Mac-Lab®/CardioLab® 2000/4000/7000

System Service Manual

2007623-079   Revision E

GE Medical Systems
Information Technologies

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1 Introduction

Mac-Lab/CardioLab 2007623-079

For your notes

Document Information

Revision History

Each page of the document has the document part number and revision letter at the bottom of the page. The revision letter identifies the document's update level.

The revision history of this document is summarized in the table below.

Table 1. Revision History PN 2007623-079		
A	31 March 2003	Initial release of manual.
B	28 July 2003	Added ML370 G3 server information.
C	01 September 2004	Added Disaster Recovery Server Repartitioning (+180 GB)
D	13 October 2004	Updated Disaster Recovery Section (Chapter 6)
E	15 May 2005	Updated Per ECR01905-003; Removed incorrect leakage current info in Chapter 4.

Manual 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.

Related Manuals

Part Number	Document
2007623-042	Mac-Lab Operator's Manual
2007623-043	CardioLab Operator's Manual
2007623-083	Centricity CardioLink Operator's Manual
2007623-081	Centricity CardioLink Installation/Upgrade Instructions

Part Number	Document
2007623-080	Mac-Lab/CardioLab System Installation Manual
2007623-059	Mac-Lab/CardioLab Advanced Security Guide
2007623-078	Mac-Lab/CardioLab/Centricity CardioLink Pre-Installation Manual
2007623-082	Mac-Lab/CardioLab System Software Upgrade Instructions
2007623-169	Mac-Lab/CardioLab Lab Management Tools (LMT) Installation/Service Manual

Statement of Indications for Use

Mac-Lab System

The Mac-Lab system is intended for use under the direct supervision of a licensed healthcare practitioner to monitor, calculate, or record cardiovascular data from patients as they undergo cardiac catheterization. Cardiovascular data may be manually entered or acquired via interfaced GE Medical Systems *Information Technologies* TRAM modules, MUSE cardiovascular system, and other interfaced information systems. Data includes: ECG waveforms, heart rate, pulse oximetry (SpO2), respiration rate, valve gradients and areas, cardiac output, hemodynamic measurements, invasive and non-invasive blood pressure, procedural information, and optional intracardiac electrocardiogram (IECG).

This is applicable to pediatric and adult patients requiring cardiac/circulatory system catheterization. This is intended for use in catheterization and related cardiovascular specialty laboratories.

CardioLab System

The intended use of the CardioLab system is to acquire, filter, digitize, amplify, display, and record electrical signals obtained during electrophysiological studies and related procedures conducted in an electrophysiological laboratory. Signal types acquired include ECG signals, direct cardiac signals, and pressure recordings. 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, store the data, perform elementary caliper-type measurements of the data, and generate reports on the data. Additionally, the system may acquire, amplify, display, and record data received from other 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 physiological data or other data acquired during an EP procedure. It does not transmit alarms or arrhythmias and does not have arrhythmia detection capabilities.

Chapter Content

This manual is organized into chapters and appendices.

1 Introduction – This chapter describes the field service manual and chapter contents. Provides general information on safety, service requirements, equipment symbols, and serial number identification.

2 Equipment Overview – This chapter describes the equipment and its technical characteristics, connector locations, and preparation for use.

3 Installation – This chapter contains the system components for the Mac-Lab/CardioLab system.

4 Maintenance – This chapter contains a preventive maintenance schedule, illustrated instructions for opening the unit, and cleaning guidelines. Instructions for performing electrical safety (leakage) tests are also included.

5 Troubleshooting – This chapter provides overall and specific troubleshooting help, and directions for performing functional tests.

6 CardioLink Disaster Recovery – This chapter provides the procedures needed to perform a server disaster recoveries in a CardioLink network environment.

7 Drawings and Parts Lists – This chapter contains upper-level parts lists, photos, and illustrations for reference in repairing the unit at the assembly level.

Appendix A - **Technical Specifications** – This appendix lists the technical descriptions and specifications for the Mac-Lab/CardioLab system.

Appendix B - **CardioLink Server Rename** – This appendix explains the procedure used to change the server name in a CardioLink network environment.

Index – The Index lists the terms used in the document.

Safety Information

Follow all of the instructions and warnings marked included in this manual, 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 Medical Systems *Information Technologies* offers optional ECG patient cables with electrosurgical noise filtering, which reduces the level of interference on ECG traces.

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.*

Responsibility of the Manufacturer

GE Medical Systems *Information Technologies* 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 Medical Systems *Information Technologies*.
- 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 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 Medical Systems *Information Technologies*. Parts and accessories used must meet the requiremetns for the applicable IEC 601 series safety standards, and the system configuration must meet the requirements of the IEC 601-1-1 medical electrical systems standard. Contact GE Medical Systems *Information Technologies* 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 Medical Systems *Information Technologies*.

This equipment should only be connected as specified by GE Medical Systems *Information Technologies*. Installation of the equipment should only be performed by qualified GE Medical Systems *Information Technologies* service representatives. Connection of the system to the equipment is not recommended in this manual.

Contact GE Medical Systems *Information Technologies* for information before connecting any device to this equipment that is not recommended in this manual. Only cables and accessory equipment purchased form GE Medical Systems *Information Technologies* 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.
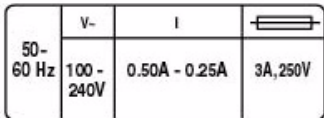
Refer servicing of the equipment to GE Medical Systems *Information Technologies* authorized service personnel. Any attempt to repair equipment under warranty will void that warranty.

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 IEC 601-1 and IEC 601-1 harmonized national standard.

Equipment Symbols

Table 2. Equipment Symbols	
Equipment Symbols	**Descriptions**
	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, if required, IEC 60601-2-27, IEC 60601-2-30, IEC 60601-2-34, IEC 60601-1-1.
$C\epsilon$ 0459	**CE Marking**
	Power Ratings Chart: V~ = Voltage I = Current Fuse =
	Equipotentiality A nonessential electrical connection which may be used to connect the chassis to other equipment to achieve the same potential.
	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.
	Attention Pay attention to the documents delivered with the equipment.
	Input Symbol

Conventions

Safety Messages

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.

Definitions

- Items shown in **Black** text are keys on the keyboard, text to be entered, or hardware items such as buttons or switches on the equipment.

- Items shown in *Italicized* text are software terms which identify menu items, buttons, or options in various windows.

- To perform an operation which appears with a plus (+)sign between the names of two keys, you press and hold the first key while pressing the second key once. This is called a keystroke combination.

  For example, Press **Ctrl**+**Esc** means to press and hold down the **Ctrl** key while pressing the **Esc** key.

- When instructions are given for 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** means to press the **Enter** or **Return** key on the keyboard. Do not type **enter**.

Danger, Warnings, and Cautions

DANGER

EXPLOSION HAZARD

Do not use in the presence of flammable anesthetics or other flammable gases.

WARNINGS

ACCESSORIES

Only connect UL 544 or UL 2601-1 listed or IEC certified medical equipment.

ACCIDENTAL SPILLS

If fluid of any kind should leak into the system, discontinue use of the equipment and contact GE Medical Systems *Information Technologies* immediately.

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

ACCURACY

The system may report erroneous heart rate values when pacemaker spikes or arrhythmias are present. Reported values should be verified by a qualified physician.

CONDUCTION HAZARD

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

DEFIBRILLATOR PRECAUTIONS

DO NOT contact the amplifier or patient during defibrillation.

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

Disconnect leadwires from patient before defibrillating. Otherwise, serious injury, death, or damage to the equipment could result.

IEC

All equipment not complying with IEC 601-1 should be placed outside the patient environment.

WARNINGS
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.

LEAKAGE CURRENT TEST

The system should be tested yearly for adequate grounding on patient leakage current.

Keep leakage current within acceptable limits when connecting auxiliary equipment to the system.

When more than two electrical devices are interconnected, the summation of leakage currents must be checked yearly.

MAINTENANCE/SERVICE

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.

PINCH POINT HAZARD

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

POWER SUPPLY

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.

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.

WARNINGS

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.

REPLACEMENTS

Replace only with the same type and rating of fuse.

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.

SUPERVISED USE

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

CAUTIONS

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

ACCURACY

DO NOT display any channels which are based on unused catheter input modules. Otherwise, erroneous values may occur.

ECG signal quality should only be checked by qualified medical personnel.

CABLING

Route optical cables thorough conduit in the ceiling or floor to avoid damage to the cables of cable connectors.

DEVICES

DO NOT reuse single use devices.

CAUTIONS
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.

OPTICAL DISK

Exit the software application properly before turning off the system. Failure to do so may damage the optical disk.

Remove the optical disk before moving the system. Failure to do so may result in damage to the drive or the disk.

TRANSDUCER

Remove air that is trapped in the transducer or associated tubing by flushing the system according to Cath lab procedures.

REMOTE MONITOR

Always power the system through separate isolation transformers which are independently connected to a wall outlet. You can power the laser printer through the IEB/Workstation power supply. Otherwise, the printer may draw enough current away from the system and cause it to reboot.

SOFTWARE

DO NOT add unauthorized software to the Mac-Lab/ CardioLab system. Doing so may make the Mac-Lab/ CardioLab software unstable.

Service Information

Service Requirements

Follow the service requirements listed below:

- Equipment servicing should be performed by GE Medical Systems *Information Technologies* 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 Medical Systems *Information Technologies* 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.

Equipment Identification

Every GE Medical Systems *Information Technologies* device has a unique serial number for identification. The serial number appears on the back of the CardioLab II Plus Amplifier.
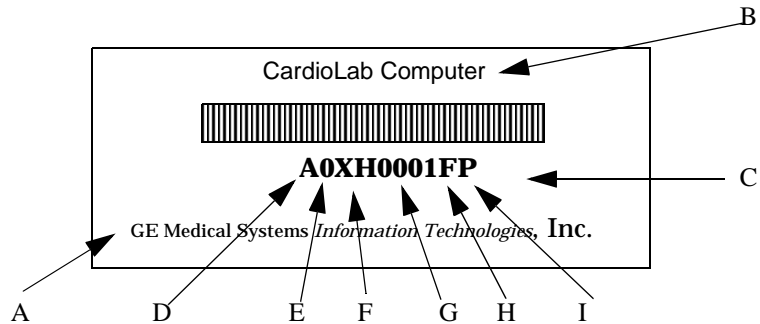
PK1

Equipment Identifications Table

Item	Name	Description
		Table 3. Equipment Identifications
A	Manufacturer	GE Medical Systems *Information Technologies*
B	Name of device	CardioLab computer
C	Serial number	Unique identifier
D	Month manufactured	A = January, B = February, C = March, D = April, E = May, F = June, G = July, H = August, J = September, K = October, L = November, M = December
E	Year manufactured	9 = 1999, 0= 2000, 1= 2001, (and so on)
F	Product code	Two-character product descriptor XH= CardioLab computer
G	Product sequence number	Four-character manufacturing number (of total units manufactured)
H	Plant designator	F = Cardiology G = Monitoring
I	Device characteristics	One or two characters that further describe the unit, for example: P = prototype not conforming to marketing specification; R = refurbished equipment; S = special product documented under Specials part numbers; U = upgraded unit

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
- Signal generator 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).

2   Equipment Overview

For your notes

Acquisition Computer with Workstation

Central Processing Unit (CPU)

The Mac-Lab/CardioLab products are diagnostic systems used for the assessment of the cardiac electrophysiologic (CardioLab) and hemodynamic (Mac-Lab) condition of patients.

The computer hardware consists of a PC motherboard, expansion cards for added functionality, and a SCSI drive system.

See Chapter 7, "Drawings and Parts List" for diagrams of the computer.

PK1

General Description

Standard Equipment

Table 1. Standard Equipment	
Description	**Part Number**
Barcode Scanner	2003417-001

Laser Printer
    4200
     2200
	
	2015205-001
	2007078-001

Monitors:
    18" Flat Screen
    19" CRT
    20" Flat Screen
    21" CRT
	
	2013547-002
	2012980-001
	2006144-001
	2010311-001

Keyboard: Mac-Lab (English)
        CardioLab (English)
        ComboLab (English)
	2003809-001
	2003809-002
	2003809-003

Scroll Mouse	2007023-001

TRAM Modules (Mac-Lab 7000/Combination systems only)
        450 SL
        400 SL
	
	412654-001
	411161-001

Remote Acquisition Unit (RAU) Mac-Lab 7000/Combination systems only) (400SL or 450 SL)	415540-001

CardioLab II Plus Amplifier (Mac-Lab/CardioLab/Combination systems only)
    32 Channel
    64 Channel
    96 Channel
    128 Channel
	
	2003232-001
	2003232-002
	2003232-003
	2003232-004

Acquisition Computer	2011646-00X
TRAM-Net RAC 4A (Mac-Lab/Combo System only)	900031-006

Additional Systems

Table 2. CardioLink Clients	
Description	
Nurses Station/Pre-Post Op Station/Review Station	2011646-006

Optional Equipment

Table 3. Optional Equipment	
Description	**Part Number**
Strip Chart Recorder (Thermal Writer)	2002480-001
Analog Output Box	2006168-001
Video Printer	2004142-001

CardioLink Server

Table 4. Server	
Description	**Part Number**

G2:
        High-End Server
        Mid-Level Server
        Local Server
G3:
        High-End Server
        Mid-Level Server
        Low-End Server
	2009350-001
	2009350-002
	2009350-003
	
	2016992-001
	2016992-002
	2016992-003

Network Switch 10/100 Base-TX	2001084-001
Rack-Mounted UPS	2006397-001
Rack	2006483-001

Software

Operating System

The computer uses the Windows NT 4.0 Operating System.

Application

The Mac-Lab/CardioLab system is a single, custom application which has an EP and a CathLab mode. The ComboLab system includes both Mac-Lab and CardioLab.

Accessory Software

In addition to the Mac-Lab/CardioLab system, the computer has the following accessory software installed:

- Microsoft Office (for generating procedure reports)
- PC Anywhere 32 (for remote support via modem)
- Microsoft Database Engine (MSDE) for database communication

MotherBoard

The motherboard is a server and has the following features:

■ Pentium III processor support

■ Integrated 10/100 Network card

■ Integrated SCSI controller

Component Boards

The following expansion cards may be added to the computer for additional functionality.

Video PCI Expansion Cards

The video subsystem utilizes a PCI video card. This card supports the high resolutions used for the application (up to 1600 by 1280 per monitor).

The computer can be configured with one or two video cards, depending on the configuration purchased. The use of the extra video card allows the desktop display to be shown across two monitors instead of one. The board in the slot labeled Video 1 drives the real-time signal display of the system, as well as non-real-time display elements. The optional board in the slot labeled Video 2 displays only non-real-time display elements.
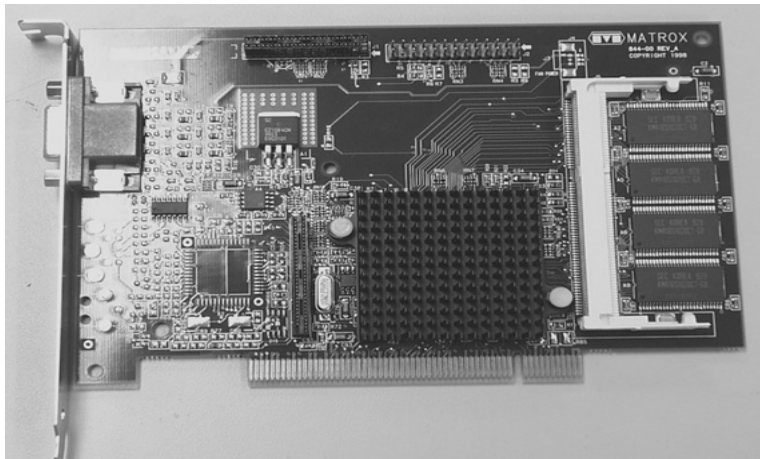
RS422 PCI Expansion Card

The computer can be configured with an optional RS422 expansion card. This card allows the computer to communicate with the TRAM RAU module. This card has two independent RS422 DB9 connectors, allowing it to communicate with two TRAM RAUs simultaneously.

NOTE:

The DB9 connectors on the board do not connect directly to the TRAM, but connect instead to the IEB. The IEB routes the dual RS422 connections to a single DB15 connector, which connect to the TRAM RAU cable.
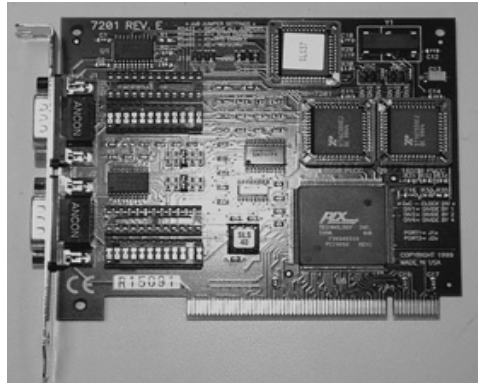
Imaging PCI Expansion Card - Optional

The computer can be configured with an optional Imaging expansion card. This card allows the computer to acquire and display analog video input, such as images from an X-ray system.
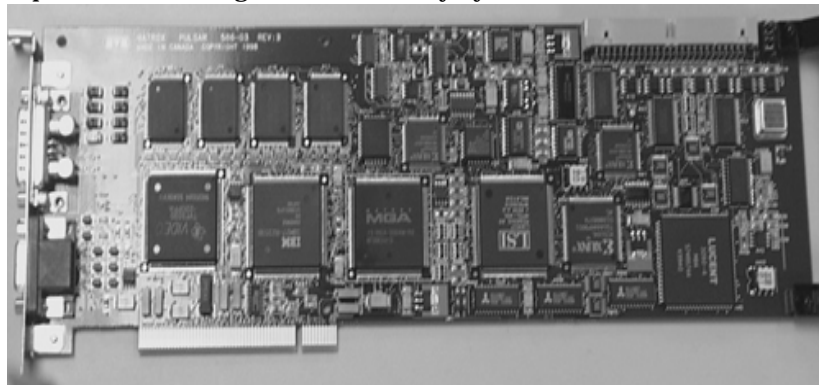
COMMS ISA Expansion Card

The computer is configured with a COMMS expansion card. The purpose of this card is to:

- Communicate with the CardioLab II/II Plus amplifier (via 2 ST connectors on the bracket).
- Output of analog signals for use by other equipment (output via the DB 44 connector on the bracket).
- Input of analog signals from other equipment (input via the DB 44 connector on the bracket).
- Provide additional serial ports (COM 5,6,7,8,9,10). Input/Output via the internal 40 pin header for COM 5,6,7,8,9 and internal 10 pin header for COM 10.
- Output a video switching signal to toggle the video display of the Switched Video output on the system VID/MUX (video distribution/ amplifier board in the IEB) (output via the DB 44 connector on the bracket).
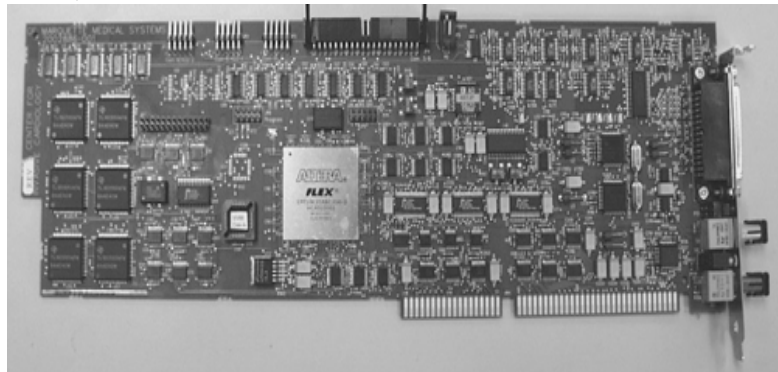
SCSI PCI Expansion Card - Optional

The computer can be configured with an optional SCSI expansion card. This card allows the computer to review old patient studies from the previous DOS CardioLab EP version of the CardioLab product.

SCSI Drive Subsystem

The computer is configured with an Ultrawide II SCSI interface. A SCSI interface is used to increase performance of the data read/write that is achieved with the SCSI.

The SCSI drives used in the system are:

- Hard drive used for the operating system, application software, and accessory software.
- CD ROM drive used for loading software as needed.
- Optical drive used for recording system studies to portable optical media.

USB Port (part of IEB Box)

The computer is configured with two USB ports:

- The USB port communicates with or prints to the optional Thermal Writer. Only one port is needed for the writer.
- The second port is an active port which can be used in the event of a problem with the first port.

Optical Drive 2.6GB

The optical drive used for recording system studies to portable optical media.

Type IV (High-end option):

5 1/4 inch Optical Drive)

Optical Drive 320MB

The optical drive used for recording system studies to portable optical media.

Type III (low-end option):

3 1/2 inch Optical Drive

TRAM-net to Ethernet conversion board

Converts signals from the TRAM-net RAC to Ethernet. Allows Mac-Lab communications with the TRAM-net RAC.

Integrated Electronics Box (IEB)

Introduction

The IEB serves as the power conditioner/distribution device for the Mac-Lab/CardioLab/ComboLab workstations. The power supplied by the IEB supports all specified equipment that is needed for system operation.The IEB is designed to provide power to the following equipment:

- NT Computer
- 3- 20" LCD Monitors
- Uninterruptible Power Supply (UPS) (Internal)
- Laser printer
- Video Multiplexer (VID/MUX) amplifier (Internal)
- Modem (Internal)
- Thermal Writer
- Two TRAM modules

There are three different versions of the IEB. They are:

- IEB 100V, 50/60 Hz
- IEB 120V, 50/60 Hz
- IEB 240V, 50/60 Hz

See Chapter 7, "Drawings and Parts List" for part numbers.

Isolation Transformer (part of IEB Box)

The isolation transformer is used to provide isolation as required by IEC601-1. The transformer is a 2.0kVA medical grade high isolation transformer. It has the appropriate primary and secondary taps to achieve 1:1 ratings for 100V, 120V, and 240V.

Uninterruptible Power Supply (UPS)

There are three different versions of the UPS, one for each rated voltage version of the IEB. The UPS is only required to power the computer (no monitors) to prevent momentary loss of power. The UPS is powered directly from the unswitched power on the secondary of the transformer. This prevents the UPS from detecting a power fault condition when the power is switched off to other components.The computer is turned off using the power switch on either the UPS or the computer.

The UPS is mounted on the upper internal shelf and is fastened in place using the UPS Hold Bracket. The front panel of the UPS is visible through the opening in the front panel of the IEB. This is needed for user access to the UPS power switch.

Modem

The universal modem is used for remote dialing to the system for service.

- The IEB is supplied with an internal modem that is connected to the computer.
- There are two versions of modems. One for use in the 120V IEB and one that is used in the 100V and 220V versions. Each version of modem is supplied with a power supply.

Modem Power Supply (part of IEB Box)

- The IEB is supplied with an internal modem that is connected to the computer.

- There are two versions of modems. One for use in the 120V IEB and one that is used in the 100V and 220V versions. Each version of modem is supplied with a power supply.

- The modem is attached to the lower internal shelf and the power is connected to the appropriate AC outlet on the same shelf. The modem is secured with Velcro. The serial interface to the computer is connected through the DB Connect Circuit Board. The phone line in and out is connected through the DB Connect Panel.

Video Multiplexer (VID/MUX) for IEB

The VID/MUX is a video board that is capable of the following functions:

- Accepts three video inputs
- Two buffered outputs for each input (one for a local monitor and one for remote)
- One buffered output that is software selectable to view input 1 or 2
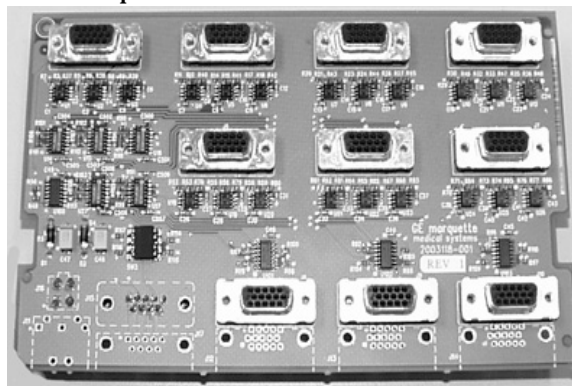
VID/MUX Power Supply (part of IEB Box)

The VID/MUX board requires ±5V @ 1.25A each. The power supply for the VID/MUX board is mounted in the lower power compartment of the IEB. Switched AC power is delivered by the power supply.

DB Connect Circuit Board

The DB Connect Panel has the following I/O connections.

- Analog IN and OUT from computer on DB44

  The DB44 is the new connector on the COMMS board. It combines the functions of Analog In and Analog OUT.

- Analog OUT to breakout box on DB37

  This connection routes the Analog OUT from the DB44 to the DB37. This allows for interface to the current analog output breakout cable.

- Analog OUT Channel 1-2 on BNC

  These connections are individual channel outputs from the DB44 connector.

- Analog IN CH 1-4 on BNC

  These connections are analog inputs that connect to the DB44.

- Digital IN on 1/4 inch phone jack.

  These connections are digital inputs that connect to the DB44.

- Modem Line IN on pass through RJ12.

  Connects modem to the phone line.

- Modem Phone OUT on pass through RJ12.

  Port allows for the connection of the external phone to the phone line.

- Serial IN for the modem.

  Serial connection for the internal modem.

- RS422 from the computer on 2 DB9.

  There are two RS422 ports from the computer for interface to 2 TRAM modules

- RS422 to TRAM on DB15 (DB9 shell).

  This connector has integrated the two RS422 ports and power for the TRAM. This connects to an RAU.

- Power from TRAM power supply for TRAM (solder side connector).

Thermal Overcurrent Circuit Breaker

The device is mounted on the lower half of the rear panel. It has two functions:

- Main Power Switch

  This switch controls power to all internal components and all external components that are connected to the system.

- Overcurrent Protection

  This is an overcurrent condition to trip the breaker. Once the overcurrent condition is removed, the breaker can be turned on.

ON/Standby Switch

This switch controls power to all components connected to the 4 outlets on the rear of the unit. It does not switch power to the single unswitched outlet on the rear of the unit. The main purpose for this switch is to allow for power control of all the components except the UPS that delivers power to the computer.

Rack-Mounted UPS for CardioLink Server

The UPS features a maximum of 2700 Watts of true power. This new rack-space saving design allows more support for critical rack mountable equipment.

LED and switch menbrane integrated into the front panel with four button controls (three buttons for UPS power control and one button under the front bezel for configuration).

For your notes

3 Installation

For your notes

Installation

CardioLab 2000/4000/7000

Components

The components may vary depending on the options in use. These variations are covered in instructions that are provided with each option.

Catheterization Procedure Room

The components that are found in the catheterization procedure room are:

- Patient leads, ECG cable
- Catheter input
- Analog output cable
- Analog input cable
- Remote monitors
- Video cables
- Video power cables
- Amplifier
- Stim input cables
- Fiber optic cable
- Amplifier power cable
- RF generator
- Stimulator
- Integrated Electronics Box (IEB) power cable
- Radio Frequency (RF) cable
- IEB
- Computer
- Workstation
- Printer
- Barcode scanner
- Network cable (with Network option)
- Mouse
- Keyboard
- Image input cable (with Image option)
- Analog phone line

Reviewing the Assembly

Before beginning to service the system, review the existing assembly to ensure that it is correctly installed and connected. This should be done prior to turning on the system.

- Ensure that the power is off.
- Ensure that the components are conveniently positioned in the room and have adequate room for access and ventilation.
- Have the monitors been mounted properly?
- Use a line analyzer to check the wall outlets for power and ground. Is the wall outlet in both the control room and procedure room a duplex 20 Amp circuit on the hospital emergency power?
- Is the conduit sized correctly and correctly installed?
- Make sure that all connections are complete and secure.
- If a line conditioner is to be used, make sure that it is connected now.
- Route all cables so that they will not be walked on, tripped over, or rolled on.
- Ensure that Network cables are correctly installed (Network option).
- Ensure that the floppy disk drive is empty.
- Turn on the power to the system at the IEB.
- Check the screen adjustments on each monitor. Is the picture centered, shaped properly, sized correctly, and the right color? Is there any color distortion indicating a need for degaussing the monitor? Moving the monitor may cause color distortion.

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Mac-Lab 2000/4000/7000

Connecting System Components

For complete information on planning for and assembling the system, mounting brackets, and options, see the following manual:

■ Mac-Lab System EX RAU Mounting Kits Installation Manual

This chapter is limited to an overview of the assembly/disassembly as it pertains to the repair of a unit already in the field.

Components

The components may vary depending on the options in use. These variations are covered in instructions that are provided with each option.

Catheterization Procedure Room

The components that are found in the catheterization procedure room are:

■ Remote Acquisition Unit (RAU) or TRAM-net RAC 4a
■ TRAM
■ RAU mounting bracket
■ Patient leads
■ BP cuff SPO_2 probe
■ Analog output cable
■ Analog input cable
■ RAU data acquisition/power cable (from RA unit DB-15 to buffer plate DB-15 connection)
■ Remote monitors
■ Video cable
■ Video power cable

Control Room

The components that are found in the control room are:

■ IEB power cable
■ Video power cables to IEB
■ Video cables
■ IEB
■ Computer
■ Workstation
■ Printer
■ Thermal Writer
■ Image input cable (with Image option)
■ Barcode scanner
■ Network cable (with Network option)
■ Local system monitors
■ Mouse

- Keyboard
- Analog phone line

Reviewing the Assembly

Before beginning to service the system, review the existing assembly to ensure that it is correctly installed and connected. This should be done prior to turning on the system.

- Ensure that the power is off.
- Ensure that the components are conveniently positioned in the room and have adequate room for access and ventilation.
- Is the RA unit positioned so that the TRAM opening is not facing the ceiling or floor?
- Have the monitors been mounted properly?
- Use a line analyzer to check the wall outlets for power and ground. Is the wall outlet in both the control room and procedure room a duplex 20 Amp circuit on the hospital emergency power?
- Is the conduit sized correctly and correctly installed?
- Make sure that all connections are complete and secure.
- If a line conditioner is to be used, make sure that it is connected now.
- Route all cables so that they will not be walked on, tripped over, or rolled on.
- Ensure that Network cables are correctly installed (Network option).
- Ensure that the floppy disk drive is empty.
- Turn on the power to the system at the IEB.
- Check the screen adjustments on each monitor. Is the picture centered, shaped properly, sized correctly, and the right color? Is there any color distortion indicating a need for degaussing the monitor? Moving the monitor may cause color distortion.

ComboLab 2000/4000/7000

Connecting System Components

For complete information on planning for and assembling the system, mounting brackets, and options, see the following manual:

- Mac-Lab System EX RAU Mounting Kits Installation Manual

This chapter is limited to an overview of the assembly/disassembly as it pertains to the repair of a unit already in the field.

Components

The components may vary depending on the options in use. These variations are covered in instructions that are provided with each option.
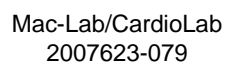
Catheterization Procedure Room

The components that are found in the catheterization procedure room are:

- RAU or TRAM-net RAC 4A
- TRAM
- RAU mounting bracket
- Patient leads
- BP cuff SPO_2 probe
- ECG cable
- Catheter input modules,
- Analog output cable, and
- Analog input cable.
- Simulator and cables
- RAU data acquisition/power cable (from RA unit DB-15 to buffer Plate DB-15 connection)
- Remote monitors
- Video cables
- Video power cables
- Amplifier
- IEB
- Workstation
- RF generator
- Fiber optic cable
- Amplifier power cable
- Computer
- Thermal Writer
- IEB power cable
- Printer
- Barcode scanner
- Network cable (with Network option)
- Analog phone line

- Mouse
- Keyboard
- Image input cable (with Image option)
- RF cable

Reviewing the Assembly

Before beginning to service the system, review the existing assembly to ensure that it is correctly installed and connected. This should be done prior to turning on the system.

- Ensure that the power is off.
- Ensure that the components are conveniently positioned in the room and have adequate room for access and ventilation.
- Ensure that the RA unit is positioned so that the TRAM opening is not facing the ceiling or floor.
- Ensure that the monitors are mounted properly.
- Use a line analyzer to check the wall outlets for power and ground. Is the wall outlet in both the control room and procedure room a duplex 20 Amp circuit on the hospital emergency power?
- Is the conduit sized correctly and correctly installed?
- Make sure that all connections are complete and secure.
- Ensure that the line conditioner being used is connected.
- Route all cables so that they will not be walked on, tripped over, or rolled on.
- Ensure that LAN cables are correctly installed (LAN option).
- Ensure that the floppy disk drive is empty.
- Turn on the power to the system at the IEB.
- Check the screen adjustments on each monitor. Is the picture centered, shaped properly, sized correctly, and the right color? Is there any color distortion indicating a need for degaussing the monitor? Moving the monitor may cause color distortion.

