

GE Healthcare

**Mac-Lab/CardioLab/Centricity
Cardiology INW Service Manual**

Version 6.5.6

Instructions

2021423-503 Revision H



The information in this manual only applies to Mac-Lab/CardioLab/Centricity Cardiology INW Service Manual software version 6.5.6. It does not apply to earlier software versions. Due to continuing product innovation, specifications in this manual are subject to change without notice.

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CE Marking Information



Compliance

The Mac-Lab/CardioLab/ComboLab system bears CE mark CE-0459 indicating its conformity with the provisions of the Council Directive 93/42/EEC concerning medical devices and fulfills the essential requirements of Annex I of this directive.

For devices manufactured in the United States, the CE mark is applied under the authority of Notified Body GMED (0459).

The country of manufacture and appropriate Notified Body can be found on the equipment labeling.

The product complies with the requirements of standard IEC 60601-1-2.

The safety and effectiveness of this device has been verified against previously distributed devices. Although all standards applicable to presently marketed devices may not be appropriate for prior devices (that is, electromagnetic compatibility standards), this device will not impair the safe and effective use of those previously distributed devices. Refer to the user's information.

Refer to the Mac-Lab/CardioLab Service Manual for Compliance Information.

Recommendations

Users should be aware of known RF sources, such as radio or TV stations and hand-held or mobile two-way radios, and consider them when installing a medical device or system.

Be aware that adding accessories or components, or modifying the medical device or system may degrade the EMI performance. Consult with qualified personnel regarding changes to the system configuration.

The Mac-Lab/CardioLab System, if operating under the conditions defined in the EMC Standard IEC 60601-1-2 (Radiated Immunity 3 V/m) and at field strengths above 3 volts per meter may cause waveform distortions at radio frequency (RF) electromagnetic interference (EMI).

MEDICAL ELECTRICAL EQUIPMENT needs special precautions regarding EMC and needs to be installed and put into service according to the EMC information provided in the **ACCOMPANYING SERVICE MANUAL**.

Portable and mobile RF communications equipment can affect **MEDICAL ELECTRICAL EQUIPMENT**.

The use of ACCESSORIES, transducers and cables other than those specified, with the exception of transducers and cables sold by the manufacturer of the Mac-Lab/CardioLab System as replacement parts for internal components, may result in increased EMISSIONS or decreased IMMUNITY of the Mac-Lab/CardioLab System.

The Mac-Lab/CardioLab System should not be used adjacent to or stacked with other equipment and that if adjacent to or stacked use is necessary, the Mac-Lab/CardioLab System should be observed to verify normal operation in the configuration in which it will be used.

Review the AAMI Committee Technical Information Report (TIR) 18, "Guidance on Electromagnetic Compatibility of Medical Devices for Clinical/Biomedical Engineers". This guidance document provides a means to evaluate and manage the EMI environment in the hospital.

The following actions can be taken to reduce the risk of medical device EMI and achieve EMC:

- Assess the EMC environment of the healthcare facility (for example, identify radio transmitters in around the facility) and identify areas where critical medical devices are used (for example, ER, ICU, CCU, NICU).
- Increase the distance between sources of EMI and susceptible devices.
- Remove the devices that are highly susceptible to EMI.
- Lower power transmitted from electrical and electronic equipment (EMI sources) under hospital control (that is, paging systems).
- Label devices susceptible to EMI.
- Educate healthcare facility staff (nurses and doctors) to be aware of, and to recognize, potential EMI related problems.

Exception

ECG Parameter

IEC 60601-1-2 clause 36.202.1 - Immunity: Radiated Immunity –

The level of compliance is less than 1V/m

If operating under the conditions defined in EMC Standard EN 60601-1-2 (Radiated Immunity 3V/m), field strengths less than 1V/m may cause waveform distortions and erroneous numeric data at various electromagnetic interference (EMI) frequencies.

Recommendations

Review the AAMI EMC Committee technical information report (TIR-18) titled Guidance on electromagnetic compatibility of medical devices for clinical / biomedical engineers - Part 1: Radiated radio-frequency electromagnetic energy. This TIR provides a means to evaluate and manage the EMI environment in the hospital.

The following actions can be taken:

- managing (increasing) distance between sources of EMI and susceptible devices
- managing (removing) devices that are highly susceptible to EMI
- lower power from internal EMI sources under hospital control (i.e. paging systems)
- labeling devices susceptible to EMI
- educating staff (nurses and doctors) to be aware of, and to recognize, potential EMI related problems

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1 Introduction

Manual Information

Purpose

This manual contains the instructions necessary to operate and service the Mac-Lab/CardioLab system safely in accordance with its function and intended use. These instructions include but are not limited to:

- Describing fundamental controls and indicators.
- Operating procedures.
- Connecting and disconnecting detachable parts and accessories.
- Troubleshooting and service procedures.

Intended Audience

This manual is intended for the person who maintains and troubleshoots this equipment.

Revision History

Revision	Date	Comment
A	6 November 2009	Initial release of the manual.
B	21 April 2010	Updated with serviceability improvements.
C	1 August 2011	Updated to address new hardware.
D	8 November 2011	Added power cords.
E	28 February 2012	Updated Hard Drive, Memory and RMOT parts.
F	7 May 2013	Updated to include installation and troubleshooting procedures for the Matrox Quad video board.
G	18 November 2013	Updated to include information for new speakers.
H	24 March 2014	Updated to include information for EIZO monitors.

Conventions

The following conventions are used throughout this manual.

Bold	Indicates keys on the keyboard, text to be entered, or hardware items such as buttons or switches on the equipment.
<i>Italics</i>	Indicates software terms that identify menu items, buttons, or options in various windows.
[Key1] + [Key2]	Indicates a keyboard operation. A (+) sign between the names of two keys indicates that you must press and hold the first key while pressing the second key once. For example, "Press Ctrl + Esc " means to press and hold down the Ctrl key while pressing the Esc key.
<Space>	Indicates you must press the spacebar on the keyboard when typing a precise text string with one or more spaces. The point where the spacebar must be pressed is indicated as: <Space> . The purpose of the < > brackets is to ensure you press the spacebar when required.
Enter	Indicates you must press the "Enter" or "Return" key on the keyboard. Do not type "enter".

Product References

The name of the product described in this manual is Mac-Lab/CardioLab/Centricity Cardiology INW System.

Related Documents

Part Number	Document
2021423-015	Mac-Lab Operator's Manual
2021423-016	CardioLab Operator's Manual
2021423-017	Centricity Cardiology INW Operator's Manual
2021423-021	Mac-Lab/CardioLab/Centricity Cardiology INW Pre-Installation Manual
2021423-022	Mac-Lab/CardioLab/Centricity Cardiology INW Service Manual (v6.5.4 and earlier)
2027332-103	Mac-Lab/CardioLab Security Guide

Illustrations and Names

All illustrations in this manual are provided as examples only. They may not necessarily reflect your system's configuration or the data on your system.

In this manual, all names appearing in examples and illustrations are fictitious. The use of any real person's name is purely coincidental.

Chapter Contents

- **Chapter 1, Introduction:** This chapter describes the Service manual and chapter contents. Also included are general safety requirements, service requirements, equipment symbols, and serial number identification information.
- **Chapter 2, Equipment Overview:** This chapter describes the equipment and its technical characteristics, connector locations, and preparation for use.
- **Chapter 3, Maintenance:** This chapter contains preventive maintenance information and cleaning guidelines.
- **Chapter 4, Troubleshooting:** This chapter contains troubleshooting instructions and functional test directions.
- **Chapter 5, Recovery Procedures:** This chapter details procedures to restore a workstation or server in the field after failure.
- **Chapter 6, Parts List:** This chapter contains a list of Field Replaceable parts.
- **Appendix A, Abbreviations:** This appendix lists all abbreviations used with the system.

Safety Information

Safety Messages

Definitions

DANGER

— Safety messages which indicate an imminently hazardous situation which, if not avoided, WILL result in death or serious injury.

WARNING

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

CAUTION

— Safety messages which indicate a potentially hazardous situation which, if not avoided may result in minor or moderate injury, loss of data or system failure.

NOTE

Messages which provide additional user information.

Applicable Messages

DANGER

EXPLOSION HAZARD — Using this equipment in the presences of flammable gasses (including anesthetics and oxygen) may cause an explosion or fire.

Always use this equipment in a well ventilated area away from the presence of potentially flammable gasses

WARNING

SYSTEM STABILITY — All systems should be installed and maintained according to installation instructions and manufacturers specifications. Any alterations may affect the stability of the system.

WARNING

PATIENT MONITORING — The system is intended to be used as a recording system for catheterization, electrophysiology and related specialty laboratories. A defibrillator or ECG monitor should be attached for patients in need of uninterrupted ECG display. An additional means to display SPO₂ should be available for patients in need of uninterrupted SPO₂ display. A temporary pacemaker needs to be available for patients in need of uninterrupted delivery of pacing.

WARNING

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

WARNING

ACCESSORIES — All system components sold by GE Healthcare for use with this system are tested to meet IEC 60601-1 when used with the system. All other components used with the system must meet IEC 60601-1.

WARNING

IEC — All equipment not complying with IEC 60601-1 should be placed outside the patient environment.

WARNING

SHOCK HAZARD — DO NOT allow hydraulic fluid from any device to contact any conductive surface. Hydraulic fluid is electrically conductive.

An electrical shock hazard exists between chassis ground and isolated (floating) ground when power is applied. Unplug the unit from the power source before proceeding. To reduce the risk of electric shock or damage to your equipment, do not disable the power cord grounding feature. This equipment is designed for connection to a earth grounded power outlet. The grounding plug is an important safety feature.

WARNING

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

WARNING

SHOCK HAZARD — Total system earth leakage current must not exceed 500 microamperes.

Voltages between the three power outlet connections must be accurate BEFORE measuring power outlet ground-to-neutral loop resistance.

Electrostatic discharge (ESD) can damage electronic components. Be sure you are properly grounded when using or servicing the system.

WARNING

SHOCK HAZARD — To reduce the risk of electric shock or damage to the equipment, do not disable the power cord grounding feature. This equipment is designed for connection to a grounded (earthed) power outlet.

WARNING

SHOCK HAZARD — Use appropriate Lock Out/Tag Out procedures whenever an energy hazard exists, such as disconnecting equipment to perform maintenance.

WARNING

SHOCK HAZARD — Electrical shock hazard between chassis ground and isolated (floating) ground when power is applied. Unplug the unit from the power source before proceeding.

To reduce the risk of electric shock or damage to your equipment, do not disable the power cord grounding feature. This equipment is designed for connection to a grounded (earthed) power outlet. The grounding plug is an important safety feature.

WARNING

SHOCK HAZARD — High voltages exist in the unit. Use insulated tools. Remove jewelry and use only one hand when possible.

Always disconnect power from the equipment before attempting service.

WARNING

SHOCK HAZARD — Only connect IEC 60601-1 certified medical equipment. If fluid of any kind should leak into the system, discontinue use of the equipment and contact GE Healthcare immediately.

WARNING

SHOCK HAZARD — To reduce the risk of electric shock, DO NOT remove cover or back. This equipment contains no user serviceable parts. Refer servicing to qualified service personnel.

WARNING

SHOCK HAZARD — Proper connections to the patient are critical for the proper operation of the CardioLab II Plus Amplifier and patient safety. Use extreme caution when making patient connections. Do NOT connect non-isolated equipment to the amplifier. Proper connections to the stimulator are critical for the proper operation of the CardioLab II Plus Amplifier and patient safety. Use extreme caution when making stimulator connections. The stimulator must be a IEC 60601-1 certified product. Ablation operations should NOT be executed when a stimulator unit is connected.

WARNING

SHOCK HAZARD — Do not allow any foreign materials such as fluids to come in contact with the CardioLab II Plus Amplifier. If fluid of any kind should leak into the CardioLab II Plus Amplifier, discontinue using the amplifier and contact GE Healthcare. DO NOT allow hydraulic fluid from any device to contact any conductive surface. Hydraulic fluid is electrically conductive.

WARNING

SHOCK HAZARD — Use appropriate Lock Out/Tag Out procedures before performing any service on potentially energized equipment.

WARNING

SHOCK HAZARD — Remote speakers must be powered by a 60601-1 certified power supply.

WARNING

CONDUCTION HAZARD — Do not leave conductive parts of lead electrodes open. This condition could leave the patient or user more susceptible to shock.

WARNING

GROUNDING — Electrostatic discharge (ESD) can damage electronic components. Be sure you are properly grounded before opening any equipment.

WARNING

POWER SUPPLY — The supply line must be fused and capable of delivering 16A.

Route the AC power cable away from moving parts.

Connect only to a properly earth grounded outlet.

WARNING

DEFIBRILLATOR PRECAUTIONS — DO NOT contact the amplifier or patient during defibrillation.

Defibrillation equipment is required in the event that the patient needs to be cardioverted or defibrillated.

WARNING

INTERNAL DEFIBRILLATION — Prior to internal defibrillation, disconnect the intercardiac catheters from the system to prevent damage to the amplifier.

WARNING

INTERPRETATION HAZARD — A qualified physician must overread all computer-generated measurements and tracings. Computerized interpretation is only significant when used in conjunction with clinical findings.

Signal quality should be checked only by a licensed health care practitioner.

All computer assisted measurement functions must be verified by a licensed health care practitioner.

WARNING

ANNUAL EQUIPMENT MAINTENANCE — The system should be checked yearly to ensure compliance with medical device standards.

WARNING

PINCH POINT HAZARD — Keep hands, hair, jewelry and loose clothing away from moving parts. Otherwise, serious injury could result.

WARNING

REPLACEMENT PARTS — Replace only with the same type and rating of fuse.

WARNING

SOFTWARE — DO NOT add unauthorized software to the system. Doing so may make the software unstable.

WARNING

REMOVABLE MEDIA — Exit the software application properly before turning off the system. Failure to do so may result in loss of ability to store the data properly.

Follow recommended instructions when exiting the application or turning off the system to ensure data integrity.

CAUTION

ELECTROSTATIC SHOCK — Working on electronic devices while not properly grounded may cause damage to the equipment.

Always use a wrist grounding strap and grounding pad when working on electronic equipment.

CAUTION

SALE OF DEVICE — Federal (USA) law restricts this device to sale by or on the order of a physician.

CAUTION

EQUIPMENT CABLING DAMAGE — Route optical cables through conduit in the ceiling or floor to avoid damage to the cables or cable connectors.

CAUTION

EQUIPMENT USE — DO NOT reuse single use devices.

CAUTION

EMC — No known electromagnetic or other interference between the system exists. However, precautions should be taken to avoid the use of cellular telephones, pagers, or other transmitters.

CAUTION

TRANSDUCER — All air must be removed from the transducer or associated tubing before calibration for accuracy.

Pressure channels should be calibrated to a known pressure value if the pressure value is in question.

CAUTION

REMOTE MONITOR — Always power the system through separate isolation transformers which are independently connected to a wall outlet.

ITE Conformance Statement

- The Mac-Lab/CardioLab/Centricity Cardiology INW Server software applications are intended to be installed and run on an applicable ITE compliant hardware platforms (minimum Hardware Essential Performance be ITE compliant) which may not meet leakage and/or EMC requirements of patient care area equipment. This means but is not limited to the following (unless the medical electrical standard [EN60601-1-1 and EN60601-1-2] is followed):
- The Mac-Lab/CardioLab/Centricity Cardiology INW Server hardware does not directly deliver energy to the Patient.
- The Mac-Lab/CardioLab/Centricity Cardiology INW Server hardware does not indirectly control energy delivered to the Patient.
- The Mac-Lab/CardioLab/Centricity Cardiology INW Server hardware is not directly connected to the Patient.
- The Mac-Lab/CardioLab/Centricity Cardiology INW Server hardware is not installed or used in the Patient vicinity.
- Patient Vicinity summarized as follows:
 - ◆ A space, within a location intended for the examination and treatment of patients, extending 6 ft (1.83 m) beyond the normal location of the bed, chair, table, treadmill, or other device that supports the patient during examination and treatment and extending vertically to 8 ft 2.4 in. (2.5 m) above the floor.
 - ◆ Areas where health care staff members monitor patients and perform charting and administrative tasks are not considered to be Patient Vicinity areas.

Types of Systems

Mac-Lab System

The Mac-Lab System is intended for use in a catheterization and related cardiovascular specialty laboratories under the direct supervision of a licensed healthcare practitioner. It is intended to monitor, calculate and/or record cardiovascular data from adult and pediatric patients undergoing cardiac catheterization procedures. The data may be manually entered or acquired via interfaced devices. Data includes: ECG, heart rate, pulse oximetry (SpO₂), respiration rate, EtCO₂, temperature, valve gradients and areas, cardiac output, hemodynamic measurements, invasive and noninvasive blood pressure and procedural information and optional intracardiac electrocardiogram (IECG). Physiological parameters such as diastolic, systolic, and mean blood pressure, heart rate, and cycle length may be derived from the signal data, displayed and recorded. The system allows the user to monitor the acquisition of data, review the data, and generate reports on the data. Additionally, the system may acquire, amplify, display and record data received from other interfaced medical devices typically used during these procedures, such as imaging devices. The Mac-Lab System does not control the delivery of energy, administer drugs, perform any life-supporting or life-sustaining functions, or analyze data acquired during the procedure. The Mac-Lab System does not transmit alarms or arrhythmias and does not have arrhythmia detection capabilities.

CardioLab EP System

The CardioLab EP System is intended for use in an electrophysiological laboratory and related specialty laboratories under the direct supervision of a licensed healthcare practitioner. It is intended to monitor, calculate and/or record electrophysiological data from adult and pediatric patients undergoing electrophysiological studies. Data includes: ECG, pressure, and intracardiac electrocardiogram (IECG) waveforms, heart rate, pulse oximetry (SpO₂), respiration rate, EtCO₂, temperature, invasive and noninvasive blood pressure, and procedural information. Physiological parameters such as diastolic, systolic, and mean blood pressure, heart rate, and cycle length may be derived from the signal data, displayed and recorded. The system allows the user to monitor the acquisition of data, review the data, and generate reports on the data. Additionally, the system may acquire, amplify, display and record data received from other interfaced medical devices typically used during these procedures, such as imaging devices and RF generators. The CardioLab EP System does not control the delivery of energy, administer drugs, perform any life-supporting or life-sustaining functions, or analyze data acquired during the procedure. The CardioLab EP System does not transmit alarms or arrhythmias and does not have arrhythmia detection capabilities.

ComboLab System

The ComboLab System is the combination of the both the Mac-Lab and CardioLab EP systems. The ComboLab System is intended for use in either a catheterization laboratory or electrophysiological laboratory and related speciality laboratories under the direct supervision of a licensed healthcare practitioner. The ComboLab System allows the user to run either the Mac-Lab System or the CardioLab EP System, although only one may be used at a time.

CardioLab II Plus Amplifier

The CardioLab II Plus Amplifier is intended for use in an electrophysiological catheter laboratory or catheterization laboratory where ECG, direct cardiac, intracardiac and pressure signals need to be recorded from a patient. This device is intended for use under the direct supervision of a licensed health care practitioner.

Security Information

Validated configurations consist of product scenario implementations that are tested against GE product failure and sample cases run to simulate a real environment while conducting testing. GE provides service and support based on validated configurations only and bears responsibility for GE products only.

Non-Validated Software Applications

This is to detail the policy for non-validated software applications applied to the following products:

- Mac-Lab Hemodynamic Systems
- CardioLab Electrophysiology Systems
- ComboLab Hemodynamic and Electrophysiology Systems
- Centricity Cardiology INW Server

Policy

Our policy is that we do not recommend installations of any other third party software applications (that is, not mentioned above) on the products above as they could affect performance, warranty and serviceability. Examples of such might include other Anti-Virus programs, print servers, interface engines, anti-spyware, anti-adware, viruses, malware, and so on. GE does not support the use or installation of these non-validated applications or tools. If such programs are installed the customer bears the risk of the product not functioning properly and any risks that are introduced for patient safety. GE will not guarantee support for an environment that is different than a validated implementation. In cases where this is found and technical assistance is requested, GE will provide support, by first eliminating the third party software on the product and bringing it back to a known and validated configuration. If it is found that the third party software is the cause of product failure, any costs associated with this will be the responsibility of the hospital.

At GE Healthcare we understand the uniqueness of our customers and pride ourselves in the personalized solutions we provide to help you in your quest to care for patients. We hope this section will help you to better understand our policy on non-validated software applications and we hope you can work with us as we proceed in further developing our products for your future benefit.

Validated Third Party Software

Currently validated and allowed third party software such as Enterprise Back-up, Archival, Anti-virus and other applications to run on the same computer are:

Enterprise Backup Software

Mac-Lab/CardioLab/ComboLab	IT (Version 6.5.6)
IBM Tivoli Storage Manager	v6.1
Symantec Backup Exec for Windows Server	v12.5
CA ARCserv Backup for Windows	r12.5
EMC Networker	v7.5 + SP1

Validated Anti-Virus Software

The Mac-Lab/CardioLab 6.5.6 system has been validated to run with the software listed below. Except where noted, the software below supports English, French, German, Italian, Spanish, Swedish, Chinese, and Japanese:

Supported Anti-Virus Software	Supported Anti-Virus Software Version
CA eTrust Antivirus	r8.1
McAfee® VirusScan® (with McAfee ePolicy Orchestrator v4.0, Patch 5)	8.7i, Patch 2
Norton Antivirus™	2009
Symantec EndPoint Protection	11.0.5 (English, French, German, Italian, Spanish, Chinese) 11.0.4 MR4 + MP2 (Japanese)
Trend Micro OfficeScan Client/Server Edition	10.0

The Antivirus Server software can be installed at a hospital domain level and the Centricity Cardiology INW server can be a client for the Antivirus software.

Previously Validated Anti-Virus Software

The Mac-Lab/CardioLab system has previously been validated to run with the software listed below. It is recommended that systems run with one of the currently validated Anti-Virus software packages to avoid any unforeseen issues. Please refer to “Validated Anti-Virus Software” on page 1-16.

Supported Anti-Virus Software	Supported Anti-Virus Software Version
CA eTrust™ AntiVirus Enterprise (for a single Acquisition, Review, or Server)	r8.1
McAfee® VirusScan® (with McAfee ePolicy Orchestrator v4.0, Patch 3)	8.7i
McAfee Active VirusScan SMB Edition (for Acquisition, Review, or Server).	8.0
McAfee ProtectionPilot™	1.0.1, 1.5
McAfee VirusScan Enterprise	8.5i
Norton AntiVirus Edition (for Acquisition and Review) (Norton AntiVirus software must be the boxed copy. Do not download the software from internet.)	2005
Norton Antivirus™ (Norton AntiVirus software must be the boxed copy. Do not download the software from internet.)	2007
Symantec EndPoint Protection	11.0.4
Symantec AntiVirus (for Acquisition, Review, or Server)	9.0
Symantec AntiVirus Corporate Edition (for Acquisition, Review, or Server)	10.2
Trend Micro OfficeScan Client/Server Edition	8.0 + SP1
Trend Micro OfficeScan Client/Server Edition (for Acquisition, Review, or Server)	8.0 (English) 7.3 (non-English and non-Swedish)

3rd Party: PedCath

Language	PedCath Version
English	v7.6.7
French	v7.5.5
Swedish/German (see note)	v7.6.5
Italian	v7.5.5
Spanish	v7.5.5
Japanese	v7.4.3J
Chinese (see note)	v7.4.3J

NOTE

Chinese systems will use the Japanese version of PedCath. Swedish and German systems will use the English version of PedCath.

Service Information

Service Requirements

Follow the service requirements listed below:

- Equipment servicing should be performed by GE Healthcare authorized service personnel only.
- Any unauthorized attempt to repair equipment under warranty voids that warranty.
- It is the user's responsibility to report the need for service to GE Healthcare or one of their authorized agents.
- Failure on the part of the responsible individual, hospital, or institution using this equipment to implement a satisfactory maintenance schedule may cause undue equipment failure and possible health hazards.
- Regular maintenance, irrespective of usage, is essential to ensure that the system is always functional when required.

Product Identification

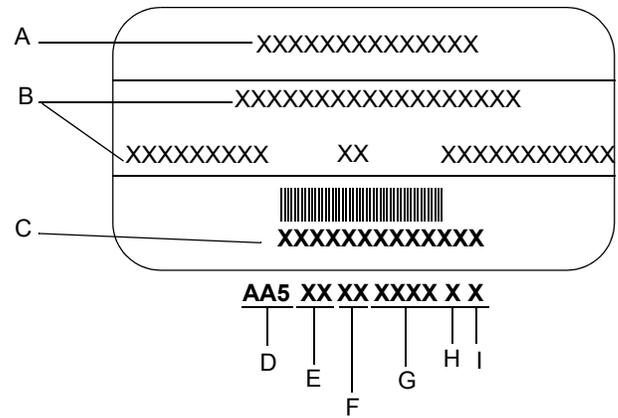
Every system has a unique serial number for identification. The serial number appears on the product labels which are located on the top of the CPU, the back of the Integrated Electronics Box (IEB), the right side of the RAC 4A, the back of the TRAM and the back of the Amplifier.



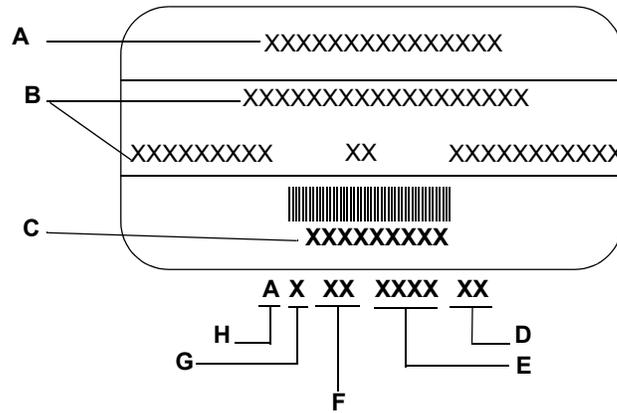
Identification Tag		
Item	Name	Description
1	Manufacture Date	Date of manufacture in YYYY-MM format.
2	Part Number of Product	GE Healthcare part number for product.
3	Product Code Description	Identifier for type of product.
4	Serial Number	Unique serial number for identification. Encoded as barcode below displayed number.
5	Manufacturer Information	Name and address of device manufacturer.

Old Identification Tags

Systems manufactured earlier may have one of the two following styles of identification labels instead.



Identification Tag	
Item	Name
A	Name of Device
B	Manufacturer
C	Serial Number
D	3-digit Product Code
E	Year Manufactured
F	Fiscal Week
G	Product Sequence Number
H	Manufacturing Site
I	Miscellaneous



Identification Tag	
Item	Name
A	Name of Device
B	Manufacturer
C	Serial Number
D	Facility Code
E	Product Sequence Number
F	Product Code
G	Year Manufactured
H	Month Manufactured

Required Tools and Supplies

The following is a list of tools needed to service the Mac-Lab/CardioLab system:

- Adjustable wrench with a 1-inch capacity
- Phillips screwdriver
- Needle nose pliers
- Pliers
- Socket wrench (3/16 inch to 1 inch size bits)
- Phillips head screwdriver (small and large sizes)
- Flat head screwdriver (small and large sizes)
- Cutting pliers
- Power outlet ground tester
- Grounding strap
- Simulator with ECG, pressure, cardiac output, and temperature outputs
- Cables to connect simulator to ECG inputs of amplifier and TRAM
- Cables to connect the simulator to the catheter input modules (2 mm shielded)
- Adapter cable to connect the simulator to the amplifier and TRAM pressure inputs
- Cables to connect the simulator to the TRAM, cardiac output, and temperature inputs

Power Input Requirements

If the equipment is installed in the USA and uses 240V rather than 120V, the source must be a center-tapped, 240V single phase circuit (120V, 20A; 240V, 10A).

Safety Information

Follow all of the instructions and warnings included in this manual and save these instructions for later use. However, these instructions in no way supersede current medical practices regarding patient care and safety.

Electromagnetic Compatibility and Interference

This catheterization system meets the requirements of the European Medical Device Directive, and by reference, the requirements for electromagnetic compatibility specified by EN 60601-1-2. This equipment is not likely to interfere with other equipment, except with certain types of rate adaptive pacemakers that rely on bioelectric impedance measurement (BIM) technology. Also, interference with the operation of this equipment is not likely to result from proximity to general equipment.

This equipment meets or exceeds Class A immunity levels. However, avoid the use of strong intentional radio transmitters in the immediate vicinity, including cellular telephones. The use of strong unintentional radiators, such as electrosurgical equipment, may cause some level of interference. GE Healthcare offers optional ECG patient cables with electrosurgical noise filtering, which reduces the level of interference on ECG traces.

The Mac-Lab/CardioLab system and CardioLab Plus II Amplifier meets the requirements of IEC 60601-1-2 Medical Electrical Equipment, Part 1: General Requirements for Safety, 2. Collateral Standard: Electromagnetic compatibility - Requirements and tests.

If using electrosurgical or RF ablation equipment in conjunction with this equipment, select an ESU filtered cable. For more information about management of the equipment in the clinical environment (from an electromagnetic compatibility perspective) consult the Association for the Advancement of Medical Instrumentation's technical information report *Guidance on Electromagnetic Compatibility of Medical Devices for Clinical/Biomedical Engineers*.

Exception

ECG Parameter

IEC 60601-1-2 clause 36.202.1 - Immunity: Radiated Immunity –

The level of compliance is less than 1V/m

If operating under the conditions defined in EMC Standard EN 60601-1-2 (Radiated Immunity 3V/m), field strengths less than 1V/m may cause waveform distortions and erroneous numeric data at various electromagnetic interference (EMI) frequencies.

Recommendations:

Review the AAMI EMC Committee technical information report (TIR-18) titled Guidance on electromagnetic compatibility of medical devices for clinical / biomedical engineers - Part 1: Radiated radio-frequency electromagnetic energy. This TIR provides a means to evaluate and manage the EMI environment in the hospital.

The following actions can be taken:

- managing (increasing) distance between sources of EMI and susceptible devices
- managing (removing) devices that are highly susceptible to EMI
- lower power from internal EMI sources under hospital control (i.e. paging systems)
- labeling devices susceptible to EMI
- educating staff (nurses and doctors) to be aware of, and to recognize, potential EMI related problems

EU Battery Directive 2006/66/EC

The Mac-Lab/CardioLab product conforms to the EU Battery Directive 2006/66/EC.

The Uninterruptable Power Supply (UPS) supplied with the IEB of the Mac-Lab/CardioLab contains lead/acid storage batteries. These batteries are a permanent part of the UPS assembly and are not intended to be removed or changed. Attempting to remove or change these batteries may result in an unsafe condition.



The separate collection symbol is affixed to a battery, or its packaging, to advise you that the battery must be recycled or disposed of in accordance with local or country laws. The letters below the separate collection symbol indicate whether certain elements (Pb=Lead, Cd=Cadmium, Hg=Mercury) are contained in the battery. To minimize potential effects on the environment and human health, it is important that all marked batteries that you remove from the product are properly recycled or disposed. Information on the potential effects on the environment and human health of the substances used in batteries is available at the urls below:

<http://www.gehealthcare.com/euen/weee-recycling/index.html>

<http://www.epa.gov/mercury/about.htm>

<http://www.cdc.gov/niosh/npg/npgd0383.html>

<http://www.epa.gov/lead/>

<http://www.cdc.gov/niosh/npg/npgd0368.html>

<http://www.cdc.gov/niosh/npg/npgd0087.html>

<http://www.epa.gov/waste/hazard/wastemin/minimize/factshts/cadmium.pdf>

Responsibility of the Manufacturer

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

- Installation operations, extensions, readjustments, modifications, or repairs are performed by persons authorized by GE Healthcare.
- The equipment is used in accordance with the instructions provided.
- The user attaches only accessory equipment recommended for interaction with the amplifier.

General

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

The Mac-Lab/CardioLab system, including the CardioLab Plus II Amplifier, maintains leakage currents below medical limits with an isolation transformer which is incorporated into the design of the integrated electronics box (IEB). The system power is supplied by a dedicated power supply on an isolated circuit for proper behavior of the system.

To ensure patient safety, use only parts and accessories manufactured or recommended by GE Healthcare. Parts and accessories used must meet the requirements for the applicable EN 60601 series safety standards, and the system configuration must meet the requirements of the EN 60601-1 medical electrical systems standard. Contact GE Healthcare before connecting any device to this system that is not recommended for use in this manual.

If the equipment is installed in the USA and uses 240V rather than 120V, the source must be a center-tapped, 240V single-phase circuit.

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

This equipment should only be connected as specified by GE Healthcare. Installation of the equipment should only be performed by qualified GE Healthcare service representatives.

Contact GE Healthcare for information before connecting any device to this equipment that is not recommended in this manual. Only cables and accessory equipment purchased from GE Healthcare should be used in conjunction with the system.

It is important that all of the instructions in this manual be followed. However, these instructions in no way supersede current medical practices regarding patient care and safety.

Refer servicing of the equipment to GE Healthcare authorized service personnel. Any attempt to repair equipment under warranty will void that warranty.

Failure on the part of responsible individuals or institutions to implement a satisfactory equipment maintenance schedule may lead to undue equipment failure and possible health hazards.

The use of ACCESSORY equipment not complying with the equivalent safety requirements of this equipment may lead to a reduced level of safety of the resulting system. Consideration relating to the choice includes:

- Use of the accessory in the Patient Vicinity.
- Evidence that the safety certification of the Accessory is performed in accordance with the appropriate EN 60601-1 and EN 60601-1 harmonized national standard.

The CardioLab II Plus Amplifier is a component/accessory of a Class II medical device.

Equipment Symbols

Equipment Symbols



50- 60 Hz	V~	I	
	100 - 240V	0.50A - 0.25A	3A, 250V



Descriptions

CE Marking

Underwriters Laboratories, Inc.

Classified by Underwriters Laboratories Inc. with respect to electric shock, fire, mechanical and other specified hazards, only in accordance with UL 2601-1, CAN/CSA C22.2 No. 601.1, IEC 60601-1 and IEC 60601-1-1.

Power Ratings Chart:

V~ = V = Voltage, ~ = Alternating Current

I = Current

Fuse =

Equipotential Ground Point

A nonessential electrical connection which may be used to connect the chassis to other equipment to achieve the same potential.

Equipment Symbols

Descriptions

**Type CF Equipment that is Defibrillator Proof**

Type CF Applied Part: Isolated (floating) applied part suitable for intentional external and internal application to the patient excluding direct cardiac application. The “paddles” outside the box indicate that the part is defibrillator proof.

(Medical Standard Definition:) F-Type applied part (floating/isolated) complying with the specified requirements of IEC 60601-1/UL 2601-1/CSA 601.1 Medical Standards provide a higher degree of protection against electric shock than that provided by Type B applied parts.

**Type CF Equipment**

Type CF Applied Part: Isolated (floating) applied part suitable for intentional external and internal application to the patient excluding direct cardiac application.

(Medical Standard Definition:) F-Type applied part (floating/isolated) complying with the specified requirements of IEC 60601-1/UL 2601-1/CSA 601.1 Medical Standards provide a higher degree of protection against electric shock than that provided by Type B applied parts.

**Type BF Equipment that is Defibrillator Proof**

Type BF Applied Part that is defibrillator proof: Isolated (floating) applied part suitable for intentional external and internal application to the patient excluding direct cardiac application. “Paddles outside the box indicate the applied part is defibrillator proof.

(Medical Standard Definition:) F-Type applied part (floating/isolated) complying with the specified requirements of IEC 60601-1/UL 2601-1/CSA 601.1 Medical Standards provide a higher degree of protection against electric shock than that provided by Type B applied parts.

**Atmospheric Pressure Limits****Temperature Limits****Humidity Limits****Attention**

Pay attention to the documents delivered with the equipment.

**Input Symbol**

Equipment Symbols

Descriptions



General Warning



Manufacturer



Date of Manufacture



Consult Instructions for Use



WARNING: SHOCK HAZARD

Remove power cord from the mains source by grasping the plug. Do not pull on the cable. This may cause cable damage, which could result in loss of protective earthing or exposure to mains voltage.

Compliance Information

Mac-Lab/CardioLab System

Declaration - Electromagnetic Emissions		
The Mac-Lab / CardioLab System is intended for use in the electromagnetic environment specified below. The customer or the user of the Mac-Lab / CardioLab System should assure that it is used in such an environment.		
Emissions Tests	Compliance	Electromagnetic environment guidance
RF emissions CISPR 11	Group 1	The Mac-Lab / CardioLab System uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class A	The Mac-Lab / CardioLab System is suitable for use in all establishments other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC 61000-3-2	Class A	
Voltage fluctuations/Flicker emissions IEC 61000-3-3	Complies	

Declaration - Electromagnetic Immunity			
The Mac-Lab / CardioLab System is intended for use in the electromagnetic environment specified below. The customer or the user of the Mac-Lab / CardioLab System should assure that it is used in such an environment.			
Immunity Test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environment - Guidance
Electrostatic discharge (ESD) IEC 61000-4-2	± 6 kV contact ± 8 kV air	± 6 kV contact ± 8 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000-4-4	± 2kV for power supply lines (signal lines exempt from testing, length is less than 3 m)	± 2kV for power supply lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	± 1kV differential mode ± 2kV common mode	± 1kV differential mode ± 2kV common mode	Mains power quality should be that of a typical commercial or hospital environment.

Declaration - Electromagnetic Immunity			
The Mac-Lab / CardioLab System is intended for use in the electromagnetic environment specified below. The customer or the user of the Mac-Lab / CardioLab System should assure that it is used in such an environment.			
Immunity Test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environment - Guidance
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	<5% 100-120Vac <5% 200-240Vac (>95% dip) for 0.5 cycle 40% 100-120Vac 40% 200-240Vac (>60% dip) for 5 cycles 70% 100-120Vac 70% 200-240Vac (>30% dip) for 25 cycles <5% 100-120Vac <5% 200-240Vac (>95% dip) for 5 seconds	<5% 100-120Vac <5% 200-240Vac (>95% dip) for 0.5 cycle 40% 100-120Vac 40% 200-240Vac (>60% dip) for 5 cycles 70% 100-120Vac 70% 200-240Vac (>30% dip) for 25 cycles <5% 100-120Vac <5% 200-240Vac (>95% dip) for 5 seconds	Mains power quality should be that of a typical commercial or hospital environment. If the user of the Mac-Lab / CardioLab System requires continued operation during power mains interruptions, it is recommended that the Mac-Lab / CardioLab System be powered from an Uninterruptable power supply or a battery.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location typical commercial or hospital environment.

Declaration - Electromagnetic Immunity

The Mac-Lab / CardioLab System is intended for use in the electromagnetic environment specified below. The customer or the user of the Mac-Lab / CardioLab System should assure that it is used in such an environment.

Immunity Test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environment - Guidance
Conducted RF emissions IEC 61000-4-6	3 Vrms 105kHz to 80 MHz with 2 Hz modulation	3 Vrms	Portable and mobile RF communications equipment should be used no closer to any part of the Mac-Lab / CardioLab System, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance (d) $d = 1.2 P$
Radiated RF emissions IEC 61000-4-3	3V/m80 MHz to 2.5 GHz	3 V/m	$d = 1.2 P$ $d = 2.3 P$ where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters(m).Field Strengths from fixed RF transmitters, as determined by a electromagnetic site survey ¹ , should be less than the compliance level in each frequency range ² . Interference may occur in the vicinity of equipment marked with the following symbol: 

NOTE

At 80 MHz and 800 MHz, the higher frequency range applies.

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

¹ Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the Mac-Lab / CardioLab System is used exceeds the applicable RF compliance level above the Mac-Lab / CardioLab System should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the Mac-Lab / CardioLab System.

² Over the frequency range 150 kHz to 80 MHz. Field strengths should be less than 3 V/m

**Recommended Separation Distances Between
Portable and Mobile RF Communications Equipment and the Mac-Lab/CardioLab system**

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

Rated Maximum Output Power of Transmitter W	Separation Distance According to Frequency of Transmitter m		
	150 kHz to 80 MHz $d = 1.2\sqrt{P}$	80 MHz to 800 MHz $d = 1.2\sqrt{P}$	800 MHz to 2.5 GHz $d = 2.3\sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

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

NOTE

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

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

2 Equipment Overview

Typical System Configuration

NOTE

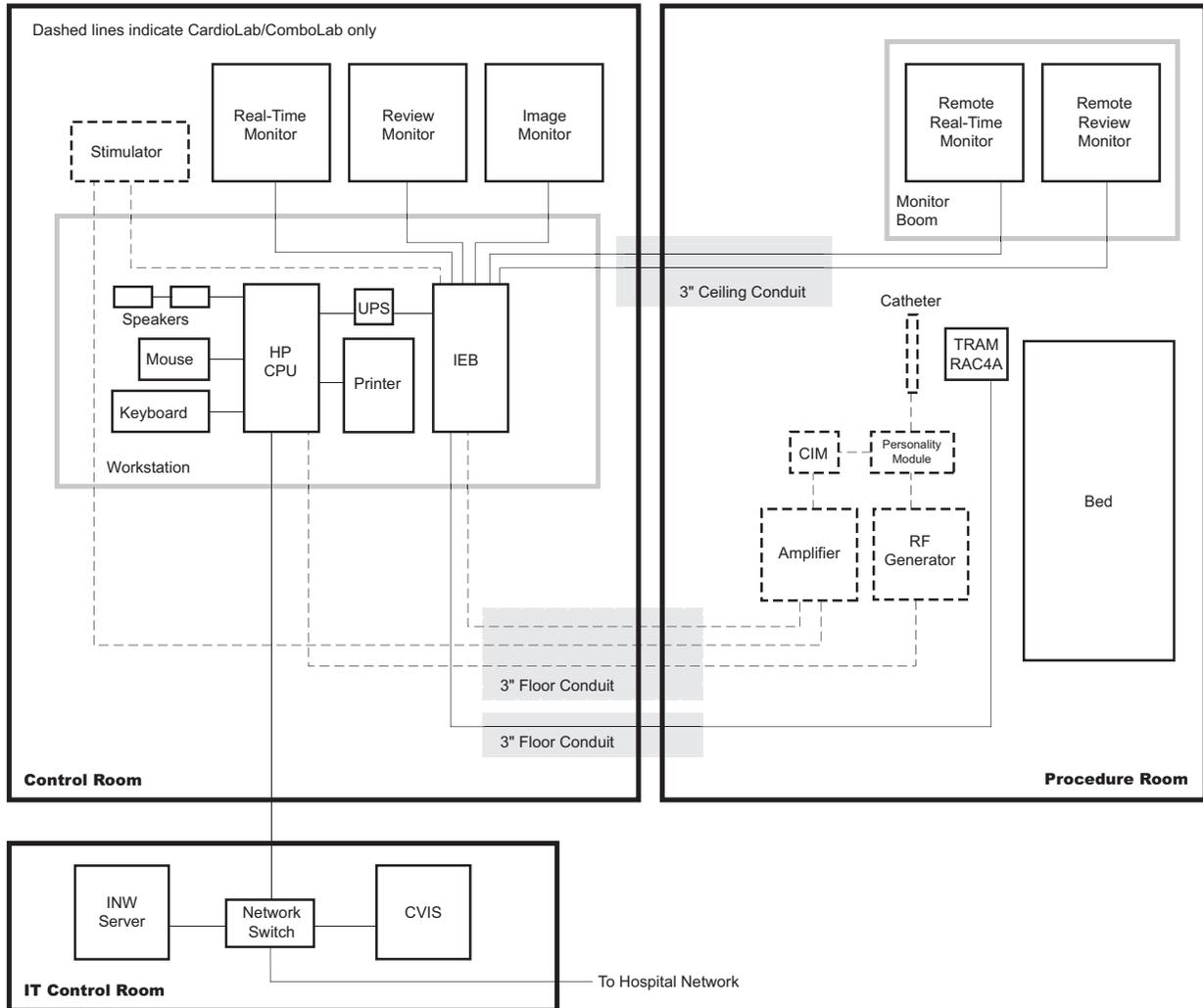
For configuration, component and connection information for HP xw8200 and HP xw8000 computers, refer to the Mac-Lab/CardioLab/Centricity Cardiology INW Service Manual v6.5 (PN 2021423-022).

This system may consist of either Mac-Lab (hemodynamic), CardioLab (electrophysiologic), or ComboLab (both systems).

The system may be standalone or connected to a network. Network installations include a Centricity Cardiology INW server. In this manual, INW refers to Centricity Cardiology INW. It may be connected to an optional CVIS server.

The system may also include a CardioLab II Plus Amplifier, also referred to as CLab II Plus.

The following block diagram shows a typical setup.



Control Room Components

- **Acquisition Computer**
 - ◆ USB Mouse
 - ◆ Keyboard
 - ◆ Barcode scanner
- **Integrated Electronics Box (IEB):** The IEB provides power to local system components, signal pass through video and communications.
- **Uninterruptible Power Supply (UPS):** The UPS provides emergency power to the HP computer.
- **Monitors:** Two monitors (Real-Time and Review) are standard. A third Image monitor is optional.
- **Local speakers:** Provide output for ECG QRS tone and optional audible indicators.
- **Laser Printer:** Prints images or reports.
- **Cardiac Stimulator:** Provides direct cardiac stimulation to assist the physician during an EP case.

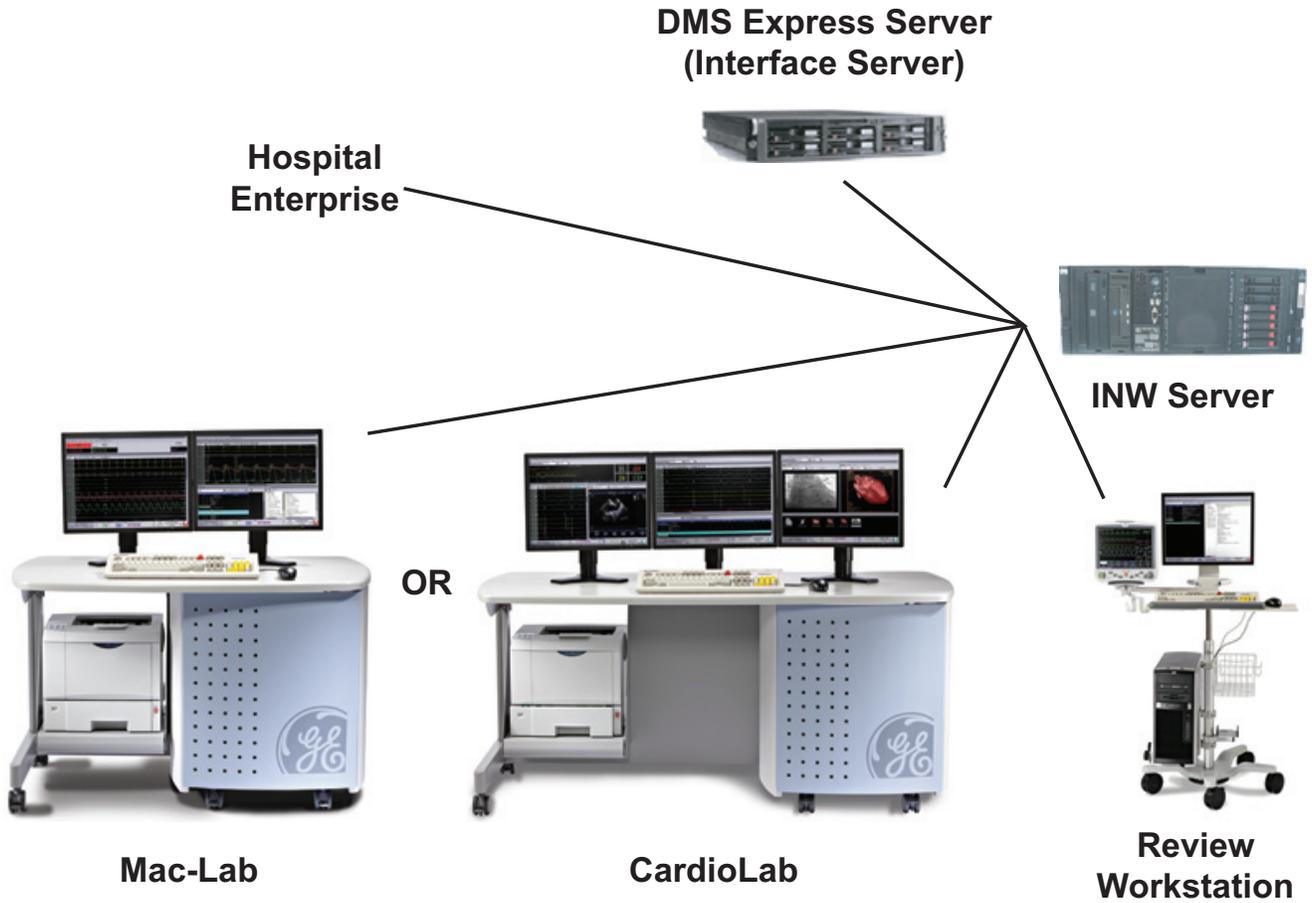
Procedure Room Components

- **Monitors:** One remote monitor is standard (and is software switchable between Real-Time and Review windows). A second monitor is optional.
- **Remote speakers:** Provide output for ECG QRS tone and optional audible indicators in the procedure room.
- **TRAMNet:** The TRAMNet gathers patient data for the Mac-Lab system. The TRAMNet consists of a Remote Acquisition Case (RAC-4A) and a Transport Remote Acquisition Module (TRAM).
- **CardioLab II Plus Amplifier:** The Amplifier gathers data for both the ComboLab and CardioLab systems.
- **CARTO™ System (Patient Interface Unit):** Provides 3D electroanatomical cardiac maps to the CardioLab.
- **Analog Output Box:** Distributes Heart rate and blood pressure signals from the TRAMNet and Amplifier to other equipment.
- **Review Workstation:** Client installed in physician office or outside lab. Provides post-procedure analysis capabilities such as generating reports.
- **Nurses Workstation:** Client used during the study. Provides the operator with the ability to participate in an active study and perform actions such as document administered medications and supplies consumed.

IT Control Room Equipment

- Network Switch
- Centricity Cardiology INW Server
- CVIS Server

Network Connections



System Hardware

WARNING

SHOCK HAZARD — Use appropriate Lock Out/Tag Out procedures before performing any service on potentially energized equipment.

Acquisition Workstation System Components

HP Computer

The HP computer is used for either Acquisition systems or Review workstations and has the following components:

- Primary Hard Drive with two partitions:
 - ◆ C: Application partition
 - ◆ D: Data partition
- Optional Magneto-Optical drive (Drive E:).

NOTE

The optional Magneto-Optical drive is only available on HP xw8400 computers.

- DVD-RAM drive (Drive F:).

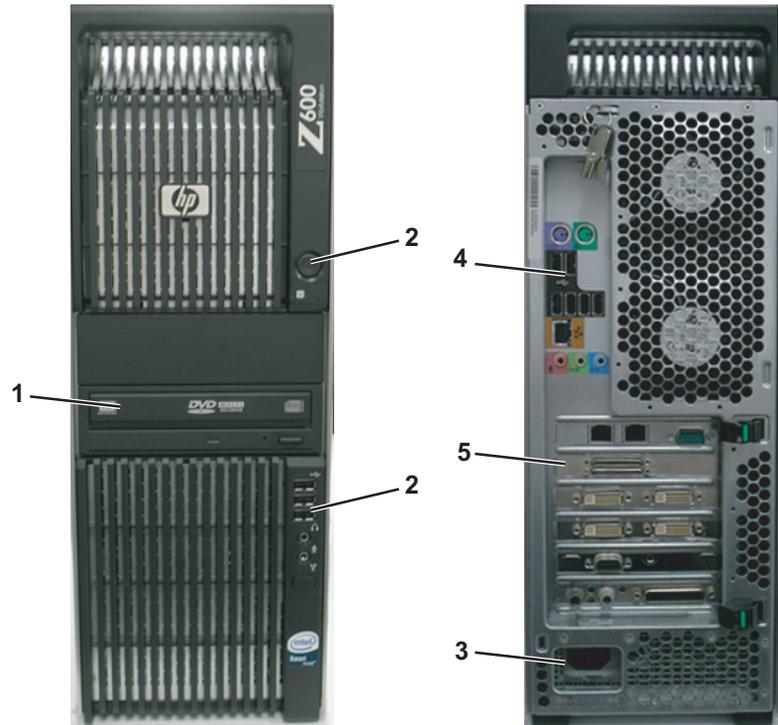
NOTE

The drive used to store application studies is determined by the file paths set in under *System Settings* in the main application menu.

- Secondary Hard Drive (Drive G:).
- Four standard expansion cards (plus optional cards):
 - ◆ HP xw8400: Matrox Parhelia video board provides video out for the Real-Time (Video 1) and Review (Video 2) monitors.
 - ◆ HP z600: Matrox M9140 video board provides video out for the Real-Time (Video 1), Review (Video 2), and optional (Video 3) monitors.
 - ◆ TRAMNet to Ethernet Adapter board for communication with the TRAM in the RAC 4A.
 - ◆ PCI Communication board to provides Amplifier Communication, Analog and Digital I/O, and Switched video (video out from the IEB).
 - ◆ Dual NIC Adapter board provides Network connection.
 - ◆ Optional on HP xw8400: Adaptec Ultra320 SCSI PCIe board for supporting MO drive.
 - ◆ Optional on HP xw8400: Matrox Odyssey XA board used to capture images from an X-Ray or other imaging system.

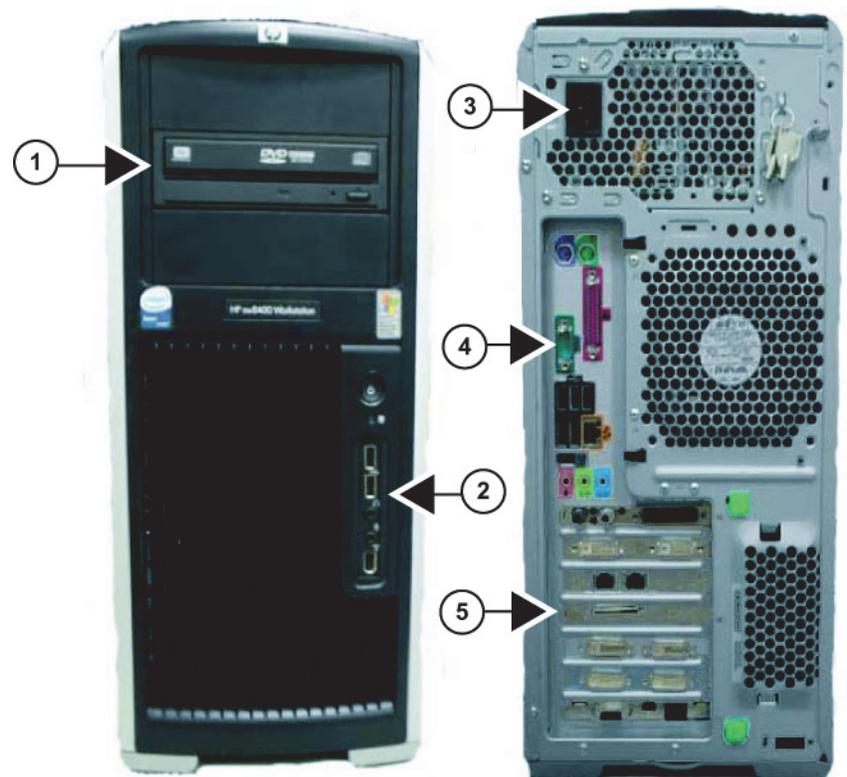
- ◆ Optional on HP xw8400: ATI FIREGL V5200 256MB PCI-E or ATI FIREGL V3350 256MB PCI-E Video board. Provides video out for optional (video 3) monitor.
- ◆ Optional on HP z600: Matrox Odyssey EA board used to capture images from an X-Ray or other imaging system.

External Components and Connections for the HP z600



Label	Part Number	Description
1	2028599-002	DVD-RAM Drive
2	N/A	Power Switch
3	N/A	LEDs, USB, Firewire, and Audio connections
4	N/A	Backplane I/O panel
5	N/A	Board Slots
6	N/A	AC Power
Not Shown	2026539-001	HP USB 2-Button Optical Mouse with Wheel
Not Shown	Various	Keyboard (dependent on language)

External Components and Connections for the HP xw8400

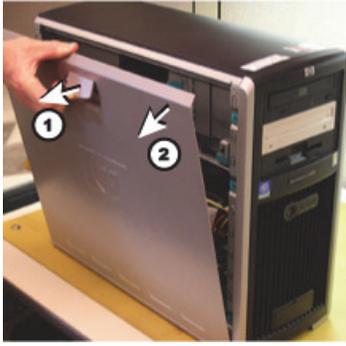
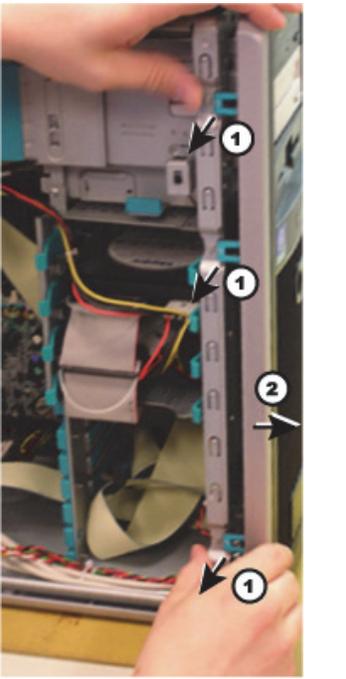


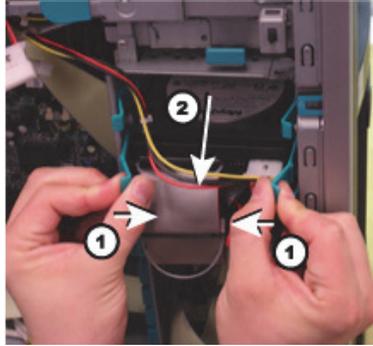
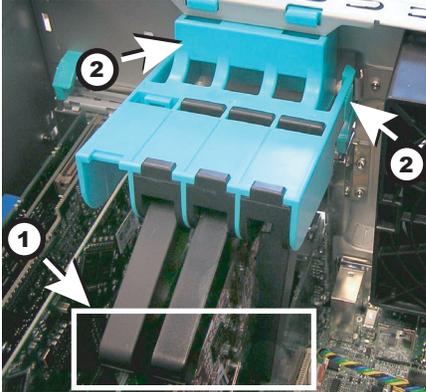
Label	Part Number	Description
1	2028599-002	DVD-RAM Drive
2	N/A	Power Switch, LEDs, USB, Firewire, and Audio connections
3	N/A	AC Power
4	N/A	Backplane I/O panel
5	N/A	Board Slots
Not Shown	2003340-001	Magneto-Optical Drive (optional)
Not Shown	2026539-001	HP USB 2-Button Optical Mouse with Wheel
Not Shown	Various	Keyboard (dependent on language)

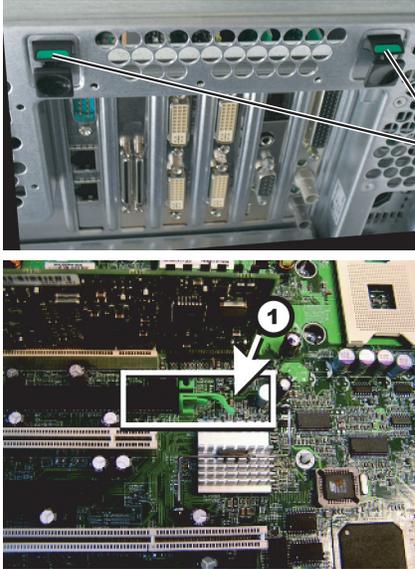
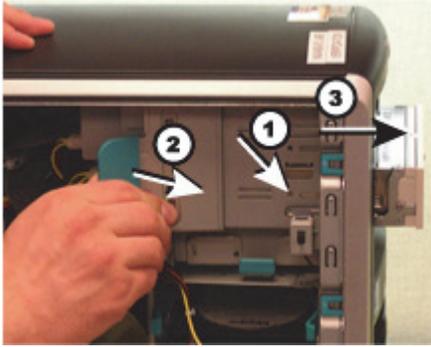
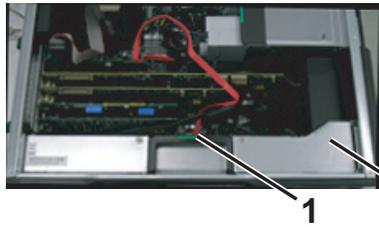
Disassembly

WARNING

GROUNDING HAZARD — Electrostatic discharge (ESD) can damage electronic components. Be sure you are properly grounded before opening any equipment.

	<p>Remove Case Side Panel</p> <ol style="list-style-type: none">1. Lift the tab near the top.2. Swing the side panel out.
	<p>Remove Front Panel - HP xw8400 only</p> <ol style="list-style-type: none">1. Lift tabs indicated.2. Swing the front panel out.

	<p>Remove Hard Drive - HP xw8400 only</p> <ol style="list-style-type: none"> 1. Press tabs as indicated. 2. Slide drive out.
	<p>Remove Hard Drive - HP z600 only</p> <ol style="list-style-type: none"> 1. Press tab to release handle. 2. Pull drive out.
	<p>Remove the AGP/PCI Card Support Assembly - HP xw8400 only:</p> <ol style="list-style-type: none"> 1. Squeeze in the tabs, where indicated. Gently push in, then pull out. 2. Lift off the clamp.

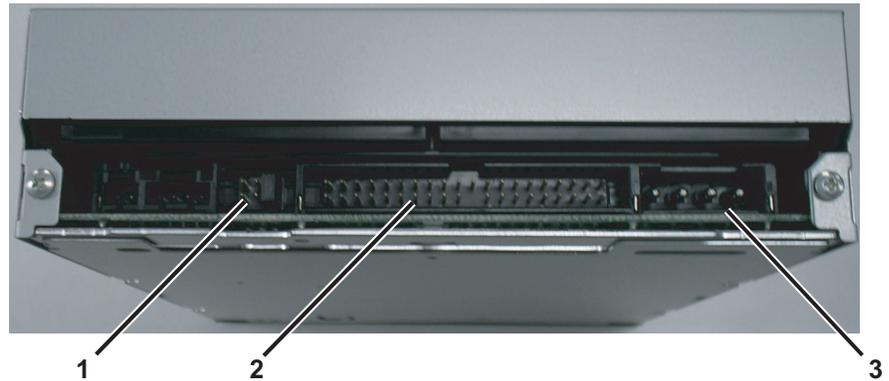
	<p>Remove PCI Boards</p> <ol style="list-style-type: none">1. Open the PCI retainer by pressing down on the green tabs and moving the retainer away.2. Matrox M9140 only: Carefully hold the board release tab toward the top of the case.3. Gently pull the board out of the computer case.
	<p>Remove DVD-RAM Drive</p> <ol style="list-style-type: none">1. Remove screw, if present.2. Lift tab indicated.3. Slide drive out.
	<p>Remove Power Supply - HP z600 only</p> <ol style="list-style-type: none">1. Pull green handle to release power supply.2. Slide power supply out.

DVD-RAM Drive

The DVD-RAM drive can also read/write to CDs. The recommended disks have a capacity of approximately 4.7 GB per side.

NOTE

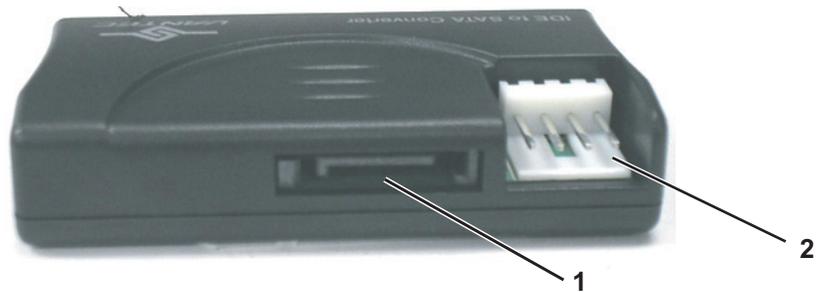
The drive used to store application studies is determined by the file paths set in under *System Settings* in the main application menu.



- 1: DVD-RAM Drive Jumpers
- 2: IDE Connector
- 3: Power Connector

SATA-to-IDE Converter - HP z600 Only

The DVD-RAM drive is connected using a SATA-to-IDE converter.



Label	Description
1	SATA Connection
2	4-pin Power Connection
Not Shown	IDE Connection (on back of device)

Optical Drive

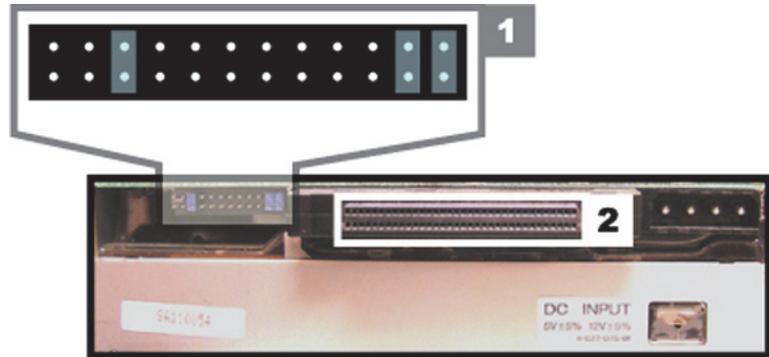
The optical drive is an optional upgrade to HP Computers.

NOTE

The optional Magneto-Optical drive is not available on HP z600 computers.

NOTE

Drive use is determined by the file paths set in under *System Settings* in the main application menu.



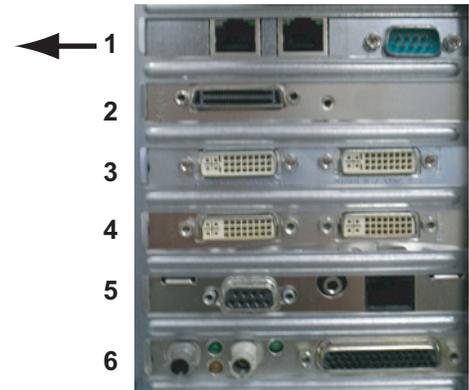
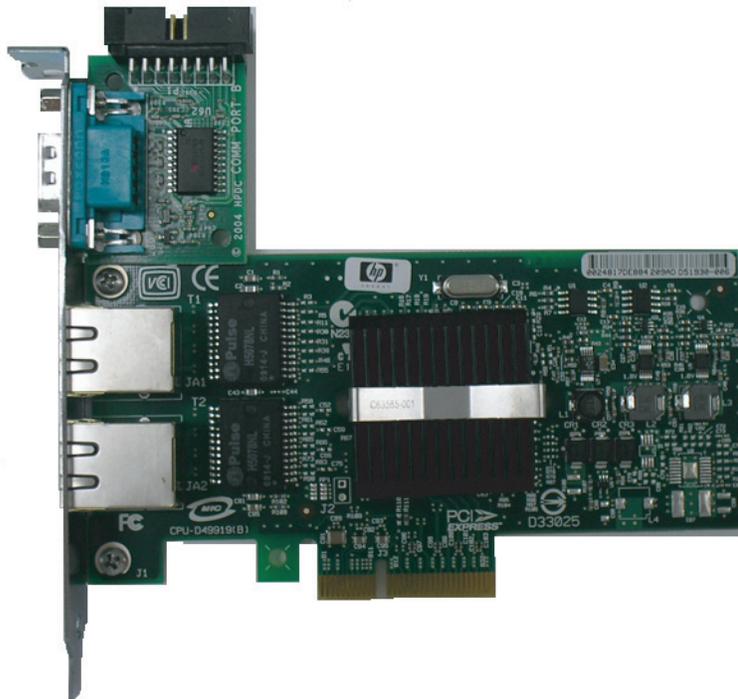
- 1: Optical Drive Jumpers
- 2: SCSI Adapter (PN 2012522-002)

NOTE

Two sets of DIP switches are located on the top optical drive. These are factory preset and must not be changed.

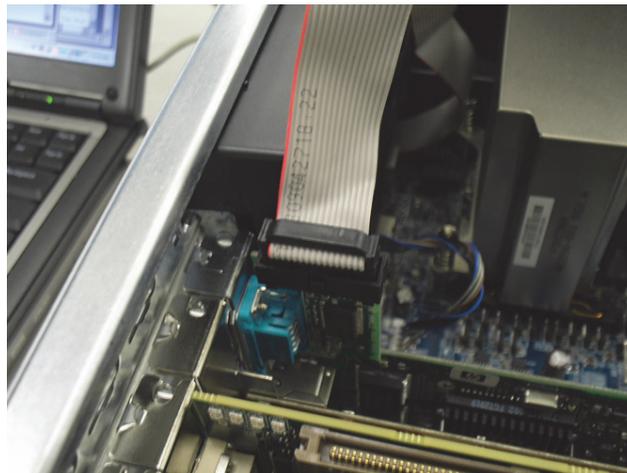
HP z600 Installed Boards

HP z600 Custom Dual NIC Adapter Board

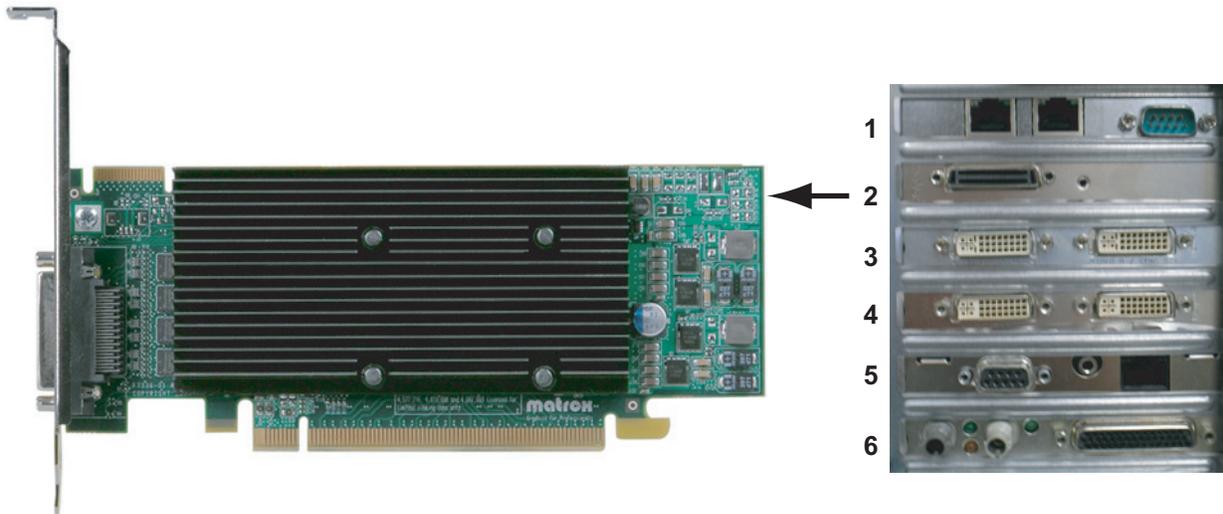


- Part Number: 2047766-001
- Location: Slot 1
- Function: Network connection card, ablation connection card.
- I/O: Two network connection jacks, one serial port (for connection to ablation devices)

Uses internal serial connection from motherboard:

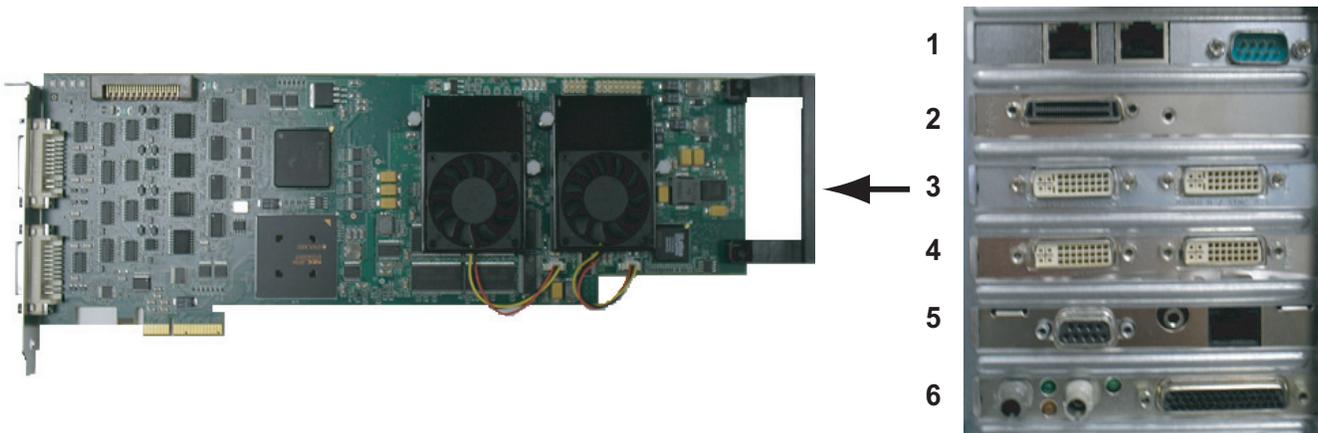


HP z600 Matrox Quad Board M9140 LP Video Board



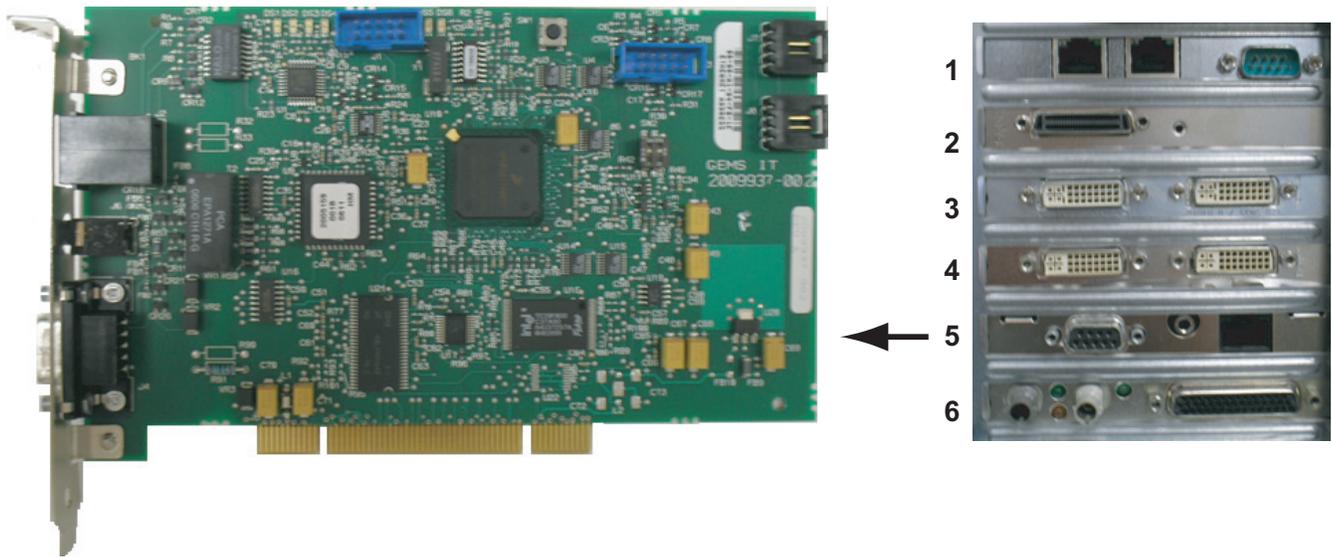
- Part Number: 2049434-001
- Location: Slot 2
- Function: Video out for Monitor 1, Monitor 2 and Monitor 3 (optional)
- I/O: One proprietary connector. Provides four DVI/VGA output ports through a custom connector.



