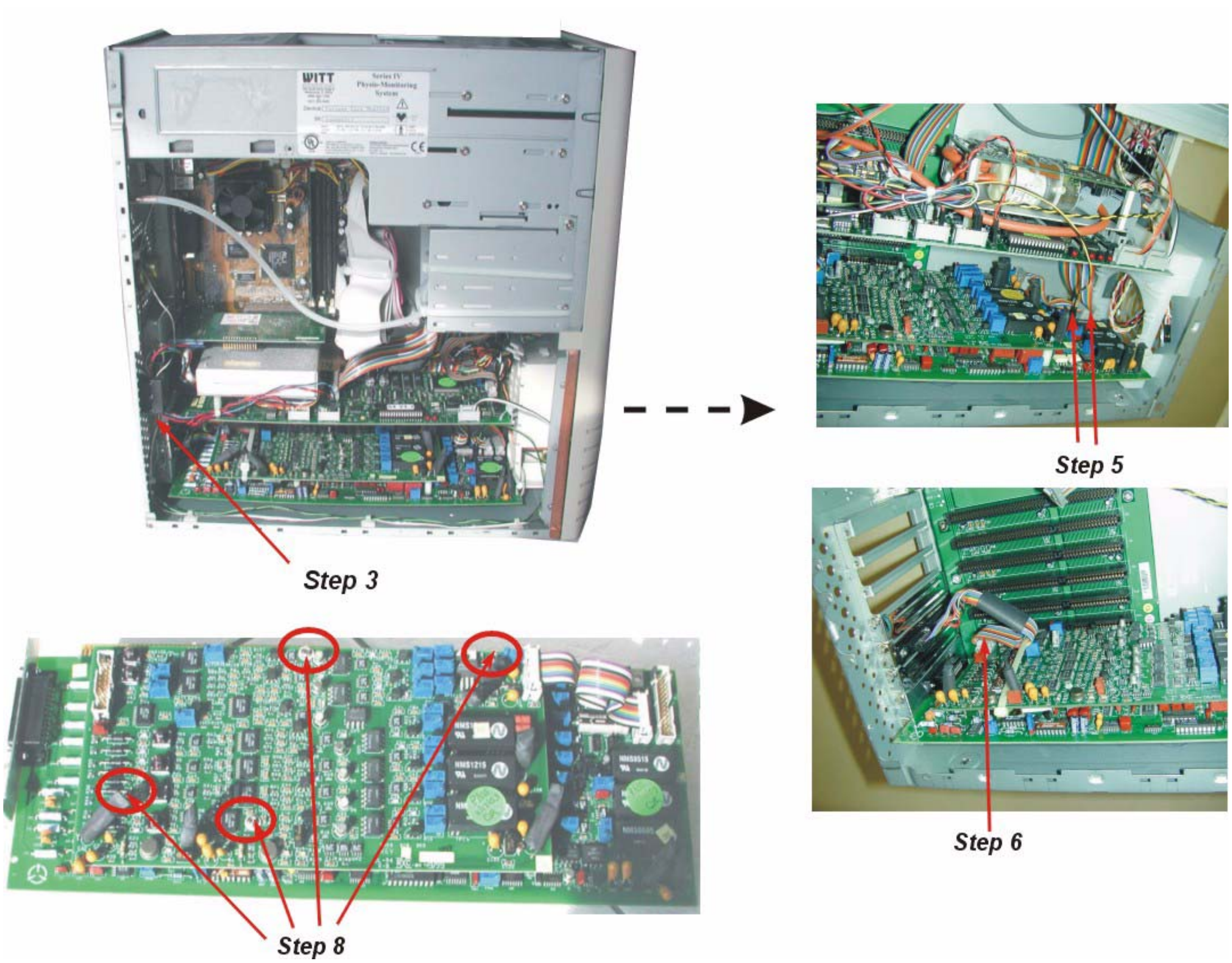
1. Remove any plastic tiedowns securing PCB to chassis.
2. Remove retaining screw on left mounting plate on main board.
3. Grasp the PCB and pull it toward you with a rocking motion until it’s loosened from the PCI slot.
4. Remove connectors from JP1, JP3, and P5.
5. Remove connector from JP9.
6. Remove ribbon cable from JP.
7. Remove ribbon cable from JP11.
8. Remove the PCB from the chassis and place it on a static protected mat.
9. Replace the PCB in the reverse order of removal.



Removing and Replacing the 12-Lead ECG and Pressure Daughter PCB

See illustration below.

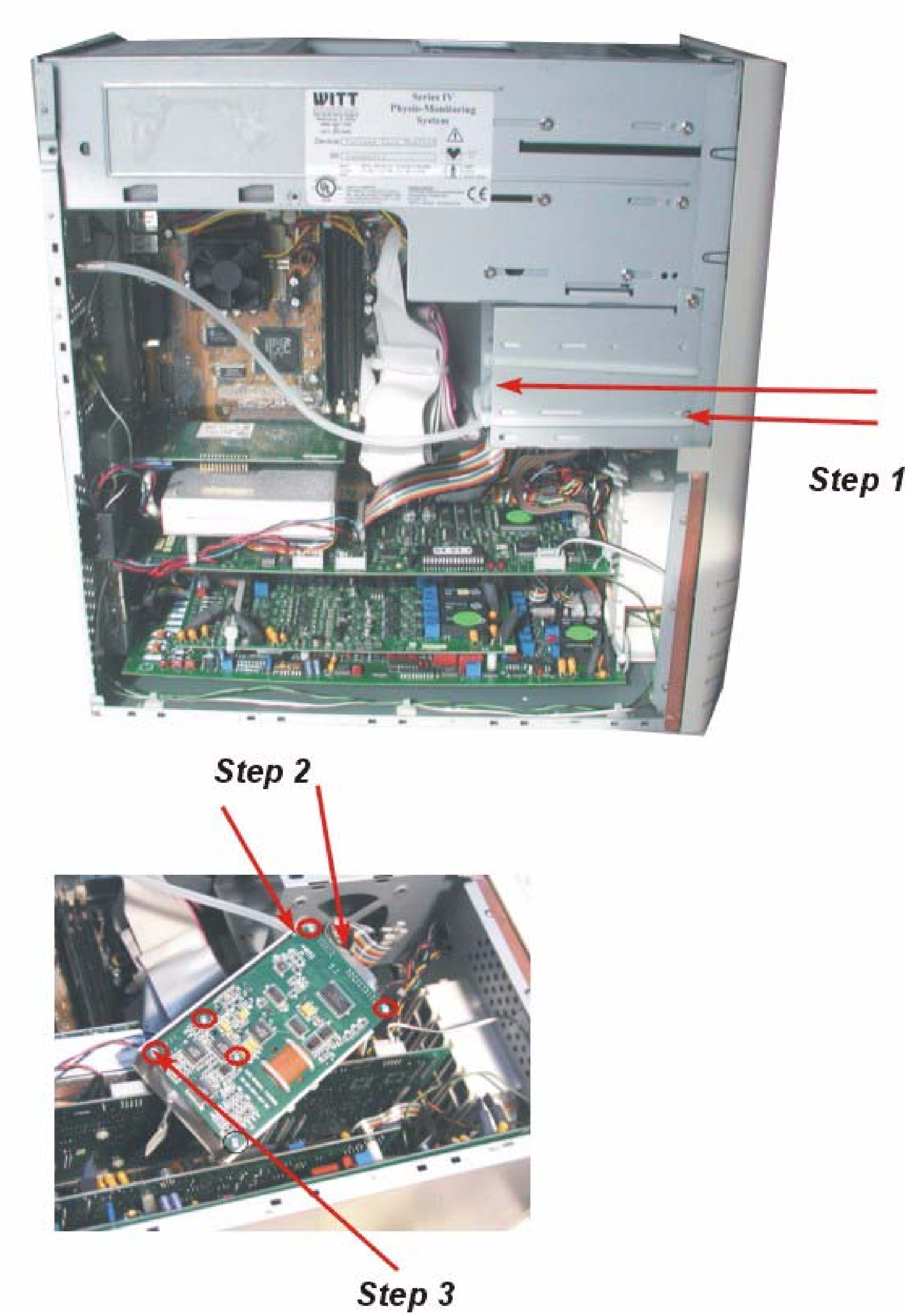
1. Disconnect the external ECG cable plugged into the PCB.
2. Remove any plastic tiedowns securing PCB to chassis.
3. Remove one retaining screw on left mounting plate.
4. Grasp the PCB (with daughter board attached) and gently pull it toward you with a rocking motion until it's loosened from the motherboard slot.
5. Disconnect the 26-pin ribbon cable at JP2 and the 2-pin connector at JP3 of the ECG PCB.
6. Remove the 20-pin ribbon cable at JP1 of the Pressure Daughter PCB.
7. Remove the PCB from the chassis and place it on a static protected mat.
8. Disconnect the Pressure Daughter PCB from the ECG PCB by removing the four nylon screws and standoffs.
9. Replace the ECG and Daughter PCBs in the reverse order of removal.



Removing and Replacing the NIBP Module

See illustration below.

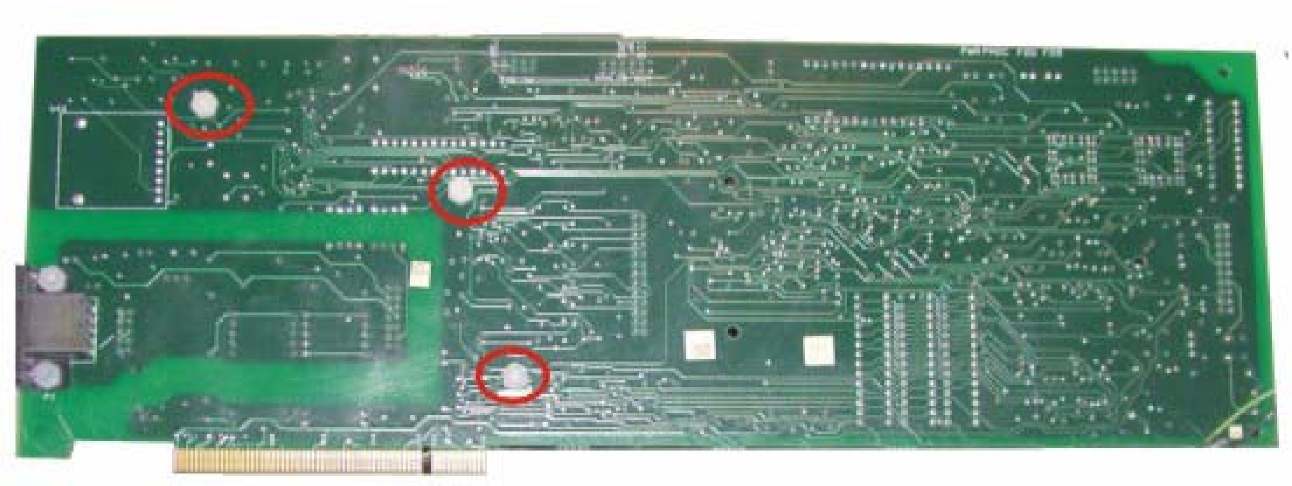
1. Remove 2 screws securing module to chassis and slide unit out.
2. Disconnect hose and ribbon cable.
3. Remove 6 standoff screws securing module to module case.
4. Replace the NIBP module in the reverse order of removal.



Removing and Replacing the SpO2 Module

See illustration below.

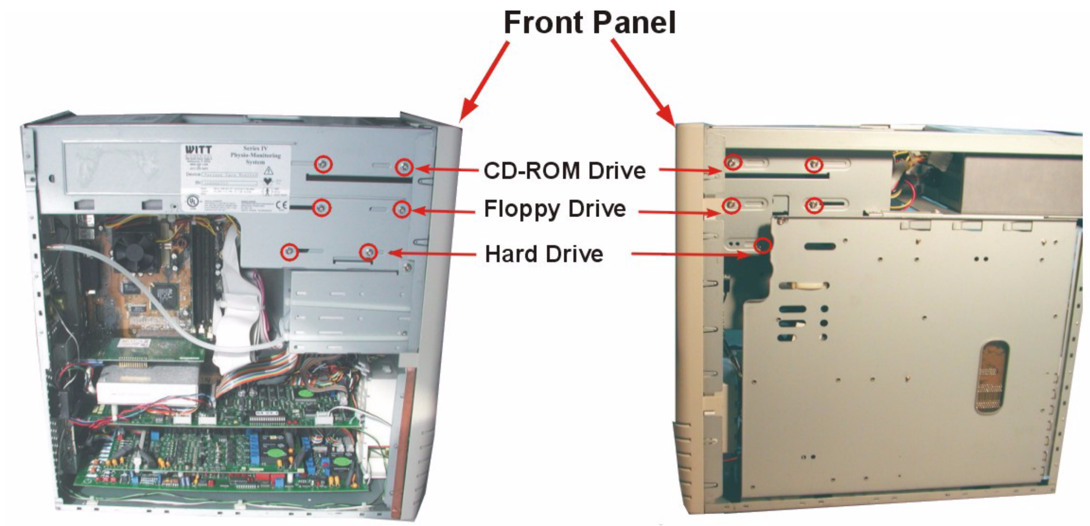
1. Remove S4 PCB as described on page 6-29.
2. Remove any plastic tiedowns securing PCB to chassis.
3. Turn PCB over and remove 3 plastic nuts holding SpO2 module to S4 PCB
4. Replace SpO2 module and S4 PCB in reverse order of removal.

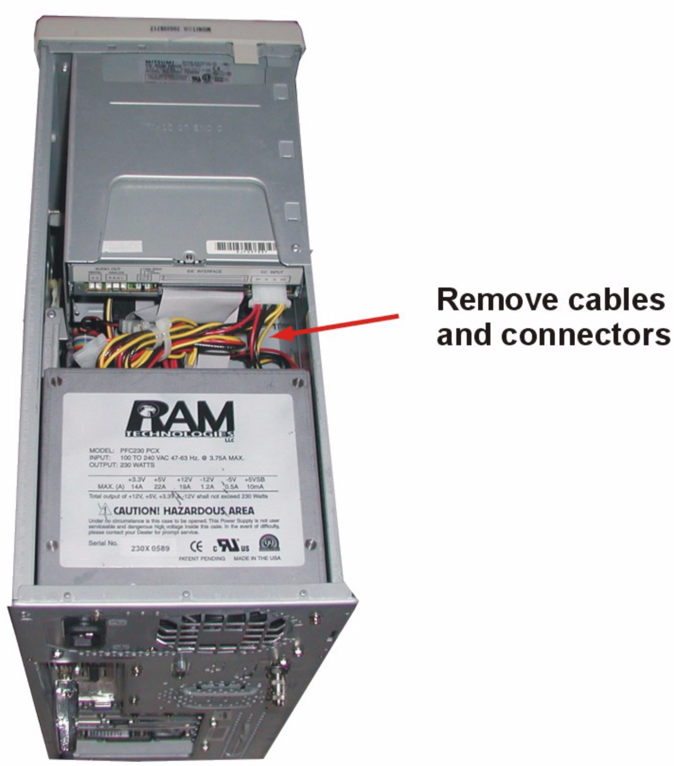


Removing and Replacing the CD-ROM Drive, Floppy Drive, and Hard Drive

See illustration below.

1. For CD-ROM drive, remove top two screws on each side chassis, as shown.
2. For floppy drive, remove middle two screws on each side chassis, as shown.
3. For hard drive, remove bottom two screws on one side and one screw on other side of chassis, as shown.
4. Slide respective drive out of chassis.
5. Remove any ribbon cables or connectors holding drive to chassis.
6. Replace respective drive in reverse order of removal.





Witt Restore CD Instructions (Windows 2003 Server)

The Witt Series IV Hard Drive Restore CD will restore the hard drive to its original state at the time of production. All data currently saved on the hard drive will be deleted. As identified in the following steps, additional network and Series IV settings will be required upon completion of running the restore CD. To prevent system conflicts, the installed hardware must match the original factory hardware specifications.

1. Boot the system with the Restore CD in the CD drive.
2. When prompted, press the **Y** key to install.
3. If required and when prompted, insert second CD.
4. Upon completion of copying to the hard drive, remove the CD and reboot the CPU.
5. At the Windows 2003 Server Setup Wizard prompt, press **Next**.
6. Accept the Windows License Agreement and press **Next**.
7. Select the appropriate Regional Settings and press **Next**.
8. Enter **WITTUSER** (all caps) for Name and **Witt Biomedical** or **Hospital Name** for Organization and click **Next**.
9. Enter the **Product Key Code** (this can be found in the upper left corner of the CPU cover) and press **Next**.
10. At Licensing Modes, select **Per Server** and enter the number of concurrent connections—5 is the number by default.
11. Enter the computer name, e.g., **Witt-nt1—**(the password will be 1234) and press **Next**.
12. Set the **Date**, **Time**, and **Time Zone** and click **Next**.
13. Note: At Network Settings, contact your Network Administrator for the appropriate settings as the Windows 2003 Server will require Internet access to activate. If Internet access is not available you may activate by phone. If activating by phone, select **Typical Settings**, select **No**, enter **WITT for Workgroup**, and click **Next**.
14. Click **Finish** to reboot.
15. Log on as **Administrator** using password **1234**, and click **OK**.
16. After login go to the control panel. Double-click on **System** and then click the **Hardware** tab. Click on **Device Manager**, then double-click **Network Adaptors** to display the network adapter installed (there may be multiple adapters installed). Double-click the installed network adapter and then click the **Power Management** tab. Uncheck "Allow the computer to turn off this device to save power." Click **OK** to close. Repeat for any additional adapters installed. Close window. Click OK to exit System Properties window. Close Control Panel.
17. To activate Windows via the Internet, select **Yes, let's activate Windows over the Internet now**, and click **Next**. Select **No, I don't want to register now, let's just activate Windows**, click **Next** and **OK**. If activating by phone, follow prompts.
18. Series IV configuration settings must now be made. Contact Witt Biomedical Technical Support Department at 1-800-669-1328.

Witt Restore CD Instructions (Windows XP Professional)

The Witt Series IV Hard Drive Restore CD will restore the hard drive to its original state at the time of production. All data currently saved on the hard drive will be deleted. As identified in the following steps, additional network and Series IV settings will be required upon completion of running the restore CD. To prevent system conflicts, the installed hardware must match the original factory hardware specifications.

1. Boot the system with the Restore CD in the CD drive.
2. When prompted, press the **Y** key to install.
3. If required and when prompted, insert second CD.
4. Upon completion of copying to the hard drive, remove the CD and reboot the CPU.
5. At the Windows XP Setup Wizard prompt, press **Next**.
6. Accept the Windows License Agreement and press **Next**.
7. Select the appropriate Regional Settings and press **Next**.
8. Enter **WITTUSER** (all caps) for Name and **Witt Biomedical** or **Hospital Name** for Organization and click **Next**.
9. Enter the **Product Key Code** (this can be found in the upper left corner of the CPU cover) and press **Next**.
10. Enter the computer name, e.g., **Jukebox-CPU, MFI-CPU, Web-DV**. Leave the password blank and press **Next**.
11. Set the **Date**, **Time**, and **Time Zone** and click **Next**.
12. Note: At Network Settings, contact your Network Administrator for the appropriate settings as Windows XP will require Internet access to activate. If Internet access is not available you may activate by phone. If activating by phone, select **Typical Settings**, select **No**, enter **WITT for Workgroup**, and click **Next**.
13. Click **Finish** to reboot.
14. Log on as **WITTUSER** using password **witt2000**, and click **OK**.
15. After login go to the control panel. Click on **System**, click on the **Hardware** tab, then click on **Device Manager** and go to **Network Adaptors**. Double-click on **Adaptors** and uncheck. Allow the computer to turn off this device to save power, then click **OK** and close the Device Manager.
16. Left-click on **Start**, then click **Tweak UI**. Go to **Logon**, then **Auto Logon**. Place a checkmark in **Log on automatically at system startup**. Type **WITTUSER** in the box, and set the password to **witt2000**.
17. To activate Windows via the Internet, select **Yes, let's activate Windows over the Internet now**, and click **Next**. Select **No, I don't want to register now, let's just activate Windows**, click **Next** and **OK**. If activating by phone, follow prompts.
18. Series IV configuration settings must now be made. Contact Witt Biomedical Technical Support Department at 1-800-669-1328.

Witt Restore CD Instructions (Windows 2000)

The Witt Series IV Hard Drive Restore CD will restore the hard drive to its original state at the time of production. All data currently saved on the hard drive will be deleted. As identified in the following steps, additional network and Series IV settings will be required upon completion of running the restore CD. To prevent system conflicts, the installed hardware must match the original factory hardware specifications.

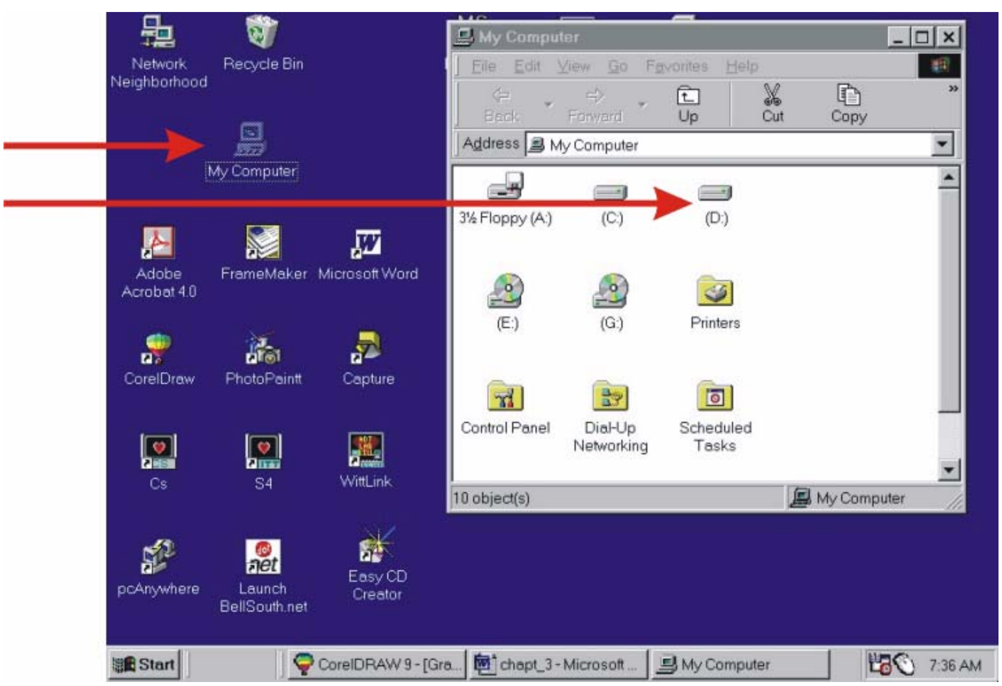
1. Boot the system with the Restore CD in the CD drive.
2. When prompted, press the **Y** key to install.
3. Upon completion of copying to the hard drive, remove the CD and reboot the CPU.
4. At the Windows 2000 Setup Wizard prompt, press **Next**.
5. Accept the Windows License Agreement and press **Next**.
6. Select the appropriate Regional Settings and press **Next**.

7. Enter **Administrator** for Name and **Witt Biomedical** or **Hospital Name** for Organization and click **Next**.
8. Enter the **Product Key Code** (this can be found in the upper left corner of the CPU cover) and press **Next**.
9. Enter the computer name, e.g., **Monitor01, Host01, Host02, Digi-Review01**. Leave the password blank and press **Next**.
10. Set the **Date**, **Time**, and **Time Zone** and click **Next**.
11. Select **Typical Settings**, select **No**, enter **WITT for Workgroup**, and click **Next**.
12. Click **Finish** to reboot.
13. Click **OK** to Pc Anywhere compatibility error.
14. Click **Next** at Network ID Wizard.
15. User should be **Administrator** with password **1234**. "**Windows always assumes the following User has logged on to this compute**r" should be selected. Click **Next** and **Finish**.
16. To access the network, the TCP/IP address must be set. See your Network Administrator for the appropriate setting.
17. To clear the Pc Anywhere compatibility error, open Pc Anywhere by clicking **Start** > **Programs**. Select **Tools** > **Options**, and change the Video Mode Selection to **Default**. Click on **Yes**, **Apply**, **OK**, and **Close**. Close Pc Anywhere.
18. Series IV configuration settings must now be made. Contact Witt Biomedical Technical Support Department at 1-800-669-1328.

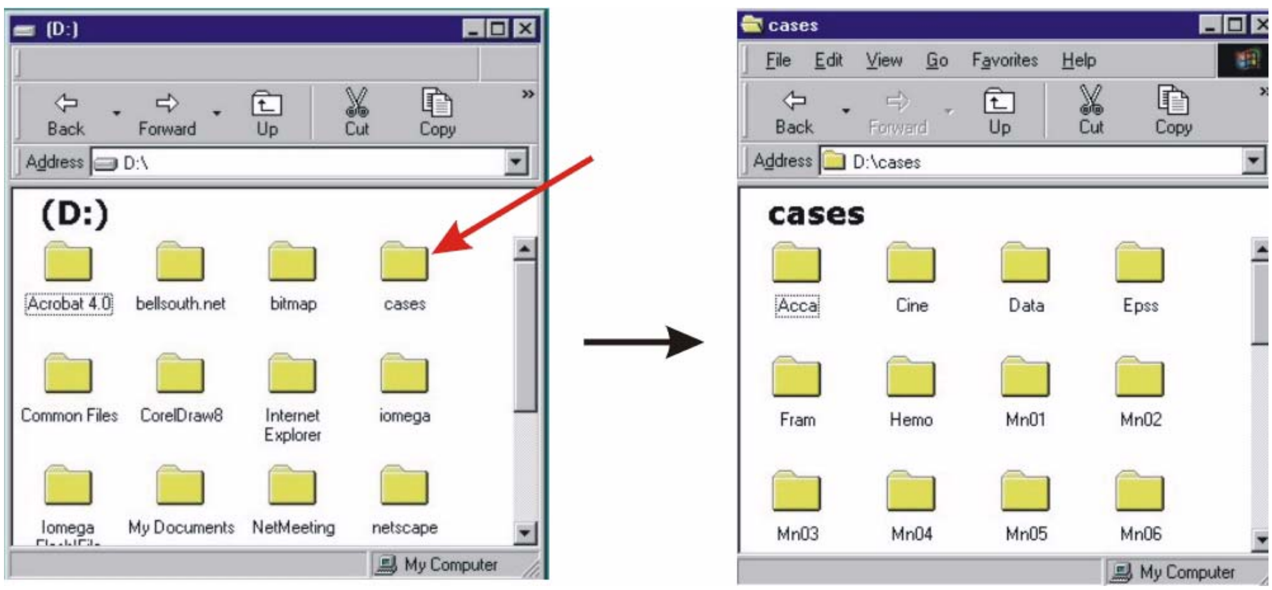
Deleting the Cases Subdirectories

To ensure there is no conflicting data in the Witt Cases directory, our next step is to delete all the Cases subdirectories. Once this is done, any files required by the system are restored automatically by opening the CALYSTO Series IV Setup screen.

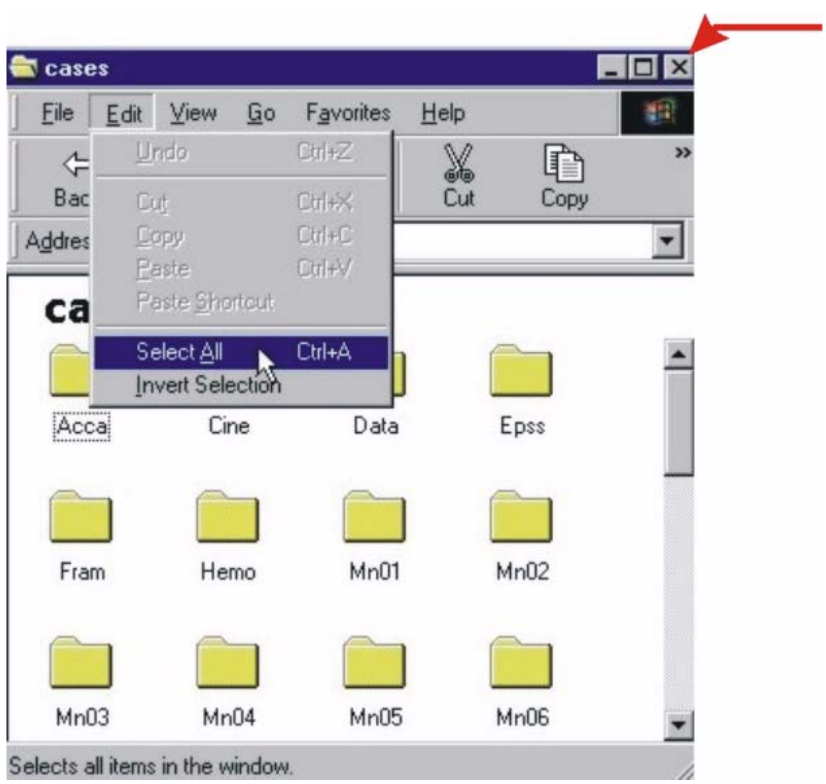
1. Press [Ctrl + F12] to close the CALYSTO Series IV application and open the Windows desktop.
2. Double-click on My Computer, then double-click the D drive.



3. From the D drive, double-click the Cases directory.



4. Click Edit and Select All. Press the keyboard Delete key to delete all the Cases subdirectories. Close the Cases directory with the close button in the upper right hand corner.



Windows 95, 98, and 2000 Regeneration

Occasionally, due to improper shutdown procedures or drive-related problems, the Windows operating system must be reinstalled. With the following procedures you can reinstall Windows without losing system settings or having to reinstall other applications.

Windows 95 Regeneration Procedure

1. Retrieve the original Windows 95 OEM license number from the Device Manager screen. Verify that Windows 95 cab files are present on the local hard drive. If the aren't, copy them to D: under the Win95 directory.
2. Reboot the computer and press the F8 key to abort Windows 95 startup. Select the command prompt from the boot-up menu.
3. In DOS, switch to the C:\Windows directory and rename the file "win.com" to "win.old."
4. Switch to the D:\Win95 directory and run setup.exe.
5. Allow scandisk to complete.
6. Select YES to select the license agreement.
7. At the setup screen select NEXT.
8. By default the setup program will attempt to install to the WINDOWS.000 directory. Select OTHER and change the directory to WINDOWS.
9. Select TYPICAL installation, then select NEXT.
10. When prompted, enter the original OEM license number. Be sure to use your original registry number.
11. Setup will start analyzing your computer. Select NEXT.
12. Setup will start adding Windows components. Select NEXT.
13. When prompted for a Startup Disk, select NO.
14. The computer will begin copying the Windows system files. Select NEXT.
15. When copying is finished restart the computer.
16. Check the video resolution and network settings for changes to the system. The video resolution may need to be adjusted.