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Integrated Electronics Box

Mac-Lab/CardioLab
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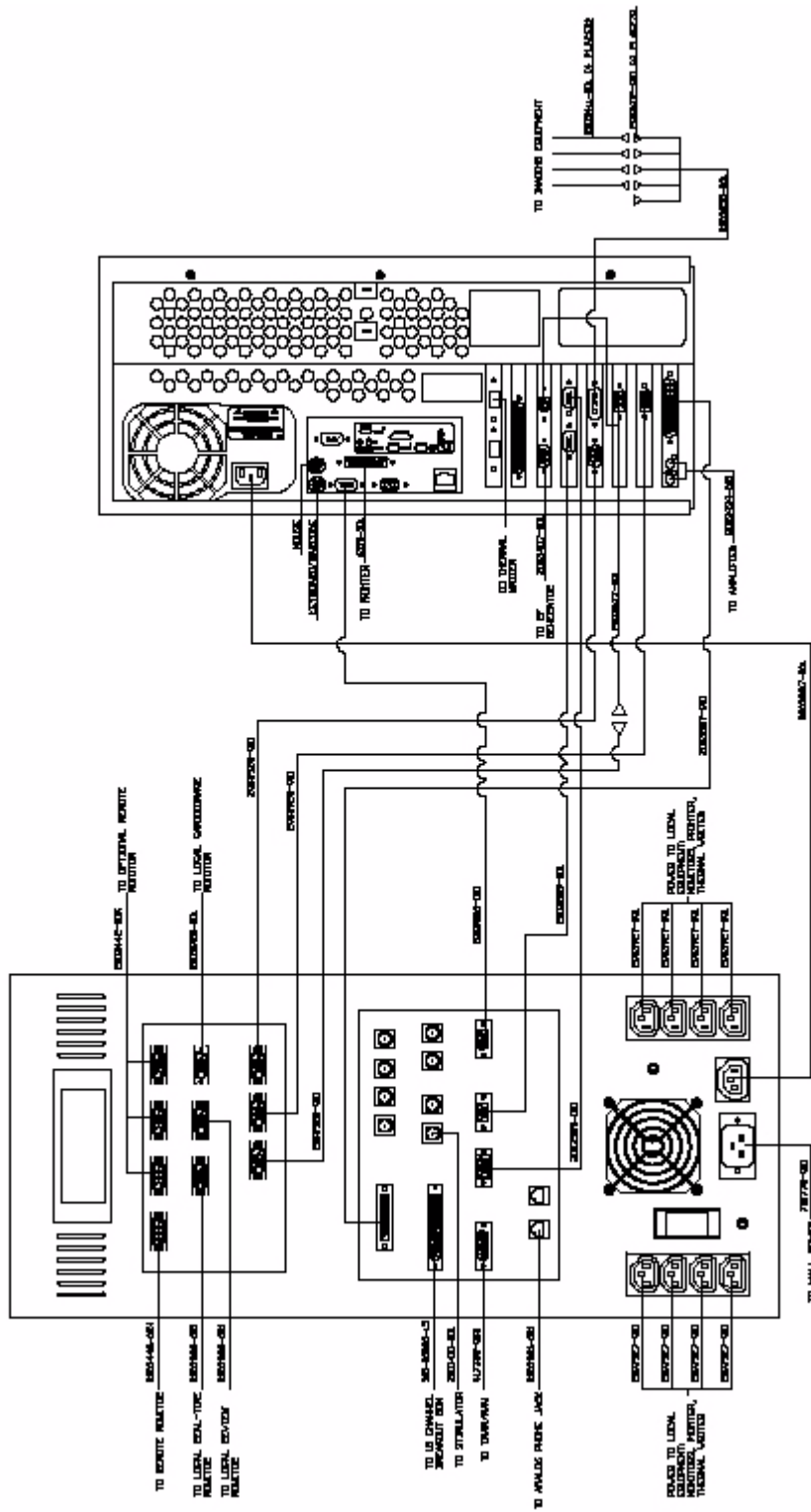
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CardioLink Diagram
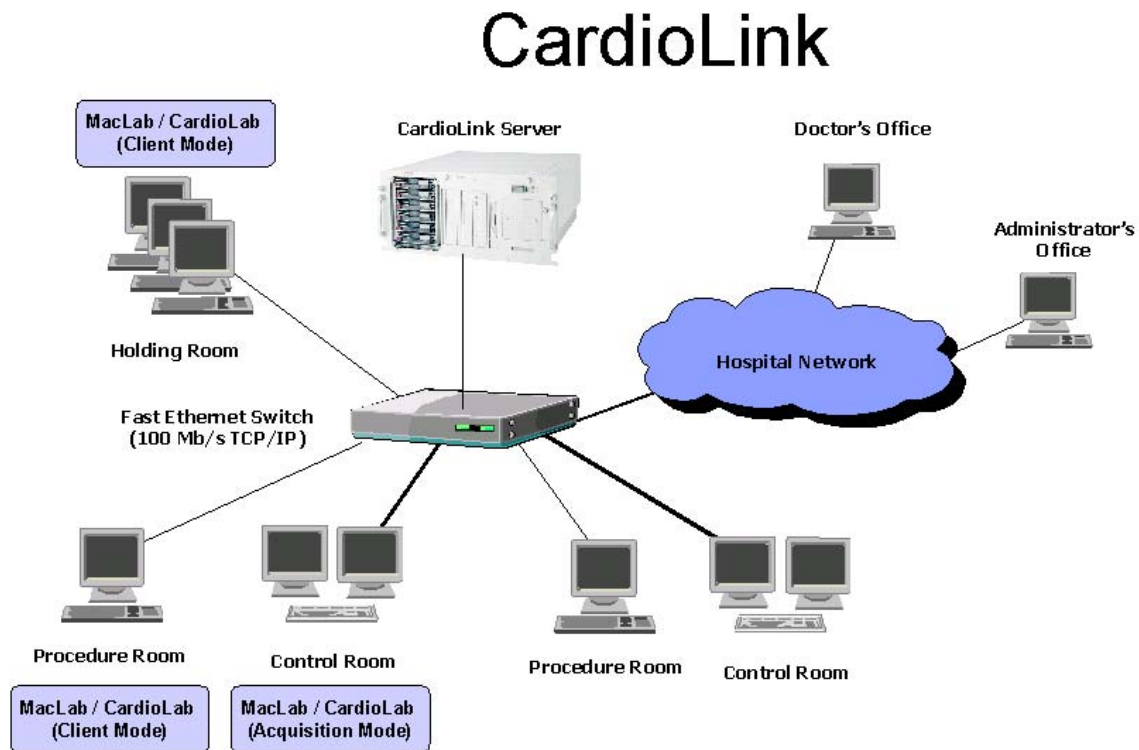
Changing the SA Password

If desired the system administrator can sa password.

On Server

NOTE:
Record the new password, as it will be needed for any future software upgrades.

To change the sa password on the server, follow these steps:

1. Login to the system as an administrator

   NOTE:
   See system administrator for login information.

2. Select *Start > Programs > Enterprise Manager*

3. Select *Server > Security > Logins*

4. Double-click on *SA* and change the password.

5. Click *OK*.

6. At the *Confirm Password* window, re-enter the new password and click *OK*.

7. Click *OK*.

8. Close *Enterprise Manager*.

On Acquisition and Review Systems

NOTE:
Record the new password, as it will be needed for any future software upgrades.

To change the sa password on an acquisition or review system, follow these steps:

1. Login to the system as an administrator

   NOTE:
   See system administrator for login information.

2. Select *Start > Microsoft Access*

3. At the *Microsoft Access* opening window, click *Cancel*.

4. Select *File > New*.

5. Double-click the *Project (Existing Database)* icon.

6. Enter a file name and click *Create*.

7. In the *Connection* tab, from the *Select or Enter a server name* dropdown box, select the local system name as the server name.

8. Select the *Use a specific user* radio button.

9. Type the current username in the *Username* textbox.

   NOTE:
   The default user for version 5.2 is **sa**; for version 5.1D is **clabsys**.

10. Uncheck the *Blank Password* and *Allow saving password* checkboxes.

11. Type the current password in the *Password* textbox.

    NOTE:
    The default password for version 5.2 is **gemssqladmin**; for version 5.1D is **clab.admin**

12. From the *Select the database on the server* dropdown box, choose *clab*.

13. Click the *Test Connection* button.

14. At the *Test Connection Succeeded* window, click *OK*.

15. Once in the database, Select *Tools > Security > Database Security*.

16. Single-click *sa*.

17. Click the *Edit* button.

18. Type the new password in the *Password* textbox.

19. Click *OK*.

20. Type the new password in the *Confirm New Password* textbox and click *OK*.

21. At the *SQL Server Login Properties* window, click *OK*.

22. Close *Microsoft Access*.

For your notes

4 Maintenance

For your notes

Introduction

Recommended Maintenance

This chapter provides preventive maintenance instructions for the system and its equipment and supplies. These maintenance guidelines are followed to prevent unnecessary equipment and supply failure and possible health hazards.

This chapter contains instructions for the following recommended maintenance:

- Inspecting and cleaning the unit
- AC line voltage tests to verify that the power outlet is properly wired
- Leakage tests to verify that the equipment does not pose a microshock hazard
- Ground continuity test to verify that all exposed metal is properly grounded

Operator's Maintenance Schedule

This chapter contains maintenance schedules for users. The CathLab supervisor and assigned operators should perform the maintenance described.

Pre-service Procedures

Before you open the unit for maintenance or service, perform these required preparations:

- Turn OFF the system at the console and at the IEB, and unplug the IEB before servicing the equipment.
- Check the power cord, but do not remove it if you will be doing anything that requires a ground. The power cord should be removed for cleaning purposes.
- Verify that the line, neutral, and ground wires are all connected firmly to the plug and that they are not shorted together.

Environmental Protection

Although the system operates in many different environments, some precautions are observed.

- Take care to avoid extremes of temperature, moisture, and humidity. The system components are not waterproof.
- Protect the various system components from spills or other debris. Eating, drinking and smoking should not be permitted near the system during a study or during maintenance procedures.

Inspection and Cleaning

Precautions

- Turn off the Integrated Electronics Box (IEB) and remove the power cord from the wall outlet before inspecting or cleaning.
- Wear latex surgical gloves and follow hospital regulations when cleaning equipment that has been exposed to bodily fluids.
- Do not immerse any part of the equipment in water.
- Do not use organic solvents, strong ammonia-based solutions, or abrasive cleaning agents which may damage equipment surfaces.
- Do not use a cleaning solution or solvent on the diskettes or disk drives. Doing so can cause loss of data or damage to the data and/or drive.
- Do not use metal articles to clean the disk drives.
- Do not allow any magnetic material near the system unit.

Daily Visual Inspection

Operators should perform a general overall inspection daily.

- Turn off the console and the IEB, and remove the power cord from the wall outlet before making an inspection or cleaning the unit.
- Check the case and display screens for cracks or other damage.
- Regularly inspect all cords and cables for fraying or other damage.
- Inspect all plugs, cables, and connectors for bent prongs or pins.
- Verify that all cords, socketed components, and connectors are securely seated.
- Inspect keys and controls for proper operation.

 Toggle keys should not stick in one position.

 Diskette drives should be fully functional.

Perform a visual exterior and interior inspection during preventive maintenance checks.

- Inspect interior for debris, oil, and moisture (liquid or condensation). Determine the source of the contamination and correct both the source and resulting problems.
- Inspect for missing hardware. Be sure that all components are present and intact. Socketed components should be firmly seated in their respective sockets. Check that all board components are properly attached, especially soldered components added as part of a repair or modification.
- Check for burn damage from overheated components. The familiar smell of burned components indicates that something has failed, even when there is no discoloration or disformation.
- Check that all printed circuit boards are seated properly if mounted in a card cage or connected to any type of edge connector. Make sure that all ground straps are connected.

- Check that all power cords and interface cables are firmly connected, with no sign of excessive wear or excessive tension.

- Check that screws and other hardware connectors are in place and properly installed. Check the security of the Remote Acquisition Unit (RAU) mounting bracket. The knobs holding the RAU to the bracket should be tight. However, be careful not to strip the threads.

- Verify that the remote video monitors are properly secured to the mounting plates. Verify that the mounting plates are properly secured.

- Verify that the local monitors are properly placed or secured.

General Maintenance

This section contains preventive maintenance instructions for the system and its equipment and supplies. These maintenance guidelines should be followed by the operator to prevent unnecessary equipment failure or possible health hazards. Before starting any maintenance, turn the system power off.

Cleaning the Exterior

Clean the exterior of the system on a regular basis with a clean, soft cloth and a solution consisting of mild detergent diluted in water. However, avoid coming in contact with open vents, plugs and connectors of any kind, the keyboard, mouse, and the thermal printer. Thoroughly wipe the exterior of the unit with a lint-free cloth dampened with one of the following approved solutions, then dry it with a clean, soft cloth or paper towel. The cleaning agents include:

- Ammonia (diluted to 10% strength)
- Cidex
- Mild soap
- Sodium hypochlorite bleach (diluted to 10% strength)

To avoid damage to the equipment, follow these rules:

- Wring the excess cleaning solution from the cloth.
- If exterior surface is swabbed with bleach or 10% ammonia solution, follow by swabbing with water.
- Always immediately wipe off all of the cleaning solution with a dry cloth or paper towel after cleaning.
- Never pour water or any cleaning solution on the equipment or permit fluids to run into the Thermal Writer, Console, AC Distribution Unit, RAU, monitors, connectors, or ventilation openings in the equipment.
- Never use these cleaning agents:
  - Abrasive cleaners or solvents of any kind
  - Alcohol-based cleaning agents
  - Wax containing a cleaning substance
  - Acetone
  - Betadine

Failure to follow these guidelines may melt, distort, or dull the finish of the case, blur lettering on the labels, or cause equipment failures.

Cleaning the Monitor Screens

Clean the monitor's screen using a gentle commercial glass cleaner. Apply a small amount of cleaner to a clean, soft, anti-static, lint-free cloth, then use on screen. This method prevents excess cleaner from running inside of the monitor.

- Use a gentle commercial cleaner.
- Follow directions for use on product.
- Do not spray directly on the glass.
- Use a clean, non-abrasive, soft, anti-static, lint-free cloth.
- Wipe glass carefully and allow to dry.

Cleaning EP Cables

GE's electrophysiology cables are typically used outside the sterile zone and therefore are not routinely sterilized. The cables may, however, be cleaned using one of the following solutions:

- Ammonia (diluted to 10% strength)
- Cidex
- Sodium hypochlorite bleach (diluted to 10% strength)
- Mild soap
- Isopropyl alcohol

Monthly Maintenance

Perform the following preventive maintenance on a monthly basis. Before starting any maintenance, turn off the system.

Cleaning the Print Head

Clean the thermal print head using isopropyl alcohol and a clean, soft cloth. Non-abrasive alcohol wipes may also be used. To access the print head, open the writer door and wipe the print head where it makes contact with the capstan roller. Clean the roller when necessary with a small amount of alcohol. Excessive use of alcohol over time may cause the roller to crack.
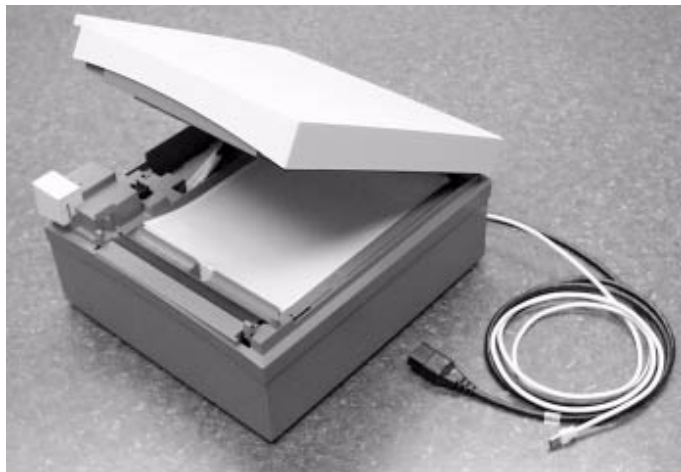
PK1

Annual Maintenance

Perform the following preventive maintenance on an annual basis. Before starting any maintenance, turn off the Console and AC Distribution Unit, and remove the power cord from the wall outlet.

Cleaning the Interior

Generally, it is not necessary to clean the interior of the system; however, if dust is an environmental problem, use a commercially available, electronically-safe, dust remover (compressed air, difluoroethane, or other). Follow the manufacturer's directions for use. Note cautions about flammability, the possibility of ignition, and the possibility of causing frostbite. Be sure to clear the nozzle before use, hold the can upright, and do not allow liquid propellant to contact skin or electronics. Be careful not to drive dust into connections or disk drives.

Whenever an exterior spill occurs, you should completely turn off the IEB and remove power from the wall outlet. Clean up the spill, and check to be sure the spill has not penetrated the CPU, Thermal Writer, RAU, or IEB. If it has, carefully blot and dry the affected area. Do not reconnect power or turn the system on until you are sure no moisture remains.

Inspect All Cables, Plugs, and Connectors

Inspect all cords for fraying or other damage. Inspect all plugs and connectors for bent prongs or pins. Verify that all cords and connectors are securely seated. Repair or replacement must be performed by qualified service personnel.

Cleaning the RAU and TRAM

Check the RAU and TRAM modules for buildup of moisture, fluids, or dust. Clean the units in the same way as the exterior of the console, being careful not to allow any moisture into the unit.

Preventative Maintenance

Perform the following general preventative maintenance.

- Make a backup copy of the hard drive onto a blank optical disk. This way, if any files ever become corrupt, a backup copy will exist to replace them.

- Test the integrity of the disk using scandisk or a similar utility found at the local computer store. DO NOT ATTEMPT TO REPAIR ANY PROBLEMS FOUND. Only diagnose the errors. If errors are found, contact technical support for assistance.

- Scan the hard disk for viruses using the recommended validated anti-virus software.

- Remove the fiber optic cable from the amplifier and computer and clean the contacts with rubbing alcohol and a clean, lint-free cloth. When finished, verify that you have connected the cables back correctly by acquiring a test patient in the software.

- Remove any dust or lint from inside the computer and IEB using electronics-safe compressed air. Do not use compressed air to clean the inside of the optical drive.

- Ensure that all cables connected to the monitors, IEB and computer are securely fastened.

- The standard life of the UPS ranges from 3 to 6 years. Test the UPS by turning the main power switch on, letting the computer boot completely and then unplugging the IEB from the wall. The computer should maintain power and the UPS will beep to indicate that power was lost to the system. If computer maintains power, the UPS is functioning normally.

Domestic Electrical Safety Tests

AC Line Voltage Test

This test verifies that the domestic wall outlet supplying power to the equipment is properly wired. For international wiring tests, refer to the internal standards agencies of that particular country.

120 VAC, 50/60 Hz

Use a digital voltmeter to check the voltages of the 120-volt AC wall outlet (dedicated circuit recommended). If the measurements are significantly out of range, have a qualified electrician repair the outlet. The voltage measurements should be as follows:

■ 120 VAC (± 10%) (108 to 132 VAC) between the line contact and neutral and between the line contact and ground.

■ Less than 3 VAC between neutral and ground.
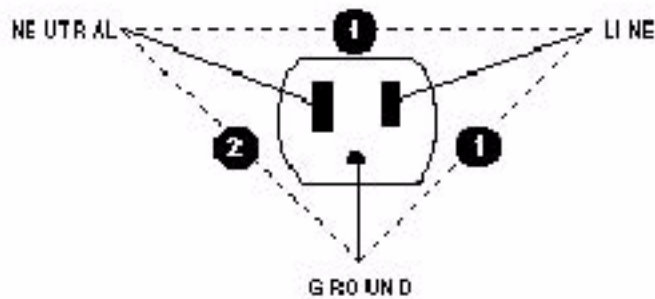
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240 VAC, 50/60 Hz

Use a digital voltmeter, set to measure at least 300 VAC, to check the voltages of the AC wall outlet (dedicated circuit recommended). If the measurements are significantly out of range, have a qualified electrician repair the outlet. The voltage measurements should be as follows:

■ 240 VAC (± 10%) (216 to 264 VAC) between either "hot" contact and ground.

■ 216 to 264 VAC between the two "hot" contacts.
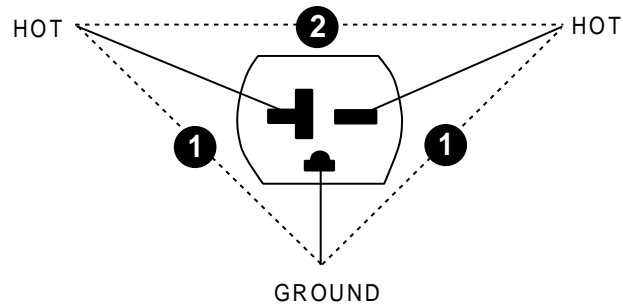
PK3

Leakage Current Tests

The leakage tests are safety tests to ensure that the equipment poses no electrical microshock hazards. The specific leakage current tests and the frequency at which they should be performed should be determined by your facility.

If the unit under test fails the leakage tests, do not allow the customer to use the equipment. Call Tech Support for assistance. (See the "How to Reach Us" page in the front of the manual.)

GE Medical Systems recommends that you perform these tests:

- Before applying power for the first time
- Every year as part of routine maintenance
- Whenever internal assemblies are serviced

You need a leakage tester to perform the leakage tests.

NOTE:
The accuracy of the leakage tests depends on a properly wired wall outlet. Do not proceed until you verify the integrity of the power source.

Special Test Considerations

When patient sink current is measured, it may be necessary to manipulate the patient cable to avoid excessive stray capacitance to ground, which may result in artificially high measurements.

Ground Continuity

This test verifies that there is continuity (less than 100 mΩ resistance) between all the exposed metal surfaces on the console that have the potential to become energized, and the ground prong on the Mains AC power cord.

- Measure the resistance between the equipotential lug on the back of the console and the ground pin on the AC inlet of the AC Distribution Unit. Repeat between the shell of the I/O port on the Thermal Writer and the ground pin on the AC inlet of the AC Distribution Unit.
- If the measurements are significantly out of range, check for breaks in the power cord or in the internal connections within the unit.

Special Considerations

- To perform this test accurately, it is necessary to use a special ground impedance measuring device that can accurately measure low resistances while providing a significant amount of current (10 to 30 A). This test cannot be performed accurately with a typical volt ohm meter.
- Because of the resistance in the power cables between the console or writer and the AC Distribution Unit, it is essential that special care is taken to obtain precise measurements. Resistance in test leads must be subtracted from an overall reading to accurately isolate the resistance in the equipment under test.
- For a cursory field service check, a volt ohm meter may be used to verify continuity and that resistance is reasonable low (less than 0.3 to 0.4 ohms, including test leads).

Maintenance/Repair Log

The Maintenance/Repair Log is included in this manual to aid in keeping a record of the work performed on the system.

NOTE:
Unless you have an Equipment Maintenance Contract, GE Medical Systems *Information Technologies* does not in any manner assume the responsibility for performing the recommended maintenance procedures. The sole responsibility rests wit the individual or institution using the equipment. GE Medical Systems *Information Technologies* service personnel may, at their discretion, follow the procedures provided in this manual as a guide during visits to the equipment site.

Maintenance/Repair Log Table

Unit Serial Number:

Institution Name:

Date	Maintenance/Repair	Technician

Unit Serial Number:

Institution Name:

Date	Maintenance/Repair	Technician

5 Troubleshooting

For your notes

Introduction

This chapter includes the following sections:

- General Troubleshooting for the system
- Troubleshooting the Remote Acquisition Unit (RAU)
- Troubleshooting the Video Processing
- Troubleshooting the Thermal Writer

Initial Inspection

The following are the most common causes for system failure:

- Ensure that the IEB, CPU, RAU, monitors, keyboard, and optional LAN are properly connected. If not, power down the system, connect the cables properly, and turn on the IEB.
- Ensure that the wall outlet is live. With a line analyzer, check the outlet for both power and ground.
- Ensure that a disk is not in the floppy disk drive. No disk should be present.
- Ensure that the IEB is turned on.
- Ensure that the monitors are turned on.
- Ensure that the CPU is turned on.
- Ensure that nothing (other than a patient lead on the TRAM) is connected or disconnected while the system is under power. If so, turn off the IEB, reconnect the cables, and then turn the IEB on again.

Visual Inspection

A thorough visual inspection of the equipment can save time. Small things — disconnected cables, foreign debris on circuit boards, missing hardware, loose components — can frequently cause symptoms and equipment failures that may appear to be unrelated and which are difficult to track.

General Troubleshooting for the System

Problems

No Boot Up

If the computer does not boot:

- Verify that the power cable from the workstation is plugged into the wall.
- Verify that the power cable is secure in the back of the IEB.
- Check the power cable from the IEB to the computer to verify that it is secure on both ends.
- With the IEB power switch turned on, try pressing the power switch on the CPU. This can be accessed by opening the right front panel on the workstation.
- Replace the power cables.

System Does Not Boot

Disk in Disk Drive

- Check to see if you left a disk in the floppy disk drive. If you did, remove the disk. Turn the system off and wait 10 seconds before turning the system on again.
- Check the IEB and then the other hardware.

System Locked Up

The system locked up and there is a patient on the table.

- If you are still able to monitor the patient, continue, but get assistance from Technical Support. See the How to Reach Us insert at the front of the manual.
- If you are not able to monitor the patient, recycle power on the system. Have hospital ready to put patient on standby equipment. Get assistance from Technical Support.

If there is no patient on the table when the system locks up:

- Turn the system off, wait ten seconds, then turn the system on again.
- If the system still does not work correctly, get assistance from technical support.

Multiple Monitors Change Colors

If more than one monitor changed colors, there is a possible VID/MUX problem. Get assistance from Technical Support. See the How to Reach Us insert at the front of the manual.

Monitor Went Black (No Signal)

One Monitor Went Black (No Signal)

- If only one monitor went black, check to see if the power light is on.
- If the power light is not on, check power to the monitor.
- If the power is OK, the fuses are OK, and the power light is still off, the monitor needs to be replaced.
- If the power light is on, hook the monitor up to another monitor signal cable.
- If the monitor still does not work with a good known signal, the monitor must be replaced.

Multiple Monitors Went Black (No Signal)

If more than one monitor goes black, there is a possible VID/MUX problem. Get assistance from Technical Support.See the How to Reach Us insert at the front of the manual.

Take the time to make all the recommended visual checks (refer to the visual inspection chart on the next page) before starting any detailed troubleshooting procedures

Inspection List

Table 1. Visual Inspection List (Continued)	
Area	**Look for the following problems**
I/O Connectors and Cables	■ Fraying or other damage ■ Bent prongs or pins ■ Damaged housing ■ Loose screws in plugs
Fuses	■ Type and rating. Replace as necessary.
Interface Cables	■ Excessive tension or wear ■ Loose connection ■ Strain reliefs out of place
Circuit Boards	■ Moisture, dust, or debris (top and bottom) ■ Loose or missing components ■ Burn damage or smell of over-heated components ■ Socketed components not firmly seated ■ PCB not seated properly in edge connectors ■ Solder problems: cracks, splashes on board, incomplete feedthrough, prior modifications or repairs
Ground Wires/Wiring	■ Loose wires or ground strap connections ■ Faulty wiring ■ Wires pinched or in vulnerable position
Mounting Hardware	■ Loose or missing screws or other hardware, especially fasteners used as connections to ground panes on PCBs
IEB	■ IEB not plugged in to working wall outlet. ■ CPU or peripheral device not properly connected to AC Distribution Unit.
Power Source	■ Faulty wiring, especially AC outlet ■ Circuit not dedicated to system ■ Power source problems cause static discharge, resetting problems, and noise.

Power On Failure Modes

No display, system appears not to initialize

Most errors will be displayed on the window. The following are additional things to check.

- ◆ Can you hear the floppy disk drive being accessed several seconds after Power On? The "in use" LED will come on at the same time. The keyboard LEDs will turn on at Power On and turn off just prior to the floppy disk drive's LED turning on. These LEDs indicate that the PC/AT system (EPC-9) is functioning properly.

- ◆ Is the floppy disk drive active?

    If you do not hear the floppy disk drive, check the fuses and power.

- ◆ Several different failures modes may exist. If the floppy drive LED is never active and there is brief activity on the hard disk drive (listen for the drive activity or watch for the hard disk drive light), the problem is probably the floppy disk drive, and vice versa.

If the two drives appear inactive at initialization, there is probably a controller failure.

- ■ Is the Hard Disk Drive Active?

    If the system appears to initialize, but there is still no display, listen for the hard drive or watch the hard drive light to see if the hard disk drive is active several seconds after turning the system on. This activation should occur shortly after you hear the floppy disk drive spin up.

    If the hard disk drive is not active, communication between the disk drive and the control board does not exist, and the software is not being loaded into the system from the drive. The hard disk drive should be active for about 17 seconds, indicating that it is loading software for the entire system. If it is on for only about 2 to 3 seconds, then it is not loading the software.

- ■ Is the COMMS board active? Check for the green LED on the COMMS board.

    If the system appears inactive, observe the LEDs on the COMMS board. After Power On, the green LED should be on.

- ■ Is the software present?

Functional Checkout Procedure

Introduction

As part of the system checkout procedure, hook up a simulator to the TRAM module in the RAU or the CardioLab II Plus Amplifier located in the procedure area.

1. If a GE or Bio-Tek simulator is being used, connect the P1 output to the P1 input of the TRAM module in the slot A position.

2. Connect the P2 output to the P2 input of the same TRAM module.

3. Define the pressures to be Arterial and Venous. These two pressure simulations provide a realistic representation of pressure monitoring waveforms.

4. Also connect the ECG leadwires.

See the "TRAM 100-600 A and SL Modules Service Manual" for additional information.

System Initialization

After you are sure that the system is properly connected, the peripherals are turned on, and there is no disk in the floppy disk drive, you can Power On the system.

1. Turn on the IEB and CPU power switches.

2. Verify that the image fills the entire window and that the colors are correct. If there appear to be video problems, refer to the "Video Failure Modes" on page 5-13. If the system does not successfully initialize, refer to "General Troubleshooting for the System" on page 5-4.

Front End Data Acquisition

1. Adjust the simulator so that the BP waveforms are zero.

2. Re-adjust the simulator so that it is simulating BP waveforms. If you have hooked up the simulator as recommended, you should see pressures in the window.

3. Verify that the correct ECG waveforms are present at the top of the window.

4. Verify that intracardiac inputs are present. Hook simulator ECG outputs to catheter input modules.

Troubleshooting the RAU

RAU Description

This section is designed to clarify operation and troubleshooting of the RAU and its interfacing with the Mac-Lab/CardioLab system. The RAU is also called the "Front End". Introductory material on the system configuration is followed by specific symptom-dependent troubleshooting techniques. Front end data, ECG, and invasive blood pressures, are acquired by using a TRAM module installed in an RAU.

Each system is shipped with either one or two TRAM modules capable of providing up to 12 ECG waveforms and up to 4 pressure waveforms. Note that the system RAUs for earlier MAC-LAB units are different from the Mac-Lab/CardioLab system RAU. They cannot be interchanged. Older RAUs have room for three TRAMs (one was not functional).

The system RAUs have room for only two. The system RAU receives its power and data via a single cable rather than via separate power and data cables. The system RAU does not have an on/off switch.

TRAM modules in the RAU

The TRAM modules are installed in the RAU that is mounted in the procedure area. Power for the RAU comes from the Console.

RAU Interconnection

The TRAM series of modules, used with the system RAU, has only one indicator, the power-on indicator.

If the system is operating with one TRAM module, it must be in the slot A position (top slot) in the RAU. Otherwise, there are no ECG waveforms.

The RAU receives its power from the IEB.

Data Transmission

The serial data from and to the TRAM module is communicated via a DB-15 connector on the rear DB connect board on the IEB. The cable also carries power for the RAU. The data is then communicated to the COMMS board.

The COMMS board must be working in order for the system to initialize. The error message "No TRAM module" appears on the review monitor window if communication with the TRAM fails.

RS-422 serial communication at a rate of 115 K baud is used between the RAU and the COMMS board.

Pressure Waveforms

Individual waveforms may be removed from the monitor window by selecting that pressure and turning off the pressure. This removes the trace.

Channel is labeled, but no pressure values are listed:

If there is a label, but no pressure numbers, and a transducer is connected, a zeroing procedure may be required.

Channel is labeled, but no pressure values or waveforms:

If a pressure site label is present, but there are no pressure numbers, a waveform may or may not be present. Check the pressure gain of the system.

Troubleshooting the Video Processing

General Information

The system video consists of one or more color monitors. For most configurations, two are mounted on the workstation and at least one is mounted in the catheterization procedure lab. At the desk are the real-time and review monitors. In the catheterization procedure lab is a remote monitor, which is a slave of the other monitors.

The review monitor displays waveforms and system-related information and allows the technician to operate the system via the menu bar at the top of the window.

The real-time monitor displays real-time data, such as ECG and blood pressure waveforms. The monitor in the catheterization procedure lab can display either workstation monitor signal, allowing the doctor to track monitoring and measurement functions.