HP z600 Matrox Odyssey eA Board (Optional)

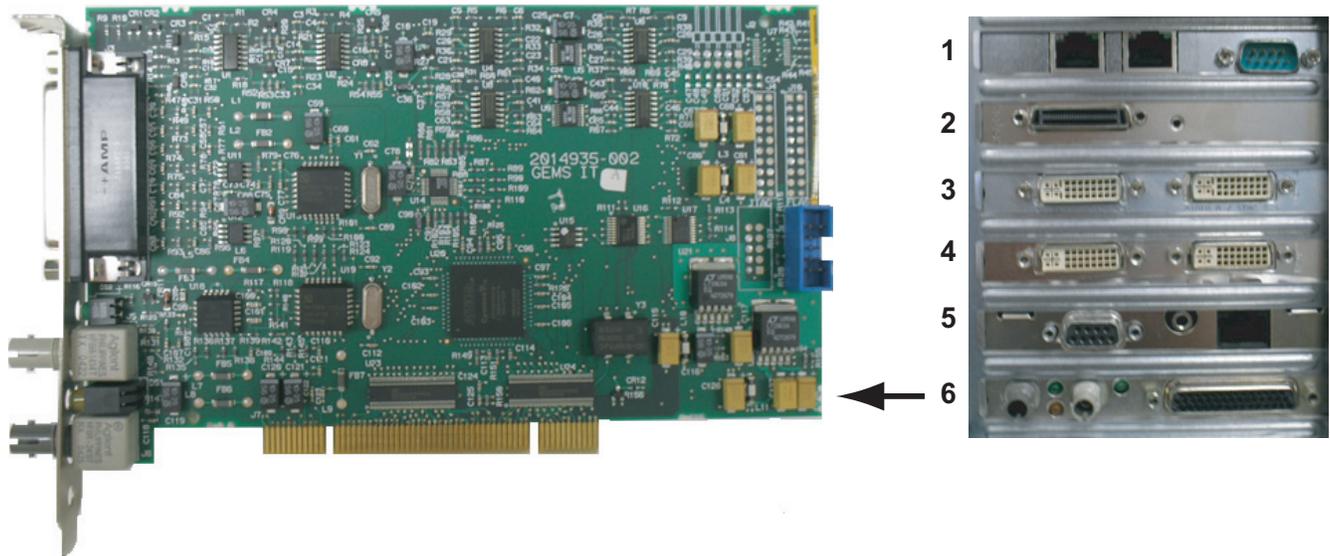
- Part Number: 2049435-001
- Location: Slot 3
- Function: Image capture for X-Ray or other imaging systems
- I/O: Two DVI connectors

HP z600 TRAMNet to Ethernet Adapter board



- Part Number: 2009937-003
- Location: Slot 5
- Function: Provides communication with the TRAM in the RAC 4A, and converts signals from the TRAM to the ethernet.
- I/O: Network Interface Port and 9-Pin D connector

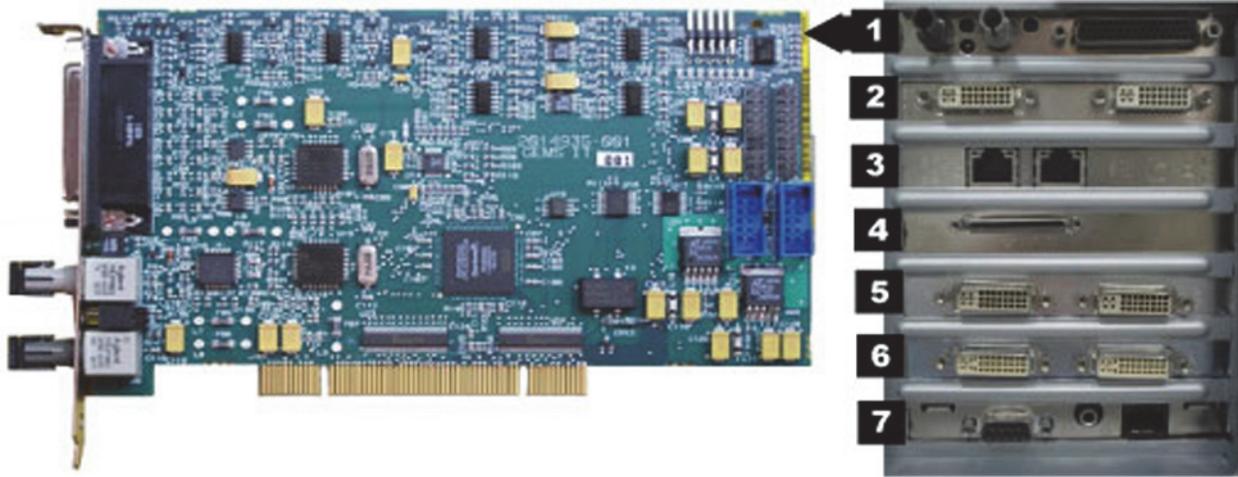
HP z600 PCI Communication Board



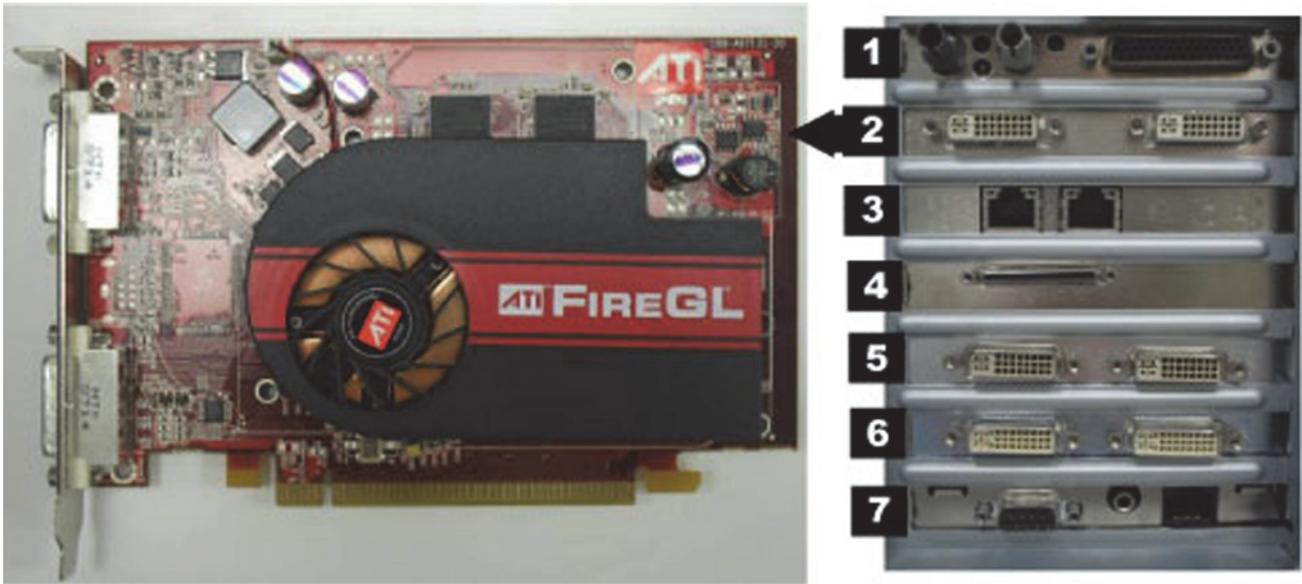
- Part Number: 2014935-002
- Location: Slot 6
- Functions:
 - ◆ Communicates with the CardioLab II Plus Amplifier via the fiber optic connectors
 - ◆ Analog and Digital communication with the IEB via the D-Connector
 - ◆ Provides the video switching signal for the Switched Video output on the IEB via the D-Connector
- I/O: D-Connector to IEB, Fiber Optic Jacks to the Amplifier

HP xw8400 Installed Boards

HP xw8400 PCI Communication Board

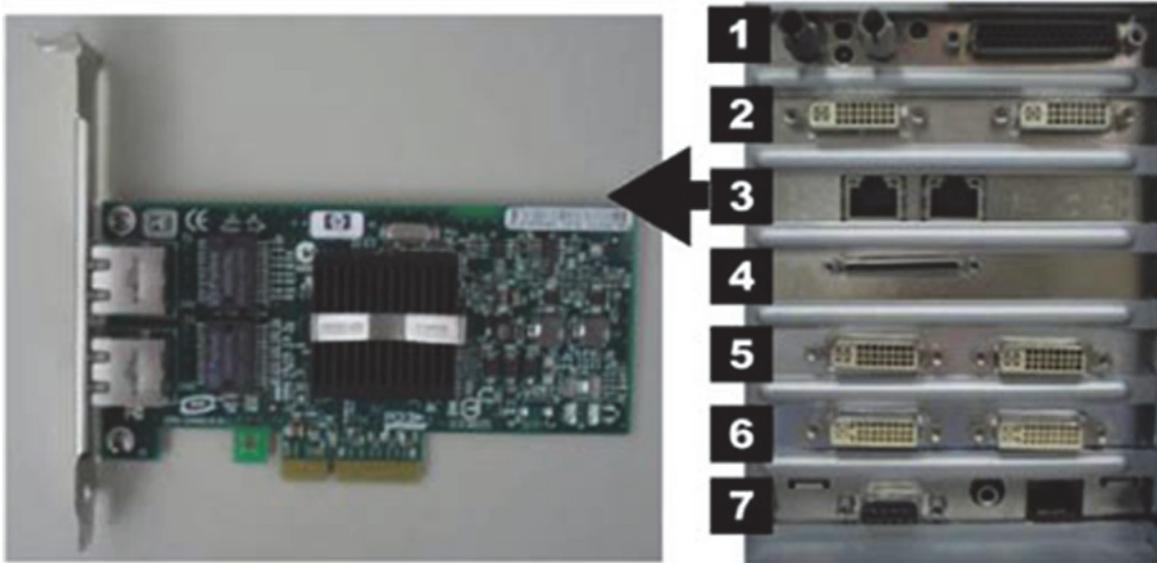


- Part Number: 2014935-002
- Location: Slot 1
- Functions:
 - ◆ Communicates with the CardioLab II Plus Amplifier via the fiber optic connectors
 - ◆ Analog and Digital communication with the IEB via the D-Connector
 - ◆ Provides the video switching signal for the Switched Video output on the IEB via the D-Connector
- I/O: D-Connector to IEB, Fiber Optic Jacks to the Amplifier

HP xw8400 ATI FIREGL V5200 256MB PCI-E Video Board (Optional)

- Part Number: 2026189-002
- Location: Slot 2
- Function: Video out for optional (video 3) monitor
- I/O: Two DVI connectors (only the left one is used)

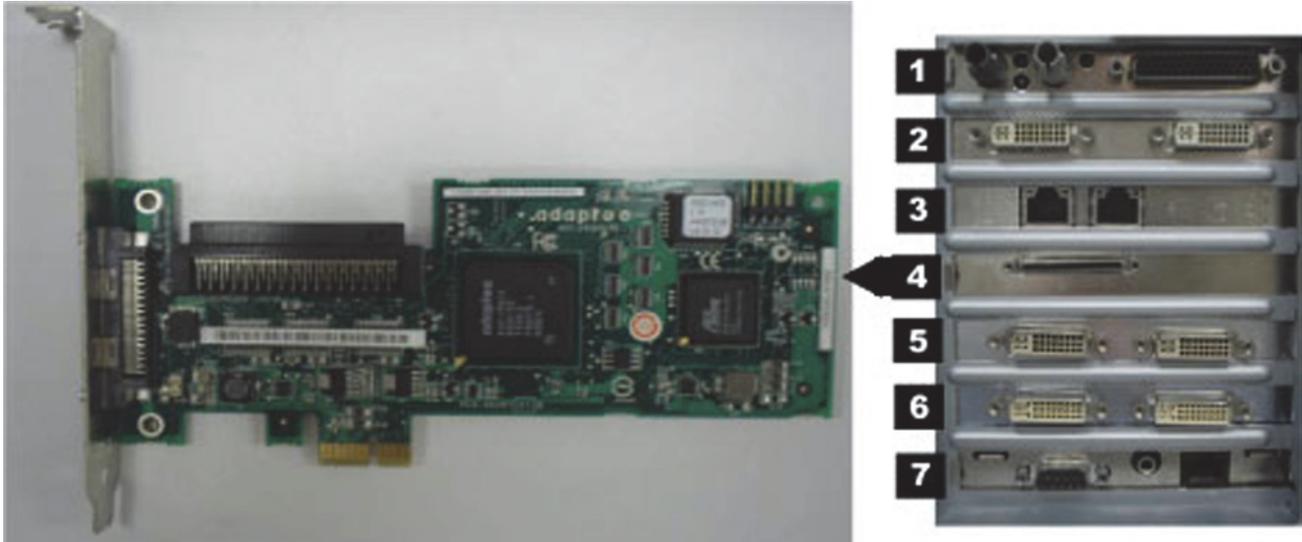
HP xw8400 Dual NIC Adapter Board



- Part Number: 2017795-002
- Location: Slot 3
- Function: Network connection card
- I/O: Two network connection jacks

HP xw8400 PCIX 2 SCSI Card**NOTE**

This board is optional with the MO upgrade kit (available only for 2034493-002 – 2034493-004 Acquisition configurations).

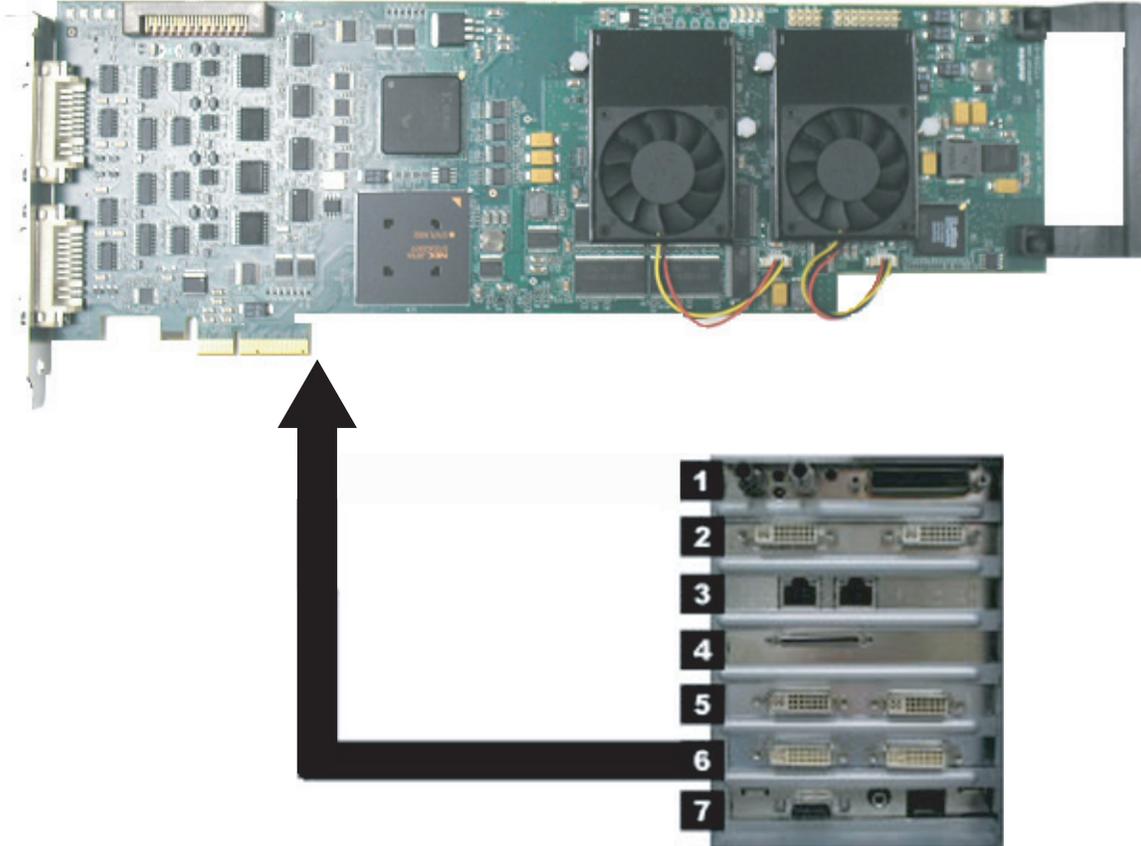


- Part Number: 2038632-001
- Location: Slot 4
- Function: Provides SCSI cable connection internally to an optional MO Drive.
- I/O: Two SCSI connectors (only internal SCSI is used)

HP xw8400 Matrox Parhelia PCI 256 MB Video Card

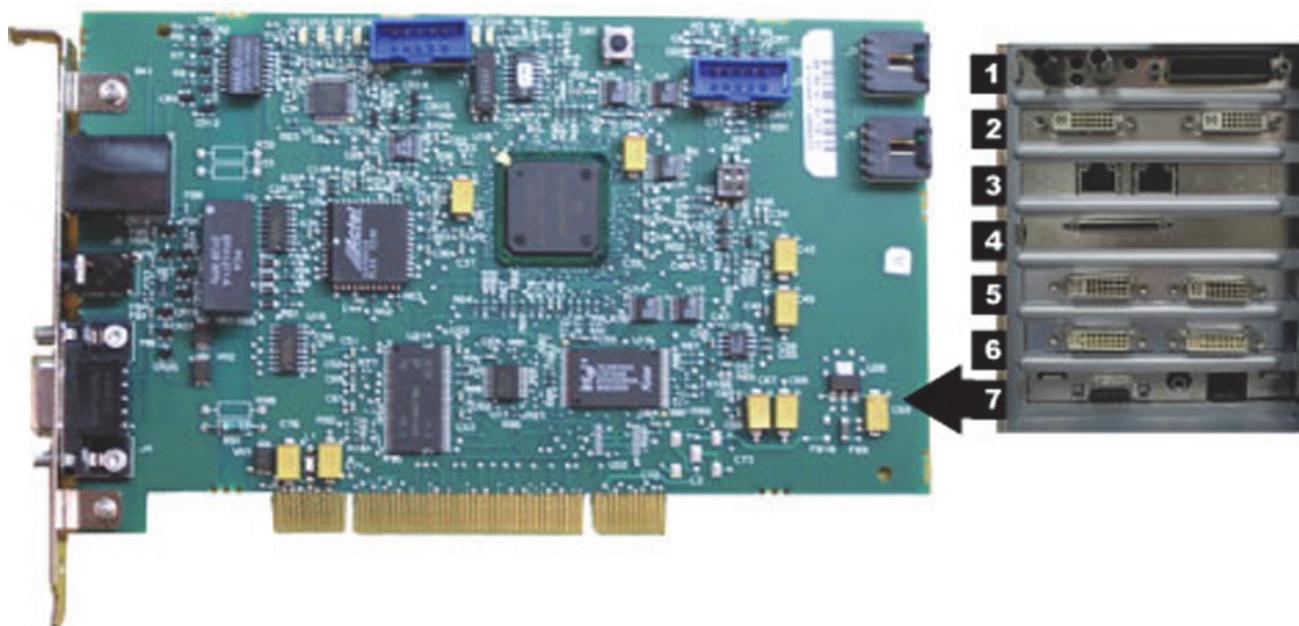


- Part Number: 2026188-001
- Location: Slot 5 (PCI slot)
- Function: Provides video out for the Real-Time (Video 1) and Review (Video 2) monitors. This board supports resolutions of 1280x1024 for Mac-Lab, 1600x1200 for CardioLab.
- I/O: Two DVI connectors
- Included adaptors: DVI to HD15 Video Adapter (2021697-001).

HP xw8400 Matrox Odyssey XA Board (Optional)

- Part Number: 2030688-001
- Location: Slot 6
- Function: Image capture for X-Ray or other imaging systems
- I/O: Two DVI connectors

HP xw8400 TRAMNet to Ethernet Adapter board



- Part Number: 2009937-002
- Location: Slot 7
- Function: Provides communication with the TRAM in the RAC 4A, and converts signals from the TRAM to the ethernet.
- I/O: Network Interface Port and 9-Pin D connector

Integrated Electronics Box (IEB)

The IEB provides power to local system components and signal pass through video and communications. Three versions of the IEB are available to handle different line voltages: 100, 120, and 240 VAC.

The IEB consists of the following components:

- Video Multiplexer (VID MUX) board to distribute video signals from the video cards in the HP computer to the monitors.
- I/O board to provide signal pass through for other system components.
- Isolation transformer:
 - ◆ Conforms to IEC 60601-1
 - ◆ 2.0 kVA medical grade high-isolation transformation
 - ◆ Provides either 120 VAC (for 100 and 120 VAC systems) or 240 VAC. The primary and secondary windings are wired in parallel for 120 VAC and in series for 240 VAC.

CAUTION

CONNECTIONS — If the transformer must be disconnected for any reason, ensure the connections are correct.

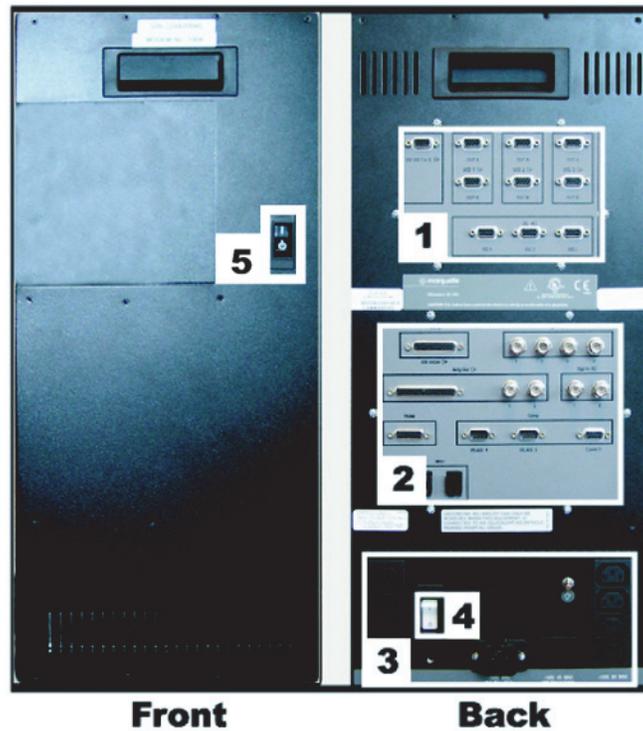
- UPS (either 100, 120, or 240 VAC) and Power Distribution panel provide conditioned power to local system components.

NOTE

The UPS is external to the IEB and provides uninterrupted power to the HP computer. The monitors and other peripherals will not remain on if power is lost.

Depending on which IEB is installed, a modem and modem power supply for dial-up communication may be present. The power supply accepts any line voltage and converts it into 9 VDC.

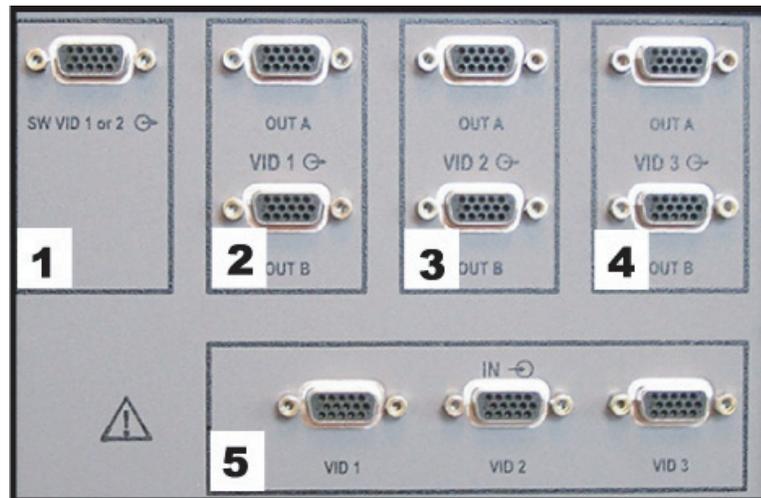
External Components and Connections



Label	Part Number	Description
1	2003681-003	VID MUX board
2	2003680-001	I/O Board
3	N/A	Power Connections. The bottom right connector is for the HP computer and the four vertical connectors on the right and left are for peripheral equipment.
4	N/A	Thermal Overcurrent Circuit Breaker. This breaker protects all internal components and external devices connected to the IEB.
5	N/A	Main Power Switch. This switch controls power to all internal components and external devices except the HP computer.

Both the Main Power switch on the front of the IEB and the Thermal Overload circuit breaker on the back must be on for the system to power up.

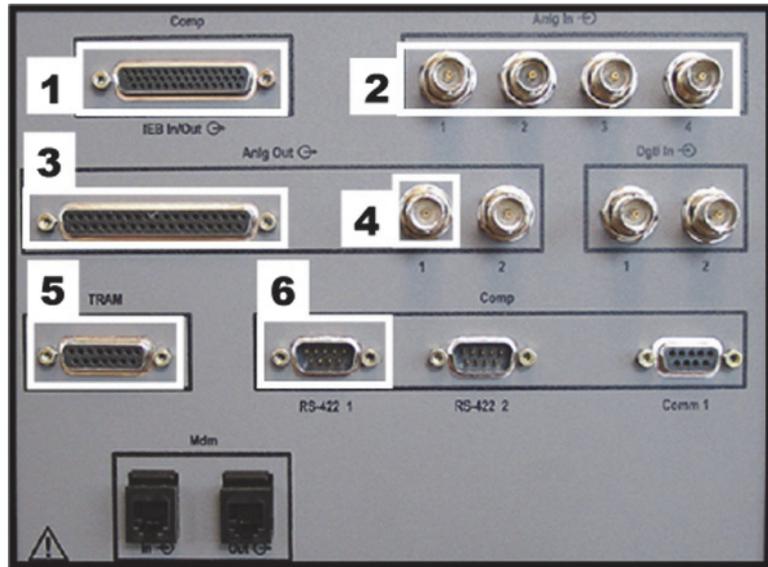
Video Multiplexer (VID/MUX) Board



Label	Description
1	Switched video out (Video 1 or 2). This is used when the facility has only one remote monitor. To switch monitors: <ul style="list-style-type: none"> ■ Mac-Lab: Go to the main menu and select <i>Windows > Physician Video</i> ■ CardioLab: Use the dropdown box just under the main menu.
2	Video 1 (Real-time) out to local monitor (bottom) and remote monitor (top)
3	Video 2 (Review) out to local monitor (bottom) and remote (top)
4	Video 3 (CardioImage) out to local monitor (bottom) and remote (top)
5	(L to R) Video 1, Video 2, Video 3 in from HP Computer Matrox AGP Video board (Vid 1 and Vid 2) and the Matrox PCI Video board (Vid 3)

The VID/MUX board amplifies ($\pm 5V$ 1.25A from the internal IEB DC power supply. See “[Internal Components and Connections](#)” on page 2-31) and distributes the video signals from the HP Computer (See “[HP xw8400 Video Connections](#)” on page 2-57 or “[HP z600 Video Connections](#)” on page 2-56).

I/O Board

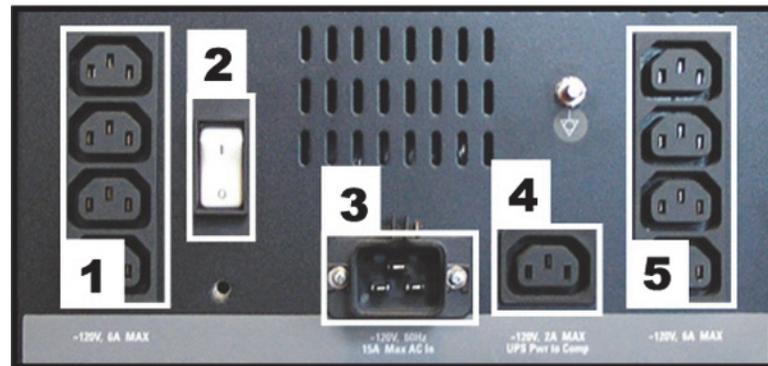


Label	Description
1	Analog I/O Communications. Connects to the HP Computer PCI Comms board.
2	Analog in from another system (Fluoro, and so on).
3	Connection to the Analog Output Box.
4	Analog out (Stimulator, and so on).
5	I/O TRAM (includes 16.5VDC power).
6	Output to HP Computer TRAMNet to Ethernet to Adapter board.

Refer to the following cabling diagrams:

- [“Communications Connections”](#) on page 2-58.
- [“TRAM/Amplifier Connections”](#) on page 2-59.

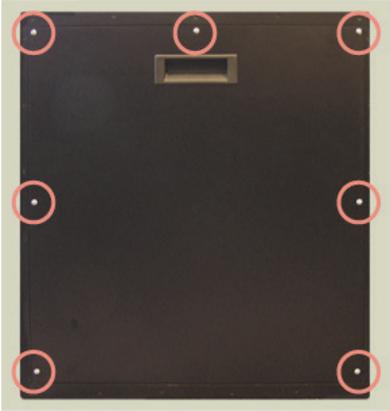
Power Connections



Label	Description
1 and 5	AC out to local equipment (6A @ 120 VAC max.; 3A @ 240 VAC max.)
2	Thermal Overcurrent circuit breaker. Protects all internal components and external devices connected to the IEB.
3	AC main power in (15A @ 120 VAC max; 7A, @ 240 VAC max.)
4	AC power out to UPS (2A @ 120 VAC max; 1A, @ 240 VAC max.)

Refer to the cabling diagram, “Power Connections” on page 2-55.

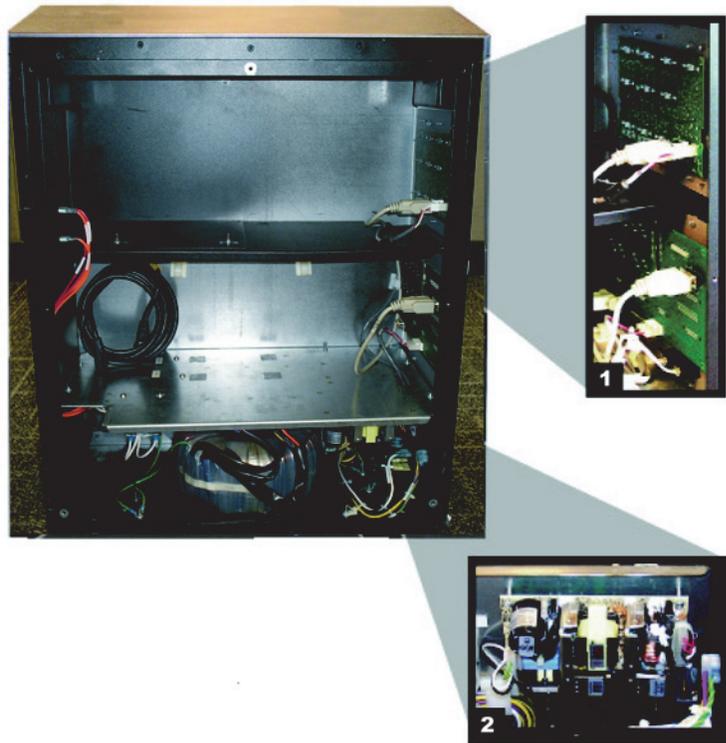
Disassembly

	<p>Open Case</p> <ol style="list-style-type: none">1. Remove 7 side-panel screws.2. Lift the side panel out.
	<p>Remove Connection Boards</p> <ol style="list-style-type: none">1. Open the case.2. Remove the board screws.3. Disconnect interior cables.

WARNING

GROUNDING HAZARD — Electrostatic discharge (ESD) can damage electronic components. Be sure you are properly grounded before opening any equipment.

Internal Components and Connections



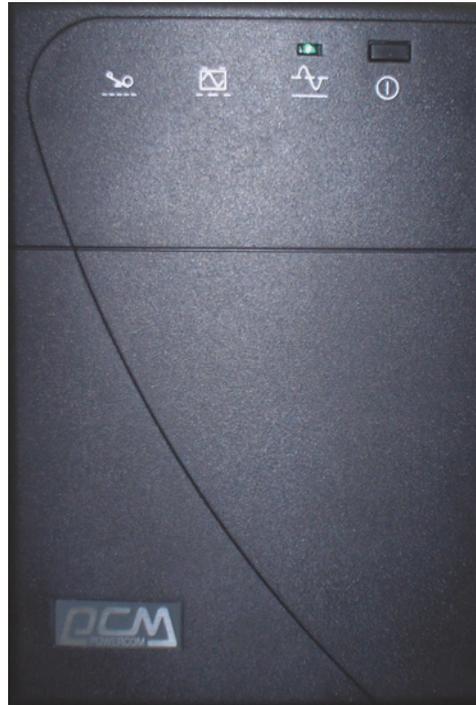
Label	Part Number	Description
1	2003681-003	VID/MUX Board Assembly
	2003680-001	I/O DB Connect Board Assembly
2	2013535-001	Power Supply: Provides ± 5 VDC 1.25A for the Vid/MUX board and +16.5 VDC for the RAC-4A.

Uninterruptible Power Supply (UPS)

The UPS is designed to maintain power to the computer during a power outage.

NOTE

The UPS is external to the IEB and provides uninterrupted power to the HP computer. The monitors and other peripherals will not remain on if power is lost.



Part Number	Description
2034077-001	UPS Powercom, 120V, 50/60 Hz, 1500 VA, BNT
2034078-001	UPS Powercom, 230V, 50/60 Hz, 1500 VA, BNT
2034079-001	UPS Powercom, 100V, 50/60 Hz, 1500 VA, BNT

GE Client Workstation

There are several configuration options for use of the Review workstations in a networked system environment.

- **Nursing Workstation** software allows the user to join a Mac-Lab or CardioLab case in progress to chart and to document within the case log.
- **Remote Review Workstation** software allows the user to review a Mac-Lab or CardioLab case in full disclosure in order to compose or complete reports or coronary diagrams or to review patient waveforms and measurements.
- **Pre/Post Procedure Workstation** software allows the user to start or continue a Mac-Lab or CardioLab case in order to chart and to document within the case log.

NOTE

Automatic vitals logging is also available with the optional DASH and Solar monitor interface.

NOTE

When used in a patient care area, the hardware must meet IEC60601-1. This can be achieved through the use of a medical grade computer, separate isolation transformer or other means as determined by appropriate hospital personal.

The GE Client Review computer has the following components:

- Primary Hard Drive with two partitions:
 - ◆ C: Application partition
 - ◆ D: Data partition
- DVD-RAM drive (Drive E:).

NOTE

The drive used to store application studies is determined by the file paths set in under *System Settings* in the main application menu.

- Secondary Hard Drive (Drive G:).

External Components and Connections for the GE Client Workstation

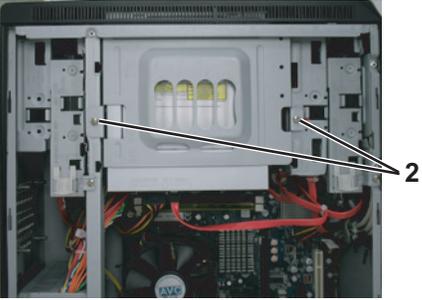


Label	Part Number	Description
1	N/A	Power and Reset Switches
2	N/A	DVD Drive
3	N/A	USB and Audio connections (behind cover)
4	N/A	AC Power
5	Various	Keyboard (dependent on language)
6	N/A	Com Port for DASH/Solar connection
7	N/A	Video Input
8	N/A	USB 2-Button Optical Mouse with Wheel
9	N/A	RJ-45 Port to Network

Disassembly

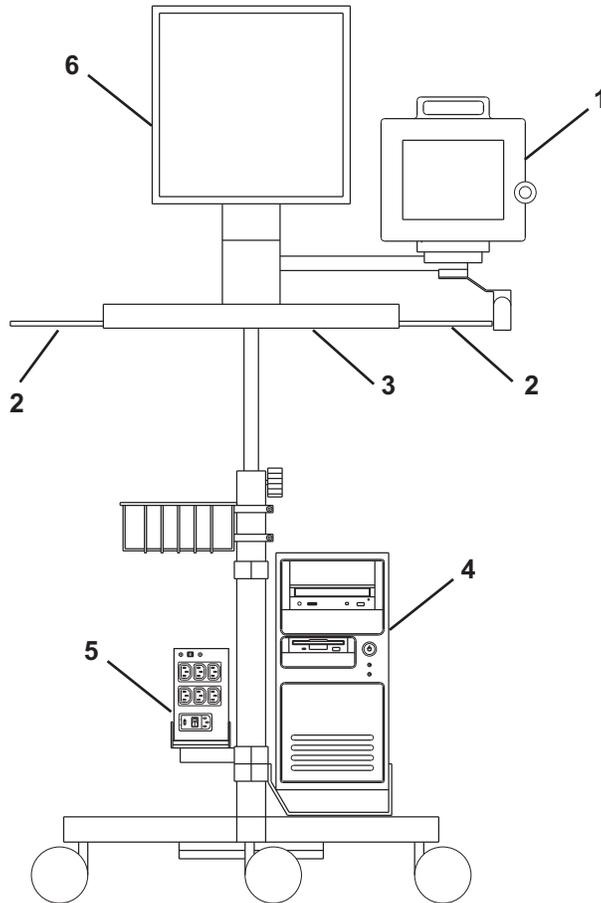
WARNING

GROUNDING HAZARD — Electrostatic discharge (ESD) can damage electronic components. Be sure you are properly grounded before opening any equipment.

	<p>Remove Case Side Panel</p> <ol style="list-style-type: none"> 1. Loosen thumbscrews. 2. Pull side panel off.
	<p>Remove Hard Drive</p> <ol style="list-style-type: none"> 1. Remove screws for hard drive. 2. Slide drive out and disconnect cables.
	<p>Remove DVD Drive</p> <ol style="list-style-type: none"> 1. Disconnect cables from DVD drive. 2. Remove DVD drive cage screws. 3. Remove DVD drive cage from case. 4. Remove screws for DVD drive. 5. Remove DVD drive from cage.

Mobile Workstand

Refer to the instructions included with the mobile workstand for details on how to place the GE hardware on an assembled GE mobile workstand (PN 2008203-001).



Label	Part Number	Description
1	N/A	DASH Monitor
2	N/A	Mouse or Barcode Scanner location
3	N/A	Keyboard location
4	2017588-001, 2021331-001, 2026192-001, 2037934-001 or 2048966-001	Review Workstation Computer
5	2004195-001	Isolation Transformer 120/220V 50/60HZ 600VA
6	2079070-002	LCD Monitor

Monitors

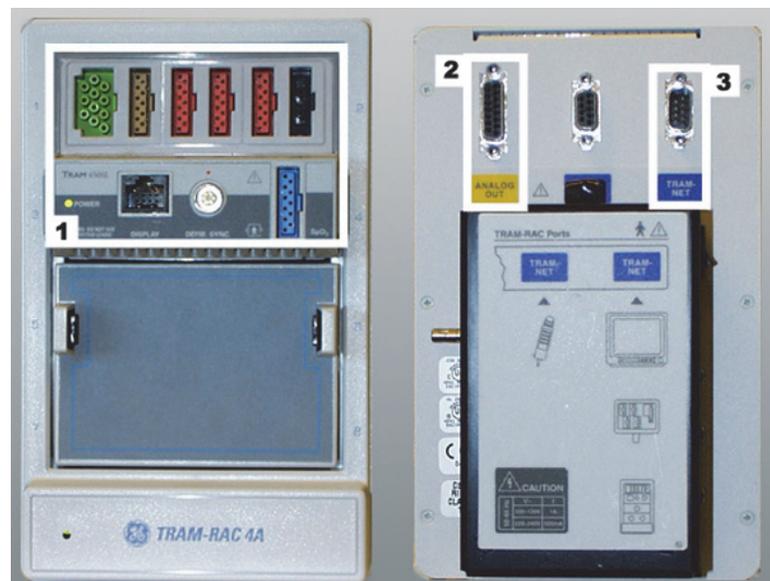
The standard workstation comes with two monitors and may have a third optional monitor. The monitors include:

- A Real-Time monitor to display current patient information. It is usually located on the left.
- A Review monitor to display past patient information.
- An optional Image monitor (used with the CardioImage option) displays live or frozen video images.

A single remote monitor is standard and receives input from the switched video out (Video 1 or 2) jack on the IEB (see “[External Components and Connections](#)” on page 2-26).

- To switch video for the Mac-Lab go to the main menu and select *Windows > Physician Video*.
- To switch video for the CardioLab use the drop-down box just under the main menu.

TRAMNet



Label	Description
1	TRAM Module
2	To Analog Out Box
3	To IEB TRAM Connector

The TRAMNet consists of a Remote Acquisition Case (RAC-4A) and one or more TRAM modules. The TRAMNet is located in the procedure room near the procedure table.

The TRAM module receives patient inputs and then transmits signal data to the IEB and other equipment through the Analog Output Box (refer to the cabling diagrams in “[TRAM/Amplifier Connections](#)” on page 2-59).

TRAM Module Inputs:

- Electrocardiogram (ECG) - green connector (5 or 10 leads)
- Thermal Dilution Cardiac Output (TDCO) - brown connector
- Invasive Blood Pressure (IBP) - 3 red connectors
- Non-Invasive Blood Pressure (NIBP) - black connector
- Pulse Oximetry (SpO₂) - blue connector

Outputs: Analog output connector.

The following TRAM modules are supported by the Mac-Lab system:

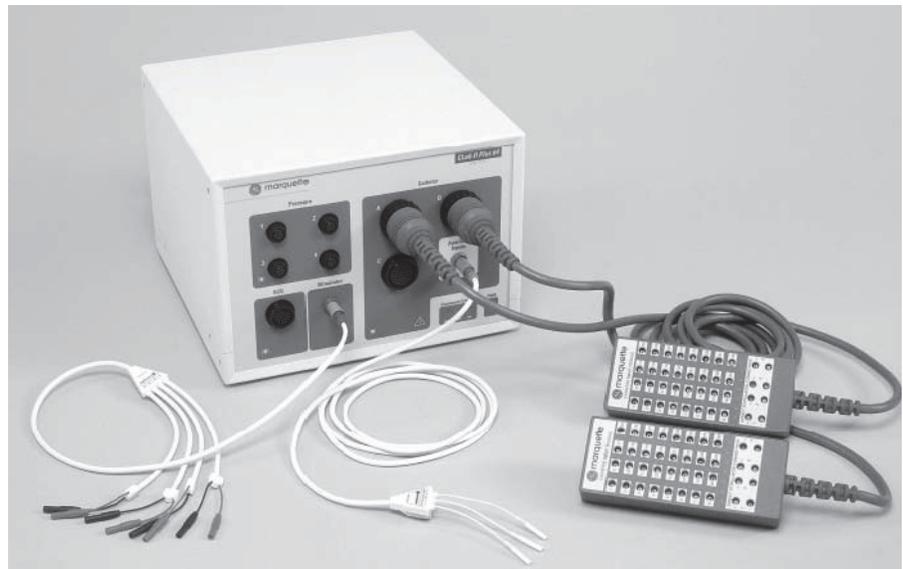
- 200SL
- 400/450SL (Ohmeda, Nellcor)
- 451/451N/451M (Ohmeda, Nellcor, Massimo)
- 600/650SL (Ohmeda, Nellcor)

The following software versions are supported by the Mac-Lab system:

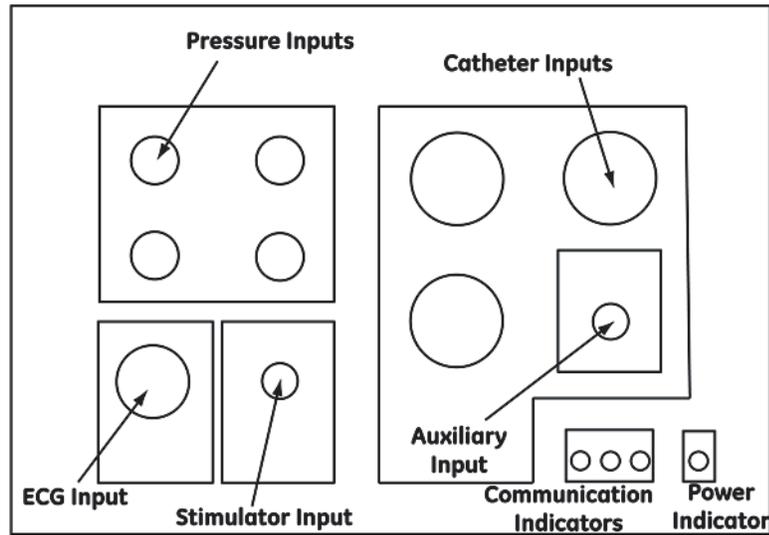
- 7A, 7B, 7C, 7D, 7E, 7F, 7H
- 8A, 8B, 8C, 8D
- 9A, 9B
- 10A, 10B
- 11A, 11B, 11C

CardioLab II Plus Amplifier

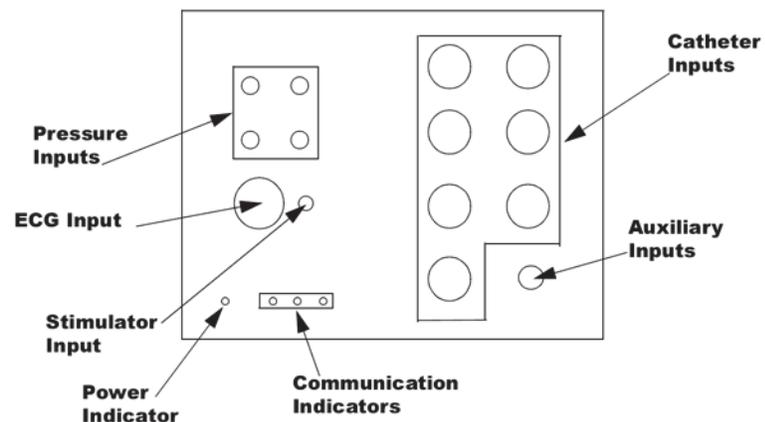
The CardioLab II Plus Amplifier is designed to amplify various types of cardiac signals that are acquired from a patient and transmit them back to the CardioLab system. These signals include 12 Lead ECG, intracardiac and pressure signals.



Front View

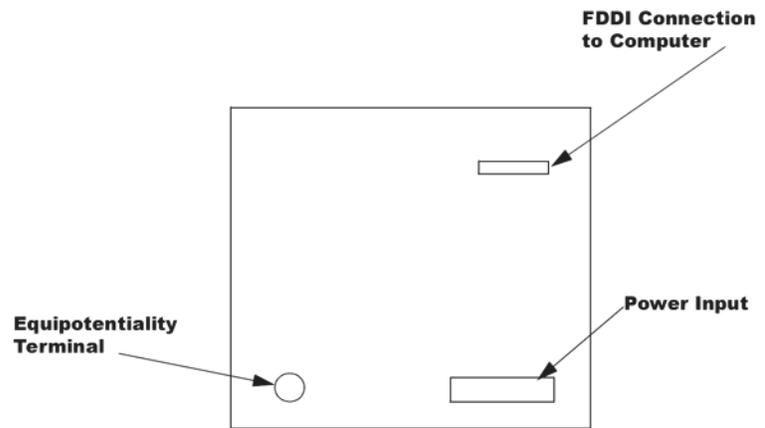


Front View 64/32 Channels- CardioLab II Plus Amplifier	
Name	Description
Pressure Inputs	Four pressure inputs will each accept a pressure transducer that is calibrated to 5uV/V/mmHg. See the Accessory Parts List for GE Healthcare Systems Information Technologies recommended pressure transducers.
ECG Input	The ECG input connector will accept a 10 lead ECG input cable.
Stimulator Input	The stimulator input will accept a stimulator input cable. Use the 3 ft, 15 ft or 30 ft Touchproof Stimulator Cables (part numbers, 301-00204-03, 301-00204-15, 301-00204-30, respectively) with the CardioLab II Plus Amplifier.
Catheter Inputs	Up to three catheter inputs will each accept a 32 pole catheter input module. Use the CardioLab II Plus Catheter Input Modules (part number 301-00202-08) with the CardioLab II Plus Amplifier.
Auxiliary Inputs	The auxiliary input will accept the Auxiliary Input Cable (part number 301-00205-08).
Power Indicator	The power indicator is on as long as the CardioLab II Plus Amplifier is turned on.
Communication Indicators	<p>Three communication indicators show the status of the communication between the acquisition computer and the CardioLab II Plus Amplifier.</p> <ul style="list-style-type: none"> ■ When the XMT indicator is on, the CardioLab II Plus Amplifier is transmitting data to the acquisition computer. The XMT indicator should remain on as long as the power indicator is on. ■ When the RCV CMD indicator is on, the CardioLab II Plus Amplifier is receiving data from the acquisition computer. The RCV CMD indicator will turn on as long as an instruction is being received by the amplifier. ■ When the RCV ERR indicator is on, the CardioLab II Plus Amplifier may not be receiving data from the acquisition computer in a valid format or there may be a problem with the fiber optic cable.



Front View 128/96 Channels- CardioLab II Plus Amplifier	
Name	Description
Pressure Inputs	Four pressure inputs will each accept a pressure transducer that is calibrated to 5uV/mmHg. See the Accessory Parts List for GE Healthcare Systems Information Technologies recommended pressure transducers.
ECG Input	The ECG input connector will accept a 10 lead ECG input cable.
Stimulator Input	The stimulator input will accept a stimulator input cable. Use the 3 ft, 15 ft or 30 ft Touchproof Stimulator Cables (part numbers, 301-00204-03, 301-00204-15, 301-00204-30, respectively) with the CardioLab II Plus Amplifier.
Catheter Inputs	Up to seven catheter inputs will each accept a 32 pole catheter input module. Use the CardioLab II Plus Catheter Input Modules (part number 301-00202-08) with the CardioLab II Plus Amplifier.
Auxiliary Inputs	The auxiliary input will accept the Auxiliary Input Cable (part number 301-00205-08).
Power Indicator	The power indicator is on as long as the CardioLab II Plus Amplifier is turned on.
Communication Indicators	<p>Three communication indicators show the status of the communication between the acquisition computer and the CardioLab II Plus Amplifier.</p> <ul style="list-style-type: none"> ■ When the XMT indicator is on, the CardioLab II Plus Amplifier is transmitting data to the acquisition computer. The XMT indicator should remain on as long as the power indicator is on. ■ When the RCV CMD indicator is on, the CardioLab II Plus Amplifier is receiving data from the acquisition computer. The RCV CMD indicator will turn on as long as an instruction is being received by the amplifier. ■ When the RCV ERR indicator is on, the CardioLab II Plus Amplifier may not be receiving data from the acquisition computer in a valid format or there may be a problem with the fiber optic cable.

Back View



Back View - CardioLab II Plus Amplifier	
Name	Description
FDDI Connection to Computer	This connector will accept a FDDI type fiber optic cable. The fiber optic cable allows for two-way communication between the amplifier and the CardioLab system.
Power Input	The GE-supplied power cord connects to the Power Input.
Equipotentiality Terminal	The Equipotentiality Terminal is connected to earth ground.

CardioLab II Plus Catheter Input Module



The equivalent to the Stimulus Inputs 1-4 on the Stimulator Input Cable are labelled on the CardioLab II Plus Amplifier as Stimulus Inputs A1, A2, B1 and B2.

The four stimulus inputs on the Stimulator Input Cable connect to the stimulator.

Each Catheter Input Module is broken down into two groups of 16 poles each. For example, Block A is broken into A (1-16) and A (17-32).

Each pacing channel, requires one positive and one negative pole. In order to maximize the number of pacing channels, only one positive and one negative designation should be made for each group.

For detailed instructions on how to designate pacing channels and enable pacing for particular sites, refer to the on-line help in the software application.

Accessory Parts List

GE Healthcare Systems Information Technologies recommends the following accessory parts be used with the CardioLab II Plus Amplifier:

Accessory Parts List	
Accessory Name	Part Number
Abbott Transpac IV Disposable Transducer with 4 ft extension Cable*	Abbott #42582-08
Abbott Transpac Reusable Cable*	Abbott #42661-04-42
3M Disposable Electrode for ECG Monitoring*	3M Red Dot #2256
* This accessory is not stocked by GE Healthcare Systems Information Technologies.	

CARTO™ System (Patient Interface Unit)



Label	Description
1	CARTO XP PIU Output to Amplifier

CAUTION

EXCESSIVE SIGNAL NOISE — Using a CARTO XP PIU earlier than version 10 with a crossover cable may cause excessive signal noise.

If this excessive signal noise occurs, then discontinue using the crossover cable until the PIU is replaced with a later version. (The new PIU must be purchased from Biosense Webster).



Label	Description
1	CARTO 3 PIU Output to Amplifier

NOTE

For specific information related to the operation, troubleshooting, or repair of the CARTO System, refer to the OEM documentation. For information about the CardioLab/CARTO System interface, refer to the CardioLab Operator manual.

The CARTO System acquires and displays electroanatomical 3D images of heart chambers. This information is displayed on the CARTO System and can be exported into the CardioLab application.

Two connections are required: one from the CARTO System Patient Interface Unit to the CardioLab II Plus Amplifier and another from the CARTO System computer to the HP computer. Refer to the cabling diagram in “[CARTO™XP System Connections](#)” on page 2-65 or “[CARTO™ 3 System Connections](#)” on page 2-66 for specific information.

To quickly view the status of the interface, check the CARTO System icon at the bottom-right of the Real-Time window (a heart against a grid). The color changes, depending on the system state:

- Gray: Disconnected
- Blue: Standby
- Green: Passive Interface
- Yellow: Active Interface

Analog Output Box



Label	Description
1	Input from TRAMNet
2	Input from Amplifier through the IEB

- The analog output box distributes heart rate and blood pressure signals to multiple outputs (refer to the connection diagram in [“TRAM/Amplifier Connections”](#) on page 2-59. This may be done to synch auxiliary equipment or display the information on a scope or other device.

Patient information comes from either the TRAMNet or the Amplifier (through the IEB) and is output through the output jacks on the top of the box:

- Channels 2-4 and 13-16 are switchable between the TRAMNet (Mac-Lab) and CardioLab II Plus Amplifier (CardioLab).
- The remaining channels are used exclusively by CardioLab.
- Channels 1-12 may be distributed to up to 4 other devices using the selector switch.

Network Components

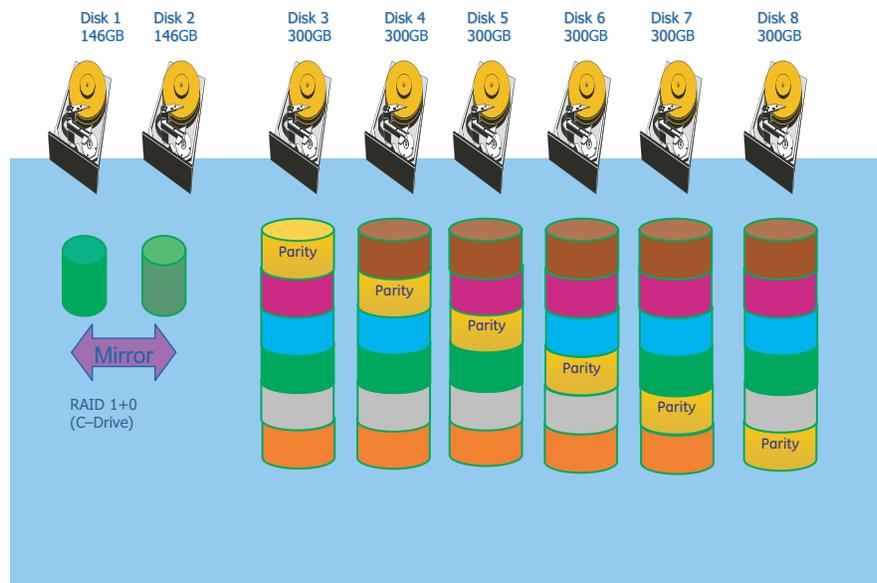
- **Centricity Cardiology INW Server provides**
 - ◆ Network repository for patient studies
 - ◆ Acquisition system and Review workstation access to patient studies
- **CVIS Server provides**
 - ◆ Central list management for staff, supplies, and so on.
 - ◆ Patient scheduling
 - ◆ Patient information
 - ◆ Inventory Management
 - ◆ Statistical Reports

Servers

Centricity Cardiology INW G6 Server

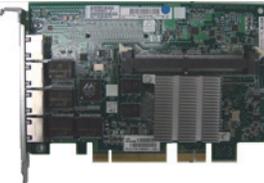
The G6 server has the following specifications:

- Intel Xeon E5504, Quad-Core, 2.00 GHz, 4MB L3 Cache, 80W
- Two tiers:
 - ◆ Low: Three 146GB Drives
 - ◆ High: Six 300GB Drives
- Separate C: and D: drives (see the following chart):
 - ◆ The C: drive is RAID 1
 - ◆ The D: drive is RAID 5





Label	Description
1	CD/DVD Drive
2	Tape Drive
3	Power Switch, USB Connectors, External Monitor Connection
4	Hard Drives

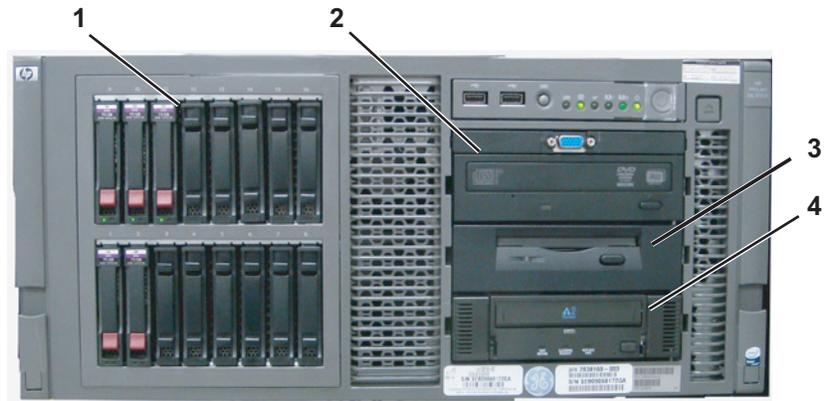
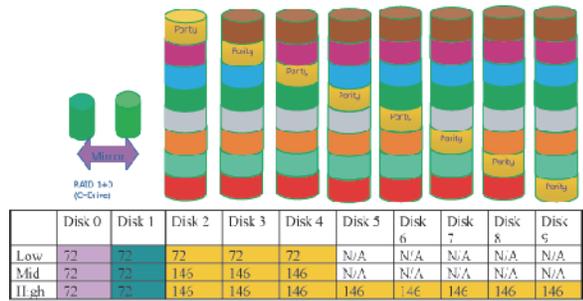
Picture	Name	Description
	HP Network Interface Card	<ul style="list-style-type: none"> ■ Part Number: 2050659-001 ■ Function: Network Interface Card ■ Location: Slot 4, 5
	HP Tape Drive Controller	<ul style="list-style-type: none"> ■ Part Number: 2050328-001 ■ Function: Tape Drive Controller Card ■ Location: Slot 4, 5

Centricity Cardiology INW G5 Server

The G5 server has the following specifications:

- Intel Dual-Core Xeon 5120/1.86 GHz (1066 MHz) with 4MB Level 2 cache (2MB per core)
- Three tiers:
 - ◆ Low: Three 72 GB drives
 - ◆ Mid: Three 146 GB drives
 - ◆ High: Eight 146 GB drives
- Separate C: and D: drives (see the following chart):

- ◆ The C: drive is RAID 1 mirrored
- ◆ The D: drive is RAID 5 mirrored



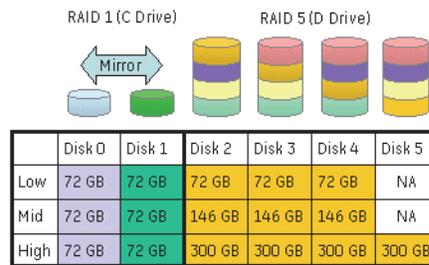
Label	Description
1	Hard Drives
2	CD/DVD Drive
3	Floppy Disk Drive
4	Tape Drive

Picture	Name	Description
	HP SMART ARRAY P/400	<ul style="list-style-type: none"> ■ Part Number: 2036800-038 ■ Function: Hard drive RAID controller ■ Location: Slot 4, 5

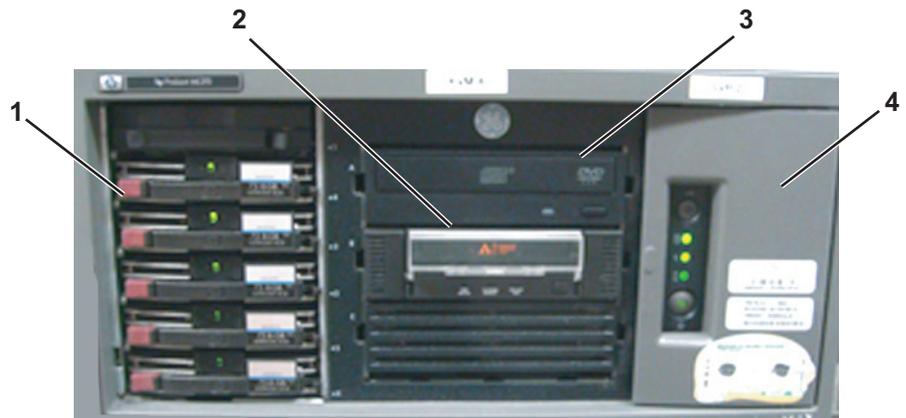
Centricity Cardiology INW G4 Server

The G4 server has the following specifications:

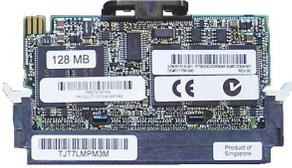
- 3.2 GHz Xeon processor with 1 GB RAM
- Three tiers:
 - ◆ Low: Three 72 GB drives
 - ◆ Mid: Three 146 GB drives
 - ◆ High: Four 300 GB drives
- Separate C: and D: drives (see the following chart):
 - ◆ The C: drive is RAID 1 mirrored
 - ◆ The D: drive is RAID 5 mirrored



C Drive - RAID 1 mirrored drive on ALL configurations



Label	Description
1	Hard Drives
2	AIT Drive
3	CD/DVD Drive
4	Floppy Drive (behind cover)

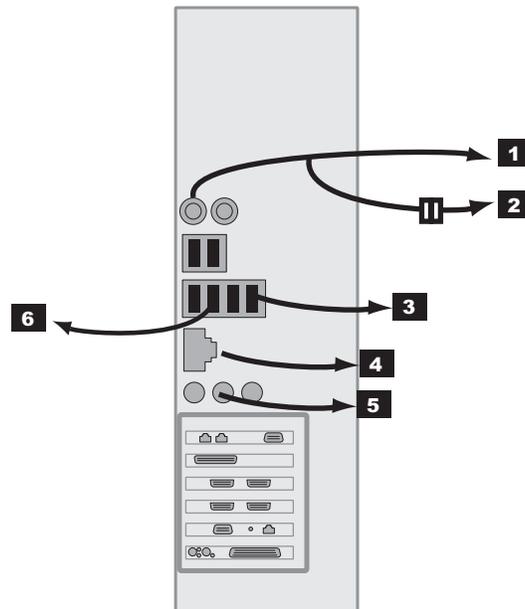
Picture	Name	Description
	<p>HP PCI GIGABIT NIC</p>	<ul style="list-style-type: none"> ■ Part Number: 2026881-001 ■ Function: Provides reliable network connection <p>NOTE On G4 servers, connect the ethernet cable to the NIC card. Do not use the motherboard network port.</p> <ul style="list-style-type: none"> ■ Location: Slot 5
	<p>HP SMART ARRAY 641</p>	<ul style="list-style-type: none"> ■ Part Number: 2016993-001 ■ Function: Hard drive RAID controller ■ Location: Slot 2
	<p>HP BBWC ENABLE - MEM - 128 MB DDR</p>	<ul style="list-style-type: none"> ■ Part Number: 2026817-001 ■ Function: Improves server performance and decreases data loss potential if power is lost ■ Location: Connected to the SMART ARRAY card in Slot 2

Cabling and Connections

WARNING

SHOCK HAZARD — Use appropriate Lock Out/Tag Out procedures before performing any service on potentially energized equipment.

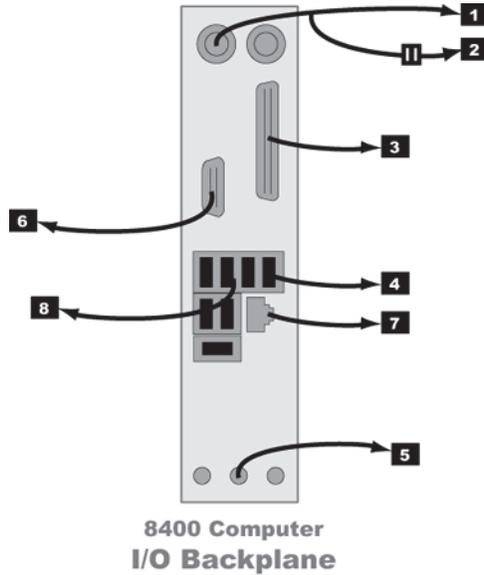
HP z600 Computer I/O Backplane Connections



**z600 Computer
I/O Backplane**

Label	Part Number	Description
1	N/A	PS2 Connection for Keyboard
2	2020280-001 (Note: This number is for the cable only)	PS2 connection for Barcode Scanner Y-Cable (other side connects to Keyboard)
3	HP 237241-001	USB Port for Mouse (Must use this port)
4	N/A	RJ-45 Port to Network
5	N/A	To Speakers
6	2025965-002	USB Port for Printer (cable to use depends on the printer)

HP xw8400 Computer I/O Backplane Connections

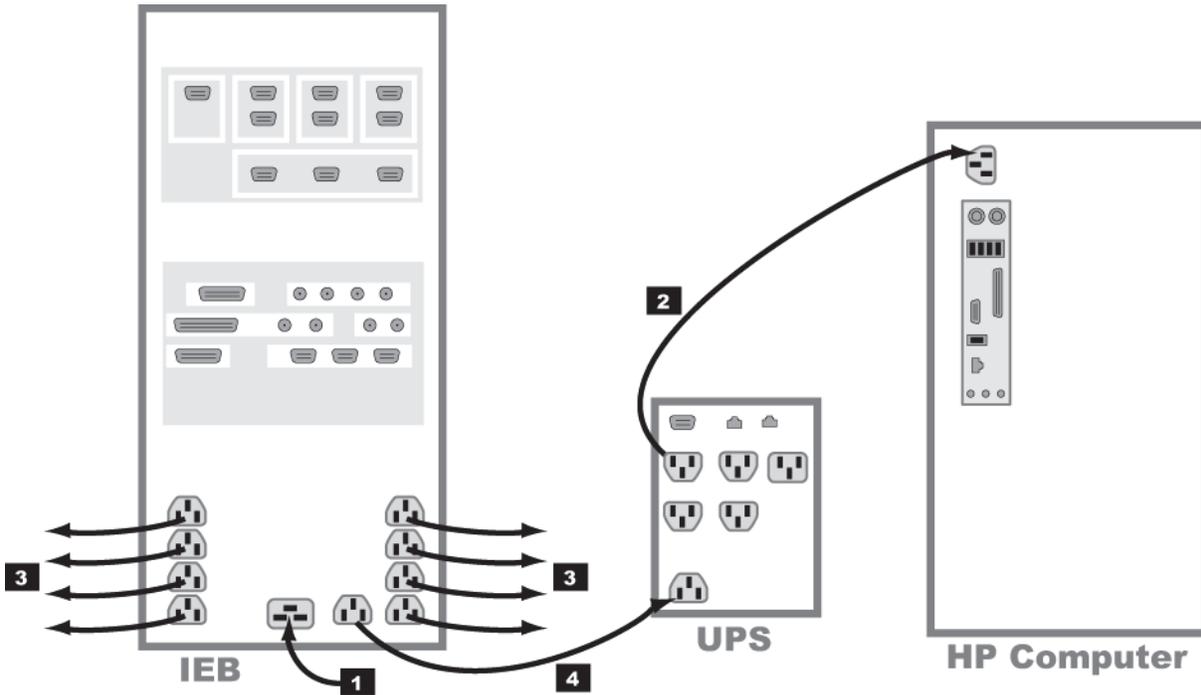


Label	Part Number	Description
1	N/A	PS2 Connection for Keyboard
2	2020280-001 (Note: This number is for the cable only)	PS2 connection for Barcode Scanner Y-Cable (other side connects to Keyboard)
3	6119-101 2031697-001	HP xw8400 only: To Local Printer (cable to use depends on the printer).
4	HP 237241-001	USB Port for Mouse (Must use this port)
5	N/A	To Speakers
6	N/A	HP xw8400 only: To Ablation Interface
7	N/A	RJ-45 Port to Network
8	2025965-002	USB Port for Printer (cable to use depends on the printer)

Power Connections

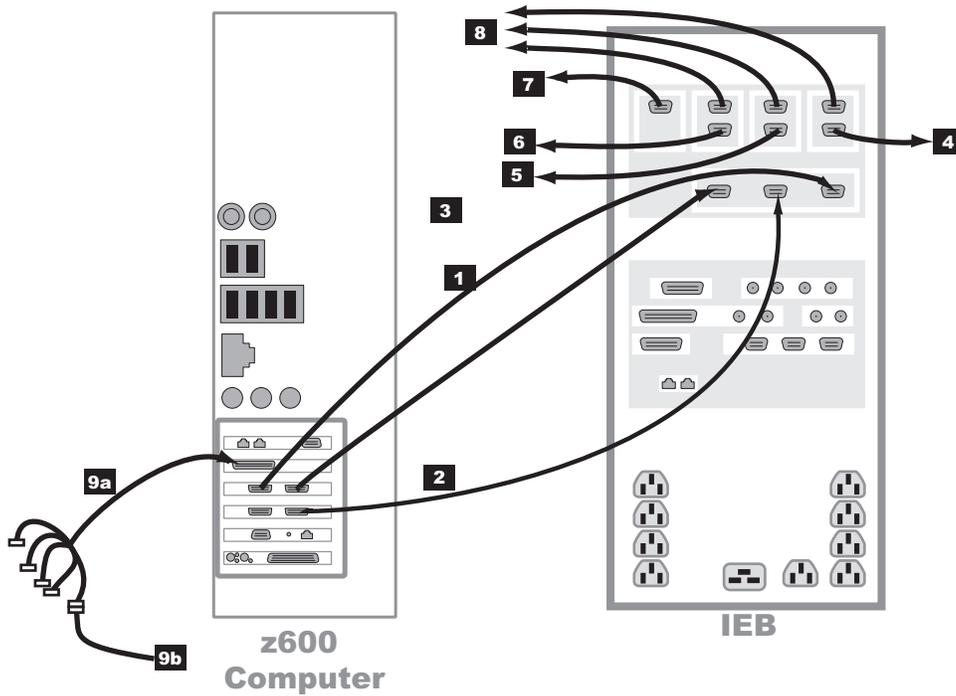
NOTE

The following diagram shows the backplane of the HP xw8400 computer. The HP z600 uses the same connection diagram, with the exception that the workstation computer connection is located at the bottom of the HP z600 backplane.



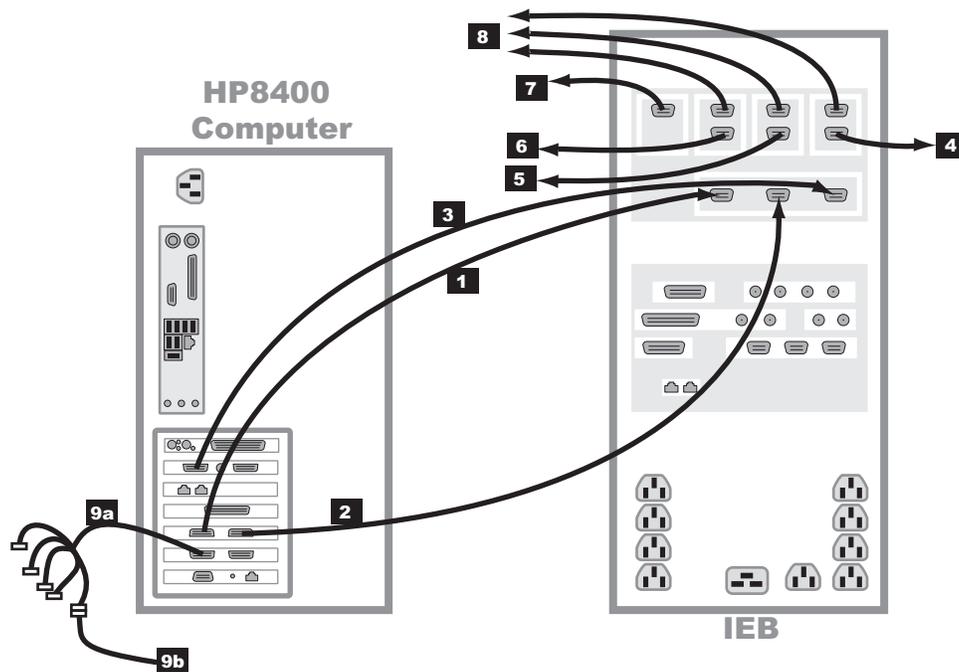
Label	Part Number	Description	Length
1	700775-001 700774-001	120 VAC main power in 250 VAC main power in	8 ft
2	405535-013 80274-006 2003927-001	AC power to HP CPU (100V) AC power to HP CPU (120V) AC power to HP CPU (230V)	8 ft
3	2003927-001 403689-010	AC to Local Equipment--Monitors, Printers, and so on AC to Remote Monitors	8 ft 100 ft
4	2003927-001	AC power to UPS	8 ft

HP z600 Video Connections



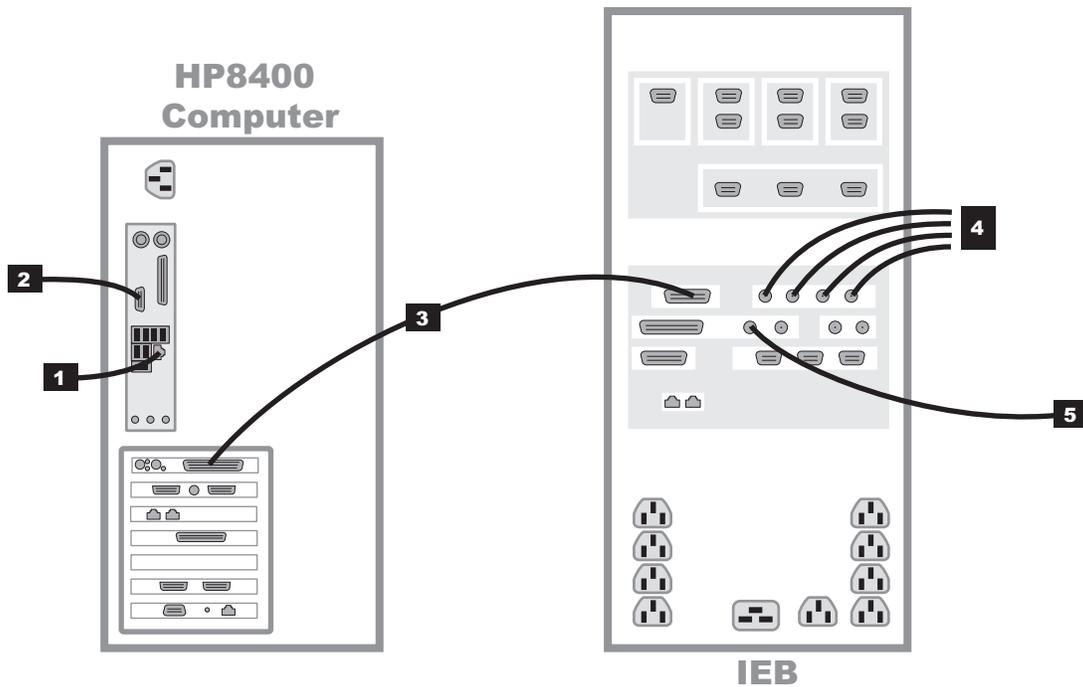
Label	Part Number	Description	Length
1	2003928-001	Real-Time display (Video 1) in to IEB	5 ft
2	2003928-001	Review display (Video 2) in to IEB	5 ft
3	2003928-001	Cardio Image display (Video 3) in to IEB	5 ft
4	2003928-001 or 2081540-001	Out to Local Cardio Image Monitor (Video 3)	5 ft or 6 ft
5	2003928-001 or 2081540-001	Out to Local Review Monitor (Video 2)	5 ft or 6 ft
6	2003928-001 or 2081540-001	Out to Local Real-Time monitor (Video 1)	5 ft or 6 ft
7	2003442-001	Out to remote monitor (switched Video 1 or Video 2)	100 ft
8	2003442-001	Out to optional remote monitors (Video 1, 2, or 3)	100 ft
9a	2018060-001	Image capture. DVI to 5-BNC female connector cable plugs into either DVI plug. Only one BNC connection is used to connect to the image input from another system (9b)	
9b	2003411-001	BNC Cable to optional imaging system	50 ft

HP xw8400 Video Connections



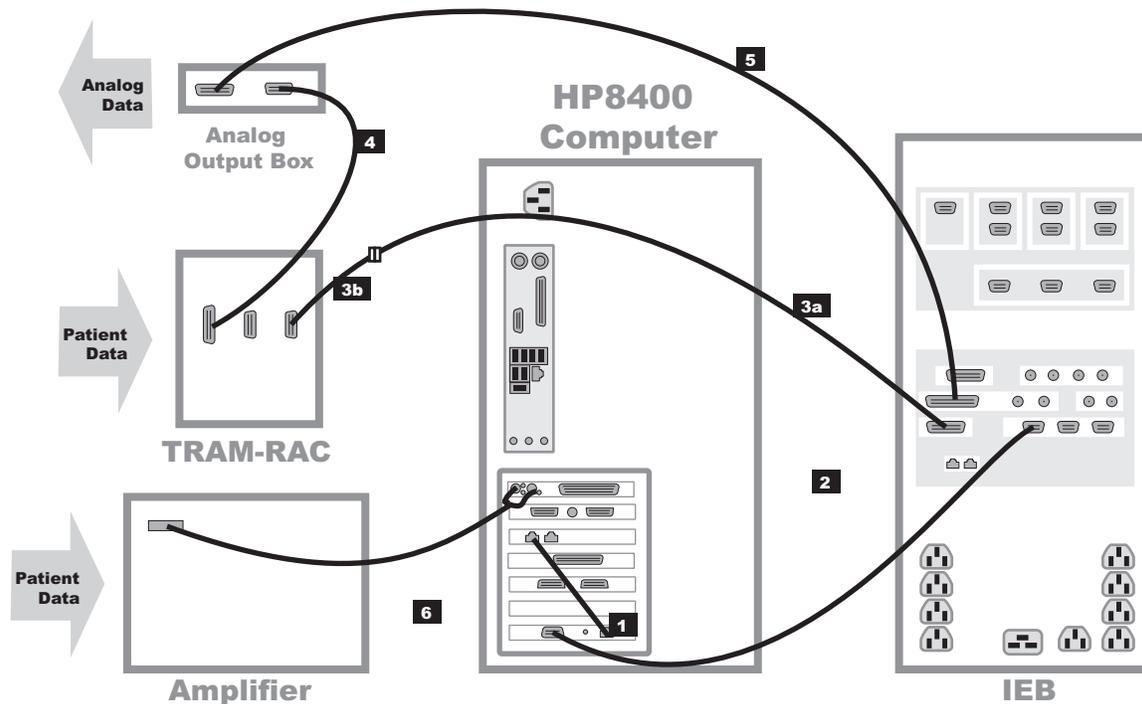
Label	Part Number	Description	Length
1	2003928-001	Real-Time display (Video 1) in to IEB	5 ft
2	2003928-001	Review display (Video 2) in to IEB	5 ft
3	2003928-001	Cardio Image display (Video 3) in to IEB	5 ft
4	2003928-001 or 2081540-001	Out to Local Cardio Image Monitor (Video 3)	5 ft or 6 ft
5	2003928-001 or 2081540-001	Out to Local Review Monitor (Video 2)	5 ft or 6 ft
6	2003928-001 or 2081540-001	Out to Local Real-Time monitor (Video 1)	5 ft or 6 ft
7	2003442-001	Out to remote monitor (switched Video 1 or Video 2)	100 ft
8	2003442-001	Out to optional remote monitors (Video 1, 2, or 3)	100 ft
9a	2018060-001	Image capture. DVI to 5-BNC female connector cable plugs into either DVI plug. Only one BNC connection is used to connect to the image input from another system (9b)	
9b	2003411-001	BNC Cable to optional imaging system	50 ft

Communications Connections



Label	Part Number	Description	Length
1	N/A	Network connection	N/A
2	2018835-001	RF Ablation Device Interface. Location shown is for the HP xw8400. HP z600 Ablation Interface will be located on the PCI NIC card.	50 ft
	2003408-002	50 ft Serial Cable	
	2042981-001	Optical Isolator	2 m
	2035570-001	Serial Cable for CryoCath Interface	6 ft
	2042214-001	Serial Cable for RF Ablation Interface	
3	2003587-001	PCI Communications (DB-44)	2.5 ft
4	2003410-001	BNC coax. analog in (from Fluoro, and so on)	30 ft
5	2003410-001	Analog out (typically to Stimulator)	30 ft

TRAM/Amplifier Connections

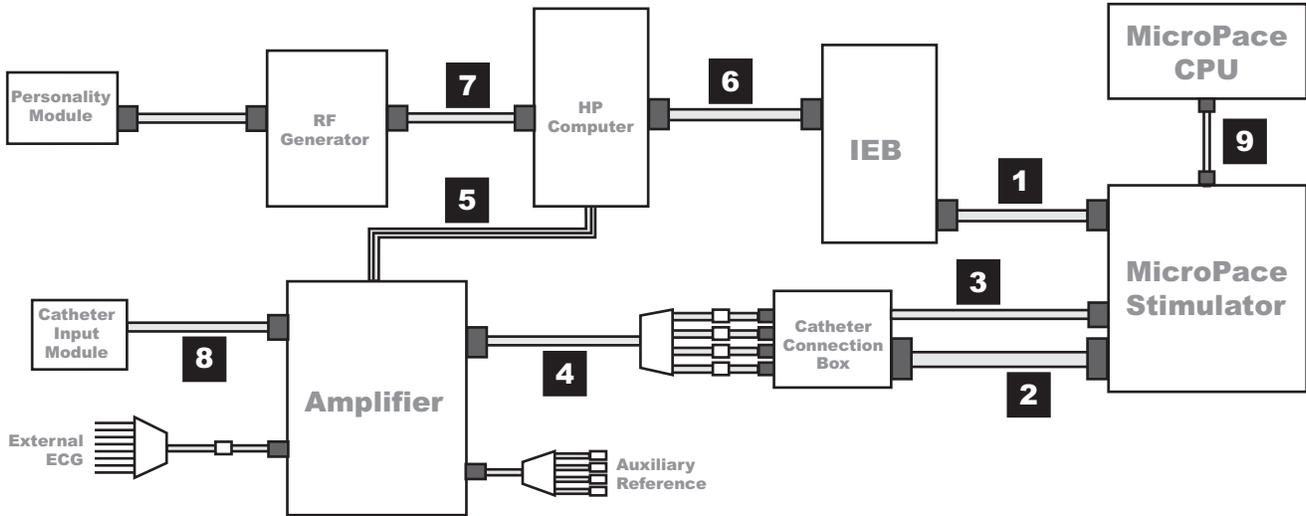


Label	Part Number	Description	Length
1*	2011129-001	TRAMNet to ethernet cable	1 ft
2*	2016133-001	HP Computer/IEB TRAMNet cable	9 ft
3a	417335-xxx	Adapter cable to TRAM. Part number varies by length ordered (-001 to -007).	Varies
3b*	2016134-001	15-pin to 9-pin adapter cable	1 ft
4	417335-002	TRAM-RAC to Analog Output Box cable	51 ft
4	417335-003	TRAM-RAC to Analog Output Box cable	70 ft
5	2007579-001	IEB to Analog Output Box cable	15 ft
6	2003434-001	Amplifier to HP fiber optic cable	75 ft

* These cables are contained in TRAMNet Cabling Kit (PN 2018683-001)

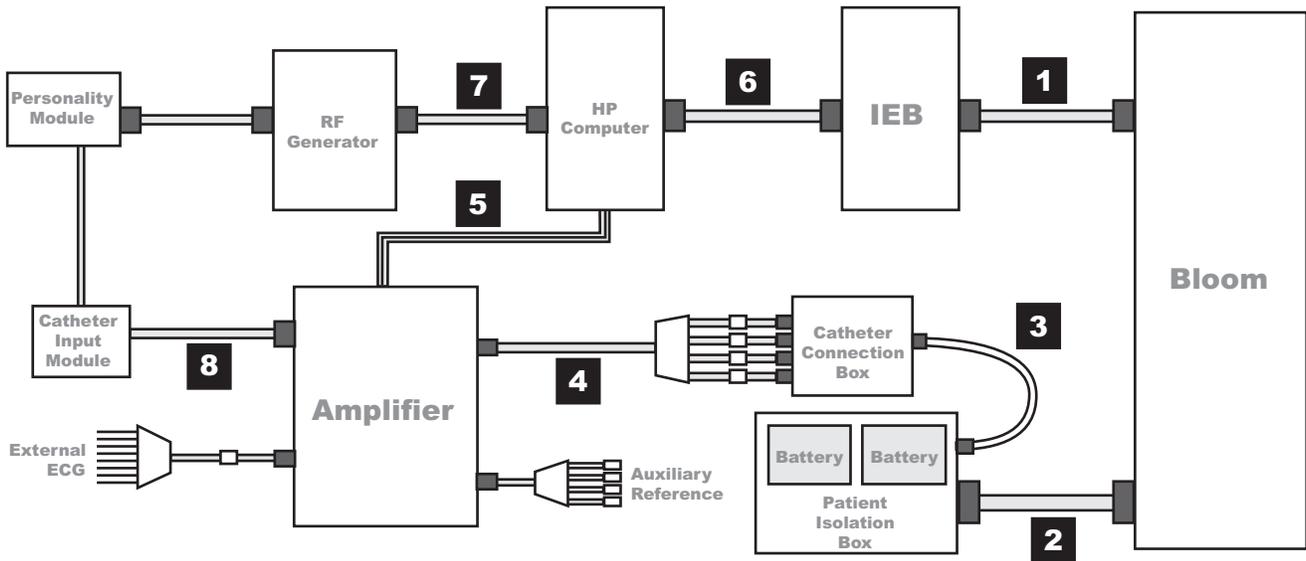
Amplifier/Stimulator Connections

Typical Setup (with MicroPace)



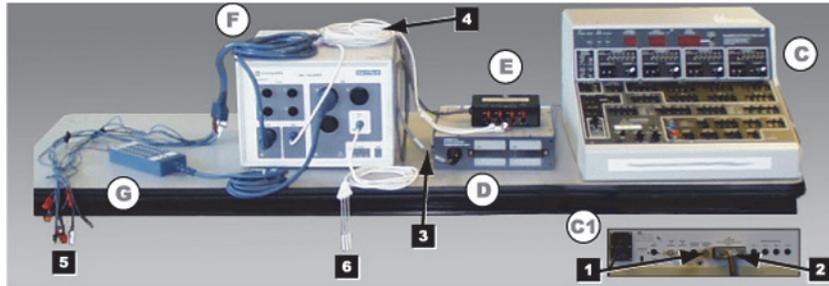
Label	Part Number	Description
1	2003411-001 A	BNC Cable (30 ft). Connects back of MicroPace (ECG 1 Input) to back of IEB (Analog Out 1).
2	N/A	Large Cable with D-Connectors. Connects back of MicroPace (Auxiliary Port) to side of Catheter Connection Box.
3	N/A	Small Cable. Connects front of MicroPace (Green Connection Port or in emergencies Red Connection Port) to side of Catheter Connection Box.
4	301-00204-03	Red or Black leads connect to front of Catheter Connection Box to Amplifier Stimulator Input.
5	2003434-001	Fiber Optic Cable (75 ft)
6	2003857-001	DB44 Connect Cable
7	2003408-002	50 ft Serial Cable
8	301-00202-08	Catheter Input Module

Typical Setup (with Bloom)



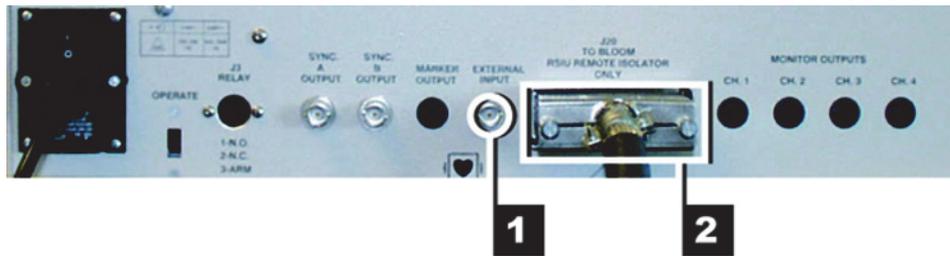
Label	Part Number	Description
1	2003410-001	BNC Cable (30 ft). Connects Bloom and IEB.
2	N/A	Large Cable with Square Connectors. Connects back of Bloom to back of Patient Isolation Box.
3	N/A	Small Cable. Connects front of Patient Isolation Box to side of Catheter Connection Box.
4	301-00204-03	Red or Black leads connect to front of Catheter Connection Box to Amplifier Stimulator Input.
5	2003434-001	Fiber Optic Cable (75 ft)
6	2003587-001	DB44 Connect Cable
7	2003408-002	50 ft Serial Cable
8	301-00202-08	Catheter Input Module

Equipment Setup



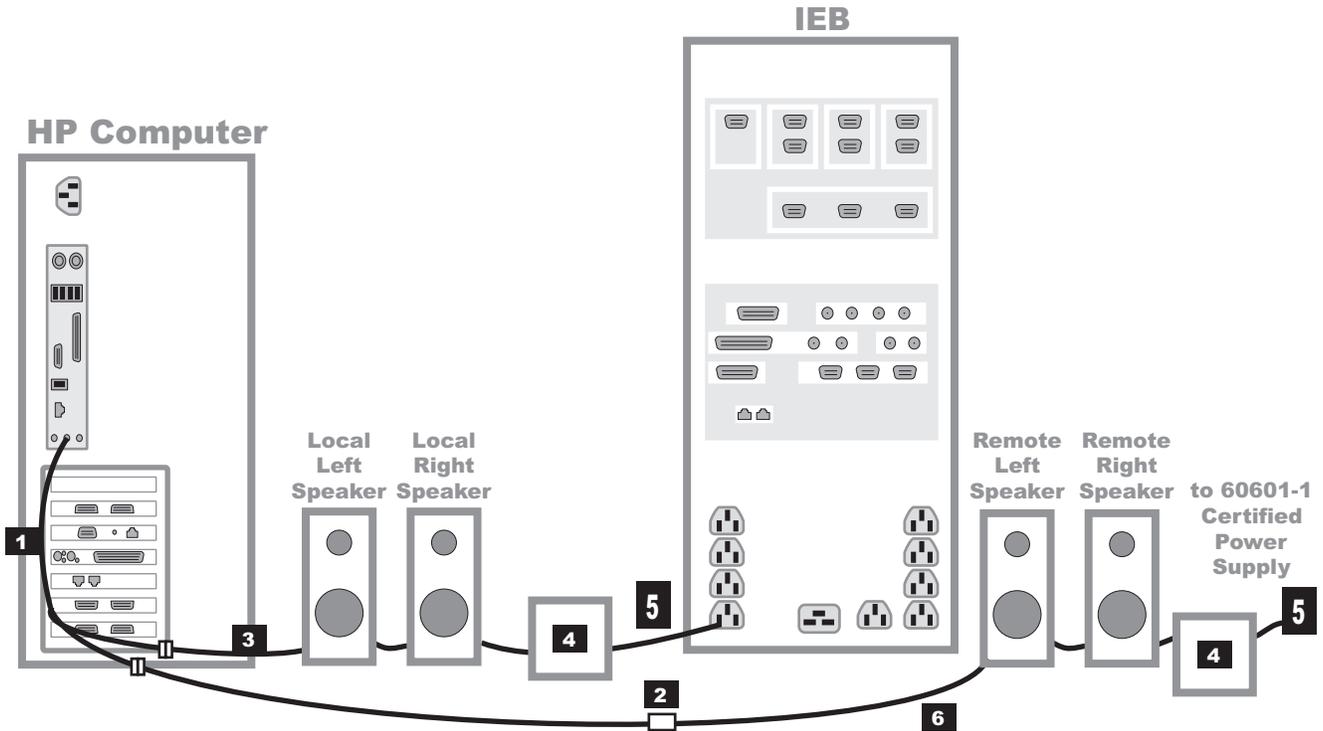
Label	Part Number	Description
C and C1	N/A	Bloom (This is a typical example. Specific equipment may vary by location). Connects to the IEB (not shown) via the External Input BNC jack on the back (C1) and the Patient Isolation Box (D) via a large cable with square connectors. (See next section for detail.)
D	N/A	Patient Isolation Box. Rear connection to Bloom (C1) via large cable with square connectors. Front connection to Catheter Connection Box (E). Front panel provides access to internal batteries.
E	N/A	Catheter Connection Box. Side connection to the Patient Isolation Box (D) front connector. Red and Black leads connect from the front to the Amplifier (F) Stim Input.
F	301-00088-10	Amplifier Connected to: <ul style="list-style-type: none"> ■ (1) External ECG connection ■ (2) Catheter Input Module ■ (3) Auxiliary Reference Cable ■ (6) Catheter Connection Box
G	301-00202-08	Catheter Input Module. Catheter leads (not shown) plug into the block end. Connector on other end plugs into the Amplifier (4) Cardiac Input (Labeled A, B, C, and so on).
1	N/A	Bloom connection to IEB (BNC cable not shown).
2	N/A	Bloom connection to Patient Isolation Box.
3	N/A	Patient Isolation box to Catheter Input Module cable.
4	301-00204-03	Catheter Connection Box to Amplifier cable.
5	301-00038-00	External ECG Connections. Colored leads connect to patient. Connector on other end connects into the Amplifier (4) ECG Input.
6	301-00205-08	Auxiliary Reference Cable. Plugs into the Amplifier (4) Auxiliary Input.

