

HDI 1500 Field Service Manual

4730-0032-05 Rev A
February 2003
Copyright © 2003 by Philips Ultrasound All rights reserved

PHILIPS

About This Manual

Audience

This manual supports the field service maintenance and repair of the HDI® 1500 Ultrasound System. The user of this document is a qualified ultrasound electronics technician who has completed training classes on the system and its peripherals.

Manual Format

This manual is in Portable Document Format (PDF) for viewing on a laptop-computer with Acrobat Reader. A list of bookmarks functions as an additional table of contents. Those bookmarks, the table of contents, and cross-references use hypertext links to provide access to the referenced information.

Conventions Used in This Manual

The following conventions are used in this manual:

- Hypertext links are [blue](#).
- All procedures are numbered. You must complete steps in the sequence they are presented to ensure reliable results.
- Bulleted lists indicate general information about a function or procedure. They do not imply a sequential procedure.
- Control names and menu items or titles are spelled as they are on the system.
- Symbols appear as they appear on the system.
- An English system is assumed.

Service Manual Questions or Comments

If you have questions about the service manual, or you discover an error in the manual, contact Philips Ultrasound Technical Publications:

- atl-bothell.techpubs@philips.com
- Technical Publications, MS 964, at the address below

Customer Assistance

Various support locations around the world can provide customers with technical assistance regarding the ultrasound system. Customers should contact the sales office where they purchased the system or the nearest Philips Ultrasound office. Office addresses and telephone numbers are in the system user documentation.

Philips Ultrasound
P.O. Box 3003
Bothell, WA 98041-3003
USA
425-487-7000 or 800-426-2670
www.ultrasound.philips.com

"Chroma", "Color Power Angio", "Cineloop", and "HDI" are registered trademarks of Philips Ultrasound.

Non-Philips Ultrasound product names may be trademarks or registered trademarks of their respective owners

Contents

About This Manual	1
General Information	22
Introduction	22
System Overview	22
Figure 1-1 HDI 1500 Ultrasound System	23
Figure 1-2 HDI 1500 System Control Panel Components	24
Applications	25
Features	25
Scanheads Supported	30
Peripherals	31
Physical Description	31
Safety Requirements	32
Philips Supplies and Accessories	33
Specifications	34
Introduction	34
System Specifications	34
Table 2-1 HDI 1500 System Physical Specifications and Limits	35
Table 2-2 HDI 1500 System Electrical Power Specifications	35
Wiring Specifications	36
Safety	37
Introduction	37
Safety Information	37

Electrical Safety	37
Mechanical Safety	39
Equipment Protection	40
Symbol Definitions	41
Theory of Operation	43
Introduction	43
System Architecture	43
Operating System	43
Functional Description	44
Figure 4-1 HDI 1500 System Functional Block Diagram	46
Operating Power	47
Table 4-1 Power Supply Output Voltages	47
Figure 4-2 Power Supply Block Diagram	48
Scanhead Select Module	49
Figure 4-3 Scanhead Select Module Block Diagram	50
Figure 4-4 Scanhead Connector Pin/Element Assignments	51
Beamformer (BF)	52
Figure 4-5 Beamformer Block Diagram	53
Echo Processor (EP)	54
Figure 4-6 Echo Processor Block Diagram	56
Color Doppler Processor (CDP)	57
System Controller (SC)	57
Continuous Wave (CW) PCB	57

Figure 4-7 Color Doppler Processor Block Diagram	58
Figure 4-8 System Controller Block Diagram	59
Figure 4-9 CW Block Diagram	60
Digital Scan Converter (DSC)	61
PC Interface and Overlay	61
Video Manager (VM)	61
Matrox Meteor2 Frame Grabber	61
Figure 4-10 Digital Scan Converter Block Diagram	62
Figure 4-11 PC Interface and Overlay Block Diagram	63
Figure 4-12 Video Manager Block Diagram	64
Backplane	65
Internal and External I/O Panels	65
User Interface	65
Data Paths	65
Figure 4-13 I/O Panel PCBs Block Diagram (1 of 2)	66
Figure 4-14 I/O Panel PCBs Block Diagram (2 of 2)	67
Figure 4-15 Data Path Block Diagram	68
Installation	69
Introduction	69
Pre-Installation Evaluations	69
Materials	69
Checking Physical Access for Delivery, Installation, and Operation	70
▶ To check that the site is prepared for system installation:	70
Checking for Proper Ventilation	70

Wiring Requirements	70
Checking the Electrical Power Source	71
▶ To verify a dedicated AC line:	71
Checking for Electrostatic Conditions	73
System Installation	74
Warnings and Cautions	74
Materials and Equipment	74
Preliminary Inspection	74
▶ To inspect the shipping crate for signs of damage:	74
Unpacking the System	74
▶ To remove the system from the crate:	74
Figure 5-1 Crate Details	76
Figure 5-2 Unpacking Details	77
▶ To unpack the uncrated system:	78
General Inspection	78
▶ To inspect the system:	78
Installing the Monitor	80
▶ To install the system monitor:	80
Figure 5-3 System Monitors	81
Figure 5-4 Monitor Mounting Plate Assembly (MicroVitec)	82
Figure 5-5 Monitor Mounting Plate Assembly (KDS Curved-screen)	83
Figure 5-6 Monitor Installation and Cable Connections	84
Installing OEM Peripherals	85
OEM bay installations	85
▶ To install the Sony UP 890/895 or Mitsubishi P91W(A) B/W image printer:	85

Figure 5-7 OEM Placements in OEM Bay	86
Figure 5-8 Velcro Placement on B/W Printer	88
Figure 5-9 Internal Sony UP-890/895MD B/W Printer Connections	90
Figure 5-10 Internal Mitsubishi P91(A) B/W Printer Connections	91
Figure 5-11 OEM Bay I/O and AC Connections For B/W Printers	92
Figure 5-12 Peripheral Strapping	93
► To install the Mitsubishi CP700U/E or CP800U/E or Sony UP-21MD color printer:	94
Figure 5-13 Internal Mitsubishi CP700U/E and CP800U/E Color Printer Connections	95
Figure 5-14 Internal Sony UP-21MD Color Video Printer Connections	96
Figure 5-15 OEM Bay I/O Panel Connections for Color Printer	97
OEM External Installation	98
► To install a Codonics NP-1660 network printer:	98
Figure 5-16 Codonics NP-1660 Printer LAN Connection Diagram	99
Figure 5-17 Codonics NP-1660 Printer Ethernet Wall Jack Connection Diagram	100
Figure 5-18 Codonics NP-1660 Printer Point-to-Point Connection Diagram	101
VCR Installation (OEM bay or Monitor Top-mount)	102
► To install the Panasonic AG-MD830/835-P/E VCR:	102
Figure 5-19 AG-MD830/835 VCR RS-232 Interface Adaptor (1 of 2)	104
Figure 5-20 AG-MD830/835 VCR RS-232 Interface Adaptor (2 of 2)	105
Figure 5-21 KDS Curved-screen Monitor Top Mount VCR Installation	106
Figure 5-22 KDS Flat-screen Monitor Top Mount VCR Installation (1 of 2)	107
Figure 5-23 KDS Flat-screen Monitor Top Mount VCR Installation (2 of 2)	108
Figure 5-24 Top-mount Panasonic AG-MD830/835P/E VCR Connections	109
Figure 5-25 Rear I/O Panel Connectors for Top-mount VCR	110

Figure 5-26 Top-mount VCR Cable Dressing Cable Tie Points	111
Figure 5-27 Top-mount VCR Cable Dressing Without Multiview Module	112
Figure 5-28 Top-mount VCR Cable Dressing With Multiview Module	113
Figure 5-29 Internal Panasonic AG-MD830/835P/E VCR Connections	114
Figure 5-30 OEM Bay I/O Panel Connectors for Internal VCR	115
Installing the Accessories	116
Figure 5-31 Cable Hanger and Accessory Basket Installation	117
Figure 5-32 Footswitch Connection	118
Installing the Multiview Video Module	119
▶ To install the Multiview Video Module:	119
Figure 5-33 Multiview Module Assembly (Video Switch Box)	120
Initial System and Peripheral Setup	121
▶ To set up the system and peripherals:	121
▶ To program the Panasonic AG-MD830/835 VCR:	123
Table 5-1 AG-MD830/835 VCR Switch Settings	123
Figure 5-34 Panasonic AG-MD830/835 VCR (Front)	124
Table 5-2 AG-MD830/835 VCR Settings for the HDI 1500	125
▶ To program the CP700 or CP800 MAIN MENU parameters:	128
Figure 5-35 Mitsubishi CP700/CP800 Color Printer (Front)	129
Table 5-3 CP700/CP800 Main Menu Control Settings	130
▶ To program the CP700 or CP800 SERVICE MENU parameters:	133
Table 5-4 CP700/CP800 Printer Service Menu Parameter Settings	134
▶ To program the Sony UP-21MD color printer:	137
Figure 5-36 Sony UP-21MD Color Video Printer (Front)	138
Table 5-5 UP-21MD Printer Settings	139

▶ To configure the system for DICOM operations:	143
Figure 5-37 SEND Display	144
Figure 5-38 Expanded SEND Display	146
Figure 5-39 SonoView DICOM Print Settings (Codonics 1660 Printer Example)	148
Figure 5-40 DICOM System Setup Display Example	149
Figure 5-41 DICOM_SimpleForm Display	150
Figure 5-42 DICOM_FullForm Display Example	151
Figure 5-43 Example Devices Menu	154
Figure 5-44 Example Device Startup Type Menu	155
Figure 5-45 Example TCP/IP Dialog Box with IP Address Selected	156
Figure 5-46 Hosts File Example	159
▶ To verify or change the regional settings:	160
▶ To verify or change the video settings:	161
Figure 5-47 Run Dialog Box	162
Figure 5-48 Initial Registry Editor	163
Figure 5-49 Registry Editor: Peripheral Values	165
Figure 5-50 Video Setting Edit String Dialog Box	166
Creating a Hard Drive Backup at System Installation	167
Completing the Installation	167
Presenting the System	167
De-Installation (Crating) Instructions	169
Preparing the Sony UP-21MD for Transport	169
▶ To secure the Sony UP-21 print head for transport:	169

Performance Tests	170
Introduction	170
Preparations	170
Warnings and Cautions	171
Equipment and Materials Required	171
Initial Setup	171
Power On and Initialization Tests	172
Figure 6-1 Circuit Breaker Location	173
Figure 6-2 Power Switch Location	174
Figure 6-3 System Startup Display	175
Functional Tests	176
Monitor Brightness and Contrast Check	176
User Interface Test	176
2D Image Quality Test	192
2D Image Test	193
M-mode Test	194
PW Doppler Mode Test	194
CW Doppler Mode Test	195
2D Color Mode Test	195
ECG Test	196
Image Filing Test	197
Peripheral Test	199
Figure 6-4 DICOM Print Dialog	202
Safety Tests	203

End of Testing	203
Performance Test Checklist	204
Adjustments	205
Introduction	205
Warnings and Cautions	205
MicroVitec Monitor Adjustments	206
Degaussing the MicroVitec Monitor	206
Figure 7-1 MicroVitec Monitor Adjustment On-screen Display	207
MicroVitec Monitor Adjustment Procedure	208
▶ To enable the OSD monitor adjustment mode:	208
Figure 7-2 MicroVitec Monitor Adjustment OSD, Main Menu	209
▶ To make GEOMETRY adjustments:	210
Figure 7-3 MicroVitec Monitor Adjustment OSD, GEOMETRY Menu	211
Table 7-1 Typical GEOMETRY Values	212
▶ To make GEOMETRY2 adjustments:	213
Figure 7-4 MicroVitec Monitor Adjustment OSD, GEOMETRY2 Menu	214
Table 7-2 Typical GEOMETRY2 Values	215
▶ To adjust COLOUR, RESET, and SPECIAL settings:	216
Table 7-3 Typical COLOUR and COLOUR2 Values	217
MicroVitec Monitor Focus Adjustment	217
Figure 7-5 MicroVitec Monitor Focus Adjustment	218
KDS Monitor Adjustments	219
Degaussing the KDS Monitor	219
KDS Monitor Adjustment Procedure	219

▶ To adjust the on-screen video parameters (curved and flat-screen):	219
Figure 7-6 KDS Monitor Controls (Curved-screen shown)	220
Preventive Maintenance	223
Introduction	223
Equipment and Supplies	223
Cleaning	223
General System	223
OEM Peripherals	224
Inspection	224
Alignment, Calibration	224
Other Maintenance	225
Troubleshooting	226
Introduction	226
Start Here	226
Warnings and Cautions	227
Failure Symptoms and Solutions	228
Table 9-1 Symptoms and Recommended Action	228
Figure 9-1 Stress Echo Symptom When Video Cable Connection Bad	232
Checking the Fuses	232
Figure 9-2 Fuse Replacement	233
Checking the Power Supply Voltages	234
Table 9-2 Power Supply Voltages	234
Figure 9-3 System Power Supply Voltages on Interconnect Panel	235
Checking for EMI and RFI Interference	236

DICOM Troubleshooting	236
Backing Up the System Hard Drive	238
Equipment Required	238
Backup Procedure	239
► To back up the system hard drive:	239
Restoring a System Hard Drive From a Backup Disk	242
Equipment Required	242
Restore Procedure	242
► To restore files to the system hard drive:	242
Making the Repair	245
Disassembly	246
Introduction	246
Warnings and Cautions	246
Figure 10-1 Side Card Cage PCB Retainer Removal	247
Cabling	248
Introduction	248
System Cabling and Connectors Illustrations	248
Figure 11-1 Rear Panel Upper I/O Connectors (Version 1.08.10 and higher)	249
Figure 11-2 Rear Panel Lower I/O Connectors (Version 1.08.10 and higher)	250
Figure 11-3 Rear Panel Upper I/O Connectors (Version 2.00.02 and higher)	251
Figure 11-4 Rear Panel Lower I/O Connectors (Version 2.00.02 and higher)	252
Figure 11-5 OEM Bay Panel I/O Connectors	253
Figure 11-6 System AC Input and OEM AC Power Panel	254
Figure 11-7 Power Supply Connectors on Interconnect Panel	255

Figure 11-8 Dual Hard Disk Drive Interconnect Diagram (Part of Stress Echo Option, v2.01.02 and up)	256
Figure 11-9 Matrox Meteor2 Frame Grabber PCB Interconnect Diagram (Part of Stress Echo Option, v2.01.02 and up)	257
Figure 11-10 Multiview Video Module Assembly Interconnect Diagram (Part of Stress Echo Option, v2.01.02 and up)	258
Figure 11-11 Multiview Video Module Power Cord and Adapters (Part of Stress Echo Option, v2.01.02 and up)	259
Figure 11-12 HDI 1500 System Signal Cable Interconnect Diagram (Version 1.09.00 and lower)	260
Figure 11-13 HDI 1500 System Signal Cable Interconnect Diagram (Version 2.00.02 and higher)	261
Figure 11-14 HDI 1500 System Power Cable Distribution Diagram	262
Cable Part Numbers	263
Table 11-1 HDI 1500 Signal Interconnect Cables	263
Table 11-2 HDI 1500 Power Distribution Cables	266
Table 11-3 Peripheral Cables	267
Change History	269
Introduction	269
Initial System Release (v1.08.05)	269
Features Supported	269
Software Release (v1.08.10)	275
Features Supported	275

Features Released	275
Changes and Problems Corrected	275
Hardware and Firmware Changes	277
Part Numbers	277
Software Release (v1.08.12)	278
Features Supported	278
Features Released	278
Hardware and Firmware Changes	279
Part Numbers	279
Software Release (v2.00.02)	280
Features Supported	280
Features Released	280
Changes and Problems Corrected	281
Hardware and Firmware Changes	282
Part Numbers	282
Software Release (v2.00.04)	283
Features Supported	283
Features Released	283
Changes and Problems Corrected	283
Hardware and Firmware Changes	283
Part Numbers	283
Software Release (v2.01.00 - for 2.0 Systems)	284
Features Supported	284

Features Not Supported	284
Features Released	284
Changes and Problems Corrected	285
Hardware and Firmware Changes	285
Part Numbers	285
Software Release (v2.01.00 - for 1.75 Systems)	286
Features Supported	286
Features Not Supported	286
Features Released	286
Changes and Problems Corrected	287
Hardware and Firmware Changes	287
Part Numbers	287
Software Release (v2.01.02)	288
Features Supported	288
Features Not Supported	288
Features Released	288
Changes and Problems Corrected	288
Hardware and Firmware Changes	289
Part Numbers	289
Software Release (v2.02.00)	290
Features Supported	290
Features Not Supported	290
Features Released	290

Changes and Problems Corrected	290
Hardware and Firmware Changes	291
Part Numbers	291
Software Release (v2.03.02)	292
Features Supported	292
Features Not Supported	292
Features Released	292
Changes and Problems Corrected	292
Hardware and Firmware Changes	292
Part Numbers	292
Software Release (v1.09.00)	293
Features Supported	293
Features Not Supported	293
Features Released	293
Changes and Problems Corrected	293
Hardware and Firmware Changes	294
Part Numbers	294
Configuration	295
Introduction	295
Compatibility Information	295
Software	295
Table 13-1 HDI 1500 System Software Release Part Numbers	295
PCB Reference Information	296

Primary System PCB Locations	297
Figure 13-1 Primary System PCB Names and Locations	297
Figure 13-2 Scanhead Select Module and Backplane Location	298
Figure 13-3 Front Card Cage PCB Acronyms and Locations	299
Figure 13-4 Side Card Cage PCB Names and Locations	300
PCB Identification	301
Table 13-2 Guide to PCB Locations and Silhouettes	301
Figure 13-5 Backplane PCB	303
Figure 13-6 Beamformer Adapter PCB	304
Figure 13-7 Beamformer PCB (1, 2, 3, 4)	305
Figure 13-8 Color Doppler Processor PCB	306
Figure 13-9 CW PCB	307
Figure 13-10 Digital Scan Converter PCB (v1.08.10)	308
Figure 13-11 Digital Scan Converter PCB (v2.00.02 and up)	309
Figure 13-12 Echo Processor PCB	310
Figure 13-13 Industrial PC Card	311
Figure 13-14 Matrox Meteor2 (Framegrabber) PCB (v2.01.02 and up with Stress Echo)	312
Figure 13-15 56K Modem (v2.00.02 and up)	313
Figure 13-16 PC Interface and Overlay PCB	314
Figure 13-17 PC Motherboard	315
Figure 13-18 Probe Selector Assembly	316
Figure 13-19 Sound Card (v1.08.10)	317
Figure 13-20 System Controller PCB	318

Figure 13-21 Video Manager PCB	319
Hard Drive Configuration	320
Figure 13-22 Master/Slave Hard Drive Jumper Configuration Table	321
Parts	322
Introduction	322
Parts Ordering Information	322
How to Find a Part Number	323
▶ How to use the figures and tables in this section:	323
Parts Illustrations	326
Figure 14-1 HDI 1500 System Main Components	326
Figure 14-2 15-Inch Curved-screen Video Monitor (KDS)	327
Figure 14-3 15-Inch Flat-screen Video Monitor (KDS)	328
Figure 14-4 Monitor Base Assembly	329
Figure 14-5 Monitor Mounting Panel (MicroVitec)	330
Figure 14-6 Monitor Mounting Panel (KDS Curved-screen)	331
Figure 14-7 Monitor VCR Support (KDS Curved-screen only - phase 1.5 systems and above)	332
Figure 14-8 Monitor VCR Support (KDS Flat-screen only)	333
Figure 14-9 Upper Cart	334
Figure 14-10 User Interface (Control Panel)	335
Figure 14-11 User Interface (Keyboard)	336
Figure 14-12 User Interface (Top Body Panel)	337
Figure 14-13 Probe Holder	338
Figure 14-14 PD (Phase) Drive and Floppy Disk Drive	339
Figure 14-15 MO (Magneto Optical) Drive and Floppy Disk Drive (v2.02.00 and higher)	340

Figure 14-16 Enclosure Panels	341
Figure 14-17 Front Cover	342
Figure 14-18 Side Panel (Left)	343
Figure 14-19 Side Panel (Right)	344
Figure 14-20 Panels and Supports	345
Figure 14-21 External Interface Rear Panel and Support	346
Figure 14-22 Rear Cover	347
Figure 14-23 Rear Cover Fans	348
Figure 14-24 OEM Bay	349
Figure 14-25 OEM Bay Internal Rear Panel and Interface PCBs	350
Figure 14-26 Card Cage Assembly	351
Figure 14-27 Scanhead Select Assembly (Front Card Cage Access)	352
Figure 14-28 Scanhead Select Breakdown	353
Figure 14-29 Card Cage Assembly (Front)	354
Figure 14-30 Card Cage Assembly (Side Card Cage Access)	355
Figure 14-31 Side Card Cage and Rack	356
Figure 14-32 Card Cage Assembly (Bottom and Rear)	357
Figure 14-33 Hard Disk Drives	358
Figure 14-34 Lower Cart	359
Figure 14-35 Power Supply	360
Figure 14-36 Power Supply w/Attached Power Cord	361
Figure 14-37 Power Supply w/Detachable Power Cord	362

Figure 14-38 Caster Assemblies	363
Figure 14-39 Multiview Video Module Assy (Video Switch Box)	364
Parts List	365
Table 14-1 HDI 1500 System Parts List	365
Peripheral Part Numbers	383
Table 14-2 Peripheral Part Numbers	383
Scanheads	385
Introduction	385
Scanhead Specifications	385
Table 15-1 Scanhead Applications	385
Table 15-2 Scanhead Information	386
Table 15-3 Scanhead Types, Capabilities, and Advantages	387
Table 15-4 Scanhead Matrix	388
Glossary	391
Acronyms and Abbreviations	391
Terms	393

1 General Information

Introduction

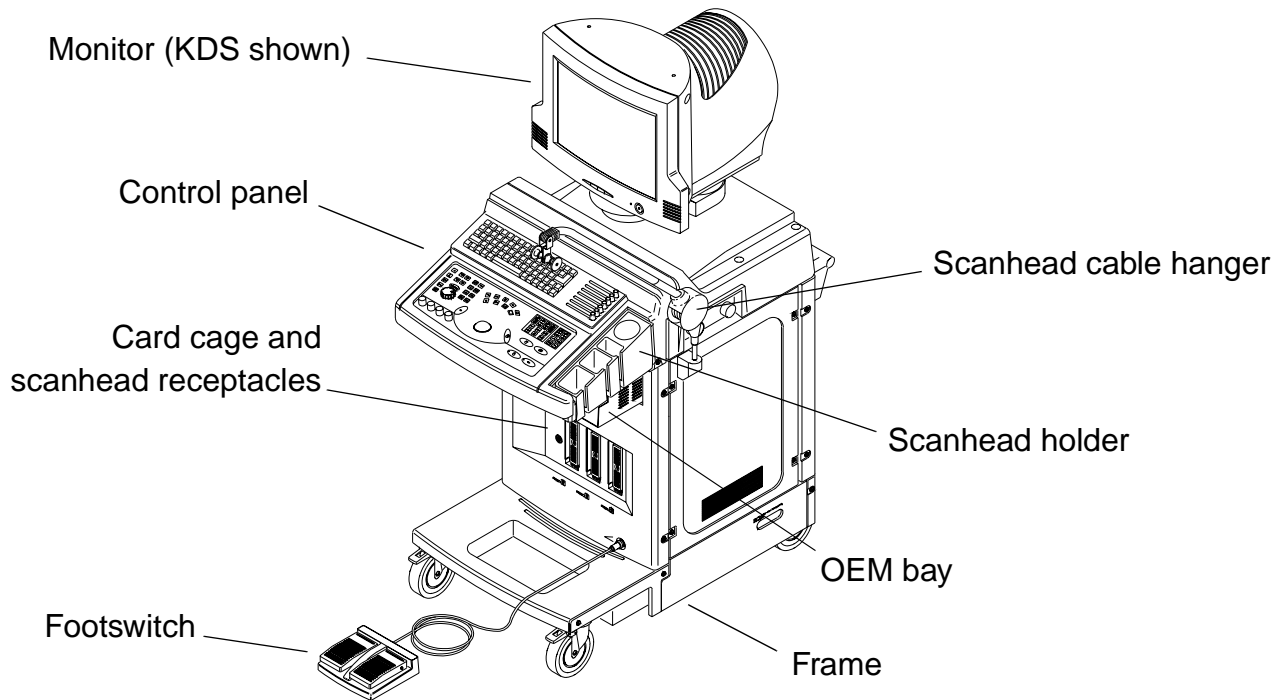
This section contains a general overview and physical description of the HDI 1500 Ultrasound System. System application, feature, and regulatory information is summarized.

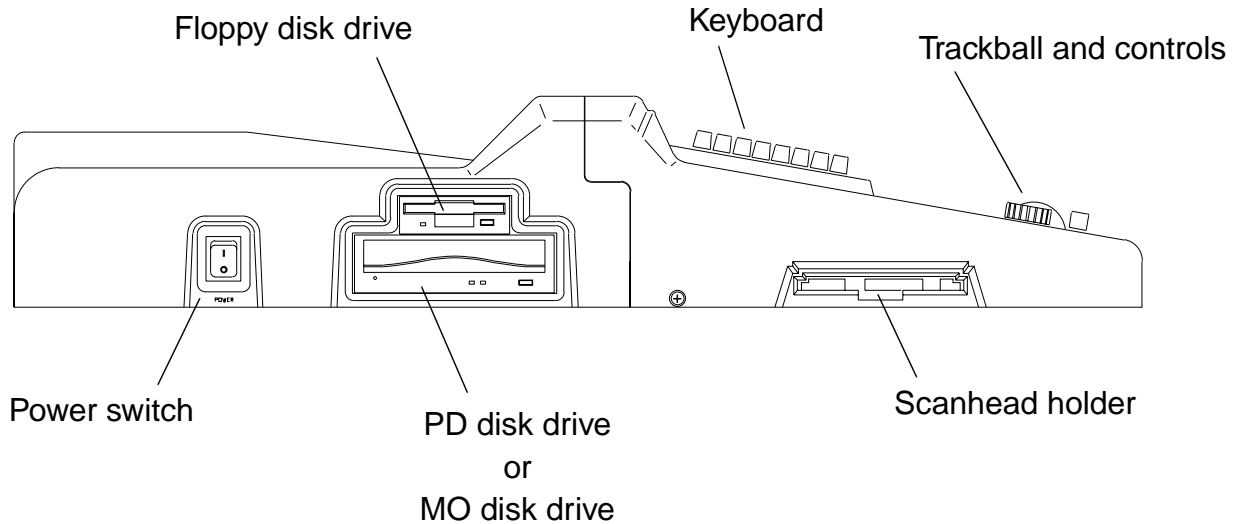
System Overview

The HDI 1500 system ([Figure 1-1](#) and [Figure 1-2](#)) is a general-purpose, mobile, software-controlled, diagnostic ultrasound system with spectral and color Doppler.

The HDI 1500 system uses a Pentium personal computer (PC) platform with a Windows NT operating system and digital beamforming to provide high-resolution, high-penetration performance.

See [Section 12, "Change History"](#), for a summary of the software and hardware changes associated with specific system releases. See [Table 13-1](#) for a list of all of the software releases and part numbers.

**Figure 1-1****HDI 1500 Ultrasound System**

**Figure 1-2****HDI 1500 System Control Panel Components**

The HDI 1500 system uses linear array, convex array, and phased array scanheads, and static probes to perform all major clinical applications. The standard operating modes are 2D/gray-scale, M-mode, color M-mode, color Doppler, Color Power Angio® (CPA) imaging, pulsed-wave (PW) and continuous-wave (CW) Doppler, and triple mode simultaneity. A fully integrated 3D imaging mode is optional for gray scale and CPA images.

Using image compression, all versions of the system can store up to 4,000 images (depending on image file size) and recall them. Data can be exported to a floppy disk and transferred to the PC environment in either JPEG or BMP formats. High-density removable media capability is standard, and the system supports compatible ink-jet printers.

Applications

- General
- Abdominal
- Adult Cardiac
- Breast
- Cerebrovascular
- Gynecological
- Obstetrical
- Pediatric
- Prostate
- Renal
- Small Parts
- Vascular
- Venous

Features

Electrical Standard

- 120 Vac, 60 Hz
- 240 Vac, 50 Hz
- 240 Vac, 60 Hz

Languages

- English
- French
- German
- Italian
- Spanish

Scanhead Selection

- Three scanhead (probe) receptacles
- Electronic switching between scanheads

Imaging Modes

- 2D real-time
- Dual 2D real-time
- M-mode with simultaneous 2D
- 2D Color Doppler
- Pulsed-wave Doppler
- Continuous-wave Doppler (static and steered)
- Stress Echo (v2.01.02 and up)

Image Presentation

- Up/down
- Left/right
- Dual side-by-side

Image Processing

- TGC control
- Gain control
- Power control
- 3D
- THI (C5-2 and P4-2 scanheads with v2.00.02 and up)
- Trapezoidal imaging (CL10-5 and L12-5 scanheads with v2.00.02 and up)
- Dynamic aperture
- Dynamic apodization
- Dynamic range
- Edge Enhancement
- Reject
- Gray-scale windowing
- Gamma correction
- Histogram
- Image apex control (up/down)
- Scan direction control (left/right)
- Real-time zoom (zoom ratio x2; no zoom with linear array scanheads)

Digital Color Doppler

- Available in velocity, power, velocity and variance, and variance-only modes
- Dual imaging
- Color capture
- Selectable color maps

Image Storage and Retrieval

- 256-frame Cineloop® memory
- Save images to and retrieve and view images from the system hard disk (in proprietary format)
- Copy images to the floppy disk (in BMP or JPEG format) or the PD or MO disk (in BMP or DICOM format, depending on the operation)

Measurements

- 2D: Linear measurements and area measurements using elliptical approximation, continuous trace, or trace-by-points (distance, circumference, area, and volume)
- Trackball operation of multiple calipers
- M-mode: Continuous readout of distance, time, and slope rate
- Doppler: Velocity, continuous trace
- Pre-measurement calibration of VCR images from an HDI 1500 system
- With software version 2.01.00 and higher, images stored to SonoView can be recalled and measured for both distance and area. These measurements cannot be transferred to any of the analysis packages, but the measurements can be recorded to hard copy

Calculations

- Automatic measurement of various parameters
- Obstetrical analysis in 2D
- Cardiology
- Vascular
- Standard Gestational Age tables: BPD, FL, CRL, GS, AD, AC, HC
- Investigators (Merz, Shepard, Hansmann, Hill, Jeanty, Nelson, Hohler, Hellman, Nyberg, and Hadlock)
- User-defined OB tables

DICOM

- Modality worklist (only v2.00.02 and up).
- Simultaneous network print and store (only v2.00.02 and up).
- Performed Procedure Step (only v2.01.00 and up) - Sends data back to the Hospital Information System when the ultrasound examination is complete, allowing automatic update of the patient's record.
- Storage Commitment (only v2.01.00 and up) - Notifies the ultrasound user when studies and images transferred to the PACS or server have been accepted.

Open Line Transfer

Open line serial data transfers of OB patient report to off-line printers, computers, and workstations (the data is sent to and appears on a computer monitor or prints on a serial printer).

Scanheads Supported

- Linear array
 - L7-4
 - L12-5
 - CL10-5 with synthetic aperture and trapezoidal imaging (only v2.01.00 and up)
- Convex array
 - C5-2
 - C7-4
 - C8-4v
 - C8-5
 - C9-5
- Phased array
 - P4-2
 - P7-4
 - P5-3 with Tissue Harmonic Imaging (only v2.01.00 and up)
- Static probes
 - D2CW
 - D5CW (only with v2.00.02 and up)
- Transesophageal echocardiographic
 - MPT7-4 multi-plane transesophageal (only v2.01.00 and up in systems containing the corresponding hardware, [Figure 13-9](#) and [Figure 13-18](#))

Peripherals

- Black-and-white image printer (optional)
- Color printer (optional)
- VCR (optional)
- DICOM network printer (optional)
- A system-compatible report printer is supported (customer supplied)

Physical Description

System Components

- Printed circuit boards (PCBs):
 - Scanhead (Probe) Select
 - Beamformer Adapter
 - Backplane
 - Beamformer
 - Digital Scan Converter
 - System Controller
 - Color Doppler Processor
 - Echo Processor
 - CW
 - PC Motherboard
 - Industrial PC Card
 - PC Interface & Overlay
 - Video Manager
 - 56K modem (only v2.00.02 and up)
 - Frame grabber (only v2.01.00 and up w/Stress Echo)

- System operating software.
- Ultrasound cart, push handles, and casters for mobility.
- Main chassis supports the monitor, control panel, disk drives, scanhead connectors, cable management system, and storage areas.
- Panel connectors for original equipment manufacturer (OEM) peripheral devices and a footswitch assembly.
- Control panel houses the keyboard control buttons, rotary controls, slide controls, and a trackball.
- Color monitor (15-inch) with tilt/swivel base and controls for display contrast and brightness.
- Classification:
 - Class I with Type BF and CF patient-applied parts
 - Ordinary Equipment
 - Non-AP/APG
- Electromechanical safety standards met:
 - CSA C22.2 No. 601.1, Canadian Standards Association, Medical Electrical Equipment
 - EN 60601-1, Second Edition, including Amendments 1 and 2, European Norm, Medical Electrical Equipment
 - EN 60601-1-2, First Edition, European Norm, Collateral Standard, Electromagnetic Compatibility
 - IEC 1157:1992, International Electrotechnical Commission, Requirements for the declaration of the acoustic output of medical diagnostic ultrasonic equipment

Safety Requirements

- UL 2601-1, Underwriters Laboratories, Medical Electrical Equipment
- Agency approvals:
 - Underwriters Laboratories (UL)
 - ISO 9001 Quality Assurance Standard
 - CE marked to the European Community Medical Device Directive 93/42/EEC as a Class IIa device
- Year 2000 compliance
 - System can perform date recording and computations accurately through and beyond the year 2000 and accommodate the leap year for the year 2000 and beyond.

Philips Supplies and Accessories

This manual contains references to Philips Supplies and Accessories. CIVCO Medical Instruments Co. has purchased Philips Supplies and Accessories. You can purchase both Philips-product-specific and general-purpose supplies and accessories, and in particular the Scanhead Biopsy Guides, from CIVCO Medical Instruments by contacting:

CIVCO Medical Instruments
102 First St. South
Kalona, IA 52247-9589

Phone: (800) 445-6741, Ex. 1 for Customer Service (USA)
(319) 656-4447 (International)
Fax: (877) 329-2482 (USA)
(319) 656-4451 (International)
E-mail: info@civcomedical.com
Internet: ultrasoundsupplies.com

2 Specifications

Introduction

This section summarizes the physical ([Table 2-1](#)) and electrical power ([Table 2-2](#)) specifications for the HDI 1500 Ultrasound System.

NOTE See [Section 12, “Change History”](#) for descriptions of system and software releases.

System Specifications

The configuration of the Pentium computer platform is as follows:

- 133 MHz CPU w/64 MB RAM, 233 MHz CPU w/64 MB RAM, or 233 MHz CPU w/128 MB RAM depending on system release (program phase 1.2, 1.5, and 2.0 systems respectively)
- 2.1 (program phase 1.2 and earlier systems only), 2.5, 3.2, 4.3, 6.4, 8.4, or 20 GB internal hard drive
- Second 8.4 GB internal hard drive (software v2.01.02 and up with Stress Echo)
- 3.5-inch 1.44 MB floppy drive
- Phased disk drive (640 MB) or MO drive (1.3 GB)
- PC interface for ultrasound engine
- Video manager
- Sound card (installed in some program phase 1.2 systems only, but never used)
- Matrox Frame Grabber (software v2.01.02 and up with Stress Echo)

Table 2-1 HDI 1500 System Physical Specifications and Limits

Parameter	Value
Height	Min. 1,290 mm (50.8 in); max. 1,380 mm (54.3 in)
Width	540 mm (21.3 in)
Depth	880 mm (34.6 in)
Weight without Peripherals	Approximately 101 kg (222 lb)
Ambient Operational Temperature ¹	10°C to 40°C (50°F to 104°F)
Operational Relative Humidity	30% to 75% RH (non-condensing)
Storage and Shipping Temperature ²	-10°C to 60°C (14°F to 140°F)
Storage Relative Humidity	10% to 95% RH (non-condensing)

1. Atmospheric pressure at 1,060 hPa to 700 hPa (1.05 ATM to 0.7 ATM).

2. Atmospheric pressure at 1,060 hPa to 500 hPa (1.05 ATM to 0.5 ATM).

Table 2-2 HDI 1500 System Electrical Power Specifications

Parameter	Value
Hot/Neutral	90-132 Vac (RMS) at 50 or 60 Hz \pm 3 Hz 180-264 Vac (RMS) at 50 or 60 Hz \pm 3 Hz
Current Draw (rated) ¹	12.5 A (at 120 Vac) 6.3 A (at 220 Vac)
Current Draw (measured)	6.20 A (at 120 Vac) 3.15 A (at 240 Vac)

Table 2-2 HDI 1500 System Electrical Power Specifications (Continued)

Parameter	Value
Power Draw (measured)	745 VA (at 120 Vac) 755 VA (at 240 Vac)
Source	< 48 A
Thermal Load ¹	Approximately 2,550 BTU
Power Dissipation ¹ , maximum	555 W (at 120 Vac) 545 W (at 240 Vac)

1. Includes the effect of peripherals operating at their maximum normal condition (for example, recording or printing).

Wiring Specifications

The electrical feed to the system shall be a dedicated line (no other equipment on the same line) with a third-wire ground. The ground wire shall be an insulated solid-copper conductor bonded to the ground bus of the service panel. The outlet shall be a Hospital Grade Receptacle or an Isolated Ground Receptacle. Proper installation shall reflect compliance with the national electrical code.

3 Safety

Introduction

This section summarizes the safety information for the HDI 1500 Ultrasound System.

Safety Information

Please read this information before using or servicing a Philips ultrasound system. It applies to the ultrasound system, scanheads, recording devices, and any optional equipment.

This device is intended for use by, or by the order of, and under the supervision of a licensed physician qualified to direct the use of the device.

In this manual, a **WARNING** describes precautions necessary to prevent injury or loss of life.

In this manual, a **CAUTION** describes precautions necessary to protect the equipment.

Electrical Safety

This equipment has been Certified by a recognized third-party testing agency as a Class I device with Type BF and Type CF isolated patient-applied parts. For maximum safety observe these warnings:

WARNINGS

-
- Before connecting and applying power, any mounting screws that complete the system ground path must be in place and properly secured.
 - Shock hazards may exist if this system is not properly grounded. Protection against electrical shock is provided by grounding the chassis with a 3-wire cable and plug. The system must be plugged into a hospital-grade three-prong outlet. The grounding wire must not be removed or defeated.
-

WARNINGS

-
- Hazardous voltages are present inside the system. Cabinet panels must be in place while the system is in use. All internal adjustments and replacements must be made by a qualified Philips Ultrasound field service engineer.
 - Do not operate this system in the presence of flammable gases or anesthetics. Explosion can result.
 - Always inspect the scanhead face, housing, and cable before use. Do not use the scanhead if the face is cracked, chipped, or torn, if the housing is damaged, or if the cable is abraded.
 - Always turn the system power off and disconnect it from the wall outlet prior to cleaning the system.
 - Connection of optional devices not supplied by Philips could result in electrical shock. When such optional devices are connected to your ultrasound system, ensure that the total system chassis risk current does not exceed 100 μA for 120 Vac systems and 500 μA for 230 Vac systems.
 - In general, only the area of the scanhead acoustic window is watertight. Except where specified in specific scanhead cleaning instructions, do not immerse the remainder of a scanhead in any liquid.

CAUTIONS

-
- This equipment contains components that are electrostatic sensitive. Proper anti-static procedures, protection, and equipment must be used prior to opening and during handling of this equipment. Failure to use ESD procedures will damage the components. Such damage to components is not covered by Philips warranties.
 - Do not connect or disconnect scanheads without putting the system in the freeze mode.

CAUTIONS

-
- Damage to the system may occur if the system power is incorrectly configured and the system is connected to an improper power source.
 - Damage to a peripheral may occur if the OEM power is incorrectly configured and the OEM is connected to an improper power source.
 - Always turn the power off and wait at least 30 seconds before removing or installing any PCB, module, or component.
-

Mechanical Safety

WARNINGS

-
- Electrostatic discharge (ESD) can amount to a significant voltage. The following precautions can reduce ESD: anti-static spray on carpets; anti-static spray on linoleum; anti-static mats; use of a ground wire connection between the system and the patient table or bed; use of the ESD pads on the system handles and the wrist support of the system keyboard.
 - Be aware of the casters, especially when moving the system. The system can weigh 101 kg (222 pounds), depending upon configuration, and it could injure you or others if it rolls over or into any part of you or them.
 - Philips recommends pushing the system, instead of pulling it, and exercising special caution when going up or down ramps.
 - Position external hardcopy devices away from the system. Ensure that they are secure. Do not stack them on the system.
-

CAUTION

Ensure the scanhead cables are secure. Use the cable management system to ensure the scanhead cables are protected from damage.

Equipment Protection**CAUTIONS**

-
- Excessive bending or twisting of a scanhead cable may cause failure or intermittent operation of the scanhead or the system.
 - Do not sterilize a scanhead using gas or heat methods. Never autoclave a scanhead or expose it to temperatures exceeding 55°C (131°F). These sterilization methods may permanently damage the scanhead. For disinfection and sterilization instructions, see the *Using Disinfectants and Gels* manual, part number 4700-0249-XX and up.
 - Inspect the system power cord and plug on a regular basis. Ensure that they are not damaged in any way.
 - Ensure the power switch is off, before unplugging the system from the wall outlet.
 - For optimal performance, your Philips ultrasound system should be connected to a 15-Ampere dedicated circuit with an isolated ground.
 - Use care when re-installing screws. The system has several places where a steel screw threads into an aluminum panel, which means that it is easy to strip and damage the hardware.
-

Symbol Definitions

The International Electrotechnical Commission (IEC) has established a set of symbols to classify electrical connections and warn of potential hazards on medical electronic equipment. The classifications and symbols are as follows:



Isolated patient connection. (Type BF)



On the power switch, represents ON and OFF.



This symbol identifies a safety note. Ensure you understand the function of this control before using it. Refer to the appropriate section in the *Reference Manual* for an explanation of the control.



Identifies equipotential ground.

The following symbols are also used on the system:



Connection for ECG.



Connection for footswitch.



Monitor brightness control.



Monitor contrast control.

S-VHS

S video NTSC/PAL video output and input.

VHS Composite NTSC/PAL video output and input.

B/W Composite monochrome video.



Left and right audio input.



Left and right audio output.



The following symbols are used inside the system:



Identifies high voltage components.



Ground.

4 Theory of Operation

Introduction

This section provides a functional description of the HDI 1500 Ultrasound System.

System Architecture

The HDI 1500 system architecture is based on a Pentium computer platform that provides a real-time operating system with hardware and software interfaces to the disk drives, control panel, and peripherals. This platform is combined with ultrasound electronics, including a digital beamformer and ultrasound software.

The ultrasound engine comprises the Scanhead Select Module (Probe Selector Assembly and Beamformer Adapter), Beamformer Module (four Beamformer PCBs), Echo Processor, Color Doppler processor, System Controller, Continuous-Wave (CW) processor, Digital Scan Converter, and Backplane.

In the HDI 1500 system, most of the ultrasound signal processing, image processing, analysis, and display functions are performed by software, using the native processing power of the computer.

Operating System

A full-service real-time operating system provides an integrated range of resources: drivers and handlers for storage, video, serial and parallel ports, and support of file system services and graphical user interfaces. The operating system, based on Microsoft Windows NT, is resident on the hard drive.

The system software performs these tasks:

- Processes requests from the control panel
- Sets up beamforming parameters
- Processes acquired ultrasound echoes into digital visual representations for conversion into analog signals

Functional Description

- Performs measurements and calculations on acquired data
- Stores acquired data (such as images and user-entered data) for subsequent retrieval
- Performs all necessary functions to coordinate software tasks

The HDI 1500 system produces color and gray-scale 2D, M-mode, and Doppler ultrasound images using electronic scanheads, digital beamforming, and Doppler processing. The central processing unit of the system is the Industrial PC card, a Pentium PC CPU that is similar to the motherboard used in a personal computer (PC). The ultrasound component comprises beamformer technology that combines with the operating system to support the system functions.

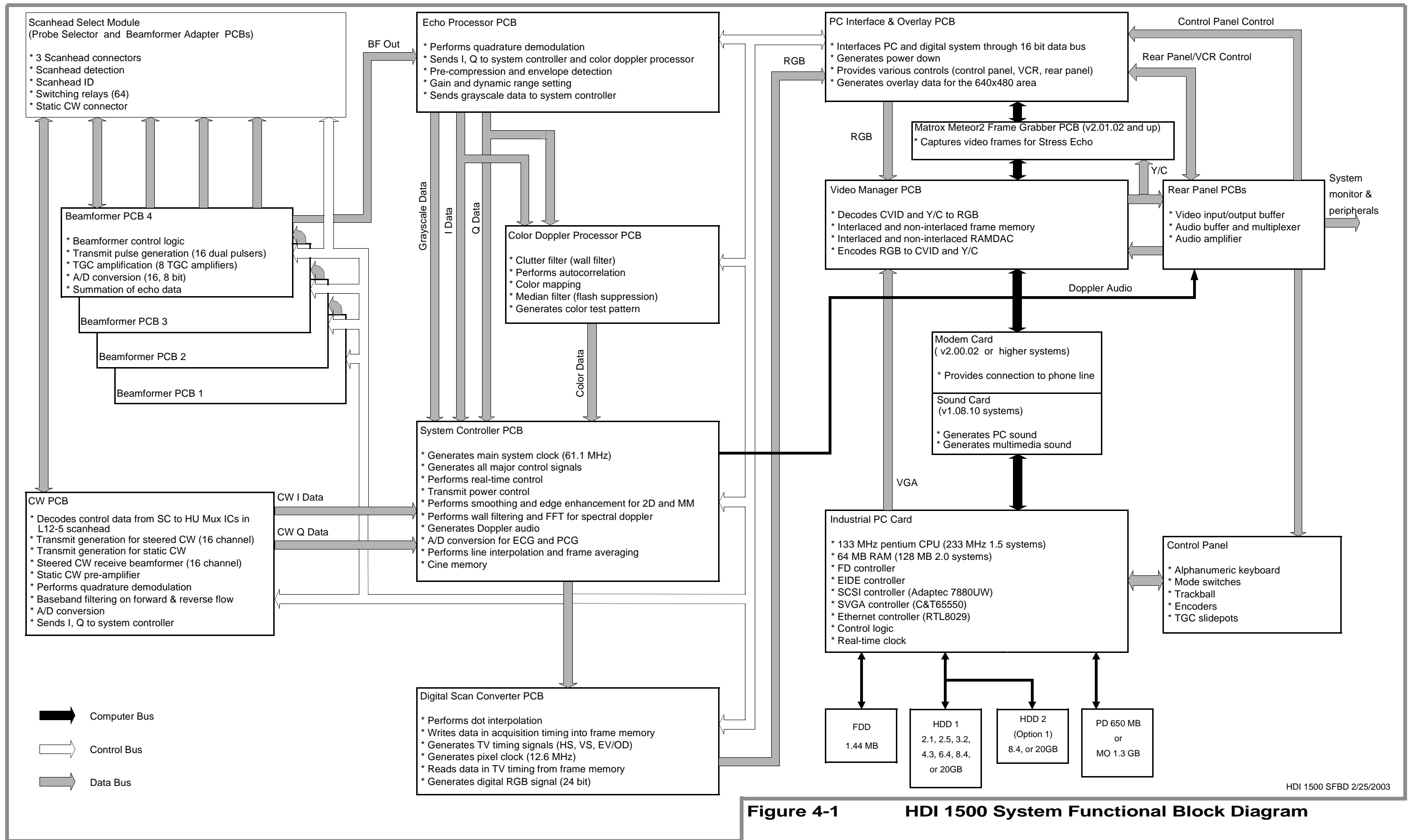
The Industrial PC card, upon power up, determines system functionality and coordinates the overall communication between the user and the system, which includes storing and saving images. Memory size on the Industrial PC card is not sufficient to hold the entire operating software of the system, so it communicates continually with the hard drive for additional operating parameters.

The HDI 1500 system stores the ultrasound images and patient data on the hard drive and can copy that data to the removeable media for offline review. The system can send the images to a black and white printer, color printer, or to a VCR, and it generates reports for printing.

After operating power is applied, the major functional elements combine to produce ultrasound images. The user interface allows system control and viewing of the results.

[Figure 4-1](#) is a simplified block diagram of the HDI 1500 system, showing the relationship between those major functional elements and indicating the primary functional tasks performed by each element.

The overall system functional flow is power development and distribution, analog signal processing, beamforming, echo signal processing, continuous-wave and color Doppler processing, scan conversion, and digital signal processing.



HDI 1500 SFBD 2/25/2003

Figure 4-1 HDI 1500 System Functional Block Diagram

Operating Power

The AC power source voltage connects directly to the system power supply, which also comprises the lower rear panel of the system. The power supply is configured for 120 or 240 Vac operation. (See “Initial System and Peripheral Setup” on page 121.)

AC and DC voltages are distributed to the system by the power supply interconnect panel. A system power distribution diagram is shown in Figure 11-13. The power supply output voltages are listed in Table 4-1. Figure 4-2 is a simple block diagram of the power supply.

Table 4-1 Power Supply Output Voltages

Voltage	Use
+5 Vdc	Computer, hard drive, floppy drive, phased or MO drive, digital logic, beamformer, keyboard
-5 Vdc	Computer, hard drive, floppy drive, phased drive, beamformer
+3 Vdc	Computer, hard drive, floppy drive, phased drive
-12 Vdc	Computer, hard drive, floppy drive, phased drive, beamformer, rear panel
+12 Vdc	Computer, hard drive, floppy drive, phased or MO drive, beamformer, keyboard, rear panel
-10 to 80 Vdc (-HV)	Beamformer
+10 to 80 Vdc (+HV)	Beamformer
0-5 Vdc	Acoustic power control

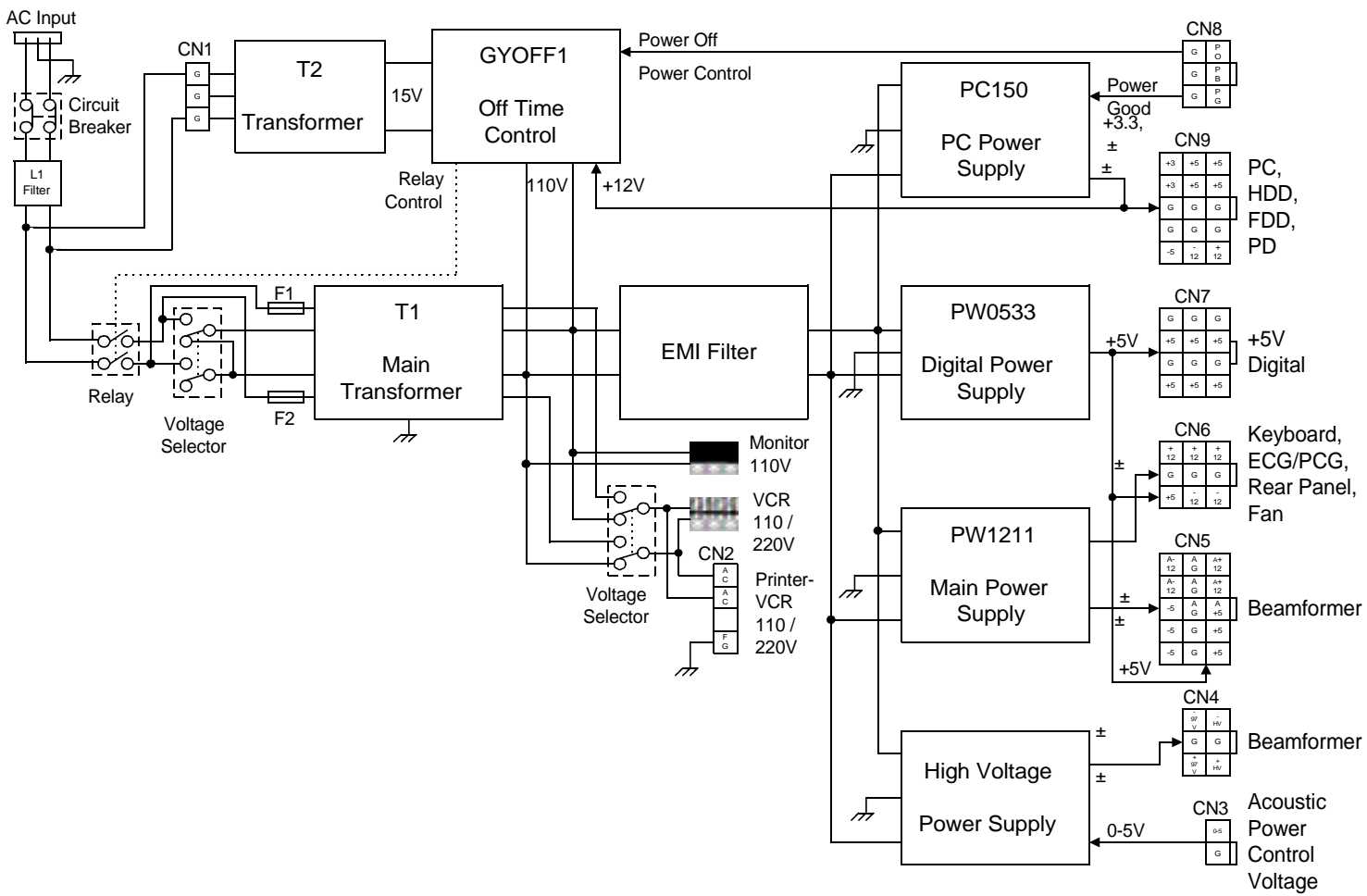


Figure 4-2 Power Supply Block Diagram

Scanhead Select Module

Figure 4-3 is a functional diagram of the Scanhead Select Module. The Scanhead Select Module (also referred to as the Probe Input Assembly, which includes the Probe Selector Assembly and Beamformer Adapter) is the system interface for three scanheads and the CW pencil probe. It contains circuits for scanhead detection, engaging the appropriate number of relays to accommodate transmitting and receiving pulses and echoes. The Beamformer (BF) Adapter, which has no electronic components, connects the Probe Selector PCB with the Beamformer PCBs.

The Scanhead Select Module receives 128 high-voltage pulse signals from the four Beamformer PCBs (“[Beamformer \(BF\)](#)” on page 52) and switches them through 64 four-position analog relays as inputs to the active scanhead to generate the ultrasound signal. The returning echoes are passed through these relays and back to the Beamformer PCBs for processing.

Scanhead Selection

The connectivity sensor and scanhead ID circuits work together to enable the selected scanhead port and to identify which scanheads, if any, are connected. Control logic in the Scanhead Select Module has three identical circuits for scanhead recognition to detect and identify the scanhead. Recognition is accomplished when the value of a register stored in the scanhead is read by the circuit corresponding to the port.

Signals indicating if a scanhead is connected and what type of scanhead is connected are sent to the system software to be interpreted. The value of a register in each scanhead establishes the scanhead ID. When the system software requires it, the scanhead ID circuitry reads that value and makes it available to the system software.

NOTE Some of the circuitry involved in identifying and operating the L12-5 scanhead is located on the CW PCB.

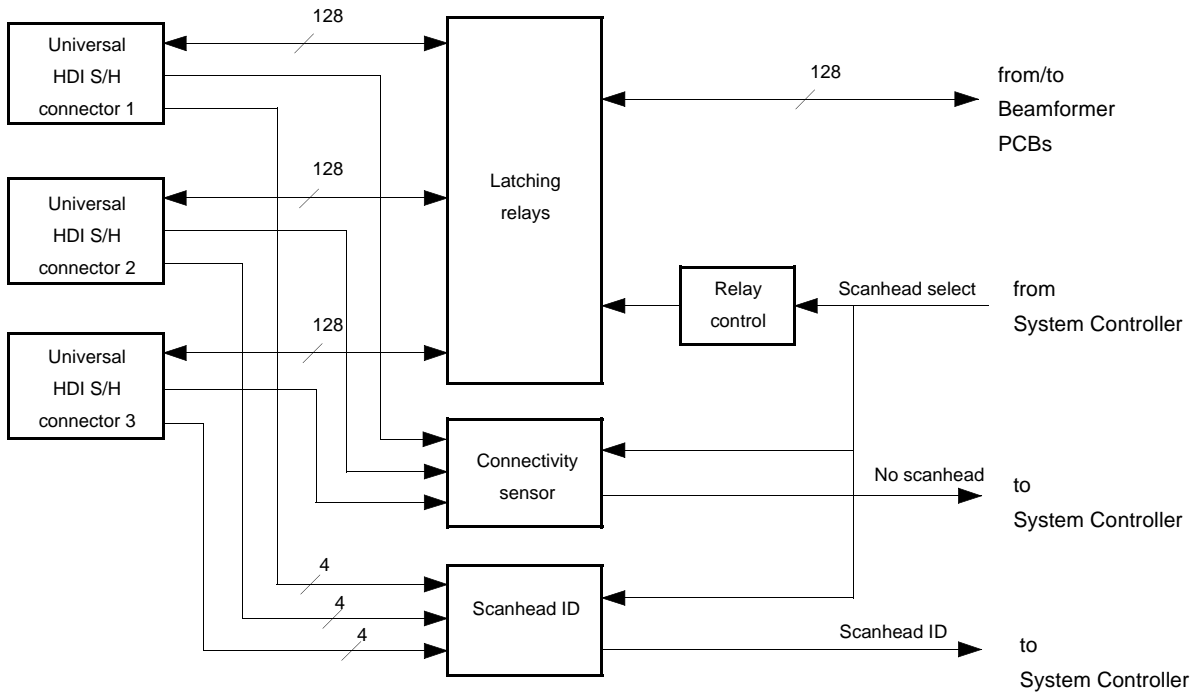


Figure 4-3

Scanhead Select Module Block Diagram

Latching Relays and Control

There are 156 total signal pins on each system scanhead connector, 128 of them are used for scanhead elements.

The analog relays switch pulse signals to the scanhead elements, which correspond to the pin number assignments shown in [Figure 4-4](#).