POWER SWITCH

POWER INDICATOR

+ BUTTON (Next Choice)

- BUTTON (Previous Choice)

MENU (also ACCEPT)

D-SUB Mini 15 Pin Connector

Red

Green/Sync

Blue

H/HV

V

AC IN Connector
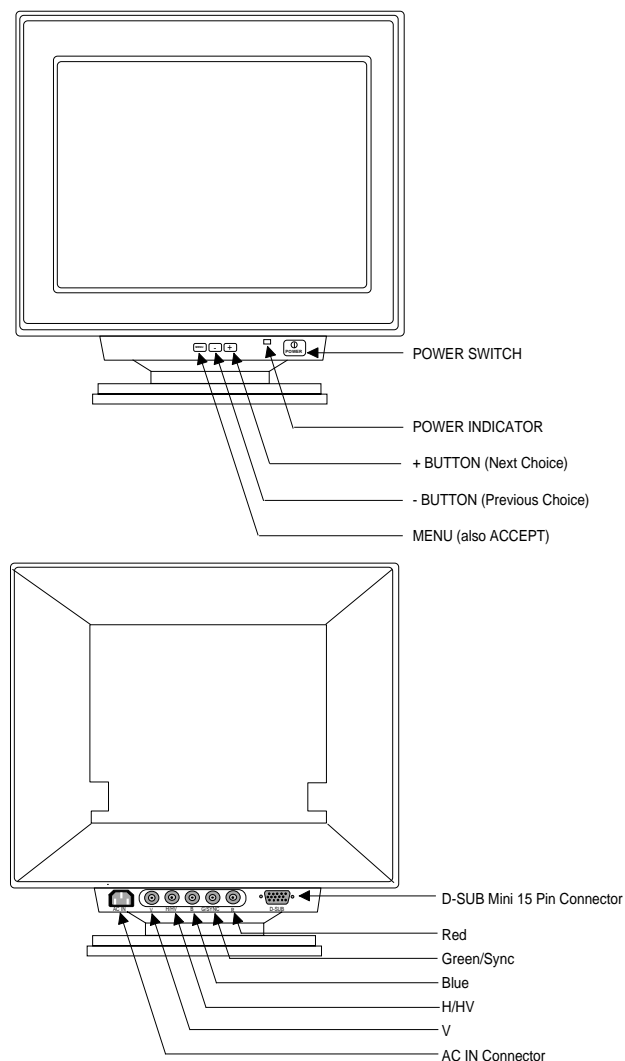
PK1

Monitor Description

All monitors are color monitors that are controlled by the video boards in the computer. The monitors themselves are not serviced by GE Medical Systems Service, but are sent back to the manufacturer for repairs. However, there is a window calibration procedure that includes brightness and position of the tracings. Several brands of monitors have been used. All are essentially the same, but have different controls.

Installation Checklist

- Be sure that the ventilation openings are not blocked or covered.
- Do not place the monitor near a heating appliance or in direct sunlight.
- Do not expose the monitor to moisture of any kind, as this may result in electrical shock or fire hazard.
- Route the power cord and cables so that they will not be walked on, tripped on, or rolled over. The monitors should be powered via the AC outlets in the lab or should be connected to one of the outlets on the IEB.
- Never use a monitor if the power cord has been damaged.
- Unplug the monitor and clean the window as needed with a small amount of a mild glass cleaner sprayed on a soft cloth. Never spray cleaner directly on the window as it may penetrate the monitor enclosure.
- Never open the enclosure. There are no user-serviceable parts inside. Risk of serious shock hazard! Refer all monitor problems to GE Service personnel.

Video Failure Modes

Color Distortion

Demagnetize the monitor window by pressing the **degauss** switch, which generally is located just below the monitor window or can be found by pressing the **MENU** button.

One or More Colors Missing on Monitor

1. Confirm that cabling for all three colors is connected to the monitor and that the cabling is properly connected to the rear interconnection panel and to the Video/Writer board in the console.

2. If the problem moves to the other monitor, then replace the defective board.

3. Otherwise, replace the monitor.

Video Signal on One Monitor is Distorted or Missing:

1. If video signals are not present, verify that monitor is receiving power.

2. Take the video cable from the back of the working monitor and plug it into the monitor with the bad signal. This will verify that the monitor works.

3. If the step above produces a good image, try replacing the video cable from the VIDMUX to the monitor.

4. If problem continues, replace cable from the associated video signal input on the VIDMUX to correct video board the computer.

5. If the problem persists, the problem may be with the system hardware.

Thermal Writer Problems

Thermal Writer Starts to Print, then Stops on its Own

Check and clean dust from the paper sensor by using canned air. Paper sensor is located on the left side of the top of the paper slot. If the thermal writer still fails to work properly, get assistance from Technical Support.

Thermal Writer Outputs Blank Sheets of Paper

Check and clean dust from the paper sensor by using canned air. Paper sensor is located on the left side of the top of the paper slot. If the thermal writer still fails to work properly, get assistance from Technical Support.

Thermal Writer Does Not Print (Blank Sheets Only)

If the thermal writer prints only blank sheets of paper, the paper may be installed upside down. Try flipping paper end for end. The top side of the paper should mark easily if scratched. Verify that the correct paper is being used. If the thermal writer still does not work correctly, get assistance from Technical Support.

Paper Jams During Printing

Verify that correct paper is being used. If the thermal writer still does not work correctly, get assistance from Technical Support.

Thermal Writer Does Not Print, Makes Machine Gun Noise

A machine gun noise indicates a possible hardware problem. Get assistance from Technical Support. Replace the thermal writer.

Troubleshooting the Thermal Writer

Thermal Writer Description

The system uses a direct digital writer with an 8.5-inch thermal print head. The paper is a plain, fan-fold style with no pre-printed grid. The system prints the necessary grid at the same time as it prints the waveforms and text. The thermal writer can run at four speeds: 5, 25, 50, and 100 mm/sec. Paper is stored in a slot backed by a paper strap that slides in and out for ease of replacement.

The thermal writer release button, which disengages the print head and opens the door, must be pressed before closing the door as well. When the door is open the 26.5 volt power is removed from the printhead, but not from the thermal writer control board. The 5 volt power is still on the print head. The print head assembly is located inside and above the door. This allows easy access for cleaning and replacement.

Repairing the Thermal Writer

Generally, the only in-field repair of the thermal writer is to replace the print head or anti-static brush. Replacing the printer engine in its bracket requires the use of a fixture, and so is performed only at the factory. Likewise, the electrical adjustment is only done at the factory. This is different from older MAC-LAB procedures.

Thermal Writer Failure Modes

Chart paper will not queue. Thermal writer runs extra sheets of blank paper.

- The queuing sensor could be dirty. Clean the queuing sensor by blowing air across it.

Erratic or no chart paper drive

- If the paper does not advance, or it advances erratically and there is no error message, check the fixed and movable cables that connect along the side of the writer drawer. Confirm that there is a solid connection.
- Verify that all required conditions are met to enable the thermal writer.

Printing too light or too dark

If the thermal print head voltage is too low, the printing may be too light, and the traces may fade prematurely. If the voltage is too high, the printing may be too dark and the life of the print head will be shortened. Voltage adjustments must be performed at the factory.

- Check the thermal paper quality. Some non-GE thermal papers are more heat-sensitive than others.
- Check print head voltage to ensure that it is in range: 24V to 27V.
- If there is no other reason, replace the Thermal Writer.

White line running across the printing

- Clean the print head and the print roller. If the lines still occur and they are obscuring the tracings, replace the print head.

RAU Failure Modes

ECG labeled, but no ECG data

These symptoms indicate no communications with the TRAM modules. Confirm that each TRAM module is installed and that the RAU is plugged in.

Check that the cable is connected on the back of the RAU (DB-15 connector) and is connected on the rear DB connect board on the IEB (DB-15 connector).

Is the power-on LED on the TRAM module illuminated? Try switching the position of the TRAM modules.

BP sites are labeled, but no pressure numbers or waveforms

This condition indicates that a transducer needs to be zeroed or replaced. Rezero this BP by selecting the correct channel and pressing the **Zero** button. This could also be a TRAM module problem.

BP waveforms are present, but no ECG waveforms

Some patients require skin preparation, including abrasion, depending on their skin type.

If the BP waveforms are present, and the ECG cable is properly connected, ensure that the ECG waveforms have not been turned off.

If the ECG waveforms are selected, are not turned off, and still are not present, suspect a TRAM module failure.

ECG waveform is present, but one or both BPs are missing

Has the BP trace been turned off at the keyboard? Try rezeroing and replacing the corresponding transducer. This situation also could be a TRAM module failure.

Server UPS Troubleshooting

The following tables provide troubleshooting information for the Tower UPS. For more detailed information, see the OEM manuals included with the UPS.

For troubleshooting recommendations for the rack-mount server UPS, see the OEM manuals.

During Start

Symptom	Possible Cause	Suggested Action
UPS will not start	No Utility Power	Check Power at the Utility power receptacle or contact a qualified electrician.
	UPS Power cord disconnected	Connect the power cord.
	UPS input circuit breaker open	Press the circuit breaker button to reset. If the breaker trips repeatedly, contact an authorized service provider (high models only).
LED 5 is red (Site wiring fault)	Utility power receptacle ungrounded or no ground wire in UPS power cord	Contact a qualified electrician.
	Line and neutral wires reversed in utility power receptacle or in UPS power cord	For units factory-configured for 208V, the Site Wiring Fault function has been disabled. If reconfiguring a 230V unit to operate at 208V, the Site Wiring Fault function must be manually disabled (high models only).
LED 10 is red (Battery Service)	Battery voltage is low because the UPS has been out of service for a long period	Allow the UPS to charge the batteries for 24 hours. Initiate a self-test: if LED 10 does not turn off, replace batteries.
	The UPS was powered on with the Sleep mode disabled, draining the batteries	Utility voltage has returned to the voltage range for which the UPS has been configured. The UPS is supplying utility power. The audio alarm should be reset.

After Start

Symptom	Possible Cause	Suggested Action
Audio Alarm	Alarm condition exists	Identify the red LED associated with this alarm condition. Check this troubleshooting guide to determine the cause of the alarm.
LED 1 is red (Input power)	Utility voltage is too high	The utility voltage is higher than the UPS operating range. The UPS switches to battery power. If this happens repeatedly, update the configuration.
LED 1 is flashing red	Alarm may need to be reset	The utility voltage has returned within the UPS operating range. Press the TEST/ALARM RESET button.

Symptom	Possible Cause	Suggested Action
LED 4 is red (Input power)	Utility voltage is too low	The utility voltage is lower than the UPS operating range. The UPS switches to battery power. If this happens repeatedly, update the configuration. Contact a qualified electrician to make sure that utility power is suitable for the UPS.
LED 4 is flashing red	Alarm may need to be reset	The utility voltage has returned within the UPS operating range. Press the TEST/ALARM RESET button.
UPS frequently switches between utility and battery power	Utility power variations	The utility voltage is frequently outside the UPS operating range. Update the configuration. Contact a qualified electrician to make sure that utility power is suitable for the UPS.
LED 11 is red	Protected devices are exceeding the UPS power rating	Remove one or more devices to reduce the power requirements.
	(UPS may switch from utility to battery power)	Make sure that the devices are not defective.
LED 9 is red (Battery Charge)	Low battery voltage	If the UPS is supplying battery power, save current work and shut down the system. Allow the batteries to charge. If the UPS is supplying utility power, no user intervention is required. Allow the batteries to charge.
Insufficient warning of low batteries	Battery service required	Allow batteries to charge for 24 hours, then initiate self-test. If LED 10 is red, replace batteries.
	Shutdown Delay configuration inappropriate	Update the Shutdown Delay from 5-seconds to 3-minutes. Use Compaq Power Management Software to specify a suitable delay.
LED 10 is red (Battery Service)	Potential battery failure detected	Allow batteries to charge for 24 hours, then initiate self-test. If LED 10 is red, replace batteries.
	New batteries improperly connected	Check connections.
LED 10 is flashing red; audio alarm cannot be silenced	Internal UPS over-voltage condition exists	Shut down the UPS. Contact an authorized service provider.

UPS Alarm Conditions

Alarm Condition	LED Activity	Can be disabled?
Utility power failure	LED 1 or LED 4 red	Yes
Site wiring faulty	LED 5 on red	Yes
Battery service	LED 10 on red	Yes
Internal UPS over voltage	LED 10 flashing red	No

Silencing an Audio Alarm

To silence the alarm, press the TEST/ALARM RESET button.

◆ Even though an audio alarm may be silenced, the condition that caused the alarm may still exist. For information on procedures to follow if the UPS detects an alarm condition, see the Troubleshooting chapter or the UPS manual.

◆ If a utility power failure caused the alarm (AC Input LED 1 or LED 4 red), the alarm will be silenced after utility power is restored.

TRAM-net 4A LED Troubleshooting Chart

Use the following chart to determine if the TRAM-net 4A is functioning properly. This chart refers to LEDs on the Processor Acquisition PCB. For problems, refer to the appropriate manual for more information about troubleshooting a patient monitor and TRAM-net housing together.

LED/Color	Signal Name	Function	Condition
		Processor Acquisition PCB Indicators	
DS6/Green	Power Indicator	Proper Operation ■ Visible on TRAM-net 4A front bezel (lower left)	■ On Continuous: normal operation ■ Flashing Quickly (2Hz): ADC Error ■ Flashing Slowly (0.5Hz): watchdog time-outs ■ LED Off: power off, supply fault, RAC FPGA configuration fault
DS5/Red	Network Activity	I hear talking on TRAM-net	■ On mostly steady: TRAM-RAC connected ■ Flickers low: TRAM-net not connected (I hear myself talk)
DS4/Green	Transmit Enable	I am talking on TRAM-net	■ Flickers occasionally: when talking ■ On continuous: while graphing
DS3/Yellow	Error Detect	I detect an error on this PCB	■ Off: normal operation
DS2/Red	RAC COMM 80C152	COMM Processor is OK	■ Flashes with DS1 (twice per second): normal operation
DS1/Red	RAC DAS 80C31	DAS Processor is OK	■ Flashes with DS2 (twice per second): normal operation

NOTE:

"I hear talking on my TRAM-net" LED flashes:

◆ with the "I am talking on TRAM-net" LED and

◆ alone when someone else is talking.

CardioLink Utilities Troubleshooting

The information below should be used when errors are encountered with the CardioLink Utilities software. Currently, the components are Archive, Restore and Purge. Most errors are logged in the Windows NT Application Log. Errors documented in the Windows NT Application log will be identified in the error box displayed in the Utilities user interface.

Error	Solution
DB Version Error	Archive utility has detected a Clab database version different that expected. Upgrade Mac-Lab/CardioLab software to 5.1D or 5.2 as applicable.
One of the study paths is invalid (viewed on Mac-Lab/CardioLab machine)	Attempting to review study while archive is in progress. Wait for archive to complete, then restore study if necessary.
Study skipped because it is in use	Study is currently being accessed from an acquisition or review system. Study will be skipped for this archive
Study on Acquisition System	Study has been skipped because it has not been archived to the server. Run archive generator (AG.exe) on the acquisition system before attempting to archive patient.
Error writing to purgelog or archivelog tables	Utilities software could not write to the archivelog or purgelog files. Files are either missing or corrupt. Contact technical support.
Minimum free space exceeded	There is not enough free space in the archive area to continue the archive process. Free up space in the archive area, or reduce the amount of free space required in the utility.
Study skipped because is has just be restored	Recently restored studies will be skipped in the archive process.
Insufficient disk space	Archive area has run out of disks space. Free up disks space in the archive area or select a different archive area in the utility.
Invalid Archive Path	Archive path no longer exists or is inaccessible. Contact your network administrator.

6   Recovery Procedures

For your notes

CardioLink Server (5.2)

Introduction

This section contains instructions for re-imaging the Server for Disaster Recovery and Restoring Data from Backup for a CardioLink 5.2 Server. The re-image procedure should be used in the event of catastrophic server failure to restore the server to its state previous to problems occurring. The "Restore data to the server" on page 6-22 should be used when there is a need to only restore the database or patient data in the event of data corruption or suspected data corruption.

NOTE:
This procedure can only be run if there is a current 5.2 tape backup.

Sections "Ensure 5.2 backup tapes exist" through "Backup LMT Custom Reports" assume that the server operating system is accessible. If the server cannot be booted completely, skip to section "Re-Image Server (G3 Only)" on page 6-9, or "Re-Image Server (G1 and G2 Only)" on page 6-15 depending on the type of server being reimaged.

Required Parts

Not all of the software listed below may be installed on a particular server.

Part Number	Description	Required for
2017591-001	G3 Server Image CD	G3 Servers
2024636-001	MEGA SERVER PARTITION UPGR TOOL 5.2 CD	G3 Server
2007041-001	Image Cast Boot Floppy	G1/G2 Servers
2007004-002	Low-End Server Image CD v1B	G1 Servers
2007005-002	Mid-Level Server Image CD v1B	G1 Servers
2007006-002	High-End Server Image CD v1B	G1 Servers
2009336-001	Low-End Server Image CD v1B	G2 Servers
2009338-001	Mid-Level Server Image CD v1B	G2 Servers
2009340-001	High-End Server Image CD v1B	G2 Servers
2006556-008	Prucka CardioLink version 1.1D CD	G1/G2 Servers
2015220-001	Core Update CD	G1/G2 Servers
2015222-001	CardioLink 5.2 CD	G1/G2/G3 Servers
2023718-001	HP/Sony AIT Driver CD	G1/G2/G3 Servers
2015474-001	LMT 1.3C Server CD	G1/G2/G3 Servers
2015472-001	LMT 1.3C Client CD	G1/G2/G3 Servers

Part Number	Description	Required for
2017867-001	LMT Backup/Restore Utility CD	G1/G2/G3 Servers
2006961-001	LMT Options Floppy Disk	G1/G2/G3 Servers
2017869-001	LMT and ML-CL Serial Number Update CD	G1/G2/G3 Servers
N/A	GEMS Advanced Security Floppy Disk (should be on-site)	G1/G2/G3 Servers

Ensure 5.2 backup tapes exist

Before reimaging, ensure a full set of 5.2 (both full and incremental) backup tapes are available.

NOTE:

Any studies performed since the last backup must be reviewed from the optical drive after the disaster recovery procedure is completed.

Stop data replication on the server

Perform this procedure if the server is still running. If not, skip to "Replace the Server Hard Drive (if applicable)" on page 6-9

1. At the server, log in as **mlcltechuser**.

2. Select *Start > Programs > Microsoft SQL Server 7.0 > Enterprise Manager*.

3.   Under *SQL Server Group*, navigate to and highlight the server.

4. Select *Tools > Replication > Disable Publishing*.

5. Click *Next.*

6. Select *Yes, disable publishing on [Server name]* and click *Next.*

7. Click *Next* in the *Confirm Dropping of Publications* window.

8. Click *Finish* in the *Completing the Disable Publishing and Distribution Wizard* window.

9. Click *OK*.

10. Right-click the server name and select *Refresh*.

11. Expand the server.

12. Verify the *Replication Monitor* is NOT visible.

13. Close the *SQL Server Enterprise Manager* window.

Stop data replication and disable networking at each acquisition system

Ensure replication on the old server is stopped before completing this procedure (see "Stop data replication on the server" on page 6-4).

Stop replication

1. At the Acquisition system, log in as **mlcltechuser**.

2. Right-click the *My Computer* icon from the Desktop and select *Explore*.

3. Navigate to *D:\Gemms\Prucka\Network*

4. Double-click *StopRepl.bat*

    A Command Prompt window opens and the file runs.

5. Press the **Enter** key when prompted to press any key.

Disable networking

1. Double-click the *GE Medical Systems* icon on the Desktop.

2. Select *Administration > System Settings* from the main menu.

3. Browse to the *File Paths* section.

4. Uncheck the *Enable Network Storage* checkbox.

5. Click *Close*.

6. Close all open windows.

7. Repeat the "Stop Replication" and "Disable Networking" steps on each Acquisition system.

Back up custom lists and reports

This procedure is done in case the custom lists and reports are lost. It may be completed at any Acquisition system.

Backup Custom Lists

1. Double-click the GE Medical Systems icon 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 backup location and click *OK*.

5. 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 *Report Export* Wizard window.

3. Select the backup location and click *OK*.

4. Click *OK* when the *Success* message is displayed.

5. Close all open windows.

Record system information at the server

Perform this procedure if the server is still running.

1. At the Server, log in as **mlcltechuser**.

2. Right-click the *Network Neighborhood* icon on the desktop and select *Properties*.

3. Select the *Identification* tab and record the computer name and the domain/workgroup in the table below.

   A sample table is shown below. You may also want to take screen captures of each tab and save them into the backup folder to ensure all information is captured exactly.

4. Select the *Protocols* tab.

5. Highlight the *TCP/IP Protocol* and click *Properties*. Record the IP Address, subnet mask and default gateway information.

6. Select the *DNS* tab and record any DNS servers listed.

7. Select the *WINS Address* tab and record any WINS servers listed.

8. Record whether the *Enable lmhosts lookup* checkbox is checked.

   Use the table below:

Network Settings	
Computer Name	
Domain/Workgroup	
IP Address	_____-_____-_____-_____
Subnet Mask	_____-_____-_____-_____
Default Gateway	_____-_____-_____-_____
DNS Server	_____-_____-_____-_____ _____-_____-_____-_____

Network Settings	
WINS Server	_____-_____-_____-_____ _____-_____-_____-_____
Enable lmhosts?	Yes/No

9. Click *OK* to close the *TCP/IP Properties* window.

10. Click *Close* to close the *Network Properties* window.

11. Click *No* at the restart computer message (if appears)

Record Microsoft security patches installed

Perform this procedure if the server is still running.

1. Navigate to *Start > Settings > Control Panel*

2. Double-click *Add/Remove Programs*.

    The base image includes the following patches:

    - *Windows NT 4.0 Hotfix* (Q29944440)
    - *Windows NT 4.0 Service Pack 6*

3. Record all other Microsoft security patches listed.

Record LMT information

Perform this procedure if the server is still running.

1. Check for LMT database.

    If the LMT database is installed, *Lab Management Tools 1.3 Server* is listed in the *Add/Remove software* window.

2. Check for LMT client. If the LMT client is installed, *Lab Management Tools 1.3 Client* is listed in the *Add/Remove software* window. If the client is installed check the version:

    a. Select *Start > Programs > Lab Management Tools 1.3 Client > Lab Management Tools 1.3 Client*.

    b. Log in as **sa** with a blank password.

    c. From the Main menu select *Help About*. Check the build number

        - 0055 = Version 1.3C
        - 0054 = Version 1.3B

    d. Close *Help* window and then the LMT application.

3. Check for LMT serial number update.

    If the LMT serial number update is installed, *Mac-Lab/CardioLab 5.2 SP1* is listed in the *Add/Remove software* window.

4. Close all open windows.

Check for advanced security

Perform this procedure if the server is still running.

1. Select *Start > GE Security Mode*.

2. One of two security options is displayed:

   - *Enable Advanced Security*. This option indicates the system is at standard security. No action is required. Continue with the next procedure.

   - *Reset to Standard Security*. This option indicates the system is at Advanced Security. To continue, the **Gems Advanced Security** floppy is required (it should be available at the site--check with the system administrator).

     If the floppy is unavailable, all systems must be changed back to Standard Security and then re-promoted to Advanced Security (with the assistance of the facility).

     NOTE

     Refer to the 5.2 Advanced Security Guide for more information.

Record job schedules

Perform this procedure if the server is still running. Use the table below to record job schedules:

Job	Date	Time
Backup Master and MSDB databases		
Database Maintenance		
Enterprise Backup		
Full Tape Backup		
Incremental Tape Backup		

1. Select *Start > Programs > Microsoft SQL Server 7.0 > Enterprise Manager*.

2. Navigate to and expand the server.

3. Navigate to *Management > SQL Server Agent > Jobs*.

4. Right click on the first job listed in the table above and select *Properties*.

5. Select the *Schedules* tab.

6. Record the job schedule in the table above.

7. Click *OK* to close the *Job Properties* window.

8. Repeat steps 4-7 for each job listed in the table.

9. Close *Enterprise Manager*.

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 the is not backed up as part of the INW backup procedure or the optical backup performed earlier.

NOTE:

This file must be saved to a network storage location. If necessary, contact the system administrator for an appropriate location.

1. Right-click *My Computer* and select *Explore*.

2. Navigate to *D:\Program Files\Gems\Lmt\Client\Resource Kit*.

3. Right-click *clink_drk.mdb* and select *Copy*.

4. Navigate to the network storage location folder.

5. Right-click on the folder and select *Paste*.

Replace the Server Hard Drive (if applicable)

WARNING
LOCK OUT/TAG OUT

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

WARNING
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, etc.). Consult GE Technical support with any drive replacement questions.

Re-Image Server (G3 Only)

Perform this procedure only for a G3 server. For G1/G2 servers, go to "Re-Image Server (G1 and G2 Only)" on page 6-15

Insert the **G3 Server Image CD** (p/n 2017591-001) and reboot the server.

1. At the *!!Warning!! This utility will re-image this....* screen, press any key to continue with the re-image.

2. The *Symantec Ghost 7.5* screen will appear monitoring the progress of the image process. This screen will appear twice, once for the image and once for the CRC.

3. The *CardioLink Imaging Manager* screen will appear, verify that it states:

   > *Image: Success*

   > *CRC: Success*

4. Press any key to continue, the system will reboot.

5. When the computer begins to reboot remove the **G3 Server Image CD**.

NOTE:
> After the computer reboots, a message stating *Additional files will now be setup and configured. Your system will reboot several times during this process. You will be notified when this process is complete.*

6. At the message "Would you like to change the Windows NT 4.0 License number" click *Cancel.*

7. At the windows script host message "This utility can be run from d:\gemms\prucka\ntos\image\gems_lic.vbs" click *OK.*

8. Once the message *Setup has completed*, click *OK* and continue with the configuration. Proceed with the Repartition of the Hard Drive section if you have reimaged a high-end mega server (D:\ storage capacity approximately 675GB), otherwise proceed to the "Load AIT tape driver" on page 6-21.

Repartition the Hard Drive

Perform the next procedure only if the server hard drive capacity is more than 500 GB.

NOTE:
> To find the approximate hard drive capacity of the server, open the server and add together the drive sizes listed on each drive label. Then subtract one drive.

> For example, the capacity of a G3 server with six 146 GB drives

>> 6 x 146 GB = 876 GB

>> 876 GB - 146 GB = 730 GB (approximate capacity)

If the hard drive capacity is not greater than 500 GB skip this section and go to "Load AIT tape driver" on page 6-21.

Required parts: **Mega Server Partition Upgrade 5.2 CD** (p/n 2024636-001)

1. Log in as **mlcladmuser** (contact GE Technical Support or the system administrator for password information).

2. Insert the **Mega Server Partition Upgrade 5.2 CD** (p/n 2024636-001) into the drive.

3. Right-click *My Computer* and select *Explore*.

4. Navigate to the CD and double-click *PreUpgrade.bat*.

   A command window opens with a prompt to press any key to continue.

5. Press **Enter**.

   The pre-upgrade scripts run. When complete, a prompt to press any key is displayed.

6. Press **Enter**.

   The command prompt window closes and the system reboots.

7. Log in as **mlcladmuser** (contact GE Technical Support or the system administrator for password information).

8. Go to *Start* > *Programs* > *Administrative Tools (Common)* > *Disk Administrator*

   The Disk Administrator loads.

9. Click *OK* at the confirmation screen.

10. Click *Yes* at the confirmation window to write a signature on Disk 0.

    Wait for the Disk Administrator to complete this process.

11. Right click on the *D: drive* and select *Delete* (see Figure 001).
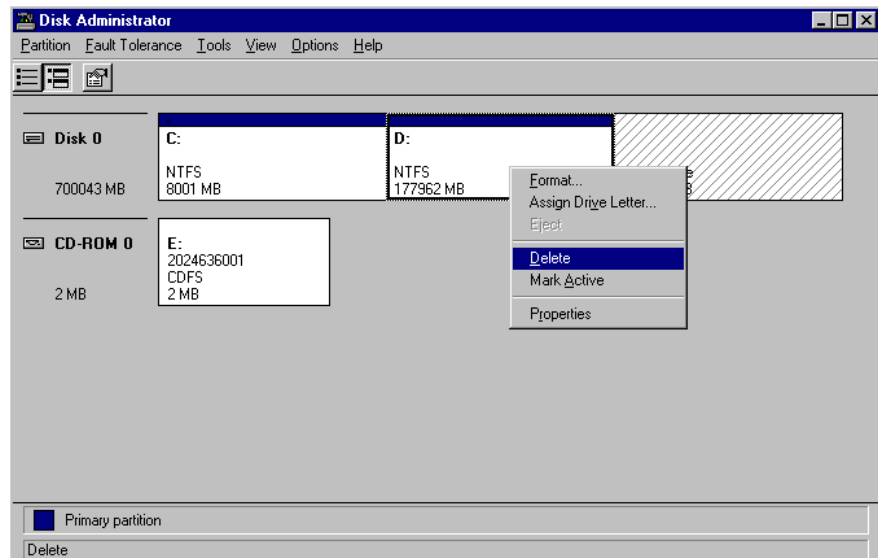
Figure 001

12. Click *Yes* to the *All data will be lost* confirmation message.

    The partition name changes from *Data (D:)* to *Free Space*.

13. Right click on the *Free Space* partition and select *Commit Changes Now...*(see Figure 002).
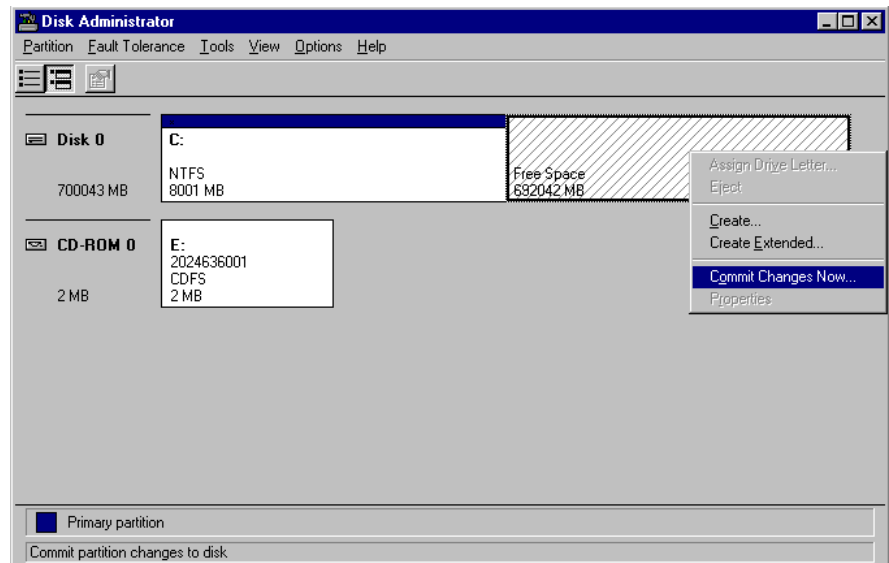
Figure 002

Click *Yes* in the confirmation window.