Bloom (Connection Detail)



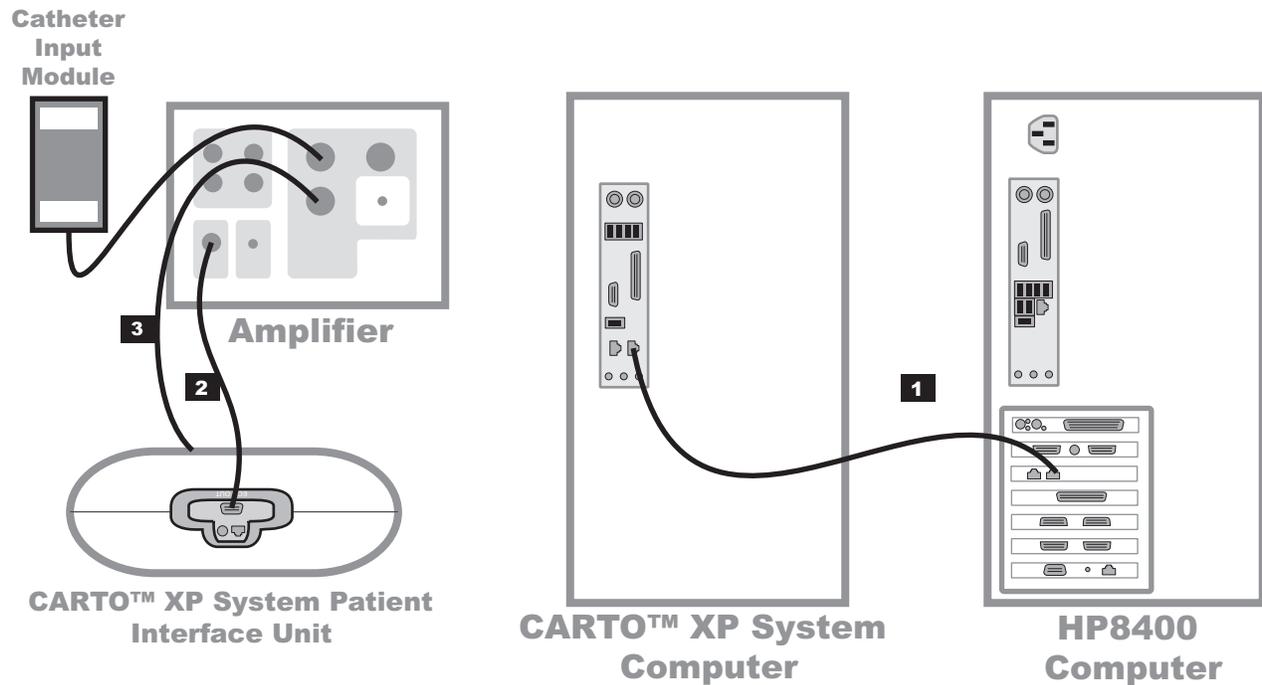
Connector	Description
1	External Input. BNC connection to the IEB (cable not shown).
2	J20. Connection to Patient Isolation Box (large square connector)

Audio



Label	Part Number	Description
1	2018218-001	Y-connector (Connects to green jack on HP. One side to local speakers, the other to remote speakers.) Location shown is for HP xw8400. HP z600 green speaker jack is located just above PCI card slots.
2	2018219-001	Audio Isolator
3	2078970-001	Speaker Set
4	2078970-001	Speaker Power Supply (included with speakers)
5	2003927-001 2003625-001	IEC (m) to IEC (f) Power Cord (8 ft) NEMA to IEC Converter Cable (1 ft) WARNING SHOCK HAZARD — Remote speakers must be powered by a 60601-1 certified power supply.
6	2011108-002	Speaker cable (50 ft)

CARTO™ XP System Connections



Label	Part Number	Description
1	2018217-001	CARTO XP System Crossover Network Cable (25 ft) HP xw8400 Workstation is shown. For HP z600, use the right-hand NIC port as well; do not use the onboard NIC.
2	2015944-001	ECG Quick Connect Cable (ECG OUT connector on the PIU to the ECG connector on the Amplifier)
3	2024507-001	CardioLab II Plus to CARTO IC/Stim Cable

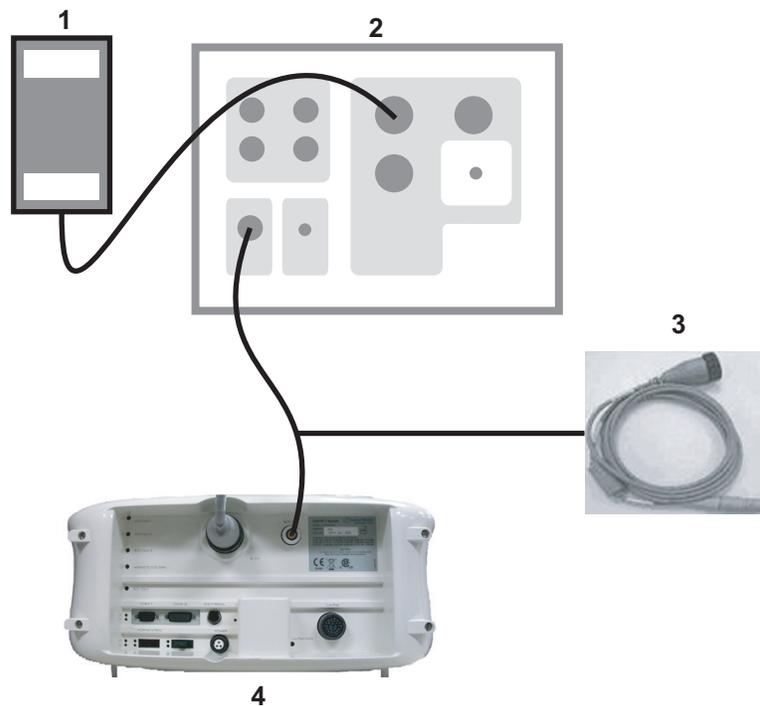
NOTE

Not all CARTO XP System equipment or connections are shown. Refer to the CARTO XP System Installation Manual for additional information.

CARTO™ 3 System Connections

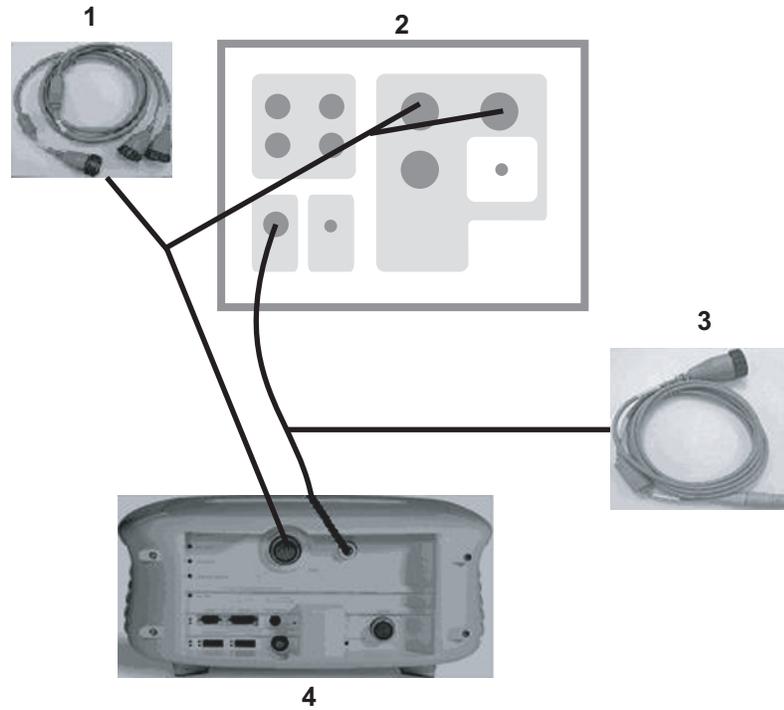
The CARTO 3 System may be connected in one of two ways:

- Configuration 1 (refer to the following figure) to acquire:
 - ◆ HIS, RVA, and HRA signals with the Catheter Input Module.
 - ◆ Surface ECG via the CARTO 3 system using the ECG connectivity cable.



Item	Description
1	Catheter Input Module
2	CardioLab II Plus Amplifier
3	ECG Connectivity Cable
4	CARTO 3 PIU

- Configuration 2 (refer to the following figure) to acquire:
 - ◆ HIS, RVA, and HRA signals, Navistar Cath (mapping), Coronary Sinus, or other signals via the CARTO 3 system using the IECG connectivity cable.
 - ◆ Surface ECG via the CARTO 3 system using the ECG connectivity cable.

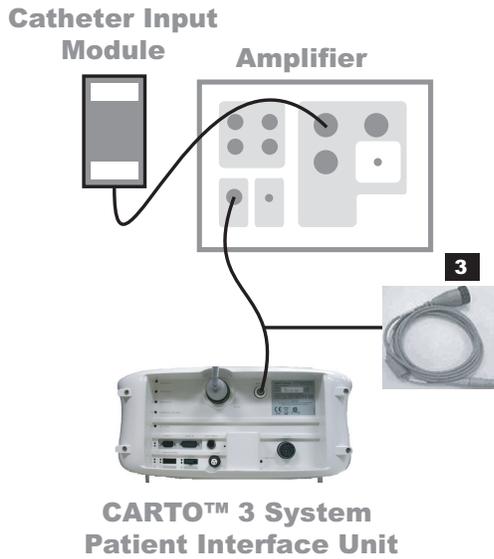


Item	Description
1	IECG Connectivity Cable
2	CardioLab II Plus Amplifier
3	Catheter Input Module
4	ECG Connectivity Cable
5	Stimulation Cables
6	CARTO 3 PIU Front
7	CARTO 3 PIU Back

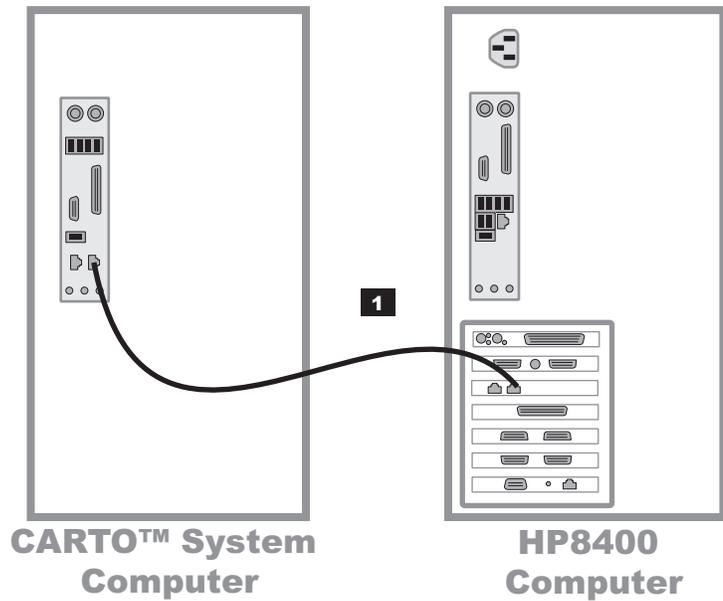
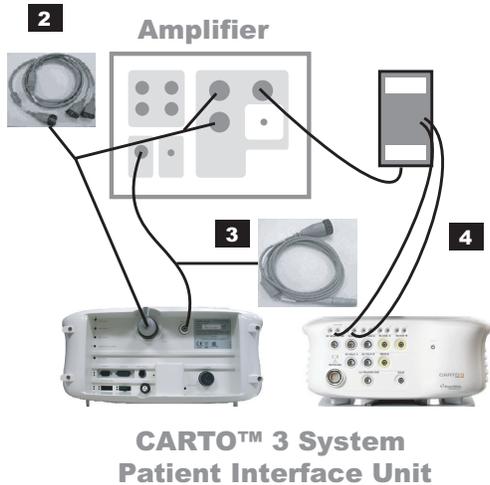
NOTE

The CardioLab II Plus Amplifier remains connected to all body surface leads even if the CARTO 3 PIU is turned off.

Configuration 1



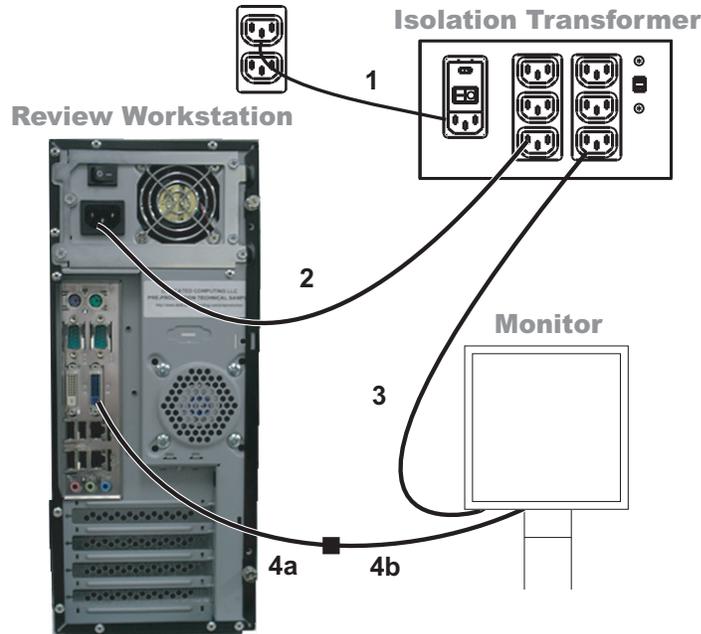
Configuration 2



Item	Manufacturer	Part Number	Description
1	GE	PN 2018217-001	25' CAT5 Crossover Cable (HP xw8400 Workstation is shown. For HP z600, use the right-hand NIC port as well; do not use the onboard NIC.)
2	Biosense Webster	CA-5400-21	BW-GE IECG Cable
3	Biosense Webster	CA-5400-19	BW-GE BS-ECG Cable
4	Biosense Webster	J-B PACINT AUX CA-4041-03	Two Pair STIM Cable (3m)
N/A	GE	301-00204-03	Stimulator Interface Cable

Review Workstations

Review Workstation Connections



Label	Part Number	Description
1	80274-006	Power Cord (connect to a dedicated power supply on an isolated circuit)
2	2003927-001	Power Cord
3	2003927-001	Power Cord
4a	N/A	DVI to VGA Adaptor
4b	2003928-001	Video Cable

WARNING

SHOCK HAZARD — Do not place the isolation transformer on the floor.

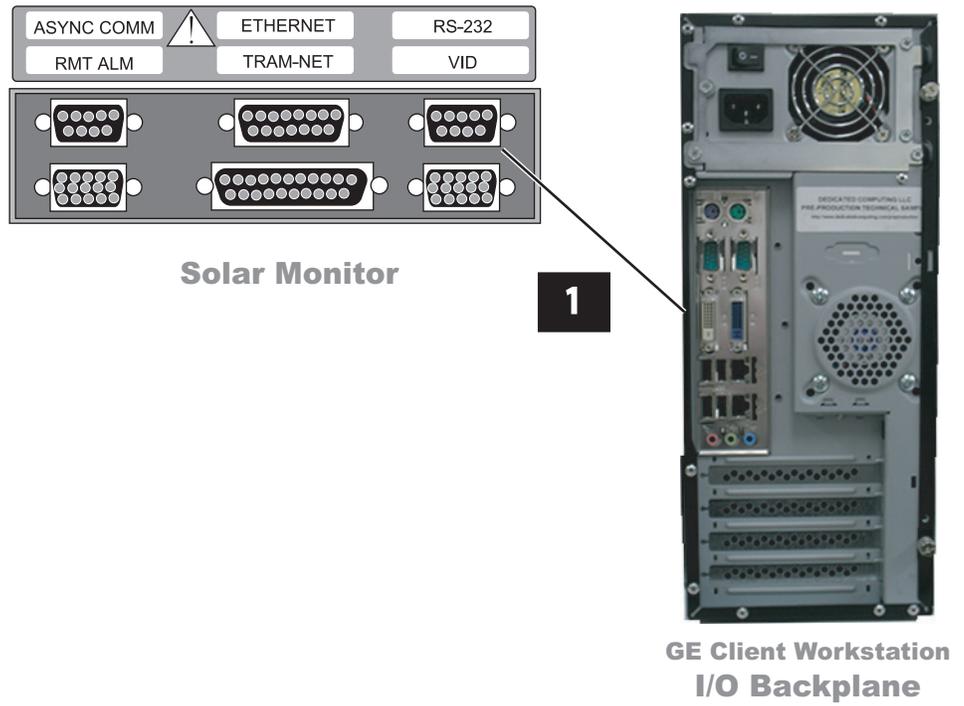
WARNING

ELECTRICAL HAZARDS — Connect equipment only as specified in connection diagrams. Failure to do so may result in excess leakage current, shock or fire.

NOTE

The DASH can also be connected to the isolation transformer as shown in the DASH connection diagram (“DASH Connection” on page 2-71).

Solar Connection



Label	Part Number	Description
1	2003408-001	DB9M TO DB9F, 50 ft, Straight Thru

DASH Connection



Label	Part Number	Description
1	N/A	Ethernet
2a	418335-002	RJ45 Cable
2b	420915-013	DIDCA ASM PC Interface Autoport
3	N/A	Auxiliary

Software

Operating System

Acquisition/Review Workstations: Windows XP Professional with Service Pack 3.

Software Only Workstation: Windows XP Professional with Service Pack 3 or Windows Vista Business with Service Pack 2.

Centricity Cardiology INW Server: Windows Server 2003 Standard Edition with Service Pack 2.

Database

Acquisition/Review Workstations: Microsoft SQL 2000 Desktop Edition.

Software Only Workstations: Microsoft SQL 2000 Desktop Edition (on XP systems only) and SQL Express 2005 (on VISTA systems only).

Centricity Cardiology INW Server: Microsoft SQL 2000 Server Standard Edition.

Application Software

Acquisition/Review Workstations: Microsoft Office 2007 Professional.

Software Only Workstations: Microsoft Office 2007 Professional.

3 Maintenance

Mac-Lab/CardioLab Service Performance Testing

WARNING

SHOCK HAZARD — Use appropriate Lock Out/Tag Out procedures before performing any service on potentially energized equipment.

Service performance testing should always be done after any service work is performed on the Mac-Lab / CardioLab / Centricity Cardiology INW system in order to ensure proper system functioning. The purpose of this section is to provide guidelines for proper service performance testing based on the service/repair that was completed. This section can also be printed and used as a form to provide objective evidence of the testing performed.

The “FRU Checkout Procedure Table” on page 3-3 provides a matrix to be followed in determining the tests and checks to perform based on the FRU replaced/service performed. Go to the appropriate row in the table and follow across that row’s column information to determine:

- Tools Recommended to perform testing
- Visual Inspection and Cleaning to perform
- Electrical Safety Test to perform, if applicable
- Checkout Procedures tests(s) to perform

Detailed lists of the tools/tests that are referenced in the FRU Checkout Procedure Table are found in the sections immediately following it.

Configuration

Customer _____ SR Number _____ Date _____

Number of Mac-Labs _____ CardioLabs _____ ComboLabs _____ Workstations _____ SW Only Workstations _____

Network Type _____ Number of INW Servers _____ Number of DMS Servers _____ Number of DMS Clients _____

FRU Checkout Procedure Table

FRU Description	Tools Recommended	Visual Inspection/ Cleaning	Electrical Safety Tests	Checkout Procedure		
				Mac-Lab	CardioLab	ComboLab
Computer	1, 3, 4, 7	1, 2, 4, 5, 7	1-8, 12-17, 22-24	page 3-8, page 3-16	page 3-10, page 3-16	page 3-8, page 3-10, page 3-16
Computer Hard Drive	1, 2, 3, 4, 7, 8, 9	ALL	1-8, 12-17, 22-24	page 3-8, page 3-16	page 3-10, page 3-16	page 3-8, page 3-10, page 3-16
Drive Replaced (Floppy Drive, Optical Drive, DVD)	1, 2, 3, 4, 7, 8, 9	ALL	1-8, 12-17, 22-24	page 3-8	page 3-10	page 3-8, page 3-10
PCI Slot Card Replaced (Video, PCI Comm, Dual NIC Adapter)	1, 2, 3, 4, 7, 8, 9	ALL	1-8, 12-17, 22-24	page 3-8	page 3-10	page 3-8, page 3-10
TRAMNet to Ethernet Adapter Board	1, 2, 3, 4, 7, 8, 9	ALL	1-8, 12-17, 22-24	page 3-8, page 3-12	page 3-10, page 3-12	page 3-8, page 3-10, page 3-12
Image Capture Board	1, 2, 3, 4, 5, 7, 8, 9	ALL	1-8, 12-17, 22-24	page 3-8, page 3-12	page 3-10, page 3-12	page 3-8, page 3-10, page 3-12
Internal Computer Component (Memory, Power Supply, Fan)	1, 2, 3, 4, 7, 8, 9	ALL	1-8, 12-17, 22-24	page 3-8	page 3-10	page 3-8, page 3-10
External Computer Component (Mouse, Keyboard, Bar Code Scanner)	1, 2, 3, 4, 7, 8, 9	ALL	—	page 3-8	page 3-10	page 3-8, page 3-10
IEB (Vid Mux, I/O Board, Power Distribution/Supply, UPS)	1, 2, 3, 4, 7, 8, 9	1, 2, 3, 4, 6, 7	ALL	page 3-8, page 3-12	page 3-10, page 3-12	page 3-8, page 3-10, page 3-12
Monitor	1, 7	2, 7	—	page 3-8	page 3-10	page 3-8, page 3-10
Printer	1, 7	2, 7	—	page 3-8, page 3-12	page 3-10, page 3-12	page 3-8, page 3-10, page 3-12
TRAM/TRAMNet	1, 3, 4, 7	1, 2, 4, 7	ALL	page 3-8, page 3-12	page 3-10, page 3-12	page 3-8, page 3-10, page 3-12
Amplifier	3, 5, 7	2, 5, 7	ALL	n/a	page 3-10	page 3-8, page 3-10

FRU Description	Tools Recommended	Visual Inspection/ Cleaning	Electrical Safety Tests	Checkout Procedure		
				Mac-Lab	CardioLab	ComboLab
CARTO (cabling)	5, 7	1, 5, 7	—	n/a	page 3-10, page 3-13	page 3-8, page 3-10, page 3-13
Audible Indicators	7	2, 7	—	page 3-8, page 3-13	page 3-10, page 3-13	page 3-8, page 3-10, page 3-13
RF Ablation (Serial Cable, Opto-isolator)	1, 7	1, 7	—	n/a	page 3-10, page 3-13	page 3-8, page 3-10, page 3-13
Stimulator	1, 3, 6, 7, 10	1, 2, 7	ALL	n/a	page 3-10, page 3-14	page 3-8, page 3-10, page 3-14
DASH/Solar	1, 5, 7	1, 2, 7	—	page 3-8, page 3-14	page 3-10, page 3-14	page 3-8, page 3-10, page 3-14
RMOT	5, 7	1, 2, 7	—	page 3-8, page 3-14	page 3-10, page 3-14	page 3-8, page 3-10, page 3-14
Analog Out	1, 7	1, 7	—	page 3-8, page 3-14	page 3-10, page 3-14, page 3-14	page 3-8, page 3-10, page 3-14, page 3-14
INW Server	1, 5, 7	1, 2, 3, 7	—	page 3-8, page 3-15, page 3-16	page 3-10, page 3-15, page 3-16	page 3-8, page 3-10, page 3-15, page 3-16
INW Server Parts (Memory, Disk Raid Adapter, Disk Drive, Tape Drive, UPS, UI Interface)	1, 2, 5, 7, 9	1, 2, 3, 7	—	page 3-8, page 3-15	page 3-10, page 3-15	page 3-8, page 3-10, page 3-15
No Parts Replaced	7	1, 2, 3, 4, 5, 7	—	page 3-8	page 3-10	page 3-8, page 3-10
Updates/Upgrades	7	1, 2, 3, 4, 5, 7	—	page 3-8	page 3-10	page 3-8, page 3-10

Tools Recommended

1. Standard hand tools (PN: N/A)
 - a. Multi-headed Screwdriver
 - b. Allen Wrenches (English and Metric)
 - c. Dykes
 - d. Needle Nose Pliers
 - e. Crescent Wrench
 - f. Tie Wraps
 - g. Electrical Tape
2. Multimeter (PN: N/A)
3. Safety Analyzer (PN: N/A)
4. Leakage current tester (PN: MT-1216)
5. Service manual (PN: 2021423-503) for reference only
6. Installation manual (PN: 2021423-502, if available) for reference only
7. Micropace Quick Installation Manual (PN: MP3156) for reference only
8. Patient simulator (PN: MARQIII-kit)
9. Vacuum cleaner (PN: N/A) (HEPA Certified, if available)
10. ESD Mat/Strap
11. Test LEDs for Stimulator

Visual Inspection/Cleaning

Inspect the following for excess wear and/or any visual signs of damage and/or clean as indicated:

1. Network/Serial/Communication cabling
2. AC power cord(s)/video cables
3. Inspect/Remove dust from fans on all computers
4. TRAM cables
5. CardioLab II Plus amplifier cables
6. Clean dust from all internals
7. Inspect external housing/case of all system components for damage

Electrical Safety Checks

Perform these checkouts as required.

1. Power down all devices.
2. Unplug the power cord of the device being checked (Computer, IEB, TRAM, Amplifier or Stimulator) from its power source and plug it into the Safety Analyzer.
3. Plug the Safety Analyzer into an AC power source.
4. Verify that the bottom two *Outlet* LEDs are illuminated and that the top LED is NOT illuminated.
5. Select **LEAKAGE > EARTH** on the Safety Analyzer.
6. Select **NEUTRAL > CLOSED** and then select **POLARITY > NORMAL** on the Safety Analyzer.
7. Record the leakage displayed in microamps (uA).
8. Verify the leakage is less than 300 uA.
9. Select **POLARITY > REVERSED**.

NOTE

This step is not required for the computers.

10. Record the leakage displayed in microamps (uA).
11. Verify the leakage is less than 300 uA.
12. On the Safety Analyzer select **LEAKAGE > CHASSIS**.
13. Connect the Chassis alligator clip (on the Safety Analyzer) to the Earth ground lug on the device.
14. Select **NEUTRAL > CLOSED** and then select **POLARITY > NORMAL** on the Safety Analyzer.

15. Verify the leakage is less than 100 uA.
16. Press and hold down the **LIFT GND** switch on the Safety Analyzer and record the leakage displayed in uA.
17. Verify the leakage is less than 300 uA.
18. Select **POLARITY > REVERSED**.

NOTE

This step is not required for the computers.

19. Verify the leakage is less than 100 uA.
20. Press and hold down the **LIFT GND** switch on the Safety Analyzer and record the leakage displayed in uA.
21. Verify the leakage is less than 300 uA.
22. Select Ω - **RESISTANCE** on the Safety Analyzer.
23. Connect the Chassis alligator clip (on the Safety Analyzer) to the Earth ground lug on the device.
24. Verify the resistance is less than 0.2 ohms.

Functional Checkout Procedure

Use this manual and the Mac-Lab, CardioLab and/or Centricity Cardiology INW Operator's manual(s) for reference. Perform the following procedures for all applicable options. Ensure all test studies created are deleted upon checkout completion.

Mac-Lab SCOP (Standard Checkout Procedure)

1. Verify the Mac-Lab module is selected. Create a new study by clicking on *New Study*. Enter the required fields: patient last name, first name and medical record number.
2. If applicable, join the test study from a Nurse's Review Workstation by highlighting the test study and clicking on *Continue Study*.
3. Add a Macro to the event log on the Acquisition. If applicable, verify that input comes across to the Nurse's Review Workstation.
4. Add a list item to the study (for example, add a complication or staff member on the Acquisition). If applicable, verify that the item comes across on the Nurse's Review Workstation.
5. If applicable, add Macro and list item to the study from a Nurse's Review Workstation and verify that items come across to the Acquisition.
6. Connect the test cables from the patient simulator to the TRAM Module. The green connector is for ECG, red connectors for invasive blood pressures, blue connector for SpO₂, black connector for non-invasive blood pressure (NIBP) and brown connector for cardiac output.
7. Verify that ECG traces display at 60 bpm, 120 bpm and 180 bpm for all 12 leads.
8. Verify blood pressure traces at two measurement points on P1, P2 and P3 inputs (0 mm/hg and 120/80 mm/hg).
9. Verify Cardiac Output traces at two measurement points.
10. Verify that NIBP readings are displayed by placing the pressure cuff over the left or right arm and initiating a measurement.
11. Verify SpO₂ by placing the finger probe on the right or left index finger. Verify that oxygen saturation and pulse rate readings are displayed.
12. If applicable, perform the EtCO₂ module Capnostat sensor check. Remove the adaptor from the sensor, but ensure that the sensor cable is still connected to the module. Ensure that the cell windows are clean and dry. Place the sensor on the cell marked **REF**. Verify that the reading is 38 mmHg +/- 2 on the display.

13. If applicable, verify the CardioImage/Image Capture feature:
 - a. Create an Image Window by clicking on the *Windows menu > Image Window 1 or 2*, in either the Real-Time, Review, or CardioImage monitor.
 - b. Drag and drop the window into the selected section of the monitor.
 - c. Verify that there is a trigger signal and an image from the fluoro monitor.
 - d. Click *Snapshot* to capture a fluoro image.
14. If applicable, verify real time vitals by initiating an NIBP measurement from a Nurse's Review Workstation.
15. Press **F2** (barcode) on the keyboard and scan a barcode to verify barcode reader functionality.
16. Generate a report and verify printer operation.
 - a. Select *Study > Reports*.
 - b. Click *New* and select a report.
 - c. Click a blank cell to add an X, which generates the report.
 - d. Click *Generate* to generate the selected report.
 - e. Highlight the report created and click *View*.
 - f. Click the *Printer* icon to print the report.
17. If applicable, close the study on the Nurse's Review Workstation.
18. Close the study and verify that no error messages are displayed and that the study is listed in System, Optical and Network Catalog if networked to the Centricity Cardiology INW server.
19. Verify that the Patient is in the DMS Database.
20. If applicable, run *Pushstudies* to verify that the case successfully went to the server
21. If applicable, verify if Patient search is active by performing a Patient Search and picking a last name that exists on the Cathlab schedule.
22. If applicable, review a study from the optical disk.

CardioLab SCOP (Standard Check Out Procedure)

1. Verify the CardioLab module is selected. Create a new study by clicking on *New Study* and then select a study configuration. Enter the required fields: patient last name, first name and medical record number.
2. If applicable, join the test study from a Nurse's Review Workstation by highlighting the test study and clicking *Continue Study*.
3. Add a Macro to the event log on the Acquisition. If applicable, verify that input comes across to the Nurse's Review Workstation.
4. Add a list item to the study (for example, add a complication or staff member on the Acquisition). If applicable, verify that the item comes across on the Nurse's Review Workstation.
5. If applicable, add a Macro and list item to the study from a Nurse's Review Workstation and verify that the items come across to the Acquisition.
6. Connect the test cables from the patient simulator to the TRAM Module. The blue connector is for SpO₂ and the black connector is for the non-invasive blood pressure (NIBP). Also connect the radiotranslucent ECG lead wires and blood pressure cables from the CardioLab Amplifier to the patient simulator.
7. Verify communication between the amplifier and computer:
 - a. Select *Administration > Amplifier Test*.
 - b. Select *Device Id* and *Detect > Read Amplifier Id EEPROM*.
 - c. Verify readings.
 - d. Select *Register Readback > Read Continuously*.
 - e. Verify no failures.
 - f. Select *Walking Ones > Walk Continuously*.
 - g. Verify no failures.
 - h. Select *Stim Walking Ones > Walk Continuously*.
 - i. Verify no failures.
 - j. Select *Calibration Pulse > Pulse All*.
 - k. Verify calibration pulses are uniform in height.
8. Turn on the stimulator device (for example, Bloom or MicroPace or EP Med) and verify the sensing of the ECG signal. Stimulate inputs 1 – 4 and verify that pacing spikes are displayed.
9. Verify that ECG traces display at 60 bpm, 120 bpm and 180 bpm for all 12 leads.
10. Verify blood pressure traces at two measurement points on P1, P2 and P3 inputs (0 mm/hg and 120/80 mm/hg).

11. Verify that NIBP readings are displayed by placing the pressure cuff over the left or right arm and initiating a measurement.
12. Verify SpO₂ by placing the finger probe on the left or right index finger. Verify that oxygen saturation and pulse rate readings are displayed.
13. If applicable, perform the EtCO₂ module Capnostat sensor check. Remove the adaptor from the sensor, but ensure that the sensor cable is still connected to the module. Ensure that the cell windows are clean and dry. Place the sensor on the cell marked **REF**. Verify that the reading is 38 mmHg +/- 2 on the display.
14. If applicable, verify the CardioImage/Image Capture feature:
 - a. Create an Image Window by clicking on *Windows menu > Image Window 1 or 2*, in either the Real-Time, Review, or CardioImage monitor.
 - b. Drag and drop the window into the selected section of the monitor.
 - c. Verify that there is a trigger signal and an image from the fluoro monitor.
 - d. Click *Snapshot* to capture a fluoro image.
15. If applicable, verify that the *CARTO* icon is blue (located on the right side of the *System Tray* on the *Real-Time* screen).
16. If applicable, verify that the ablation device is selected and configured and that all required cabling is attached (for example, opto-isolator).
17. If applicable, verify real time vitals on the Nurse's Review Workstation. Initiate an NIBP measurement from a Nurse's Review Workstation.
18. Press **F2** (barcode) on the keyboard and scan a barcode to verify barcode reader functionality.
19. Generate a report and verify printer operation.
 - a. Select *Study > Reports*.
 - b. Click *New* and select a report.
 - c. Click a blank cell to add an X, which generates the report.
 - d. Click *Generate* to generate the selected report.
 - e. Highlight the report created and click *View*.
 - f. Click the *Printer* icon to print the report.
20. If applicable, close the study on the Nurse's Review Workstation.
21. Close the study and verify that no error messages are displayed and that the study is listed in the System, Optical and Network Catalog if networked to an Centricity Cardiology INW server.

22. Verify that the Patient is in the DMS Database.
23. If applicable, run *Pushstudies* to verify that the case successfully went to the server
24. If applicable, verify if Patient search is active by performing a Patient Search and picking a last name that exists on the Cathlab schedule.
25. If applicable, review a study from the optical disk.

TRAM Module Testing

1. Verify that there is a connection.
2. Run the TRAMNet Test:
C:\windows\utilities\tramtest\tramnetest.bat.

CardioImage/Image Capture Testing

1. Verify that the correct *.dcf* file is selected.
2. Create an Image Window by clicking *Windows menu > Image Window 1 or 2*, in either the Real-Time, Review, or CardioImage monitor.
3. Drag and drop the window into the selected section of the monitor.
4. Verify that there is a trigger signal and an image from the fluoro monitor.
5. Click *Snapshot* to capture a fluoro image.

IEB Testing

1. Verify that switched video is functional.
2. Verify UPS functionality by unplugging power from IEB and confirming that the acquisition computer remains powered.

Printer Testing

Verify that a test page prints.

CARTO Testing

NOTE

Work with the customer to start up and connect the CARTO system, if needed, before proceeding.

1. Verify the ECG connections to the CARTO system.
2. Select *Start > Settings > Network Connections*. Verify the CARTO connection is 100Mbps.
3. Start a new case and verify that the *CARTO* icon is blue (located on the right side of the *System Tray* on the Real-Time screen).

Audible Indicators Testing

1. Open a study. Open the *Vital Configuration* window from the *Measurements* drop-down menu.
2. Verify that the *Audible Indicators* check box is selected, that the min/max settings are selected for the *Vital Signs* check box and that the *ECG tone* check box is selected for Mac-Lab.
3. If Mac-Lab, verify that *ECG QRS* tones are present.
4. Adjust the vital signs low and high to verify an audible tone when the min/max settings are reached.

RF Ablation Testing

NOTE

You need to perform the following test with the customer's cooperation.

1. Open the *Ablation* window in CardioLab.
2. Generate an RF output.
3. Verify that the waveforms and values are properly displayed in the *Ablation* window.

Stimulator Testing

1. Connect a Patient Stimulator.
2. Turn on the stimulator device (for example, Bloom or MicroPace or EP Med) and verify the sensing of the ECG signal.
3. Stimulate inputs 1 – 4 and verify that pacing spikes are displayed.
4. Refer to the vendor manual for configuration and checkout information.

DASH / Solar Testing

1. Connect NIBP and SpO₂ to the DASH or Solar monitor.
2. Verify that the interface cable is properly connected.
3. Perform a *Stat Vitals* measurement and verify that a log entry is created in the log window of the Nurse's Review Workstation.

Remote Operators Terminal Testing

1. Verify that the DIP-switch position 2 for the Normal Scroll Lock position is set to ON. Setting the Normal Scroll Lock position to ON ensures pressing the normal Scroll Lock key on the keyboard does not lock the remote keyboard.
2. Verify mouse and keyboard functionality at the RMOT.
3. Verify mouse and keyboard functionality at the local Acquisition after this testing is completed.

Analog Out Testing

NOTE

Due to the various configurations and usages of this output, the customer's cabling and test device is required to complete the verification.

1. Verify that there are signals coming out of DFIB Sync out from TRAM.
2. Verify that there are signals coming out of analog out on back of the TRAM RAC.
3. Verify that there are signals coming out of analog output in back of IEB.

Centricity Cardiology INW Testing

1. Log on to the server as **Administrator** (Contact GE Healthcare Technical Support or the system administrator for current password information).
2. Select *Start > Programs > Microsoft SQL Server > Enterprise Manager*.
3. Navigate to *Microsoft SQL Servers > SQL Server Group > INW Server*.
4. Click to expand the INW Server.
5. Verify that the *Replication Monitor* is present and is green.
6. Verify that the Archive Generator has been properly set up for each Acquisition System in replication.
7. Verify that Database Maintenance is configured properly.
8. Verify that backups have been configured.

NOTE

For Enterprise Backups, have the customer verify the backup of the folders listed in step 8c below was successful.

- a. Select *Start > Programs > Accessories > System Tools > Backup*.
 - b. Expand the tape and navigate through the folder structure to verify that the proper directories and files are included in the tape backup.
 - c. Verify that the following directories and files are selected:
 - *D:\Gemms\Prucka\Database\Maintenance\Backup*
 - *D:\Gemms\Prucka\Database\Maintenance\Log*
 - *D:\Gemms\Prucka\Studies*
9. Verify that a full tape backup has been performed on the INW server and that no errors exist in the logs. Navigate to *C:\Documents and Settings\Administrator\Local Settings\Application Data\Microsoft\Windows NT\NT Backup\Data* for the log files.
 10. Create a test study on one of the Acquisition system and close the study.
 11. Verify that the new study is displayed on the *Network* catalog on the other systems (Acquisitions and Reviews).
 12. Verify that lists and macros are present.
 13. Verify that List Sharing and replication is working properly on all Acquisitions and Server by adding a supply item in the DMS and verify that item shows up on all Acquisition systems in replication. Remember to remove the item from the DMS after the test.
 14. Verify that a study that has been archived to the INW server can be reviewed from all systems (Acquisitions and Reviews).

15. Verify that a study that has been pushed to the Centricity Cardiology INW server can be reviewed from all systems (Acquisitions and Reviews).

Remote Connection Testing

Verify that InSite ExC and/or VPN is working for remote diagnostics.

Planned Maintenance

The following form is a list of inspection and planned maintenance tasks that should be performed once a year. Print out a copy of this form and leave the copy of the form with the customer. Ensure that the customer knows that performing these tasks once a year will help maintain the equipment properly.

Mac-Lab/CardioLab Planned Maintenance Checklist

GE Healthcare



Hospital Name			
Equipment Type		Software Version	
Serial Number		Model #	
FE Signature		SR #	
PM Date		Next PM Due	

Preliminary Checklist

- * Record hardware information
- * Verify grounds
- * Inspect all power cords for damage
- * Check for loose cables and tighten as needed
- * Clean and check fiber Optic cable
- * Check patient cable, lead wires and stimulator cables for abuse and wear , replace as needed
- * Inspect all signal cables for Stress - Cuts - Tears
- * Check mounting hardware on Remote Monitor, tighten as needed
- * Check mounting hardware on TRAM and tighten as needed
- * Contact customer to determine/discuss any issues
- * Leave a copy of this form with customer

Hardware Checklist

- * Remove front cover of computer and remove dust
- * Remove dust and check operation of system fan
- * Removed dust from power supply and checked power supply fan
- * Remove dust from IEB and checked operation of fan
- * Clean and check fans on video boards
- * Check operation of UPS
- * Verify operation of computer displays
- * Clean and check floppy and CD drives
- * Clean and check keyboard
- * Shutdown and restart computer to verify correct boot operation
- * Check event logs for errors
- * Check that Anti Virus software is installed and is correctly setup
- * Check that the latest OS Patches are installed

Functional Checklist

- * Create New Study
- * Check ECG traces, Pressures, SpO2 and Cardiac output
- * Check with customer that all Macro's operate properly
- * Verify with customer all lists are correct
- * Verify recording of study onto the DVD/Optical
- * Print a report to verify printer operation
- * Close Study , verify study in system, optical and network catalog if networked
- * Verify study transfers to DMS and DMS logs contains no errors
- * Verify operation of Archive Generator
- * Verify study can be continued and reviewed from network if networked
- * Verify operation of Clab Amplifier, Stimulator , CARTO if Cardioblab/Combol
- * Verify operation of Vivid Ultrasound if installed
- * Verify study can be joined from a workstation if networked
- * Verify replication make change to list in DMS and confirm Delta export
- * Verify Insite 2/VPN functionality
- * Verify connectivity with X-ray
- * Check operation of Image Capture/Cardioimage if imaging system

Hardware and System Configuration Information

Description	Model #	S/N #
Vivid		
IEB 120V	2010698-002	
TRAM 451	2006171-001	
TRAMRac	900031-006	
ClabII 32 Amp	2003232-001	
Ricoh CL3500N	2026916-001	
INW G3	2038168-002	
DMS Express	P0000DD	
MicroPace	2004011-901	

GEHC schedules and conducts Planned Maintenance on equipment that is under contract. For equipment not under contract, the customer can schedule Planned Maintenance and will be charged a standard service rate. All Planned Maintenance service will be conducted between 8-5, M-F only unless Service contract purchased for extended coverage hours. This is not a contract amendment.

Mobile Workstand Preventative Maintenance

The following is preventative maintenance instructions for the mobile workstand (2008203-001).

Tools Required

- 1/2 inch socket wrench
- 9/64 inch hex wrench (provided with workstand)

Adjusting Tilt and Tilt Tension

1. For minor adjustments of the display tilt, loosen the Tilt Adjustment Lever, grasp the top and bottom of the display and tilt it to the desired angle. Tighten the Tilt Adjustment Lever.
2. To adjust tilt tension, equally tighten or loosen the two (2) Tension Adjustment Screws with the 9/64 inch hex wrench provided.

CAUTION

Equipment Damage — Tilt tension screws must be torqued to a minimum of 35 in-lbs [4.0 N-m].

NOTE

The Tilt Adjustment Lever is a multi-position, clamping lever that operates by lifting, rotating and releasing the handle.

Adjusting Swivel or Pivot Tension

Using a 1/2 inch socket wrench, tighten or loosen the pivot tension bolt swivel nut to the desired tension.

CAUTION

Equipment Damage — Swivel tension nut must be torqued to a minimum of 20 in-lbs [2.3 N-m].

NOTE

The Utility Hook must be removed to allow adjustment of the swivel nut.

Routine Maintenance

Periodically inspect all mounting hardware. Tighten or adjust as necessary for optimal operation and safety.

4 Troubleshooting

Initial Inspection

WARNING

SHOCK HAZARD — Use appropriate Lock Out/Tag Out procedures before performing any service on potentially energized equipment.

CAUTION

EQUIPMENT DAMAGE — Do not disconnect or reconnect cables while the system is under power (especially the barcode scanner).

Always use the following username for troubleshooting the system:

mlcltechuser (Contact GE Healthcare Technical Support or the system administrator for current password information).

CAUTION

SECURITY BREACH — Never leave a system logged in as **mlcltechuser**. When done, always log out and leave the system at the custom shell.

Before performing any troubleshooting procedure, check the following:

- The IEB is plugged in and power and ground are available at the wall outlet (also check the outlet circuit breaker).
- The IEB, computer, monitors, keyboard, and any optional equipment are properly connected and all connections are tight. Be sure to check for:
 - ◆ Frayed cables
 - ◆ Exposed conductors
 - ◆ Bent prongs or pins
 - ◆ Damaged cable housings
 - ◆ Loose plug screws
- Both IEB power switches (one in front and one in back) are on.
- Computer power switch is on.
- All monitors are turned on and set to the appropriate brightness and contrast.
- Equipment housing for cracks, overheating, or other damage.

Hardware

Clean Fiber Optic Cable

1. Clean each end of the fiber optic cable connecting the amplifier to the HP computer with a soft, dry, clean cloth.
2. Use a can of compressed air to remove any dust accumulation from the connector at the amplifier.

Initial Check

1. Right-click *My Computer* and select *Explore*.
2. Navigate to *C:\Windows\cpqdiag\cpqdiag.exe*.
3. Run a complete hardware diagnostic test on the system.

NOTE

The tests also include an internal serial loopback test.

Troubleshooting

Problem: Unable to Communicate with the TRAM

- The system cannot have an IP address in the range of 192.168.0.xxx. Verify the IP address for the system network connection (in network properties) is not 192.168.0.xxx. For example, if one of the other adapters on the Acquisition system has the IP configured for 192.168.0.20, the TRAMNet connection will fail and TRAM communication will fail.
The IP address of the TRAMNet is 192.168.0.100 and cannot be changed.
- Verify the TRAMNet jumper cable (1 ft yellow Ethernet cable) is connected into the left network port.
Review Installation manual (if available) and “[TRAM/Amplifier Connections](#)” on page 2-59 for proper cable connections.

Problem: System Locks Up After First Scan (with the Barcode Scanner) or the Barcode Scanner Does Not Work Properly

Ensure the barcode scanner is connected to a USB port. Otherwise, re-seat the connector. Refer to the Mac-Lab/CardioLab Barcode Scanner Configuration Instructions (PN: 2050508-001).

Problem: No Video Display on the Review Stations with LCD Monitor

Check the video cable. The computer and monitors both have DVI connectors.

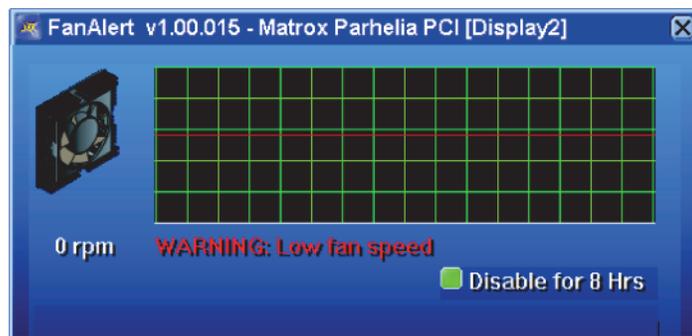
- Use the DVI-VGA adapter with the DB15-HD15 cable.
- Try the supplied DVI-HD15 cable.
- Try a different cable with the monitor or test the monitor on a different station.

Problem: Scrambled Video Display after Upgrade

- Incompatible refresh rate between the video card and the supported ranges on the monitor (if the monitor is older). The new Parhelia video board supports a high range of refresh rates, and may power up with a random rate.
- Scan for hardware problems using the built-in HP diagnostic tool (on Acquisition systems and HP Review stations).

Matrox Parhelia Fan Alert

The following is a diagnostic message that is displayed by the Matrox Parhelia board driver if the cooling fan on the board fails:



1. If this message appears on an Acquisition or HP Review system, click *Disable for 8 hours* to temporarily disable this message.

NOTE

Do not use the system for an extended period if this problem is reported.

2. The error message will continue to be displayed if the fan continues to malfunction. In order to fix this problem, replace the affected Parhelia display board on the system.

Replace Main Video Board with Matrox M9140 Quad Video Board

If the main video board is being replaced with the Matrox M9140, the previous video board's drivers must be uninstalled and the board removed.

After the old video board is removed, install the Matrox M9140 Quad video board, connect the cables, power on the system and install the Matrox M9140 drivers. Then configure the display.

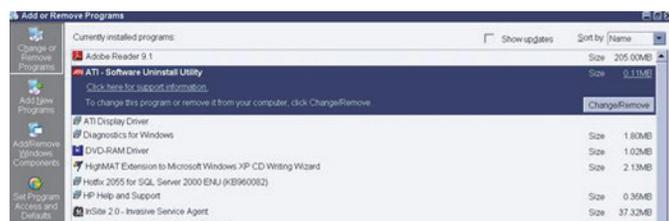
Uninstall Unused Display Drivers

Uninstall unused display drivers before installing the Matrox M9140 Quad video board drivers.

1. Log on to Windows and the Custom Shell as **mlcltechuser**.
2. Ignore any New Hardware found messages.
3. If an error message about stopping ONL display appears, click *OK*.



4. Click *Start > Settings > Control Panel > Add or Remove Programs*.
5. Uninstall the *ATI – Software Uninstall Utility*.



6. Ignore any New Hardware found messages.
7. Restart the system.
8. Log on to Windows and the Custom Shell as **mlcltechuser**.
9. Ignore any New Hardware found messages.
10. If an error message about stopping ONL display appears, click *OK*.

11. Click *Start > Settings > Control Panel > Add or Remove Programs*.
12. Uninstall *Powerdesk-HF and Driver*.



13. Select *No* to restart in the *Matrox Uninstaller for PowerDesk* window.

Shut Down the System

WARNING

SHOCK HAZARD — To reduce the risk of shock and equipment damage, use safe working practices before servicing electrical equipment.

1. Close all open windows.
2. Select *Start > Shutdown*.
3. Click *Shutdown*.
4. Power off the computer and all peripheral devices.
5. Disconnect the AC main power cords from the computer and from all peripheral devices.

Remove and Install the Board

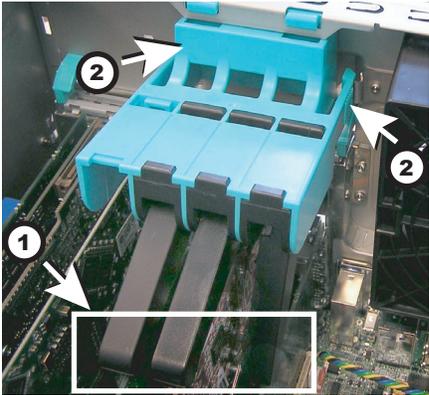
WARNING

SHOCK HAZARD — To reduce the risk of shock and equipment damage, use safe working practices before servicing electrical equipment.

1. Lift up on the tab near the top of the side panel.



- 2. Swing out the side panel and remove from the computer.
- 3. Disconnect all video cables (including adaptors) from the computer.
- 4. Place computer on side (open side up).
- 5. Squeeze in two tabs, gently push in, then pull, and lift off the clamp.



Item	Description	Quantity
1	Tabs	1
2	Clamp	1

- 6. Gently pull the board from slot 5 of the computer.
- 7. Gently pull the video board from slot 2 of the computer (if present).
- 8. Slide the new M9140 video board into the computer slot 2.
- 9. Follow the instructions included with the Matrox Quad Graphics card for securing the bracket to the card. After the bracket is

installed, test to ensure the mating quad video cable can plug into the graphics card without any interference from the bracket.

10. Install the blank panel for the unused PCI slot 5.
11. Connect the new proprietary connector cable to the board.
12. Slide the clamp into the computer, swing the clamp toward the board end plates. Make sure the clamp is properly secured when the tabs “click” into their locked position.
13. Connect three video cables (including adaptors) to the proprietary connector cable on the board.
 - Video 1 cable to connector labeled 1/5
 - Video 2 cable to connector labeled 2/6
 - Video 3 cable to connector labeled 4/8
 - Connector labeled 3/7 not used
14. Re-install the side panel on the computer.

Power On the System

WARNING

SHOCK HAZARD — To reduce the risk of shock and equipment damage, use safe working practices before servicing electrical equipment.

1. Connect the AC main power cords to the computer and all peripheral devices.
2. Power on all peripheral devices.
3. Power on the Acquisition computer.

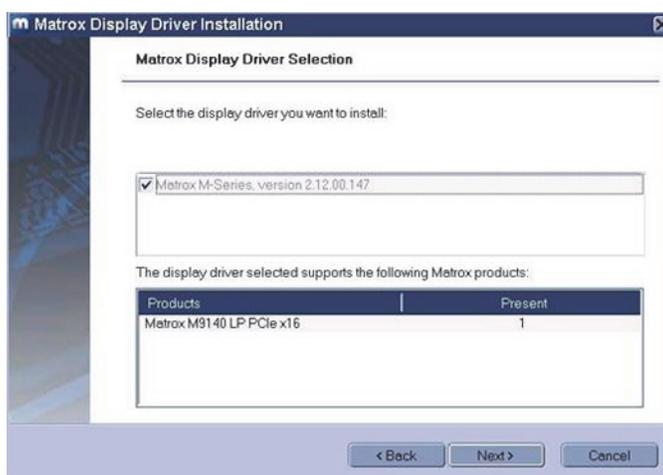
Install Matrox M9140 Quad Video Board Drivers V2.12.00.147

Install the Matrox M9140 Quad video board drivers using CD-R MATROX M9140 QUAD VIDEO CARD DRIVER, V2.12.00.147 (P/N 2074635-001).

1. Log on to Windows and the Custom Shell as **mlcltechuser**.
2. Ignore any New Hardware found messages.
3. If an error message about stopping ONL display appears, click *OK*.



4. Insert CD-R MATROX M9140 QUAD VIDEO CARD DRIVER, V2.12.00.147 (P/N 2074635-001) into the drive.
5. Browse to the CD drive and double-click *Setup.exe*.
6. At the *Matrox Display Driver Installation - Matrox PowerDesk* window, click *Next*.
7. At the *Matrox Display Driver Selection* window, click *Next*.



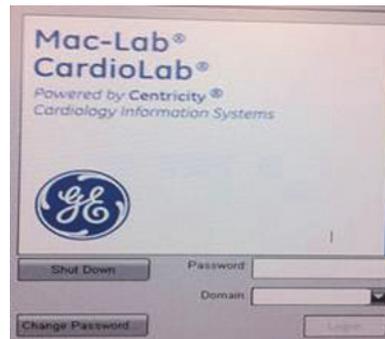
8. At the *Ready to Install* window, click *Next*.
9. At the *Installation Completed Successfully* window, click *Next*.
10. At the *Installation Completed* window, click the *Restart Computer* checkbox and click *Finish*.



Post Installation Steps for Matrox M9140 Quad Video Board Drivers V2.12.00.147

After installing drivers for the Matrox M9140, the logon fields might not display properly when the computer first restarts. Restarting the computer again resolves the issue.

1. Log on as **mlcltechuser**.



NOTE

The logon fields are present, but might not display properly.

2. Shut down and restart the system again to resolve the issue.
3. Log on to Windows and the Custom Shell as **mlcltechuser**.
4. Reconfigure the monitor settings using [“Set Display Configurations”](#) on page 4-10.

Set Display Configurations

Two Monitor Systems

1. Right-click the Desktop and select *Properties*.

2. Select the *Settings* tab.
3. Click the icon for the second monitor (labeled “2”).
4. Select *Extend the Windows desktop onto this monitor* check box.
5. Click *Apply*.
6. Close all open windows.

Three Monitor Systems

1. Right-click the Desktop and select *Properties*.
2. Select the *Settings* tab.
3. Click the second monitor icon (labeled 2).
4. Select *Extend the Windows desktop to this monitor* check box.
5. Re-order the monitor icons so they appear in the following order:
1-2-4.

NOTE

For HP z600 and HP xw8400 systems, the order of monitors should be *1-2-4*, the second monitor (“2”) and fourth monitor (“4”) need to be extended and the third monitor (“3”) should not be extended.

NOTE

To re-order the icons, drag the monitor icons and drop them in the correct position.

6. Click *Apply*.
7. Click the third monitor icon (labeled 4).
8. Select *Extend the Windows desktop to this monitor* check box.
9. Click *Apply*.
10. Click *Identify*.
11. Verify the monitors are identified as *1-2-4* from left to right.

Set Display Resolution

1. Verify you are logged on as **mlcltechuser** (password: **mlcl!techuser**).
2. Right-click the Desktop and select *Properties*.
3. Select the *Settings* tab.
4. In the *Screen Resolution* section, select *1600x1200*.

NOTE

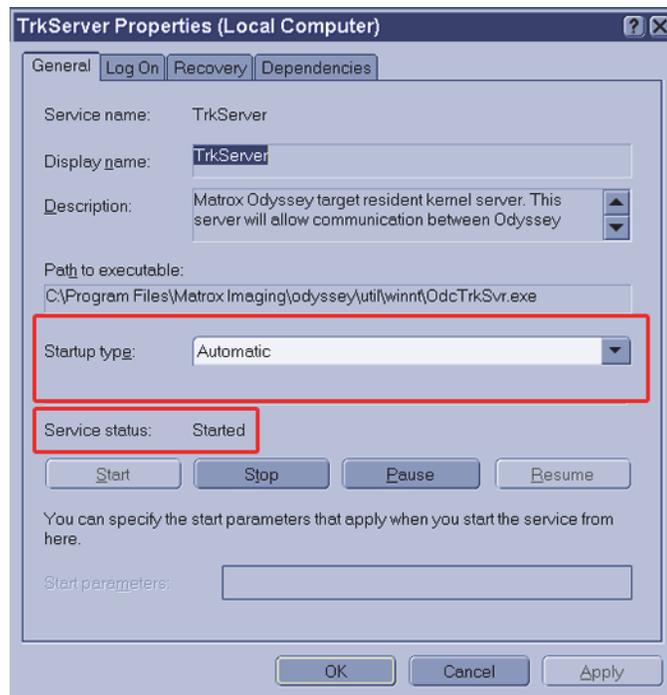
This is the only supported resolution for new systems. If existing monitors do not support this resolution, *1280x1024* may be used for Mac-Lab systems. All monitors must be set to the same resolution.

5. Verify the color for all monitors is set to *Highest (32-bit)*.
6. Click *OK*.

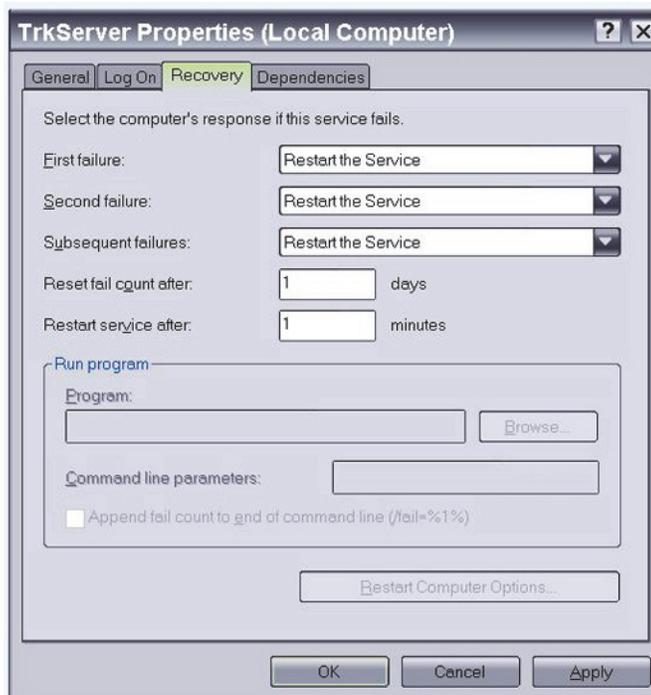
Prevent Failure of the Matrox Odyssey Driver Service

If the Image icon in the Image window appears grayed-out and disabled, the Matrox Odyssey driver service might have failed to start. The following procedure ensures that if the display driver service fails, it is automatically restarted.

1. Log on to Windows and the Custom Shell as **mlcltechuser**.
2. Click *Control Panel > Administrative tools > Services*.
3. In the *Services* panel, right-click *TrkServer* and select *Properties*.
4. Select the *General* tab and verify the following:
 - The *Startup type* is set to *Automatic*
 - The *Service Status* is *Started*



5. If the service is not started, click *Start* in the *Service Status* section to start it manually.
6. Select the *Recovery* tab and change the recovery actions as shown below:



7. Click *OK*.
8. Log off and auto-logout to Windows.

CardioLab Amplifier Troubleshooting

If the amplifier does not send signals to the CardioLab system or you receive an unable to communicate with amplifier message:

- Ensure that the amplifier is plugged in and turned on.
- Verify that the external cables are connected properly and are securely attached.
- Replace the fiber optic cable (FOC).
- Clean the FOC with isopropyl (rubbing) alcohol and blow out the connectors with compressed air.
- Disconnect the FOC from back of the computer and make sure that there is a light coming from the end of the cable that was plugged into CPU IN.
- With the amplifier and computer turned on, the green LED next to the CPU IN port on the computer will turn green when connected properly.
- If the problem is intermittent, this problem may indicate a dirty or broken FOC or connector.
- If the problem persists, ensure that all connections inside the amplifier are secure and the boards are seated securely in their slots.

Random spikes or square waveforms appear in signals when not stimulating the patient:

- Clean the FOC contacts with a non-abrasive, lint-free cloth and isopropyl alcohol.
- Replace the fiber optic cable.
- If the waveforms only exist on one channel, try replacing either the catheter, catheter extender, or catheter junction box. You may also try another Catheter Input Module.

Noise on Intracardiac Signals

The noise should resemble 60 Hz or some other relatively consistent interference which are not associated with stim artifact.

- Go to the amplifier test selection under Administration and perform a hardware reset on the amplifier (this is equivalent to turning the amplifier off and on, which would be the second option).
- Verify that the catheter is correctly plugged into the Catheter Input Module (CIM) and that these poles have been correctly entered into the study configuration.
- Remove/replace the catheter extender cables, especially if they have been re-sterilized.

Amplifier Communication (Choppy Signals in CardioLab)

Verify the PCI Comms board has the proper version number. Use the PCI Comms Tool (*Start > Programs > PCI Comms Tool*) to verify it is version 2.

Amplifier Signals Incomplete, Intermittent, and/or Noisy

Clean the fiber optic cable. Clean the pin ends of the fiber optic cable with a soft, dry clean cloth to remove any dust or debris that may be present. Do this at each end of the cable connecting to the amplifier and to the HP computer. Also remove any dust build up at the connector on the amplifier (use a can of compressed air).

NOTE

If a user is pacing and ablating simultaneously, noise may occur on the signals and interval sensing may be interrupted and log incorrectly due to this noise.

Real-Time Testing During a Case

Make Duplicate Channels

- If the noisy signal is set to poles x and y, set up another channel (one with a high quality intracardiac signal, (for example, HRA or RVA) with the same poles and see if the noise is present there as well. This tests the channel.
- While keeping the channels consistent, try inputting the catheters to different poles on the CIM and see if the noise follows the signal. This tests the CIM poles.

NOTE

If the last two tests make no difference, the problem may exist with the catheter itself. Try replacing the catheter.

Detailed Testing: Amplifier Channel Test

- Input a simulated signal into poles 1 and 2 of the CIM block A and connect the ground of the simulator to the RL limb lead
- In the study configuration set all intracardiac channels to:
 - ◆ Poles 1 and 2
 - ◆ Bicath type setting
 - ◆ No notch filter and identical high and low pass settings.
 - ◆ Make sure each signals is displayed on an active page.
- All of the signals should be identical. If one channel does not produce an identical signal, the channel may be bad.

Catheter Input Module Test

In the study configuration:

- All channels should be set to Bicath type with equal filter settings.
- Give each channel 2 poles in ascending order: Ch.1 (poles 1 and 2), Ch. 2 (poles 3 and 4), Ch. 3 (poles 5 and 6), and so on Continue to do this through all poles for all blocks.
- Plug a simulated signal from channel to channel, from one pair of poles to the next pair of poles. Connect the simulator ground to the RL limb lead.
- All of the signals should look the same, if one does not produce an identical signal, the pole in the catheter input module may be bad.
- Ensure that you are not placing the CIM in sterile bags and then pushing the catheter pins through the plastic and into the CIM. This plastic can become lodged in the CIM and create problems.
- Catheters with long pins (1/2 inch) normally produce less noise than catheters with short pins. This is due to the long pins' deep penetration into the CIM.
- Send a fax of any noise issues to customer support. Use calipers to demonstrate the cycle length of the noise. 60 Hz noise has a cycle length of 16.7 ms.

Noise on ECG Signals

- When inspecting a full 12 lead, is there one signal which is particularly clean?
 - ◆ If Lead I is clean and all other signals are noisy, apply a new left leg patch.
 - ◆ If Lead II is clean and all other signals are noisy, apply a new left arm patch.
 - ◆ If Lead III is clean and all other signals are noisy, apply a new right arm patch.
 - ◆ If all signals are noisy, apply a new right leg patch.
- Buff and clean the patient's skin before applying the new patch.

- If changing the patch does not help, swap the suspected limb lead with any of the other lead wires. For example, if Lead I is clean, and all other signals are noisy, swap the LL with a V wire.
- Ensure that all patches on the patient are of the same type. Do not use different types of patches because this will cause the Common Mode Rejection Ratio (CMRR) to decrease, producing more noise.
- In some cases, an abnormally high soft scale value in the study configuration can lead to noise. You can reduce this setting by one level and adjust your signal gains accordingly. For example, if you move from 1/4 to 1/8, you will have to increase the gain of your signals by 2 (for example, from 500 to 1000). Values of 1/8 or less are recommended.
- Select hardware reset from the amplifier test window.
- Ensure that neither the amplifier nor the computer/IEB is plugged into an emergency AC power outlet. While these may have good power, they may introduce noise into CardioLab due to the many extraneous circuits tied to them. Also, make sure the amplifier is not plugged into a power strip. The amplifier should always be plugged into its own dedicated outlet.
- Install a harmonic filter isolation transformer between the power source and the amplifier to further reduce noise.
- It may be necessary to replace the ECG cable (the cable from the front of the amplifier to the limb leads).
- Ensure that all AC outlets which CardioLab interfaces with are properly grounded. To ensure this, a receptacle tester should be used to look for these wiring faults.
- When testing for these problems, remember that auxiliary equipment such as RF pads and pulse oximeters may be adding noise to the patient. Therefore, remove all auxiliary equipment and add each piece individually while looking for signs of noise. Also, make certain that any auxiliary piece of equipment connected to the patient is not plugged into a power strip.
- When using a simulator to test ECG channels, ensure that the Right Leg lead is always attached to the simulator. This is used as a reference channel by the amplifier.

Signals Offset from the Channel Labels

- Go into the amplifier test option under the Administration menu and select Reset Hardware.
- If this does not fix the problem, click on the Zero tab in the amplifier test window and zero the signals with the offset.
- Ensure that the soft scale is no greater than 1/4. Also, abnormally high gain settings for ECGs may contribute to an offset problem.
- Check the filter settings for the signal.
- Continued problems with signal offset may mean that the amplifier needs calibration. Calibration must be performed by a trained GE Service personnel.

ECGs are Flat

- When inspecting a full 12 lead, is there any one signal which is flatline?
 - ◆ If Lead I is flat and all other signals are good, apply a new left leg patch.
 - ◆ If Lead II is flat and all other signals are good, apply a new left arm patch.
 - ◆ If Lead III is flat and all other signals are good, apply a new right arm patch.
- If changing the patch doesn't help, swap the suspected limb lead wire with any of the other lead wired.
- In many cases, an abnormally low soft scale value can lead to flatlines. Values of 1/8 and 1/4 are recommended.
- Select Reset Hardware from the amplifier test window under the Administration menu.
- It may be necessary to replace the ECG cable (the cable between the amplifier and the limb leads).
- If using a simulator to test the ECG signals, always make sure the right leg lead is attached to the ground of the simulator.

Stimulus Artifact on Intracardiac Channels

NOTE

If this is the first case in which you have seen this problem, the problem is most likely with a “case variable”. A case variable is something which has changed since the last case was performed. Catheters and catheter extenders are good examples of case variables. If the amplifier has worked properly in the past, it is doubtful that it has suddenly developed a stim artifact problem. New or re-sterilized catheters may have a short or bad connection.

- Does the artifact occur when pacing from one catheter but not from others?
 - ◆ If yes, connect a catheter that is not producing stim artifact to the same inputs on the catheter input module (CIM) where the catheter with the stim artifact is connected. Pace through the new catheter.
 - ◆ If no artifact is present, the problem is with the original catheter.
- If artifact is still present, move the catheter to poles on the CIM which are seldom used. If there is no stim artifact here, the problem may be with the original poles on the CIM. They may have loosened over time. The pacing poles at the bottom of the CIM may also be used for this purpose.
- Replace the stim cable from the stimulator to the amp. If artifact is no longer present, the cable was bad.
- Move the stim cable input for the stim channel with the artifact problem to another channel on the stimulator. If the artifact is no longer present, the stimulator channel may be bad.
- Try using another stimulator. A hand held temporary pacemaker or another battery operated stimulator will work.
- Connect the catheter directly to the stimulator. If the artifact is no longer present, the problem may be with the amplifier or one of the cables connected to the amplifier.
- For continued problems with stim artifact, please fax a snapshot of the signals to customer support for evaluation.

Stimulus Artifact on ECG Signals

- Does the artifact appear on all of the surface leads?
 - ◆ If Lead I is clean and all other ECGs have artifact, replace the left leg patch.
 - ◆ If Lead II is clean and all other ECGs have artifact, replace the left arm patch.
 - ◆ If Lead III is clean and all other ECGs have artifact, replace the right arm patch.
 - ◆ If all ECGs have artifact, replace the right leg patch.
- Buff and clean the patient's skin before applying new patches.
- If the artifact occurs at random times on random signals, this is further evidence that a faulty patch or lead may be causing the artifact. If changing the patch above does not help, try swapping the associated lead wire with one that is known to be producing a good signal.
- Reduce the gain on the affected signals.
- Select the Reset Hardware button in the amplifier test window under the Administration menu.
- Ensure that you are not placing the CIM in sterile bags and pushing the catheters through the bag into the poles. This plastic can become lodged in the junction box and create problems.
- Catheters with long pins (1/2 inch) normally produce less artifact than catheters with short pins. This is due to the long pins' deep penetration into the CIM.
- Replace the stim cable.

Cannot Stimulate the Patient

- Ensure that the stimulator input cable is connected to the front of the amplifier and the opposite end is connected to the appropriate poles on the stimulator.
- Ensure that the appropriate stim enable button at the top of the Real-Time window in the CardioLab application is turned on (red).
- Check the study configuration to ensure that the stimulus is set to go to the correct catheter.
- Check to make sure the stimulator is working properly. Bypass the amplifier by connecting the distal poles of the catheter to the stimulus poles at the bottom of the catheter input module. These poles are directly wired from the front of the amplifier.
- If you are still unable to pace, connect the distal poles of the catheter directly to the stimulator, bypassing the amplifier. If you still cannot pace, the problem is not with the CardioLab equipment and most likely lies with the stimulator or catheter. Check the output of the stimulator with a multi-meter or oscilloscope.

General Hints to Reduce Noise in a Typical EP Lab

- Good grounding is key. All equipment which is connected to the patient should be connected to the same electrical circuit (not the same outlet), if possible. By connecting all of the equipment to the same circuit, it is possible to prevent “grounding loops” from occurring which can cause noise.
- Any light fixtures or other antenna-like devices above or around the bed can be connected to the same circuit mentioned above.
- If possible, labs should not be positioned next to elevator generators, or any other power generators. Other major pieces of noise emitting equipment include MRI systems, and so on.
- For ultimate noise protection, the lab can be enclosed in a “Faraday Cage”. This involves enclosing the lab in a metal box which is then grounded. While this is expensive, it is quite effective.