	1	2	3	4	5	6
A	97	105	GND	GND	2	10
B	65	73	33	34	42	66
C	GND	41	1	74	98	GND
D	9	99	107	106	4	12
E	35	75	GND	GND	36	44
F	3	43	67	68	76	100
G	GND	11	101	108	6	GND
H	109	69	77	14	38	46
J	37	45	GND	GND	70	78
K	5	13	103	102	110	8
L	GND	111	71	16	40	GND
M	47	39	79	48	72	80
N	7	15	Pid-A0	Pid-A1	104	112
P	113	121	/Pin_A	PCOM	18	26
R	49	89	81	50	58	82
S	GND	57	17	90	114	GND
T	25	115	123	122	20	28
U	83	91	GND	GND	52	60
V	51	59	19	84	92	116
W	GND	27	117	124	22	GND
X	125	85	93	30	54	62
Y	53	61	GND	GND	86	94
Z	21	29	23	118	126	24
a	GND	31	55	32	56	GND
b	63	87	95	64	88	96
c	119	127	GND	GND	120	128

Figure 4-4

Scanhead Connector Pin/Element Assignments

Beamformer (BF)

Figure 4-5 is a functional diagram of the Beamformer PCBs. Four Beamformer PCBs are responsible for generating and transmitting pulses to the scanhead elements. When the returning echoes come back into the system, they are sent in analog form to the Beamformer PCBs for processing, where the returning echoes are amplified using time gain compensation (TGC), and are filtered prior to being converted into digital data. Once the data is digital, it is sent to specialized circuits (Beamformer ASICs) that perform the beamforming.

The signal processing functions of digital beamforming that determine the real image quality of the system include dynamic apodization, multiplication, coefficient loading, variable sample clock generation, summation of the channels within each board, and dynamic gain control. Upon exiting the Beamformer ASICs (BFICs) the data is buffered before being sent to the Echo Processor PCB.

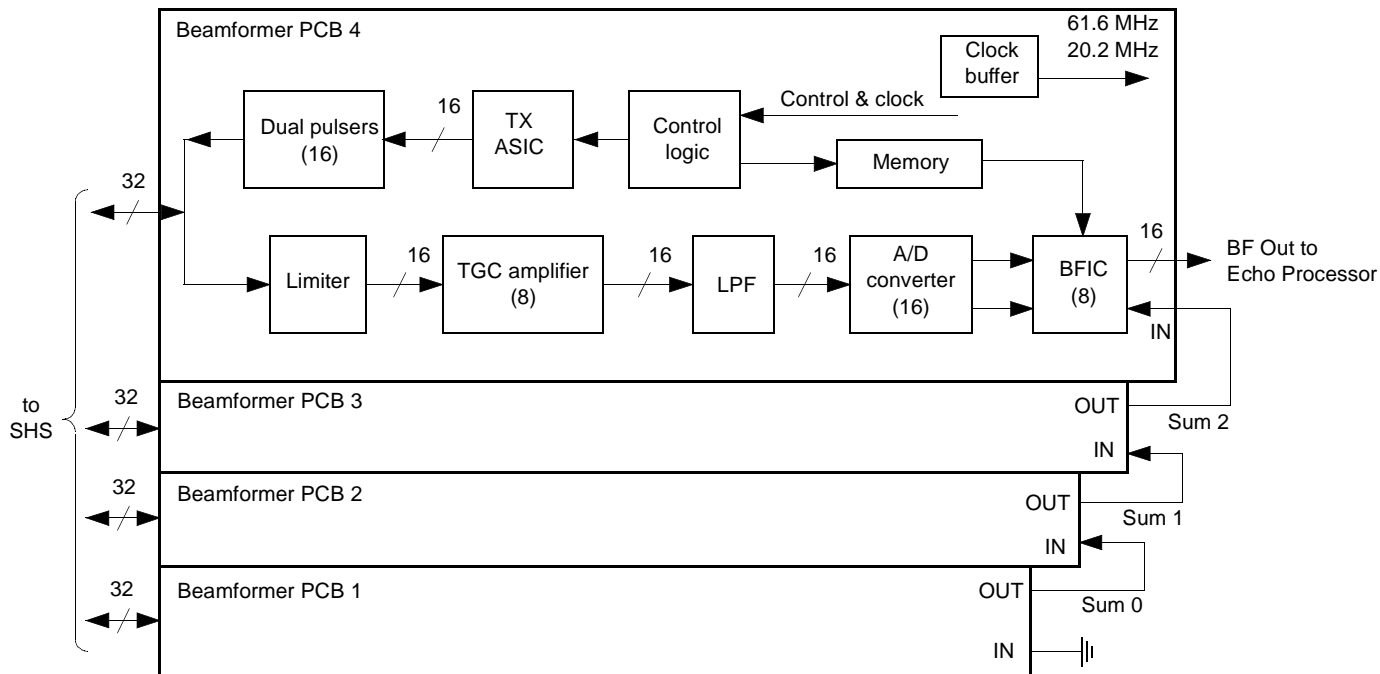


Figure 4-5 Beamformer Block Diagram

Echo Processor (EP)

Figure 4-6 is a functional diagram of the Echo Processor PCB. This PCB processes gray-scale image, spectral, and color Doppler signals. The EP PCB performs the following functions:

Quadrature Demodulation

The quadrature demodulator consists of a digital mixer and low-pass filter. In-phase term (I) and quadrature term (Q) data is abstracted from the beamformed signal (RF digital data) and sent to the 2D compression and detecting envelope and to the Doppler integrator.

Pre-compression and Envelope Detection

The 32-bit total, from the 16-bit I and Q data, is compressed for the envelope detection look-up table.

Dynamic Range Compression

The ultrasound signal from the body has a wide dynamic range. Even with TGC, the signal range is higher than the dynamic range that the monitor can display, so compression is needed. A Log and Differential Amp circuit compresses the signal from the Envelope Detector. The operator controls the dynamic range (a look-up table value) via the user interface.

Offset (Reject)

After log compression, offset is added to or subtracted from the signal. The offset value is controlled by operating the respective gain control.

Anti-aliasing

A low-pass filter reduces aliasing before sampling by the display clock. The cutoff frequency is the same frequency as the sampling clock.

Doppler Integration

The signal-to-noise ratio (sensitivity) of the Doppler signal is increased by passing the I and Q data through an integrator circuit.

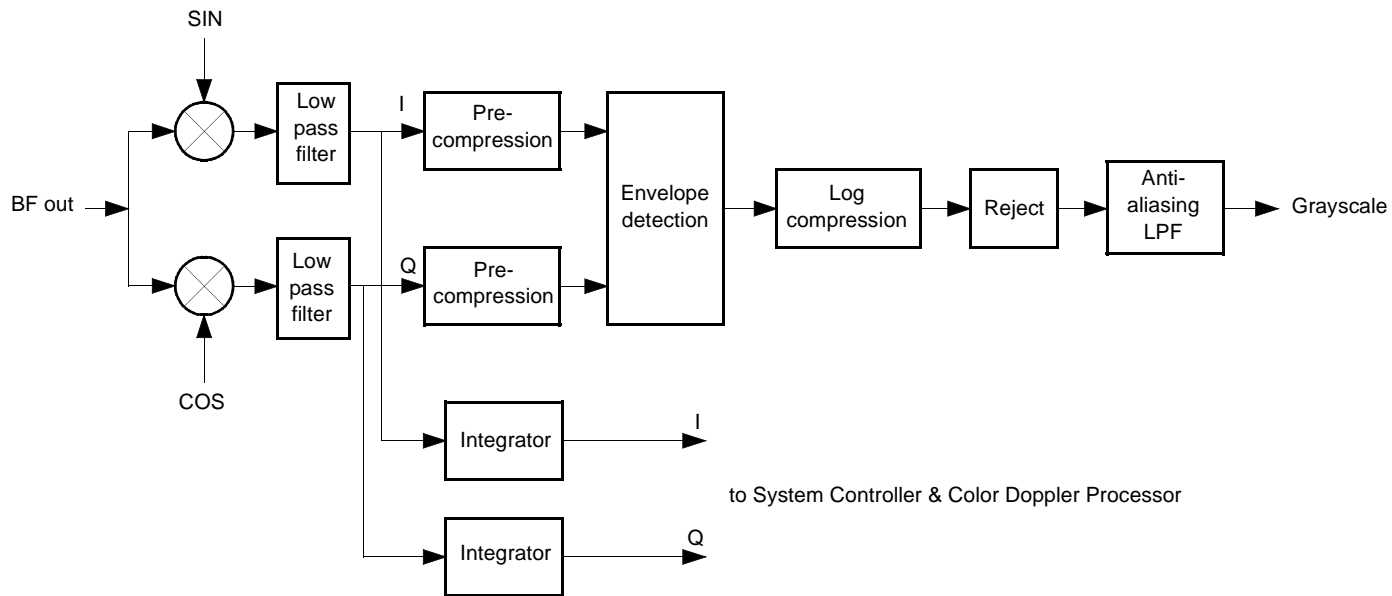


Figure 4-6

Echo Processor Block Diagram

Color Doppler Processor (CDP)

[Figure 4-7](#) is a functional diagram of the Color Doppler Processor PCB. This PCB receives the integrated I and Q signal from the Echo Processor and calculates power, velocity (mean frequency) and variance values. The results are routed to the System Controller PCB. During the process, the signal is filtered to reject clutter and autocorrelated to create data that contains information on blood flow velocity, variance, and power. The Color Doppler Processor also constructs Color Flow Imaging (CFI).

System Controller (SC)

[Figure 4-8](#) is a functional diagram of the System Controller (SC) PCB. This PCB generates the main system clock and all of the basic control signals for the other PCBs. It receives all real-time mode data (grayscale, spectral Doppler, and color Doppler) from the Echo Processor, which it further processes for displaying and sends to the Digital Scan Converter.

Continuous Wave (CW) PCB

[Figure 4-9](#) is a functional diagram of the CW PCB. The following functions are performed by the CW PCB:

- Transmit generation for steered CW (16 channel)
- Transmit generation for static CW
- Steered CW receive beamformer (16 channel)
- Static CW pre-amplifier
- Performs quadrature demodulation
- Baseband filtering on forward and reverse flow
- A/D conversion
- Sends I and Q to the System Controller
- MUX control for the L12-5 scanhead
- L12-5 ID

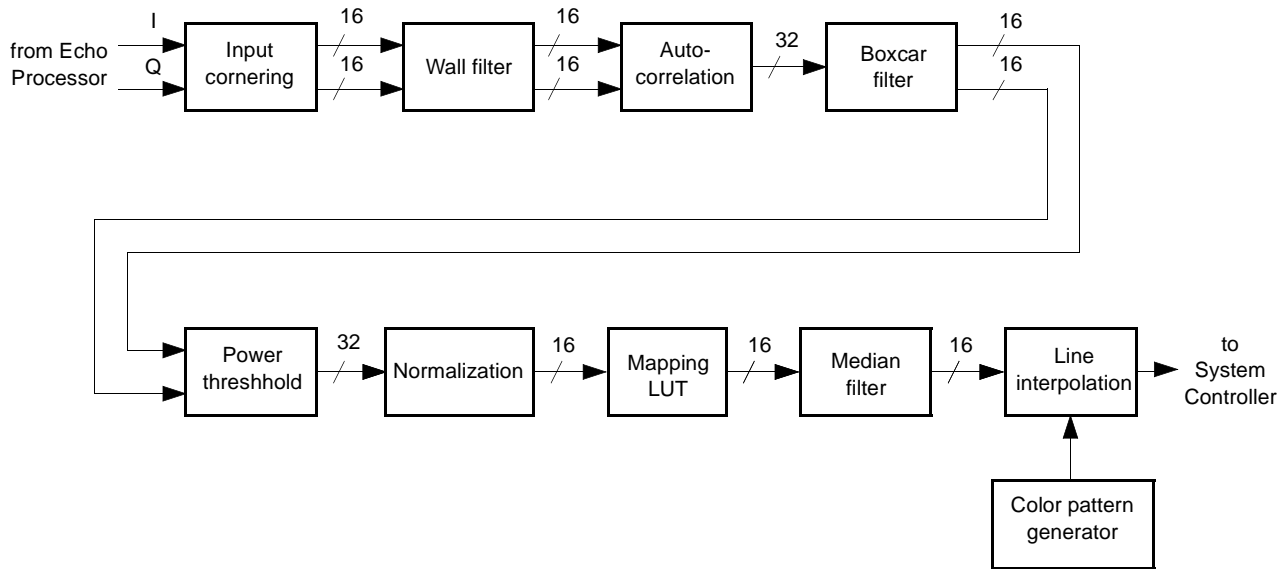


Figure 4-7

Color Doppler Processor Block Diagram

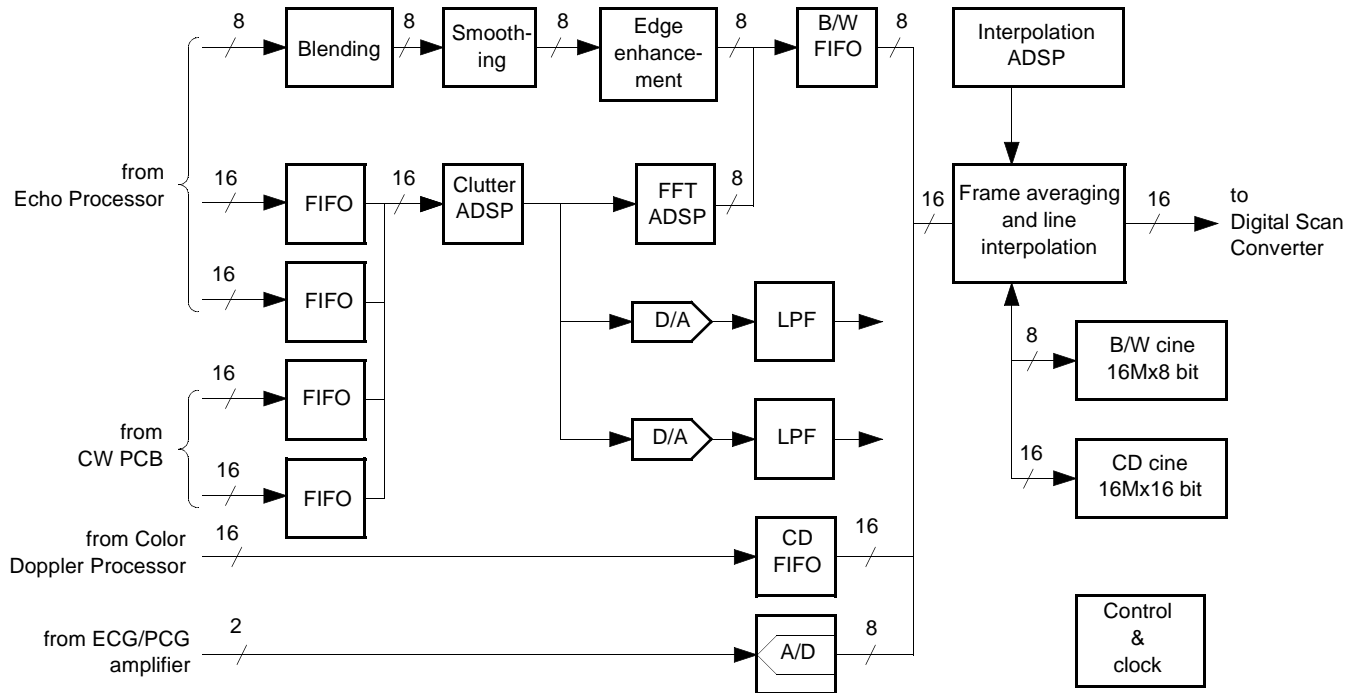


Figure 4-8

System Controller Block Diagram

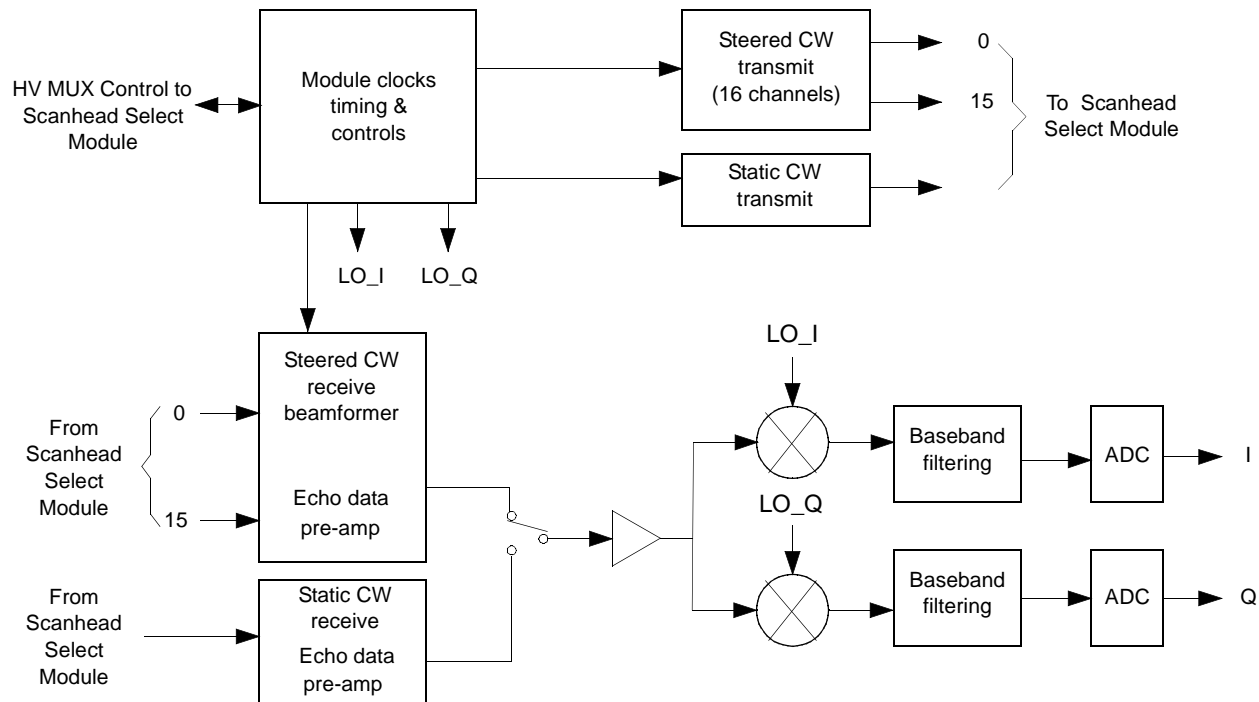


Figure 4-9

CW Block Diagram

Digital Scan Converter (DSC)

[Figure 4-10](#) is a functional diagram of the DSC PCB. Scan conversion is the process for mapping echo information into frame memory for displaying on the monitor. In this system, scan conversion is divided between the System Controller and the DSC. The System Controller sends data received from the Echo Processor or Color Doppler Processor to the DSC for/after the smoothing, edge enhancement, frame averaging, and line interpolation processing. The DSC maps data to frame memory according to an algorithm and sends image data to the Video Manager.

PC Interface and Overlay

[Figure 4-11](#) is a functional diagram of the Overlay and PC Interface PCB. This PCB is the interface between the PC Motherboard and the digital system. The overlay function generates the display overlay data, a 640x480 pixel area without a menu bar, on the screen.

Video Manager (VM)

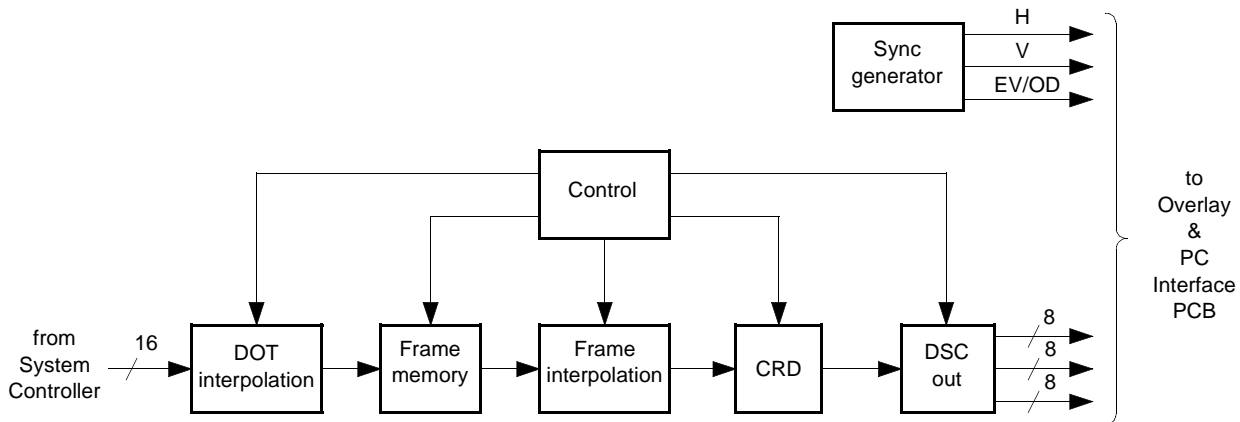
[Figure 4-12](#) is a functional diagram of the Video Manager PCB. This PCB receives video signals from the Rear Panel PCB and converts them to digital data, which is converted to Y/UV format and then to RGB.

The VM PCB receives the digital image output from the system, performs image processing, and sends video signals to the Rear Panel PCB. The following are other functions performed by the VM PCB:

- Interlaced and non-interlaced frame memory
- Interlaced and non-interlaced RAMDAC
- Encodes RGB to CVID and Y/C

Matrox Meteor2 Frame Grabber

The Frame Grabber PCB ([Figure 4-1](#)) captures video frames and processes them for the Stress Echo feature, which uses video and ECG-trigger signals to provide display, selection, comparison, evaluation, and archiving of multiple cardiac loops during the exam.

**Figure 4-10****Digital Scan Converter Block Diagram**

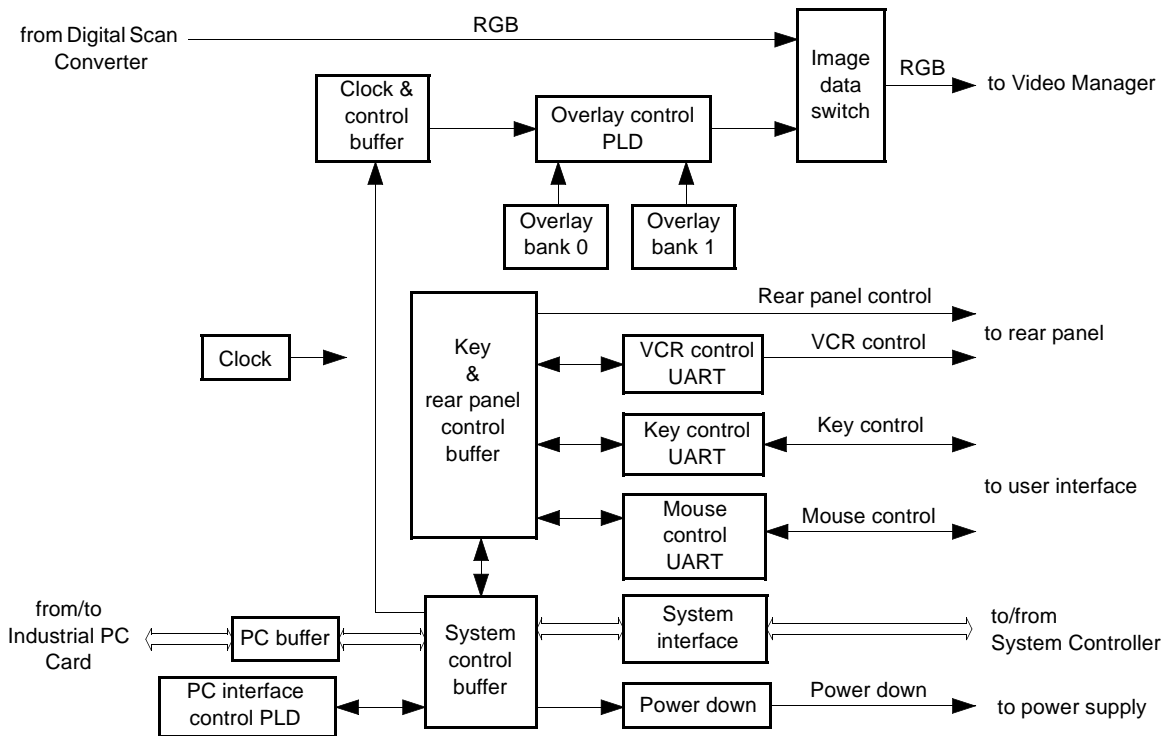


Figure 4-11

PC Interface and Overlay Block Diagram

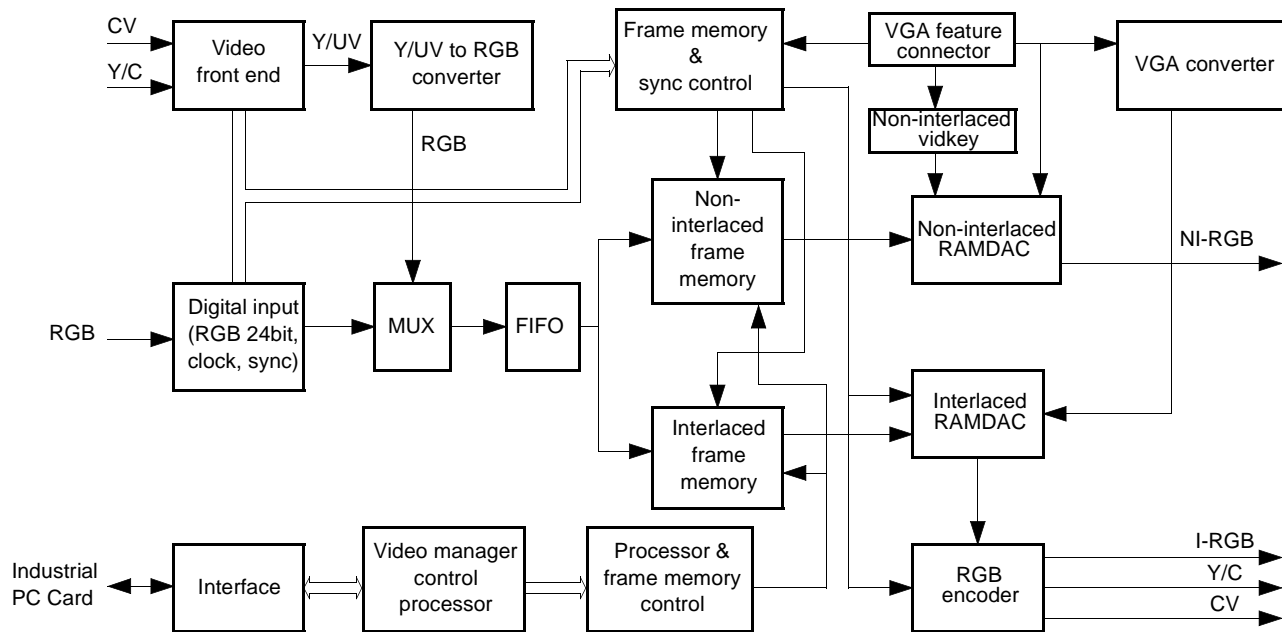


Figure 4-12 Video Manager Block Diagram

Backplane

The Beamformer, CW, Echo Processor, Color Doppler Processor, System Controller, and Digital Scan Converter PCBs are plugged into connectors on the Backplane. The Backplane distributes operating power and provides control and signal interconnection between these ultrasound PCBs.

Internal and External I/O Panels

The Internal I/O Panel (inside of the OEM bay) and the External I/O Panel (at the rear of the system) each comprise two PCBs, one upper and one lower (horizontally), that accomplish the interconnection between system components and peripheral devices shown in [Figure 4-13](#) and [Figure 4-14](#).

User Interface

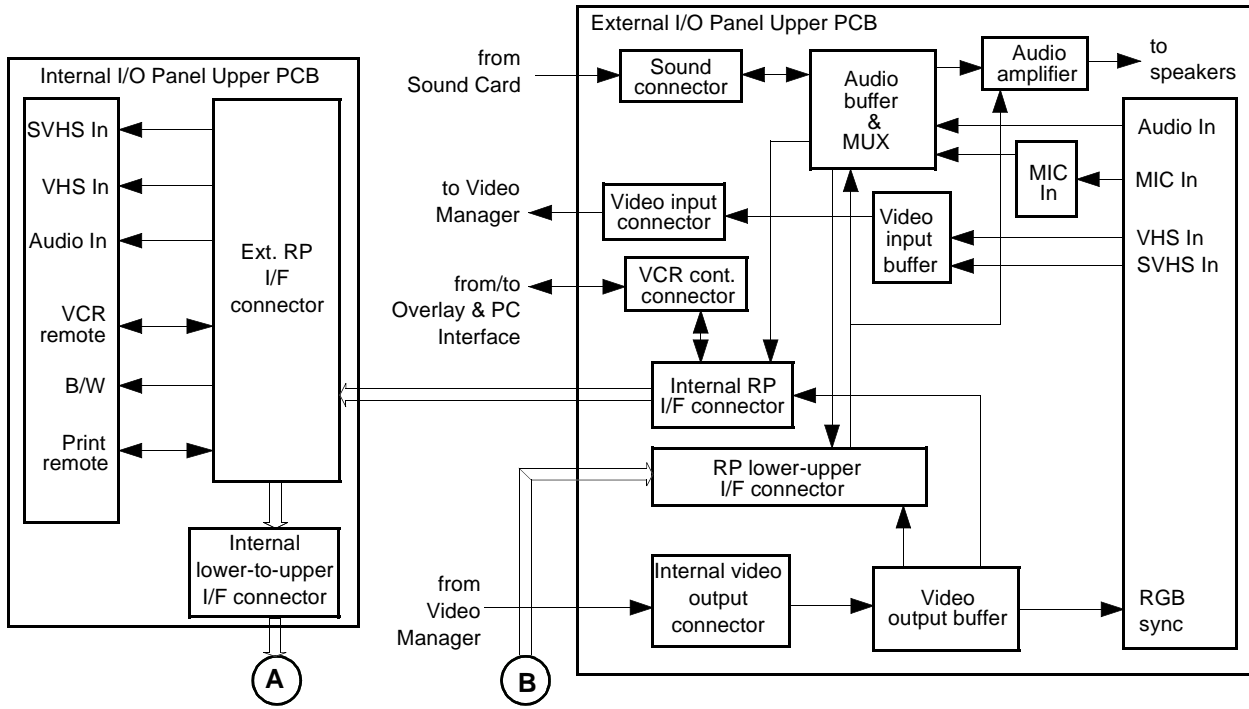
The user interface comprises the controls, indicators, and output devices of the system. The control panel (in conjunction with the monitor displays) is the primary operating interface with the ultrasound system. The footswitch, with freeze and display change functions, is an extension of the control panel.

The control panel consists of a QWERTY keyboard, TGC slide pot control, trackball, additional system control knobs and buttons, and a Key Interface PCB. The Key Interface PCB reads all of the control inputs.

The Key Interface PCB determines the function that has been selected and transmits that information to the PC Interface and Overlay PCB and on to the PC Motherboard for processing.

Data Paths

[Figure 4-15](#) is a diagram of the system 2D, M-mode, Doppler, and color data paths.



See Figure 4-14

Figure 4-13 I/O Panel PCBs Block Diagram (1 of 2)

See Figure 4-13

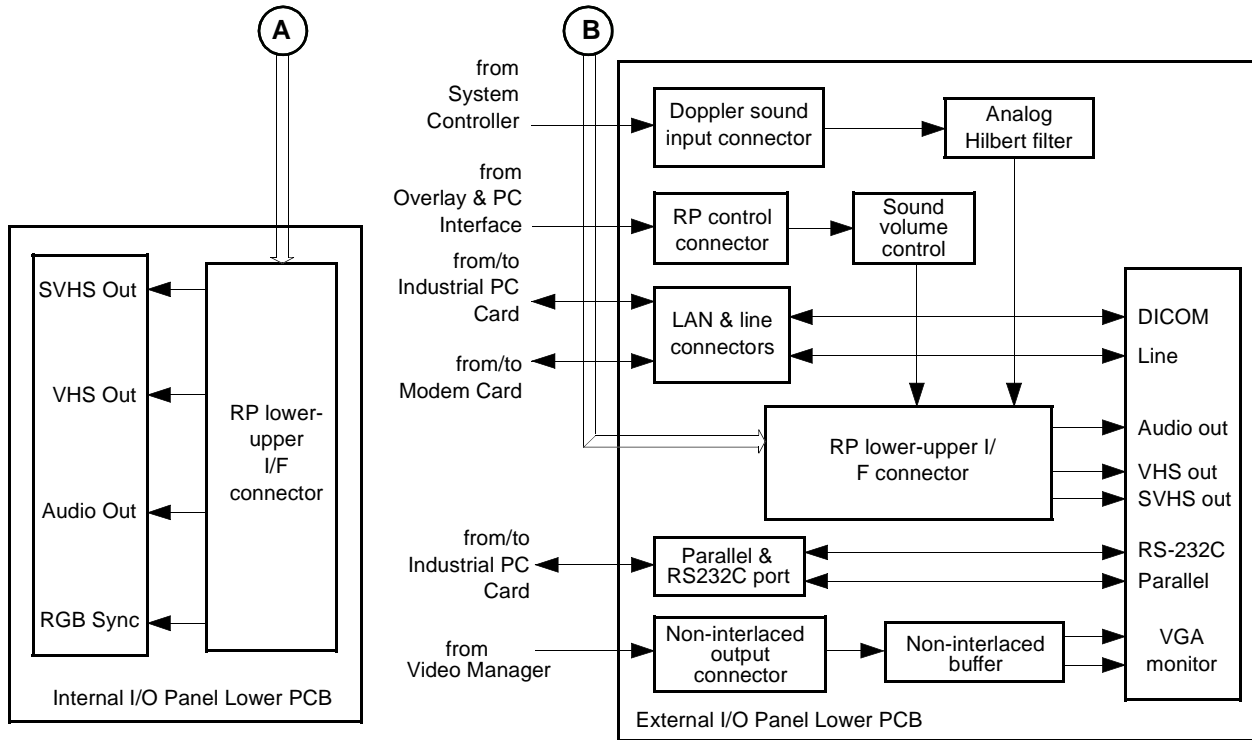


Figure 4-14

I/O Panel PCBs Block Diagram (2 of 2)

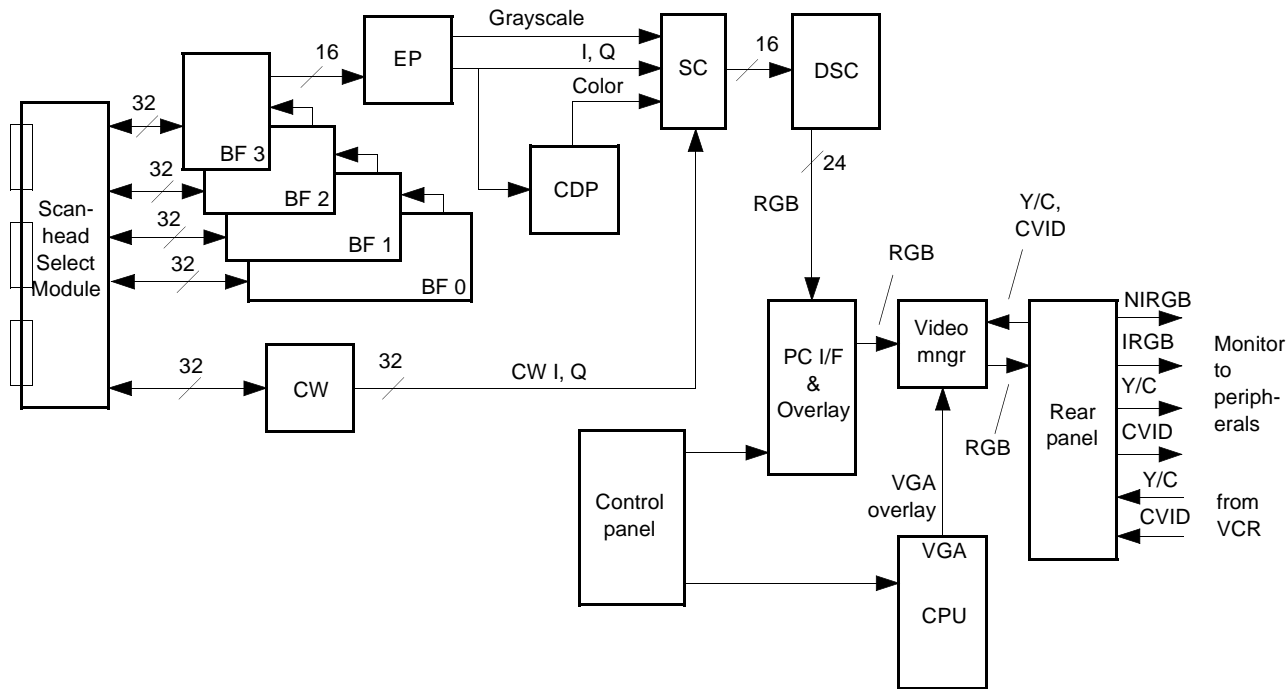


Figure 4-15

Data Path Block Diagram

5 Installation

Introduction

This section contains pre-installation, installation, and de-installation information for the HDI 1500 system. On-site installation usually consists of uncrating, unpacking, installing the monitor, accessories, and OEM peripherals, checking connections, and powering up the system for a functional check. De-installation consists of disconnecting the scan-heads, removing the monitor and OEM peripherals, and correctly packing the system components for shipment.

Read this section completely, before starting the installation.

NOTE There is important system inspection and setup information under [“Initial System and Peripheral Setup” on page 121](#).

Pre-Installation Evaluations

Before the system is delivered, Philips recommends that you perform the following pre-installation evaluations.

Materials

- Tool kit and digital volt meter (DVM)
- Oscilloscope
- ONEAC Line Viewer
- Three-prong test plug
- Power Line Data Sticker (4765-0247-XX)

Checking Physical Access for Delivery, Installation, and Operation

► To check that the site is prepared for system installation:

1. With the customer, evaluate site access for delivery. Consider the availability of a loading dock, elevators, ramps, and the width of passageways and doors.
2. Verify adequate space is available for system uncrating and installation.
3. At each location where the system will be operated, verify there is enough space for the system and any external peripherals.
4. Check adjacent rooms for activity and types of equipment that might negatively affect the Philips Ultrasound system.

Checking for Proper Ventilation

Advise the appropriate facility representative of system environmental operating requirements. If the rooms where the system will be used seem excessively hot or humid to you, ask the facility representative to take measurements. If they are not within system environmental operating specifications, ask the facility representative to make the appropriate corrections.

Wiring Requirements

Philips recommends that the electrical feeds to the system each be a dedicated line (no other equipment on the same line) with a third-wire ground. The ground wire must be an insulated, isolated solid-copper conductor bonded to the ground bus of the service panel. The outlet must be a Hospital Grade Receptacle (for installations in North America) or an Isolated Ground Receptacle. Proper installation shall reflect compliance with the national electrical code.

Checking the Electrical Power Source

WARNING

For safety and liability reasons, do not disassemble any power outlet or open any electrical panel. Have the facility representative confirm the wiring compliance using the criteria specified below.

► **To verify a dedicated AC line:**

1. Explain to the facilities representative that the system requires a dedicated AC line meeting the electrical power requirements identified in [Section 2, "Specifications"](#), in this manual.
2. Verify that the outlet to be used is a dedicated line:
 - a. Have the facility representative open the circuit breaker corresponding to the AC line for the system.
 - b. With a DVM or three-wire test plug, confirm that power is still applied to all other outlets and hard-wired devices in the immediate area, and that power is removed only from the dedicated outlet.
3. Verify the proper wiring of the outlet using a three-prong test plug. Use this plug to also test for the presence of a ground, but remember that it cannot detect neutral/ground reversals.
4. Review with the facility representative the current draw of the system and the voltage range it requires. It is the responsibility of the facility representative to determine the proper size of the wire based upon the length of the feed.

5. Using your DVM at the outlet, measure the hot/neutral, hot/ground, and neutral/ground voltages with a comparable load (for example, another ultrasound system) on the line.
6. Determine line loss:
 - a. Have the facility representative measure the voltage at the primary of the line's circuit breaker in the distribution sub-panel. If a facility representative is not available go to [step c](#).
 - b. Measure the voltage at the wall outlet. Calculate the percentage of voltage loss across the line using this formula:
Percent line loss = $[(A - B)/A] \times 100$
where A is the voltage at the circuit breaker with the system on, and B is the voltage at the wall outlet with the system on.
 - c. If a facility representative is not available, measure the voltage at the outlet with the load on and then with the load off.
 - d. Calculate the percentage of voltage loss across the line using this formula:
Percent line loss = $[(A - B)/A] \times 100$
where A is the voltage at the wall outlet with the system off, and B is the voltage at the wall outlet with the system on.
7. Use an ONEAC line viewer and oscilloscope to measure the power-line noise. Repeat with a load applied, for example, another ultrasound system.
8. Record your power quality observations and measurements.
9. Affix a Power Line Data sticker to the most qualified outlet in each of the primary operating areas. Add the circuit breaker number and location.

Checking for Electrostatic Conditions

During system operation and maintenance, electrostatic discharge (ESD) can cause system lock-ups, equipment reliability problems, and component failures.

CAUTION

With system covers or shields removed, ESD *will always* cause component damage. ESD damage is cumulative and may not be apparent at first, as indicated by a hard failure, but can cause degraded performance. Therefore, always use proper ESD handling procedures.

ESD results from a difference in electrical potential equalizing. ESD is more prevalent in low humidity and when there is friction against carpeting, linen, and clothing. Avoid placing the system directly under or close to HVAC vents. While special equipment is required to measure ESD levels, you can determine the presence of ESD as follows:

1. Check for the presence of ESD by walking around where the system will be installed and touching grounded surfaces. Note if you experience static discharges in the area.
2. Ask the operators if they have experienced static discharges in the work area.
3. If ESD is evident, suggest possible ESD minimizing devices and their usage, for example, static mats, humidifiers, and sprays.

System Installation

The following paragraphs contain system installation procedures. These procedures include onsite installation of factory-approved OEM peripherals, which may or may not have been ordered with the system you are installing. After you have completed the physical system installation, verify the system operates correctly using tests from [Section 6, “Performance Tests”](#).

Read this section completely before starting system installation.

Warnings and Cautions

Review [Section 3, “Safety”](#), before taking any action. Also, heed all additional warnings and cautions contained in this section.

Materials and Equipment

- FSE Tool Kit (6005-0077-02)
- DVM (digital volt meter)
- Quality Assurance Audit (PM) label overlay (4100-0941-XX)
- Service manuals and any separate installation instructions for the included OEM peripherals

Preliminary Inspection

- ▶ **To inspect the shipping crate for signs of damage:**
 1. Inspect the shipping crate before unpacking the system, examining it for any damage. Look for evidence that might indicate the crate was opened.
 2. Inspect tilt and shock indicators on the outside of the crate to ensure that they are not indicating RED. If the indicators show RED, the system needs to be inspected and tested to determine if it was damaged in shipment.
 3. Report any damage or pilferage to the carrier, the customer, and the Philips traffic department.

Unpacking the System

- ▶ **To remove the system from the crate:**
 1. Inspect the shipping crate before unpacking the system ([Figure 5-1](#) and [Figure 5-2](#)).

2. Ensure that you have sufficient space to unpack the system.
3. Set any additional boxes safely aside.

WARNING

Use caution when removing the strapping bands securing the shipping container. These bands are under enough tension to cause injury if removed carelessly.

4. Remove (cut) the strapping bands from around the crate.
5. Remove the top cover from the shipping container.
6. Cut the taped edges of the container; then carefully remove the box from around the system.
7. Carefully remove the interior foam cushioning and any accessories boxes packed with the system. Set the accessories safely aside.
8. Remove the two 9/16-inch or 1/2-inch bolts securing the front section of the inner crate to the pallet. This front section also serves as a ramp.

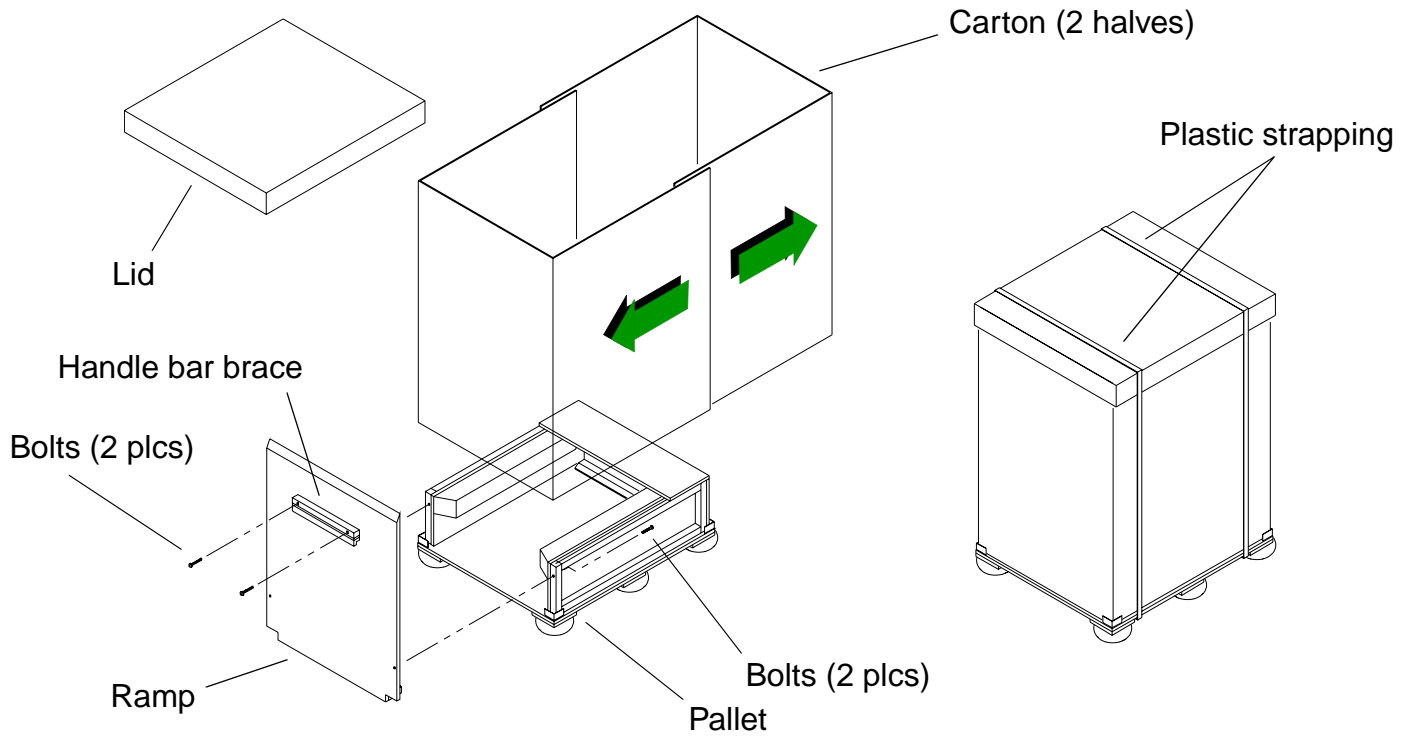
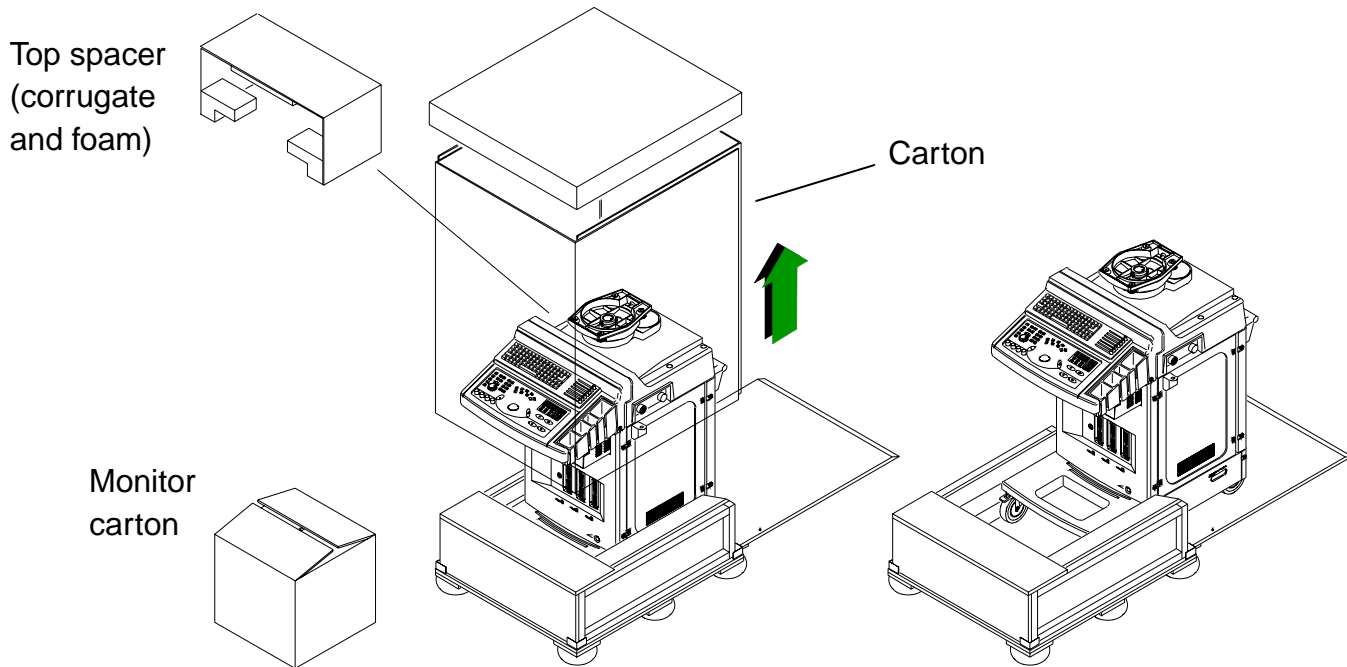


Figure 5-1

Crate Details



Monitor carton is shipped separately from system.

Figure 5-2

Unpacking Details

WARNING

This system weighs approximately 101 kg (222 lbs). To avoid possible personal injury or damage to equipment, do not attempt to lift the system without assistance. Also, use care when moving the system to avoid injuring yourself and damaging the equipment.

► To unpack the uncrated system:

1. Position the tall end of the ramp so it butts up against the pallet at the rear of the system with the beveled end of the ramp sloping to the floor. Carefully pull the system off of the pallet and down the ramp.
2. Carefully remove the monitor from its packaging and set it safely aside.
3. Open any accompanying boxes, locate and unwrap the contents, and set everything safely aside.
4. Properly dispose of the shipping materials. Do not return these materials to Philips.

► To inspect the system:

1. Inventory the shipment against the packing list.
2. Inspect the video monitor, scanheads, and accessories for damage.
3. Inspect the outside surfaces of the system for damage.
4. Report any damage to the carrier, the customer, and the Philips traffic department.
5. Verify that the system rolls and turns smoothly on its casters.
6. Remove the system covers.

**General
Inspection**

CAUTION

This equipment contains components that are electrostatically sensitive. Proper anti-static procedures, protection, and equipment must be used prior to opening and during handling of this equipment. Failure to use ESD procedures *will* cause damage to these components. Such damage to components is *not* covered by Philips warranties.

7. Remove any loose packing material, dust, or debris from the system interior.
8. Verify all visible cable connections are correct and secure.
9. Verify all modules are secure.
10. Seat and tighten modules and connectors as necessary.

CAUTION

The OEM power outlet has, on at least one occasion, been found miswired (the ground and a hot lead were reversed). It is recommended that you test all of the AC power receptacles on the system with a multi-meter.

11. Check the wiring of the AC power receptacles with power off:
 - a. Verify that the resistance between the ground pin and the chassis ground is less than 1.0 ohm (shorted).
 - b. Verify that the resistance from each of the AC power pins and the ground pin is greater than 20 Meg ohms (open)
12. Install the system covers.

Installing the Monitor

► To install the system monitor:

NOTE The system comes with one of three different monitors ([Figure 5-3](#)), which are functionally identical except for monitor adjustments. For monitor adjustments, refer to [Section 7, “Adjustments”](#).

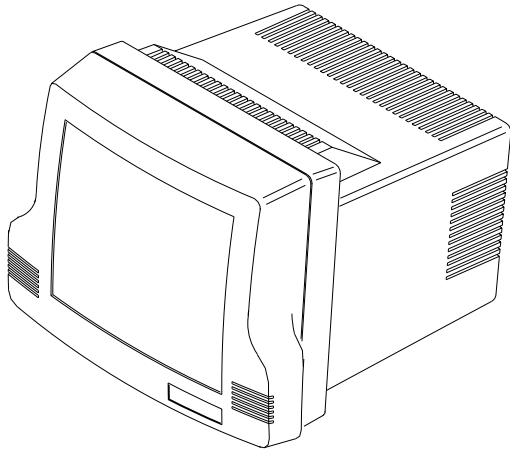
CAUTION

Use care when re-installing screws. The system has several places where a steel screw threads into an aluminum panel, which means that it is easy to strip and damage the hardware.

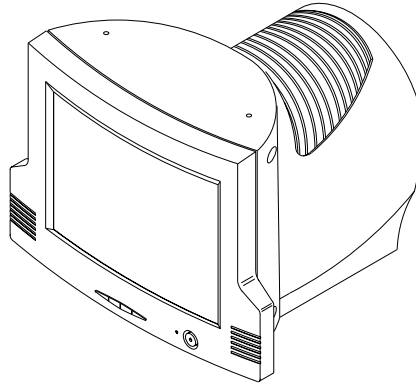
1. Remove the single Allen-head screw holding the monitor mounting plate to the monitor pedestal (MicroVitec only [Figure 5-4](#)).
2. Install the monitor mounting plate on the monitor (MicroVitec, [Figure 5-4](#) or KDS curved-screen, [Figure 5-5](#)) if needed.

NOTE The KDS flat-screen has a built-in mounting plate and does not require an installation for a separate plate.

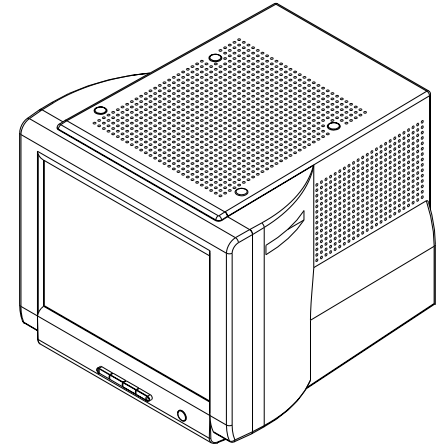
3. Mount the monitor on the pedestal and secure it with the thumb nuts or thumb screws ([Figure 5-6](#)).
4. Connect the video and power cables at the back of the monitor, dressing the cables as needed ([Figure 5-6](#)).
5. Verify that the monitor tilts and swivels correctly on its base and that the monitor pedestal can be moved up and down.



-MicroVitec-



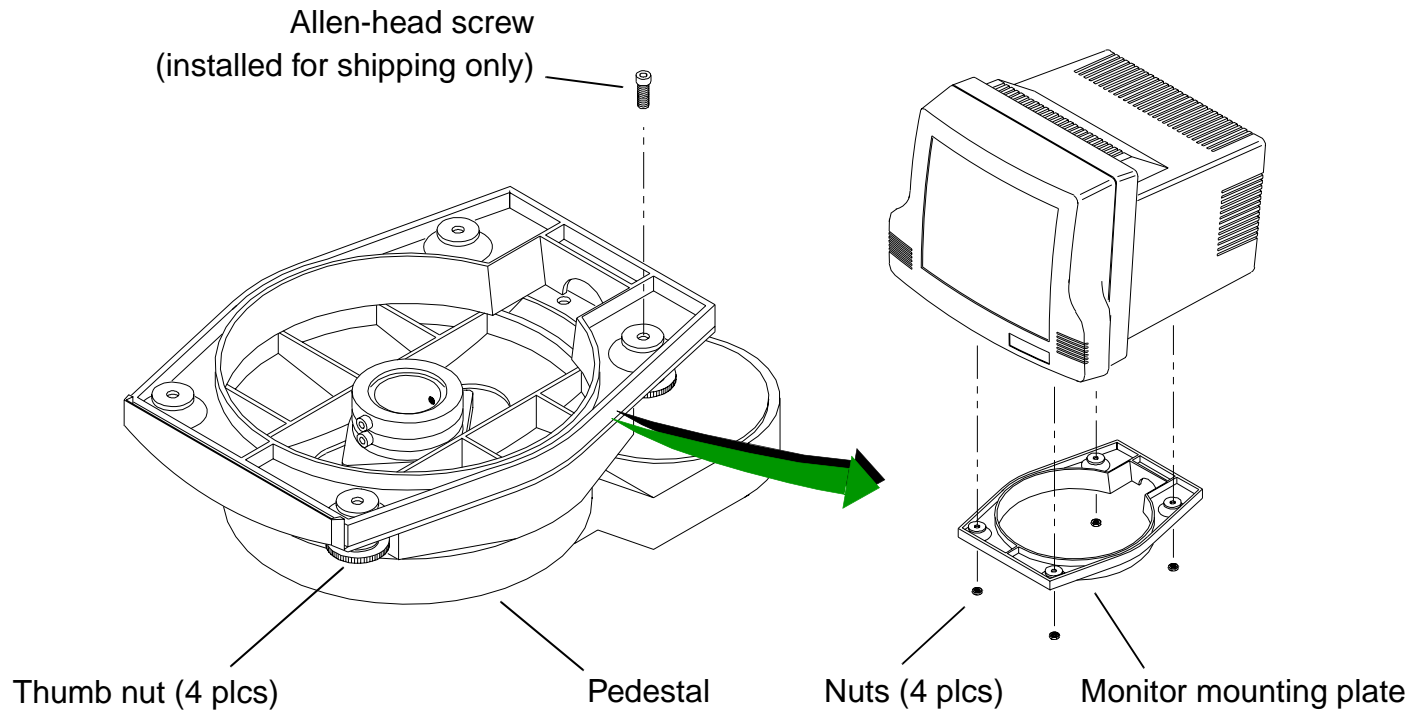
-KDS Curved-screen-



-KDS Flat-screen-

Figure 5-3

System Monitors

**Figure 5-4****Monitor Mounting Plate Assembly (MicroVitec)**

NOTE The KDS flat-screen has a built-in mounting plate and does not require an installation for a separate plate.