14. Click *OK* to confirm the disk was updated successfully.

15. Right-click on the *Free Space* space and select *Create* (see Figure 003)*.*
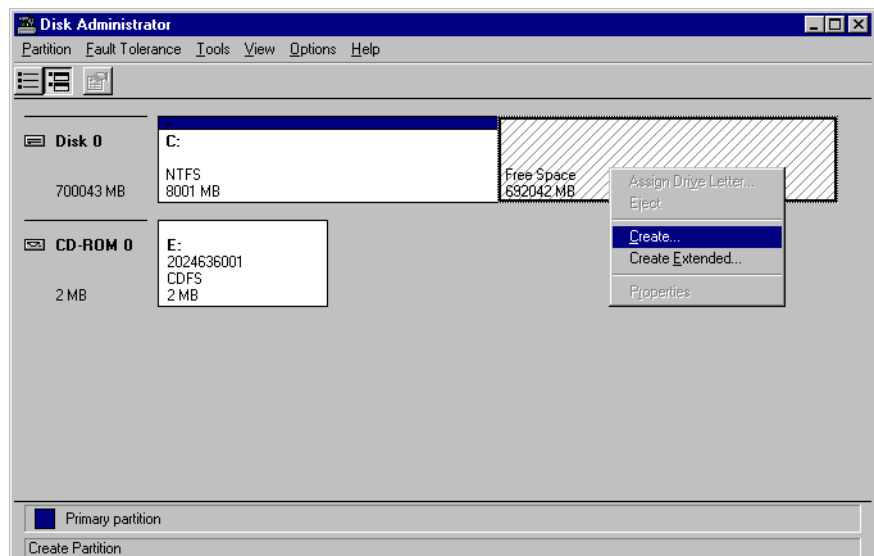
Figure 003

16. Click *Yes* in the confirmation window.

Ensure the *Create partition of size* is set to the maximum (see Figure 004).
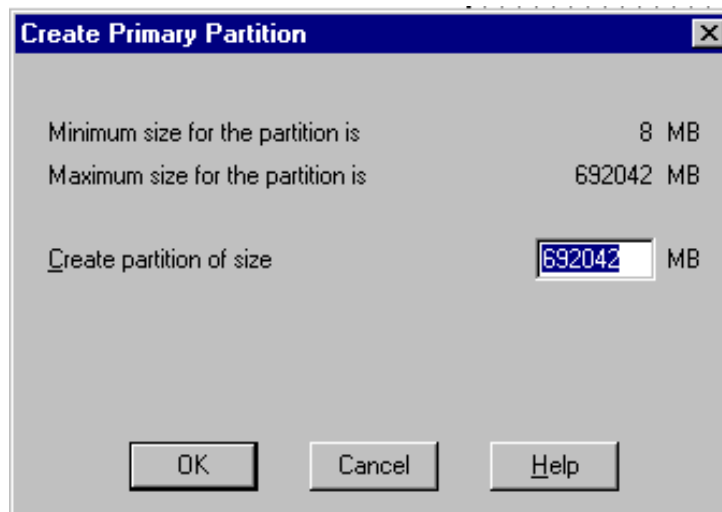
Figure 004

17. Click *OK*.

18. Click *Yes* in the confirmation window.

19. Right-click *Unformatted Space* and click *Commit Changes Now...*(see Figure 005).
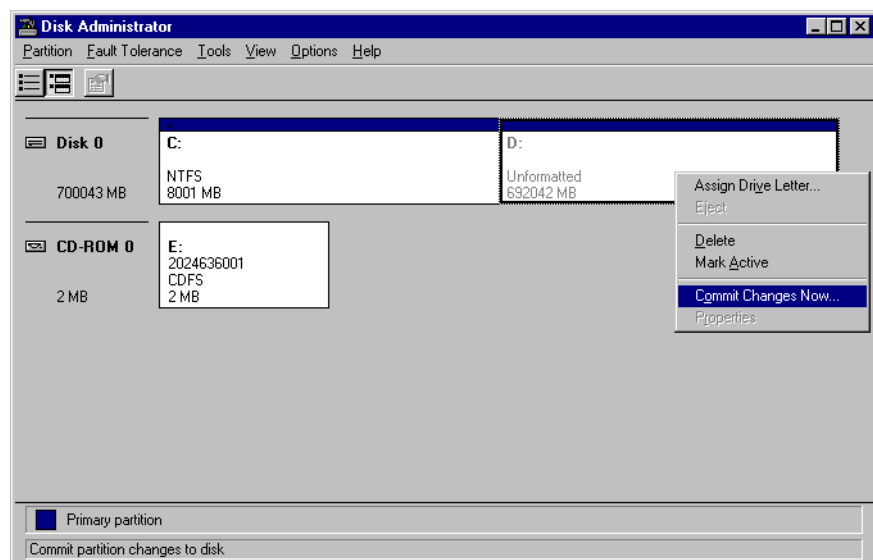
Figure 005

20. Click *Yes* in the confirmation window.

21. Click *OK*.

22. Right-click on the *Unknown space* and select *Format* (see Figure 006).
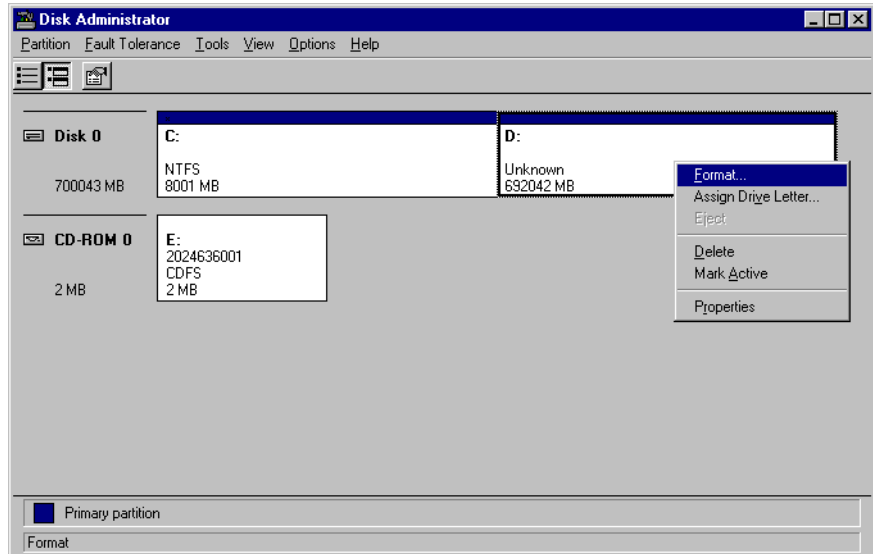
Figure 006

23. The *Format D:* window is displayed. Change the *File System* from FAT to NTFS and check the *Quick Format* box. Then click *Start* (see Figure 007).
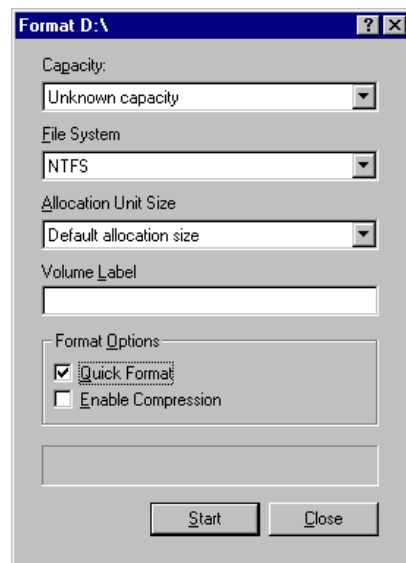
Figure 007

24. Click *OK* in the *Warning* window to format the disk.

25. Click *OK* to *Format Complete*.

26. Close the *Format D:* window.

    Verify the *Disk Administrator* window shows the following (see Figure 008).
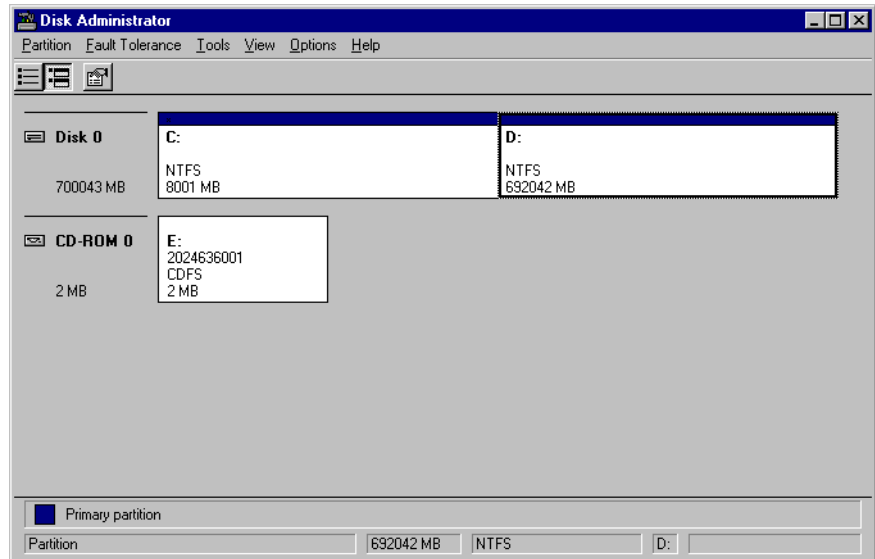
Figure 008

27. Close the Disk Administrator Window.

28. Right-click on *My Computer* and select *Explore*.

29. Navigate to the CD and double-click *PostUpgrade.bat*.

    A command window opens with a prompt to press any key to continue.

30. Press **Enter**.

    The post-upgrade scripts run. When complete, a prompt to press any key is displayed.

31. Press **Enter**.

    The command prompt window closes.

32. Remove the CD from the drive.

33. Restart the system to ensure all the services restart.

34. Skip the next procedure and go to "Load AIT tape driver" on page 6-21.

Re-Image Server (G1 and G2 Only)

1. Insert the *ImageCast Boot Floppy* and *Image CD* and reboot the server.

    a. For G1 servers:

    ◆ High End Server Image CD v1B (PN: 2007006-002)
    ◆ Mid Level Server Image CD v1B (PN: 2007005-002)
    ◆ Low End Server Image CD v1B (PN: 2007004-002)

    b. For G2 servers:

◆ High End Server Image CD v2A (PN: 2009340-001)

◆ Mid Level Server Image CD v2A (PN: 2009338-001)

◆ Low End Server Image CD v2A (PN: 2009336-001)

2. After Image Cast wizard comes up, select *Image file to Disk*.

3. After *Select Image Type* screen, select *Restore Entire Image* and click *Next*.

4. At the *Selected Image Type* screen, select the *Browse* button. Select the C: drive and then select the *IMC file* for system being configured. Select *OK*.

5. At the *Selecting File* screen, confirm the IMC file selection. Select *Next*.

6. At the *Select Partition* screen, click *Next*.

7. At the *Select Post Configuration File* screen, verify that nothing is selected. Select *Next*.

8. At the *Select Destination* screen, select *Drive 1* and click *Next*.

9. At the *Select Advanced Options* screen, select *Automatically Resize Partition*. Select *Next*.

10. At the *Ready to Begin* screen, select *Image*. Select *Continue* in the warning screen.

11. When the image process begins, eject the boot disk from the floppy drive and allow the server to reboot twice.

12. After the system reboots, login as **Administrator**; password: **changeme.** Verify that the image was transferred to the server.

Setup User Properties on Server

1. Select *Start > Programs > Administrative Tools (Common) > User Manager for Domains*.

2. In the *User Manager* dialog box, double click on *Administrator*.

3. In the *User Properties* dialog box, change the password to **cardiolab!** (lower-case).

4. Deselect: *User must change password at the next login*.

5. Select: *User Cannot Change Password and Password Never Expires*.

6. Select the *Groups* button.

7. In the *Groups Membership* dialog box, verify that the *Administrator* account to be a member of the *Administrators* group.

8. If the *Administrator* is not a member of the *Administrators* group, select *Administrators* in the *Not Member of* list, and select the *Add* button.

9. Click *OK*.

10. At the *User Properties* window, click *OK*.

Install SQL Service Pack 3 (G1 Only)

Perform this procedure on a G1 server only. Otherwise skip to "Install CardioLink 1.1D" on page 6-17.

1. Insert **Prucka CardioLink version 1.1D CD** into the CD-ROM drive.

2. Launch the file: *\SQL SP3\setup.bat* file.

   NOTE

   If setup detects that this Service Pack has already been installed, select *No* to the message: *Would you like to continue*, then proceed to "Install CardioLink 1.1D" on page 6-17.

3. In the *Welcome* window, select *Next*.

4. In the *Software License Agreement* window, select *Yes*.

5. In the *Connect to Server* window, select the radio button: *The SQL Server System administrator login information (SQL Server authentication).*

6. Enter the password for the **sa** login: <**blank**>. Select *Next*. A message box appears: *Validating Password. Please wait.... Installation process starts.* This takes a few minutes*.*

7. Select *Next* in the start copying files box.

8. A message box appears: *You have a blank password for the sa login. This is a security risk.* Select *OK*.

9. In the *Authentication mode* dialog box, select the *Mixed Mode* radio button, and check the *Blank Password (not recommended)* checkbox. Select *Next*.

10. In the Setup complete dialog box, select the radio button: *Yes, I want to restart my computer now*. Select *Finish*.

11. The system reboots itself.

12. Log in as **Administrator;** password: **cardiolab!**

Install CardioLink 1.1D

1. In *Windows NT Explorer*, locate the CD-ROM drive.

2. Select the *Setup.exe file*.

3. When you start the *Setup.exe* file, the *Welcome* window appears, select *Next* to continue.

4. At the *Maintenance Options* window, verify that the *CardioLink Server* radio button is selected and click *Next*

5. Leave the *sa* password as blank, and select *Next*.

6. If a read-only file detected box appears, select *Yes*.

   NOTE

   Ignore any error messages that may be displayed in the MS-DOS window.

7. To restart your computer, select the first radio button. A reboot is necessary for the changes to take effect.

   NOTE

   If error messages are displayed, please refer to the Installation troubleshooting sections of this manual.

8. Select *Finish*.

Install Server Core Update

If the system has mapped drives under the Administrator account, the drives MUST be disconnected before running the Core Update procedure.

If the Core Update procedure produces any errors that are not documented in this manual, contact Technical Support.

The core update will update the third party software on the system. These updates are being performed to optimize the system security for all third party applications.

The system will automatically reboot several times throughout this update.

1. Insert the **Core Update CD** into the CD drive on the Server.

   NOTE

   The message, *cpmgmt.dll initialization failed because Windows is shutting down...* may appear, click OK. At the *End Task* window, click End Task. Accept these message and allow core update to continue.

   NOTE

   The message, *Cannot find the file 'F:\Setup.exe' (or one of its components). Make sure the path and filename are correct and that all required libraries are available* may appear, leave the CD in the drive, click OK to the message, and reboot the system (*Start > Shutdown > Restart*).

2. The *Core Software Update 5.2 InstallShield* will begin.

3. At the *Welcome* screen, read the security message and click *Next* to continue.

4. At the *Enter Password* window, enter the SA password and click *Next*.

   NOTE

   The SA password should be blank unless changed by the Administrator.

5. At the *Enter Password* window for the administrator password, type **cardiolab!** and click *Next*.

6. At the *Information* window, click *Yes*.

7. The *Setup Status* window appears monitoring the progress.

8. If the *Microsoft Office 2000 SR-1 Premium* error message appears, click *Ignore*.

9. At the message, *All required patches have been installed*, click *OK*.

10. At the *Installation Complete* window, click *Finish*.

    NOTE
    A list of the software updates installed by the core update is located in the install log:
    D:\Gemms\Prucka\Setup\GEMS_Install.log

11. Remove the **Core Update CD** from the CD drive.

Upgrade CardioLink 5.2

1. Insert the **CardioLink version 5.2 CD** into the CD-ROM drive.

2. In *Windows NT Explorer*, locate the CD-ROM drive.

3. Double-click the *Setup.exe* file.

4. In the *Maintenance Option* window, select the *Update CardioLink Version 5.2* radio button and click *Next* to continue.

5. In the *Maintenance Options* window, verify that the *CardioLink Server* radio button for the server setup type is selected and select *Next*.

6. At the *Warning* message, click *Yes*.

7. The Setup Status window will appear with a progress bar.

8. At the *SA Password* window, enter the sa password and select *Next*.

    NOTE
    The SA password should be blank unless changed by the system Administrator.

9. At the Installation Complete window, check the *Yes, I want to restart my computer now* radio button and click *Finish*. A reboot is necessary for the changes to take effect.

10. After server reboots, log in as **mlcltechuser**

    NOTE
    See system administrator for password information

Install CardioLink Utilities

1. Right-click on *My Computer* and select *Explore*.

2. Navigate to *E:\CardioLink Utilities Install* and double-click *Setup.exe*.

3. Click *Next* at the *Welcome* screen.

4. Ensure the *Archive Utility* option is selected in the *Setup Type* screen and click *Next*.

5. Enter **gemssqladmin** in the *Password* textbox and click *Next*.

    The software installs the necessary files. It will take approximately 3 to 5 minutes for installation to complete. A completion window is displayed.

6. Click *Finish*. A reboot is not required.

7. Remove the **CardioLink version 5.2 CD** from the CD-ROM drive.

Configure pcAnywhere Callers List (G1 Only)

Perform the steps below to configure the *Callers* list in pcAnywhere to limit remote access to the mlcltechuser user only.

1. Select *Start > Programs > Symantec pcAnywhere*.

2. Right-click *GE Remote Support* icon and select *Properties.*

3. In the *Connection Info* tab, verify the *MultiTech Systems MT5634ZBA* and the *TCP/IP connection* checkboxes are checked.

4. In the *Settings* tab, verify the *Launch with Windows* and *Run Minimized* checkboxes are checked.

5. In the *Callers* tab, select the *Use pcAnywhere authentication with pcAnywhere privileges* radio button.

6. Highlight the *GEMMS* caller and then click the *X* icon to delete the caller.

7. Click *Yes* to confirm.

8. Select the *Use pcAnywhere authentication with pcAnywhere privileges* radio button.

9. Click the *New Item* icon.

10. In the *Identification* tab, select the *Group* radio button.

11. In the *Domain* drop down box, select the *[computer name]*.

12. In the *Account* drop down box, select the *MLCLTECHGRP*.

13. Click *OK*.

14. Click *OK*.

15. Close the *pcAnywhere* window.

Configure pcAnywhere Callers List (G2 Only)

It is recommended that pcAnywhere Version 10 is on the Mac-Lab/CardioLab system to provide remote service support for your Mac-Lab/CardioLab system by GE Medical Systems *Information Technologies* service personnel.

Perform the steps below to configure the *Callers* list in pcAnywhere to limit remote access to the mlcltechuser user only.

1. Select *Start > Programs > Symantec pcAnywhere*.

2. Right-click *GE Remote Support* icon and select *Properties.*

3. In the *Connection Info* tab, verify that the *MultiTech Systems MT5634ZBA* and the *TCP/IP connection* are checked

4. In the *Settings* tab, verify the *Launch with Windows* and *Run Minimized* checkboxes are checked.

5. Select the *Callers* tab.

6. In the *Name* field, click *GEMMS* to highlight this caller.

7. Click the *X* icon to delete the caller.

8. Select *Yes* to confirm.

9. In *Authentication type* drop down box, select *NT*.

10. Click the *New Item* icon.

11. In the *Identification* tab, select the *Group* radio button

12. In the *Domain* drop down box, select the *<computer name>*.

13. In the *Account* drop down box, select the *MLCLTECHGRP*

14. Check the *Global NT users and groups defined in Local NT groups* checkbox.

15. Click *OK*.

16. Click *OK*.

17. Close the *pcAnywhere* window.

Load AIT tape driver

Required parts: **HP/SONY AIT Driver NT** CD (p/n 2023718-001).

Perform this procedure only if a Sony AIT-2 or AIT-3 Tape drive is installed. If Compaq AIT tape drive is installed, skip this procedure and go to "Restore data to the server" on page 6-22.

1. Log in as **mlcltechuser**.

2. Select *Start > Settings > Control Panel* and double-click *Tape Devices*.

   The *Install Driver* window is displayed.

   NOTE:
   > If *SONY SDX-500V* or *SONY SDX-700C* is not listed in the *Install Driver* window, the Sony AIT drive is not installed. Go to the next procedure, "Restore data to the server" on page 6-22.

3. Insert the **HP/SONY AIT Driver NT** CD (p/n 2023718-001) into the CD-ROM drive.

4. Click *Have Disk*.

5. Click *Browse*.

6. Navigate to the *E:\Sony AIT Drive* and click *Open*.

7. Click *OK*.

8. Select *Sony AIT Tape Drive (NT 4.0)* and click *OK*.

9. Click *OK*.

10. Select the *Drivers* tab in the *Tape Devices* window.

11. Highlight *Compaq AIT driver* and click *Remove*.

12. Click *Yes* to the confirmation message.

13. Click *OK*.

14. Remove the CD.

Restore data to the server

CAUTION
Continue with the remaining recovery procedures only if you are restoring data to the server. If there is no data to restore, follow the server installation procedures in the CardioLink Installation Instructions.

Rename the Server

The server must have the same name as it had prior to re-imaging. If the rename is not needed, skip to section "Configure Network Settings" on page 6-26.

Change the NT name

Perform these steps only if the server name was not CLINK_2.

1. Right-click *Network Neighborhood* and select *Properties*.

2. Go to the *Identification* tab and select *Change*.

3. Change the computer name to name of the server that was recorded in "Record system information at the server" on page 6-6 and click *OK*.

4. Click *OK* to the confirmation message.

5. Close the *Network Properties* window.

6. Click *Yes* at the *Reboot the Server* message.

   The server reboots.

7. Accept any error messages and log in as **mlcltechuser**.

Run the Rename utility

Perform these steps only if the server name was not CLINK_2.

CAUTION
LOSS OF DATA — If an error occurs and the rename utility exits before it entire rename process is complete, the server Rename utility must be run again to rename the server back to its old name.

Then run Rename utility again to change the server to the new name.

1. Insert the 5.2 CardioLink CD (p/n 2015222-001) into the CD drive.

2. Right-click *My Computer* and select *Explore*.

3. Navigate to *E:\Server Rename Install* and double-click *setup.exe*.

   The *Welcome* screen is displayed.

4. Click *Next.*

    The *Setup Type* window is displayed.

5. Verify *Rename Server* is selected and click *Next.*

6. Click *Yes* to the confirmation message.

7. Click *OK* to the information message.

8. Click *Finish* to restart the computer.

9. Log in as **mlcltechuser**.

10. Right-click *My computer* and select *Explore*.

11. Navigate to *E:\Server Rename Install* and double-click *setup.exe.*

    The *Welcome* screen is displayed.

12. Click *Next*

    The *Setup Type* window is displayed.

13. Verify *Rename Server* is selected and click *Next.*

14. Click *OK* to the information message.

15. Launch *Enterprise Manager* under *Start > Programs > Microsoft SQL server 7.0* and verify the new CardioLink server computer name is registered and working (denoted by a green arrow).

16. Verify there is no registration for *CLINK_2* by highlighting the *SQL Server Group*. If the new name is not displayed and *CLINK_2* is still registered, then perform the following steps:

    a. Under the *SQL Server Group*, right-click the entry for *CLINK_2* and select *Delete SQL Server Registration*. Select *Yes* to confirm.

    b. Right-click *SQL Server Group* and select *New SQL Server Registration*.

    c. Select Next.

    d. From the *Available Server window,* select the new name of the CardioLink server and select *Add* and then select *Next.*

    e. Verify the *Windows NT account information* radio button is selected, then select *Next.*

    f. Verify the *Add to existing group* radio button is selected, then select *Next.*

    g. Select *Finish* and verify the new CardioLink server name is registered successfully.

17. Remove the CD from the drive.

Edit timeserv.ini

Check the *timeserv.ini* file in the *C:\WinNT* directory to verify the server name is correct.

1. Right-click *My Computer* and select *Explore*.

2. Navigate to *C:\Winnt* and double-click to open *timeserv.ini*.

3. Scroll down in the file to find the line *PrimarySource = \ \ [CardioLink Server Name]*. Verify the *[CardioLink Server Name]* is the new server name. If it is not, perform the following steps:

    a. Edit the *PrimarySource =* value to *\ \ [CardioLink Server Name]* and save the file.

    b. Select *Start > Run*, and type in *timeserv -update*.

    c. Select *Start > Run*, and type in *timeserv -automatic*.

    d. Reboot the server to commit timeserv changes.

Correct SNMP traps

Perform this procedure only if the server name is not CLINK_2.

1. Right-click on *Network Neighborhood* icon and select *Properties.*

2. Select the *Services* tab.

3. Select *SNMP* service, then select *Properties*.

4. Select the *Traps* tab.

5. Remove the entry for CLINK_2.

6. Select *Add* and enter the new name of the CardioLink server. Select *Add*.

7. Select *OK* on Microsoft SNMP Properties window.

8. Select *Close* on the Network window.

9. Close the *Control Panel* window.

Configure Insight manager

Perform this procedure only if the server name is not CLINK_2.

1. Open the Compaq Insight Manager: *Start > Programs > Compaq Insight Manager > Compaq Insight Manager*.

2. From the main menu, select *Setup > Device List*.

3. In the *Responsible Device* list, highlight the entry for *CLINK_2* then select *Remove*.

4. Click the *IP Device List* button.

5. Select *New*.

6. Enter into the *Device name* field the new name of the CardioLink server. Check the box for *WINS/DNS IP Address Resolution* and then select the *Add* button. Select *Close*.

7. In the *IP Device List* window, highlight the entry for CLINK_2 and then select Remove. Select *OK*.

8. In the *List all Devices* list, highlight the entry for CLINK_2 then select *Delete*.

9. Select *Yes*.

10. If the new server name is not already in the *Responsible Device* list, select on the new name of the server from the *List of All Devices* window, and select *Add*.

    Confirm the *Responsible Device List* displays the new CardioLink server name.

11. Select *OK*.

12. Verify the new CardioLink server has a green status in the *Device List 1* window.

Reconfigure pcAnywhere

Perform this procedure only if the server name is not CLINK_2.

1. Double-click the pcAnywhere shortcut icon on the desktop.

2. Right-click the *GE Remote Support* icon and select *Properties*.

3. Select the *Callers* tab.

4. Verify *Authentication type* is *NT*.

5. Delete any existing users.

6. Right-click in the whitespace and select *New*.

7. In the *Identification* tab, select the *Group* radio button.

8. In the *Domain* field, select the local server name.

9. In the *Account* field, select the *MLCLTECHGRP* and click *OK*.

10. Click *OK*.

11. Close pcAnywhere.

Configure Network Settings

The network must be configured on all systems. Configure using the workgroup member setup, immediately following, or "Domain Member Setup" on page 6-26. If you are unsure of the setup, contact the hospital system administrator GE Technical Support.

Workgroup Member Setup

> **NOTE**
> For optimum security, GE Medical Systems *Information Technologies* recommends that the CardioLink server and all associated Acquisition and Review systems be configured as members of an independent workgroup.

1. Right-click *Network Neighborhood* and select *Properties*.

2. In the *Identification* tab, select the *Change* button.

3. Verify that the *Workgroup* option radio button is selected.

4. Enter the workgroup (recorded earlier) as the name of the *Workgroup* to join and select *OK*.

5. At the *Workgroup Welcome* message, select *OK*.

6. Select *Close*.

7. Select *Yes* at the message: *Do you want to restart your computer now?*

8. Login as an **mlcltechuser**

> **NOTE**
> See system administrator for login information

9. Proceed to **"Configure Settings" on page 6-27**.

Domain Member Setup

Perform this procedure only if the server must be set up as a domain member (i.e., is not a workgroup member).

Adding the CardioLink server and all associated Acquisition and Review systems to the customer's domain is NOT recommended.

1. In the *Identification* tab, select the *Change* button.

2. Verify that the *Domain* option button is selected.

3. Enter the name of the Domain to join.

4. Verify that the *Create Computer Account* in the Domain box is checked.

5. Enter the *User Name* and *Password* of an account with the ability to add a computer to the domain, and select *OK.*

> **NOTE:**
> An account with the ability to add a computer to a domain is typically a domain administrator account. The IT department must enter the User Name and Password, unless this information is provided to GE Medical Systems personnel.

6. Select *Yes* at the message: *Are you sure you want to move this computer?*

7. At the domain welcome message, select *OK*.

8. Select *Close*.

9. Select *Yes* at the message: *Do you want to restart your computer now?*

10. Login as an **mlcltechuser**

    NOTE
    See system administrator for login information.

Configure Settings

1. Right-click *Network Neighborhood* and select *Properties*.

2. Select the *Protocols* tab.

3. Highlight the *TCP/IP Protocol*, and select the *Properties* button.

4. Setup IP Address information:

    a. If a static IP address is used, obtain the IP Address from the hospital IS/IT department and verify that the *Specify an IP Address* option button is selected and continue to step 5.

    b. If connecting to a DHCP network and setup in a workgroup, an indefinite lease is required from the hospital's IS/IT department to ensure that the settings configured in the *lmhost* file will be current at all times. Select the *Obtain an IP Address from a DHCP server* button and proceed to step 8 to setup LMHOSTS.

        NOTE
        If the hospital CANNOT provide an INDEFINITE lease, a static IP address is required.

    c. If connecting to a DHCP network and setup in a domain, proceed to step 6 to setup the DNS server.

5. Enter the *IP Address, Subnet Mask,* and *Default Gateway*.

6. If a DNS server was previously configured, proceed with this step otherwise skip to the next step.

    a. Select the *DNS* tab.

    b. Select *Add* for the *DNS Service Search Order*.

    c. Enter the *IP Address* for the DNS server, and select *Add*. Repeat this step as needed.

    d. Select *Add* for the *Domain Suffix Search Order*.

    e. Enter the *TCP/IP Domain Suffix* and click *Add*. Repeat this step as needed.

7. If a WINS server was previously configured, proceed with this step otherwise skip to the next step.

    a. Select the *WINS Address* tab.

    b. Enter the *IP Address* of the Primary WINS Server.

    c. Enter the *IP Address* of the Secondary WINS Server, if one

exists.

d.   Verify that the *Enable DNS for the Windows Resolution* checkbox is unchecked, unless you are told to check it by the network administrator.

8.   If LMHOSTS was previously configured, proceed with this step otherwise skip to the next step.

a.   Select *Start > Run.*

b.   Type *Notepad* in the Run window and click *OK.*

c.   Type the following for each CardioLink server, Acquisition system, and Review station in the network:

   IPADDRESS\<Tab\>COMPUTERNAME\<Tab\>#PRE

   example:
   192.168.2.1   CLINK_2   #PRE
   192.168.2.2   ACQ_1   #PRE
   192.168.2.3   REV_1   #PRE
   3.20.118.172 REV_2   #PRE

   NOTE
   The #PRE command will preload the information into cache.

d.   Insert a floppy disk into the **a:** drive.

e.   Select *File > Save As.* Be sure to change the file extension to *.txt*

f.   Save the file **host.txt**

g.   Select the *WINS Address* tab in the Microsoft TCP/IP Properties window.

h.   Uncheck the *Enable DNS for Windows Resolution* checkbox.

i.   Verify that the *Enable LMHOSTS Lookup* checkbox is checked.

j.   Click the *Import LMHOSTS* button.

k.   Browse to and select the *host.txt* file on the **a:** drive and click *Open.*

l.   At the information box, *Do you want to continue?* click Yes.

9.   Select *OK* at the bottom of the Microsoft TCP/IP Properties window.

10. Select *Yes* at the message: *Do you want to restart your computer now?*

11. Log in as an **mlcltechuser**.

   NOTE
   See system administrator for login information.

Restore the CardioLink Database from BackupTape

CAUTION
LOSS OF DATA -- The data restore procedures following
will overwrite any existing data on the server. The
existing data on the server must be backed up before
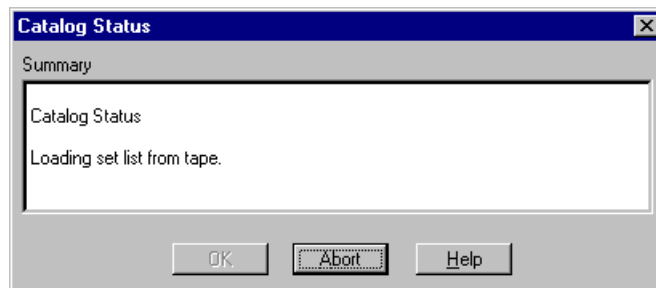restoring the data
---

This procedure can only be run if there is a current 5.2 tape backup. If
backups are located on an enterprise backup location, use the
appropriate procedure in "Enterprise Backups" on page 6-31.

NOTE

    In order to successfully restore the disk to its latest state, remember
to restore the most recent full tape (weekly) backup first and then
each successive incremental (daily) backup.

    For example: If a system failure occurs on Thursday, in order to
restore the system to its most recent state, one must first restore the
last full tape backup from the previous Friday and then restore each
incremental backup from Monday, Tuesday and Wednesday.

1. Launch the Backup Utility from *Start > Programs > Administrative
   Tools (Common) > Backup.*

2. Insert the data cartridge to restore.

3. Open the tapes screen by selecting the *Tape* button.

4. From the tapes screen, double click on the *Tape* icon. The following
   dialog box should appear:

PK 3

5. After the catalog is loaded, the tapes screen should display the
   contents of the tape.

6. From the tape screen, select the items by checking the checkboxes
   next to *D:* to restore all data (by description & set number) from the
   Drive D:.

7. Select the appropriate set.

8. After selecting the folders from tape, select on the *Restore* button. The Restore Information screen appears.

9. Specify restore settings as follows:

    a. Select *Restore File Permissions.*

    b. Select *Verify After Restore.*

    c. Type the path and filename to specify the log file as **d:\GEMMS\Prucka\NetConfig\clabrestore.log**

    d. Select the option *Summary Only.*

10. Select *OK* to begin Restore Process.

    NOTE:

    If the message *Confirm File Replace* appears, select *Yes to All* to continue. This message will only appear during the restore of the daily tape backups.

11. Verify that the restoration is complete by viewing the Restore Status screen.
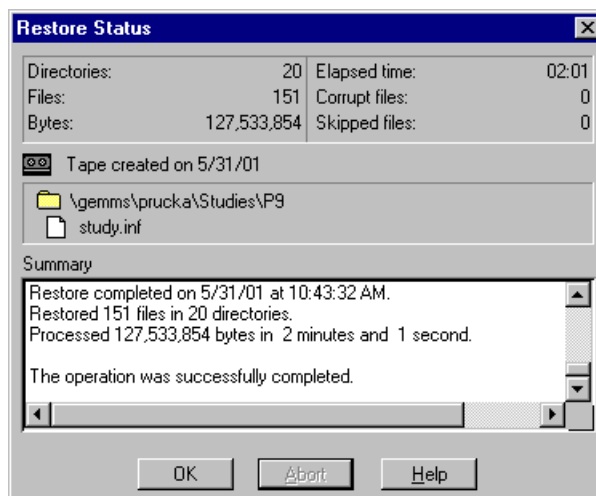
PK 5

12. Select *OK* on Restore Status screen.

13. Remove the tape.

NOTE
Repeat steps 2 - 12 for each data cartridge to restore.

14. Exit the backup utility after restoring the desired data cartridges.

15. Skip the next procedure and continue with "Install LMT server" on page 6-37

Enterprise Backups

If restoring from enterprise backup, use the appropriate procedure following:

Restore from a Veritas Backup

If using Enterprise backup software with a domain authentication, ensure that the domain user that is used for the backup is a member of the MLCLADMGRP on the CardioLink Server. If the user is not made a member of the MLCLADMGRP the backup restoration will NOT successfully run.