Windows 98 Regeneration Procedure

1. Verify that Windows 98 cab files are present on the local hard drive. If the aren't, copy them to D: under the Win98 directory.
2. Reboot the computer and press the F8 key to abort Windows 95 startup. Select the command prompt from the boot-up menu.
3. In DOS, switch to the C:\Windows directory and rename the file "win.com" to "win.old."
4. Switch to the D:\Win98 directory and run setup.exe.
5. Setup will perform a routine to check your system. Press ENTER.
6. Allow scandisk to complete, then select EXIT.
7. By default the setup program will attempt to install to the WINDOWS.000 directory. Select OTHER and change the directory to WINDOWS.
8. Select the location, then select NEXT.
9. Setup will now create a startup disk.
10. Windows 98 will start copying files. Select NEXT.

11. Restart the computer.
12. Check the video resolution and network settings for changes to the system. The video resolution may need to be adjusted.

Windows 2000 Regeneration Procedure

1. Enter Device Manager, expand System Devices, and uninstall the following: (will require network driver disk when reinstalling Windows; do not reboot until all are uninstalled):
   - ACPI Fixed Feature Button
   - ACPI Sleep Button
   - ACPI Thermal Zone
   - Microsoft ACPI Compliant System (system will appear to lock up when uninstalling, will take about one minute to receive reboot message, will also lose mouse driver; press ALT-F4 to clear screen and reboot)
2. Reboot system and enter Bios. Set system to boot from CD. Change Plug and Play Aware O/S to No. Insert Windows 2000 disc in CD, save Bios settings, and reboot.
3. At start of Windows 2000 setup, press F5 key and select Standard PC.
4. Press Enter to set up Windows and F8 to License Agreement.
5. Press "R" to repair.
6. Continue normal Windows 2000 installation (see MFGWI-001 Section 18).
7. Upon completion of install, reset Bios to boot from primary hard drive.
8. Adjust Windows settings per MFGWI-001 Section 25.

Building a New Hard Drive

Ghosting is not your only option when replacing a hard drive. You can also do a complete software installation manually, from the operating system on up through drivers and applications. This is sometimes called "building" or "rebuilding" the drive, and is the same procedure our technicians use at the factory when they're installing a new system for shipment.

For starters your drive must be at least 18 gigabytes (GB), and we recommend you partition it into C and D drives. The C drive will hold the operating system and programs and the D drive will hold the data. This way if you have problems with the operating system you can reinstall it without impacting your patient data.

On an 18 GB drive your C partition should hold 3 GB and the remainder to the D partition, leaving 15 GB for data.

Installing the Software

Once you've partitioned the drive you're ready to load the operating system. The CALYSTO Series IV will run under Windows 95, 98, NT, and 2000 (our standard operating system). When you're installing Windows, choose the typical Microsoft install, then load the remainder of the software in the order given below. The required software and drivers can be found in Witt's software development kit, or in the WITT directory on the file server.

C Drive

1. Operating system (Windows 95, 98, NT, or 2000—typical installation)
2. PcAnywhere version 8.0 or above (for modem support)
3. Logitech mouse drivers version 7.5 or above (recommend middle button be set for double-click)
4. In Windows directory, load the following software simulator bitmap (.bmp) files for EKG and pressure waveforms: ssimao, ssimao1, ssimao2, ssimco, ssimecg, ssimecs, ssimehb, ssimehb1, ssimehb2, ssemera, ssimerv, ssimesm, ssimlv, ssimlv1, ssimlv2, ssimpa, ssimpw, ssimra, ssimrv, ssimrv1
5. ODBC drivers (for parallel database and transcription)
   - Windows 95: ODBC42, ODBC_SDK
   - Windows 98: ODBC_3.5.1 — Load MDAC_TYP
   - Windows NT 4.0: ODBC_3.5.1 — Load MDAC_TYP
   - Windows 2000: ODBC_4.0
6. In Windows directory load the following 2 drivers to interface with the data translation frame capture board: olfg32.dll and oling32.dll.
7. Create an S4 directory, containing
   - S4.exe (main Series IV program executable)
   - AK.exe (transcription executable)
   - S4.ini (Series IV configuration file)
   - Following software simulator bitmap (.bmp) files for EKG and pressure waveforms: simao, simco, simecg, simecs, simehb, simera, simerv, simesm, simlv, simpa, simpw, simra, simrv
   - 2 types of heart bitmap files: heartp (grayscale for printing), heartw (color for display)
   - hearts.lst (heart list file to represent which drawing is which number)
   - Up to 110 Menu files, for charting (men01.s4 through men110.s4)
     - Menus 1-20 = Cardiac Cath Lab
     - Menus 21-30 = Echocardiography
     - Menus 31-40 = Nuclear Medicine
     - Menus 41-90 = Radiology, CT, MRI, Ultrasound
     - Menus 91-100 = ECG Management
     - Menus 101-105 = Holter
     - Menus 106-110 = Stress ECG
   - Following coronary tree files for computer aided cardiology: s4tree.cl, s4tree.cm, s4tree.cr, s4tree.cra, s4tree.pel, s4tree.peu, s4tree.ren
8. For Windows NT 4.0/2000 users: install file GIVEIO.SYS in the Winnt/System 32 directory (and appropriate registry changes).

D Drive

On the D drive you must create a directory called CASES. Once this is created and you launch CALYSTO Series IV for the first time, the system will automatically create the following subdirectories within CASES. CALYSTO Series IV writes data to each of these directories during procedures. Each data file is named based on the patient's CALYSTO Series IV case number (e.g., HA003480) and includes a unique file extension.

- ACCA, which stores ACC data (file extension .ACC)
- Billing, which stores billing files used by the Main Frame Interface (file extension .L20)
- CINE, which stores movies (icon file extension .I00, .I01, etc.; cine file extension .M00, .M01, etc.)
- CR, stores radiology images (image file extension .A00, .A01, etc.)
- CT, which stores catscan images (image file extension .Q00, .Q01, etc.)
- DATA, which stores demographic files (file extension .P00)
- DR, which stores radiology images
- ECalc, which stores stress echocardiography measurements (file extension .D00, .D01, etc.)
- ECG, which stores resting and stress 12-lead ECGs (file extension .N00, .N01, etc.)
- ECGCalc, which stores ECG measurements imported from the cart or done within Series IV (file extension .500, .501, etc.)
- Echo, which stores echocardiography images (file extension .L00, .L01, etc.)
- EPDP, which stores electrophysiology data (file extension .EP)
- EPSS—not currently used
- FRAM, which stores still frames (file extension .F00, .F01, etc.)
- HEMO, which stores hemodynamic data. (file extension .H00, .H01, etc.)
- MN01—MN100, which stores menu files (file extension .T01, .T02, etc.)
- MPEG4, which stores echocardiography full disclosure files created by the DI-CORDER (file extension casenum_0.avi, etc.)
- MRI, which stores MRI images (file extension .O00, .O01, etc.)
- NUKE, which stores nuclear medicine images (file extension .J00, .J01, etc.)
- NukeData, which stores nuclear medicine measurements (file extension .400, .401, etc.)
- OTHR—not currently used
- PRES, which stores numerical pressure data files (file extension .S00)
- SNAPS, which stores teaching files (subdirectories exist for Echo wall motion, still frames, coronary trees, and pressure wave forms)
- SR, which stores DICOM structural reporting data (file extension .z00)
- TRAN, which stores transcription files (Word file extension .X00, .X01, etc.; Witt file extension .Y00, .Y01, etc.)
- TREE, which stores graphical tree files (file extension .G00, .G01, etc.)
- US, which stores ultrasound images
- VENT, which stores ejection fraction and vessel analysis files (file extension .L00)
- VITL, which stores vital signs files (file extension .V00)
- WAVE, which stores waveform files (file extension .W00, .W01, etc.)

Automatic File Creation

As you use CALYSTO Series IV, other files will be created and stored in the S4 directory. If you're doing queries and setting up custom reports, for instance, you'll get files that have the suffix QRP. Here are some of the other files that will be automatically created and written to the S4 directory:

- cust0001.qrp—cust000~.qrp (custom query report files)

- inv01.s4—inv000~.s4 (inventory files)
- inv00001.kit—inv000~.kit (inventory kit files)
- tran0001.tem—tran000~.tem (Witt transcription template files)
- mac0001.s4—mac000~.s4 (macros for the waveform screen)
- men01.bak—men100.bak (backup menu files created when changes are made)
- seq00001.s4—seq0000~.s4 (pullback sequence files)
- *.lst (IO and user data screen drop-down list files)
- *.tmp (temporary Image IV data files, which may be safely deleted)
- *.log (Image IV information log files)
- *.on (local workstation activity files)
- *.doc (Word transcription template files)
- *.lck (broken database lock files)
- *.dbx (Witt database files)
- *.idx (Witt database index files)
- *.par (query parameter files)
- *.dat (Image IV configuration files)
- .z** (workstation configuration files)
- *.cfg (custom database configuration files)
- *.xfg (menu scraper configuration files)

File Server Directories

If your system is network based, you'll have a file server. On the server we create three different directories:

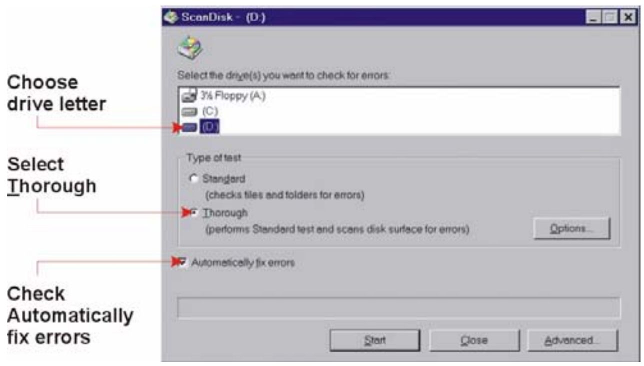
- CASES, which is a replication of your local D:\CASES directory
- WITT, which is where all the drivers used by the system are stored. Here is where you'll find the video cards, network cards, frame capture cards, and ODBC drivers. And this will be your resource for rebuilding the hard drive.
- WITTNET, which is the control directory. This is the directory where the shared files reside that all the stations use. When you make changes to menus, or user lists, or coronary trees, this is where they're stored so that other stations can access them. On a network based system the S4 directory polls or queries the network every minute or so, and if it notices a change in a menu file or a user list file, it automatically downloads the new file. This is the way continuity is achieved between stations. This directory also contains the same files that are in the S4 directory—the menu files, templates, inventory files, and the executables. This directory is your source for repopulating the S4 directory when you rebuild the hard drive. When we do a software upgrade by modem we send the new executables to the WITTNET directory. When the S4 directory polls the network and sees the new executable, it automatically downloads and overwrites the old executable with the updated revision. So all software upgrades can be done in the background. WITTNET also has some files that the local stations don't have. These are control or software information files, such as the master clock.
- Your final step is to delete the Cases subdirectory as you did following Ghosting.

Scanning and Defragmenting Hard Drives

To ensure peak performance, hard drives should be scanned and defragmented every month. The following steps describe the Windows ScanDisk and Disk Defragmenter tools. Always use the Scan Disk tool first.

To Use the ScanDisk Tool

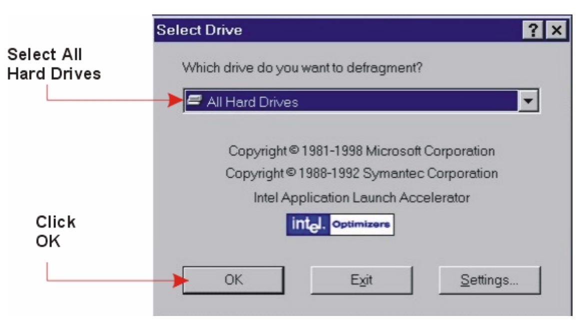
1. If you're currently using a Witt application, press Ctrl + F12 to return to the desktop.
2. Click the Start button in the lower left corner of the display.
3. Click Programs, Accessories, System Tools, ScanDisk.



4. Choose drive C or D. The D drive is the most important since it holds your cases.
5. Select the Thorough radio button.
6. Click the Automatically fix errors checkbox.
7. Click the Start button. ScanDisk will begin. Depending on how much data you have on the drive, the process will take anywhere from 10 minutes to an hour.
8. When ScanDisk is finished a window will open showing results of the scan. Click Close.
9. Click Close again to quit ScanDisk, or repeat steps 4 through 8 to scan another drive.

To Use the Disk Defragmenter Tool

1. Click the Start button in the lower left corner of the display.
2. Click Programs, Accessories, System Tools, Disk Defragmenter.
3. Click the drop-down arrow and choose All Hard Drives.
4. Click OK. Disk Defragmenter will begin and a window will open showing the defragmentation progress.
5. When finished, a query window will open. Click Yes to exit.



Suntech Advantage NIBP Module Calibration Procedures

The following procedures should be used to calibrate the pressure transducer for the Suntech Advantage NIBP module.

Tools and Equipment Required

- Calibrated Manometer
- Pneumatic "T" Adapters
- Volume (500mL bottle or regular sized cuff wrapped around a solid object is suggested)
- Hand Bulb
- Connection Tubing

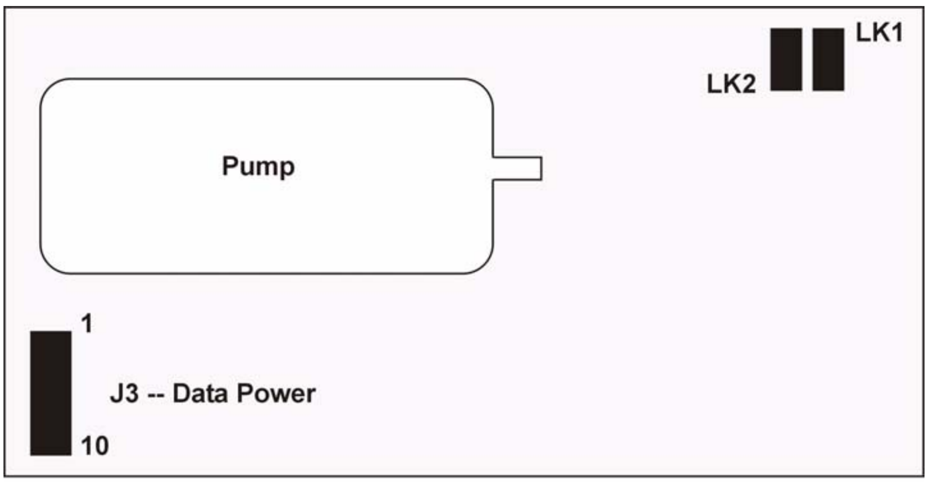
Volume is added to the pneumatic system so that the user has more control of the pressure increments when using the hand bulb. If no volume is added, it is quite easy to cause unwanted overpressure errors using the hand bulb.

1. Connect the manometer, volume, and the hand bulb to the module using a "T" adapter.
2. Issue the CONTROL_PNEUMATICS command (0x0C) to the module to close the Control Valve and the Dump Valve.
3. Fit the Safety Inhibit jumper (LK1). This prevents unwanted pressure timeouts during calibration.
4. Apply various pressures (between 0 mmHg and 280 mmHg) to the module with the hand bulb. At the same time, issue GET_CUFF_PRESSURE commands to the module. Verify that the module pressure is equal to the manometer pressure (±2 mmHg). If the module pressure does not agree with the manometer pressure (±2 mmHg), perform the following steps until the module and manometer pressures agree within ±2 mmHg.

   (a) Ensure the Calibration Inhibit Jumper (LK2) is removed from the module if fitted (see BP Module Connectors figure on following page).
   (b) Issue the CONTROL_PNEUMATICS command to the module to open valves.
   (c) Apply 0 mmHg to the module.
   (d) Issue the CALIBRATE_TRANSDUCER (0x04) command to the module with a data value of "0." Verify the module acknowledged the command correctly (i.e., "O" and "K" received by the Host).
   (e) Issue the GET_RETURN_CODE command and verify that the return code is "0."
   (f) Issue the CONTROL_PNEUMATICS command (0x0C) to the module to close the Control Valve and the Dump Valve.
   (g) While applying **EXACTLY** 250 mmHg to the module, issue the CALIBRATE_TRANSDUCER command to the module with a data value of "1." Verify the module acknowledged the command correctly (i.e., "O" and "K" received by the Host).
   (h) Issue the GET_RETURN_CODE command and verify that the return code is "0."
   (i) **If either of the two return codes from the GET_RETURN_CODE command is non-zero, then the CALIBRATE_TRANSDUCER commands were not able to change the calibration data. Check that the Calibration Inhibit Link LK2 is removed (see BP Module Connectors figure on following page), and that the correct pressure values were applied at each setting point**.

(j) Apply various pressures (between 0 mmHg and 280 mmHg) to the module with the hand bulb. At the same time, issue GET_CUFF_PRESSURE commands to the module. Verify that the module pressure is equal to the manometer pressure (±2 mmHg). Repeat steps (a) through (j) until the module pressure and the manometer pressures agree within ±2 mmHg.

5. Issue the CONTROL_PNEUMATICS command to the module to open valves.
6. Remove the Safety Inhibit jumper (LK1). The module will not respond to a Start BP command if this is forgotten.
7. If required, replace the Calibration Inhibit jumper (LK2) on the module.
8. Remove power to reset the module.
9. Calibration is now complete.



BP Module Connectors

Cass NB NIBP Module Calibration Procedures

The following procedures should be used to calibrate the pressure transducer for the Cass NB NIBP module.

Tools and Equipment Required

- Rigid metal vessel with a capacity of 500 mL ±2 5%
- Calibrated Manometer with an error rate less than 0.8 mmHg (0.1 kPa)
- Pressure generator, e.g. ball pump (hand pump)
- T-piece connectors and hoses
- Climatic chamber

Procedure 1

1. Replace the cuff of the device with the rigid metal vessel.
2. Connect the calibrated reference manometer by means of a T-piece connector and hoses to the pneumatic system (see Test Rig figure below). After disabling the electromechanical pump (if fitted), connect the additional pressure generator (hand pump) into the pressure system by means of another T-piece connector.

3. Carry out the test in pressure steps of not more than 50 mmHg between 0 mmHg and the maximum pressure of the scale range.

Expression of results

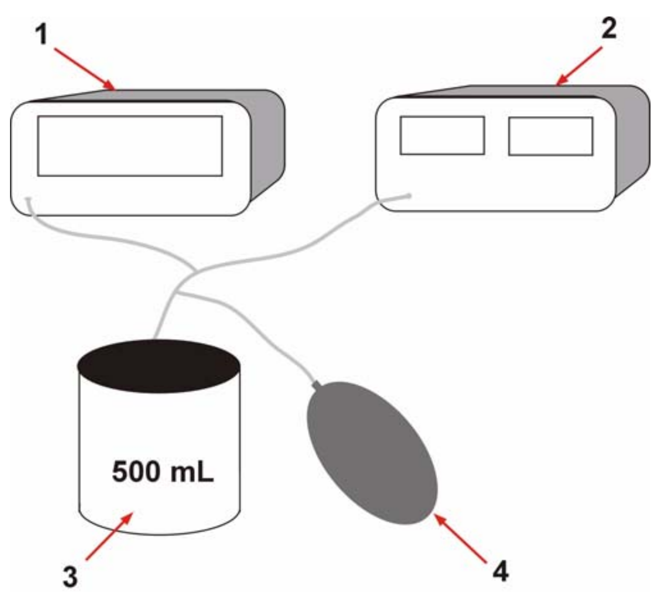
Express the results as the difference between the indicated pressure of the manometer of the device to be tested and the corresponding reading of the reference manometer.

Procedure 2

1. Replace the cuff with the rigid metal vessel.
2. Connect the calibrated reference manometer by means of a T-piece connector and hoses to the pneumatic system (see Test Rig figure below). After disabling the electromechanical pump (if fitted), connect the additional pressure generator (hand pump) into the pressure system by means of another T-piece connector.
3. For each of the following combinations of temperature and humidity, condition the device for at least 3 hours in the climatic chamber to allow the device to reach steady conditions.
   - 10° C ambient temperature, 85% relative humidity (non-condensing)
   - 20° C ambient temperature, 85% relative humidity (non-condensing)
   - 40° C ambient temperature, 85% relative humidity (non-condensing)
4. Carry out the test in pressure steps of not more than 50 mmHg, between 0 mmHg and the maximum pressure of the scale range, for each of the combinations of temperature and humidity mentioned above.

Expression of results

Express the results as the difference between the readings of the manometer of the device to be tested and the corresponding reading of the reference manometer.



1 Reference Manometer
2 Manometer of the device to be tested
3 Metal Vessel
4 Pressure Generator

Preventive Maintenance

Customers are responsible to implement a program of regular testing and maintenance for CALYSTO Series IV devices. Failure on the part of the customer to implement a satisfactory testing and maintenance schedule may lead to potential equipment failure, safety issues and possible health hazards to patients.

Hardware

Monthly

- Dust exterior of CPUs with lint-free cloth.
- Check all cable terminations.
- Confirm boom monitor mounting integrity.

Quarterly

- Clean interior of CPUs with lint-free cloth or vacuum
- Reseat all circuit boards.

Yearly

- Calibrate/check NIBP transducer for accuracy. See instructions beginning on page 6-42.
- Test SpO2 sensor for accuracy (utilize Nellcor SRC-2 for MP203/MP204P modules and Nellcor SRC-MAX for MP506/NELL-3 modules). See instructions on pages 3-13 and 3-14 of this manual.
- Test ECG, Invasive Pressure, Cardiac Output and End Tidal CO2 for proper operation and accuracy as described in Chapter 3 of this manual.

Software

Monthly

- Remove unnecessary files from File Server and local hard drives.
- Run ScanDisk and Disk Defragmenter on all hard drives.
- Scan hard drives for viruses.
- Verify all system functions.

Witt technicians will perform hardware and software preventive maintenance for a specified fee (check with Customer Support for current fee) plus the cost of any parts deemed necessary.

CALYSTO Series IV Audible Monitoring Alarms Test

This test can be performed to test audible alarms on the following equipment:

- CALYSTO Series IV PCM
- CALYSTO Series Host and Front End

The following simulators are recommended, but any comparable equipment can be used.

- Dale 14 Multiparameter Patient Simulator
- DNI Nevada CuffLink Non-Invasive Blood Pressure Simulator
- Fogg TP400 Temperature Probe Simulator
- Nellcor SRC-MAX Simulator (for analog systems) or Nellcor SRC-2 Simulator (for digital systems)

1. Admit a test case and click SWITCH. The monitoring screen displays.
2. Click SETUP. The Waveform Setup screen displays.
3. In the ALARMS section, place a check in the AUDIBLE ALARMS box. If a sound card is installed, check USE SOUND CARD and set WAVE FILE to ALARM 1.
4. Set alarm parameters as follows:

	HIGH	LOW	
HR:	140	50	
PRES (Sys):	110	30	(N/A on Basic PCM)
PRES (Dias):	110	30	(N/A on Basic PCM)
PRES (Mean):	110	30	(N/A on Basic PCM)
NIBP (Sys):	110	75	
NIBP (Dias):	70	40	
TEMP:	38	35	
ETCO2:	25	10	(if equipped)
RESP:	40	18	
SPO2:	87	85	

Check HR. Click OK. Monitoring screen displays.

5. Turn off all non-invasive monitoring and pressure channels. Turn on ECG leads I, II, III, aR, aL, aF. Attach limb leads (RA, RL, LA, LL) to Dale 14 Multiparameter Simulator (or equivalent). Set heart rate to 180 bpm. Alarm sounds and heart rate is highlighted in red.
6. Set heart rate to 100. Alarm ceases. Heart rate is no longer highlighted.
7. Set heart rate to 30 bpm. Alarm sounds and heart rate is highlighted in red.
8. Set heart rate to 100 bpm. Alarm ceases. Heart rate is no longer highlighted.
9. Click SETUP, uncheck HR and check PRES (SYS). Attach cable to channel 1 and activate the pressure channel. Set simulator to 200 mmHg. Alarm sounds. Pressure reading is highlighted in red. (NOTE: invasive pressure monitoring not available on Basic PCM).
10. Set simulator to 100 mmHg. Alarm ceases. Pressure no longer highlighted. (NOTE: invasive pressure monitoring not available on Basic PCM).

11. Set simulator to 20 mmHg. Alarm sounds. Pressure reading is highlighted in red. (NOTE: invasive pressure monitoring not available on Basic PCM).
12. Set simulator to 100 mmHg. Alarm Ceases. Pressure no longer highlighted. (NOTE: invasive pressure monitoring not available on Basic PCM).
13. Click SETUP, uncheck PRES (SYS) and check PRES (DIAS). Repeat pressure settings in steps 9 thru 12. (NOTE: invasive pressure monitoring not available on Basic PCM).
14. Click SETUP, uncheck PRES (DIAS) and check PRES (MEAN). Repeat pressure settings in steps 9 thru 12. (NOTE: invasive pressure monitoring not available on Basic PCM).
15. Turn off pressure channel. Attach DNI Nevada CuffLink Simulator. Set pressure to 120/80 mmHg. Click SETUP and check NIBP (SYS), then click OK. Turn on NIBP cuff. When reading is displayed, alarm sounds, NIBP reading highlighted in red.
16. Set pressure on CuffLink to 80/50. Alarm ceases Pressure reading is no longer highlighted in red.
17. Set pressure on CuffLink to 60/30. When reading is displayed, alarm sounds, NIBP reading highlighted in red.
18. Set pressure on CuffLink to 80/50. Alarm Ceases. Pressure reading is no longer highlighted in red.
19. Click SETUP. Uncheck NIBP (SYS) and check NIBP (DIAS), then click OK. Repeat steps 15 thru 18.
20. Turn off NIBP monitoring and detach simulator. Click SETUP, uncheck NIBP (DIAS) and check TEMP, then click OK. Attach Fogg TP400 Temperature Probe Simulator. Set temperature to 30°C. Activate temperature monitoring. Alarm sounds, temperature reading is highlighted in red.
21. Set temperature to 37° C. Alarm ceases. Temperature is no longer highlighted.
22. Set temperature to 40° C. Alarm sounds, temperature reading is highlighted in red.
23. Set temperature to 37° C. Alarm ceases. Temperature is no longer highlighted.

NOTE: Perform steps 24 and 25 only if ETCO2 option is installed. If not available, skip to step 26.

24. Turn off temperature monitoring and detach simulator. Click SETUP, check ETCO2, and click OK. Attach and calibrate ETCO2 monitor. After calibration, put on mask. When reading appears, alarm sounds, ETCO2 reading highlighted in red.
25. Remove mask. When reading drops to 0, alarm sounds, reading highlighted in red. Turn off ETCO2 monitoring.
26. Click SETUP, check RESP, and click OK. Set respiration rate on Dale 14 Multiparameter Simulator to 60 ipm. Activate respiration monitoring. Alarm sounds, respiration reading is highlighted in red.
27. Set simulator to 30 ipm. Alarm ceases, reading is no longer highlighted.
28. Set simulator to 15 ipm. Alarm sounds, reading is highlighted.
29. Set simulator to 30 ipm. Alarm ceases, reading is no longer highlighted.
30. Turn off respiration monitoring and detach simulator. Attach Nellcor Pulse Oximetry simulator. See below for settings:

    NELLCOR SRC-2:

    Set LIGHT switch to HIGH 1.
    Set MODULATION switch to HIGH.
    Set RATE switch to 112.

    NELLCOR SRC-MAX:

    Set simulator to 90 ipm

Alarm sounds, SPO2 reading is highlighted in red.

31. Detach simulator. Alarm sounds, SPO2 reading is highlighted in red.
32. Reattach simulator. Enter Waveform Setup screen. Uncheck all alarms except respiration and check SPO2 TONE. Exit Setup screen. Activate SPO2 monitoring. Tone sounds.
33. Activate respiration monitoring and set rate to 15. Onboard RESP alarm sounds, reading is highlighted in red. SPO2 tone continues to sound through external speaker.
34. Turn off respiration monitoring. Alarm ceases, reading is no longer highlighted. SPO2 tone is still audible.