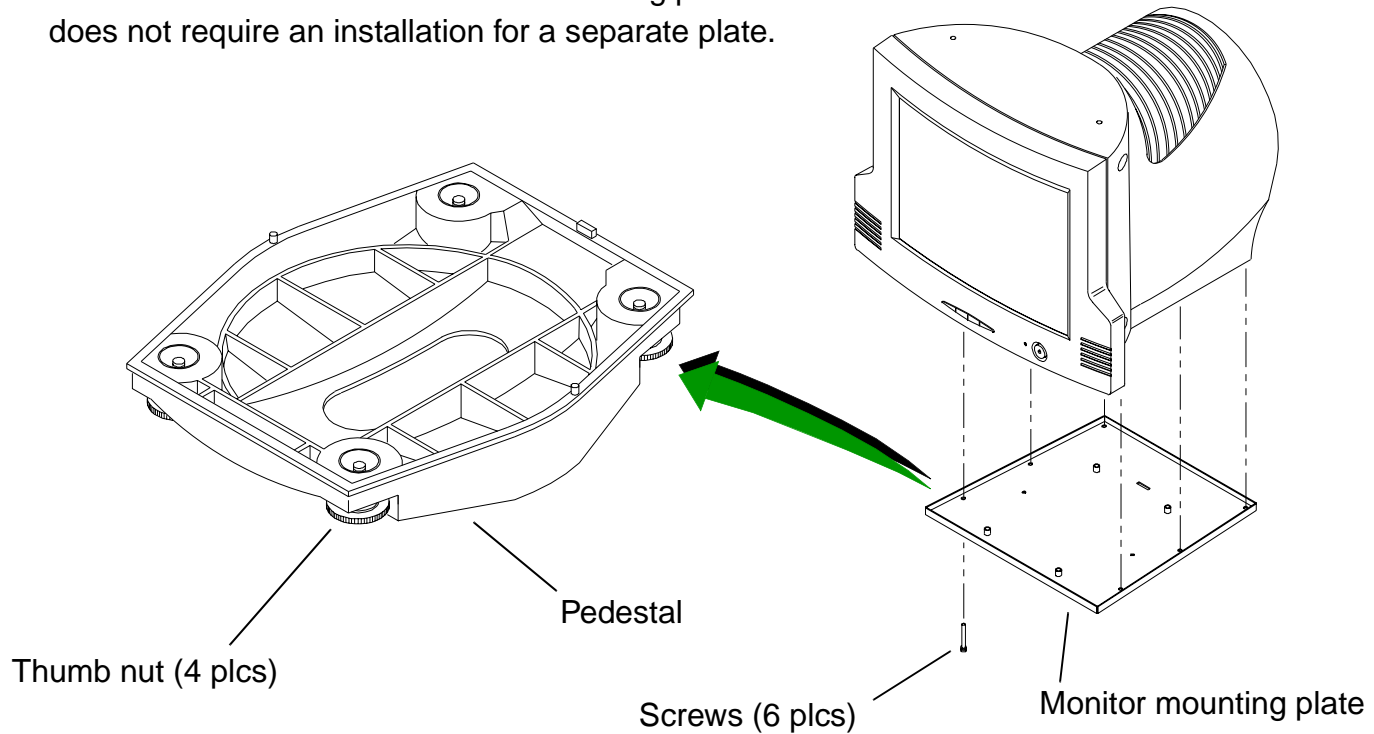
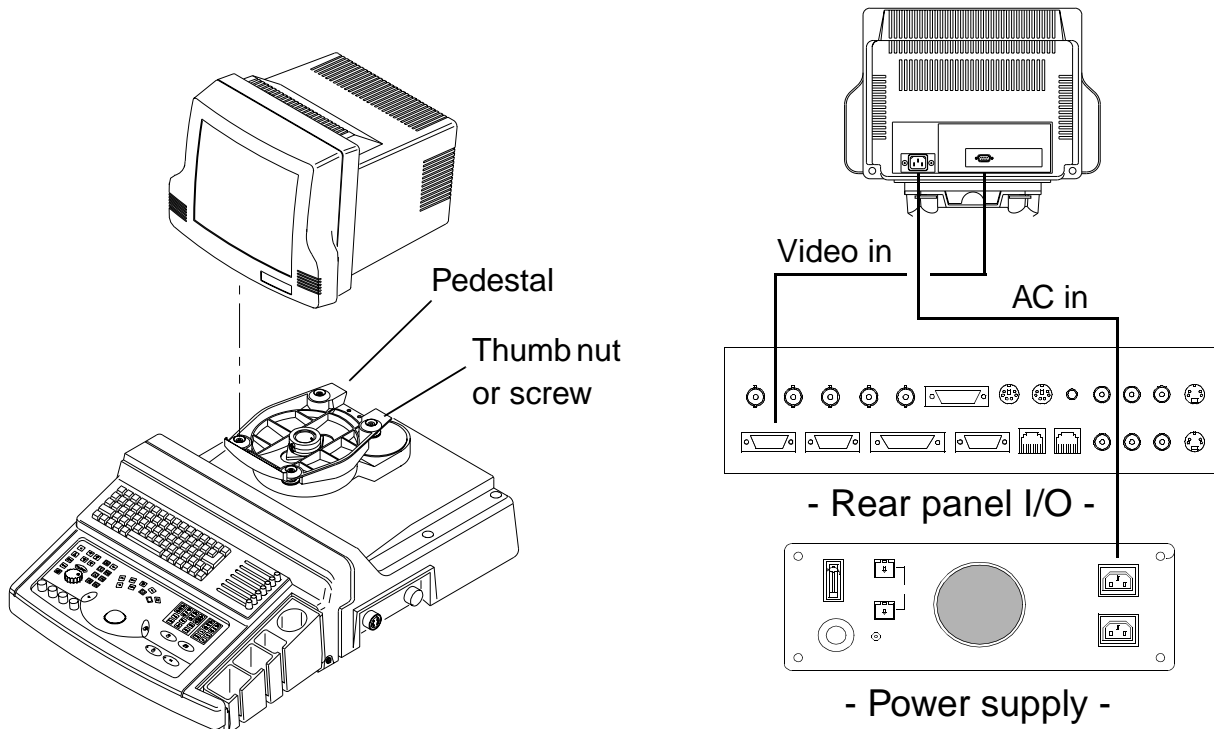


Figure 5-5

Monitor Mounting Plate Assembly (KDS Curved-screen)

**Figure 5-6****Monitor Installation and Cable Connections**

Installing OEM Peripherals

The shelf space below the control panel (OEM bay) will accommodate internal installation of a black and white (B/W) image printer and a color image printer, or a B/W image printer and a VCR, or any one of these peripherals. The Codonics NP-1660 is an “external” peripheral and is not installed in the OEM bay.

- NOTES**
- Only program phase 1.5 (or higher) systems shipped from the factory with a KDS monitor can support the VCR top-of-monitor mounting option.
 - Systems that do not have the required monitor or upgrade kit, for top-mount VCR installation, cannot be upgraded or installed properly. The original monitor, manufactured by MicroVitec, does not have the required mounting holes and does not support monitor top-mount installation. The curved-screen and flat-screen KDS monitors require different upgrade kits for installation and do support top-mount installation.

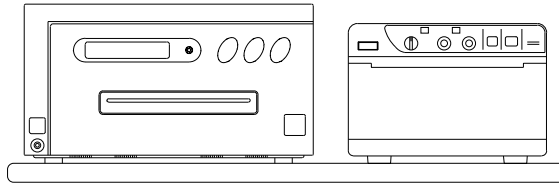
OEM bay installations

► **To install the Sony UP 890/895 or Mitsubishi P91W(A) B/W image printer:**

The black-and-white image printer should be installed on the right side of the shelf whenever there are two peripherals to install ([Figure 5-7](#)), otherwise it will be centered on the shelf and secured with Velcro and a strap.

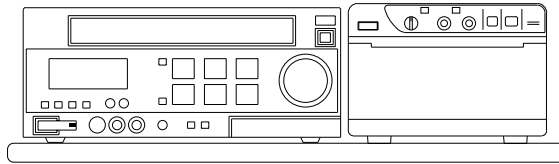
1. If not already done, open the printer shipping box, carefully unpack the contents and set them safely aside.
2. Install the printer paper roll.
3. If you are installing a B/W printer by itself, proceed with [step 4](#). If you are installing a B/W printer with a companion VCR or color printer, skip to [step 5](#).

CP 700/800 color printer
or UP-21 color video printer



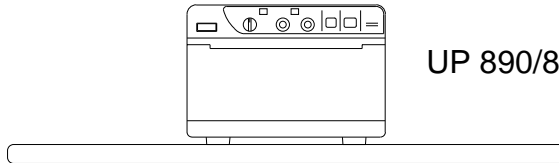
UP 890/895/P91W(A) B/W printer

AG MD830/835 VCR



UP 890/895/P91W(A) B/W printer

UP 890/895/P91W(A) B/W printer



Note: Shelf is not removable

Figure 5-7

OEM Placements in OEM Bay

4. To install a B/W printer by itself, center it on the shelf ([Figure 5-7 C](#)), and secure it with Velcro as follows:

NOTE In the following steps, do not allow exposed Velcro adhesive to contact any surface until it is in the correct position; otherwise, you will need to remove the Velcro and start over. Do not reuse Velcro that has been removed after making contact, because it will not provide a reliable bond. The adhesive should be allowed to set for at least 24 hours before separating the Velcro for any reason.

- a. Cut four 3-inch lengths of Velcro (P/N 2210-0125 and 2210 -0126), with the hook and loop strips mated.
- b. With isopropyl alcohol, thoroughly clean the two areas on the bottom of the printer where the Velcro adhesive will make contact ([Figure 5-8](#)). Allow to dry for a full 5 minutes before proceeding.
- c. Assemble the pieces of Velcro as shown in [Figure 5-8](#), paying particular attention to the orientation of the Velcro.
- d. Remove the backing from the bottom pieces of Velcro and attach them securely to the front and back locations ([Figure 5-8](#)).
- e. Firmly press on the Velcro along the length of the applied strips to ensure there are no gaps. Allow the adhesive to set for a few minutes before proceeding.
- f. With isopropyl alcohol, thoroughly clean the two areas on the shelf where the Velcro adhesive on the bottom of the printer will make contact ([Figure 5-7](#)). Allow to dry for a full 5 minutes.

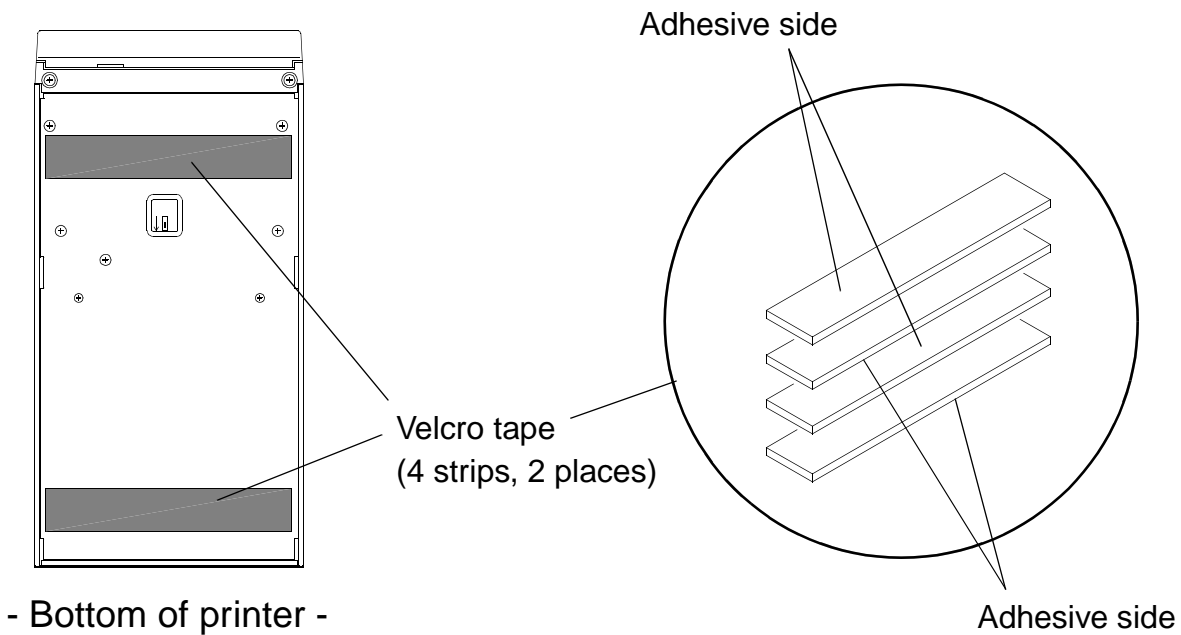
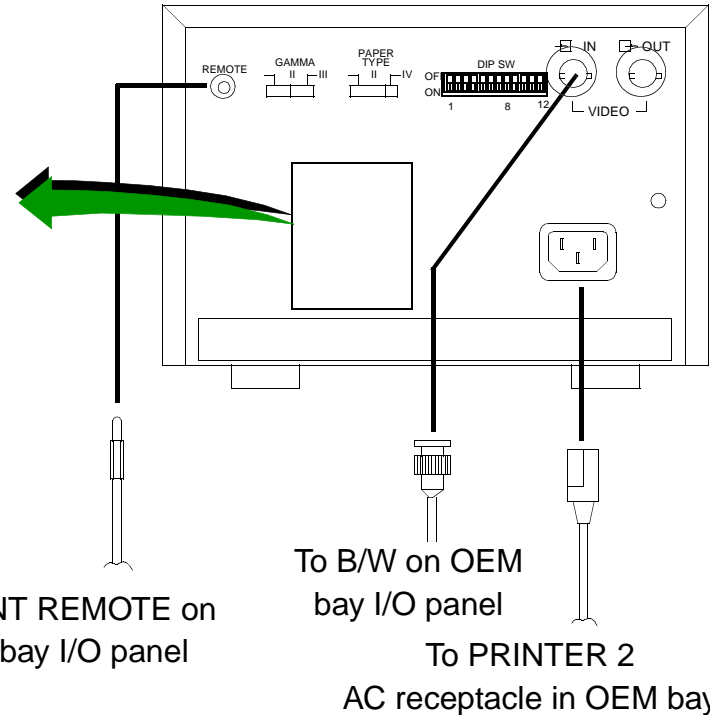


Figure 5-8

Velcro Placement on B/W Printer

Dip Switch Settings

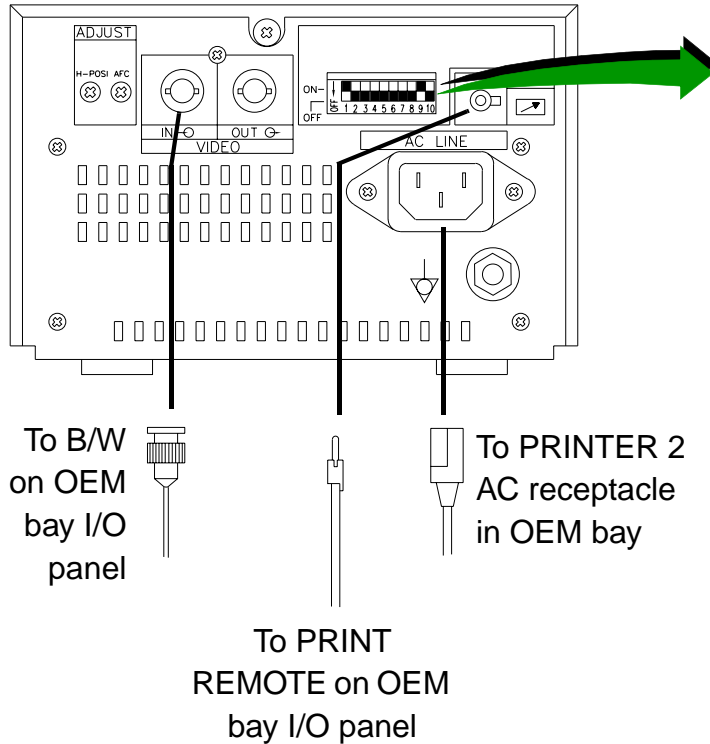
Switch	Function	Setting
1	Interrupt	ON
2	Postfeed	ON
3	Aspect	ON
4	Memory	ON
5	Image	ON
6	Mirror	ON
7	Direction	ON
8	Scan	ON
9	Scan	ON
10	Reserved	ON
11	Input	ON
12	75 Ω	ON



See Figure 5-11

Figure 5-9

Internal Sony UP-890/895MD B/W Printer Connections



Dip Switch Settings

Switch	Function	Setting
1	Impedance	ON
2	Trap	OFF
3	Gain	OFF
4	Image	OFF
5	AFC	OFF
6	DIR	OFF
7	Memory	OFF
8	Scan	OFF
9	Saving ¹	ON
10	Paper	OFF
HPOSI	-	DO NOT ADJUST
AFC	-	DO NOT ADJUST

1. Switch 9 is for paper-saving mode. Install printers with the paper-saving mode turned off. If the paper-saving mode is turned on, instruct the customer to advance the paper before removing the print; otherwise, the patient data will be cut off the top of the print.

[See Figure 5-11](#)

Figure 5-10

Internal Mitsubishi P91(A) B/W Printer Connections

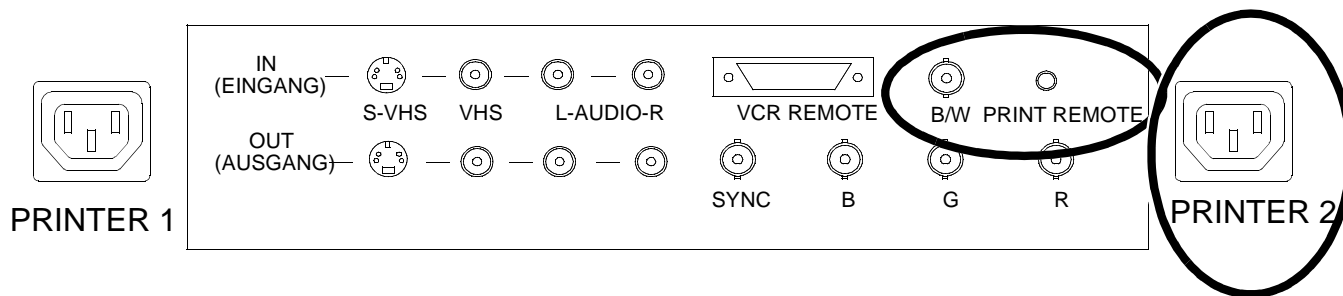
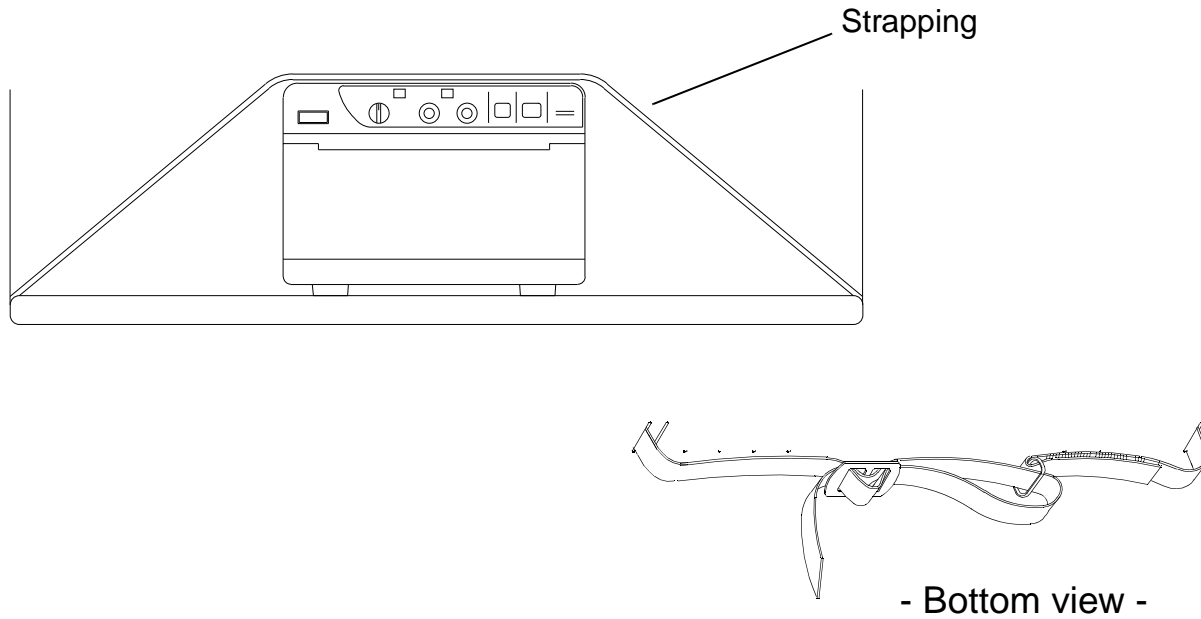


Figure 5-11

OEM Bay I/O and AC Connections For B/W Printers



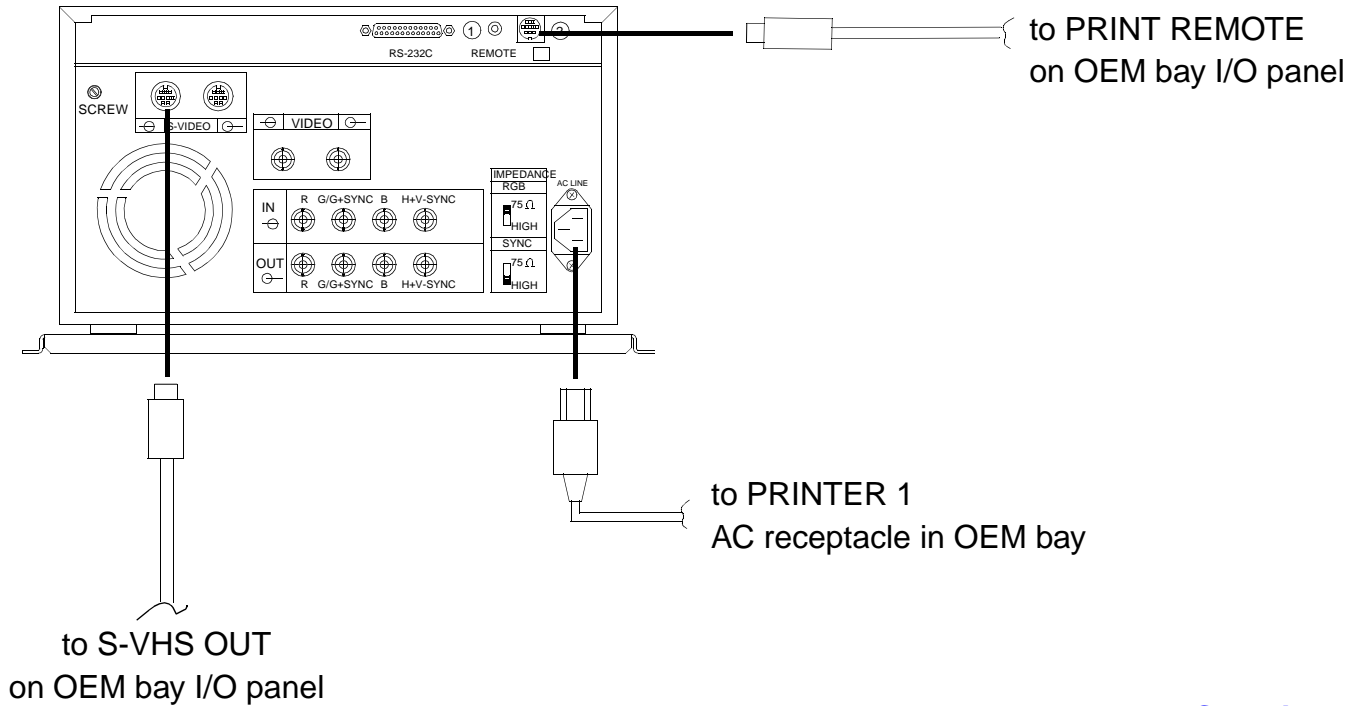
Note: Shelf is not removable

Figure 5-12 **Peripheral Strapping**

► **To install the Mitsubishi CP700U/E or CP800U/E or Sony UP-21MD color printer:**

Install the color printer on the left side of the shelf when it is paired with the B/W printer ([Figure 5-7 A](#)); otherwise, center the color printer on the shelf and secure it with a strap.

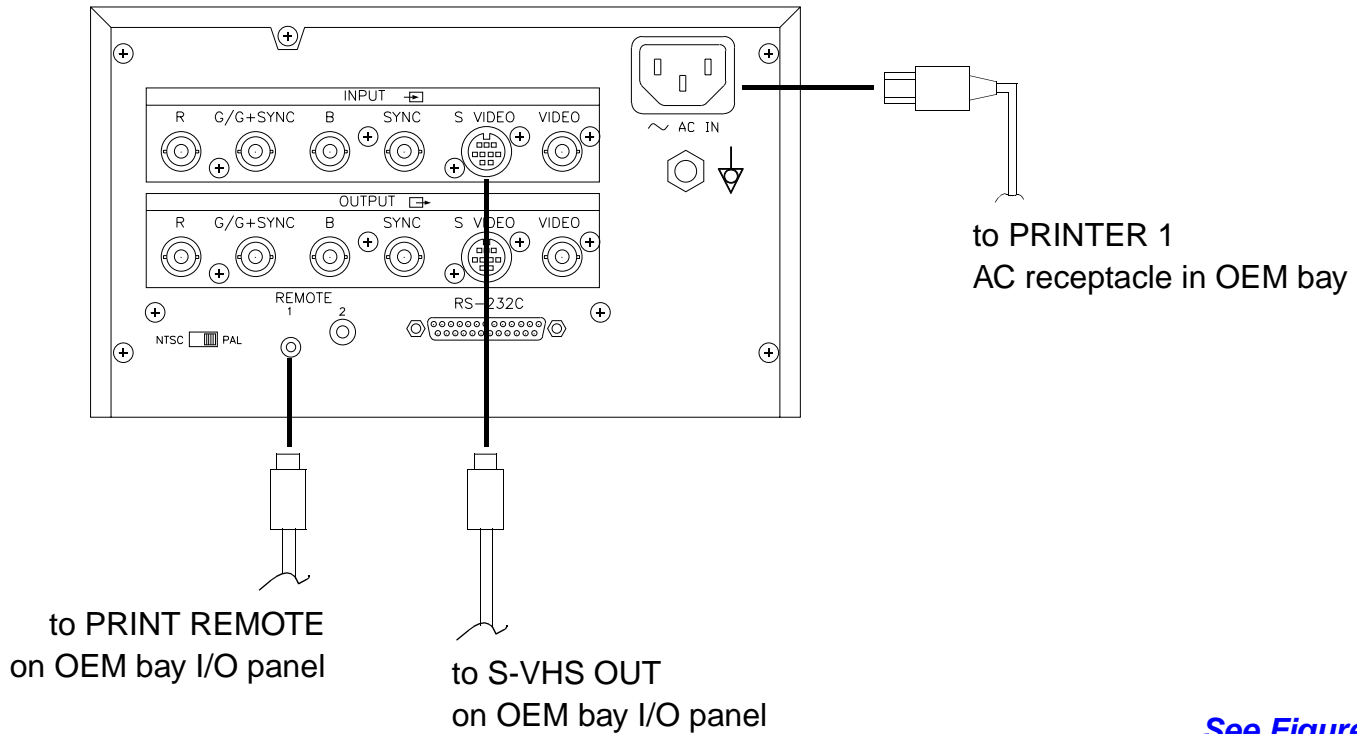
1. If not already done, open and carefully unpack the color printer shipping box.
2. Connect the color printer as shown in [Figure 5-13](#) or [Figure 5-14](#), and [Figure 5-15](#) as applies.
3. Position the color printer on the left side of the OEM bay with the front of the printer aligned with the front edge of the shelf. (If you are installing the printer by itself, center it on the shelf.)
4. Install the strap (P/N 1065-2386-01) through the bottom vent hole on each side of the OEM bay, over the color printer and the B/W printer, and cinch it on the bottom as shown in [Figure 5-12](#).
5. Program the color printer using the procedures on [page 128](#) and [page 133](#) or [page 137](#) as applies.



See Figure 5-15

Figure 5-13

Internal Mitsubishi CP700U/E and CP800U/E Color Printer Connections



See Figure 5-15

Figure 5-14

Internal Sony UP-21MD Color Video Printer Connections

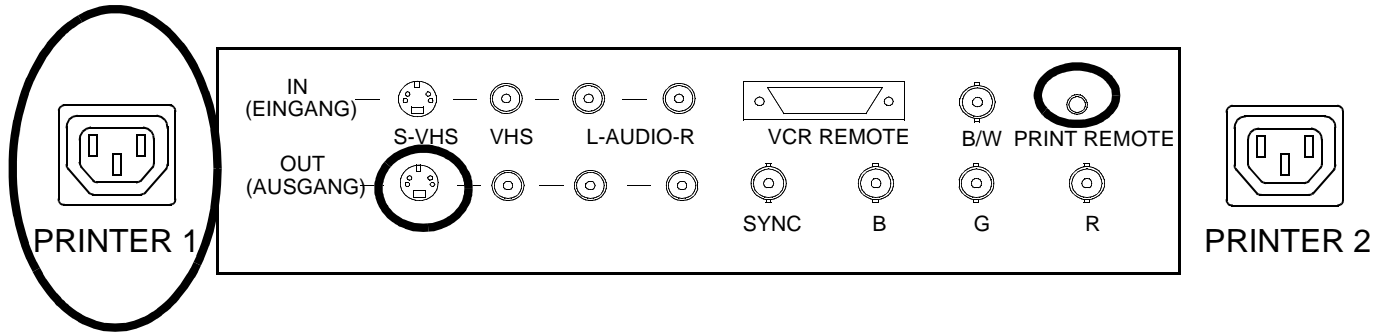


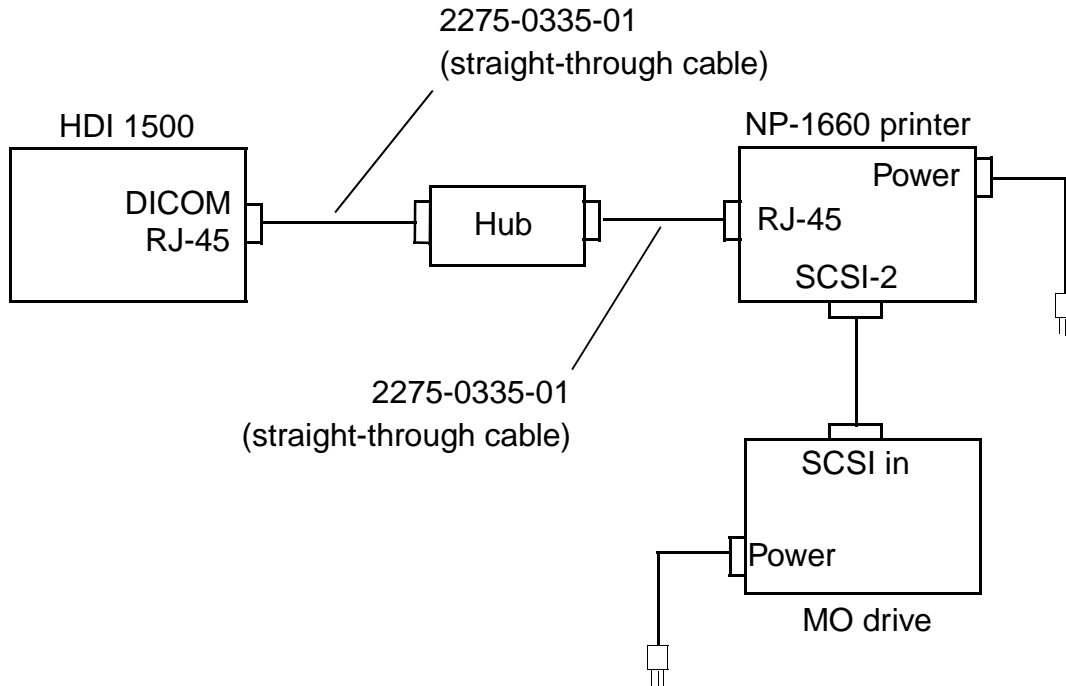
Figure 5-15

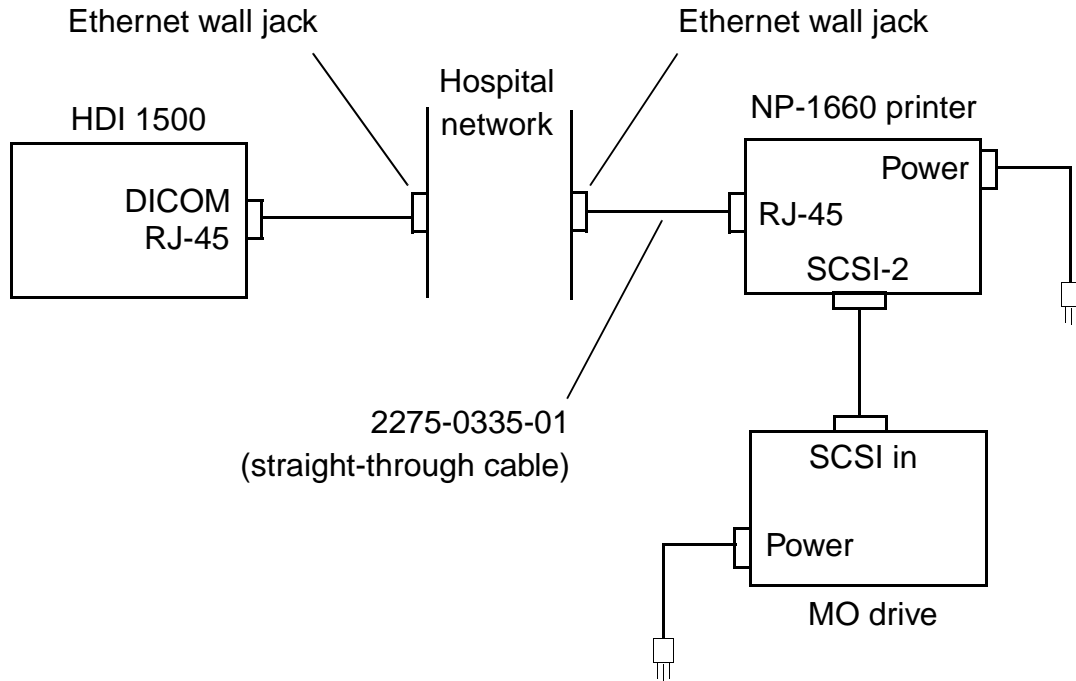
OEM Bay I/O Panel Connections for Color Printer

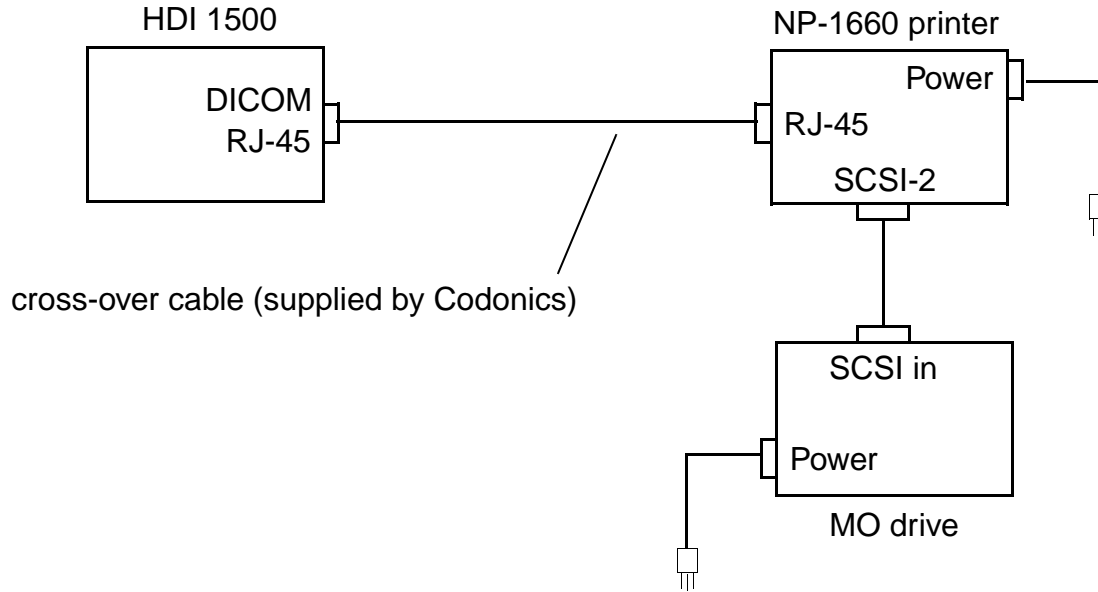
OEM External Installation

► To install a Codonics NP-1660 network printer:

1. Connect the printer as appropriate ([Figure 5-16](#), [Figure 5-17](#), or [Figure 5-18](#)).
2. Set up the system for DICOM operation as described on [page 143](#), setting the Codonics printer as the default printer.
3. Finish installing the Codonics NP-1660 printer as described in the *External Codonics NP-1660 Printer Field Installation Instructions* (P/N 8055-1767-02 and up) or the *Codonics Printer Installation and Setup Video* (P/N WTE-9903), available through Philips Worldwide Sales Training and Education in Bothell.

**Figure 5-16****Codonics NP-1660 Printer LAN Connection Diagram**

**Figure 5-17****Codonics NP-1660 Printer Ethernet Wall Jack Connection Diagram**

**Figure 5-18****Codonics NP-1660 Printer Point-to-Point Connection Diagram**

VCR Installation (OEM bay or Monitor Top-mount)

► To install the Panasonic AG-MD830/835-P/E VCR:

NOTE The AG-MD835 VCR is compatible only with HDI 1500 2.5 systems with the 7575-1587-05 (or higher) Video Manager PCB.

If you do not have the VCR top-of-monitor mounting option, install the VCR on the left side of the shelf when it is paired with the B/W printer ([Figure 5-7 B](#)); otherwise, center the VCR on the shelf and secure it with a strap.

1. If not already done, open and carefully unpack the VCR shipping box.
2. If you are installing the VCR on a system with v1.08.10 software, proceed to [step 4](#).
3. If you are installing the VCR on a system with v2.00.02 and up software, configure the VCR as follows:
 - a. Remove the four screws securing the RS-232C Interface Adaptor in the VCR, noting the location of the long screw ([Figure 5-19](#)).
 - b. Remove the the RS-232C Interface Adaptor from the VCR and set the switches as shown in [Figure 5-20](#).

NOTE A metal shield may be present. If so, remove the shield to access the DIP switch and reinstall it after you are done with the DIP switch settings.

- c. Re-install the RS-232C Interface Adaptor.

4. If you have one of the KDS top-of-monitor mounting kits for the VCR, install the VCR as shown in [Figure 5-21](#) (KDS curved-screen) or [Figure 5-22](#) and [Figure 5-23](#) (KDS flat-screen). If you do not have the VCR top-of-monitor mounting option, proceed to [step 5](#).

NOTE Systems that do not have the required monitor or upgrade kit for top-mount VCR installation cannot be installed properly. The original MicroVitec monitor does not have the required mounting holes and does not support monitor top-mount installation. The curved-screen and flat-screen KDS monitors require different upgrade kits for installation and do support top-mount installation.

- a. Once the VCR has been securely installed, connect the VCR cables as shown in [Figure 5-24](#) and [Figure 5-25](#).
 - b. For systems without the Stress Echo feature, which do not have the Mutiview Module installed, dress the cables as shown in [Figure 5-26](#) and [Figure 5-27](#). For systems with the Stress Echo feature, which do have the Mutiview Module installed, dress the cables as shown in [Figure 5-26](#) and [Figure 5-28](#). In either case, secure the cable bundle to the cable anchors with cable ties, leaving a loop in the cable bundle to allow the monitor to swivel fully and ensuring that the VCR power cord is not too short to reach the system rear panel.
 - c. Program the VCR using the procedure on [page 123](#).
5. Connect the internal VCR as shown in [Figure 5-29](#) and [Figure 5-30](#).
 6. Position the VCR on the left side of the OEM bay with the front of the VCR aligned with the front edge of the shelf. (If you are installing the VCR by itself, center it on the shelf.)

7. Install the strap (P/N 1065-2386-01) through the bottom vent hole on each side of the OEM bay, over the VCR and the printer, and cinch it on the bottom as shown in [Figure 5-12](#).
8. Program the VCR using the procedure on [page 123](#).

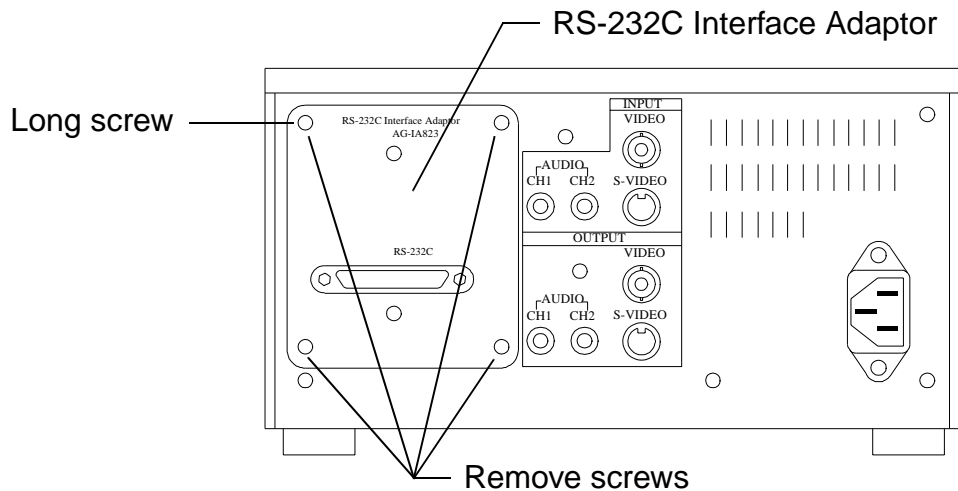
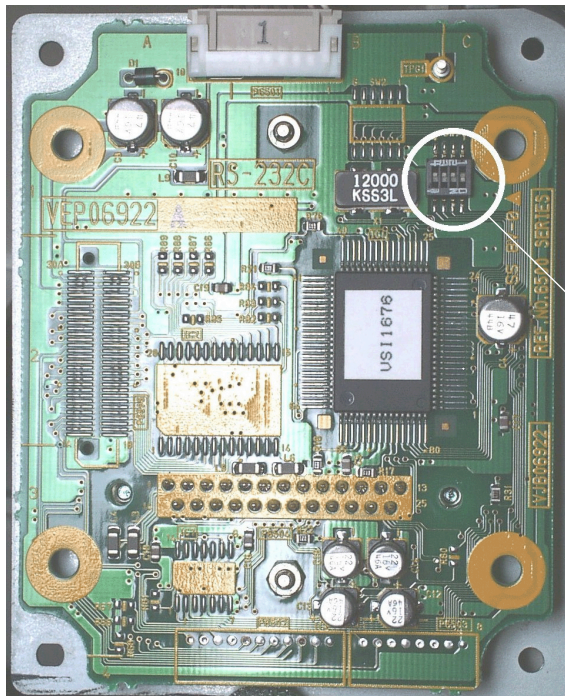


Figure 5-19

AG-MD830/835 VCR RS-232 Interface Adaptor (1 of 2)



- PCB side -

DIP switch

v1.08.10 v2.00.02 and up

1: OFF 1: ON

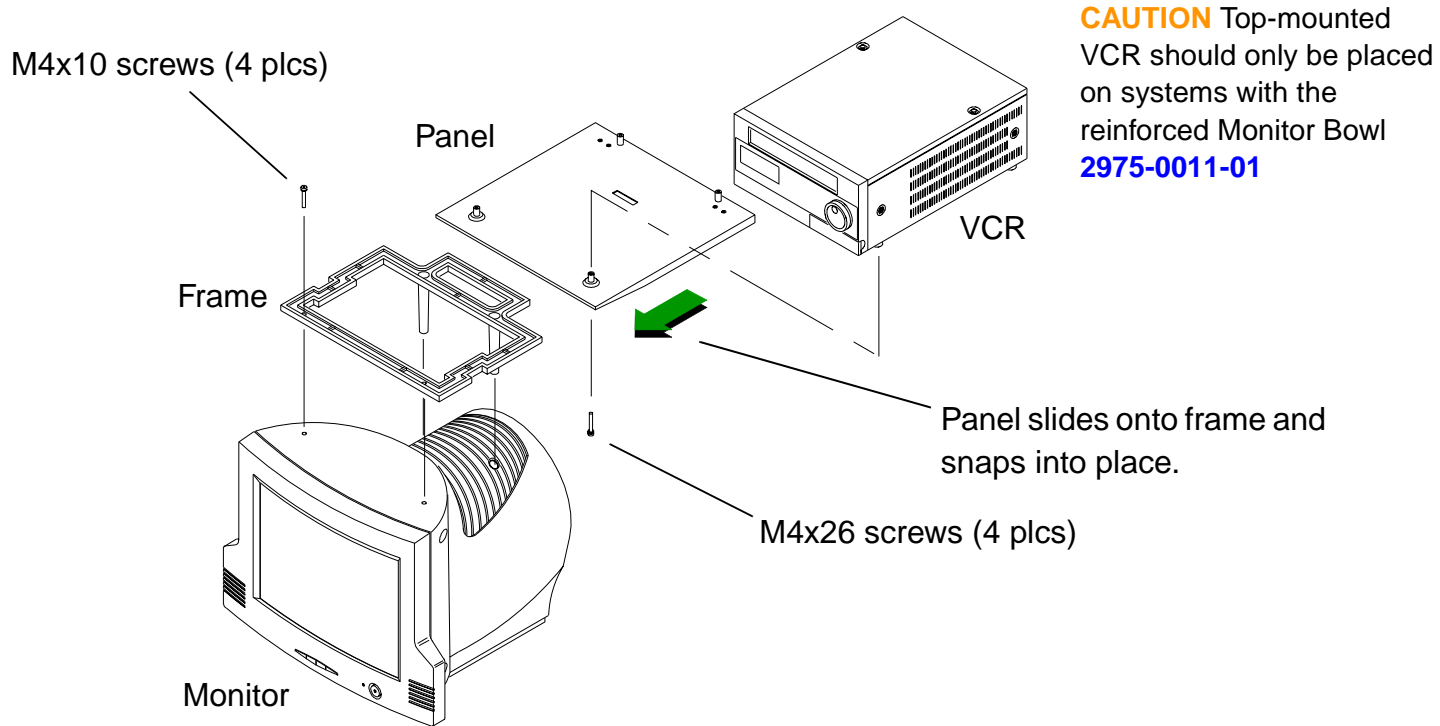
2: OFF 2: OFF

3: OFF 3: OFF

4: OFF 4: OFF

Figure 5-20

AG-MD830/835 VCR RS-232 Interface Adaptor (2 of 2)



Use Loctite (P/N 2301-1212) on all screws

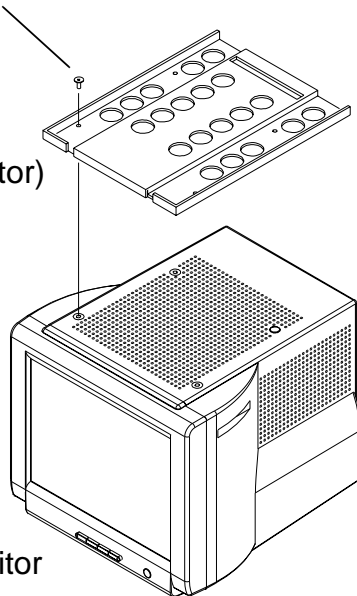
Figure 5-21

KDS Curved-screen Monitor Top Mount VCR Installation

M4x30 screws (4 plcs)

VCR bracket (monitor)

Monitor

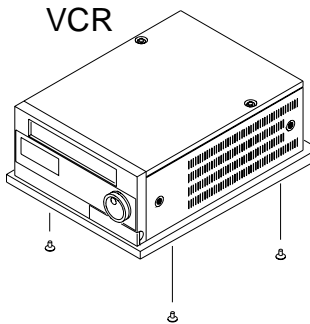


CAUTION Top-mounted VCR should only be placed on systems with the reinforced Monitor Bowl [2975-0011-01](#)

VCR

VCR bracket (VCR)

M4x30 screws (4 plcs)



Use Loctite (P/N 2301-1212) on all screws

Figure 5-22

KDS Flat-screen Monitor Top Mount VCR Installation (1 of 2)

CAUTION Top-mounted VCR should only be placed on systems with the re-inforced Monitor Bowl [2975-0011-01](#)

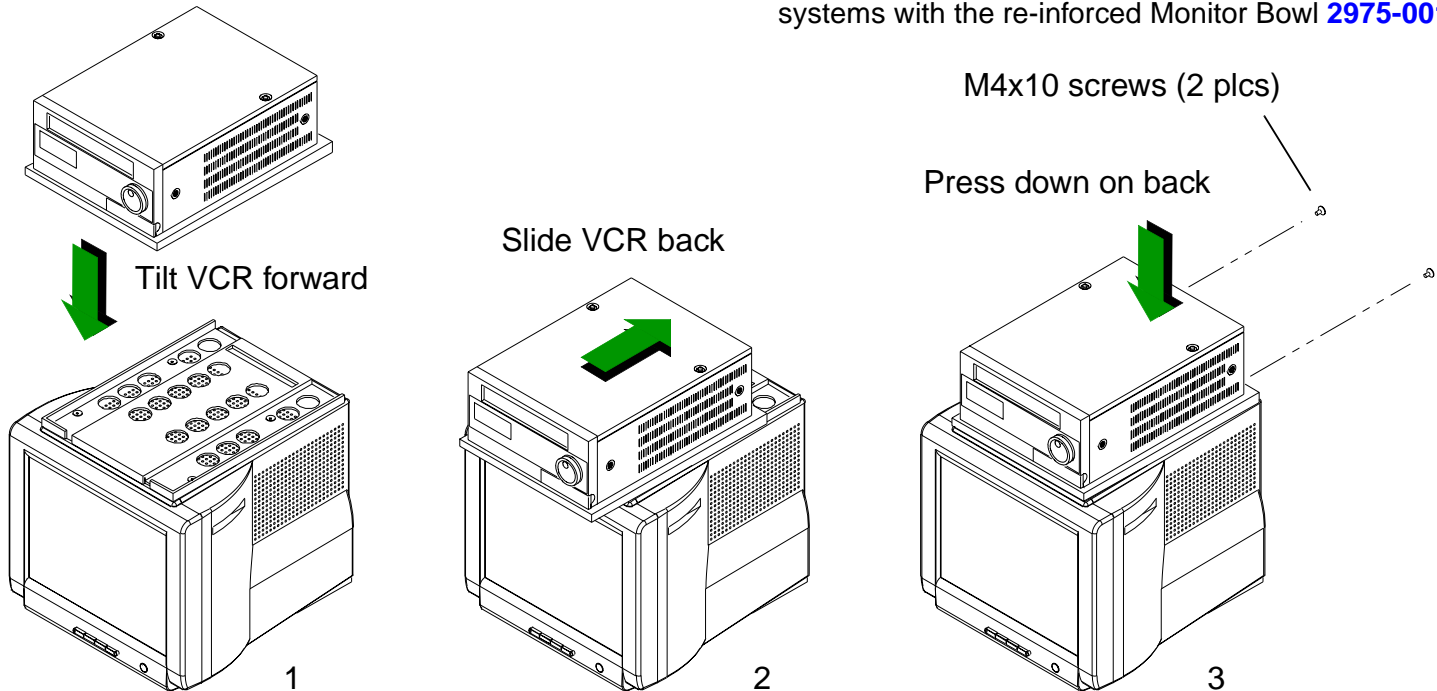
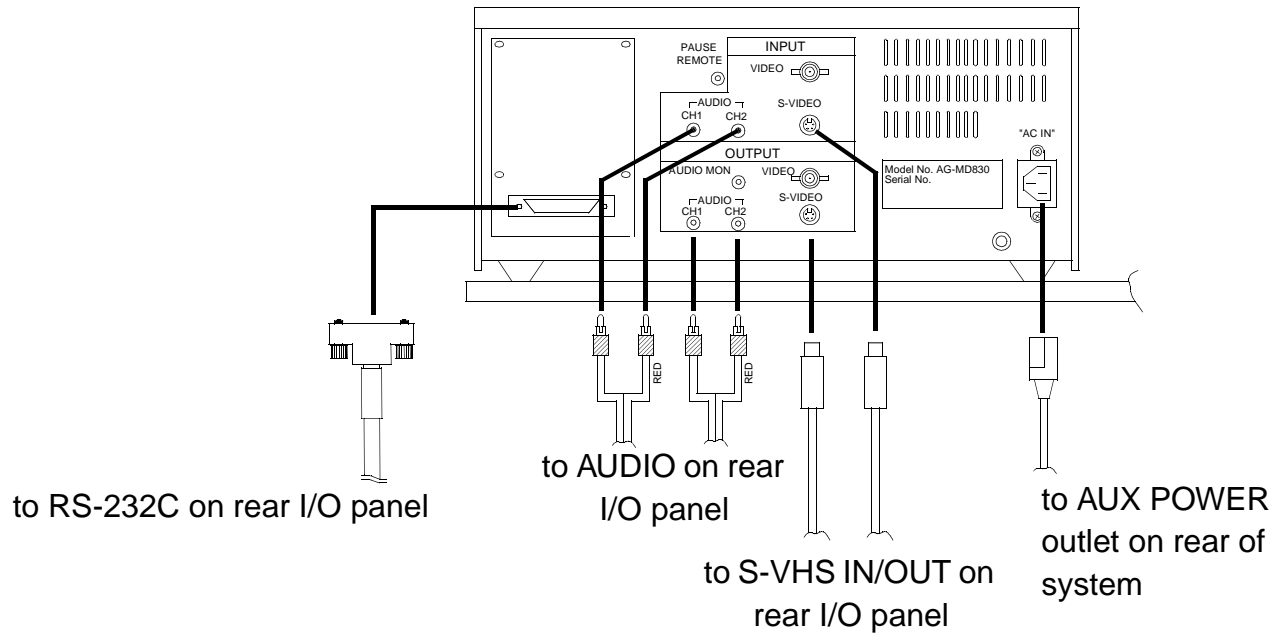


Figure 5-23

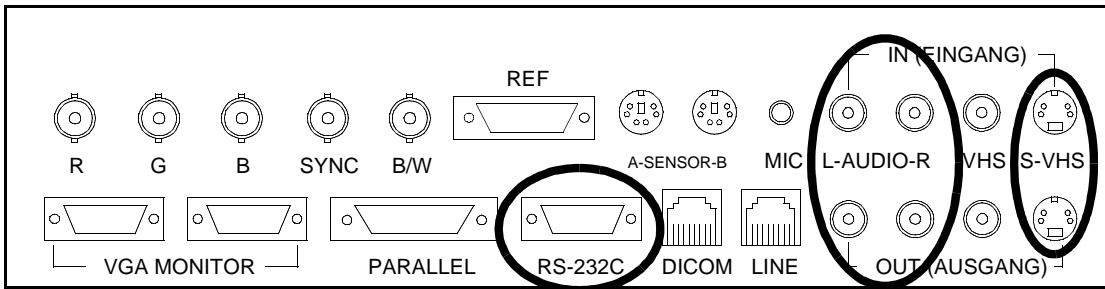
KDS Flat-screen Monitor Top Mount VCR Installation (2 of 2)

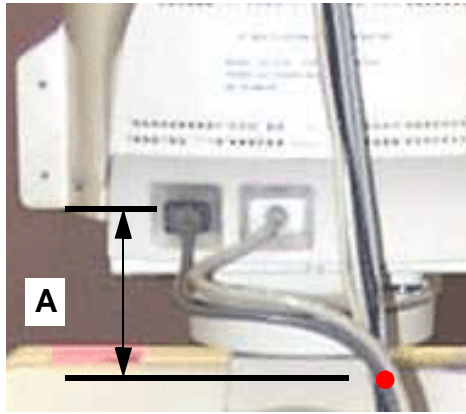


See Figure 5-25

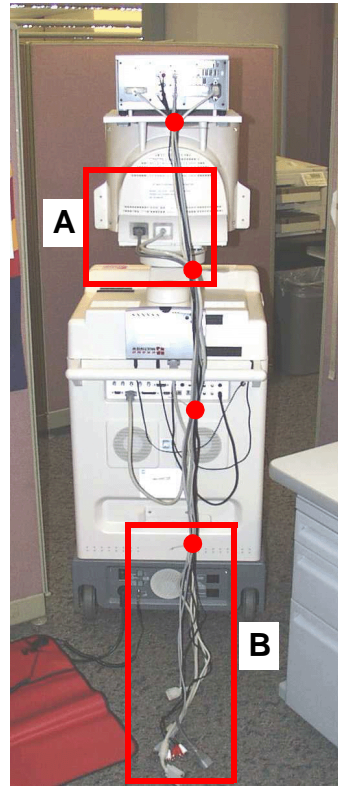
Figure 5-24

Top-mount Panasonic AG-MD830/835P/E VCR Connections

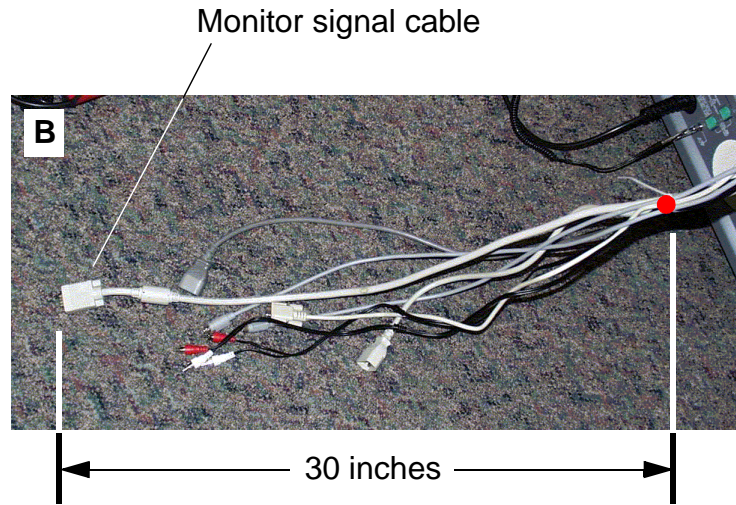
**Figure 5-25****Rear I/O Panel Connectors for Top-mount VCR**