Before attempting to restore server data using Veritas, the Veritas Remote Agent must be installed on the CardioLink server. See the CardioLink Operator's Manual for detailed instructions on installing the agent.

◆ Both the Daily and Weekly Restore sets will include the user databases files from
D:\GEMMS\Prucka\Database\Maintenance\Backup and the patient studies folder from the path
D:\GEMMS\Prucka\Studies.

◆ Daily Restore Selection

Select the
D:\GEMMS\Prucka\Database\Maintenance\Backup
D:\GEMMS\Prucka\Studies

◆ Weekly Restore Selection

Select the
D:\GEMMS\Prucka\Database\Maintenance\Backup
D:\GEMMS\Prucka\Studies

Restore from ArcServe Backup

If using Enterprise backup software with a domain authentication, ensure that the domain user that is used for the backup is a member of the MLCLADMGRP on the CardioLink Server. If the user is not made a member of the MLCLADMGRP the backup restoration will NOT successfully run.

Before attempting to restore server data using ArcServe, the ArcServer Remote Agent must be installed on the CardioLink server. See the CardioLink Operator's Manual for detailed instructions on installing the agent.

◆ Both the Daily and Weekly Restore sets will include the user databases files from
D:\GEMMS\Prucka\Database\Maintenance\Backup and the patient studies folder from the path
D:\GEMMS\Prucka\Studies.

◆ Daily Restore Selection

Select the
D:\GEMMS\Prucka\Database\Maintenance\Backup
D:\GEMMS\Prucka\Studies

◆ Weekly Restore Selection

Select the
D:\GEMMS\Prucka\Database\Maintenance\Backup
D:\GEMMS\Prucka\Studies

16. Execute the DB restore utility by selecting
D:\gemms\prucka\netconfig\GEMS_RestoreClab.bat.

17. Press any key to continue with the restore operation.

18. Select *OK* to message *The backup file has been restored.*

19. Reboot server to restart process.

20. Navigate to *Start > Microsoft SQL Server 7.0 >Enterprise Manager*

21. In *Enterprise Manager*, navigate to:

    Clink_2->Databases>Clab>Tables>DetailVersion

22. Right-click on *Detail Version table*, select *Open Table > Return All Rows from the menu.*

23. From the newly opened Data, Set the *NetVersion* and *MachineDBVersion* fields to **0**.

24. Exit from Enterprise manager.

25. Run the file D*:\GEMMS\Prucka\Network\stoprepl.bat* from the server.

Restoring Database and Study Data from the Enterprise Network

If using Enterprise backup software with a domain authentication, ensure that the domain user that is used for the backup is a member of the MLCLADMGRP on the CardioLink Server. If the user is not made a member of the MLCLADMGRP the backup restoration will NOT successfully run.

Before restoring study data from tape backup, replication must be disabled as follows:

1. Select *Start>Programs>Microsoft SQL Server 7.0>Enterprise Manager*.

2. Enterprise Manager launches. Expand the *SQL Server Group*.

3. Highlight *<Clink_2>* or the *<Server_Name>*.

4. Select *Tools>Replication>Disable* publishing.

5. Select *Next* in the Disable Publishing and Distribution Wizard window.

6. Select *Yes* to disable publishing on <Server_Name>, and select *Next*.

7. At *Confirm Dropping of Publications* window, select *Next* and then select *Finish*.

8. In the *SQL Server Enterprise Manager successfully disable* window, select *OK*.

9. Delete the file *history.log* from *D:\Gemms\Prucka\Netconfig* folder.

10. Select the *<Ctrl + ALT + Delete>* keys.

11. Select the *Task Manager* button.

12. Select the *Processes* tab.

13. Select the process *NetMsgSender.ex.*

14. Select the *End Process* Button.

15. Select *Yes* to the Task Manager Warning message.

NOTE

Make sure you have a backup of the existing studies before continuing.

16. Delete all items under the *D:\Gemms\Prucka\Studies* folder.

Using Veritas Backup Exec Remote Agent for Windows NT

◆ Both the Daily and Weekly Restore sets will include the user databases files from *D:\GEMMS\Prucka\Database\Maintenance\Backup* and the patient studies folder from the path *D:\GEMMS\Prucka\Studies* as per the figure below.
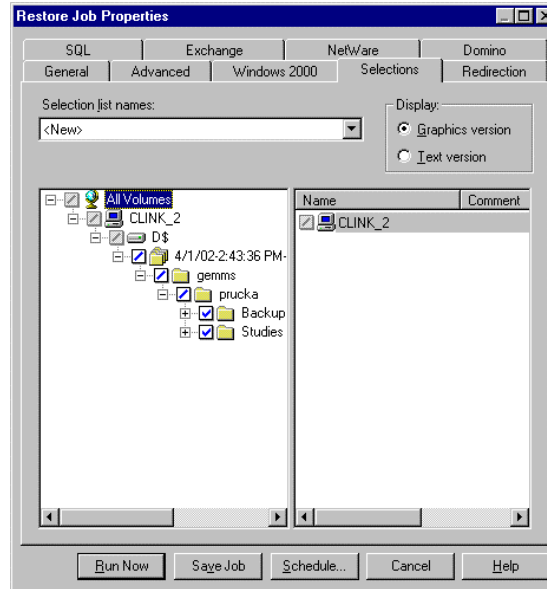
◆ **Daily Restore Selection**

> Select the
> D:\GEMMS\Prucka\Database\Maintenance\Backup
> D:\GEMMS\Prucka\Studies

◆ **Weekly Restore Selection**

> Select the
> D:\GEMMS\Prucka\Database\Maintenance\Backup
> D:\GEMMS\Prucka\Studies

Using ArcServe Windows NT Enterprise ED. v6.5 Bld 600

◆ Both the Daily and Weekly Restore sets will include the user databases files from D:\GEMMS\Prucka\Database\Maintenance\Backup and the patient studies folder from the path D:\GEMMS\Prucka\Studies as per the figure below.

◆ Daily Restore Selection
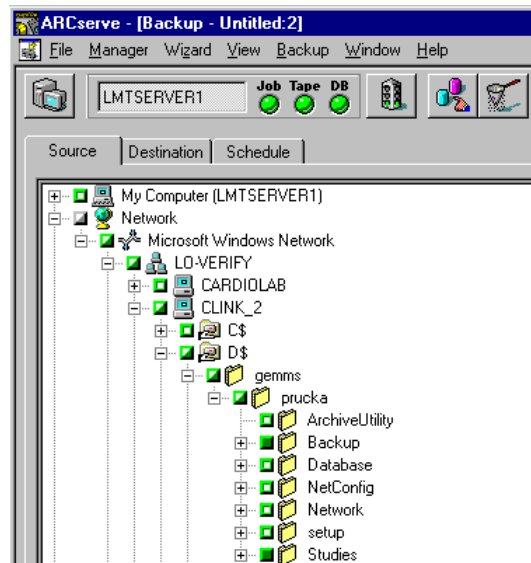
Select the
D:\GEMMS\Prucka\Database\Maintenance\Backup
D:\GEMMS\Prucka\Studies

◆ Weekly Restore Selection

Select the
D:\GEMMS\Prucka\Database\Maintenance\Backup
D:\GEMMS\Prucka\Studies

17. Execute the DB restore utility
D:\gemms\prucka\netconfig\GEMS_RestoreClab.bat.

18. Press any key to continue with the restore operation.

19. Select *OK* to message *The backup file has been restored.*

20. Run the file *D:\GEMMS\Prucka\Network\Stoprepl.bat.*

21. Reboot Server to restart process.

22. On each acquisition system, run the file
D:\GEMMS\Prucka\Network\stoprepl.bat.

23. Restart replication by running the replication utility. On the server, select *D:\Gemms\Prucka\Netconfig,* and double click on the *PEICreate_Replica.exe* file. The log-in dialog box launches.

24. Type in:

User Name: **sa**

Contact the GE Technical Support or the System Administrator for current password information

25. Select *OK.*

26. In the Select System for Replication dialog box:

    From the System list, select: *<LOCAL-SERVER-NAME>.*

    a. Select the *Add* button.

    b. Make sure the server is selected for the type of system.

    c. The <LOCAL-SERVER-NAME> appears in the Network list.

    From the System list, select each <ACQUISITION-SYSTEM-NAME>.

    a. Select the *Add* button.

    b. Make sure acquisition system is selected as the type of system.

    c. The <ACQUISITION-SYSTEM-NAME> appears in the Network list.

27. Select *OK.*

28. Select *Yes* to the message: *Please make sure you have created a master list.*

29. Wait for the processes to stop running.

30. The message appears: *Do you want to move existing studies form the acquisition system: <CUSTOMER-ACQUISITION-SYSTEM-NAME> to the server?*

Select *Yes* if any of the following conditions are true:

- If you are adding a single acquisition system to the network environment for the first time.

- If there are studies on the system that need to be moved to the server.

- If this system has been removed from the network and studies were performed.

- If this system has been removed from the network and lists were edited.

NOTE

If Yes is selected and a message appears warning *All Lists will be Deleted,* DO NOT CONTINUE. Select *No* to consolidate.

Select *No* if any of the following conditions are true:

- If the acquisition system is currently on the network.

- If the acquisition system was removed from the network and no studies or list modifications were performed. A message will appear to warn of duplicate lists. If it is certain that no list modifications have been made, select *Yes* to continue, otherwise do not continue and select *Yes* to Consolidate.

31. Select *OK* on the Replication Started message window.

32. Run the batch file *D:\Gemms\Prucka\Netconfig\Synclist.bat.* This will synchronize the server database with the new acquisition system.
33. Reboot the server.

NOTE

After the replication is re-started at the end of restore process, the user will be able to locate the patient studies that were restored from tape on the Network catalog on acquisition machines and will be able to review or continue the studies.

Install LMT server

If the LMT server was previously installed on the server before re-imaging perform this procedure. If it was not, skip this procedure and go to "Re-Install Microsoft security patches" on page 6-39.

1. Insert the **LMT 1.3 Server Install** CD (p/n 2015474-001) into the drive.

2. Right-click on *My Computer* and select *Explore.*

3. Navigate to the E:\ drive and run *Setup.exe.*

   The *Password* window is displayed.

4. Contact the GE Technical Support or the System Administrator for current login information and press *Next.*

   NOTE
   The password may have been changed. Verify with the system administrator the password is still the one listed above.

5. Click *Next* at the *Welcome* window.

6. Click *Next* at the *Choose Destination* window.

   The installation takes about 10 minutes.

7. Click *Finish.*

8. Remove the CD from the drive.

Install LMT client

If the site uses Scheduled Reports, the LMT client must be installed on the server.

1. Insert the **LMT 1.3 Client Install** CD (p/n 2015472-001) into the drive.

2. Right-click on *My Computer* and click *Explore.*

3. Navigate to the E:\ drive and run *Setup.exe.*

   If the *Welcome* window is displayed, skip the next step. If the setup aborts, Pervasive SQL 2000 has not been installed yet. Perform the next step.

4. Install Pervasive SQL 2000:

    a. Navigate to the *E:\Pervasive*.

    b. Double-click on*Setup.exe*.

    c. Click *Next* the *Welcome* window.

    d. Click *Yes* at the *Software License* window.

    e. Click *Next* at the *Setup Type* window.

    f. Click *Next* at the Select *Installation Directory* window.

    g. Click *Next* at the *Pervasive System Analyzer* window.

        Wait for the System Analysis to complete.

    h. Click *Next*.

    i. Click *Next* at the *Analyzer Results* window.

        When the Results Analysis is complete, the *Start Copying* window is displayed.

    j. Click *Next*.

        Files are copied and a configuration runs. When complete, the *Transactional Engine Test* window is displayed.

    k. Select the *I do not want to run* radio button and click *Next*.

    l. Select the *I do not want to run* radio button and click *Next* at the The *Relational Engine* window.

    m. Uncheck the *read me* checkbox and click *Finish* in the *Finish* window.

        When the Pervasive SQL 2000 install is complete, reboot the system, login as mlcltechuser, and go back to step 2 and restart the LMT client installation.

5. Click *Next* at the *Welcome* window.

6. Click *Next*. at the *Select Options* window.

7. Click *Next* at the *Program Folder* window.

    Files are copied.

8. Uncheck both checkboxes and click *Finish* at the *Completion* window.

9. Remove the CD.

10. Reboot the server.

11. Log in as **mlcltechuser** (contact the GE Technical Support or the System Administrator for current login information).

12. Select *Start > Programs > Microsoft Access*.

    An *End User License Agreement* screen is displayed.

13. Click *Accept*.

14. Close *Microsoft Access*.

15. Launch the LMT application from the shortcut on the desktop.

16. Click the *Utilities* button at the login window.

17. Select *Re-link database tables* and click *OK* at the *LMT Table Relink* window.

Install LMT Backup/Restore utility

1. Insert the **LMT Backup/Restore Utility Install** CD (p/n 2017867-001) into the drive.

   The *Welcome* window is displayed.

   NOTE
   If the CD does not auto run, click the *setup.exe* file on the CD.

2. Click *Next*.

   The *Complete* window is displayed.

3. Click *Finish*.

4. Remove the CD from the drive.

Re-Install Microsoft security patches

Instructions for downloading and installing Microsoft security patches are listed by product type on Support Central. Download and install all previously installed patches (as recorded before in "Record Microsoft security patches installed" on page 6-7).

Restore the GEMS Registry Key

1. Right-click *My Computer* and select *Explore*.

2. Navigate to *D:\Gemms\Prucka\Database\Maintenance*

3. Double click the file *GEMS_REGRES.cmd*

4. Type *Y* and press the **Enter** key at the confirmation screen.

5. Click *OK* to the confirmation message.

Restore the clab database

1. Navigate to *D:\Gemms\Prucka\NetConfig*.

2. Double-click on: *GEMS_Restoreclab.bat*.

3. Press the **Enter** key when prompted to press any key.

   The restore script runs.

4. Press **Enter** again when prompted.

5. Reboot the server.

6. Log in as **mlcltechuser** (contact the GE Technical Support or the System Administrator for current login information).

7. Select *Start > Programs > Microsoft SQL Server 7.0 >Enterprise Manager*

8. In Enterprise Manager, navigate to: *Microsoft SQL Servers > SQL Server Group > [Server Name] > Databases > clab > Tables*

9. Right-click *Detail Version* table, and select *Open Table > Return all rows* from the menu.

10. From the newly opened table, set the *NetVersion* to *0* (zero) and *MachineDBVersion* fields to *00* (double zero).

11. Close the *Detail Version* table.

12. Close *Enterprise Manager*.

13. Right-click *My Computer* and select *Explore*.

14. Navigate to *D:\Gemms\Prucka\Network*

15. Double-click *stoprepl.bat*.

16. Ignore the error message and press the **Enter** key to continue.

Restore LMT database

Perform this procedure only if the LMT database is available.

1. Navigate to *D:\Gemms\Prucka\Database\Maintenance\Backup*.

2. Right-click on: *clinkbackup.bak* and select *Copy*.

3. Navigate to the *D:\Program Files\Gems\Lmt\Maintenance\Backup* folder.

4. Right-click and select *Paste*.

5. In the *D:\Program Files\Gems\Lmt\Maintenance* folder, double-click *Gems_Restoreclink*.

   A login screen is displayed.

6. Log in as username: **sa** (contact the GE Technical Support or the System Administrator for current login information).

   A command window opens.

7. Press **Enter** as required.

Install Serial Number update

Perform this procedure only if the Serial Number update was previously installed on the old server.

1. Log in as **mlcltechuser** (contact the GE Technical Support or the System Administrator for current login information).

2. Insert the **Serial Number Update** CD (p/n 2017869-001) into the drive.

   NOTE

   If the CD does not auto run, double-click the *setup.exe* file on the CD.

3. Click *Next.* at the The *Welcome* window.

4. Click *Next* in the *Start Copying Files* window is displayed.

5. Check the *I will run this CD on all systems in the network environment* checkbox, and click *Finish*.

6. Remove the CD.

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 6-9) as indicated below.

1. Right-click *My Computer* and select *Explore*.

2. Navigate to the location of the *clink_drk.mdb* file that was recorded in "Backup LMT Custom Reports" on page 6-9.

3. Right-click on the *clink_drk.mdb* file and click *Copy.*

4. Navigate to *D:\Program Files\Gems\Lmt\Client\Resource Kit*.

   Create this directory if it does not exist.

5. Paste *clink_drk.mdb* into the *Resource Kit* folder.

Verify time and time zone

Verify the time and time zone on the server are set correctly.

Register Acquisition systems

1. Log in as **mlcltechuser**.

2. Select *Start > Programs > Microsoft SQL Server 7.0 > Enterprise Manager*.

3. Expand the *SQL Server* group and highlight the *[Server]*.

4. Right-click *SQL Server Group* and select *New SQL Server Registration*.

5. At the *Welcome to the Register SQL Server Wizard*, select *Next*.

6. From the list of *Available Servers*, highlight the networked Acquisition systems one at a time.

   If the system does not exist in the list, type in the computer name, and click *Add*. The system name appears on the *Added servers* list on the right side.

7. Click *Next.*

8. Select the SQL Server login information radio button that was assigned by the system administrator (SQL Server authentication) and click *Next.*

9. Select the *Login automatically using my...* radio button and enter username: **sa** (Contact GE Technical Support for current login information).

10. Click *Next.*

11. Select the *Add the SQL Server (s) to an existing SQL Server group* radio button. and click *Next.*

    The system name is displayed in the server group list.

12. Click *Finish.*

    The status shows <SYSTEM-NAME> Registered successfully.

13. Click *Close.*

14. Verify the <SYSTEM-NAME> appears on the left panel of the *Enterprise Manager* under the *SQL Server Group* and the communication is established with the server (indicated by a green arrow).

15. Verify all systems are connected to the network and registered on the CardioLink Waveform Server in *Enterprise Manager.* All systems should be visible directly from the *Network Neighborhood.*

16. Close *Enterprise Manager.*

Enable for advanced security

If Advanced Security was previously enabled, it must be re-enabled.

1. Insert the **Gems Advanced Security** floppy disk

2. Select *Start > GE Security Mode.*

3. Select *Enable Advanced Security* mode.

4. Remove the floppy from the drive.

Run the Replication utility

1. Right-click *My Computer* and select *Explore.*

2. Navigate to *D:\Gemms\Prucka\NetConfig.*

3. Double-click *PEICreate_Replica.exe* file.

   A login window is displayed.

4. Log in as username: **sa** (contact the GE Technical Support or the System Administrator for current login information).

5. Click *OK.*

6. Select the server name in the *System* list in the *System for Replication* dialog box.

7. Click *Add*.

   Ensure *Server* is selected for the type of system.

8. Click *OK*.

   The server system name is displayed in the *Network* list.

9. Select each Acquisition system name from the *System* list.

10. Click *Add*.

    Ensure the *Acquisition system* is selected for the type of system.

11. Click *OK*.

    The *[Acquisition system name]* is displayed in the *Network* list.

12. Repeat for all the Acquisition systems added to the network. After adding all acquisition systems, select *OK*.

13. Click *Yes* at the message: *Please ensure you have created a master list.*

    Wait for the processes to stop running. The following messages is displayed for each acquisition system added: *Do you want to move existing studies from the acquisition system: <ACQUISITION-SYSTEM-NAME> to the server?*

14. Click *No* to the consolidation message.

15. Click *Yes* at the continue window.

    The replication process runs in the background.

16. Select *OK* at the *Replication Started* window.

17. Reboot the server and then all Acquisition systems.

    Any studies done on the Acquisition systems when not connected to the CardioLink server must be added to the network by reviewing each study from the optical disk and then closing it.

Setup file paths at each Acquisition system

1. At the Acquisition system, log in as **mlcltechuser** (contact the GE Technical Support or the System Administrator for current login information).

2. Double-click the GE Medical Systems icon on the desktop to start the ML/CL application.

   If the message *Optical path specified* is not valid is displayed, click *OK*.

3. Select *Administration > System Settings* from the Main menu.

4. If prompted for an administrator login, log in as **mlcladmuser** (contact the GE Technical Support or the System Administrator for current login information).

5. Browse to the *File Paths* section.

6. Verify the *Enable Acquisition* checkbox is checked. Check the *Enable Network Storage* checkbox.

7. Click *Browse*.

8. Browse to the CardioLab server and select the *PruckaStudies* share as the network storage path.

9. Click *Close*.

10. Change the catalog view to *Network*.

11. Verify all studies are visible.

12. Close the ML-CL application.

Push emergency cases to the server

At all Acquisitions systems review and close any emergency cases (i.e., studies performed while the system was out of replication) from the optical disk.

Re-link LMT tables

Perform this procedure only if LMT is installed.

1. At the Acquisition or Review system, run the LMT application.

2. Click the *Utilities* button at the *Login* window.

3. Click the *Relink Database Tables* button.

4. Click *OK* to start relinking.

    A confirmation message indicates the tables are relinked successfully.

5. Click *OK* to close the application.

6. Repeat steps 1-5 for all LMT Clients.

Restore ACC access /PedCath/Personal Files

At the server, restore any AccAccess/PedCath/Personal files, if available, back to their respective folders.

Schedule reports

This procedure is required only if reports are used on the server.

1. Log in as **mlcltechuser** (contact the GE Technical Support or the System Administrator for current login information).

2. Select *Start > Programs > Administrative Tools (Common) > User Manager for Domains*.

3. Double-click the *MLCLADMGRP.*

4. Click *Add*.

5. Highlight the *SQLAgentCmdExec* user and click *Add*.

6. Click *OK*.

7. Click *OK*.

8. Close *User Manager*

9. Log out of the server and log in as:
    User name:*SQLAgentCmdExec*
    Password: *clab*

10. Select *Start > Settings > Printers*.

11. Select the desired printer as *Default for this user*.

12. Start the LMT application, and select *OK* at the *Microsoft Access* user identification window.

13. Relink the tables for the *SQLAgentCmdExec*. (See "Re-link LMT tables" on page 6-44).

14. Logoff the server.

15. Log in as **mlcltechuser** (contact the GE Technical Support or the System Administrator for current login information).

16. Select *Start > Programs > Administrative Tools (Common) > User Manager for Domains*.

17. Double-click the *MLCLADMGRP.*

18. Highlight the *SQLAgentCmdExec* user.

19. Click *Remove*.

20. Close *User Manager*.

Verify the LMT application installed correctly

1. Verify the *D:\Program Files\Gems\LMT\Client* folder was created and that files exist in the directory. If this directory is not present, restart the computer.

2. Select the *Start/Settings/Control Panel/Data Sources(ODBC)* options, and select the *System DSN* tab. Verify that the installation created a system DSN named *ClinkSQL* in the *ODBC Configuration*.

3. Highlight *CLinkSQL*, and click the *Configure* button.

4. Verify the *Name* field is set to *CLinkSQL*.

5. Verify the *Server* field is set to the local machine name. If you are installing multiple clients to one data source, verify that this field is set to the central file server machine name.

6. Click the *Next* button, and verify the *With SQL Server authentication using a login ID and the password entered by the user* checkbox is selected.

7. Verify the checkbox *Connect to SQL Server to obtain default settings for the additional configuration options* is selected.

8. Verify the Login ID is **sa** and enter the contact the GE Technical Support or the System Administrator for current login information.

9. Click the *Next* button, and select the checkbox: *Change the default database to:*.

10. Select the *clink* database from the pull-down menu. Accept all other defaults on this page.

11. Click the *Next* button.

12. Click the *Finish* button.

13. Click the *Test Data Source* button in the *ODBC Microsoft SQL Server Setup* window.

14. Verify that the message is displayed: *Tests Completed Successfully!*

15. Click *OK* and close the *ODBC configuration* windows and the control panel window.

16. Verify that the *CLINK.MDF* and *CLINK.LDF* files exist in the *D:\MSSQL7\Data* folder.

Verify the modem connection and PC Anywhere

1. Identify the phone number for the server analog line.

2. Launch pcAnywhere, and begin the host operation through the modem.

3. Use technical support or clinical applications to modem into the server.

Reconfigure hospital shares and mapped drives

Re-map hospital shared and mapped drives as recorded in "Record system information at the server" on page 6-6, if available. Otherwise, contact the hospital administrator for additional information

Reconfigure SQL Jobs

Reconfigure SQL jobs as recorded in "Record job schedules" on page 6-8.

1. Select *Start > Programs > Microsoft SQL Server 7.0 > Enterprise Manager*.

2. Under the *SQL Server Group*, navigate to and expand the server.

3. Under the server, navigate to *Management > SQL Server Agent > Jobs*

4. Right-Click on a job and select *Properties*.

5. Select the *Schedules* tab and click *New Schedule*.

6. Enter the name for the schedule (i.e., the name of the SQL job) and click *Change*.

7. Edit the schedule to match the schedule recorded earlier and click *OK*.

8. Click *OK*.

9. Click *OK*.

10. Repeat for remaining jobs.

Run DB Maintenance Job

1. Select *Start > Programs > Microsoft SQL Server 7.0 > Enterprise Manager*.

2. Under the *SQL Server* group, navigate to (and expand) the server.

3. Under the server, navigate to *Management > SQL Server Agent > Jobs*.

4. Right-click the *Database Maintenance* job and click *Start Job*.

   A confirmation window is displayed.

5. Click *Start*.

   Wait for the *Maintenance* job to complete before continuing with the next step.

   NOTE
   This job can take up to 30 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.

6. Check the NT Application log to verify the job ran with no errors.

   If any errors occurred, contact Technical Support.

Setup Archive Generator

The archive generator moves study data from the local acquisition systems to the CardioLink server to preserve hard drive space on the local acquisition systems.

This should take place in the middle of the night. For this process to occur without any problems, ensure that the acquisition system is not turned off.

To configure the archiving of studies to the CardioLink server:

1. Expand the *SQL Server* group, click to expand the acquisition system that is scheduling the archive generator task.

2. Expand the *Management* folder.

3. Expand the *SQL Server Agent*.

4. Click *Jobs*.

5. Right-click *Run archive generator*.

6. Choose *Properties*.

7. Select the *Schedule* tab.

8. Click *Edit* and update the schedule.

   WARNING
   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.

   NOTE
   If the archive generator process is triggered off during a study in progress, that specific study will not be archived to the server until the next archive generator process is executed.

9. Click *OK*.

10. Save the new schedule.

11. Click *OK* to save the changes to the job.

Run a full tape backup

1. Insert a tape into the tape drive.

2. Select *Start > Programs > Microsoft SQL Server 7.0 > Enterprise Manager*.

3. Under the *SQL Server* group, navigate to (and expand) the server.

4. Under the server, navigate to *Management > SQL Server Agent > Jobs*.

5. Right-click the *Full Tape Backup* job and click *Start Job*.

   A confirmation window is displayed.

6. Click *Start*.

7. Check the NT Application log to verify the job ran with no errors.If any errors occur, contact Technical Support.

CardioLink Network Functional Checkout Procedure

1. Ping all of the acquisition workstations and client computers connected to the server.

2. Run *Insight Manager* on the server.

3. Open the *Device List*, and double click on the *<CardioLink Server Name> in* the list.

4. Ensure that all of the highlighted devices are green. If they are not, select the *Recovery* button and select the *Integrated Log* button.

5. If the failures do not require action during the initial installation (some errors may be present from the manufacturing process), select each of the failure messages, and select *Mark Repaired*.

6. After all of the log entries are marked as repaired, it may take several minutes for the status marker to change colors to green in the device list.

7. Create a test patient on one of the CardioLab or Mac-Lab acquisition systems.

8. Verify a restored study can be reviewed on an Acquisition or Review system.

9. Review the patient on each acquisition and review systems from the network catalog.

   a. Set the *Navigator* catalog on the acquisition system to *Network.* The catalog will display a list of studies cataloged on the CardioLink Server.

   b. Highlight the desired study and Review the study.

10. Test Modem Connection:

    a. Identify the phone number for the server analog line.

    b. Launch *pcAnywhere*, and begin the host operation through the modem.

    c. Use technical support or clinical applications to modem into the server.
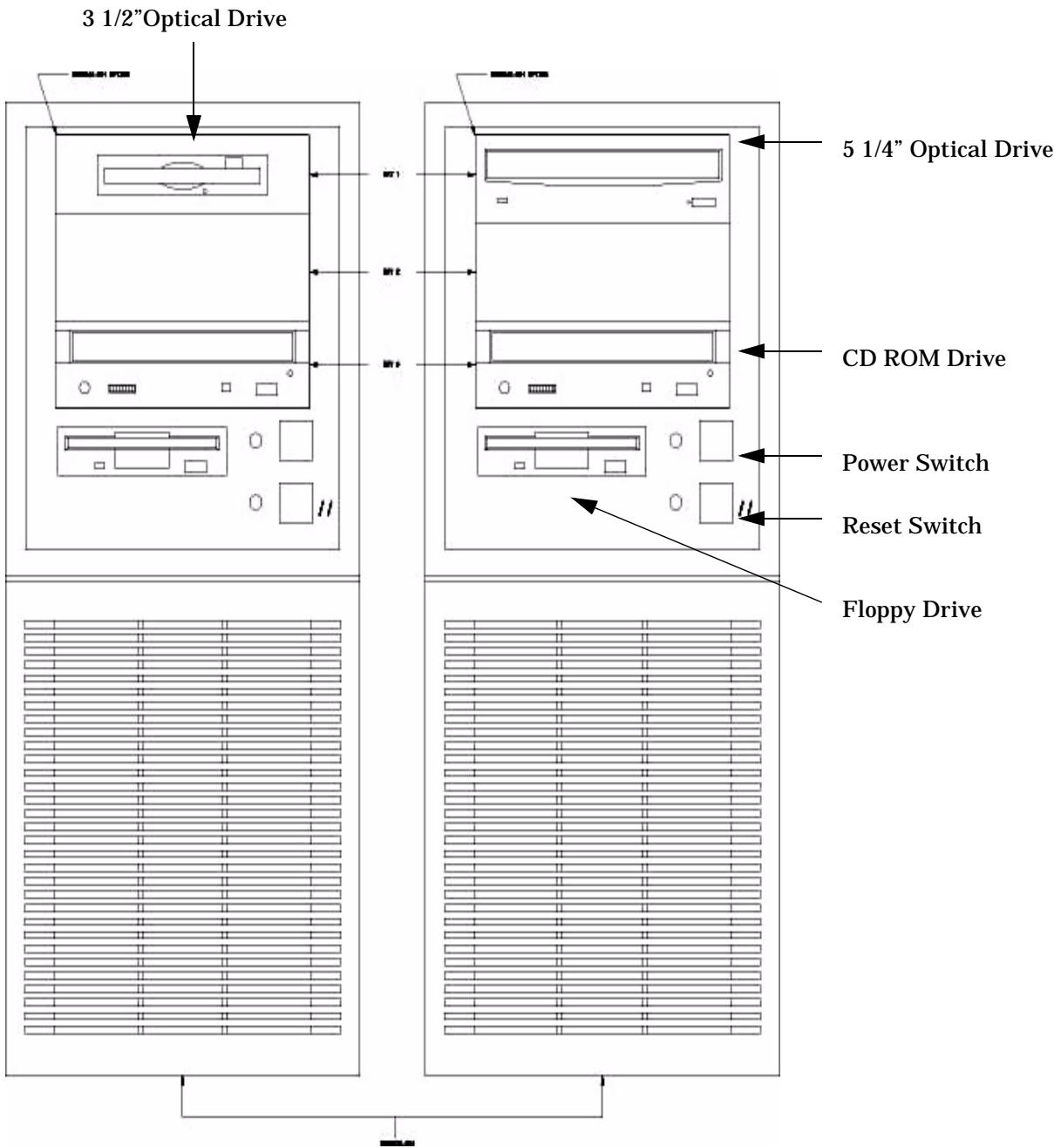
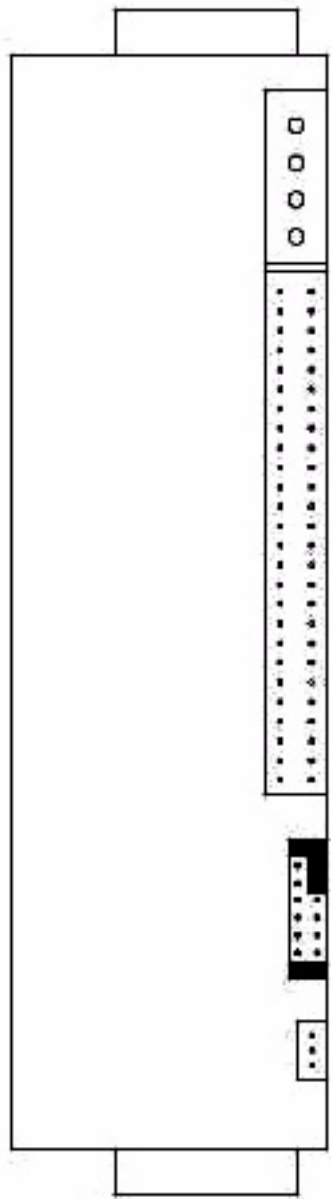**For your notes**