Chapter 7:

Replaceable Parts List

Front End, Host, Review, Nurse, and Central Station Computers

Part Number	Description
LBR	Power Supply, Medical Grade, 230 Watt AT, RAM
LBRML75	Power Supply Medical Grade, 75 Watt, Digital FE, RAM ML75
LBRX	Power Supply, Medical Grade, 230 Watt ATX, RAM
LBR310/33	Power Supply, Medical Grade, 310 Watt, P4 ATX, RAM, Rev0033
OCO2	Module ETCO2, NOVAMETRIX
OGC, OGD	Module, NIBP, Adult/Peds, CAS
OHNELL-3	Module, SPO2 (Rev D) NELLCOR NELL-3 *
OHP	Module, SPO2, NELLCOR MP204P *
OHP506	Module, SPO2 (Rev D) NELLCOR MP506 *
PKO	G4 ISA Signal, Analog Board, WITT
PK5	G5 ISA Signal, Digital Board, WITT
PK5PCI	G5 PCI Signal, Digital Board, WITT
PS4	S4 ISA Signal, Analog Board, WITT
PS5	S5 PCI Signal, Digital Board, WITT
QSDB	Pressure/CO, Daughter, Analog Board, WITT
QSDP	Pressure/CO PCI DPT, Digital Board, WITT
QS5	S5 Interconnect Panel Assy., Digital, WITT
QXII	Witt 12 Lead ISA ECG, Analog
QXIID	Witt 12 Lead PCI ECG DSP, Digital Board

Series IV Display Monitors

Part Number	Description
HMPL1700M-BK	Monitor, LCD 17 Inch Planar PL1700M-BK
HMPL1910M	Monitor, LCD 19 Inch Planar PL1910M-BK
HMPL2010M	Monitor, LCD 20 Inch Planar PL2010M-BK

Series IV Cables

Part Number	Description
AA	Cable, 7 Lead ECG (10 Feet)
AB	Cable, 7 Lead ECG (15 Feet)
AC	Cable, 12 Lead ECG (10 Feet)
ACA	Cable, 12 Lead ECG (15 Feet)
ACD	Cable, 12 lead Digital AMP (10 Feet)
ACD15	Cable, 12 Lead Digital AMP (15 Feet)
ACO2	Cable, ETCO2 Capnostat Sensor
ACO2A	Mask, ETCO2, Adult
ACO2P	Mask, ETCO2, Pediatric
AD	Cable, 7 Lead Radiopaque Set (54 Inches)
AD72	Cable, 7 Lead Radiopaque Set (72 Inches)
ADT	Cable, 12 Lead Radiopaque Set (54 Inches)
ADT72	Cable, 12 Lead Radiopaque Set (72 Inches)
AF	Limb Lead Cover Set
AG	Cable, 7 Lead Radiolucent Set (48 Inches)
AG72	Cable, 7 Lead Radiolucent Set (72 Inches)
AGT	Cable, 12 Lead Radiolucent Set (48 Inches)
AGT72	Cable, 12 Lead Radiolucent Set (72 Inches)
BAB	Cable, Surface, Body Temperature Probe
BDOC	NIBP Cuff, Non-Latex, Adult
BEOC	NIBP Cuff, Non-Latex, Adult, Large
BFOC	NIBP Cuff, Non-Latex, Thigh
BGOC	NIBP Cuff, Non-Latex, Child
BHOC	NIBP Cuff, Non-Latex, Infant
BIOC	NIBP Host, Non-Latex
BJOC	NIBP Hose, Neonatal
BNOC	NIBP Cuff, Non-latex, Newborn
BM	Cable, SPO2, Extension

BM5	Cable, SPO2, Extension for MP204P Module, Digital Chassis, AMP
BM506	Cable, SPO2, Extension for MP506 Module, Digital Chassis
BN	Cable, SPO2 Finger Probe
BP	Cable, Pressure, Harness - 4
BPD	Cable, Pressure Adaptor, Digital, AMP - CANNON
BQ2	Cable, Cardiac Output (15 Pin)
BQ5	Cable, Cardiac Output, Digital AMP
BR	Cable, Bath Temp Probe
DE	Cable, Power, Hospital Grade (10 Feet)
STE	NIBP Rectus, QDC, Female
STF	NIBP Rectus for NIBP Hose, QDC, Female
STM	NIBP Rectus for NIBP Hose, QDC, Male

Miscellaneous Parts

Part Number	Description
KAB	Barcode Reader, Pen, PS/2
KACWLS9000	Barcode Reader, Gun, USB, WASP
KDOPU	Mouse, Optical, USB/PS2, Gray, LOGITECH
KE	Keyboard, Standard, AT
KEB800USB	Keyboard, Standard, Black, USB
KFC	Keyboard, S4 Custom, PS2
KFCBLKPS2	Keyboard, S4 Custom, Black, PS2
KFCBLKUSB	Keyboard, S4 Custom, Black, USB
KHB	Modem, Fax, 56K - V.92
L1200XLHG	UPS, Medical Grade, 1000VA / 750 Watts, TRIPP LITE SMART1200XLHG
MCC4250	Printer, HP Laser Jet 4250

* Use only Tyco/Nellcor approved Oximax DS-100A sensors and cables with this system. Use of other sensors/cables may cause improper performance.
Order Tyco/Nellcor sensors by calling 1-800-NELLCOR (635-5267).

Appendix A:

Pre-Installation Checklist and Guidelines

Forms Package

We've included the following forms in this appendix for information only. The forms make up a package used by Witt Biomedical Sales and Installation personnel to ensure that the needs specific to the current customer are fully documented.

- The Pre-Installation Checklist Forms begin on page A-2.
- The Pre-Installation Guidelines Form begins on page A-9.

Pre-Installation Checklist
CALYSTO Series IV Image IV

Hospital Name: ______________________________ City/State: ______________

PO# ______________ Sales/Service Rep: ______________________________

COMPLETED PRE-INSTALLATION CHECKLIST MUST BE RETURNED TO WITT BIOMEDICAL WITHIN 30 (THIRTY) DAYS OF SCHEDULED INSTALLATION DATE. HOSPITAL IS RESPONSIBLE FOR REMOVAL OF EXISTING EQUIPMENT AND FOR PULLING ALL INSTALLATION CABLE. FAX COMPLETED CHECKLIST TO (321) 253-03722 ATTN TONY DRAKE.

# Rooms	Boom Monitor Size (22" Dimensions = 19.5" W x 19" H x 20" D) (17" Dimensions = 16" W x 17" H x 17" D)	Image Capture Details			Pediatric Lab
		Specify Brand/Source	Downscanner Required	Downscanner Type LX = Progressive Video LT = Interlace Video	

# PCMs	Mounting Method	Installation Location NOTE: Hospital required to install wall mount	# Reviews / Nurse Stations	Installation Location (Customer to provide Desk / work surface)	# Node License	Installation Location
Basic ___ Advanced ___	Wall Mount ___ **Roll Stand** ___ **Other (specify)** ___					

Customer is responsible to provide transducer cables with AMP 1 1/8 plug -- male (206434-1) connector. Cables may be obtained from Transducer Manufacturers or from Fogg Systems at a charge (800-525-0292). Customer is responsible for acquiring transducer cables up to 4 cables per room, 2 cables per PCM.

Name: ______________________________ Date: ______________

Image IV Installation Details

Modalities to be Acquired

Cine/Peripheral Angiography (XA)

# Rooms	Brand/Age of X-Ray Equipment	Single/Bi-Plane	Analog/DICOM (if DICOM -- specify AE Title/IP address of service (If Analog -- DCL required)

Ultrasound/Echocardiography/IVUS (US) -- Carts must provide DICOM signal or require DI-CORDER

# Carts	Brand/Age of Cart	DICOM Compatible (Specify AE Title/IP Address)	DI-CORDER Required

Nuclear Medicine (NM) -- Camera must provide DICOM signal

# Cameras	Brand/Age of Camera	DICOM Compatible (Specify AE Title/IP Address)	Nuclear Medicine Tool Kit Purchased

ECG Management

# Carts	Brand/Model of Cart	Communication Method (Modem, Floppy, Serial, LAN) If Modem -- specify Phone #s	Data migration required? If Yes, specify # of studies

CALYSTO Series IV/Image IV supports the following ECG carts: GE/Marquette SOLC (MACG, MAC 8, MAC-VU, MAC-PC, MAC 12, MAC 15); Philips/HP XLI (M1700, Page Writer); Burdick (Eclipse 850, Eclipse Plus)

# Review Stations	Monitor Type	Installation Location(s) (customer to provide desk/work surface)	# Node License	Installation Location
Dual Screen ____ One Screen ____	Color ____ Monochrome ____			

Deep Archival Information		
Media Type	Brand of Equipment	Installation Location and Details
MO ____ DVD/RAM ____ NAS/SAN ____ Tape ____		

If archiving to a NAS/SAN device, customer is responsible to provide any specialty software required to manage capacity and/or allow our device to access the NAS/SAN and any fibre channel switches, port upgrades or other hardware required for our device to physically connect to the NAS/SAN.

Network Installation Details

Witt Biomedical Series IV and Image IV File Servers are provided in a rack-mount chassis. Image IV series include a storage rack. Series IV series do not. Customer must provide a rack to Series IV File Server or may request a mid tower case.

File Server		Network Topology	
Specs	Installation Location/Details	Switches/Hubs	Backbone connection/standalone (if connected to backbone, provide specs)
Witt Provided ____ Customer Provided ____ If customer provided, specify details (brand, capacity, etc.)		Witt Provided ____ Customer Provided ____ If customer provided, specify details (brand, capacity, etc.)	

MFI		Web^{IV}
MFI Purchased -- If yes, specify customer Main Frame vendor		
Specify Interface Specialist: Name ________ Phone # ________ E-Mail ________	Specify desired services ADT ________ Labs ________ Billing ________ Results ________ EP-Med ________ PKI ________ Transcription ________	Witt Provided Server ________ Customer Provided Server ________ If customer provided, specify details (brand, capacity, etc.)

All workstations must be located within 300' of Ethernet switch or else repeaters or fiber optic connections will be required to boost the signal. Customer is responsible to provide any necessary repeaters or fiber optic components.

Remote Communication Details

Witt Biomedical delivers 24 hours, 7 day/week support for all systems. Customer is required to provide some form of remote system access (e.g., Modem, dial-up connection, VPN, etc.)

Type	Brand / Provider	Phone # / Access Codes	Compatability with PCAnywhere?
Modem ________ Dial-Up Connection ________ VPN ________ RAS ________			

Installation Cabling / Conduit Requirements

Witt Biomedical supplies all required installation cables with each system. The customer is responsible to provide all necessary conduit runs and pull all installation cables prior to the scheduled installation date. Cables should be pulled leaving at least 48" of extra cable on both ends of conduit. Witt Biomedical will trim and terminate cables during installation. Standard wiring diagrams are included at the end of this document. Direct questions to Witt Biomedical Project Management.

SERIES IV SYSTEMS

Cable Function	Conduit Requirements	Cable Type	Footage Required	To be pulled by:
Front End Cables	1.5" conduit from rear of Witt pedestal desk to base of patient table. Conduit should terminate in 4-6" junction box	Primary Signal (CAT5) -- 1/4" diam RS232 Signal (CAT5) -- 1/4" diam Power -- 3/8" diam Merit Intelliflector (CAT5) -- 1/4" diam		
Boom Monitor Cables	1.5" conduit from rear of Witt pedestal desk to procedure room monitors. Suspension boom conduit should terminate in 4-6" junction box.	VGA -- 3/8" diam Power -- 3/8" diam		
Image Capture Cables	Not Applicable	RG59 -- 3/8" diam		

IMAGE IV SYSTEMS

Cable Function	Cable Type	Footage Required	To be pulled by:
Video Capture Cables	Coaxial (LV77) -- 3/8" diam Foot Switch (2 conductors) -- 1/4" diam Cine Inhibit (2 conductors) -- 1/4" diam		

IMAGE IV SYSTEMS

Cable Function	Cable Type	Footage Required	To be pulled by:
Network Cables (Witt Biomedical does not provide or install wall jacks for network connections.)	CAT5 (plenum rated) -- 3/8" diam	Calculate quantity to connect all workstations to Switch/Hub.	

Cables may not be required to be pulled through conduit, depending upon local building codes.

Furniture Requirements

Witt Biomedical provides an optional pedestal desk and laser printer stand for each Series IV system and an optional pedestal desk for each Cine Acquisition station purchased. The customer is responsible for providing desks and workstation furniture for Review Stations and any computer hardware they provide.

Desks Required (Limited to 1 per room)	Desk Size (large if S4 or S4/I4 purchased; medium if I4 only purchased)	# Print Stand required (limited 1 per room)

IMPORTANT DATES	
Preferred Installation Date:______________________	Preferred In-Service Date(s):______________________
(Dates must be confirmed with Customer Support Department, Tony Drake -- Carl Becker)	

DISCLAIMER
Witt Biomedical CALYSTO Image IV Digital Imaging systems archive data automatically to DVD-RAM jukeboxes, StorageTek Tape Libraries, Enterprise SAN systems or manually to individual CD-ROMs. Please ensure that your facility has an internal procedure for verifying that all appropriate data is recorded and available for subsequent review. Secondary backup procedures (e.g., video tape, individual CD-ROM) are highly recommended as per your facility's choice.

SIGNATURES

Signature acknowledges and agrees to all the above statements.

SALESPERSON SIGNATURE: ______________________ DATE: ____________

MANAGER SIGNATURE: ______________________ DATE: ____________

BIOMED OR ENGINEERING SIGNATURE: ______________________ DATE: ____________

Please print the following names, phone numbers and e-mail addresses:.

CATH LAB MANAGER/DIRECTOR: ________________ ________________ ________________

BIOMED / ENGINEERING / IS ________________ ________________ ________________

STRATEGIC OR SPECIAL ISSUES OR CONCERNS ADDRESSED IN SALES PROCESS:

CALYSTO Image IV Pre-Installation Guidelines

These guidelines are provided to assist Witt customers in the installation of Witt CALYSTO Series IV and Image IV^{HL} equipment. The guidelines are intended to establish and clarify acceptable installation methods. Adherence to these standards is mandatory. Any deviation from the standards and specifications contained herein requires prior approval from Witt Biomedical.

Facility Requirements

Physical Requirements

The Witt CALYSTO Series IV and Image IV^{HL} products can be purchased in a number of different configurations. The space requirements of the associated equipment will depend on the configuration chosen by the customer. The following table lists the space requirements for various CALYSTO Series IV and Image IV^{HL} Equipment.

Equipment	Dimensions	Weight	Amps RMS	BTUs
Series IV Components:				
Host/Nurse/Review CPU	7.25" (W) x 17" (H) x 18" (D)	25 lbs	.69 w/ Mouse/Keyboard	495
Digital Front End (1 each)	7.625"(W) x 13.25" (H) x 20.5" (D)	25 lbs	.39 w/Host attached	70
Patient Care Monitor	.625" (W) x 10.5" (H) x 20.5" (D)		.39	495
Image IV Components:				
Acquisition/Review CPU	12" (W) x 3.25" (H) x 18" (D)	45 lbs	.69 w/ Mouse/Keyboard	495
DI-CORDER Components:				
CPU	12" (W) x 3.25" (H) x 14" (D)	17 lbs		
Touch Screen Monitor	7.75" (W) x 5" (H) x 1.5" (D)	21 lbs		
Keyboard	12.5" (W) x 1.75" (H) x 5.75" (D)	1 lb		
Network/Interface Components:				
Series IV File Server /MFI/Web^{DV} /	19" (W) x 1.75" (H) x 21" (D)	25 lbs	.69 w/ Mouse/Keyboard	495
Dell Rackmount Server	19" (W) x 3.25" (H) x 28" (D)	85 lbs	.78	495
Direct Attach Storage Array	19" (W) x 7" (H) x 18" (D)	100 lbs		
Tape Backup Library	19" (W) x 3.75" (H) x 24" (D)	30 lb		
Dell 24 Port Ethernet Switch	19" (W) x 1.75" (H) x 10.5" (D)	10 lb		
Server Rack	23.5" (W) x 47.25" (H) x 39.5" (D)	320 lb		
Archive Components:				
80 Slot DVD-RAM Jukebox	10" (W) x 32.5" (H) x 27" (D)	110 lbs		
200 Slot DVD-RAM Jukebox	20" (W) x 34" (H) x 26.5" (D)	150 lbs		
440 Slot DVD-RAM Jukebox	20" (W) x 57" (H) x 26.5" (D)	180 lb		
875 Slot DVD-RAM Jukebox	27.2" (W) x 68" (H) x 36" (D)	491 lbs		
1525 Slot DVD-RAM Jukebox	34.2" (W) x 68" (H) x 36" (D)	631 lbs		
2175 Slot DVD-RAM Jukebox	41.2" (W) x 68" (H) x 36" (D)	771 lbs		
Monitor Components:				
22" CRT Monitor	19" (W) x 19" (H) x 20" (D)	75 lbs	.4	239
17" Flat Panel Monitor	17.5" (W) x 17.5" (H) x 8" (D)	20.9 lbs		239
17" CRT Monitor	16" (W) x 17" (H) x 17" (D)	65 lbs	.78	239
15" CRT Monitor	14.25" (W) x 14.5" (H) x 15" (D)	70.5 lbs	.72	239
17" Monochrome CRT Monitor	17.5" (W) x 18.5" (H) x 19.5" (D)	70.5 lbs		239
20" Monochrome Flat Panel Monochrome LCD	17.5" (W) x 19.6" (H) x 8.2" (D)	30 lbs		239
Common Components:				
Pedestal Desk, medium	44.25" (W) x 34" (H) x 32.25" (D)	100 lbs	N/A	N/A
Pedestal Desk, large	52.25" (W) x 34" (H) x 32.25" (D)	120 lbs	N/A	N/A
Anthro Printer Stand	29.75" (W) x 20" (H) x 15.5" (D)	28 lbs	N/A	N/A
Anthro Computer Cart	24" (W) x 35" (H) x 30" (D)	69 lbs	N/A	N/A
Keyboard	19" (W) x 2" (H) x 9" (D)	3 lbs	See CPU	N/A
Laser Printer	15.5" (W) x 13.5" (H) x 19" (D)	50 lbs	6.5 (Printing) .25 (StdyState)	
Intelligent Switchbox	8" (W) x 3" (H) x 6.5" (D)	3 lbs	N/A	N/A
UPS (Series IV)	7.3" (W) x 8.3" (H) x 17.7" (D)	53 lbs	1.4 (charging Mode)	68
UPS (File Server)	29.75" (W) x 20" (H) x 15.5" (D)	64 lbs	1.3 (charging Mode)	68
UPS (Rackmount)	19" (W) x 5.25" (H) x 19.5" (D)	64 lbs	1.3 (charging Mode)	68

Electrical Requirements

- All Witt CALYSTO Image IV stations require a minimum of 2 and a maximum of 4 electrical outlets at the proposed location of the equipment.

- All Witt CALYSTO Series IV stations require 4 electrical outlets at the proposed location of the equipment.

- All Review, Nurse, Patient Care Monitor and File Server stations require 2 electrical outlets at the proposed location of the equipment.

  These outlets should be on the hospital's emergency power system, and should be capable of providing emergency power within 10 minutes of power loss to the lab.

- 120 Vac, 15 amp redundant hospital power required for all system components. Power consumption shall not exceed 1000w nominal at 120 Vac/15 amp per circuit. **1054 slot Magneto Optical Jukebox requires 220 Vac, 12 amp power.**

- Environmental requirements listed below:

Temperature	5 - 25 Degrees Centigrade
Humidity	20% - 80% Non-condensing Relative Humidity
BTUs	Approx. 7500 / fully Populated Console

Minimum PC Specifications for Series IV Review Stations

Customers may supply their own computers, **for CALYSTO Image IV review stations <u>only</u>**, provided that they meet or exceed all of the following minimum requirements. It's the customer's responsibility to provide and install all licensed software, network cable and hub ports and to perform the installation and setup of their own computers.

- 100% IBM PC Compatible 1 GHz Mainboard/Processor with 256K of Cache and 128 MB RAM

- 1.44 MB 3 ½" Floppy Drive

- 20 GB IDE Hard Drive

- 40x CD-ROM Drive

- 12x or greater CDRW drive

- Two Serial ports and one Parallel port. All ports active

- **AGP Dual Head Video Graphic board capable of displaying 1280 x 1024 resolution at 16 or 24 bit color and compatible with Microsoft DirectX 8.0 or greater.** (Witt Biomedical recommends ATI 2000, 128 RAGE with 32 MB RAM)

- Mini Tower or Desktop Chassis
- 300 WATT power supply
- SVGA Monitor with 1280 x 1024 resolution
- Enhanced 101 key keyboard
- 10/100 Ethernet Network Adaptor.
- Hard Drive loaded with Windows 2000 operating system and partitioned as follows:

  C: 3 gigabyte (Bootable)
  D: Remaining portion of hard drive.

- PCAnywhere version 10.5 or above installed for remote modem access and/or support (included with Witt Biomedical node license).

Minimum specifications notwithstanding, Witt Biomedical cannot guarantee 100% compatibility between Witt Biomedical application software and hospital provided software.

Minimum PC Specifications for CALYSTO Series IV File Servers

Customers may supply their own file server computer provided that they meets or exceed all of the following minimum requirements: It is the customer's responsibility to provide all licensed software, network cable, hub ports and perform the install/setup of their own computers.

- 100% IBM PC Compatible 1 GHz processor with 258 KB of cache and 128 MB RAM
- 1.44 MB 3 ½" Floppy Drive
- 20 GB IDE Hard Drive
- 48x CD-ROM Drive
- Two Serial Ports and one Parallel Port. All ports active
- PCI or AGP Video Graphics board with 4 MB video memory
- Mini Tower or Desktop Chassis
- 200 Watt Power Supply

- SVGA Monitor with 1280 x 1024 resolution
- Enhanced 101 key keyboard
- 10/100 Ethernet network adaptor
- Hard Drive loaded with Windows NT 4.0 Service Release 6.0 or Windows 2000 Server and partitioned as follows:

  C: 3 gigabyte (Bootable)
  D: Remaining portion of hard drive.

- PCAnywhere version 8.0 or greater installed for remote modem access and/or support (included with Witt Biomedical node license)

Minimum specifications notwithstanding, Witt Biomedical cannot guarantee 100% compatibility between Witt Biomedical application software and hospital provided software.

Minimum PC Specifications for CALYSTO Image IV Digital Review Stations

Customers may supply their own file server computers (**for Image IV Review stations only**) provided that they meets or exceed all of the following minimum requirements: It is the customer's responsibility to provide all licensed software, network cable, hub ports and perform the install/setup of their own computers.

- 100% IBM PC Compatible 1 GHz processor with 258 KB of cache and 128 MB RAM
- 1.44 MB 3 ½" Floppy Drive
- 120 GB Ultra ATA IDE Hard Drive
- 40x SCSI or IDE CD-ROM Drive
- 12x or greater CDRW Drive
- Two Serial Ports and one Parallel Port. All ports active
- **AGP Dual Head Video Graphic board capable of displaying 1280 x 1024 resolution at 24 or 32 bit color on two monitors simultaneously and compatible with Microsoft DirectX 8.0 or greater** (Witt Biomedical requires NVDIA G-Force 4600TI or ATI Radeon 9700)
- Mid Tower Chassis
- 310 Watt or greater Power Supply

- 17" SVGA Monitor with 1280 x 1024 resolution and .28 dot pitch
- Enhanced 101 key keyboard
- 10/100 Ethernet network adaptor
- Hard Drive loaded with Windows 2000 operating system and partitioned as follows:

  C: 3 gigabyte (Bootable)
  D: Remaining portion of hard drive.

- PCAnywhere version 10.5 or greater installed for remote modem access and/or support (included with Witt Biomedical node license)

Minimum specifications notwithstanding, Witt Biomedical cannot guarantee 100% compatibility between Witt Biomedical application software and hospital provided software.

Minimum PC Specifications for CALYSTO Image IV File Servers

Customers may supply their own file server computers for short-term archival of Image IV data. The server must meet or exceed all of the following minimum requirements. It is the customer's responsibility to provide and install network infrastructure (wiring, hubs/switch, firewall, etc.) and any other desired server based application software (e-mail, client, proxy, etc.).

- 100% IBM PC Compatible with Intel Xeon 1 GHz processor and 1 GB RAM
- 1.44 MB 3 ½" Floppy Drive
- RAID 5 configuration with capacity of 36 GB or greater (should be scaled to procedural volume, at least 36 GB per lab)
- 40x SCSI CD-ROM Drive
- 1 hot spare drive for redundancy and emergency fail safe
- Redundant Power Supplies
- Dual 10/100/1000 Ethernet network adaptor
- Windows 2000 Server allowing appropriate number of concurrent users for proposed configuration
- PCAnywhere version 8.0 or greater installed for remote modem access and/or support
- Tape Backup system or other disaster recovery mechanism

- Recommend Tape Auto Loader running Veritas Backup Exec
- Set Tape to Append Only

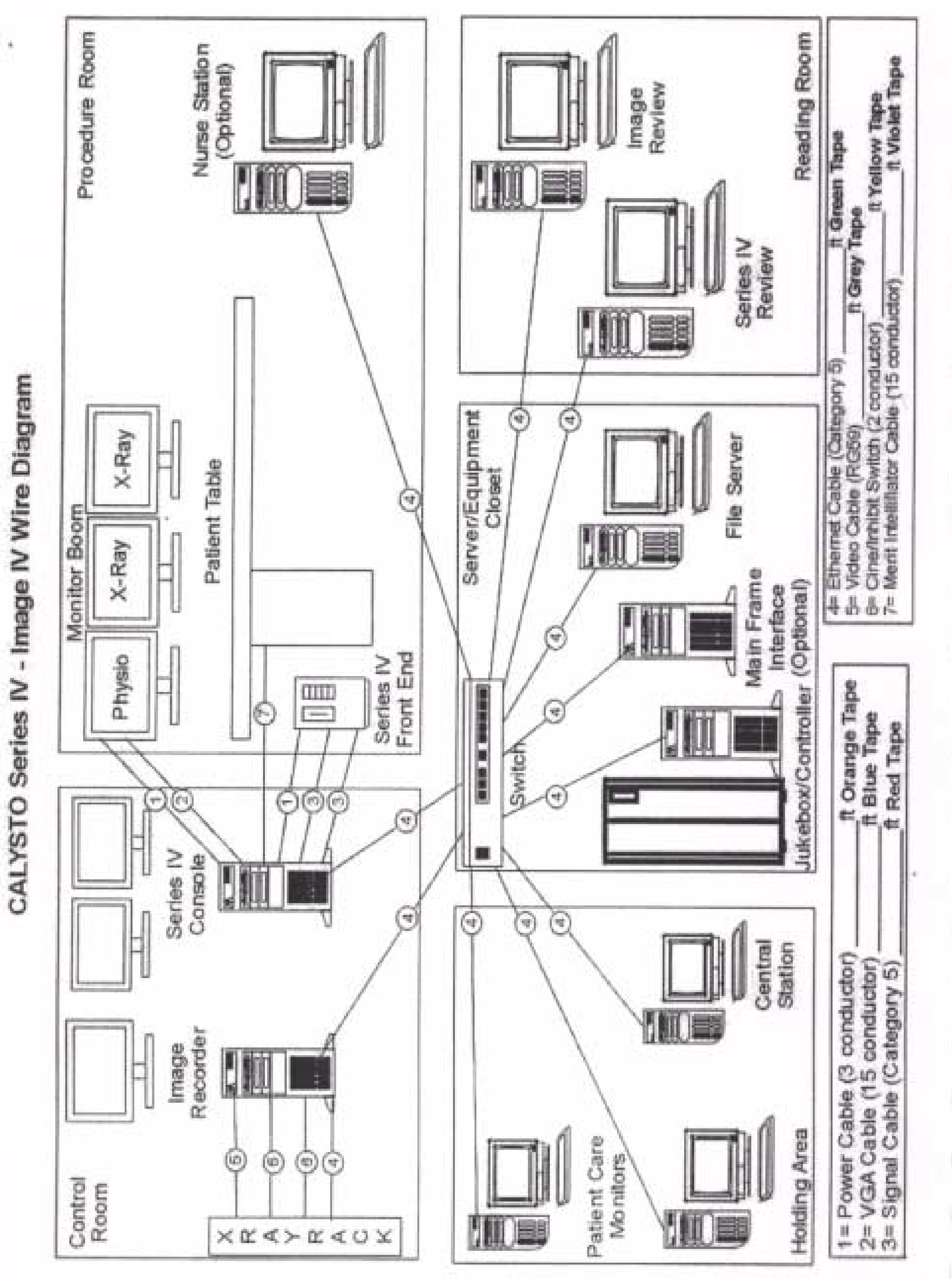
Minimum specifications notwithstanding, Witt Biomedical cannot guarantee 100% compatibility between Witt Biomedical application software and hospital provided software.

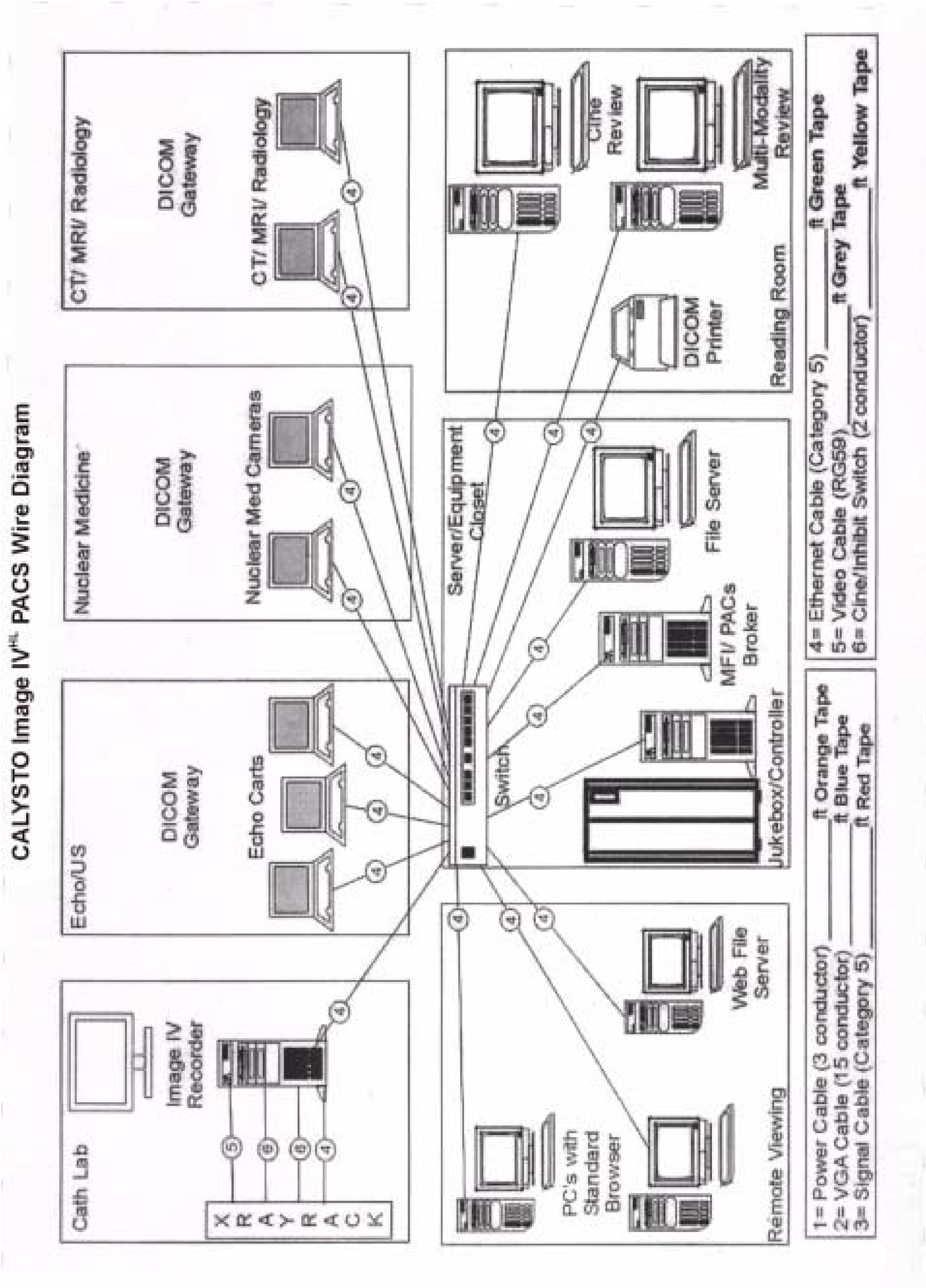
Minimum PC Specifications for CALYSTO Web^{DV} File Server

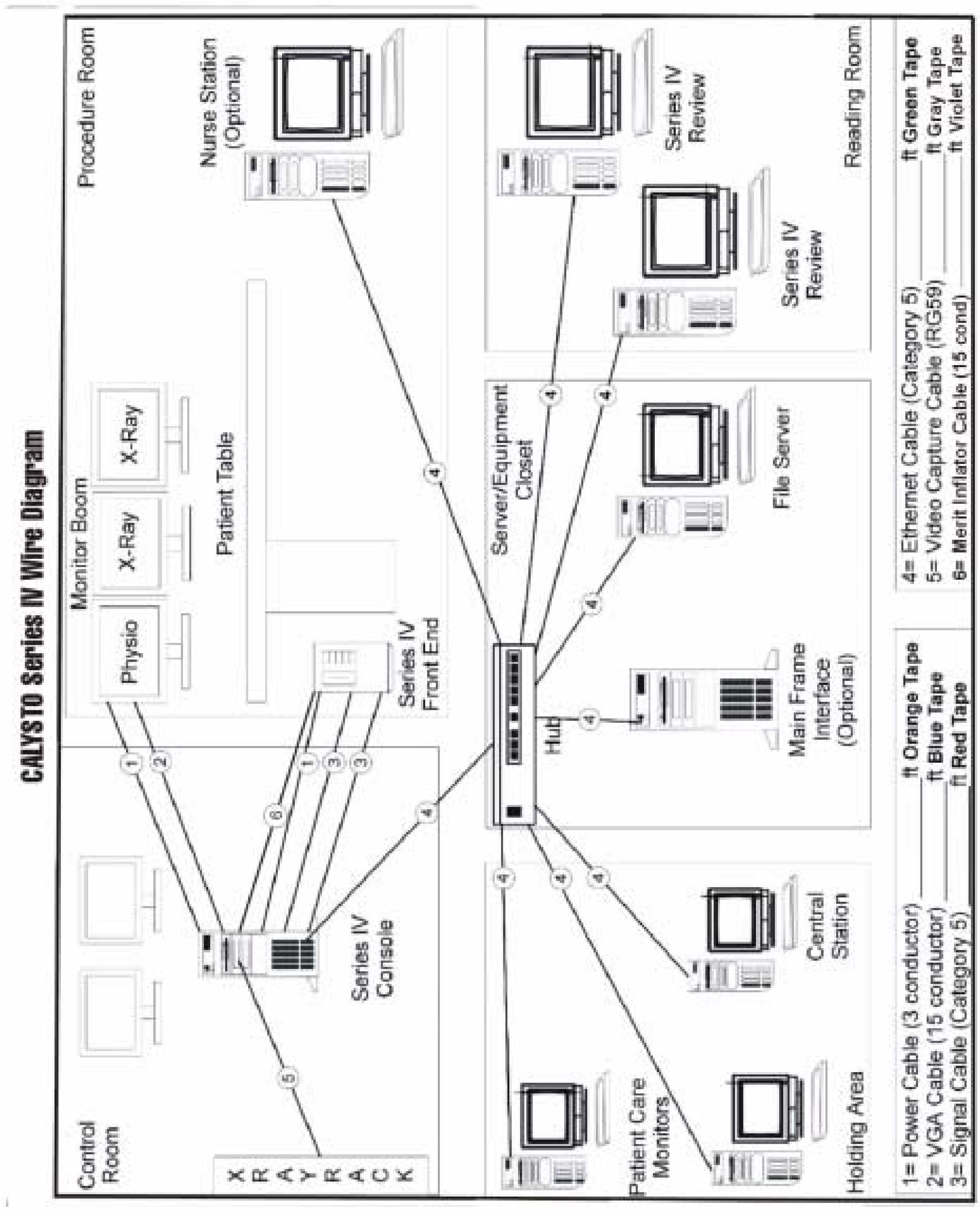
Customers typically supply their own web server for Web^{DV} remote access. The server must meet or exceed all of the following minimum requirements. It is the customer's responsibility to provide intranet structure (wiring, hubs/switch, firewall, etc.) and any other desired web-based application software (e-mail client, proxy, etc.).