12 inches



● Cable tie points

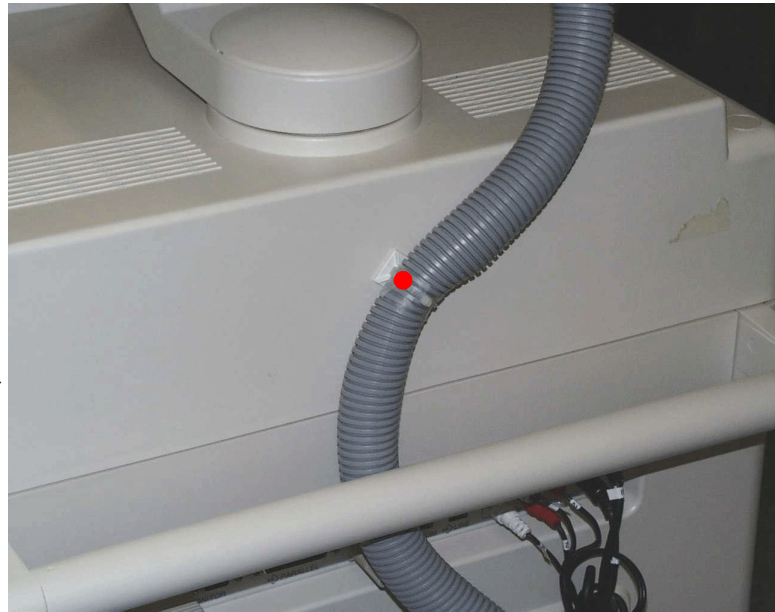
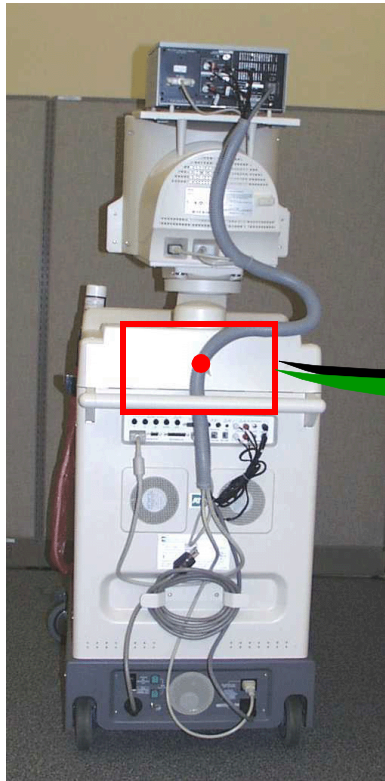


Monitor signal cable

30 inches

Figure 5-26

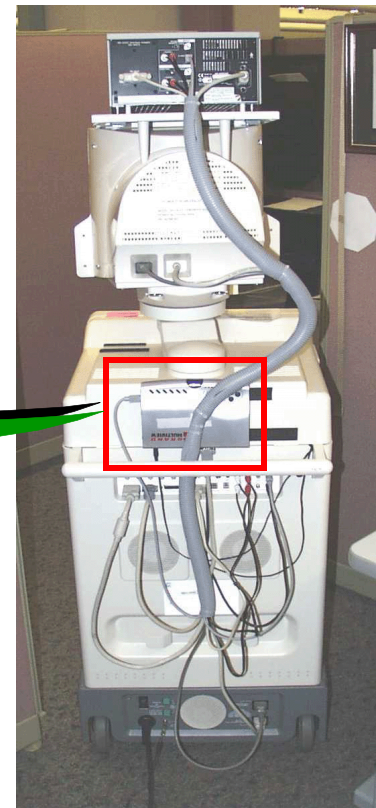
Top-mount VCR Cable Dressing Cable Tie Points



● Cable tie points

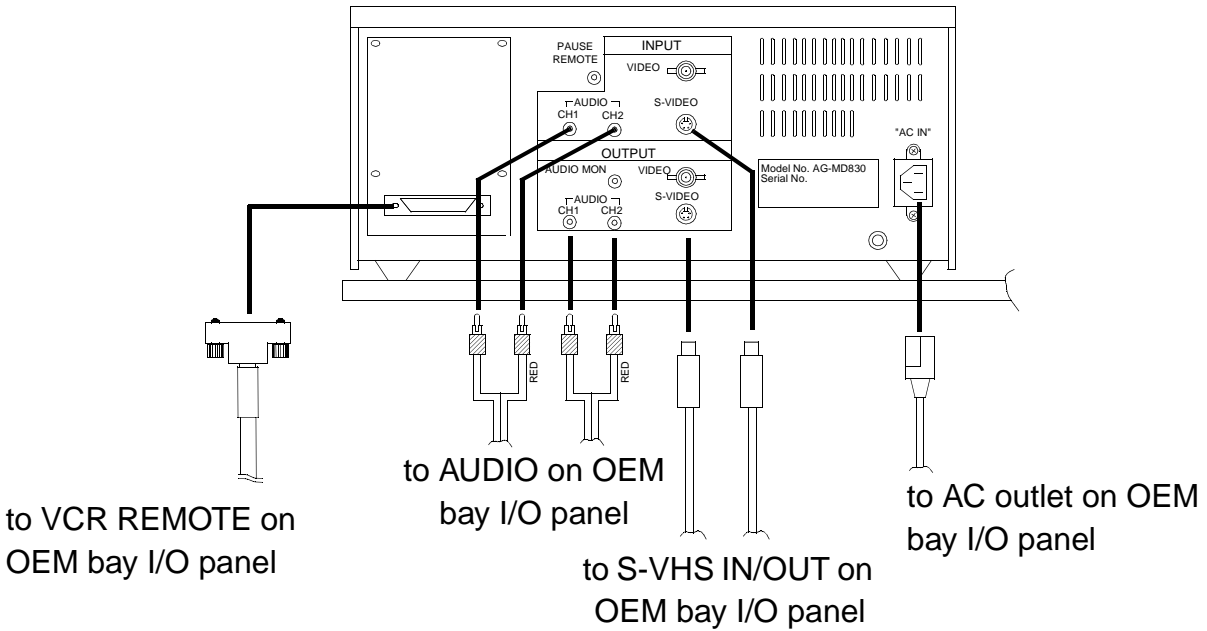
Figure 5-27

Top-mount VCR Cable Dressing Without Multiview Module



● Cable tie points

Figure 5-28 Top-mount VCR Cable Dressing With Multiview Module



See Figure 5-30

Figure 5-29 Internal Panasonic AG-MD830/835P/E VCR Connections

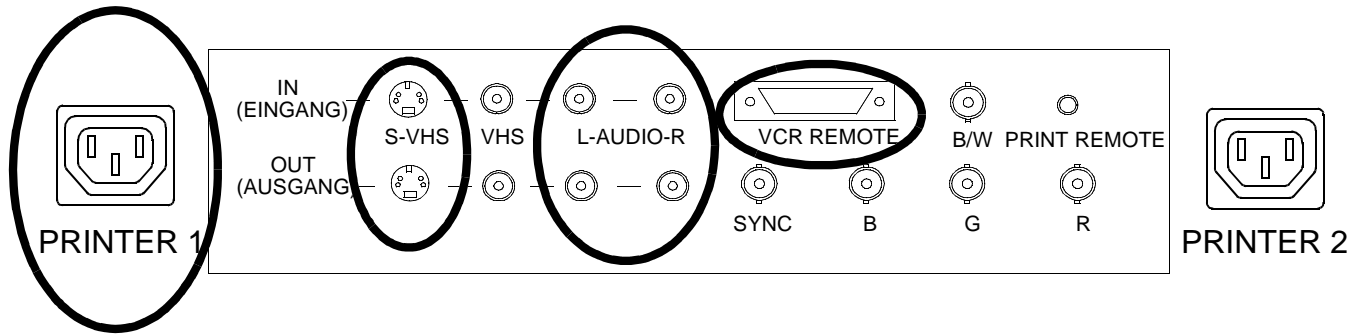


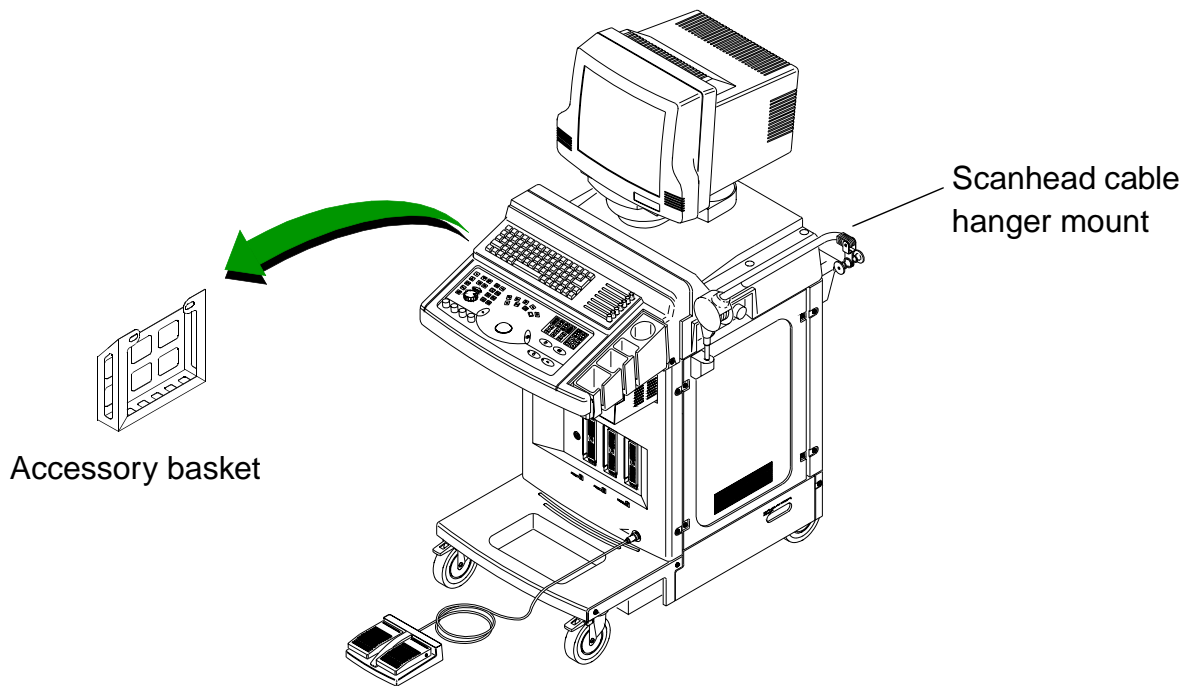
Figure 5-30

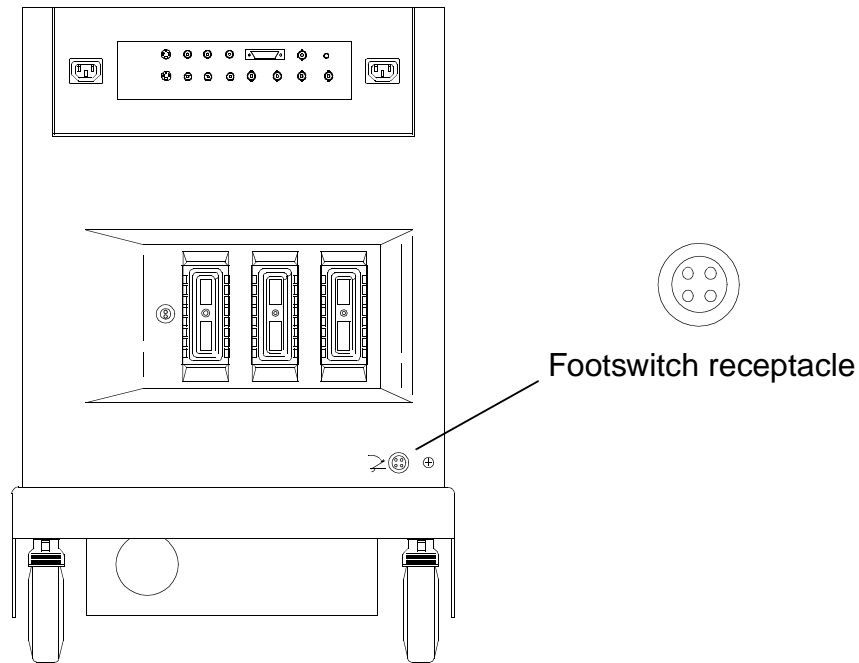
OEM Bay I/O Panel Connectors for Internal VCR

Installing the Accessories

The scanhead cable hanger, accessory basket, and footswitch assembly require simple installation:

- **To install the scanhead cable hanger:**
 - If the cable hanger is not already installed, insert the shaft on the bottom of the hanger into the hanger mount on the right side of the system as shown in [Figure 5-31](#).
- **To install the accessory basket:**
 - Hang the accessory basket on the left side of the system ([Figure 5-31](#)) by sliding the basket over the chrome hooks on the side cover.
- **To install the footswitch assembly:**
 - Connect the footswitch cable to the system footswitch connector on the lower front panel ([Figure 5-32](#)).

**Figure 5-31****Cable Hanger and Accessory Basket Installation**

**Figure 5-32****Footswitch Connection**

Installing the Multiview Video Module

Only on v2.01.02-and-up systems with the Stress Echo option, install the video module as described:

► **To install the Multiview Video Module:**

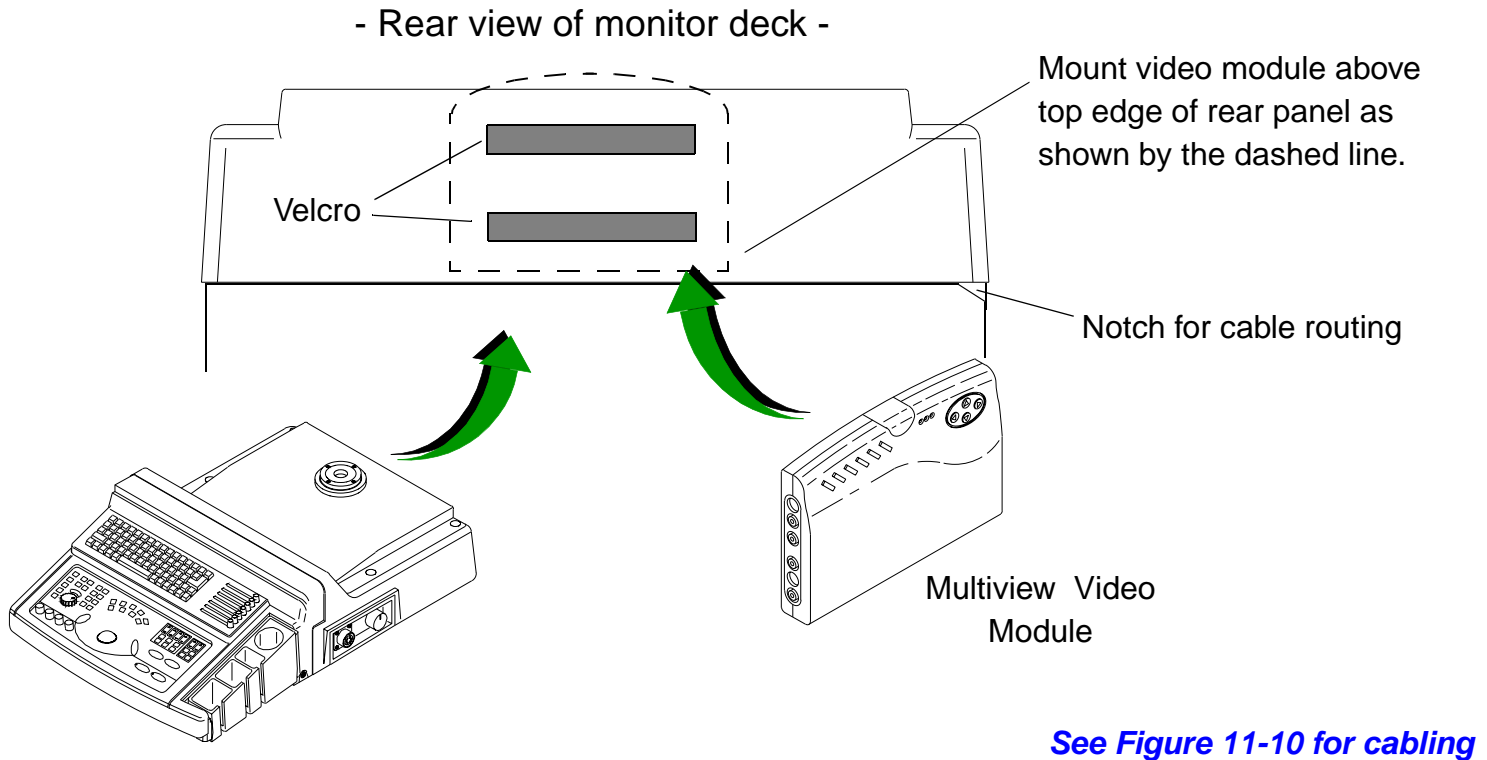
1. Install velcro mounting on the rear of the system and the video module as follows:

CAUTION

Do not allow exposed Velcro adhesive to contact any surface until it is in the correct position. Do not reuse Velcro that has been removed after making contact, because it will not provide a reliable bond and the module could come loose and become damaged.

- a. Cut two 6-inch lengths of Velcro while the hook and loop strips (P/N 2210-0125 and P/N 2210-0126) are mated. Separate the mated strips after cutting.
- b. With isopropyl alcohol, thoroughly clean the two areas on the back of the system where the Velcro adhesive will make contact ([Figure 5-33](#)) as well as the corresponding areas on the bottom of the video module. Allow to dry for 5 minutes before proceeding.
- c. To allow for the best access to the rear handle and cable connections to the video module, locate the Velcro where it will hold the module so it is centered horizontally with its bottom edge flush to the bottom of the monitor deck ([Figure 5-33](#)).
- d. Remove the white backing from the adhesive side of the Velcro and apply two loop strips to the system and two hook strips to the corresponding areas on the bottom of the video module.
- e. Firmly press on the Velcro along the length of the applied strips to ensure there are no gaps. Allow the adhesive to set before mating the Velcro pieces. It is best if the adhesive is allowed to set for at least 24 hours before separating Velcro hook and loop strips that have been mated after application.

2. Connect the video module as shown in [Figure 11-10](#) and mount it on the system, routing the MIC IN and DC IN cables from the rear I/O panel to the OEM bay I/O panel through a notch in the rear panel metal ([Figure 5-33](#)).

**Figure 5-33****Multiview Module Assembly (Video Switch Box)**

Initial System and Peripheral Setup

► **To set up the system and peripherals:**

1. If not already done, verify proper wiring and voltage levels. (See “Checking the Electrical Power Source” on page 71 and “General Inspection” on page 78.)
2. Before turning system power on, confirm that the power configuration of the system is compatible with the power source. If connecting peripheral equipment, check that the output voltage and current setting of the peripheral power outlets is compatible with the power configuration of the peripherals:
 - a. Remove the rear panel cover from the system power supply (Figure 14-37).
 - b. Find the three red voltage configuration switches (Figure 14-37).
 - c. Verify that the left and middle switches are set to the correct system AC source voltage (115 or 230) for the installation site.
 - d. Verify that the right-most switch is set to the OEM-bay AC-source voltage (115 or 230) that corresponds to the internal peripherals being installed.

NOTE The upper right rear panel peripheral power connector (labeled MONITOR ONLY on the rear panel cover, Figure 11-6) is always 120 volts AC and is unaffected by the power supply voltage configuration switch settings.

WARNING

Do not plug in the system if a wiring fault is discovered. Advise the customer immediately, and proceed only after the fault has been corrected.

3. Connect the scanheads and the power cable.
4. Turn on the system power and verify that the fans are operating.

5. If a VCR is installed, verify that the System Setup VCR Type (NTSC or PAL) and VCR Source (VHS or S-VHS) settings correspond to the installed VCR, and then program the VCR using the procedure on [page 123](#).
6. If applicable, program the color printer using the procedures on [page 128](#) and [page 133](#), or [page 137](#) as applies.
7. Verify that any PD or MO disks to be used in the system are formatted. (A PD or MO disk must be formatted to be used in the system. The system will not recognize a new PD or MO disk that is not formatted.)
8. If the system DICOM features will be used, set up the system for DICOM operation as described on [page 143](#).
9. Verify or change the regional settings as described on [page 160](#).
10. Verify or change the video settings as described on [page 161](#).
11. Verify proper system operation, referring to the procedures in [Section 6, "Performance Tests"](#).

CAUTION

Adjusting the KDS monitor display size so the display fills the screen has been known to reduce image resolution.

► **To program the Panasonic AG-MD830/835 VCR:**

1. Pull open the cover on the bottom right of the VCR front panel to access the switches (Figure 5-34).
 - a. Press STOP and set the VCR switches as shown in Table 5-1.

Table 5-1 AG-MD830/835 VCR Switch Settings

Switch	Settings
AUDIO OUT	MIX NORM
INPUT	S-VIDEO
S-VHS	AUTO
MENU	SET
MODE LOCK	OFF

2. With the MENU switch in the SET position, use the VCR controls (Figure 5-34) to move through the programming operations and verify the parameters and sub-parameters are set as follows:
 - a. Press PLAY or REC (Figure 5-34) to step through the four main parameter menus (Table 5-2).
- NOTE** The only way to distinguish between the menus is the numeric display reading.
- b. Press FF or rotate the search dial to step through sub-parameters in each menu.
 - c. Press REW or STOP to increment the last digit of the display readout to achieve the desired setting (Table 5-2).
3. To return to normal operation, set the MENU switch to the OFF position

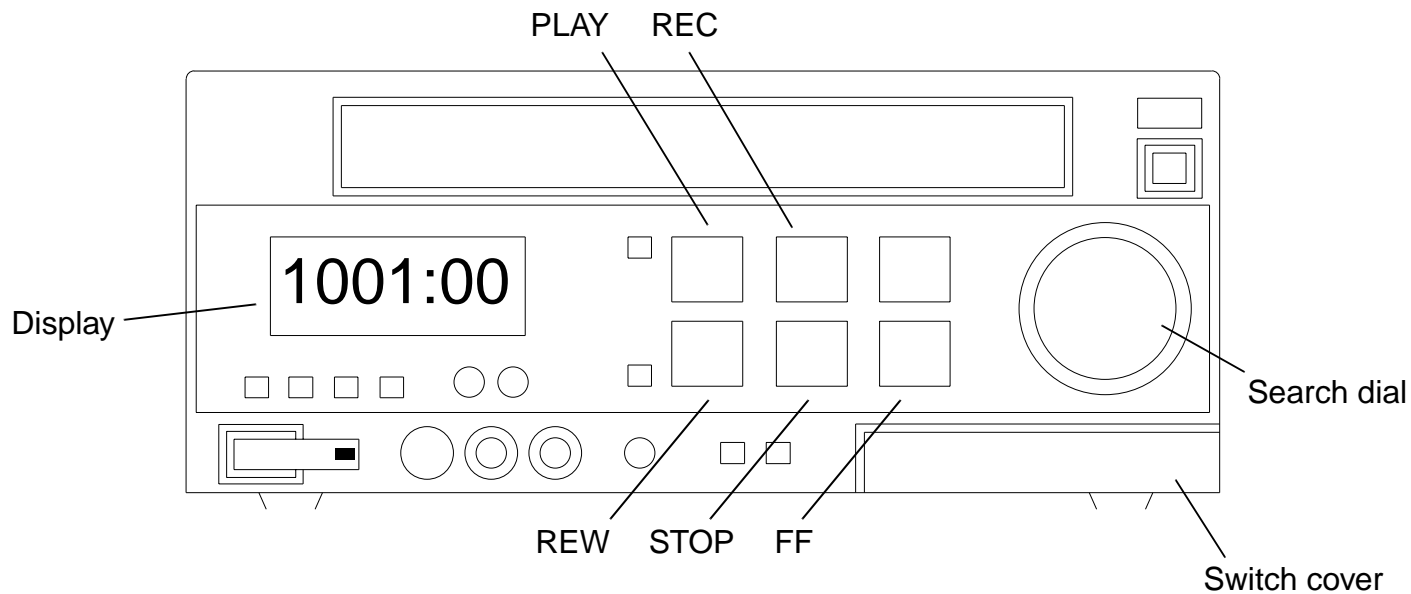
**Figure 5-34****Panasonic AG-MD830/835 VCR (Front)**

Table 5-2 AG-MD830/835 VCR Settings for the HDI 1500

Menu	Parameters and Sub-parameters	Display Reading	Possible Settings	HDI 1500 Settings
1	VISS	1001:00	Off	Off
1a	Tape Select	1001:01	Record	
1b	Auto Back	1001:02	Record/ Pause	T-120 (NTSC)
		1002:00	T-120	
		1002:01	(NTSC)	On
		1003:00	E-180 (PAL)	
		1003:01	Off On	
1c	Tape In Mode	1004:00	Stop	Stop
		1004:01	Rewind	
1d	Tape End Mode	1005:00	Stop	Stop
		1005:01	Rewind	
1e	REC Tape End	1006:00	Stop	Stop
		1006:01	Eject	
1f	STBY Off Time	1007:00	0 min.	
		1007:01	5 min.	5 min.
		1007:02	30 min.	
2	Hi-Fi REC	1008:00	Off	On

Table 5-2 AG-MD830/835 VCR Settings for the HDI 1500 (Continued)

Menu	Parameters and Sub-parameters	Display Reading	Possible Settings	HDI 1500 Settings
2a	Audio Dub	1008:01	On	
		1009:00	CH1, CH 2	CH1
		1009:01	CH1	
		1009:02	CH 2	
2b	Edit	1010:00	Off	Off
		1010:01	On	
2c	YC Filter	1011:00	NTSC only	NTSC
3	Notch Hour Meter	1011:01	PAL only	N/A
		XX XX H (where xx xx is the number of hours the VCR has had power applied)	N/A	
4	Bit Length	3001:00	7-Bit	
		3001:01	8-Bit	8-Bit
4a	Stop Bit	3002:00	Stop-1	
		3002:01	Stop-2	Stop-2

Table 5-2 AG-MD830/835 VCR Settings for the HDI 1500 (Continued)

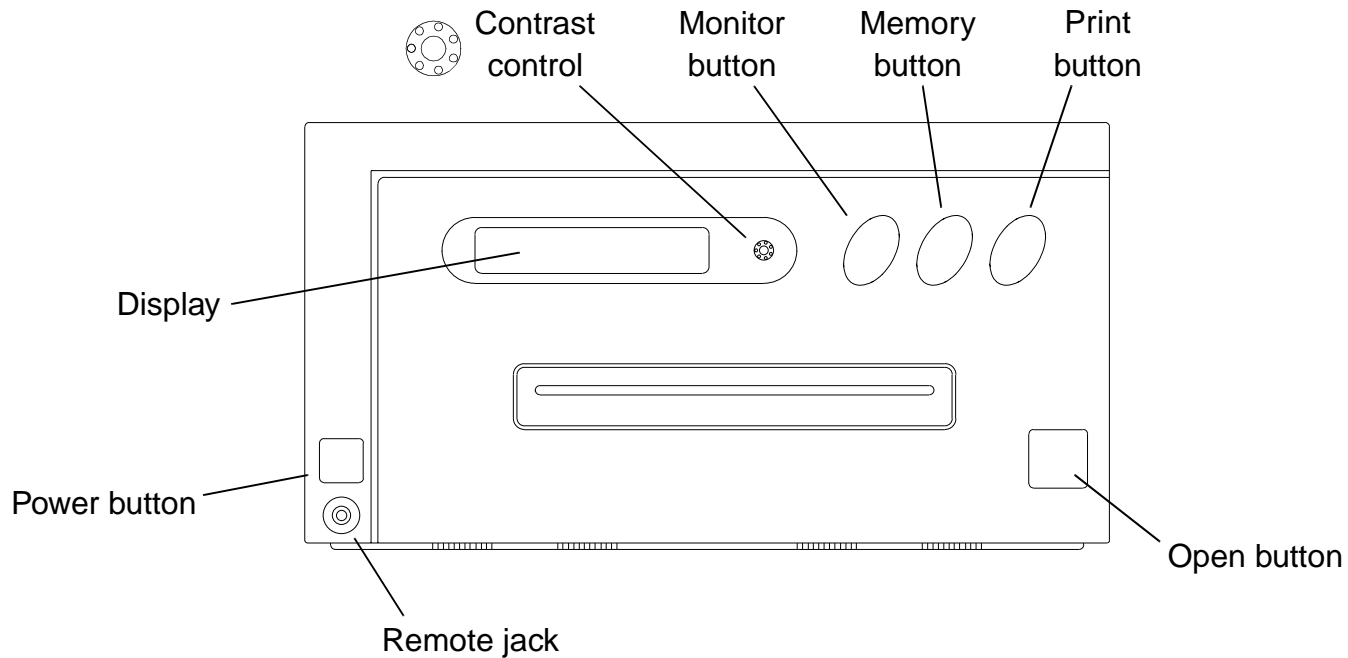
Menu	Parameters and Sub-parameters	Display Reading	Possible Settings	HDI 1500 Settings
4b	Parity	3003:00	Odd	None
		3003:01	Even	
		3003:02	None	
4c	Baud Rate	3004:00	1200	9600
		3004:01	2400	
		3004:02	4800	
		3004:03	9600	

► **To program the CP700 or CP800 MAIN MENU parameters:**

View the printer front panel display ([Figure 5-35](#)) when programming the printer.

NOTE Depending on the model and age of your printer, some of the menus and parameters are not applicable and will not be displayed. Program the parameters applicable to your printer as described.

1. Turn the printer power on.
2. Press the Menu button on the printer remote control to display the MAIN MENU.
3. Press MENU on the printer hand controller. The MAIN MENU with the first parameter menu will be displayed.
4. As indicated by the right caret [>] in the display, press the right arrow key on the hand controller to enter the menu. The first applicable parameter is displayed.
5. Press the right or left arrow key on the hand controller to increment or decrement the value to set the parameter to the value given in [Table 5-3](#).

**Figure 5-35****Mitsubishi CP700/CP800 Color Printer (Front)**

6. After you have set the value, press the down arrow key to cycle to the next parameter and set it to the value given in [Table 5-3](#). Continue in this manner until after the last parameter, when the CHANGE OK prompt appears.
7. If the changes you have made in the menu are not acceptable, press the right arrow key. The CANCEL prompt appears. Then press SET on the hand controller to cancel the changes and return to the menu to reprogram the options.
8. If the changes you have made in that menu are acceptable, press SET on the hand controller.
9. Press the down arrow key to move to the next menu of parameters (or the up arrow to move to the previous menu of parameters). In the same fashion as described above, access the remaining menus and set the parameters applicable to your printer in accordance with [Table 5-3](#).
10. When the last parameter is programmed on the printer MAIN MENU, the SAVE PRG:1 prompt appears. Press SET on the hand controller to save the parameter values.

Table 5-3 **CP700/CP800 Main Menu
Control Settings**

Menus and Parameters	HDI 1500 Default Settings
COLOR ADJ	
BRT	User's preference
CONT	User's preference
R-SUB	0
G-SUB	0
B-SUB	0

Table 5-3 CP700/CP800 Main Menu Control Settings (Continued)

Menus and Parameters	HDI 1500 Default Settings
CENTER	OFF
ANALOG ADJ	
Color ¹	0
Tint ¹	0
BRT	0
CONT	0
R-SUB	0
B-SUB	0
CENTER	0
INPUT	
	VIDEO (external installation)
	S-VIDEO (external installation)
	RGB (internal installation)
ADDITIONAL	
MULTI	OFF
BUZZER	TONE 1
PRINT	
MODE	AUTO
GRAD	ECHO

**Table 5-3 CP700/CP800 Main Menu
Control Settings (Continued)**

Menus and Parameters	HDI 1500 Default Settings
GAMMA ADJ	
GAMMA CENTER	
COLOR	ALL
SELECT	
Hi	0
Mid	0
Low	0
Low POINT	64
Mid POINT	128
Hi POINT	192
APT	NORMAL
COM	OFF
MIRROR	OFF
COMMENT	[>]

Table 5-3 CP700/CP800 Main Menu Control Settings (Continued)

Menus and Parameters	HDI 1500 Default Settings
SIZE/TIMING	
H-POSI	0
H-START	NORMAL
SIZE	WIDE
SAVE PRG	1

1. Color and tint appear only when using S-Video input.

► **To program the CP700 or CP800 SERVICE MENU parameters:**

View the printer front panel display ([Figure 5-35](#)) when programming the printer.

NOTE Depending on the model and age of your printer, some of the menus and parameters are not applicable and will not be displayed. Program the parameters applicable to your printer as described.

1. To display the SERVICE MENU, hold down MEMORY on the printer front panel while turning the printer power on. The SERVICE MENU with the first parameter menu will be displayed.
2. As indicated by the right carrot [>] in the display, press the right arrow key on the hand controller to enter the menu. The first applicable parameter is displayed.
3. Press the right or left arrow key on the hand controller to increase or decrease the value and set the parameter value to that given in [Table 5-4](#).

4. After you have set the value, press the down arrow key to cycle to the next parameter and set it to the value given in [Table 5-4](#). Continue in this manner until after the last parameter, when the CHANGE OK prompt appears.
5. If the changes you have made in the menu are not acceptable, press the right arrow key. The CANCEL prompt appears. Then press SET on the hand controller to cancel the changes and return to the menu to reprogram the options.
6. If the changes you have made in that menu are acceptable, press SET on the hand controller.
7. Press the down arrow key to move to the next menu of parameters (or the up arrow to move to the previous menu of parameters). In the same fashion as described above, access the remaining menus and set the parameters applicable to your printer in accordance with [Table 5-4](#).
8. When the last parameter is programmed on the printer SERVICE MENU, the SAVE prompt appears. Press SET on the hand controller to save the parameter values.

Table 5-4 **CP700/CP800 Printer Service Menu
Parameter Settings**

Menus and Parameters	HDI 1500 Default Settings
KEY SET	
KEY LOCK	OFF
MEM & PRN	ON
MEM & STOP	OFF
MEM & MONI	OFF

**Table 5-4 CP700/CP800 Printer Service Menu
Parameter Settings (Continued)**

Menus and Parameters	HDI 1500 Default Settings
PRN & CLR	OFF
CLEAR KEY	PAGE
KEEP MONI	OFF
SIGNAL SET1	
FIELD	NORMAL
AFC	OFF
SYNC	EXT
R-SUB	0
B-SUB	0
SIGNAL SET2	
IN SYNC	.3V
OUT SYNC	.3V
SYNC	NEGA
RGB SOG OUT	OFF
SPCL TIMING	OFF
PRINT SET	
DIR	NORMAL
MARGIN CUT	OFF
AUTO CUT	ON

**Table 5-4 CP700/CP800 Printer Service Menu
Parameter Settings (Continued)**

Menus and Parameters	HDI 1500 Default Settings
OP MODE	4P
SYSTEM SET	
PAGE INC	ON
LIVE SELECT	DIGITAL
CONVERT	ON
REMAINING	OFF
REMOTE SET	
BAUD RATE	9600
COMMAND TYPE	A
RESPONSE	RETURN
BUSY LEVEL	H
BUSY MODE	NOT PRINT
V SYNC MEM	OFF
PREVIOUS ERROR	
MECHA ERROR	NOTHING
PRG ALL INIT	OFF

► **To program the Sony UP-21MD color printer**

View the printer front panel display ([Figure 5-36](#)) when programming the printer.

1. Place the NTSC/PAL switch on the rear of the printer to the video format designated on the COA.
2. Turn the printer power on.
3. Press **MENU** button to access the menus.
4. Press the up or down arrow cursor keys to move the display cursor and select the parameter.
5. Press the right or left arrow key to change the parameter setting to the value given in [Table 5-5](#).

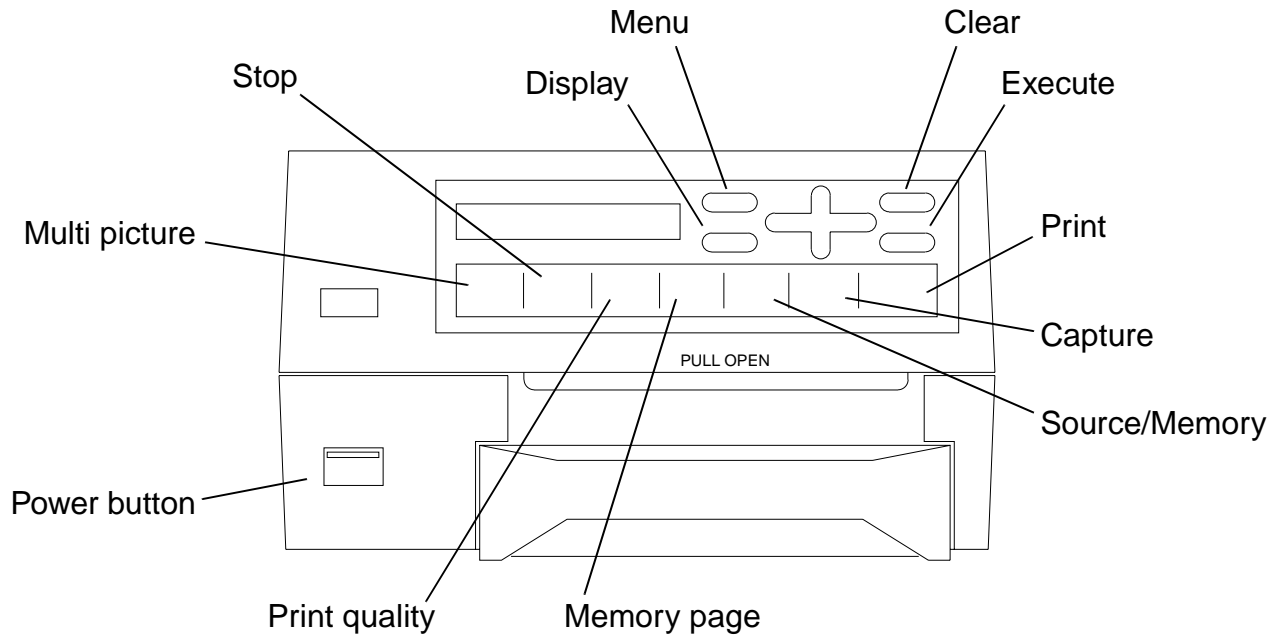
**Figure 5-36****Sony UP-21MD Color Video Printer (Front)**

Table 5-5 UP-21MD Printer Settings

Menus and Parameters	NTSC Settings	PAL Settings
COL:		
Load Color:	1	1
CYN – RED:	0	0
MAG – RGB:	0	0
YEL – BLU:	0	0
Dark:	1	1
Light:	0	0
Sharpness:	8	8
Interpol:	OFF	OFF
Save Color:	1 [EXEC]	1 [EXEC]
LAY:		
Memory:	Frame	Frame
Multi Pix:	1	1
Separate:	*****	*****

Table 5-5 UP-21MD Printer Settings (Continued)

Menus and Parameters	NTSC Settings	PAL Settings
Window:		
H Start:	-24 Dots	40 Dots
V Start:	-8 Dots	20 Dots
H Width:	976 Dots	840 Dots
V Width:	480 Dots	496 Dots
Save:	Press [EXEC]	Press [EXEC]
Caption:	OFF	OFF
PRN:		
Print QLT:	1	1
GAMMA:	Normal	Normal
PRN Speed:	Normal	Normal
Load user:	1	1
System Setup:		
LCD. Center:	7	7
Baud Rate:	4800	4800
Beep:	ON	ON
IRE.:	100	100
Save User:	1	1

Table 5-5 UP-21MD Printer Settings (Continued)

Menus and Parameters	NTSC Settings	PAL Settings
Function:		
Auto Live:	OFF	OFF
Immed. Cap.:	OFF	OFF
RM2 Func.:	C&Print	C&Print
Clear:	ALL	ALL
Color Balance:		
BAL X:	50	50
BAL Y:	50	50
BAL Step:	5	5
IN:		
INPUT SEL:		
Video:	N/A	N/A
S – Video:	N/A	N/A
RGB:		
Hue:	* * * * *	* * * * *
Color:	* * * * *	* * * * *
Gain:	0	0
Offset:	0	0
AGC:	ON	ON

Table 5-5 UP-21MD Printer Settings (Continued)

Menus and Parameters	NTSC Settings	PAL Settings
OUT:		
Display:	OFF	OFF
RBN Remain:	OFF	OFF
Source:	EE	EE
Sync on G:	ON	ON
Moni C-R:	0	0
Moni M-G:	0	0
Moni Y-B:	0	0

► **To configure the system for DICOM operations:**


NOTE This and other connectivity information can also be found at the *Connectivity* link on the Philips Customer Service intranet web site (<http://service.btl.ms.philips.com/>).

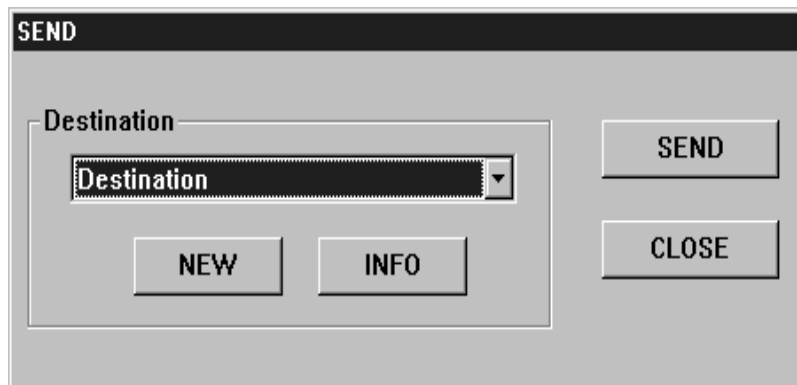
Before beginning this procedure, consult with your customer or the customer's system administrator to determine the following information:

- Administrator Mode password
- HDI 1500 system IP address, subnet mask, and gateway address
- IP addresses of the network devices to which the system will send or print images
- Application Entity (AE) Title and port numbers for each destination device (consult the vendor's DICOM Conformance Statement or technical support personnel for this information)

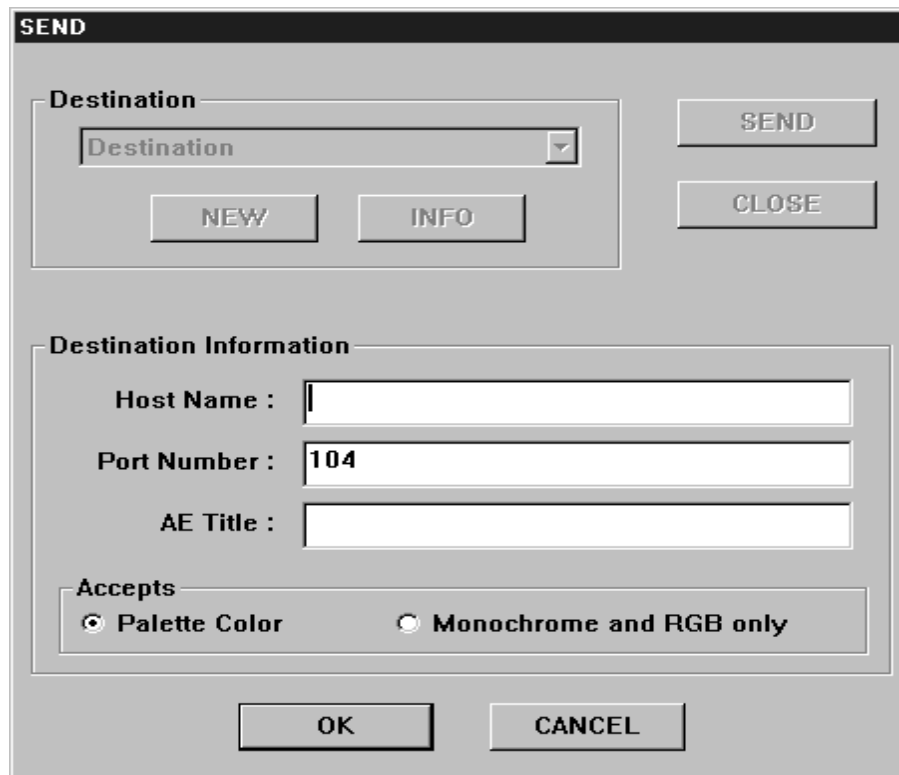
You will not be ready to proceed until you have all of this information. The DICOM features will not work properly if the information is wrong or incorrectly entered (AE Titles are case-sensitive and the Host Name must be identical in spelling and syntax to the Host Name entered in the Hosts file).

1. Configure the SonoView DICOM SEND and PRINT destination device settings:

- a. On the control panel, press  to access SonoView.
- b. Click Exams List to display the list.
- c. Highlight an exam entry.
- d. To configure a storage device, select SEND. The SEND display appears ([Figure 5-37](#)).

**Figure 5-37****SEND Display**

- e. Click either NEW (to configure a new storage destination) or INFO (to verify an existing device). An expanded SEND display appears ([Figure 5-38](#)).
- f. Enter or verify the Destination information and ensure the appropriate presentation mode, Palette Color or Monochrome and RGB only, is selected (use Monochrome and RGB only as default selection, unless otherwise specified). Follow these conventions:
 - Port numbers, which are vendor-specific, can be found in the DICOM Conformance Specification for each device. The port number for the HDI 1500 system is 104, but other types of devices may use other values.
 - AE Titles are case-sensitive. The Host Name must be identical in spelling and syntax to the host name entered in the Hosts file.
- g. Click PRINT. The DICOM Print configuration display appears ([Figure 5-39](#)).
- h. Configure SonoView for DICOM printing by verifying or entering the Remote Printer, Film Session, and Film Box settings appropriate to the destination print device. (The customer also can do this when printing.)
- i. Exit SonoView.




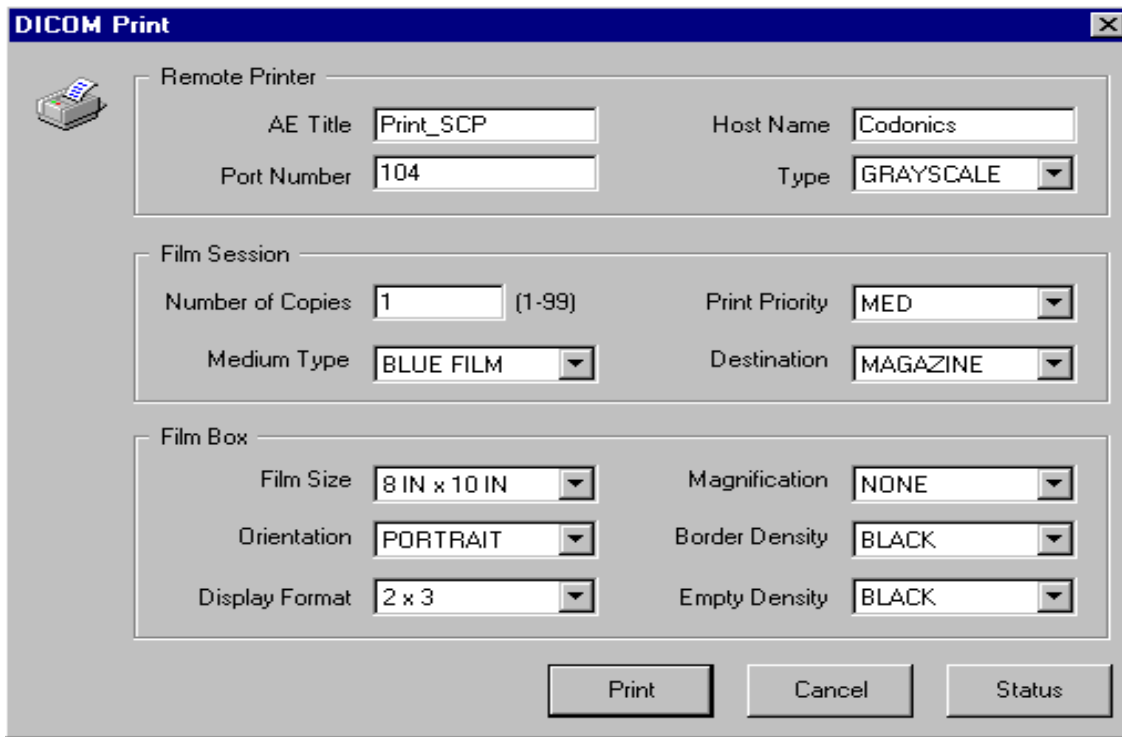
The image shows a dialog box titled "SEND". It is divided into several sections:

- Destination:** A dropdown menu currently showing "Destination". Below it are two buttons: "NEW" and "INFO".
- SEND and CLOSE:** Two buttons located to the right of the Destination section.
- Destination Information:** A section containing three text input fields:
 - Host Name:** An empty text box.
 - Port Number:** A text box containing the value "104".
 - AE Title:** An empty text box.
- Accepts:** A section with two radio button options:
 - Palette Color
 - Monochrome and RGB only
- OK and CANCEL:** Two buttons at the bottom of the dialog.

Figure 5-38

Expanded SEND Display

2. Set up the DICOM Modality Worklist, Acquisition in Progress, and Print after each image parameters:
 - a. On the control panel, press  and select the DICOM setups display (Figure 5-40).
 - b. At Modality Worklist, click Add. The DICOM_SimpleForm display appears (Figure 5-41).
 - c. Enter the destination device host name in the Alias field; then enter in the corresponding fields the IP Address, AE Title, and Port Number for the worklist server and click OK. The information must match the corresponding device information in the Hosts file.
 - d. At Acquisition in Progress, click Add. The DICOM_SimpleForm display appears (Figure 5-41).
 - e. Enter the destination device host name in the Alias field; then enter in the corresponding fields the IP Address, AE Title, and Port Number for the worklist server and click OK. The information must match the corresponding device information in the Hosts file.
 - f. At Print after each image, click Add. The DICOM_FullForm display appears (Figure 5-42).
 - g. Enter the destination device host name in the Alias field; then enter in the corresponding fields the IP Address, AE Title, and Port Number for each DICOM printer and click OK. The information must match the corresponding device information in the Hosts file.
 - h. Close the System Setups display.



The screenshot shows a dialog box titled "DICOM Print" with a printer icon in the top-left corner. The dialog is organized into three sections: "Remote Printer", "Film Session", and "Film Box".

Remote Printer Section:

- AE Title:
- Host Name:
- Port Number:
- Type:

Film Session Section:

- Number of Copies: (1-99)
- Print Priority:
- Medium Type:
- Destination:

Film Box Section:

- Film Size:
- Magnification:
- Orientation:
- Border Density:
- Display Format:
- Empty Density:

At the bottom of the dialog are three buttons: "Print", "Cancel", and "Status".

Figure 5-39

SonoView DICOM Print Settings (Codonics 1660 Printer Example)

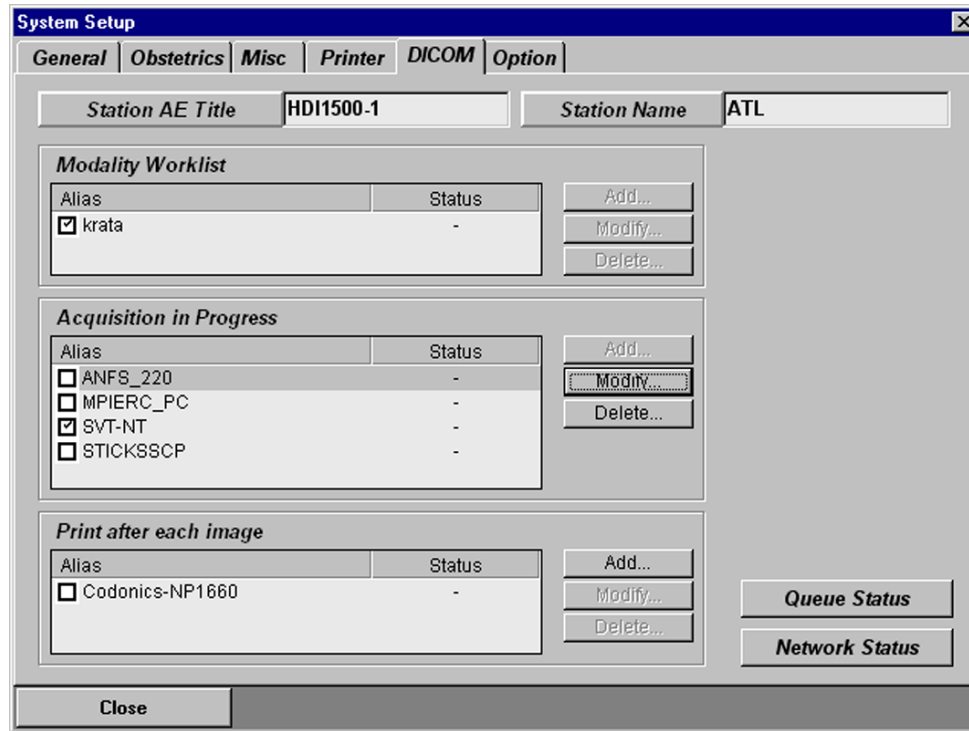
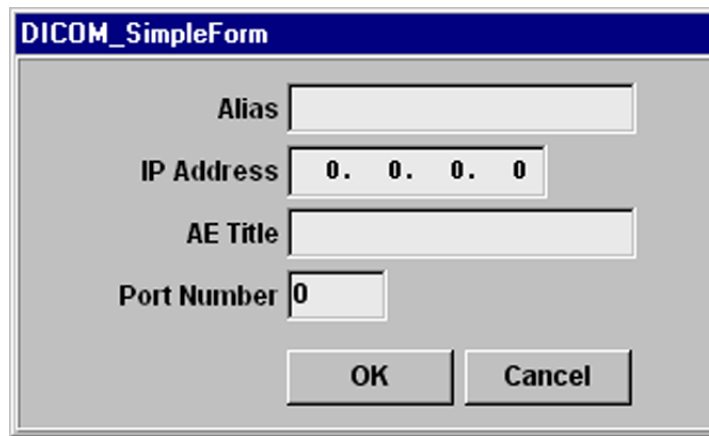


Figure 5-40

DICOM System Setup Display Example



The image shows a dialog box titled "DICOM_SimpleForm" with a blue header bar. The dialog contains four input fields and two buttons. The "Alias" field is empty. The "IP Address" field contains the text "0. 0. 0. 0". The "AE Title" field is empty. The "Port Number" field contains the text "0". At the bottom of the dialog are two buttons labeled "OK" and "Cancel".

Alias	
IP Address	0. 0. 0. 0
AE Title	
Port Number	0

OK Cancel

Figure 5-41**DICOM_SimpleForm Display**

The image shows a software dialog box titled "DICOM_FullForm". It contains various input fields and dropdown menus for configuring a DICOM printer. The fields are organized into sections: "Alias" and "AE Title" at the top; "IP Address" and "Port Number" below; "Color" as a dropdown; a "Film Session" section with "Number of Copies" and "Medium Type"; a "Film Box" section with "Film Size", "Orientation", "Display Format", "Min Density", "Magnification", "Border Density", "Empty Density", and "Max Density". At the bottom, there is a "Configuration Information" text area and "OK" and "Cancel" buttons.

Field	Value
Alias	Codonics-NP1660
AE Title	PRINT_SCP
IP Address	149. 59. 232. 160
Port Number	104
Color	GrayScale
Number of Copies	1
Medium Type	Paper
Print Priority	High
Destination	Magazine
Film Size	8in x 10in
Orientation	Portrait
Display Format	1 x 1
Min Density	
Magnification	Replicate
Border Density	Black
Empty Density	Black
Max Density	

Configuration Information

OK Cancel

Figure 5-42

DICOM_FullForm Display Example

3. Verify the Network Interface Card (NIC) is active and configure the TCP/IP protocol:
 - a. Press Ctrl+Shift+Delete to access the Windows NT operating system. The Administrator Mode dialog box prompts you for the password.
 - b. Type the password in the Administrator Mode dialog box and press Enter. (If you do not know the password, contact your country's technical support group.)
 - c. Press Alt+F4 to switch the display from the ultrasound application to the Windows operating system.

CAUTION

Do not make any unspecified entries while in Windows NT. Unauthorized actions can damage the operating system.

- d. Click Start > Settings > Control Panel.
- e. Double-click the Devices icon. The Devices menu will appear (Figure 5-43).
- f. Scroll to (highlight) "Realtek RTL8029 PCI Ethernet Adapter" and click Startup.
- g. On the Device Startup Type menu (Figure 5-44), click Automatic; then click OK. The menu will close.
- h. Close the Devices menu (Figure 5-43).
- i. In the Control Panel window, double-click the Network icon.
- j. Click Protocols, scroll to (highlight) TCP/IP and click Properties. The TCP/IP Properties dialog box will appear (Figure 5-45).
- k. On the IP Address display tab, select "Specify an IP address" and enter the IP Address, Subnet Mask, and Default Gateway address settings provided by the system administrator.

- l. Click DNS and delete all items under DNS Service Search Order.
- m. Click WINS Address. With Realtek RTL8029 PCI Ethernet Adapter highlighted, ensure that no other addresses are entered and that no other selections are enabled.
- n. Click Routing. Ensure that Enable IP Forwarding is not selected and click OK. The message, "At least one of the adapter cards has an empty primary WINS address. Do you want to continue?" appears.
- o. Click Yes.
- p. Close the Network window and restart the computer.

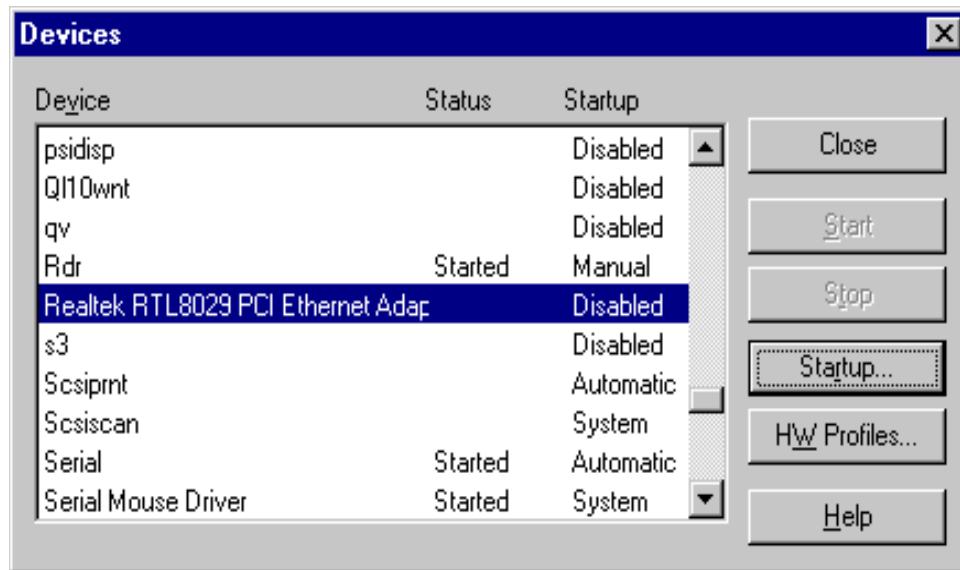
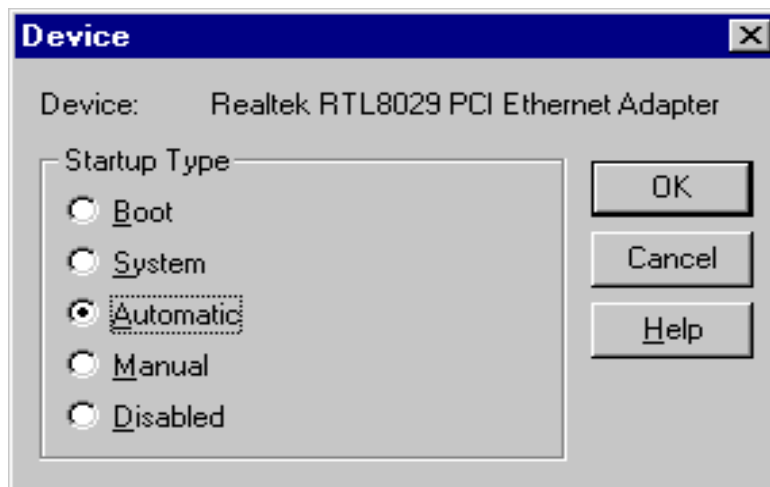
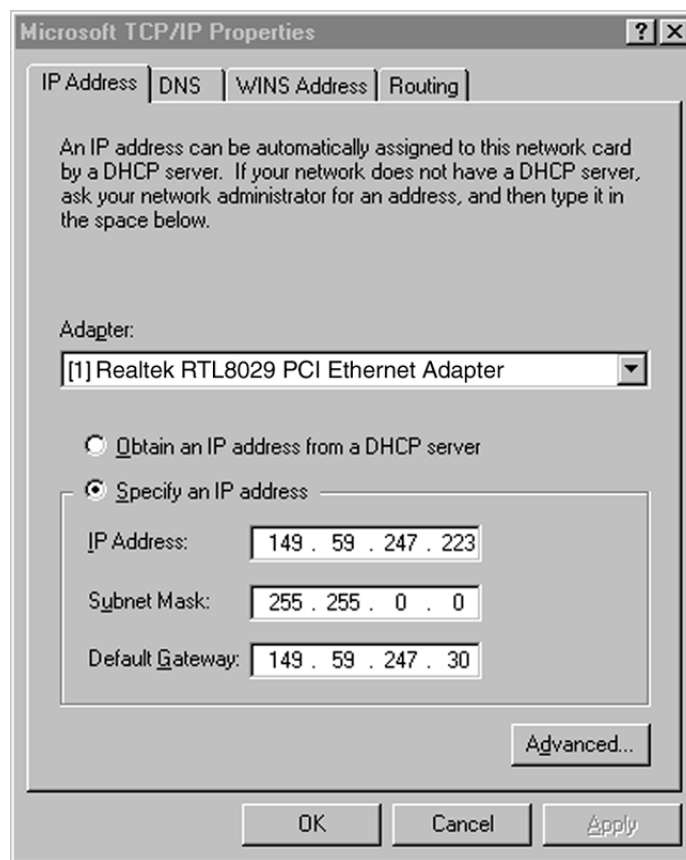


Figure 5-43

Example Devices Menu

**Figure 5-44****Example Device Startup Type Menu**

**Figure 5-45****Example TCP/IP Dialog Box with IP Address Selected**

4. Edit the Hosts file to include the DICOM devices (servers and printers) that will be receiving data:
 - a. Press Ctrl+Shift+Delete to access the Windows NT operating system. The Administrator Mode dialog box prompts you for the password.
 - b. Type the password in the Administrator Mode dialog box and press Enter. (If you do not know the password, contact your country's technical support group.)
 - c. Press Alt+F4 to switch the display from the ultrasound application to the Windows operating system.