7   Drawings and Parts List

For your notes
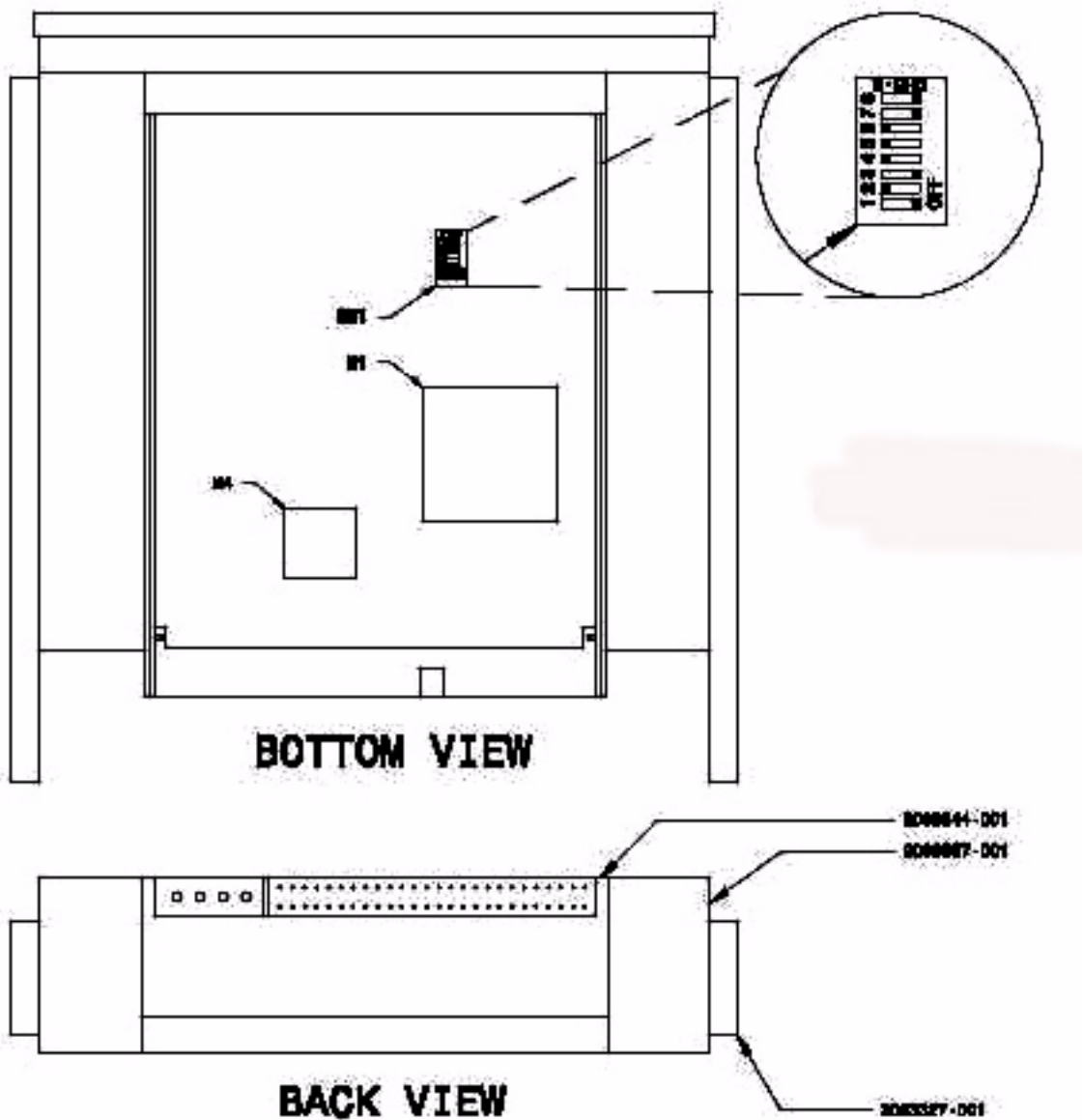
For your notes

Diagrams/Drawings/Illustrations

Chassis Front View

3 1/2"Optical Drive

5 1/4" Optical Drive

CD ROM Drive

Power Switch

Reset Switch

Floppy Drive

Chassis Back View CD-ROM Drive

PK2

Optical Drive - 3 1/2

BOTTOM VIEW

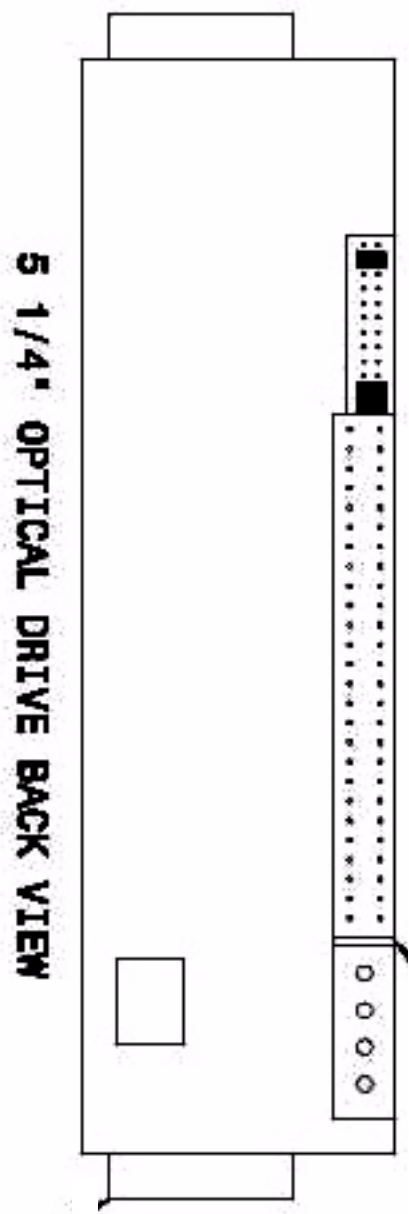BACK VIEW

PK3

RS422 PCI Card

PK4

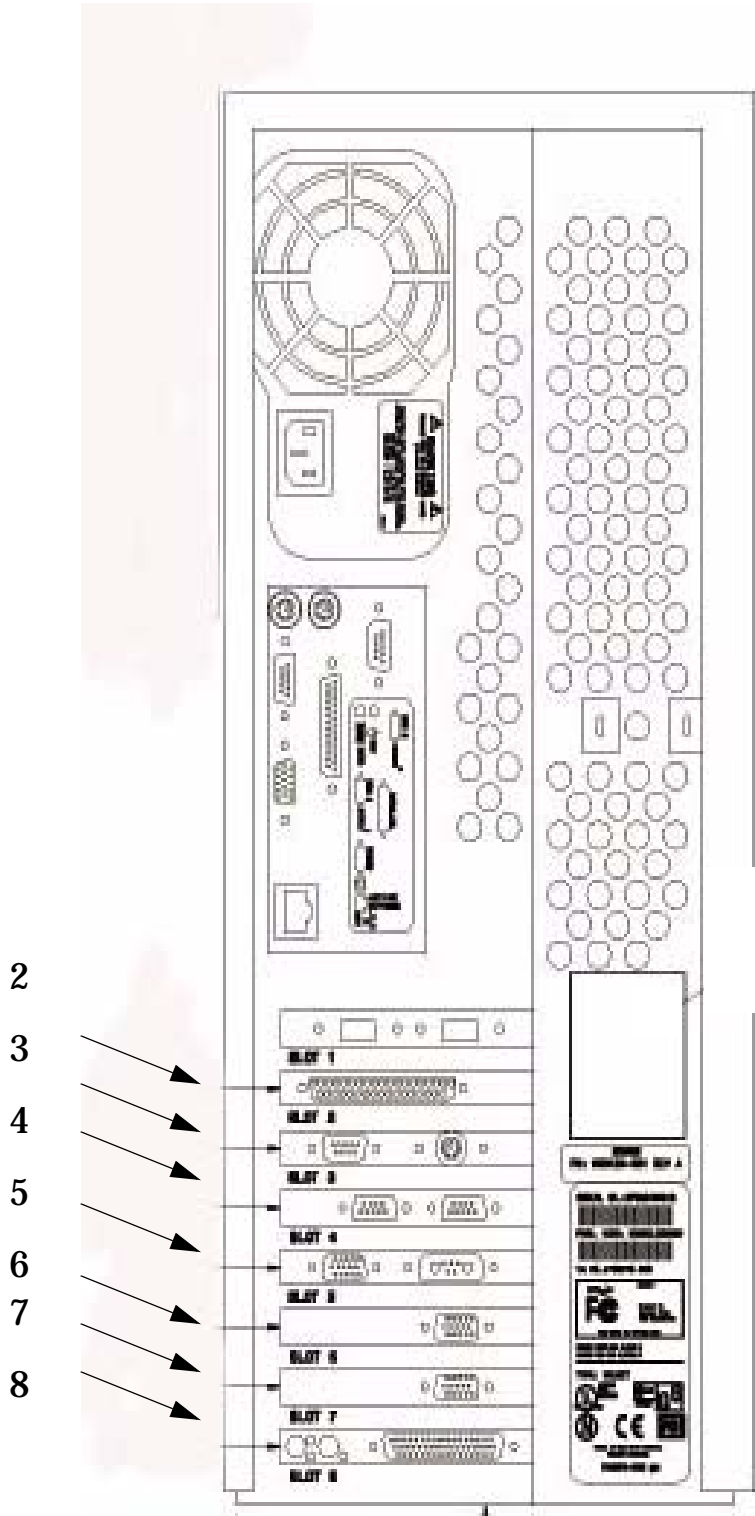# Optical Drive - 5 1/4

5 1/4" OPTICAL DRIVE BACK VIEW
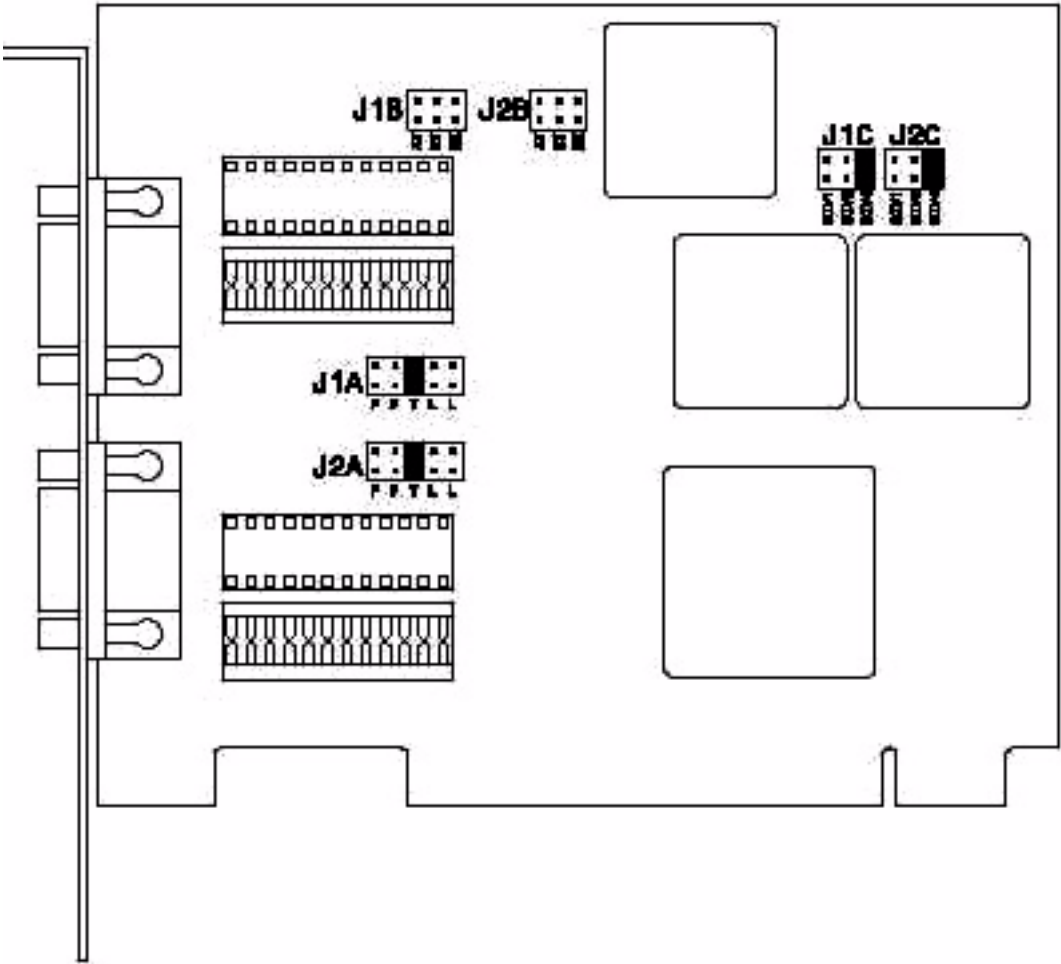
PK6

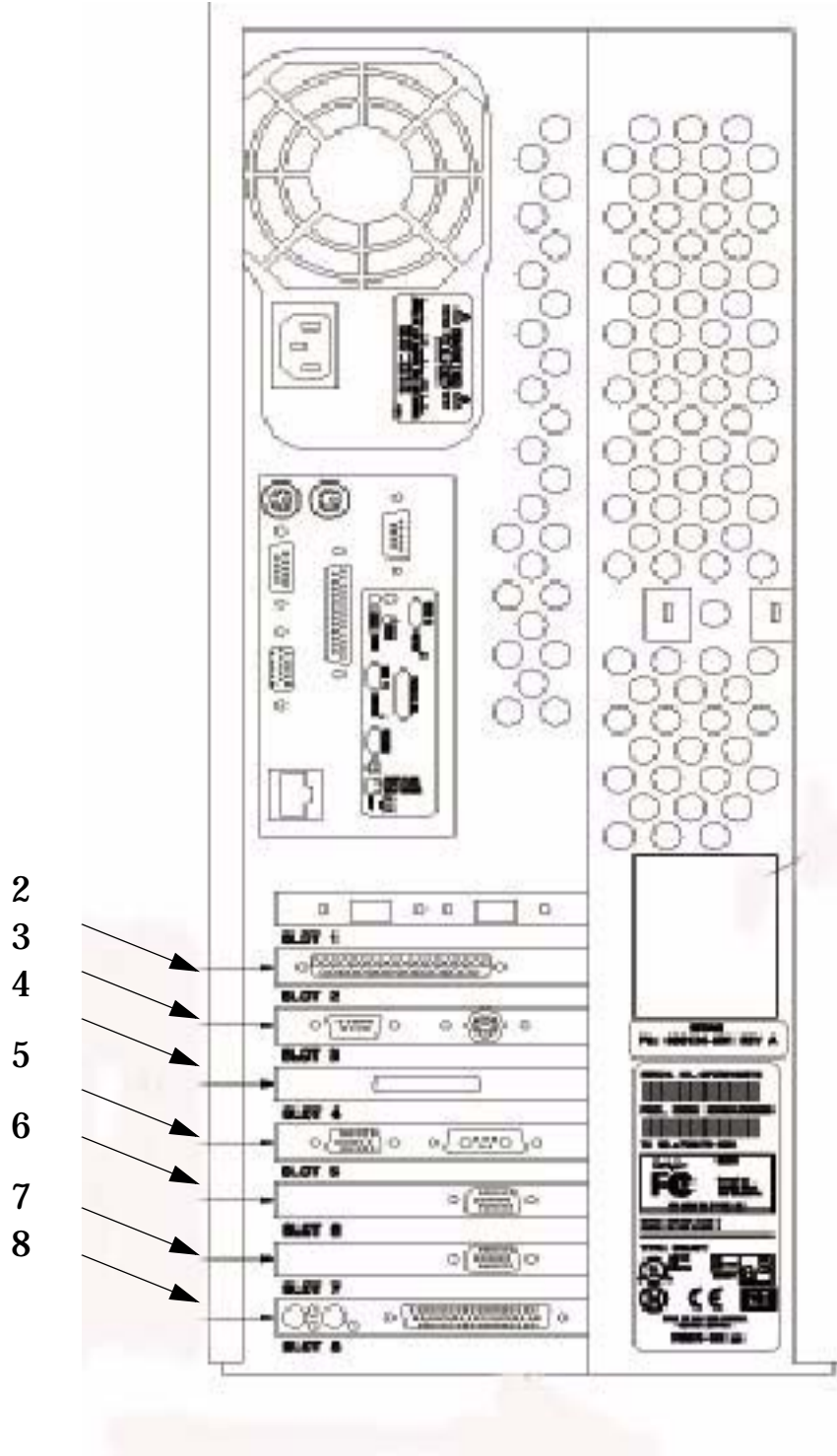# Back Panel Showing Slots for CardioLab/Mac-Lab Computers

PK11

Slots for CardioLab/Mac-Lab Computer with RS422 or TRAM-net Card

Table 1. Slot Descriptions with RS422 Card

Slot	Reference	Description	Part Number
Slot 2	Reference 2	Digital Input	2003238-001
Slot 3	Reference 3	COM 10/V-Synch	2003240-001
Slot 4	Reference 4	PCI Card, RS422 or TRAM-net	2003245-001 or 2009937-001
Slot 5	Reference 5	Image Card	2003243-001
Slot 6:	Reference 6	Video Card 1 (Real-Time)	2003236-001
Slot 7	Reference 7	Video Card 2	2003236-001
Slot 8	Reference 8	Acquisition COMMS	2002886-001

Back Panel Showing Slots for CardioLab/Mac-Lab Computers
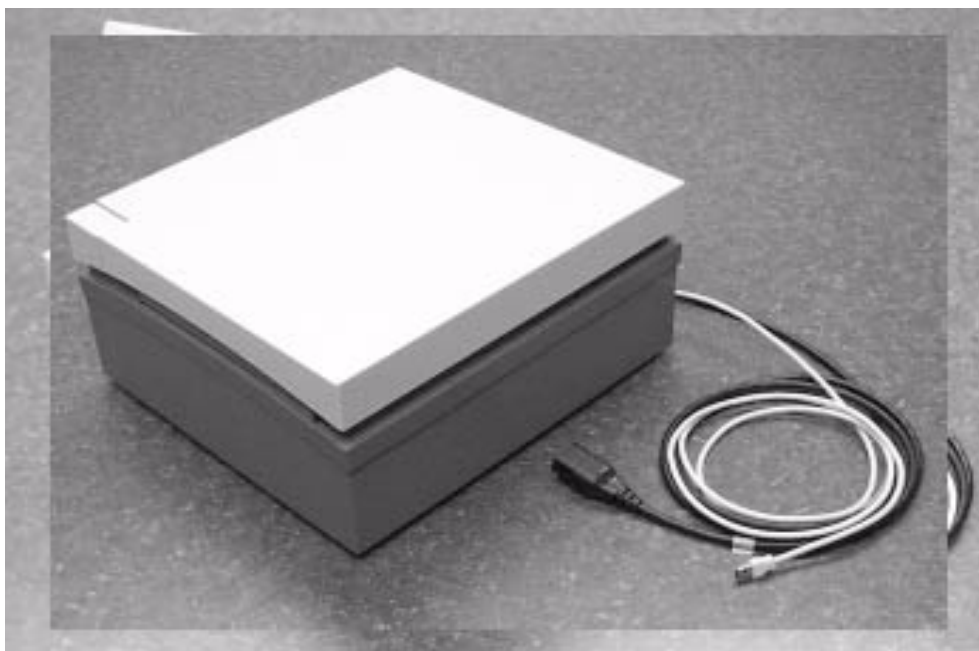

PK7

Slots for CardioLab/Mac-Lab Computer with PSI Card

Table 2. Slot Descriptions with PSI Card

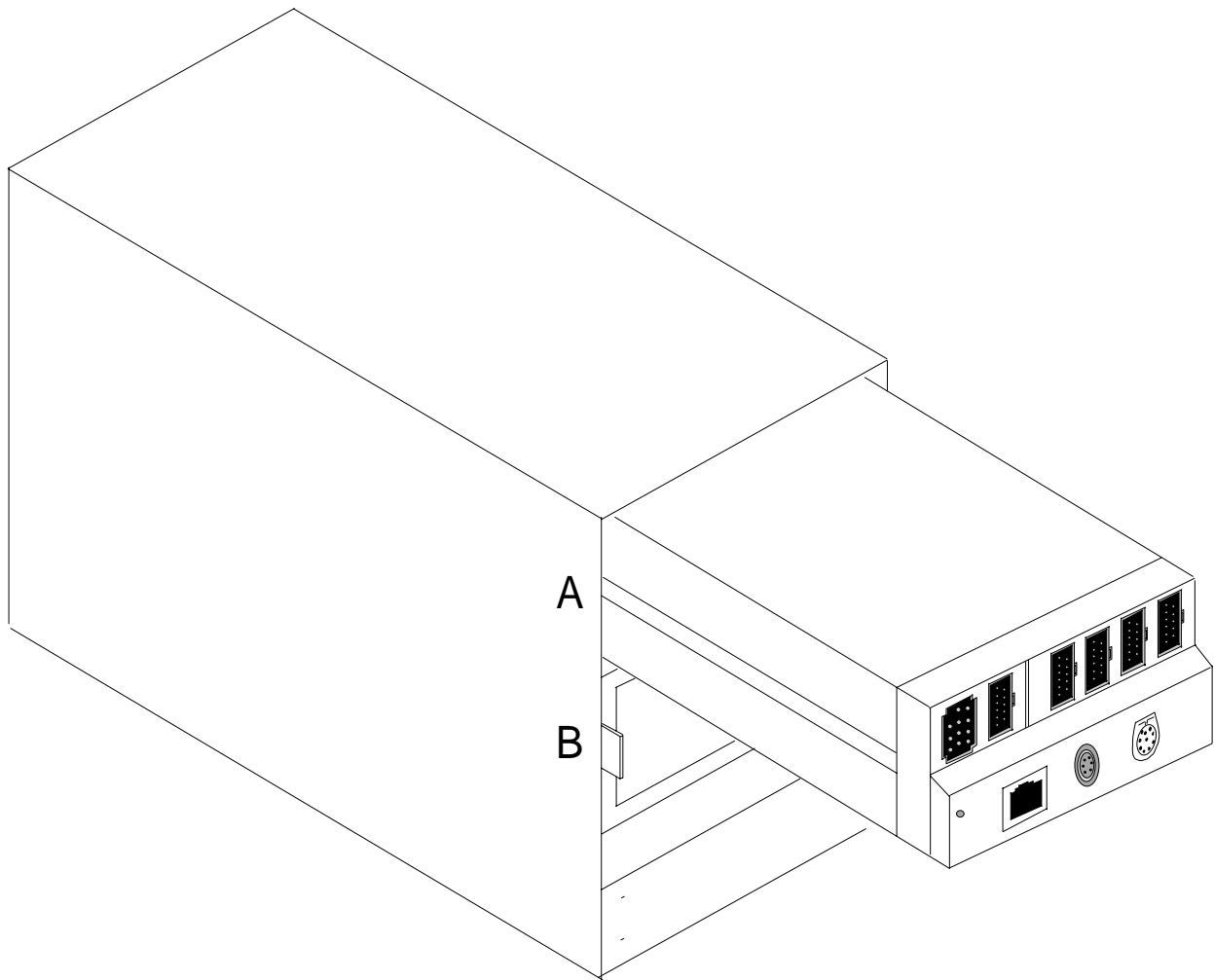| Slot	Reference	Description	Part Number
Slot 2	Reference 2	Digital Input	2003238-001
Slot 3	Reference 3	COM 10/V-Synch	2003240-001
Slot 4	Reference 4	PSI SCSI Controller Card	2003338-001
Slot 5	Reference 5	Image Card	2003243-001
Slot 6:	Reference 6	Video Card 1 (Real-Time)	2003236-001
Slot 7	Reference 7	Video Card 2	2003236-001
Slot 8	Reference 8	Acquisition COMMS	2002886-001

Thermal Writer

PK8

PK9

Remote Acquisition Unit (RAU) with TRAM

A

B

PK10

RAU Rear Panel
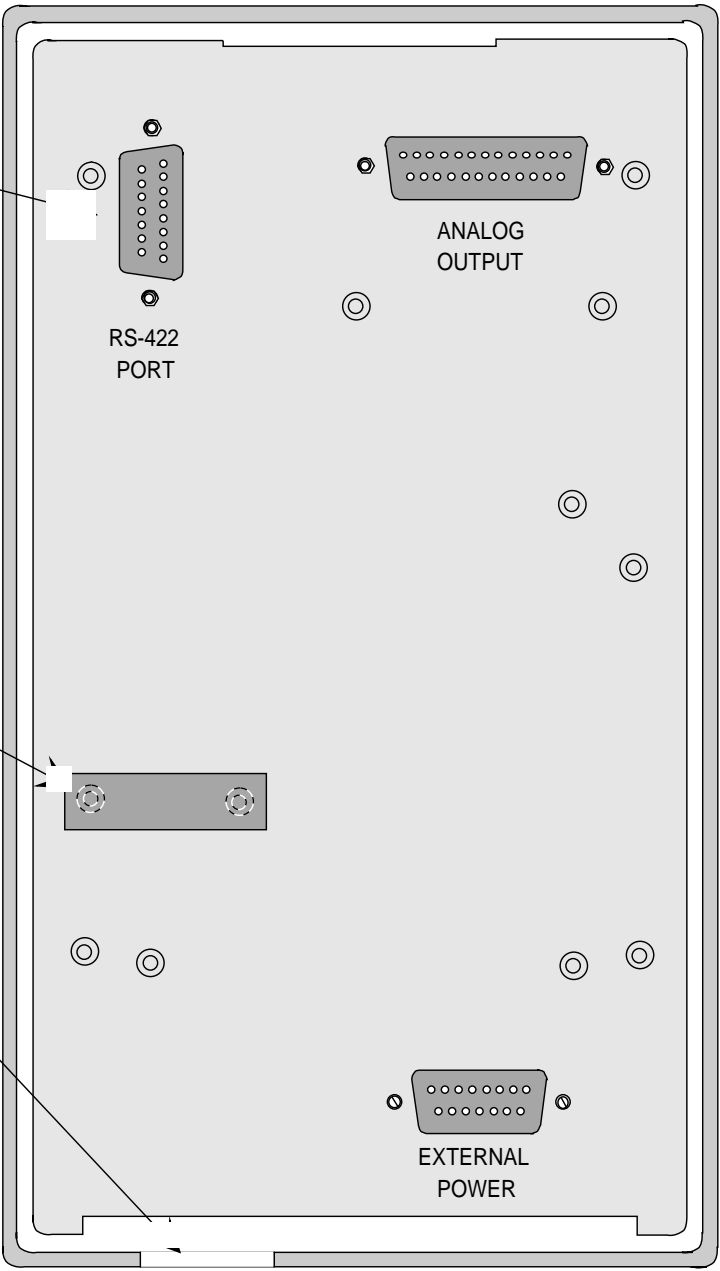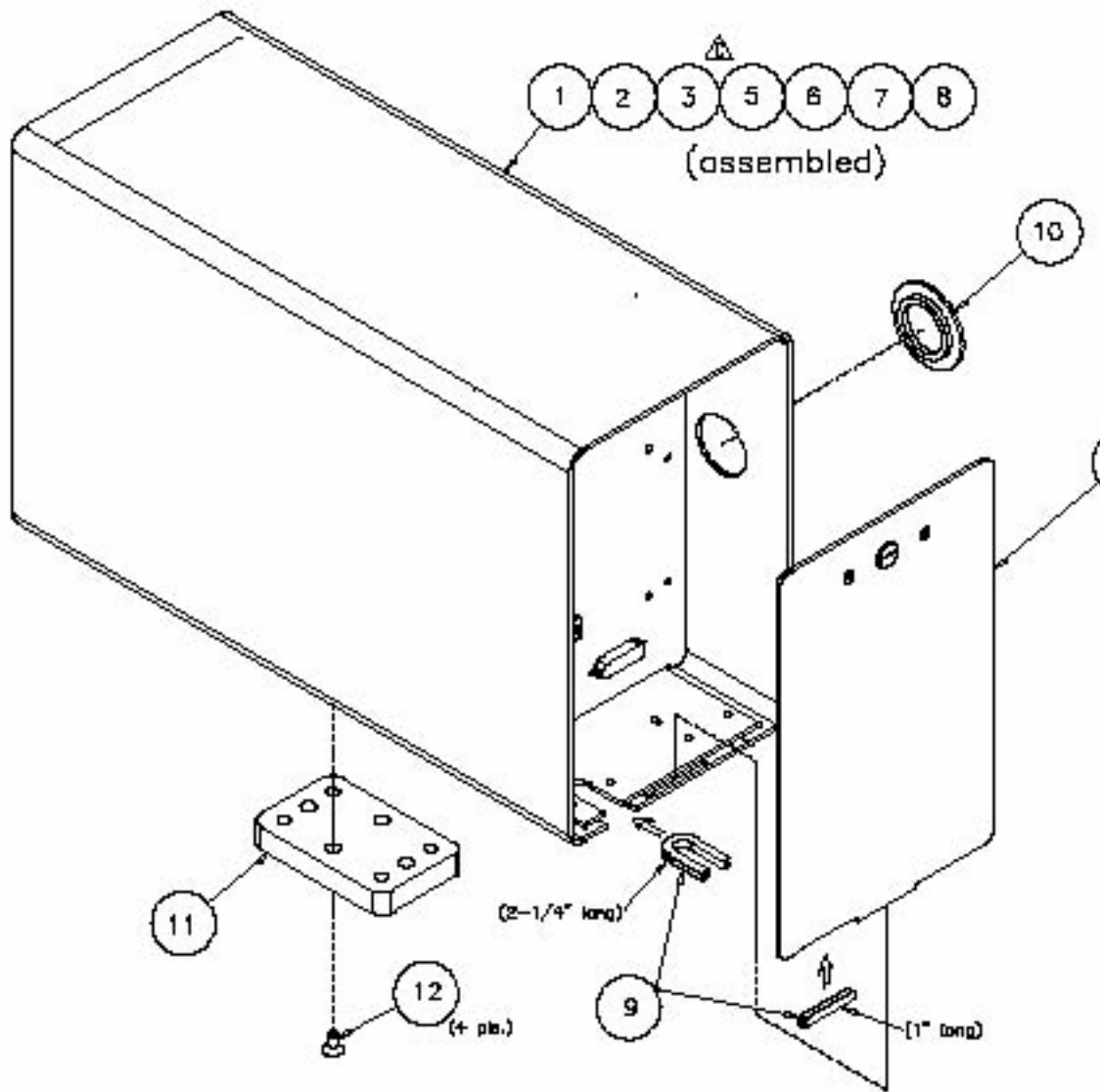
RS-422
PORT

ANALOG
OUTPUT

EXTERNAL
POWER

PK11

RAU

PK12

RAU

SEE NOTE 15

SEE NOTE 16
(1−1/2" long)

(4 pls)

(2 pls)

PK13

Connections for the NT CardioLab/Mac-Lab Computer

This diagram shows the connections between the following components: the NT CardioLab/Mac-Lab computer, the COMMS Interface box, the Analog Output Breakout box, and the External VIDMUX box