- 100% IBM PC Compatible with Dual Pentium III 800 MHz processors and 1 GB RAM
- 1.44 MB 3 ½" Floppy Drive
- RAID 5 configuration with capacity of 36 GB or greater (should be scaled to procedural volume)
- 40x SCSI CD-ROM Drive
- Hot swap hard drives
- Redundant power supplies
- Dual 10/100/1000 Ethernet network adaptor
- Windows 2000 Advanced Server allowing 50 concurrent users
- IIS5 installed (configures with assistance from Witt Biomedical)
- PCAnywhere version 8.0 or greater installed for remote modem access and/or support

Minimum specifications notwithstanding, Witt Biomedical cannot guarantee 100% compatibility between Witt Biomedical application software and hospital provided software.


CALYSTO Series IV - Image IV Wire Diagram
Procedure Room
Nurse Station (Optional)
Monitor Boom
Physio
X-Ray
X-Ray
Patient Table
Series IV Front End
Control Room
Series IV Console
Image Recorder
XRAY RACK
Server/Equipment Closet
Switch
File Server
Main Frame Interface (Optional)
Jukebox/Controller
Reading Room
Image Review
Series IV Review
Holding Area
Patient Care Monitors
Central Station
1= Power Cable (3 conductor) ft Orange Tape
2= VGA Cable (15 conductor) ft Blue Tape
3= Signal Cable (Category 5) ft Red Tape
4= Ethernet Cable (Category 5) ft Green Tape
5= Video Cable (RG59) ft Grey Tape
6= Cine/Inhibit Switch (2 conductor) ft Yellow Tape
7= Merit Intellilator Cable (15 conductor) ft Violet Tape


CALYSTO Image IV PACS Wire Diagram
Cath Lab
X R A Y R A C K
Image IV Recorder
Echo/US
DICOM Gateway
Echo Carts
Nuclear Medicine
DICOM Gateway
Nuclear Med Cameras
CT/ MRI/ Radiology
DICOM Gateway
CT/ MRI/ Radiology
Remote Viewing
PC's with Standard Browser
Web File Server
Switch
Jukebox/Controller
MFI/ PACs Broker
File Server
Server/Equipment Closet
Reading Room
DICOM Printer
Multi-Modality Review
Cine Review
1= Power Cable (3 conductor) ____ ft Orange Tape
2= VGA Cable (15 conductor) ____ ft Blue Tape
3= Signal Cable (Category 5) ____ ft Red Tape
4= Ethernet Cable (Category 5) ____ ft Green Tape
5= Video Cable (RG59) ____ ft Grey Tape
6= Cine/Inhibit Switch (2 conductor) ____ ft Yellow Tape


CALYSTO Series IV Wire Diagram
Control Room
X R A Y R A C K
Series IV Console
Procedure Room
Monitor Boom
Physio
X-Ray
X-Ray
Patient Table
Series IV Front End
Nurse Station (Optional)
Server/Equipment Closet
Hub
Main Frame Interface (Optional)
File Server
Series IV Review
Series IV Review
Reading Room
Patient Care Monitors
Central Station
Holding Area
1= Power Cable (3 conductor) ft Orange Tape
2= VGA Cable (15 conductor) ft Blue Tape
3= Signal Cable (Category 5) ft Red Tape
4= Ethernet Cable (Category 5) ft Green Tape
5= Video Capture Cable (RG59) ft Gray Tape
6= Merit Inflator Cable (15 cond) ft Violet Tape

Appendix B: System Cabling

System Cabling

In this appendix we describe the cables provided with the CALYSTO Series IV. We've divided the appendix into the following four sections:

- Installation Cables
- Patient Cables
- Internal Cables
- Peripheral Cables

Installation Cables connect system components between rooms and are usually routed through walls and floors inside conduit. Hospital personnel install them before the system arrives.

Patient Cables connect the patient to the equipment.

Internal cables connect the CALYSTO Series IV Front End and Patient Care monitors internally or externally to other equipment.

Peripheral Cables connect devices such as keyboards.

Within the sections, each cable description begins with a table that provides labeling, specifications, part numbers, connector data, and installation procedures for the cable. This is followed by supplementary data needed to repair the cable if it's found to be defective. We've also included a table preceding the sections to help you quickly locate specific cables.

Cable Location Table

Cable Name	Type	Use	Page
Ethernet Network	Interconnect	Network Comm	B-3
RGB Shielded VGA	Interconnect	Slave Monitor-Host	B-4
VGA	Installation	Slave Monitor-Host	B-5
Power	Interconnect	AC Power-UPS	B-6
S4 Front End to G4 Host Communication	Interconnect	FE-Host Comm	B-7
Digital Front End (S5) to G5 Host cable	Installation	FE-Host Comm	B-8
RS-232, Category 5 Installation	Interconnect	FE-Host Comm	B-9
RS-232, 15-Conductor Installation	Installation	FE-Host comm	B-10
G4 Video Patch, Rev A	Installation	Internal, G4-Host	B-11
12-Lead ECG	Patient	FE/PCM-Limb Leads	B-12
12 Radiolucent Cable Set	Patient	ECG Cable to Patient	B-13
Dual Cardiac Output	Patient	FE-Catheter	B-14
4-Channel Pressure Harness	Patient	FE-Transducer	B-15
SpO2 Extension	Patient	FE/PCM-SpO2 Probe	B-16
7-Lead ECG for Patient Care Monitor (PCM), Rev A	Patient	PCM-Limb Leads	B-17
7-Lead ECG for Patient Care Monitor (PCM), Rev B	Patient	PCM-Limb Leads	B-18
QXII 12-Lead Output	Internal	FE/PCM	B-19
QXII 12-Lead to S4 Signal, Rev D	Internal	FE/PCM	B-21
PS4 for RAM Configuration	Internal	FE/PCM	B-23
CO/Temp/Pressure S4DB	Internal	FE/PCM	B-25
12-Lead ECG JP1 to Respiration Daughter PCB	Internal	FE/PCM	B-27
ISO 10-Pin ISO	Internal	FE/PCM	B-28
12 ID (14-Pin) Adapter to RAM Pressure PCB	Internal	FE/PCM	B-30
ISO 14-Pin ISO	Internal	FE/PCM	B-31
S4 Analog to Digital 12-Lead	Internal	FE/PCM	B-32
S4 Front End Internal Serial	Internal	FE	B-33
S4 Auxiliary Output Set for Front Ends	Internal	FE	B-34
S4 Auxiliary Output Set for Patient Care Monitors (PCM)	Internal	PCM	B-36
S4 Auxiliary Output Set for Advanced Patient Care Monitors (PCM)	Internal	PCM	B-37
S4 Reset	Internal	FE	B-38
S4 Internal RS-232	Internal	Host	B-39
S4 Internal RS-232 for Demos	Internal	Demo	B-40
S4 Auxiliary Temperature	Internal	FE	B-41
14-Pin ISO SpO2	Internal	FE/PCM	B-43
S4 Internal SpO2 Sensor	Internal	FE/PCM	B-44
S4 SpO2 Sensor Shielded, Rev D/E	Internal	FE/PCM	B-45
S4 SpO2 Sensor, Rev D	Internal	FE/PCM	B-46
PCM Serial Data Transfer	Internal	PCM	B-47
S4 A/D 7-Lead Patient Care Monitor (PCM)	Internal	PCM	B-48
RS-232 Patient Care Monitor (PCM)	Internal	PCM	B-49
NIBP Extension for APCM ATX Platform	Internal	FE	B-50
Manufacturer's Recommendation for External Cables for S4 Auxiliary Outputs	Internal	N/A	B-52
Keyboard/Barcode Extension	Peripheral	Host/PCM/Reviews	B-53

Installation Cables

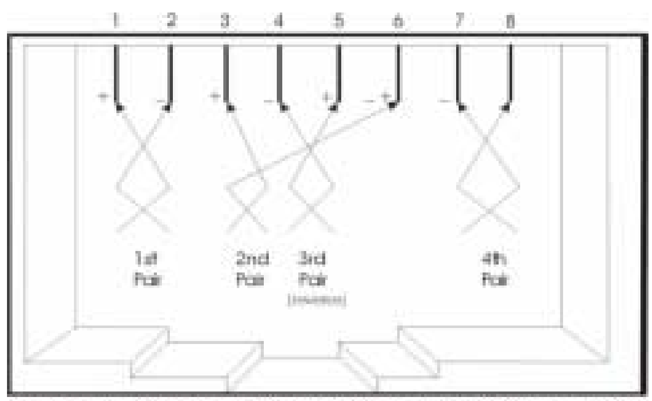
Ethernet Network Cable

Witt PN:	**Label:** Network Cable	**Drawing Ref:** N/A

Purpose	Network Cable		
Connector	**Installation**		
RJ45	Attaches FROM Workstation RJ45, 8 conductor TO Active Hub RJ45, 8 conductor		
Witt PN	**Cable Bill of Materials**		
None	Cable Type: Level 5 Ethernet, twisted pair (4)	Cable Length: TBD at pre-install	Cable Gauge: 24 AWG
SE	Connector Type: RJ45, 8 conductor	Connector Quantity: 2	

Assembly

Note: 1. The 16 Fast Ethernet connectors use standard RJ45 connectors.
2. The polarity of the blue twisted pair is **reversed** from all other twisted pairs.



RJ-45 Connector Front View (reverse for connector rear view)

Pin Number	Wire Pair Color
1	Orange Stripe
2	Orange
3	Green Stripe
4	Blue
5	Blue Stripe
6	Green
7	Brown Stripe
8	Brown

RGB Shielded VGA Cable

Witt PN:	**Label:** Witt Video Cable	**Drawing Ref:** N/A

Purpose	Slave Monitor to Host Video		
Connector	**Installation**		
DB15	Attaches TO Slave Monitor		
DB15	Attaches TO Host CPU		
Witt PN	**Cable Bill of Materials**		
None	Cable Type: 15-conductor	Cable Length: TBD at pre-install	Cable Gauge: 26 AWG
SG	Connector Type: DB15, Hood, Male	Connector Quantity: 1	
TA	Connector Type: DB15, Hood, (1 hood)	Connector Quantity: 1	
None	Heat Shrink, ½” ∅, 1-2” long	Heat Shrink Quantity: 1	

Assembly: Connector attached at installation time.

Pin	Description	Rev01 Black Cable	Rev02 Black Cable
1	Red	Red Center	Red Center
2	Green	Green Center	Green Center
3	Blue	Blue Center	Blue Center
4	ID Bit 2	Thin Yellow	Thin Green
5	Self Test	Thin Black	Thin Yellow
6	Red Return	Shielding from pins 1 – 3 to case	
7	Green Return	Shielding from pins 1 – 3 to case	
8	Blue Return	Shielding from pins 1 – 3 to case	
9	NC	NC	NC
10	Ground	Thin Black/White	Thin Black
11	ID Bit 0	Thin Orange	Thin Purple
12	ID Bit 1	Thin Brown	Thin Blue
13	H Sync	Thin Brown/White	Thin Red
14	V Sync	Thin Red/White	Thin White
15	ID Bit 3	Thin Red	Thin Gray

Drain wires are to be soldered to the shoulder of both connectors.

ELECTRICAL SPECIFICATION

1. CONTACT CURRENT RATING: 5 Amps
2. CONTACT RESISTANCE: 15 MegΩ max.
3. INSULATION RESISTANCE: > 10 MegΩ, 500 Vdc

Label end of cable clearly as “SLAVE MONITOR, VGA VIDEO” and “HOST.”

VGA Cable

Witt PN:	Label: Witt Video Cable	Drawing Ref: N/A

Purpose	Slave Monitor to Host Video		
Connector	**Installation**		
DB15	Attaches TO Slave Monitor		
DB15	Attaches TO Host CPU		
Witt PN	**Cable Bill of Materials**		
None	Cable Type: 15-conductor	Cable Length: TBD at pre-install	Cable Gauge: 24 AWG
SG	Connector Type: DB15, Hood, Male	Connector Quantity: 2	
TA	Connector Type: DB15, Hood, (2 hoods)	Connector Quantity: 2	
None	Heat Shrink, ½” ∅, 1-2” long	Heat Shrink Quantity: 2	

Assembly: Connector attached at installation time.

Pin	Description	Color (1st Revision)	Color (2nd Revision)
1	R (Red Video)	Red	Red
2	G (Green Video)	Green	Green
3	B (Blue Video)	Blue	Blue
4	Straight through	White/Black	White/Green
5	Straight through	Green/Black	Pink
6	R Ground	Orange/Black	Yellow
7	G Ground	Orange	Orange
8	B Ground	Black	Black
9	Straight through	Red/Black	Tan
10	Sync Ground	Blue/Black	Violet
11	Straight through	Green/White	White/Red
12	Straight through	Blue/White	White/Black
13	Horizontal Sync	Black/White	Gray
14	Vertical Sync	White	White
15	Straight through	Red/White	Brown

Drain wire is to be soldered to the shoulder of both connectors.
Red, Green, and Blue signals are 0.7 Vac p-p and require 75Ω termination impedance.
Horizontal and vertical syncs are TTL level and require high termination impedance.

Label end of cable clearly as “SLAVE MONITOR, VGA VIDEO” and “HOST.”

Power Cable

Witt PN:	**Label:** Witt Power Cable	**Drawing Ref:** N/A

Purpose	AC Connection to UPS		
Connector	**Installation**		
Male	Attaches TO UPS		
Female	Attaches TO Front End or Slave Monitor		
Witt PN	**Cable Bill of Materials**		
None	Cable Type: 3-conductor	Cable Length: TBD at pre-install	Cable Quantity: 2
LH	Connector Type: Male Plug	Connector Quantity: 2	
LI	Connector Type: Female Socket	Connector Quantity: 2	

Assembly: Connectors attached at installation time.

Male Pin	Female Pin	Description	Color
1 (Brass Screw)	L	Load	Brown
2 (Green Screw)		Ground	Green & Drain Wire
3 (Nickel Screw)	N	Neutral	Blue

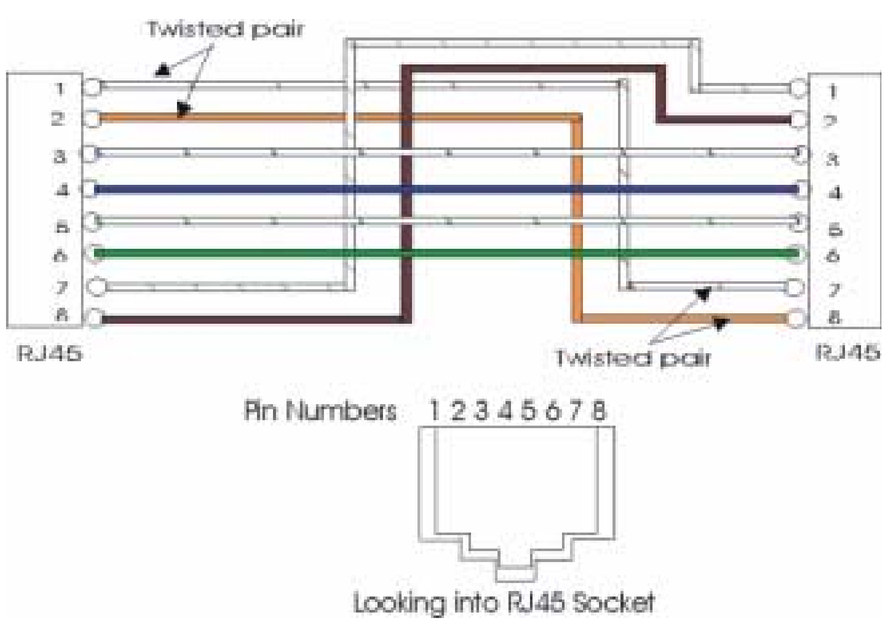
S4 Front End to G4 Host Communication Cable

Witt PN:	**Label:** S4/G4 Comm Cable	**Drawing Ref:** N/A

Purpose	Communications between S4 and G4 PCBs		
Connector	**Installation**		
Ethernet 8	Attaches TO Front End RJ45		
Ethernet 8	Attaches TO Host RJ45		
Witt PN	**Cable Bill of Materials**		
None	Cable Type: Ethernet Category 5	Cable Length: TBD at pre-install	Cable Gauge: 24 AWG
SE	Connector Type: Ethernet 8 Position	Connector Quantity: 2	

Assembly:

8 Position Connector	Description	Color	8 Position Connector	Description
1	Transmit (+)	Orange Stripe	7	Receive (+)
2	Transmit (-)	Orange	8	Receive (-)
3		White/Blue	3	
4		Blue	4	
5		White/Green	5	
6		Green	6	
7	Receive (+)	Brown Stripe	1	Transmit (+)
8	Receive (-)	Brown	2	Transmit (-)



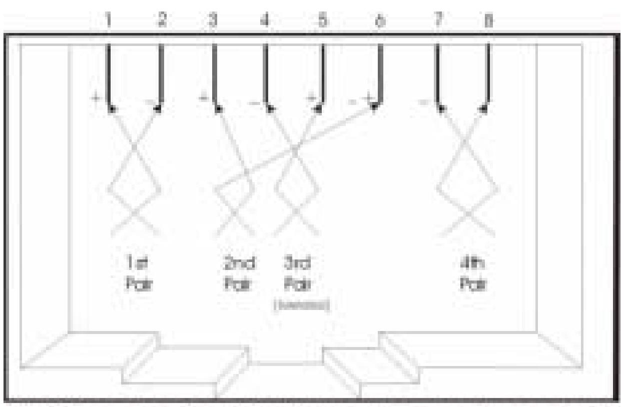
Digital Front End (S5) to G5 Host Cable

Witt PN:	**Label:** CAT 5	**Drawing Ref:** N/A

Purpose	Primary communications between Host CPU and Front End		
Connector	**Installation**		
RJ45	Connects RJ45 connector on Host G5 PCB to RJ45 connector on Front End S5 PCB		
Witt PN	**Cable Bill of Materials**		
None	Cable Type: Level 5 Ethernet, twisted pair (4)	Cable Length: TBD at preinstall	Cable Gauge: 24 AWG
SE	Connector Type: RJ45, 8 conductor	Connector Quantity: 2	

Assembly

Note:
1. CAT 5 connector is wired as a standard Ethernet network cable.
2. The 16 Fast Ethernet connectors use standard RJ45 connectors.
3. The polarity of the blue twisted pair is **reversed** from all other twisted pairs.



RJ-45 Connector Front View (reverse for connector rear view)

Pin Number	Wire Pair Color
1	Orange Stripe
2	Orange
3	Green Stripe
4	Blue
5	Blue Stripe
6	Green
7	Brown Stripe
8	Brown

RS-232 Category 5 Installation Cable

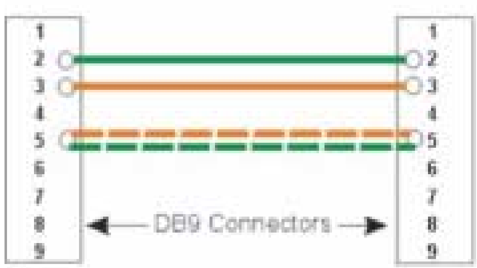
Witt PN:	**Label:** Witt RS-232	**Drawing Ref:** N/A

Purpose	Front End-Host Communications		
Connector	**Installation**		
DB9 Male	Attaches TO Front End Serial A Input		
DB9 Hood	Attaches TO Host RS-232 Input		
Witt PN	**Cable Bill of Materials**		
None	Cable Type: Category 5	Cable Length: TBD at pre-install, not to exceed 125	Cable Gauge: 24 AWG
SC	Connector Type: DB9 Male	Connector Quantity: 2	
TA	Connector Type: DB9 Hood	Connector Quantity: 2	
None	Heat Shrink, ¼” ∅, 1” long	Heart Shrink Quantity: 2	

Assembly:

DB9M	DB9M	Description	Color
1	1	NC	
2	2	TX/RX	Green
3	3	TX/RX	Orange
4	4	NC	
5	5	GROUND	Orange Stripe & Green Stripe
6	6	NC	
7	7	NC	
8	8	NC	
9	9	NC	

1. Strip outer jacket back ½”.
2. 2Strip orange, green, orange stripe, and green stripe wires 1/8”.
3. Fill solder cups 2, 3, and 5.
4. Cut unused wires ¼” back from outer jacket.
5. Place one or two layers of heat shrink over cable to encapsulate unused wires and provide proper strain relief with hood.



DO NOT:

1. USE GENDER CHANGERS.
2. SOLDER ANY OTHER WIRE TO DB9 CONNECTOR.
3. SOLDER ANY WIRE TO THE SHOULDER OF THE DB9 CONNECTOR.

An increase in unwanted signal noise will occur if any of the above is implemented.

RS-232 Category 5, 15-Conductor Installation Cable

Witt PN:	**Label:** Witt RS-232	**Drawing Ref:** N/A

Purpose	Front End-Host Communications		
Connector	**Installation**		
DB9 Male	Attaches TO Front End Serial A Input		
DB9 Hood	Attaches TO Host RS-232 Input		
Witt PN	**Cable Bill of Materials**		
None	Cable Type: 15-conductor, shielded	Cable Length: TBD at pre-install	Cable Gauge: 24 AWG
SC	Connector Type: DB9 Male	Connector Quantity: 2	
TA	Connector Type: DB9 Hood	Connector Quantity: 2	
None	Heat Shrink, 3/8” ∅, 1” long	Heat Shrink Quantity: 2	

Assembly:

DB9	DB9	Description	Color (1st Revision)	Color (2nd Revision)
1	1	SpO2 RxD	Red	Red
2	2	SpO2 CTS	Green	Green
3	3	SpO2 TxD	Blue	Blue
4	4	SpO2 Ground	Orange/Black	Yellow
5	5	NIBP RxD	Orange	Orange
6	6	NIBP CTS	Black	Black
7	7	NIBP TxD	Blue/Black	Violet
8	8	NIBP RTS	Black/White	Gray
9	9	NIBP Ground	White	White

Connectors and hoods are attached at the time of installation. Captivate unused conductors in 3/8” heat shrink. Label cable as Witt RS-232

Unused wires from 15-conductor cable in:

1st Revision	2nd Revision
Green/Black	White/Green
Red/Black	Pink
White/Black	Tan
Red/White	White/Red
Green/White	White/Black
Blue/White	Brown

G4 Video Patch Cable, Rev A

Witt PN: BG4	**Label:** Witt G4 Video Patch	**Drawing Ref:** N/A

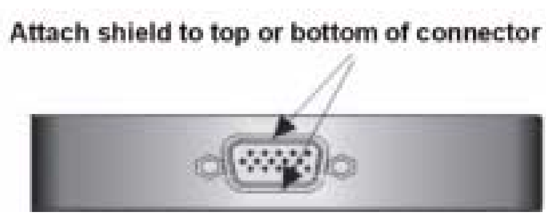
Purpose	Video output from G4 PCB		
Connector	**Installation**		
DB15 Female	Attaches TO Host CPU backplate		
DB15 Male	Attaches TO G4 PCB		
Witt PN	**Cable Bill of Materials**		
BG4	Cable Type: 15-conductor, foil	Cable Length: 12”	Cable Gauge: 24 AWG
SF	Connector Type: DB15 HD Female	Connector Quantity: 1	
SG	Connector Type: DB15 HD Male	Connector Quantity: 1	
None	Heat Shrink, 1/2” ∅, 1” long	Heat Shrink Quantity: 2	

Assembly:

DB15 HD F	Description	Color (1st Revision)	Color (2nd Revision)	DB15 HD M
1	R (Red Video)	Red	Red	1
2	G (Green Video)	Green	Green	2
3	B (Blue Video)	Blue	Blue	3
6	R Ground	Yellow	Orange/Black	6
7	G Ground	Orange	Orange	7
8	B Ground	Black	Black	8
10	Sync Ground	Violet	Blue/Black	10
13	Horizontal Sync	Gray	Black/White	13
14	Vertical Sync	White	White	14
Solder shield to the **top or bottom** of DB15HD(F) shoulder connector only, as shown below. Other end is captured with heat shrink.				

Note: Red, Green, and Blue signals are 0.7 Vac p-p. All unused conductors are removed for cable.

1st Revision	2nd Revision
White/Green	Green/Black
Pink	Red/Black
Tan	White/Black
White/Red	Red/White
White/Black	Green/White
Brown	Blue/White



Patient Cables

12 Lead ECG Cable

Witt PN: AC	**Label:** Witt 12-Lead ECG	**Drawing Ref:** N/A

Purpose	Front End/PCM connection for limb leads		
Connector	**Installation**		
25-pin IDC Male	Attaches TO rear of Front End		
Molded End	Attaches TO Limb Leads		
Witt PN	**Cable Bill of Materials**		
BG4	Cable Type: 15-conductor, foil	Cable Length: 12”	Cable Gauge: 24 AWG
SM	Connector Type: IDC-25 Male	Connector Quantity: 1	
None	Heat Shrink, 1/2” ∅, 1” long	Heat Shrink Quantity: 1	

Assembly:

Wrap end of cable insulation with ½” ∅ heat shrink, approximately 1” long for stress relief. To check continuity, connect pin 14 (shield) to the top row of pins on ECG cable.

Pin	Description	Color
1	RA	White
3	LA	Blue
5	LL	Red
7	V1	Black
9	V2	Yellow
11	V3	Gray
13	V4	Brown
14	Shield	Shield
19	RL	Green
22	V6	Purple
24	V5	Orange

12 Radiolucent Cable Set

Witt PN: AGT	**Label:** Individual Assignment	**Drawing Ref:** N/A

Purpose	Connects ECG Cable to Patient		
Connector	**Installation**		
2-pin Female	Attaches TO ECG Cable		
Clip	Attaches TO Patient		
Witt PN	**Cable Bill of Materials**		
AGT	Cable Type: 1-12 Lead Radiolucent Set	Cable Length:	Cable Gauge:
ADX	Cable Type: Limb Lead Wire	Cable Length:	Cable Gauge:
AGB	Beads, 2 Bags		

Assembly:

1. Remove green bead RL and return to stock.
2. Remove one radiolucent wire from set and return to stock.
3. Add one RL limb lead wire.
4. Assemble each complete wire set to the following schedule.

Note: RL is not radiolucent or beaded.