CAUTION

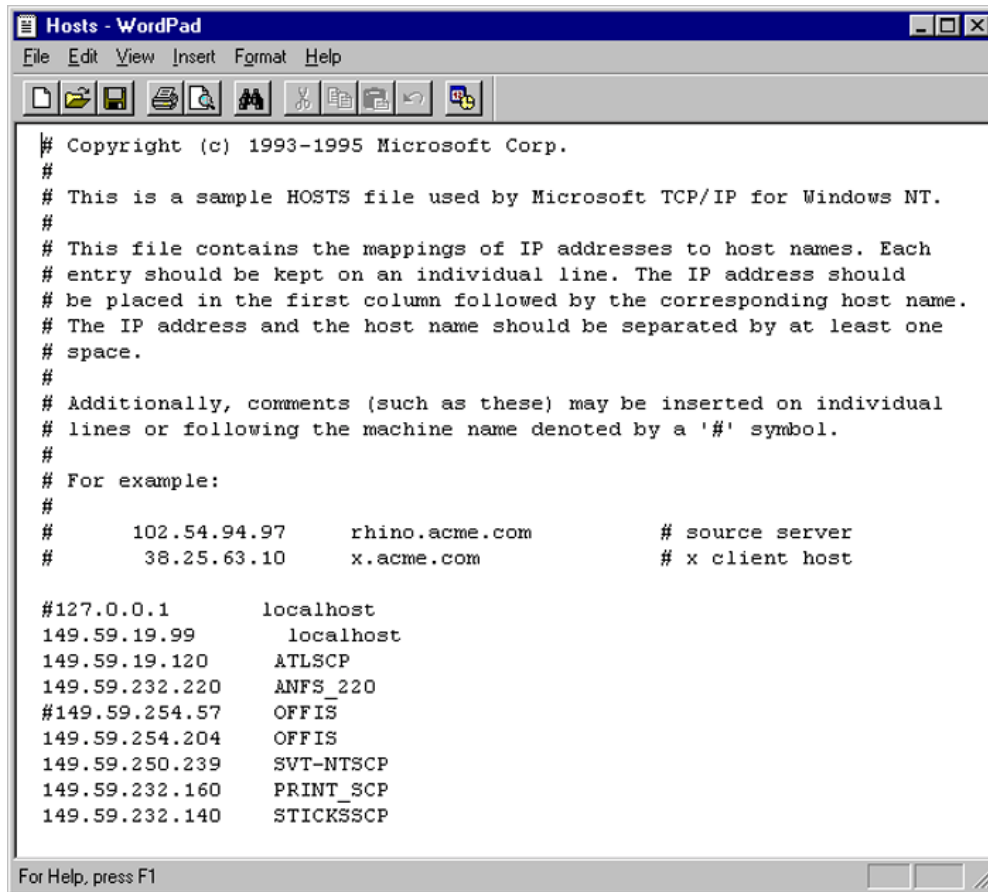
Do not make any unspecified entries while in Windows NT. Unauthorized actions can damage the operating system.

- d. Click Start > Programs > Accessories > Notepad.
- e. Click File > Open.
- f. Change the Files of type setting to All Files.
- g. Navigate to and open C:\Winnt\system32\drivers\etc\hosts.
- h. View the HOSTS file ([Figure 5-46](#)) and, if not already done, add the Host names and IP addresses for all of the DICOM devices that will receive images and information from the ultrasound system. Use the destination AE Titles as Host names if you are unsure about which host names to use.
- i. Click File > Save > Close.

CAUTION

You must reboot the system to reset the access restriction to the operating system. Failure to do so could result in unauthorized access and actions that can damage the operating system.

- j. Reboot the system by clicking Start > Shut Down > Restart the computer? unless you will be immediately performing other procedures in Windows NT.



```
# Copyright (c) 1993-1995 Microsoft Corp.
#
# This is a sample HOSTS file used by Microsoft TCP/IP for Windows NT.
#
# This file contains the mappings of IP addresses to host names. Each
# entry should be kept on an individual line. The IP address should
# be placed in the first column followed by the corresponding host name.
# The IP address and the host name should be separated by at least one
# space.
#
# Additionally, comments (such as these) may be inserted on individual
# lines or following the machine name denoted by a '#' symbol.
#
# For example:
#
#       102.54.94.97       rhino.acme.com           # source server
#       38.25.63.10      x.acme.com                # x client host

#127.0.0.1       localhost
149.59.19.99     localhost
149.59.19.120    ATLSCP
149.59.232.220   ANFS_220
#149.59.254.57   OFFIS
149.59.254.204   OFFIS
149.59.250.239   SVT-NTSCP
149.59.232.160   PRINT_SCP
149.59.232.140   STICKSSCP
```

For Help, press F1

Figure 5-46

Hosts File Example

► **To verify or change the regional settings:**

1. If you are already in the Windows NT operating system, go to [step 5](#).
2. If you are not already in Windows NT, press Ctrl+Shift+Delete. The Administrator Mode dialog box appears to prompt you for the password.
3. Type the password in the Administrator Mode dialog box and press Enter. (If you do not know the password, contact your country's technical support group.)
4. Press Alt+F4 to switch the display from the ultrasound application to the Windows NT operating system.

CAUTION

Do not make any unspecified entries while in Windows NT. Unauthorized actions can damage the operating system.

5. Click Start > Settings > Control Panel.
6. Double-click Regional Settings. The first menu (Regional Settings) is displayed. Verify that the language/region is correct for your installation.
7. If you need to change the setting, click the correct language, then Apply, and then OK.
8. If you changed the setting, click Yes when you get the computer restart message or reboot the system by clicking Start > Shut Down > Restart the computer? unless you will be immediately performing other procedures in Windows NT.

CAUTION

You must reboot the system to reset the access restriction to the operating system. Failure to do so could result in unauthorized access and actions that can damage the operating system.

► **To verify or change the video settings:**

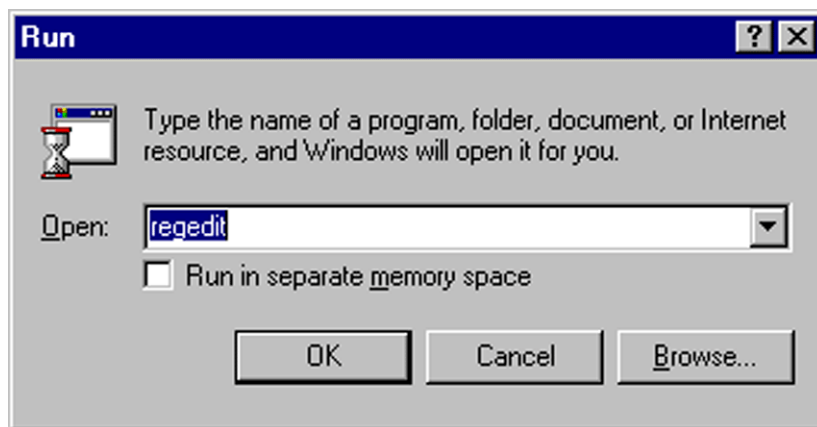
The video settings are different for PAL and NTSC systems. Use this procedure to verify or change the system video settings.

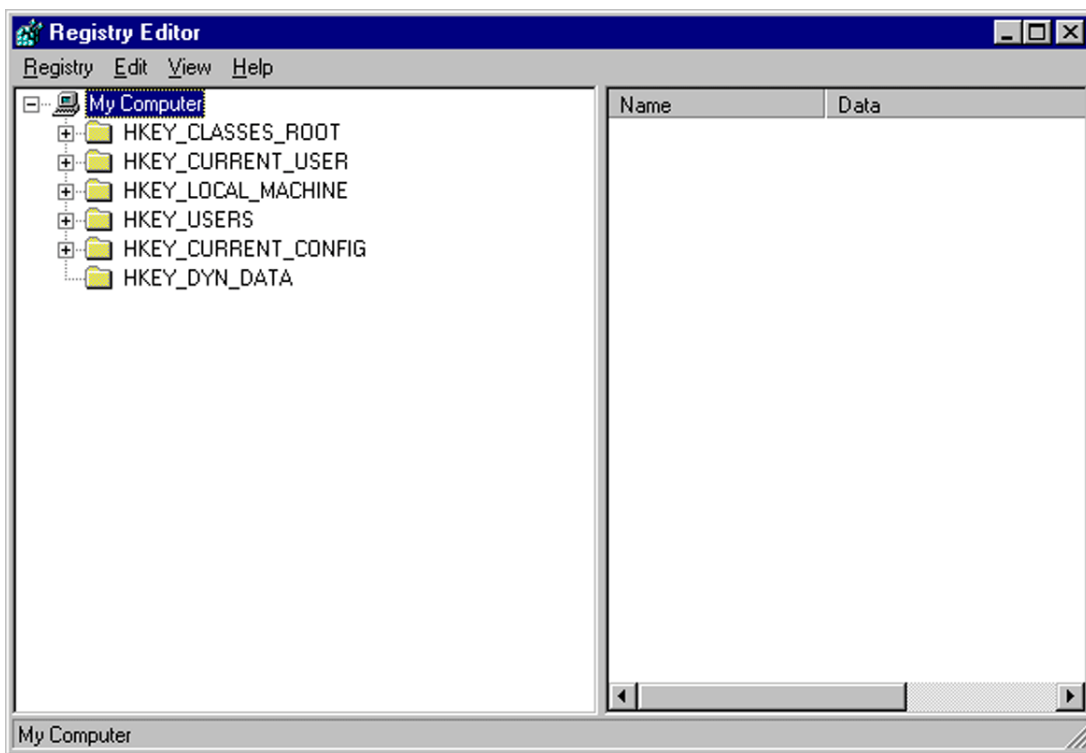
1. If you are already in the Windows NT operating system, go to [step 4](#).
2. If you are not already in Windows NT, press Ctrl+Shift+Delete. The Administrator Mode dialog box appears to prompt you for the password.
3. Type the password in the Administrator Mode dialog box and press Enter. (If you do not know the password, contact your country's technical support group.)
4. Press Alt+F4 to switch the display from the ultrasound application to the Windows NT operating system.

CAUTION

Do not make any unspecified entries while in Windows NT. Unauthorized actions can damage the operating system.

5. Click Start > Run.
6. In the Run dialog box ([Figure 5-47](#)) type "regedit" and click OK. The Registry Editor is displayed ([Figure 5-48](#)).

**Figure 5-47****Run Dialog Box**

**Figure 5-48****Initial Registry Editor**

7. In the Registry Editor, click HKEY_LOCAL_MACHINE > SOFTWARE > MEDISON > SA8800 > System > Pheriperals (Figure 5-49).

NOTE Do not correct the factory misspelling, “Pheriperals”.

8. Observe the PAL_NTSC Data value to determine the system video setting. A PAL_NTSC Data value of “0” means the system video is set to NTSC. A PAL_NTSC Data value of “1” means the system video is set to PAL.
9. If you want to change the setting, double-click PAL_NTSC to bring up the Edit String dialog box (Figure 5-50).
10. Highlight the existing value, type in the desired value (“0” = NTSC, “1” = PAL) and click OK.
11. If you changed the setting, observe the change to the PAL_NTSC Data value in the Registry Editor (Figure 5-49).
12. When you have the setting you want, close the Registry Editor, and reboot the system.

CAUTION

You must reboot the system to reset the access restriction to the operating system. Failure to do so could result in unauthorized access and actions that can damage the operating system.

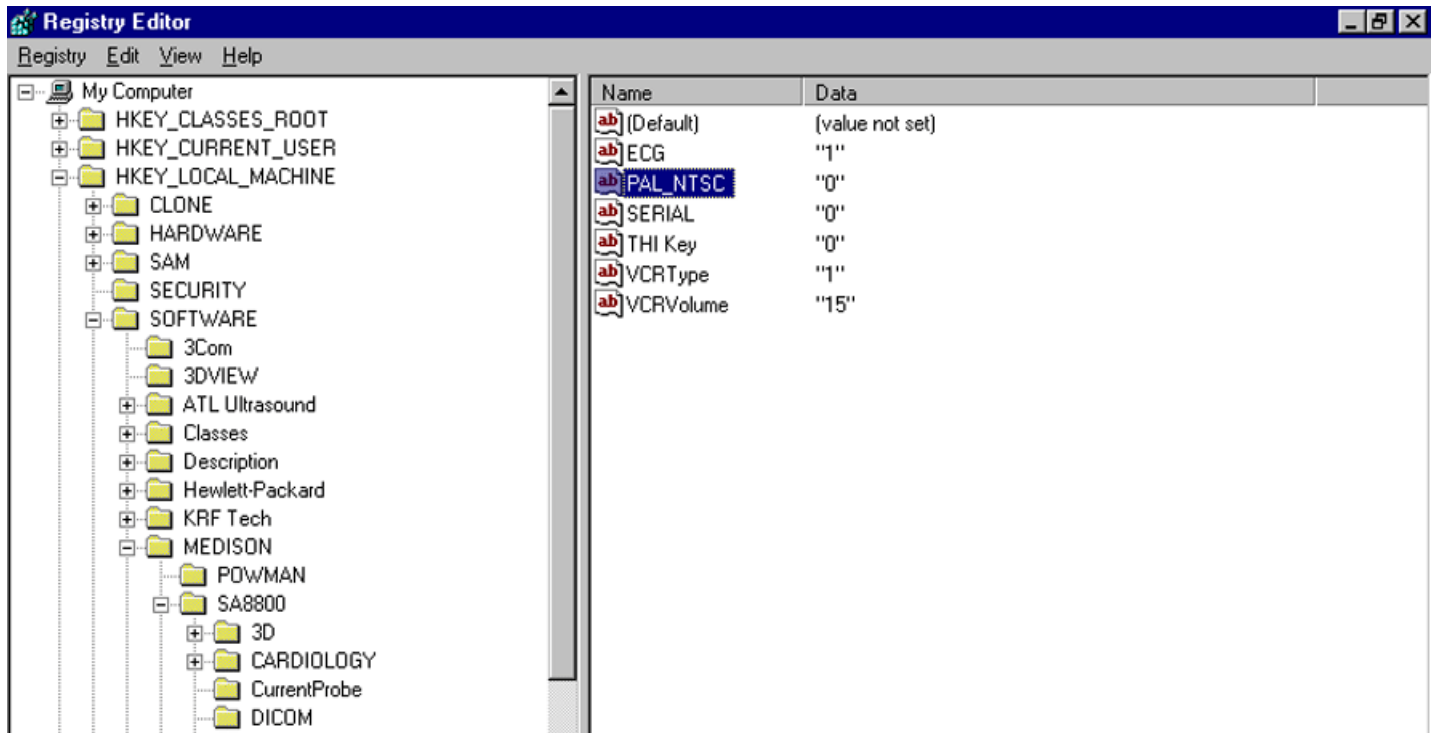
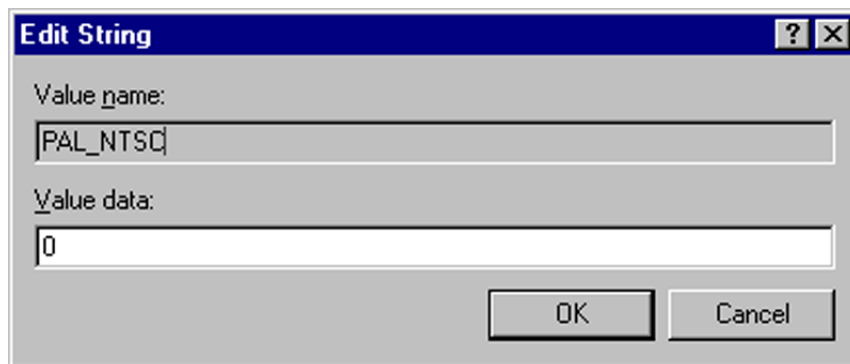


Figure 5-49

Registry Editor: Peripheral Values

**Figure 5-50****Video Setting Edit String Dialog Box**

Creating a Hard Drive Backup at System Installation

As described in [“Backing Up the System Hard Drive” on page 238](#), you can make a backup copy of the system hard drive.

NOTE This is a good time to educate or remind our customers that the system is not an archive device and that it is advisable to routinely off-load or delete excess images from the hard drive to avoid a system response failure or data loss because the hard drive is too full.

Completing the Installation

1. Have the most current system reference manual and operating notes ready for review with the system operator, so that questions can be answered during the system presentation.
2. Complete a Quality Assurance Audit (PM) sticker and attach it to left side of the monitor.
3. Discuss the present status of the system with your customer and review any hard-copy prints that were produced during the system checkout. Be sure to cover any environmental concerns as well, making suggestions as appropriate.
4. Tell the facilities representative that the system is installed and ready for any safety tests that they normally conduct.

Presenting the System

Do not present the system until you have accomplished the actions described in [“Initial System and Peripheral Setup” on page 121](#). When the system and the customer documents are ready, present them to the operators as follows:

1. Present an overview of the system to the operators, review the Customer Order Acknowledgement to familiarize them with the system and its options, and show them they have received what they ordered.
2. Present the system user manuals and operating notes. Describe our product documentation and show the operators all information needed to operate the system and

- peripherals. Review the information contained in each operating note with the operators; demonstrating the issue and the correct associated procedure. If questions arise, show the operators where to find the specific information in the documentation.
3. Show the operators how to turn on the system power and how to power on any external OEMs.
 4. Describe the initialization process and explain what is taking place during this process.
 5. Explain the reasons for properly observing the warnings and cautions associated with this system.
 6. Explain why it is important for the operators to never remove covers from the system, because of ESD and warranty considerations.
 7. After the system is fully initialized, give the operators a brief demonstration of system controls. Refer to the system reference manual.
 8. Describe any hardcopy devices provided with the system and demonstrate how to reload the applicable consumables.
 9. Describe and demonstrate system maintenance procedures to be performed as needed:
 - System cleaning.
 - Scanhead disinfection.
 - Sony UP 890/895 printer head cleaning.
 - Other peripherals, as necessary.
 10. Review the procedures for requesting service or technical assistance.

De-Installation (Crating) Instructions

De-installation consists of disconnecting the scanheads, removing the monitor, and correctly packing the system components for shipment. Crating instructions are provided with the crate shipping materials, but are essentially the reverse of the unpacking instructions ([“Unpacking the System” on page 74](#)).

Remove any scanheads connected to the system and package them in the original or equivalent shipping containers; using packaging methods appropriate for protecting delicate electronic equipment during shipment.

Determine how to remove peripherals from the installation information. Disconnect any peripherals that are not considered part of the original system and package them in their original or equivalent shipping containers. Use packaging methods appropriate for protecting delicate electronic equipment during shipment.

Preparing the Sony UP-21MD for Transport

► To secure the Sony UP-21 print head for transport:

1. Remove the ink ribbon and paper tray.
2. Turn on the printer power.
3. Simultaneously press the **CURSOR** and **MENU** controls. The message “TRANSPORT MODE” appears in the printer display, and the printer operation tone sounds for about 2 seconds.
4. When the printer operation tone stops sounding, turn off the printer power. The print head is now secured for transport. (The print head is released for operation the next time printer power is turned on, allowing access for ribbon installation)

6 Performance Tests

Introduction

This section contains performance tests based on the factory acceptance testing Philips Ultrasound performs when conducting HDI 1500 functional audits. Use these tests to verify that a system is operating and performing correctly. Some or all of these tests should be performed as necessary, following installation, upgrade, preventive maintenance, or repair.

The procedures in this section are intended for qualified technicians who have been trained by Philips to maintain HDI 1500 systems.

A list of tests is provided at the end of this section ([“Performance Test Checklist” on page 204](#)) for use as a performance test checklist and a record of system performance. Dated copies can serve as confirmation of proper system operation. If any of the tests fail, troubleshoot and repair the system, and then restart and complete the performance testing.

Preparations

The tests in this section are organized to follow a logical progression through each of the major system operating functions. Philips recommends you perform the tests in the sequence given. The following paragraphs describe considerations and actions to take before performing the tests.

Warnings and Cautions

Review [Section 3, "Safety"](#) before continuing. Also, heed all additional warnings and cautions contained in this section.

WARNINGS

-
- Use extreme caution if applying power to the system while protective covers are removed. Dangerous voltages are present. Only a qualified Philips Ultrasound field service representative should work on internal system components.
 - Do not wear ESD wrist straps grounded to the cart when working inside a system with its power turned on.

Equipment and Materials Required

- CSR Tool Kit (6005-0077-02)
 - RMI Model 413 or 406 Tissue Equivalent Phantom (199-12204-00; 4500-8920-01)
 - Digital volt meter (DVM)
 - ECG Simulator
 - Appropriate scanheads
 - Any S-VHS 120-minute video cassette (2100-0785-02)
 - Floppy disk, 3.5-inch, DS, HD, DOS-formatted (2100-0548-01)
 - PD disk (2100-1551-01) or MO disk (2100-0811-01 or 2100-1409-01)
-

Initial Setup

Initial setup consists of applying system power and confirming a successful software initialization. You should also verify that the system configuration is consistent with the Customer Order Acknowledgement.

These tests rely on the assumption that the site power is in compliance with the pre-installation criteria described in [Section 5, "Installation"](#).

Check the equipment for abnormalities or conditions that do not meet Philips standards.

Power On and Initialization Tests

1. If not already done, plug the system power cord into a dedicated hospital grade outlet, rated for at least 15 Amperes.
2. Load printer paper and video cassette as required.
3. Connect two appropriate scanheads to the probe connectors.
4. Place the system main circuit breaker ([Figure 6-1](#)) on, and wait 15 seconds.
5. Turn on the system power switch ([Figure 6-2](#)).
6. Verify that the “power on” indicators on the internal peripherals light.
7. Turn on the power to any external peripherals and verify the “power on” indicators light.
8. After the system performs its initialization and self-test routine (about one minute), confirm that a 2D startup display appears on the screen ([Figure 6-3](#)).
9. Verify that all the keys on the system control panel (except blue Mode keys) are backlit.
10. Verify the system has the correct software level by reading the software version displayed on the screen during boot-up, or you can check it in the System Setup menu.
11. Select a scanhead and verify the 2D image is updating.

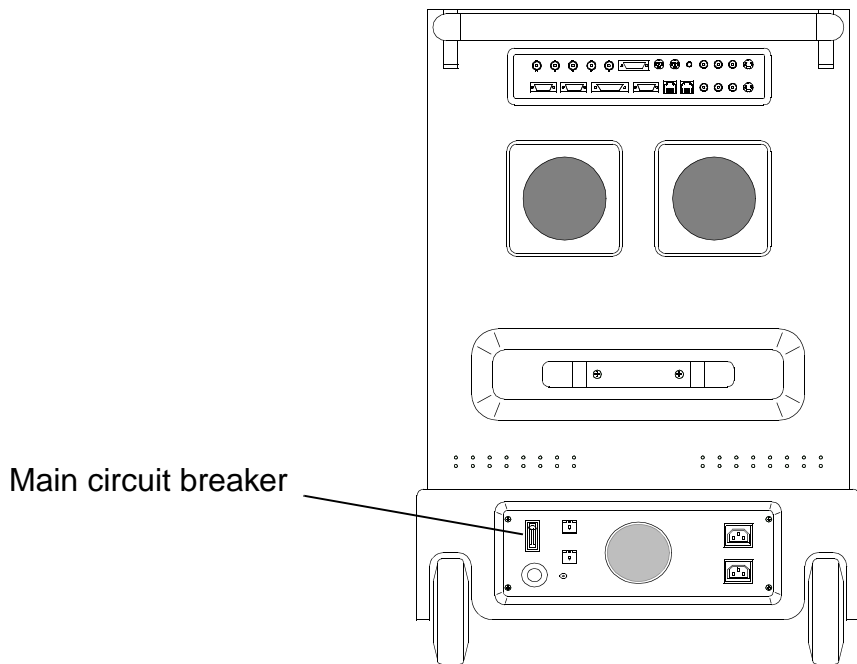


Figure 6-1

Circuit Breaker Location

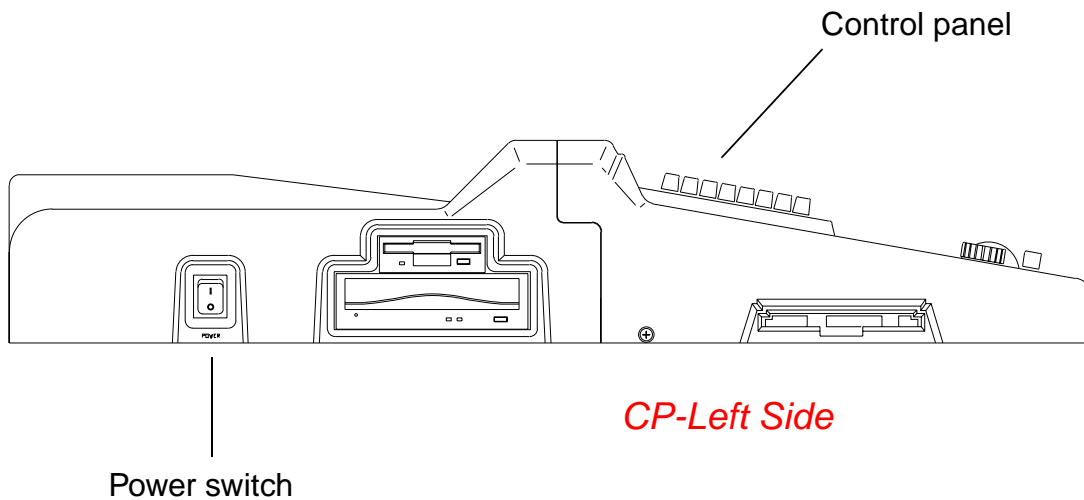


Figure 6-2

Power Switch Location

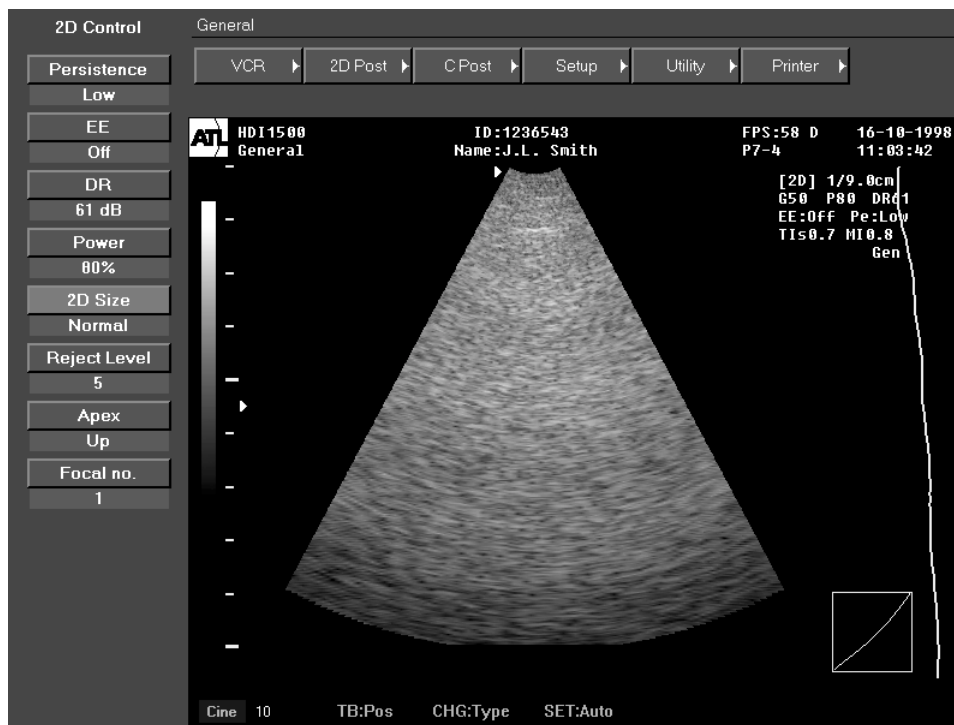


Figure 6-3

System Startup Display

Functional Tests



Use the following procedures to examine system functionality. If system testing reveals any problems, troubleshoot, repair, and retest the system. If the monitor has any alignment or color problems, perform the monitor adjustments described in [Section 7, “Adjustments”](#).

Throughout performance testing, continue to verify the following general observations:

- The image is correctly placed on the video display.
- The indicators associated with the buttons on the control panel indicate correctly when that feature is activated.
- Toggle switches, slidepots, trackball, and other moveable controls operate smoothly and efficiently.

If not already done, perform the actions described in [“Initial Setup” on page 171](#).

Monitor Brightness and Contrast Check

- On MicroVitec monitors, verify that  adjusts the light output of the entire display and that  adjusts the difference in light output between the light and dark parts of the display.
- On KDS monitors, access the on-screen display (refer to [Section 7, “Adjustments”](#)) and verify that Brightness adjusts the brightness or the light output of the entire display, and that Contrast adjusts the difference in light output between the light and dark parts of the display. (You also can check contrast by pressing Up or Down on the front of the monitor.)

User Interface Test

This test verifies that the system and the user interface are performing correctly. The test checks the functions of the trackball, controls, keys, encoders, potentiometers, and LEDs on the control panel. Operate the system to verify that each user-interface element performs as described in the following paragraphs:

NOTE During this test, verify that the LEDs light for all controls that have LEDs.



Displays the New Patient form used to create a new patient report. Press a second time to exit the form.



Displays the Probe Selection screen where you can select a scanhead, application, and settings.



Opens SonoView image management. Displays the existing patient reports. Images from the reports can be viewed, printed, and exported here as well.



Displays the system setup options.



Displays the current patient reports that are used to document measurements and calculations. Successive presses on this cycle through available reports.



User keys (later version systems) can be customized per user. You can store a series of key presses and menu selections to these keys.



Allows you to select a highlighted menu item.



Highlights the Control and Application menu items and the options available with those items.



Turns on 2D imaging. Returns to 2D-only imaging from the other imaging modes.

Displays the 2D Control menu, from which the following functions are available:

Persistence: Changes the number of frames used to generate an image. For a smoother image, select a high-persistence value.

Edge enhancement (EE): Enhances edges and border areas giving better object perspective to the image; the higher the value, the more enhanced the border.

Dynamic range (DR): Adjusts the dynamic range of the system. The range is from 40 dB to 60 dB.

Power: Adjusts the acoustic output power level in 10% increments from 0 to 100%.

2D Size: Adjusts the sector size. The three settings are normal, narrow 1, and narrow 2.

Reject Level: Displays different depths of the image.

Apex: Changes the up/down orientation of the image.

Focal no.: Allows you to choose from one to four focal points on the display.



Turns on Color imaging. Press a second time to turn off the Color imaging and display the previously active imaging mode.

Displays the Color Control menu, from which the following functions are available:

Persistence: Changes the number of frames used to generate an image. For a smoother image, select a high-persistence value.

Power: Adjusts the acoustic output power level in 10% increments from 0 to 100%.

Color Priority: Adjusts the balance between color and black-and-white.

Display Mode: Adjusts the color modes, which are Power, Variance, Velocity, and Variance + Velocity.

Display: Allows you to choose Color, Black and White, or Both.

Sensitivity: Allows you to change the ensemble size to improve resolution.



Turns on M-mode imaging. Press a second time to turn off M-mode imaging and display the previously active imaging mode.

The M Control menu displays the following functions:

Edge enhancement (EE): Enhances edges and border areas giving better object perspective to the image; the higher the value, the more enhanced the border.

Dynamic range (DR): Adjusts the dynamic range of the image.

Power: Adjusts the acoustic output power level in 10% increments from 70% to 100%.

Display Format: Shifts M-mode display to bottom, which is horizontal, or side, which is vertical.



Turns on Tissue Harmonic Imaging for the C5-2 and the P4-2 probes. Press a second time to turn the THI display off and display the previously active imaging mode.



Turns on 3D imaging (if option purchased/enabled).

Displays the 3D Control menu, from which the following functions are available:

Start/Stop: Gathers the frames to be converted into the 3D image.

Set Area: Allows you to set a focus area.

Convert: Initiates the conversion into 3D.

View: Allows you to view existing 3D images.



Turns on the stress echocardiography feature (if option purchased/enabled). Displays the stress echo menu, from which you select a protocol and perform an examination.



Provides access to dual 2D imaging. Dual images can be used for measurements in a single image. Pressing this key a second time switches activation from left to right image.



Displays the Dual Control menu, which has the same controls as the menu.



Turns on Color Power Angio. Press a second time to turn the CPA display off and display the previously active imaging mode.

Displays the Power Doppler (Doppler) Control menu, from which the following functions are available:

Persistence: Changes the number of frames used to generate an image. For a smoother image, select a high-persistence value.

Power: Adjusts the acoustic output power level in 10% increments from 70% to 100%.

Color Priority: Adjusts the balance between color and black-and-white.

Display: Allows you to choose Color, Black and White, or Both.

Sensitivity: Allows you to change the ensemble size to improve resolution.



Turns on the pulsed-wave Doppler display. Press a second time to turn the pulsed-wave Doppler display off and display the previously active imaging mode.

Displays the Doppler Control menu, from which the following functions are available:

Dynamic range (DR): Adjusts the dynamic range of the system.

Power: Adjusts the acoustic output power level in 10% increments from 70% to 100%.

Angle: Adjusts the Doppler angle indicator.

Volume: Adjusts the speakers Volume.

Vel/Freq. Scale: Switches between Frequency and Velocity.

Simultaneous: Turns Doppler on or off.

Display Format: Shifts Doppler display to bottom (full-sweep horizontal), or to the right side (half-sweep horizontal).



Turns on the continuous-wave Doppler display. Press a second time to turn off the continuous-wave Doppler display and to display the previously active imaging mode.

Displays the Doppler Control menu, which is the same as the PW Doppler menu.



Changes current trackball functions. Switches activation between the two measurement cursors. Rotates the arrow on the display.



Displays the arrow used to highlight a selected feature or area of an image.



Removes the current text entry on the image display.



Turns on the Text mode for the image display.



Turns on, and cycles through, the body marker selections.



Deletes measurement traces.



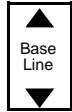
Displays the calculations menu or protocol that supports the active scanhead and clinical option. Successive presses on this cycle through available calcs.



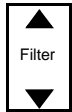
Selects and starts a measurement. Successive presses on this cycle through distance, circumference, and area measurements in 2D imaging; and distance, time, and velocity measurements in M-mode and PW Doppler imaging.



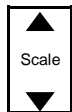
Erases annotation, body marks, measurements, and measurement results that have been placed on the image.



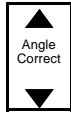
Shifts the Doppler or Color baseline among nine different positions.




Changes the value of the Doppler, Power, or Color wall filter. The settings are high, medium 2, medium 1, and low.



Changes the pulse-repetition frequency and the range of the displayed-velocity or frequency-display range in Color Flow, CPA, and Doppler imaging.



Corrects for the angle between the beam axis and the direction of flow. The cosine theta of this angle is used in the Doppler equation to calculate the velocity of blood flow. The range of Doppler angle correction is -70 degrees to +70 degrees in 2-degree increments. Press the control up to rotate the flow direction cursor in the clockwise direction; press the control down to rotate the flow direction cursor in the counterclockwise direction. See

also  .



Inverts the image display relative to the baseline.



In ECG-triggered imaging, activates ECG update based on the triggers you have selected. In dual imaging, if the dual display is frozen, switches between the display of the cine sequence related to each image. In duplex, activates the 2D image or the scrolling display. In simultaneous, switches between simultaneous and duplex update.



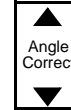
Selects among three possible steering angles for Color, Power, and Doppler imaging when using linear array scanheads. The exact angles are scanhead dependent.



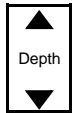
During 2D imaging, displays a line of dots that corresponds to the M-line (for M-Mode) or D-line and a depth cursor (for Doppler). The locations of the line and the depth cursor are used for data acquisition when you initiate a scrolling display.



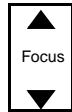
Selects a Doppler angle correction value of 60 degrees to the right, 60 degrees to the left, or 0 degree angle correction. See also



Modifies the sweep speed in either M-mode or Doppler mode.



Selects the 2D imaging depth. Depth markers are displayed on the left side of the display. The range of depth varies from 2 to 25 cm, depending on the scanhead used.



Changes the depth of the focal zones. Pressing the control moves the focal zones up or down to a shallower or deeper depth as reflected by the focal zone markers on the display.



Selects the left or right orientation of the 2D image. An orientation marker adjacent to the image display indicates the current orientation.



Increases or decreases the line density of the ultrasound image to improve image viewing. Ensure the image is active before you change the line density.



Magnifies the image in freeze or real-time mode. This control does not work on linear scanheads.



Selects different optimization settings; available settings are general (Gen), resolution (Res), and penetration (Pen).

Trackball Function

Use the trackball to move display elements, move all cursors, and position the M-line and D-line.



Initiates an action or enables a control. When measuring a distance or a size, fixes cursor position and activates the second cursor. In 3D imaging and Image Management, used similarly to a left mouse button with the trackball.



Exits a function, display, or imaging mode. In 3D imaging, used similarly to a right mouse button with the trackball.



Prints the current display to the image printer.



Saves the current display to the hard drive or to a disk. Saves reports and images to SonoView.



Freezes the image display. Stops active scanning and allows the image to be observed and measured.



Initiates a recording of the video display on the system VCR. Press a second time to pause the recording.



POWER

Adjusts the ultrasound power output. Turning this control clockwise increases the acoustic output, as reflected by an increase in the thermal index and mechanical index values; turning it counterclockwise decreases the acoustic output, as reflected by a decrease in these values.



D-Gain

Adjusts the receiver gain for the Doppler image display. Turn the control clockwise to increase the Doppler gain; turn the control counterclockwise to decrease the Doppler gain.



C-Gain

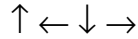
Adjusts the receiver gain for the Color Flow or CPA imaging display. Turn the control clockwise to increase the color gain; turn the control counterclockwise to decrease the color gain.



2D-Gain

Adjusts the receiver gain for the 2D and M-mode image displays. Turn the control clockwise to increase the gain; turn the control counterclockwise to decrease the gain.

Keyboard



Move the annotation cursor in the direction the arrow points.

Backspace

Erases the character to the left of the cursor.

End

Moves the cursor to the right of the last text displayed.

Enter

Moves the cursor to the next line on the image display.

Home

Moves the cursor location to the left side of the first text displayed.





Press this key and another key on the keyboard to display the upper case character or the alternate character assigned to that key.

TGC

The TGC (time gain compensation) slide controls adjust gain as a function of depth. By moving a TGC slide control to the right, gain is increased; by moving it to the left, gain is decreased.

Footswitch

Conduct this test when a footswitch is installed.

1. Press the FREEZE footswitch a few times, and verify that the 2D image freezes and unfreezes accordingly.
2. Press  twice. Press the DISPLAY CHANGE footswitch, and verify that the system switches between the left and right image.
3. Press  to return to normal imaging.




2D Image Quality Test

Perform this test with the delivered scanheads. Refer to the *General Service Manual*, P/N 4720-0219-XX, for detailed information about the use of the 2D phantom and associated reference values and measurement tolerances.


1. Turn the system power off, wait for a minimum of 10 seconds, and then turn system power back on.
2. Connect and calibrate a probe.
3. Verify that a 2D image is displayed and imaging a 413 or 406 phantom.
4. Set POWER to 100%.
5. Adjust the Gain and TGC to produce a smooth, uniform 2D image with a minimum of noise. Do not reduce the gain to the point that the echoes in the far field are eliminated.
6. Adjust the position of the probe on the phantom to obtain an image that clearly shows both the horizontal and vertical rows of pins.
7. Verify the image appears uniform in both the axial and lateral direction, without any dropouts or intensity variations.
8. Verify the pins within the structure are clearly differentiated from the surrounding tissues.
9. Verify the cystic structures at the focal zone are clearly differentiated from the surrounding tissues and are echo free, while the solid tissue, with numerous echo sources, appears solid.

2D Image Test

Perform this test with any delivered phased or curved array scanhead imaging the 413 or 406 phantom.

1. Unfreeze the system.
2. Adjust the depth up and down and verify the image remains stable with no dropouts or changes in intensity.
3. Adjust the focal zones up and down and verify the image remains stable.
4. Verify the resolution of the image is sharper in the focal zone.
5. Press  and verify the image orientation changes accordingly.
6. Press  and verify a zoom box appears on the screen.
7. Move the zoom box, using the trackball, to any area of the image and press  again.
8. Verify the system zooms the image and that the image quality remains the same.
9. Verify the depth markers re-scale with the zoomed image.
10. Exit zoom mode.
11. Select each item on the 2D Control menu and verify the controls operate properly.
12. Select 2D Post twice, and then select 2D Curves.
13. Verify that as the 2D Curves are changed, the gray scale curves change in the 2D image.
14. Set the 2D Curves to Type 1.
15. Set Chroma® to On and verify the 2D image changes to color.

NOTE The color function does not operate unless the Chroma function is enabled.

16. Press  and verify that changing the Color value changes the hue of the colored 2D image.
17. Set Chroma to OFF and exit the 2D Post menus.


M-mode Test

Perform this test with any delivered scanhead imaging the 413 or 406 phantom.

1. Adjust the gain and TGC to produce a smooth, uniform, 2D image with a minimum of noise. Do not reduce the gain to the point that the echoes in the far field are eliminated.
2. Adjust the position of the probe on the phantom to obtain an image that clearly shows both the horizontal and vertical rows of pins.
3. Enable M-mode and verify that the M-mode data is stable with no dropouts or intensity changes.
4. Verify the trackball moves the M-Line smoothly from one edge of the 2D sector to the other, and that the M-mode data is updated accordingly.

PW Doppler Mode Test

NOTE Conduct the Doppler tests only if you have a Doppler phantom or a test subject.

1. Connect and initialize an L7-4 scanhead. Use the General application and Default setting.
2. Press  and verify the Doppler annotation is displayed and the Doppler display is scrolling.
3. If not already done, image the Doppler phantom or a test subject and verify the basic functionality of the Doppler controls while in PW mode.
4. Select 2D Post, D Post, and then D Curves.

5. Verify that as the D Curves are changed, the gray scale curves change in the Doppler spectral image and the 2D image is not affected.




CW Doppler Mode Test



NOTE Conduct the Doppler tests only if you have a Doppler phantom or a test subject.

1. Connect and initialize a static CW scanhead. Use the General application and Default setting.
2. Verify the Doppler annotation is displayed and the Doppler display is scrolling.
3. Select 2D Post, D Post, and then D Curves.
4. Verify that as the D Curves are changed, the gray scale curves change in the Doppler spectral image and the 2D image is not affected.
5. If not already done, image the Doppler phantom or a test subject and verify the basic functionality of the Doppler controls while in CW mode.

2D Color Mode Test

NOTE Conduct the Doppler tests only if you have a Doppler phantom or a test subject.

1. Connect and initialize a linear scanhead. Use the General Default application.
2. Press  and verify the Doppler annotation is displayed and the Doppler display is scrolling.
3. Press  to enable color mode and verify the Color annotation is displayed.
4. Verify the trackball will position the Color Box anywhere within the image.
5. Press  and verify the trackball now changes the size of the Color box.

6. Press  and position the Color Box over the active vessel in the phantom or a test subject, and if not already done, verify the basic functionality of the color Doppler controls while in 2D color mode.
7. Select Color Priority and verify that as the Color Priority is increased, the color Doppler writes over the corresponding gray shades.
8. Verify that as the Color Priority is decreased, the color Doppler does not write over the corresponding gray shades.
9. With the color annotation displayed, select C Post, and then Curve.
10. Verify that changing the curve type caused the color maps to change.
11. Verify that selecting each of the color maps changes the color assignment of the color bar.
12. Press  and verify the system changes to color power mode.
13. Select C Post, and then Curve.
14. Verify that changing the curve type causes the power maps to change.
15. Verify that selecting each of the color maps changes the color assignment of the color bar.





ECG Test



NOTE Conduct the ECG tests only if you have an ECG simulator.


1. Connect the ECG simulator to the system.
2. Set the simulator to 1 mV amplitude, 60 BPM rate.
3. Connect and calibrate a phased array scanhead. Use the Cardiac application and Default setting.

4. Select ECG, set ECG to on, and verify that an ECG trace appears at the bottom of the screen.
5. Adjust the ECG gain up and down and verify the ECG trace responds accordingly.
6. Set the ECG Trigger to on and verify a red trigger cursor is displayed on the ECG trace.
7. Select Sync L and verify the trigger cursor moves to the right as the trigger delay is increased.
8. Image a 413 or 406 phantom and verify the 2D image updates at every trigger.
9. Turn the ECG trigger off and verify the 2D image updates normally.

Image Filing Test

1. Insert a formatted floppy disk into the system floppy disk drive.
2. Insert a formatted PD or MO disk into the system PD or MO disk drive.
3. Acquire a 2D image. Press  .
4. Press  several times to save several images.
5. Press  and verify the SonoView display appears on the screen.
6. Select Current Exam and verify the system displays the saved images with their thumbnails below them.
7. Click the  tool and drag it to one of the images in the main window.
8. In the Save In window, select the A drive (floppy drive) in the Save In dropdown list and type a unique file name in the File Name box.



9. Set Save as type to BMP and click Save.
10. Verify the LED on the disk drive lights and that no errors are reported by the system.
11. Verify the image has been copied to the floppy disk and that the image data is complete by viewing the BMP file on your laptop, or a PC that is equipped with BMP file-viewing software.
12. Repeat [step 1](#) through [step 8](#).
13. Set Save as type to JPG and click Save.
14. Verify the LED on the disk drive lights and that no errors are reported by the system.
15. Verify the image has been copied to the floppy disk and that the image data is complete, by viewing the JPG file on your laptop, or a PC that is equipped with JPG file-viewing software.
16. On the system, press , click Exams List, and highlight the current exam in the exam window.
17. Click BACKUP.
18. Click OK to the “Insert a (PD or MO) disk” message.
19. Click Yes to the “Do you want to delete the selected exams after the backup process is completed” message.
20. Observe the drive and verify the drive LED flickers, indicating activity.
21. Click the BACKUP tab and verify the exam is listed in the exam window.
22. Highlight the exam, click VIEW, and verify the images load properly.
23. Press  and click Exams List.
24. Click the BACKUP tab.

25. Highlight the exam in the exam window and click RESTORE.
26. Click Yes to the “Do you want to delete the selected exams after the restoring process is completed” message and verify the exam is deleted from the exam window.
27. Click the LOCAL tab and verify the exam is listed in the exam window.
28. Highlight the exam, click VIEW, and verify the images load properly.
29. Press  and click Exams List.
30. Highlight all exams and click DELETE.
31. Click Yes to the “Are you sure...” message and verify all exams are deleted.
32. Click CLOSE and return to normal scanning.

Peripheral Test

B&W Printer Test

Conduct this test when a B&W image printer is installed.

1. If not already done, install appropriate paper into the printer.
2. Acquire a 2D image and press .
3. Press  and verify the printer makes a print of the system video and that the print contains all the information being displayed on the system monitor.

VCR Test



Conduct this test when a VCR is installed.

1. If not already done, insert a tape into the VCR.
2. Record a few minutes of system imaging video on the VCR and include spectral and color Doppler.

3. Rewind the tape to the beginning of the recording.
4. Playback the recording and verify the recorded imaging plays back and that the video is clear and stable.
5. Verify the playback is similar in quality to the live system video. Some noise is expected from the VCR playback, but it should not be excessive or interfere with the quality of the image.
6. Verify the Doppler audio playback is clear and properly oriented (flow toward the scanhead is heard on the left speaker, flow away from the scanhead is heard on the right speaker).

Color Printer Test

Conduct this test when a color image printer is installed.

1. If not already done, install appropriate paper into the printer.
2. Acquire a Doppler image using a Doppler phantom or a test subject and press .
3. Push the Memory button of the color printer remote control.
4. Push the Print button of the color printer remote control.
5. Verify the printer makes a print of the system image and that the print contains all the information being displayed on the system monitor.
6. Press  and increase color gain to fill the color box with color.
7. Press Print on the printer front panel.
8. Verify the printer makes a print of the system image and that the print contains all the information being displayed on the system monitor.

9. Verify the color is accurately reproduced on the color print with respect to color intensity and hue (tint).
10. Verify the graphics and gray bar on the print are in sharp focus and that the gray bar displays the full range of gray shades seen on the monitor.
11. Verify the print image is spatially correct, horizontally and vertically.

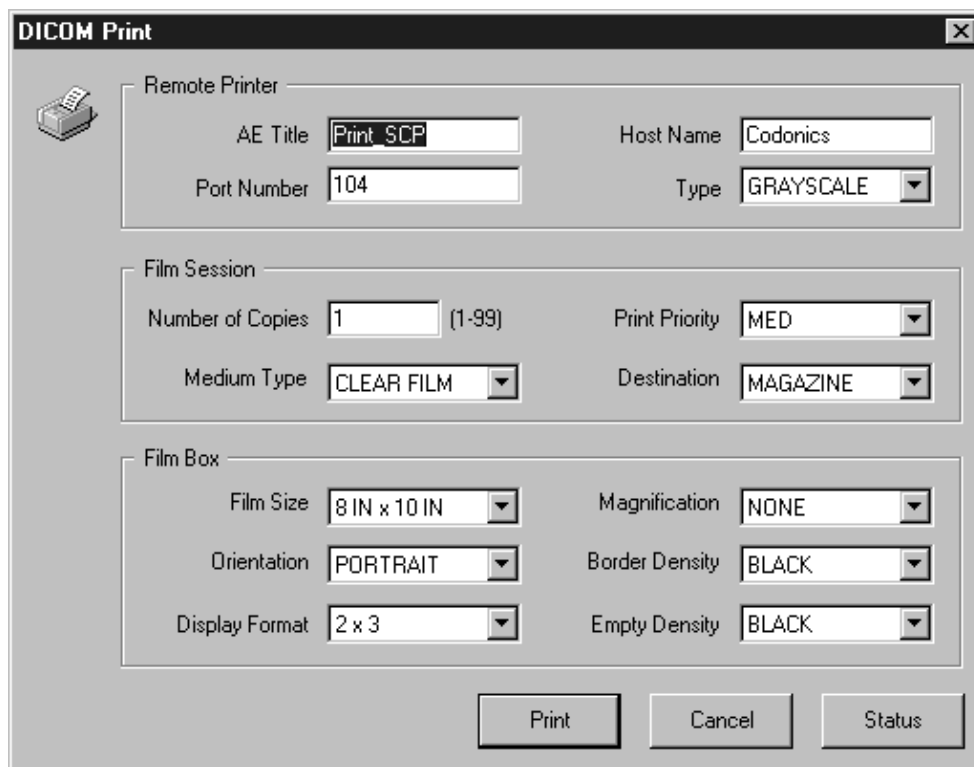
Network Printer Function Test

Conduct this test if a network printer is installed and you want to test the system DICOM printing function.

1. Use SonoView to print exams to a DICOM 3.0-compliant printer such as the Codonics NP-1660.
2. Verify the system is set up for DICOM operation.

NOTE You can find additional DICOM details on [page 143](#) of this manual, the *External Codonics NP-1660 Printer Field Installation Instructions* (P/N 8055-1767, -02 and up), and the *HDI 1500 Reference Manual Update* (P/N 4705-0032-01).

3. Select the exams in the exam list that you want to print.
4. Click Print. The DICOM Print dialog appears ([Figure 6-4](#)).
5. If necessary, enter the Remote Printer, Film Session, and Film Box information to match the printer.
6. Click Print to print the exams to the DICOM printer. A progress dialog is displayed until the print is complete.



The image shows a 'DICOM Print' dialog box with a printer icon in the top-left corner. The dialog is organized into three sections: 'Remote Printer', 'Film Session', and 'Film Box'. Each section contains several input fields and dropdown menus. At the bottom, there are three buttons: 'Print', 'Cancel', and 'Status'.

Section	Field Name	Value
Remote Printer	AE Title	Print_SCP
	Host Name	Codonics
	Port Number	104
	Type	GRAYSCALE
Film Session	Number of Copies	1 (1-99)
	Print Priority	MED
	Medium Type	CLEAR FILM
	Destination	MAGAZINE
Film Box	Film Size	8 IN x 10 IN
	Magnification	NONE
	Orientation	PORTRAIT
	Border Density	BLACK
	Display Format	2 x 3
	Empty Density	BLACK

Buttons: Print, Cancel, Status

Figure 6-4

DICOM Print Dialog

Report Printer Function Test

Conduct this test if a customer-provided report printer is installed and you want to test the system report printing function.

1. Select a report to print.
2. Click Print in the Report window.
3. Click Line Printer and verify the printer prints the report.

Multiview Video Module Test

Conduct this test when a VCR and Multiview module are installed.

1. With the system and Multiview module power on and the correct NTSC/PAL selection (LED on = NTSC, LED off = PAL), record a few minutes of system 2D imaging video on the VCR.
2. Play back the recorded 2D video and verify that only the ultrasound image is displayed.
3. Enter either the SonoView, 3D, or Stress Echo mode and record a few minutes of system imaging video on the VCR.
4. Play back the recorded SonoView, 3D, or Stress Echo video, and verify the entire screen, not just the ultrasound image, is displayed.

Safety Tests

Safety tests must be performed using the procedures in the *General Field Service Manual*, 4720-0219-XX.

End of Testing

When the system passes the tests you conduct, delete your test patient files and make the system available for use. If any of the tests failed, troubleshoot and repair the system; then restart and complete your performance testing.

Performance Test Checklist

- Visual Inspection
- Power Application and Initialization Tests
- Monitor Contrast and Brightness
- User Interface Tests
 - Controls
 - Keys
 - Footswitch
- 2D Mode Tests
 - M-mode Test
 - PW Doppler Mode Test
 - CW Doppler Mode Test
 - 2D Color Mode Test
 - ECG Test
 - Image Filing Test
- Peripheral Tests
 - B/W Image Printer
 - VCR
 - Color Image Printer
 - Report Printer Function
 - DICOM Printer Function
 - Multiview Module Function
- Safety Tests

7 Adjustments

Introduction

This section contains instructions for performing adjustments to a monitor in the field when preventive or corrective maintenance actions dictate. There are no other calibration or alignment adjustments to make in the field for this system. There are no voltage adjustments to make in the field for this system.

It is recommended the procedures in this section be performed only by qualified technicians who have been trained by Philips to maintain HDI 1500 systems.

Warnings and Cautions

Review [Section 5, "Installation"](#) before continuing. Also, follow all additional warnings and cautions contained in this section.

WARNING

Do not wear ESD wrist straps grounded to the cart when working inside a system with its power turned on.

MicroVitec Monitor Adjustments

Most monitor adjustments and operation setting changes are made by means of a micro-processor-controlled, on-screen display (OSD) adjustment mode. When this software tool is enabled, OSD menus prompt the use of five function buttons to accomplish the adjustments ([Figure 7-1](#)). Properly exiting the adjustment session automatically saves the changes you make.

The monitor bezel covers the five physical function buttons. To access and operate the respective button, carefully insert an adjustment tool (the MO drive manual disk extraction tool or a straightened paperclip will work) through the small hole in the bezel that is directly in front of the function/button to be operated. Use the tool to push the corresponding button as needed.

Degaussing the MicroVitec Monitor

Applying power to this monitor performs a degauss function. Also, when exiting the monitor OSD adjustment mode, one additional push of the Esc function button after a “save” performs a degauss function.

NOTE Multiple degaussings may be required to sufficiently degauss a monitor exposed to magnetic conditions.