CardioImage

Normal Operation and Setup

1. Connect the video output from the lab's image source to the input of the Image Capture board (Odyssey board) on the CardioLab unit. The BNC connectors on the cable attached to the Odyssey board are color-coded to indicate the channels: Red = 1, Blue = 2. If more than two video outputs are present, use the second (right) connector on the Odyssey board with the following color-coding: Red = 3, Blue = 4.
2. Double-click *Mac-Lab/CardioLab* on the desktop.
3. Create a CardioLab test study.
4. Open the *Image 1* window on the Review monitor by selecting the *Windows* menu and *Image 1*.
5. Select an area on the *Review* window to open the window.
6. Click the *Toolkit* on the *Image* window to open the *Imaging Configuration* screen.
7. For the selected channel, pick the correct video format (DCF) file that matches the input video source used.

For NTSC composite video, select *RS170.DCF*.
8. Click *Freeze* in the *Image 1* window.
9. Ensure that an output is present from the lab's image system.

Do this for all of the image inputs that are connected.
10. Verify that a single image is grabbed and displayed in the *Image* window.
11. Open an *Image* window on the Image monitor (third monitor).
12. Acquire a live image by clicking *Live*.
13. Ensure that a live image is displayed in the *CardioImage* window.

NOTE

This should be done for all of the image inputs that are connected.

14. If the image does not appear, or is not centered in the window, you may need to select a different video format (DCF) file.

Troubleshooting

Problem: Unable to Capture Image

The image grabber window is blank or displays an error (no video found).

1. Check the cables:
 - Red and blue cables are input 1 and input 2 (respectively).
 - Left DVI port on the Odyssey board is channels 1 and 2, right DVI port is channels 3 and 4.
2. Verify Odyssey Firmware Version:
 - a. Right-click *My Computer* and select *Explore*.
 - b. Navigate to *C:\Program Files\Matrox Imaging\Odyssey\Util\Winnt* and run *MTXEDIT.exe*.
 - c. Click *OK* at the *Select Board* window.
 - d. The title of the *MTXEDIT* application window displays the current firmware information. The format of the information displayed is: *Grab:0x###A/B AN:1480.0*, for example, this may look like: *Grab:0x460A AN:1480.0*. Please ensure that *1480.0* is the last part of this string.
 - e. If the firmware revision is not 1480 (or the information is not displayed), then you have not successfully upgraded. Do not continue, return to the Odyssey Board Setup section.
3. Verify Odyssey Driver:
 - a. Verify that you are logged into Windows as local **mlcltechuser**.
 - b. Right-click *My Computer* and select *Manage*.
 - c. Browse to *Device Manager*, and expand *Matrox Imaging Adapter*.
 - d. Verify that two Odyssey devices are listed under *Matrox Imaging Adapter*.
 - e. If these devices are not listed, do the following:
 - i. Expand and check the *Other Devices* folder.
 - ii. Right-click the devices listed and select *Update driver*.
 - iii. Click *Next* to install the default driver.
 - iv. Once the installation is complete, the devices should be listed under *Matrox Imaging Adapter* as listed previously.
4. Verify Odyssey Service:
 - a. Navigate to *C:\Program files\Matrox imaging\odyssey\util\winnt* and run the *OdcMon.exe* tool. The tool will be minimized to the system tray.

- b. Double-click *OdcMonitor* in the system tray (lower right corner of the first monitor) to open the tool.
 - c. If a red square icon is shown in the toolbar, no action is needed. This is the expected result.
 - d. If a green arrow icon is shown in the toolbar, it indicates a required system service is not running. Click the green arrow to start the service. Verify that the service is started, as indicated by a red square icon in the toolbar.
5. Navigate to *D:\GEMMS\Prucka\Utilities* and run the *OdysseyTest.exe* program to verify that the board and the driver are installed correctly:

NOTE

This procedure requires an external composite video source, such as a DVD player, to be connected to the first input of the Odyssey board.

- Verify that the *OdysseyTest* program starts without errors.
- Click the *arrow* icon in the toolbar to start a live image capture.
- Verify that a live image is displayed.
- Click the *square* icon to stop the capture.
- Exit the test utility.

NOTE

If a different video source (not standard composite video) is used, replace the *OdysseyTest.dcf* file in the *D:\GEMMS\Prucka\Utilities* folder with a DCF file that matches the video source. All DCF files installed on the system are available in the *D:\GEMMS\Prucka\System\Image\DCF* folder on the system.

CAUTION

LOSS OF FUNCTION — Do not edit or change the original dcf files. They may be needed in the future.

Always create a copy of the original dcf file to work on.

6. Contact technical support if an X-Ray image is not properly displayed using any of the supplied *.dcf* files.
- Provide all image source specifications (resolution size, video timing, frequency, and so on). Contact the X-Ray OEM if necessary.
 - Technical support may be able to create a custom dcf file based on the specifications.

Problem: Image Distorted

Use this procedure if you are able to capture images using one of the provided DCF files but the image is distorted or partially cut off.

1. Ensure you are logged on to Windows as **mlcltechuser**.
2. Attempt to capture using all provided DCF files. Identify the DCF file that gives the best image.
3. Select *Start > Programs > Matrox Imaging > Intellicam > Intellicam*.
4. Select the *Options* menu and choose *System Selection*. Choose *Odyssey 0 Device* and make it active.
5. Select the *Open* menu and browse to *D:\GEMMS\Prucka\System\Image\Dcf*.
6. Choose the DCF file that gave the best image.
7. Save the DCF file as a different name to prevent the original file from being modified.
8. Select the *Digitizer* menu and select *Continuous Grab*.

You should see an image at this time. If you do not see any image, check your connections and make sure the imaging system is sending out a signal.

NOTE

If Intellicam does not capture images using the *dcf* file, use the *OdysseyTest* utility (refer to “[Problem: Unable to Capture Image](#)” on page 4-23) or the CardioLab application to test the file.

9. Click the *Pixel Clock* tab in the configuration box.
 - If the image is a vertically elongated, increase the pixel clock value. This will make the image wider and shorter.
 - If the image is a horizontally elongated, decrease the pixel clock. This makes the image taller and narrower.
10. Click the *Video Timing* tab of the *Configuration* window.

NOTE

As you change the settings and modify the image, it may be necessary to close the grab window from time to time and open a new one for the changes to take effect. Most changes will take effect in real-time during the grab.

It may also be necessary to turn off the pixel clock Auto-adjust so you do not lose the pixel clock setting you just set.

- To decrease the amount of blank space to the left of the image, click the lock active and total box in the horizontal section.
- To move the image to the left, increase the back porch value.
- To move it to the right, decrease it.

With the lock active and total box checked, the software automatically computes the front porch value.

- To decrease the amount of blank space above the image, click the Lock Active and Total box in the vertical section.
- To move the image up, increase the back porch value.

With the lock active and total box checked, the software automatically calculates the back porch value.

11. Save changes made to the camera format once the image is set up correctly.
12. Return to the Mac-Lab/CardioLab software and start a study. Open the *Study Configuration* window, and select the *Imaging* tab. In the camera type field for image input 1, select the DCF file you created in *Intellicam* utility.
13. Test the camera format by acquiring an image. If the image is not acceptable, you may need to go back to *Intellicam* to adjust the image.

NOTE

The brightness and contrast of the image can be adjusted by changing the controls in the image window.

14. If it is not possible to correct the image using manual adjustments, you need to contact the vendor of the imaging system. You will need the following details that can be directly entered in *Intellicam* to create a new DCF file:
 - Whether video is interlaced or non-interlaced
 - Pixel clock (dot clock) in MHz
 - Horizontal frequency (line rate) in kHz
 - Vertical frequency (frame rate) in Hz
 - Image width (both active and total) in pixels
 - Image height (both active and total) in lines
 - Horizontal sync, front porch and back porch duration, in pixels or microseconds
 - Vertical sync, front porch and back porch duration, in lines or microseconds

Problem: 3rd Monitor Set to Pan Mode After Reimaging

When the display resolution for the 3rd monitor was changed to 1600X1200, the display for the 3rd monitor changed to a pan mode where only a portion of the display was visible. The rest would be visible only when I used the mouse to pan the desktop area.

This problem is dependent on the monitor used. It does not occur with production CardioLab LCD monitors natively support 1600X1200 resolution. However, this may happen with older CRT monitors or with LCD monitors do not natively support 1600X1200. In this case, the following procedure can be used to fix the problem:

1. Install the ATI Control Panel utility:
 - a. Log in as **local mlcltechuser**.
 - b. Browse to the *C:\windows\drivers\display\ATI FireGL[Driver Information]* folder.
 - c. Double-click *setup.exe* and follow on-screen instructions.
 - d. Select the *Custom* option in the *Select Components* window.
 - e. Ensure the *ATI Control Panel* is selected and click *Next*.
Wait until the Setup Complete screen is displayed.
 - f. Click *Finish* to restart.
 - g. After the restart, login again as **local mlcltechuser**.
2. Change the Monitor settings:
 - a. Right-click the desktop and select *Properties*.
 - b. Select the 3rd monitor icon.
 - c. Click *Advanced*.
 - d. Select the *ATI Displays* tab.
 - e. Click the *Monitor* button corresponding to the active monitor shown.
 - f. Uncheck the *Use DDC information* check box if it is checked.
 - g. Set maximum resolution to 1600X1200.
 - h. Click *OK* to close all ATI dialogs.
 - i. Change the resolution of the 3rd monitor to 1280X1024 and then back to 1600X1200 using the *Windows Display* properties dialog.
 - j. Verify the whole desktop is visible (that is, not in pan mode).

Problem: Missing Video for the 3rd Monitor on HP xw8400 Systems

Performs the following procedure if a site reports missing video for the 3rd monitor on HP xw8400 systems:

1. Check Windows Display settings to verify that the 3rd monitor is enabled.
2. Verify that the monitor is working correctly.
3. Verify that the motherboard BIOS is up-to-date (v2.35). Upgrade if necessary.
4. Verify that the monitor cable for the 3rd monitor is tightly connected on both ends. It may be connected to either port on the FireGL board, although we normally use the first (left) port by convention.
5. Verify that nothing is connected to the other (unused) connector on the FireGL board.
6. Completely power down the system. Disconnect the power cable, wait until the system powers off completely and reconnect the cable.
7. Video for the 3rd monitor should now be displayed correctly.

Problem: Image Buttons Are Grayed Out

The *Live* and *Freeze* buttons on the Image window toolbar are grayed out.

1. Check the Software options installed on the system. The CardioImage option should be enabled for Live capture support. The Image capture option must be enabled for single-image capture (Freeze).

NOTE

Live capture is supported only when the Image window is opened on the third monitor.

2. Check that the Odyssey Service is running on the system. Refer to the steps “Verify Odyssey Service” in the troubleshooting section “[Problem: Unable to Capture Image](#)” on page 4-23.
3. Check that the Imaging driver is installed correctly and the Odyssey board firmware is up-to-date. Refer to the steps “Verify Odyssey Firmware Version” and “Verify Odyssey Driver” in the troubleshooting section “[Problem: Unable to Capture Image](#)” on page 4-23.

Switching Ablation Devices

When switching ablation devices from the CryoCath to any other, the cable should be switched first followed by the ablation device driver. When switching from any RF ablation device to the CryoCath, the ablation device driver should be switched first followed by the cable. If an ablation device appears to not be receiving data, clicking on the ablation device driver in the ablation setup screen will reset the com port. They may resolve the ablation data transmission issue.

Windows XP/2003

Normal Operation

Windows XP/2003 are extremely stable (if you delete system files, it puts them back, entire CD is built into the drive *C:\windows\i386*).

- Three tools to use on 2003 are (refer to Installation manual):
 - ◆ Active Directory users and computers
 - ◆ Active Directory domains and trusts
 - ◆ DNS configuration
- OEM images randomly generated name based on CLWS or CLSV and 4 digits – if a duplicate name on the network is found, there is a utility built in to change the name automatically (*C:\windows\special\rename.hta*).
- Files may be dragged to the CD to write to re-writable media.

Troubleshooting

No login Through the Custom Shell

1. Log off and during log on, hold the **Shift** key to break the auto-logon sequence.
2. Logon through the windows logon dialog as **MLCLTechUser** from Centricity Cardiology INW domain (the following steps require administrative privileges).
3. Log into the Custom Shell as **MLCLTechUser** from INW domain.
4. Open a Command Prompt.

NOTE

If Explorer or the command prompt icon are not available in the *Start Menu*, open explorer by right-clicking *Start* and selecting *Explore*. Then go to *C:\Windows\System32\Cmd.exe*.

5. Type **net time /set /domain:INW**. Click *Y* for yes when prompted.
6. At the command prompt, type **gpupdate /force**. This command will take about 15-20 seconds to finish.
7. Reboot the computer.

Problem: How can you tell if the computer has the correct policies applied?

1. Open Help (*Start > Help*) from the Start menu.
2. Select *Pick a Task > Use tools* to view your computer information and diagnose problems.
3. Select *Tools > Advanced System Information*.
4. Select *View Group Policy settings applied* in the right window (may take up to 2 minutes to display).
5. *Default_MLCL Computers_Policy* must be listed under *Applied Group Policy Objects*.
6. If not, perform the following procedure:
 - a. Ensure the system is properly entered into the domain.
 - b. Reboot and allow computer to come to custom shell.
 - c. Press **Ctrl+Alt+Delete** and logoff while holding down **Shift** key.
 - d. Log back in as **local mlcltechuser** to the Windows OS.
 - e. Logon to the Mac-Lab/CardioLab Custom Shell as **local mlcltechuser**.
 - f. Log off and allow the system to auto-logon. The correct policies should now be applied.

Problem: Error message (User Does Not Have Appropriate Rights) while logged in the domain as MLCLTechUser.

1. Make sure you are in the OU.
2. If so, log out and log in to the systems as a **local mlcltechuser**.

Problem: Can not obtain proper policies on acquisition or review system.

1. Verify the DNS entry for the workstation is directed to the IP of the Centricity Cardiology INW server.
2. Verify the Centricity Cardiology INW server can be pinged by both name and IP address.

GEMS_TaskMonitor Service

NOTE

To start or stop the service, select *Control Panel > Administrative Tools > Services > GEMS_TaskMonitor*.

GEMS_TaskMonitor service monitors configured services. Based on configuration, this service could be used to start or stop any windows services.

On the Centricity Cardiology INW server, GEMS_TaskMonitor will be configured to monitor the CentralList Service. CentralList service will be used for communicating with CVIS server.

The GEMS_TaskMonitor service must be stopped for:

- CentralList Service configuration or maintenance:
GEMS_TaskMonitor service will try to start CentralList Service at every 15 minutes. The CentralList Service may be started while configuring the GEMS_TaskMonitor service if we didn't stop GEMS_TaskMonitor before configuration.
- If the Centricity Cardiology INW server is not configured to communicate with CVIS: We don't need the monitoring service, as CentralList Service won't be running on Centricity Cardiology INW server. In this case you need to stop and then disable the GEMS_TaskMonitor service. Be sure to start GEMS_TaskMonitor service when you configure Centricity Cardiology INW server to communicate with CVIS.

Networking

Normal Operation

It is very important to understand the facilities IP Addressing scheme before equipment setup. If any IP setting is miss-typed the system may not be able to communicate on the network.

Troubleshooting

IP Troubleshooting

- Ping 127.0.0.1 to ensure the TCP/IP is installed properly.
- Ping the IP of the Local Computer to ensure the IP was entered correctly.
- If applicable, ping the IP Address of the Default Gateway. If this ping fails then you may not be able to communicate with other devices on the network.
- If applicable, ping the IP Address of a device located beyond the Default Gateway. This will ensure the Default Gateway is properly routing packets outside of your current network segment.
- Attempt to ping a remote device by name. If the system can ping by IP, but not by name, there is probably an issue with the DNS configuration.

Slow Transfer/Ping Speeds

- If the system is experiencing slow transfer speeds ensure the NIC is communicating at 100mb/s at Full Duplex. If the link is not 100mb/s then there may be a conflict between the NIC adapter and the network switch.
- To ensure transfer speeds of 100mb/s Full Duplex, the NIC and the Switch port must BOTH be configured for either: Auto Negotiate or forced 100/Full Duplex.

DNS Troubleshooting (Client Side)

- If unable to ping a system by name it may be the local DNS cache is out of date. To resolve this open a command prompt and type the following:
 - ◆ *Ipconfig /flushdns* **Enter**
 - ◆ *Nbtstat -R* **Enter**
- If the problem persists after flushing the local DNS records the problem may reside on the server side.

DNS Troubleshooting (Server Side)

- Correct DNS Entry:
 1. *Launch Administrative Tools > DNS*
 2. Navigate to *[Server Name] > Forward Lookup Zone > [Domain Name]*
 3. Ensure all records in the DNS table are accurate. If there is an IP / Name mismatch, the record can be updated by double-clicking it.
- Clearing DNS Cache
 1. *Launch Administrative Tools > DNS.*
 2. Right-click the server name and select *Clear the DNS Cache.*
 3. If the problem persists after flushing the local DNS records the problem may reside on the server side. Try a lengthy ping test to determine if packets are being dropped.

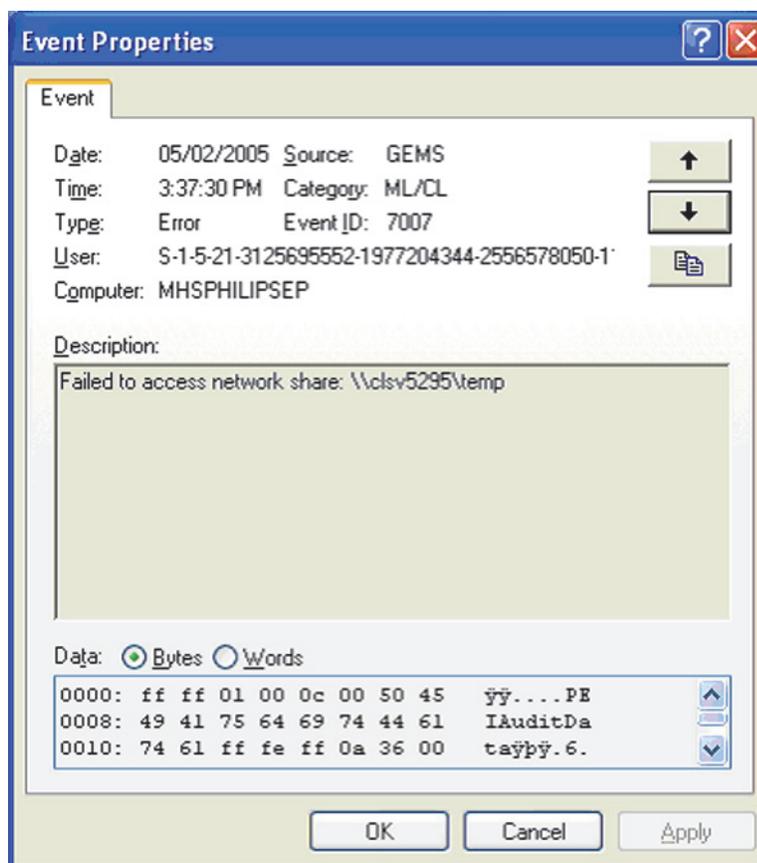
Operating System Troubleshooting

- Group Policy at Local Computer: If policy is not correctly applied to the local computer, some or all of the following symptoms may occur:
 - ◆ Custom Shell is not displayed
 - ◆ Domain **mlcltechuser** does not have Administrative Rights
 - ◆ SQL Replication failures
 - ◆ Auto OS login failure
- Verify the computer is the proper OU.
- Verify all network settings are correct. If DNS, IP, Subnet or Gateway settings are not correct the policy may not push to the local computer.
- Ensure the time of the local machine is synchronized with the time of the Domain Controller. To set the time open a command prompt and type **net time /set /domain:[DOMAIN NAME]**.
- If you are unsure if the policy has been applied perform the following:
 1. Select *Start > Help.*
 2. Select *Pick a Task > Use Tools.*
 3. Select *Tools > Advanced System Information.*
 4. Select *View Group Policy Settings Applied* (may take up to 2 minutes to display).
 5. Ensure the *Default_MLCL Computers_Policy* is listed under *Applied Group Policy Objects.*
- Unable to logon to the Custom Shell with a Hospital User: This is commonly caused by Default_MLCL Computers_Policy not containing the proper trusted user group information. To verify and correct policy edits perform the following:
 1. *Launch Administrative Tools > Group Policy Management Console.*

2. Open the *Group Policy Objects* container.
3. View the *Settings* for the *Default_MLCL Computers_Policy*.
4. Ensure the MLCLAdmGrp, MLCLUsrGrp and MLCLSystemGrp contain their respective hospital group names (for example, Hospital\MLCLAdmGrp).
5. Ensure the *Users* group contains all hospital MLCL groups. This setting determines if the user has rights to interactively logon to the operating system. If this setting is incorrect the user will be unable to logon with their hospital account information.

Cardiolink Server Unavailable

- Evidence of a Cardiolink Server Unavailable error is contained in the Application Event Log. These errors are not always consistent. The most common error is the following.



- Verify that under *System Settings*, the network storage is checked and that the correct path is being used. (Example: \\clsXXXX\pruckastudies\)
- Verify that your primary DNS server is the INW server.
- Ping the INW server by name (this will determine if it is a DNS/WINS resolution).
- If you can ping by IP but not by name, then it is a WINS resolution problem.

Net Message Sender Error

- If a network system has an Acquisition system and a Nurse's workstation both joined in a case and the case logs do not sync up, verify that *netmessagesender.exe* is running as a process on the acquisition system.
- If it is not, go to *D:\GEMMS\Prucka\Network* and double-click *netmessagesender.exe* and start it manually.
- Reboot the system and verify the process started after the reboot.

Centricity Cardiology INW Server

Refer to the Centricity Cardiology INW Operator's Manual, 2021423-017, Chapter 4 for additional Troubleshooting information specific to INW servers.

Replication

Normal Operation

- All clients must be in the domain before starting replication.
- All clients must be in the correct Organization Unit and have the correct policies applied.

Troubleshooting

Problem: Archive Generator

- If the Archive Generator is not functioning properly, please verify that the run times are not set up to a duplicate time or within 20 minutes of each other.
- Verify on the Acquisition systems that the service SQL Server Agent is being ran by the MLCLSqluser@inw.com account (or inw.local).

Problem: Replication Errors

- The replication tool must be able to see and connect with the clab database on the acquisition system.
- Verify the acquisition system's SQLServerAgent service has logon rights as INW\mlclsqluser.

Problem: SQL not running on clients (or fails)

Changing the SQL user password requires a replication update on all systems. If the update is not done, the SQL agent will not be run on the clients (and if you try to start it, the service will fail).

Problem: Putting an Acquisition into Replication

- After replication is complete and you verify the replication monitor has a green X, go to the replication monitor/agents/merge agents.
- Verify which agent has the green X on it and manually start it up.

Cleanup Database Corruption

The Database Repair Utility must be executed on a Centricity Cardiology INW Server with Administrator privileges.

1. Navigate to *D:\GEMMS\Prucka\Database\Maintenance\DB Repair Utility*.
2. Double-click the executable file *GEHC_DBRepairUtility.exe*.



3. In the *DB Repair Utility* window, select both of the table names and then click *Execute*.
 - A command prompt will open. Do not close the command prompt. It will be closed automatically.
 - Once the operation is complete, the following message will be shown to the user:



In case of any failures, check the event log for the error details with the source as *DB Repair Utility*.

NOTE

If failures occur during the operation, then the backup of the CLAB database that was automatically restored is found in the *D:\GEMMS\Prucka\Database\Maintenance\Backup* folder.

In the event that any errors occur, especially if the database cannot automatically be restored, contact Technical Support. If possible, provide Technical Support with the backup of the database.

4. Click *OK*.
5. Close all open windows.

INNOVA CENTRAL/Touch screen

Check Connection Status

1. Open the Mac-Lab/CardioLab application.
2. Select *Administration > System Settings*.
3. Select the *Connectivity* screen.
4. Check the *Connection Status* in the *Touchscreen* section.
 - *Connected* is displayed if the INNOVA CENTRAL/Touch screen is connected.
If the connection status is *disabled*, ensure the INNOVA CENTRAL/Touch screen enable check box is checked. If the check box is grayed out, the software option is disabled. Any changes to items on this dialog require an application restart to update.
 - *Listening on port nnn* (where nnn is the port setting) is displayed if the INNOVA CENTRAL/Touch screen is not connected.
If the INNOVA CENTRAL/Touch screen is connected and this message is displayed, ensure the port listed is 889. This is the INNOVA CENTRAL/Touch screen connection port.

Determine IP Addresses

1. Press the **Service** button on the bottom of the INNOVA CENTRAL/Touch screen.

The INNOVA CENTRAL/Touch screen local service main page is displayed. Note the INNOVA CENTRAL/Touch screen IP address.

2. Determine Mac-Lab IP address
 - a. Open a browser and type the following URL:
http://TouchScreenIPAddress
 - b. Log onto the web application with the user id: **service** (password: **service**).
 - c. Touch the *Configuration* button.
 - d. Touch the *Modalities IP configuration* button.

Verify the Mac-Lab IP address is set correctly. Update if necessary.

- e. Press the reset button on the bottom of the unit to reset the INNOVA CENTRAL/Touch screen.

CARTO XP/CARTO 3 System

NOTE

Error messages on the CARTO System itself (such as a magnet positioning error) are the responsibility of the manufacturer — either refer to the documentation or call CARTO System technical support.

Normal Operation

The CARTO System has five states:

- Gray and unclickable: Software option must be enabled.
- Gray and clickable: Disconnected--No physical connection between the CARTO System and Mac-Lab/CardioLab systems.
- Blue: Connected. If the icon does not turn blue automatically, check the connections.
- Green: Passive interface. Must be activated from the Acquisition.
- Yellow: Active interface. Must be activated from the CARTO System. Refer to OEM documentation for specific information.

In active mode, a point selected on the Acquisition system is also selected on the CARTO System (however, a point selected at the Review system is not select at the CARTO System).

One CARTO System study may only be synched to one Mac-Lab/CardioLab study (a 1 to 1 relationship). The same two studies may be independently stopped and restarted, but a new CARTO System study can not be added to an existing Mac-Lab/CardioLab study.

Netmsgsender is used to communicate between Acquisition and Review systems. Check the connection between Acquisition and Review systems before targeting problem as CARTO System issues (for example, log entries not being added).

A quick-connect cable is required to show ECG information.

CARTO System files are always less than 1MB.

Troubleshooting

Problem: CARTO System button inactive.

Verify normal operation.

- Ensure the CARTO System interface is enabled on the Mac-Lab/CardioLab system.
- The interface is only available in the CardioLab application (ensure you're not in Mac-Lab).
- The interface is only accessible from the *Real-Time* window.
- The CARTO System must be version 7.0 or greater to be able to use this interface.
- Patient demographics may be edited on the CARTO System.

- CARTO System does not support import of foreign language demographics from Mac-Lab/CardioLab system (ENGLISH ONLY). Foreign languages are displayed as unrecognizable characters.

Problem: CARTO System connection failure.

Check cabling.

- The CARTO System option requires a crossover cable connected from the acquisition system computer to the CARTO System computer. Ensure cable and connectors are good.
- Verify the Ethernet lights are on.

Problem: CARTO System IP address conflict.

- Use ping to test communication between the two systems.
- The CARTO System interface uses hardcoded IP address on our system.
 - ◆ The IP of the CARTO System is 192.168.5.1
 - ◆ The IP of the Mac-Lab/CardioLab CARTO System adapter is 192.168.5.2

Problem: Cannot print from the Mac-Lab/CardioLab system to the CARTO System color printer.

This functionality is not supported. The Mac-Lab/CardioLab and *CARTO System* are completely independent and only send messages for points and waveform data.

Problem: Mapping points are unsynchronized or missing

At the Review system double-click points to see the data.

- Regular CARTO System mapping points are not editable on Mac-Lab/CardioLab system.
- Resynch at the CARTO System.
- Check the CARTO System point filter on the log. Missing points may be filtered out.
- Points missing from a report may have been manually deselected (the default is to include all points in a report).
- During normal operation waveform point synchronization may be off by up to ± 50 ms.
- If it is off by more than ± 50 ms, select a different channel (channel registered is the channel measured in CardioLab).

Problem: Signal Noise

The following steps should be tried when troubleshooting noise associated with connectivity of the CARTO system. Each of these steps have proven to reduce or eliminate noise.

NOTE

If the 10 ft 2015944-001 ECG cable is used, the total ECG signal path will be lengthened significantly and in some clinical settings increased noise may appear on the ECG readout.

1. For Carto XP, make sure you are using Revision 10 or newer of the CARTO PIU. Earlier revisions of the PIU can make the overall system more susceptible to ECG noise. Revision 10 introduced an improved grounding scheme.
2. For Carto XP, if you are not using the CARTO IC cable (that is, if you are currently providing IC signals to the CARTO PIU by connecting the CARTO IC input leads to the CardioLab CIM terminals), try routing all catheter leads to the CARTO PIU IC inputs, then connect the CardioLab to the CARTO PIU using the blue CARTO-to-CardioLab cable (PN 2015944-001). This is the recommended system configuration.
3. For Carto XP, in some clinical settings, the use of the ECG cable that connects the CARTO PIU and the CardioLab II Plus amplifier (PN 2015944-001) can be a source of noise. In this case, noise may be reduced by removing this cable and instead connecting the CardioLab to the ECG terminals on the top of the CARTO PIU via the ECG cable assembly (PN 2003419-001) along with the ECG lead set (PN 2003421-001). This is a cleaner alternative to “double patching” the patient (10 electrodes for the CardioLab, 10 electrodes for the CARTO).
4. If noise is present during ablation, try using the RF Filter Box (PN 2004965-001).

Problem: Data import does not work on non-English systems

- This is expected behavior. Patient demographics are shared only between English CardioLab systems and CARTO Systems.
- For non-English CardioLab systems, the demographic data must be entered manually.

EtCO₂

EtCO₂ Overview

End tidal CO₂ (EtCO₂) is a continuous, noninvasive technique for determining the concentration of CO₂ (carbon dioxide) in respiratory gas by measuring the absorption of infrared light.

The light generated in the analyzer bench is passed through respiratory gas samples. The amount of absorption by CO₂ in the sample is measured and digitized by the photodetector. The EtCO₂ module processes the electronic signal and displays a waveform and digital values for expired CO₂ (EXP), inspired CO₂ (INSP), and respiratory rate (RR) on the display.

NOTE

If the EtCO₂ module is in the RAC, but Respiration, Inspired CO₂, or Expired CO₂ cannot be measured, the display will show two asterisks (**). If the EtCO₂ module is not in the RAC, the values will be blank.

The EtCO₂ module can accommodate both intubated and non-intubated patients using the Capnostat Dual CO₂ module or the Mainstream CO₂ module.

Capnostat Module Setup

CAUTION

INACCURATE READINGS — Do not use the Capnostat CO₂ sensor in close proximity to wireless networking equipment or in the presence of strong electromagnetic fields such as those generated by radio station transmitters, citizens band radios, cellular phones, and so on. Using the Capnostat sensor under the above conditions may cause one or all of the following to occur:

- Artifact may be induced on the capnogram.
- The CO₂ parameter values may be replaced by ** (two asterisks).
- The message, *Please check/calibrate adaptor* may be displayed in the parameter window.

Normal operation will resume when the source of interference is removed.

CAUTION

WIRELESS LAN INTERFERENCE — Capnostat sensors with a serial number of 26104 or greater require a separation distance of 10 inches (25 cm) from the Wireless LAN adaptor to minimize potential interference.

Capnostat sensors with a serial number less than 26104 require a separation distance of 8.2 feet (2.5 meters) and are not recommended for use on recording equipment equipped with the Wireless LAN option.

CAUTION

INACCURATE VALUES — Failure to perform a zero cell calibration may result in inaccurate CO₂ values.

A zero cell calibration is required each time a sensor is connected.

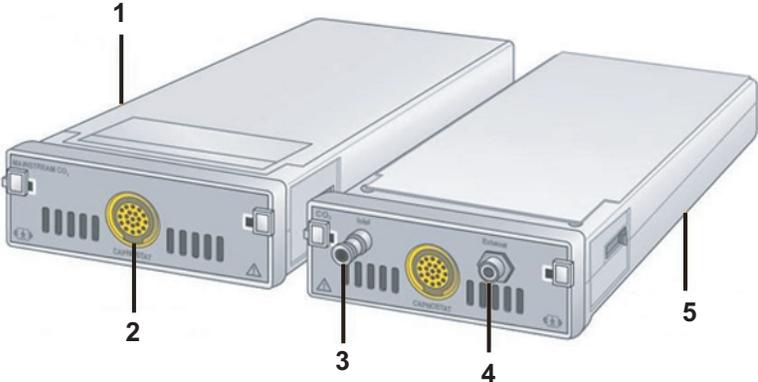
After placing a EtCO₂ module in the TRAMNet housing (RAC-4A) and connecting the patient cable, a two minute warm-up is required. The message *WARMING UP* is displayed in the EtCO₂ window.

After the warm-up period, when the patient is properly connected and breath is detected, numerics are displayed in the EtCO₂ window and a CO₂ waveform may be displayed.

After the initial warm up period when a new Capnostat sensor is connected, the message *Please calibrate sensor on the zero cell* is displayed. You must zero the Capnostat sensor before recording, refer to **“Zero the Capnostat Sensor”** on page 4-56.

NOTE

To assure accuracy, always perform a zero cell calibration when connecting a sensor to the module, even if the *Please calibrate sensor* message is not displayed.



1	Capnostat Mainstream Module
2	Capnostat Connection
3	Sidestream Inlet Port
4	Exhaust Port to Scavenging System
5	Capnostat Dual Module

NOTE

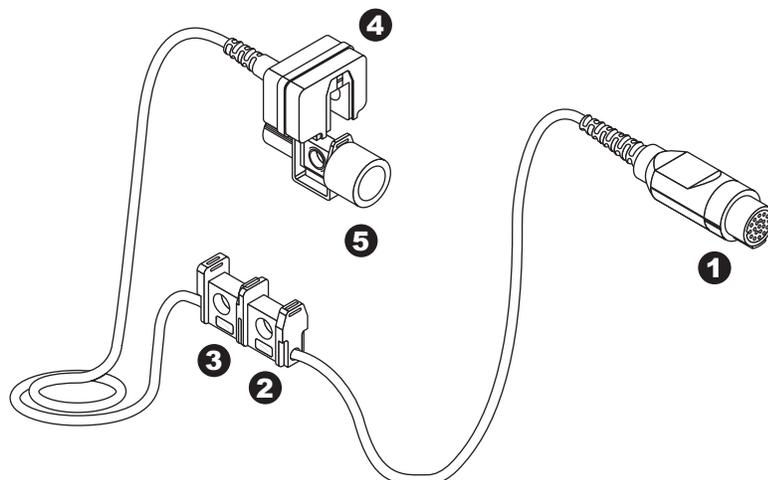
An EtCO₂ module is either a Capnostat Mainstream or Dual CO₂ Module.

NOTE

The signal input is isolated, but it is not defibrillator-proof.

The Capnostat modules must be used with a Capnostat sensor and airway adaptor. Two airway adaptors are available:

- Mainstream adaptor (refer to the following illustration)

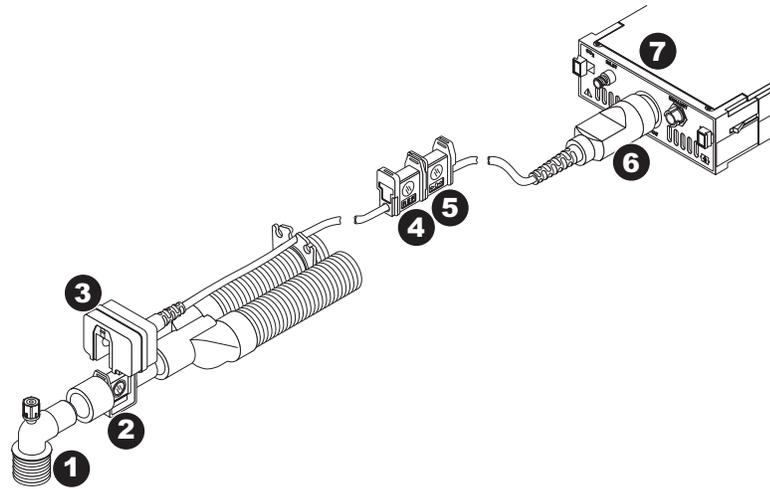


1	Capnostat Sensor Cable to Module
2	-0- Cell
3	REF Cell
4	Capnostat Sensor Module
5	Capnostat Airway Adaptor

- Sidestream adaptor with sample tubing for sidestream recording. The sensor cable is equipped with two cells. The **-0-** cell is used for zeroing (calibration) of the sensor, and the **REF** cell is used for verifying sensor accuracy.

Mainstream Setup (Dual Module)

The mainstream setup is shown below:



1	Endotracheal Tube (to Patient)
2	Capnostat Airway Adaptor
3	Capnostat Sensor (Upright Position)
4	REF Cell
5	-0- Cell
6	Sensor Cable
7	Capnostat CO ₂ Module

To record EtCO₂ using the mainstream setup:

1. Open the EtCO₂ window in the application.
2. Securely insert the module into the RAC-4A.

The EtCO₂ module can sit in either of the lower slots of the RAC-4A.

3. Connect the Capnostat sensor cable to the module. If the message *Please calibrate sensor on the zero cell* is displayed in the *EtCO₂* window, you must zero the sensor. Refer to “[Zero the Capnostat Sensor](#)” on page 4-56.
4. Snap the Capnostat airway adaptor into the Capnostat sensor. If the message *Please check/calibrate adaptor* is displayed in the *EtCO₂* window, you must calibrate the adaptor. Refer to “[Calibrate the Capnostat Adaptor](#)” on page 4-57.
5. Position the adaptor and sensor in the patient respiratory circuit between the endotracheal tube and the ventilator circuit (as close to the patient as possible).

NOTE

Always position the sensor with the adaptor in an upright position to avoid collection of fluids on the windows of the adaptor. Large concentrations of fluids at this point will obstruct gas analysis.

Sidestream Setup (Dual Module)

CAUTION

MODULE SELECTION — Do not use this module with any patient who may be affected by the Capnostat dual CO₂ module's sidestream withdrawal rate of 180 milliliters per minute (normal).

1. Open the EtCO₂ window in the Mac-Lab/CardioLab application.
2. Securely insert the module into the RAC-4A.
Wait two minutes for the module to warm up.
3. Connect the Capnostat sensor cable to the module. If the message: *Please calibrate sensor on the zero cell* is displayed in the EtCO₂ window, you must zero the sensor. Refer to “Zero the Capnostat Sensor” on page 4-56.
4. Connect the sidestream adaptor tubing to the inlet connector on the module.
5. When delivering anesthetics, connect the scavenging tube to *EXHAUST* connector on the module. Refer to “Gas Exhaust” on page 4-55.
6. Attach the 5-inch adaptor tubing (male-to-male) connector to the airway adaptor.
7. Secure the Aqua-Knot water trap to the 5-inch adaptor tubing.
The Aqua-Knot water trap must be used. The arrow on the water trap shows the direction of the gas flow. When inserting the water trap, the arrow must point toward the module.
8. Connect the nasal cannula or sample line to the Aqua-Knot water trap.
9. Select the *Start/Stop EtCO₂ Pump* icon in the EtCO₂ window to turn the pump on.

When the pump is on, the window title is *Sidestream*. (When the pump is off, the window title is *Mainstream*.)

10. Snap the Capnostat sidestream adaptor with its tubing into the Capnostat sensor. If the message *Please check/calibrate adaptor* is displayed in the *EtCO₂* window, you need to calibrate the adaptor. Refer to “[Calibrate the Capnostat Adaptor](#)” on page 4-57.

Always position the sensor with adaptor in an upright position to avoid collection of fluids on the windows of the adaptor. Large concentrations of fluids at this point will obstruct gas analysis.

11. Occlude the open end of the airway circuit. The message *Pump is Blocked. Please Check* must be displayed in the CO₂ parameter window to ensure a blockage will be recognized during patient care.
12. Position the nasal cannula on the patient according to the manufacturer’s instructions or attach the patient sample line to the patient airway adaptor.

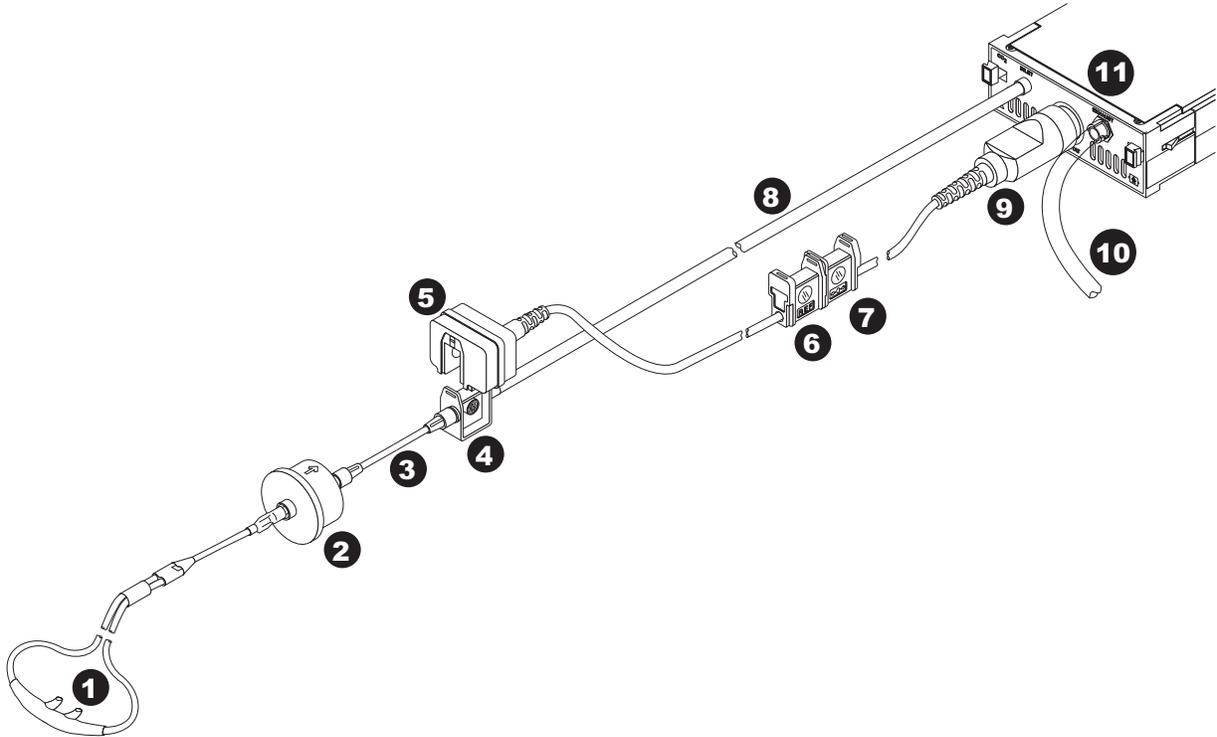
CAUTION

INACCURATE READINGS — A leak in the breathing circuit may cause inaccurate readings. The sidestream analyzer will not detect a leak in the breathing circuit.

Ensure all connections are tight.

Sidestream Set Up (Non-intubated)

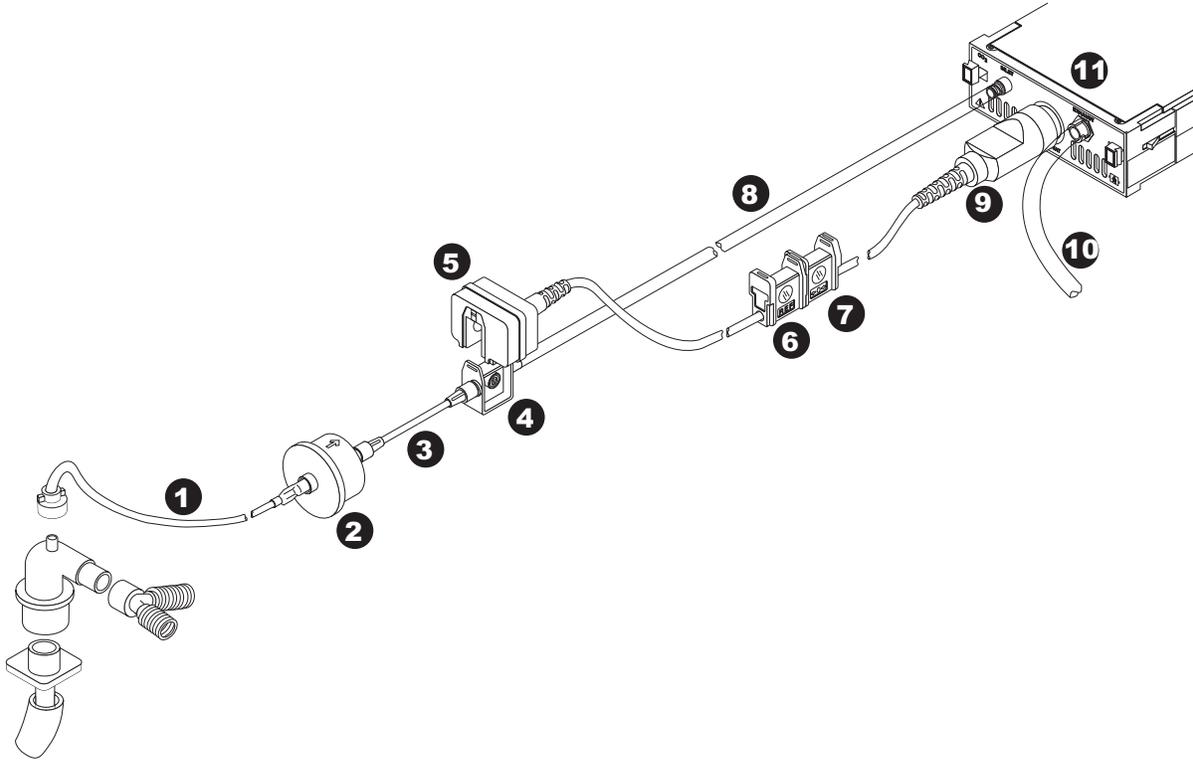
Refer to the following figure for sidestream setup of non-intubated patients.



1	Nasal Cannula
2	Aqua Knot II
3	12.7 cm Adapter Tubing
4	Sidestream Airway Adaptor
5	Capnostat Sensor (upright position)
6	REF Cell
7	-O- Cell
8	Sidestream Adaptor Tubing (30.5 cm)
9	Sensor Cable
10	Scavenging Tube
11	Capnostat CO ₂ Module

Sidestream Setup (Intubated)

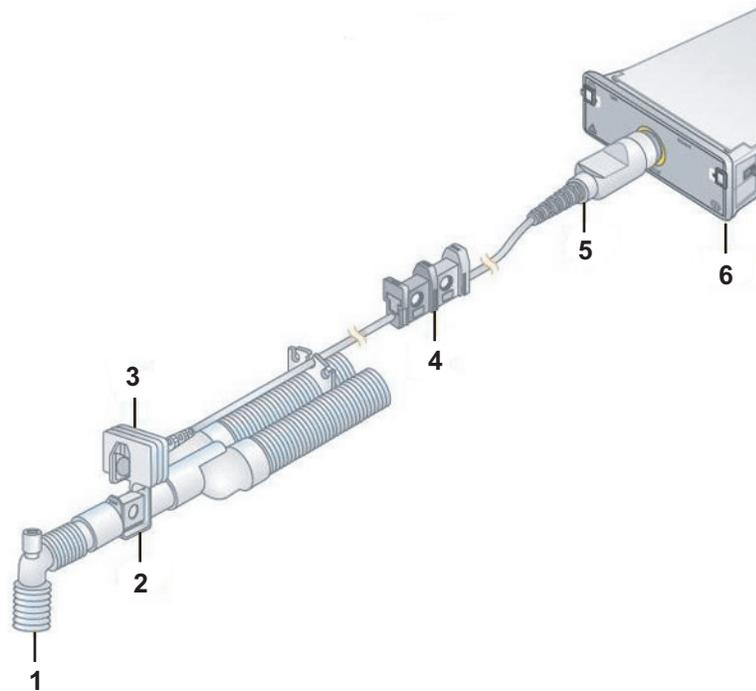
Refer to the following figure for sidestream setup of intubated patients.



1	Patient Sample Line
2	Aqua Knot II
3	12.7 cm Adaptor Tubing
4	Sidestream Airway Adapter
5	Capnostat Sensor (upright position)
6	REF Cell
7	-O- Cell
8	Sidestream Adaptor Tubing (30.5 cm)
9	Sensor Cable
10	Scavenging Tube
11	Capnostat CO ₂ Module

Mainstream Setup (Mainstream Module)

The mainstream setup using a mainstream module is identical to that using a dual module.



1	Airway Adaptor to Patient Endotracheal Tube
2	Mainstream Adapter
3	Mainstream Sensor (Upright Position)
4	Reference and Zero Cells
5	Sensor Cable
6	Module

Sidestream Setup (Mainstream Module)

CAUTION

MODULE SELECTION — Do not use this module with any patient who may be affected by the Capnostat Mainstream CO₂ module's sidestream withdrawal rate of 50 milliliters per minute (normal).

1. Open the *EtCO₂* window in the Mac-Lab application. Refer to “[EtCO₂ Window](#)” on page 4-59.
2. Securely insert the module into the RAC-4A.
3. Connect the Dash CapnoFlex LF module (which contains both the Capnostat sensor and the pump for the sidestream operation) to the Mainstream CO₂ module and plug in the sample line into the CapnoFlex LF module.

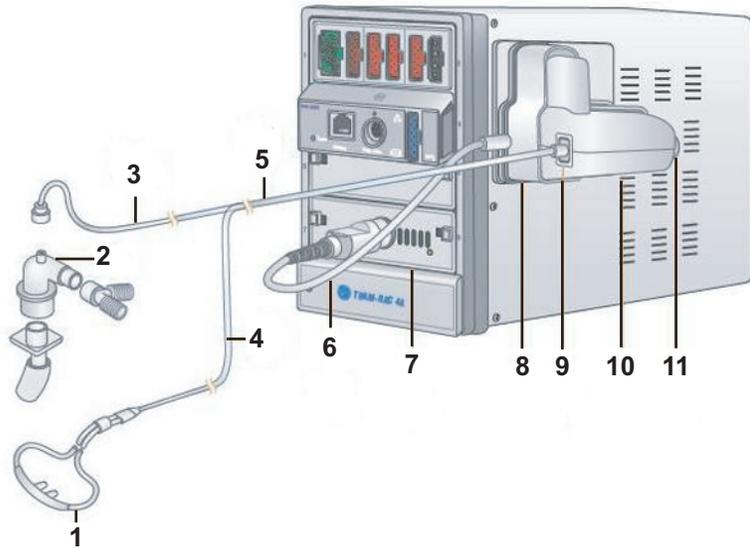
Wait two minutes for the module to warm up.

If the message *Please calibrate sensor on the zero cell* is displayed in the EtCO₂ window, you must zero the sensor. Refer to “[Calibrate the CapnoFlex LF Module \(Sensor + Pump\)](#)” on page 4-58.

4. When delivering anesthetics, connect the scavenging tube to EXHAUST connector on the module. Refer to “[Gas Exhaust](#)” on page 4-55.
5. Attach the 5-inch adaptor tubing (male-to-male) connector to the airway adaptor.
6. Secure the Aqua-Knot water trap to the 5-inch adaptor tubing. The Aqua-Knot water trap must be used. The arrow on the water trap shows the direction of the gas flow. When inserting the water trap, the arrow must point toward the module.
7. Connect the nasal cannula or sample line to the Aqua-Knot water trap.
8. Occlude the open end of the airway circuit. The message Pump is Blocked. Please Check must be displayed in the CO₂ parameter window to ensure a blockage will be recognized during patient care.
9. Position the nasal cannula on the patient according to the manufacturer's instructions or attach the patient sample line to the patient airway adaptor.

CAUTION

INACCURATE READINGS — A leak in the breathing circuit may cause inaccurate readings. The sidestream analyzer will not detect a leak in the breathing circuit. Ensure all connections are tight.



1	Nasal Cannula (non-intubated patients)
2	Airway Adaptor (intubated patients)
3	Patient Sample Line (intubated patients)
4	Sample Line
5	Capnoflex LF CO ₂ Adapter Cable
6	Capnostat Mainstream or Dual CO ₂ Module
7	Capnoflex LF CO ₂ Adapter
8	Sample Line Connector
9	Capnoflex LF CO ₂ Module
10	Scavenger Port

Gas Exhaust

CAUTION

INACCURATE READINGS/MODULE DAMAGE — Do not allow the exhaust line to become kinked or blocked.

Back pressure may cause inaccurate gas readings and also may cause serious damage to the module's internal components.

CAUTION

INACCURATE READINGS/MODULE DAMAGE — Do not connect exhaust of the module to an unregulated, high vacuum source.

Pressure may cause inaccurate gas readings and also may cause serious damage to the equipment's internal components.

CAUTION

INFECTIOUS DISEASE — Do not allow the exhaust to discharge in the direction of the patient or user.

When using the sidestream method for recording CO₂ and anesthetics are being delivered, the gas exhaust must be considered. The gas exhaust may be scavenged using the scavenging adaptor package (PN 9504-016). Follow the steps below to properly connect the module to the anesthesia machine exhaust circuit.

1. Remove exhaust adaptor and tube from the package.
2. Attach the connector end of the exhaust tube to the outlet marked *EXHAUST* on the front of the module.
3. Install the exhaust adaptor into the gas scavenging system of the anesthesia delivery system.

Following the anesthesia machine manufacturer's recommended procedure.

4. Drape the exhaust tube so that it does not obstruct the work area.

Capnostat Module Calibration

CAUTION

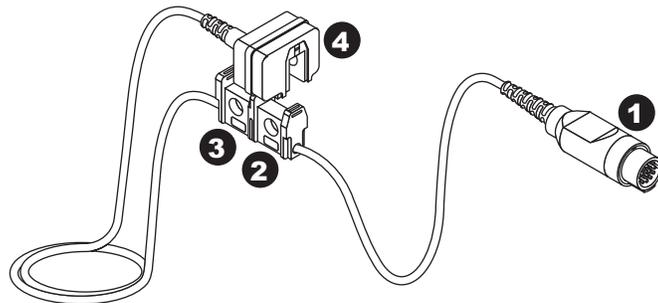
LOSS OF FUNCTION — EtCO₂ calibration interrupts the function of keyboard shortcuts. Once calibration has begun, please use the drop down menu commands to execute any desired functions (including saving).

If necessary, turn on save prior to EtCO₂ calibration. Once calibration is complete all keyboard functions are available.

Zero the Capnostat Sensor

A sensor must be zeroed (calibrated) whenever it is connected to a Capnostat module, and whenever the message *Please calibrate sensor on the zero cell* or *Not calibrated* is displayed.

The sensor cable has two cells, as shown in the figure below. One is marked **-0-** (zero), and the other is marked **REF** (reference).



1	Capnostat Sensor Cable to Module
2	-0- Cell
3	REF Cell
4	Capnostat Sensor Module

To zero the sensor:

1. Remove the adaptor from the sensor, but be certain that the sensor cable is still connected to the module.
2. Ensure that the cell windows are clean and dry.
3. Place the sensor on the cell marked **-0-**. (Refer to the previous illustration.)
4. Select the *Calibrate EtCO₂ Sensor* icon.

5. The message *CALIBRATING* is displayed in the *EtCO2* window.
When calibration is complete, an EXP value of 0 is displayed.
6. Remove the sensor from the **-0-** cell and place it on the **REF** cell.
An EXP value of 38 mmHg (± 2 mmHg) is displayed. If the value is not within this range, the sensor is out of tolerance and must be replaced.

Calibrate the Capnostat Adaptor

An adaptor calibration is required under the following conditions:

- Whenever you change adaptor types, for example, adult to low volume dead space, or mainstream to sidestream.
- When the monitor displays the message *Please check/calibrate adaptor*.

Before calibrating, ensure the following:

- The airway adaptor is clean and clear of foreign matter.
- All sampling tubing is securely attached.
- The pump is turned on.

Use the following procedure to calibrate the adaptor:

1. Place the sensor and the adaptor away from all sources of CO₂, including:
 - Patient breath
 - Your breath
 - Ventilator exhaust valves
2. Click the *Calibrate EtCO2 Adaptor* icon.

The message *Calibrating...* is displayed in the *EtCO2 parameter* window.

Calibrate the CapnoFlex LF Module (Sensor + Pump)

The sensor in the CapnoFlex LF module must be zeroed (calibrated) whenever it is connected to a Mainstream CO₂ module, and whenever the message *Please calibrate sensor on the zero cell* or *Not calibrated* is displayed.

To zero the sensor:

1. Ensure that the sample line plugged into the CapnoFlex LF module is clean and dry.
2. Ensure that the pump in the CapnoFlex LF module is running.
3. Ensure that the sample line is NOT connected to a patient. Always position the airway adaptor in an upright position to avoid collection of fluids on the windows of the adaptor. Large concentrations of fluids at this point will obstruct gas analysis.
4. Select *Calibrate EtCO2 Sensor*.
5. The message *CALIBRATING* is displayed in the *EtCO2* window.

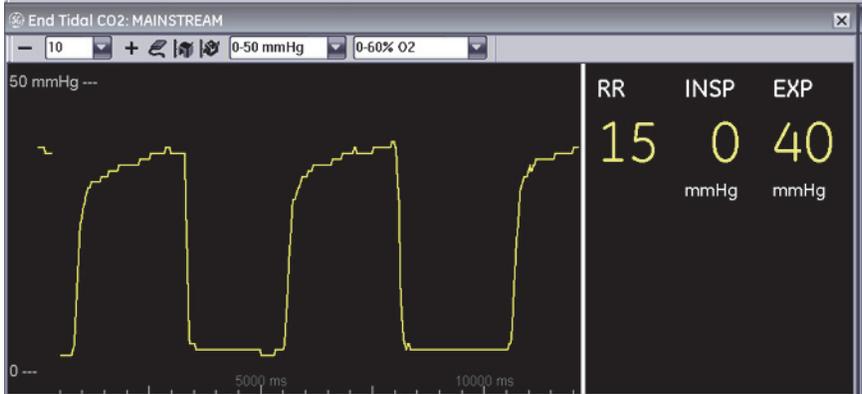
When calibration is complete, an EXP value of *1* is displayed.

Mac-Lab Interface

EtCO₂ Window

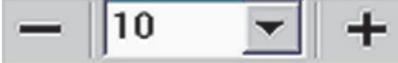
EtCO₂ information is displayed in a separate window in the Mac-Lab application. To launch the EtCO₂ window, from either the *Real-Time* or *Review* window, select *End Tidal CO2* from the *Windows* menu.

The window is shown below:



Window Component	Description
Title Bar	When a Capnostat Dual CO ₂ module is used, the EtCO ₂ window title displays the following: <ul style="list-style-type: none">■ <i>SIDESTREAM</i> when the pump is turned on■ <i>MAINSTREAM</i> when the pump is turned off When a Mainstream CO ₂ module is used, the EtCO ₂ window title does not indicate the operation mode (<i>SIDESTREAM</i> or <i>MAINSTREAM</i>).
EtCO ₂ Window Toolbar	Tool bar icon descriptions are listed below.
RR	Indicates Respiratory Rate (in breaths per minute).
INSP	Inspired CO ₂ Value (in mmHg)
EXP	Expired CO ₂ Value (in mmHg)

EtCO₂ Toolbar

	
	<p><i>Sweep Speed/Scale</i></p> <p>This option selects sweep speed for the displayed CO₂ waveform.</p>
	<p><i>Start/Stop EtCO₂ Pump</i></p> <p>This icon is available for Dual CO₂ modules only; it is disabled when a Mainstream CO₂ module is used. This icon turns the module pump on and off. The pump must be on when using the sidestream method.</p> <p>NOTE The EtCO₂ window title will read:</p> <ul style="list-style-type: none"> ■ <i>Sidestream</i> when the pump is turned on ■ <i>Mainstream</i> when the pump is turned off <p>A blocked line condition may cause the pump to shut off automatically. To restart the pump, clear or replace any blocked lines and, for Dual CO₂ modules, select the <i>Start/Stop EtCO₂ Pump</i> icon; for Mainstream CO₂ modules, reinsert the sample line into the CapnoFlex LF module</p>
	<p><i>Calibrate EtCO₂ Sensor</i></p> <p>Zeros the Capnostat sensor. This is required whenever a new sensor is connected to the module.</p>
	<p><i>Calibrate EtCO₂ Adaptor</i></p> <p>Calibrates the Capnostat airway adaptor.</p>
	<p><i>EtCO₂ Waveform Range (Scale)</i></p> <p>Selects the scale in mmHg.</p> <p>If the waveform is too big, it will be clipped on the display. Adjust the scale to reduce the waveform size.</p>
	<p><i>O₂ Compensation</i></p> <p>The presence of a high concentration of oxygen causes the CO₂ value to appear lower than the actual value. Use this option to compensate for the presence of O₂.</p> <p>This is a direct action menu option that switches between 0-60% O₂ and >60% O₂. Your selection depends on the amount of O₂ present.</p> <p>O₂ concentration can be obtained from the anesthesia machine.</p>

EtCO₂ and Log Window

The Inspired CO₂, Respiration Rate, and Expired CO₂ can be recorded in the *Log* window using the *AutoLog Vitals* and *AutoLog NBP*. You may insert the recorded events in your report.

To edit the vitals event, double-click in the *Summary* column on the event (or right-click in the *Summary* column and choose *Edit Event*). The *Edit Vitals Event* window is displayed.

The screenshot shows a dialog box titled "Edit Vitals Event" with a close button (X) in the top right corner. The dialog contains the following fields and values:

- SpO₂: 96 %
- RR: 13
- HR: 70 BPM
- INSP CO₂: (empty) mmHg
- EXP CO₂: (empty) mmHg
- SP: 120 mmHg
- DP: 80 mmHg
- Mean: 90 mmHg
- Temp: (empty) °C
- LOC: 2 - Fully Awake (dropdown menu)

At the bottom right, there are two buttons: "OK" and "Cancel".

Troubleshooting

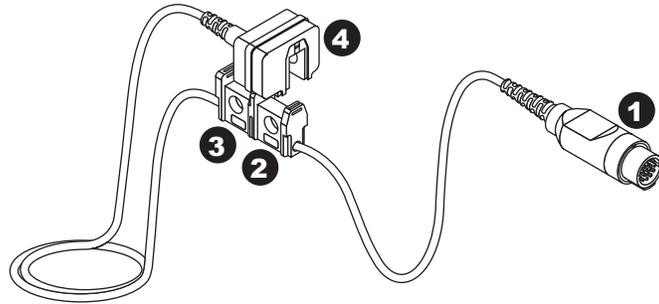
Capnostat Sensor Check

WARNING

INCORRECT VALUE DISPLAY — The End-Tidal CO₂ value (EtCO₂) is in most cases considerably lower than the CO₂ partial pressure determined by blood-gas analysis. The major clinical reasons are: Dead-space ventilation, ventilation/perfusion mismatch; drop in cardiac output; alveolar shunts; incomplete emptying of the alveoli.

It may also be lower due to the following technical reasons (which must be corrected): Leak in the respiration tube system; hypothermia, but blood-gas analysis at 37° C; anesthesia gases (correction possible for O₂ only).

The sensor cable has two cells, as shown in the figure below. One is marked **-0-** (zero), and one is marked **REF** (reference). Whenever you suspect incorrect values or sensor failure, perform a sensor check.



1	Capnostat Sensor Cable to Module
2	-0- Cell
3	REF Cell
4	Capnostat Sensor Module

Follow these steps to perform a sensor check:

1. Remove the adaptor from the sensor, but be certain that the sensor cable is still connected to the module.
2. Ensure that the cell windows are clean and dry.
3. Place the sensor on the cell marked **REF**.

Depending on the units of measure, you should see a reading of 38 mmHg (± 2) on the display. If the displayed value is within range, you can resume recording.

If the sensor is not within range, the error message *Not Calibrated* is displayed. You must calibrate the sensor to the zero cell.

Error Messages

Following is a list of error messages that may be displayed in the EtCO₂ window when recording CO₂. The error message should clear when normal operating criteria are met or a solution is found. If a message persists, call GE Healthcare for service at 1-800-437-1171 option 4 (U.S. only). Outside the United States, please contact your sales/service office.

NOTE

The actual message that appears on your monitor depends on the module used and the installed software version.

Message	Cause	Solution
Pump is blocked. Please check.	Nasal cannula, moisture filter, sidestream adaptor tube or exhaust line is blocked.	Check nasal cannula, moisture filter, sidestream adaptor tube and exhaust lines for blockage and replace if necessary. If the blocked line condition persists for a period of time, the module's pump will automatically shut off. The pump must then be restarted to clear the message. To restart the pump, clear or replace any blocked lines and, for Dual CO ₂ modules, select the <i>Start/Stop ETCO2 Pump</i> icon; for Mainstream CO ₂ modules, reinsert the sample line into the CapnoFlex LF module. Repeat this process until the <i>Pump is Blocked. Please Check.</i> message clears.
Sensor cable is disconnected. Please check.	Sensor cable is not connected to module.	Check sensor cable connection.
Please calibrate the sensor on the zero cell.	A new sensor was introduced into the system or there is a possible signal drift in sensor electronics.	Zero the CO ₂ sensor.
Cannot be calibrated.	Calibration cannot be performed during warm up or while there is an error.	Wait for the module to warm up or clear the error condition before calibrating.
Please check/ calibrate adaptor	<ul style="list-style-type: none"> ■ Adaptor is not attached to sensor ■ Adaptor is obstructed ■ Adaptor used is of a different type than the one last calibrated to the sensor 	<ul style="list-style-type: none"> ■ Ensure the sensor is securely snapped onto the adaptor. ■ Check for possible obstructions in the adaptor and clean if required. ■ Recalibrate the adaptor.
Please Check Sample Line	<ul style="list-style-type: none"> ■ Sample line is disconnected ■ Sample line used is of a different type than the type used when adaptor was last calibrated. 	<ul style="list-style-type: none"> ■ Be sure the sample line is securely connected. ■ Recalibrate the adaptor using the new type of sample line.
Incompatible Sensor	Capnostat sensor is of older type and not supported by module software.	Use only a Capnostat 3 sensor.
Calibration Error Sensor	Sensor signal is out of tolerance.	Calibrate the sensor.
Not calibrated	Sensor signal is out of tolerance.	Calibrate the sensor.
Service CO ₂ module CPU	Module failure.	Contact GE Healthcare or contact your sales/ service representative for service.
Service CO ₂ module RAM	Module failure.	Contact GE Healthcare or contact your sales/ service representative for service.
Service CO ₂ module ROM	Module failure.	Contact GE Healthcare or contact your sales/ service representative for service.
Service CO ₂ module 2nd CPU	Module failure.	Contact GE Healthcare or contact your sales/ service representative for service.

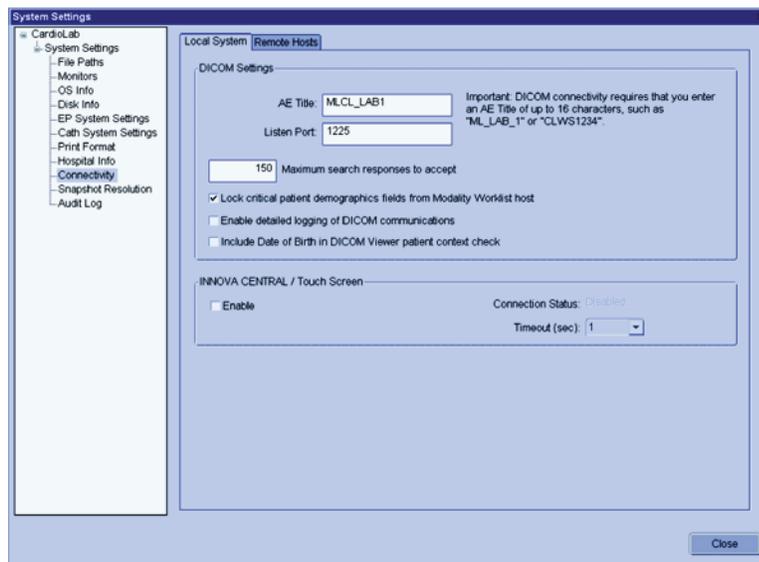
Troubleshooting

Message	Cause	Solution
Service CO ₂ module Sensor Temperature	Module failure.	Contact GE Healthcare or contact your sales/ service representative for service.
CO ₂ module is warming up...	Occurs when: <ul style="list-style-type: none">■ The Sensor is first plugged in■ A module is placed in a RAC 4A■ When a sensor is first powered on.	Message clears automatically. If it lasts more than 4 minutes, call GE Healthcare service or contact your sales/service representative.
Calibrating...	Module is calibrating.	Message clears automatically. If the message is displayed continuously, call GE Healthcare service or contact your sales/ service representative.
Calibration Error	The module cannot be calibrated.	Call GE Healthcare service or contact your sales/service representative.
Please calibrate cannula		Calibrate the adaptor.
Unknown Error	Module failure due to unknown cause.	Call GE Healthcare service or contact your sales/service representative.

CVIS to Mac-Lab/CardioLab Interface

NOTE

For Acquisition and Review systems, the *Local System* and *Remote Hosts* sections must be completed to perform a patient search and a schedule search.



The previous screen shows the *Local System* configuration settings with some sample settings. Enter each field as described in the following:

DICOM Settings: These settings are for this Mac-Lab/CardioLab system. You must fill in this section.

- **AE Title:** The DICOM name for the Mac-Lab/CardioLab system. An AE Title typically only contains letters, numbers, and the underscore character, and must be 16 characters or less.

NOTE

AE Titles are case sensitive, for example, *Lab1* is not the same as *LAB1*.

- **Listen Port:** Port number on which Mac-Lab/CardioLab listens for connections from the X-ray and U/S systems. Use the default of 1225.

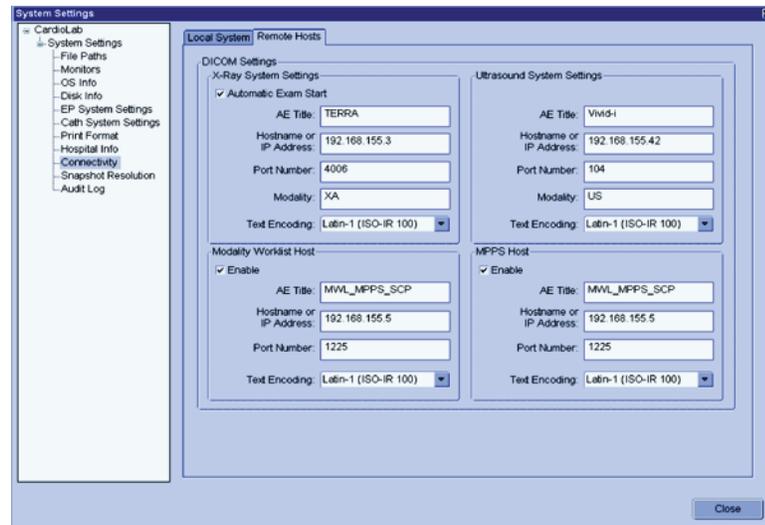
Maximum search responses to accept: Defines the maximum number of DICOM search results displayed. Use the default value of 150.

Lock critical patient demographics fields from Modality Worklist host: Leave checked to prevent the operator from changing Patient Name, MRN, and Date of Birth when these values are provided by the CVIS.

Enable detailed logging of DICOM communications: If you are having problems with connectivity, turn this feature on to troubleshoot the system. When you are finished troubleshooting, turn off this feature. These log files can be found in *D:\GEMMS\Prucka\Logs\DICOM*.

Include DOB in DICOM viewer patient context check: This is used to include the DOB parameter when searching for patient data with the DICOM viewer.

INNOVA CENTRAL/Touch Screen: If you have purchased this option, you should check the box to enable this feature.



The previous screen shows the Remote Hosts DICOM configuration settings with some sample settings. Enter each field as described in the following:

X-Ray System Settings: Fill in this section only if the X-ray system DICOM interface will be used. The typical X-ray systems are the GE Innova or the DLX.

- **Automatic Start Exam:** Check this box only if you are using a GE Innova system. This feature sends a notification to the Innova to start an exam.

NOTE

You should only check this option if your version of Innova supports this feature, otherwise leave this box unchecked.

- **AE Title:** The DICOM name for the X-ray system. This is found in the X-ray system’s configuration settings. (The default names are “dlx_root” for the DLX or “TERRA” for the Innova, but these values are typically changed).
- **Hostname or IP Address:** X-ray system hostname or IP address. (Obtain this from the hospital administrator).
- **Port Number:** Port number on which the X-ray system listens for connections from the Mac-Lab/CardioLab.
- **Modality:** Imaging system’s modality. This should be left at the default of XA.
- **Text Encoding:** How text sent to the X-ray system is encoded. This should be left at the default of *Latin-1*.

Ultrasound System Settings: Fill in this section if you are connecting to an ultrasound device.

- **AE Title:** DICOM name for the Ultrasound system. Check Ultrasound system configuration to verify the name.
- **Hostname or IP Address:** Ultrasound system hostname or IP address.
- **Port Number:** Port number on which the ultrasound system listens for connections from the Mac-Lab/CardioLab.
- **Modality:** Ultrasound system's modality. This should be left at the default of *US*.
- **Text Encoding:** How text sent to the Ultrasound system is encoded. This should be left at the default of *Latin-1*.

Modality Worklist Host: CVIS settings. You must fill in this section.

- **AE Title:** DICOM name for the CVIS. Default is *MWL_MPPS_SCP*. Check CVIS configuration to verify the name.
- **Hostname or IP Address:** CVIS hostname or IP address.
- **Port Number:** Port number on which CVIS listens for connections from the Mac-Lab/CardioLab. Default values are:
 - ◆ Domestic CVIS is *1225*.
 - ◆ Non-Domestic CVIS is *104*.
 Check the CVIS configuration to verify the value.
- **Text Encoding:** How text sent to the CVIS is encoded. Leave at default of *Latin-1* (exception: CVIS in China and Japan should be *Unicode (UTF-8)*).

MPPS Host: CVIS settings. You must fill in this section. Use exactly the same values you used to fill in the **Modality Worklist Host** section.

Maximum search responses to accept: Defines the maximum number of DICOM search results displayed. Use the default value of 150.

Lock critical patient demographics fields from Modality Worklist host: Leave checked to prevent the operator from changing Patient Name, MRN, and Date of Birth when these values are provided by the CVIS.

Problem Scenarios

Problem: My supplies or other list items I add to the CVIS system are not showing up on my Mac-Lab.

- INW service that processes lists not configured or started
- CVIS List Sharing Delta export not configured for the given location
- Corrupt XML export from the CVIS system
- CVIS List Sharing services on CVIS server not started
- Replication errors/issues with INW Server and Mac-Labs
- Network connection between CVIS and INW server lost (INW service can't find files even though they're getting created appropriately)

Problem: Cases I do on Mac-Lab are not showing up in the CVIS system.

- Interfaces on CVIS server not running or configured improperly
- Data Export Utility on Mac-Lab not configured correctly
- Data Export not turned on Mac-Lab in Sys Admin File Path setup
- Network connection between Mac-Lab and CVIS Server not up

Problem: I scheduled the patient on the CVIS system, but I can't find them in the Schedule search.

- DICOM settings not configured correctly on Mac-Lab
- DICOM services not running on CVIS Server
- Network connection lost between Mac-Lab and CVIS

Problem: I can't find a patient with the Patient search, but I know they are admitted...the Patient search isn't working.

- DICOM settings on Mac-Lab not configured correctly
- Network connection lost between Mac-Lab and CVIS
- Patient Interface service not running
- HIS feed to ADT Interface is down on CVIS

Test DICOM Connectivity (CVIS)

Steps 1 and 2 are only valid for US (English Canada) CVIS.

1. Open the *Study > Patient Search* at the *Navigator*.
 2. Enter a *Patient Last Name* of *Smith* (or other common name) and press *Start Search*. One of the following outcomes will occur:
 - One or more patient records are returned and shown in the list. (If too many matches are found the list will be truncated.) The DICOM configuration settings are correct.
 - An error message is displayed indicating no matching patients were found. The DICOM configuration settings may be correct, but another name should be tried.
 - Some other error message is displayed:
 - ◆ The DICOM configuration settings are incorrect.
 - ◆ The CVIS system configuration settings are incorrect.
 - ◆ The CVIS system is not actively listening for connections.
- Begin troubleshooting with the next step.

3. These substeps are valid for both US and Non-US (English Canada) CVIS.
 - a. Log in as *MLCLTechUser* (to OS).
 - b. Open command prompt.
 - c. Type *dicomdiag* and press *Enter*. The diagnostic tool will attempt to connect to all configured remote DICOM hosts. Failures and recommended solutions will be reported.
 - d. The diagnostic tool will tell you what to do next.
4. Check the DICOM server settings on the CVIS systems. Log in to the CVIS system using *MuseAdmin* (Contact GE Healthcare Technical Support or the system administrator for current password information). *MuseAdmin* is only valid for US (English Canada) CVIS.
 - a. Open the *Interface Management Console* tool (if it is not already running, look for it on the system tray).
 - b. Select the *DICOM MWL SCP* on the left side (it may be called something else).
 - c. Verify the DICOM server is running (it is shown on the right side). If it is not, click the + button on the toolbar.
 - d. Verify the AE Title and Network Port values match the Mac-Lab/CardioLab configuration.
 - e. Verify the CVIS application is running. If it is not, open the *Centricity Cardiology DMS* application on the desktop.
 - f. Go to *Administrative > System Management > DICOM Maintenance*.
 - g. Check the Location drop-down just above the DICOM Network group box. The Mac-Lab/CardioLab system should have the same *AE Title* configured earlier in CVIS (*MLCL_LAB1* in the previous example).
 - h. If it does not, you need to either modify the *AE Title* back in CVIS or click the *Add Net Device* button and enter the following information:
 - **AE Alias** column: Enter a user-friendly name for the system (for example, Lab #1 or Mac-Lab 3).
 - **AE Title** column: Enter the *AE Title* of Mac-Lab/CardioLab system.
 - **Modality** column: Check the appropriate checkboxes: *HD* for Mac-Lab, *EPS* for CardioLab systems, or both for ComboLab systems.
 - i. Repeat the patient search. If all settings are correct, it should return a valid result.

NOTE

By default, only errors from the DICOM interface are logged. To see additional error messages, you must edit the registry.

5. Add event log for DICOM traffic.
 - a. At the command prompt, run *regedit*.
 - b. Go to the following key:
 HKEY_LOCAL_MACHINE\SOFTWARE\GEMS\DICOM\MWL_MPPS
 - c. Open *Logging Filter*. (It should have a default value of “08”.)
 - d. Change the value to “0F” (number zero, letter “F”) to enable logging of all events.

NOTE

Only change this value for troubleshooting because debug messages are also logged and the log will quickly fill up with unneeded information.

- e. Restore the value to “08” when finished troubleshooting.

Test DICOM Connectivity (X-Ray)

Mac-Lab/CardioLab: After you configure (or re-configure) the “Local System” Settings tab, the “X-ray System Settings” section within the Mac-Lab/CardioLab application, you must either reboot the Acquisition system or manually restart the service called “MWL MPPS Service”. Note that you must be logged in as MLCLTechUser to manually start this service. MLCLLogonUser does not have the privilege to do this.

X-ray: You must configure the X-ray system to use the Mac-Lab/CardioLab Acquisition system as its destination for both MWL and MPPS transactions. The X-ray system must not get this information from the CVIS system.

NOTE

To test with the Innova, use the *dicomdiag* tool, as described in the previous section.

1. PING (at the command prompt) the X-ray system using the same hostname or IP address previously configured.
 - PING fails: Possibly a networking problem, check if configuration is correct.
 - PING successful: Go to the next step.

NOTE

The *dcmecho* command (see previous for CVIS) will not work for to test the X-ray system interface. This is because the command tests connecting from Mac-Lab/CardioLab to X-ray systems, but the connections only go the other way. Therefore, the connection test must be done from the X-ray side.