Wire	Bead Color
RL	None
RA	White
LA	Black
LL	Red
V1	Red
V2	Yellow
V3	Green
V4	Blue
V5	Orange
V6	Violet

Dual Cardiac Output Cable

Witt PN: BQ2	**Label:** Witt Dual CO Cable	**Drawing Ref:** N/A

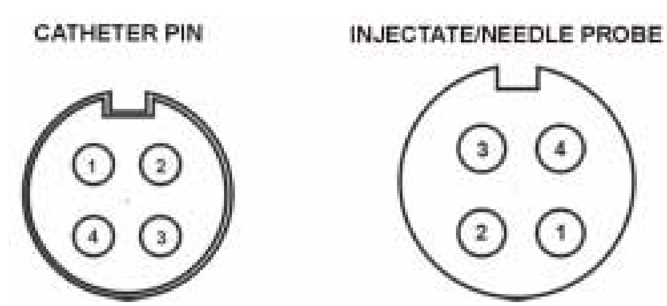
Purpose	Connects Catheter to Front End		
Connector	**Installation**		
DB15 Female	Attaches TO rear of Front End		
Molded End	Attaches TO Catheter		
Witt PN	**Cable Bill of Materials**		
BQ2	Cable Type: Baxter Edwards 30-cc Cable	Cable Length:	Cable Gauge:
SF	Connector Type: DB15 Female, 2-row	Connector Quantity: 1	
TB	Connector Type: DB15 Hood, 2-row	Connector Quantity: 1	
None	Heat Shrink, 1/4” ∅, 1” long	Heat Shrink Quantity: 1	

Assembly:

1. Remove the plastic cover from the DB9 connector.
2. Disconnect all wires from the DB9 connector, by cutting. Trim as close as possible to the connector, leaving as much workable conductor as possible for reconnection as detailed below. Discard the plastic hood and connector.

DB15F (2 row type)	Catheter Pin	Injectate/Needle Probe
1	1 (Black)	
2	4 (White)	
3	3 (Red)	
4		4 (White)
5		1 (Black)
6		2 (Red)
7	NC	NC
8		3 (Green)
9 - 15	NC	NC

3. Put heat shrink over the unused blue and green wires.
4. Finish with DB15 (2 row type) metal hood.



Four Channel Pressure Harness

Witt PN: BP	**Label:** Witt 4-Channel Pressure Harness	**Drawing Ref:** N/A

Purpose	Connects Transducer to Front End		
Connector	**Installation**		
IDC25 Male	Attaches TO rear of Front End		
6-Pin Male	Attaches TO Hospital-Provided transducer		
Witt PN	**Cable Bill of Materials**		
BP	Cable Type: 4-Conductor	Cable Length: 12”	Cable Gauge: 24 AWG
SM	Connector Type: IDC25 Male w/Hood	Connector Quantity: 1	
SO	Connector Type: 6-Pin Male	Connector Quantity: 1	
None	Heat Shrink, 1/8” ∅, 2” long	Heat Shrink Quantity: 2	

Assembly:

Cannon Pin	Signal	Color	DB Pin	Labels
1-1	+EX	Red	14	Place a 5/8” diameter, ~ 1” in length piece of heat shrink on all channels. Place cable ID label over heat shrink.
1-2	+SIG	White	2	
1-3	-SIG	Black	1	
1-4	-EX	Green	15	
1-5	Shield	Wire	-----	
2-1	+EX	Red	16	
2-2	+SIG	White	4	
2-3	-SIG	Black	3	
2-4	-EX	Green	17	
2-5	Shield	Wire	-----	
3-1	+EX	Red	18	
3-2	+SIG	White	6	
3-3	-SIG	Black	5	
3-4	-EX	Green	19	
3-5	Shield	Wire	-----	
4-1	+EX	Red	20	
4-2	+SIG	White	8	
4-3	-SIG	Black	7	
4-4	-EX	Green	21	
4-5	Shield	Wire	-----	

1. Short 4 and 5 together.
2. Use 1/16” heat shrink on drain wire (Cannon end).
3. Use 2 pieces 1/8” heat shrink on Cannon end juncture where outer jacket is removed.

SPO2 Extension Cable

Witt PN: BMA	**Label:** Witt SpO2 Ext. Cable	**Drawing Ref:** N/A

Purpose	Connects SpO2 Probe to Front End/PCM		
Connector	**Installation**		
DB9 Male	Attaches TO rear of Front End		
DB9 Female Molded End	Attaches TO SpO2 Probe		
Witt PN	**Cable Bill of Materials**		
BMA	Cable Type: Nellcor PN 020800 EXT	Cable Length: 8’	Cable Gauge: N/A
SC	Connector Type: DB9 Male	Connector Quantity: 1	
TA	Connector Type: DB9 Hoods	Connector Quantity: 1	
None	Heat Shrink, 1/4” ∅, 2” long	Heat Shrink Quantity: 1	
ZBA	Retaining Clip	Retaining Clip Quantity: 1	

Assembly

DB9 M (front end connection)	Color	DB9 F (probe)
1	Blue	1
2	Red	2
3	Black	3
5	Coax Core (Center)	5
6	Gray	6
7	Overall Braid	7
9	Coax Braid	9

Use grommet to accommodate hood. Applied ¼” ∅ heat shrink to Witt attached end.

7-Lead ECG Cable for Patient Care Monitor (PCM), Rev A

Witt PN: AA	**Label:** Witt 7-Lead ECG Rev A	**Drawing Ref:** N/A

Purpose	Connects ECG Limb Leads to PCM		
Connector	**Installation**		
IDC15 Male	Attaches TO rear of PCM		
Molded End	Attaches TO Limb Leads		
Witt PN	**Cable Bill of Materials**		
AA	Cable Type: 5-conductor, Individual Shield	Cable Length: TBD at Pre-install	Cable Gauge: 28 AWG
SL	Connector Type: IDC15 Male	Connector Quantity: 1	
None	Connector Type: IDC Hoods	Connector Quantity: 1	
None	Heat Shrink, 1/2” ∅, 1” long	Heat Shrink Quantity: 1	

Assembly

- Wrap end of cable insulation with ½”∅ heat shrink, approximately 1 inch long for stress release. To check continuity, pin 9 (shield) is connected to the top row of pins on ECG cable.

Pin	Description	Color
1	LL	Red
5	RA	White
8	LA	Blue
9	Shield	Shield
11	C (V lead)	Brown
14	RL	Green

7-Lead ECG Cable for Patient Care Monitor (PCM), Rev B

Witt PN: AA	**Label:** Witt 7-Lead ECG Rev B	**Drawing Ref:** N/A

Purpose	Connects ECG Limb Leads to PCM		
Connector	**Installation**		
IDC15 Male	Attaches TO rear of PCM		
Molded End	Attaches TO Limb Leads		
Witt PN	**Cable Bill of Materials**		
AA	Cable Type:CONMED PN Conmed W85XX	Cable Length:	Cable Gauge:
SL	Connector Type: IDC15 Male	Connector Quantity: 1	
None	Connector Type: IDC Hoods	Connector Quantity: 1	
None	Heat Shrink, 1/2” ∅, 1” long	Heat Shrink Quantity: 1	

Assembly

Pin	Description	Color
1	LL	Red
5	RA	White
8	LA	Blue
9	Shield	Shield
11	C (V lead)	Brown
14	RL	Green

Internal Cables

QXII 12 Lead Output Cable

Witt PN: BQXII	**Label:** Witt 12-Lead Output Cable	**Drawing Ref:** N/A

Purpose	Connects ECG PCB to rear of Front End		
Connector	**Installation**		
DB25 Male	Connects TO Rear of Front End		
IDC26	Connects TO JP2 on Witt 12-Lead ECG PCB		
Witt PN	**Cable Bill of Materials**		
BQXII	Cable Type: 26-conductor, multi-color ribbon	Cable Length: 20”	Cable Gauge:
SH	Connector Type: DB25 Male w/solder	Connector Quantity: 1	
SIT	Connector Type: 26-Pin IDC header	Connector Quantity: 1	
X25	Witt Edge Bracket	Bracket Quantity: 1	
None	Heat Shrink, 1/16” ∅, 1/4” long	Heat Shrink Quantity: 25	

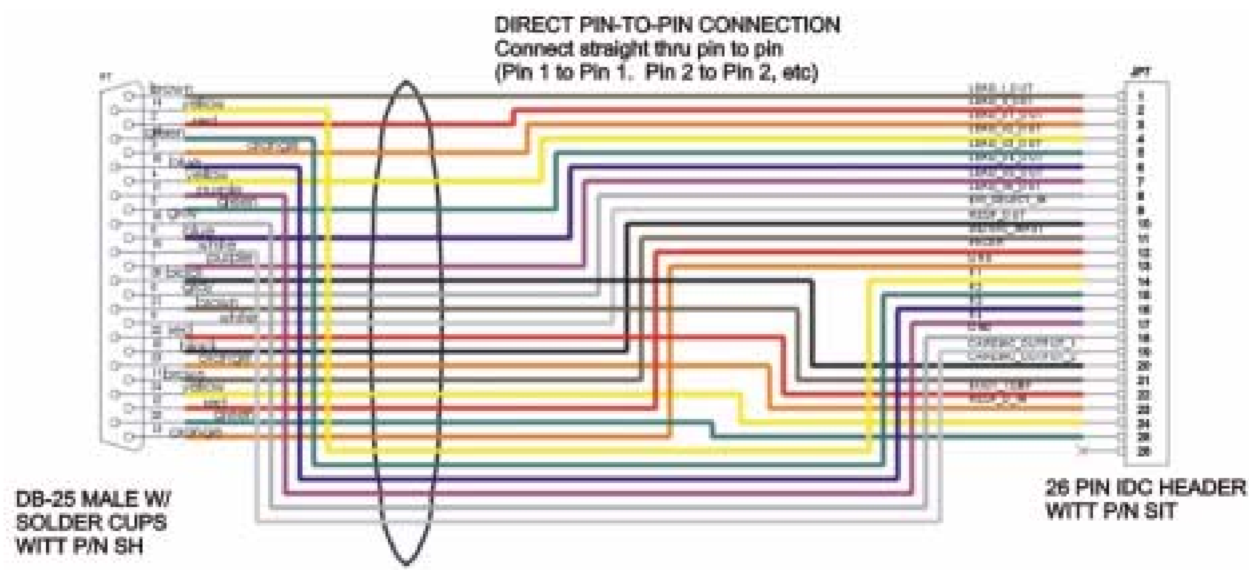
Assembly:

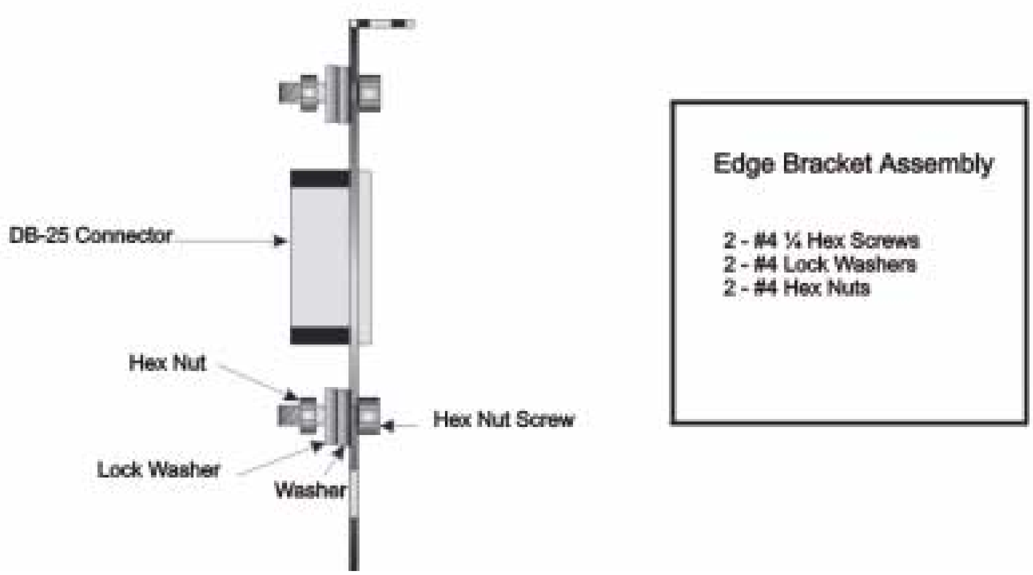
DB25 Male	Color	Signal	26 Pin IDC
1	Brown	Lead 1 Out	1
2	Red	Lead II Out	2
3	Orange	Lead V1 Out	3
4	Yellow	Lead V2 Out	4
5	Green	Lead V3 Out	5
6	Blue	Lead V4 Out	6
7	Purple	Lead V5 Out	7
8	Gray	Lead V6 Out	8
9	White	BW Select In	9
10	Black	Resp Out	10
11	Brown	Digital Input	11
12	Red	Pacer	12
13	Orange	Ground	13
14	Yellow	P1	14
15	Green	P2	15
16	Blue	P3	16
17	Purple	P4	17
18	Gray	Ground	18
19	White	Cardiac Output 1	19
20	Black	Cardiac Output 2	20

DB25 Male	Color	Signal	26 Pin IDC
21	Brown		21
22	Red	Body Temp	22
23	Orange	Resp G In	23
24	Yellow		24
25	Green		25
		NC	26

Assembly Notes:

1. Make cable no less than 20 inches long.
2. Cut back 40 conductor ribbon cable to 25 conductors with conductor one designated as brown.
3. Connect straight through pin to pin.
4. Fasten edge bracket, Witt PN X25, to DB25M connector using hex nut screw, lock washer, washer and hex nut. Use LocTite.





QXII 12 Lead to S4 Signal Cable, Rev D

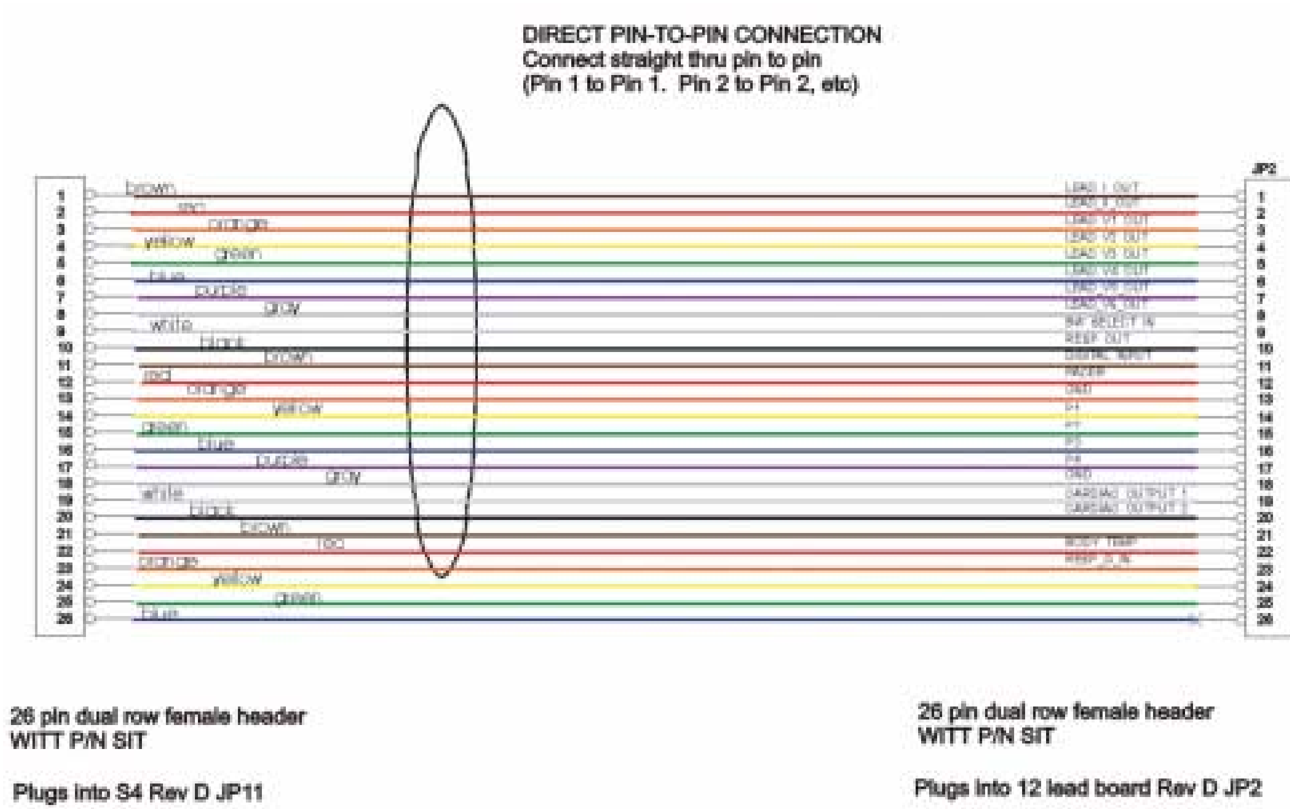
Witt PN: BS4QX	**Label:** Witt 12-Lead Output	**Drawing Ref:** N/A

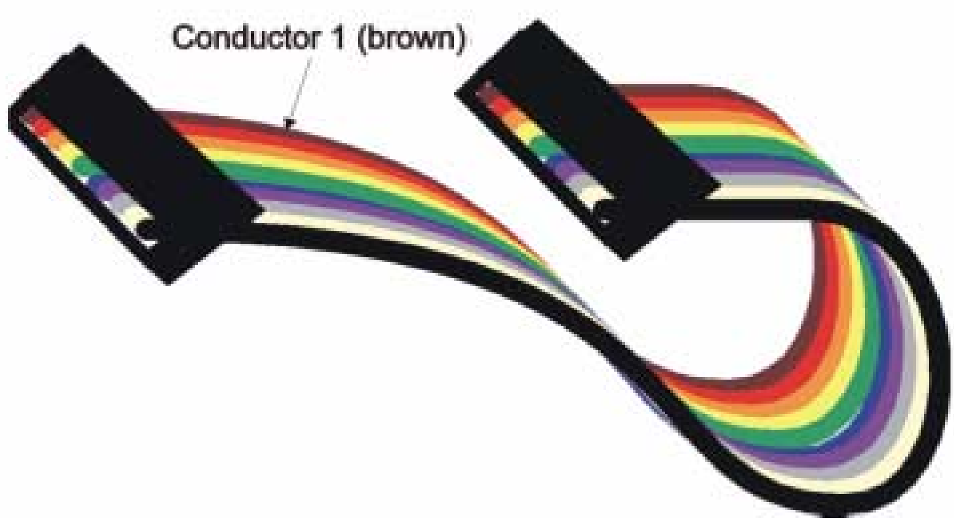
Purpose	Connects ECG/Resp PCB to S4 PCB		
Connector	**Installation**		
26-Pin 2-Row	Connects TO S4 PCB Rev D, JP11		
26-Pin 2-Row	Connects TO 12-Lead ECG/Resp PCB Rev D, JP2		
Witt PN	**Cable Bill of Materials**		
BS4QX	Cable Type: 26-conductor, multi-color ribbon, DIGI-KEY PN R005-100-ND	Cable Length: 20”	Cable Gauge:
SIT	Connector Type: 26-Pin Dual Row,	Connector Quantity: 2	
WAA	Ferrite Bead	Ferrite Bead Quantity: 1	

26 PIN Female IDC	Color	Signal	26 PIN Female IDC
1	Brown	LEAD I	1
2	Red	LEAD II	2
3	Orange	LEAD V1	3
4	Yellow	LEAD V2	4
5	Green	LEAD V3	5
6	Blue	LEAD V4	6
7	Purple	LEAD V5	7
8	Gray	LEAD V6	8
9	White	FILTER BW SELECT	9
10	Black	RESPIRATION	10
11	Brown	DIGITAL INPUT	11
12	Red	PACER	12
13	Orange	GND	13
14	Yellow	P1	14
15	Green	P2	15
16	Blue	P3	16
17	Purple	P4	17
18	Gray	GND	18
19	White	CARDIAC OUTPUT 1	19
20	Black	CARDIAC OUTPUT 2	20
21	Brown	NC	21
22	Red	BODY TEMP	22
23	Orange	RESPIRATION GAIN	23
24	Yellow	NC	24
25	Green	NC	25
26	Blue	NC	26

Assembly:

1. Start with 40 conductor multi-color ribbon cable and strip back to 26 conductor.
2. Orient cable so that the brown conductor is going pin one marked with the triangle, (refer to connector orientation below).





PS4 for RAM Configuration Cable

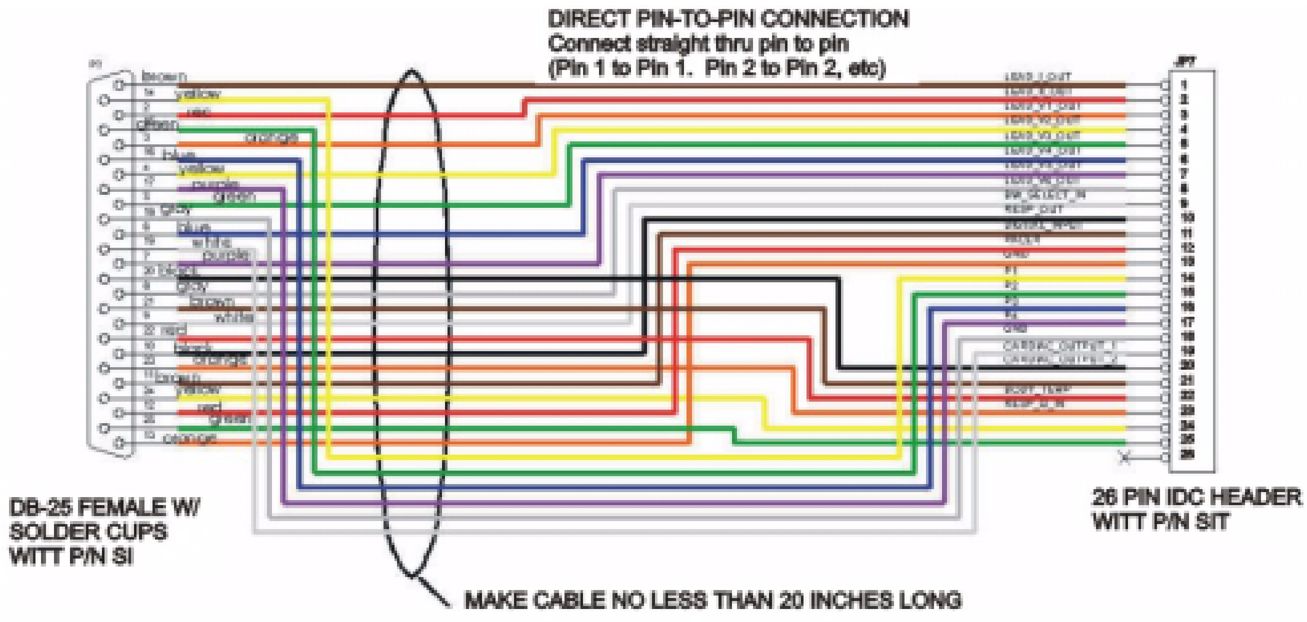
Witt PN: BS4QD	**Label:**	**Drawing Ref:** N/A

Purpose	Connects A/D from S4 PCB to rear of Front End		
Connector	**Installation**		
26-Pin IDC	Connects TO JP11, S4 PCB Rev D		
DB25 Female	Connects TO Rear of Front End A/D connector		
Witt PN	**Cable Bill of Materials**		
BS4QD	Cable Type: 26-conductor, multi-color ribbon, JDR PN RCC40-10040C	Cable Length: Minimum 20”	Cable Gauge:
SIT	Connector Type: 26-Pin IDC Header	Connector Quantity: 1	
SI	Connector Type: DB25 Female with Solder	Connector Quantity: 1	
X25	Witt Edge Bracket	Bracket Quantity: 1	
None	Heat Shrink, 1/16” ∅, 1/4” long	Heat Shrink Quantity: 25	

DB25 Male	Color	Signal	26 PIN IDC
1	Brown	LEAD I OUT	1
2	Red	LEAD II OUT	2
3	Orange	LEAD V1 OUT	3
4	Yellow	LEAD V2 OUT	4
5	Green	LEAD V3 OUT	5
6	Blue	LEAD V4 OUT	6
7	Purple	LEAD V5 OUT	7
8	Gray	LEAD V6 OUT	8
9	White	BW SELECT IN	9
10	Black	RESP OUT	10
11	Brown	DIGITAL INPUT	11
12	Red	PACER	12
13	Orange	GND	13
14	Yellow	P1	14
15	Green	P2	15
16	Blue	P3	16
17	Purple	P4	17
18	Gray	GND	18
19	White	CARDIAC OUTPUT 1	19
20	Black	CARDIAC OUTPUT 2	20
21	Brown		21
22	Red	BODY TEMP	22
23	Orange	RESP G IN	23
24	Yellow		24
25	Green		25
		NC	26

Assembly:

1. Make cable no less than 20 inches long.
2. Cut back 40 conductor ribbon cable to 25 conductors with conductor one designated as brown.
3. Connect straight through pin to pin.
4. Fasten edge bracket, Witt PN X25, to DB25F connector using hex nut screw, lock washer, washer and hex nut.



CO/Temp/Press S4DB Cable

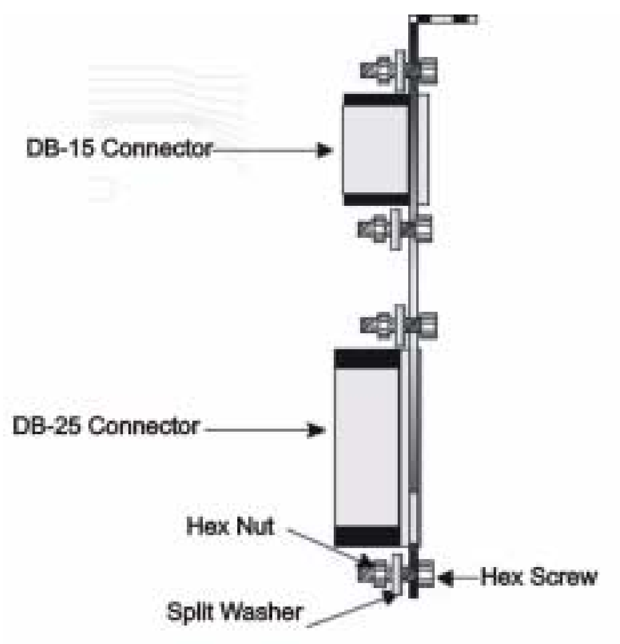
Witt PN: BACT	**Label:**	**Drawing Ref:** N/A

Purpose	Connects Pressure PCB to Front End and PCM
Connector	**Installation**
20-Pin IDC F	Connects TO JP1 on Pressure PCB
DB15 Male	Connects TO rear of Front End or PCM
DB25 Female	Connects TO back panel of Front End or PCM
Witt PN	**Cable Bill of Materials**

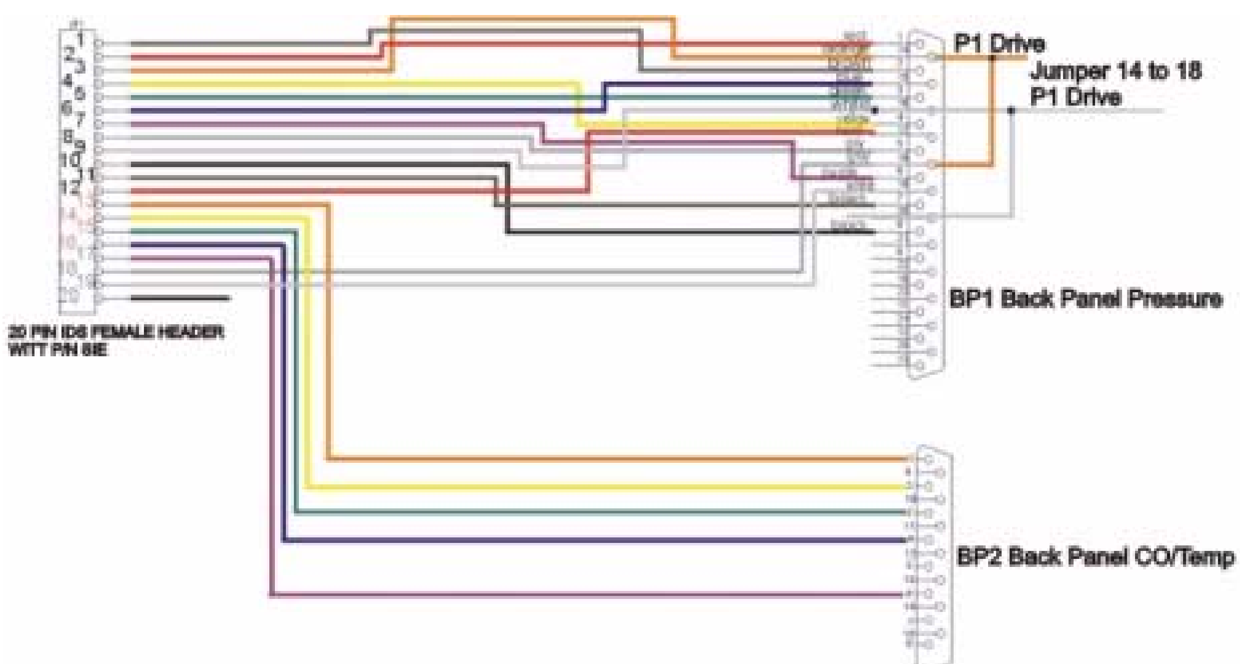
BACT	Cable Type: 20-conductor ribbon	Cable Length: 7”	Cable Gauge: 28 AWG

SIE	Connector Type: 20-Pin IDC Female	Connector Quantity: 1
SIG	Connector Type: DB15 Male Plastic	Connector Quantity: 1
SIF	Connector Type: DB25 Female Plastic	Connector Quantity: 1
XC	Backplate DB15 + DB25	Backplate Quantity:1
XNUT	Hex Screw with nut & split washer	Hex Screw Quantity: 4
None	Heat Shrink, 1/2” ∅, 1” long	Heat Shrink Quantity: 1

Assembly:



20 pin IDC F	Color	DB25F	DB15M	Signal
1	Brown	2		P1_+
2	Red	1		P1_-
3	Orange	14		P1_DRIVE
4	Yellow	4		P2_+
5	Green	3		P2_-
6	Blue	15		RTN
7	Purple	6		P3_+
8	Gray	5		P3_-
9	White	16		P2_DRIVE
10	Black	8		P4_+
11	Brown	7		P4_-
12	Red	17		RTN
13	Orange		1	CO_IN_2
14	Yellow		2	C0_IN_3
15	Green		3	CO_IN_1
16	Blue		4	BATH_IN_2
17	Purple		6	BATH_IN_1
18	Gray	19		RTN
19	White	21		RTN
20	Black	fold wire from pin 20 back at		RTN
		end and captivate in heat shrink.		
jumper DB25 pin 14 to DB25 pin 18				
jumper DB25 pin 16 to DB25 pin 20				



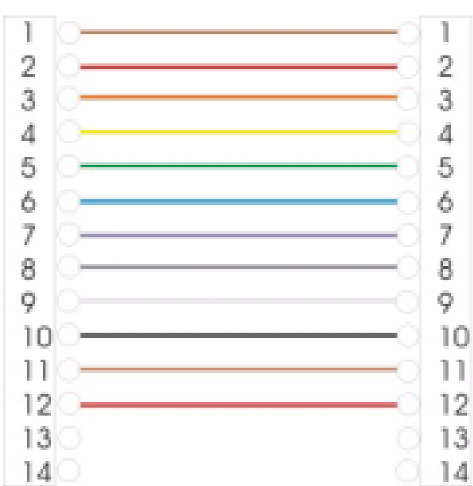
12 Lead ECG JP1 to Respiration Daughter PCB Cable

Witt PN: BDB	**Label:**	**Drawing Ref:** N/A

Purpose	Connects ECG PCB to Front End and PCM		
Connector	**Installation**		
14-Pin IDC	Connects TO JP1 on ECG PCB		
14-Pin IDC	Connects TO 14-pin connector at rear of CO/Temp/Resp PCB		
Witt PN	**Cable Bill of Materials**		
BDB	Cable Type: 20-conductor ribbon	Cable Length: 3 3/8”	Cable Gauge: 28 AWG
SSR	Connector Type: 14-Pin IDC Keyed	Connector Quantity: 2	

Assembly

14 pin IDC	Color		14 Pin IDC
1	Brown	Body Temp Out	1
2	Red	NC	2
3	Orange	Ground	3
4	Yellow	P1 Out	4
5	Green	P2 Out	5
6	Blue	P3 Out	6
7	Purple	P4 Out	7
8	Gray	Ground	8
9	White	CO DIST OUT	9
10	Black	CO BATH OUT	10
11	Brown	+12 V	11
12	Red	Ground	12
13	N/A	NC	13
14	N/A	NC	14



Orient Pin 1 (conductor 1) to triangular marking on the connector.