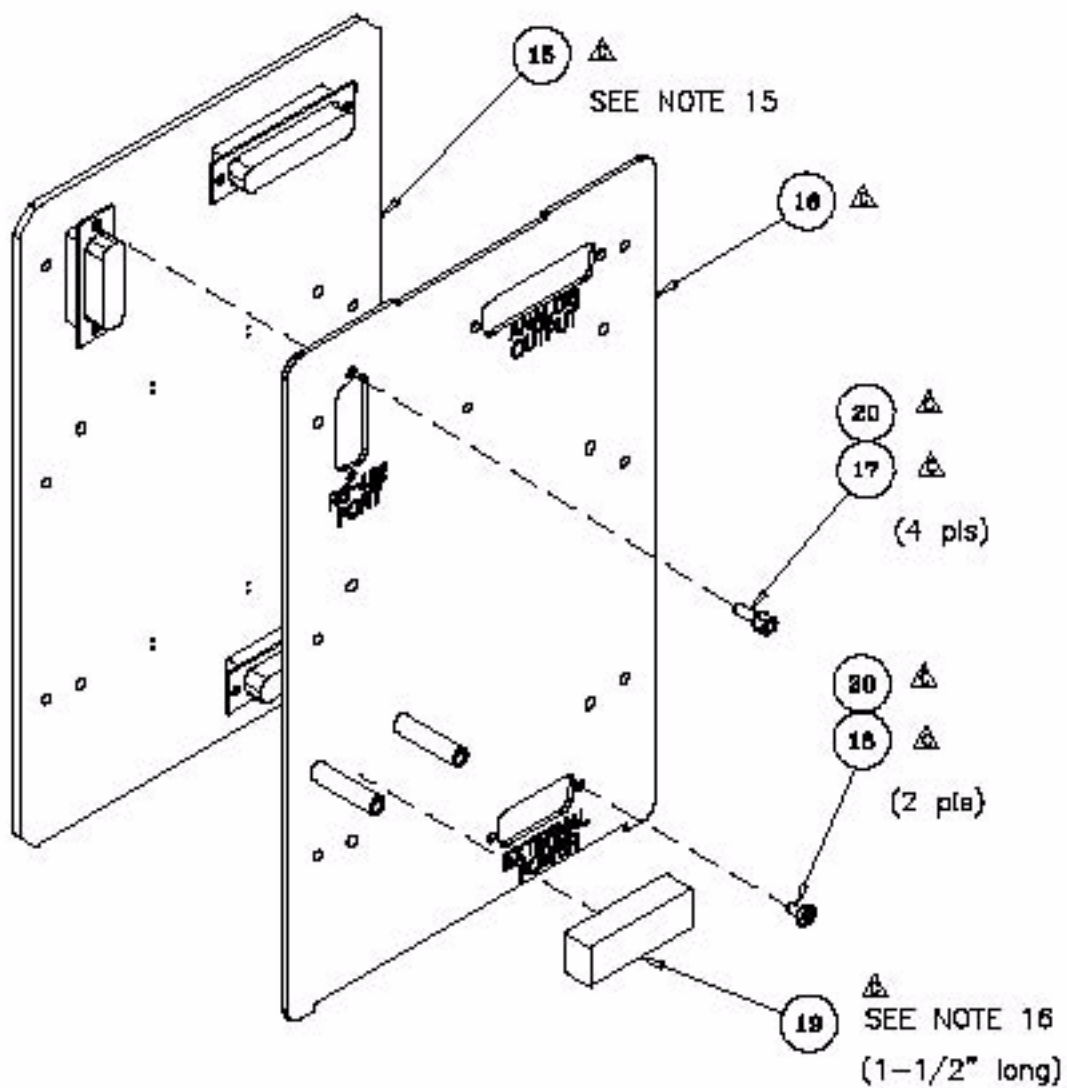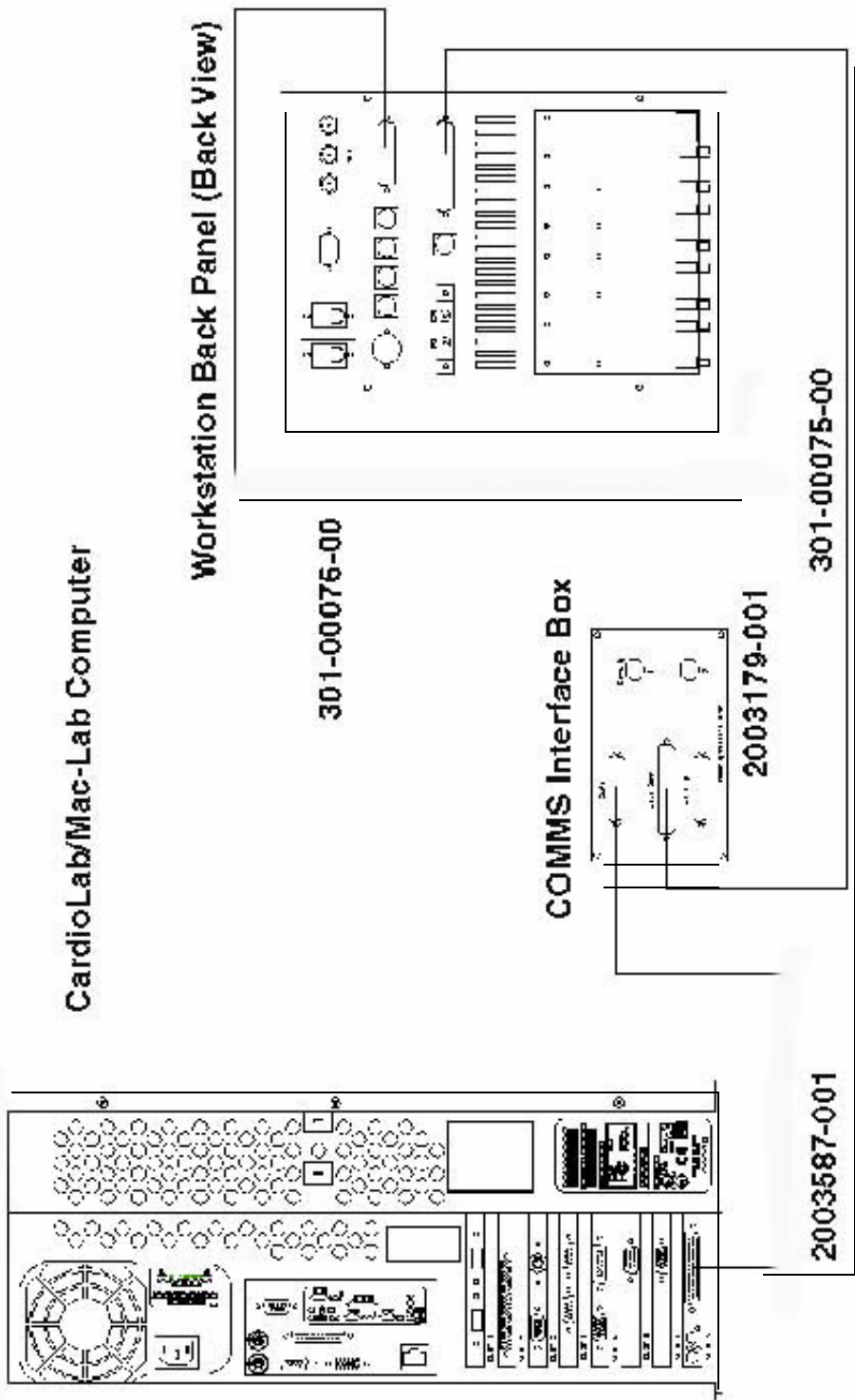This diagram shows the connections between the following components: the NT CardioLab/Mac-Lab computer, the COMMS Interface box, and the back panel of the DOS Cardiolab workstation


PK15

CardioLink Server Airflow Requirements

Compaq rack-mountable servers draw cool air in through the front door and exhaust warm air out the rear door of the server. Therefore, the front door of the rack must be adequately ventilated to allow ambient room air to enter the cabinet and the rear door must be adequately ventilated to allow the warm air to escape from the cabinet. Do not block the ventilation apertures. Leave at least 2 to 3 feet in front and behind the server for ventilation.

NOTE:

If all of the vertical space in the rack is not filled by components, the gaps that are left cause a change in airflow through the rack and across the components. These gaps should be covered with blanking panels.

Rack-Mount Server Front View
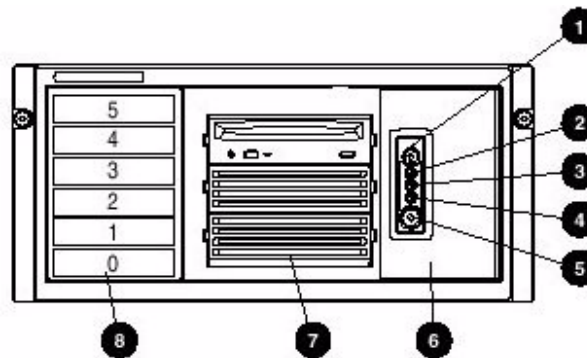
Item	Name
1	UID switch and LED
2	Internal system health LED
3	External system health LED
4	Network LED
5	Power button/LED assembly
6	Diskette Drive (behind media door)
7	Removable media area
8	Hot-plug SCSI hard drive bays (SCSI IDs o through 5)

Rack-Mount Server Back View
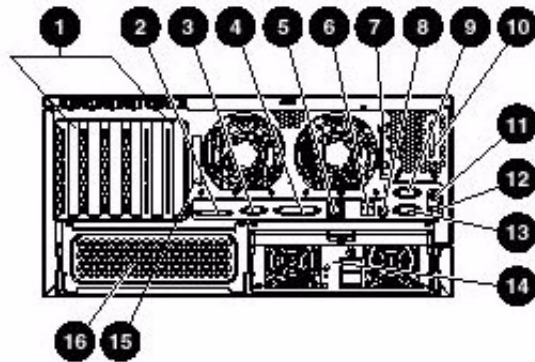
Item	Name
1	PCI expansion slots
2	VHDCI SCSI connector
3	Video connector
4	Parallel connector
5	RJ-45 connector
6	USB connectors
7	Torx T-15 too
8	UID switch and LED
9	Serial connector B
10	Auxillary VDHCI SCSI blank
11	Mouse connector
12	Keyboard connector
13	Serial connector A
14	Primary hot-plug power supply
15	Serial number
16	Secondary hot-plug power supply bay

Rack-Mount Server UPS

The rack-mount server uses an R3000 XR universal power supply.

Item	Name
1	Battery compartment
2	Control Buttons
3	LED display

Rack Mount Server UPS Rear View

| Item	Name
1	REPO port
2	ERM connector
3	Communications port/open slot
4	Load segment 1
5	Load segment 2
6	Load segment 3
7	Load segment circuit protectors
8	Compaq PDU output (L5-30) receptable (Load segment 1)
9	Cord retention clip attachment locations
10	Ground bonding screw
11	Power cord with L5-30 plug

TRAMnet Communication

TRAMnet communication permits connection to the TRAM-RAC housing and other bedside peripherals. The TRAMnet communication is one form of local area network that provides a data and power link from the monitor to peripheral devices. The connector makes a communication processor available for the peripheral devices. The TRAMnet controller processor is built into the communication PCB assembly which frees up the main processor in the monitor.

To avoid confusion, consider TRAMnet communication as a small area network (SAN) contained in one room or at the patient bedside. For more details about communication networks, refer to the appropriate monitor service manual.

TRAM-RAC 4A Housing

Shown below is a TRAM-RAC 4A housing with a TRAM module and one BP and one BP/Dual Temperature module inserted.
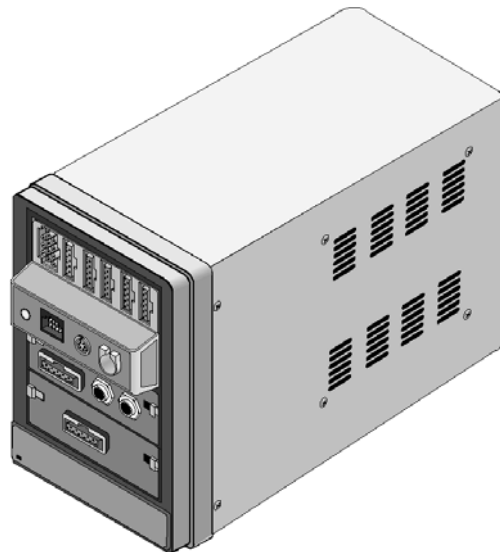
The TRAM-RAC 4A housing has three communication connectors:

- The 15-pin yellow color-coded connector is used for analog output,
- The two 9-pin blue color-coded connectors are for:
    - TRAMnet communication with a patient monitor,
    - TRAMnet hub,
    - remote control, or
    - an additional TRAM-RAC housing.

The number of peripheral devices is dependent upon the software version of the host monitor. When you use an optional power supply, there is an additional hidden connector on the back panel for the power supply connection.

Below are examples of the rear label of the TRAM-RAC 4A housing with and without a power supply. Further explanation about connection and labeling of the male and female TRAMnet connectors is found on the following pages.
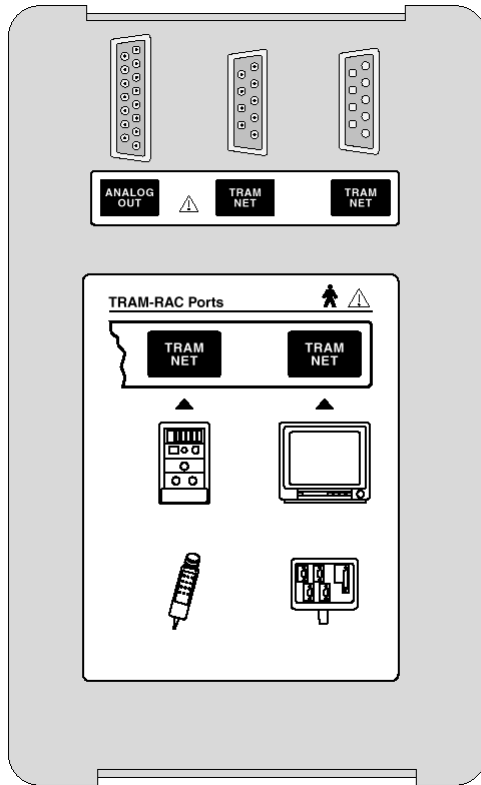
TRAM-RAC without Power Supply
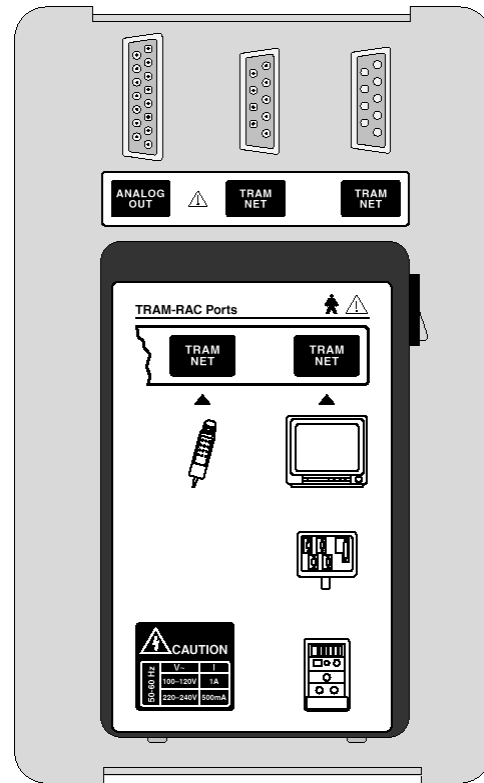
TRAM-RAC with Power Supply

Analog Output Connection

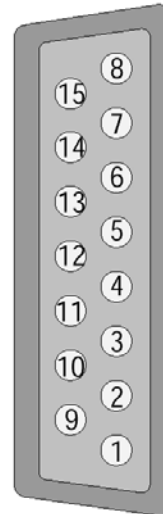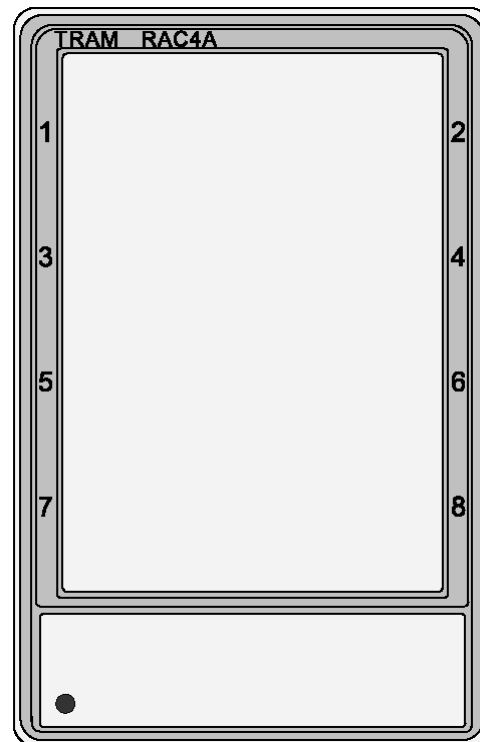The analog out connector is provided for customized uses for other peripheral devices. The yellow color-coded 15-pin connector provides an analog output waveform signal.

Note the parameter numbers indicated on the front of the TRAM-RAC 4A housing.

When a TRAM or discrete parameter module is inserted into the housing, the slot number of the parameter and its analog output waveform is available at a designated pin of the analog out connector. Refer to the list below

NOTE:
The TRAM module must be in the top slot in order to receive the TRAM signals listed below.

Table 1. Analog Output Signals		
Analog Output Pin	**Signal Name**	**Bezel Number For BP**
Pin 1	Signal Ground for TRAM Waveforms	–
Pin 2	Trace 1	TRAM[1]
Pin 3	TRAM BP3 or SPO$_2$ Value	TRAM[1]
Pin 4	Slot 1 Discrete Module Waveform A	1
Pin 5	TRAM ART 1 or BP1	TRAM
Pin 6	Slot 3 Discrete Module Waveform A	6
Pin 7	Slot 4 Discrete Module Waveform A	8
Pin 8	Signal Ground for Discrete Module Waveforms	
Pin 9	TRAM ECG II	TRAM[1]
Pin 10	TRAM ECG V	TRAM[1]
Pin 11	TRAM BP4 or RESP	TRAM[1]
Pin 12	Slot 1 Discrete Module Waveform B	2
Pin 13	TRAM BP2 or SPO$_2$ Waveform	TRAM
Pin 14	Slot 3 Discrete Module Waveform B	5
Pin 15	Slot 4 Discrete Module Waveform B	7

NOTE:
The superscript number 1 indicates that this signal remains unchanged after entering the TRAM-RAC 4A housing and is controlled by TRAM module software. All other signals are generated by the DAC (digital-to-analog converter) on the TRAM-RAC 4 interface PCB assembly.

Ordering Parts

Introduction

The parts lists and assembly drawings in this chapter supply enough detail for you to order parts for the assemblies that are considered field serviceable. If you require additional information, schematic diagrams, or troubleshooting assistance, contact technical support.

Orders for new installations should be made using the system Site Survey and Price List.

To order parts, contact Service Parts at the address or telephone number on the "How to Reach Us" insert provided at the beginning of this manual.

Part Number	Description	Quantity								
		Computer								
		2011646-								
		001	002	003	004	005	006	007	008	009
421572-028	Ethernet Cable	1	1	1	1	1	1	1	1	1
2003587-001	Muticonductor DB44 M-m 2.5ft cable	1	1	1	1	1		1	1	1
2003677-001	Vsynch HD DB15F to HD DB15M and PS2 Cable	1	1	1	1	1		1	1	1
2003339-001	Image Cable Accessories Kit			1	1					1
2003887-001	Optical Disk FAT 16FMT DRV3 MLAB 230MB V1A	1						1		
2011646-00X	Mac-Lab/CardioLab 1.0GB BCM Computer							1	1	1
2002886-003	Communications board	1	1	1	1	1		1	1	1
2003240-001	CABLE ASSY, 9PIN RIBBON W/2X5 TO DB9M	1	1	1	1	1		1	1	1
2003338-001	PSI SCSI Controller Card				1	1				
2011111-001	Speaker Jumper Harness for TRAM-net							1	1	1
2011129-001	-1FT Ethernet Patch Cable							1	1	1
2003888-001	Formatted Optical Disk 2.6 GB	1	1	1	1	1	1	1	1	1
		Workstations								
2002459-004	Monitor Cart - 32 inch 32w x 32.5h x 30d w/casters or feet	1								
2002459-001	Small Workstation - 32 inch 32w x 32.5h x 30d w/casters or feet	1								
2002459-002	Medium Workstation - 40 inch 40w x 32.5h x 30d w/casters or feet	1								
2002459-003	Large Workstation - 60 inch 60w x 32.5h x 30d w/ casters or feet	1								
		Printers								
2015205-001	4200 Printer	1								
2007078-001	2200 D Printer	1								
6119-101	12 ft. Parallel Printer Cable	1								
2003403-001	Printer Paper (A4 size)	1								
9242-101	Printer Paper (8 1/2 x 11)	1								
2004142-001	Digital Image Printer	1								

Part Number	Description	Quantity
2004192-001	Image Printer Parallel Switch Box	1
2004194-001	Digital Image Printer Paper (A6 size)	1
2004193-001	6′ Parallel Printer Cable	1
Monitors		
2000594-019	17″ CRT (Compaq U7550)	1
2012980-001	19″ CRT (Sony CPD-6420)	1
2010311-001	20″ CRT (Sony CPD-6520)	1
2013547-002	18″ LCD (NEC 1880SX)	1
2006144-001	20″ LCD (E120 L771) (Sharp LL-T2020 B)	
2003442-001	100 ft. DB15MHD-DB15MHD Video Cable	1
Hardware Options		
2007557-002	ASSY 16 Channel Analog out with Breakout Box	1
2003408-001	50 ft. RF Option Cable	1
2003250-001	50 ft. COAX BNC-BNC Cable	1
2003412-001	BNC-BNC Barrell Connector	1
2003250-001	Image Capture Cable	1
2007023-001	Scroll Mouse	1
422310-001	GE Mousepad	1
2003417-001	Barcode Scanner	1
2003236-001	Matrox G200 Video Card	1
2003243-001	Matrox Pulsar Image Card	1
2003340-001	5.25″ Internal Optical Disk Drive	1
2003341-001	3.5″ Internal Optical Disk Drive	1
2003245-001	RS422 TRAM Card	1
2009937-001	TRAM-net to Ethernet Card	1
2001323-001	External speakers for TRAMnet	1
2003238-001	SCSI Cable Assembly	1

Part Number	Description	Quantity
Compaq ML370 G1 Server		
2006397-001	3KVA Power Conditioner Rack Mountable	1
2002241-001	Modem Multitech Analog 56K Global 220V	1
2005992-001	Memory DIMM SDRAM PC133 128MB ECC ML370 G1	1
2005992-002	Memory DIMM SDRAM PC133 256MB ECC ML370 G1	1
2005165-001	Smart Array Controller MOD Kit Option	1
2002664-005	HD HOT PLUG 36.4 GB WIDE ULTRA3 SCSI	1
2002664-006	HD HOT PLUG 18.2 GB WIDE SCSI	1
413627-005	Tape Drive DAT DDS3 GRAY	1
413629-001	Mounting Kit DDS-2 DAT	1
421572-012	Keyboard with Trackball	1
451572-0281	Ethernet Cable	1
419248-001	Cross over Cable	1
2004072-001	Modem Cable	1
Rack		
2005993-001	Compaq ML370 G1 Rack Server	1
Network Switch		
2001084-002	10/100 Network Switch	1
Isolation Transformer		
2004195-001	Isolation Transformer 600 VA	1
Compaq ML370 G2 Server		
2008887-001	Compaq ML370 G2 Rack Server	1
2005992-006	Memory DIMM SDRAM PCI33 256 MB	1
2005165-002	Smart Array SI Controller ML370 G2	1
2002664-005	HD HOT PLUG 36.4 GB WIDE ULTRA3 SCSI	1
2002664-006	HD HOT PLUG 18.2 GB WIDE SCSI	1
413627-005	Tape Drive DAT DDS3 GRAY	1
421572-012	Keyboard with Trackball	1
2002241-001	Modem Multitech Analog 56K Global 220V	1
2004072-001	Modem Cable	1
2006397-001	3KVA Power Conditioner Rack Mountable	1

Part Number	Description	Quantity
2001084-002	10/100 Network Switch	1
451572-0281	Ethernet Cable	1
419248-001	Cross over Cable	1

A Appendix A – Technical Specifications

For your notes

Specifications

Special Instructions for Using Equipment

The remote monitor is powered through a separate isolation transformer, which is independently connected to a wall outlet to maintain leakage currents at medical grade levels. The laser printer is powered through the IEB/Workstation power supply.

Table 1. Electrical Specifications	
Item	**Description**
Equipment Class	Class I
Degree of Protection Against Ingress of Water	Ordinary
Mode of Operation	Continuous
Power	
Frequency	50/60 Hz
Maximum Current Draw	9.6/4.8 Amps at 115 Volts; 4.8 Amps at 230 Volts (945 Kcal/hr)
Chassis Leakage Current	< 100 µA
Maximum Cumulative Load for AC Distribution Subsystem	1100VA
Fuse	
Thermal Writer	3.15A, fast blow 5 x 20 mm
Specified ECG signal amplitude accuracy	+/-5%
Specified ECG time base accuracy	+/-5%

Table 2. Equipment Type	
Item	**Description**
CardioLab/Mac/Lab System Console	Type B
CardioLab II Plus Amplifier	Class I, Type CF
Display Monitors	Type B
Tram Module Surface ECG	Defibrillator-proof Type CF
Tram Module Internal ECG	Defibrillator-proof Type CF
Tram Module Noninvasive Blood Pressure	Defibrillator-proof Type CF
Tram Module Invasive Blood Pressure	Defibrillator-proof Type CF
Tram Module Temperature/Cardiac Output	Defibrillator-proof Type CF
Tram Module Oxygen Saturation	Type B or defibrillator-proof Type BF

Table 3. Thermal Writer	
Technology	Instant load thermal array printer. User selectable: A4 and STD (8.5x11) paper
Paper Type	Thermal, perforated, fan fold, 300 sheets per pack
Paper Size	A size 215 mm (8.5 in) x 280 mm(11 in) A4 size 210 mm (8.27 in) x 297.5 mm (11.7 in)
Resolution	200 dpi (vertical) x 1000 lines/sec; (horizontal) dedicated local printing 200 x 200 dpi generic printing
Channels	3, 6, or 12 channels
Frequency Response (-3 dB point)	HPF: 0.01 (or 0.05 Hz.) LPF: 150, 100, 40, or 20 Hz. User Selectable
Line Filter	50.0 or 60.0 Hz Notch filter. User Selectable.
Baseline Roll Filter	Cubic Spline
Noise/Artifact filter	Finite Residual Filter (FRF)
Sensitivity	2.5, 5, 10, or 20 mm/mV (+/- 5%). User selectable.
Speeds	5, 12.5, 25, and 50 mm/sec (+/- 2%). User selectable.

Table 4. Display Monitors (Real-Time, Review, Local or Remote)	
Item	**Description**
Quantity	Real-Time - up to 2 Review - up to 2 Image - up to 2 Switched Video - 1
Size	17-inch 18-inch 19-inch 20-inch 21-inch
Type	1280 x 1024 for 17″ & 18″ 1600 x 1280 for 19″, 20″, & 21″
Sweep speed	5 - 400 mm/s (Real-Time monitor) 5 - 1600 mm/s (Review monitor)
Sweep Speed Accuracy	10%
Frequency Response	0 to 40 Hz

Table 5. Safety	
Item	**Description**
Handling of Disposable Supplies and Other Consumables	Use only parts and accessories manufactured or recommended by GE. Follow manufacturer's instructions for use for disposable/ consumable product. Follow local environmental guidelines concerning the disposal of hazardous materials.
Maintenance Frequency	Recommended user daily visual inspection and cleaning as necessary. Recommended monthly and annual maintenance by qualified technical personnel. See maintenance section of this manual for details.
Repair Guidelines	Calibration instructions, equipment descriptions, and all other service information to repair those parts of the equipment designated as field repairable by qualified technical personnel is available in the MAC-LAB system for Cardiac Catheterization Service manual. Upon request, GE will provide circuit diagrams and component parts lists for printed circuit boards deemed repairable by qualified technical personnel.

Environmental

Table 6. Transport and Storage Conditions	
Item	**Description**
Temperature	-40^0 C to +60^0 C
Relative Humidity	10% to 100% non-condensing
Pressure	500 hPA (mbar) to 1060 hPA (mbar)

Table 7. Operating Conditions	
Item	**Description**
Temperature	+15^0 C to +30^0 C
Relative Humidity	95% non-condensing
Pressure	700 hPA to 1060 hPA

Classifications/Standards

■ Classified by Underwriters Laboratories, Inc., with respect to electric shock, fire and mechanical hazards only in accordance with
 UL 2601-1

■ Meets or exceeds CAN/CSA C22.2 No 601-1-M90
■ Meets or exceeds IEC 601-1
■ Meets or exceeds Japanese Safety and Performance Standards
■ European Union Medical Device Directive (CE Mark)

NOTE:

For detailed information about the TRAM modules, see the TRAM 100-850 A and SL Service Manual (p/n 404422-065).

NOTE:

hPa is a measure of atmospheric pressure. One hPa (hectopascal) is equivalent to one millibar. At sea level the standard atmospheric pressure is 1013.25 hPa or millibars, and is equal to 29.92 inches or 760 mmHg (millimeters of Mercury).

Table 8. Equipment Type				
Equipment Type	**Height/Length**	**Width**	**Depth**	**Weight**
TRAM (all models)	3.2 inches 8.1 cm	4.5 inches 11.4 cm	11.6 inches 29.5 cm Need 5″ (12.7 cm) front clearance for cables	4.7 lbs 2.1 kg
CardioLab II Plus Amplifier 32/64 channel 96/128 channel	9.5 inches 14.0 inches	14.0 inches 14.0 inches	14.0 inches 14.0 inches	22 lbs 25 lbs
CPU	18.9/47.3 in/cm	8.3/20.8 lbs/kg	18/45 in/cm	43/20 in/cm
IEB	24.5/61.3 in/cm	11/27.5 lbs/kg	21/53 in/cm	75/34 in/cm

Table 9. Remote Acquisition Unit (RAU)	
Item	**Description**
RAU Cabinet	Accommodates one or two TRAM modules With Table Mount or Floor Mount

Table 10. Processing	
Item	**Description**
ECG	12-lead with ST analysis (Mac-Lab only)
Respiration	Impedance method (1 — 200 breaths per minute range)
Cardiac Output	Thermal Dilution, Calculated, and Estimated Fick (Mac-Lab only)
Invasive Pressure	4 channels with means (-98 to 350 mmHg range)
Non-invasive Pressure	Automatic and Manual modes (Oscillometric)
Pulse Oximetry	Saturation range 0 — 100% (accuracy 90 — 100%; ±1.5%)
IECG	8 channels, 16 inputs (6000 Hz per channel) (CardioLab only) 32 channel (Clab II Plus), 16 channels, 32 inputs (1000Hz per channel) 64 channel (Clab II Plus), 48 channels, 96 inputs (1000Hz per channel)

Table 11. Analog Output Cable for TRAMs (Defib Sync Cable)				
The Analog Output cable interfaces to the 6-pin LEMO connector on the front panel of the 200, 500, and 600 TRAM modules. The cable is 15' long and is terminated for the TRAM connection only.				
Pin No.	**Wire Color**	**Signal Name**	**INput OUTput**	**Volts/Units**
1	White	Software Selectable	OUT	1V/mV
2	Black	Signal Ground		
3	Red	Digital Sync Pulse (Factory Set)	OUT	
4	Green	Return Marker Pulse In	IN	
5	Yellow	Analog Ground		

Table 12. Analog Input Cable for TRAMs (External Analog Signal)				
The Analog Input cable is designed to interface an external analog signal to one of the BP inputs on the TRAM module. This enables the MAC-LAB system to display that signal on the BP channel to which it is connected. The cable is 15' long and is terminated for the TAM connection only.				
Pin No.	**Wire Color**	**Signal Name**	**INput OUTput**	**Volts/Units**
1	Red	Analog Signal	IN	1 V/100 mmHg
2	Black	Signal Ground		

Table 13. Analog Output Connector J4 (RAU)	
Pin No.	**Sign Al**
1	MOD B BP 4
2	MOD B BP 2
3	GND
4	GND
5	GND
6	GND
7	GND
8	GND
9	GND
10	MOD B ART BP
11	MOD B RESP/ECGV
Table 14. Analog Output Connector J4 (RAU)	
Pin No.	**Sign Al**
12	MOD B TRC2/ECG1
13	MOD B TRC1/ECG2
14	MOD B SYNC ECG
15	MOD A RESP
16	MOD A BP 3
17	MOD A BP 2
18	MOD A ART BP
19	MOD A RESP/ECGV
20	MOD A ECG V1
21	MOD A ECG Lead II
22	MOD A ECG Lead II
23	B SYNCECGRTN
24	MOD A ECG Lead II
25	MOD B BP 3

Table 15. CardioLink Archive Waveform ML370 G2 Server			
Hardware Option	Low-End 2006433-003	Mid-End 2006433-002	High-End 2006433-001
Processor	933 MHz	933 MHz	933 MHz
Memory	256 MB	512 MB	512 MB
Added Controller	N/A	Integrated Smart Array	Integrated Smart Array
RAID	N/A	RAID 5	RAID 5
Storage Capacity	One 18.2 GB Hot Pluggable Ultra 3 SCSI	Three 36.4 GB Hot Pluggable Ultra 3 SCSI	Six 36.4 GB Hot Pluggable Ultra 3 SCSI
Tape Drive	12/24GB DDS-s DAT Drive	12/24GB DDS-s DAT Drive	12/24GB DDS-s DAT Drive
CD-ROM	High Speed IDE CD-ROM	High Speed IDE CD-ROM	High Speed IDE CD-ROM

Table 16. CardioLink Archive Waveform ML370 G3 Server			
Hardware Option	Low-End 2016992-003	Mid-End 2016992-002	High-End 2016992-001
Processor	2.8GHz Xeon	2.8GHz Xeon	2.8GHz Xeon
Memory	1GB / 200MHz	1GB / 200MHz	1GB / 200MHz
Added Controller	Smart Array 641	Smart Array 641	Smart Array 641
RAID	RAID 0	RAID 5	RAID 5
Storage Capacity	One 72 GB Hot Pluggable Ultra 3 SCSI	Three 146 GB Hot Pluggable Ultra 3 SCSI	Six 146 GB Hot Pluggable Ultra 3 SCSI
Tape Drive	AIT2 Drive (50/100 GB)	AIT3 Drive (100/200 GB)	AIT3 Drive (100/200 GB)
CD-ROM	High Speed IDE CD-ROM	High Speed IDE CD-ROM	High Speed IDE CD-ROM
Remote System Support	56K modem or VPN	56K modem or VPN	56K modem or VPN

Table 17. SCSI Drive Locations			
SCSI ID and Bay location.	2006433-001	2006433-002	2006433-003
SCSI ID 0 (this is the bottom bay in the Drive array cage)	36.4 GB hot swappable drive.	36.4 GB hot swappable drive.	18.2 GB hot swappable drive.
SCSI ID 1	36.4 GB hot swappable drive.	36.4 GB hot swappable drive	

SCSI ID 2	36.4 GB hot swappable drive.	36.4 GB hot swappable drive	
SCSI ID 3	36.4 GB hot swappable drive		
SCSI ID 4	36.4 GB hot swappable drive		
SCSI ID 5	36.4 GB hot swappable drive.		