2. On the X-ray system, use the DICOM Echo interface or a similar connectivity test, to verify that the connection with the Mac-Lab/CardioLab system can be established. If that works, the Mac-Lab/CardioLab system is configured correctly and is listening for and responding to requests.
3. In order to use the MWL interface on the X-ray system to request patient and study data from the Mac-Lab/CardioLab system, follow these steps:
 - a. Start a new study on the Mac-Lab/CardioLab system. (If you don't, the MWL request from the X-ray system will fail because there is no patient and study data to report).
 - b. Make the MWL request from the X-ray system. Key patient attributes such as Name, MRN, Date of Birth, Height, and Weight should transfer from the Mac-Lab/CardioLab and should be displayed on the X-ray system.
4. If this doesn't work, make sure the *MWL MPPS Service* is running on the Mac-Lab/CardioLab system.
5. Check the error log and look for errors reported by the DICOM layer.
6. Recheck the configuration on both systems (the values should match exactly):
 - **Mac-Lab/CardioLab:** *Local AE Title* and *Listen Port*, the X-ray system's *AE Title* and *Modality*.
 - **X-ray System:** *AE Title* values, MWL/MPPS destination *Hostname/IP Address*, *Port Number*.

HL7 Export to CVIS

1. Perform a check on the Mac-Lab/CardioLab logs to verify successful HL7 export. Open *Windows Explorer*.
2. Check the CVIS Interface Console audit logs to see if the HL7 message was received.
3. Check the CVIS archive logs to see if the HL7 message was processed.

InSite ExC

Normal Operation

Once the agents are configured and started after initial setup, any configuration problems will cause the agents to attempt to connect three times at two minute intervals before shutting down.

Once the agents are successfully configured and started:

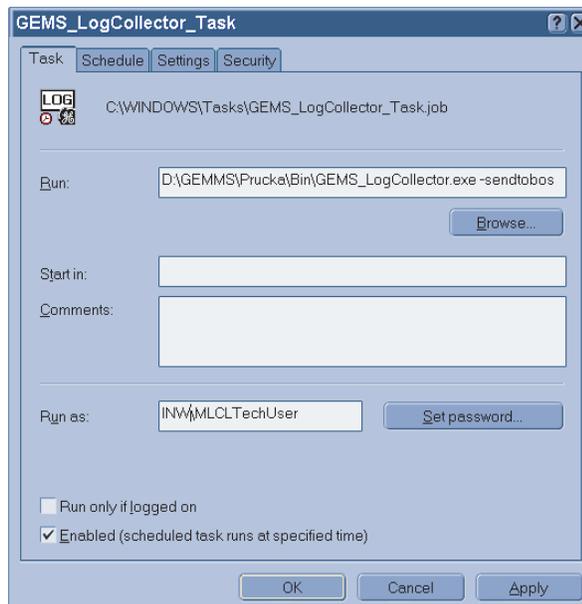
- If the system is restarted, the agents attempt to start three times and then shut down until manually restarted.
- In the event of a failure (that is, the network or enterprise is server down), the service agent polls every 10 minutes until it can connect.

GEMS Log Collector Task

GEMS Log Collector Task Creation

The following steps are needed only if you want to configure InSite ExC Log Collection on GE Acquisition and Review systems only.

1. Select *Start -> Settings -> Control Panel -> Scheduled Tasks*. The *Scheduled Tasks* page opens.
2. If the *GEMS_LogCollector_Task* entry is present, right-click it and chose *Properties*.
3. If the *GEMS_LogCollector_Task* entry is not present, add a new entry as follows:
 - Select *File > New* to add a new scheduled task.
 - Rename the task *GEMS_LogCollector_Task*
 - Right-click the new entry and select *Properties*.
 - Browse to *D:\GEMMS\Prucka\Bin* and select the *GEMS_LogCollector.exe* program. Edit the run command line to add the **-sendtobos** option as shown in the following figure.
4. Select the *Enabled* check box.

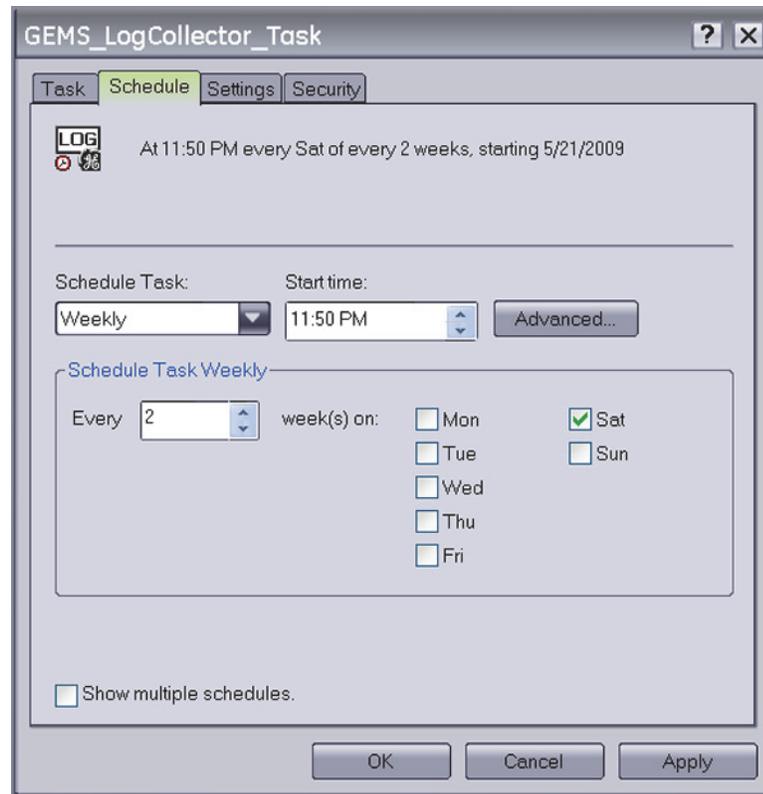


5. In the *Run as* field, enter the account information as follows:

- For a networked system (Acquisition or Review), enter the user name as **<Domain Name>\MLCLSqlUser**.
- For a stand-alone system, enter the user name as **<Computer name>/ MLCLSqlUser**.
- Click *Set Password*. When prompted, enter the password **sql8273user** in both fields.
- Click *OK*.

GEMS Log Collector Task Schedule Configuration

Select the *Schedule* tab and configure the task to run once every two weeks as shown in the following figure.



1. In the *Schedule Task:* field, select *Weekly*.
2. In the *Start time:* field, select *11:50PM*.
3. In the *Schedule Task Weekly* section, select *Every 2 week(s) on: Sat*.

List of Log Events

- Timed Out while waiting for network thread
- GetFileAttributes failed for path
- The Exception EXCEPTION_ACCESS_VIOLATION was generated by the application
- Exit Code indicates failure for path
- Central List Service not starting
- The service cannot be started, either because it is disabled
- disk space left in the network storage path
- Maximum number of client connections reached
- Unable to create the patient directory
- truncating rdc file to
- Failed to update client status
- .rdc was denied
- Failed to copy file from

List of SNMP Faults

1. SNMP_EVENT_LOG_FOUNDATION_AGENTS_267
2. SNMP_EVENT_LOG_FOUNDATION_AGENTS_399
3. SNMP_EVENT_LOG_FOUNDATION_AGENTS_1174
4. SNMP_EVENT_LOG_FOUNDATION_AGENTS_1176
5. SNMP_EVENT_LOG_FOUNDATION_AGENTS_1178
6. SNMP_EVENT_LOG_FOUNDATION_AGENTS_1180
7. SNMP_EVENT_LOG_NIC_AGENTS_258
8. SNMP_EVENT_LOG_NIC_AGENTS_259
9. SNMP_EVENT_LOG_NIC_AGENTS_260
10. SNMP_EVENT_LOG_NIC_AGENTS_269
11. SNMP_EVENT_LOG_NIC_AGENTS_296
12. SNMP_EVENT_LOG_STORAGE_AGENTS_399
13. SNMP_EVENT_LOG_STORAGE_AGENTS_1061
14. SNMP_EVENT_LOG_STORAGE_AGENTS_1062
15. SNMP_EVENT_LOG_STORAGE_AGENTS_1064
16. SNMP_EVENT_LOG_STORAGE_AGENTS_1067
17. SNMP_EVENT_LOG_STORAGE_AGENTS_1068
18. SNMP_EVENT_LOG_STORAGE_AGENTS_1070

19. SNMP_EVENT_LOG_STORAGE_AGENTS_1075
20. SNMP_EVENT_LOG_STORAGE_AGENTS_1076
21. SNMP_EVENT_LOG_STORAGE_AGENTS_1077
22. SNMP_EVENT_LOG_STORAGE_AGENTS_1152
23. SNMP_EVENT_LOG_STORAGE_AGENTS_1153
24. SNMP_EVENT_LOG_SERVER_AGENTS_399
25. SNMP_EVENT_LOG_SERVER_AGENTS_1024
26. SNMP_EVENT_LOG_SERVER_AGENTS_1082
27. SNMP_EVENT_LOG_SERVER_AGENTS_1085
28. SNMP_EVENT_LOG_SERVER_AGENTS_1088
29. SNMP_EVENT_LOG_SERVER_AGENTS_1123
30. SNMP_EVENT_LOG_SERVER_AGENTS_1137
31. SNMP_EVENT_LOG_SERVER_AGENTS_1138
32. SNMP_EVENT_LOG_SERVER_AGENTS_1139

Application Repair

NOTE

For repairing corrupted or missing Operator's manual files, run the *UserManualUpdate.wsf* from the root of the **DVD ML/CL APPLICATION INSTALL 6.5.6** (PN 2049051-001). A message stating "User manuals updated" will be displayed once the manuals are repaired.

Prerequisite

To run repair, set the current DVD drive letter in the registry at the location *HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\Uninstall\{A826E79B-2E00-4538-847B-D88A3DB98E6F}* as:

Value Name: *InstallSource*

Value Data: <DVD Drive letter>:\

For example if the DVD drive letter has changed to F, the Value data shall be *F:*.

1. Log on as a **local Administrator**.
Ensure all programs are closed.
2. Insert the **DVD ML/CL APPLICATION INSTALL 6.5.6** (PN 2049051-001) into the DVD-ROM drive.
3. Browse to the DVD drive and double-click *mlcl.msi*.
4. Click *Next* at the *Mac-Lab/CardioLab-Installation Wizard Welcome* window.
5. Click *Next* at the *Setup Type* window.
6. Enter the **sa** password (contact the Hospital administrator for current logon information) in the *Database Password* window and click *Next*.
7. Click *Next* at the *Repair* window. The *Installing Mac-Lab/CardioLab* progress bar opens.
8. Click *Finish* at the *Installation Complete* window.
9. Remove the DVD from the drive.
10. Reboot the system.

Option Codes

Normal Operation

- **IMPORTANT:** Always make a backup options CD after system setup. Refer to the Installation manual for detailed procedures.
- *Invalid key* message indicates key was entered incorrectly.
- Functions are enabled only when checkboxes are checked.
- If Option codes are changed while in the applications: Log out and log back in to see the changes.

Troubleshooting

Fix Corrupt Option Codes

If options somehow become corrupted, then the following procedure can be used to reset the Mac-Lab CardioLab/Options.

1. Login as *mlcltechuser* (to the OS and Custom Shell)
2. Open a command prompt and type: *regedit.exe [enter]*
3. Navigate to
HKEY_LOCAL_MACHINE\Software\GEMS\CardioLab\Options.
4. Delete Option List.
5. Launch the Service Console from the desktop and select the Options Manager.
6. Launch the Software Options from the CD and apply the changes.

If Serial Numbered Entered Incorrectly

1. Open command prompt
2. Navigate to *D:\GEMMS\Prucka\Bin*
3. Type: *GEMS_ChangeSerialNum [SERIAL NUMBER]*

Event Viewer

The Event Viewer maintains logs about program, security, and system events on the computer. You can use Event Viewer to view and manage the event logs, gather information about hardware and software problems, and monitor Windows security events.

1. To open the Event Viewer, on the Desktop, right-click *My Computer* and select *Manage*. The *Computer Management* window comes up.
2. Click the *Event Viewer* to expand the menu so you can see the following items: *Application*, *Security* and *System*.
 - **Application Log** - The application log contains events logged by applications or programs. For example, a database program might record a file error in the application log.
 - **Security Log** - The security log records events such as valid and invalid logon attempts, as well as events related to resource use such as creating, opening, or deleting files or other objects. For example, if you have enabled logon auditing, attempts to log on to the system are recorded in the security log.
 - **System Log** - The system log contains events logged by Windows XP system components. For example, the failure of a driver or other system component to load during startup is recorded in the system log.
3. All logons are logged to the Security section, you will need administrator rights in order to view the security logs. The Mac-Lab/CardioLab system handles its own errors.
4. You can choose *View > Filter* to filter logs that you want to see.

You also have to have administrator rights in order to save log files.
5. Click *Computer Management* and then select *Connect to another computer* on the Toolbar in order to connect to another computer.

Log Files

Application Logs

Information, Warning, and Error messages are logged during different states of Mac-Lab/CardioLab (Acquisition and Review) and INW server systems. These messages can be used for checking: the state of the system, success of a command, or for debugging.

The Mac-Lab/CardioLab application writes messages to the Windows Event Log while running. These event logs can be accessed through the Event Viewer and appear in the Application Event Log with source GEMS. These messages may be of type information, warning, or error. The number of information or warning messages can be controlled through Audit Log settings inside the application. Error messages are always logged.

File Name	Origin or Location	Usage Description	Server/ Workstation
DICOM log files	D:\GEMMS\Prucka\Logs\DICOM	Logs the status/details about the DICOM interface. These logs are created only if the option is checked in the Connectivity section of System Settings.	Workstation
Data Export Audit Log Files	D:\GEMMS\Prucka\Exportdata	Logs the status/details about the Data Export operation.	Workstation
Mini Dump Files	D:\GEMMS\Prucka\Bin\Remote Service\Insite2\outgoing	Logs the mini dump when there is an application crash.	Workstation
SQL Server log files	C:\Program Files\Microsoft SQL Server\MSSQL\log	Logs the status/details about the operation of the SQL server.	Both

Install/Update Logs

Messages are written to Windows Event Log during installation or upgrade of Mac-Lab/CardioLab software. These event logs can be accessed through the Event Viewer and appear in the Application Event Log with the source GEMS and the category Setup.

Install Log Files

Test log files are created during the installation of Mac-Lab/CardioLab software. These files contain information regarding: the actions performed during an install, result (success/failure) of the install, and error information (if any). These files are created in *D:\GEMMS\Prucka\Setup* and include the following:

- Audit.log
- GEMS_Droplinkedserver.log
- GEMS_Dropreplblaster.log
- GEMS_Replcheck.log
- GEMS_CLAB_Export.log
- GEMS_archiveuser.log
- GEMS_clabsys.log
- GEMS_clabuser.log
- GEMS_StartServices.log
- GEMS_CmdExecNT.log
- GEMS_CmdExecSQLAcq.log
- GEMS_CmdExecSQLRev.log
- LMT_Update.log

Details of purpose and information contained in these files can be found in the following table.

File Name	Origin	Usage Description	Server/ Workstation
CMD_RESULT.log	D:\GEMMS\Prucka\Bin\GEMS_Install Config.dll	Reads the CMD_RESULT.log file after the script execution during the application install to check whether the operation is successful or failure.	Both
CMD_RESULT.log	GEMS_SysProfiler.bat	Always creates the new CMD_RESULT.log file and logs GEMS_SUCCESS or GEMS_ERROR depending on the System Profiler operation during the application install.	Both
CMD_RESULT.log	GEMS_SQLJOBS.bat	Always creates the new CMD_RESULT.log file and logs GEMS_SUCCESS or GEMS_ERROR depending on the System Profiler operation during the database maintenance.	Server
GEMS_SW Install.log	GEMS_SysProfiler.bat	Logs the steps performed and errors that occurred during the application install.	Both
GEMS_SWEError.log	GEMS_SysProfiler.bat	Logs the errors occurred during the application install.	Both
GEMS_HWPProfile%TDYY%%TDMM% %TDDD%.log	GEMS_SysProfiler.bat	Logs the Hardware profile of the system during the application install.	Both
MLCL_Set_Language.log	MLCLSetLang.cpp	Logs the details of the operation performed while setting the language.	Both

File Name	Origin	Usage Description	Server/ Workstation
MLCL_Set Language.log	MLCL_Set_Language. bat	Logs the details of the operation performed while setting the language.	Both
GEMS_CREATE_ CLAB_OPTICAL_ 6011.log	MLCL_Set_Language. bat	Logs the status/details about the v6.0 Clab Optical database creation operation.	Both
GEMS_CLAB_ OPTICAL_6500.log	MLCL_Set_Language. bat	Logs the status/details about the v6.5 Clab Optical database upgrade operation.	Both
GEMS_CLAB_ INSTALL.log		Logs the status/details about the database creation/upgrade during application install.	Both
GEMS_CLAB_ INSTALL.log	MLCL_Set_Language. bat	Logs the error if any problems in creating/updating the database while switching languages.	Both
GEMS_DROP_ DATABASE.log		Logs the error if any problems in dropping the database.	Workstation

Upgrade Log Files

Text log files are created during the upgrade of Mac-Lab/CardioLab software. These files contain information regarding the actions performed during the upgrade, result (success/failure) of the upgrade, and error information (if any). These files are created in D:\Upgrade60 and include the following:

- capture_settings.log
- capture_settings_rev.log
- detach_5.x.log
- migrate_acq.log
- migrate_rev.log
- migrate_srv.log
- pre_install.log
- reattach_5x.log

Maintenance Log Files

Text log files are created during the maintenance operations performed on the Mac-Lab/CardioLab systems. These maintenance activities include Database Maintenance, Backup, Archive, Running Scheduled Jobs, and so on. These log files contain information regarding the actions performed during maintenance, result (success/failure) of the maintenance, and error information (if any). These files are created in the folder D:\GEMMS\Prucka\Database\Maintenance\Log and include the following:

- GEMS_BKP.log
- GEMS_TAPEBKP.log
- GEMS_backup_clabdb.log
- GEMS_backup_masterdb.log
- GEMS_DBMAINT_PROCS.log
- GEMS_db_maint_reindexdb_clab.log
- GEMS_db_maint_recompile_clab.log
- GEMS_db_maint_checks_master.log
- scheduled_jobs_on_' + @subscriber + '.log
- Gems_backupclab.log
- Gems_restoreclab.log
- Listjobs.log
- GEMMS_tmparchive.log
- GEMMS_tmppurge.log
- sp_detach_5x.log
- sp_attach_cb.log
- sp_attached_5x.log

Details of purpose and information contained in these files can be found in the following table.

File Name	Origin	Usage Description	Server/ Workstation
Database Maintenance.log	GEMS_SQLJOBS.bat	Logs the status and details about the database maintenance operation.	Server
GEMS_sqljobs.log	GEMS_SQLJOBS.bat	Logs the status and details about SQL Jobs during the database maintenance operation.	Server
GEMS_WS_DB MAINT.log	GEMS_2GBLimitPatch.bat	Logs the status and details of the operation performed during the database maintenance for 2 GB Limit.	Workstation
GEMS_WS_DB MAINT.log	GEMS_WS_DBMAINT.bat	Logs the status and details of all the operations performed during the database maintenance.	Workstation
GEMS_WS_DB MAINT.log	GEMS_WS_DBMAINTJOB.bat	Logs the error if any problems in starting the database maintenance operation.	Workstation
GEMS_db_maint_backup.log	GEMS_WS_DBMAINT.bat	Logs the status/details about backup operation performed during the database maintenance.	Workstation
GEMS_db_maint_REINDEX.log	GEMS_WS_DBMAINT.bat	Logs the status/details about re-index operation performed during the database maintenance.	Workstation
GEMS_db_maint_checks.log	GEMS_WS_DBMAINT.bat	Logs the status/details about maintenance checks operation performed during the database maintenance.	Workstation
GEMS_db_maint_updatestats.log	GEMS_WS_DBMAINT.bat	Logs the status/details about update stats operation performed during the database maintenance.	Workstation
GEMS_db_maint_recompile.log	GEMS_WS_DBMAINT.bat	Logs the status/details about recompile operation performed during the database maintenance.	Workstation
Archive Generator Log Files		Logs the status/details about Archive Generator operation.	Workstation
2GBLimit.log		Logs the status/details about the operation of the 2GB Utility.	Workstation (Acquisition)

Replication Log Files

Text log files are created during the replication setup and configure operations on the Centricity Cardiology INW server. These log files contain information regarding the actions performed during replication setup, result (success/failure) of the setup, and error information (if any). These files include the following:

- GEMS_Acq_ReplRemove.log
- GEMS_ReplicationCheck.log
- GEMS_Server_ReplRemove.log

Device Log Files

These are errors that are created from devices that are hooked up to the Mac-Lab/CardioLab system.

File Name	Origin or Location	Usage Description	Server/ Workstation
TramErr.log	D:\GEMMS\Prucka\ Bin\PEITram.dll	Logs the device status and errors occurred on the TRAM.	Workstation
TramNetErr.log	D:\GEMMS\Prucka\ Bin\PEITramNet.dll	Logs the connection status and failures on the TRAMNet Driver.	Workstation
DashErr.log	D:\GEMMS\Prucka\ Bin\PEIDash.dll	Logs the device status and errors occurred on the DASH/Solar.	Workstation

Log File Locations for Mac-Lab/CardioLab System

The following log files may exist on workstations and INW servers:

- D:\GEMMS\Prucka\Setup\GEMS_CLAB_INSTALL.log
- D:\GEMMS\Prucka\Setup\GEMS_DROP_DATABASE.log
- D:\GEMMS\Prucka\Database\Maintenance\Log\GEMS_DBMAINT_PROCS.log
- D:\GEMMS\Prucka\Bin\TramNetErr.log
- D:\GEMMS\Prucka\Bin\Gems_backupclab.log
- D:\GEMMS\Prucka\Bin\Gems_restoreclab.log
- D:\GEMMS\Prucka\Bin\Audit.log
- C:\DFCTest\merge.log
- C:\clabdbsizecheck.log
- D:\GEMMS\Prucka\Bin\CMD_RESULT.log
- D:\GEMMS\Prucka\setup\GEMS_Droplinkedserver.log
- D:\GEMMS\Prucka\setup\GEMS_Dropreplblaster.log
- D:\GEMMS\Prucka\setup\GEMS_Replcheck.log
- D:\GEMMS\Prucka\SETUP\GEMS_CLAB_Export.Log
- D:\GEMMS\Prucka\Setup\GEMS_CLAB_INSTALL.Log
- D:\GEMMS\Prucka\Setup\GEMS_archiveuser.log
- D:\GEMMS\Prucka\Bin\DATABASE\MAINTENANCE\LOG\GEMS_BKP.Log
- D:\GEMMS\Prucka\Bin\DATABASE\MAINTENANCE\LOG\GEMS_TAPEBKP.Log
- D:\GEMMS\Prucka\Bin\build.log
- D:\GEMMS\Prucka\Bin\DashErr.log
- D:\GEMMS\Prucka\Bin\TramErr.log
- C:\STATS.LOG
- C:\QUERY.LOG
- C:\SQL.LOG
- D:\GEMMS\Prucka\2GBUtility\Log\2GBLimit.log
- D:\GEMMS\Pruckaa\Bin\GEMMS_tmparchive.log
- D:\GEMMS\Prucka\Bin\GEMMS_tmppurge.log
- D:\GEMMS\Prucka\Bin\log\gems_ws_dbmaint.log
- D:\GEMMS\Prucka\Bin\log\GEMS_DBMAINT_PROCS.log
- D:\GEMMS\Prucka\Bin\log\GEMS_WS_DBMAINT.log
- D:\GEMMS\Prucka\Bin\log\GEMS_db_maint_checks.log
- GEMS_db_maint_backup.log
- GEMS_db_maint_REINDEX.log
- GEMS_db_maint_updatestats.log
- D:\GEMMS\Prucka\log\GEMS_db_maint_recompile.log
- D:\GEMMS\Prucka\DICOM\merge.log
- D:\GEMMS\Prucka\Ntos\logs\GEMS_Policy.log

- D:\Upgrade65\capture_settings.log
- D:\GEMMS\Prucka\Database\maintenance\log>Listjobs.log
- D:\GEMMS\Prucka\Database\maintenance\log\sp_detach_5x.log
- D:\Upgrade60\migrate_acq.log
- D:\Upgrade60\migrate_rev.log
- D:\Upgrade60\migrate_srv.log
- D:\GEMMS\Prucka\Database\maintenance\log\sp_attach_cb.log
- D:\GEMMS\Prucka\Bin\log\sp_attach_5x.log
- C:\windows\security\logs\resetup.log
- C:\windows\special\cardiosec.log
- D:\GEMMS\Prucka\setup\LMT_Update.log
- D:\GEMMS\Prucka\Setup\MLCL_Set_Language.log
- D:\GEMMS\Prucka\Setup\history.log
- D:\GEMMS\Prucka\Bin\GEMS_SWInstall.log
- D:\GEMMS\Prucka\Bin\GEMS_SW_D.log
- D:\GEMMS\Prucka\Setup\GEMS_clabsys.log
- D:\GEMMS\Prucka\Setup\GEMS_clabuser.log
- D:\GEMMS\Prucka\Setup\GEMS_CmdExecNT.log
- D:\GEMMS\Prucka\Setup\GEMS_StartServices.log
- D:\GEMMS\Prucka\Setup\GEMS_CmdExecNT.log
- D:\GEMMS\Prucka\Setup\GEMS_CmdExecSQLAcq.log
- D:\GEMMS\Prucka\Setup\GEMS_CmdExecSQLRev.log
- D:\GEMMS\Prucka\Setup\GEMS_netshare.log
- D:\GEMMS\Prucka\Database\Maintenance\Log\DatabaseMaintenance.log
- D:\GEMMS\Prucka\Database\Maintenance\Log\GEMS_sqljobs.log
- D:\GEMMS\Prucka\Database\Maintenance\Log\GEMS_backup_clabdb.log
- D:\GEMMS\Prucka\Database\Maintenance\Log\GEMS_backup_masterdb.log
- D:\GEMMS\Prucka\Database\Maintenance\Log\GEMS_db_maint_reindexdb_clab.log
- D:\GEMMS\Prucka\Database\Maintenance\Log\GEMS_db_maint_recompile_clab.log
- D:\GEMMS\Prucka\Database\Maintenance\Log\GEMS_db_maint_checks_master.log
- D:\GEMMS\Prucka\Database\Maintenance\Log\GEMS_SrvNameChanger.log
- D:\GEMMS\Prucka\Database\Maintenance\Log\GEMS_SrvNameChanger.log
- D:\GEMMS\Prucka\Database\Maintenance\Log\NameChanger.log
- D:\GEMMS\Prucka\Database\Maintenance\Log\GEMS_Acq_ReplRemove.log
- D:\GEMMS\Prucka\Database\Maintenance\Log\GEMS_ReplicationCheck.log

- D:\GEMMS\Prucka\Database\Maintenance\Log\GEMS_Server_ReportRemove.log
- D:\GEMMS\Prucka\Setup\MLCLInstallerDbg.log
- Navigate to *D:\GEMMS\Prucka\ExportData*
 - ◆ Double-click *DataExportConfig.exe*.
 - ◆ Check the *audit.log* file in the directory in the *Audit Log* tab.
- Domestic CVIS Only: Perform a check on the CVIS Interface Management Console to verify the HL7 messages were processed/received.
 - ◆ Navigate to *Administrative > System Management > Audit Logs*.
 - ◆ Then go to respective tab page to find the log files.

5 Recovery Procedures

Acquisition System Disaster Recovery

The decision to perform an Acquisition system recovery should only be made after consultation with GE Technical Support by the on-site Field Engineer. The high-level steps for a complete 6.5.6 Acquisition system recovery are listed below. Detailed instructions for each step follow.

High-Level Overview

Required Parts

Verify the appropriate media is available. Double-check all part numbers before you begin.

- DVD ML/CL APPLICATION INSTALL 6.5.6: 2049051-001
- DVD MLAB/CLAB HPXW8000 IMG DVD v6.5.6: 2049072-001
- DVD MLAB/CLAB HPXW8000 IMG DVD v6.5.6 #2: 2049072-002
- DVD MLAB/CLAB HPXW8200 IMG DVD v6.5.6: 2049074-001
- DVD MLAB/CLAB HPXW8200 IMG DVD v6.5.6 #2: 2049074-002
- DVD MLAB/CLAB HPXW8400 IMG DVD v6.5.6: 2049076-001
- DVD MLAB/CLAB HPXW8400 IMG DVD v6.5.6 #2: 2049076-002
- DVD MLAB/CLAB HPZ600 IMG DVD v6.5.6: 2049080-001
- DVD MLAB/CLAB HPZ600 MG DVD v6.5.6 #2: 2049080-002
- CD-R DRIVERS, PANASONIC LKM-KB23 ADA DRV: 2057762-001 (If applicable)

Recovery Scenario

Perform the following steps on an acquisition that needs to be reimaged.

Step 1: Save Acquisition System Information. Backed up data from the second hard drive (drive G:) is used later on to restore the system.

Step 2: Take the Acquisition systems out of replication and set systems to standalone (if necessary). Go to [“Obtain System Information at the Server”](#) on page 5-8.

Step 3: Reimage the Acquisition System. Go to [“Restore System Software”](#) on page 5-10.

Step 4: Perform all the procedures in [“Configure the Acquisition System”](#) on page 5-32.

Step 5: If necessary, perform all the procedures in [“Configure the Acquisition System on the INW Network”](#) on page 5-40.

Log On to the Acquisition System

When starting up an Acquisition system, an auto-logon sequence starts and you are automatically logged on to Windows XP. You must stop the auto-logon so you can log on to Windows XP as **mlcltechuser**.

1. Power on the Acquisition system.

The system boots up to the *Mac-Lab/CardioLab Custom Shell* screen.

2. Press **Ctrl + Action + Delete**.
3. Click *Logoff* and select *Logoff*.
4. Immediately hold down the **Shift** key.
5. Log on to the Windows OS as **local mlcltechuser** (contact GE Technical Support or the system administrator for current password information).

To log on locally, select the computer name in the *Domain* field.

6. Log on to the Mac-Lab/CardioLab Custom Shell as **local mlcltechuser** (contact GE Technical Support or the system administrator for current password information).

Save Acquisition System Information

If the system will not boot up or drives C: or D: are unavailable:

- For INW networked systems, go to “[Obtain System Information at the Server](#)” on page 5-8.
- For standalone systems, go to “[Reimage the Acquisition System](#)” on page 5-10.

If the system boots up and the C: and D: drives are available, use the following procedures to back up system information.

Export Custom Data

Use this procedure to save custom data to the G: (backup) drive.

If the system is being completely replaced, save the custom data to removable media to be moved to the replacement system after recovery. It is recommended to use a USB Flash Drive.

Export Custom Lists

NOTE

If prompted for an administrative logon, enter **domain mlcladmuser** (password: **mlcl!admuser**).

1. Double-click *Mac-Lab/CardioLab* to start the *Mac-Lab/CardioLab* application.
2. In the Navigator window, select *Utilities > Export Lists*.
The *Data Export Wizard* is displayed.
3. Select the *G:* drive and click *New Folder*.
4. Enter **List_ Backup** for the folder name and click *Ok*.
5. Click *OK* when the *Success* message is displayed.

Export Custom Forms

1. In the Navigator window, select *Utilities > Export Custom Form Layouts*.
The *Data Export Wizard* is displayed.
2. Select the *G:* drive and click *New Folder*.
3. Enter **Forms_ Backup** for the folder name and click *OK*.
4. Click *Export*.
5. Click *OK* when the *Success* message is displayed.

Export Custom Report Formats

1. In the Navigator window, select *Utilities > Export Report Formats*.
The *Data Export wizard* is displayed.
2. Select the *G:* drive and click *New Folder*.
3. Enter **Report_ Backup** for the folder name and click *Ok*.
4. Click *OK* when the *Success* message is displayed.
5. Close the application.

Back Up System Information Manually

Run Database Maintenance (if applicable)

Check to see if there is a recent backup in the *G:\GEMMS* folder. This backup would have been created by the Database Maintenance task. If there is not a recent backup, run the Database Maintenance task.

1. Select *Start > Settings > Control Panel*.

2. Double-click *Scheduled Tasks*.
3. Right-click the *Database Maintenance* task.
4. Click *Run*.
5. Wait for the database maintenance job to complete.
6. After the job completes, close all open windows.

Backup Image Capture Settings

This procedure is only necessary on a Image Capture/CardioImage system.

Backup any custom DCF files in the *D:\GEMMS\Prucka\System\Image\DCF* folder to the *G:* drive.

Record CVIS Information

On the Desktop, verify whether or not the *Centricity Cardiology DMS* shortcut is installed.

Back up Third-Party Software

A manual backup must be created for Third Party Software:

1. Check for the PedCath database:
 - a. Open the *PedCath* application and select *File > Show Data Folder Path* from the main menu.

If the data folder path is on the local C: or D: drive, then perform the next steps:
 - b. Right-click *My Computer* and select *Explore*.
 - c. Navigate to the PedCath database folder location.
 - d. Drag and drop the PedCath Data folder into the G: drive.
2. Check for the ACCAccess database:
 - a. Right-click *My Computer* and select *Search*.
 - b. Search the C: and D: drives for the file *acc.mdb*.
 - c. If the ACCAccess database is found, drag and drop the file into the G: drive.
3. Backup any other third-party software to the G: drive.

NOTE

This disaster recovery procedure will only save Mac-Lab/CardioLab files. Any other files must be backed up manually to the G: drive and restored later.

Back Up Software Options

1. Double-click *Service Console* on the *Desktop*.
2. Navigate to *Software Options Manager > Software Options*.
3. Click *Create Backup*.
4. In the *Save In* drop-down box navigate to *G:* drive.
5. In the *File Name* field, type **Software_Options** and click *Save*.
6. Close the *Service Console*.

Back Up Desktop Files

1. Right-click *My Computer* on the *Desktop* and select *Explore*.
2. Navigate to *G:* drive and click the *New Folder* button.
3. Enter the folder name as *Desktop_Items*.
4. Copy any customer created documents or folders from the desktop to the *Desktop_Items* folder.
5. Repeat this procedure logged in as any other applicable user (**local mlcllogonuser**, **INW mlcllogonuser**, and **INW mlcltechuser**).

Record Network Settings

1. Verify that you are logged in to both the Windows OS and the Custom Shell as **local mlcltechuser**.
2. From the *Desktop*, right-click *My Computer*.
3. Choose *Properties*.
4. Click the *Computer Name* tab.
5. Record the computer name in the table below.
6. Record the *Domain/Workgroup* information and click *Ok*.
7. From the *Desktop*, right-click *My Network Places*.
8. Choose *Properties*.
9. Right-click *Local Area Connection*.
10. Choose *Properties*.
11. Highlight the *Internet Protocol (TCP/IP)* and click *Properties*.
12. Record the *IP Address*, *Subnet Mask*, *Default Gateway*, *WINS* (if used) and *DNS Server* information.

Network Settings	
Computer name	
Domain\Workgroup	
IP Address	_____ - _____ - _____ - _____
Subnet Mask	_____ - _____ - _____ - _____
Default Gateway	_____ - _____ - _____ - _____
WINS (if used)	
DNS Server	_____ - _____ - _____ - _____ _____ - _____ - _____ - _____ _____ - _____ - _____ - _____

Record Mapped Drives and Printer

1. Press **Ctrl + Action + Delete**.
2. Click *Logoff* and select *Logoff*.
3. Allow the system to auto-logon to Windows.
4. Log on to the Mac-Lab/CardioLab Custom Shell as a local user.
5. Double-click *My Computer*.
6. Go to *Network Drives*. All mapped drives will be listed.
7. Record all mapped drives.
 - Drive letter
 - Share name
 - Hostname of the computer that owns the share
8. Record the configured printers.

INW Networked Acquisition Systems Only

Use these procedures only if the Acquisition system is part of an INW network. For a Standalone Acquisition, continue with “[Restore System Software](#)” on page 5-10.

You must log on to the server as the INW **domain Administrator** to perform this procedure (contact GE Technical Support or the system administrator for current password information).

Obtain System Information at the Server

Use this procedure to obtain network settings only if the Acquisition system will not boot or the C: or D: drives are unavailable.

1. Select *Start > Programs > Microsoft SQL Server > Enterprise Manager*.
2. Open *Microsoft SQL Servers > SQL Server Group*.
3. Highlight the server name.
4. Expand *Replication Monitor > Agents > Merge Agents*.

The failed Acquisition has a red X displayed next to system’s *Merge Agent*.

5. Record the system name in one of the *Merge Agents* with the red X under the *Subscription* tab.

-
6. Close the *Enterprise Manager*.
 7. Open a command prompt (*Start > Programs > Accessories > Command Prompt*).
 8. Type:

Ping [System Name]

recorded in step 5.

9. Record the Acquisition system IP address.

NOTE

Ignore the request timeout.

10. Close all open windows.
11. Go to another Acquisition or Review system on the network within the same subnet, and use the procedure “[Record Network Settings](#)” on page 5-6 to obtain and record DNS, Default Gateway, and Subnet information.

NOTE

A system on the network within the same subnet will have the same network information as the system being recovered.

Remove the Acquisition System from Replication

1. At the server, select *Start > Programs > Microsoft SQL Server > Enterprise Manager*.
2. Open *Microsoft SQL Servers > SQL Server Group*.
3. Highlight the server name.
4. From the menu Select *Tools/Replication/Configure Publishing, Subscribers, and Distribution*.
5. Select the *Subscribers* tab.
6. Deselect the checkbox next to the Acquisition system name.
7. Click *Yes*.
8. Click *OK*.
9. In the *Enterprise Manager*, right-click the Acquisition system in the left pane.
10. Select *Delete SQL server registration*.
11. Select *Yes*.
12. Close the *Enterprise Manager*.

Remove the Acquisition System from the GE MLCL Organizational Unit

1. At the server Desktop, go to *Start > Control Panel*.
2. Double-click *Administrative tools*.
3. Double-click *Active Directory Users and Computers*.
4. Expand the domain name (default is *inw.local*).
5. Expand the *GE Medical Systems (MLCL)* organizational unit.
6. Expand the *MLCL Computers*.
7. Expand the *MLCL Workstations*
8. Expand the *MLCL Acquisition Workstations*
9. Delete the Acquisition system name from the *MLCL Acquisition Workstations* folder.
10. Click *Yes* to confirm.
11. Close all open windows.

Restore System Software

Reimage the Acquisition System

CAUTION

SHOCK HAZARD — Use appropriate Lock Out/Tag Out procedures before performing any service on potentially energized equipment.

CAUTION

EQUIPMENT DAMAGE — Electrostatic discharge (ESD) can damage electronic components. Be sure you are properly grounded before opening any equipment.

CAUTION

LOSS OF DATA — If drive G:, the second hard drive, is physically connected during reimaging, all data contained on it will be lost.

You must physically disconnect the second hard drive before reimaging.

NOTE

The HP z600 computer must be reimaged because it will have 6.8.1 software installed.

For the reimaging process you'll need the following media depending on system type (HP xw8000, HP xw8200, HP xw8400 and HP z600).

- DVD ML/CL APPLICATION INSTALL 6.5.6: 2049051-001
- DVD MLAB/CLAB HPXW8000 IMG DVD v6.5.6: 2049072-001
- DVD MLAB/CLAB HPXW8000 IMG DVD v6.5.6 #2: 2049072-002
- DVD MLAB/CLAB HPXW8200 IMG DVD v6.5.6: 2049074-001
- DVD MLAB/CLAB HPXW8200 IMG DVD v6.5.6 #2: 2049074-002
- DVD MLAB/CLAB HPXW8400 IMG DVD v6.5.6: 2049076-001
- DVD MLAB/CLAB HPXW8400 IMG DVD v6.5.6 #2: 2049076-002
- DVD MLAB/CLAB HPZ600 IMG DVD v6.5.6: 2049080-001
- DVD MLAB/CLAB HPZ600 MG DVD v6.5.6 #2: 2049080-002

1. Shut down the system, if necessary.
2. Open the computer case and disconnect the second hard drive (drive G:) before reimaging.

The second hard drive is physically located below the primary hard drive.

- Restart the system.

NOTE

Press **F1 (Help)** at the *Intel Boot Agent* screen, if displayed.

- Log on to the Windows OS and the Mac-Lab/CardioLab Custom Shell locally as **mlcltechuser**.

NOTE

If the *Systems Settings Change* window is displayed, click *Yes* to restart. Log on again as **mlcltechuser**. At this point of the setup, you may see a *Windows New Hardware Found* wizard dialog. Please ignore this dialog. This window will be closed by Windows during the system shutdown.

- Right-click *My Computer*, select *Explore* and verify the *G:* drive is no longer available.
- Insert the appropriate Image DVD.
- Shut down the system and replace the faulty hard drive.

NOTE

For the HP xw8000 only: Ensure the jumpers are set to cable select.

- Restart the system.
- If the system is an HP z600, the following needs to be changed in the BIOS in order to boot from the image DVD:
 - Restart the system and press **F10** to enter *BIOS*.
 - Select *Storage > Storage Options*.
 - Select *SATA Emulation*. Change the default of *RAID+AHCI* to *IDE*.
 - Press **F10** to accept changes in *BIOS*.

The system will reboot.

- Select *Erase System Data* and press **Enter** to begin reimaging.

The *Symantec Ghost* screen is displayed monitoring the progress of the image process. If necessary, insert the remaining image DVDs as prompted. When the installation is complete, the computer will automatically restart. Remove the DVD.

NOTE

During the setup process a blank Windows DOS-Prompt window is displayed. Do not close this window as setup is being performed.

- If the system is an HP z600, the following needs to be changed in the BIOS:
 - Restart the system and press **F10** to enter *BIOS*.
 - Select *Storage > Storage Options*.

- c. Select *SATA Emulation*. Change the default of *IDE* to *RAID+AHCI*.
- d. Press **F10** to accept changes in *BIOS*.

The system will reboot.

12. Shut down the system.
13. Reconnect the *G:* drive.
14. Restart the system.

NOTE

Press **F1 (Help)** at the *Intel Boot Agent* screen, if displayed.

15. Log on to the Windows OS and the Mac-Lab/CardioLab Custom Shell locally as **mlcltechuser**.
16. If any devices were not automatically installed during re-imaging, a *New Hardware Found* message may be displayed at restart. If this happens, use the following procedure for each wizard:
 - Select *Install the software automatically* and click *Next*.
 - If a choice of drivers is presented, pick the default selection and click *Next*.
 - If prompted about Windows Logo testing or driver signing, click *Continue anyway*.
 - If prompted by Matrox Powerdesk Installation about enabling independent mode for Matrox graphics hardware, click *Yes*.
 - Click *Finish* when the installation is complete.
 - Restart the computer if prompted and log on again as **local mlcltechuser**.

Install the ADA Driver (Only for HP z600 with ADA Drive)

If the system is an HP z600 with an ADA drive installed, install this driver.

1. Insert **CD-R DRIVERS, PANASONIC LKM-KB23 ADA DRV** (PN 2057762-001) into the CD/DVD drive.
2. Right-click *My Computer* and select *Explore*.
3. Navigate to the Panasonic ADA Driver CD.
4. Double-click *Setup.exe*.
5. Select the *Driver and Formatter Setup*.
6. Uninstall the previous driver and confirm the uninstall.
7. Restart the computer when prompted.
8. After the computer restarts, log on as **local mcltechuser** for both Windows and the Mac-Lab CardioLab custom shell.
9. Navigate to the Panasonic ADA Driver CD.
10. Double-click *Setup.exe*.
11. Select the *Driver and Formatter Setup*.
12. When prompted,
 - a. Click *Next*.
 - b. Click *Yes* to accept the license agreement.
 - c. Click *Next* to accept the default destination.
 - d. Click *Next* to accept the default Program Folder.
 - e. Click *Next* to start copying files.
13. Close *ReadmeXP.txt*.
14. Click *Next* to restart the computer and Finish.
15. After the computer restarts, log on as **local mcltechuser** for both Windows and Mac-Lab CardioLab custom shell.
16. Remove **CD-R DRIVERS, PANASONIC LKM-KB23 ADA DRV** (PN 2057762-001) from the CD/DVD drive.

Verify Drive Order

1. Right-click *My Computer* and select *Manage*.
2. Select *Storage > Disk Management* in the left pane.
3. In the right pane, verify each drive is assigned the correct drive letter.
 - C: Primary Hard Drive
 - D: Data Hard Drive
 - E: MO Drive (if installed)
 - F: DVD-RAM Drive or ADA Drive
 - G: Second Hard Drive

NOTE

If the C: or D: drive letters are not correctly set, security settings were not properly applied. Do not change the drive letter. The system must be reimaged.

4. If a drive does not have the correct letter perform the following steps for each drive not assigned the correct letter:
 - a. Right-click the drive in the right pane and select *Change drive letter and paths*.
 - b. Click *Change*.
 - c. Select the new drive letter in the drop-down menu and click *OK*.
 - d. Click *Yes* to the confirmation message.
5. Close the Computer Management window.

Required Updates for Systems Using the Matrox M9140 Quad Video Board

For systems using the Matrox M9140 Quad video board, the video board drivers installed with the reimage must be uninstalled. After uninstalling the old video board drivers, install the Matrox M9140 Quad video board drivers. If the system is not using the Matrox M9140 Quad video board, proceed to [“Set Display Configurations”](#) on page 5-18.

Uninstall Unused Display Drivers

Uninstall unused display drivers before installing the Matrox M9140 Quad video board drivers.

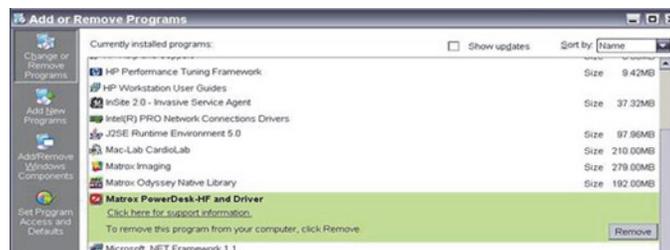
1. Log on to Windows and the Custom Shell as **mlcltechuser**.
2. Ignore any New Hardware found messages.
3. If an error message about stopping ONL display appears, click *OK*.



4. Click *Start > Settings > Control Panel > Add or Remove Programs*.
5. Uninstall the *ATI – Software Uninstall Utility*.



6. Ignore any New Hardware found messages.
7. Restart the system.
8. Log on to Windows and the Custom Shell as **mlcltechuser**.
9. Ignore any New Hardware found messages.
10. If an error message about stopping ONL display appears, click *OK*.
11. Click *Start > Settings > Control Panel > Add or Remove Programs*.
12. Uninstall *Powerdesk-HF and Driver*.



13. Select *No* to restart in the *Matrox Uninstaller for PowerDesk* window.
14. Shutdown the system.

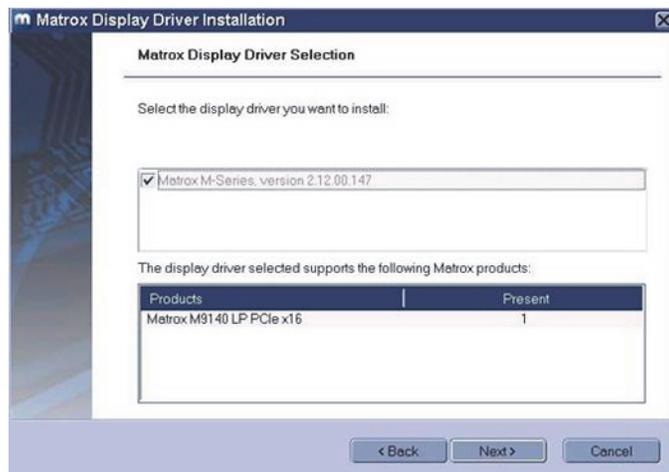
Install Matrox M9140 Quad Video Board Drivers V2.12.00.147

Install the Matrox M9140 Quad video board drivers using CD-R MATROX M9140 QUAD VIDEO CARD DRIVER, V2.12.00.147 (P/N 2074635-001).

1. Power on the system.
2. Log on to Windows and the Custom Shell as **mlcltechuser**.
3. Ignore any New Hardware found messages.
4. If an error message about stopping ONL display appears, click *OK*.



5. Insert CD-R MATROX M9140 QUAD VIDEO CARD DRIVER, V2.12.00.147 (P/N 2074635-001) into the drive.
6. Browse to the CD drive and double-click **Setup.exe**.
7. At the *Matrox Display Driver Installation - Matrox PowerDesk* window, click *Next*.
8. At the *Matrox Display Driver Selection* window, click *Next*.



9. At the *Ready to Install* window, click *Next*.

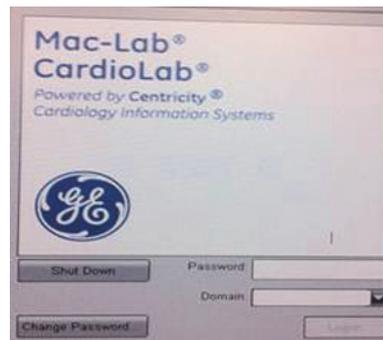
10. At the *Installation Completed Successfully* window, click *Next*.
11. At the *Installation Completed* window, click the *Restart Computer* checkbox and click *Finish*.



Post Installation Steps for Matrox M9140 Quad Video Board Drivers V2.12.00.147

After installing drivers for the Matrox M9140, the logon fields might not display properly when the computer first restarts. Restarting the computer again resolves the issue.

1. Log on as **mlcltechuser**.



NOTE

The logon fields are present, but might not display properly.

2. Shut down and restart the system again to resolve the issue.
3. Log on to Windows and the Custom Shell as **mlcltechuser**.
4. Reconfigure the monitor settings using **"Set Display Configurations"** on page 5-18.

Set Display Configurations

Two Monitor Systems

1. Right-click the Desktop and select *Properties*.
2. Select the *Settings* tab.
3. Click the icon for the second monitor (labeled “2”).
4. Select *Extend the Windows desktop onto this monitor* check box.
5. Click *Apply*.
6. Close all open windows.

Three Monitor Systems

1. Right-click the Desktop and select *Properties*.
2. Select the *Settings* tab.
3. For systems with the Matrox Parhelia and ATI FireGL video boards re-order the monitor icons as: 1-3-2.
 - a. Click the icon for the third monitor (labeled “3”).
 - b. Select *Extend the Windows desktop onto this monitor* check box.
 - c. Click *Apply*.
 - d. Click the second monitor icon (labeled 2).
 - e. Select the *Extend the Windows desktop to this monitor* check box.
 - f. Click *Apply*.
 - g. Click *Identify*.
 - h. Verify the monitors are identified as 1-3-2 from left to right.
 - i. Close all open windows.

NOTE

To re-order the icons, drag the monitor icons and drop them in the correct position.

4. For systems with the Matrox M9140 Quad video board, do the following:
 - a. Click the second monitor icon (labeled 2).
 - b. Select *Extend the Windows desktop to this monitor* check box.
 - c. Re-order the monitor icons so they appear in the following order: 1-2-4.

NOTE

For HP z600 and HP xw8400 systems, the order of monitors should be 1-2-4, the second monitor (“2”) and fourth monitor (“4”) need to be extended and the third monitor (“3”) should not be extended.

NOTE

To re-order the icons, drag the monitor icons and drop them in the correct position.

- d. Click *Apply*.
- e. Click the third monitor icon (labeled 4).
- f. Select *Extend the Windows desktop to this monitor* check box.
- g. Click *Apply*.
- h. Click *Identify*.
- i. Verify the monitors are identified as 1-2-4 from left to right.

Set Display Resolution

1. Verify you are logged on as **mlcltechuser** (password: **mlcl!techuser**).
2. Right-click the Desktop and select *Properties*.
3. Select the *Settings* tab.
4. In the *Screen Resolution* section, select *1600x1200*.

NOTE

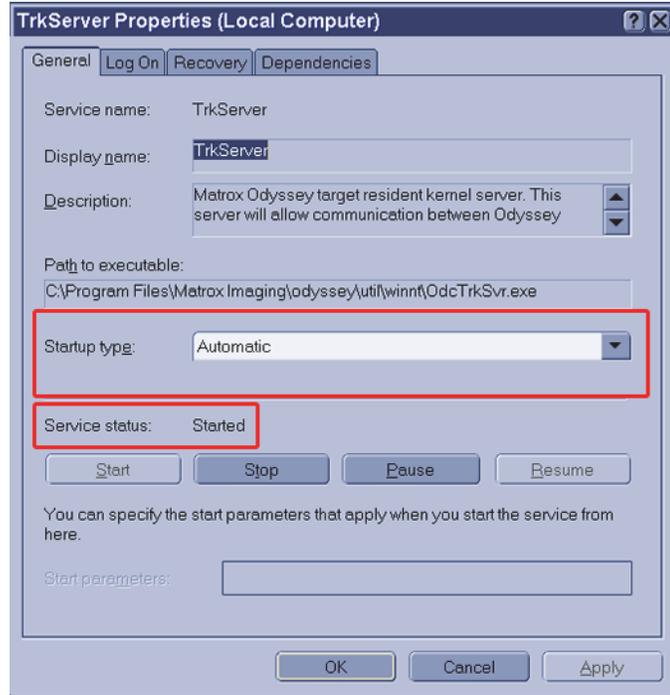
This is the only supported resolution for new systems. If existing monitors do not support this resolution, *1280x1024* may be used for Mac-Lab systems. All monitors must be set to the same resolution.

5. Verify the color for all monitors is set to *Highest (32-bit)*.
6. Click *OK*.

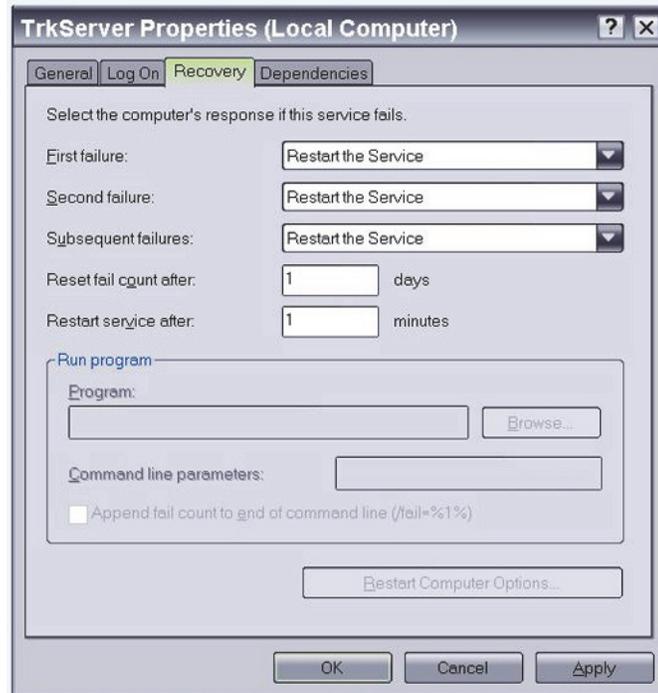
Configure the Matrox Odyssey Driver Service

The following procedure ensures that if the display driver service fails, it is automatically restarted.

1. Log on to Windows and the Custom Shell as **mlcltechuser**.
2. Click *Control Panel > Administrative tools > Services*.
3. In the *Services* panel, right-click *TrkServer* and select *Properties*.
4. Select the *General* tab and verify the following:
 - The *Startup type* is set to *Automatic*
 - The *Service Status* is *Started*



5. If the service is not started, click *Start* in the *Service Status* section to start it manually.
6. Select the *Recovery* tab and change the recovery actions as shown below:



7. Click *OK*.

Install Microsoft Operating System Updates

Instructions for downloading and installing Microsoft security patches and service packs are listed by product type on Support Central. Download and install all applicable patches and service packs.

Change Computer Name

Use this procedure to change the computer name, if required.

CAUTION

PROCEDURE FAILURE — If the computer name is to be changed, this procedure must be completed at this time. If the computer's name is changed at a later time the system must be reimaged.

Also note the following naming conventions:

- The name cannot begin with a number
 - The name cannot contain hyphens or underscore characters
 - The name cannot contain spaces or special characters
 - The name cannot exceed 15 characters in length
-
-

1. Verify you are logged on to the Windows OS and the Mac-Lab/CardioLab Custom Shell as **local mlcltechuser**.
2. Right-click *My Computer* and select *Explore*.
3. Navigate to *C:\Windows\Special*.
4. Double-click *ManualRename.hta*.
5. Enter the new Acquisition system name.
6. Click *OK* at the confirmation messages.
The system automatically restarts.
7. At the Mac-Lab/CardioLab Custom Shell screen, press **Ctrl + Action + Delete**.
8. Click *Logoff*.
9. Click *Logoff*.
10. Immediately hold down the **Shift** key.
11. Log on to the Windows OS as **local mlcltechuser**.
12. Log on to the Mac-Lab/CardioLab Custom Shell as **local mlcltechuser**.

Change Language

Use these procedures to change the language, if necessary. If the language remains English, continue with “[Check/Set Time](#)” on page 5-26.

Delete User Profiles

1. Select *Start > Settings > Control Panel*.
2. Double-click *System*.
3. Click the *Advanced* tab.
4. Click *Settings* in the *User Profiles* section.
5. Select each profile in the list and click *Delete*, if enabled, to delete the profile.

The MLCLTechUser profile cannot be deleted.

6. Click *OK* to close the *User Profiles* dialog.
7. Click *OK* to close the *System Properties* dialog.

Set Operating System Language

For setting the languages the following must be applied for the application to function properly:

Language: Country/Locale

- English: United States/United Kingdom
 - French: France
 - German: Germany
 - Italian: Italy
 - Spanish: Spain
 - Swedish: Sweden
 - Chinese: China (PRC)
 - Japanese: Japan
1. Verify you are logged on as **local mlcltechuser** (password: **mlcl!techuser**).
 2. Double-click *Regional and Language Options*.
 3. Select the *Regional Options* tab.
 4. In the *Standards and formats* section, select the correct language and locale (for example, *French (France)*) from the drop-down list.
 5. In the *Location* section, select the correct locale (for example, *France*).
 6. Select the *Languages* tab.
 7. Click *Details*.
 8. For Chinese systems only:

If the use of the IME is required, the following steps must be taken to set it up in a manner which is compatible with the operation of the Mac-Lab/CardioLab software:

- a. Click *Add*.
- b. Change the Input Language to *Chinese (PRC)*.
- c. Select the *Keyboard Layout/IME* check box.
- d. Select *Chinese (Simplified) - Enhanced Unicode IME* from the drop-down list.
- e. Click *OK*.
- f. Click *Add*.
- g. Select the *Keyboard Layout/IME* check box.
- h. Select the *Chinese (Simplified) - US Keyboard* check box.
- i. Click *OK*.
- j. Select *Chinese (PRC) - Chinese (Simplified) - US Keyboard* in the *Default input language* drop-down.

If the use of the IME is not required, select the desired keyboard layout as appropriate.

9. For all other languages:

Determine if the desired language and locale is listed in the *Default input language* section. If it is not:

- a. Click *Add*.
 - b. Select the appropriate language and locale in the *Input language* list. If necessary, configure other settings (for example, *Keyboard layout/IME*) as appropriate.
 - c. Click *OK*.
10. Select the language and locale in the *Default input language* section.
 11. Click *OK*.
 12. Select the correct language (for example, *Francais*) in the *Languages used in menus and dialogs* section.
 13. Select the *Advanced* tab.
 14. Select the correct language (for example, *French (France)*) in the *Language for non-Unicode programs* section.
 15. Select the *Apply all settings...* check box in the *Default user account settings* section.
 16. Click *OK* if prompted.
 17. Click *OK* to close the *Regional and Language Options* window.
 18. Click *OK* at *the changes will not take effect until you reboot* prompt.
 19. Click *Yes*, if prompted about copying required files, to use the files that are already on the system.
 20. Click *Yes* to reboot.

Set Mac-Lab/CardioLab Application Language

1. At the Mac-Lab/CardioLab Custom Shell screen, press **Ctrl + Action + Delete**.
2. Click *Logoff*.
3. Click *Logoff*.
4. Immediately hold down the **Shift** key.
5. Log on to the Windows Operating System as **local mlcltechuser** (password: **mlcl!techuser**).
6. Log on to the Mac-Lab/CardioLab Custom Shell as **local mlcltechuser** (password: **mlcl!techuser**).
7. Right-click *My Computer* and select *Explore*.
8. Browse to the *D:\GEMMS\Prucka\Setup\Language* directory.

9. Double-click *MLCL_Set_Language.bat* to start the process of setting the Mac-Lab/CardioLab application language.
10. Verify the language listed is correct (for example, *French*). If so, press any key to begin the process of setting the application language.

NOTE

The process takes a few minutes to complete.

11. Press **Enter** at the success prompt.

Both the Operating System language and the Mac-Lab/CardioLab application language should now be set correctly.

Install International Ablation files

This procedure must be performed on systems using ablation that are located outside of the United States and English Canada.

1. Right-click *My Computer* and select *Explore*.
2. Navigate to *D:\GEMMS\Prucka\Bin\Ablation\International*.
3. Double-click the *InstallAblation.bat* file.
4. Verify no errors occurred.

The installer runs without confirmation. To confirm the install was successful, proceed with “[Verify Ablation Files](#)” below.

Adjust Japanese Ablation file

This procedure must be performed on Japanese systems.

1. Navigate to *D:\GEMMS\Prucka\Bin\Ablation*.
2. Right-click the *PEIAtakr.dll* file and select *Copy*.
3. Right-click in the white space on the right side of the window and select *Paste*.
4. Right-click the *Copy Of PEIAtakr.dll* file and select *Rename*.
5. Type **JLLCABL-IT.dll** and press **Enter**.

Verify Ablation Files

1. Navigate to *D:\GEMMS\Prucka\Bin\Ablation*.
2. Verify the files in the following table are in the directory:

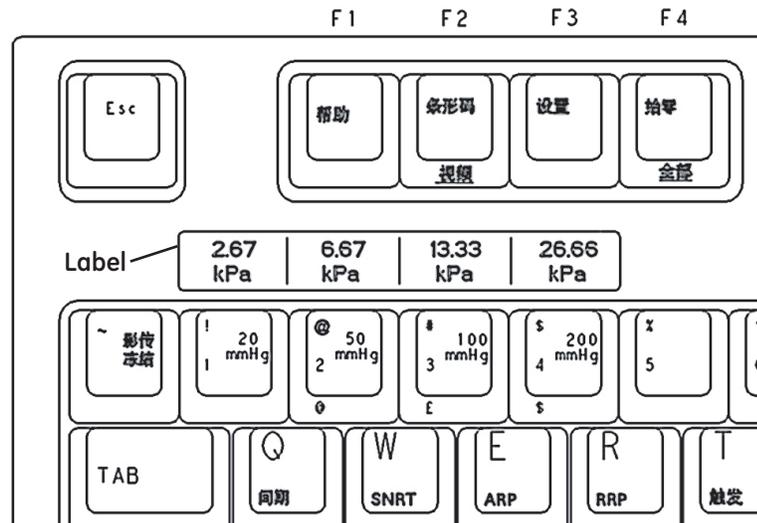
Ablation File	Locale = US	Locale = Japan	Locale = Other
<i>CryoCath.dll</i>	Yes	Yes	Yes
<i>PEIAtakr.dll</i>	Yes, as <i>PEIAtakr.dll</i>	Yes, as <i>JLLCABL-IT.dll</i>	Yes, as <i>PEIAtakr.dll</i>
<i>PEIEpt1000.dll</i>	Yes	Yes	Yes
<i>PEIStockert.dll</i>	Yes	Yes	Yes

Ablation File	Locale = US	Locale = Japan	Locale = Other
PEIHat300S.dll	No	Yes	Yes
PEIbi1500T.dll	Yes	Yes	Yes

3. Close the *Windows Explorer* window.

Install kPa Label (Chinese Systems Only)

1. Clean the area above the pressure keys if necessary.
2. Apply the kPa label as shown.



Check/Set Time

1. Verify you are logged on as **local mlcltechuser** (password: **mlcl!techuser**).
2. Select *Start > Programs > Accessories > Command Prompt*.
3. Type **net stop w32time** and press **Enter**.
4. Select *Start > Settings > Control Panel > Date and Time*.
5. Select the *Date & Time* tab.
6. Set the time and date.
7. Click *Apply*.
8. Select the *Time Zone* tab.
9. Select the correct time zone and daylight savings setting.
10. Click *Apply*.
11. Select the *Internet Time* tab.

12. Clear the *Automatically synchronize with an Internet Time Server* check box.
13. Click *OK*.
14. Type **net start w32time** at the command prompt and press **Enter**.
15. Close the command window.

Initialize Applications

Adobe Reader, Microsoft Word, and Microsoft Word Reports must be initialized under both **mlcllogonuser** and **mlcltechuser** logons for standalone system and only as **local mlcltechuser** for networked Acquisition system. For networked systems, more initialization will be done after the system as been added into the network.

mlcllogonuser

Adobe Reader

1. Press **Ctrl + Action + Delete**.
2. Click *Logoff*.
3. Click *Logoff*.

Allow the system to auto-log on to Windows as **mlcllogonuser**.

4. Log on to the Mac-Lab/CardioLab Custom Shell as **local mlcllogonuser** (password: **mlcl!logonuser**).
5. Select *Start > Programs > Adobe Reader 9*.
6. Click *Accept* if the *End User License Agreement* opens.
7. Close *Adobe Reader*.

Microsoft Word

1. Select *Start > Programs > Microsoft Word*.

NOTE

For Microsoft Office 2007 Professional, select *Start > Programs > Microsoft Office Word 2007*.

2. Click *Accept* if the *End User License Agreement* opens.
3. Click *OK* if the *User Initial* dialog box opens.
4. If the *Privacy Option* dialog box opens, clear the *Search Microsoft Online For Help* check box, if it appears.
5. Close *Microsoft Word*.

Microsoft Word Reports

Perform this procedure on multiple monitor systems only.

1. Double-click *Mac-Lab/CardioLab*.

2. Select *Administration > Reports > Templates*.
If prompted for an administrator password enter **mlcladmuser** (password: **mlcl!admuser**).
3. Click *Retry* if a server busy message opens. Microsoft Word will open.
4. Configure the Microsoft Word window for the review monitor:
 - a. Right-click the Microsoft Word title bar and select *Restore*.
 - b. Move the Microsoft Word window to the next monitor (from the real-time monitor to the review monitor).
 - c. Right-click the Microsoft Word title bar and select *Maximize*.
5. Close Microsoft Word.
6. Click *No* when prompted to save the report.
7. Close the Mac-Lab/CardioLab application.

mlcltechuser

Adobe Reader

1. Press **Ctrl + Action + Delete**.
2. Click *Logoff*.
3. Click *Logoff*.
4. Immediately hold down the **Shift** key.
5. Log on to Windows as **local mlcltechuser** (password: **mlcl!techuser**).
6. Log on to the Mac-Lab/CardioLab Custom Shell as **local mlcltechuser** (password: **mlcl!techuser**).
7. Select *Start > Programs > Adobe Reader 9*.
8. Click *Accept* if the *End User License Agreement* opens.
9. Close *Adobe Reader*.

Microsoft Word

1. Select *Start > Programs > Microsoft Word*.

NOTE

For Microsoft Office 2007 Professional, select *Start > Programs > Microsoft Office Word 2007*.

2. Click *Accept* if the *End User License Agreement* opens.
3. Click *OK* if the *User Initial* dialog box opens.
4. If the *Privacy Option* dialog box opens, clear the *Search Microsoft Online For Help* check box, if it appears.
5. Close *Microsoft Word*.

Microsoft Word Reports

Perform this procedure on multiple monitor systems only.

1. Double-click *Mac-Lab/CardioLab*.
2. Select *Administration > Reports > Templates*.
If prompted for an administrator password, enter **mlcladmuser** (password: **mlcl!admuser**).
3. Click *Retry* if a server busy message opens. Microsoft Word will open.
4. Configure the Microsoft Word window for the review monitor:
 - a. Right-click the Microsoft Word title bar and select *Restore*.
 - b. Move the Microsoft Office Word 2007 window to the next monitor (from the real-time monitor to the review monitor).
 - c. Right-click the Microsoft Word title bar and select *Maximize*.
5. Close Microsoft Word.
6. Click *No* when prompted to save the report.
7. Close the Mac-Lab/CardioLab application.

Additional Installation for Purchased Options

The purchased options may include:

- PedCath: the instructions to complete the install are found at the following website: <http://www.pedcath.com/manual.php>
- For the following purchased options, refer to the Mac-Lab/CardioLab/Centricity Cardiology INW Installation Manual:
 - ◆ Install the CARTO System
 - ◆ Install RMOT
 - ◆ Install EtCO₂
 - ◆ Analog Output Installation
 - ◆ INNOVA CENTRAL/Touch Screen Installation

Perform Necessary Software Updates

Apply all necessary software updates to the Acquisition system. Refer to the Mac-Lab/CardioLab 6.5.6/6.8.1 Release 3 Update (PN 2027332-533) for the instructions.

Restore Data to the Acquisition System

Restore Clab Database, Registry, and Patient Folders

1. Verify you are logged on as **local mlcltechuser** (password: **mlcl!techuser**).

2. Right-click *My Computer* and select *Explore*.
3. Using *Windows Explorer*, copy the contents of the following folders:
G:\GEMMS\Prucka\Database\Maintenance\Backup folder
to the
D:\GEMMS\Prucka\Database\Maintenance\Backup folder
4. Copy the contents of the following folders:
G:\GEMMS\Prucka\Database\Maintenance\Log folder
to the
D:\GEMMS\Prucka\Database\Maintenance\Log folder.

NOTE

If a confirmation message is displayed, click *Yes* and continue.

5. Copy the contents of the following folders:
G:\GEMMS\Prucka\Studies folder
to the
D:\GEMMS\Prucka\Studies folder.
6. Restore the clab database by executing the
D:\GEMMS\Prucka\Bin\gems_restoreclab.bat file.

A command prompt window opens.
7. Press **Enter** at the prompt. When the process is complete, a confirmation screen is displayed.
8. Press **Enter** to close the command prompt window.
9. In the *Windows Explorer* window, navigate to:
D:\GEMMS\Prucka\Database\Maintenance\Backup.
10. Double-click *gemsback.reg* to restore the registry.

A confirmation message is displayed.
11. Click *Yes*. A completion message is displayed.
12. Click *OK* and close any open windows.
13. On networked Acquisition systems only:
 - a. Navigate to **D:\GEMMS\Prucka\network**.
 - b. Double-click *stoprepl.bat*.

NOTE

Ignore any reported errors. The file will run successfully even if errors are reported.

Restore the Clink Database

Use the following steps to restore the Clink database if *clinkbackup.bak* is present in the backup folder.

1. Select *Start > Programs > Accessories > Command Prompt*.

2. Type (case sensitive):

OSQL -S -Usa -Pgemssqladmin

and press **Enter**.

3. Type:

Restore database Clink from Disk =

'D:\gemms\prucka\database\maintenance\backup\Clinkbackup.bak'

and press **Enter**.

4. Type:

Go

and press **Enter**.

Wait for the database to restore.

5. Type:

Exit

and press **Enter**.

6. Type:

Exit

and press **Enter**.

Set Default Baseline Phase

This section has to be executed only if GEMS registry key (*gemsback.reg*) was not restored in “[Restore Clab Database, Registry, and Patient Folders](#)” on page 5-29.

1. Open the Mac-Lab/CardioLab application and select the Mac-Lab Module.
2. Select *Administration > Lists > Phases*.
3. Click *Edit*.
4. If prompted for an administrator logon, use **mlcladmuser** (password **mlcl!admuser**).
5. Select *Baseline* in the Default drop-down box.
6. Close all open windows.

Install/Enable Software Options

This section has to be executed only if GEMS registry key (gemsback.reg) was not restored in “[Restore Clab Database, Registry, and Patient Folders](#)” on page 5-29.

NOTE

The software options backup that was made when the system was installed can be used in this section.

1. Double-click *Service Console* from the Desktop.
2. Browse to *Software Options Manager > Software Options*.

NOTE

If prompted for the GEMS Serial Number, enter the serial number and click *OK*. The serial number can be found on a label on the top of the computer.

3. In the *Software Options* form, click *Read License File*.
4. Insert the **Software Options CD** into the F: drive.
5. In the *Look In* dropdown box, select the F:\ drive.
6. Double-click the *Options.txt* file.
7. Ensure the correct options are enabled.
8. Click *Update and Save changes to Software options* to save the options.
9. At the *Save changes?* message, click *Yes*.

Configure the Acquisition System

Configure Network Settings on the Acquisition System

A Standalone Acquisition system is NOT a member of the hospital Domain. It is a member of the CARDIOLAN workgroup. Do not add the Acquisition system to the hospital Domain.

1. Right-click *My Computer* on the Desktop and select *Properties*.
2. Select the *Computer Name* tab, and check the computer name.
3. Record the name of the Acquisition system and the workgroup.
Computer Name: _____
Workgroup: _____
4. In *Computer Description* textbox, type an easily identifiable name for the system.
5. Click *OK* to close the *Properties* window.
6. Select *Start > Settings > Network Connections*.

7. Verify that *Local area connection* is enabled.
8. If the network connections for TRAMNet or CARTO System are required, connect the necessary network cables and verify that the corresponding items are enabled as well.
9. Right-click *Local Area Connection* and select *Properties*.
10. Select *Internet Protocol (TCP/IP)*, and click *Properties*.
11. Select the *Use the following IP Address* radio button.
12. If system is to be attached to a network, enter the following information from the “[Record Network Settings](#)” on page 5-6, or “[Obtain System Information at the Server](#)” on page 5-8, as appropriate:
 - a. Static IP address
 - b. Subnet mask
 - c. Default gateway
 - d. DNS server
13. In the *Internet Protocol (TCP/IP) Properties* window, click *OK*.
14. In the *Local Area Connection Properties* window, click *Close*.

The following steps must ALWAYS be performed regardless if the CARTO System or TRAMNet connections are being used.

15. Right-click the *TRAMNET connection* and select *Properties*.
16. Uncheck all components except *Internet Protocol (TCP/IP)*.
17. Select *Internet Protocol (TCP/IP)* and click *Properties*.
18. Click the *Advanced* button.
19. Click the *WINS* tab.
20. Uncheck *Enable LMHOSTS Lookup*.
21. In the *NetBIOS* setting, select the *Disable NetBIOS over TCP/IP* radio button.
22. Click *OK* in the *Advanced TCP/IP Settings* window.
23. Click *OK* in the *Internet Protocol (TCP/IP) Properties* window.
24. Click *Close*.
25. If the TRAMNet option is not being used, right-click the *TRAMNET connection* and select *Disable*.
26. Right-click the *CARTO System* connection and select *Properties*.
27. Uncheck all components except *Internet Protocol (TCP/IP)*.
28. Select *Internet Protocol (TCP/IP)* and click *Properties*.

29. Click the *Advanced* button.
30. Click the *WINS* tab.
31. Uncheck *Enable LMHOSTS Lookup*.
32. In the *NetBIOS* setting, select the *Disable NetBIOS over TCP/IP* radio button.
33. Click OK in the Advanced TCP/IP Settings window.
34. Click *OK* in the *Internet Protocol (TCP/IP) Properties* window.
35. Click *Close*.
36. If the CARTO System option was not purchased, right-click the *CARTO System* connection and select *Disable*.

Set Network Connection Order

The following steps must be performed on every Acquisition system:

1. In the *Network Connections* window, click the *Advanced* menu, then click the *Advanced Settings...* option.
2. In the *Advanced Settings* window, click the *Adapters and Bindings* tab.
3. In the *Connections* section of the window, select the item *Local Area Connection*.
4. Click the **up arrow** button just to the right of the *Connections* section until *Local Area Connection* is at the top of the list.
5. Click **OK**.

Verify NIC Connection Speed

1. Right-click *Local Area Connections* and select *Status*.
2. Verify with the hospital IT department that the hospital switch speed settings **exactly match** the NIC speed settings on the Mac-Lab/CardioLab system. Acceptable speeds are *100Mbps Full Duplex* or *Auto Negotiate*.
3. Click *Close*.
4. Close the *Network Connections* window.
5. Restart the Acquisition system.

NOTE

The restart is required for the previous settings to take effect.

6. At the *Mac-Lab/CardioLab Custom Shell* screen, press **Ctrl + Action + Delete**.
7. Click *Logoff*.

8. Select *Logoff...* and click *OK*.
9. Immediately hold down the **Shift** key.
10. Log on to the Windows OS as **local mlcltechuser**.
11. Log on to the Mac-Lab/CardioLab Custom Shell as **local mlcltechuser**.
12. Right-click *Local Area Connection* and select *Properties*.
13. Click *Configure*.
14. Select the *Advanced* tab.
15. Highlight the *Link Speed & Duplex* property.
16. Verify the value is set to *Auto*.
17. Click *OK*.
18. Close all open windows.

Verify Amplifier Settings

1. Verify you are logged on as local **mlcltechuser** (password: **mlcl!techuser**).
2. Double-click *Select Amplifier*.
3. Verify the Amplifier settings and click *OK*.
4. Click *Yes* if the message *You have chosen a different amplifier than what has been detected* is displayed.

Configure Database Maintenance

For networked or standalone Acquisition systems

1. Select *Start > Settings > Control Panel*.
2. Double-click *Scheduled Tasks*.
3. Double-click *Add Scheduled Task*.
4. At the *Scheduled Task Wizard* window, click *Next*.
5. Click *Browse*.
6. Browse to the file that needs to be scheduled. To schedule database maintenance on the system browse to:

*D:\GEMMS\Prucka\Database\Maintenance\GEMS_WS_DBMAIN
TJOB.bat.*
7. Click *Open*.
8. In the textbox, type **Database Maintenance** to name the job.

9. Select the radio button *Weekly* to perform this task on a weekly basis. Click *Next*.
10. Select the time and day to begin the task. Click *Next*.

NOTE

The recommended time is 10:00 pm and the day is Saturday. Acquisitions that will be networked should be scheduled to run database maintenance one-half hour apart (Lab 1: 10:00 p.m., Lab 2: 10:30 p.m., Lab 3: 11:00 p.m.). Ensure the schedule does not overlap with the following jobs:

- Archive Generator on all Acquisition systems
- Archive Utility on the server
- DB Maintenance on the server
- Backups on the server

11. Enter the **local mlcltechuser** information for the **Administrator** user name and password and click *Next*.
12. Click *Finish* to successfully schedule the Database Maintenance job. It will appear in the *Scheduled Tasks* folder.

Setup Purge on Standalone Acquisition Systems

The next steps are for standalone Acquisition systems only. Skip these steps if the system will be connected to a Centricity Cardiology INW server later in the installation, close all open windows, and proceed to “**Configure InSite ExC**” on page 5-36. Perform the following steps to update the job to purge studies on a regular basis.

The task below will purge studies only after the clab database reaches 1,350 MB.

1. Right-click *Database Maintenance* and select *Properties*.
2. The *Database Maintenance* window appears. In the *Run:* field, add **<space> purge** to the end of the existing command.
3. Click *OK*.
4. The *Set Account Information* window appears. Enter the **local mlcltechuser** information as the Administrator user name and password and select *OK* to save the modified job.
5. Close all open windows.

Configure InSite ExC

Verify the customer will be using InSite ExC as the Remote Support Service. If no Remote Service Support is needed, proceed to “**Import Report Formats**” on page 5-39.

1. Verify you are logged on to the Windows Operating System and the Mac-Lab/CardioLab Custom Shell as **mlcltechuser** (password: **mlcl!techuser**).
2. Double-click *Service Console*.
3. Expand the *InSite 2.0* folder and select the *Device Manager* folder in the left pane of the *Service Console* window.
4. Click *Generate Device Information* in the *Device Information* window.
5. Click *OK* in the *Device Manager Confirmation* window.
6. Verify the *Serial Number*, *Name*, and *Type* fields.
7. Select the *Configuration Utility* folder in the left pane under *InSite 2.0*.
8. If the hospital uses a proxy server perform the following steps, otherwise continue with step 13.
9. Click the *Proxy Configuration* tab and check *Use a Proxy Server to connect to the Enterprise*
10. Enter proxy server information.

NOTE

Contact the Hospital IT Department for the proxy address, proxy port, and authentication information.