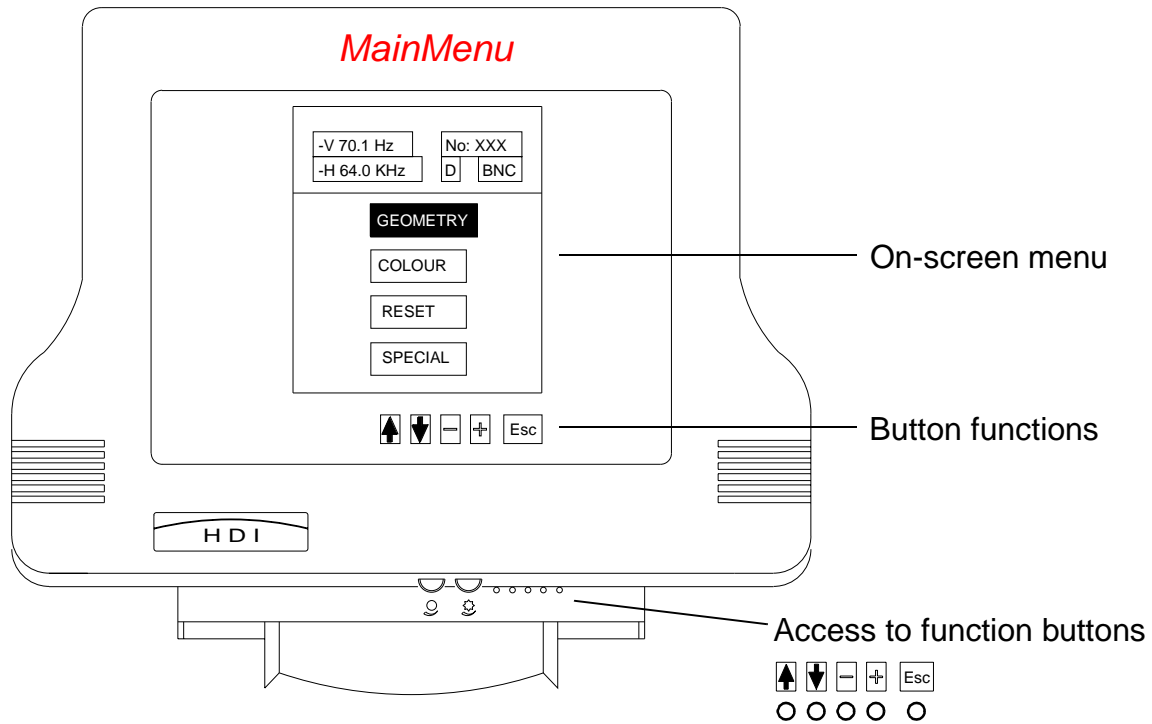





Figure 7-1

MicroVitec Monitor Adjustment On-screen Display

MicroVitec Monitor Adjustment Procedure

► To enable the OSD monitor adjustment mode:

1. Place the system in the operating mode for which the adjustment is meant. For example, if you are adjusting video position size for live playback, then you need to have live video coming in when you activate the adjustment menu.
 2. Leaving the system powered on, unplug the monitor AC power cord from the back of the monitor.
 3. Press and hold in the right-most function button while reconnecting the monitor AC power cord.
 4. Release the button, and then allow the monitor to warm up for 10 minutes to stabilize the display before checking or making any monitor adjustments.
 5. Press the  function (left-most button) to display the Main OSD Menu ([Figure 7-2](#)).
 6. Press the  or  function button until the desired menu selection is highlighted.
- NOTE** The - and + functions are both temporarily displayed as → until a menu is selected. Pressing the Esc function button will return you to the Main Menu.
7. Press either → button to display the highlighted menu.

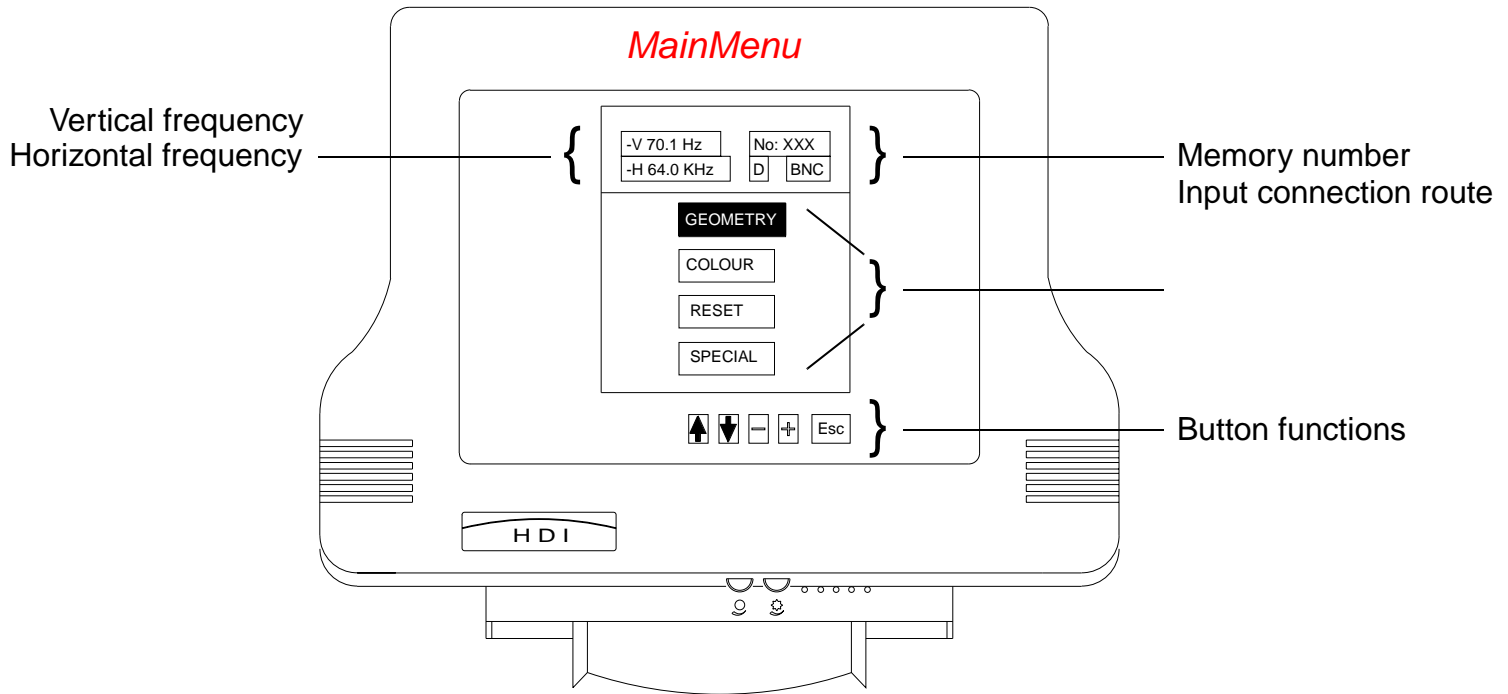


Figure 7-2

MicroVitec Monitor Adjustment OSD, Main Menu

► **To make GEOMETRY adjustments:**

Selecting the GEOMETRY option displays a menu that gives you access to the horizontal and vertical size and centering adjustments and the GEOMETRY2 menu, which when selected, displays a menu that gives you access to the sine, trapezoid, parallelogram, sidepin, and raster centering adjustments.

1. Press the ▼ or ▲ function button until GEOMETRY is highlighted.
2. Press either → button to display the GEOMETRY menu ([Figure 7-3](#)).

NOTE The - and + functions are again displayed at this point. Do not push these buttons until after [step 3](#). Pushing either of these buttons will change the numeric value that you started with in the selected adjustment.

3. Press the ▼ or ▲ function button to cycle through the four adjustment options, noting the numeric values indicated, before making any changes.
4. Press the ▼ or ▲ function button to cycle to and highlight the adjustment option you wish to change or GEOMETRY2.



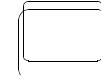
H Size



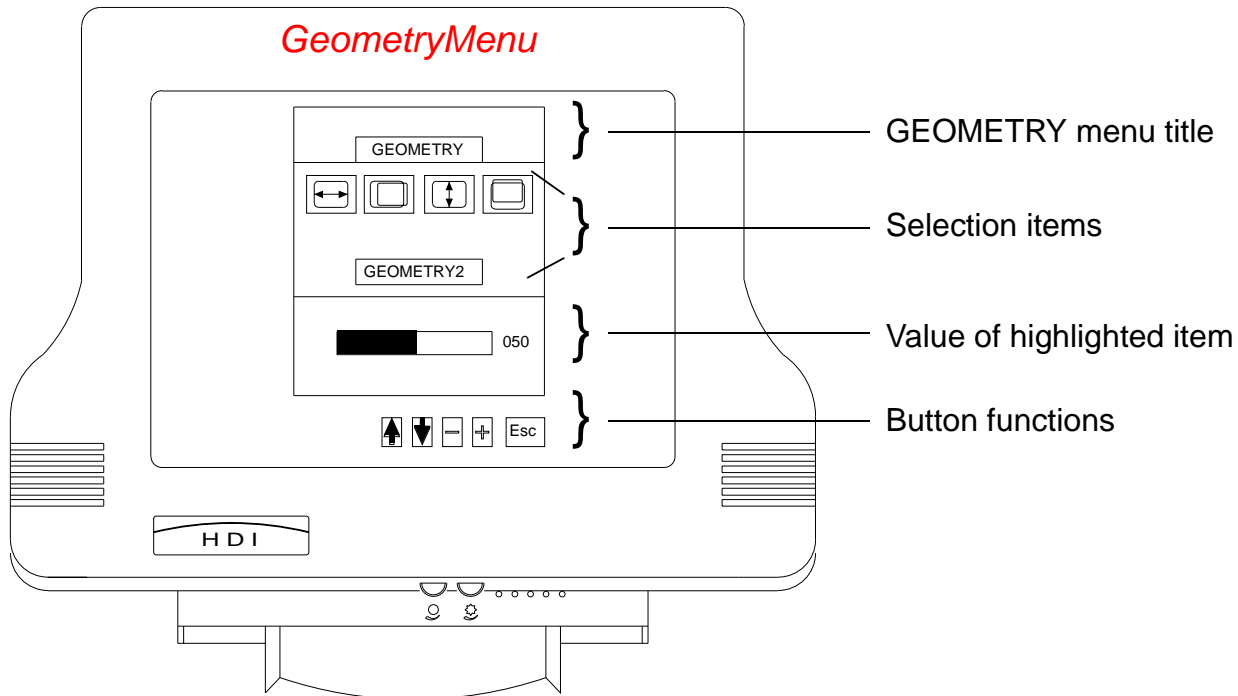
H Centering



V Size



V Centering

**Figure 7-3****MicroVitec Monitor Adjustment OSD, GEOMETRY Menu**

5. Press the - or + function button to decrease or increase the adjustment value (and bar graph) respectively. (If you press either of those buttons while GEOMETRY2 is highlighted, the GEOMETRY2 menu appears.) For your reference, [Table 7-1](#) lists typical GEOMETRY values. On some monitors one or more of these parameters may fall outside of the ranges listed.

Table 7-1 Typical GEOMETRY Values

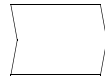
Typical Values for HDI 1500 31 kHz NTSC GEOMETRY Adjustments		Typical Values for HDI 1500 31 kHz PAL GEOMETRY Adjustments	
H size	82-92	H size	36-48
H centering	28-36	H centering	52-60
V size	63-73	V size	80-90
V centering	75-90	V centering	60-75

6. Press the ↓ or ↑ function button to cycle to and highlight GEOMETRY2; or press the Esc function button as many times as needed to return to the Main menu and exit the OSD mode, saving the changes you have made.

NOTE “Escaping” to the Main Menu and out of the OSD mode is the only way the adjustment changes will save. If the monitor is powered off before the Esc function is used, the changes will not be saved.

► **To make GEOMETRY2 adjustments:**

1. Press the \downarrow or \uparrow function button until GEOMETRY is highlighted.
2. Press either \rightarrow button to display the GEOMETRY menu ([Figure 7-3](#)).
3. Press the \downarrow or \uparrow function button to cycle to and highlight GEOMETRY2.
4. Press the - or + function button to go to the GEOMETRY2 menu ([Figure 7-4](#)).
5. Press the \downarrow or \uparrow function button to cycle through the five adjustment options, noting the numeric values indicated, before making any changes.



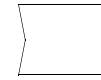
Sine



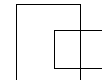
Trapezoid



Parallelogram



Sidepin



Raster

6. Press the - or + function button once to access the value change mode of the GEOMETRY2 adjustment, and then again to decrease or increase the numeric value (and bar graph) respectively.
7. Press the Esc function button to return to the GEOMETRY2 menu. For your reference, [Table 7-2](#) lists typical GEOMETRY2 values. On some monitors one or more of these parameters may fall outside of the ranges listed.

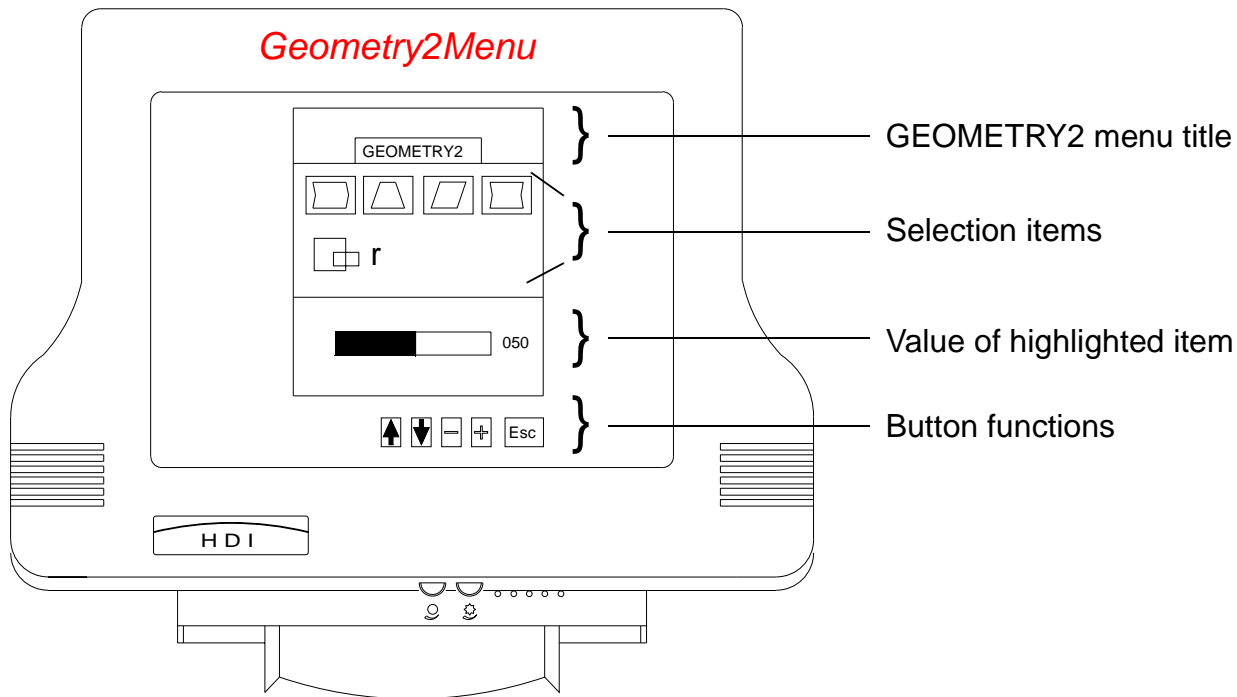


Figure 7-4

MicroVitec Monitor Adjustment OSD, GEOMETRY2 Menu

Table 7-2 Typical GEOMETRY2 Values

Typical Values for HDI 1500 31 kHz NTSC GEOMETRY2 Adjustments		Typical Values for HDI 1500 31 kHz PAL GEOMETRY2 Adjustments	
Sine	61-69	Sine	61-69
Trapezoid	48-56	Trapezoid	48-56
Parallelogram	54-62	Parallelogram	54-62
Sidepin	39-47	Sidepin	39-47
Raster	35-43	Raster	35-43

8. Press the \blacktriangledown or \blacktriangleup function button to cycle to, and highlight GEOMETRY2; or press the Esc function button as many times as needed to return to the Main menu and exit the OSD mode, saving the changes you have made.

NOTE “Escaping” to the Main Menu and out of the OSD mode is the only way the adjustment changes will save. If the monitor is powered off before the Esc function is used, the changes will not be saved into monitor memory.

COLOUR, RESET, and SPECIAL Settings

CAUTION

The COLOUR and COLOUR2 adjustments should not be changed from the factory settings unless the monitor is entirely unacceptable for customer use. Special equipment is required to properly calibrate COLOUR2 adjustments.

The RESET menu gives you the choice of resetting the adjustment parameters to the same values that existed when you entered this OSD adjustment session (losing any changes you have made during the session), or returning to the adjustment menus.

The SPECIAL menu shows the status of the monitor settings. You can cycle through the line items, but you cannot make any changes in this menu.

The COLOUR menu gives you access to the color temperature (value of white) settings and the COLOUR2 menu. The COLOUR2 menu gives you access to four additional color background settings.

► To adjust COLOUR, RESET, and SPECIAL settings:

1. In the monitor adjustments Main Menu, press the ↓ or ↑ function button until the desired choice is highlighted.
2. Press the → button to display the highlighted menu.
3. As required, interact with the menu options in a similar manner to that previously described for the GEOMETRY adjustments.

4. When in the COLOUR menu, if you want to go to the COLOUR2 menu, press the ↓ or ↑ function button to cycle to and highlight COLOUR2, and then press the - or + function button to go to the COLOUR2 menu. [Table 7-3](#) lists typical COLOUR and COLOUR2 settings. On some monitors one or more of these parameters may fall outside of the ranges listed.

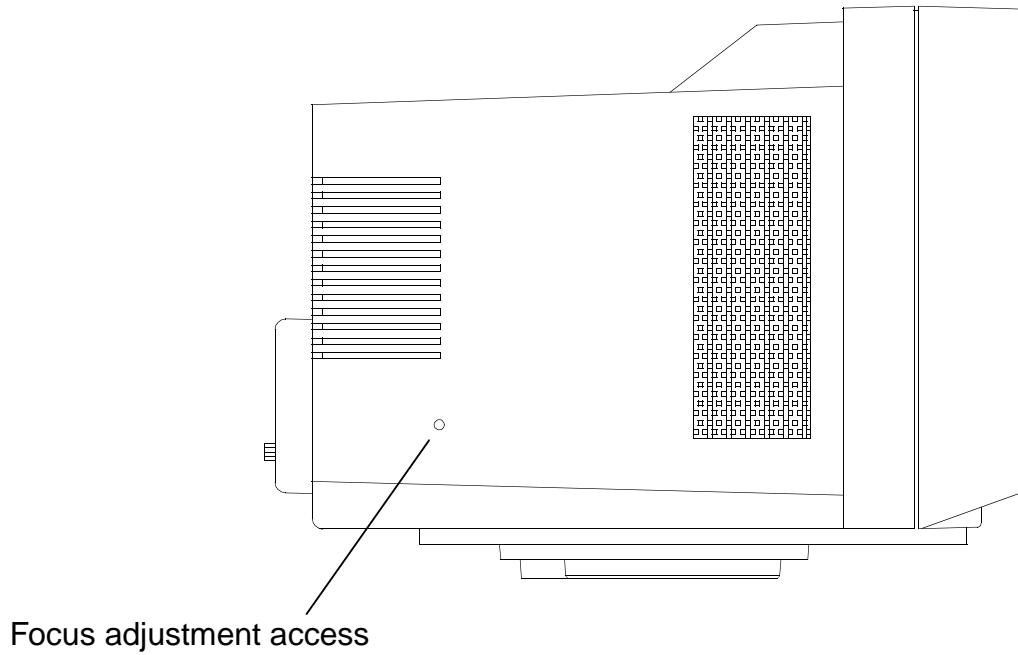
Table 7-3 Typical COLOUR and COLOUR2 Values

Typical Values for HDI 1500 COLOUR Settings			Typical Values for HDI 1500 COLOUR2 Settings		
Adjustment	31 kHz NTSC	31 kHz PAL	Adjustment	31 kHz NTSC	31 kHz PAL
Color Temp ¹	USER	USER	Sub Contrast ^{2,3}	53-61	53-61
Red	41-49	41-49	Red ³	48-56	48-56
Green	50 (Preset Value)	50 (Preset Value)	Green ³	45-53	45-53
Blue	54-62	54-62	Blue ³	47-55	47-55

1. Must be at USER selection.
2. Adjusts maximum light output. Also affects minimum brightness level.
3. Just the act of selecting any of these settings will change the setting. Any adjustments should be made in a totally dark room to see the subtle affects of the adjustments.

MicroVitec Monitor Focus Adjustment

If you determine that it is necessary to adjust the monitor focus, use a non-metallic 3/32-inch flat-blade screw driver to adjust the focus potentiometer through the access hole in the monitor cover as shown in [Figure 7-5](#).

**Figure 7-5****MicroVitec Monitor Focus Adjustment**

KDS Monitor Adjustments

Certain monitor adjustments and operation setting changes are made by means of a microprocessor-controlled, on-screen display (OSD) adjustment mode.

Degaussing the KDS Monitor

Applying power to this monitor performs a degauss function. Also, pressing Exit ([Figure 7-6](#)) performs a degauss function.

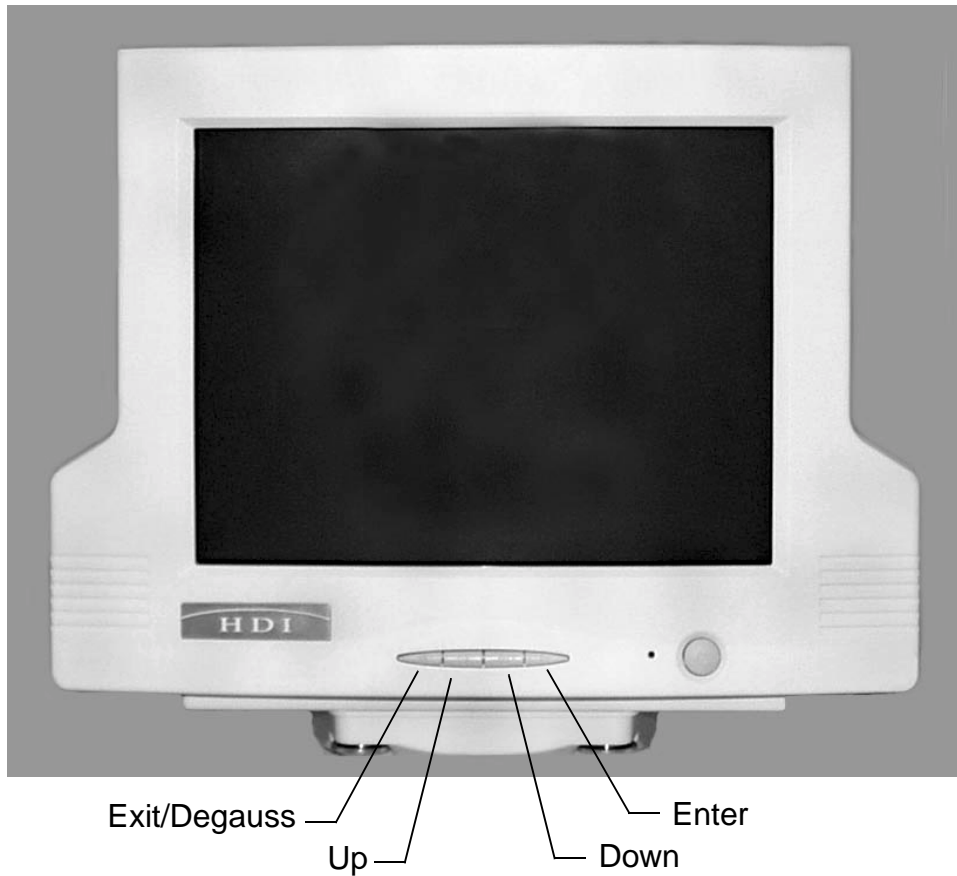
NOTE Multiple degaussings may be required to sufficiently degauss a monitor exposed to magnetic conditions.

KDS Monitor Adjustment Procedure

► **To adjust the on-screen video parameters (curved and flat-screen):**

NOTE At this release, these monitors have a tendency toward a slightly green background tint. Presently, there is no provision for adjustment of this condition. Do not reject monitors for this condition; some background tint is to be expected.

1. Monitor background light output and color tint may vary in the first 5 to 10 minutes after power is applied. Allow the monitor to warm up for 10 to 15 minutes before making adjustments. It is normal for a slight background tint to remain, even after warm-up.
2. Check and, if necessary, use the on-screen display menu to adjust horizontal and vertical size, centering, and geometry settings that leads to a display that is centered and fills the screen:
 - a. Press Enter. The on-screen display menu appears.
 - b. Press Up or Down to move through the menu.
 - c. Press Enter to display the menu for the video parameter that you selected in [step b](#).

**Figure 7-6****KDS Monitor Controls (Curved-screen shown)**

- d. Press Up (+) or Down (-) to adjust the selected video parameter. The video parameters available for setting are as follows:

Contrast adjusts the difference in light output between the light and dark parts of the display. (When the on-screen display is not displayed, you can also adjust Contrast by pressing Up or Down on the front of the video monitor.)

Brightness adjusts the brightness or the light output of the entire display.

Horizontal position centers the image horizontally on the screen.

Horizontal size adjusts the image width. The typical setting is 50. Adjust this only as necessary to produce an image width of 260 mm (± 2 mm) when viewing the Setup screen.

Vertical position centers the image vertically on the screen.

Vertical size adjusts the image height. The typical setting is 24. Adjust this only as necessary to produce an image height of 194 mm (± 2 mm) when viewing the Setup screen.

NOTE Adjusting the monitor display size so the display fills the screen will produce an incorrect image aspect ratio and has been known to reduce image resolution.

Pincushion straightens the sides of the image by pulling them in opposite directions.

Pin balance straightens the sides of the image by pulling them in the same direction.

Corner pin straightens the top and bottom corners of the image by pulling them in opposite directions.

Trapezoid evens the width of the top and bottom of the display by pulling the sides in opposite directions.

Parallelogram centers the top and bottom of the display by pulling the sides in the same direction.

Moiré removes the moiré or wavy pattern from the display.

Rotation rotates the image until the sides are parallel to the edge of the bezel.

Color controls include the Temperature selections and the RGB selections. Set the Temperature selection Kelvin setting to 9300 K, the Color Selection to USER, and the RGB selections as follows:

Red: 100%

Green: 85%

Blue: 100%

(Green may be slightly increased or decreased to give best gray rendition. White color adjustment has no significant effect on the background tint. There is no separate adjustment for background tint.)

Language selects English, German, Spanish, Italian, or French for the on-screen display language.

OSD position moves the on-screen display.

Recall resets the display settings to the original factory values. You must press and hold Enter until the progress bar disappears.

- e. Press Enter to save the setting.
 - f. Repeat steps [step b](#) through [step c](#), as necessary, to set the video parameters.
3. Press Exit to deactivate the on-screen display.

8 Preventive Maintenance

Introduction

This section identifies quality assurance audit (QAA) activities that must be performed in accordance with Customer Service policy.

The procedures in this section are intended for qualified technicians who have been trained by Philips to maintain HDI 1500 systems.

Equipment and Supplies

The tools, parts, and supplies needed for the preventive maintenance activities are identified as part of the described or referenced procedures.

Cleaning

General System

Use a vacuum cleaner, compressed air, or soft-bristle brush to remove any lint and dust from the air-flow passages and components associated with the fan assemblies, PCBs, and any other system components, that may have accumulated dust or dirt. Use mild, non-abrasive, standard computer-cleaning products to clean the monitor, keyboard, and system surfaces.

CAUTION

When cleaning the system keyboard and monitor, take care not to get any solution inside the housings. Also, take care not to scratch the face of the monitor while cleaning it.

OEM Peripherals

In accordance with Customer Field Service policy, perform any preventive maintenance recommended and described in the OEM manual for each installed peripheral:

- Panasonic AG-MD830/835 Video Cassette Recorder
P/N 4740-0292-01(E); 4740-0291-01 (P)
- Sony UP-890/895MD Black and White Video Page Printer
P/N 4740-0299-01
- Mitsubishi CP700/800 Color Video Page Printer
P/N 4740-0296-01
- Sony UP-21MD Color Video Page Printer
P/N 4740-0301-01 (Vol 1); 4740-0302-01 (Vol 2)

CAUTION

To avoid damaging the Sony UP-21 printer, if the need arises, be sure to secure the thermal printing head before shipping (See [“Preparing the Sony UP-21MD for Transport” on page 169](#)).

Inspection

Ensure that all system hardware is in the correct place and properly secured. Check the equipment for abnormalities or conditions that do not meet the manufacturer's specifications.

Inspect all cables, power cords, scanheads, scanhead connectors, fans, shields, ground straps, PCBs, and fasteners to ensure they are in good working condition.

Verify the equipment is up to date according to Service Bulletins.

Alignment, Calibration

Perform the monitor adjustments in [Section 7, “Adjustments”](#), and the tests in [Section 6, “Performance Tests”](#), per a schedule that is in accordance with Customer Service policy, to ensure the system and peripherals are working properly.

Other Maintenance

For scanhead cleaning and disinfection procedures, refer to *Using Disinfectants and Gels*, part number 4700-0249-17 and up.

Perform other cleaning and inspection procedures per Customer Service policy.

9 Troubleshooting

Introduction

The troubleshooting information provided in this section will assist you in determining if a system is failing and will help you isolate the cause if it is.

Start Here

1. Prior to taking any action, it is important that you review all relevant warnings, cautions, and procedures.
2. If possible, make a hardcopy print of the system display that shows the first indication of the failure. Take hardcopy prints as soon as possible of any system displays that reveal the failure to ensure this type of data is not lost. Relevant data is often lost when the system is rebooted.
3. Try to determine if the symptoms indicate an operating/procedural error or a system failure, and if a system failure, whether it is an operating system (Windows NT) or an ultrasound problem.
4. Consider the situation: When was the last time the system was working correctly and what, if any, influencing circumstances have occurred since. Check the system configuration.
5. Check for obvious causes and solutions: Voltage at electrical outlets, “tripped” circuit breakers, blown fuses, disconnected or damaged wires, and so forth.
6. Conduct tests from [Section 6, “Performance Tests”](#) as required to determine if the system is failing or to attempt to duplicate the failure.
7. Consider the value against the difficulties of swapping suspect components with good ones. Do *not* cause additional problems or confuse your search. *Never* swap parts if a known good item might be damaged.

8. Once the fault has been identified, perform the authorized corrective action needed to repair the failure and conduct the performance tests necessary to ensure the system meets an optimum level of performance.

Review Section [Section 3, “Safety”](#) before continuing. Also, follow all additional warnings and cautions contained in this section.

Warnings and Cautions

WARNINGS

-
- Dangerous voltages are present when protective covers are removed. Use extreme caution.
 - Do not wear ESD wrist straps grounded to the cart when working inside a system with its power turned on.
 - Do not replace components with power connected. Under certain conditions, dangerous voltages may exist with power disconnected. Always disconnect power and allow circuits to discharge before touching any components.
 - To protect against fire hazard, only use replacement fuses of the same type and rating as the original fuses.
 - Be careful not to burn yourself on the peripherals in systems where two peripherals are installed and operating in the OEM bay. Allow enough time to let built-up heat on the peripherals to dissipate before servicing.

CAUTIONS

-
- Always turn power off and wait at least 30 seconds before removing or installing any PCB, module, or component.
 - Always use correct ESD procedures. Do not handle PCBs without proper ESD protection. Damage to components will result from improper handling.
-

Failure Symptoms and Solutions

[Table 9-1](#) lists some general trouble symptoms and recommended actions. Also review Service Bulletin 1500-02, which contains a variety of troubleshooting information that you may find helpful.

Table 9-1 Symptoms and Recommended Action

Symptom or Condition	Recommended Action
System will not power on (no audible fan or relay noise when the POWER switch is on).	<ul style="list-style-type: none"> • Verify the AC source is active, at the correct voltage, and the system power cord is connected. • Check that the main power switch is on. • Check that the main power fuses are good, as described in “Checking the Fuses” on page 232. • Verify the power supply voltages as described in “Checking the Power Supply Voltages” on page 234.
System will not power on (fans run, but no audible relay noises when the POWER switch is on).	<ul style="list-style-type: none"> • Verify the DC power supply voltages as described in “Checking the Power Supply Voltages” on page 234.

Table 9-1 Symptoms and Recommended Action (Continued)

Symptom or Condition	Recommended Action
System power is on, but no display shows on the monitor.	<ul style="list-style-type: none"> • After power up, the HDI 1500 takes approximately 1 minute to initialize the software and hardware. • Check that the AC and video cables to the monitor are connected. • Check contrast and brightness adjustments on monitor. • Consider if the lithium CMOS battery on the Industrial PC Card (Figure 13-13) has failed (although the battery is usually reliable with a life expectancy of 3 to 4 years), preventing computer bootup. <p>Note: If a hard copy print can be made that shows a display, the system is probably OK, and the monitor is probably bad.</p>
System monitor has a “shuddering” display or noise in the image.	<ul style="list-style-type: none"> • Consider the possibility of EMI or RFI as described in “Checking for EMI and RFI Interference” on page 236. • Check print quality for similar noise. If it is on the print, it is probably an internal system failure. Troubleshoot the PCBs.
System power is on, but OEMs will not power on.	<ul style="list-style-type: none"> • Verify that the correct AC voltage is present at the OEM receptacle. • If AC voltage is not present at the OEM receptacle, check it at the power supply (“Checking the Power Supply Voltages” on page 234).
Cannot select a scanhead and message “Please connect any scanhead” is displayed.	<ul style="list-style-type: none"> • Verify that all scanhead circuit connections are properly seated. • Verify that connected scanheads are compatible (Section 15, “Scanheads”).

Table 9-1 Symptoms and Recommended Action (Continued)



Symptom or Condition	Recommended Action
Cannot Export images to the PD cartridge.	<ul style="list-style-type: none"> Verify that the PD cartridge is formatted.
Video problems.	<ul style="list-style-type: none"> Verify or change the video settings as described on page 161. Verify the jumper on the VM PCB is correctly configured (Figure 13-21).
Software on hard disk is corrupt.	<ul style="list-style-type: none"> If a system backup exists, restore files to the hard drive as described in “Restoring a System Hard Drive From a Backup Disk” on page 242.
Dual hard drive system will not boot up, or a disk error is reported.	<ul style="list-style-type: none"> Verify the “Master” and “Slave” drive configurations are correct (See “Hard Drive Configuration” on page 320.)
Poor VCR color playback or poor image quality with Fuji Laser Camera	<ul style="list-style-type: none"> If the system has a 7575-1587-01 or -02 Video Manager PCB with software v1.08.05 through v1.08.10, replace the VM PCB with a -03 VM PCB.
 (Set ROI/Trigger) is not active after starting stress echo. <p>NOTE For the Stress Echo feature to work, the default configuration set up via the Archive software must match the system hardware configuration.</p>	<p>Reason: The Matrox Meteor2 Frame Grabber PCB was not recognized by the operating system: Verify by going into Windows NT and clicking Programs > Administrative Tools > WindowsNT Diagnostics > Resources. “Corona” should be listed as a device. If it is not, the Matrox PCB is not properly seated, is missing, or is failing.</p>

Table 9-1 Symptoms and Recommended Action (Continued)

Symptom or Condition	Recommended Action
 <p>(Set ROI/Trigger) is active, but after pressing the button, no live image is displayed, only a black box in the left upper corner of the display is visible (Figure 9-1).</p> <p>NOTE For the Stress Echo feature to work, the default configuration setup via the Archive software must match the system hardware configuration.</p>	<p>Reason: The Matrox Meteor2 Frame Grabber PCB is recognized by the operating system, but the PCB is not receiving the video-signal:</p> <ul style="list-style-type: none"> • Verify the video cable (Figure 11-9) is installed and that the cable-connections are good. • Verify the Matrox PCB is properly seated.
<p>“Dr.Watson” error displayed when Stress Echo is initiated.</p>	<p>Reason: Closing the Stress Echo Report menu with the Windows “x” button causes a “Dr.Watson” error next time Stress Echo is initiated.</p> <ul style="list-style-type: none"> • Reboot the system and advise the customer that when using the Stress Echo Report menu, they should close the menu by clicking File then Close, not the Windows “x” button.

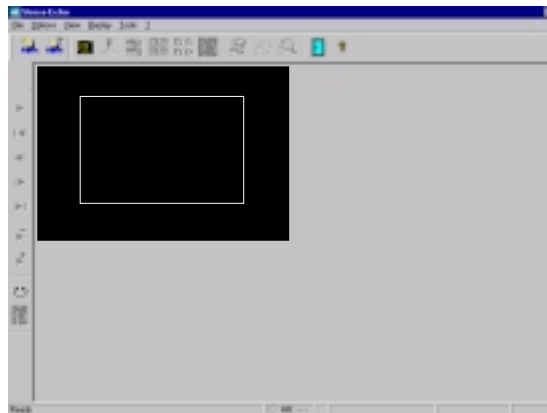
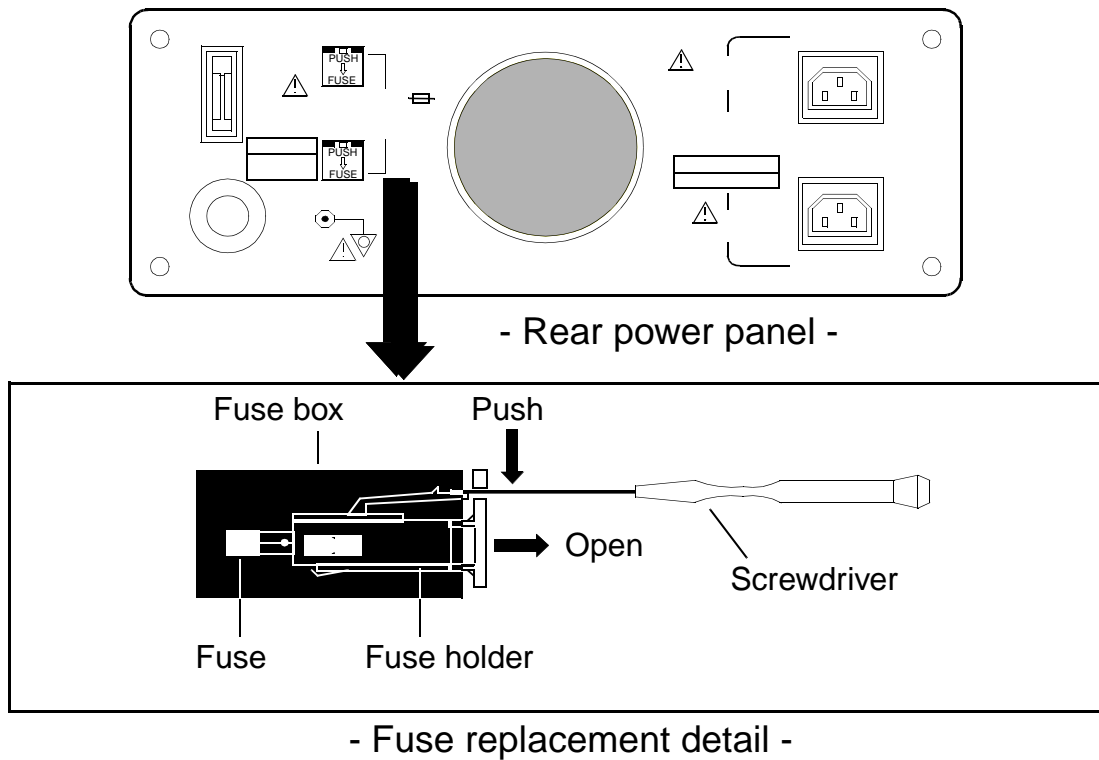


Figure 9-1
Checking the Fuses

Stress Echo Symptom When Video Cable Connection Bad

1. Turn the system power off and unplug the power cord.
2. Open the respective fuse box as shown in [Figure 9-2](#); the fuse holder is inside.
3. Pull the fuse holder out to remove it.
4. Remove the fuse from the fuse holder.
5. Verify that the fuse is good or if it needs replacing.
6. Install the fuse by pushing it into the back of the fuse holder.
7. Reinsert the fuse holder into the fuse box. At this time, the arrow direction on the upper side of the fuse holder should be in accordance with that on the fuse drawing.
8. Repeat [step 3](#) through [step 7](#) to inspect or replace the other fuse.

**Figure 9-2****Fuse Replacement**

Checking the Power Supply Voltages

Measure the Power Supply voltages at the connectors shown in [Figure 9-3](#).

Table 9-2 Power Supply Voltages

Voltage	Tolerance
+5 Vdc	± 30 mVdc
-5 Vdc	± 30 mVdc
+3.3 Vdc	± 30 mVdc
-12 Vdc	± 0.6 Vdc
+12 Vdc	± 0.6 Vdc
-10 to 80 Vdc (-HV)	variable voltage
+ 10 to 80 Vdc (+HV)	variable voltage
0-5 Vdc	variable voltage
115 Vac	± 11.5 Vac
240 Vac	± 24 Vac

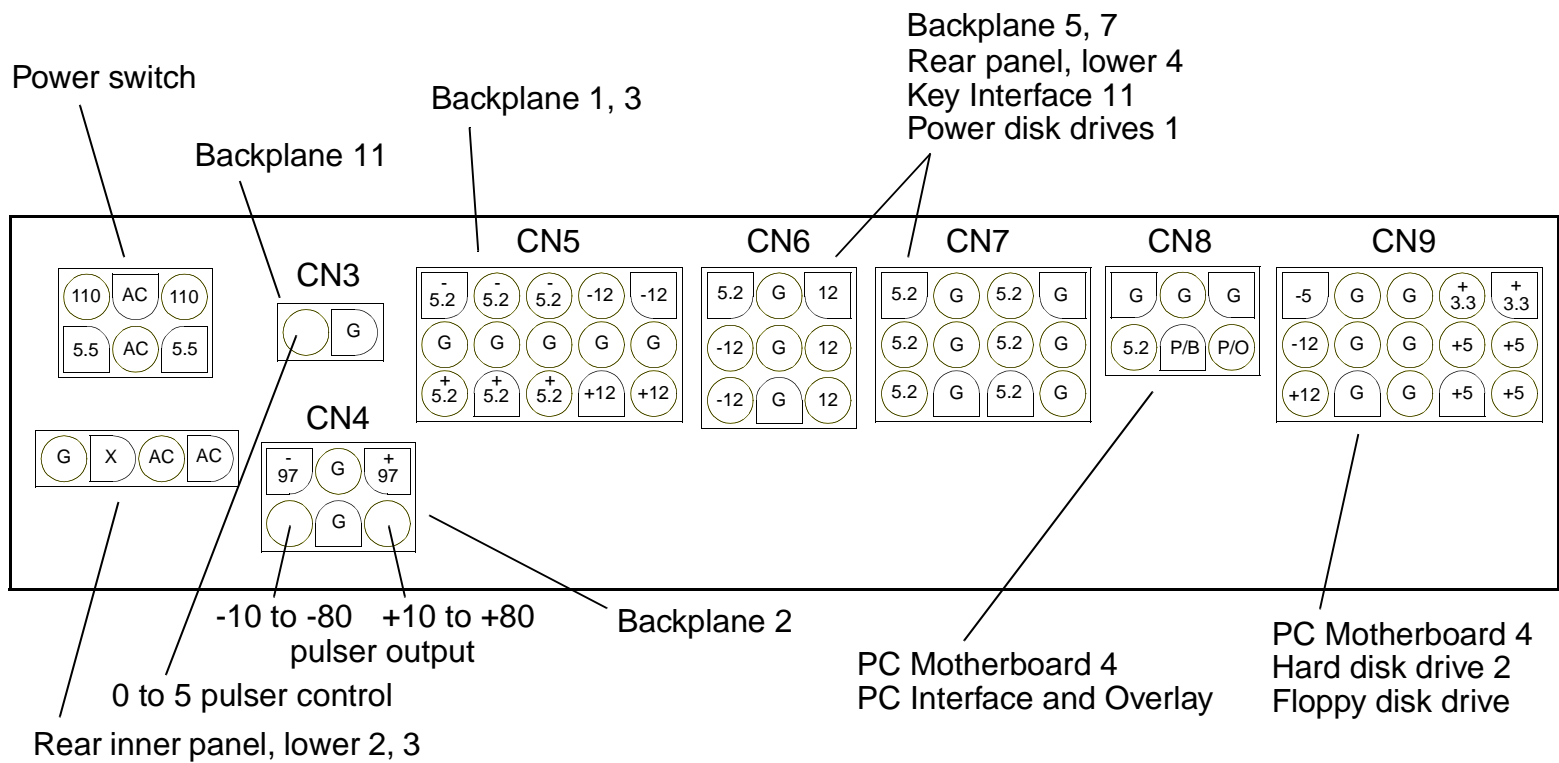


Figure 9-3 System Power Supply Voltages on Interconnect Panel

Checking for EMI and RFI Interference

Electromagnetic interference (EMI) and radio frequency interference (RFI) can conceivably cause image noise or monitor distortion if the system EMI shielding has been compromised. EMI and RFI can be generated by a variety of electrical devices. The interference can be transmitted over power lines or radiated through the air.

- An operating AM radio tuned between stations around 1,600 Hz can be used as an EMI/RFI source tester. The interference would be noticeable as audible static noise on the radio while walking it around the room. Sometimes EMI/RFI sources are not constant, but are temporary or surge situations that may only occur at certain times.
- Considering and locating the source/cause is important, but regardless of the source, since the system is designed to shield EMI/RFI interference, troubleshoot the system to determine if the EMI/RFI shielding has been compromised. One place to start is to verify that all the system panels are appropriately secured with all their factory-approved screws.

DICOM Troubleshooting

Three key elements in the network environment must be configured properly for DICOM communications to work:

- Physical data path integrity; the hardware responsible for data transmission (cabling, transceivers, hubs, routers, and switches) must be correct and functional. ([Figure 5-16](#), [Figure 5-17](#), and [Figure 5-18](#))
- Correct TCP/IP configuration: The IP addressing and subnet masking for the HDI 1500 system and all active devices in the host table, including the gateway address, must be correct.
- Correct DICOM configuration: The application entity titles and port number must be correct.

If a customer's DICOM connection quits working, it is usually because something was changed in the network environment. Use these steps to help isolate the problem:

NOTE If the DICOM connection worked before, it is typical that either the local information systems department has changed something in the IP environment (such as rerouting data without informing those affected), or there is a hardware failure in the physical data path (such as a bad data cable).

1. Verify the host table data and network configuration is still correct and that the Network Interface port is enabled on the HDI 1500 system. Refer to the *External Codonics NP-1660 Printer Field Installation Instructions* (P/N 8055-1767-02 and up) and the *HDI 1500 Reference Manual Update* (P/N 4705-0032-01) for DICOM information.
2. Check if there is an obvious problem with the physical data path, such as a broken or disconnected cable (see [Figure 5-16](#), [Figure 5-17](#), [Figure 5-18](#)). If you cannot do it on your own, contact the appropriate customer site information or systems administration person to verify the physical data path integrity.
3. If the physical data path is good, verify the data path to the hub, network, or the printer, as applies:
 - a. On the HDI 1500 system, open a DOS window and type in the command “ping hostname” (where “hostname” is the name of the device, as listed in the system host table, with which the system is trying to communicate).

- b. Press Enter. If the path is complete, there will be a response that reads:
Reply from xxx.xxx.xxx.xxx: bytes=32 time<10ms TTL=128
Reply from xxx.xxx.xxx.xxx: bytes=32 time<10ms TTL=128
Reply from xxx.xxx.xxx.xxx: bytes=32 time<10ms TTL=128
Reply from xxx.xxx.xxx.xxx: bytes=32 time<10ms TTL=128
4. If the previous steps have not met with success, verify the device in question is online and operational.
5. If the HDI 1500 host table DICOM data is unchanged, then it must have been changed at the archive device or the printer. It will be necessary to involve the local system administrator to assist with the troubleshooting.
6. If you have not resolved the issue at this point or if any of the previous steps yielded unexpected results, call the Philips Bothell-based Connectivity Group at 1-800-874-3499 extension 3044.

Backing Up the System Hard Drive

As described in the following procedure, you can use Norton Ghost software and a PD or MO disk to back up a system hard drive. If it becomes necessary to restore the backed up files to a hard drive, see [“Restoring a System Hard Drive From a Backup Disk” on page 242](#).

Equipment Required

You will need the Service Boot Disk (4252-0877-02, or you can use the -01 SBD on earlier systems with PD drives) and as applies, a blank, formatted, PD disk (2100-1551-01) or MO disk (2100-1409-xx), the quantity of which depends on the size of the hard drive and the number of files it contains.

CAUTION

Separately backup any images your customer wants to save. This procedure copies the file headings only, NOT the information inside the files. Also, record the option passwords before proceeding.

**Backup
Procedure****► To back up the system hard drive:**

1. Verify the system is connected to an AC power outlet and that system power is off.
2. Insert the Service Boot Disk into the floppy disk drive.
3. Turn the system power on.
4. When the system bootup screen appears, press Del and enter the appropriate access key sequence at the prompt to open the CMOS SETUP UTILITY. (Contact your country's Technical Support Group if you do not know the correct key sequence.)
5. Select BIOS FEATURES SETUP with the down arrow or up arrow key and press Enter. The BIOS FEATURES SETUP display appears.
6. Use the down arrow key to select the Boot Sequence setting and press Page Up or Page Down to change the setting from C,A,SCSI to A,C,SCSI.
7. Press Esc to exit the BIOS FEATURES SETUP display.
8. Press F10, then select Y and press Enter, to save these settings and exit the CMOS SETUP UTILITY.
9. The system automatically re-boots from the floppy disk. When the Windows Startup Menu display appears, select the appropriate keyboard language from the menu and press Enter. (The keyboard language defaults to English if no selection is entered.)
10. When the About NORTON GHOST display appears, press Enter to continue.

11. Insert a blank, formatted, PD optical disk into the PD/CD drive; or a blank, formatted, MO disk into the MO drive.
12. Using the right arrow key, select Local, Disk, and To Image, then press Enter to display the hard disk drive (HDD) parameters.
13. Press Enter again to continue.

CAUTION

Systems with the Stress Echo feature will have two HDD parameters because those systems will have two hard drives. Use Tab to select the correct hard drive you are going to back up to. Selecting the wrong hard drive can cause data loss and boot problems.

14. Press Tab until the drop-down “drive” menu at the top of the window is highlighted.
15. Select the destination drive using the down arrow key to select the drive designator and press Enter.

NOTE The drive designators for the various disk drives in the system are determined by the file system installed. Systems with software version 1.08.10 use the FAT16 (File Allocation Table) file system, and systems with software version 2.00.02 or higher use the NT File System (NTFS). The drive designator is d:Local drive for systems using the FAT16 file system or c:Local drive for systems using the NT file system.

16. Press Tab until the File Name field is highlighted and enter a file name as follows:
Type “hdback drive_letter:\ name.gho”, where “drive_letter” is the letter assigned to the drive per [step 15](#), and “name” is the last eight numbers of the system serial number. For example, “hdback c:\ 91000133.gho” for a system with software version 2.00.02 or higher and a serial number of HD91000133.
17. Press Enter when you have typed in the filename.

NOTE If the hard drive you are backing up contains a large amount of information, it may require more than one PD or MO disk to complete the backup (in this case the Ghost program will ask if you want to “SPAN” to multiple disks). In some circumstances, selecting High instead of Fast in [step 18](#) may allow a larger amount of information to fit on one disk.

18. When the message “Compress image file?” appears, use Tab to select Fast or High and press Enter.
19. When the message “Proceed with disk dump?” appears, use Tab to select Yes and press Enter. The GHOST program checks the directory structure of the hard drive and copies (“dumps”) its contents onto the PD or MO disk.
20. After the “Dump Completed Successfully” message appears, press Enter.
21. If you are backing up a system with the Stress Echo feature and want to back up the second hard drive, perform the following steps; otherwise proceed to [step 22](#):
 - a. Remove the PD or MO disk and label it as described in [step 27](#).
 - b. Cycle power now and repeat [step 9](#) through [step 20](#).
22. Use the down arrow key to select Quit and press Enter.
23. When the message “Really Quit?” appears, remove the Service Boot Disk and the PD or MO disk from their drives and use Tab to select Yes.
24. Press Enter. The system displays the message “Not ready reading drive A...”
25. Press Ctrl+Alt+Del to re-boot the system.
26. In the same manner as described in [step 4](#) through [step 8](#), change the boot sequence back to C,A,SCSI.

27. Label all PD or MO backup disks similar to the following example, using the serial number of the system, your FSE number, the backup date, and the exact filename:
S/W Backup Disk, HDI 1500, S/N: HD91000133, 02-18-2000, FSE-#### --For intended use only, copyright Philips Ultrasound 2003 - *Filename*: 91000133.gho
28. Store the backup in a safe location, accessible to anyone who might need to restore the backed up data to the system.

Restoring a System Hard Drive From a Backup Disk

As described in the following procedure, use Norton Ghost software to restore a system hard drive that has been backed up to a PD or MO disk, as instructed in [“Backing Up the System Hard Drive” on page 238](#).

Equipment Required

You will need the Service Boot Disk (4252-0877-02, or you can use the -01 SBD on earlier systems with PD drives) and the correct PD or MO disks containing the hard drive backup files.

CAUTION

The restore process overwrites the system hard drive completely. All files on the hard drive before the restore process are lost.

Restore Procedure

- **To restore files to the system hard drive:**
1. Verify the system is connected to an AC power outlet and that system power is off.
 2. Insert the Service Boot Disk into the floppy disk drive.
 3. Turn the system power on.

4. When the system bootup screen appears, press Del and enter the appropriate access key sequence at the prompt to get into the CMOS SETUP UTILITY. (Contact your country's Technical Support Group if you do not know the correct key sequence.)
5. Select BIOS FEATURES SETUP with the down arrow or up arrow key and press Enter. The BIOS FEATURES SETUP display appears.
6. Use the down arrow key to select the Boot Sequence setting and press Page Up or Page Down to change the setting from C,A,SCSI to A,C,SCSI.
7. Press Esc to exit the BIOS FEATURES SETUP screen.
8. Press F10, then select Y and press Enter to save these settings and exit the CMOS SETUP UTILITY.
9. The system automatically re-boots from the floppy disk. When the Windows Startup Menu screen appears, select the appropriate keyboard language from the menu and press Enter. (The keyboard language defaults to English if no selection is entered.)
10. When the About NORTON GHOST screen is displayed, press Enter to continue.
11. Insert the first PD or MO disk that contains the system backup files into the PD/CD or MO drive.
12. Using the right arrow key, select Local, Disk, and From Image, then press Enter. The file name window appears.
13. Press Tab until the drop-down "drive" menu at the top of the window is highlighted.
14. Select the source drive using the down arrow key to select the drive designator and press Enter.

NOTE The drive designators for the various disk drives in the system are determined by the file system installed. Systems with software version 1.08.10 use the FAT16 (File Allocation Table) file system, and systems with software version

2.00.02 or higher use the NT File System (NTFS). The drive designator is d:Local drive for systems using the FAT16 file system and c:Local drive for systems using the NT file system.

15. Press Tab until the image file with the backup file name is highlighted and press Enter. The local destination drive window appears.
16. When the image file parameters appear, press Enter,

CAUTION

Systems with the Stress Echo feature will have two destination drive parameters, because those systems will have two hard drives. Use Tab to select the correct hard drive to restore. Selecting the wrong hard drive can cause data loss and boot problems.

17. When the Destination Drive Details window showing the HDD (hard disk drive) appears, press Enter,

NOTES • The restore process works only if a hard drive letter is designated and the filename entered is the same as the filename on the backup disk.

- If the hard drive you are restoring contained a large amount of information when it was backed up, it may have required more than one PD or MO disk (in this case the Ghost restore program will prompt you to insert the multiple backup disks in sequence).

18. When the message “Proceed with disk load? destination drive will be overwritten.” appears, use Tab to select Yes and press Enter. The GHOST program copies (“clones”) the PD or MO disk contents onto the designated hard drive.
19. When the “Clone Completed Successfully” message appears, remove the Boot Disk and the PD or MO disk from their drives.

20. Use Tab to select Restart Computer and press Enter.
21. In the same manner as described in [step 4](#) through [step 8](#), change the boot sequence back to C,A,SCSI.
22. Store the backup disk in a safe location accessible by anyone who might need to restore the backed up data to the system.

Making the Repair

After you have finished troubleshooting, isolating a fault, and identifying the appropriate repair, perform the authorized corrective action needed. Then conduct the performance tests necessary to ensure the system meets its optimum level of performance.

10 Disassembly

Introduction

With the exceptions noted here, any disassembly required for the removal and installation of field replaceable parts, as necessary to troubleshoot the system and implement a repair, can be discerned from the illustrations in [Section 13, “Configuration”](#), and [Section 14, “Parts”](#).

See [Figure 10-1](#) for details of the side card cage PCB retainer.

Warnings and Cautions

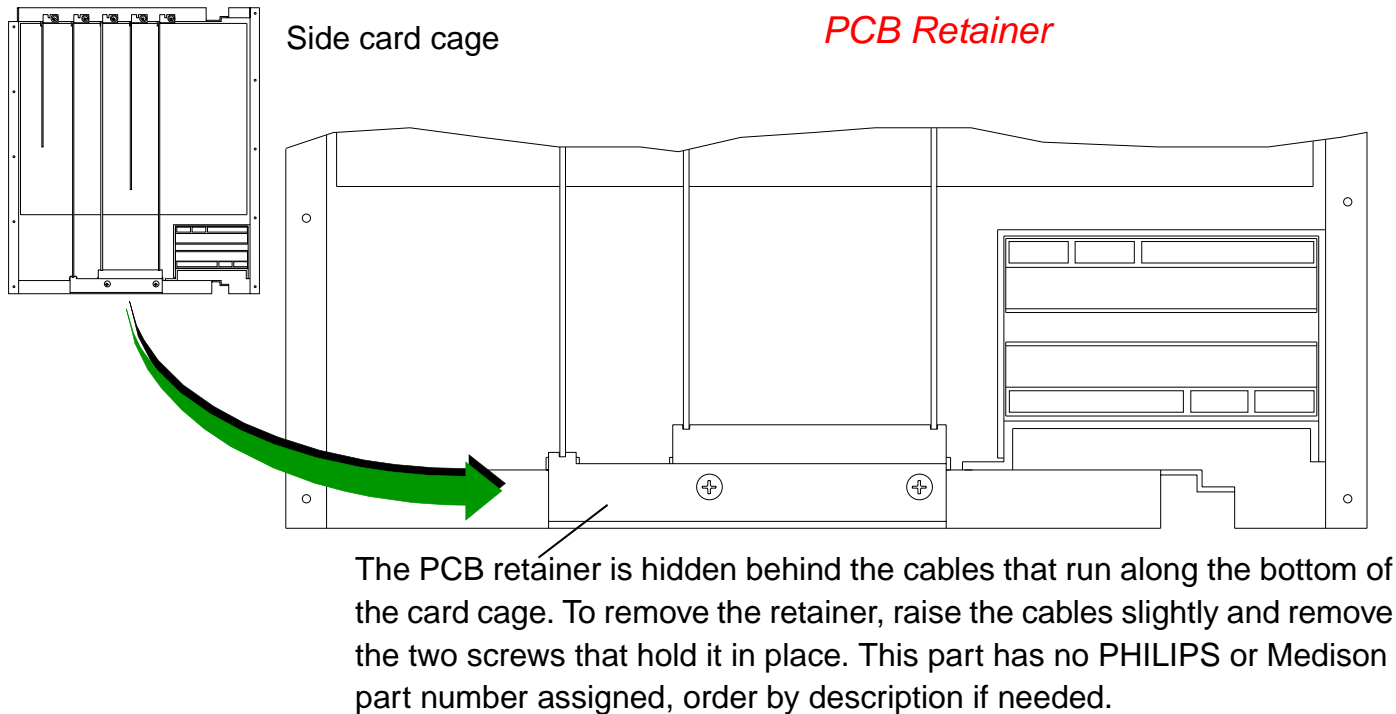
Review [Section 3, “Safety”](#) before any disassembly. Also, heed all additional warnings and cautions contained in this section.