Note: Strip 20 conductor back to 14 conductors.

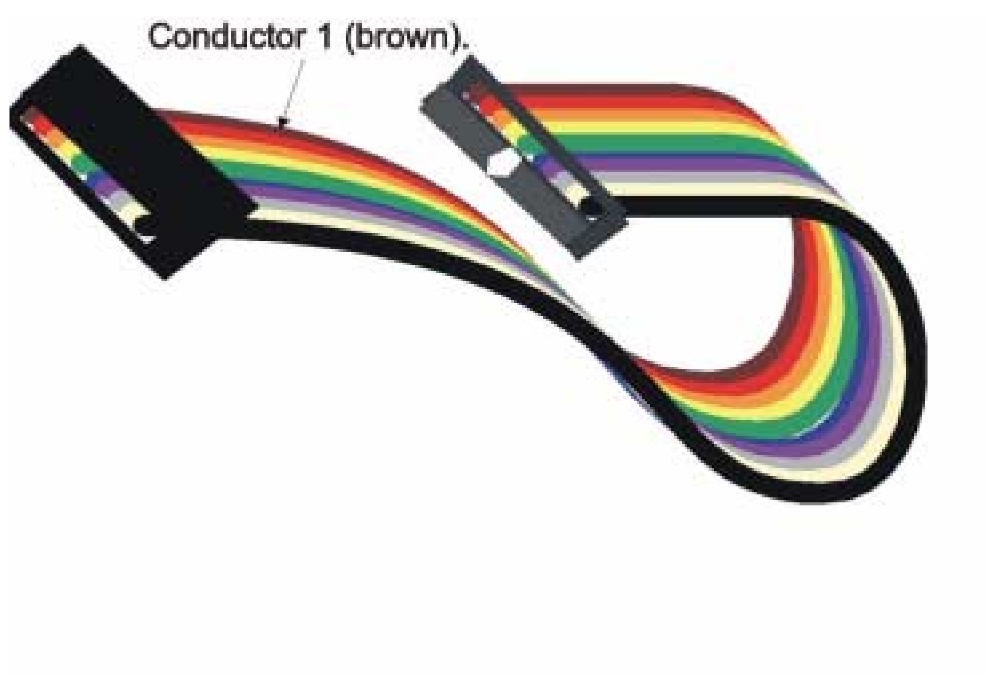
ISO 10 Pin ISO Cable

Witt PN: BISO-10	**Label:**	**Drawing Ref:** N/A

Purpose	Connects ECG/Resp PCB to RAM Pressure PCB		
Connector	**Installation**		
10-Pin IDC	Connects TO JP1 on ECG/Resp PCB		
10-Pin IDC	Connects TO J101 on RAM Pressure PCB		
Witt PN	**Cable Bill of Materials**		
BISO-10	Cable Type: 20-conductor ribbon, cut back to 10-conductor	Cable Length: 14”	Cable Gauge: 28 AWG
SSS	Connector Type: 10-Pin IDC Keyed	Connector Quantity: 2	

Assembly:

Remove conductors 11 through 20. Cable/pin orientation should be conductor 1 (brown) aligns with pin one (indicated by the arrow on the connector).



Assembly for 10 PIN ISO cable:

Color	Pin	Description
Brown	1	Body Temp
Red	2	NC
Orange	3	Ground, Pressure
Yellow	4	P1
Green	5	P2
Blue	6	P3
Violet	7	P4
Gray	8	Ground, CO
White	9	CO 1
Black	10	CO 2

12 ID (14 Pin) Adapter Cable to RAM Pressure Board

Witt PN: BQXQB	**Label:**	**Drawing Ref:** N/A

Purpose	Connects ECG/Resp PCB to RAM Pressure PCB (for modified 12-lead PCBs Rev C & D with 14-pin header at JP1)		
Connector	**Installation**		
14-Pin IDC	Connects TO JP1 on ECG/Resp PCB		
10-Pin IDC	Connects TO J101 on RAM Pressure PCB		
Witt PN	**Cable Bill of Materials**		
BQXQB	Cable Type: 10-conductor ribbon	Cable Length: 12”	Cable Gauge: 28 AWG
SSS	Connector Type: 10-Pin IDC Keyed	Connector Quantity: 1	
SSR	Connector Type: 14-Pin IDC Keyed	Connector Quantity: 1	

Assembly

Color	Pin	Description
Brown	1	Body Temp
Red	2	NC
Orange	3	Ground, Pressure
Yellow	4	P1
Green	5	P2
Blue	6	P3
Violet	7	P4
Gray	8	Ground, CO
White	9	CO 1
Black	10	CO 2
Brown	11	+12
Red	12	Ground
	13 removed	
	14 removed	

ISO 14 Pin IOS Cable

Witt PN: BISO-14	**Label:**	**Drawing Ref:** N/A

<table>
<tr><td>Purpose</td><td colspan="3">Connects RAM ECG/Resp PCB to RAM Pressure PCB</td></tr>
<tr><td></td><td colspan="3"></td></tr>
<tr><td>Connector</td><td colspan="3">Installation</td></tr>
<tr><td>14-Pin IDC</td><td colspan="3">Connects TO RAM ECG/Resp PCB</td></tr>
<tr><td>14-Pin IDC</td><td colspan="3">Connects TO RAM Pressure PCB</td></tr>
<tr><td></td><td colspan="3"></td></tr>
<tr><td>Witt PN</td><td colspan="3">Cable Bill of Materials</td></tr>
<tr><td>BISO-14</td><td>Cable Type: Purchased cable that comes with RAM 12-Lead PCB</td><td>Cable Length:</td><td>Cable Gauge:</td></tr>
<tr><td></td><td colspan="3"></td></tr>
<tr><td>SSR</td><td>Connector Type: 14-Pin IDC Keyed</td><td colspan="2">Connector Quantity: 2</td></tr>
</table>

S4 Analog to Digital 12 Lead Cable

Witt PN: BADS4	**Label**: Witt A/D 12-Lead Cable	**Drawing Ref:** N/A

Purpose	Connects S4 digitizing NIBP/SpO2 PCB to Pressure PCB		
Connector	**Installation**		
DB25 Male	Connects TO S4 digitizing NIBP/SpO2 PCB (PSD016BU). Label: Digital		
DB25 Female	Connects TO Pressure PCB. Label: Analog		
Heat Shrink	Heat shrink to be used at both DB25 ends prior to hood connection.		
Witt PN	**Cable Bill of Materials**		
BADS4	Cable Type: 25-conductor, shielded	Cable Length: 12.5”	Cable Gauge: 24 AWG
SI	Connector Type: DB25 Female	Connector Quantity: 1	
SH	Connector Type: DB25 Male	Connector Quantity: 1	
TC	Connector Type: Metal Hoods	Connector Quantity: 2	
ZSC	Thumbscrew	Thumbscrew Quantity: 4	
ZRB	Grommet (as needed)	Grommet Quantity: 2	
None	Heat Shrink, 3/8” ∅, 1” long	Heat Shrink Quantity: 2	

DB25M/F	Color
1	Red
2	Green
3	Blue
4	Orange
5	Orange/Red
6	Blue/Red
7	White/Black
8	White/Red
9	Orange/Green
10	Red/Black
11	Black/White
12	Green/Black/White
13	Red/Green
14	Black
15	White
16	Green/White
17	Blue/Black
18	Red/White
19	Red/White/Black
20	Blue/White
21	Black/White/Red
22	Black/Red
23	White/Red/Black
24	Green/Black
25	Orange/Black
Drain/shield***	Bare Wire***

*******Shield wire is to be soldered at both ends to the shoulder of the connectors.

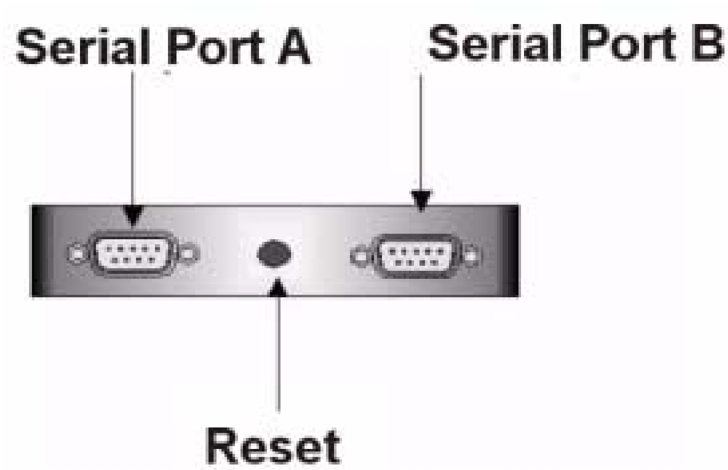
S4 Front End Internal Serial Cable

Witt PN: BFES4	**Label**:	**Drawing Ref:** N/A

Purpose	Connects Front End slot plate to S4 Digitizing NIBP/SpO2 PCB		
Connector	**Installation**		
DB9 Female	Connects TO slot plate on rear of Front End (Serial A)		
10-Pin IDC F	Connects TO Serial Port A, JP7 on S4 Digitizing NIBP/SpO2 PCB		
DB9 Female	Connects TO slot plate on rear of Front End (Serial B)		
10-Pin IDC F	Connects TO Serial Port B, JP8 on S4 Digitizing NIBP/SpO2 PCB		
Witt PN	**Cable Bill of Materials**		
BFES4	Cable Type: 10-conductor ribbon, stripped back to 3 conductors (mark to show conductor used for pin 1)	Cable Length: 16”	Cable Gauge: 28 AWG
SB	Connector Type: DB9 Female	Connector Quantity: 2	
SSS	Connector Type: 10-Pin IDC Female	Connector Quantity: 2	
None	Heat Shrink, 1/16” ∅, 1/4” long	Heat Shrink Quantity: 3	

Assembly:

DB9 Female	10 pin IDC Female*
3	1
2	2
5	3
NC	4
NC	5
NC	6
NC	7
NC	8
NC	9
NC	10



1. Note 1: Cable must enter connector from opposite side of pin 1 orientation triangle.
2. Note 2: Apply heat shrink to each individual conductor, (a total of 3) on the DB9 end of the cable. This application is intended to increase the strength of the DB9 connection.

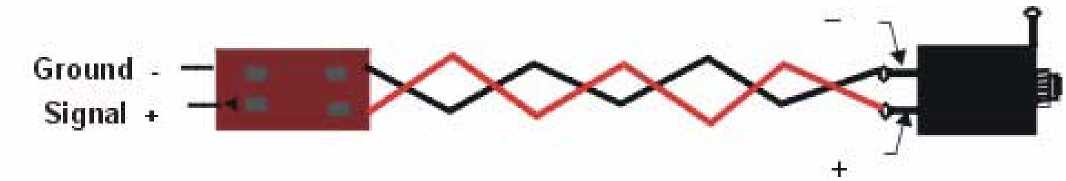
S4 Auxiliary Output Cable Set for Front Ends

Witt PN: BX	**Label**:	**Drawing Ref:** N/A

Purpose	Connects Front End to S4 PCB or 12-Lead Filter PCB as specified by latest S4 drawing		
Connector	**Installation**		
2 Circuit Terminal Housing	Connects TO rear of Front End case as specified by latest S4 configuration drawing		
Mini Jack	Connects TO S4 PCB or 12-Lead Filter PCB as specified by latest revision of S4 drawing		
Witt PN	**Cable Bill of Materials**		
BX1	Cable Type: 2-conductor twisted pair	Cable Length: 12” (3) Cable Length: 12” (1-BP Out) Cable Length: 15” (1)	Cable Gauge: 26 AWG Quantity: 5 black conductors & 5 assorted colors
SCT	Connector Type: 2 Circuit Terminal Housing	Connector Quantity: 5	
SVAA	Connector Type: Mini Jack	Connector Quantity: 5	
SIS	Crimp Pins	Pin Quantity: 10	
WCA	Resistor, 2.05 KΩ 2%	Resistor Quantity: 1	
WCB	Capacitor, C1, 0.001µf	Capacitor Quantity: 1	
None	Heat Shrink, 1/16” ∅, 1/2” long	Heat Shrink Quantity: 5	

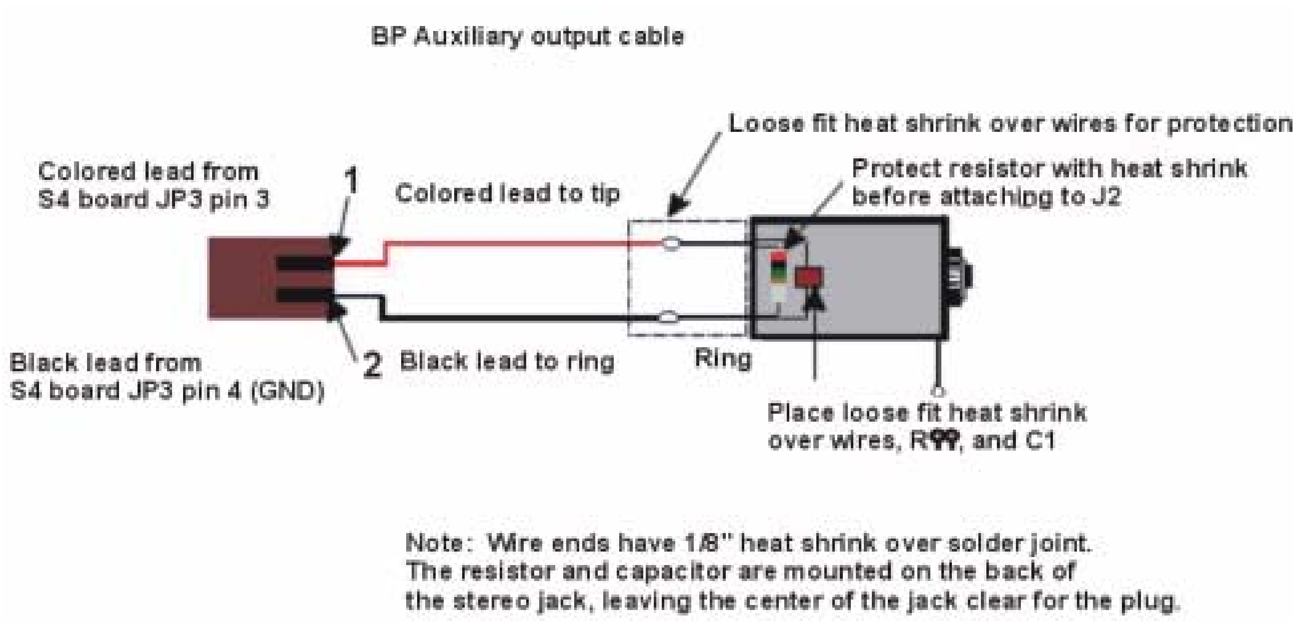
Assembly:

Ground	Black	-
Signal	Color	+



Assembly of BP Out aux cable:

Ground	Black	-
Signal	Color	+



S4 Auxiliary Output Cable Set for PCM

Witt PN: BXP	**Label**:	**Drawing Ref:** N/A

Purpose	Connects Front End to S4 PCB or 12-Lead Filter PCB as specified by latest S4 drawing		
Connector	**Installation**		
2 Circuit Terminal Housing	Connects TO rear of Front End case as specified by latest S4 configuration drawing		
Mini Jack	Connects TO S4 PCB or 12-Lead Filter PCB as specified by latest revision of S4 drawing		
Witt PN	**Cable Bill of Materials**		
BXP	Cable Type: 2-conductor twisted pair	Cable Length: 32” (1) Cable Length: 15” (2)	Cable Gauge: 26 AWG Quantity: 3 black conductors & 3 assorted colors
SCT	Connector Type: 2 Circuit Terminal Housing	Connector Quantity: 3	
SVAA	Connector Type: Mini Jack	Connector Quantity: 3	
SIS	Crimp Pins	Pin Quantity: 6	
None	Heat Shrink, 1/16” ∅, 1/2” long	Heat Shrink Quantity: 3	

Assembly:

Ground	Black	-
Signal	Color	+

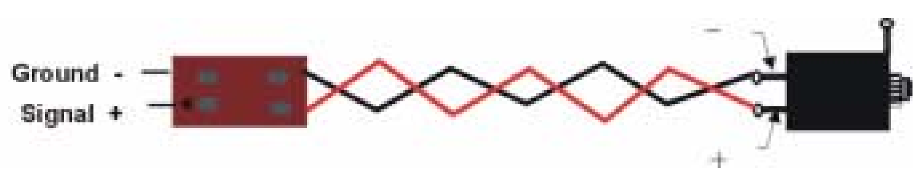
S4 Auxiliary Output Cable Set for Advanced PCM

Witt PN: BXAP	**Label**:	**Drawing Ref:** N/A

Purpose	Connects Front End to S4 PCB or 12-Lead Filter PCB as specified by latest S4 drawing		
Connector	**Installation**		
2 Circuit Terminal Housing	Connects TO rear of Front End case as specified by latest S4 configuration drawing		
Mini Jack	Connects TO S4 PCB or 12-Lead Filter PCB as specified by latest revision of S4 drawing		
Witt PN	**Cable Bill of Materials**		
BX1	Cable Type: 2-conductor twisted pair	Cable Length: 32” (1) Cable Length: 15” (1-BP Out) Cable Length: 15” (1)	Cable Gauge: 26 AWG Quantity: 3 black conductors & 3 assorted colors
SCT	Connector Type: 2 Circuit Terminal Housing	Connector Quantity: 3	
SVAA	Connector Type: Mini Jack	Connector Quantity: 3	
SIS	Crimp Pins	Pin Quantity: 6	
WCA	Resistor, 2.05 KΩ 2%	Resistor Quantity: 1	
WCB	Capacitor, C1, 0.001µf	Capacitor Quantity: 1	
None	Heat Shrink: as per drawing below		

Assembly:

Ground	Black	-
Signal	Color	+



Assembly of BP Out aux cable:

Ground	Black	-
Signal	Color	+

S4 Reset Cable

Witt PN: BHR4	**Label**:	**Drawing Ref:** N/A

Purpose	Connects Front End Reset Button to S4 PCB		
Connector	**Installation**		
2 Circuit Terminal Housing	Connects TO JP5 of S4 PCB		
Heat Shrink	NOTE: Push button assembly is sensitive to heat and must be protected from high temperatures during heat shrink procedure		
Witt PN	**Cable Bill of Materials**		
	Cable Type: 2-conductor twisted pair	Cable Length: 10” (3)	Cable Gauge: 24 AWG
SCT	Connector Type: 2 Circuit Terminal Housing	Connector Quantity: 1	
WFIG	Push Button Switch	Push Button Switch Quantity: 1	
SIS	Crimp Pins	Pin Quantity: 2	
None	Heat Shrink, 3/8” ∅, 1” long	Heat Shrink Quantity: 1	

S4 Internal RS232 Cable

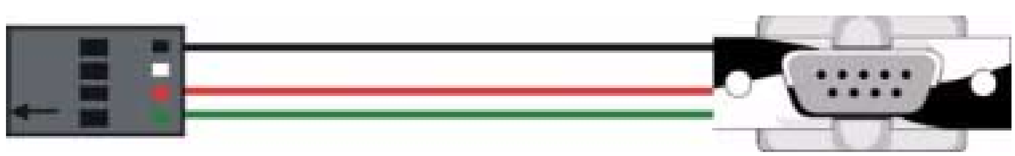
Witt PN: BRSS4	**Label**: Witt S4 Internal RS232	**Drawing Ref:** N/A

Purpose	Connects rear of Host CPU to G4 PCB		
Connector	**Installation**		
DB9 Female	Connects TO rear of Host CPU		
4-Pin Housing	Connects TO G4 PCB JP2 bottom row pins 2, 3, 5, header positions 2 - 5		
Witt PN	**Cable Bill of Materials**		
	Cable Type: 4-conductor	Cable Length: 18”	Cable Gauge: 24 AWG
SB	Connector Type: DB9 Female	Connector Quantity: 1	
SIP	Connector Type: 4-Pin Internal Housing	Connector Quantity: 1	
SIS	Crimp Pin, Internal Speaker Type	Crimp Pin Quantity: 3	
None	Heat Shrink, 1/4” ∅, 1” long	Heat Shrink Quantity: 2	

Assembly:

DB9 Female	Color	4 pin housing
2	Green	1
3	Red	2
NC		3
5	Black	4
Shoulder	Drain	NA

NOTE: Solder shield wire to shoulder of 9 pin connector. Captivate unused conductors in ¼” heat shrink



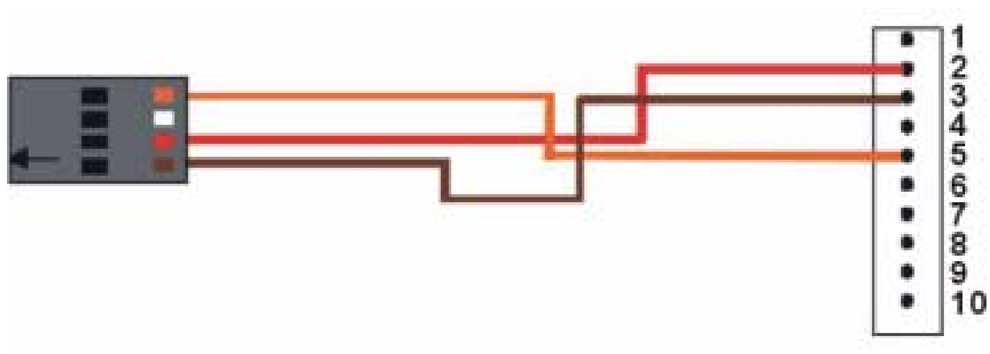
S4 Internal RS232 Cable for Demos

Witt PN:	Label:	Drawing Ref: N/A

Purpose	Connects COM2 output to G4 PCB JP2 bottom row pins 2, 3, 5, header positions 2 - 5		
Connector	**Installation**		
10-Pin IDC	Connects TO COM2		
4-Pin Housing	Connects TO G4 PCB JP2 bottom row pins 2, 3, 5, header positions 2 - 5		
Witt PN	**Cable Bill of Materials**		
	Cable Type: 3-conductor	Cable Length: 32”	Cable Gauge: 24 AWG
SSS	Connector Type: 10-Pin IDC Female	Connector Quantity: 1	
SIP	Connector Type: 4-Pin Internal Housing	Connector Quantity: 1	
SIS	Crimp Pin, Internal Speaker Type	Crimp Pin Quantity: 3	

Assembly:

Color	4 pin housing	G4	10 PIN IDC	COM2
	NC		1	
Red	2	RX	2	TX
Brown	1	TX	3	RX
	NC		4	
Orange	4	Ground	5	Ground
	NC		6	
	NC		7	
	NC		8	
	NC		9	
	NC		10	

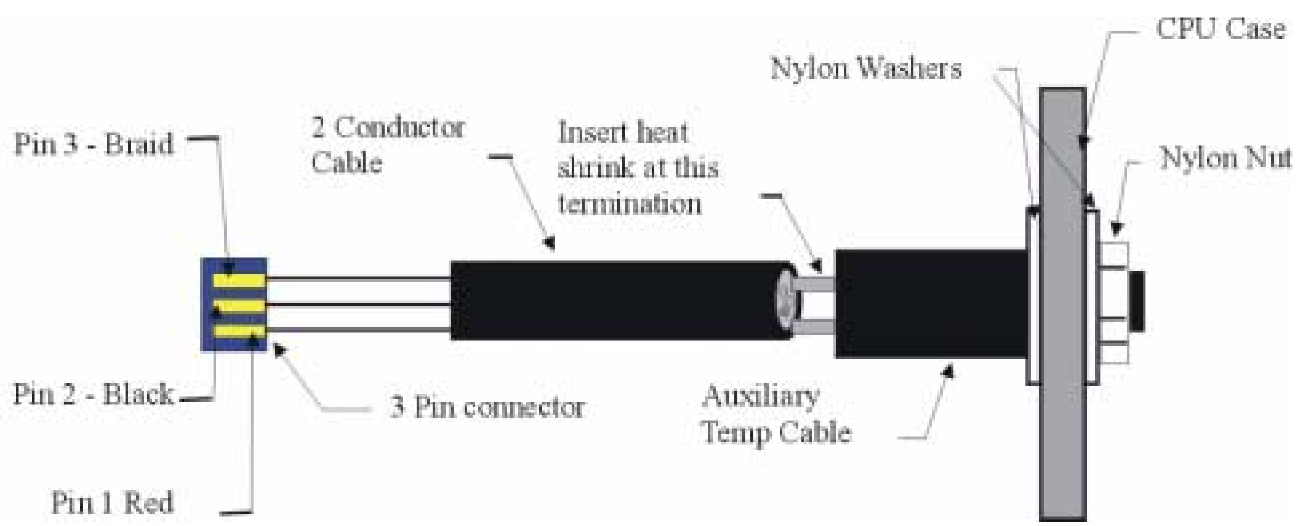


S4 Auxiliary Temperature Cable

Witt PN: BAT	Label:	Drawing Ref: N/A

Purpose	Connects Auxiliary Temp output to Pressure/CO PCB		
Connector	**Installation**		
Aux Temp	Connects TO Front End CPU case as per drawing		
3-Pin Conn	Connects TO J102 of Pressure/CO POCB **after HYPOT TEST**		
Witt PN	**Cable Bill of Materials**		
	Cable Type: 2-conductor shield, PVC jacket	Cable Length: 12.5”	Cable Gauge: 24 AWG
SAUX	Connector Type: Auxiliary Temperature Connector	Connector Quantity: 1	
SBL	Connector Type: 3-Pin Connector	Connector Quantity: 1	
ZAUX	Washer, Auxiliary Temp, Nylon	Washer Quantity: 2	
ZAT	Nut, Nylon	Nut Quantity: 1	
None	Heat Shrink, 1/8” ∅, 1” long	Heat Shrink Quantity: 1	

Assembly



Aux. Temp Connector	Color	3 pin IDC Connector
1 Tip	Red	1
2 Ring	Black	2
3 ISO Ground/No connection	Braid	3

Testing: 4 KV HYPOT

Required Conditions: This test is to be conducted in the early stages of assembly. The phone jack assembly is to be installed to the case as per the S4 Auxiliary Temperature Cable drawing, **without** the 4 pin Female lock attached to the Pressure Board.

Procedure:

1. Install the Auxiliary Temperature Input assembly as per the drawing. DO NOT connect the 4 pin female lock housing to any board.

2. Insert the S4 4KV Aux. Temp Test Cable into the Auxiliary Temperature connector of the Front End.

3. Connect the Black lead of the Hi Pot test equipment to an unpainted surface of the chassis.

4. Connect the Red lead of the Hi Pot test equipment to the exposed wire on the loop end of the test cable.

5. Slowly increase the voltage to 4000 V for only 1 second. A normal hissing sound will occur as the voltage is increased.

6. Breakdown or arcing is revealed by the “Breakdown” light in the Hi Pot equipment illuminating, or by visual inspection of the test components.

7. If no arcing occurs, the auxiliary temperature should be labeled with an initialed GREEN DOT sticker and assembly continued.

8. If arcing does occur the Auxiliary Temperature assembly is to be replaced and testing repeated with the new component. The suspect part is to be filed as a Floor Failure.

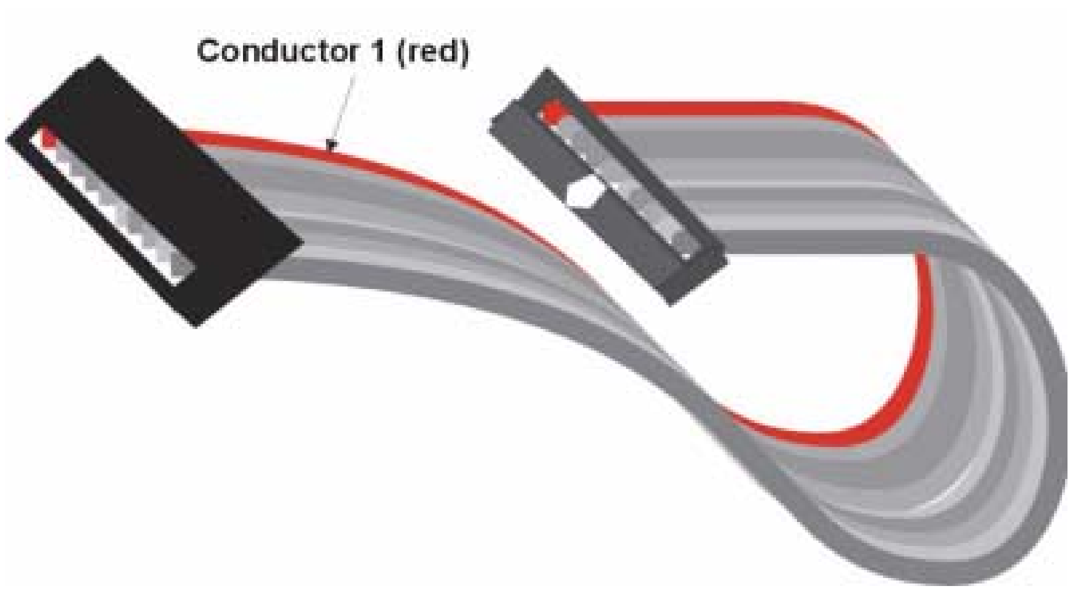
14 Pin ISO SP02 Cable

Witt PN: BOG	**Label**:	**Drawing Ref:** N/A

Purpose	Connects SpO2 PCB to S4 PCB		
Connector	**Installation**		
14-Pin IDC Keyed	Connects TO JP5 on SpO2 PCB		
14-Pin IDC Keyed	Connects TO JP4 on S4 PCB		
Witt PN	**Cable Bill of Materials**		
	Cable Type: 20-conductor ribbon	Cable Length: 6.75”	Cable Gauge: 28 AWG
SSR	Connector Type: 14-Pin IDC Keyed	Connector Quantity: 2	
None	Heat Shrink, 1/16” ∅, 1/4” long	Heat Shrink Quantity: 8	

Assembly:

Remove conductors 15 through 20. Cable/pin orientation should be conductor 1 (red) aligns with pin one (indicated by the arrow on the connector).