11. Click *Update Proxy* after entering the proxy server information.
12. Click *OK* at the *InSite 2.0 Message* window.
13. Select the *Service Controller* tab in the *Configuration Utility*.
14. Click *Start Service*.
15. Verify the Service has started:
 - a. Wait 10 seconds.
 - b. Select *Check Service Status*.

A confirmation window opens indicating the service is running.
 - c. Click *OK*.
16. Select *Initiate Remote Service* and verify that it connects and a *Request submitted successfully* message is displayed.
17. Close the *Service Console*.

NOTE

Perform the following steps only if the customer requests InSite ExC access control.

18. Right-click *VNC* in the System Tray and select *Options*.

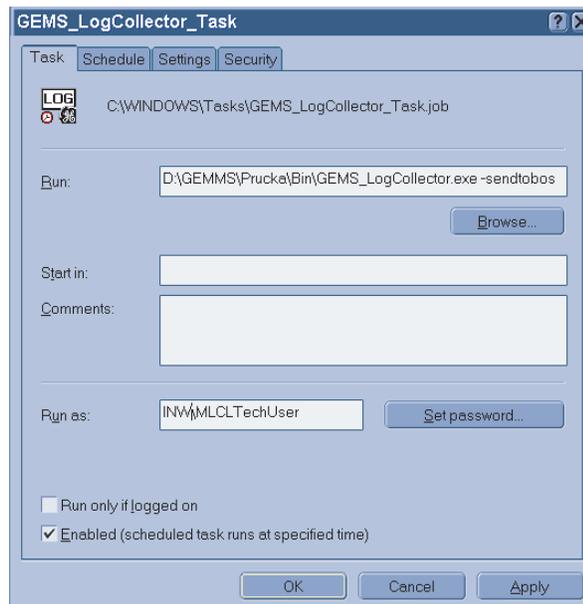
19. Select the *Authentication* tab and check *Prompt local user to accept incoming connections*.
20. Click *OK*.

GEMS Log Collector Task

GEMS Log Collector Task Creation

The following steps are needed only if you want to configure InSite ExC Log Collection on GE Acquisition and Review systems only.

1. Select *Start -> Settings -> Control Panel -> Scheduled Tasks*. The *Scheduled Tasks* page opens.
2. If the *GEMS_LogCollector_Task* entry is present, right-click it and chose *Properties*.
3. If the *GEMS_LogCollector_Task* entry is not present, add a new entry as follows:
 - Select *File > New* to add a new scheduled task.
 - Rename the task *GEMS_LogCollector_Task*.
 - Right-click the new entry and select *Properties*.
 - Browse to *D:\GEMMS\Prucka\Bin* and select the *GEMS_LogCollector.exe* program. Edit the run command line to add the **-sendtobos** option as shown in the following figure.
4. Select the *Enabled* check box.

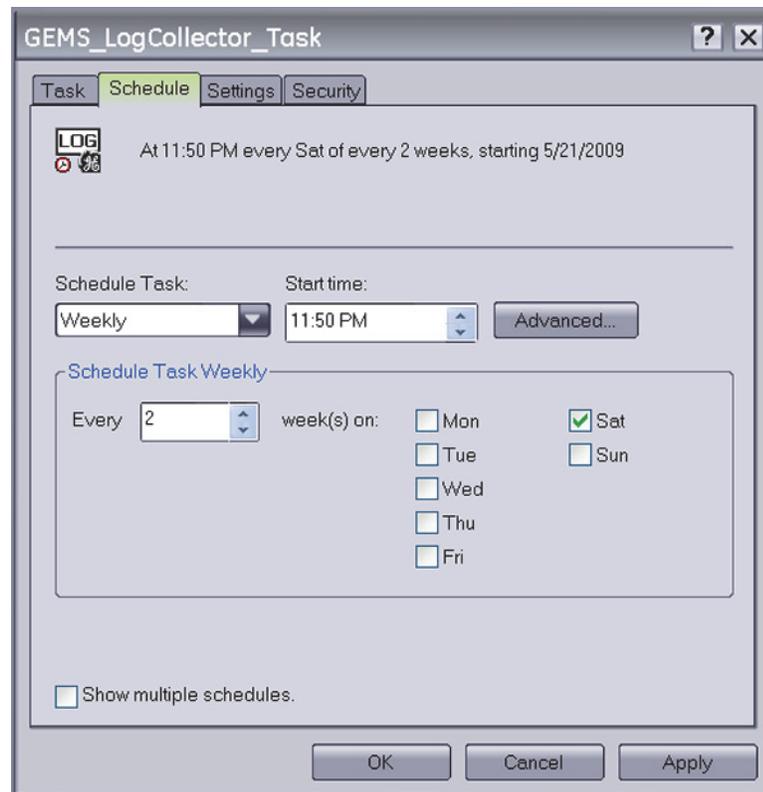


5. In the *Run as* field, enter the account information as follows:
 - For a networked system (Acquisition or Review), enter the user name as **<Domain Name>\MLCLSqlUser**.

- For a stand-alone system, enter the user name as **<Computer name>/ MLCLSqlUser**.
- Click *Set Password*. When prompted, enter the password **sql8273user** in both fields.
- Click *OK*.

GEMS Log Collector Task Schedule Configuration

Select the *Schedule* tab and configure the task to run once every two weeks as shown in the following figure.



1. In the *Schedule Task*: field, select *Weekly*.
2. In the *Start time*: field, select *11:50PM*.
3. In the *Schedule Task Weekly* section, select *Every 2 week(s) on: Sat*.

Import Report Formats

Perform these steps to import report formats on recovered network or standalone Acquisition systems. Report Formats are not replicated in the INW networked environment. Obtain the backups from one of the following sources:

- Use the backup saved to the *G:* drive.
- Check with the Lab administrator to see if a backup they made earlier is available.
- Make a copy from a Review workstation in the same lab.

- If any other backups are unavailable and for English systems only, report formats must be imported from the **CD-R MLABCLAB CLIN APP DEFAULTS V6.5.6** (PN 2049104-001).
1. Double-click *Mac-Lab/CardioLab* to open the application.
 2. Select *Utilities > Import Report Formats* in the *Navigator* window.
 3. At the *Report Wizard* window, click *Next*.
 4. Click *Change Folder*.
 5. Select the drive G (or the appropriate folder location).
 6. Navigate to the *Report_Backup* folder (or other location).
 7. Click *OK*.
 8. Select *No* when asked whether to merge with existing data.
 9. Click *OK* at success message.
 10. Close the application.

Configure Central List Management

If the system was configured in CVIS mode, perform this procedure only on standalone Acquisition systems (Options can be used to find out if the system was configured in CVIS mode).

1. At the Acquisition system, double-click *Service Console* on the Desktop.
2. Navigate to *GEMS Central List Management > Central List Setup*
3. In the *CVIS Server Export Directory* click the... button to browse.
4. Browse to the path on the CVIS server.

NOTE

This may be a mapped drive or the UNC name (for example, \\DMSexp001>ListSharing).

5. In the *Location* dropdown box, select the appropriate location for the hospital.
6. Click *Update Lists*.
7. Close the *Service Console* window.

Configure the Acquisition System on the INW Network

If the Acquisition system is part of an INW network, use these procedures to configure the system. If configuring Standalone Acquisition systems, go to “[Initialize Applications](#)” on page 5-48.

Add the System to the Domain

1. Verify that you are logged on to the Windows OS and the Mac-Lab/CardioLab Custom Shell as **local mlcltechuser**.
2. Right-click *My Computer* on the Desktop and select *Properties*.
3. Select the *Computer Name* tab.
4. Click the *Change* button.
5. In the *Member of* section, select the *Domain* radio button, enter the name of the INW Domain to join and click *OK*.

NOTE

The default Domain is *inw.local*.

6. When prompted, type the username **mlcltechuser** and password.
7. At the *Welcome to inw* message, click *OK*.
8. At the restart message click *OK*.
9. At the *System Properties* window, click *OK*.
10. At the *Do you want to restart now?* message click *Yes*.
11. After the system restarts, at the Mac-Lab/CardioLab Custom Shell window, press **Ctrl + Action + Del** and click *Logoff*.
12. Click *Logoff* and immediately hold the **Shift** key to stop the auto-logon sequence.
13. Logon to Windows and the Mac-Lab/CardioLab Custom Shell as the **local mlcltechuser**.

Synchronize Time

1. Select *Start > Programs > Accessories > Command Prompt*.
2. Type **net time /set** and press **Enter**.
3. When asked to sync with the server, type **y** and press **Enter**.

NOTE

This step may take up to 2 minutes to complete.

4. Close the *Command Prompt* window.

Add Acquisition System to GE MLCL Organizational Unit

1. Log on to the server as the INW **domain Administrator** (contact GE Technical Support or the system administrator for current password information).
2. Select *Start > Settings > Control Panel*.
3. Double-click *Administrative tools*.

4. Double-click *Active Directory Users and Computers*.
5. Expand *inw.local* (this is an example, the actual domain name may be different).
6. Click the *Computers* folder and locate the Acquisition system to add.
7. Expand the *GE Medical Systems (MLCL)* organizational unit.
8. Expand the *MLCL Computers*.
9. Expand the *MLCL Workstations*.
10. Drag and drop the computer name from the *Computers* folder to the *MLCL Acquisition workstations*.
11. Close all open windows.
12. Restart the Acquisition system added to the organizational unit in the previous step.
13. After restart, press **Ctrl + Action + Delete**, logoff as **mlcllogonuser**.
14. Click *Logoff*.
15. Immediately hold down the **Shift** key.
16. Log on to the Windows OS and the Mac-Lab/CardioLab Custom Shell locally as **mlcltechuser**.

Confirm Domain Security Policy

Verify Security Policy

To verify the security policy at the Acquisition system:

1. Right-click *My Computer* on the Desktop and select *Manage*.
2. Select *System Tools > Local Users and Groups > Groups*.
3. Right-click *Administrators* and select *Properties*.
4. Verify that the following members are shown in the list:
 - [domain name]\Domain Admins
 - [domain name]\mlcltechuser
 - [domain name]\mlclsqluser

NOTE

The default domain name is *inw.local*.

NOTE

If the members are not shown, follow the troubleshooting steps below.

Troubleshooting

1. Verify that the Acquisition system is in the correct Domain:
 - a. Right-click *My Computer* on the Desktop and select *Properties*.
 - b. Verify that on the *Computer Name* tab the INW Domain is present.
2. Verify that the Acquisition system shows up in the *GE Medical Systems (MLCL)* Organizational Unit on the server.
3. On the server, open a command prompt window and type **gpupdate /force** and press **Enter**.
4. Restart the Acquisition systems, wait approximately 7 minutes and check the policy again as described in “**Verify Security Policy**” on page 5-42. If the policy is still not correct proceed to the next step.
5. Verify that the TCP/IP properties on the server are set correctly
 - a. The Centricity Cardiology INW server IP must be configured as the preferred DNS server.
 - b. The subnet mask must be correct as defined by the hospital IT staff.
6. Verify that the TCP/IP properties on the Acquisition are set correctly
 - a. The IP subnet mask of the Acquisition system **MUST** match exactly the subnet mask of the server.
 - b. The IP address of the Acquisition system must be manually configured and must fall within the subnet of the server as defined by the subnet mask.
 - c. The gateway of the Acquisition system must be set to the IP address of the server or another machine on the hospital network.
 - d. The DNS of the Acquisition system must be set to the IP address of the Centricity Cardiology INW server.
 - e. In the CARTO System and TRAMNet IP settings, make sure that the *Internet Protocol (TCP/IP)* checkbox is the **ONLY** item selected in the *This connection uses the following items:* list.
7. Verify that the server and Acquisition system can communicate.
8. Open a command window on the Acquisition system and type **ping <servername>** and press **Enter**.
 - a. A *Request timed out* message indicates failure, a *Reply from* message indicates success.

NOTE

If successful, verify that the reply from IP address shown matches the server's IP address and if correct skip the reset of the sub-steps below

- b. If step a failed, repeat with the servername replaced with the correct IP address of the server **ping** <###.###.###.###> and press **Enter**.
 - c. If step a and step b both failed, there is a problem with the IP address or the physical network. Repeat the above steps to verify the TCP/IP properties of the server and Acquisition system.
 - d. If step a fails and step b succeeds, there is a problem with DNS setup. Repeat the TCP/IP properties steps above paying careful attention to the DNS setup.
9. Verify that the time and time zone settings on the server and the Acquisition system match.
 - a. If they do not match, open a command prompt on the Acquisition system and type **net time /set** and press **Enter**.
 - b. Restart the Acquisition system, wait 7 minutes and check the policy again in “**Verify Security Policy**” on page 5-42. If the policy is still not correct proceed to the next step.
 10. If the policy is still not correct after all above steps:
 - a. Remove the Acquisition system from the Domain and add it back to the *CARDIOLAN* workgroup.
 - b. Restart the Acquisition system.
 - c. Delete the Acquisition system name for the OU on the server.
 - d. Repeat the instructions for adding the Acquisition system to the Domain.

Register the Acquisition System and Update Acquisition Database on the Server

Use this procedure to register the recovered Acquisition system and update the Acquisition database at the server.

1. At the server go to *Start > Programs > Microsoft SQL Server > Enterprise Manager*.
2. Open *Microsoft SQL Servers* and right-click *SQL Server Group*.
3. Select *New SQL Server Registration*.
4. Click *Next*.
5. Select the Acquisition system name and click *Add*.
6. Click *Next*.
7. Select *SQL Server Authentication*.
8. Click *Next*.
9. Type **sa** as the account name and enter the password (contact GE Technical Support or the system administrator for current password information).

10. Follow onscreen confirmation messages. When complete the Acquisition system is displayed in the machine list in the left pane.
 11. Expand *SQL Server Group*.
 12. Open [*Acquisition computer name*] > *Databases* > *Clab* > *Tables*.
 13. Right-click *Detail Version* and select *Open Table* > *Return All Rows*.
 14. Set the following fields:
 - *NetVersion* = **0**
 - *MachineDBVersion* = **00**
- NOTE**
MachineDBVersion must be **00** (two zeros) or the restore will fail.
15. Close the *Table* window.
 16. Close *Enterprise Manager*.

Add Acquisition System to Replication on the INW Server

Perform the rest of these steps only if you are adding the Acquisition to the INW network.

1. Logon to the Windows OS and Mac-Lab/CardioLab Custom Shell as **domain mlcltechuser**.
2. Double-click *Service Console* on the Desktop.
3. Navigate to *Console Root* > *Create Replica* > *Replication Setup* in the left hand frame.
4. The right frame should show the *Replication utility* with the top *Service User Login* section active.
5. In the password box enter the password and click *Login*.
6. The top *Login* section should now be inactive and the bottom section will be active with a *password validated* message.
7. Click *Add*.
8. Browse to *My Network Places* > *Entire Network* > *Microsoft Windows Network* > <*current domain*> and select an Acquisition system and click *OK*.
9. When prompted for consolidation, click *Yes* to move all studies on the currently selected Acquisition system up to the server.
10. The selected machine should now appear in the *Add to replication* list box.
11. Click *Apply*.
12. Click *Yes* to confirm replication.

13. Wait while the progress bar and text indicate the operations performed.

NOTE

This may take 5 minutes to complete.

14. When complete, a *Replication setup complete* message will be displayed above the progress bar and the server and all Acquisition systems will appear in the *Currently replicating* list.
15. Close out of the *Service Console* window.

Verify Replication Started Correctly

Verify

1. Select *Start > Programs > Microsoft SQL Server > Enterprise Manager*.
2. Open *Microsoft SQL Servers > SQL Server Group*.
3. Highlight the server name.
4. Expand *Replication Monitor > Agents > Merge Agents*.
5. Verify that there are no red X's displayed against any system's Merge agent.
6. If there are no errors in the replication monitor, continue with "[Configure Archive Generator](#)" on page 5-47.
7. If there are red X's displayed against all merge agents, verify that SQLSERVERAGENT service is running on the server. If the SQLSERVERAGENT service is not running on the server, start the service and restart replication setup (refer to "[Stop Replication](#)" on page 5-46).

Stop Replication

To stop replication, launch the replication setup:

1. At the server, open the *Service Console* and select *Create Replica > Replication Setup*.
2. Log on to the Service Console as **mlclsquser** (password **sql8273user**).
3. If necessary, highlight all acquisition systems (for example, CLWS0001) in the list of currently replicating systems. Click the *Remove*. Click *Yes* at the confirmation window.
4. Refresh the window (click another folder in the tree and then click *Replication Setup* again) to verify all acquisition systems have been taken out of replication.
5. Close the *Service Console*.

6. Go to the *Enterprise Manager* and stop server replication:
 - a. Select *Start > Programs > Microsoft SQL Server > Enterprise Manager*.
 - b. Expand *Microsoft SQL Servers* and the *SQL Server Group*. Highlight the *INW Server* (in the left window).
 - c. Select *Tools > Replication > Disable Publishing*.
 - d. Click *Next*.
 - e. Select *Yes, disable publishing on [Server name]* and click *Next*.
 - f. Click *Next* in the *Confirm Dropping of Publications* window.
 - g. Click *Finish* in the *Completing the Disable Publishing and Distribution Wizard* window.
 - h. Click *OK* to the *Successfully Disabled* window.
 - i. Right-click the server name and select *Refresh*.
 - j. Verify the *Replication Monitor* is not visible.
 - k. Close the *SQL Server Enterprise Manager* window. Proceed to “[Add Acquisition System to Replication on the INW Server](#)” on page 5-45.

Configure Archive Generator

Perform the following steps to configure the archiving of studies to the Centricity Cardiology INW server.

CAUTION

ARCHIVE GENERATOR FAILURE — If the time for the archive generator process is set at the same time on more than one Acquisition system, the studies will not be moved properly because different systems will be attempting to move studies simultaneously.

NOTE

If the archive generator process is started while a study is in progress, that specific study will not be archived to the server until the next archive generator process is run.

1. On the server, select *Start > Programs > Microsoft SQL Server > Enterprise Manager*.
2. Expand the *SQL Server group*, click to expand the *Acquisition system* that is scheduling the archive generator task.
3. Expand the *Management* folder.
4. Expand the *SQL Server Agent*.
5. Click *Jobs*.

6. Right-click *Run Archive Generator*.
7. Choose *Properties*.
8. Select the *Schedule* tab.
9. Click *Edit*.
10. Click *Change*.
11. In the *Edit Recurring Job Schedule* window, enter the following information:
 - a. In the *Occurs:* section, select the *Daily* radio button.
 - b. In the *Daily:* section, type **1**.
 - c. In the *Daily Frequency:* section, enter a time.

NOTE

The time must be set to at least 5 to 10 minutes after the hour (for example, 1:05 am, 1:35 am). Ensure the job schedule does not overlap other scheduled jobs. Do not schedule any jobs at 12:05 am as other system jobs are scheduled at this time.

12. Click *OK*.
13. At the *Run Archive Generator Properties* window, click *OK*.

Initialize Applications

Adobe Reader, Microsoft Word, and Microsoft Word Reports must be initialized under both **mlcllogonuser** and **mlcltechuser** logons.

Adobe Reader

1. Press **Ctrl + Action + Delete**.
2. Click *Logoff*.
3. Click *Logoff*.

Allow the system to auto-log on to the Windows Operating System as **mlcllogonuser**.

4. Log on to the Mac-Lab/CardioLab Custom Shell as **domain mlcllogonuser** (password: **mlcl!logonuser**).
5. Select *Start > Programs > Adobe Reader 9*.
6. Accept the *End User License Agreement* if displayed.

After *Adobe Reader* opens, wait one minute to ensure a *Check for Update* dialog box is not displayed. If the dialog box is displayed, click *Cancel*.

7. Close *Adobe Reader*.

Microsoft Word

1. Select *Start > Programs > Microsoft Word*.

NOTE

For Microsoft Office 2007 Professional, select *Start > Programs > Microsoft Office Word 2007*.

2. Accept the *End User License Agreement* if displayed.
3. Click *OK* if the *User Initial* dialog box is displayed.
4. If the *Privacy Option* dialog box is displayed, uncheck *Search Microsoft Online for Help*, if it appears.
5. Close *Microsoft Word*.

Microsoft Word Reports

Perform this procedure on multiple monitor systems only.

1. Double-click *Mac-Lab CardioLab*.
2. Select *Administration > Reports > Templates*.

If prompted for an administrator password enter **mlcladmuser** (password: **mlcl!admuser**).

3. Click *Retry* if a server busy message is displayed. Microsoft Word will open.
4. Configure the Microsoft Word window for the review monitor:
 - a. Right-click the Microsoft Word title bar and select *Restore*.
 - b. Move the Microsoft Word window to the next monitor (from the real-time monitor to the review monitor).
 - c. Right-click the Microsoft Word title bar and select *Maximize*.
5. Close Microsoft Word.
6. When prompted to save the report, click *No*.
7. Close the Mac-Lab/CardioLab application.

Adobe Reader

1. Press **Ctrl + Action + Delete**.
2. Click *Logoff*.
3. Click *Logoff*.
4. Immediately hold down the **Shift** key.
5. Log on to the Windows Operating System as **domain mlcltechuser** (password: **mlcl!techuser**).

6. Log on to the Mac-Lab/CardioLab Custom Shell as **domain mlcltechuser** (password: **mlcl!techuser**).
7. Select *Start > Programs > Adobe Reader 9*.
8. Accept the *End User License Agreement* if displayed.

After *Adobe Reader* opens, wait one minute to ensure a *Check for Update* dialog box is not displayed. If the dialog box is displayed, click *Cancel*.

9. Close *Adobe Reader*.

Microsoft Word

1. Select *Start > Programs > Microsoft Word*.

NOTE

For Microsoft Office 2007 Professional, select *Start > Programs > Microsoft Office Word 2007*.

2. Accept the *End User License Agreement* if displayed.
3. Click *OK* if the *User Initial* dialog box is displayed.
4. Close *Microsoft Word*.

Microsoft Word Reports

Perform this procedure on multiple monitor systems only.

1. Double-click *Mac-Lab CardioLab*.
2. Select *Administration > Reports > Templates*.

If prompted for an administrator password enter **domain mlcladmuser** (password: **mlcl!admuser**).

3. Click *Retry* if a server busy message is displayed. Microsoft Word will open.
4. Configure the Microsoft Word window for the review monitor:
 - a. Right-click the Microsoft Word title bar and select *Restore*.
 - b. Move the Microsoft Word window to the next monitor (from the real-time monitor to the review monitor).
 - c. Right-click the Microsoft Word title bar and select *Maximize*.
5. Close Microsoft Word.
6. When prompted to save the report, click *No*.
7. Close the Mac-Lab/CardioLab application.

Confirm File Paths and Network Storage Settings

Perform this procedure for network and standalone Acquisitions. For standalone systems do not enable network storage.

1. Log on to the Windows OS and the Mac-Lab/CardioLab Custom Shell as INW **domain mlcltechuser**.
2. Double-click *Mac-Lab/CardioLab* on the Desktop to start the Mac-Lab/CardioLab application.
3. Select *Administration > System Settings*.
4. Browse to the *File Paths* section.
5. Set the *Local Storage Optical Study Path*.
6. Check the *Enable Acquisition* checkbox, if unchecked.
7. Check the *Enable Network Storage* checkbox.
8. Click *Browse*.
9. If not already configured, browse to the Centricity Cardiology INW server and select the *PruckaStudies* share as the network storage path.
10. Click *OK*.
11. Select the *Audit Log* section.
12. Move all items in the list to the right *Events selected for audit* by clicking the >> button.
13. Close the application.

Additional Installation for Purchased Options

The purchased options may include:

- PedCath: The instructions to complete the installation are found at the following website: <http://www.pedcath.com/manual.php>
- Refer to the Installation manual for the following:
 - ◆ Install the CARTO System.
 - ◆ Install RMOT.
 - ◆ Install EtCO₂.
 - ◆ Analog Output Installation.
 - ◆ INNOVA CENTRAL/Touch Screen Installation.

Reconfigure Printer

If the printer information was recorded, refer to the list of printers recorded in “[Record Mapped Drives and Printer](#)” on page 5-7. Also refer to the setup instructions included with the printer to install the appropriate printer driver.

Reconfigure Mapped Drives

If any mapped drives were recorded in “[Record Mapped Drives and Printer](#)” on page 5-7, perform this procedure.

1. Log off the system and allow the auto-logon run and log on to the Mac-Lab/CardioLab Custom Shell as a local user.
2. Verify any mapped drives still exist.
If they do not, perform the steps in this procedure.
3. Right-click *My Computer* on the Desktop and select *Map Network Drive*.
4. In the *Drive* section, select the drive letter.
5. In the *Folder* section, enter the path.
6. Click *Finish*.
7. Close all open windows.
8. Log off the system and allow the auto-logon run.

Configure Data Export

Refer to the appropriate subsection below to reconfigure Data Export of either a standalone Acquisition system or a networked Acquisition system.

Create Active Translation on Standalone Acquisition Workstation

If the Acquisition system was a standalone system and connected to the CVIS server, the following must be reconfigured (refer to the appropriate CVIS installation/configuration documentation for specific information/procedures):

- Re-establish CVIS connectivity.
- Reconfigure shares. Ensure the share permissions are correct. On the CVIS server the following must be reconfigured with proper permissions:
 - ◆ List Sharing share
 - ◆ Export share

Perform the following steps on the standalone Mac-Lab/CardioLab systems.

1. Map a drive to the English (and US Canada) CVIS Full Interface or English (and US Canada) CVIS Express server Import Share, which was configured in the interfaces console.
2. Right-click *My Computer* and select *Explore*.
3. Click *Tools*.
4. Click *Map Network Drive > Browse*.
5. In the Network, locate the English (and US Canada) CVIS server.
6. Double-click the English (and US Canada) CVIS server name (you may enter the unc path to the share as well, that is, \\dmsint001\import or \\dmsexp001\import).
7. Highlight the import directory.
8. Click *OK*.
9. Select drive letter *S* from the drive letter drop-down list.
10. Verify that the *Reconnect at Login* checkbox is checked.
11. Select *Connect using a different user name*.
12. In the *Connect As . . .* window, enter the user: [**DMS Server Name** (for example, **DMSINT001** or **DMSEXP001**)]\mlcllogonuser in the *User Name* field and the password in the *Password* field.
13. Click *OK*.
14. Click *Finish*.
15. Close any mapped drive windows that may automatically open.
16. Navigate to *D:\GEMS\Prucka\Bin* in *Windows Explorer*.
17. Double-click *DataExportConfig.exe*.
18. Click the *Active Translations* tab.
19. Select *HL7 Cath*.
20. Browse to the drive letter for the mapped drive created above followed by:\ (that is, *S:*).
21. Select the following check boxes: *Study Reports (R)*, *Images (I)* and *Snapshots (S)*.
22. Click *Add translation*.
23. Click *Done*.

Create Active Translation on Networked Acquisition System

NOTE

Perform the following steps on each of the networked Mac-Lab/ CardioLab Acquisition systems.

1. Open *Windows Explorer*.
2. Navigate to *D:\GEMMS\Prucka\Bin*.
3. Double-click *DataExportConfig.exe*.
4. Click the *Active Translations* tab.
5. Verify that any previously configured translations are still present.
6. Click *Done*.

Reload CVIS Client

If a CVIS client needs to be reloaded onto the computer, refer to the appropriate CVIS Installation manual for installation steps.

Update Operator Manuals

This script has to be executed for updating the Mac-Lab, CardioLab or Centricity Cardiology INW Operator's manual. To apply these changes, use the **DVD ML/CL APPLICATION INSTALL 6.5.6** (PN 2049051-001).

1. Log on as a **local mlcltechuser** to Windows as well the Custom Shell.
Ensure all programs are closed.
2. Insert the **DVD ML/CL APPLICATION INSTALL 6.5.6** (PN 2049051-001) into the DVD-ROM drive.
3. Browse to the DVD drive and double-click *UserManualUpdate.wsf*.
4. A message box will open stating, *System will now update the user manuals*.
Click *Yes* to install, *No* to quit.
5. Click *Yes* at the message box.
6. On completion of the update, a message box stating *User manuals updated* will open.
7. Click *OK*.

Review System Disaster Recovery

The decision to perform a Review system recovery should only be made after consultation with GE Technical Support by the on-site Field Engineer. The high-level steps for a complete 6.5.6 Review system recovery are listed below. Detailed instructions for each step follow.

High-Level Overview

Recovery Scenario

Perform the following steps on review that needs to be reimaged.

Step 1: Save Review System Information. Backed up data from the second hard drive (drive G:) is used later on to restore the system.

Step 2: Take the Review systems out of GE MLCL OU. Go to [“Obtain System Information at the Server”](#) on page 5-60.

Step 3: Configure New Hardware. Go to [“Configure New Hardware”](#) on page 5-61 if the existing Review system is being replaced with a new Review system.

Step 4: Reimage the Review System. Go to [“Restore System Software”](#) on page 5-63.

Step 5: Perform all the procedures in [“Configure the Review System”](#) on page 5-63.

Step 6: Perform all the procedures in [“Configure the Review System on the INW Network”](#) on page 5-75.

Log On to the Review System

When starting up a Review system, an auto-logout sequence starts and you are automatically logged on to Windows XP. You must stop the auto-logout so you can log on to Windows XP as **mlcltechuser**.

1. Power on the Review system.

The system boots up to the *Mac-Lab/CardioLab Custom Shell* screen.

2. Press **Ctrl + Action + Delete**.
3. Click *Logoff* and select *Logoff*.
4. Immediately hold down the **Shift** key.
5. Log on to the Windows OS as **local mlcltechuser** (contact GE Technical Support or the system administrator for current password information).

To log on locally, select the computer name in the *Domain* field.

6. Log on to the Mac-Lab/CardioLab Custom Shell as **local mlcltechuser** (contact GE Technical Support or the system administrator for current password information).

Save Review System Information

If the system will not boot up or drives C: or D: are unavailable go to [“Obtain System Information at the Server”](#) on page 5-8.

If the system boots up and the C: and D: drives are available, use the following procedures to back up system information.

Export Custom Data

Use this procedure to save custom data to the G: (backup) drive.

If the system is being completely replaced, save the custom data to removable media to be moved to the replacement system after recovery. It is recommended to use a USB Flash Drive.

Export Custom Report Formats

1. In the Navigator window, select *Utilities > Export Report Formats*.
The *Data Export* wizard is displayed.
2. Select the *G:* drive and click *New Folder*.
3. Enter **Report_Backup** for the folder name and click *Ok*.
4. Click *OK* when the *Success* message is displayed.
5. Close the application.

Back Up System Information Manually

Record CVIS Information

On the Desktop, verify whether or not the *Centricity Cardiology DMS* shortcut is installed.

Record Anti-Virus Information

Record whether or not there is anti-virus software installed on the system.

Back up Third-Party Software

A manual backup must be created for Third Party software:

1. Check for the PedCath database:
 - a. Open the *PedCath* application and select *File > Show Data Folder Path* from the main menu.

If the data folder path is on the local C: or D: drive, then perform the next steps:
 - b. Right-click *My Computer* and select *Explore*.
 - c. Navigate to the PedCath database folder location.
 - d. Drag and drop the PedCath Data folder into the G: drive.
2. Check for the ACCAccess database:
 - a. Right-click *My Computer* and select *Search*.
 - b. Search the C: and D: drives for the file *acc.mdb*.
 - c. If the ACCAccess database is found, drag and drop the file into the G: drive.
3. Backup any other third-party software to the G: drive.

NOTE

This disaster recovery procedure will only save Mac-Lab/ CardioLab files. Any other files must be backed up manually to the G: drive and restored later.

Back Up Software Options

1. Double-click *Service Console* on the *Desktop*.
2. Navigate to *Software Options Manager > Software Options*.
3. Click *Create Backup*.
4. In the *Save In* drop-down box navigate to *G:* drive.
5. In the *File Name* field, type **Software_Options** and click *Save*.
6. Close the *Service Console*.

Back Up Desktop Files

1. Right-click *My Computer* on the *Desktop* and select *Explore*.
2. Navigate to *G:* drive and click the *New Folder* button.
3. Enter the folder name as *Desktop_Items*.
4. Copy any customer created documents or folders from the desktop to the *Desktop_Items* folder.
5. Repeat this procedure logged in as any other applicable user (**local mlcllogonuser**, **INW mlcllogonuser**, and **INW mlcltechuser**).

Record Data Export Settings

You only need to verify that the HL7 translation was configured per the normal instruction.

1. Right-click *My Computer* and select *Explore*.
2. Navigate to *D:\GEMMS\Prucka\Bin*.
3. Double-click *DataExportConfig.exe*.
4. Record only the information listed for the four tabs: *CardioLab Files*, *Audit Logs* (track errors only or track all activity), *Active Translations* and *HL7*.

Record Network Settings

1. Verify that you are logged in to both the Windows OS and the Custom Shell as **local mlcltechuser**.
2. From the *Desktop*, right-click *My Computer*.
3. Choose *Properties*.
4. Click the *Computer Name* tab.
5. Record the computer name in the table below.
6. Record the *Domain/Workgroup* information and click *Ok*.
7. From the *Desktop*, right-click *My Network Places*.

8. Choose *Properties*.
9. Right-click *Local Area Connection*.
10. Choose *Properties*.
11. Highlight the *Internet Protocol (TCP/IP)* and click *Properties*.
12. Record the *IP Address*, *Subnet Mask*, *Default Gateway*, *WINS* (if used) and *DNS Server* information.

Network Settings	
Computer name	
Domain\Workgroup	
IP Address	_____ - _____ - _____ - _____
Subnet Mask	_____ - _____ - _____ - _____
Default Gateway	_____ - _____ - _____ - _____
WINS (if used)	
DNS Server	_____ - _____ - _____ - _____ _____ - _____ - _____ - _____ _____ - _____ - _____ - _____

Record Mapped Drives and Printer

1. Press **Ctrl + Action + Delete**.
2. Click *Logoff* and select *Logoff*.
3. Allow the system to auto-logon to Windows.
4. Log on to the Mac-Lab/CardioLab Custom Shell as a local user.
5. Double-click *My Computer*.
6. Go to *Network Drives*. All mapped drives will be listed.
7. Record all mapped drives.
 - Drive letter
 - Share name
 - Hostname of the computer that owns the share
8. Record the configured printers.

Gather Information from INW Server

You must log on to the server as the INW **domain Administrator** to perform this procedure (contact GE Technical Support or the system administrator for current password information).

Obtain System Information at the Server

Use this procedure to obtain network settings only if the Review system will not boot or the C: or D: drives are unavailable.

Go to another Acquisition or Review system on the network within the same subnet, and use the procedure **“Record Network Settings”** on page 5-6 to obtain and record DNS, Default Gateway, and Subnet information.

Network Settings	
Subnet Mask	_____ - _____ - _____ - _____
Default Gateway	_____ - _____ - _____ - _____
WINS (if used)	
DNS Server	_____ - _____ - _____ - _____
	_____ - _____ - _____ - _____
	_____ - _____ - _____ - _____

NOTE

A system on the network within the same subnet will have the same network information as the system being recovered.

Remove the Review System from the GE MLCL Organizational Unit

1. At the server Desktop, go to *Start > Control Panel*.
2. Double-click *Administrative tools*.
3. Double-click *Active Directory Users and Computers*.
4. Expand the domain name (default is *inw.local*).
5. Expand the *GE Medical Systems (MLCL)* organizational unit.
6. Expand the *MLCL Computers*.
7. Expand the *MLCL Workstations*.
8. Expand the *MLCL Review Workstations*.
9. Record the name of the review system which is being restored.
10. Delete the Review system name from the *MLCL Review Workstations* folder.

11. Click *Yes* to confirm.
12. Close all open windows.

Configure New Hardware

Inspect Computer

NOTE

If the mobile cart (PN 2008203-001) option was ordered, the cart must be assembled first and then the computer configured on the cart.

1. Open the case.
2. Remove and reseat all boards in the computer. Boards can shift during shipping.
3. Check all ribbon cable and power connections.
4. Close the case.

Connections

1. Connect the keyboard to the keyboard PS/2 connection on the computer.

CAUTION

EQUIPMENT DAMAGE — Do not plug the keyboard to the keyboard PS/2 connection in with the computer turned on. If it is connected, when the computer is turned on, the cable must be replaced.

2. Connect the USB mouse to the top right USB port.
3. Connect the barcode scanner to an available USB port.
4. Connect the network cable to the computer.
5. Attach power cord to the computer if the isolation transformer is used:
 - a. Plug the power cable from the computer into the isolation transformer.
 - b. Plug the power cable from the monitor into the isolation transformer.
 - c. Plug the isolation transformer into the wall outlet.
6. Connect the video cable from the monitor to the computer.

Connect Solar or DASH Monitors

This section only applies if installing an optional Solar Monitor or an optional DASH Monitor.

CAUTION

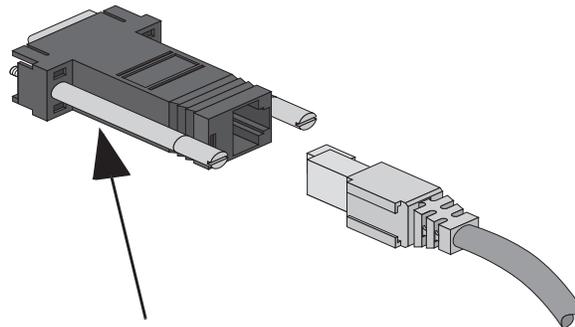
AVOID PERFORMANCE DEGRADATION — The Solar and DASH monitors must only be connected to Review workstations. Do not connect a Solar or DASH monitor to an Acquisition workstation.

Connect Solar System

1. Connect one end of the cable (PN 2003408-001) to the 9-pin COM port on the back of the HP computer.
2. Connect the other end of the cable to the 9-pin RS-232 port on the back of the Solar monitor.

Connect DASH System

1. Connect the interface adapter (PN 420915-013) to the 9-pin COM port on the back of the HP computer.



Interface Adapter

2. Connect one end of the CAT5 cable (PN 418335-002) to the interface adapter.
3. Connect the other end of the CAT5 cable to the AUX port on the back of the DASH Monitor.

Configure the Review System

Restore System Software

Reimage the Review System

CAUTION

SHOCK HAZARD — Use appropriate Lock Out/Tag Out procedures before performing any service on potentially energized equipment.

CAUTION

EQUIPMENT DAMAGE — Electrostatic discharge (ESD) can damage electronic components. Be sure you are properly grounded before opening any equipment.

CAUTION

LOSS OF DATA — If drive G:, the second hard drive, is physically connected during reimaging, all data contained on it will be lost.

You must physically disconnect the second hard drive before reimaging.

NOTE

The GE Client Review computer (DCGCW) must be reimaged because it will have 6.8.1 software installed.

For the reimaging process you'll need the following media depending on system type (HP xw8000, HP xw8200, HP xw8400 and DCGCW).

- DVD ML/CL APPLICATION INSTALL 6.5.6: 2049051-001
- DVD MLAB/CLAB HPXW8000 IMG DVD v6.5.6: 2049072-001
- DVD MLAB/CLAB HPXW8000 IMG DVD v6.5.6 #2: 2049072-002
- DVD MLAB/CLAB HPXW8200 IMG DVD v6.5.6: 2049074-001
- DVD MLAB/CLAB HPXW8200 IMG DVD v6.5.6 #2: 2049074-002
- DVD MLAB/CLAB HPXW8400 IMG DVD v6.5.6: 2049076-001
- DVD MLAB/CLAB HPXW8400 IMG DVD v6.5.6 #2: 2049076-002
- DVD MLAB/CLAB DCGCW IMG DVD V6.5.6: 2049068-001
- DVD MLAB/CLAB DCGCW IMG DVD V6.5.6 #2: 2049068-002

1. Shut down the system, if necessary.
2. Open the computer case and disconnect the second hard drive (drive G:) before reimaging.

The second hard drive is physically located at the bottom of the disk bay.

3. Restart the system.

NOTE

Press **F1 (Help)** at the *Intel Boot Agent* screen, if displayed.

4. Log on to the Windows OS and the Mac-Lab/CardioLab Custom Shell locally as **mlcltechuser**.

NOTE

If the *Systems Settings Change* window is displayed, click *Yes* to restart. Log on again as **mlcltechuser**. At this point of the setup, you may see a *Windows New Hardware Found* wizard dialog. Please ignore this dialog. This window will be closed by Windows during the system shutdown.

5. Right-click *My Computer*, select *Explore* and verify the *G:* drive is no longer available.
6. Insert the appropriate Image DVD.
7. Shut down the system and replace the faulty hard drive.

NOTE

For the HP8000 only: Ensure the jumpers are set to cable select.

8. Restart the system.
9. Select *Erase System Data* and press **Enter** to begin reimaging.

The *Symantec Ghost* screen is displayed monitoring the progress of the image process. If necessary, insert the remaining image DVDs as prompted. When the installation is complete, the computer will automatically restart. Remove the DVD.

NOTE

During the setup process a blank Windows DOS-Prompt window is displayed. Do not close this window as setup is being performed.

10. Shut down the system.
11. Reconnect the second hard disk.
12. Restart the system.

NOTE

Press **F1 (Help)** at the *Intel Boot Agent* screen, if displayed.

13. Log on to the Windows OS and the Mac-Lab/CardioLab Custom Shell locally as **mlcltechuser**.

14. If any devices were not automatically installed during re-imaging, a *New Hardware Found* message may be displayed at restart. If this happens, use the following procedure for each wizard:

- Select *Install the software automatically* and click *Next*.

- If a choice of drivers is presented, pick the default selection and click *Next*.
- If prompted about Windows Logo testing or driver signing, click *Continue anyway*.
- If prompted by Matrox Powerdesk Installation about enabling independent mode for Matrox graphics hardware, click *Yes*.
- Click *Finish* when the installation is complete.
- Restart the computer if prompted and log on again as **local mlcltechuser**.

Verify Drive Order

1. Right-click *My Computer* and select *Manage*.
 2. Select *Storage > Disk Management* in the left pane.
 3. In the right pane, verify each drive is assigned the correct drive letter.
 - C: Primary Hard Drive
 - D: Data Hard Drive
 - F: DVD-RAM Drive
 - G: Second Hard Drive
- NOTE**
- If the C: or D: drive letters are not correctly set, security settings were not properly applied. Do not change the drive letter. The system must be reimaged.
4. If a drive does not have the correct letter perform the following steps for each drive not assigned the correct letter:
 - a. Right-click the drive in the right pane and select *Change drive letter and paths*.
 - b. Click *Change*.
 - c. Select the new drive letter in the drop-down menu and click *OK*.
 - d. Click *Yes* to the confirmation message.
 5. Close the Computer Management window.

Set Display Resolution

1. Verify you are logged on as **mlcltechuser** (password: **mlcl!techuser**).
2. Right-click the Desktop and select *Properties*.
3. Select the *Settings* tab.
4. In the *Screen Resolution* section, select *1600x1200*.

NOTE

This is the only supported resolution for new systems. If existing monitors do not support this resolution, *1280x1024* may be used for Mac-Lab systems. All monitors must be set to the same resolution.

5. Verify the color for all monitors is set to *Highest (32-bit)*.
6. Click *OK*.

Install Microsoft Operating System Updates

Instructions for downloading and installing Microsoft security patches and service packs are listed by product type on Support Central. Download and install all applicable patches and service packs.

Change Computer Name

Use this procedure to change the computer name, if required.

CAUTION

PROCEDURE FAILURE — If the computer name is to be changed, this procedure must be completed at this time. If the computer's name is changed at a later time the system must be reimaged.

Also note the following naming conventions:

- The name cannot begin with a number
 - The name cannot contain hyphens or underscore characters
 - The name cannot contain spaces or special characters
 - The name cannot exceed 15 characters in length.
-
-

1. Verify you are logged on to the Windows OS and the Mac-Lab/CardioLab Custom Shell as **local mlcltechuser**.
2. Right-click *My Computer* and select *Explore*.
3. Navigate to *C:\Windows\Special*.
4. Double-click *ManualRename.hta*.
5. Enter the new Review system name.

NOTE

If the customer needs the previously used name to be used then enter the system name recorded in **“Remove the Review System from the GE MLCL Organizational Unit”** on page 5-60.

6. Click *OK* at the confirmation messages.

The system automatically restarts.

7. At the Mac-Lab/CardioLab Custom Shell screen, press **Ctrl + Action + Delete**.

8. Click *Logoff*.
9. Click *Logoff*.
10. Immediately hold down the **Shift** key.
11. Log on to the Windows OS as **local mlcltechuser**.
12. Log on to the Mac-Lab/CardioLab Custom Shell as **local mlcltechuser**.

Change Language

Use these procedures to change the language, if necessary. If the language remains English, continue with “[Check/Set Time](#)” on page 5-70.

Delete User Profiles

1. Select *Start > Settings > Control Panel*.
2. Double-click *System*.
3. Click the *Advanced* tab.
4. Click *Settings* in the *User Profiles* section.
5. Select each profile in the list and click *Delete*, if enabled, to delete the profile.

The MLCLTechUser profile cannot be deleted.

6. Click *OK* to close the *User Profiles* dialog.
7. Click *OK* to close the *System Properties* dialog.

Set Operating System Language

For setting the languages the following must be applied for the application to function properly:

Language: Country/Locale

- English: United States/United Kingdom
- French: France
- German: Germany
- Italian: Italy
- Spanish: Spain
- Swedish: Sweden
- Chinese: China (PRC)
- Japanese: Japan

1. Verify you are logged on as **local mlcltechuser** (password: **mlcl!techuser**).
2. Double-click *Regional and Language Options*.
3. Select the *Regional Options* tab.

4. In the *Standards and formats* section, select the correct language and locale (for example, *French (France)*) from the drop-down list.
5. In the *Location* section, select the correct locale (for example, *France*).
6. Select the *Languages* tab.
7. Click *Details*.
8. For Chinese systems only:

If the use of the IME is required, the following steps must be taken to set it up in a manner which is compatible with the operation of the Mac-Lab/CardioLab software:

- a. Click *Add*.
- b. Change the Input Language to *Chinese (PRC)*.
- c. Select the *Keyboard Layout/IME* check box.
- d. Select *Chinese (Simplified) - Enhanced Unicode IME* from the drop-down list.
- e. Click *OK*.
- f. Click *Add*.
- g. Select the *Keyboard Layout/IME* check box.
- h. Select the *Chinese (Simplified) - US Keyboard* check box.
- i. Click *OK*.
- j. Select *Chinese (PRC) - Chinese (Simplified) - US Keyboard* in the *Default input language* drop-down.

If the use of the IME is not required, select the desired keyboard layout as appropriate.

9. For all other languages:

Determine if the desired language and locale is listed in the *Default input language* section. If it is not:

- a. Click *Add*.
 - b. Select the appropriate language and locale in the *Input language* list. If necessary, configure other settings (for example, *Keyboard layout/IME*) as appropriate.
 - c. Click *OK*.
10. Select the language and locale in the *Default input language* section.
 11. Click *OK*.
 12. Select the correct language (for example, *Francais*) in the *Languages used in menus and dialogs* section.

13. Select the *Advanced* tab.
14. Select the correct language (for example, *French (France)*) in the *Language for non-Unicode programs* section.
15. Select the *Apply all settings...* check box in the *Default user account settings* section.
16. Click *OK* if prompted.
17. Click *OK* to close the *Regional and Language Options* window.
18. Click *OK at the changes will not take effect until you reboot* prompt.
19. Click *Yes, if prompted about copying required files*, to use the files that are already on the system.
20. Click *Yes* to reboot.

Set Mac-Lab/CardioLab Application Language

1. At the Mac-Lab/CardioLab Custom Shell screen, press **Ctrl + Action + Delete**.
2. Click *Logoff*.
3. Click *Logoff*.
4. Immediately hold down the **Shift** key.
5. Log on to the Windows Operating System as **local mlcltechuser** (password: **mlcl!techuser**).
6. Log on to the Mac-Lab/CardioLab Custom Shell as **local mlcltechuser** (password: **mlcl!techuser**).
7. Right-click *My Computer* and select *Explore*.
8. Browse to the *D:\GEMMS\Prucka\Setup\Language* directory.
9. Double-click *MLCL_Set_Language.bat* to start the process of setting the Mac-Lab/CardioLab application language.
10. Verify the language listed is correct (for example, *French*). If so, press any key to begin the process of setting the application language.

NOTE

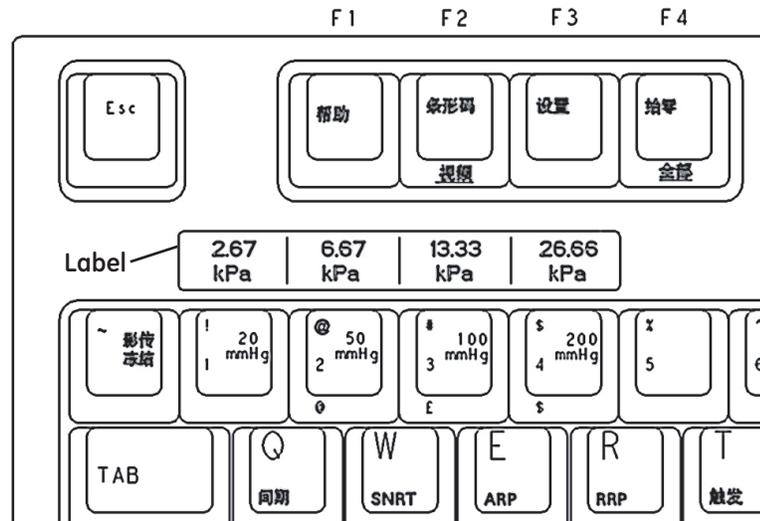
The process takes a few minutes to complete.

11. Press **Enter** at the success prompt.

Both the Operating System language and the Mac-Lab/CardioLab application language should now be set correctly.

Install kPa Label (Chinese Systems Only)

1. Clean the area above the pressure keys if necessary.
2. Apply the kPa label as shown.



Check/Set Time

1. Verify you are logged on as **local mlcltechuser** (password: **mlcl!techuser**).
2. Select *Start > Programs > Accessories > Command Prompt*.
3. Type **net stop w32time** and press **Enter**.
4. Select *Start > Settings > Control Panel > Date and Time*.
5. Select the *Date & Time* tab.
6. Set the time and date.
7. Click *Apply*.
8. Select the *Time Zone* tab.
9. Select the correct time zone and daylight savings setting.
10. Click *Apply*.
11. Select the *Internet Time* tab.
12. Clear the *Automatically synchronize with an Internet Time Server* check box.
13. Click *OK*.
14. Type **net start w32time** at the command prompt and press **Enter**.
15. Close the command window.

Install/Enable Software Options

NOTE

The software options backup that was made when the system was installed can be used in this section or you can also use the backed up option file at the beginning of Review system restore.

1. Double-click *Service Console* from the Desktop.
2. Browse to *Software Options Manager > Software Options*.

NOTE

If prompted for the GEMS Serial Number, enter the serial number and click *OK*. The serial number can be found on a label on the top of the computer.

3. In the *Software Options* form, click *Read License File*.
4. Insert the **Software Options CD** into the F: drive.
5. In the *Look In* dropdown box, select the F:\ drive.
6. Double-click the *Options.txt* file.
7. Ensure the correct options are enabled.
8. Click *Update and Save changes to Software options* to save the options.
9. At the *Save changes?* message, click *Yes*.

Configure InSite ExC

Verify with the customer that InSite ExC will be used for Remote Service Support. If no Remote Service Support is needed, proceed to “[GEMS Log Collector Task](#)” on page 5-72.

1. Verify you are logged on to the Windows Operating System and the Mac-Lab/CardioLab Custom Shell as **local** mlcltechuser (password: **mlcl!techuser**).
2. Double-click *Service Console*.
3. Expand the *InSite 2.0* folder and select the *Device Manager* folder in the left pane of the *Service Console* window.
4. Click *Generate Device Information* in the *Device Information* window.
5. Click *OK* in the *Device Manager Confirmation* window.
6. Verify the *Serial Number*, *Name*, and *Type* fields.
7. Select the *Configuration Utility* folder in the left pane under *InSite 2.0*.
8. If the hospital uses a proxy server perform the next steps, otherwise continue with step 13.

9. Click the *Proxy Configuration* tab and select *Use a Proxy Server to connect to the Enterprise*.
10. Enter the proxy server information.

NOTE

Contact the Hospital IT Department for the proxy address, proxy port, and authentication information.

11. Click *Update Proxy* after entering the proxy server information.
12. Click *OK* at the *InSite 2.0 Message* window.
13. Select the *Service Controller* tab in the *Configuration Utility*.
14. Click *Start Service*.
15. Verify the Service has started:
 - a. Wait 10 seconds.
 - b. Select *Check Service Status*.

A confirmation window opens indicating the service is running.
 - c. Click *OK*.
16. Select *Initiate Remote Service* and verify that it connects and a *Request submitted successfully* message is displayed.
17. Close the *Service Console*.

NOTE

Perform the following steps only if the customer requests InSite ExC access control.

18. Right-click *VNC* in the System Tray and select *Options*.
19. Select the *Authentication* tab.
20. Select *Prompt local user to accept incoming connections* and click *OK*.

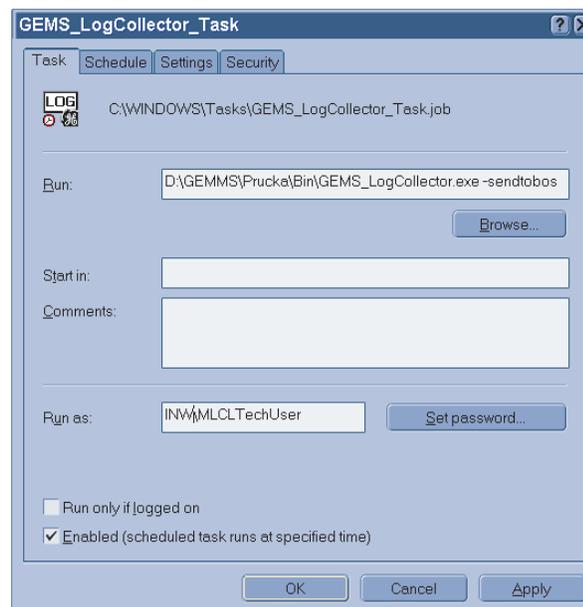
GEMS Log Collector Task

GEMS Log Collector Task Creation

The following steps are needed only if you want to configure InSite ExC Log Collection on GE Acquisition and Review systems only.

1. Select *Start -> Settings -> Control Panel -> Scheduled Tasks*. The *Scheduled Tasks* page opens.
2. If the *GEMS_LogCollector_Task* entry is present, right-click it and chose *Properties*.

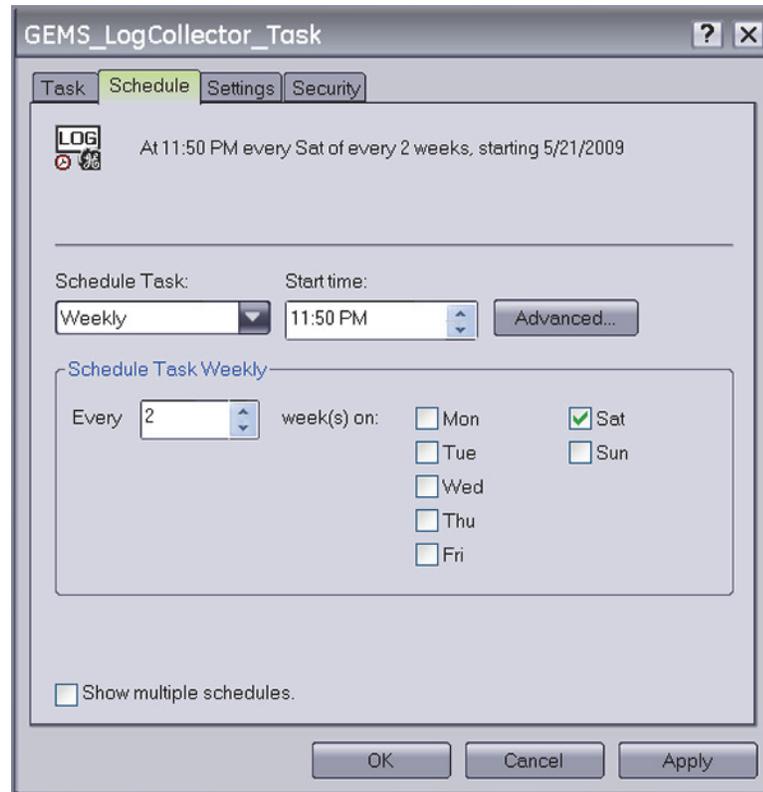
3. If the *GEMS_LogCollector_Task* entry is not present, add a new entry as follows:
 - Select *File > New* to add a new scheduled task.
 - Rename the task *GEMS_LogCollector_Task*
 - Right-click the new entry and select *Properties*.
 - Browse to *D:\GEMMS\Prucka\Bin* and select the *GEMS_LogCollector.exe* program. Edit the run command line to add the **-sendtobos** option as shown in the following figure.
4. Select the *Enabled* check box.



5. In the *Run as* field, enter the account information as follows:
 - For a networked system (Acquisition or Review), enter the user name as **<Domain Name>\MLCLSqlUser**.
 - For a stand-alone system, enter the user name as **<Computer name>\ MLCLSqlUser**.
 - Click *Set Password*. When prompted, enter the password **sql8273user** in both fields.
 - Click *OK*.

GEMS Log Collector Task Schedule Configuration

Select the *Schedule* tab and configure the task to run once every two weeks as shown in the following figure.



1. In the *Schedule Task:* field, select *Weekly*.
2. In the *Start time:* field, select *11:50PM*.
3. In the *Schedule Task Weekly* section, select *Every 2 week(s) on: Sat*.

Import Report Formats

Perform these steps to import report formats on recovered Review systems. Report Formats are not replicated in the INW networked environment. Obtain the backups from one of the following sources:

- Use the backup saved to the *G:* drive.
- Check with the Lab administrator to see if a backup they made earlier is available.
- Make a copy from a Review workstation in the same lab.
- If any other backups are unavailable and for English systems only, report formats must be imported from the **CD-R MLABCLAB CLIN APP DEFAULTS V6.5.6** (PN 2049104-001).

1. Double-click *Mac-Lab/CardioLab* to open the application.
2. Select *Utilities > Import Report Formats* in the *Navigator* window.

3. At the *Report Wizard* window, click *Next*.
4. Click *Change Folder*.
5. Select the drive G (or the appropriate folder location).
6. Navigate to the *Report_Backup* folder (or other location).
7. Click *OK*.
8. Select *No* when asked whether to merge with existing data.
9. Click *OK* at success message.
10. Close the application.

Configure the Review System on the INW Network

Add the Review System to the Domain

1. Verify that you are logged on to the Windows OS and the Mac-Lab/CardioLab Custom Shell as **local mlcltechuser**.
2. Right-click *My Computer* on the Desktop and select *Properties*.
3. Select the *Computer Name* tab.
4. Click the *Change* button.
5. In the *Member of* section, select the *Domain* radio button, enter the name of the INW Domain to join and click *OK*.

NOTE

The default Domain is *inw.local*.

6. When prompted, type the username **mlcltechuser** and password.
7. At the *Welcome to inw* message, click *OK*.
8. At the restart message click *OK*.
9. At the *System Properties* window, click *OK*.
10. At the *Do you want to restart now?* message click *Yes*.
11. After the system restarts, at the Mac-Lab/CardioLab Custom Shell window, press **Ctrl + Action + Del** and click *Logoff*.
12. Click *Logoff* and immediately hold the **Shift** key to stop the auto-logon sequence.
13. Logon to Windows and the Mac-Lab/CardioLab Custom Shell as the **local mlcltechuser**.

Synchronize Time

1. Select *Start > Programs > Accessories > Command Prompt*.
2. Type **net time /set** and press **Enter**.
3. When asked to sync with the server, type **y** and press **Enter**.

NOTE

This step may take up to 2 minutes to complete.

4. Close the *Command Prompt* window.

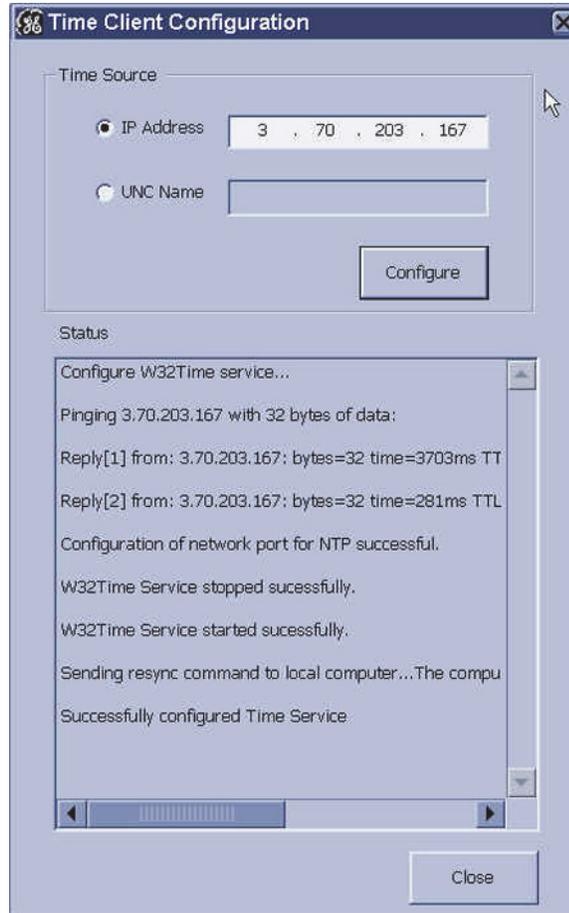
Add Review System to GE MLCL Organizational Unit

1. Log on to the server as the INW **domain Administrator** (contact GE Technical Support or the system administrator for current password information).
2. Select *Start > Settings > Control Panel*.
3. Double-click *Administrative tools*.
4. Double-click *Active Directory Users and Computers*.
5. Expand *inw.local* (this is an example, the actual domain name may be different).
6. Click the *Computers* folder and locate the Review system to add.
7. Expand the *GE Medical Systems (MLCL)* organizational unit.
8. Expand the *MLCL Computers*.
9. Expand the *MLCL Workstations*.
10. Drag and drop the computer name from the *Computers* folder to the *MLCL Review workstations*.
11. Close all open windows.
12. Restart the Review system added to the organizational unit in the previous step.
13. After restart, press **Ctrl + Action + Delete**, logoff as **mlcllogonuser**.
14. Click *Logoff*.
15. Immediately hold down the **Shift** key.
16. Log on to the Windows OS and the Mac-Lab/CardioLab Custom Shell locally as **mlcltechuser**.

Synchronize Time

This procedure applies to all Review systems.

1. Right-click *My Computer* and select *Explore*.
2. Navigate to *D:\GEMMS\Prucka\Setup\TimeSynchronization*.
3. Double-click *TimeClientConfig.exe*. This tool will perform the following:
 - Check for Administrator logon.
 - Performs a backup of the existing registry entries pertaining to Windows Time Service.
 - Update the required registry entries to configure Windows Time Service.
 - Verify one of the registry keys to ensure the registry update was successful.
 - Enable/configure UDP port 123 in the *Windows Firewall* on Windows XP SP3 system.
 - Stop and Start the W32Time service.
 - Run the *w32tm* command to update the *Windows Time Service* to look at the update configuration, re synchronize, and rediscover the time source.



4. In a fixed-IP network, select *IP Address* and enter the IP address of the INW server. For a DHCP network, select the *UNC name* and enter the name of the INW server.

NOTE

In a DHCP environment, the UNC name must be used since it is likely that the IP address will change.

5. Click *Configure*.
6. When the configuration completes, the status will indicate that the time settings were updated successfully.
7. Close all open windows.
8. Time Sync Configuration is now complete.

Confirm Domain Security Policy

Verify Security Policy

To verify the security policy at the Review system:

1. Right-click *My Computer* on the Desktop and select *Manage*.
2. Select *System Tools > Local Users and Groups > Groups*.
3. Right-click *Administrators* and select *Properties*.
4. Verify that the following members are shown in the list:
 - [domain name]\Domain Admins
 - [domain name]\mlcltechuser
 - [domain name]\mlclsquser

NOTE

The default domain name is *inw.local*.

NOTE

If the members are not shown, follow the troubleshooting steps below.

Troubleshooting

1. Verify that the Review system is in the correct Domain:
 - a. Right-click *My Computer* on the Desktop and select *Properties*.
 - b. Verify that on the *Computer Name* tab the INW Domain is present.
2. Verify that the Review system shows up in the *GE Medical Systems (MLCL)* Organizational Unit on the server.
3. On the server, open a command prompt window and type **gpupdate /force** and press **Enter**.
4. Restart the Review systems, wait approximately 7 minutes and check the policy again as described in “**Verify Security Policy**” on page 5-42. If the policy is still not correct proceed to the next step.
5. Verify that the TCP/IP properties on the server are set correctly
 - a. The INW server IP must be configured as the preferred DNS server.
 - b. The subnet mask must be correct as defined by the hospital IT staff.

6. Verify that the TCP/IP properties on the Review are set correctly
 - a. The IP subnet mask of the Review system **MUST** match exactly the subnet mask of the server.
 - b. The IP address of the Review system must be manually configured and must fall within the subnet of the server as defined by the subnet mask.
 - c. The gateway of the Review system must be set to the IP address of the server or another machine on the hospital network.
 - d. The DNS of the Review system must be set to the IP address of the INW server.
7. Verify that the server and Review system can communicate.
8. Open a command window on the Review system and type **ping <servername>** and press **Enter**.
 - a. A *Request timed out* message indicates failure, a *Reply from* message indicates success.

NOTE

If successful, verify that the reply from IP address shown matches the server's IP address and if correct skip the reset of the sub-steps below

- b. If step a failed, repeat with the servername replaced with the correct IP address of the server **ping <###.###.###.###>** and press **Enter**.
 - c. If step a and step b both failed, there is a problem with the IP address or the physical network. Repeat the above steps to verify the TCP/IP properties of the server and Review system.
 - d. If step a fails and step b succeeds, there is a problem with DNS setup. Repeat the TCP/IP properties steps above paying careful attention to the DNS setup.
9. Verify that the time and time zone settings on the server and the Review system match.
 - a. If they do not match, open a command prompt on the Review system and type **net time /set** and press **Enter**.
 - b. Restart the Review system, wait 7 minutes and check the policy again in “**Verify Security Policy**” on page 5-42. If the policy is still not correct proceed to the next step.
10. If the policy is still not correct after all above steps:
 - a. Remove the Review system from the Domain and add it back to the *CARDIOLAN* workgroup.
 - b. Restart the Review system.
 - c. Delete the Review system name for the OU on the server.

- d. Repeat the instructions for adding the Review system to the Domain.

Initialize Applications

Adobe Reader, Microsoft Word, and Microsoft Word Reports must be initialized under both **mlcllogonuser** and **mlcltechuser** logons.

Adobe Reader

1. Press **Ctrl + Action + Delete**.
2. Click *Logoff*.
3. Click *Logoff*.

Allow the system to auto-log on to the Windows Operating System as **mlcllogonuser**.

4. Log on to the Mac-Lab/CardioLab Custom Shell as **domain mlcllogonuser** (password: **mlcl!logonuser**).
5. Select *Start > Programs > Adobe Reader 9*.
6. Accept the *End User License Agreement* if displayed.

After *Adobe Reader* opens, wait one minute to ensure a *Check for Update* dialog box is not displayed. If the dialog box is displayed, click *Cancel*.

7. Close *Adobe Reader*.

Microsoft Word

1. Select *Start > Programs > Microsoft Word*.

NOTE

For Microsoft Office 2007 Professional, select *Start > Programs > Microsoft Office Word 2007*.

2. Accept the *End User License Agreement* if displayed.
3. Click *OK* if the *User Initial* dialog box is displayed.
4. If the *Privacy Option* dialog box is displayed, uncheck *Search Microsoft Online for Help*, if it appears.
5. Close *Microsoft Word*.

Microsoft Word Reports

Perform this procedure on multiple monitor systems only.

1. Double-click *Mac-Lab CardioLab*.
2. Select *Administration > Reports > Templates*.

If prompted for an administrator password enter **mlcladmuser** (password: **mlcl!admuser**).

3. Click *Retry* if a server busy message is displayed. Microsoft Word will open.
4. Configure the Microsoft Word window for the review monitor:
 - a. Right-click the Microsoft Word title bar and select *Restore*.
 - b. Move the Microsoft Word window to the next monitor (from the real-time monitor to the review monitor).
 - c. Right-click the Microsoft Word title bar and select *Maximize*.
5. Close Microsoft Word.
6. When prompted to save the report, click *No*.
7. Close the Mac-Lab/CardioLab application.

Adobe Reader

1. Press **Ctrl + Action + Delete**.
2. Click *Logoff*.
3. Click *Logoff*.
4. Immediately hold down the **Shift** key.
5. Log on to the Windows Operating System as **domain mlcltechuser** (password: **mlcl!techuser**).
6. Log on to the Mac-Lab/CardioLab Custom Shell as **domain mlcltechuser** (password: **mlcl!techuser**).
7. Select *Start > Programs > Adobe Reader 9*.
8. Accept the *End User License Agreement* if displayed.

After *Adobe Reader* opens, wait one minute to ensure a *Check for Update* dialog box is not displayed. If the dialog box is displayed, click *Cancel*.

9. Close *Adobe Reader*.

Microsoft Word

1. Select *Start > Programs > Microsoft Word*.

NOTE

For Microsoft Office 2007 Professional, select *Start > Programs > Microsoft Office Word 2007*.

2. Accept the *End User License Agreement* if displayed.
3. Click *OK* if the *User Initial* dialog box is displayed.

4. Confirm that *Office* is activated using the following steps:

For Office 2007

- a. Click on the *Office* button (left topmost corner).
- b. Select *Word Options*.
- c. Choose *Resources*.
- d. Click *Activate*.
- e. Verify that this product has already been activated.

For Office XP

- a. Select *Help > Activate Word*.
 - b. Verify that this product has already been activated.
5. Close *Microsoft Word*.

Microsoft Word Reports

Perform this procedure on multiple monitor systems only.

1. Double-click *Mac-Lab CardioLab*.
2. Select *Administration > Reports > Templates*.
If prompted for an administrator password enter **domain mlcladmuser** (password: **mlcl!admuser**).
3. Click *Retry* if a server busy message is displayed. Microsoft Word will open.
4. Configure the Microsoft Word window for the review monitor:
 - a. Right-click the Microsoft Word title bar and select *Restore*.
 - b. Move the Microsoft Word window to the next monitor (from the real-time monitor to the review monitor).
 - c. Right-click the Microsoft Word title bar and select *Maximize*.
5. Close Microsoft Word.
6. When prompted to save the report, click *No*.
7. Close the Mac-Lab/CardioLab application.

Confirm Windows XP is Activated

1. Open a command prompt and from the command prompt run
c:\windows\system32\oobe\msoobe.exe /A
2. Confirm Windows XP has already been activated.

Confirm File Paths and Network Storage Settings

Perform this procedure for a networked Review system.

1. Log on to the Windows OS and the Mac-Lab/CardioLab Custom Shell as INW **domain mlcltechuser**.
2. Double-click *Mac-Lab/CardioLab* on the Desktop to start the Mac-Lab/CardioLab application.
3. Select *Administration > System Settings*.
4. Browse to the *File Paths* section.
5. Check the *Enable Network Storage* checkbox.
6. Click *Browse*.
7. Browse to the INW server and select the *PruckaStudies* share as the network storage path.
8. Click *OK*.
9. Select the *Audit Log* section.
10. Move all items in the list to the right *Events selected for audit* by clicking the >> button.
11. Close the application.

Additional Installation for Purchased Options

The purchased options may include PedCath. The instructions to complete the installation are found at the following website: <http://www.pedcath.com/manual.php>

Reconfigure Printer

If the printer information was recorded, refer to the list of printers recorded in “**Record Mapped Drives and Printer**” on page 5-59. Also refer to the setup instructions included with the printer to install the appropriate printer driver.

Reconfigure Mapped Drives

If any mapped drives were recorded in “[Record Mapped Drives and Printer](#)” on page 5-59, perform this procedure.

1. Log off the system and allow the auto-logon run and log on to the Mac-Lab/CardioLab Custom Shell as a local user.
2. Verify any mapped drives still exist.

If they do not, perform the steps in this procedure.

3. Right-click *My Computer* on the Desktop and select *Map Network Drive*.
4. In the *Drive* section, select the drive letter.
5. In the *Folder* section, enter the path.
6. Click *Finish*.
7. Close all open windows.
8. Log off the system and allow the auto-logon run.

Configure Data Export

Perform the following steps on each of the networked Mac-Lab/CardioLab Review systems.

1. Open Windows Explorer.
2. Navigate to D:\GEMMS\Prucka\Bin.
3. Double-click DataExportConfig.exe.
4. Configure to the settings captured earlier in “[Record Data Export Settings](#)” on page 5-58.

Reload CVIS Client

If a CVIS client needs to be reloaded onto the computer, refer to the appropriate CVIS Installation manual for installation steps.

Update Operator Manuals

This script has to be executed for updating the Mac-Lab, CardioLab or Centricity Cardiology INW Operator's manual. To apply these changes, use the **DVD ML/CL APPLICATION INSTALL 6.5.6** (PN 2049051-001).

1. Log on as a **local mlcltechuser** to Windows as well the Custom Shell.

Ensure all programs are closed.

2. Insert the **DVD ML/CL APPLICATION INSTALL 6.5.6** (PN 2049051-001) into the DVD-ROM drive.
3. Browse to the DVD drive and double-click *UserManualUpdate.wsf*.
4. A message box will open stating, *System will now update the user manuals*.
Click *Yes* to install, *No* to quit.
5. Click *Yes* at the message box.
6. On completion of the update, a message box stating *User manuals updated* will open.
7. Click *OK*.

Perform Necessary Software Updates

Apply all necessary software updates to the Acquisition system. Refer to the Mac-Lab/CardioLab 6.5.6/6.8.1 Release 3 Update (PN 2027332-533) for the instructions.

System Checkout

Review Workstation Test

Solar and DASH Checkout

1. Verify the Mac-Lab or CardioLab module is selected for a Cath or EP study respectively. Perform a patient search or create a new study by clicking *New Study*. Enter the required fields: patient last name, first name and medical record number.
2. Connect the ECG, NIBP and SpO₂ cables from the patient simulator to the TRAM Module or DASH monitor. Place the SpO₂ finger probe on the right or left index finger. Place the NIBP pressure cuff over the left or right arm.
3. Perform a Stat Vitals Measurement from the Nurses Review Workstation by selecting *Measurements > Stat Vitals* or by pressing the **Action + L** keys on the keyboard.
4. Verify that the vitals information is displayed in the log window.
5. Close the study.

INW Server Disaster Recovery

The decision to perform server recovery should only be made after consultation with GE Technical Support by the on-site Field Engineer. The high-level steps for a complete 6.5.6 INW server recovery are listed below. Detailed instructions for each step follow.

High-Level Overview

Required Parts

Verify the appropriate media is available. Double-check part numbers before you begin.

- DVD MLAB/CLAB G4 IMG DVD V6.5.6: 2049064-001
- DVD MLAB/CLAB G5 IMG DVD V6.5.6: 2049060-001
- DVD MLAB/CLAB G6 IMG DVD V6.5.6: 2049056-001
- DVD ML/CL APPLICATION INSTALL 6.5.6: 2049051-001
- Backup tapes (Full and Incremental, if applicable)

NOTE

The G6 server must be reimaged because it will have 6.8.1 software installed.

Depending on the site configuration server failure will fall into one of two scenarios:

Scenario 1

Failure of a single drive in a disk array on a G4/G5 low- mid- or high-end server and G6 low or high-end Server.

Replace the drive (See [“Replace the Server Hard Drive”](#) on page 5-96); the RAID automatically rebuilds the replacement drive. No further action is required.

Scenario 2

Perform the steps listed below if the failure involves multiple drives in a disk array on a G4/G5/G6 server.

Step 1: Record Server Information. Go to [“Record Server Information”](#) on page 5-90.

Step 2: Take the Acquisition systems out of replication and set systems to standalone.

Perform the following steps to take the Acquisitions systems out of replication:

- If the server is still running (for example, the hard drive is corrupt, rather than completely failed), remove all Acquisition systems from replication (See [“Take All Acquisition Systems out of Replication at the Server”](#) on page 5-91) and then continue with the [“Set All Acquisition Systems to Standalone”](#) on page 5-93.
- If the server is not running, go to each Acquisition system and remove the system from replication (See [“Set All Acquisition Systems to Standalone”](#) on page 5-93).

Step 3: See procedures: [“Backup Custom Lists”](#) on page 5-95 for detailed steps.

Step 4: Replace the hard drive (See [“Replace the Server Hard Drive”](#) on page 5-96).

Step 5: Reimage the hard drive. Depending on the type of server, perform the associated steps.

- Compaq ML370 G4 Servers: [“Load G4 Server Image”](#) on page 5-96
- HP ProLiant ML370 G5 Servers: [“Load G5 Server Image”](#) on page 5-97
- HP ProLiant DL370 G6 Servers: [“Load G6 Server Image”](#) on page 5-97

Step 6: Perform all the procedures in [“G4/G5/G6 Server Setup and Data Restore”](#) on page 5-98.

Step 7: Perform all the procedures in [“Reconfigure Centricity Cardiology INW Network”](#) on page 5-119.

Step 8: Perform all the procedures in [“Post Configuration Procedures”](#) on page 5-128.

Record Server Information

Record the Server IP Information

The Server IP information is required for the “G4/G5/G6 Server Setup and Data Restore” on page 5-98 procedure. The Server IP can be found on any Acquisition system or Review workstation connected to the network. Use the following procedure to find and record the information:

1. Log on to the Windows OS and the Mac-Lab/CardioLab Custom Shell as **local mlcltechuser**.
2. Right-click *My Network Places* and select *Properties*.
3. Right-click *Local Area Connection* and select *Properties*.
4. Highlight *TCP/IP* and select *Properties*.
5. Record the following information:
 - *Preferred DNS Server:* _____
(This is the server IP)
 - *IP Subnet Mask:* _____

Record the Server and Domain Names

Record the server name for the “G4/G5/G6 Server Setup and Data Restore” on page 5-98.

1. Go to any Acquisition system or Review workstation.
2. Launch the *Mac-Lab/CardioLab* application and go to *Administration > System Settings*.
3. Select *File Paths* and look at the *Network Study Path* field.

CAUTION

PROCEDURE FAILURE — The entire server disaster recovery procedure will fail if you record the wrong server name below. Be sure to double-check the name you recorded.

4. Record the server name. It has this format:

\\CLSV[four digit number**]\Prucka\Studies**

CLSVxxxx is the server name.: _____

5. Close all open windows.

6. Right-click *My Computer*, select *Properties* and click the *Computer Name* tab.
7. Record the domain name. It has this format: *CLWSxxxx.<Domain name>*.

Domain name: _____

On the INW Server, Back Up User Profiles (if possible)

Save the INW Server account profiles:

1. Log on to the domain as **Administrator**.
2. Launch *Explorer* and navigate to *C:\Documents and Settings*.
3. Highlight the user profile/profiles except Administrator from this directory and choose copy. Paste the profiles on a USB storage device.
4. Log off from the Server.
5. Log on to the domain as **mlcltechuser**.
6. Launch *Explorer* and navigate to *C:\Documents and Settings*.
7. Highlight the Administrator profile from this directory and choose copy. Paste the profile on a USB storage device.
8. Log off from the INW Server.

Reimaging Procedures

Take All Acquisition Systems out of Replication at the Server

If the server is available (that is, can be booted and the service console can be run), use this procedure to take all Acquisitions out of replication at the server, and then continue with to “[Set All Acquisition Systems to Standalone](#)” on page 5-93.

If the server is not available, skip this procedure and continue with “[Set All Acquisition Systems to Standalone](#)” on page 5-93.

CAUTION

PROCEDURE FAILURE — If either this procedure or “[Stop Replication](#)” on page 5-93 is not performed to stop replication on the Acquisition system, the Acquisition systems cannot be added back into replication later.

Adding or removing a system from replication requires administrative privileges. Contact the facility IT department for current logons if necessary.

1. At the server, double-click *Service Console* from the Desktop and navigate to *Create Replica > Replication Setup*.
2. Log on to the *Service Console* as **mlclsquser** (contact GE Technical Support or the system administrator for current password information).
3. Highlight all Acquisition systems (for example, CLWS0001, and so on) in the list of *currently replicating systems*.
4. Click the *Remove* button.
5. Click *Yes* at the confirmation window.

NOTE

Stopping replication could take several minutes to complete.