WARNINGS

-
- Dangerous voltages are present when protective covers are removed. Use extreme caution. Any action taken inside the system must be made by a qualified Philips Ultra-sound field service engineer.
 - Do not wear ESD wrist straps grounded to the cart when working inside a system with its power turned on.
 - Do not replace components with power applied. Under certain conditions, dangerous voltages may exist with power disconnected.

CAUTIONS

-
- Always use correct ESD procedures. ESD damage is cumulative and may not be noticeable at first. ESD symptoms may be first exhibited as a slight degradation of performance or image quality.
 - Always turn power off and wait at least 30 seconds before removing or installing any PCB, module, or component.
-

**Figure 10-1****Side Card Cage PCB Retainer Removal**

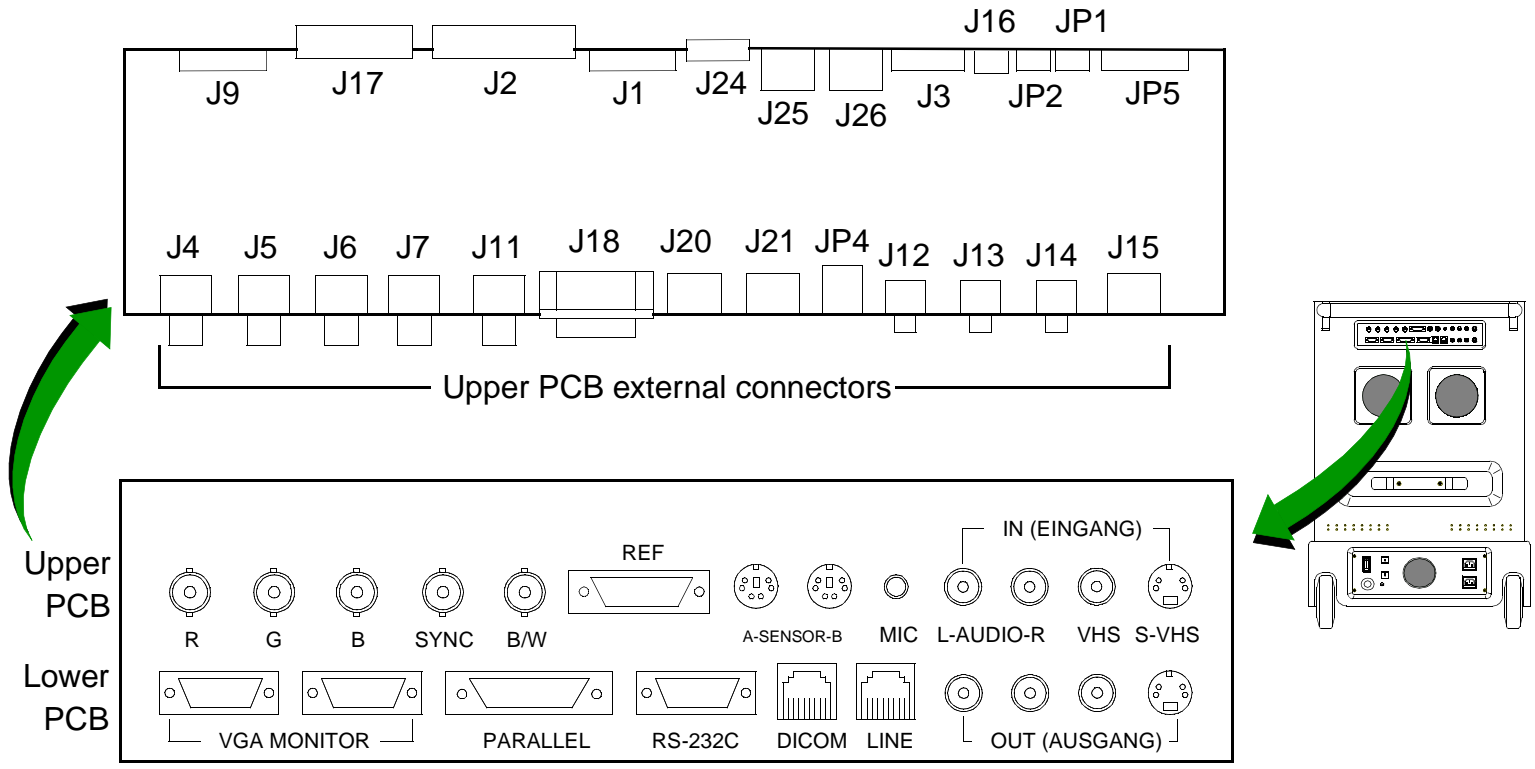
11 Cabling

Introduction

This section contains system cabling and connector information. Use the figures and parts tables in this section to locate and identify system cables and their part numbers. Part numbers are shown on the illustrations and listed and described in the corresponding tables. Figures are keyed to the tables and the tables to the figures, as applicable.

System Cabling and Connectors Illustrations

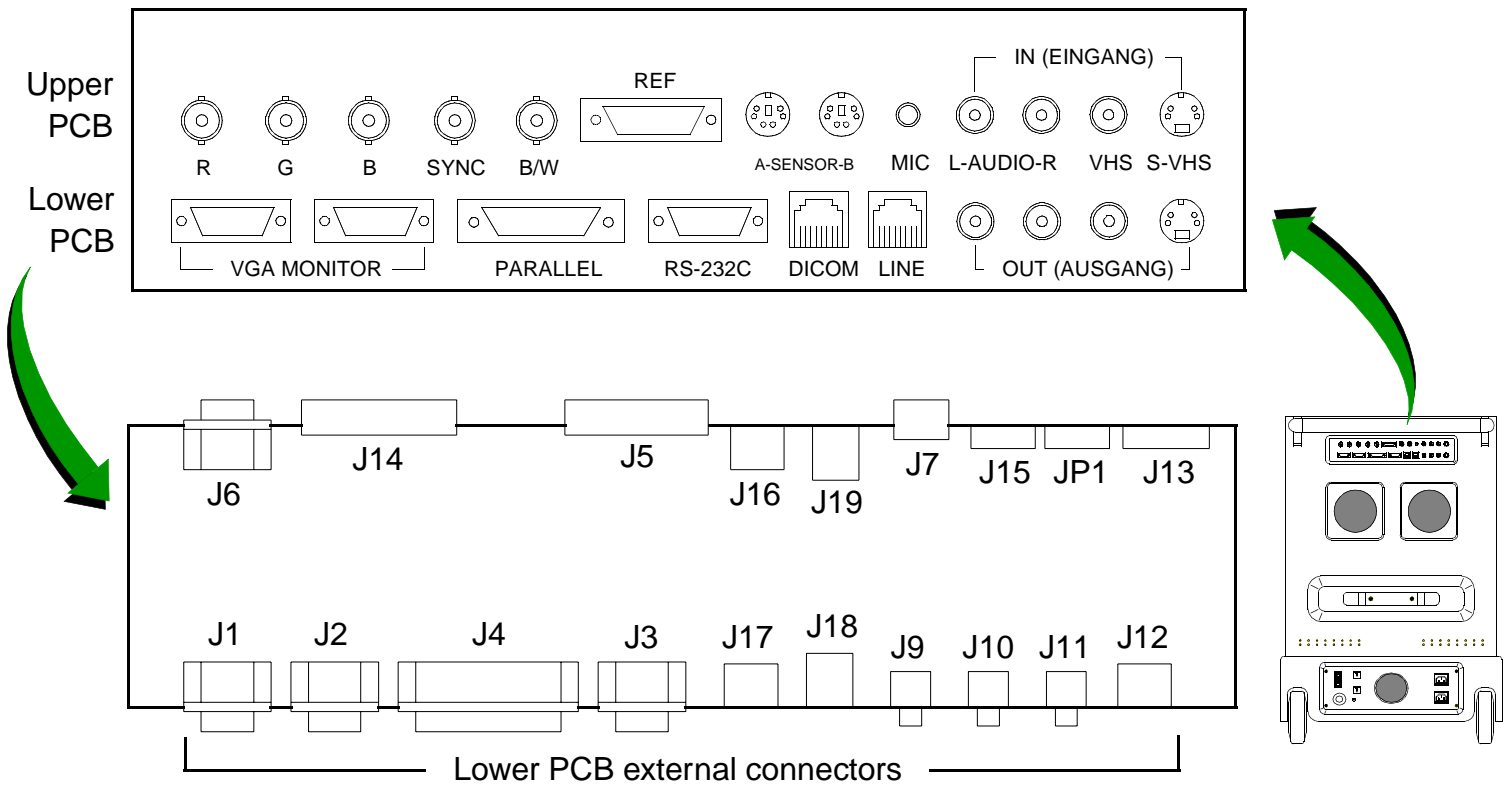
[Figure 11-1](#) through [Figure 11-7](#) are illustrations of the system primary connector assemblies. [Figure 11-8](#) through [Figure 11-11](#) are illustrations of Stress Echo (v2.01.02) hardware cabling. [Figure 11-12](#) and [Figure 11-13](#) are the system cable interconnect diagrams. [Figure 11-14](#) is the system power distribution diagram.



See Figure 11-2

Note: Two PCBs mounted horizontally behind the panel make up the Rear I/O Panel connectors

Figure 11-1 Rear Panel Upper I/O Connectors (Version 1.08.10 and higher)

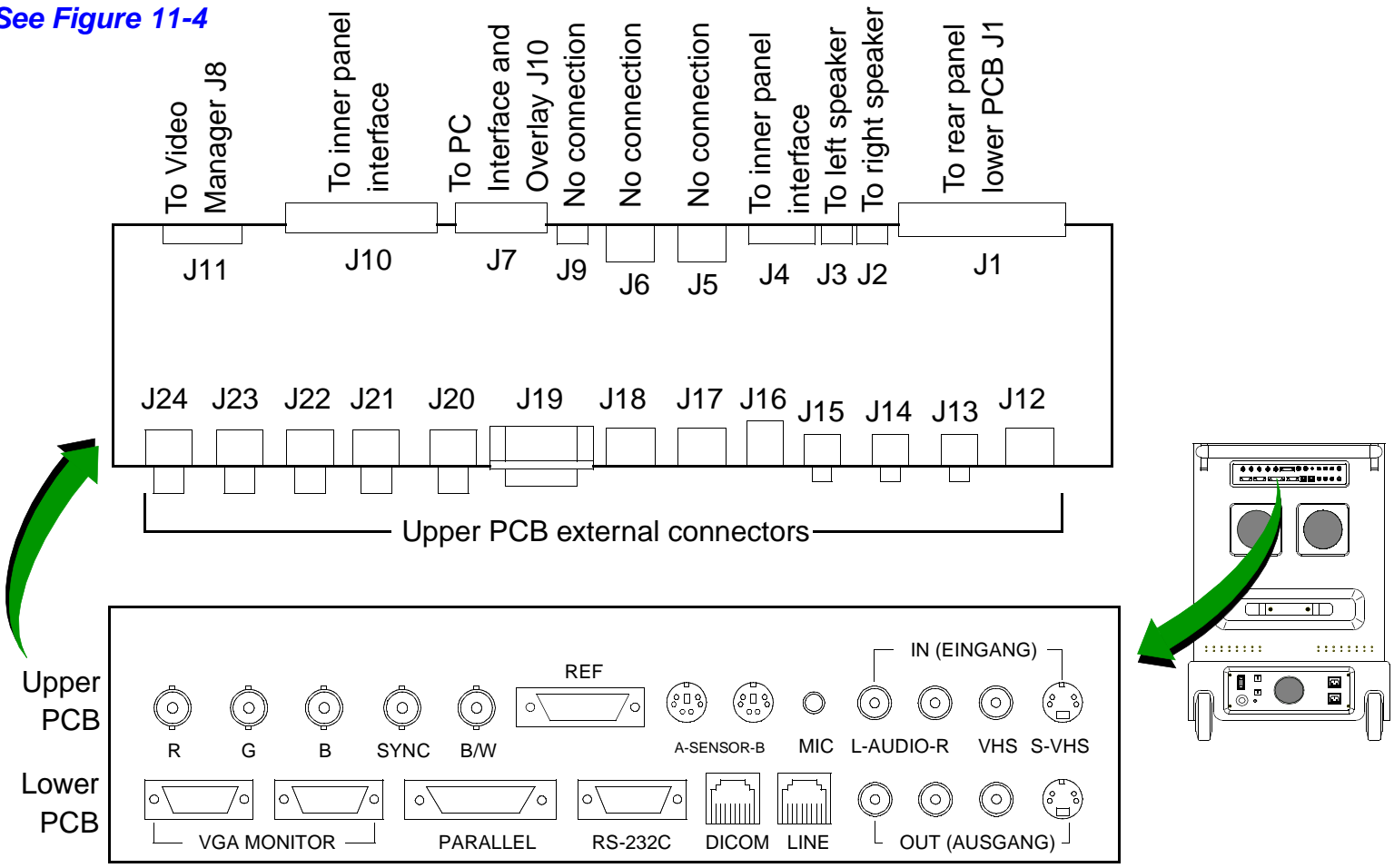


See Figure 11-1

Note: Two PCBs mounted horizontally behind the panel make up the Rear I/O Panel connectors

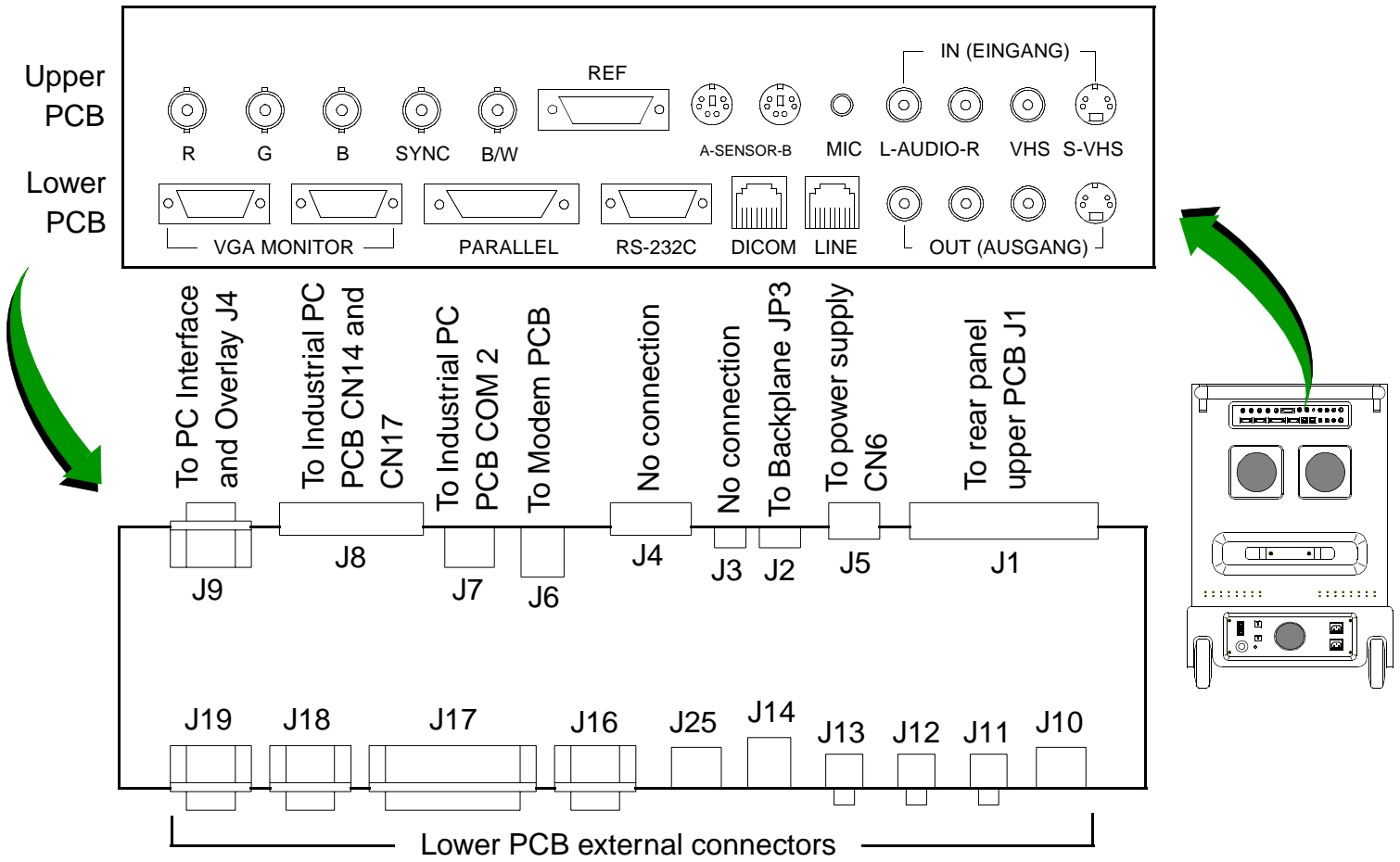
Figure 11-2 Rear Panel Lower I/O Connectors (Version 1.08.10 and higher)

See Figure 11-4



Note: Two PCBs mounted horizontally behind the panel make up the Rear I/O Panel connectors

Figure 11-3 Rear Panel Upper I/O Connectors (Version 2.00.02 and higher)



See Figure 11-3

Note: Two PCBs mounted horizontally behind the panel make up the Rear I/O Panel connectors

Figure 11-4 Rear Panel Lower I/O Connectors (Version 2.00.02 and higher)

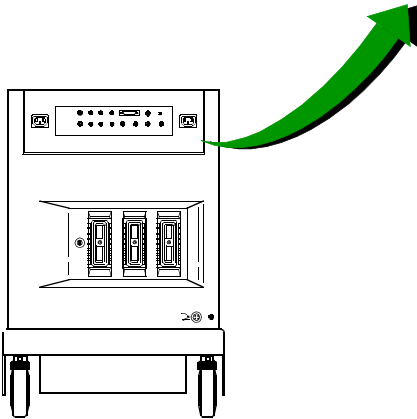
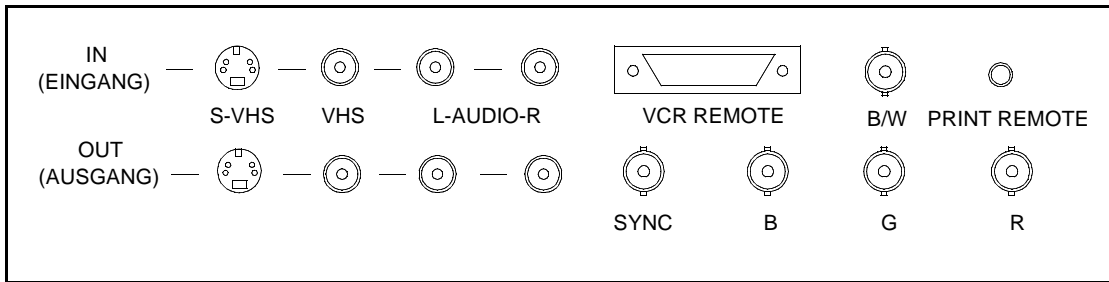


Figure 11-5

OEM Bay Panel I/O Connectors

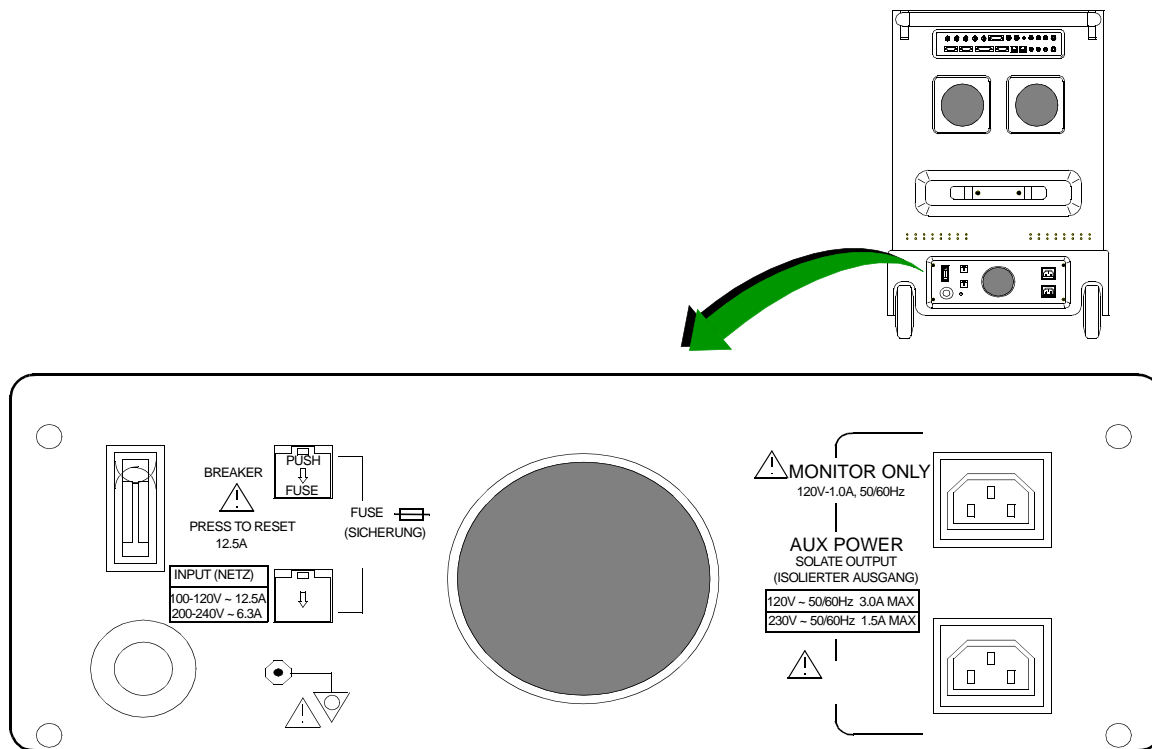


Figure 11-6

System AC Input and OEM AC Power Panel

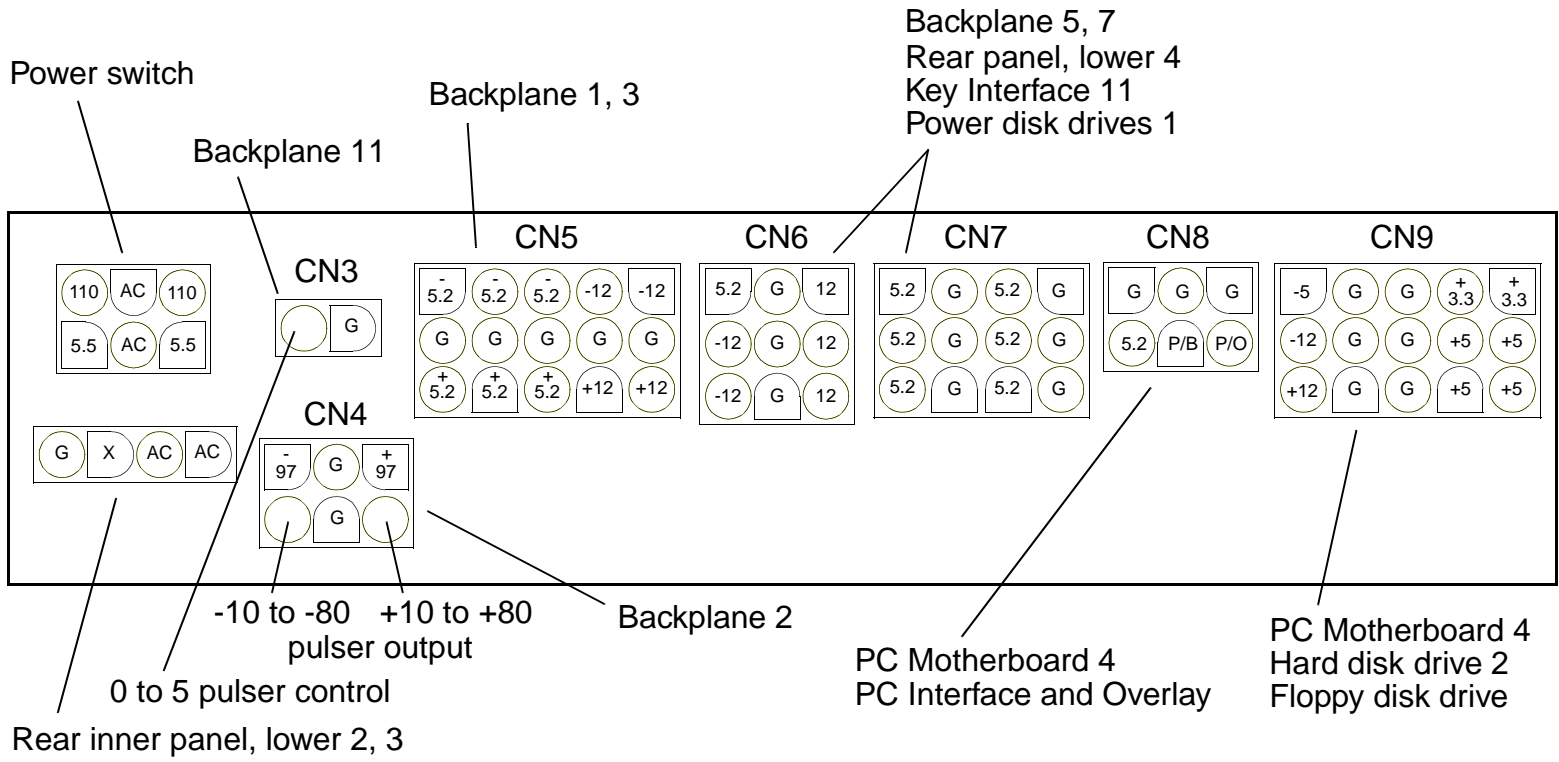


Figure 11-7 Power Supply Connectors on Interconnect Panel

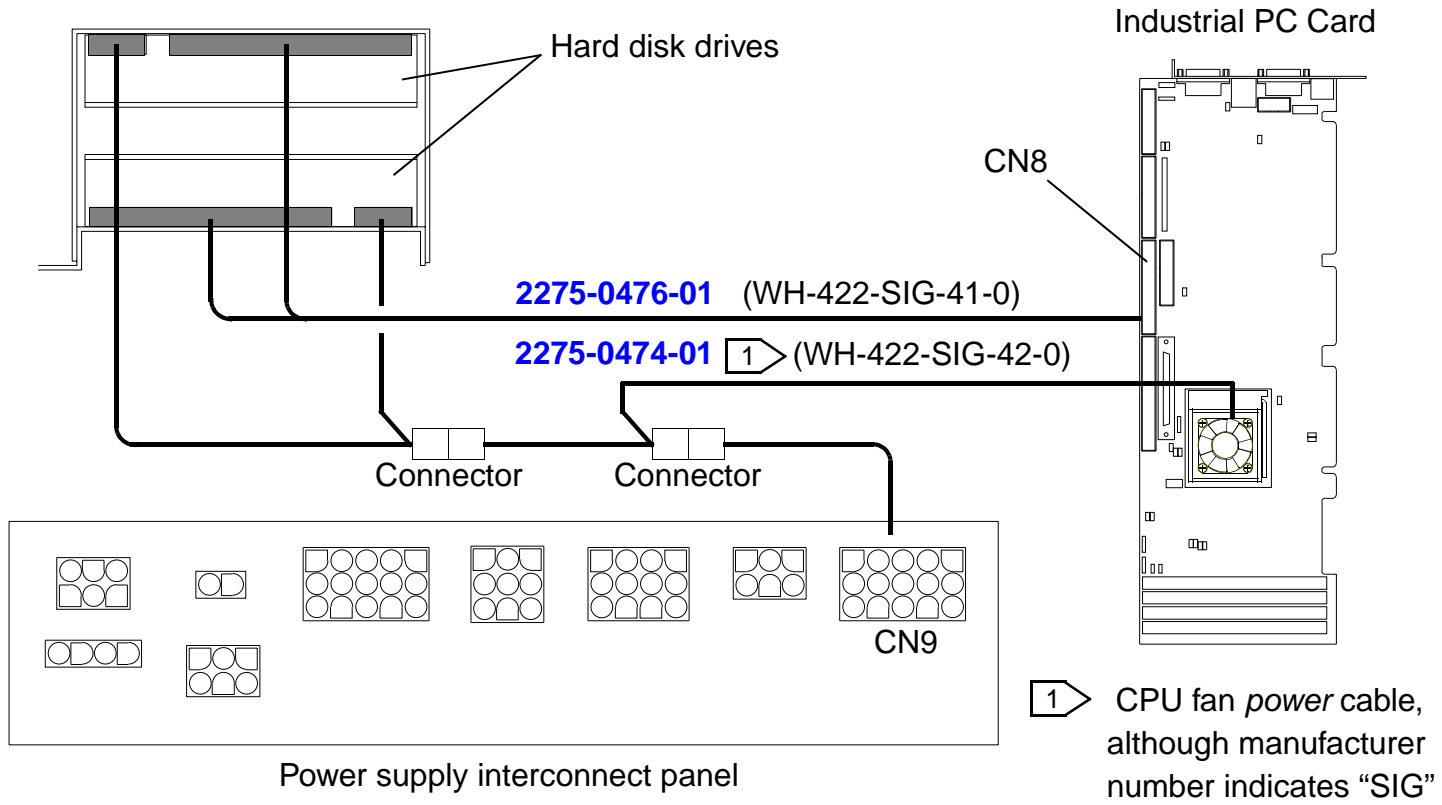
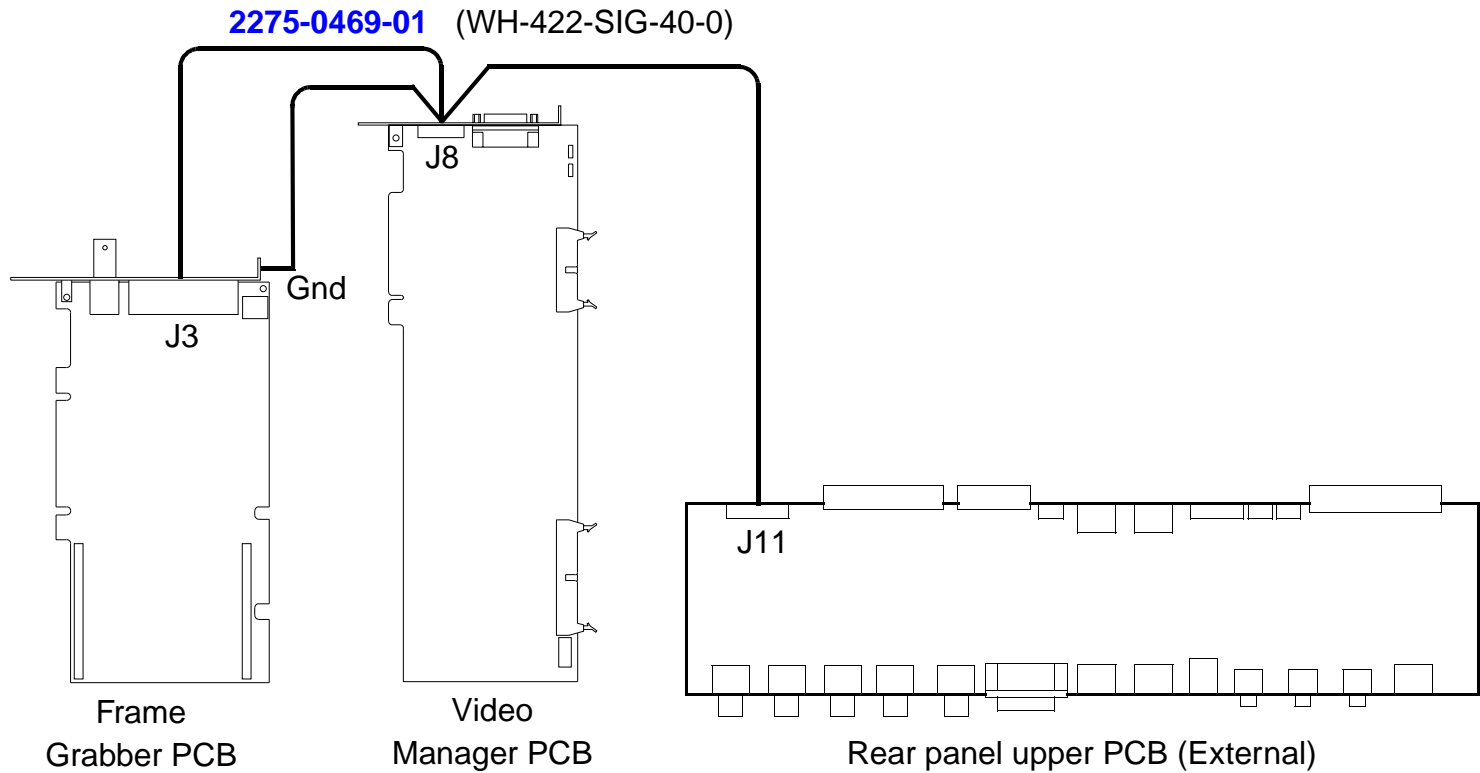


Figure 11-8

**Dual Hard Disk Drive Interconnect Diagram
(Part of Stress Echo Option, v2.01.02 and up)**

**Figure 11-9****Matrox Meteor2 Frame Grabber PCB Interconnect Diagram
(Part of Stress Echo Option, v2.01.02 and up)**

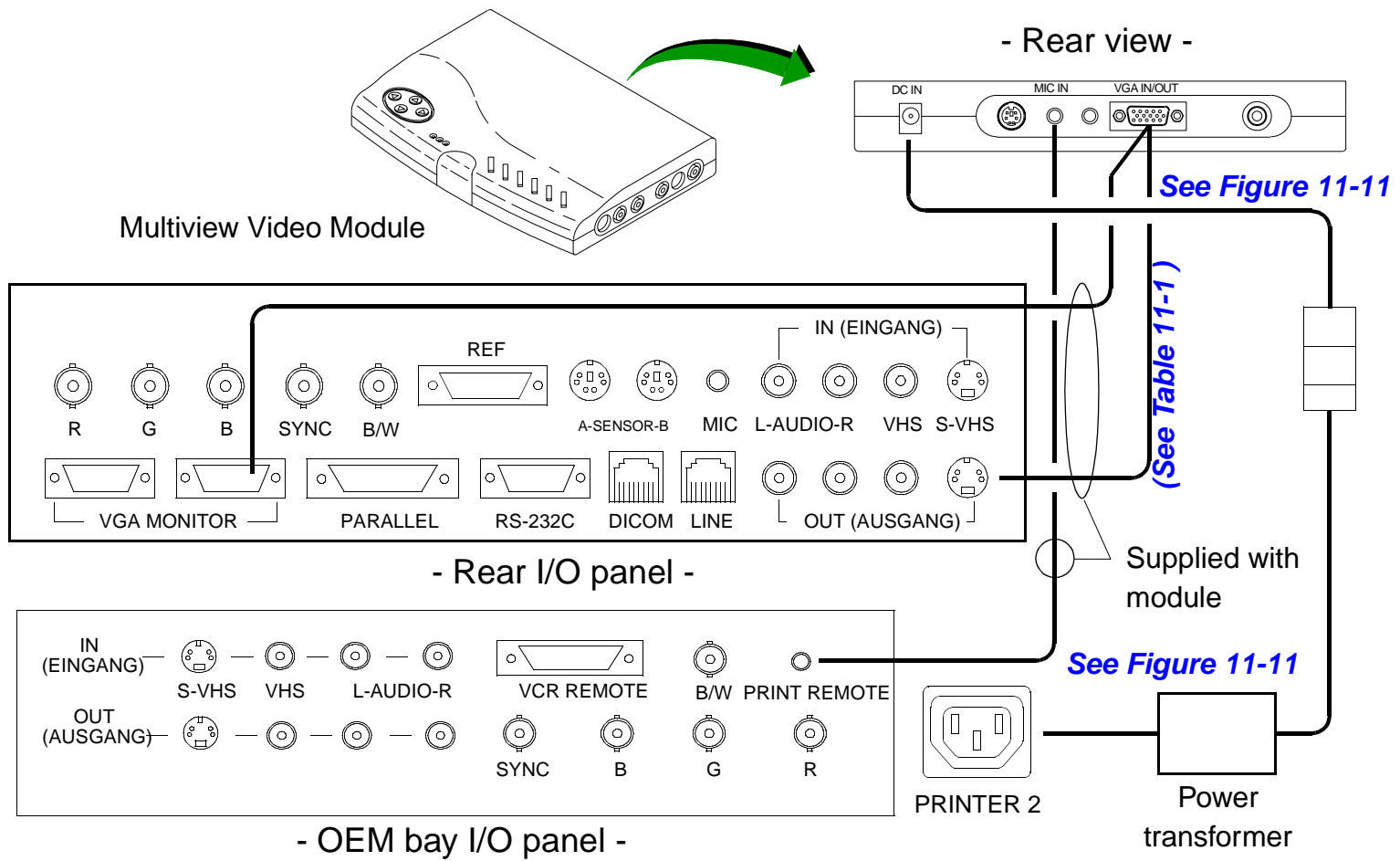
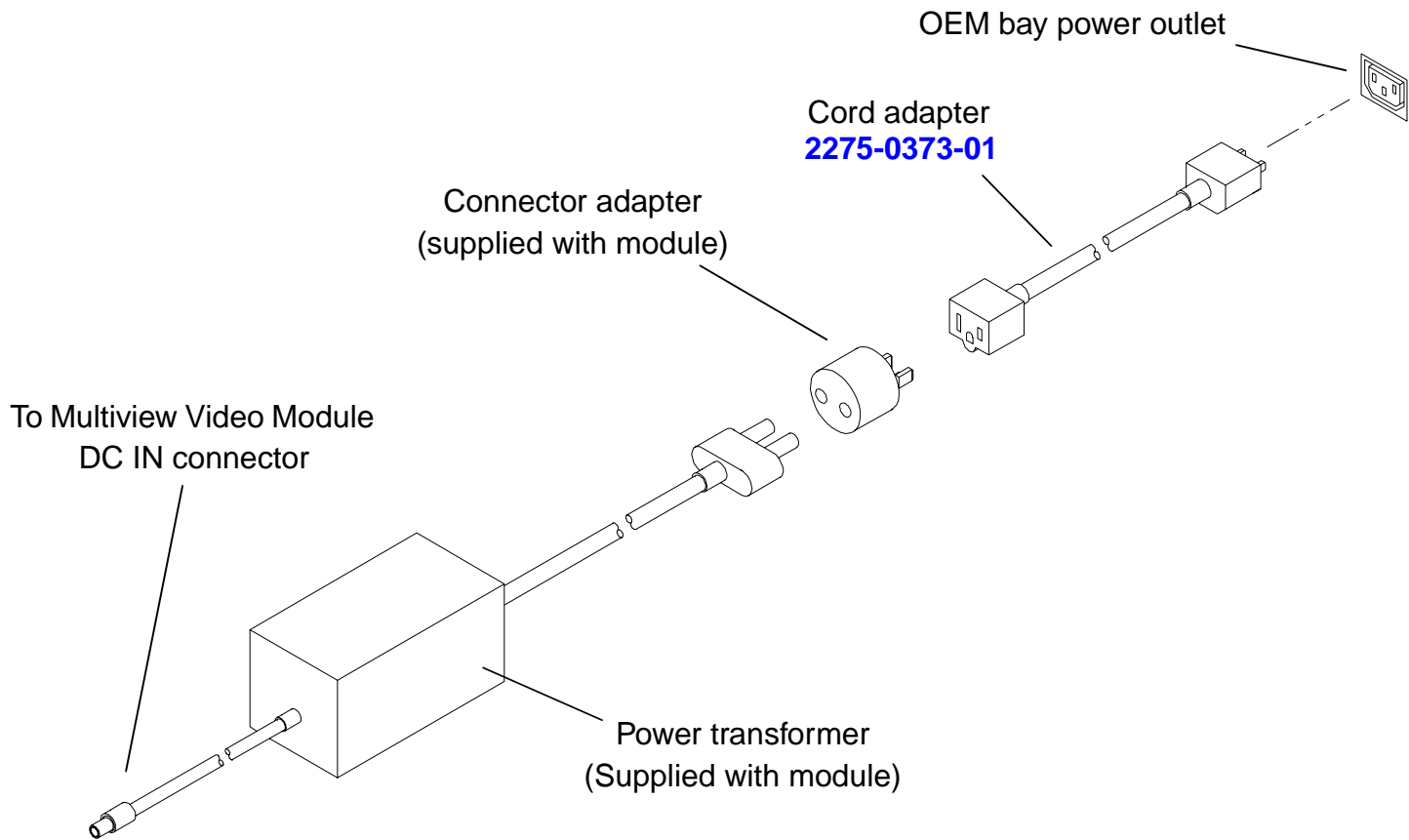


Figure 11-10 Multiview Video Module Assembly Interconnect Diagram (Part of Stress Echo Option, v2.01.02 and up)



See Figure 11-10

Figure 11-11 Multiview Video Module Power Cord and Adapters (Part of Stress Echo Option, v2.01.02 and up)

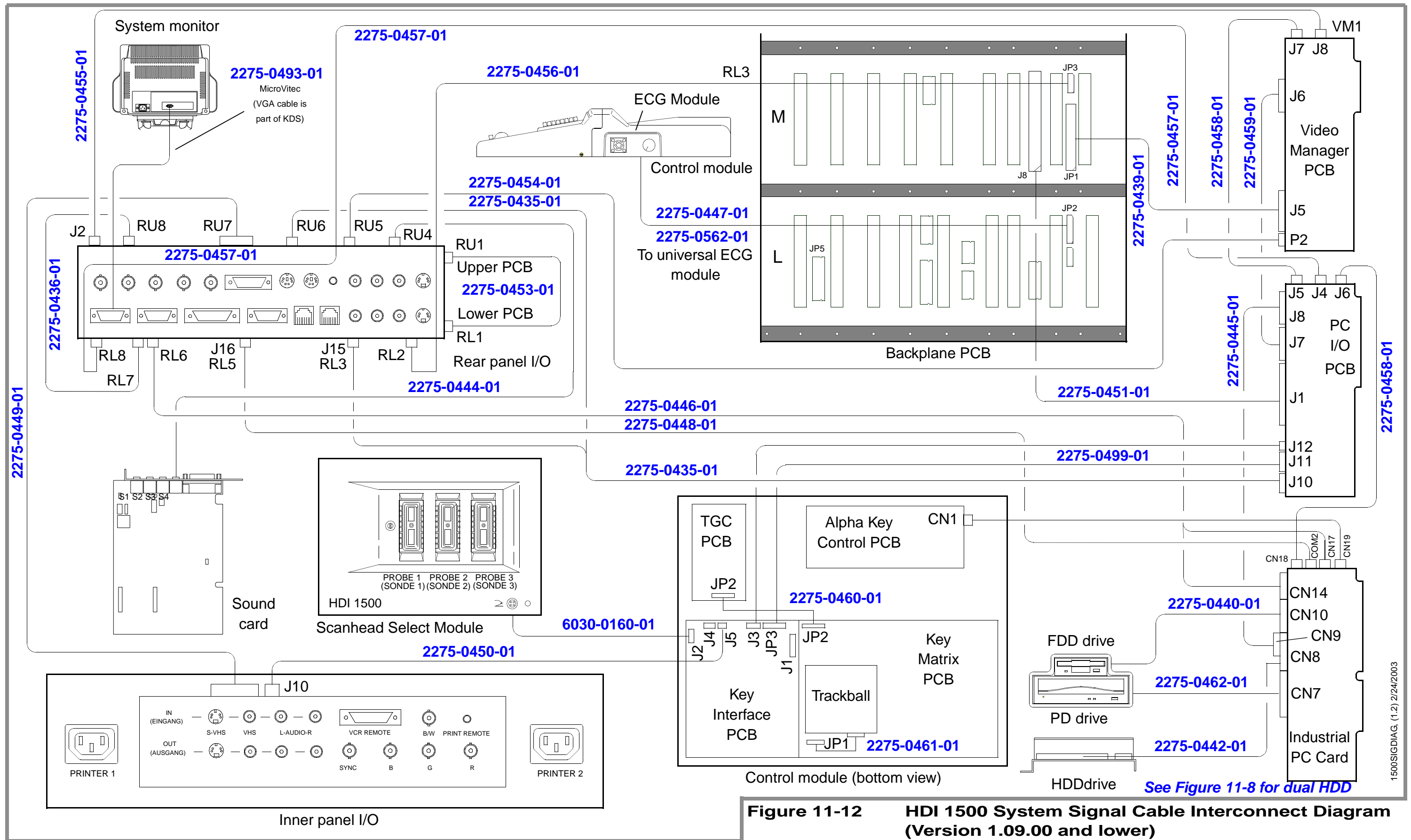


Figure 11-12 HDI 1500 System Signal Cable Interconnect Diagram (Version 1.09.00 and lower)

1500SIGDIAG (1.2) 2/24/2003

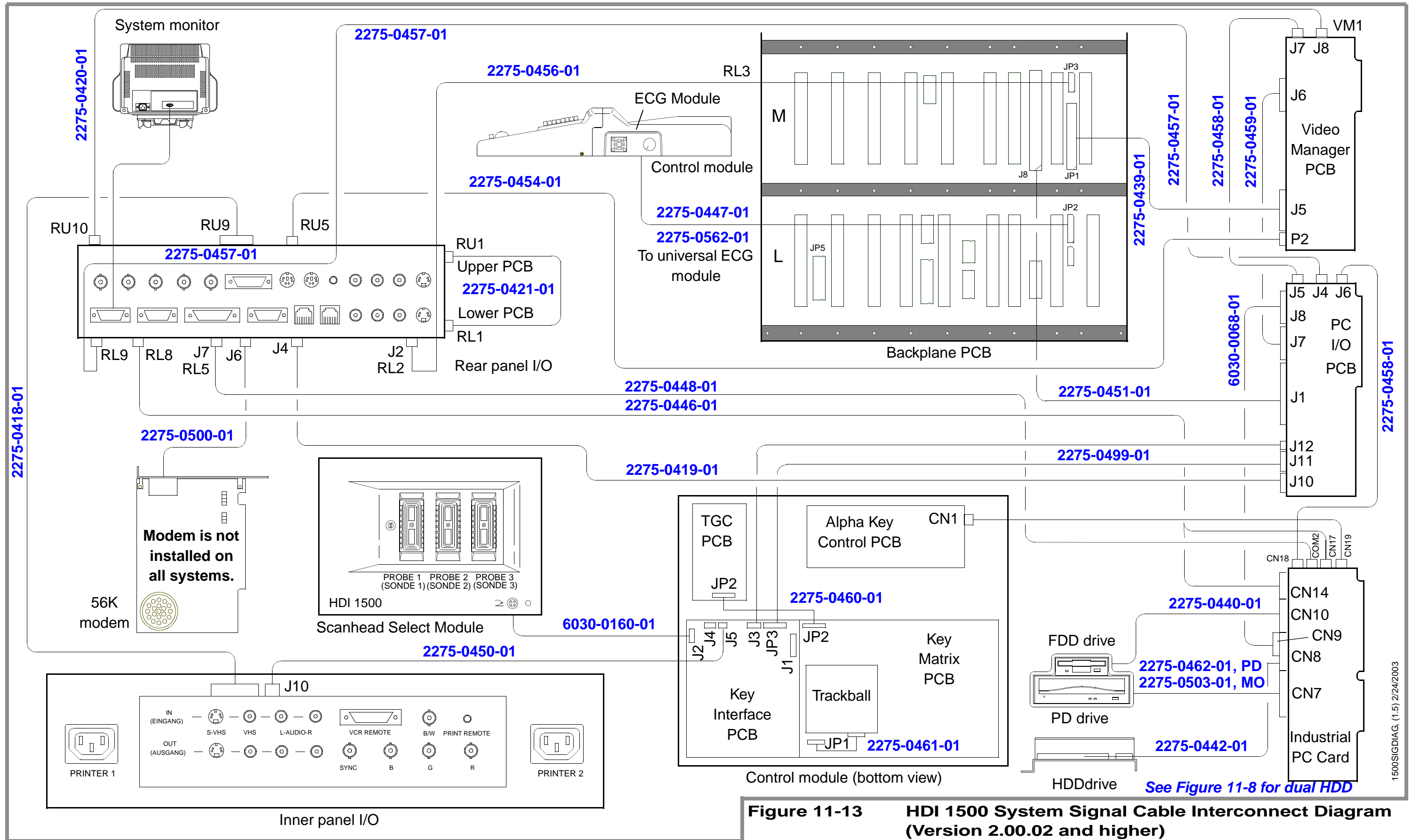
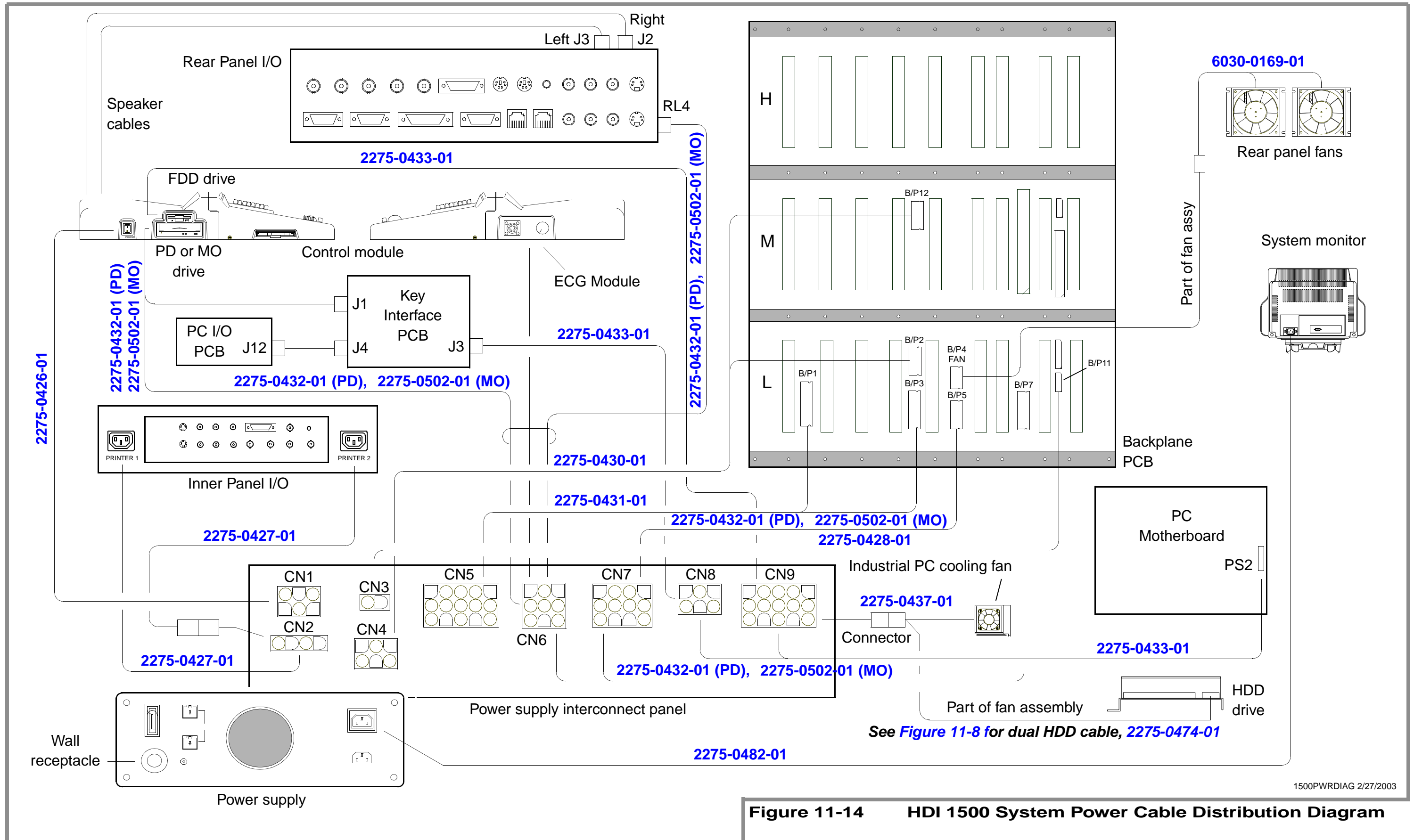


Figure 11-13 HDI 1500 System Signal Cable Interconnect Diagram (Version 2.00.02 and higher)

1500SIGDIAG, (1.5) 2/24/2003



1500PWRDIAG 2/27/2003

Figure 11-14 HDI 1500 System Power Cable Distribution Diagram

Cable Part Numbers

[Table 11-1](#) is a parts list of the interconnect cables, [Table 11-2](#) is a parts list of the power distribution cables, and [Table 11-3](#) is a parts list of OEM peripheral cables.

Table 11-1

HDI 1500 Signal Interconnect Cables

Part Number	Cable Description (See Figure 11-12 or Figure 11-13 unless otherwise noted)	Notes/Reference
2275-0450-01	Cable Assy, Control Panel to Inner Panel Interface	WH-322-SIG-22-0
2275-0447-01	Cable Assy, ECG Module to Backplane	WH-322-SIG-28-0
2275-0562-01	Cable Assy, ECG Module, Universal	WH-322-SIG-28-02 (Used on 7575-1875-01 ECG board)
2275-0440-01	Cable Assy, Floppy Drive to Industrial PC	WH-322-SIG-03-0
2275-0442-01	Cable Assy, Hard Drive to Industrial PC	WH-322-SIG-02-0
2275-0462-01	Cable Assy, Industrial PC to Optical Drive	WH-322-SIG-32-0 (Used on phased drive)
2275-0449-01	Cable Assy, Inner Panel Interface to Rear Panel Interface	WH-322-SIG-09-0, v1.08.10
2275-0500-01	Cable Assy, Modem Card-LRear Panel	WH-322-SIG-34-0
2275-0594-01	Cable Assy, Multiview Video Module, HDI 1500	WH-422-SIG-43-1 (Figure 11-10 : used with 2100-1888-01 and 2100-1889-01 modules, the cable for the 2100-1742-01 module comes with the module and has no part number)

Table 11-1 HDI 1500 Signal Interconnect Cables (Continued)

Part Number	Cable Description (See Figure 11-12 or Figure 11-13 unless otherwise noted)	Notes/Reference
2275-0476-01	Cable Assy, PC Card/HDD	WH-422-SIG-41-0 (Stress Echo option only, see Figure 11-8)
2275-0451-01	Cable Assy, PC Interface to Backplane	WH-322-SIG-05-0
2275-0499-01	Cable Assy, PC Interface to Key Interface	WH-322-SIG-06-0
2275-0458-01	Cable Assy, PC Interface to Video Manager, J5/J7	WH-322-SIG-20-0
2275-0459-01	Cable Assy, PC Interface to Video Manager, J6/J7	WH-322-SIG-19-0
2275-0453-01	Cable Assy, Rear Panel	WH-322-SIG-10-0, v1.08.10
2275-0421-01	Cable Assy, Rear Panel, Upper/Lower	WH-422-SIG-38-0, v2.00.02 and up
2275-0436-01	Cable Assy, Rear Panel Interface	WH-322-SIG-08-0
2275-0456-01	Cable Assy, Rear Panel Interface to Backplane	WH-322-SIG-14-0
2275-0446-01	Cable Assy, Rear Panel Interface to Industrial PC	WH-322-SIG-11-0, v1.08.10
2275-0419-01	Cable Assy, Rear Panel Lower/PC Main	WH-422-SIG-11-4, v2.00.02 and up
2275-0448-01	Cable Assy, Rear Panel Interface to Industrial PC	WH-322-SIG-23-0
2275-0457-01	Cable Assy, Rear Panel Interface to J4	WH-322-SIG-21-0
2275-0435-01	Cable Assy, Rear Panel Interface to J10	WH-322-SIG-07-0
2275-0455-01	Cable Assy, Rear Panel Interface to Video J8	WH-322-SIG-13-0, v1.08.10

Table 11-1 HDI 1500 Signal Interconnect Cables (Continued)

Part Number	Cable Description (See Figure 11-12 or Figure 11-13 unless otherwise noted)	Notes/Reference
2275-0418-01	Cable Assy, Rear Panel Upper/IP Lower	WH-422-SIG-09-1, v2.00.02 and up
2275-0420-01	Cable Assy, Rear Panel Upper/VM Board	WH-422-SIG-39-0, v2.00.02 and up
2275-0454-01	Cable Assy, Rear Panel Interface to Video P2	WH-322-SIG-12-0
2275-0469-01	Cable Assy, Rear Upper	WH-422-SIG-40-0 (Stress Echo Option only, see Figure 11-9)
2275-0503-01	Cable Assy, Signal, MO Drive	WH-422-SIG-32-3 (Used on magneto optical drive)
2275-0444-01	Cable Assy, Sound Card to Rear Panel	WH-322-SIG-16-0
2275-0460-01	Cable Assy, TGC PCB to Key Matrix	WH-322-SIG-17-0
2275-0461-01	Cable Assy, Trackball to Key Interface	WH-322-SIG-18-0
2275-0493-01	Cable Assy, VGA to MicroVitec Monitor	
2275-0445-01	Cable Assy, VGA to PC Interface, Rev3	WH-322-SIG-01-0, v1.08.10
6030-0068-01	Cable Assy, VGA to PC Interface, HDI 1500	WH-322-SIG-01-1, v2.00.02
2275-0439-01	Cable Assy, Video PCB, Backplane	WH-322-SIG-04-0
6030-0160-01	F/P Panel (Put S/W) Key Interface	WH-322-SIG-15-0

Table 11-2 HDI 1500 Power Distribution Cables

Part Number	Cable Description (See Figure 11-14 or unless otherwise noted)	Notes/Reference
2275-0474-01	Cable Assy, Dual HDD Power	WH-422-SIG-42-0 (Stress Echo option only, see Figure 11-8) (This is the CPU fan power cable, even though Mfgr number indicates "SIG")
2275-0502-01	Cable Assy, Power, MO Drive	WH-422-PWR-06-3 (Used on magneto optical drive)
2275-0432-01	Cable Assy, Power Supply	WH-322-P-06-0 (Used on phased drive)
2275-0428-01	Cable Assy, Power Supply, Backplane	WH-322-P-03-0
2275-0430-01	Cable Assy, Power Supply, Backplane	WH-322-P-04-0
2275-0431-01	Cable Assy, Power Supply, Backplane	WH-322-P-05-0
2275-0426-01	Cable Assy, Power Supply, Disk Drive	WH-322-P-01-0
2275-0433-01	Cable Assy, Power Supply, Disk Drive, Key Interface	WH-322-P-07-0
2275-0437-01	Cable Assy, Power Supply, Fan	WH-322-SIG-24-0
2275-0427-01	Cable Assy, Power Supply, Inner Panel Interface	WH-322-P-02-0
6030-0169-01	Cable, BIC, 5239-02P, HDI 1500	CND-MOLE-02FLU
2275-0482-01	Power Cord, Monitor/Power Supply	CORD-316-MNT

Table 11-3 Peripheral Cables

Part Number	Part Description	Notes/Reference
Color Video Printer Cables		
2275-0404-01	Cable Assy, PWR, Jumper, .5M, IEC M/F	
3500-1622-01	Cable Assy, Remote	
150763	Cable Assy, S-video	Internal installation
2275-0323-01	Cable Assy, S-video	External installation
3500-2716-02	Power Cord, Angular Entry	
black and white Video Printer Cables		
2275-0366-01	Cable Assy, AC Power	
3500-1622-01	Cable Assy, Remote	
VCR Cables		
146126	Cable Dual RCA Plugs 3Ft	
2275-0267-01	Cable Dual RCA Plugs 6Ft	
150763	Cable S-VHS, Shielded	
154899	Cable S-VHS, Shielded, 6Ft	
2100-1417-01	Cable, Remote Control	
2100-0570-01	Cable, Microphone	
154510	Cable RS-232	
2275-0411-01	Cable Assy, DB25, M/F, ST, 3Ft	
2275-0404-01	Cable Assy, PWR, Jumper, .5M, IEC M/F	
3500-2716-02	Power Cord, Angled Entry	

Table 11-3 Peripheral Cables (Continued)

Part Number	Part Description	Notes/Reference
2275-0482-01	Power Cord, Monitor/Power Supply	OEM Bay installation
Network Printer Cables		
2100-1566-01	Codonics NP-1660 Printer, NTSC, 120Vac	
2100-1567-01	Codonics NP-1660 Printer, PAL, 240Vac	
2275-0335-01	Cable Assy, RJ-45	
Multiview Video Module Cables		
154899	Cable S-VHS, Shielded, 6Ft	
2275-0373-01	Cord, PC Adapter, 10A/125V, 12 Inch, Black	(Stress Echo option only, see Figure 11-10 and Figure 11-11)

12 Change History

Introduction

This section summarizes the software and hardware changes associated with specific software releases. Unless noted under “Hardware Changes,” hardware changes are not always required for a software release. See [Table 13-1](#) for a list of all of the software releases (the last entry is the most current with respect to this manual release).