S4 Internal SPO2 Sensor Cable

Witt PN: BSS4	**Label**:	**Drawing Ref:** N/A

Purpose	Connects SpO2 Sensor output to SpO2 PCB		
Connector	**Installation**		
DB9 Female	Connects TO Front End case		
10-Pin IDC Female	Connects TO SpO2 PCB		
Witt PN	**Cable Bill of Materials**		
	Cable Type: 10-conductor ribbon	Cable Length: 16”	Cable Gauge: 28 AWG
SB	Connector Type: DB9 Female	Connector Quantity: 1	
SST	Connector Type: 10-Pin IDC Female	Connector Quantity: 1	
None	Heat Shrink, 1/16” ∅, 1/4” long	Heat Shrink Quantity: 8	

Assembly:

10 pin IDC Female		**DB9 Female**	
Brown	1	5	Anode (Detector)
Red	2	NC	
Orange	3	7	Ground
Yellow	4	9	Cathode (detector shield)
Green	5	6	Ground (RCAL ground)
Blue	6	1	RCAL
Violet	7	3	LED (-)
Gray	8	NC	
White	9	2	LED(+)
Black	10	7	Ground

Apply heat shrink over all soldered connections.

S4 SPO2 Sensor Cable, Shielded, Rev D/E

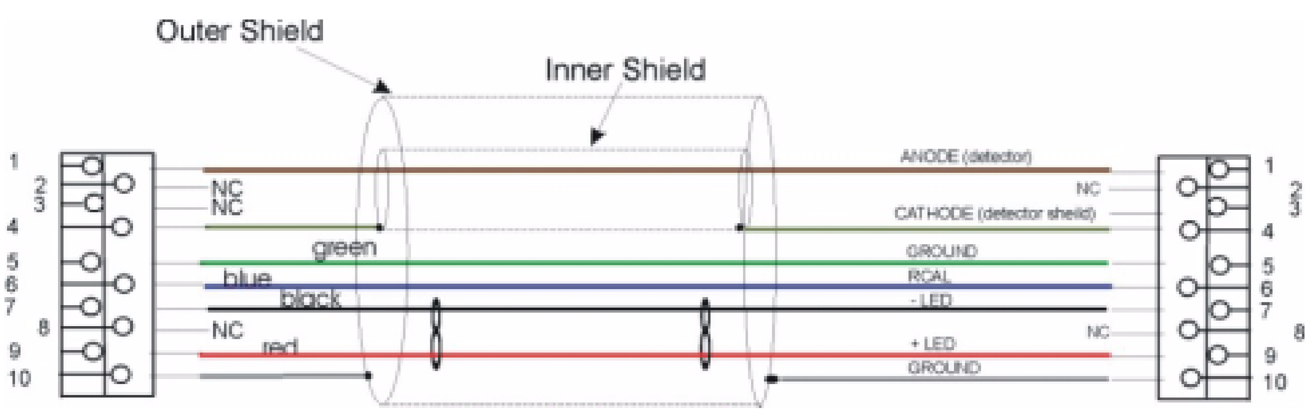
Witt PN: BSS4D	**Label**:	**Drawing Ref:** N/A

Purpose	Connects SpO2 PCB to S4 PCB Rev D/E		
Connector	**Installation**		
10-Pin IDC F	Connects TO JP12 S4 PCB Rev D		
10-Pin IDC F	Connects TO JP1 SpO2 PCB		
Witt PN	**Cable Bill of Materials**		
	Cable Type:	Cable Length: 6”	Cable Gauge: AWG
SSS	Connector Type: 10-Pin IDC Female	Connector Quantity: 2	

Assembly:

Assembly Note: Shielding and conductor outer jackets are to be stripped only to within ½” of the connector. Excess beyond this length interferes with EMC considerations and SPO2 readings.

10 pin IDC Female		**10 pin IDC Female**	
Brown	1	1	Anode (Detector)
Red	2	2	NC
Orange	3	3	NC
Yellow	4	4	Cathode (detector shield)
Green	5	5	Ground
Blue	6	6	RCAL
Violet	7	7	- LED
Gray	8	8	NC
White	9	9	+ LED
Black	10	10	Ground



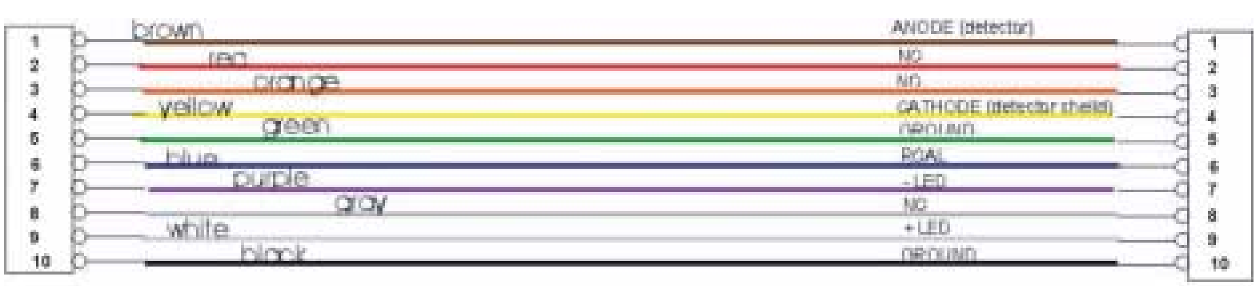
S4 SPO2 Sensor Cable, Rev D

Witt PN: BSS4D	**Label**:	**Drawing Ref:** N/A

Purpose	Connects SpO2 PCB to S4 PCB Rev D		
Connector	**Installation**		
10-Pin IDC Female	Connects TO JP12 S4 PCB Rev D		
10-Pin IDC Female	Connects TO JP1 SpO2 PCB		
Witt PN	**Cable Bill of Materials**		
	Cable Type: 10-conductor multicolor ribbon	Cable Length: 3”	Cable Gauge: 28 AWG
SSS	Connector Type: 10-Pin IDC Female	Connector Quantity: 2	

Assembly:

10 pin IDC Female		**10 pin IDC Female**	
Brown	1	1	Anode (Detector)
Red	2	2	NC
Orange	3	3	NC
Yellow	4	4	Cathode (detector shield)
Green	5	5	Ground
Blue	6	6	RCAL
Violet	7	7	- LED
Gray	8	8	NC
White	9	9	+ LED
Black	10	10	Ground



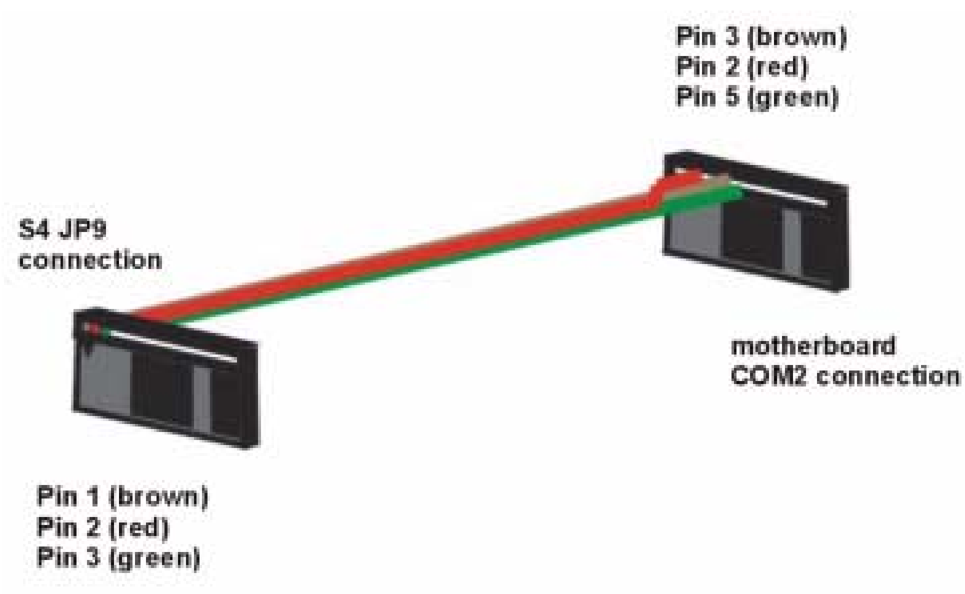
PCM Serial Data Transfer Cable

Witt PN: BACX	**Label**:	**Drawing Ref:** N/A

Purpose	Connects COM2 on Front End motherboard to S4 PCB Rev D		
Connector	**Installation**		
10-Pin IDC Female	Connects TO JP9 S4 PCB Rev D		
10-Pin IDC Female	Connects TO COM2 on Front End motherboard (Mustang Ultra R548, Pentium PCI/ISA)		
Witt PN	**Cable Bill of Materials**		
	Cable Type: 3-conductor multicolor ribbon	Cable Length: 36”	Cable Gauge: 28 AWG
SSS	Connector Type: 10-Pin IDC Female	Connector Quantity: 2	

Assembly:

JP9 (Serial A)	COM2	USE
1	3	Transmit
2	2	Receive
3	5	Ground



S4 A/D 7-Lead PCM Cable

Witt PN: BADFE	**Label**: S4 A/D PCM	**Drawing Ref:** N/A

Purpose	Connects NIBP/SpO2 PCB to ECG PCB		
Connector	**Installation**		
DB25 Female	Connects TO ECG PCB		
DB25 Male	Connects TO S4 A/D NIBP/SpO2 PCB		
Witt PN	**Cable Bill of Materials**		
	Cable Type: 25-conductor	Cable Length: 12”	Cable Gauge: 24 AWG
SI	Connector Type: DB25 Female	Connector Quantity: 1	
SH	Connector Type: DB25 Male	Connector Quantity: 1	
None	Heat Shrink, 1/2” ∅, 1” long	Heat Shrink Quantity: 2	

Assembly:

1. Drain to shoulder at both ends.
2. Unused conductors are captivated in ½” heat shrink.

DB25 F	Color	DB25 M	
1	Red	1	
2	Green	2	
NA	Blue	NA	**Unused Conductors**
NA	Orange	NA	Blue
NA	Orange/Red	NA	Orange
NA	Blue/Red	NA	Orange/Red
7	White/Black	3	Blue/Red
NA	White/Red	NA	White/Red
9	Orange/Green	23	Black/Red
10	Red/Black	24	White/Black/Red
11	Black/White	25	Orange/Black
12	Green/Black/White	10	
13	Red/Green	13	
14	Black	14	
15	White	15	
16	Green/White	16	
17	Blue/Black	17	
18	Red/White	18	
19	Red/White/Black	19	
20	Blue/White	20	
21	Black/White/Red	21	
NA	Black/Red	NA	
NA	White/Red/Black	NA	
24	Green/Black	11	
NA	Orange/Black	NA	

RS232 PCM Cable

Witt PN: BGDS4	**Label**: S4 RS232 PCM	**Drawing Ref:** N/A

Purpose	Connects Serial Port A to COM2 output		
Connector	**Installation**		
DB9 Female	Connects TO COM2		
DB9 Male	Connects TO Serial Port A		
Witt PN	**Cable Bill of Materials**		
	Cable Type: 8-conductor	Cable Length: 8”	Cable Gauge: 24 AWG
SB	Connector Type: DB9 Female	Connector Quantity: 1	
SC	Connector Type: DB9 Male	Connector Quantity: 1	
TA	Connector Type: DB9 Metal Hood	Connector Quantity: 2	
None	Heat Shrink, 1/4” ∅, 1” long	Heat Shrink Quantity: 4	

Assembly:

DB9 F	Color	DB9 M
1	Brown	1
2	Red	2
3	Orange	3
4	Yellow	4
5	Green	5
6	Blue	6
7	Drain	7
8	Black	8
9	White	9

NIBP Extension for APCM ATX Platform

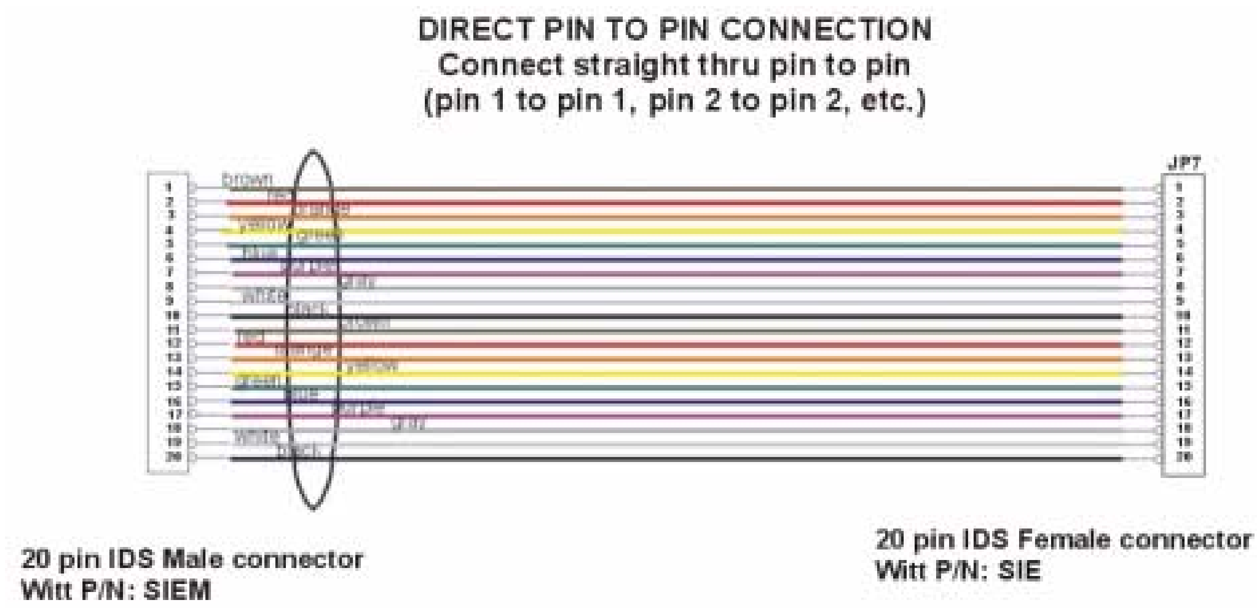
Witt PN: BOGA	**Label**:	**Drawing Ref:** N/A

Purpose	Connects NIBP Extension to S4 PCB Rev D	
Connector	**Installation**	
20-Pin IDS Female	Connects TO JP7 S4 PCB Rev D	
20-Pin IDS Male	Connects TO CAS NIBP ribbon cable	
Witt PN	**Cable Bill of Materials**	
	Cable Type: 20-conductor multicolor ribbon	Cable Length: 12”	Cable Gauge:
SID	Connector Type: 20-Pin IDS Female	Connector Quantity: 1
SIEM	Connector Type: 20-Pin IDS Male	Connector Quantity: 1
ZP	Connector Type: Polarization Keys for 20-Pin IDS Male connector	Connector Quantity: 2

20 PIN Female IDS	Color	Signal	20 PIN Male IDS
1	Brown	RxD	1
2	Red	TxD	2
3	Orange	*RTS-	3
4	Yellow	*CTS-	4
5	Green	GND	5
6	Blue	OPEN	6
7	Purple	OPEN	7
8	Gray	OPEN	8
9	White	GND	9
10	Black	GND	10
11	Brown	OPEN	11
12	Red	+ POWER	12
13	Orange	+ POWER	13
14	Yellow	+ POWER	14
15	Green	GND	15
16	Blue	GND	16
17	Purple	GND	17
18	Gray	OPEN	18
19	White	OPEN	19
20	Black	RESET – (Active LO)	20

Assembly:

1. Orient cable so that the brown conductor is going to pin one marked with the triangle (refer to connector orientation below).



Manufacturer's Recommendation for External Cables for S4 Auxiliary Outputs

Cable Specifications:

MONO		STEREO
Cable Type: Two conductor shielded or coax		**Cable Type:** Two conductor shielded
Cable length: TBD on-site		**Cable length:** TBD on-site
Cable gauge: 24 awg		**Cable gauge:** 24 awg
Connector type: 1/8" Mono plug		**Connector type:** 1/8" Stereo plug

Jack specification:

MONO			STEREO	
Tip	Signal		Tip	Signal (+)
Sleeve/Barrel/Ring	Ground – return		Ring	Ground reference
			Sleeve/Barrel	Chassis

Signal Voltage:

MONO			STEREO	
ECG (S4 brd)	~ 1 Volt P-P		**ECG** (S4 brd)	~ 1 Volt P-P
Lead I (12 lead brd)	~ 1 Volt P-P		**Lead I** (12 lead brd)	~ 1 Volt P-P
Lead II (12 lead brd)	~ 1.35 Volt P-P		**Lead II** (12 lead brd)	~ 1.35 Volt P-P
BP (S4 brd)	~1.55 Volt/100 mmHg		BP (S4 brd)	1.55 Volt/100 mmHg **OR** 1.0 V/100 mmHg with divider cable.
QRS Sync (S4 brd)	Square Wave 0 – 5 volts		**QRS Sync (S4 brd)**	Square Wave 0 – 5 volts
Foot Pedal	NA		**Foot Pedal**	

Peripheral Cables

Keyboard/Barcode Extension Cable

Witt PN: GKA	**Label**:	**Drawing Ref:** N/A

Purpose	Connects Keyboard Y-Adapter to Barcode Reader Box		
Connector	**Installation**		
DB9 Male	Connects TO Keyboard Y-adapter cable		
DB9 Female	Connects TO Barcode Reader Box		
Witt PN	**Cable Bill of Materials**		
	Cable Type: 8-conductor	Cable Length: 4’	Cable Gauge: 24 AWG
LH	Connector Type: DB9 Male power plug	Connector Quantity: 1	
LI	Connector Type: DB9 Female socket	Connector Quantity: 1	

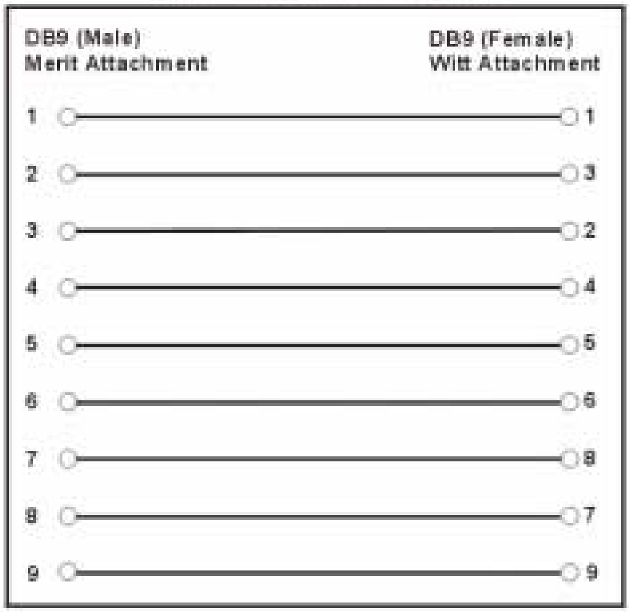
Assembly

9 Pin (Female)	9 Pin (male)
1 Red	1 Red
2 Green	2 Green
3 Blue	3 Blue
4 Orange	4 Orange
5 Yellow	5 Yellow
6 Brown	6 Brown
7 Black	7 Black
8 White	8 White
9 Braid (drain)	9 Braid (drain)

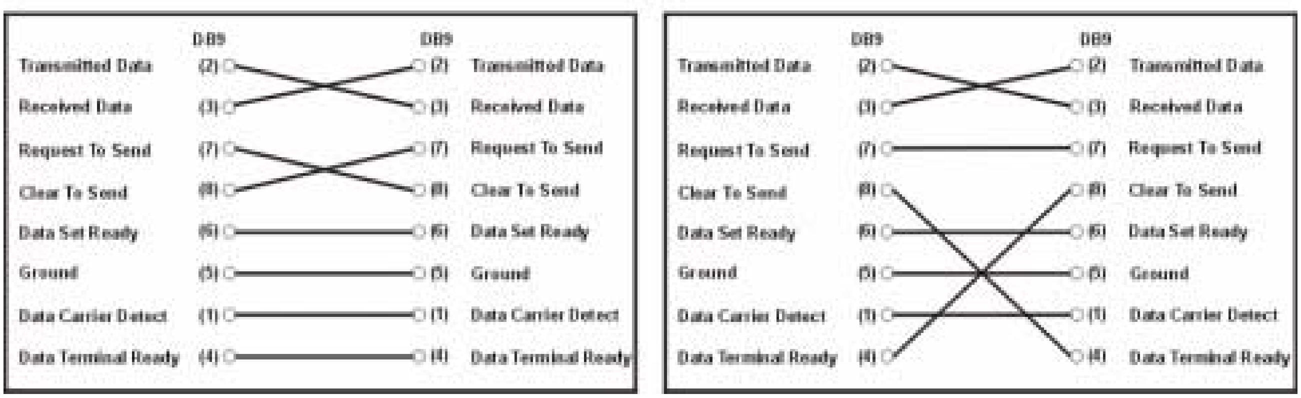
Note:

1. Drain wire is to be covered with heat shrink prior to soldering. Strain relief is to be built up with heat shrink to accommodate hood.

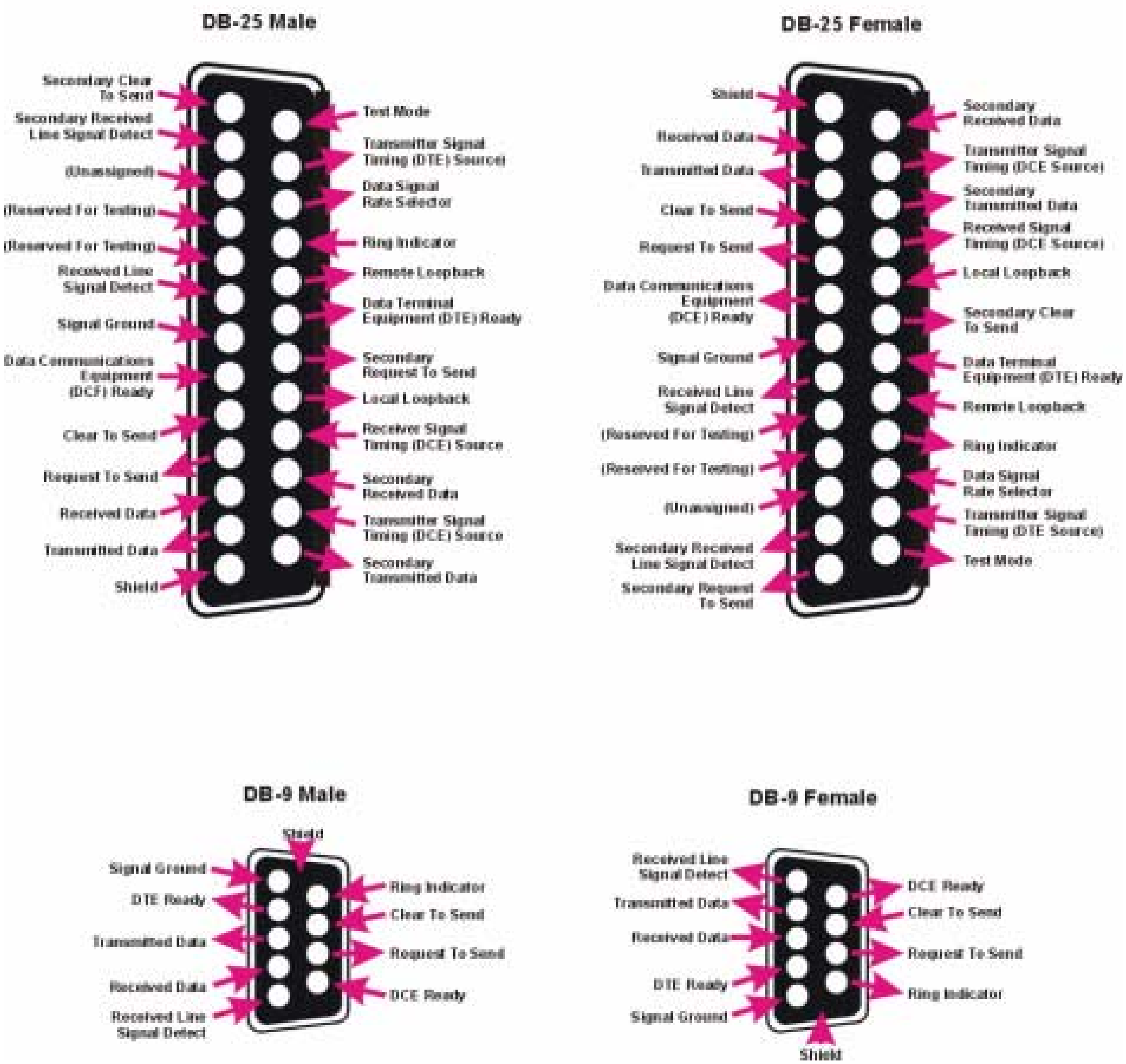
Intellifiator Attachment Pinout



Null Modem Pinouts



RS-232C Pin Designations

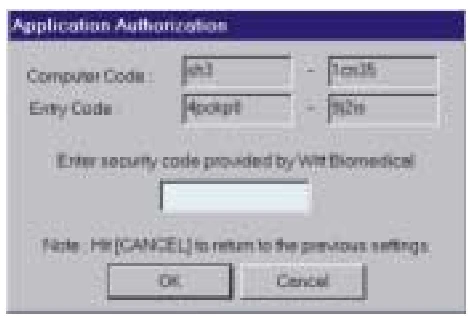


Appendix C

Application Authorization Window

Application Authorization Window

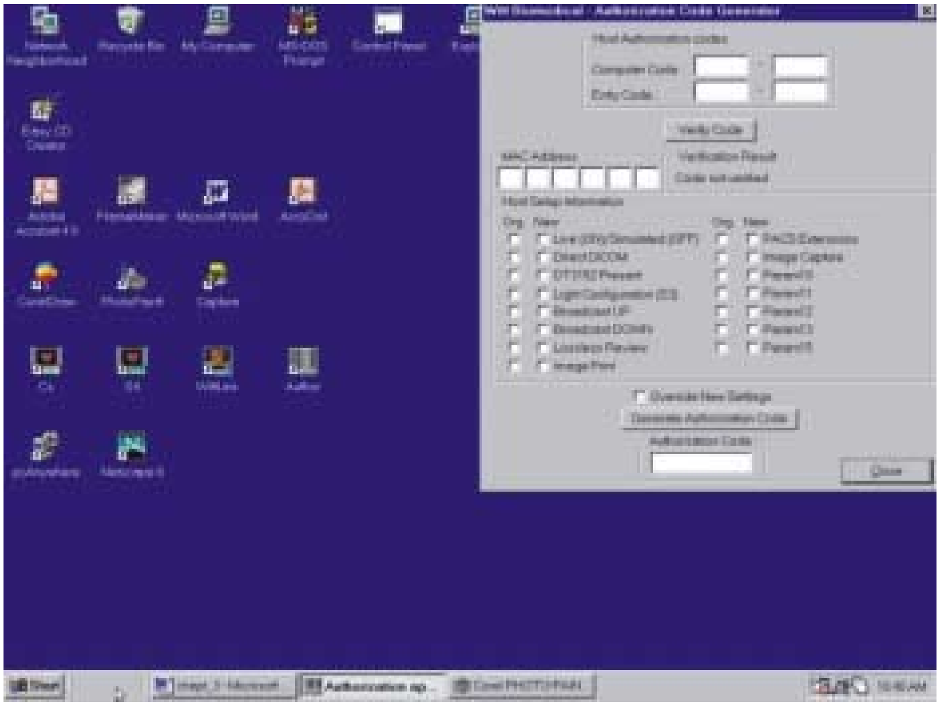
Certain changes to the Configuration screen will activate the Application Authorization window, shown below, which requires you to enter a security code before proceeding with the change.



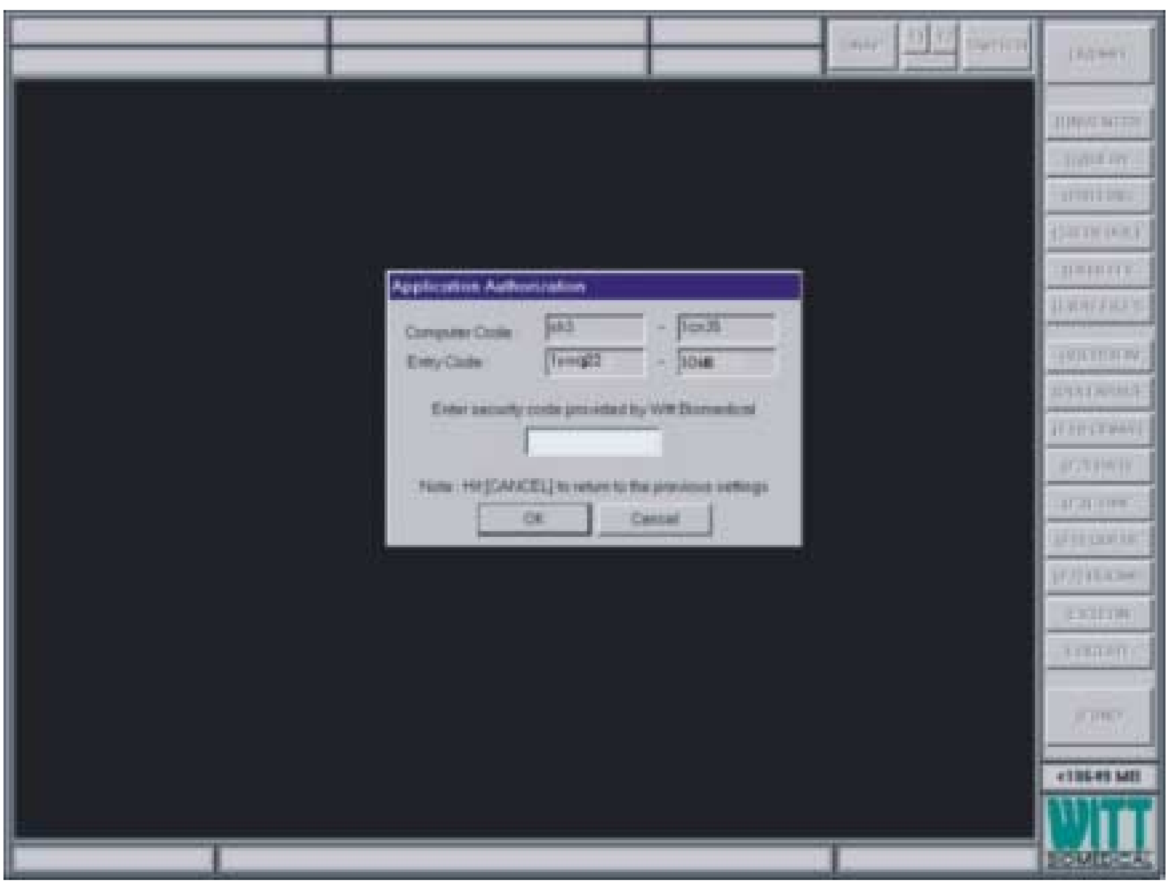
When this happens, perform the following steps:

1. Close the CALYSTO Series IV application
2. Open the Authorization Code Generator, either from its desktop icon or through Windows Explorer.