CardioLink Server G1

Table 18. CardioLink Server	
CardioLink Server	
Dimensions	
Height	8.67 in. / 22.02 cm
Depth	22.75 in / 57.78 cm
Width	19.0 in / 48.26 cm
Weight	
No drives installed	50.0 lb / 22.68 kg
Input Requirements	
Rated input voltage	100 to 240 VAC
Rated input frequency	50 to 60 Hz
Rated input current	6A (110V) to 3A (220V)
Rated input power	550W
BTUs per hour	1880
Power Supply Output Power	
Rated steady-state power	325W
Maximum peak power	350 W
Temperature Range	
Operating	50°F to 95°F / 10°C to 35° C
Shipping	-22°F to 122°F / -30°C to 50°C
Relative Humidity (noncondensing)	
Operating	8% to 90%
Nonoperating	5% to 95%
Wet Bulb Temperature	
Maximum	101.7°F / 38.7°C
Connector Interfaces	
Integrated Dual Channel Wide Ultra2 SCSI Controller on Port 1 (internal and external) and Port 2 (internal only)	
Hot-plug keyboard	
Mouse	
Serial 2	
Parallel	
IDE Interface for CD-ROM drive	

Table 18. CardioLink Server (Continued)	
NC31163 Fast Ethernet NIC Embedded 10/100 WOL with RJ-45 Interface	
Video	
Operating Voltage Settings (Low-Voltage Models)	120V (User selectable for 100, 110, 120, 127 V via front panel)
Power Out (VA/Watts)	2880 / 2700
Input Connection	NEMA L5-30P
Output Connection	(1)L5-30R; (6)5-15R
UPS R3000 XR	
Unit Dimensions	3.50 x 19.0 x 24.5in / 89 x 483 x 622 mm
Shipping Dimensions	14 x 32 x 38.5 in / 356 x 813 x 978 mm
Unit Weight	82 lb / 37 kg
Shipping Weight:	105 lb / 48 kg
Electrical. Input	
Voltage Range	100, 110, 120, and 127V selectable via front panel
Frequency	50/60 Hz
Online Efficiency	96%
Surge Suppression	High Energy 6500A peak
REPO:	Remote Emergency Power-Off disables AC power to load
Electrical Output	
Online Regulation	-10% to +6% of nominal voltage
On battery Regulation	$\pm$5% of nominal voltage
Voltage Wave Form	Sine wave
Output Protection	Re-set table circuit protectors
Environmental and Safety	
Operating Temperature	50× F to 104× F / 10× C to 40× C
Transit Temperature	-13× F to 131× F / -25× C to 55× C
Storage Temperature	32× F to 77× F / 0× C to 25× C
Humidity (Operation)	20% to 80% (non-condensing)
Humidity (Non-Operating)	5% to 95%
Operating Altitude	Up to 6,562 ft / 2000 m above sea level
Transit Altitude	49,212 ft / 15,000 m above sea level
Safety Markings	FCS, UL, CSA, VDE, NEMKO, FIMKO, DEMKO, SEMKO, NOM
Safety Certifications	UL1778; CSA22.2 No.107.1, No.107.2, No.950; CB Bulletin No.86AI; EN50091-1; EN60950; EMKO-TSE207/95; NOM-019-SCFI-1993
EMC Markings	FCC; CISPR; VCCI; CE

Table 18. CardioLink Server (Continued)	
Emissions	FCC CFR 47, Part 15 Class A, EN50091-2
Immunity	IEC 801-2, IEC 801-3, IEC 801-4, IEC 801-5
Surge Suppression	Conforms to IEEE 587B and ANSI C62.41
REPO Port	Meets NEC code 645-11 intent and UL requirements
Network Switch	2001084-001
Eight 10/100 Base-Tx Autosensing Ports	
Auto-Negotiating Full and Half Duplex	
Store-and Forward Switching	
Connectors	8 RJ-45 Ports ((MDI/MDUX Selectable on Prot 8)
Dimensions	
Width	220 mm (8.7 in.
Height	54.6 mm (2.1 in.)
Depth	185.4 mm (7.3 in)
Power	16.6 VA
Standards	
Functional/EMC	ISO 8802; IEEE 802.3; EMC; EN 55022-1;FCC PART 15 CLASS B; ICES-003 CLASS B; CSA C108.8 CLASS B; VCCI CLASS B; AS/NZS 3548 CLASS B
Safety	UL 1950; 60950 CSA 22.2 #950

Rack for CardioLink Server

Table 19. Rack for CardioLink Server	
Dimensions (H x D x W)	
Total Cabinet Area	49.5 x 33.25 x 23.25 in / 1257.3 x 844.55 x 590.55 mm
Shipping	56.63 x 48 x 32 in / 1438.4 x 1219.2 x 812 mm
Weight	
Operating	176 lb / 79.89 kg
Shipping	225 lb / 102.13 kg
Color	
Opal	Beach Gray

CardioLink Server G2

System Specifications

The CardioLink rack-mount server is a Compaq ProLiant ML370 Generation 2 (G2) server.

ProcessorsTwo 1.26 GHz

Item	Description
Processors	Two 1.26 GHz
System Memory	2 GB
Expansion Slots	Eight I/O expansion slots
Media Bays	IDE CD-ROM drive 3 1/2″, 1.44 MB diskette drive DLT Tape Drive
Keyboard	The keyboard connector is hot-pluggable. Any standard keyboard can be plugged in without powering down the system or causing keyboard errors.
Mouse	The keyboard uses an integral trackball that is plugged into the standard mouse port on the rear of the CPU.
Video	Integrated ATI Rage XL PCI Video Controller with 8MB
High-Availability Features	Hot-Plug Redundant Power supplies Redundant fans RAID support with Smart Array Family controllers
System Management	Integrated Management Log (IML) provides a detailed log of key system events. This log is accessible through Compaq Insight Manager.
Fans	Three redundant hot-swappable fans.
Power Supply	Redundant power supply: 500-W at 110V, 700-W at 220V

Additional information, updates and the most current information on Compaq hardware is available at http://www.compaq.com.

Compaq Server Standard Features (Rack)	
Feature	**Specification**
Model Number	Compaq Proliant ML370 Generation 2 (G2)
System Memory	2 GB
Hard drive capacity	■ 100 GB Tower / 300GB Rack ■ 300 GB (11 x 36.4 RAID 5 with Hot Spare)
Processor	1.26 GHz
Cache Memory	512 KB second level ECC cache (full speed)
Video/Graphics	Integrated ATI Rage XL Video Controller with 8mb SDRAM Video memory
Network Controller	(2) Compaq NC 3123 Fast Ethernet NIC
Diskette Drive	1.44 MB
CD ROM	40x IDE
Power supply	500 Watt Redundant Dual
Interfaces	Parallel 1, Serial 2, Pointing Device (Mouse) 1, Graphics 1, Keyboard 1, External SCSI (for tape only) 1, Network RJ-45 2, USB Ports 2
Tape Drive	DLT, DDS-3
Storage Controller	Integrated Dual Channel Wide Ultra3 SCSI Adapter and Compaq Smart Array 5i Controller Option Kit.

Rack Server Specifications		
Feature	**Metric Units**	**English Units**
Dimensions		
Height	22.07 cm	8.69 in
Depth	65.41 cm	25.75 in
Width	48.26	19.0
Weight		
No drives installed	23.05 kg	50.8 lb
Power supply input		
Rated input voltage		90 to 264 VAC
Rated input frequency		47 to 63 Hz
Rated input current		7.3 A (110v) / 3.6 A (220v)
Rated input power		800W
BTU's per hour		2732
Power supply output		
Rated steady-state power		500 W
Maximum peak power		550 W for up to two minutes
Rated output voltages		+5., +3.3, +12 (VDC)
Rated auxiliary voltage		+5 VDC
Temperature range		
Operating	5 to 35 degrees C	41 to 95 degrees F
Shipping	-40 to 50 degrees C	-40 to 185 degrees F
Relative humidity (noncondensing)		
Operating	5% to 95%	5% to 95%
Non-operating	5% to 95%	5% to 95%
Maximum wet bulb temperature	38.7 degrees C	101.7 degrees F

LaserJet 4200 Printer

Table 20. HP LaserJet 4200 Printer	
GEMMS PN	2015205-001
Manufacturer/Model	Hewlett Packard / Q2425A
Description	HP Laserjet 4200 Printer, 48 MB RAM PostScript Level 2, HP PCL 6, 120V Included: Toner cartridge, 500-sheet paper tray, power cord, drivers, and documentation.
Speed	17 pages per minute (ppm) 133 MHz RISC microprocessor First page out = 15 seconds "RIP ONCE" capability with 16 MB or hard disk option.
Resolution	600 dpi Level 2 emulation (PS) HP FastRes 1200 (PCL6, PS) HP ProRes 1200 at engine speed (17 ppm) (PCL6, PS)
Typefaces	100 Scalable TrueType (80 built-in, 30 via HP FontSmart) Euro symbol
Memory Options	48 MB RAM standard
Optional Memory	4, 8, 16, MB EDO DIMMs 4, 8, 16, 32, 64 MB SDRAM DIMM
Mass Storage Options	2 and 4 MB Flash DIMMs Greater than 1GB hard disk
Expansion Slots	3 100-pin DIMM slots 2 enhanced I/O (EIO) slots
Interface	Bidirectional IEEE 1284-compliant parallel RS232 9-pin serial Paper Handling Connector (PHC)
Optional Networking	10Base-T and 10Base-2 100Base-TX Token Ring LocalTalk
Paper Trays	100-sheet Tray 1 Size: 76 x 127 mm to 2 16 x 356 mm (3 x 5 inches to legal) 500-sheet Tray 2,3 Size: letter, legal, A4
Paper Path	Straight through from Tray 1 to Rear Output Bin or to Top Output Bin
Output Capacity	250-sheet Top Output Bin 50-sheet Rear Output Bin
Paper Handling Options	Duplexer, Envelope Feeder, Optional 500-sheet Universal Tray Assembly

Table 20. HP LaserJet 4200 Printer (Continued)	
Physical Specifications	
Height	366 mm (14.4 inches)
Width	412 mm (16.4 inches)
Depth	439 mm (17.3 inches)
Depth (trays/rear output bin open)	100.76 cm (39.67 inches) 100.76 cm (39.67 inches)
Weight (without toner cartridge)	20 kg (45 lb)
Electrical specifications	

Printer State
    Printing
    Standby
    PowerSave (default activation
    time, 30 minutes)
    Off
	Power Consumption (average, in watts)
	    580 watts
	    <27 watts
	
	    <25 watts

Minimum recommended circuit capacity	

Voltage
    100-127 Volts
    220-240 Volts
	Amps
	    8 amps
	    4 amps

Power requirements (acceptable line voltage)	100-127 Volts; (±10% 50-60 Hz, (+/-2 Hz)
Environmental specifications	

Condition
    Operating Temperature
 	
    Relative Humidity
	Specification
	    10 to 32 degrees C (50 to 91 degrees F)
	
	    20% to 80% RH

Acoustic emissions (per ISO 9296)	

Condition
 	
    Printing, 35 ppm
    PowerSave
	Specification
	
	    Lwad = 6.8 bels (A)
	    Lwad = 4.0 bels (A)

Safety certifications	
Safety	CSA, UL, NOM-1-NYCE, FCC Part 15B Class B, Canada

Table 20. HP LaserJet 4200 Printer (Continued)	
EMC	CISPR 22:1993+A1 / EN 55022:1994 Class B (1) EN 50082-1:1992 4 kV CD, 8 kV IEC 801-2:1991 / prEN AD 55024-2:1992 - 4 V/m IEC 801-3:1984 / prEN 0.5 kV Signal 55024-3:1991 - Lines IEC 801-4:1988 / prEN 1.0 kV Power 55024-4:1992 - Lines IEC 1000-3-2:1995 / EN61000-3-2:1995 IEC 1000-3-3:1994 / EN61000-3.3:1995 FCC Title 47 CFR, Part 15 Class B (2)) / ICES-003, Issue 2 / VCCI-2 (1)) AS / NZS 3548:1992 / CISPR 22:1993 Class B (1))
Supplementary Information:	The product herewith complies with the requirements of the following Directives and carries the CE-marking accordingly: the EMC directive 89/336/EEC the Low-Voltage Directive 73/23/EEC [1] The product was tested in a typical configuration with Hewlett-Packard Personal Computer Systems. [2] This Device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: This device may not cause harmful interference, and this device must accept any interference received, including interference that may cause undesired operation.

HP 2200 D

Table 21. HP LaserJet 2200 D Printer	
GEMMS PN	2007078-001
Manufacturer/Model	Hewlett Packard 2200 D
Speed	19 pages per minute (ppm) 133 MHz RISC microprocessor First page out = 15 seconds
Resolution	1200 x 1200 dpi
Memory Options	8 MB standard; expansion available up to 64 MB
Media Handling and Weights	Tray 1: up to 100 sheets Tray 2 up to 250-sheets
Interface	1 bi-directional parallel port (IEEE 1284 ECP-compliant, B-size); 1 fast infrared port (IrDA compliant); 1 LocalTalk port of r Macintosh and 1 Enhanced Input Output) EIO) slot; HP JetSend enabled (Ir and EIO only)
Physical Specifications	
Width and Depth	16 x 10 x 17.1 in. (405 x 255 x 435 mm)
Power	100/127 V; AC 50/60 Hz
Weight	29 lb (14 kg)

Table 22. IEB Dimensions	
Dimensions: Power	100 V, 50/60 Hz; 120 V, 50/60 Hz; 240 V, 50/60 Hz
Height	24.5 in
Width	11 in
Depth	21 in

Table 23. CPU Dimensions	
Dimensions: Power	Auto Switching:100-120 4.6A, 60 Hz; 200-240 2.3A, 50 Hz
Height	19 in
Width	8.5 in
Depth	18 in

B   Appendix B – CardioLink Server Rename

For your notes

Purpose

The purpose of this procedure is to enable **CardioLink trained service personal** to be able to successfully change the computer machine name of a CardioLink server. There are two sections: The first are instructions on changing a server name that has not yet been installed and is still at the manufactured base image. The second are instructions for changing the name of a server that has had CardioLink software installed, or has been in replication. **Please use the appropriate sections when doing the conversion**.

CAUTION
An Administrator MUST run the server rename procedure. Failure to do so will cause the server rename to FAIL because the user may not have enough privileges.

Special Notes

1. Applying this kit will alter the current CardioLink disaster recovery process. If for any reason the server is re-imaged to the production base server image in the event of a recovery, then the server computer name will be set back to CLINK_2. In these cases, this kit must be reapplied to the server with the exact server computer name that was used prior to the re-image of the server and before any other software or database restores are reinstalled onto the server.

2. For version 1.1D ONLY, once this kit has been applied to an existing CardioLink 1.1C environment, the rename utility CD must be re-run on the server after that environment is updated to CardioLink 1.1D. This is in order to correct the system files to the current server name that were installed with the CardioLink 1.1D update. Again, this action is to only update the system files, not to change the server name again.

NOTE
If any user errors are reported while running the server rename utility and the utility exits uncompleted, then the server computer name must be re-named back to the previous computer name and the server rename utility must be re-run to correct the system state. Then the server must be named to the desired name and the server rename utility must be run once more.

Equipment needed

- For version 1.1D
  - ◆ Rename Server Utility CD (PN: 2012484-001)
- For version 5.2
  - ◆ CardioLink CD (PN: 2015223-001)

Reference documentation:

- ◆ Centricity CardioLink Installation/Upgrade Instructions
- ◆ Centricity CardioLink Operator's Manual

Customer Notification

During this conversion procedure, the CardioLink server will be renamed and will require that replication be stopped and all clients moved into stand alone mode for a short period of time. After conversion, it is extremely important that all clients be properly redirected to the new server name to prevent possible patient data loss.

New Server Install

NOTE
Please follow these steps carefully and precisely.

After the server hardware has been installed and setup, perform the following steps to rename the server before installing any other software.

1. Verify that the server is at the base image by checking that the D: drive has no gemms or program files folder.

2. At the CardioLink server using the network applet in the control panel, select the *Change* button and change the CardioLink server computer name to the new name.

3. Select *OK* in the identification window. Select *OK* in the information window, then select *Close.* Select *Yes* to restart the computer. Allow the system to reboot and logon as an administrator.

   NOTE:
   See system administrator for login information

4. Using the CD, run setup to reinstall SQL 7.0 and correct the master database server name. Use the following steps:

For version 1.1D:

   a. Insert the Rename Server Utility CD.

   b. Run *E:\setup.exe.*

   c. Select *Next* at the welcome window.

   d. Verify that the radio button for *Rename Server (Reinstall SQL)* is selected, then select *Next*.

   e. Verify that setup has detected the new server name correctly and then select *Yes* to confirm.

   f. Setup will begin file copy, reinstall SQL 7.0, and correct the master database server.

   g. Setup will display an Information dialog box indicating that *This utility must be re-run after the CardioLink application has been installed*. Select *OK*.

      NOTE:
      This process may take 5 to 10 minutes.

   h. Once this step completes, select *Yes, I want to restart my computer now*. Select *Finish t*o restart the server. Logon as an **Administrator**.

      NOTE:
      See system administrator for login information

For version 5.2:

   a. Insert the CardioLink CD.

   b. Run *E:\Server Rename Install\setup.exe.*

   c. Select *Next* at the welcome window.

   d. Verify that the radio button for *Rename Server (Reinstall SQL)* is selected, then select *Next*.

   e. Verify that setup has detected the new server name correctly and then select *Yes* to confirm.

   f. Setup will begin file copy, reinstall SQL 7.0, and correct the master database server.

g. Setup will display an Information dialog box indicating that *This utility must be re-run after the CardioLink application has been installed*. Select *OK*.

NOTE:
This process may take 5 to 10 minutes.

h. Once this step completes, select *Yes, I want to restart my computer now*. Select *Finish t*o restart the server. Logon as an administrator.

NOTE:
See system administrator for login information

5. Launch Enterprise manager under *Start > Programs > Microsoft SQL server 7.0* and verify that the new CardioLink server computer name is registered and working denoted by a green arrow. Also verify that there is no registration for CLINK_2. If the new name does not appear and there remains a registration for CLINK_2, then perform the following steps:

a. Under the SQL Server Group, right click on the entry for CLINK_2 and select *Delete SQL Server Registration*. Select *Yes* to confirm.

b. Right click on SQL Server Group and select *New SQL Server Registration.*

c. Select *Next* at the next window.

d. From the available server window, select the new name of the CardioLink server and select *Add*. Select *Next*.

e. Verify that the *Windows NT account information* radio button is selected, then select *Next.*

f. Verify that the *add to existing group* radio button is selected, then select *Next.*

g. Select *Finish* and verify that the new CardioLink server name is registered successfully.

6. Using the network applet under control panel, correct the SNMP traps to the new server name. Use the following steps:

a. In the *Network* window, select the *Services* tab.

b. Select on *SNMP* service, then select *Properties*.

c. In the *SNMP Properties* window, select the *Traps* tab.

d. Under the *Trap Destination* window, remove the entry for *CLINK_2*.

e. Select *Add* and enter the new name of the CardioLink server. Select *Add.*

f. Select *OK* on *SNMP Properties* window.

g. Select *Close* on the *Network* window.

7. Correct Insight manager's console to monitor the new name of the CardioLink server and remove the old device name for CLINK_2. Use the following steps:

a. Open Insight manager by selecting *Start > Programs > Compaq Insight Manager > Compaq Insight Manager*.

b. From the top pull down menus, select *Setup > Device List*.

c. In the *Responsible Device* list, highlight the entry for *CLINK_2* then select *Remove*.

d. Select the *IP Device List* button.

e. Select the *New* button.

f. Enter into the *Device name* field the new name of the CardioLink server. Check the box for *WINS/DNS IP Address Resolution* and then select the *Add* button. Select *Close*.

g. In the *IP Device list* window, highlight the entry for *CLINK_2* and then select *Remove*. Select *OK*.

h. In the *List all Devices* list, highlight the entry for *CLINK_2* then select *Delete.* Select *Yes*.

i. If the new server name is not already in the *Responsible Device List*, select on the new name of the server from the *List of All Devices* window, and select *Add*. Confirm that the *Responsible Device List* shows the new CardioLink server name.

j. Select *OK.*

k. Verify that in the *Device List 1* window, the new CardioLink server is shown and has a green status.

8. After the rename process has been run, reboot server and proceed with the CardioLink installations as currently documented in the CardioLink installation manual and then perform the following steps:

a. After the CardioLink application has been installed on the server, the server rename utility CD must be re-run on the server in order to correct the system files to the current server name that were installed by CardioLink. Verify that when the rename utility is re-run, an information dialog box displays *Update of the backup scripts is now set to the current server name* and a message that *This utility is now complete.*

NOTE:

This step is just to rerun the server rename utility to update system files and **NOT** to change the server name.

b. After the CardioLink application has been installed, edit the *timeserv.ini* file in the C:\WinNT directory with the following steps on the server and all acquisition and review systems.

c. Edit the PrimarySource = value to \\ <CardioLink Server Name>.

d. Select *Start > Run*, and type in **timeserv -update**.

e. Select *Start > Run*, and type in **timeserv -automatic**.

f. Reboot all machines to commit timeserv changes.

NOTE

Please complete the attached "CardioLink Server Rename Record" on page B-15 and fax to Technical Support for their records (561-575-5055).

9. Proceed to "System Functional Checkout Procedure" on page B-14.

Re-name Installed Server

NOTE
Please follow these steps carefully and precisely. Mistakes may cause loss of customer data.

1. Please write down the current server name:_____.

2. Run the Archive Generator manually *D:\gems\Prucka\network\ag.exe* on all acquisition machines to move all studies to the server. Verify that it ran successfully and that all client system catalogs are clear of any studies.

3. Perform a full backup of the database and patient study directory as described on the CardioLink operators manual. Refer to the weekly backup section.

   WARNING
   The following step 4 must be run prior to launching the rename utility.

4. Disable replication on the server as described in the CardioLink Installation/Upgrade Instructions.

5. Run on all acquisition clients the following two files in order.

   a. *D:\gemms\Prucka\network\stoprepl.bat*.

   b. *CD Rom\Gems_Replicationcheck.bat* (found on Rename Server Utility CD.)

   c. Be sure confirmation that it is ok to proceed is received after running this check.

6. Move all client machines (acquisition and review) to stand-alone by un-checking *Enable network storage* under *Administration > System Settings > File Paths*. Then place them at the NT desktop.

7. On the server, run the file *GEMS_replicationcheck.bat* from the utility CD and verify that it displays a message that *The replication check has passed. It is OK to proceed.*

8. At the CardioLink server using the network applet in the control panel, select the *Change* button and change the CardioLink server computer name to the new name.

9. Please record new server name:_____.

10. Select *OK* in identification window. Select *OK* in the information window, then select *Close.* Select *Yes* to restart the computer. Allow the system to reboot and logon as an administrator.

    NOTE:
    See system administrator for login information.

    NOTE
    You will see a message on reboot *Your SQL Server installation is either corrupt or has been tampered with, (unknown package ID). Please rerun setup.* Click *OK.*

11. Using the appropriate CD, run setup to reinstall SQL 7.0 correct the master database server name and clab database location pointers. Use the following setup.

For version 1.1D

a. Insert the Rename Server Utility CD.

b. Run *E:\setup.exe.*

c. Select *Next* at the welcome window.

d. Verify that the radio button for *Rename Server (Reinstall SQL)* is selected, then select *Next*.

e. Verify that setup has detected the new server name correctly and then select *Yes* to confirm.

f. Setup will begin file copy, reinstall SQL 7.0, and correct the master database server and clab database location pointers.

   NOTE:
   This process may take 5 to 10 minutes.

g. Setup will display an information dialog box indicating that backup scripts were set to the new server name and the utility must be rerun on this server if the CardioLink application is later updated.

h. Once this step completes, select *Yes, I want to restart my computer now*. Select *Finish t*o restart the server. Logon as **Administrator**.

For version 5.2

a. Insert the CardioLink CD.

b. Run *E:\Server Rename Install\setup.exe.*

c. Select *Next* at the welcome window.

d. Verify that the radio button for *Rename Server (Reinstall SQL)* is selected, then select *Next*.

e. Verify that setup has detected the new server name correctly and then select *Yes* to confirm.

f. Setup will begin file copy, reinstall SQL 7.0, and correct the master database server and clab database location pointers.

   NOTE:
   This process may take 5 to 10 minutes.

g. Setup will display an information dialog box indicating that backup scripts were set to the new server name and the utility must be rerun on this server if the CardioLink application is later updated.

h. Once this step completes, select *Yes, I want to restart my computer now*. Select *Finish t*o restart the server. Logon as an administrator.

   NOTE:
   See system administrator for login information.

12. Launch Enterprise manager under *Start > Programs > Microsoft SQL server 7.0* and verify that the new CardioLink server computer name is registered and working as denoted by a green arrow. Also verify that there is no registration for CLINK_2 or the previous server name. If the new name does not appear and there remains a registration for CLINK_2 or the previous server name, then perform the following steps:

    a. Under the *SQL Server Group*, right click on the entry for *CLINK_2* or the previous server name and select *Delete SQL Server Registration.* Select *Yes* to confirm.

    b. Right click on *SQL Server Group* and select *New SQL Server Registration.*

    c. Click *Next* at the *Welcome* window.

    d. From the *Available Server* window, select the new name of the CardioLink server and select *Add.* Click *Next.*

    e. Verify that the *Windows NT account information* radio button is selected, then select *Next.*

    f. Verify that the *add to existing group* radio button is selected, then select *Next.*

    g. Select *Finish* and verify that the new CardioLink server name is registered successfully.

13. If LMHOSTS files are used for name to IP resolutions, correct the file at *C:\WINNT\SYSTEM32\DRIVERS\ECT* by editing the line entry for *CLINK_2* or the previous server name to the new server name on the server and all client machines and reboot all machines for the change to take effect. If LMHOST files were not used proceed to Step 14.

14. After all machines are rebooted, launch *Network Neighborhood* and verify all machines can browse the new named CardioLink server.

15. Using the network applet under control panel, correct the SNMP traps to the new server name. Use the following steps:

   a. In the *Network* window, select the *Services* tab.

   b. Select on *SNMP service*, then select *Properties*.

   c. In the *SNMP Properties* window, select the *Traps* tab.

   d. Under the *Trap Destination* window, remove the entry for *CLINK_2* or the previous server name.

   e. Select *Add* and enter the new name of the CardioLink server. Click *Add*.

   f. Click *OK* on *SNMP Properties* window.

   g. Select *Close* on the *Network* window.

16. Correct Insight manager's console to monitor the new name of the CardioLink server and remove the old device name for CLINK_2 or the previous server name. Use the following steps:

   a. Open Insight Manager by selecting *Start > Programs > Compaq Insight Manager > Compaq Insight Manager*.

   b. From the top pull down menus, select *Setup > Device List*.

   c. In the *Responsible Device List*, highlight the entry for *CLINK_2* or the previous server name, then select *Remove*.

   d. Select the *IP Device List* button.

   e. Select the *New* button.

   f. Enter into the *Device name* field the new name of the CardioLink server. Check the box for *WINS/DNS IP Address Resolution* and then select the *Add* button. Select *Close*.

   g. In the *IP Device List* window, highlight the entry for *CLINK_2* or the previous server name and then select *Remove*. Select *OK*.

   h. In the *List all Devices* list, highlight the entry for *CLINK_2* or the previous server name, then select *Delete*. Select *Yes*.

   i. If the new server name is not already in the *Responsible Device List*, select on the new name of the server from the *List of All Devices* window, and select *Add*. Confirm that the *Responsible Device List* shows the new CardioLink server name.

   j. Select *OK*.

   k. Verify that in the *Device List 1* window, the new CardioLink server is shown and has a green status.

17. On the CardioLink server delete the file *D:\gemms\Prucka\NetConfig\history.log*.

18. Assure that each acquisition system is registered in Enterprise Manager and perform the following tasks on EACH registered acquisition system:

    a. Open *Enterprise Manager*

    b. Expand the *Server* by clicking the *+*

    c. Expand the *Security* folder

    d. Expand *Linked Server*

    e. In the *Linked Server* folder, right-click on the old server name.

    f. In the pop-up menu, click *Delete*.

    g. In the *Confirmation* windows (both *delete of server* and *remote logins will also be dropped*), click *Yes*.

    h. Close *Enterprise Manager*.

19. After the server has been renamed and the DB utilities have successfully run, restart replication as described in the Centricity CardioLink Installation/Upgrade Instructions. When asked to consolidate, select *No* and confirm *Yes* for all acquisitions systems.

20. Edit the *timeserv.ini* file in the C:\WinNT directory with the following steps on the server and all acquisition and review systems.

    a. Edit the PrimarySource = value to \\ <CardioLink Server Name>.

    b. Select *Start > Run*, and type in **timeserv -update**.

    c. Select *Start > Run*, and type in **timeserv -automatic**.

21. Redirect all clients (Acquisition and Review) network storage path the new name of the CardioLink server. Under *Administration > System Settings > File Paths*, set *Network Storage Path* to \\<New Name of CardioLink Server>\PruckaStudies and check *Enable network storage.*

22. For systems that had LMT installed on the CardioLink server, the ODBC settings need to be corrected to the new server name and the tables re-linked. Perform the following steps on the server first and then all clients using LMT:

    a. Launch the *Control Panel* applet for *Data Sources (ODBC).*

    b. Select the tab for *System DSN*.

    c. In the System Data Sources list, highlight the entry for *CLinkSQL* then select the *Configure* button.

    d. In the Sever DSN Configuration window, change the *Which SQL Server do you want to connect to?* to be the new name of the CardioLink server from the pull down select list (if it is not listed type in the name), then select *Next*.

    e. Leave the existing settings on *How should SQL Server verify.* Select *Next*.

    f. Verify that the *Change the default database to*: is still set to *clink*, then select *Next*.

    g. Then select *Finish*.

    h. Select the *Test data Source* button and verify that test completed

          successfully. Select *OK* on the test window.

    i.   In the New ODBC window, select *OK.*

    j.   In the *ODBC Data Source Administrator* window, select *OK.*

    k.   On LMT Client computers, launch the *LMT* applications and at the login window select the *Utilities* button then select the button to *Re-Link Database Tables.* Select *OK.*

    l.   Verify these steps are run on the server and all clients.

23. Reboot server and all client computers.

NOTE

If there were any Enterprise backup tasks created for this CardioLink server they will need to be redirected to the new server name. In addition if there were any PCAnywhere LAN links to this server they will also need to be redirected to the new server name.

NOTE

Please complete the attached worksheet "CardioLink Server Rename Record" on page B-15 and fax to Technical Support for their records (561-575-5055).

24. Proceed to "System Functional Checkout Procedure" on page B-14.

System Functional Checkout Procedure

1. Using *Network Neighborhood*, verify that all client computers can browse the new server name and that the server can browse the client computers.

2. Launch *Enterprise Manager* under *Start > Programs Microsoft SQL server 7.0* and verify that all systems including the new server name are registered and working (denoted by green arrow) and that there is no entry for *CLINK_2* or the previous server name.

3. Verify that the *Replication Monitor* shows no errors in *Enterprise Manager*.

4. Verify that all client computers have their network storage path redirected to the new server name and that no systems show the error *CardioLink Server unavailable*.

5. Verify from one Acquisition computer that a previously created network study can be reviewed.

6. Verify from one Review computer that a previously created network study can be reviewed.

7. Verify from one Acquisition computer that a new test patient study can be created and is automatically displayed on other system's network catalogs.

8. Verify that items from the lists can be entered into the log of this test patient.

9. Verify that list replication is still functioning by making a change to the list and checking that the change is reflected on other systems.

10. Verify from one review station that the new test patient can be reviewed.

11. Verify at the CardioLink server that the Insight manager shows the new name of the server in the device list and has a green status.

12. Verify at one of the client computers that LMT application can be launched and that the previous data is still accessible.

13. Perform a full backup of the database and patient study directory as described on the CardioLink operators manual. Refer to the weekly backup section.

CardioLink Server Rename Record

Hospital Name:

_____

Address:

_____

City: _____ State: _____ Zip:_____

Site Contacts:

I.S. Contact/Lab Manager: _____

Title: _____

Phone: _____

Server Rename Data:

Date of Change:_____

Compaq Server Serial Number:_____

Name of Server **prior** to Rename:_____

Name of Server **after** Rename:_____

Print and fax to Technical Support the following two log files as well as this worksheet:

1. D:\gemms\prucka\Setup\Gems_SvrRename.log

2. D:\gemms\Prucka\Database\maintenance\log\Gems_SvrNameChanger.log

GE Medical Systems Contacts:

Field Engineer:

_____

*Fax number for Technical Support is 561-575-5055.

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