6. Once all Acquisitions have been taken out of replication, the message *Replication Removal Complete* will appear and all Acquisitions are no longer listed as being replicated.
7. Refresh the window (click another folder in the tree and then click *Replication Setup* again) to verify all Acquisition systems have been taken out replication.
8. Close the *Service Console*.
9. Go to the *Enterprise Manager* and stop server replication.
 - a. Select *Start > Programs > Microsoft SQL Server > Enterprise Manager*.
 - b. Expand *Microsoft SQL Servers > SQL Server Group*. Highlight the INW Server (in the left window).
 - c. Select *Tools > Replication > Disable Publishing*.
 - d. Click *Next*.
 - e. Select *Yes, disable publishing on [Server name]* and click *Next*.
 - f. Click *Next* in the *Confirm Dropping of Publications* window.
 - g. Click *Finish* in the *Completing the Disable Publishing and Distribution Wizard* window.
 - h. Click *OK* to the *Successfully Disabled* window.
 - i. Right-click the server name and select *Refresh*.

Set All Acquisition Systems to Standalone

While the server is down communicate the following to the users and lab administrator:

- Review workstations will not be functional while the server is being recovered.
- Acquisitions systems will function in standalone mode (but will have no access to the network catalog).
- Switching users or logging on using some usernames may fail. If this happens users should either use the emergency logon or the temporary logon set up in this step (username: **Tempuser**, Password: **password**).

To set the Acquisition systems to standalone while the server is down perform the following procedures at each Acquisition system:

- “[Stop Replication](#)” on page 5-93 (This step is not required if the Acquisition systems were taken out of replication at the server in the previous procedure).
- “[Set Up a Temporary User on Each Acquisition System](#)” on page 5-93.
- “[Disable Networking](#)” on page 5-94.
- “[Backup LMT Custom Reports](#)” on page 5-94.

At the Acquisition system, log on to the Windows OS and the Mac-Lab/CardioLab Custom Shell as **local mlcltechuser** (contact GE Technical Support or the system administrator for current password information).

Stop Replication

This procedure is not required if the Acquisition systems were taken out of replication at the server in the procedure “[Take All Acquisition Systems out of Replication at the Server](#)” on page 5-91.

1. Verify you are logged in as **local mlcltechuser**.
2. Right-click *My Computer* and select *Explore*.
3. Navigate to *D:\GEMMS\Prucka\Network*.
4. Double-click *StopRepl.bat*.
5. A Command Prompt window opens and the file runs.
6. Press the **Enter** key when prompted to press any key.

Set Up a Temporary User on Each Acquisition System

1. Right-click *My Computer* and select *Manage*.
2. Expand *Local Users and Groups*.
3. Highlight *Users*.

4. Right-click *Users* and select *New User*.
5. Enter the following information in the New User window:
 - User ID: **Tempuser**
 - Password: **password**
 - Uncheck the option to require the user to change the password at the first logon.
6. Click *Create*.
7. Click *Close*.
8. Double-click the user you just created and go to *Member of tab*.
9. Click *Add*.
10. Click *Advanced*.
11. Verify the *Location* field displays the local computer name.
12. Click *Find Now*.
13. Multi-Select the following groups:
 - Administrators
 - MLCLAdmgrp
14. Click *Ok three times*.
15. Double-Click the user, go to the *Member of tab* and ensure the following groups are listed:
 - Administrators
 - MLCLAdmgrp
 - Users
16. Close all open windows.

Disable Networking

1. Open the Mac-Lab/CardioLab application.
2. Select *Administration > System Settings*.
3. When prompted, log on as **Tempuser** (Password: **password**) to the local computer.
4. Select *File Paths*.
5. Uncheck the *Enable Network Storage* option and click close.

Backup LMT Custom Reports

Skip this procedure if the customer is not using LMT Custom reports or the customer has previously backed up the `clink_drk.mdb` file. The customer is responsible for backing up the `clink_drk.mdb` file because it is not backed up as part of the INW backup procedure.

1. Connect a USB drive.

2. Right-click *My Computer* and select *Search*.
3. Search for *clink_drk.mdb* and copy the file (most commonly the file will be found in *D:\Program Files\GEMMS\LMT\Client\Resource Kit*).
4. Navigate to the USB drive and select *Paste*.
5. Remove the USB drive.

Backup Database, Log and Studies

Ensure that the following folders are backed-up by Tape Backup or Enterprise Backup Agents.

- *D:\GEMMS\Prucka\Database\Maintenance\Backup*
- *D:\GEMMS\Prucka\Database\Maintenance\Log*
- *D:\GEMMS\Prucka\Studies*

Backup Custom Lists, Custom Reports, and Custom Forms

Backup Custom Lists

This procedure is done in case the custom lists, custom reports, and custom forms are lost during the recovery. It may be completed at any one of the Acquisition systems.

NOTE

If prompted for an administrator password enter **domain mlcladmuser**. If **mlcladmuser** does not work, log on as **Tempuser**.

1. Double-click *Mac-Lab/CardioLab* to start the Mac-Lab/CardioLab application.
2. In the *Navigator* window, select *Utilities > Export Lists*.
3. Click *Next* in the *Data Export* wizard window.
4. Select the *G:* drive and click *New Folder*.
5. Enter *List_Backup* for the folder name and click *OK*.
6. Click *OK* at the *Data Export* wizard window.
7. Click *OK* when the Success message is displayed.

Backup Custom Reports

1. In the *Navigator* window, select *Utilities > Export Report Formats*.
2. Click *Next* in the *Data Export* wizard window.
3. Select the *G:* drive and click the *New Folder*.
4. Enter *Reports_Backup* for the folder name and click *OK*.
5. Click *OK* at the *Data Export* wizard window.
6. Click *OK* when the Success message is displayed.

Backup Custom Forms

1. In the *Navigator* window, select *Utilities > Export Custom Form Layouts*.
2. Click *Next* in the *Data Export* wizard window.
3. Select the *G:* drive and click *New Folder*.
4. Enter *Forms_Backup* for the folder name and click *OK*.
5. Click *Export* at the *Data Export* wizard window.
6. Click *OK* when the Success message is displayed.

Replace the Server Hard Drive

WARNING

SHOCK HAZARD — Use appropriate Lock Out/Tag Out procedures before performing any service on potentially energized equipment.

WARNING

GROUNDING HAZARD — Electrostatic discharge (ESD) can damage electronic components. Be sure you are properly grounded before opening any equipment.

Ensure the new hard drive is exactly the same as the old one (type, size, and so on). Consult GE Technical support with any drive replacement questions.

Reimage G4/G5/G6 Server

Load G4 Server Image

The following media is needed to reimage the G4 server: **DVD MLAB/CLAB G4 IMG DVD V6.5.6** (PN 2049064-001).

1. Restart or power on the server, as necessary.
2. Insert **DVD MLAB/CLAB G4 IMG DVD V6.5.6** (PN 2049064-001) during the restart or power on. The *Ghost 11.5 Boot CD 2.2* prompt is displayed.
3. Select *Erase System Data...* and press **Enter** to begin reimaging.
A command prompt is displayed when reimaging is complete.
4. Remove the **G4 Image DVD** from the drive.
5. Manually restart the server.

NOTE

The Initial Windows Configuration (SysPrep) process will be completed without any input from the user.

6. Log on as **Administrator**, if necessary.

Load G5 Server Image

The following media is needed to reimage the G5 server: **DVD MLAB/CLAB G5 IMG DVD V6.5.6** (PN 2049060-001).

1. Restart or power on the server, as necessary.
2. Insert **DVD MLAB/CLAB G5 IMG DVD V6.5.6** (PN 2049060-001) during the restart or power on. The *Ghost 11.5 Boot CD 2.2* prompt is displayed.
3. Select *Erase System Data...* and press **Enter** to begin reimaging.
A command prompt is displayed when reimaging is complete.
4. Remove the **G5 Image DVD** from the drive.
5. Manually restart the server.

NOTE

The Initial Windows Configuration (SysPrep) process will be completed without any input from the user.

6. Log on as **Administrator** if necessary

Load G6 Server Image

The following media is needed to reimage the G6 server: **DVD MLAB/CLAB G6 IMG DVD V6.5.6** (PN 2049056-001).

1. Restart or power on the server, as necessary.
2. Insert **DVD MLAB/CLAB G6 IMG DVD V6.5.6** (PN 2049056-001) during the restart or power on. The *Ghost 11.5 Boot CD 2.2* prompt is displayed.
3. Select *Erase System Data...* and press **Enter** to begin reimaging.
A command prompt is displayed when reimaging is complete.
4. Remove the **G6 Image DVD** from the drive.
5. Manually restart the server.

NOTE

The Initial Windows Configuration (SysPrep) process will be completed without any input from the user.

6. Log on as **Administrator** if necessary.

G4/G5/G6 Server Setup and Data Restore

Check/Set Time

1. Select *Start > Settings > Control Panel > Date and Time*.
2. Select the *Date & Time* tab.
3. Set the time and date.
4. Click *Apply*.
5. Select the *Time Zone* tab.
6. Select the correct time zone and daylight savings setting.
7. Click *Apply*.
8. Select the *Internet Time* tab.
9. Clear the *Automatically synchronize with an Internet Time Server* check box.
10. Click *OK*.

Confirm Time Service

1. Select *Start > Programs > Accessories > Command Prompt*.
2. Type **net stop w32time** and press **Enter**.
3. Type **regedit** and press **Enter**.
4. Navigate to
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\W32Time\TimeProviders\NTPServer.
5. Double-click *ENABLED*.
6. Change the value to *1*, if necessary.
7. Navigate to
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\W32Time\Parameters.
8. Double-click *TYPE*.
9. Change the value to *NT5DS*, if necessary.
10. Close the Registry Editor.
11. At the command prompt, type **net start w32time** and press **Enter**.
12. Close the command prompt.

Configure NIC Connections

1. Verify you are logged on to the server as **local administrator** (password: **MLCL8273!admin**).
2. Select *Start > Settings > Network Connections*.
3. Verify that *Local Area Connection* is enabled.
4. Right-click *Local Area Connection 2* and select *Disable*.

Rename Server

The server is automatically named during the imaging procedure. The name must be changed back to the old name. Use the server name recorded earlier.

To rename the server to the old name:

1. Right-click *My Computer* and select *Explore*.
2. Navigate to *C:\Windows\Special*.
3. Double-click *manualRename.hta*.
4. Enter the old server name and click *OK*.
5. The system will reboot when the script completes.

NOTE

The old server name was recorded in “[Record the Server and Domain Names](#)” on page 5-90.

6. Log on to the server as **local Administrator** (password: **MLCL8273!admin**)

Configure Static IP

1. At the server, Select *Start > Settings > Network Connections*.
2. Right-click *Local Area Connection* and select *Properties*.
3. Highlight *Internet Protocol (TCP/IP)*, and click *Properties*.
4. Select the *Use the following IP Address* radio button.
5. Enter the IP Address, subnet mask, default gateway, and preferred DNS server as recorded in “[Record the Server IP Information](#)” on page 5-90.

NOTE

The IP addresses for the primary DNS server should be set to be the same as the Centricity Cardiology INW server’s IP address. The secondary DNS server should be set to the Hospital DNS server if applicable.

6. Click *Advanced*.

7. Select the *DNS* tab.
8. Add any additional DNS servers previously recorded.
9. Select the *WINS* tab.
10. Add any WINS servers previously recorded.
11. Click *OK*.
12. Close the *Properties* windows.
13. Select *Start > Programs > Accessories > Command Prompt*.
14. Verify that you can ping (by IP address) all of the following:
 - a. Hospital Domain Controller (required if using a trust).
 - b. Hospital DNS Server (required if using DNS forwarding).

NOTE

To do this type **ping <IP Address>** in the *Command Prompt* window and press **Enter**.

Verify NIC Connection Speed

1. Right-click *Local Area Connections* and select *Status*.
2. Verify with the hospital IT department that the hospital switch speed settings **exactly match** the NIC speed settings on the Mac-Lab/CardioLab system. Acceptable speeds are *100Mbps Full Duplex* or *Auto Negotiate*.
3. Click *Close*.
4. Close the *Network Connections* window.

Promote Server to Domain Controller

1. Insert **CD-R I386 FOR MS WIN SERVER 2003 SP2** (PN 2046386-001) into the CD drive.
2. If the content of the CD in *E:* drive is displayed, close the window.
3. Select *Start > Programs > Accessories > Command Prompt*
4. Type *dcpromo* and press **Enter**.
5. At the *Welcome To Active Directory Installation Wizard* window, click *Next*.
6. At the *Operating System Compatibility* window, click *Next*.
7. At the *Domain Controller Type* window, select the *Domain controller for a new domain* radio button and click *Next*.
8. At the *Create New Domain* window, select the *Domain in a new forest* radio button and click *Next*.

9. Enter the domain as recorded in “**Record Server Information**” on **page 5-90** and click *Next* at the *New Domain Name* window is displayed.
10. At the *NetBIOS Domain name* window, click *Next*.
11. At the *Database and Log folders* window, click *Next*.
12. At the *Shared System Volume* window, click *Next*.
13. At the *DNS Registration Diagnostics* window, select *Install and configure the DNS server on this computer, and set this computer to use this DNS server as the preferred DNS server* and click *Next*.
14. At the *Permissions* window, click *Next*.
15. At the *Directory Services Restore Mode Administrator Password* window, click *Next*.
16. At the *Summary* window, click *Next*.

The *Active Directory Installation Wizard* is displayed while the installation runs for several minutes.

NOTE

If prompted for the *I386* folder, browse to the *I386* folder on the CD. It may appear to be selected, but you must select the CD/DVD drive, then select the *I386* folder and then click *OK*. (This prompt may occur more than once.)

17. At the *Completing the Active Directory Installation Wizard* window, click *Finish*.
18. At the *Active Directory Installation Wizard* window, click *Restart now*.
19. Log on to the server as **INW domain administrator** (password: **MLCL8273!admin**).
20. Remove **CD-R I386 FOR MS WIN SERVER 2003 SP2 (PN 2046386-001)** from the CD drive.

Update Policies

1. Log on to the server as **Administrator**.
2. Right-click *My Computer* on the Desktop and select *Explore*.
3. Browse to the *C:\Windows\special* folder.
4. Double-click the *ADConfig.hta* script to create the Active Directory users, groups and policies.
5. At the *AD Creation Script* window, click *OK* to run the script.

NOTE

The script will take about a minute to run. Wait for the success message before continuing.

6. At the message, *The ADConfig script for Mac-Lab/CardioLab Product completed successfully*, click **OK**.

This message may appear behind the *Windows Explorer* window.

7. Close the *Windows Explorer* window.
8. Select *Start > Settings > Control Panel*.
9. Double-click *Administrative Tools*.
10. Double-click *Active Directory Users and Computers*.
11. Verify that the new *inw.local* Domain is listed.
12. Expand the *inw.local* Domain and verify the *GE Medical Systems (MLCL)* organizational unit is listed.
13. Browse to *inw.local > GE Medical Systems (MLCL) > MLCL Users* and verify that the following MLCL users are present:
 - MLCLAdmUser
 - MLCLEmergency
 - MLCLLogonUser
 - MLCLSqlUser
 - MLCLTechUser
 - MLCLUser
14. Browse to *inw.local > GE Medical Systems (MLCL) > MLCL Software Groups* and verify that the following MLCL groups are present:
 - MLCLAdmGrp
 - MLCLEmergencyGrp
 - MLCLSystemGrp
 - MLCLUsrGrp
15. Close all open windows.
16. Restart the system to allow policies to take effect.
17. Log on as **Administrator**.

Install MS09-008 for INW Server Domain Controller with DNS Server

1. Ensure you are logged into the INW Server as **Administrator**.
2. Navigate to *C:\Temp*.
3. Install the MS09-008 security patch. Double-click *WindowsServer2003-KB961063-x86-ENU.exe*.
4. Follow the installation instructions, and reboot the INW Server if requested.

Install Microsoft Operating System Updates

Instructions for downloading and installing Microsoft security patches and service packs are listed by product type on http://www.gehealthcare.com/us/en/security/products/modality_links.html. Download and install all applicable patches and service packs.

Change Language

Delete User Profiles

Perform this procedure to change the operating system language if necessary.

All of the following steps to set the Operating System and Mac-Lab/CardioLab language and locale must not be done until the server has been promoted to an Active Directory Domain Controller and the ADConfig tool has been run to configure security and policy settings on the system. Only when this is complete should you follow the steps listed here.

1. Log on to the server as **mlcltechuser**.
2. Select *Start > Settings > Control Panel*.
3. Select *Switch to Classic View*, if not in *Classic* view.
4. Double-click *System*.
5. Click the *Advanced* tab.
6. In the *User Profiles* section, click *Settings*.
7. Select each profile in the list, and click the *Delete* button if it is enabled to delete the profile.

NOTE

The mlcltechuser profile cannot be deleted.

8. Click *OK* to close the *User Profiles* dialog.
9. Click *OK* to close the *System Properties* dialog.

Set Operating System Language

NOTE

The following language settings must be applied for the application to function properly:

- English: United States/United Kingdom
- French: France
- German: Germany
- Italian: Italy
- Spanish: Spain
- Swedish: Sweden
- Chinese: China (PRC)
- Japanese: Japan

1. Double-click *Regional and Language Options*.
2. Select the *Regional Options* tab.
3. In the *Standards and formats* section, select the correct language and locale (for example, *French (France)*) from the dropdown list.
4. In the *Location* section, select the correct locale (for example, *France*).
5. Select the *Languages* tab.
6. Click *Details* button.
7. For Chinese systems only:

If the use of the IME is required, the following steps must be taken to set it up in a manner which is compatible with the operation of the Mac-Lab/CardioLab software:

- a. Click the *Add* button.
- b. Change the Input Language to *Chinese (PRC)*.
- c. Click the *Keyboard Layout / IME* checkbox.
- d. Select *Chinese (Simplified) - Enhanced Unicode IME* from the drop down box.
- e. Click *OK*.
- f. Click the *Add* button.
- g. Click the *Keyboard Layout / IME* checkbox.
- h. Select *Chinese (Simplified) - US Keyboard* checkbox.
- i. Click *OK*.

- j. In the *Default input language* dropdown, select *Chinese (PRC) - Chinese (Simplified) - US Keyboard*.

If the use of the IME is not required, select the desired keyboard layout as appropriate.

8. For all other languages:

In the *Default input language* section, determine if the desired language and locale is listed. If it is not:

- a. Click the *Add* button.
- b. In the *Input language* list, select the appropriate language and locale. If necessary, configure other settings (for example, *Keyboard layout/IME*) as appropriate.
- c. Click *OK* to close this dialog.

9. In the *Default input language* section, select the language and locale.

10. Press *OK* to close this dialog.

11. In the *Languages used in menus and dialogs* section, select the correct language (for example, *Francais*).

12. Select the *Advanced* tab.

13. In the *Language for non-Unicode programs* section, select the correct language (for example, *French (France)*).

14. In the *Default user account settings* section, check the *Apply all settings...* checkbox.

15. If prompted after doing this, click *OK*.

16. Click *OK* to close the *Regional and Language Options* window.

17. If the prompt that *the changes will not take effect until you reboot*, click *OK*.

18. If prompted about copying required files; click *Yes* to use the files that are already on the system.

19. When prompted to restart, click *Yes*.

Set Mac-Lab/CardioLab Database Language

1. Log on to the server as **mlcltechuser**.
2. Right-click *My Computer* and select *Explore*.
3. Browse to the *D:\GEMMS\Prucka\Setup\Language* directory.
4. Double-click the batch file *MLCL_Set_Language.bat* to start the process of setting the Mac-Lab/CardioLab application language.
5. Verify that the language listed is correct (for example, *French*). If so, press any key to begin the process of setting the application language.

NOTE

The process takes several minutes to complete.

6. At the *Language Switch Completed Successfully* message, click *OK*.
7. Log on as **Administrator**. Both the Operating System language and the Mac-Lab/CardioLab application language should now be set correctly.

Restore User Profiles on the INW Server (if backed up previously)

Follow this procedure to restore INW Server account profiles, if previously backed-up.

1. Connect the USB storage device to the INW Server.
2. Log on to the domain as **Administrator**.
3. Launch *Explorer* and navigate to *C:\Documents and Settings*.
4. Copy all profiles, except *Administrator*, from the USB device and paste the profiles in *C:\Documents and Settings*. If prompted to overwrite, click *Yes to All*.
5. Log off the destination INW Server.
6. Log on to the domain as **mlcltechuser**
7. Copy the profile of Administrator from the USB storage device and paste in *C:\Documents and Settings*. If prompted to overwrite, click *Yes to All*.
8. Log off from the INW Server, all profiles are restored.

Configure InSite ExC

Verify with the customer that InSite ExC will be used for Remote Service Support. If no Remote Service Support is needed, proceed to “[Add SQL Licenses \(if needed\)](#)” on page 5-107.

1. Verify you are logged on to the server as Centricity Cardiology INW **domain Administrator** (password: **MLCL8273!admin**).
2. Double-click *Service Console*.
3. Expand the *InSite 2.0* folder and select the *Device Manager* folder in the left pane of the *Service Console* window.
4. Enter the serial number of the Centricity Cardiology INW server and click *Update Serial Number*.
5. Click *OK* in the *Device Manager Confirmation* window.
6. Verify the *Serial Number*, *Name* and *Type* fields.
7. Select the *Configuration Utility* folder in the left pane under *InSite 2.0*.

8. If the hospital uses a proxy server perform the following steps, otherwise continue with step 13.
9. Click the *Proxy Configuration* tab and check *Use a Proxy Server to connect to the Enterprise*.
10. Enter proxy server information.

NOTE

Contact the Hospital IT Department for the proxy address, proxy port and authentication information.

11. Click *Update Proxy* after entering the proxy server information.
12. Click *OK* at the *InSite 2.0 Message* window.
13. Select the *Service Controller* tab in the *Configuration Utility*.
14. Click *Start Service*.
15. Verify the Service has started:
 - a. Wait 10 seconds.
 - b. Select *Check Service Status*.

A confirmation window opens indicating the service is running.
 - c. Click *OK*.
16. Select the *Initiate Remote Service* tab and click *Initiate Remote Service*. Verify that it connects and a *Request submitted successfully* message opens.
17. Close the *Service Console*.

Add SQL Licenses (if needed)

1. Select *Start > Settings > Control Panel*.
2. Double-click *SQL Server 2000 Licensing Setup*.
3. Choose *Licensing Mode*.
4. In the *Licensing Mode* section increase *Per Seat for* number (default is 5) to the total number of licenses needed.
5. Click *Continue*.
6. Once finished, close all open windows.

Perform Necessary Software Updates

Apply all necessary software updates to the Centricity Cardiology INW Server. Refer to the Mac-Lab/CardioLab 6.5.6/6.8.1 Release 3 Update (PN 2027332-533) for the instructions.

Restore Data to the Server

Restore Tape Backup from INW Server

A backup may be restored locally from AIT or from an enterprise backup agent.

The high-level steps for restoring from the backup tapes are:

- Step 1: Restore the last full backup first.
 - Step 2: Then restore the oldest incremental backup made after the full backup.
 - Step 3: Finally, restore each succeeding incremental backup up to the previous night.
 - Step 4: Verify the restore is successful. If it is not, restore the full backup from the previous week.
1. For a single-tape backup, insert the Full Backup tape. If your system requires a multiple-tape backup, insert the first tape.
 2. Select *Start > Programs > Accessories > System Tools > Backup* to open the Backup and Restore wizard. After a few minutes at the Backup and Restore wizard, the *Recognizable Media Found* screen opens.
 3. Select *Allow Backup Utility to use all recognized media* and click *OK*.
 4. Click *Next* to start the restore process.
 5. Select *Restore files and settings* and click *Next*.
 6. Expand the 8mm AIT (for AIT-2 TURBO tapes) or 8mm AIT1 (for all other AIT tapes) to list the tape names under *items to restore*.
 7. Double-click the tape name to catalog the tape.
 8. Double-click *D: Data* to catalog the *GEMMS* directory.
 9. Select the folders to restore:
 - *D:\GEMMS\Prucka\Database\Maintenance\Backup*
 - *D:\GEMMS\Prucka\Database\Maintenance\Log*
 - *D:\GEMMS\Prucka\Studies*and click *Next*.
 10. Click *Advanced*.
 11. Select *Original location* and click *Next*.
 12. Select *Replace existing files* and click *Next*.
 13. Ensure the following are selected:
 - Restore security settings
 - Restore junction points, but not the folders and file data they reference
 - Preserve existing volume mount points

and click *Next, Finish*. The restore begins and the *Restore Progress* screen is displayed.

If the backup spans multiple tapes, insert each tape as requested.

NOTE

Ignore the Mount Waiting message--just insert the next tape. The window closes automatically.

14. Click *close* when the restore is complete.
15. Eject the tape.
16. Repeat steps 1-14 for each incremental backup tape.

Restore Enterprise backup agents

All procedures regarding enterprise backup are the responsibility of the facility Enterprise Backup Manager.

1. Ensure the Enterprise backup folders are restored from previous full, differential, or incremental backups to ensure all data has been recovered to the server.
2. These folders are:
 - D:\GEMMS\Prucka\Database\Maintenance\Backup
 - D:\GEMMS\Prucka\Database\Maintenance\Log
 - D:\GEMMS\Prucka\Studies

Restore Backup Files

Restore the Database Files

Once all previously backed-up files are restored to the server, the database and registry must be restored for the INW server to become fully functional.

1. Right-click *My Computer* and select *Explore*.
2. Go to the *D:\GEMMS\Prucka\Netconfig* folder.
3. Run the *gems_restorelab.bat*. A command prompt screen is displayed.
4. Press **Enter** to continue.

When the restore is complete a confirmation message is displayed.

5. Press **Enter** to continue and close the window.
6. Go to *Start > Programs > Microsoft SQL Server > Enterprise Manager*.
7. Go to *Microsoft SQL Servers > SQL Server Group*.
8. Expand *SQL Server Group*.
9. Expand the local server.

10. Expand *Databases > Clab* and highlight *Tables*.
11. Right-click the *Detail Version* table and select:
Open Table > Return All Rows.

12. Set the following fields:

NetVersion = 0

MachineDBVersion = 00

NOTE

MachineDBVersion must be “00” (two zeros) or the restore will fail.

13. Close all open windows.
14. Run the stop replication batch file on the server:

D:\GEMMS\Prucka\Network\stoprepl.bat

NOTE

This file must be run on the server to complete this procedure. Ignore any error messages displayed.

There will be no indication the batch file ran successfully.

Restore the GEMS Registry Key

1. Double-click the *gems.reg* file located in:

D:\GEMMS\Prucka\Database\Maintenance\Backup

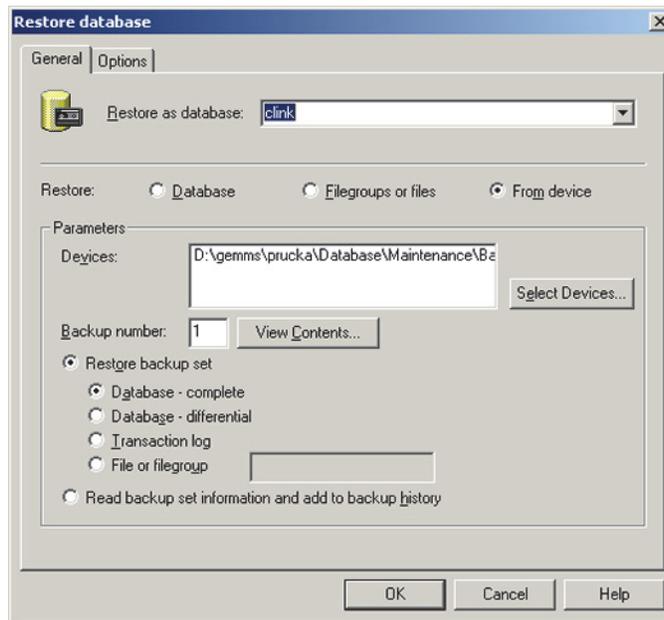
2. Follow on-screen prompts and confirmation messages.

Restore Clink Database

If the file *clinkbackup.bak* exists in *D:\GEMMS\Prucka\Database\Maintenance\Backup*, then perform this procedure. If it does not, proceed to “[Restore LMT Custom Reports](#)” on page 5-113.

1. Select *Start > Programs > Microsoft SQL Server > Enterprise Manager*.
2. In *Enterprise Manager*, navigate to: *Microsoft SQL Servers > SQL Server Group > [Server Name] (local)*.
3. Right-click *Databases* and select *All Tasks > Restore Databases*.

The *Restore Databases* window is displayed.



4. Type *clink* in the *Restore as database* field.
5. Select the *Restore from device* radio button.
6. If necessary, select and delete any entries in the *Devices* field.
7. Click *Select Device*.
8. Click *Add*.
9. Browse to the *clinkbackup.bak* file under
D:\GEMMS\Prucka\Database\Maintenance\Backup.

Before continuing, check the window selections with the screenshot above.

10. Click *OK*.
11. Click *OK*.

A status display indicates restore progress. A confirmation window is displayed when complete.

12. Click *OK*.
13. Right-click *Databases* and select *Refresh*.
14. Expand *Databases* and verify *clink* is shown.

Restore LMT Custom Reports

Skip this procedure if the customer is not using LMT Custom reports. If the customer is using LMT Custom Reports, restore the customer backup of the *clink_drk.mdb* file (or the file backed up earlier in “Backup LMT Custom Reports” on page 5-94) as indicated below.

1. Right-click *My Computer* and select *Explore*.
2. Restore the file to the location from which it was backed up. Refer to “Backup LMT Custom Reports” on page 5-94.

Set Software Options

This section has to be executed only if GEMS registry key was not restored in “Restore the GEMS Registry Key” on page 5-111.

1. Right-click *My Computer* and select *Explore*.
2. Navigate to *D:\GEMMS\Prucka\bin*.
3. Double-click *GEMS_SetServerOptions.exe*.
4. Enter the system HP Proliant Server Serial Number and click *Generate Options*.
5. At completed message, click *OK*.
6. Close the *GEMS_SetServerOptions* program.
7. This utility installed and enabled the CVIS Integration software option. If the hospital is not using CVIS, Launch the *Service Console >GEMS Software Options Management Console* to disable CVIS Integration.
8. Close all open windows.

Configure INW DNS Server with a Forwarder to the Hospital DNS Server IP Address (if applicable)

The trust must be removed from the hospital Domain controller before re-establishing the trust between the INW server and the hospital Domain controller. The trust must be set up on the INW server before re-establishing the trust on the Hospital Domain Controller (contact the hospital system administrator).

The DNS Server IP address is provided by the Hospital Administrator.

1. Log onto the INW server as **Administrator**.
2. Select *Start > Settings > Control Panel > Administrative Tools > DNS*.
3. Right-click the *INW Domain Name Server* (for example, *CLSV####*), and select *Properties*.
4. In the *Properties* window, select the *Forwarders* tab.

5. Enter the IP address of the Hospital DNS Server in the forwarders *IP Address List* and click the *Add* button.
6. Click *OK*.
7. Close the *DNS Management* window.
8. Close the *Administrative Tools* window.
9. Select *Start > Programs > Accessories > Command Prompt*.
10. Verify that from a command prompt you can ping the following by name:
 - a. Hospital Domain Controller (supplied by hospital).
 - b. Hospital DNS Server (supplied by hospital).

NOTE

To do this type **ping <name>** and press **Enter**.

Create Two-Way Trust with Hospital Domain

Before setting up the trust, the INW server must have the hospital server configured as a DNS forwarder as well as the hospital server must have the INW server configured as a DNS forwarder.

1. Select *Start > Settings > Control Panel*.
2. Double-click *Administrative Tools*.
3. Double-click *Active Directory Domains and Trusts*.
4. Right-click the Domain name (that is, *inw.local*), and select *Properties*.
5. In the *Domain Properties* window, select the *Trusts* tab.
6. From the Open window, click the *New Trust* button to start the *New Trust Wizard*.
7. At the *Welcome to the New Trust Wizard* window, click *Next*.
8. Enter the DNS name of the Hospital Domain Controller (if trusting to a Windows 2003/2008 server) in the *Trust Name* window and click *Next*.
9. In the *Direction of Trust* window, leave the default setting *Two-Way* selected and click *Next*.
10. In the *Outgoing Trust Authentication* window, ensure *Domain Wide Authentication* is selected and click *Next*.
11. At the *Trust Password* window, enter the password (contact GE Technical Support or the system administrator for current password information) and click *Next*.
12. At the *Trust Selection Complete* window, click *Next*.
13. At the *Trust Creation Complete* window, click *Next*.

14. At the *Confirm Outgoing Trust* window, select *Yes* and click *Next*.
15. At the *Confirm Incoming Trust* window, select *Yes* and click *Next*.

NOTE

The hospital admin will need to provide the password for the site.

16. At the *Completing The New Trust Wizard* window, click *Finish* to complete.

Create One-Way Trust with Hospital Domain

Before setting up the trust, the INW server must have the hospital server configured as a DNS forwarder as well as the hospital server must have the INW server configured as a DNS forwarder.

1. Select *Start > Settings > Control Panel*. Double-click *Administrative Tools*.
2. Double-click *Active Directory Domains and Trusts*.
3. Right-click the Domain name (that is, *inw.local*), and select *Properties*.
4. In the *Domain Properties* window, select the *Trusts* tab.
5. From the Open window, click the *New Trust* button to start the *New Trust Wizard*.
6. At the *Welcome to the New Trust Wizard* window, click *Next*.
7. Enter the DNS name of the Hospital Domain Controller (if trusting to a Windows 2003/2008 server) in the *Trust Name* window and click *Next*.
8. In the *Direction of Trust* window, select *One-Way (outgoing)* and click *Next*.
9. If the *Sides of Trust* window appears, ensure that *This Domain Only* is selected and click *Next*.
10. In the *Outgoing Trust Authentication Level* window, select *domain-wide authentication* and click *Next*.
11. At the *Trust Password* window, enter the password and click *Next*.
12. At the *Trust Selections Complete* window, click *Next*.
13. At the *Trust Creation Complete* window, click *Next*.
14. At the *Confirm Outgoing Trust* window, select *Yes* and click *Next*.

NOTE

The hospital administrator will need to provide the password for the site.

15. At the *Completing The New Trust Wizard* window, click *Finish* to complete.

Hospital IT Department Setup

Have the Domain Administrator from the Hospital Domain Complete the Domain Trust on the Hospital Domain using the same password that was used on the INW side.

Modify Default_MLCL Computer_Policy

1. Select *Start > Settings > Control Panel*.
2. Double-click *Administrative Tools*.
3. Double-click *Active Directory Users and Computers*.
4. Right-click the INW Domain server and select *Properties*.
5. Select the *Group Policy* tab.
6. Click *Open*.
7. In the *GPMC Interface* window, expand the server Domain tree and locate the *Group Policy Objects* folder.
8. Expand all *Group Policy Objects*.
9. Right-click the *Default_MLCL Computer_Policy* and select *Edit*.
10. In the *Group Policy Object Editor* window, navigate to *Computer Configuration > Windows Settings > Security Settings > Restricted Groups*.
11. Double-click *MLCLAdmGrp*.
12. In the *MLCLAdmGrp Properties* window, under members of this group section, click *Add*.
13. In the *Add Member* window, type in the name of the Hospital Users Groups that was created for you in the Hospital Domain by the Hospital Administrator and click *OK*.

NOTE

For example: *HOSPITALDOMAIN\MLCLAdmGrp*

14. Click *OK* to the *MLCLAdmGrp Properties* window.
15. Double-click *MLCLEmergencyGrp*.
16. In the *MLCLEmergencyGrp Properties* window, under members of this group section, click *Add*.
17. In the *Add Member* window, type in the name of the Hospital Users Groups that was created for you in the Hospital Domain by the Hospital Administrator and click *OK*.

NOTE

For example: *HOSPITALDOMAIN\MLCLEmergencyGrp*

18. Click *OK* to the *MLCLEmergencyGrp Properties* window.

19. Double-click *MLCLUsrGrp*.
20. In the *MLCLUsrGrp Properties* window, under members of this group section, click *Add*.
21. In the *Add Member* window, type in the name of the Hospital Users Groups that was created for you in the Hospital Domain by the Hospital Administrator and click *OK*.

NOTE

For example: *HOSPITALDOMAIN\MLCLUsrGrp*

22. Click *OK* to the *MLCLUsrGrp Properties* window.
23. Double-click *Users*.
24. In the *Users Properties* window, under members of this group section, click *Add*.
25. In the *Add Member* window, type in the name of the Hospital Administrators group previously entered (for example, *HOSPITALDOMAIN\MLCLAdmGrp*) and click *OK*.
26. In the *Add Member* window, type in the name of the Hospital Emergency group previously entered (for example, *HOSPITALDOMAIN\MLCLEmergencyGrp*) and click *OK*.
27. In the *Add Member* window, type in the name of the Hospital Users group previously entered (for example, *HOSPITALDOMAIN\MLCLUsrGrp*) and click *OK*.
28. Click *OK* to the *Users Properties* window.
29. Close all open windows.
30. Select *Start > Programs > Accessories > Command Prompt*.
31. Type **gpupdate /force** and press **Enter**.
32. Close the *Command Prompt*.

Modify Default_MLCL SoftwareOnly_Policy

1. Select *Start > Settings > Control Panel*.
2. Double-click *Administrative Tools*.
3. Double-click *Active Directory Users and Computers*.
4. Right-click the INW Domain server and select *Properties*.
5. Select the *Group Policy* tab.
6. Click *Open*.
7. In the *GPMC Interface* window, expand the server Domain tree and locate the *Group Policy Objects* folder.
8. Expand all *Group Policy Objects*.

9. Right-click the *Default_MLCL SoftwareOnly_Policy* and select *Edit*.
10. In the *Group Policy Editor* window, navigate to *Computer Configuration > Windows Settings > Security Settings > Restricted Groups*.
11. Double-click *MLCLAdmGrp*.
12. In the *MLCLAdmGrp Properties* window, under members of this group section, click *Add*.
13. In the *Add Member* window, type in the name of the Hospital Users Groups that was created for you in the Hospital Domain by the Hospital Administrator and click *OK*.

NOTE

For example: *HOSPITALDOMAIN\MLCLAdmGrp*

14. Click *OK* to the *MLCLAdmGrp Properties* window.
15. Double-click *MLCLEmergencyGrp*.
16. In the *MLCLEmergencyGrp Properties* window, under members of this group section, click *Add*.
17. In the *Add Member* window, type in the name of the Hospital Users Groups that was created for you in the Hospital Domain by the Hospital Administrator and click *OK*.

NOTE

For example: *HOSPITALDOMAIN\MLCLEmergencyGrp*

18. Click *OK* to the *MLCLEmergencyGrp Properties* window.
19. Double-click *MLCLUsrGrp*.
20. In the *MLCLUsrGrp Properties* window, under members of this group section, click *Add*.
21. In the *Add Member* window, type in the name of the Hospital Users Groups that was created for you in the Hospital Domain by the Hospital Administrator and click *OK*.

NOTE

For example: *HOSPITALDOMAIN\MLCLUsrGrp*

22. Click *OK* to the *MLCLUsrGrp Properties* window.
23. Double-click *Users*.
24. In the *Users Properties* window, under members of this group section, click *Add*.
25. In the *Add Member* window, type in the name of the Hospital Administrators group previously entered (for example, *HOSPITALDOMAIN\MLCLAdmGrp*) and click *OK*.

26. In the *Add Member* window, type in the name of the Hospital Emergency group previously entered (for example, *HOSPITALDOMAIN\MLCLEmergencyGrp*) and click *OK*.
27. In the *Add Member* window, type in the name of the Hospital Users group previously entered (for example, *HOSPITALDOMAIN\MLCLUsrGrp*) and click *OK*.
28. Click *OK* to the *Users Properties* window.
29. Close all open windows.
30. Select *Start > Programs > Accessories > Command Prompt*.
31. Type **gpupdate /force** and press **Enter**.
32. Close the Command Prompt.

Reconfigure Centricity Cardiology INW Network

Remove each Acquisition System and Review Workstation from the Domain

Each Acquisition system and Review (as well as Software Only reviews configured in the INW domain) workstation must be removed from the Domain, and then added back to the Domain.

Change the System from a Domain to Workgroup

1. At the Acquisition system or Review workstation, log on to the Windows OS and the Mac-Lab/CardioLab Custom Shell as **local mcltechuser**.
2. Right-click *My Computer* and select *Properties*.
3. Select the *Computer Name* tab.

NOTE

Do not change the computer name in the next step.

4. Click the *Change* button.

The *Computer Name Changes* window is displayed.

5. In the *Member of* section, select the *Workgroup* radio button, enter *MLCL* as the workgroup name and click *OK*.

Enter the log on as **mcltechuser** when prompted.

6. Click *OK*.
7. Click *OK* at the confirmation message to restart the computer.
8. Click *OK*.

The member change takes about 1 minute. A *Welcome to the workgroup* window is displayed when complete.

9. Click *OK* at the *System Properties* window to close.

10. Click *Yes* to restart the system.

Windows will attempt to auto-logon, but the logon will fail.

11. Click *OK* to the message and log on to the Windows OS and the Mac-Lab/CardioLab Custom Shell as **local mlcltechuser**.

Delete Unrecognizable User Names

1. Right-click *My Computer* and select *Manage*.
2. Expand *Local Users and Groups* and select *Groups*.
3. Open the first group and delete any member names that begin with *??*.
4. Repeat for all other groups.
5. Close the *Computer Management* window.

Reset sqlserveragent Service (Acquisition Systems only)

Perform this procedure on Acquisition systems only.

1. Verify you are logged on as **mlcltechuser**.
2. Select *Start > Settings > Control Panel*.
3. Double-click *Administrative Tools*.
4. Double-click *Services*.
5. Right-click *sqlserveragent* and select *Properties*.
6. Select the *Log On* tab.
7. Select the *Local System Account* radio button and click *Apply*.
8. Select the *General* tab and click *Start* to start the *sqlserveragent* service.
9. Click *OK* to close the dialog.

Configure DNS Entry on Each Acquisition System and Review Workstation

1. Select *Start > Settings > Network Connections*.
2. Right-click *Local Area Connection* and select *Properties*.
3. Highlight *Internet Protocol (TCP/IP)* and click *Properties*.
4. Verify that the entry for the preferred DNS server is the IP address of the Centricity Cardiology INW Server.
5. Click *OK*.
6. Click *OK* to close the *Local Area Connections Properties* window.
7. Close the *Network Connections* window.

Add Each Acquisition and Review (including Software Only) back into the Domain

1. Verify that you are logged on to Windows as **mlcltechuser**.

NOTE

This should be the **local mlcltechuser** account (that is, log on to the computer not the Domain.)

2. Right-click *My Computer* on the desktop and select *Properties*.
3. Select the *Computer Name* tab.
4. Click the *Change* button.
5. In the *Member of* section, select the *Domain* radio button, enter the name of the INW Domain to join and click *OK*.

NOTE

The default Domain is *inw.local*

6. When prompted, type the username **mlcltechuser** and password.
7. At the *Welcome to inw* message, click *OK*.
8. At the restart message click *OK*.
9. At the *System Properties* window, click *OK*.
10. At the *Do you want to restart now?* message click *Yes*.
11. After the system restarts, at the Mac-Lab/CardioLab Custom Shell window, press **Ctrl + Action + Delete** and click *Logoff*.
12. Click *Logoff*.
13. Immediately hold the **Shift** key to stop the auto-logon sequence.
14. Log on to the Windows OS and the Mac-Lab/CardioLab Custom Shell as **local mlcltechuser**.

Run Scripts

Perform the following steps on both Acquisition and Review (including Software only) systems.

The next steps are required to reset internal settings changed by previously run scripts.

1. Ensure you are logged on as **local mlcltechuser**.
2. Open a command prompt.

3. Type:

```
secdit[sp]/configure[sp]/  
db[sp]"C:\Windows\Special\secdit.sdb"[sp]/  
cfg[sp]"C:\Windows\Security\Templates\cardiosec.inf"[sp]/  
overwrite[sp]/quiet
```

and press **Enter** (Note: [sp] = one space).

This command takes about 5 minutes to run. The scripts are complete when the *C:* prompt returns.

4. Restart the system.
Windows will attempt to auto-logon, but the logon may fail.
5. If necessary, click *OK* to the message.
6. Log on to Windows and the Mac-Lab/CardioLab Custom Shell as **domain mlcltechuser**.

Synchronize Time

Perform the following steps on both Acquisition and Review (including Software Only) systems.

1. Select *Start > Programs > Accessories > Command Prompt*.
2. Type **net time /set** and press **Enter**.
3. When asked to sync with the server, type **y** and press **Enter**.

NOTE

This process may take up to 2 minutes to complete.

4. Close the *Command Prompt* window.

Add Acquisition System and Reviews (including Software Only) to GE MLCL Organizational Unit

1. At the server, log on as **Administrator**.
2. Select *Start > Settings > Control Panel*.
3. Double-click *Administrative tools*.
4. Double-click *Active Directory Users and Computers*.
5. Expand the domain name (default is *inw.local*).
6. Click the *Computers* folder and locate the Acquisition system/Review workstations to add.
7. Expand the *GE Medical Systems (MLCL)* organizational unit.
8. Expand the *MLCL Computers*.
9. Expand the *MLCL Workstations*.

10. Drag and drop the computer names from the *Computers* folder to the *MLCL Acquisition workstations* or *MLCL Review workstations* folder as appropriate.
11. Close all open windows.
12. Restart each Acquisition system and Review workstation that was added to the organizational unit in the previous step.
13. After restart on each system, press **Ctrl + Action + Delete**, logoff as **mlcllogonuser**.
14. Click *Logoff*.
15. Immediately hold down the **Shift** key.
16. Log on to the Windows OS and the Mac-Lab/CardioLab Custom Shell as **local mlcltechuser**.

Confirm Domain Security Policy

On the Acquisition and Review (including Software Only) systems, perform the following steps:

1. Right-click *My Computer* on the Desktop and select *Manage*.
2. Select *System Tools > Local Users and Groups > Groups*.
3. Right-click *Administrators* and select *Properties*.
4. Verify that the following members are shown in the list:
 - INW\Domain Admins
 - INW\mlclsqluser
 - INW\mlcltechuser
5. If the members are not shown, go to the “[Domain Troubleshooting](#)” on page 5-124.
6. If the members were displayed correctly, log on to the Domain using the steps below and skip “[Domain Troubleshooting](#)” on page 5-124. Go to “[Register SQL Server](#)” on page 5-125
 - a. Press **Ctrl + Action + Delete** and click *Logoff*.
 - b. Click *Logoff*.
 - c. Immediately hold the **Shift** key to stop the auto-logon sequence.
 - d. Log on to Windows and the Mac-Lab/CardioLab Custom Shell as **domain mlcltechuser**.

Domain Troubleshooting

1. Verify that the Acquisition system is in the correct Domain:
 - a. Right-click *My Computer* on the Desktop and select *Properties*.
 - b. Verify that on the *Computer Name* tab the *INW Domain* is present.
2. Verify that the Acquisition system shows up in the *GE Medical Systems (MLCL)* Organizational Unit on the server.
3. On the server, open a command prompt window and type **gpupdate /force** and press **Enter**.
4. Restart the Acquisition systems, wait 7 minutes and check the policy again as described in “[Confirm Domain Security Policy](#)” on page 5-123. If the policy is still not correct proceed to the next step.
5. Verify that the TCP/IP properties on the server are set correctly:
 - a. The INW server IP must be configured as the preferred DNS server.
 - b. The subnet mask must be correct as defined by the hospital IT staff.
6. Verify that the TCP/IP properties on the Acquisition are set correctly:
 - a. The IP subnet mask of the Acquisition system **MUST** match exactly the subnet mask of the server.
 - b. The IP address of the Acquisition system must be manually configured and must fall within the subnet of the server as defined by the subnet mask.
 - c. The gateway of the Acquisition system must be set to the IP address of the server or another machine on the hospital network.
 - d. The DNS of the Acquisition system must be set to the IP address of the INW server.
 - e. In the CARTO System and TRAMNet IP settings, make sure that the *Internet Protocol (TCP/IP)* checkbox is the **ONLY** item selected in the *This connection uses the following items:* list.
7. Verify that the INW server and Acquisition system can communicate.

8. Open a command window on the Acquisition system and type **ping <servername>** and press **Enter**.
 - a. A *Request timed out* message indicates failure, a *Reply from* message indicates success.

NOTE
If success, verify that the reply from IP address shown matches the server's IP address and if correct skip the reset of the sub steps below.
 - b. If step a failed, repeat with the servername replaced with the correct IP address of the server **ping <###.###.###.###>** and press **Enter**.
 - c. If steps a and b both failed, there is a problem with the IP address or the physical network. Repeat the above steps to verify the TCP/IP properties of the server and Acquisition system.
 - d. If step a fails and step b succeeds, there is a problem with DNS setup. Repeat the TCP/IP properties steps above paying careful attention to the DNS setup.
9. Verify that the time and time zone settings on the server and the Acquisition system match:
 - a. If they do not match, open a command prompt on the Acquisition system and type **net time /set** and press **Enter**.
 - b. Restart the Acquisition system, wait 7 minutes and check the policy again in “**Confirm Domain Security Policy**” on page 5-123- if the policy is still not correct proceed to the next step.
10. If the policy is still not correct after all previous steps:
 - a. Remove the Acquisition system from the Domain and back to workgroup *CARDIOLAN*.
 - b. Restart the Acquisition system.
 - c. Delete the Acquisition system name for the OU on the server.
 - d. Repeat the instructions for adding the Acquisition system to the Domain.

Start Replication

Register SQL Server

Verify you are logged on to each Acquisition system as **domain mlcltechuser** before adding the system to replication.

1. At the Server, select *Start > Programs > Microsoft SQL Server > Enterprise Manager*.
2. Navigate to *Microsoft SQL Servers > SQL Server Group*.
3. Right-click the *default (LOCAL) server* entry if present and select *Delete SQL Server Registration*.

4. At the confirmation window, click *Yes*.
5. Right-click *SQL Server Group* and select *New SQL Server Registration*.
6. At the *Welcome* screen, click *Next*.
7. Click *Add* to select the server.
Server name should show up automatically in the textbox.
8. In the *Select SQL Server* window, select the Acquisition system and click *Add*.

If the Acquisition system name does not appear in the list, type the name in the textbox and click *Add*.
9. Once all systems are added, click *Next*.
10. At the *Select an Authentication mode* window, select *SQL Server login information* and click *Next*.
11. At the *Select Connection Option* window, select *Logon automatically*.
12. Type **sa** as the account and enter the password (contact GE Technical Support or the system administrator for current password information) and click *Next*.
13. At the *Select SQL Server Group* window, click *Next*.
14. At the *Completing the Register SQL Server Wizard* window, click *Finish*.
15. Close the *Register SQL Server Messages* window.
16. Close *Enterprise Manager*.

Add each Acquisition System to Replication on the INW Server

1. Double-click *Service Console* on the Desktop.
2. Navigate to *Console Root > Create Replica > Replication Setup* in the left frame.

The right frame should show the *Replication utility* with the top *Service User Login* section active.
3. Log on as **mlclsquser** (Contact GE Technical Support or the system administrator for current password information) and click the *Login* button.

The top *Login* section should now be inactive and the bottom section will be active with a *password validated* message.
4. Click *Add*.
5. Browse to *My Network Places > Entire Network > Microsoft Windows Network > [current Domain]* and select an Acquisition system to add to replication and click *OK*.

6. When prompted for consolidation, click *Yes* to move all studies on the currently selected Acquisition system up to the server.
7. The selected machine is now shown in the *Add to replication* list box.
8. Repeat the steps above for each additional Acquisition system to add to replication.
9. Click *Apply*.
10. Click *Yes* to confirm replication.

The process may take up to 5 minutes per Acquisition system. A progress bar indicates replication status.

When complete, a *Replication setup complete* message will be displayed above the progress bar and the server and all Acquisition systems will appear in the *Currently replicating list*.

11. Close the *Service Console* window.

Verify Replication Started Correctly

Verify

1. Select *Start > Programs > Microsoft SQL Server > Enterprise Manager*.
2. Open *Microsoft SQL Servers > SQL Server Group*.
3. Highlight the server name.
4. Expand *Replication Monitor > Agents > Merge Agents*.
5. Verify that there are no red X's displayed against any system's Merge agent.
6. If there are no errors in the replication monitor, continue with "[Post Configuration Procedures](#)" on [page 5-128](#).
7. If there are red X's displayed against all merge agents, verify that SQLSERVERAGENT service is running on the server. If the SQLSERVERAGENT service is not running on the server, start the service and restart replication setup (refer to "[Stop Replication](#)" on [page 5-127](#)).

Stop Replication

To stop replication, launch the replication setup:

1. At the server, open the *Service Console* and select *Create Replica > Replication Setup*.
2. Log on to the Service Console as **mlclsquser** (password **sql8273user**).
3. If necessary, highlight all acquisition systems (for example, CLWS0001) in the list of currently replicating systems. Click *Remove*. Click *Yes* at the confirmation window.

4. Refresh the window (click another folder in the tree and then click *Replication Setup* again) to verify all acquisition systems have been taken out of replication.
5. Close the *Service Console*.
6. Go to the *Enterprise Manager* and stop server replication:
 - a. Select *Start > Programs > Microsoft SQL Server > Enterprise Manager*.
 - b. Expand *Microsoft SQL Servers* and the *SQL Server Group*. Highlight the *INW Server* (in the left window).
 - c. Select *Tools > Replication > Disable Publishing*.
 - d. Click *Next*.
 - e. Select *Yes, disable publishing on [Server name]* and click *Next*.
 - f. Click *Next* in the *Confirm Dropping of Publications* window.
 - g. Click *Finish* in the *Completing the Disable Publishing and Distribution Wizard* window.
 - h. Click *OK* to the *Successfully Disabled* window.
 - i. Right-click the server name and select *Refresh*.
 - j. Verify the *Replication Monitor* is not visible.
 - k. Close the *SQL Server Enterprise Manager* window. Proceed to “[Add each Acquisition System to Replication on the INW Server](#)” on page 5-126.

Post Configuration Procedures

Reconfigure Hospital Mapped Drives on the Server (If Applicable)

1. At the server, right-click *My Computer* and select *Map Network Drive*.
2. In the *Drive* section, select an available drive letter.
3. In the *Folder* section, enter the path to the folder set up on the foreign server.
4. Click *Finish*.

Configure Archive Utility User

1. Select *Start > Settings > Control Panel*.
2. Double-click *Administrative Tools*.
3. Double-click *Services*.
4. Double-click the *GEMS Task Scheduler* service.

5. Set the *Startup Type* to *Automatic*.
6. Select the *Log On* tab.
7. Click the *This account* radio button.
8. In the *UNDER THIS ACCOUNT TYPE* box, enter **<Domain>\MLCLSQLUSER**.
9. Type the password: **sql8273user**.
10. Click *OK*.
11. Right-click *GEMS Task Scheduler* service and click *Start*.
12. Close all open windows.

Configure Database Maintenance on the Server

1. At the server Desktop, go to *Start > Programs > Microsoft SQL Server > Enterprise Manager*.
2. Expand the INW server.
3. Expand *Management*.
4. Expand *SQL Server Agent*.
5. Select *Jobs*.
6. Right-click *Database Maintenance Job* and select *Properties*.
7. Select the *Schedules* tab.
8. Click *New Schedule*.
9. In the *Name:* textbox, type *Database Maintenance*.
10. Click the *Change* button.
11. In the *Occurs:* section, select the *Weekly* radio button.
12. In the *Weekly:* section, select only the *Sat* checkbox.
13. In the *Daily Frequency:* section, select a time at least 30 minutes after the last archive generator is run.
14. Click *OK*.
15. At the *New Job Schedule* window, verify *Enable* is checked and click *OK*.
16. Select the *General* tab, and verify *Enable* is checked.
17. At the *Database Maintenance Properties* window, click *OK*.

NOTE

Ensure the schedule does not overlap with the following jobs:

- Archive Generator on all Acquisition systems
- Archive Utility on the server
- Backups on the server

Configure Database Backup Job

1. Right-click *Backup clab, clink databases and GEMS registry job* and select *Properties*.
2. Select the *Schedules* tab.
3. Click *New Schedule*.
4. In the *Name:* textbox, type *Database Backup*.
5. Click *Change*.
6. In the *Occurs:* section, select the *Daily* radio button.
7. In the *Daily Frequency:* section, select a time at least 30 minutes after the last Archive Generator is run and must not overlap with the server Database Maintenance schedule.
8. Click *OK*.
9. At the *New Job Schedule* window, verify *Enabled* is checked and click *OK*.
10. Select the *General* tab, and verify *Enable* is checked.
11. In the *Backup clab, clink databases and GEMS registry job* window click *OK*.
12. Right-click *Backup Master and MSDB Databases job* and select *Properties*.
13. Select the *Schedules* tab.
14. Click *New Schedule*.
15. In the *Name:* textbox, type ***Backup Master and MSDB Databases***.
16. Click *Change*.
17. In the *Occurs:* section, select the *Monthly* radio button.
18. In the *Monthly Frequency:* Last Sunday of "1" Month.
19. In the *Daily Frequency:* section, set the time to 3:10 pm.
20. Click *OK*.
21. At the *New Job Schedule* window, verify *Enabled* is checked and click *OK*.
22. Select the *General* tab, and verify *Enable* is checked.

23. Click *OK*.
24. Close *Enterprise Manager*.

Recommended Backup Schedule

GE Healthcare recommends the following schedule for a facility with a server and four Acquisition systems based on a 5-day, single-shift work-week.

NOTE

The following schedules are staggered because the Archive Generator must not be scheduled to start within 5 minutes of the clock hour and at 12:05 am. Also, more than one Archive Generator must not run at the same time.

1. Daily (Monday Night-Tuesday Morning through Thursday Night-Friday Morning):
 - 11:10 pm: Archive Generator on AC1 (the archive generator schedule was set when the Acquisition computer was installed or upgraded).
 - 11:40 pm: Archive Generator on AC2
 - 12:10 am: Archive Generator on AC3
 - 12:40 am: Archive Generator on AC4
 - 2:10 am: Run the *Backup clab, clink databases and GEMS registry job*.
 - 3:10 am: Incremental Backup on the Server.
2. Weekly (Friday Night-Saturday Morning)
 - 11:10 pm: Archive Generator on AC1
 - 11:40 pm: Archive Generator on AC2
 - 12:10 am: Archive Generator on AC3
 - 12:40 am: Archive Generator on AC4
 - 1:10 am: Run the *Database Maintenance* job.
 - 2:10 am: Run the *Backup clab, clink databases and GEMS registry job*.
 - 3:10 am: Full Backup on the Server. 50 GB of data takes approximately 2 hours.
3. Monthly (Last Sunday of the Month)
 - 3:10 pm: Run the *Backup Master and MSDB databases* job.
 - This job may be run concurrently with other jobs.

Create Backup Tapes and Schedule Backups

These instructions show how to configure a full tape backup using single or multiple tapes as well as the incremental tape backups.

CAUTION

PROCEDURE FAILURE — Please be advised that tape backup requires human intervention.

- For full backups that use single tape and incremental backups the user has to insert appropriate tapes on daily basis for backups to run successfully.
 - For full backups that use multiple tapes, in addition to inserting the appropriate tapes the user has to manually prepare the additional tapes.
-
-

Determine Number of Tapes Needed for Full Backup

1. Login on to the server as **Administrator**.
2. Right-click *My Computer* and select *Explore*.
3. Browse to
 - a. *D:\GEMMS\Prucka\Studies*
 - b. *D:\GEMMS\Prucka\Database\Maintenace\Backup*
 - c. *D:\GEMMS\Prucka\Database\Maintenace\Log*

For each of these folders right-click the folder and choose *Properties* to view the size of the folder.

4. If the total size of the *Studies*, *Backup* and *Log* folders from the above step is greater than the tape size, then multiple tapes will be needed for full backups.

Physically Label the Backup Tapes

Place a sticker on each tape with the labels listed below, then perform the procedures below for each tape.

- Tuesday Incremental. Backups normally run in the early morning, so the tape is actually put in the drive at the end of the previous day (in this case, Monday evening.)
- Wednesday Incremental
- Thursday Incremental
- Friday Incremental
- Full Backup 1 (Full Backup 1 - 2, Full Backup 1 - 3, and so on for additional tapes in case of multiple tape backups)
- Full Backup 2 (Full Backup 2 - 2, Full Backup 2 - 3, and so on for additional tapes in case of multiple tape backups)

- On Demand Backup (On Demand Backup - 2, On Demand Backup - 3, and so on for additional tapes in case of multiple tape backups)

NOTE

When labeling the tapes, it is important to use a consistent naming convention. If consistent names are not used, the procedures below will fail.

Catalog Backup Tapes

This procedure runs a dummy backup to label (name) the tape and create an initial catalog. This backup will be overwritten when the actual backup is run.

NOTE

The tapes are automatically formatted during this procedure.

1. Open the *Backup Utility* by selecting *Start > Programs > Accessories > System Tools > Backup*.
2. If the Backup application opens in Wizard mode, click *Advanced Mode*.
3. Insert the first tape (for example the one labeled Full Backup 1) into the tape drive. Wait for a message to be displayed.
4. If the message *Unrecognized Media Found* is displayed, accept any confirmation messages and check the *Restore and Manage Media* tab and confirm the tape is listed under Free Media. Skip the next step.
5. If the message *Recognizable Media Found* is displayed:
 - a. Select *Allow Backup Utility to Use this Media*
 - b. Click *OK*. The media is displayed under 8mm AIT (for AIT-2 TURBO tapes) or 8mm AIT1 (for all other AIT tapes).
 - c. Right-click the media and select *Mark as Free* and click *Yes* to confirm.
6. Go to the *Backup Utility Welcome* tab.
7. Click *Backup Wizard*.
8. Click *Next*.
9. Select *Backup selected files, drives, or network data* and click *Next*.
10. In the *Items to Back Up* window expand *My Computer* and select a sample folder to backup (this is done just to assign a name to the tape. The actual backup is performed below. Use the *D:/Gemms/Prucka/Database/Maintenance/Log* folder for example). Click *Next*.
11. Select *8mm AIT (for AIT-2 TURBO tapes) or 8mm AIT1 (for all other AIT tapes)* for the backup type and *New* for the tape to use. Then click *Next*.
12. Click *Advanced*.

13. Click *Next* for the next three screens (accept the defaults).

CAUTION

BACKUP FAILURE — All label names must be written exactly the same or the backup will fail.

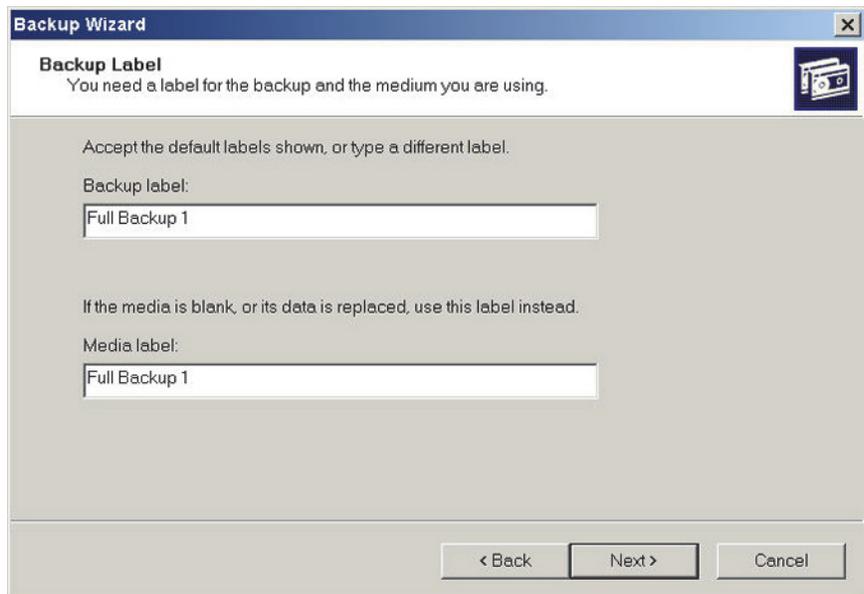
Ensure the name written on the outside of the tape, the backup label, the media label, and the job name all match exactly.

14. Change the backup label and media label to the name written on the label on the outside of the tape (In this case Full Backup 1). Click *Next*.

NOTE

For multiple tape backups, name the first tape as Full Backup 1 or Full Backup 2 or On Demand Backup as the case might be. Then for additional tapes:

- For Full Backup -1 as Full Backup 1 - 2, Full Backup 1 - 3, and so on
- For Full Backup -2 as Full Backup 2 - 2, Full Backup 2 - 3, and so on
- For On Demand Backup as On Demand Backup - 2, On Demand Backup - 3, and so on



15. At the *When To Backup* dialog box, click *Now*.

16. Click *Finish*. When the backup is complete, click *Close*.

17. Eject the tape.

18. Repeat this procedure for each remaining tape so that all tapes labeled earlier in “**Physically Label the Backup Tapes**” on page 5-132 are cataloged (including the additional tapes that will be used in multiple tape backups).

Configure storage to Automatically Return Backup Media to the Free Media Pool

1. Right-click *My Computer* and select *Manage*.
2. Double-click *Removable Storage*.
3. Double-click *Media Pools*.
4. Double-click *Backup*.
5. Right-click the media pool *8mm AIT (for AIT-2 TURBO tapes)* or *8mm AIT1 (for all other AIT tapes)* and choose *Properties*.
6. In the *General* tab check the *Return media to Free media pool* check box.
7. Press *Apply* and choose *OK*.
8. Close the *Computer Management* dialog box.

Schedule Backups

This procedure sets the schedule for the backups to run. When performing this procedure for each tape note the following:

- Ensure the tape labels are typed in accurately. If the tape name is different the backups won't run.
- Be sure to set the start time for Full Backup 2 to one week after Full Backup 1, otherwise both backups will try to run on the same day.
- Check all backup options carefully. When performing this procedure for each tape, the defaults may reset.

NOTE

If the full backup for this server is a single tape backup you can start with an incremental backup -- a full backup is not necessary to start the backups. All selected files and folders are backed up, so an initial full backup is not required. But if you expect to use multiple tapes for full backup then a full backup should be executed first, as incremental backups are not configured to span multiple tapes. Based on this suggested schedule, the “On Demand Backup” (a full backup) is executed after scheduling the jobs, and will serve as the first full backup.

1. Go to the *Backup Utility Welcome* tab.
2. Click *Backup Wizard*.
3. Click *Next*.
4. Select *Backup selected files, drives, or network data* and click *Next*.

5. In the *Items to Back Up* window click *My Computer* and select the following folders:
 - *D:\Gemms\Prucka\Database\Maintenance\Backup*
 - *D:\Gemms\Prucka\Database\Maintenance\Log*
 - *D:\Gemms\Prucka\Studies*
6. Click *Next*.
7. Select *8mm AIT (for AIT-2 TURBO tapes)* or *8mm AIT1 (for all other AIT tapes)* and select the name of the backup tape (for example, Full Backup 1) from the dropdown list. For multiple tape full backups pick the first tape. For example for Full Backup 1 pick the tape that is labeled as Full Backup 1. Then click *Next*.

NOTE

It is very easy in this step to forget to select the tape name and leave the default 'New' in.

8. Click the *Advanced* button.
9. Select the type of backup:
 - Normal for Full Backup 1, Full Backup 2, and On Demand Backup.
 - Incremental for daily Incremental backups.and click *Next*.
10. Select *Verify Data after Backup* and *Use Hardware Compression* (if available) and click *Next*.
11. Select *Replace Existing Backups* and click *Next*.

CAUTION

BACKUP FAILURE — All label names must be written exactly the same or the backup will fail.

Ensure the name written on the outside of the tape, the backup label, the media label, and the job name all match exactly.

12. Change both the backup label and media label to the tape name used when labeling the tape (for example, Full Backup 1) and click *Next*.
13. Select *Later* and enter the job name (for example, Full Backup 1 or Tuesday Incremental) for the backup name. Then click *Set Schedule*.
14. Schedule the task:

For Full Backup 1 select:

 - Weekly
 - Every 2 Weeks
 - Saturday (ensure no other days are checked)
 - Appropriate Start Time

For Full Backup 2 select:

- Weekly
- Every 2 Weeks
- Saturday (ensure no other days are checked)
- Appropriate Start Time
- Click the *Advanced* button and change the start day to the Friday following the first Full Backup 1. For example, if Full Backup 1 runs Saturday, May 1, then the start day for Full Backup 2 must be Friday May 7 (the start day should be the day before the backup is scheduled to run).

For each incremental backup, select:

- Weekly
- Every 1 Week
- The appropriate day (Tuesday-Friday)
- Appropriate Start Time

For On Demand Backup select:

- Once
- Tonight
- Appropriate Start Time

15. Click *OK*.
16. Enter the **administrator** password (**MLCL8273!admin**) and click *Next* (the password will be requested again) and click *OK*.
17. Click *Finish*.
18. Repeat the above steps for the remaining tapes. **DO NOT** repeat for all tapes in multiple tape full backups. Create only one job for a set of full backup tapes.
19. When all jobs are created continue with the next procedure below.

Multiple Tape Preparation

Execute these instructions for multiple tape full backup scenarios. It prepares the additional tapes for first time use. Not preparing the tape will cause failure of the full tape backup that uses multiple tapes.

NOTE

Nothing has to be changed for the first tape that will be used for full backup and for the tapes that will be used in incremental backups.

1. Ensure all tapes of a multi-tape backup are the same model.
2. Verify that you are logged on to the server as *Administrator*.

3. Prepare the additional tapes in the order they will be used, First prepare additional tapes for On Demand Backup (On Demand Backup - 2, On Demand Backup - 3, and so on) then additional tapes for full backup 1 (Full Backup 1 - 2, Full Backup 1 - 3, and so on) and then for Full Backup 2 (Full Backup 2- 2, Full Backup 2- 3, and so on).

NOTE

It is important that the additional tapes are prepared in the order they will be used by the backup jobs otherwise the backup job will prompt for a wrong tape.

- a. Insert the tape.
- b. Right-click *My Computer* and select *Manage*.
- c. Drop-down the *Removable Storage* under *Storage*.
- d. Click *Media*.

NOTE

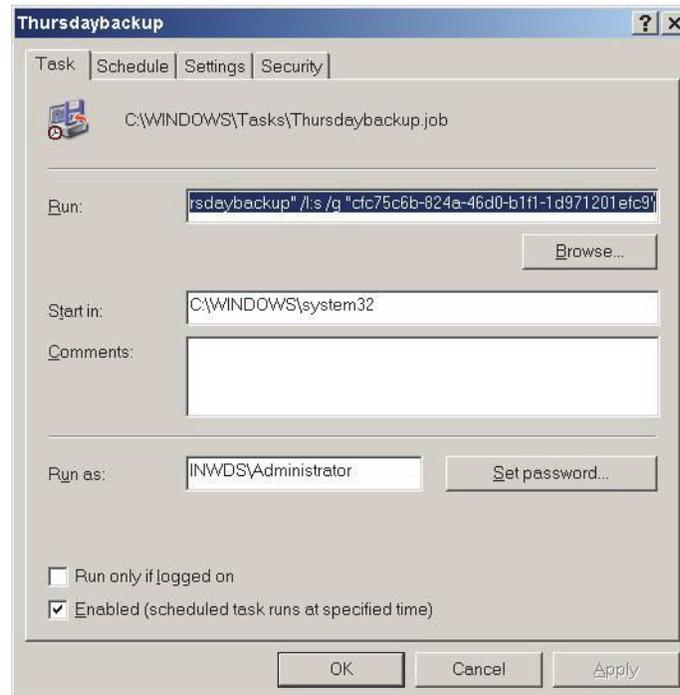
It may take up to 1 minute for the system to recognize the tape.

- e. Right-click the *Media* (tape) that was just inserted and select *Properties*.
- f. Ensure *Enable Media* is checked.
- g. Click *OK* and close the *Properties* dialog.
- h. Right-click the tape being prepared and select *All Tasks > Deallocate*. Select *Yes* to the confirmation dialogs.
- i. Verify that the tape just de-allocated is listed under *Free \ 8mm AIT/AIT1 Media* pool.
- j. Eject the tape.
- k. Repeat these steps for each additional tape (2nd and 3rd tape) that will be part of the full backups.

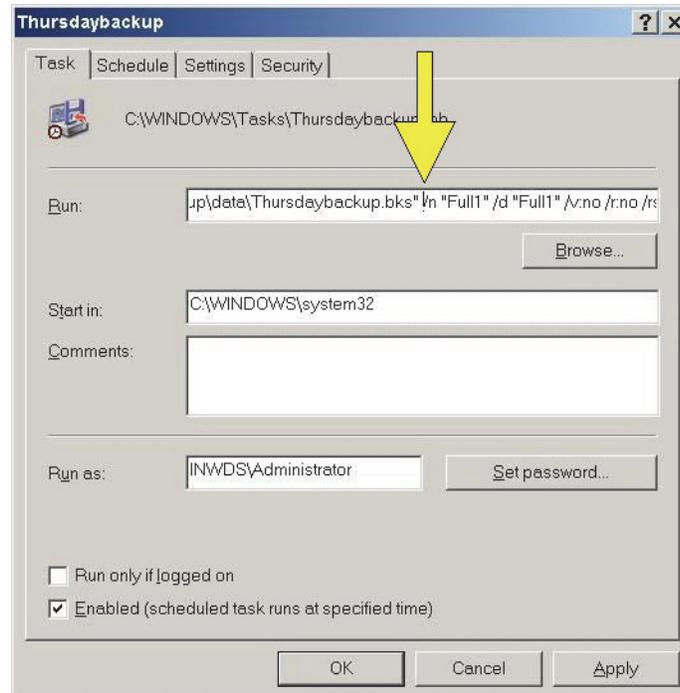
Add the /UP Switch

1. In the Control Panel, under *Scheduled Tasks* right-click a scheduled full backup task and select *Properties* (since Incremental backups do not exceed one tape in length, those tasks will not be altered. Even if the current full backup doesn't exceed one tape add the /UP switch, this will prompt for additional tape when the size of backup grows in future and exceeds the size of a single tape).

The following dialog box appears (the values within quotes on the command line in the run text box will be different between all systems).



2. In the *Run* text box, locate the */n* switch right after the path for the **.bks* file.

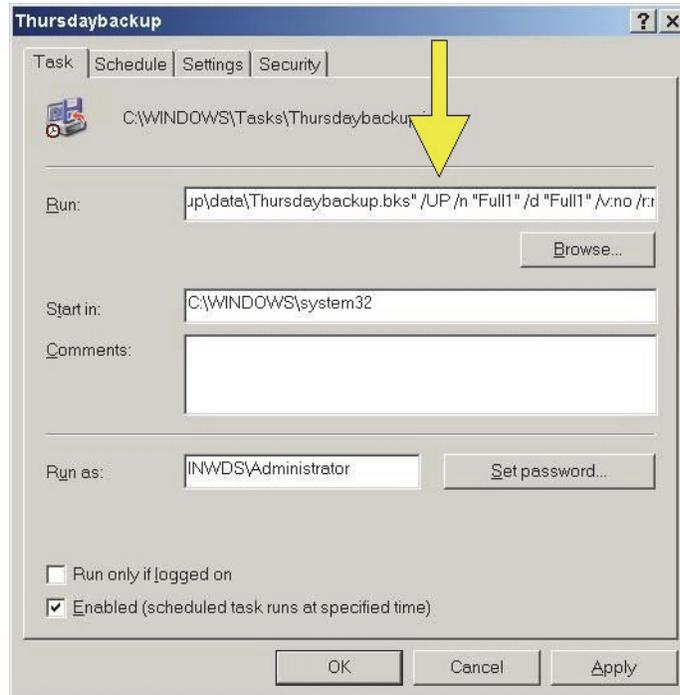


3. After the .bks" and before the /n place the /UP (case-sensitive) switch.

NOTE

Make sure there is a space before and after the /UP switch.

Example: .bks"<space>/UP<space>/n



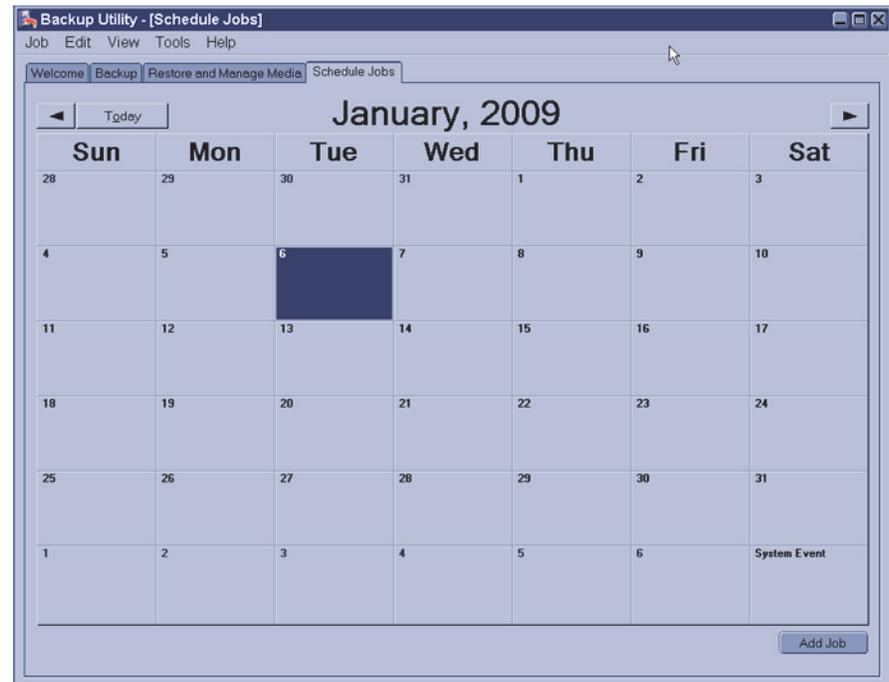
4. Click *Apply*. Enter the Administrator password when prompted for it and close out of the dialog box.
5. Repeat these steps to set the /UP switch for each full backup task (including the On Demand Backup).

Verify Backup Schedule

NOTE

The Schedule Jobs tab may not always refresh automatically. If the jobs are not displayed correctly, close the Backup Utility and then reopen it.

Click the *Schedule Jobs* tab. The schedule should look like this:



The schedule can be verified or modified in the following ways:

- The blue “N” indicates a Normal (that is, Full) backup. The green “I” indicates an Incremental backup.
- Roll the cursor over each backup event. The name of the backup schedule is displayed. Ensure each incremental backup takes place on the appropriate day and Full Backup 1 and Full Backup 2 occur on alternate Saturdays.
- Click on one instance of each event to view the details. Go to the Schedule tab to ensure the schedule is correct.
- At the schedule tab, the schedule may be adjusted, if necessary. An incorrect schedule name (typo, and so on) can not be changed. The backup must be deleted and recreated.

Run the Backup Job at the Server

This procedure creates database and registry backup files.

1. Select *Start>Programs>Microsoft SQL Server>Enterprise Manager*.
2. Expand *Microsoft SQL Servers* and the *SQL Server Group*. Highlight *INW Server* in the left pane.
3. Under the server, navigate to *Management>SQL Server Agent>Jobs*.
4. Right-click the *Backup clab, clink databases, and GEMS registry* job and select *Start Job*.
5. Click *Start* at the confirmation window.
6. Wait for the *Backup* job to complete before continuing with the next step.

NOTE

This job can take up to 20 minutes to run. The status will not automatically update. To view the status, right-click the job and select *Refresh Job*. When the job is completed *Succeeded* is displayed in the *Last Run Status* column.