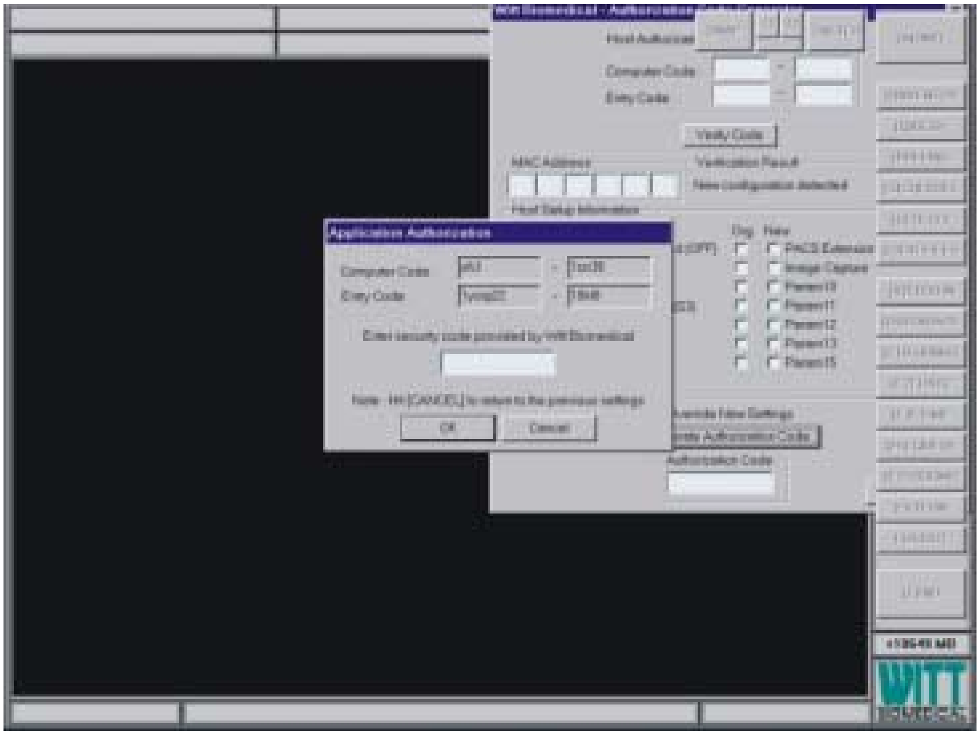
3. Move the Code Generator to the top right or top left portion of the desktop, as shown.



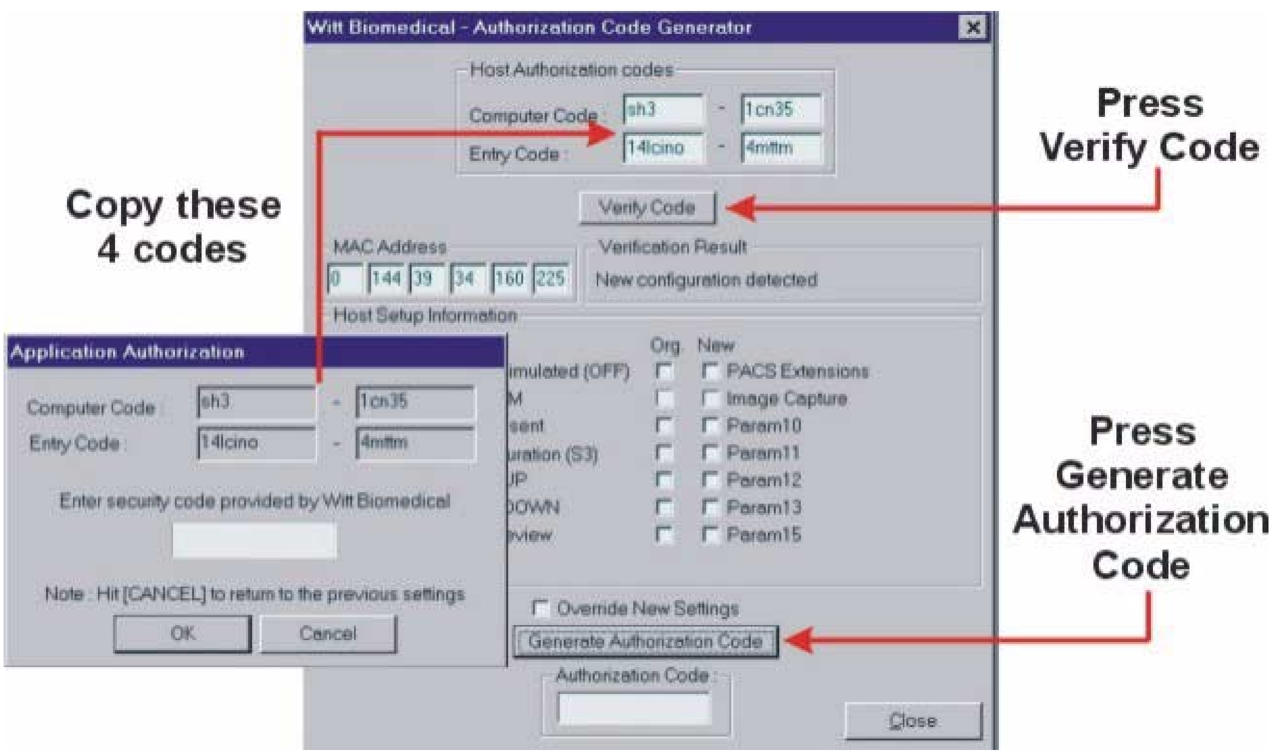
4. Reopen the CALYSTO Series IV application Configuration screen, reenter your changes, and exit to the CALYSTO Series IV Main screen. The Application Authorization window will reappear.



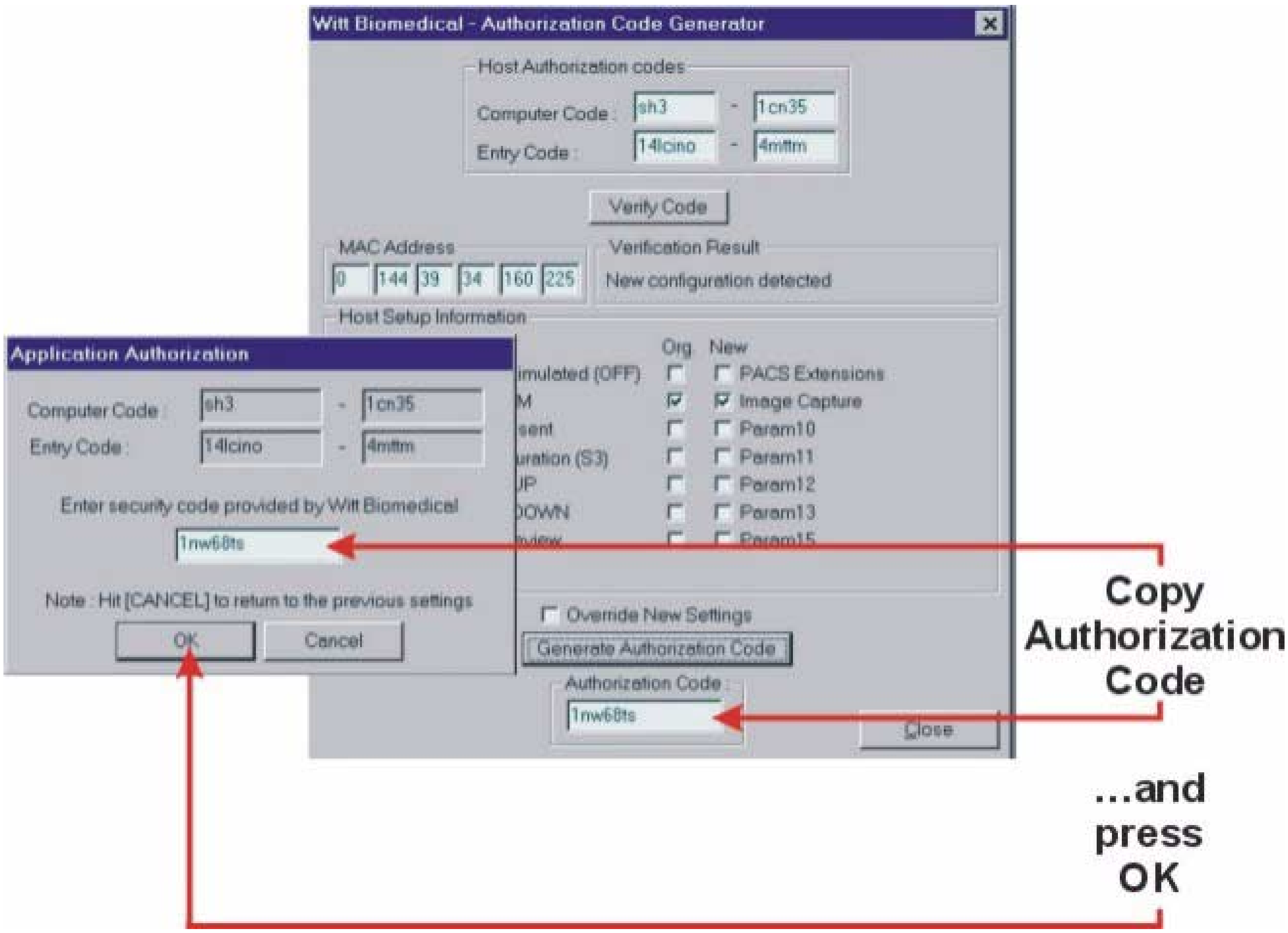
5. Use the keyboard Alt + Tab keys to display the Code Generator alongside the Application Authorization window.



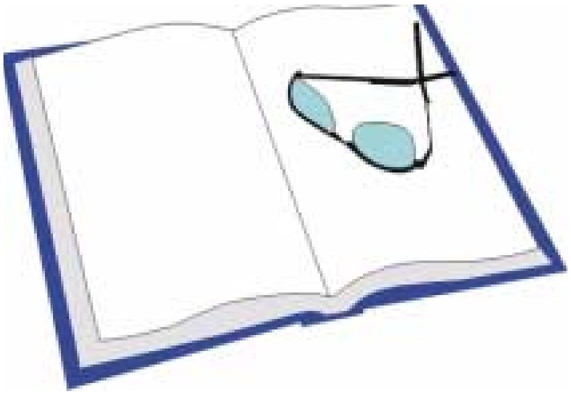
6. Copy the four codes from the Application Authorization window into the appropriate boxes on the Code Generator, as shown, and press the [Verify Code] button. A 5-segment number will appear in the MAC Address windows.



7. Press the [Generate Authorization Code] button.
8. Copy the code that appears in the Authorization Code window into the security code box on the Application Authorization window and press OK.



9. The CALYSTO Series IV Main screen will open with your configuration changes in effect.



Appendix D: Glossary of Terms

A

Absolute case number
A sequential number assigned by CALYSTO for each case.

ACC
American College of Cardiology

ACC screens
CALYSTO screens that are formatted in accordance with the American College of Cardiology for use with their database of diagnostic and interventional cardiology procedures.

AE (Application Entity)
A layer in the Digital Imaging and Communication (DICOM) format standard.

Algorithm
An organized procedure or formula for solving problems.

Application Authorization Window
An entry point, used with the Authorization Code Generator, to provide a means to change the authorization code of a CALYSTO computer station (e.g., from Image IV station to Series IV station).

Archiving
The process of automatically or manually copying patient cine image files onto CDR or MO discs, then storing them locally or on jukebox mass storage devices.

ASCII (American Standard Code for Information Interchange)
A standard character-coding scheme used by computers and computer keyboards to translate and display letters, digits, and special characters.

B

Barcode
A standardized system of representing data in the form of parallel lines of different widths and spacings. CALYSTO has the ability to create its own barcodes and read and use the manufacturer's

Batch report
A report that is programmed to print automatically in accordance with a pre-determined schedule.

Binary file
A file created in a binary (0 and 1 code) format that can be read by other software applications.

BIOS (Basic Input/Output System)
The portion of a computer operating system that provides the lowest level interface to peripheral devices. BIOS is stored in the ROM on a computer's motherboard.

Biplane
Two images or runs per page.

Bit
Short for *binary digit*, the smallest unit of binary information. A bit can hold one of two values—0 or 1.

Bitmap graphic (BMP)
A computer graphic for Windows platforms, made up of tiny squares that are represented by one or more bits describing the square's color or grayscale.

Blood Gas Worksheet
A screen on the Hemodynamic Page that allows you to enter complete blood data in addition to oxygen saturation.

BNC Connector
A male, bayonet-style connector used mainly

with coaxial cable. The connector contains a center pin inside a metal tube connected to the shielded portion of the cable. A ring outside the tube rotates and locks the cable to the female connector or receptacle.

Bookmark
A portion of a recording captured for future access and review.

BPS
Bits per second.

Broadcast
To simultaneously write files to the local hard drive and the network drive.

Broken Study
A CALYSTO utility that checks DICOM headers to ensure they contain all the required fields before the study is sent to long-term archive.

Burn
To record or write data to a CD or DVD disc.

Byte
A binary unit of storage equal to eight bits, a single character.

C

CD-R
Compact Disc, Recordable. A disc that can be recorded to once. It cannot be erased and reused, although the information can be stored in numerous sessions if the disc is not filled in the first session.

CD-RW
A computer disc with a format that allows the disc data to be rewritten without damaging the disc. Reading and writing the disc is accomplished through a CD-RW drive.

CD Writer
A CD-recordable drive that can read and write to CDs, allowing users to create their own CD ROMs.

Charge Code
The hospital's assigned number to be used when billing for a certain item. With CALYSTO, the charge code is required if the item is to be printed to a patient's procedural charge sheet.

Cine Run
A video recording of the x-ray image of a patient's cardiovascular system, usually lasting from 3 to 10 seconds and capturing the interval when the contrast is injected.

Clipping
Technique used in electrophysiology to filter out the high and low ends of an ECG signal so that it can be more easily analyzed.

Cookie
Web site data sent to a browser and stored on a user's hard drive. Cookies contain information about the user's login name, password, and preferences. Browsers can be configured to accept or reject cookies.

D

Delimiter
A character or series of characters that act as a punctuation mark, separating data or denoting the beginning or end of a software routine.

Delta
In inventory, represents the difference between stock and par levels. The delta will be a negative number if stock is below desired levels (par).

DICOM
Digital Imaging and Communications in Medicine

DICOM spigot
A digital signal interface between the output of the cath lab x-ray system and the input of the physiomonitoring system.

DICOM SR (Structured Reporting)
A document architecture that consists of a sequence of linked nodes called "content items," which represent a name/value pair. The name, or concept, is defined by code rather than free text, which facilitates indexing and searching.

DICOM standard
A set of rules that govern the data format structure in which a cine image is created and burned to a disc.

DICOM Worklist Interface
A CALYSTO interface designed to locate patients already admitted through the x-ray or imaging department, and to use the patient data

to automatically populate the CALYSTO Patient ID screen.

DI-CORDER Full Disclosure

A CALYSTO feature that allows the user to view an echo case begun on a DI-CORDER. The case is sent through the PACS server and viewed using Windows Media Player.

Digitize

The process of converting linear pictorial images into digital data for storage**.**

Distal

Farthest from the center or point of attachment.

Double click

Two depressions of the mouse button, performed rapidly and without moving the mouse. Double clicking is one method of opening an application in GUIs. It can also be used to activate commands.

DP (deep archived)

Files that have been burned to a CD and stored in a jukebox are said to be deep archived.

DP/DT

Delta Pressure divided by Delta Time.

DSL (Digital Subscriber Line)

A high speed telephone line used to send analog and digital signals simultaneously.

DVD-RAM

Digital Video Disc Random Access Memory. DVD format in which discs can be recorded and erased (rewritten) repeatedly.

DVD-RW

Digital Video Disc Read Write. A digital video disc format similar to CD-RW. The disc data can be erased and recorded over several times without damaging the medium. Reading and writing the disc is accomplished through a DVD-RW drive.

E

EP-DSP Interface

Electrophysiology Digital Signal Processing Interface. A CALYSTO interface that provides up to 16 inputs, allowing the user to acquire, display, and store intercardiac ECG data employing all industry-standard catheters.

ESD

Electrostatic Discharge

Ethernet

Widely used local area network (LAN) protocol that provides data communications in excess of 100 MBps.

Event timer

CALYSTO feature that permits the timing of certain evolutions such as balloon inflating.

F

Fiber Optic

Technology that employs thin, hollow cables to carry digital information as pulses of light.

Field

An individual item of information in a database. Together, a group of fields forms a record.

FIFO

First In First Out. CALYSTO purging method that automatically erases case data chronologically, from the earliest to the latest—on a first-in-first-out basis.

Format Translator

A device that converts ECG cart data into a format that CALYSTO can use. The format translator does a complete digital conversion, presenting all aspects of the ECG waveforms, patient demographics, calculations, and interpretive statements generated by the ECG cart. No data is altered or lost.

FPS

Frames per Second

Front End computer

A computer that handles input and output communications for a larger mainframe computer, reducing the computer’s load.

Full disclosure

CALYSTO feature that, when activated (either automatically or manually) records the case that is being performed

Function button

CALYSTO on-screen areas that, when clicked on with the mouse, perform pre-programmed operations.

Function key

Keyboard keys that act as shortcuts or alternatives to performing tasks, such as saving, printing, and exiting. Function keys occupy the top row of keys on most computer keyboards and are usually labeled F1 through F12. In CALYSTO, these keys may change their function depending on what screen the user is in.

G

Gamma
A measure of contrast in an image.

Gateway
An entrance or exit point in a communications network.

GB
Gigabyte, 1 billion bytes.

Graphical tree template
A graphical line drawing of a particular cardiological area, such as left or right dominant coronary. The template is used to graphically insert lesions, grafts, and cardiac anomalies that are specific to the patient.

Graphical User Interface (GUI)
(Pronounced *gooey*) A computer interface, such as a desktop, that uses graphical symbols and menus to carry out various options such as opening and closing files and programs. A GUI is operated with a mouse or a keyboard and is easier to use than a character-based interface, such as DOS, which requires exact commands to be typed following a prompt. Popular GUIs include Microsoft Windows and the Macintosh operating system.

Grayscale
A color mode consisting of absolute black, absolute white, and 254 shades of gray in between.

Grouping
A CALYSTO feature that allows the user to create a group of two or more images from a specific case, and to display only that group of images when reviewing the case. For example, a patient case may have 20 images, but the physician might be interested in only 3 of them—as the heart of the study.

GUI
See Graphical User Interface.

H

HIPAA
Health Insurance Portability and Accountability Act

Histogram
A chart comprised of horizontal and/or vertical bars representing values. Each bar is proportional to the value it represents.

Historical Linking
A CALYSTO feature that allows the user to simultaneously view two cases of the same modality on the primary and secondary displays.

Host computer
A network computer used as a control station to perform, document, and monitor actual procedures.

Hyperlink
In CALYSTO, a feature that enables the user to navigate between cases linked historically or by Medical Record Number (MRN).

I

International Organization for Standardization (ISO)
A Geneva-based organization that establishes the international standards for data communications. Founded in 1947, the ISO is made up of approximately 90 countries.

IP Address
Internet Protocol Address. A computer's address on a TCP/IP, written as four groups of up to three digits each, separated by periods. (e.g., 217.115.414.21).

IRQ
Interrupt Request. Signals used to get the computer processor's attention. Devices are assigned unique IRQ addresses that enable them to communicate with the processor.

ISDN
Integrated Services Digital Network. A fast and efficient digital telecommunications network used to transmit voice, video, and data.

ISO
See International Organization for Standardization.

J

JPEG

Joint Photographic Experts Group. Pronounced *JAY-peg*. A graphic image created by choosing from a range of compression algorithms. The best image results in the largest file, so a trade-off is made between size and quality.

Jukebox

An electro-mechanical computer device for storing data on various disc media, such as CD-ROM and MO. The largest jukeboxes contain multiple readers and hold upwards of 500 discs.

K

Kb

Kilobyte, 1 thousand bytes.

K variable

Number used to calculate estimated oxygen consumption. Witt uses 133.

Kit

In CALYSTO, a group of inventory items represented by a single kit name. When selected the kit automatically enters all of its components, rather than requiring the user to enter each component individually.

L

LAN

Local Area Network

Linking

Multiple cases that are connected with the same medical record number. These cases can be called up and reviewed by clicking their respective Link icon on the Patient Locator screen.

Local Archival Station

A dedicated review station computer equipped with a CD writer, used to copy cine image files to CDR or MO discs for the purposes of archiving.

Loop

The continuous repetition of a selected cine run or a series of cine runs.

Lossless Compression

A method of file compression that loses no data during the compression or decompression process.

Lossy Compression

A data compression method that sacrifices some information to achieve greater compression.

LRU

Lowest Replaceable Unit

M

Macro

A series of keyboard or mouse operations compiled and recorded to a single name or key action. Macros are useful for tasks that contain a number of steps and are performed repeatedly.

Magneto-optical disc (MO disc)

Discs used in a magneto-optical drive that can be read from and written to (see magneto-optical drive).

Magneto-optical drive (MO drive)

A computer drive that combines the qualities of magnetic disc drives and CD-ROM drives, and features the read and write capabilities of magnetic drives as well as the higher storage capabilities of CD-ROMs. MO drives access more rapidly than magnetic and CD-ROM drives.

Mainframe Interface (MFI)

A device consisting of both hardware and software that acts as a link between computers and applications. For example, a CALYSTO MFI links the billing module with the hospital's accounting department computer.

Margin

In the costing section, the dollar difference between cost and charge.

MB

Megabyte, 1 million bytes

Medical Record Number (MRN)

A hospital admitting number generally assigned to patients as a unique identifier. In CALYSTO the MRN is used to identify and link cases.

Menu

A list of choices offered to a computer user (*see also*, Pull-down menu).

Menu Scraper

A special CALYSTO program designed to automatically extract data from menus and place the data in various screens.

MFI

See mainframe interface.

MO

See Magneto Optical.

Modality

Any of the various medical imaging categories available within the CALYSTO system, including cine, echocardiology, MRI, ECG, x-ray, and ultrasound.

MPEG (Motion Picture Experts Group)

A video compression standard that achieves its high compression rate by storing only the changes between video frames instead of the entire frame. MPEG-1 has a resolution of 352 x 240 pixels at 30 frames per second (fps). The advanced MPEG-2 version has a resolution of 720 x 480 pixels at 30 fps and can be fine tuned to work with high definition television.

MRN

See Medical Record Number.

Multi Modality Review

A CALYSTO feature that allows the user to access different procedures performed on the same patient for side-by-side review on primary and secondary monitors.

N

NAS

See Network Attached Storage.

Network Attached Storage (NAS)

A network server dedicated to storage and file sharing.

Node

A computer or network terminal.

O

OCR

Optical Character Recognition. Computer technology that scans and digitizes letters and numbers, and retains them as text rather than graphics.

OEM

Original Equipment Manufacturer

Open Database Connectivity (ODBC)

A standard for data transfer between databases (such as a transfer between Excel and Access). All databases must support ODBC for the transfer to succeed. ODBC functions by placing a driver between database access programs and the databases themselves. When one program needs to access a foreign database it does it by approaching that database's driver. The driver then acts as a data interchange between the program and the database.

P

PACS

Picture Archival Communications System. Computers or networks designed to store, retrieve, distribute, and display medical images.

Par

In inventory, par represents the on-hand amount desired. When querying, it represents search parameters used to filter query data.

Parse

In programming, to break down input into smaller, more functional pieces. In menus it identifies the arrangement of menu level entries.

Path

The direction a computer must take to get to a data file (e.g., D:/CASES/CINE/HA000002.POO).

Pixel

Picture Element. The smallest component of an image displayed by a computer monitor. Each image is composed of hundreds of thousands of pixels.

P/N

Part Number

Proactive sampling

Opposed to retroactive sampling, proactive sampling consists of data samples or pictures of the Patient Monitoring screen taken in real time.

Proximal
Nearest to the center or point of attachment.

Pull-down menu
A menu that is opened by placing the cursor over the title or a scroll arrow and clicking a mouse button. A list will then appear from which the user can choose various options.

Purge
The automatic erasure of data during nightly archiving to maintain a certain level of free local hard drive space.

Q

QCA
Quantitative Cardiac Analysis

Q/R
Query and Retrieve

Quadplane
Four images or runs per page.

R

Radio Button
A programming tool named for its functional similarity to station selectors on car radios, a Radio Button is an outlined area in a graphical user interface that can be clicked on to select an option. Only one button can be selected within a given section.

RAID
Redundant Array of Inexpensive Disks. An assembly of disk drives that functions as one storage unit.

RAM
Random Access Memory. Computer storage, the contents of which can be accessed in any order, written to, and read from.

Retroactive sampling
A picture, snap shot, or data sample of a recorded version of Monitoring and Review screens. As waveforms move across the screen, CALYSTO stores them in memory. Snap shots can be taken at any time from this memory.

S

SAN
Storage Area Network. A high speed subnetwork of linked storage devices.

Scale
To alter the size of an image, up or down.

Screen Reading Tool
A software device that extracts measurement values and stores them in an information file for CALYSTO echocardiology cases. The values can be viewed in the OCR Content screen.

SCSI
Small Computer System Interface. (Pronounced *scuz-ee*). A parallel interface that can accept up to seven peripheral devices and transfers data at eight bps.

Sequence function
CALYSTO feature designed to handle pullback procedures for pediatric patients and adults with cardiac anomalies.

SGML
Standard Generalized Markup Language. A platform-neutral language and ISO standard that defines a document's structure and the relationship of its parts. SGML is used to create a variety of products, such as typesetting, indexing, language translation, and hypertext over the web. SGML is sometimes referred to as a language for style sheets.

Signal average sample gradient calculation
Where two samples are taken at different times and averaged together.

Simultaneous sample gradient calculation
Where one catheter is in two chambers and a sample from each chamber is taken simultaneously.

SMPTE
Society of Motion Picture and Television Engineers

SMTP
Simple Mail Transfer Protocol. A protocol used to transmit e-mails between servers.

Snap button
Function button on the top right of every CALYSTO screen. When selected the Snap button prints a snap shot of the current screen.

Snap shot
See Retroactive Sampling

Split scale
A CALYSTO feature that permits the display

of two different pressure scales on the Patient Monitoring screen.

Split screen

A CALYSTO feature that splits the Patient Monitoring screen in half vertically, so that a large number of waveforms can be displayed without their trace lines overlapping.

SQL

See structured query language**.**

String

In programming, a series of characters or items.

Structured Query Language

SQL (pronounced *see-quell*) A sublanguage in a database used to request information from that database. SQL can also be used to update and manage relational databases as well as alter and secure data. While there is no official standard database language, SQL is the most common and therefore the de facto standard.

Sub-Loop

The continuous repetition of a selected, one-second portion of a cine run.

SVGA

Super Video Graphics Array. A graphics standard that provides resolutions up to 800 x 600 (480,000 pixels) and supports a palette of 16 million colors.

Sweep speed

The time it takes for waveforms to pass across the monitoring screen (measured in millimeters per second).

Switch Button

Function button on the top right of every CALYSTO screen. When selected the Switch button opens the Patient Monitoring screen.

T

TB

Terabyte, 1 trillion bytes.

TCP/IP

Transmission Control Protocol/Internet Protocol. A language governing communication among all computers on the internet. TCP/IP is actually two separate protocols—TCP and IP—that are used together. The IP portion dictates how packets of information are sent over networks. TCP checks the packets for errors.

Template

A ready-to-use document set up with layout, formatting commands, and formulas that permits users to create individualized reports, letters, and other documents by entering information.

Thumbnail

A small version of a graphic, reduced to allow multiple images to be displayed on the same screen or page.

Time Grid

A CALYSTO function that places a timeline grid against the screen, similar to ECG paper.

Transcription

A CALYSTO feature that automates the task of generating case reports, letters, and procedure-related documents. CALYSTO has two transcription modules—the Witt module and the Microsoft Word module. Both modules are based on a user-defined template system, and allow the user to access the CALYSTO database to extract patient information for the document.

Transducer

A device that converts one form of energy into another, specifically when one of the quantities is electrical.

U

User-defined

Fields, tables, variables, etc. that are determined and entered into the system by the customer.

V

VGA

Video Graphics Array. A graphics standard that provides resolutions up to 720 x 400 and supports a palette of 262,144 colors.

W

WAS

Witt Archival System

Waveform marker

A letter (s, d, etc.) depicting the waveform type (systolic, diastolic, etc.) that can be positioned at various points on the wave.

Web^{DV}

A CALYSTO product that provides secure access to patient data via the Internet or hospital intranet.

Witt case number

An eight-character code, with the first two characters representing the computer station on which the case was admitted, and the remaining characters the sequential case number for that station (e.g., NA000001). The number is used by CALYSTO to track each case from its point of origin onward through archiving.

WNL

Within Normal Limits

Work Flow Aid

A CALYSTO feature that permits users to store cases being reviewed into different folders. The cases can then be sorted and accessed within the folders without leaving the Review screen.

Wrist Strap

A static (ESD) protected strap worn on the wrist.

X

XML

Extensible Markup Language. A programming language designed specifically for World-Wide Web documents. Among other capabilities, XML provides a means of creating customized tags.

Index