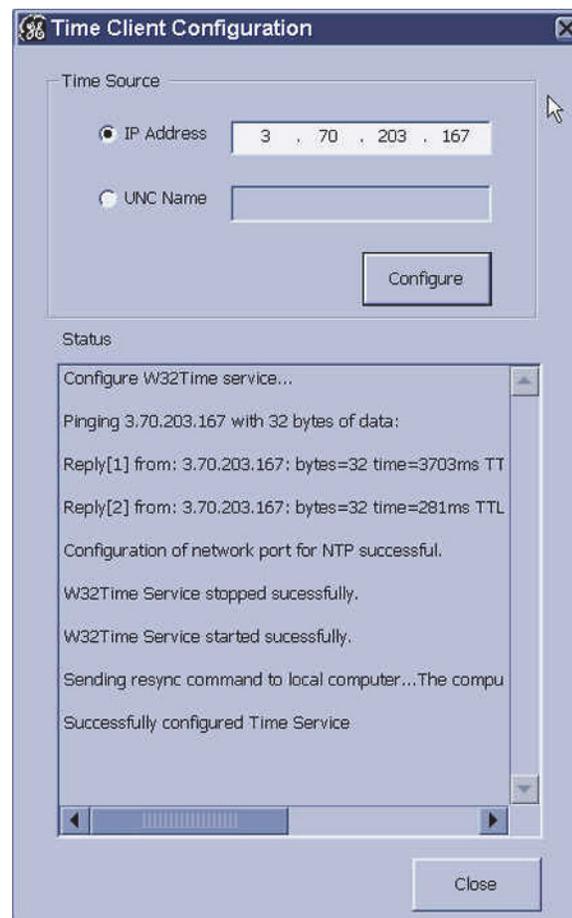
7. Minimize the *Enterprise Manager*.
8. Verify the following files with the timestamp from today are in the backup directory:
D:\GEMMS\Prucka\Database\Maintenance\Backup.
 - clabbackup.bak
 - clinkbackup.bak (if the LMT database is installed)
 - Gems.reg
9. Close all open windows.

For Each Acquisition System and Review System (Including Software Only)

The time has to be re-synchronized using this section only if the environment uses static IP and the server IP was changed during disaster recovery.

1. Log in to both the OS and custom shell as domain **mlcltechuser**. Ensure the Mac-Lab/CardioLab application is not running.
2. Right-click *My Computer* and select *Explore*.
3. Navigate to *D:\GEMMS\Prucka\Setup\TimeSynchronization*.

4. Double-click the file *TimeClientConfig.exe*. This tool will perform the following:
 - Checks for Administrator logon.
 - Does a backup of the existing registry entries pertaining to Windows Time Service.
 - Updates the required registry entries to configure Windows Time Service.
 - Verifies one of the registry keys to ensure the registry update was successful.
 - Enables/Configures UPD port 123 in the **Windows Firewall** on Windows XP SP3 system.
 - Stops and Starts the W32Time service.
 - Runs the w32tm command to update the Windows Time Service to look at the update configuration, re synchronize, and rediscover the time source.



5. In a fixed-IP network, select the radio button for IP Address, and enter the IP address of the INW server. For a DHCP network, select the radio button for the UNC name and enter the name of the INW server.

NOTE

In a DHCP environment, the UNC name must be used since it is likely that the IP address will change.

6. Click the *Configure* button.
7. When the configuration completes, the status will indicate that the time settings were updated successfully.
8. Close all open windows.
9. Time Sync Configuration is now complete. Proceed to the next section.

Initialize Applications

Adobe Reader, Microsoft Word, and Microsoft Word Reports must be initialized under both **mlcllogonuser** and **mlcltechuser** logons.

Adobe Reader

1. Press Ctrl + Action + Delete.
2. Click *Logoff*.
3. Click *Logoff*.
4. Immediately hold down the **Shift** key.
5. Log on to the Windows as **domain mlcltechuser** (password: **mlcl!techuser**).
6. Log on to the Mac-Lab/CardioLab Custom Shell as **domain mlcltechuser** (password: **mlcl!techuser**).
7. Select *Start > Programs* and select *Adobe Reader 9*.
8. Accept the *End User License Agreement* if displayed.

After *Adobe Reader* opens, wait one minute to ensure a *Check for Update* dialog box is not displayed. If the dialog box is displayed, click *Cancel*.

9. Close *Adobe Reader*.

Microsoft Word

1. Select *Start > Programs* and select *Microsoft Word*.

NOTE

For Microsoft Office 2007 Professional, select *Start > Programs > Microsoft Office Word 2007*.

2. Accept the *End User License Agreement* if displayed.

3. Click *OK* if the *User Initial* dialog box is displayed.
4. If the *Privacy Option* dialog box opens, clear the *Search Microsoft Online For Help* check box, if it appears.
5. Close *Microsoft Word*.

Microsoft Word Reports

Perform this procedure on multiple monitor systems only.

1. Double-click *Mac-Lab/CardioLab*.
2. Select *Administration > Reports > Templates*.
If prompted for an administrator password enter **local mlcltechuser** (password: **mlcl!techuser**).
3. If a server busy message is displayed. Click *Retry*. Microsoft Word will open.
4. Configure the Microsoft Word window for the Review monitor:
 - a. Right-click the Microsoft Word title bar and select *Restore*.
 - b. Move the Microsoft Word window to the next monitor (from the real-time monitor to the Review monitor).
 - c. Right-click the Microsoft Word title bar and select *Maximize*.
5. Close Microsoft Word.
6. When prompted to save the report, click *No*.
7. Close the Mac-Lab/CardioLab application.

Adobe Reader

1. Press **Ctrl + Action + Delete**.
2. Click *Logoff*.
3. Click *Logoff*.
Allow the system to auto-log on to Windows as **domain mlcllogonuser**.
4. Log on to the Mac-Lab/CardioLab Custom Shell as **domain mlcluser** (password: **mlcl!user**).
5. Select *Start > Programs* and select *Adobe Reader 9*.
6. Accept the *End User License Agreement* if displayed.

After *Adobe Reader* opens, wait one minute to ensure a *Check for Update* dialog box is not displayed. If the dialog box is displayed, click *Cancel*.

7. Close *Adobe Reader*.

Microsoft Word

1. Select *Start > Programs* and select *Microsoft Word*.

NOTE

For Microsoft Office 2007 Professional, select *Start > Programs > Microsoft Office Word 2007*.

2. Accept the *End User License Agreement* if displayed.
3. Click *OK* if the *User Initial* dialog box is displayed.
4. If the *Privacy Option* dialog box opens, clear the *Search Microsoft Online For Help* check box, if it appears.
5. Close *Microsoft Word*.

Microsoft Word Reports

Perform this procedure on multiple monitor systems only.

1. Double-click *Mac-Lab/CardioLab*.
2. Select *Administration > Reports > Templates*.

If prompted for an administrator password enter **local mlcltechuser** (password: **mlcl!techuser**).

3. If a server busy message is displayed. Click *Retry*. Microsoft Word will open.
4. Configure the Microsoft Word window for the Review monitor:
 - a. Right-click the Microsoft Word title bar and select *Restore*.
 - b. Move the Microsoft Word window to the next monitor (from the real-time monitor to the Review monitor).
 - c. Right-click the Microsoft Word title bar and select *Maximize*.
5. Close Microsoft Word.
6. When prompted to save the report, click *No*.
7. Close the *Mac-Lab/CardioLab* application.

Enable the Network Path on each Acquisition System

1. Go to each Acquisition system and log on to Windows and the Mac-Lab/CardioLab Custom Shell as INW **domain mlcltechuser**.
2. Open the Mac-Lab/CardioLab application.
3. Go to *Administration > System Settings*.
4. Select *File Paths*.
5. Select *Enable Network Storage* checkbox.
6. Close the *System Settings* window.
7. Switch the *Catalog View* from *System* to *Network* to verify the network catalog is displayed.

Review Studies on Acquisition Systems

All studies performed on the Acquisition system since the last successful server backup (full or incremental) that were restored must be reviewed from optical or DVD. These are the studies performed since the last backup and not restored as part of the recovery procedure. This procedure must be performed on each Acquisition system.

NOTE

This procedure must also be performed for studies performed while the server was being recovered.

1. At the Acquisition system double-click *Mac-Lab/CardioLab* to open the Mac-Lab/CardioLab application.
2. Switch the catalog to optical.
3. Select the first patient on the list and verify the proper module is selected (Mac-Lab or CardioLab).
4. Click *Review Study*.
5. After the study loads, select *Study > Close Study*.
6. Select *Yes* at the confirmation window.
7. Repeat this procedure for the remainder of the studies listed.

Delete Temporary Users from each Acquisition System

1. Log on to the Windows OS and the Mac-Lab/CardioLab Custom Shell as INW **domain mlcltechuser**.
2. Right-click *My Computer* and select *Manage*.
3. Choose *Local Users and Groups*.
4. Choose *Users*.
5. Highlight *Tempuser*.

6. Right-click *Tempuser* and delete. A confirmation message is displayed.
7. Click *Yes* to delete.

Cardiovascular Information System (CVIS) Configuration

If configuring a CVIS system outside of the US or English Canada, use the “[Non-US \(or English Canada\) CVIS Configuration](#)” on page 5-153.

Use this procedure to re-configure CVIS systems in the US and English Canada. If no configuration is required, go to “[Perform On Demand Backup](#)” on page 5-155.

US (or English Canada) CVIS Reconfiguration

Remove INW Users/Groups from the DMS Shared Directories

If the system included a CVIS server it must be reconfigured. Determine the CVIS Network configuration. Possible configurations include:

- The CVIS server is part of the INW domain. On the CVIS server, right-click *My Computer*, go to *Properties > Network Identification* tab and check to see if the CVIS server was part of the INW domain.
 - The CVIS Server was part of a two-way trust relationship with the facility and the INW server.
1. Logon to the DMS server as **local MuseAdmin** (password **Muse!Admin**).
 2. Open *Windows Explorer* in the DMS Express server.
 3. Navigate to *D:\Mac-Lab\Import*.
 4. Right-click the *Import* folder.
 5. Select *Sharing*.
 6. Select the *Permissions* button.
 7. Highlight all INW Users and Groups and click *Remove*.
 8. Click *OK*.
 9. Select the *Security* tab.
 10. Highlight all INW Users and Groups and click *Remove*.
 11. Click *OK*.
 12. Navigate to *D:\Program Files\GE Medical Systems\Report_Router\Bin\List Sharing*.
 13. Right-click the *List Sharing* folder.
 14. Select *Sharing*.

15. Select the *Permissions* button.
16. Highlight all INW Users and Groups and click *Remove*.
17. Click *OK*.
18. Select the *Security* tab.
19. Highlight all INW Users and Groups and click *Remove*.
20. Click *OK*.
21. Close all open windows.

Remove the CVIS Server from the INW Domain

If the CVIS is in the INW Active Directory Domain, it must be removed from the Domain, and then added back to the Domain.

1. Log on as **local MuseAdmin** (password: **Muse!Admin**).
2. Right-click *My Computer* and select *Properties*.
3. Select the *Computer Name* tab.
4. Click the *Change* button.

The *Computer Name Changes* window is displayed.

5. In the *Member of* section, select the *Workgroup* radio button, enter **CARDIOLAN** as the workgroup name and click *OK*.

Enter the log on as **MuseAdmin** (password **Muse!Admin**) if prompted.

6. Click *OK*.

The member change takes about 1 minute. A *Welcome to the workgroup* window is displayed when complete.

7. Click *OK*.
8. Click *OK* at the confirmation message to restart the computer.
9. Click *OK*.
10. Click *OK* at the *System Properties* window to close.
11. Click *Yes* to restart the system.
12. Log on as **local MuseAdmin** (password: **Muse!Admin**).

Delete Unrecognizable User Names

1. Right-click *My Computer* and select *Manage*.
2. Expand *Local Users and Groups* and select *Groups*.
3. Open the first group and delete any member names that begin with a question mark "?".
4. Repeat for all other groups.

5. Close the *Computer Management* window.

Add CVIS Server to the INW Domain

1. Right-click *My Computer* and select *Properties*.
2. Select the *Computer Name* tab.
3. Click the *Change* button.

The *Computer Name Changes* window is displayed.

4. In the *Member of* section, select the *Domain* radio button, enter the INW Domain name and click *OK*.
5. Click *OK*.

The member change takes about 1 minute. A *Welcome to the Domain* window is displayed when complete.

6. Click *OK*.
7. Click *OK* at the confirmation message to restart the computer.
8. Click *OK*.
9. Click *OK* at the *System Properties* window to close.
10. Click *Yes* to restart the system.

Configure the Import Share on the CVIS Server

The following users or groups are from the INW domain:

- MLCLTechUser
 - MLCLUsrGrp
 - MLCLAdmGrp
 - MLCLSystemGrp
1. Log onto as local MuseAdmin to the English US (and English Canada) CVIS server (Contact GE Technical Support or the system administrator for current password information).
 2. Open *Windows Explorer* on the US (and English Canada) CVIS server Interface or Express Server.
 3. Navigate to *D:\Mac-Lab\Import*.
 4. Right-click the *Import* folder.
 5. Select *Sharing*.
 6. Remove all existing entries.
 7. Click the *Permissions* button.
 8. Click the *Add* button.
 9. Select the INW domain from the dropdown.

10. Multi-select the following users/groups:
 - MLCLTechUser
 - MLCLUsrGrp
 - MLCLAdmGrp
 - MLCLSystemGrp
11. Click the *Add* button.
12. Click the *OK* button.
13. Highlight each added user and check the *Full Control* checkbox.
14. Remove the *Everyone* group if listed under the Share.
15. Click *OK*.
16. Select the *Security* tab.
17. Remove all existing entries.
18. Click *Add*.
19. Select the INW domain from the dropdown.
20. Multi-select the following users/groups:
 - MLCLTechUser
 - MLCLUsrGrp
 - MLCLAdmGrp
 - MLCLSystemGrp
21. Click *Add*.
22. Click *OK*.
23. Highlight each added user and check the *Full Control* checkbox.
24. Click *OK*.
25. Click *OK*.

Configure the US (and English Canada) CVIS List Sharing Share

The following users or groups are from the INW domain:

- MLCLTechUser
 - Administrator
 - MLCLSqlUser
1. Log onto as **local MuseAdmin** to the US (and English Canada) CVIS server.
 2. Open *Windows Explorer* on the US (and English Canada) CVIS server Interface or Express Server.
 3. Navigate to *D:\Program Files\GE Medical Systems\Report_Router\Bin\List Sharing*.

4. Right-click the *List Sharing* folder.
5. Select *Sharing*.
6. Select the *Permissions* button.
7. Remove all existing entries.
8. Click *Add*.
9. Select the INW domain from the dropdown.
10. Multi-select the following users/groups:
 - MLCLTechUser
 - Administrator
 - MLCLSqlUser
11. Click *Add*.
12. Click *OK*.
13. Highlight each added user and check *Full Control* checkbox.
14. Remove the *Everyone* group if listed under the Share.
15. Click *OK*.
16. Select the *Security* tab.
17. Remove all existing entries.
18. Click *Add*.
19. Select the INW domain from the dropdown.
20. Multi-select the following users/groups:
 - MLCLTechUser
 - Administrator
 - MLCLSqlUser
21. Click *Add*.
22. Click *Close*.
23. Highlight each added user and check *Full Control* checkbox.
24. Click *OK*.
25. Click *OK*.

Add CVIS Server to Centricity Organizational Unit on the INW Server

1. At the server, log on as **Administrator**.
2. Select *Start > Settings > Control Panel*.
3. Double-click *Administrative tools*.
4. Double-click *Active Directory Users and Computers*.

5. Expand the domain name (default is *inw.local*).
6. Click the *Computers* folder and locate the DMS server to add.
7. Drag and drop the DMS server from the *Computers* folder to the *Centricity OU* folder.
8. Close all open windows.
9. Restart the DMS server.

Configure CVIS Central List Management on the INW Server

1. At the INW server, double-click *Service Console* on the Desktop.
2. Navigate to *GEMS Central List Management > Central List Setup*.
3. In the *CVIS Server Export Directory* click the... button to browse.
4. Browse to the path on the US (and English Canada) CVIS server.
This may be a mapped drive or the UNC name.
5. In the *Location* dropdown box, select the appropriate location for the hospital.
6. Click *Update Lists*.
7. Close the *Service Console* window.

Check List Management Service Status

1. Go to *Control Panel > Administrative Tools > Services*.
2. Verify the Gems Task Scheduler is running.
3. Verify the Central List Management Service is running.

Non-US (or English Canada) CVIS Configuration

Refer to Non-US (or English Canada) CVIS Installation manual for steps to install the Server and its clients.

Record the following information for the Non-US (or English Canada) CVIS Server:

Configure Central List Management

Perform the following steps to configure Central List Management:

1. Double-click *Service Console* on the Desktop.
2. Navigate to *GEMS Central List Management > Central List Setup*.
3. In the *CVIS Server Export Directory* click the... button to browse.
4. Browse to the path on the non-US (or English Canada) CVIS server.

This may be a mapped drive or the UNC name.

5. In the *Location* dropdown box, select the appropriate location for the hospital.
6. Click *Update Lists*.

The *Update Lists* button must be clicked on the Mac-Lab/CardioLab system each time the lists are updated on the US (or English Canada) CVIS server. Ensure this is done while the application is not running.

7. Close the *Service Console* window.

Check List Management Service Status

1. Go to *Control Panel > Administrative Tools > Services*.
2. Verify the GEMS Task Scheduler is running.
3. Verify the Central List Management Service is running.

Perform On Demand Backup

CAUTION

SYSTEM PERFORMANCE DEGRADATION — A full backup takes several hours (depending on the amount of data to backup. Running a full backup while procedures are being performed may cause the system to slow unacceptably.

Always perform a full backup at a time when no procedures will be performed for several hours.

1. For single tape On Demand Backup insert the On Demand Backup tape and for multiple tape On Demand Backup insert the first tape.
2. Open the Control Panel by browsing to *Start > Settings > Control Panel*.
3. In the Control Panel double-click *Scheduled Tasks*.
4. To start the backup job:
 - a. Right-click the *On Demand Backup* task.
 - b. Select *Properties*.
 - c. Select the *Schedule* tab.
 - d. Assign a schedule to start the job in 3 to 5 minutes.
 - e. When prompted for the **Administrator** password, enter the password.
 - f. Select *Apply*.
 - g. Click *OK* to close the dialog.
5. For multiple tape On Demand Backup: When prompted for the additional tape, insert the additional tape.
6. For multiple tape On Demand Backup: When the multiple tape backup finishes the backup tape must be verified. To verify the backup, insert the tapes as prompted.
7. For single and multiple tape On Demand Backup: Check the On Demand Backup job log to verify that it completed successfully. To view the log file:
 - a. Launch backup from *Start > Programs > Accessories > System Tools > Backup*.
 - b. In the backup utility drop down Tools menu click *Reports*. This will list the reports for each backup job.
 - c. Open the log file for the On Demand Backup job.

Verify Backups Ran Successfully

After each backup tape runs for the first time, check the following the next day to ensure the backup ran successfully:

1. View the tape backup log file. To view the log file:
 - a. Launch backup from *Start > Programs > Accessories > System Tools > Backup*.
 - b. In the backup utility drop down Tools menu click *Reports*. This will list the reports for each backup job.
 - c. Review the log file for the tape backup job to verify that the backup was performed successfully.
2. For Full Backups: Restore several files from the tape to an alternate location (such as *D:\Temp*). Only restore the Backup folder and the 20 most recent patient folders.

NOTE

Do not restore the whole backup as the server hard drive may run out of space. Make sure you delete the files after verification.

3. Verify the following files are in the backup directory:
D:\GEMMS\Prucka\Database\Maintenance\Backup.

- *clabbackup.bak*

NOTE

Check the timestamp and the size of the *clabbackup.bak* file after every backup to ensure the database was backed up successfully.

- *clinkbackup.bak* (if the LMT database is installed)
- *Gems.reg*

Update Operator Manuals

This script has to be executed for updating the Mac-Lab, CardioLab or Centricity Cardiology INW Operator's manual. To apply these changes, use the **DVD ML/CL APPLICATION INSTALL 6.5.6** (PN 2049051-001).

1. Log on as a **local Administrator** to Windows as well the Custom Shell.

Ensure all programs are closed.

2. Insert the **DVD ML/CL APPLICATION INSTALL 6.5.6** (PN 2049051-001) into the DVD-ROM drive.
3. Browse to the DVD drive and double-click *UserManualUpdate.wsf*.
4. A message box will open stating, *System will now update the user manuals*.
Click *Yes* to install, *No* to quit.
5. Click *Yes* at the message box.
6. On completion of the update, a message box stating *User manuals updated* will open.
7. Click *OK*.

System Checkout

Verify Functionality

At Acquisition or Review systems, all system testing should be done as **mlcllogonuser** (not **mlcltechuser**). Before starting the checkout procedure, verify you are logged on to Custom Shell as **mlcllogonuser** (password: **mlcl!logonuser**).

General

1. Verify that a full tape backup has been performed on the Centricity Cardiology INW server, and that no errors exist in the logs.
2. Verify all systems (Acquisitions and Reviews) are set to the Network catalog.
3. Create a test study on one of the Acquisition system and close the study.
4. Verify the new study is displayed on the network catalog on the other systems (Acquisitions and Reviews).
5. Verify that a study that has been archived to the Centricity Cardiology INW server can be reviewed from all systems (Acquisitions and Reviews).

6 Parts List

NOTE

For parts information for HP xw8200 and HP xw8000 computers, refer to the Mac-Lab/CardioLab/Centricity Cardiology INW Service Manual v6.5 (PN 2021423-022).

HP z600 Computer with ADA Drive

Part Number	Description
2057729-002	ASSY CL/ML ACQ CMPTR Z600 ADA
2057729-004	ASSY CL/ML IMAGECAP CMPTR Z600 ADA
2057729-005	ASSY CL/ML CARDIOICE CMPTR Z600 ADA
MAC-LAB/CARDIOLAB Computers	
2050338-001	160GB SATA HDD, 7200 RPM, 3.5" (Hard Drive)
2050338-002	FRU WD 600GB SATA HDD, 10K RPM, 3.5"
2057730-001	DISK DRIVE PANASONIC ADA LKM-KB23
2021462-001	DISK DVD-RAM CARTRIDGE 9.4 GB FORMATTED
2026539-001	OPTICAL USB SCROLL MOUSE ALL (HP #32617-005)
2050334-001	FRU HP REAR SYSTEM FAN KIT (HP #519559-001)
422310-001	MOUSEPAD GE HEALTHCARE
2038834-001	EQPMT, BARCODE SCANNER 3800G USB (replaces PS2 Version 2003417-001 EQPMT, BARCODE SCANNER)
2014935-002	PCB COMM PCI
2009937-003	PCB TRAMNET TO ETHERNET ADAPTER
2003587-001	CABLE, MULTICONDUCTOR, DB-44, M-M, 2.5 FT.
2047766-001	BRACKET NIC/COMM ML/CL COMPUTER
2049434-001	CARD VIDEO, MATROX M9120 QUAD PCIE 512MB
2017899-001	KIT, IMAGE CABLING ACCESSORIES CABLE DVI-I MALE TO 5 BNC FEMALES (2018060-001) CABLE BNCM TO BNCM, MIN RG-59 COAX, 50FT (2003411-001)
2050333-001	FRU HP 1GB DDR3-1333, 240-PIN, ECC DIMM
2050333-002	FRU HP 2GB DDR3-1333, 240-PIN, ECC DIMM
2050335-001	FRU HP MEMORY MODULE FAN KIT
2050336-001	FRU HP Z600 POWER SUPPLY 650-WATT, PFC
2050337-001	FRU HP Z600 MOTHERBOARD, 1333MHZ FSB

Part Number	Description
CARDIOIMAGE Computer	
2049435-001	CARD, VIDEO, MATROX ODYSSEY eA
CARDIOICE Computer	
2031725-001	CARD, VIDEO, MATROX SOLIOS EA
Keyboards	
2045812-001	LABEL KEYBOARD CUSTOMER SUPPORT ML/CL
CARDIOLAB Keyboards from Language Kits	
2045802-002	CARDIOLAB KEYBOARD (replaces 2003809-002)
2045802-009	GERMAN CARDIOLAB KEYBOARD (replaces 2003810-009)
2045802-008	FRENCH CARDIOLAB KEYBOARD (replaces 2003810-008)
2045802-011	ITALIAN CARDIOLAB KEYBOARD (replaces 2003810-011)
2045802-010	SPANISH CARDIOLAB KEYBOARD (replaces 2003810-010)
2045802-019	CHINESE CARDIOLAB KEYBOARD (replaces 2003810-019)
2045802-016	SWEDISH CARDIOLAB KEYBOARD (replaces 2003810-016)
COMBOLAB Keyboards from Language Kits	
2045802-003	COMBOLAB KEYBOARD (replaces 2003809-003)
2045802-005	GERMAN COMBOLAB KEYBOARD (replaces 2003809-005)
2045802-004	FRENCH COMBOLAB KEYBOARD (replaces 2003809-004)
2045802-007	ITALIAN COMBOLAB KEYBOARD (replaces 2003809-007)
2045802-006	SPANISH COMBOLAB KEYBOARD (replaces 2003809-006)
2045802-021	CHINESE COMBOLAB KEYBOARD (replaces 2003809-021)
2045802-018	SWEDISH COMBOLAB KEYBOARD (replaces 2003809-018)
MAC-LAB Keyboards from Language Kits	
2045802-001	MACLAB KEYBOARD (replaces 2003809-001)
2045802-013	GERMAN MACLAB KEYBOARD (replaces 2003809-013)
2045802-012	FRENCH MACLAB KEYBOARD (replaces 2003809-012)
2045802-015	ITALIAN MACLAB KEYBOARD (replaces 2003809-015)
2045802-014	SPANISH MACLAB KEYBOARD (replaces 2003809-014)
2045802-020	CHINESE MACLAB KEYBOARD (replaces 2003809-020)
2045802-017	SWEDISH MACLAB KEYBOARD (replaces 2003809-017)

HP z600 Computer with DVD-RAM Drive

Part Number	Description
2048962-002	ASSY CL/ML ACQ CMPTR HP Z600
2055263-002	ASSY CL/ML ACQ CMPTR Z600 PURCH
2048962-004	ASSY CL/ML CARDIOIMAGE CMPTR HP Z600
2055263-004	ASSY CL/ML CARDIOIMAGE CMPTR Z600 PURCH
2048962-005	ASSY CL/ML CARDIOICE CMPTR HP Z600
2055263-005	ASSY CL/ML CARDIOICE CMPTR Z600 PURCH
MAC-LAB/CARDIOLAB Computers	
2050338-001	160GB SATA HDD, 7200 RPM, 3.5" (Hard Drive)
2050338-002	FRU WD 600GB SATA HDD, 10K RPM, 3.5"
2028599-002	DISK DRIVE PANASONIC SW-9576
2021462-001	DISK DVD-RAM CARTRIDGE 9.4 GB FORMATTED
2026539-001	OPTICAL USB SCROLL MOUSE ALL (HP #32617-005)
2050334-001	FRU HP REAR SYSTEM FAN KIT (HP #519559-001)
422310-001	MOUSEPAD GE HEALTHCARE
2038834-001	EQPMT, BARCODE SCANNER 3800G USB (replaces PS2 Version 2003417-001 EQPMT, BARCODE SCANNER)
2014935-002	PCB COMM PCI
2009937-003	PCB TRAMNET TO ETHERNET ADAPTER
2003587-001	CABLE, MULTICONDUCTOR, DB-44, M-M, 2.5 FT.
2047766-001	BRACKET NIC/COMM ML/CL COMPUTER
2049434-001	CARD VIDEO, MATROX M9120 QUAD PCIE 512MB
2017899-001	KIT, IMAGE CABLING ACCESSORIES CABLE DVI-I MALE TO 5 BNC FEMALES (2018060-001) CABLE BNCM TO BNCM, MIN RG-59 COAX, 50FT (2003411-001)
2050333-001	FRU HP 1GB DDR3-1333, 240-PIN, ECC DIMM
2050333-002	FRU HP 2GB DDR3-1333, 240-PIN, ECC DIMM
2050335-001	FRU HP MEMORY MODULE FAN KIT
2050336-001	FRU HP Z600 POWER SUPPLY 650-WATT, PFC
2050337-001	FRU HP Z600 MOTHERBOARD, 1333MHZ FSB

Part Number	Description
CARDIOIMAGE Computer	
2049435-001	CARD, VIDEO, MATROX ODYSSEY eA
Keyboards	
2045812-001	LABEL KEYBOARD CUSTOMER SUPPORT ML/CL
CARDIOLAB Keyboards from Language Kits	
2045802-002	CARDIOLAB KEYBOARD (replaces 2003809-002)
2045802-009	GERMAN CARDIOLAB KEYBOARD (replaces 2003810-009)
2045802-008	FRENCH CARDIOLAB KEYBOARD (replaces 2003810-008)
2045802-011	ITALIAN CARDIOLAB KEYBOARD (replaces 2003810-011)
2045802-010	SPANISH CARDIOLAB KEYBOARD (replaces 2003810-010)
2045802-019	CHINESE CARDIOLAB KEYBOARD (replaces 2003810-019)
2045802-016	SWEDISH CARDIOLAB KEYBOARD (replaces 2003810-016)
COMBOLAB Keyboards from Language Kits	
2045802-003	COMBOLAB KEYBOARD (replaces 2003809-003)
2045802-005	GERMAN COMBOLAB KEYBOARD (replaces 2003809-005)
2045802-004	FRENCH COMBOLAB KEYBOARD (replaces 2003809-004)
2045802-007	ITALIAN COMBOLAB KEYBOARD (replaces 2003809-007)
2045802-006	SPANISH COMBOLAB KEYBOARD (replaces 2003809-006)
2045802-021	CHINESE COMBOLAB KEYBOARD (replaces 2003809-021)
2045802-018	SWEDISH COMBOLAB KEYBOARD (replaces 2003809-018)
MAC-LAB Keyboards from Language Kits	
2045802-001	MACLAB KEYBOARD (replaces 2003809-001)
2045802-013	GERMAN MACLAB KEYBOARD (replaces 2003809-013)
2045802-012	FRENCH MACLAB KEYBOARD (replaces 2003809-012)
2045802-015	ITALIAN MACLAB KEYBOARD (replaces 2003809-015)
2045802-014	SPANISH MACLAB KEYBOARD (replaces 2003809-014)
2045802-020	CHINESE MACLAB KEYBOARD (replaces 2003809-020)
2045802-017	SWEDISH MACLAB KEYBOARD (replaces 2003809-017)

HP xw8400 Computer

Part Number	Description
2034493-001	ASSY CL/ML REVIEW CMPTR HP XW8400
2034493-002	ASSY CL/ML ACQ CMPTR HP XW8400
2034493-004	ASSY CL/ML CARDIOIMAGE CMPTR HP XW8400
2037934-001	ASSY CMPTR CLAB/MLAB REVIEW (DVD-RAM drive)
2037934-002	ASSY CMPTR CLAB/MLAB ACQUISITION (DVD-RAM drive)
2037934-003	ASSY CMPTR CLAB/MLAB ACQUISITION W/ IMAGE IN (DVD-RAM drive)
2037934-004	ASSY CMPTR CLAB/MLAB ACQ. W/ IMAGE IN/OUT (DVD-RAM drive)
MAC-LAB/CARDIOLAB Computers	
2032742-001	80GB SATA/7200 ALL (Hard Drive) (HP #390595-001)
2028599-002	DISK DRIVE PANASONIC SW-9576 DVD-RAM
2021462-001	DVD Disk Cartridge. 9.4 GB, Formatted
2038813-001	MEMORY INVASIVE HPXW8400 2GB FRU KIT (HP #EMii60AA)
2026539-001	OPTICAL USB SCROLL MOUSE ALL (HP #32617-005)
2038827-001	FAN HPXW8400 FAN KIT
2026188-001	CARD, VIDEO, MATROX PCI PARHELIA
422310-001	MOUSEPAD GE
2038834-001	EQPMT, BARCODE SCANNER 3800G USB (replaces PS2 Version 2003417-001 EQPMT, BARCODE SCANNER)
2021697-001	DVI TO DB15 VIDEO ADAPTER
2014935-002	PCB COMM PCI
2009937-002	PCB TRAMNET TO ETHERNET ADAPTER
2003587-001	CABLE, MULTICONDUCTOR, DB-44, M-M, 2.5 FT.
2017795-002	CARD DUAL NIC ADAPTER PCI-E GIGABIT
IMAGE CAPTURE/CARDIOIMAGE Computers	
2030688-001	CARD, VIDEO, MATROX ODYSSEY XA
2026189-004	CARD, VIDEO, ATI FIREGL V3350 25MB
2017899-001	KIT, IMAGE CABLING ACCESSORIES CABLE DVI-I MALE TO 5 BNC FEMALES (2028060-001) CABLE BNCM TO BNCM, MIN RG-59 COAX, 50FT (2003411-001)
UPGRADES	

Part Number	Description
UP-MODK-A	UPGRADE KIT: MO DRIVE Kit is used to add MO drive to computers (for backward compatibility)
2003888-001	DISK OPTICAL FAT 16 FMT DRV4 MLAB 2.6 GB VIA
2003340-001	DISK DRIVE OPT 5 1/4 SONY SMO-F551SD (Black bezel)
2038632-001	CARD SCSI PCI-E
CARDIOLAB Keyboards from Language Kits	
2003809-002	CARDIOLAB KEYBOARD
2003810-009	GERMAN CARDIOLAB KEYBOARD
2003810-008	FRENCH CARDIOLAB KEYBOARD
2003810-011	ITALIAN CARDIOLAB KEYBOARD
2003810-010	SPANISH CARDIOLAB KEYBOARD
2003810-019	CHINESE CARDIOLAB KEYBOARD
2003810-016	SWEDISH CARDIOLAB KEYBOARD
COMBOLAB Keyboards from Language Kits	
2003809-003	COMBOLAB KEYBOARD
2003810-005	GERMAN COMBOLAB KEYBOARD
2003810-004	FRENCH COMBOLAB KEYBOARD
2003810-007	ITALIAN COMBOLAB KEYBOARD
2003810-006	SPANISH COMBOLAB KEYBOARD
2003810-021	CHINESE COMBOLAB KEYBOARD
2003810-018	SWEDISH COMBOLAB KEYBOARD
MACLAB Keyboards from Language Kits	
2003809-001	MACLAB KEYBOARD
2003810-013	GERMAN MACLAB KEYBOARD
2003810-012	FRENCH MACLAB KEYBOARD
2003810-015	ITALIAN MACLAB KEYBOARD
2003810-014	SPANISH MACLAB KEYBOARD
2003810-020	CHINESE MACLAB KEYBOARD
2003810-017	SWEDISH MACLAB KEYBOARD

GE Client Workstation

Part Number	Description
2048962-001	ASSY CL/ML GE CLIENT WORKSTATION D COMP
Keyboards	
2045812-001	LABEL KEYBOARD CUSTOMER SUPPORT ML/CL
CARDIOLAB Keyboards from Language Kits	
2045802-002	CARDIOLAB KEYBOARD (replaces 2003809-002)
2045802-009	GERMAN CARDIOLAB KEYBOARD (replaces 2003810-009)
2045802-008	FRENCH CARDIOLAB KEYBOARD (replaces 2003810-008)
2045802-011	ITALIAN CARDIOLAB KEYBOARD (replaces 2003810-011)
2045802-010	SPANISH CARDIOLAB KEYBOARD (replaces 2003810-010)
2045802-019	CHINESE CARDIOLAB KEYBOARD (replaces 2003810-019)
2045802-016	SWEDISH CARDIOLAB KEYBOARD (replaces 2003810-016)
COMBOLAB Keyboards from Language Kits	
2045802-003	COMBOLAB KEYBOARD (replaces 2003809-003)
2045802-005	GERMAN COMBOLAB KEYBOARD (replaces 2003809-005)
2045802-004	FRENCH COMBOLAB KEYBOARD (replaces 2003809-004)
2045802-007	ITALIAN COMBOLAB KEYBOARD (replaces 2003809-007)
2045802-006	SPANISH COMBOLAB KEYBOARD (replaces 2003809-006)
2045802-021	CHINESE COMBOLAB KEYBOARD (replaces 2003809-021)
2045802-018	SWEDISH COMBOLAB KEYBOARD (replaces 2003809-018)
MAC-LAB Keyboards from Language Kits	
2045802-001	MACLAB KEYBOARD (replaces 2003809-001)
2045802-013	GERMAN MACLAB KEYBOARD (replaces 2003809-013)
2045802-012	FRENCH MACLAB KEYBOARD (replaces 2003809-012)
2045802-015	ITALIAN MACLAB KEYBOARD (replaces 2003809-015)
2045802-014	SPANISH MACLAB KEYBOARD (replaces 2003809-014)
2045802-020	CHINESE MACLAB KEYBOARD (replaces 2003809-020)
2045802-017	SWEDISH MACLAB KEYBOARD (replaces 2003809-017)

DASH Connection

Part Number	Description
2000453-001	KIT DOWNLOAD DASH
418335-002	OCTACOMM, SERIAL PORT CABLE
420915-013	DIDCA ASM PC INTERFACE AUTOPORT

Solar Connection

Part Number	Description
2003408-001	DB9M TO DB9F, 50FT, STRAIGHT THRU

Centricity Cardiology INW G6 Server

Part Number	Description
2048968-001	ASSY SERVER CL/ML INW G6 HI
2055264-001	
2048968-003	ASSY SERVER CL/ML INW G6 LO
2055264-003	
2049045-001	HARD DRIVE HP 300GB 10K 6G 2.5
2048609-001	HP 146GB 10K 6G 2.5 SAS DP HDD
2024244-002	TAPE DRIVE SONY AIT-3 SDX-700V/RB INTERNAL (HIGH)
2024244-003	TAPE DRIVE SONY AIT-2T TURBO INT SCSI (LOW)
2050327-001	FRU HP SERVER PWR SUPPLY 460W, HOT PLUG
2050328-001	FRU HP SC11XE SCSI HOST BUS ADAPTER
2050329-001	FRU HP SMART ARRAY P410, 512MB, BBWC
2050330-001	FRU HP IDE DVD-ROM, 16X
2050331-001	FRU HP ML370 G6 FAN ASSEMBLY
2050332-001	FRU HP 2GB 1333MHz PC3-10600R,DDR3 DIMM

Centricity Cardiology INW G5 Server

Part Number	Description
2038168-001 2050580-001 2045708-001	CMPTR SERVER CL/ML INW G5 HI
2038168-002	CMPTR SERVER CL/ML INW G5 MID
2038168-003 2050580-003 2045708-003	CMPTR SERVER CL/ML INW G5 LO
2038630-001	CMPTR SERVER ML/CL INW G5 BASE
2036800-038	HP SMARTARRAY P400 CNTRLLR CACHE MOD
2034798-001	HP 72GB 10K SAS 2.5 HOT PLUG HARDDRIVE
2034806-001	HP 146GB 10K SAS 2.5 HOT PLUG HARDDRIVE
2024244-002	TAPE DRIVE SONY AIT-3 SDX-700V/RB INTERNAL (HIGH/MID)
2024244-003	TAPE DRIVE AIT-2 turbo SDX-550V INTERNAL (LOW)
2036798-017	MEMORY HP 2GB Fully Buffered DIMM PC2-5300F (2x1GB Memory)
2036800-025	HP ML370 DVD-RW DRIVE
414582-222	POWER ADAPTER 230VAC/DC ME (FOR EUROPE)
414582-223	POWER ADAPTER 100VAC/DC JAP (FOR JAPAN)
414582-224	POWER ADAPTER 240VAC/DC AA (FOR ASIA/AUSTRALIA)
414582-225	POWER ADAPTER 240VAC/DC UK (FOR UNITED KINGDOM)
421572-028	CABLE ETHERNET
2018135-005	TAPE CARTRIDGE AIT-2 TURBO 80GB
2018135-003	AIT-3 TAPE CARTRIDGES - Single
2025078-001	INTERFACE ADAPTORS
2025079-001	CAT5 ETHERNET PATCH CABLE 10FT.
2025080-001	Keyboard, Mouse, and Video Zip Cable
2036800-014	HP ML370 1000-W HOT-PLUG POWER SUPPLY
2036800-015	HP ML370 HOT-PLUG FAN, 120-MM

Centricity Cardiology INW G4 Server

Part Number	Description
2026341-001	CMPTR SVR RACK MNT CLINK WVFM ARCH HIGH (M4)
2026341-002	CMPTR SVR RACK MNT CLINK WVFM ARCH MID (M4)
2026341-003	CMPTR SVR RACK MNT CLINK WVFM ARCH LOW (M4)
2015268-002	DISK DRIVE CPQ HOT SWAP 72.8GB 10K U320
2015268-003	DISK DRIVE CPQ HOT SWAP 146.8GB 10K U320
2015268-004	DISK DRIVE CPQ HOT SWAP 300 GB 10K U320
2024244-002	TAPE DRIVE SONY AIT-3 SDX-700V/RB INTERNAL (HIGH/MID)
2024244-001	TAPE DRIVE SONY AIT-2 SDX-500V/RB INTERNAL (LOW)
2026819-001	MEMORY HP 512MBX DDER2-400MHZ PC2-3200
2027723-001	1 GB SDRAM PC2 3200 ECC (2X512)
2016993-001	ADPTR DISK RAID HP 2 SMART ARRAY 641
2026817-001	CARD HP BBWC ENABLER - MEM -128 MB DDR
2025649-001	HP CD-RW/DV ROM 48X COMBO DRIVE
2026881-001	CARD HP NC320T PCI GIGABIT NIC
414582-222	POWER ADAPTER 230VAC/DC ME (FOR EUROPE)
414582-223	POWER ADAPTER 100VAC/DC JAP (FOR JAPAN)
414582-224	POWER ADAPTER 240VAC/DC AA (FOR ASIA/AUSTRALIA)
414582-225	POWER ADAPTER 240VAC/DC UK (FOR UNITED KINGDOM)
421572-028	CABLE ETHERNET
2018135-003	AIT-3 TAPE CARTRIDGES - Single
2018135-004	AIT-2 TAPE CARTRIDGES - Single
2025078-001	INTERFACE ADAPTORS
2025079-001	CAT5 ETHERNET PATCH CABLE 10FT.
2019000-001	KYBD TRACKBALL INTEGRATED IU HP

Integrated Electronics Box (IEB)

Part Number	Description
2033852-001	PWR BOX IEB, W/VIDEO, ANALOG I/O 100V (replaces 2010698-001 IEB) Includes parts listed under 120V IEB, except the following parts are changed:
2006323-001	CABLE POWER, IEC C19 TO UNTERMINATED
2033852-002	PWR BOX IEB, W/VIDEO, ANALOG I/O 120V (replaces 2010698-002 IEB)
2003253-002	XFMR, ISO, 100-240VAC, 50/60HZ, 2.0KVA
2003680-001	ASSY DB CONNECT FOR IEB
2003681-003	ASSY VID/MUX FOR IEB
2013535-001	PWR SPLY SW 90-265VAC 50-60HZ 16.5/-5/5V
700775-001	PWR CORD 125V 15A 2.5M
2003410-001	CABLE BNCM TO BNCM, MIN RG-59 COAX, 30FT
2003927-001	POWER CORD IEC (M)-IEC(F) 8FT
2003928-001	CABLE, VIDEO, DB15MHD-DB15MHD; 5FT
2081540-001	CABLE, VIDEO, DB15MHD-DB15MHD, 6FT
2033852-003	PWR BOX IEB, W/VIDEO, ANALOG I/O 240V (replaces 2010698-003 IEB) Includes parts listed under 120V IEB, except the following parts are changed:
2011055-001	IEB SHELF ASSY 100V & 120V Use this replacement part for repair of an RAU power supply (2003264-001) and/or Vid/mux power supply (2003266-001)
2011055-002	IEB SHELF ASSY 240V Use this replacement part for repair of an RAU power supply and/or Vid/mux power supply.
2003825-006	BRACKET, BLANKING PANEL FOR IEB
2006323-001	CABLE POWER, IEC C19 TO UNTERMINATED
2033852-004	IEB, MAC-LAB, NO MDM, 240V CHINESE Includes parts listed under 120V IEB, except the following parts are changed:
401855-110	PWR SPLY CRD ST AUSTRALIAN 10A 250V 2.5M
401855-101	PWR SPLY CRD ST CONT EURO 10A 250V 2.5M- AUSTRIA, BELGIUM, FINLAND, FRANCE, GERMANY, GREECE, HUNGARY, LUXUMBERG, NETHERLAND, POLAND, PORTUGAL, SPAIN, SWEDEN
401855-102	PWR SPLY CRD ST BRITSH 10A 250V 2.5M FSD
401855-104	PWR SPLY CRD ST ISRAELI 10A 250V 2.5M
401855-103	PWR SPLY CRD ST ITALIAN 10A 250V 2.5M
401855-039	PWR SPLY CRD ST ARGENTINA 10A 250V 2.5M
401855-041	PWR SPLY CRD ST BRAZIL 10A 250V 2.5M

Part Number	Description
401855-018	PWR CRD ST CHINA RA PLUG 10A 250V 2.5M
401855-109	PWR SPLY CRD ST DANISH 10A 250V 2.5M
401855-108	PWR SPLY CRD ST INDIA 10A 250V 2.5M
401855-037	PWR SPLY CRD ST S.AFRICA 10A 250V 2.5M
401855-107	PWR SPLY CRD ST SWISS 10A 250V 2.5M
2059901-003	IEB, w VIDEO, ANA LOG IO, C14 CONN, 240V
2059901-004	IEB, MAC-LAB, C14 CONN, 240V CHINESE(Replaces 2033852-004)
2059901-005	IEB, CARDIOLAB, C14 CONN, 240V CHINESE(Replaces 2033852-005)
2059901-006	IEB, COMBOLAB, C14 CONN, 240V CHINESE(Replaces 2033852-006)
2059901-007	IEB, CADIO-LAB, C14 CONN, 240V KOREAN(Replaces 2033852-007)
2059901-008	IEB, MAC-LAB, C14 CONN, 240V KOREAN(Replaces 2033852-008)
2059901-009	IEB, COMBOLAB, C14 CONN, 240V KOREAN(Replaces 2033852-009)

Uninterrupted Power Source (UPS)

Part Number	Description
2034260-001	KIT 120V IEB UPS REPLACEMENT EXTERNAL — includes 2034077-001 UPS POWERCOM, 120V, 50/60 Hz, 1500VA, BNT (replaces: 2033849-001 UPS POWERCOM, 120V, 1000VA 2031037-001 UPS POWERCOM, 115V, 800VA 2023532-001 BTRY UPS, 115V, MI800)
2034261-001	KIT 230V IEB UPS REPLACEMENT EXTERNAL — includes 2034078-001 UPS POWERCOM, 230V, 50/60 Hz, 1500VA, BNT (replaces: 2033850-001 UPS POWERCOM, 240V, 1000VA 2031038-001 UPS POWERCOM, 230V, 800VA 2023533-001 BTRY UPS, 230V, MI800)
2034259-001	KIT 100V IEB UPS REPLACEMENT EXTERNAL — includes 2034079-001 UPS POWERCOM, 100V, 50/60 Hz, 1500VA, BNT (replaces: 2033851-001 UPS POWERCOM, 100V, 1000VA 2031039-001 UPS POWERCOM, 100V, 800VA 2023534-001 BTRY UPS, 100V, MI800)

Monitors and Printers

Part Number	Description
2079070-002	MONITOR, EIZO S2133, LED 21 INCH, BOOM MOUNTABLE
2081124-001	MOUNTING KIT, MONITOR ON MAVIG GD60 SUSPENSION
2044863-001	MONITOR VIEWSONIC CRT (Used for real-time scrolling) (Replaces NEC 2027200-001)
2030604-002	DSPL LCD 20 INCH NEC LCD 2090UX+ (replaces 2080UX 20" LCD - PN 2020737-002)
2003442-001	CABLE VIDEO, DB15MHD-DB15MHD; 100FT
403689-010	CABLE ASSY, MON PWR, 100FT
2004036-001	POWER CABLE
6119-101	CABLE PARALLEL PRNTR 8-12 FT
2031697-001	CABLE EPP DB25M/MDR36M 10 FT
9242-101	PAPER 20LB BOND WHITE 8 1/2x11
2046140-001	HP LaserJet P2035n (120V) (Replaces 2037296-001 RICOH 4100N - US)
2046141-001	HP Color LaserJet CP2025n (120V) (Replaces 2030606-001 RICOH CL3500N)
2046141-002	HP Color LaserJet CP2025n (220V) (Replaces 2030606-002 RICOH CL3500N 220V)
2046677-002	HP LaserJet P2035 (220V)
2025965-002	CABLE USB 3.0M

TRAMNet

Part Number	Description
2018683-001 2011129-001 2016133-001 2016134-001	Kit MLCL TRAMNet Cabling Accessories CABLE ETHERNET PATCH - 1FT ASSY CABLE TNET TO IEB D 9M/9F ASSY CABLE IEB TO RAC 4A ADAPTOR
2019445-001	TRAM 451 CABLE KIT (AHA): includes ACQ CABLE, TRAMNET CABLES, AND MOUNTING KIT
2019446-001	TRAM 451N CABLE KIT (AHA): includes ACQ CABLE, TRAMNET CABLES, AND MOUNTING KIT
2019447-001	TRAM 451M CABLE KIT (AHA): includes ACQ CABLE, TRAMNET CABLES, AND MOUNTING KIT
2021597-001	TRAM 451N CABLE KIT (IEC): includes ACQ CABLE AND MOUNTING KIT
2021598-001	TRAM 451M CABLE KIT (IEC): includes ACQ CABLE AND MOUNTING KIT
2021599-001	TRAM 451N CABLE KIT (IEC)
2021600-001	TRAM 451M CABLE KIT (IEC)
417335-003	ASM, ACQUISITION CABLE 70 FT (Standard)
417335-001	ASM, ACQUISITION CABLE 10 FT
417335-002	ASM, ACQUISITION CABLE 51 FT
417335-004	ASM, ACQUISITION CABLE 100 FT
417335-005	ASM, ACQUISITION CABLE 125 FT
417335-006	ASM, ACQUISITION CABLE 150 FT
417335-007	ASM, ACQUISITION CABLE 20 FT
2007759-002	MOUNTING KIT
900031-006	ASSY TRAM RAC 4A W/PWR SPLY
2000633-001	CABLE ASSY CINCH MDC-7P15
412931-005	MAC-LAB 5LD STRTR KIT, RADIOTRANSLUCENT
416035-003	MAC-LAB 12LD STARTER KIT AHA
2025248-002	CABLE ASSY CARDIAC OUTPUT 2.7M (replaces 2002973-004 CABLE ASSY PATIENT CARDIAC OUTPUT 9FT)
9446-909	BATH PROBE TR INJ TEMP 6FT MEI
9446-910	CA TRAM INLINE INJ EDW 3FT MEI
415265-003	KIT NBP ADULT STARTER
900079-006	SYNC CBL, TRAM 3 'Y' ADAPTER
2008991-001	ADPTR MINI DIN TO CONN RCPT 6P PHG 1B
2006644-001	CABLE ASSY PATIENT ADAPTER NELLCOR SPO2

Parts List

Part Number	Description
407705-006	DURASENSOR ADULT DS-100A INDV
2017002-001	CABLE ASSY SPO2 MASIMO 3.6M (replaces 2016041-001 CABLE ASSY PATIENT ADPT MASIMO SPO2 12FT)
2017002-003	CABLE ASSY SPO2 MASIMO (replaces 2016041-002 CABLE ASSY PATIENT ADPTR MASIMO SPO2 8FT)
2002800-001	MASIMO REUSABLE FINGER SENSOR ADULT
2002799-001	MASIMO REUSABLE FINGER SENSOR PED
2017006-003	CABLE ASSY ECG MLT-LNK 10 LEAD 3.6M IEC (replaces 416035-002 PATIENT CABLE 12SL IEC)
403751-026	LD RT GRB/MNK IEC 60L 10/SET
414873-001	TUBE NBP CUFF
9461-601	BP CUFF DL TUBE ADULT - DURA-CUF
9446-911	CA TR INLINE INJ GOULD 3FT MEI

Amplifier

Part Number	Description
2003232-001	ASSY CLAB II PLUS 32 AMP 110-240V 50/60HZ
2003232-002	ASSY CLAB II PLUS 64 AMP 110-240V 50/60HZ
2003232-003	ASSY CLAB II PLUS AMPLIFIER 96 CHANNEL
2003232-004	ASSY CLAB II PLUS AMPLIFIER 128 CHANNEL
2004965-001	ASSY PACING ENABLED RF FILTER BOX
301-00207-03	CABLE STIM EXTENDER, 3FT DUAL TOUCHPROOF
2003419-001	CABLE, ECG, 10LEAD, SHIELDED 10FT
2003421-001	CABLE LEAD SET, ECG, SHIELDED, 36" WIRES
2003434-001	CABLE FIBER, ST TO FDDI, DUPLEX, 75FT
2007857-001	PRUCKA CATHETER INPUT MODULE LABELS
301-00202-08	CABLE CATHTR INPT MOD3 TPRF 8FT M CLBII+
301-00204-03	CABLE STIM INPT TCHPRF 3FT CLABII+
301-00205-08	CABLE AUX INPT RF RCRD UNIPLR CLABII+
80274-006 405535-013 (Japan)	POWER CORD
301-00204-15	15 FT TOUCHPROOF STIMULATOR INPUT CABLE
301-00204-30	30 FT TOUCHPROOF STIMULATOR INPUT CABLE
401855-110	PWR SPLY CRD ST AUSTRALIAN 10A 250V 2.5M
401855-101	PWR SPLY CRD ST CONT EURO 10A 250V 2.5M- AUSTRIA, BELGIUM, FINLAND, FRANCE, GERMANY, GREECE, HUNGARY, LUXUMBERG, NETHERLAND, POLAND, PORTUGAL, SPAIN, SWEDEN
401855-102	PWR SPLY CRD ST BRITISH 10A 250V 2.5M FSD
401855-104	PWR SPLY CRD ST ISRAELI 10A 250V 2.5M
401855-103	PWR SPLY CRD ST ITALIAN 10A 250V 2.5M
401855-039	PWR SPLY CRD ST ARGENTINA 10A 250V 2.5M
401855-041	PWR SPLY CRD ST BRAZIL 10A 250V 2.5M
401855-018	PWR CRD ST CHINA RA PLUG 10A 250V 2.5M
401855-109	PWR SPLY CRD ST DANISH 10A 250V 2.5M
401855-108	PWR SPLY CRD ST INDIA 10A 250V 2.5M

Parts List

Part Number	Description
401855-037	PWR SPLY CRD ST S.AFRICA 10A 250V 2.5M
401855-107	PWR SPLY CRD ST SWISS 10A 250V 2.5M

MicroPace

Part Number	Description
MicroPace FRUs	
2032778-001	FRU MICROPACE STIMULATOR - SGU, NO PS MFG - MP3008
2032779-001	FRU MICROPACE ACC KIT, SGU PWR, CABLS, US MFG - MP3055-GE-US
2032780-001	FRU MICROPACE BONA LIGHT PC, PSU MFG - MP3093
2032781-001	FRU MICROPACE DIAMOND TOUCH KEYBOARD MFG - MP3015
2032782-001	FRU MICROPACE NEC MONITOR MFG - MP3076
2031041-001	MICROPACE TOUCHSCREEN FOR STIMULATOR MFG - MP3113-GE
2032783-001	FRU MICROPACE 4CH SM-BOX, CABLES MFG - MP3091
2032784-001	FRU MICROPACE 2CH STIMULATOR CONNECT BOX MFG - MP3014
2032785-001	FRU MICROPACE UNIVERSAL ISOLATION XFMR MFG - MP3107
MicroPace Cables	
2049323-001	CABLE STIM EXTENSION FOR MICROPACE, 13M (MP3070-13)
2049324-001	CABLE STIM EXTENSION FOR MICROPACE, 17M (MP3070-17)
2037660-001	CABLE MUX CNTRL FOR MICROPACE, 15M MFG - MP3090
2037661-001	CABLE MUX CNTRL FOR MICROPACE, 27M MFG - MP3146
2037662-001	CABLE SERIAL RS232 EXT MICROPACE, 25M MFG - MP3084-25

RMOT

Part Number	Description
RMOT	
2022144-002	MOUSE USB OPTICAL SCROLL LIGHTED
2022144-003	MOUSE USB SCROLL BLACK
2022144-004	MOUSE MICROSOFT BASIC OPTICAL SCROLL BLACK USB/PS2
2003927-001	POWER CORD IEC (M) - IEC (F) 8FT
2026972-002	KIT RMOT, CAT5, 100FT W/ ISOLATOR

Speakers and Miscellaneous

Part Number	Description
2018835-001	RF ABLATION DEVICE INTERFACE KIT
2003408-002	CABLE DB25M TO DB9F, 50 FT, SERIAL
2042981-001	OPTO ISOLATOR KIT, SERIAL DB25
2042214-001	CABLE ASSY SERIAL RF ABLATION INTERFACE
2035570-001	CABLE ASSY SERIAL CRYOCATH INTERFACE
2018971-001	16CH ANALOG OUTPUT CPU INTERFACE OPTION
2007557-002	KIT ANALOG OUTPUT BOX W/CABLES
2010476-001	BOX CARDIOLAB/MACLAB ANALOG OUTPUT
2007579-001	CABLE DB 37 MALE/FEMALE 15 FT
417335-002	ASM, ACQUISITION CABLE 51'
2011355-001	CABLE PHONE-BNC M 10FT RG-174 COAX 20 PC
2003410-001	CABLE BNCM TO BNCM, MIN RG-59 COAX, 30FT
2018216-001	KIT, CARTO™ XP System CABLES
2015944-001	AMPLIFIER TO PIU QUICK CONNECT 10 FT
2018217-001	CABLE RJ45 CROSSOVER CAT5 25FT
2024507-001	IC TO PIU QUICK CONNECT 10FT

Parts List

Part Number	Description
2017900-001	KIT, AUDIO CABLING ACCESSORIES
2011108-002	CABLE AUDIO 50 FT.
2018218-001	STEREO AUDIO SPLITTER 1M-2F
2018219-001	MONO AUDIO ISOLATOR
2018856-001	AUDIBLE INDICATORS 120V
2078970-001	POWERED SPEAKERS, 120V (replaces 2039003-001, 2036113-001, 2029281-001, 2049499-002 and 2026555-001)
2003625-001	CABLE, NEMA 5-15R TO IEC320P, 1FT
2018857-001	AUDIBLE INDICATORS 240V
2078970-001	POWERED SPEAKERS, 240V (replaces 2039004-001, 2036113-002, 2029281-002, 2049499-002 and 2026555-002)
2003625-001	CABLE, NEMA 5-15R TO IEC320P, 1FT
	EtCO₂
412340-002	SNSR CBL CO2 CAPNOSTAT 3 W/AGND
412554-003	LABEL MODULE CO2 CAPNOSTAT
412832-001	ASSEMBLY MODULE CO2 CAPNOSTAT
418747-001	STARTER KIT EAGLE 3X00 CO2
2032243-004	ASSY SOLAR CAPNO MDL ADPTR CO2 MDL SNSR
900553-001	ASSY MOD MS CO2 CAPNOSTAT
2013427-001	OEM ASSY DASH CAPNOFLEX LF CO2
2027759-001	ASSY SOLAR CAPNOFLEX ADAPTER
412340-002	SNSR CBL CO2 CAPNOSTAT 3 W/AGND
9504-016	GAS SCAVENGER 10FT TGB W/CPLG
2008203-001	MOBILE WORKSTAND CART
2018892-003	65 IN WORKSTATION DESK
2018892-002	47 IN WORKSTATION DESK
2018892-001	MOBILE CABINET
2004195-001	ISO Transformer, 120V/220V 50/60HZ 600VA

A Abbreviations

Electrical and IT Abbreviations

Abbreviation	Description
AD	Active Directory
AC	Alternating Current
AE	Application Entity
AIT	Advanced Intelligent Tape
Com	Communication
CMC	Crystal Management Console
CNDT	Conduit
CPU	Central Processing Unit
DAT	Digital Audio Tape
DC	Direct Current
DICOM	Digital Imaging and Communication in Medicine
DMS	Data Management System
DOS	Disk Operating System
D-Sub	hardware connector
dV/dT	change in Voltage over Time
EMC	Electromagnetic Compatibility
EMI	ElectroMagnetic Interference
ESD	Electrostatic Discharge
GB	gigabytes
HW/SW	Hardware/Software
Hz	Hertz
IEB	Integrated Electronics Box
IEC	International Electrotechnical Commission
INW	Invasive Net Work formerly known as CardioLink
IT	Information Technology
kB	Kilobytes
kOhm	kilo-ohms
kV	Kilovolts
LCD	Liquid Crystal Display

Abbreviation	Description
LMT	Lab Management Tools
MB	Megabytes
MHz	Mega Hertz
ML/CL	Mac-Lab/CardioLab
MWL	Modality Work List
MPPS	Modality Performed Procedure Step
ms	milliseconds
MSDE	MicroSoft Data Engine
mV	millivolts
OD	Optical Disk
OS	Operating System
OU	Organizational Unit
PC	Personal Computer
pcb	Printed Circuit Board
PDF	Portable Document Format
RAC-4A	Remote Acquisition Case
RAU	Remote Acquisition Unit
RF	Radio frequency
TCP/IP	Internet Protocol
UI	User Interface
UPS	Uninterruptible Power Supply
VIDMUX	Video Multiplexer
V	Volts
VPN	Virtual Private Network

Hospital Staff

Abbreviation	Description
CNS	cardiac nurse specialist
CRNA	certified registered nurse anesthetist
CVT	cardiovascular technologist
CVVT	certified cardiovascular technologist
DO	doctor of osteopathic medicine
DR	doctor
LPN	licensed practical nurse
LVN	licensed vocational nurse
MD	doctor of medicine
MD/PhD	Physician/Doctor
NA	nurse's assistant
NP	nurse practitioner
PA	physician's assistant
PhD	doctor of philosophy
RCIS	registered cardiac interventional specialist
RCPT	registered cardiopulmonary technologist
RCS	registered cardiac sonographer
RCVT	registered cardiovascular technologist
RN	registered nurse
RRT	registered respiratory therapist
RT	radiology technologist
RTR	radiologic technologist registered cardiovascular
RTRCV	radiologic technologist registered cardiovascular

Medical Abbreviations

Abbreviation	Description
ABAO	Abdominal Aorta
ACC	American College of Cardiology
ACV	Antecubital Vein
ADT	Admission Discharge Transfer
AIR	Room Oxygen Temperature
Ao	Aorta or Aortic Pressure
APV	Anamalous Pulmonary Vein
ARCH	Transverse Aortic Arch
AREA	Area - No Valve
ARP	Antegrade Refractory Period
ART	Arterial
ARTSAT	Arterial Saturation
ASAO	Ascending Aorta
ATM	Atmospheres
ATPS	Ambient Temperature and Pressure where Gas is Saturated with Water Vapor
AVA	Aortic Valve Area
AVdiff	Arteriovenous Oxygen Difference
aVF	left foot augmented lead
AVF	Aortic Valve Flow
AVG	Aortic Valve Gradient
AVI	Aortic Index or Aortic Valve Area Index
aVL	left arm augmented lead
AVN ERP	Atrio-Ventricular Node Effective Refractory Period
A-VO ₂ diff	Arterial - Venous Oxygen difference
aVR	right arm augmented lead
AXA	Axiliary Artery
AXV	Axiliary Vein

Abbreviations

Abbreviation	Description
AZV	Azygos Vein
BA	Brachial Artery
BIM	bioelectric impedance measurement
BP	Blood Pressure
BPM	Beats Per Minute
BSA	Body Surface Area
BV	Brachial Vein
C.I.	Cardiac Index
C.O.	Cardiac Output
CA	Common Atrium
CARA	Carotid Artery
cath	catheterization
CCU	Coronary Care Unit
CI	Cardiac Index
CIM	Catheter Input Modules
Clin Proc	Clinical Procedures
CO	Cardiac Output
CO _{FICK}	Cardiac Output by Fick
COL	Systemic Collateral Artery to Lungs
Comp	Complications
Cond Intvl	Conduction Intervals
Cons Sed	Conscious Sedation
COR	Coronary Artery
COTd	Cardiac Output obtained by Thermodilution
COUT	Cardiac Output
COUTI	Cardiac Index
CPT	Current Procedural Terminology
CS	Coronary Sinus
CSNRT	Corrected Sinus Node Recovery Time
CV	Common Ventricle
CVIS	Cardiovascular Information System

Abbreviation	Description
CVP	Central Venous Pressure
DCS	Distal Coronary Sinus
DFP	Diastolic Filling Period
DFPm	Mitral Diastolic Filling Period
DFPt	Tricuspid Diastolic Filling Period
DFT	Diastolic Filling Time
Dias	Diastolic
dp/dt	change in pressure per unit in time
DSAO	Descending Aorta
ECG	ElectroCardioGram
EDP	End Diastolic Point
Emerg	Emergency
EP	electrophysiology
ER	Emergency Room
ERP	Effective Refractory Period
ESU	Electrosurgical Unit
EtCO ₂	End tidal CO ₂
EXP CO ₂	Expired CO ₂
FA	Femoral Artery
FCa	Arterial Content
FCI	Fick Cardiac Index
FCLA	Fistula Coronary to the Left Atrium
FCLV	Fistula Coronary to the Left Ventricle
FCpa	Pulmonary Artery Content
FCpv	Pulmonary Venous Content
FCRA	Fistula Coronary to the Right Atrium
FCRV	Fistula Coronary to the Right Ventricle
FCv	Venous Content
FEO ₂	Oxygen of Expired Air
FIO ₂	Oxygen of Inspired Air

Abbreviations

Abbreviation	Description
FIS	Arterial Fistula
FLOW	Flow - No Gradient
FRZ	Freeze
FV	Femoral Vein
Gcm ²	Gray-centimeter squared
HABAO	High Abdominal Aorta
HAO	High Aorta
HARCH	High Transverse Aortic Arch
HASAO	High Ascending Aorta
HAZ	Hemiazygos Vein
Hb	Hemoglobin
HDSAO	High Descending Aorta
HEPA	Hepatic Artery
HEPV	Hepatic Vein
HIPAA	Health Insurance Portability and Accountability Act
HIS	Hospital Information System
HIVC	High Inferior Vena Cava
HLA	High Left Atrium
HLV	High Left Ventricle
HLVA	High Left Ventricular Apex
HLVIN	High Left Ventricle Inflow
HLVOC	High Left Ventricle Outflow
HNAO	High Neo-Aorta
HR	Heart Rate
HRA	High Right Atrium
HRAO	Heart Rate
HRf	Fick Heart Rate
HRU	Hybrid Resistance Units
HRV	High Right Ventricle
HRVA	High Right Ventricular Apex

Abbreviation	Description
HRVIN	High Right Ventricular Inflow
HRVIN	High Right Ventricle Inflow
HRVOT	High Right Ventricular Outflow
HSVC	High Superior Vena Cava
HUA	High Umbilical Artery
HUV	High Umbilical Vein
HVC	High Vena Cava
I/O	Intake/output
IABP	Intra-Aortic Balloon Pump
IB	Inferior Baffle
IC	Intra-cardiacs
ICU	Intensive Care Unit
IM	Internal Mammary
IMA	Internal Mammary Artery
INDEX	Valve Index or Area Index - No Valve
INNA	Innominate Artery
INNV	Innominate Vein
INSP CO ₂	Inspired CO ₂
IVC	Inferior Vena Cava
JX	Juxtaposed Appendage
LA	Left Atrium
LACV	Left Antecubital Vein
LaM	Mean Left Atrial Pressure
LAO	Low Aorta
LAPV	Left Anomalous Pulmonary Vein
LARCH	Low Transverse Aortic Arch
LART	Left Arterial
LASAO	Low Ascending Aorta
LAXA	Left Auxiliary Artery
LAXV	Left Auxiliary Vein
LAZV	Left Azygos Vein

Abbreviations

Abbreviation	Description
LBA	Left Brachial Artery
LBAO	Low Abdominal Aorta
LBV	Left Brachial Vein
LCA	Left Common Atrium or Left Coronary Artery
LCARA	Left Carotid Artery
LCNDT	Left Conduit
LCOR	Left Coronary Artery
LCV	Left Common Ventricle
LDSAO	Low Descending Aorta
LED	Light Emitting Diode
LFCLV	Left Fistula Coronary to Left Ventricle
LFCRA	Left Fistula Coronary to Right Atrium
LFCRV	Left Fistula Coronary to Right Ventricle
LFIS	Left Arterial Fistula
LFV	Left Femoral Vein
LHAZ	Left Hemiazygos Vein
LHEPA	Left Hepatic Artery
LHEPV	Left Hepatic Vein
LIB	Left Inferior Baffle
LIMA	Left Internal Mammary Artery
LINNA	Left Innominate Artery
LINNV	Left Innominate Vein
LIVC	Low Inferior Vena Cava
LJX	Left Juxtaposed Appendage
LLA	Low Left Atrium
LLV	Low Left Ventricle
LLVA	Low Left Ventricular Apex
LLVIN	Low Left Ventricle Inflow
LLVOT	Low Left Ventricle Outflow
LNAO	Left Neo-Aorta
LNPA	Left Neo Pulmonary Artery

Abbreviation	Description
LOC	Level of Consciousness
LPA	Left Pulmonary Artery
LPAB	Left Pulmonary Artery Branch
LPACN	Left Pulmonary Artery Conduit
LPAVF	Left Pulmonary Artery Venous Fistula
LPAW	Left Pulmonary Artery Wedge
LPDA	Left Patent Ductus Arteriosus
LPV	Left Pulmonary Vein
LPVAT	Left Pulmonary Venous Atrium
LPVC	Left Pulmonary Vein chamber in Cor Triatriatum
LPVCN	Left Pulmonary Vein Confluence
LPVW	Left Pulmonary Vein Wedge
LRA	Low Right Atrium
LRADA	Left Radial Artery
LRENV	Left Renal Vein
LRFLOW	Left to Right Flow
LRFLOWI	Left To Right Shunt Flow Index
LRV	Low Right Ventricle
LRVA	Low Right Ventricular Apex
LRVIN	Low Right Ventricular Inflow
LRVOT	Low Right Ventricular Outflow
LSBCA	Left Subclavian Artery
LSCLV	Left Subclavian Vein
LSHNT	Left Systemic Pulmonary Shunt
LSP	Left Special
LSPHV	Left Saphenous Vein
LSVC	Low Superior Vena Cava
LTAC	Left Truncus Arteriosus Communis
LUA	Low Umbilical Artery
LUV	Low Umbilical Vein
LV	Left Ventricle

Abbreviations

Abbreviation	Description
LVA	Left Ventricle Apex
LVC	Low Vena Cava
LVEDP	Left Ventricular End Diastolic Period
LVEN	Left Venous
LVET	Left Ventricle Ejection Time
LVFT	Left Ventricle Filling Time
LVIN	Left Ventricle Inflow
LVOC	Left Ventricle Outflow Chamber
LVOT	Left Ventricle Outflow
LVRTA	Left Vertebral Artery
LVSW	Left Ventricular Stroke Work
LVSWI	Left Ventricle Stroke Work Index
MAP	Mean Arterial Pressure
Meds	Medications
MMF	Mean Maximum Flow
MRN	Medical Record Number
MV	Mixed Venous
MVA	Mitral Valve Area
MVF	Mitral Valve Flow
MVG	Mitral Valve Gradient
MVGpcws	Mitral Valve Splice Pulmonary Capillary Wedge
MVI	Mitral Index or Mitral Valve Area Index
NAO	Neo Aortic Arch
NIBP	Non-Invasive Blood Pressure
NICU	Neuro Intensive Care Unit
NPA	Neo Pulmonary Artery
O ₂	Oxygen
Op	Operative
PA	Pulmonary Artery
Pa	Pressure Artery for FFR
PAB	Pulmonary Artery Branch

Abbreviation	Description
PACN	Pulmonary Artery Conduit
PAFV	Pulmonary Arteovenous Fistula
PAm	Mean Pulmonary Arterial Pressure
PAO ₂	Mixed Venous Oxygen Saturation a/k/a Pulmonary Artery Saturation
PAW	Pulmonary Artery Wedge
Pb	Barometric Pressure
PCI	Percutaneous Coronary Intervention
PCS	Proximal Coronary Sinus
PCW	Pulmonary Capillary Wedge Pressure
PDA	Patent Ductus Arteriosus
PER	Period - No Value
PID	Patient Identification
PO ₂	Dissolved Oxygen Tension a/k/a Partial Pressure of Oxygen
PV	Pulmonary Vein
PVA	Pulmonary Valve Area
PVAT	Pulmonary Venous Atrium
PVCH	Pulmonary Vein Chamber in Cor Triatriatum
PVCN	Pulmonary Vein Confluence
PVF	Pulmonary Valve Flow
PVG	Pulmonary Valve Gradient
PVGs	Pulmonary Valve Splice
PVI	Pulmonary Index or Pulmonary Valve Area Index
PVO ₂	Pulmonary Vein Saturation
PVR	Peripheral Vascular Resistance
PVR_SVR ratio	Pulmonary Vascular Resistance, Systemic Vascular Ratio
PVR_W	Pulmonary Vascular Resistance in Wood Units
PVRI	Pulmonary Vascular Resistance Index
PVRI_W	Pulmonary Vascular Resistance in Wood Units
PVW	Pulmonary Vein Wedge

Abbreviations

Abbreviation	Description
Qeff	Effective Pulmonary Flow
Qp	Pulmonary Flow
Qp/Qs	Flow Ratio
QPEFFI	Effective Pulmonary Flow Index
Qpl	Pulmonary Flow Index
Qs	Systemic Flow
Qsl	Systemic Flow Index
R	Report
RA	Right Atrium
RACV	Right Antecubital Vein
Rad	Radiology
RADA	Radial Artery
RaM	Mean Right Atrial Pressure
RAPV	Right Anamolous Pulmonary Vein
RART	Right Arterial
RAVZ	Right Azygos Vein
RAXA	Right Auxiliary Artery
RAXV	Right Auxiliary Vein
RBA	Right Brachial Artery
RCA	Right Common Atrium or Right Coronary Artery
RCARA	Right Carotid Artery
RCNDT	Right Conduit
RCOR	Right Coronary Artery
RCV	Right Common Ventricle
RENA	Renal Artery
RENV	Renal Vein
RFA	Right Femoral Artery
RFCLA	Right Fistula Coronary to Left Atrium
RFCLV	Right Fistula Coronary to Left Ventricle
RFCRA	Right Fistula Coronary to Right Atrium
RFV	Right Femoral Vein

Abbreviation	Description
RHAZ	Right Hemiazygos Vein
RHEPA	Right Hepatic Artery
RHEPV	Right Hepatic Vein
RIB	Right Inferior Baffle
RIMA	Right Internal Mammary Artery
RINNA	Right Innominate Artery
RINNV	Right Innominate Vein
RJX	Right Juxtaposed Appendage
RLFLOW	Right to Left Flow
RLFLOWI	Right to Left Shunt Flow Index
RMOT	Remote Operators Terminal
RNPA	Right Neo Pulmonary Artery
ROI	Region of Interest
RPA	Right Pulmonary Artery
RPAB	Right Pulmonary Artery Branch
RPACN	Right Pulmonary Artery Conduit
RPAVF	Right Pulmonary Artery Venous Fistula
RPAW	Right Pulmonary Artery Wedge
RPDA	Right Patent Ductus Arteriosus
RPV	Right Pulmonary Vein
RPVAT	Right Pulmonary Venous Atrium
RPVC	Right Pulmonary Vein chamber in Cor Triatriatum
RPVCN	Right Pulmonary Vein Confluence
RPVW	Right Pulmonary Vein Wedge
RR	Respiratory Rate
RRADA	Right Radial Artery
RRENV	Right Renal Vein
RRP	Retrograde Refractory Period
RSCLV	Right Subclavian Vein
RSHT	Right Systemic Pulmonary Shunt
RSP	Right Special

Abbreviations

Abbreviation	Description
RSPHV	Right Saphenous Vein
RT	Room Temperature
RTAC	Right Truncus Arteriosus Communis
RVA	Right Ventricle Apex
RVEN	Right Venous
RVET	Right Ventricle Ejection Time
RVFT	Right Ventricle Filling Time
RVIN	Right Ventricle Inflow
RVOT	Right Ventricle Outflow
RVSW	Right Ventricular Stroke Work
RVSWI	Right Ventricle Stroke Work Index
RVTRA	Right Vertebral Artery
SA	Systemic Artery
SAm	Mean Systemic Arterial Pressure
Sat	Saturation
SB	Superior Baffle
SBCA	Subclavian Artery
SCL	Sinus Cycle Length
SCLV	Subclavian Vein
SCV	Superior Vena Cava
SEP	Systolic Ejection Period
Sep/Dfp	Systolic Ejection Period divided by Diastolic Filling Period
SEPa	Aortic Systolic Ejection Period
SEPe	Systolic Ejection Period
SHNT	Systemic Pulmonary Shunt
SNRT	Sinus Node Recovery Time
SP	Special Pressure
SPHV	Saphenous Vein
SpO ₂	Peripheral Oxygen Saturation
Stat	statim (Latin for immediately)

Abbreviation	Description
Stim	Stimulus
STPD	Standard Temperature and Pressure of Dry Gas
STS	Society of Thoracic Surgeons
SV	Stroke Volume
SVA	Systemic Venous Atrium
SVI	Stroke Index
SVR	Systemic Vascular Resistance
SVR_W	Systemic Vascular Resistance in Wood Units
SVRI	Systemic Vascular Resistance Index
SVRI_W	Systemic Vascular Index in Wood Units
sync	synchronis
Sys	Systolic
T	Room Temperature
TAC	Truncus Arteriosus Communis
TDCI	Thermodilution Cardiac Index
TDCO	Thermodilution Cardiac Output
TPR	Total Peripheral Resistance
TPR_TVR ratio	Total Pulmonary Resistance, Total Vascular Resistance Ratio
TPR_W	Total Pulmonary Resistance, Wood Units
TPRI	Total Pulmonary Resistance Index
TPRI_W	Total Pulmonary Index, Wood Units
TPVR_W	Total Pulmonary Vascular Resistance in Wood Units
TPVRI_W	Total Pulmonary Vascular Resistance Index in Wood Units
TRAM	Transport Remote Acquisition Monitor
Trig	Trigger
TSVR	Total System Vascular Resistance
TSVR_W	Total Systemic Vascular Resistance in Wood Units
TVA	Tricuspid Valve Area

Abbreviation	Description
TVF	Tricuspid Valve Area
TVG	Tricuspid Valve Gradient
TVGs	Tricuspid Valve Splice
TVI	Tricuspid Index or Tricuspid Valve Area Index
TVR	Total Vascular Resistance
TVRI	Total Vascular Resistance Index
TVRI_W	Total Vascular Resistance Index in Wood Units
UA	Umbilical Artery
UV	Umbilical Vein
VA	Valve Area
VC	Vena Cava
VeATPS	Minute volume at ATPS
VEN	Venous
VENSAT	Venous Saturation
VeSTPD	Minute volume
VeSTPD	Volume of Gas (Corrected)
VF	Valve Flow or Ventricular Fibrillation
VGs	Valve Splice
VI	Valve Index
VO ₂	Oxygen Consumption
VRTA	Vertebral Artery
WCT	Wilson Central Terminal
WU	Wood Units

Miscellaneous Abbreviations

Abbreviation	Description
3-D	Three Dimensional
Accts	Accounts
C	Centigrade

Abbreviation	Description
Cal	Calibration
cm	centimeters
cm ²	centimeters squared
CO ₂	Carbon Dioxide
FAQ	Frequently Asked Questions
FT	Feet
gm/dl	grams per deciliter
Grad	Gradient
HT	Height
HH:MM:SS	Hours:Minutes:Seconds
ID	Identity
IMG	Image
Info	Information
kgs	kilograms
kPa	Kilopascal
KT	Water Vapor Pressure
lb	pounds
l/min	liters per minute
l/min/m ²	liters per minute per milliliter squared
mcg	micrograms
ml/dl	milliliters per deciliter
ml/min	milliliters/minute
ml/s	milliliters per second
mm/hg	millimeters of mercury
mm/sec	millimeters per second
uA	microamperes
UL	Underwriter's Laboratory



GE Medical Systems
Information Technologies, Inc.
8200 West Tower Avenue
Milwaukee, WI 53223 USA
Tel: + 1 414 355 5000
1 800 558 7044 (US Only)
Fax: + 1 414 355 3790



GE Medical Systems
Information Technologies GmbH
Munzinger Straße 5
D-79111 Freiburg
Germany
Tel: + 49 761 45 43 - 0
Fax: + 49 761 45 43 - 233

Asia Headquarters

GE Medical Systems
Information Technologies Asia; GE (China) Co., Ltd.
No. 1 Huatuo Road,
Zhangjiang Hi-tech Park Pudong
Shanghai, People's Republic of China 201203
Tel: + 86 21 3877 7888
Fax: + 86 21 3877 7402

www.gehealthcare.com