Initial System Release (v1.08.05)

ATL Ultrasound released the HDI 1500 Ultrasound System for distribution in December 1998. The software version at initial release was 1.08.05.

Features Supported

Electrical Standard

- 120 Vac, 60 Hz, NTSC
- 240 Vac, 50 Hz, NTSC or PAL
- 240 Vac, 60 Hz, NTSC or PAL

Languages

- English
- French
- German

System Applications

- General
- Abdominal
- Adult Cardiac
- Breast
- Cerebrovascular
- Gynecological
- Obstetrical
- Pediatric
- Prostate
- Renal
- Small Parts
- Vascular
- Venous

Measurements

- 2D: Linear measurements and area measurements using elliptical approximation, continuous trace, or trace-by-points (distance, circumference, area, and volume)
- Trackball operation of multiple calipers
- M-mode: Continuous readout of distance, time, and slope rate
- Doppler: Velocity, continuous trace

Calculations

- Automatic measurement of various Doppler parameters
- Obstetrical analysis in 2D
- Cardiology
- Vascular
- Standard Gestational Age tables: BPD, FL, CRL, GS, AD, AC, HC
- Investigators (Merz, Shepard, Hansmann, Hill, Jeanty, Nelson, Holhler, Hellman, Nyberg, and Hadlock methods)
- User-defined OB tables

Scanheads

- Linear array
 - L7-4
 - L12-5
- Convex array
 - C5-2
 - C7-4
 - C9-5
- Phased array
 - P4-2
 - P7-4
- Static probe
 - D2 CW

Scanhead Selection

Three scanhead (probe) receptacles

Imaging Modes

- 2D real-time
- Dual 2D real-time
- M-mode with simultaneous 2D
- 2D Color Doppler
- Pulsed-wave Doppler
- Continuous-wave Doppler (static and steered)

Image Presentation

- Up/down
- Left/right
- Dual side-by-side

Image Processing

- TGC control
- Gain control
- 3D
- Dynamic aperture
- Dynamic apodization
- Dynamic range
- Edge enhancement

- Reject
- Gray-scale windowing
- Gamma correction
- Histogram
- Image apex control (up/down)
- Scan direction control (left/right)
- Real-time zoom (zoom ratio x2; no zoom with linear array scanheads)

Digital Color Doppler

- Available in velocity, power, velocity and variance, variance only modes
- Dual imaging
- Color capture
- Selectable color maps

Image Storage and Retrieval

- 256 frame cineloop memory
- Save images to and retrieve/view images from system hard disk (in proprietary format)
- Copy images to the floppy disk (in BMP or JPEG format) or the PD disk (in BMP or DICOM format, depending on the operation)

OEM Devices

- Black-and-white image printer (optional)
- Color printer (optional)
- VCR (optional)
- A system-compatible report printer is supported (customer supplied)

Standard Accessories

- Clear vinyl, company-logo dust cover with storage bag
- Power cord
- Footswitch assembly
- Accessory basket
- ECG cable
- Scanhead cable hanger
- Phased disk

Software Release (v1.08.10)

ATL Ultrasound released baseline software version 1.08.10 for the program phase 1.2 HDI 1500 Ultrasound System for distribution in May 1999. The existing phase 1.2 system baseline software (version 1.08.05) is replaced by software version 1.08.10.

Features Supported

All of the features supported in the previous versions of the software are supported in this version of the software.

Features Released

The following new features are released with this software version:

- A gynecology analysis package is added with this version of the software, which provides measuring tools for uterus, ovaries, follicles, kidneys, and ovarian arteries.
- Italian and Spanish system configurations are released with this version of the software.
- The C8-4v curved array scanhead is now supported.

Changes and Problems Corrected

NOTE System operating and interface changes associated with this release are documented in the *HDI 1500 Reference Manual*, 4703-0032-XX.

This software version has these enhancements:

- The Codonics NP1660MD network printer is now supported.
- The Mitsubishi CP800 color printer is supported as well as the CP700.

The following improvements have been made:

- Modifications to the OB calculations package, which includes the ability to choose the trace measurement technique as the default selection (also, the selection is now indicated on the display), new Doppler measurements “Menu : Peak” and “Display : PSV, EDV” and in the OB Reports Trend menu, an exam data pop-up display appears when the cursor touches the graph point.
- Modifications to the cardiology calculations package, which includes improved cardiac Doppler measurement, added trace function, and some display menu and report content changes.

NOTE A new style (KDS) monitor is released separately, but is compatible with this release.

The following problems have been corrected with this release:

- When displaying dual images, the image parameters no longer cover up near-field information.
- Users can no longer access the NT operating system without entering a specific key sequence and password.
- When multiple measurements are entered into the OB calcs and then one of those values is deleted, the system no longer forces the user to input 0.00 into the deleted value slot.
- The (out-of-date) online manual will no longer be available to the user until it is made current to the software released.
- In the System Setups menu, the number of weeks for the Pregnancy Week value is now limited to entries between 35 and 45 weeks.

- If the GA calculated by the system exceeds the Pregnancy Week value, an error no longer occurs in EDD.
- When OB data is cleared from the report, the ratios no longer remain.
- In the New Patient form, the system will no longer let the user enter an LMP date that is in the future.

Hardware and Firmware Changes

Hardware changes concurrent with this release are a new style (KDS) monitor, released separately, but in parallel with the v1.2 system release, which is a recommended replacement unit for the initial HDI 1500 monitor. There are no mandatory hardware changes concurrent with the v1.2 release.

Part Numbers

Any new parts and configuration information associated with this release is provided in [Section 13, "Configuration"](#), and [Section 14, "Parts"](#).

Software Release (v1.08.12)

ATL Ultrasound released baseline software version 1.08.12 for the program phase 1.2 HDI 1500 Ultrasound System for distribution in February 2000. The existing phase 1.2 baseline software (version 1.08.10) is replaced by software version 1.08.12.

Features Supported

All of the features supported in the previous versions of the software are supported in this version of the software.

Features Released

No new features were released with this software version, it is a follow-on, software-only baseline upgrade to the program phase 1.2 HDI 1500 Ultrasound System. Changes and Problems Corrected

This release corrected the following problems:

- Incorrect calculation of a circumference using the ellipse method.
- Circumference by trace produces erroneous results.
- V1 in Doppler Velocity measurement does not update when the cursor is changed.
- Error message "Invalid Floating Point Operation" when making a Doppler peak velocity measurement.
- A connected scanhead can be calibrated as a different scanhead.
- Intermittently, the measurements do not appear on the printed report.
- Doppler auto trace will not work with Chroma on and color between 120 and 240.
- Doppler measurements do not change when Angle Correction is adjusted.
- Some gestational age tables (CRL Nelson and FL Merz) have wrong values.

- Intermittently, alphanumeric keyboard does not work.
- In some circumstances, NT shutdown causes errors.
- Intermittent “Service Control Manager” errors.
- Intermittent abnormally slow operation, especially in 3D VIEW.

Hardware and Firmware Changes

There were no hardware changes concurrent with this release.

Part Numbers

Any new parts and configuration information associated with this release is provided in [Section 13, “Configuration”](#), and [Section 14, “Parts”](#).

Software Release (v2.00.02)

ATL Ultrasound released software version 2.00.02 for the program phase 1.5 HDI 1500 Ultrasound System for distribution in October 1999.

Features Supported

All of the features supported in the previous versions of the software are supported in this version of the software.

Features Released

The following new features are released with this software version:

Scanheads

- D5CW scanhead support added
- Tissue Harmonic Imaging (THI) supported for the C5-2 and P4-2 scanheads
- L12-5 support improvements
 - Trapezoidal imaging will produce a field of view of 6 cm width at 3 cm depth
 - Shallower depth selection is supported
- New gray-scale maps

Color Enhancements

This version has a complete reintegration of the color signal path. This version offers smoother color, smaller pixels, increased sensitivity, improved persistence, improved flash suppression, and new color and CPA maps.

DICOM Enhancements

- Modality Worklist (a list of patient information loaded into system memory from a central server)
- Simultaneous print and store (allows users to simultaneously store and print images before the end of the exam)

Obstetrics Enhancements

The fetal anatomy checklist, which includes fetal description, fetal environment, and comments; multiple trending graphs on a print (previously only one trending graph printed, now all trending graphs are automatically printed); open-line data transfer to off-line printers, computers, and workstations.

Miscellaneous Enhancements

Pre-measurement calibration of VCR images recorded from an HDI 1500 system.

User Interface

- On production 1.5 systems, the control panel has a THI control where the 3D control is on the 1.2 systems, the 3D control is located where the User 4 control is on the 1.2 systems, and the control panel has no User 4 control. 1.2 systems that are upgraded to 1.5 will follow the same scheme. (The control function changes are software implemented. The control name changes are accomplished with a paste-over label on upgraded systems and with new controls on production systems.)
- Some dialogs in the French, German, Italian, and Spanish software no longer appear in English.

Changes and Problems Corrected

Annotating the Display

You no longer have to exit Text mode before attempting to store an image.

Measurements

- The system no longer displays results in velocity units when measuring a Doppler spectral trace with the Doppler scale set to frequency units.
- During Doppler measurement, pressing Chg to reactivate a previously set cursor no longer causes a labeling error of the V1 and V2 velocity results.

Calcs

For calculation of a circumference, the continuous trace method no longer overestimates circumference values.

Peripherals

When printing images with an ink-jet printer, a half-page of the patient report will no longer be printed with the image.

Hardware and Firmware Changes

There are hardware changes concurrent with the 1.5 release:

- Certain PCBs have changed (see [Section 13, "Configuration"](#)).
- The 1.5 system control panel has changed.
- A 56K modem is installed (but is not active), replacing the sound card.
- The power supply has been improved.

Part Numbers

Any new parts and configuration information associated with this release is provided in [Section 13, "Configuration"](#), and [Section 14, "Parts"](#).

Software Release (v2.00.04)

ATL Ultrasound released baseline software version 2.00.04 for the program phase 1.5 HDI 1500 Ultrasound System for distribution in January 2000. The existing phase 1.5 baseline software (version 2.00.02) is replaced by software version 2.00.04.

Features Supported

All of the features supported in the previous versions of the software are supported in this version of the software.

Features Released

No new features are released.

Changes and Problems Corrected

This software corrects the problem, "Dots occur in the image on the left side of the sector when using the P4-2 scanhead with THI on."

Hardware and Firmware Changes

There no are hardware changes concurrent with this release.

Part Numbers

Any new parts and configuration information associated with this release is provided in [Section 13, "Configuration"](#), and [Section 14, "Parts"](#).

Software Release (v2.01.00 - for 2.0 Systems)

ATL Ultrasound released software version 2.01.00 for the program phase 2.0 HDI 1500 Ultrasound System for distribution in July 2000.

Features Supported

All of the features supported in the previous versions of the software are supported in this version of the software.

Features Not Supported

Stress Echo was not supported at this release.

Features Released

The following new features are released with this software version:

Scanheads

- P5-3 with Tissue Harmonic Imaging
- CL10-5 with synthetic aperture and trapezoidal imaging
- MPT7-4 multi-plane transesophageal

DICOM Enhancements

- Unique identifier for Ultrasound Retired Service-Object Pair data transfer class
- Secondary capture
- Selective printing
- Modality performed procedure step
- Storage commitment
- Palette and RGB color data support
- Planar and chunky pixel interleave support

- Measurement (distance and area)

3D Enhancements

- Fast view
- Selective scanning direction
- Selective initial screen

Miscellaneous Enhancements

- Menu-driven measurements
- Volume flow measurement
- Measurements on stored images
- Footswitch can be programed for various selection options through system setup
- Calibration pattern for adjusting monitor

Changes and Problems Corrected

In the v2.01.00 software build, there are no fixes to the problems listed in Operating Notes 4707-0032-09A.

Hardware and Firmware Changes

There are hardware changes concurrent with the program phase 2.0 release:

- Certain PCBs have changed (see [Section 13, "Configuration"](#)).
- The 2.0 system control panel has a control change from the previous versions; a new Stress Echo control replaces the former User 3 control.

Part Numbers

Any new parts and configuration information associated with this release is provided in [Section 13, "Configuration"](#), and [Section 14, "Parts"](#).

Software Release (v2.01.00 - for 1.75 Systems)

ATL Ultrasound released software version 2.01.00 for the program phase 1.75 HDI 1500 Ultrasound System (a phase 1.5 system with this software and a modified control panel) for distribution in September 2000.

Features Supported

All of the features supported in the previous versions of the software are supported in this version of the software.

Features Not Supported

Stress Echo was not supported at this release.

Features Released

The following new features are released with this software version:

Scanheads

- P5-3 with Tissue Harmonic Imaging
- CL10-5 with synthetic aperture and trapezoidal imaging

DICOM Enhancements

- Unique identifier for Ultrasound Retired Service-Object Pair data transfer class
- Secondary capture
- Selective printing
- Modality performed procedure step
- Storage commitment
- Palette and RGB color data support
- Planar and chunky pixel interleave support
- Measurement (distance and area)

3D Enhancements

- Fast view
- Selective scanning direction
- Selective initial screen

Miscellaneous Enhancements

- Menu-driven measurements
- Volume flow measurement
- Measurements on stored images
- Footswitch can be programed for various selection options through system setup
- Calibration pattern for adjusting monitor

Changes and Problems Corrected

In the v2.01.00 software build, there are no fixes to the problems listed in Operating Notes 4707-0032-09A.

Hardware and Firmware Changes

The phase 1.75 system control panel has a control change from the phase 1.5 version; a new Stress Echo control replaces the former User 3 control.

Part Numbers

Any new parts and configuration information associated with this release is provided in [Section 13, "Configuration"](#), and [Section 14, "Parts"](#).

Software Release (v2.01.02)

ATL Ultrasound released software version 2.01.02 for the program phase 2.0.5 HDI 1500 Ultrasound System for distribution in September 2000.

Features Supported

All of the features supported in the previous versions of the software are supported in this version of the software.

Features Not Supported

Not applicable.

Features Released

The following new features are released with this software version:


- Integrated Stress Echo
- Top-mount VCR

Changes and Problems Corrected

The following issues from the last operating notes (4707-0032-11A) are fixed in the v2.01.02 software build:

- Imaging

When changing from a D2CW or a D5CW scanhead to any other type of scanhead, the system generates an “Invalid Floating Point Operation” error message.

- Calcs
 - An open-line transfer of patient data cannot be performed if the modem connection in the Remote Diagnostics feature is live.
 - System calculation of Mean Velocity, Mean Gradient, or Velocity Time Integral (VTI), when measuring abnormal Doppler waveforms with strong vertical components, may be underestimated. Using  will underestimate both the Mean Velocity and the VTI calculations. Using the manual Doppler Trace function, located in the Cardiac Analysis package, will also underestimate the Mean Velocity and the Mean Gradient calculations.

Hardware and Firmware Changes

There are hardware changes concurrent with the program phase 2.0.5 release: There are new control panel overlays and the systems with the stress echo feature have a frame grabber PCB, second hard drive, and a video switchbox. The top-mount VCR option adds and changes some system hardware as well.

Part Numbers

Any new parts and configuration information associated with this release is provided in [Section 13, "Configuration"](#), and [Section 14, "Parts"](#).

Software Release (v2.02.00)

ATL Ultrasound released software version 2.02.00 for the program phase 2.1 HDI 1500 Ultrasound System for distribution in November 2000.

Features Supported

All of the features supported in the previous versions of the software are supported in this version of the software.

Features Not Supported

Not applicable.

Features Released

There were no new features released in this version of the software.

Changes and Problems Corrected

None of the issues from operating notes 4707-0032-12, Rev A were corrected in the v2.02.00 software build. The following enhancements and changes are supported by this software release:

- A 3.5-inch magneto-optical (MO) disk drive replaces the (less-commonly available) phase disk drive, enhancing the system removable-media storage capacity. This drive accepts 128 MB, 540 MB, 640 MB, and 1.3 GB MO disks.

NOTE The phase disk drive is no longer offered on new systems, but replacement phase drives are available through Philips Supplies.

- The cardiac analysis is modified to speed exam type and simplify the use of the system. Most measurement results are now displayed on the monitor at the time of measurement, so the user no longer has to enter the report to see calculated values.

- Changes to the M-mode analysis make measurements easier:
 - The Aortic Valve measurement is rearranged and fixed along a single vertical axis.
 - The changes to the All Points method simplify and speed measurement of many M-mode measurements.
- A new method for measuring Aortic Valve gradient is added, allowing the user to calculate this value with either a Doppler trace or peak velocity method.
- Changes to the SonoView image management package include:
 - An option to select the MO drive
 - An MO disk formatting function
 - A fix to the problem where the Chroma map disappeared when moving a saved image from the quad display
 - An operational SonoView DICOM print option

Hardware and Firmware Changes

A 3.5-inch MO disk drive replaces the phase drive previously installed in the HDI1500 systems.

Part Numbers

Any new parts and configuration information associated with this release is provided in [Section 13, "Configuration"](#), and [Section 14, "Parts"](#).

Software Release (v2.03.02)

ATL Ultrasound released baseline software version 2.03.02 for the program phase 2.5 HDI 1500 Ultrasound System for distribution in February 2001. This release will be the new baseline for the program phase 1.5, 1.75, 2.0, 2.05, and 2.1 systems. The existing baseline software (version 2.00.04) is replaced by software version 2.03.02.

Features Supported

All of the features supported in the previous versions of the software are supported in this version of the software.

Features Not Supported

Not applicable.

Features Released

This release integrates the ATL C8-5 scanhead.

Changes and Problems Corrected

None of the issues reported on the previous operating notes (4707-0032-14, Rev A) were corrected in the v2.03.02 software build.

Hardware and Firmware Changes

A new CW PCB and a new ECG PCB are standard in the phase 2.5 HDI 1500 systems.

Part Numbers

Any new parts and configuration information associated with this release is provided in [Section 13, "Configuration"](#), and [Section 14, "Parts"](#).

Software Release (v1.09.00)

Philips Ultrasound released baseline software version 1.09.00 for the program phase 1.2 HDI 1500 Ultrasound System for distribution in September 2002 to replace the existing 1.2 software (version 1.08.10 or 1.08.12).

Features Supported

All of the features supported in the previous versions of the software are supported in this version of the software.

Features Not Supported

Not applicable.

Features Released

There were no new features released in this version of the software.

Changes and Problems Corrected

The 1.09.00 software version corrects the following problems:

- As described in the 4707-0032-07, Rev A, Operating Notes:
 - Measurements: When measuring a Doppler spectral trace with the Doppler scale set to frequency units, the system displays results in velocity units.
 - Peripherals: When printing images with an ink-jet printer, a half-page of the patient report will also be printed.

- As described in the 4707-0032-17, Rev A, Operating Notes:
 - **Calcs**: System calculation of Mean Velocity, Mean Gradient, or Velocity Time Integral (VTI), when measuring abnormal Doppler waveforms with strong vertical components, may be underestimated. Using will underestimate both the Mean Velocity and the VTI calculations. Using the manual Doppler Trace function, located in the Cardiac Analysis package, will also underestimate the Mean Velocity and the Mean Gradient calculations. (Note the Mean Velocity calculation is used to generate the Pulsatility Index result.) To obtain an accurate VTI, use the manual Doppler Trace method from the **Calcs** menu.
- The option to install the BIOS upgrade software (4252-0960-01), which eliminates the "NOT FOR SALE" text that appears on the BIOS bootup display on some early systems, was included with the ultrasound software upgrade.

Hardware and Firmware Changes

There no are hardware changes concurrent with this release.

Part Numbers

Any new parts and configuration information associated with this release is provided in [Section 13, "Configuration"](#), and [Section 14, "Parts"](#).

13 Configuration

Introduction

This section lists all of the released software versions for the HDI 1500 system, identifies the primary system PCBs, and shows where these PCBs are located in the system. When applicable, additional PCB reference information is provided. Configuration information for systems with a second hard drive is included at the end of this section.

Compatibility Information

See the HDI 1500 Master Compatibility Matrix (P/N 9015-0679) for the core information you need to determine the compatibility of primary system PCBs and certain hardware assemblies with respect to the system software releases.

Software

Software release levels and corresponding part numbers are listed in [Table 13-1](#). See [Section 12, "Change History"](#) for a summarized history of the software and hardware changes associated with specific software releases.

Table 13-1 HDI 1500 System Software Release Part Numbers

Released Software Version	Disk Part Number	Dash Number	Notes
1.08.05	4252-0836	-07	Initial release/program phase 1.0 (NPB 157B)
1.08.10	4252-0836	-09	Program phase 1.2 baseline (NPB 166A)
1.08.12	4252-0887	-01	Program phase 1.2 baseline upgrade (NPB 184A)
2.00.02	4252-0876	-01	Program phase 1.5 upgrade CD (NPB 173A)
2.00.04	4252-0885	-01	Program phase 1.5 baseline upgrade CD (NPB 183A)

Table 13-1 HDI 1500 System Software Release Part Numbers (Continued)

Released Software Version	Disk Part Number	Dash Number	Notes
2.01.00	4252-0906	-01	Program phase 2.0 upgrade (NPB 186A)
	4252-0906	-01	Program phase 1.75 upgrade (NPB 190A)
2.01.02	4252-0922	-01	Program phase 2.0.5 upgrade (NPB 196A)
2.02.00	4252-0926	-01	Program phase 2.1 upgrade CD (NPB 198A)
	4252-0927	-01	Program phase 2.1 upgrade MO disk (NPB 198A)
2.03.02	4252-0930	-01	Program phase 2.5 baseline upgrade CD (NPB 201A)
	4252-0931	-01	Program phase 2.5 baseline upgrade MO disk (NPB 201B)
1.09.00	4252-0973	-01	Program phase 1.2 baseline upgrade CD (NPB 229A)

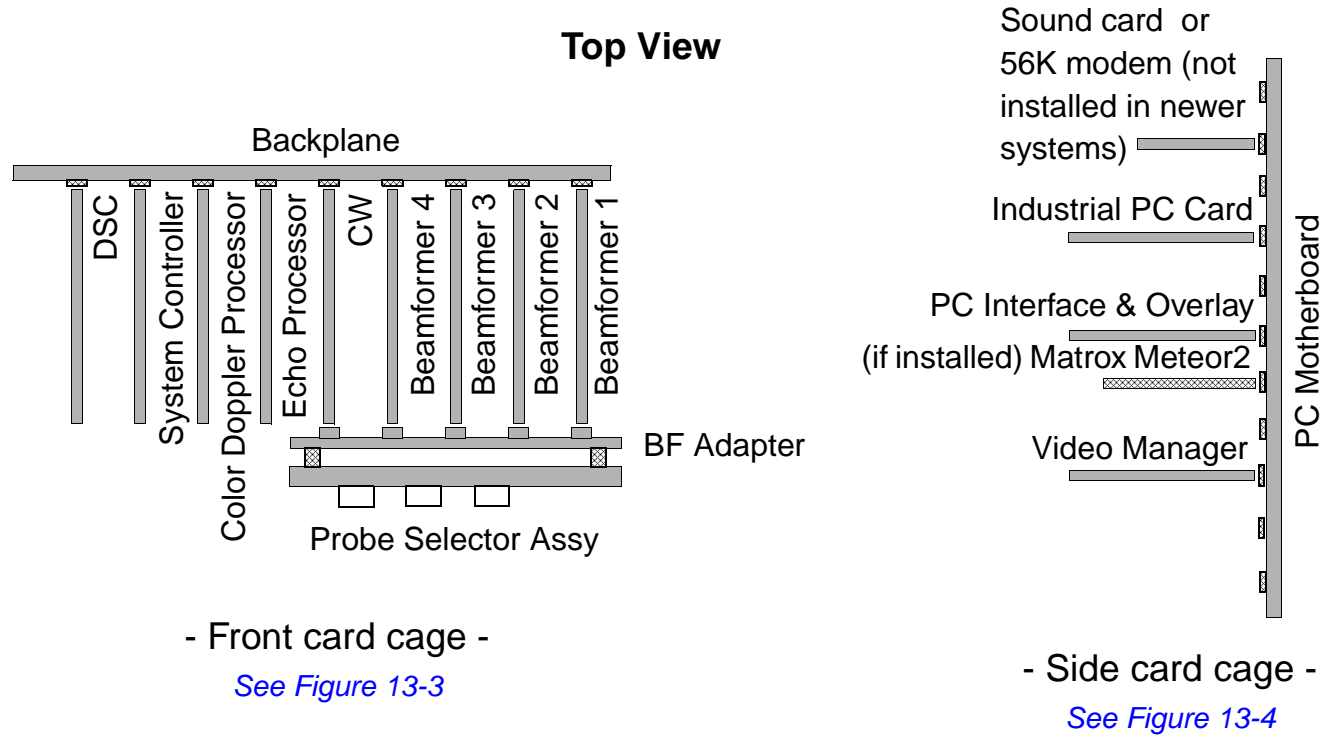
PCB Reference Information

The following conditions apply to the PCB reference information provided in this section:

- PCB illustrations are provided only as an aid to verifying physical integrity or matching the physical configuration of new PCBs.
- Configurable jumpers and switches on PCBs should not require configuration by field service representatives at installation. Not all configurable devices are shown.
- The positions of components and test points shown are relative locations only, not necessarily to scale. Not all components and test points are shown.
- Potentiometers on PCBs shall *not be adjusted by field service representatives unless an authorized procedure instructs otherwise. Not all potentiometers are shown.*

Primary System PCB Locations

The identities and locations of the primary system PCBs are shown in [Figure 13-1](#) through [Figure 13-4](#).



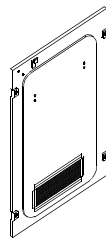
[See Table 13-2](#)

Figure 13-1 Primary System PCB Names and Locations

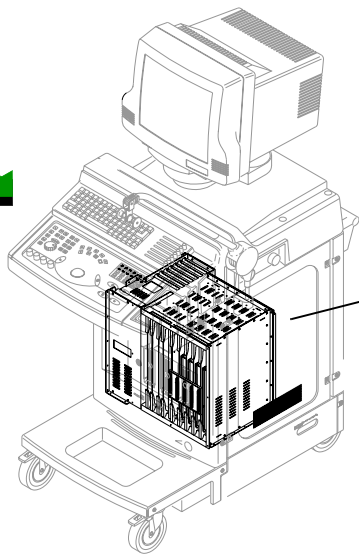
See Figure 13-3 and Figure 13-4

- Side card cage access -

Left side panel



1500SystemWCC

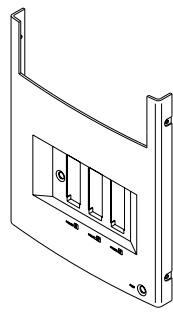


Backplane

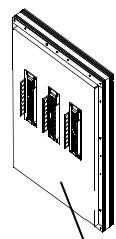
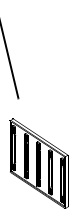
- Front card cage access -

Front panel

FrontPanel



PCB spacer



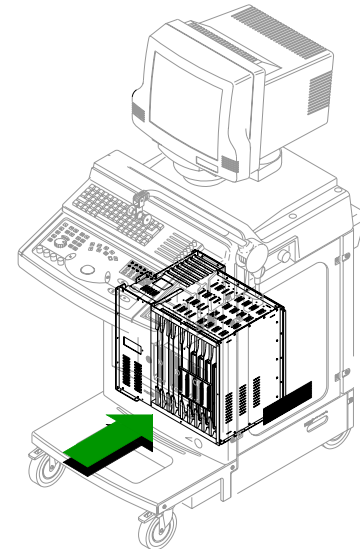
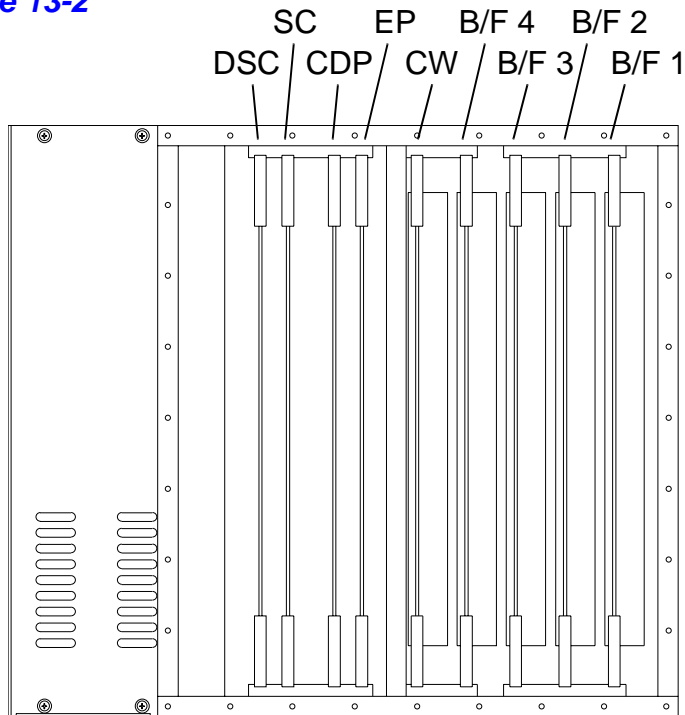
Beamformer Adapter
Probe Selector Assembly

Scanhead Select Module

See Table 13-2

Figure 13-2 Scanhead Select Module and Backplane Location

See Figure 13-2



1500SystemWCC

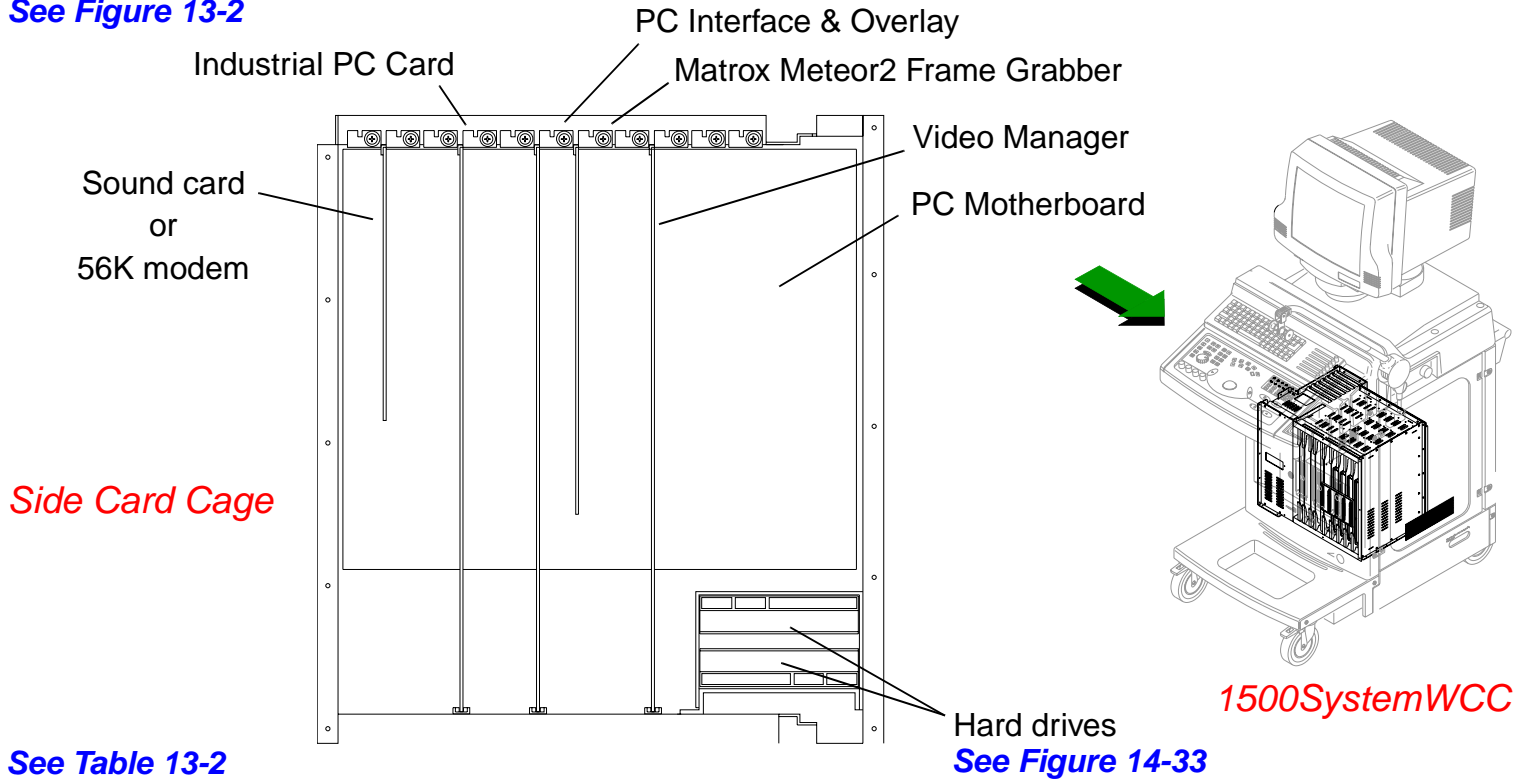
See Table 13-2

Front Card Cage

Figure 13-3

Front Card Cage PCB Acronyms and Locations

See Figure 13-2



See Table 13-2

Figure 13-4 Side Card Cage PCB Names and Locations

PCB Identification

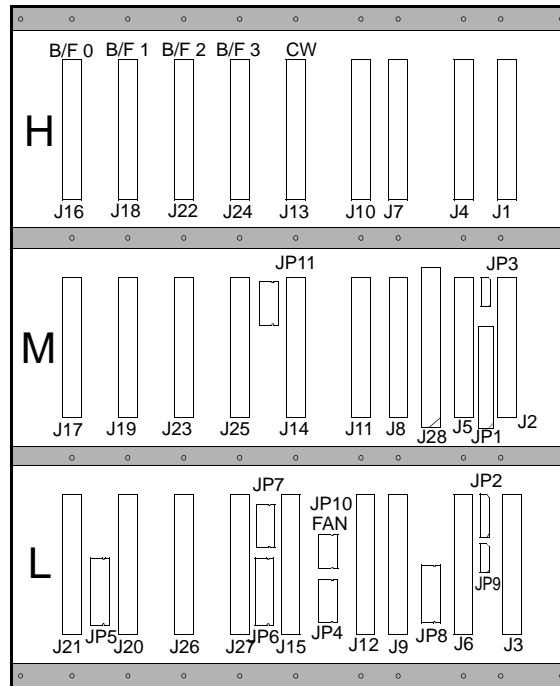
[Table 13-2](#) is a list of the primary system PCBs, with references to PCB location illustrations and corresponding PCB silhouettes. See the current HDI 1500 Master Compatibility Matrix (P/N 9015-0679) for the part number and compatible software version of system PCBs.

Table 13-2 Guide to PCB Locations and Silhouettes

PCB	Location Figure	Silhouette Figure
Backplane	Figure 13-1 Figure 13-2	Figure 13-5
Beamformer Adapter	Figure 13-1 Figure 13-2	Figure 13-6
Beamformer	Figure 13-1 Figure 13-3	Figure 13-7
Color Doppler Processor	Figure 13-1 Figure 13-3	Figure 13-8
CW	Figure 13-1 Figure 13-3	Figure 13-9
Digital Scan Converter	Figure 13-1 Figure 13-3	Figure 13-10 Figure 13-11
Echo Processor	Figure 13-1 Figure 13-3	Figure 13-12
Industrial PC Card	Figure 13-1 Figure 13-4	Figure 13-13
Matrox Meteor2 Frame Grabber	Figure 13-1 Figure 13-4	Figure 13-14

Table 13-2 **Guide to PCB Locations
and Silhouettes (Continued)**

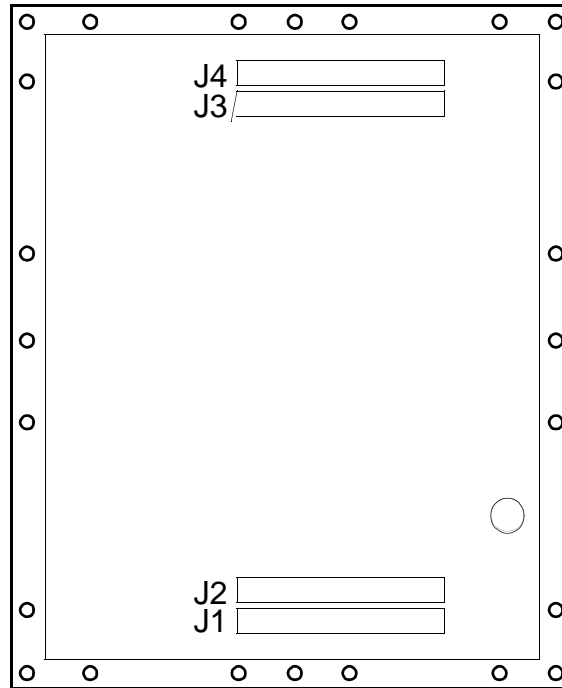
PCB	Location Figure	Silhouette Figure
Modem	Figure 13-1 Figure 13-4	Figure 13-15
PC Interface & Overlay	Figure 13-1 Figure 13-4	Figure 13-16
PC Motherboard	Figure 13-1 Figure 13-4	Figure 13-17
Probe Selector	Figure 13-1 Figure 13-2	Figure 13-18
Sound Card	Figure 13-1 Figure 13-4	Figure 13-19
System Controller	Figure 13-1 Figure 13-3	Figure 13-20
Video Manager	Figure 13-1 Figure 13-4	Figure 13-21



NOTE See the HDI 1500 Master Compatibility Matrix for the part number and compatible software version of system PCBs.

Figure 13-5

Backplane PCB

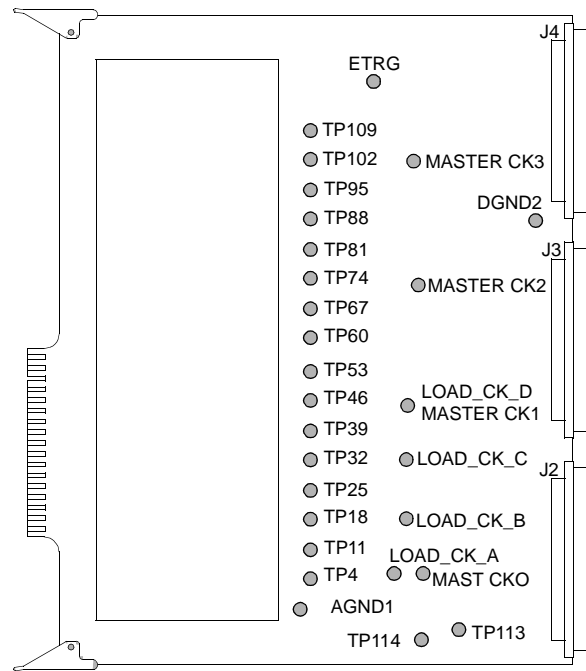


NOTE See the HDI 1500 Master Compatibility Matrix for the part number and compatible software version of system PCBs.

Figure 13-6 **Beamformer Adapter PCB**

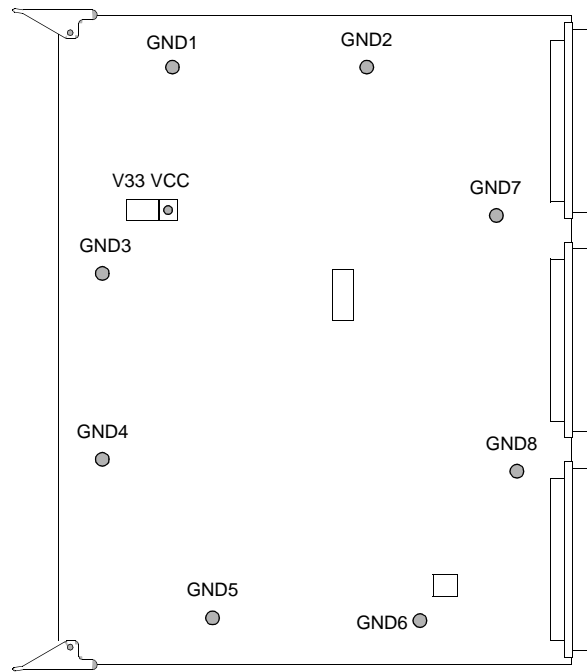
NOTE

Starting with phase 1.5 and above systems, BF#4 looks the same, but is improved and has a different part number.



NOTE See the HDI 1500 Master Compatibility Matrix for the part number and compatible software version of system PCBs. 1.5 the fourth beamformer is a different part number

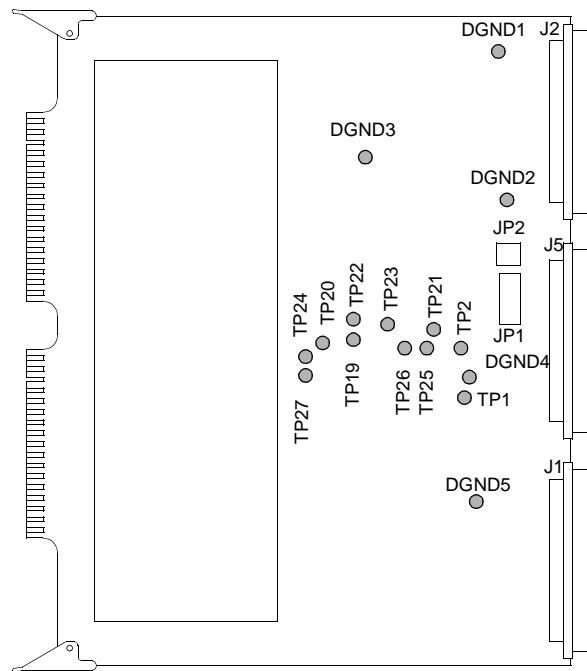
Figure 13-7 Beamformer PCB (1, 2, 3, 4)



NOTE See the HDI 1500 Master Compatibility Matrix for the part number and compatible software version of system PCBs.

Figure 13-8

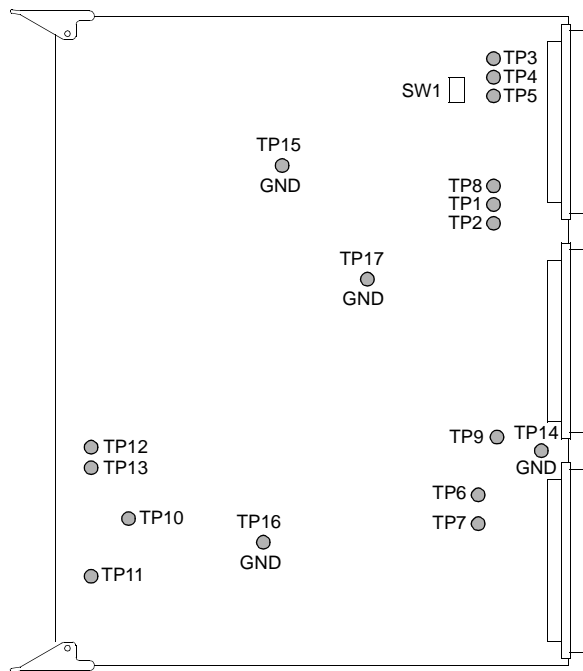
Color Doppler Processor PCB



NOTE See the HDI 1500 Master Compatibility Matrix for the part number and compatible software version of system PCBs.

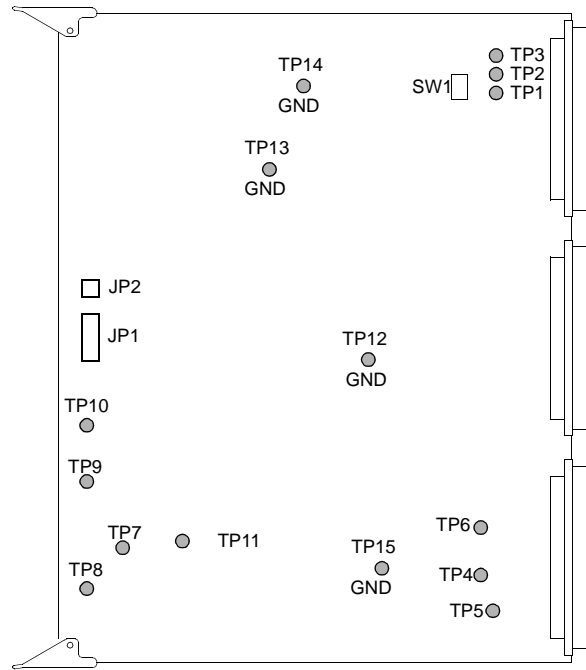
Figure 13-9

CW PCB



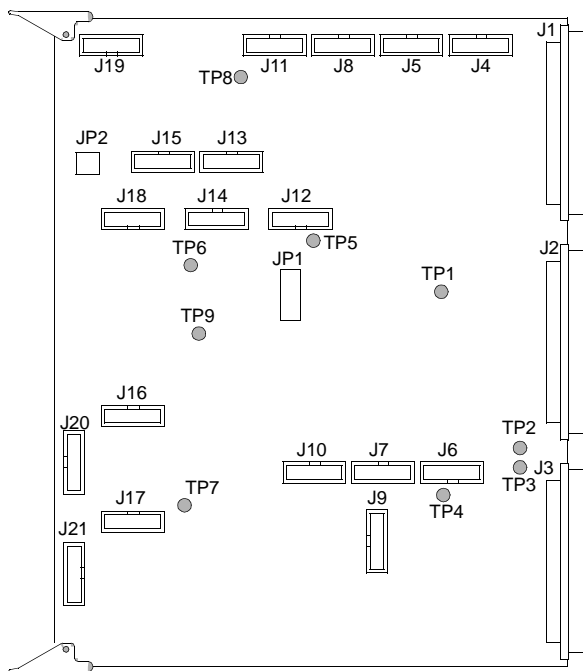
NOTE See the HDI 1500 Master Compatibility Matrix for the part number and compatible software version of system PCBs.

Figure 13-10 **Digital Scan Converter PCB (v1.08.10)**



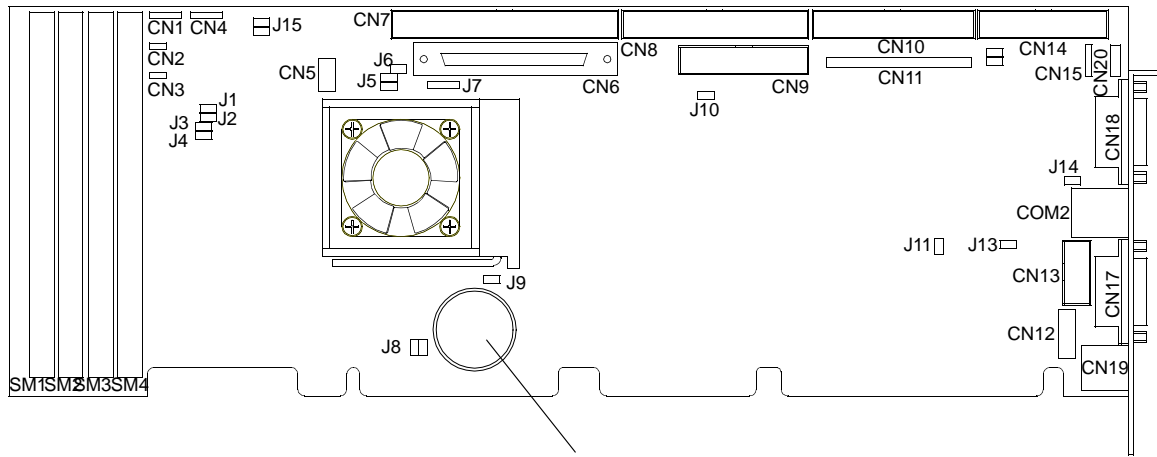
NOTE See the HDI 1500 Master Compatibility Matrix for the part number and compatible software version of system PCBs.

Figure 13-11 Digital Scan Converter PCB (v2.00.02 and up)



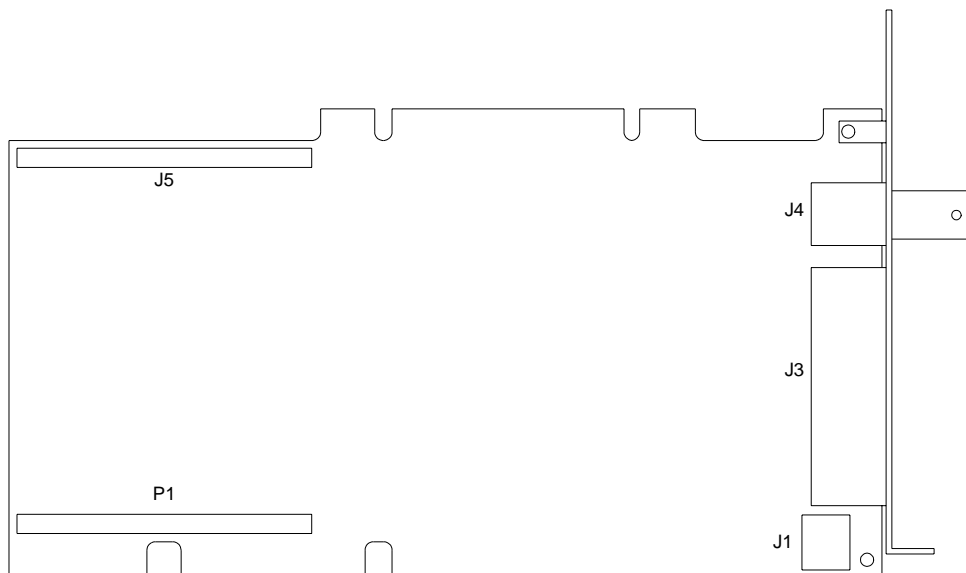
NOTE See the HDI 1500 Master Compatibility Matrix for the part number and compatible software version of system PCBs.

Figure 13-12 **Echo Processor PCB**



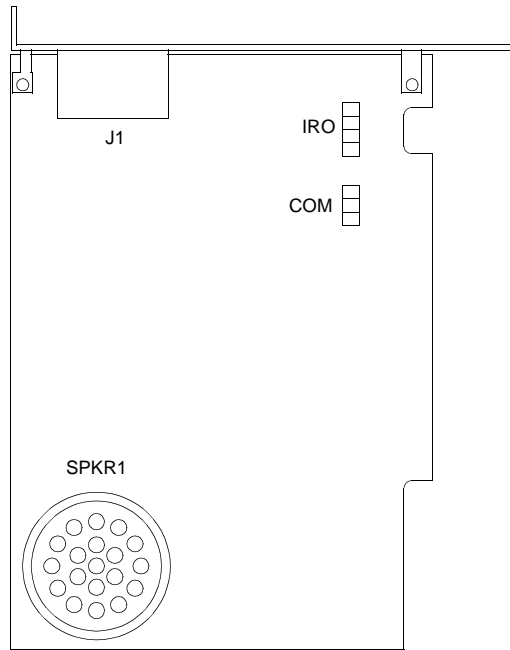
NOTE See the HDI 1500 Master Compatibility Matrix for the part number and compatible software version of system PCBs.

Figure 13-13 Industrial PC Card



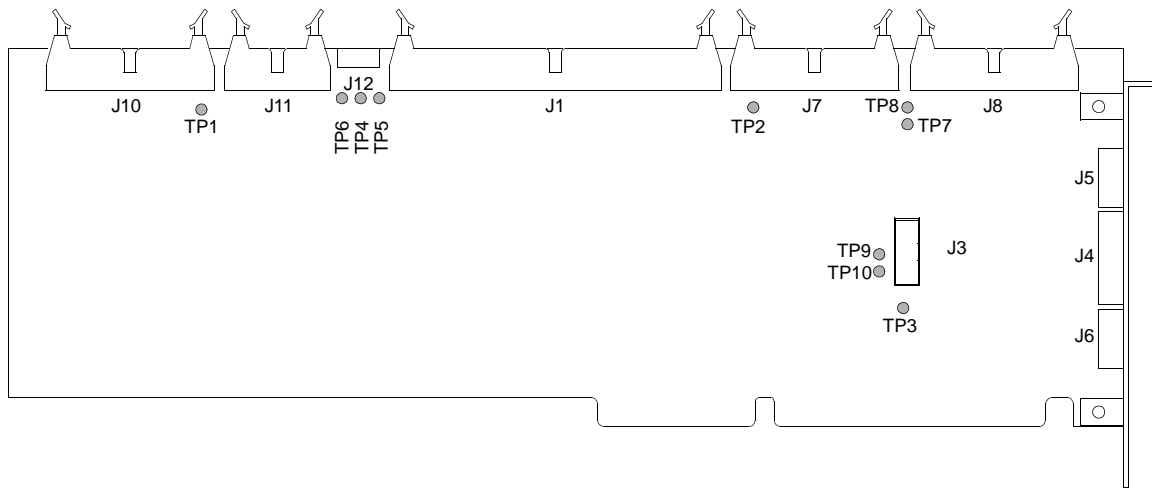
NOTE See the HDI 1500 Master Compatibility Matrix for the part number and compatible software version of system PCBs.

Figure 13-14 **Matrox Meteor2 (Framegrabber) PCB (v2.01.02 and up with Stress Echo)**



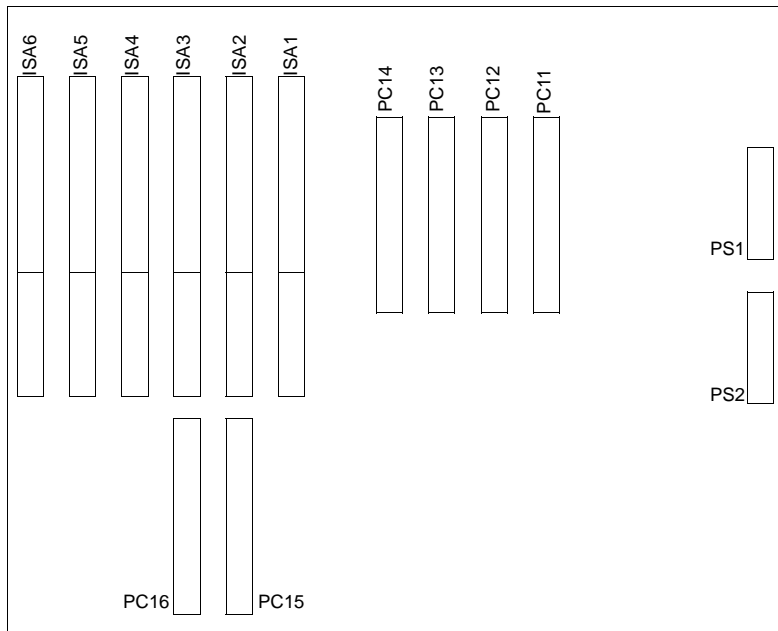
NOTE See the HDI 1500 Master Compatibility Matrix for the part number and compatible software version of system PCBs.

Figure 13-15 **56K Modem (v2.00.02 and up)**



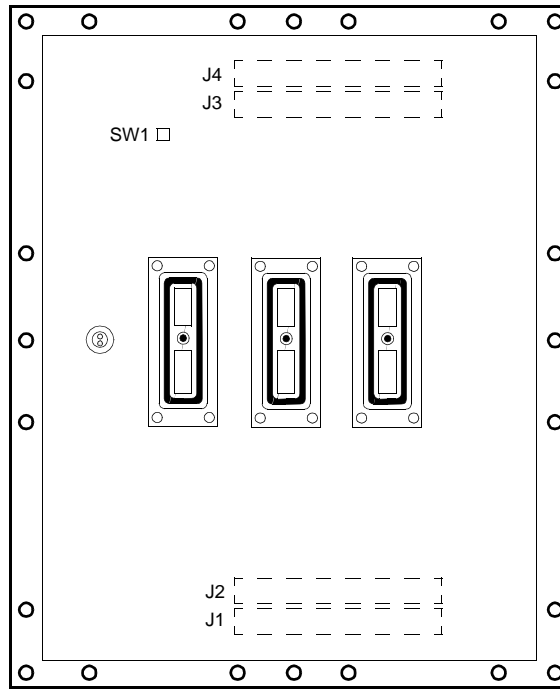
NOTE See the HDI 1500 Master Compatibility Matrix for the part number and compatible software version of system PCBs.

Figure 13-16 PC Interface and Overlay PCB



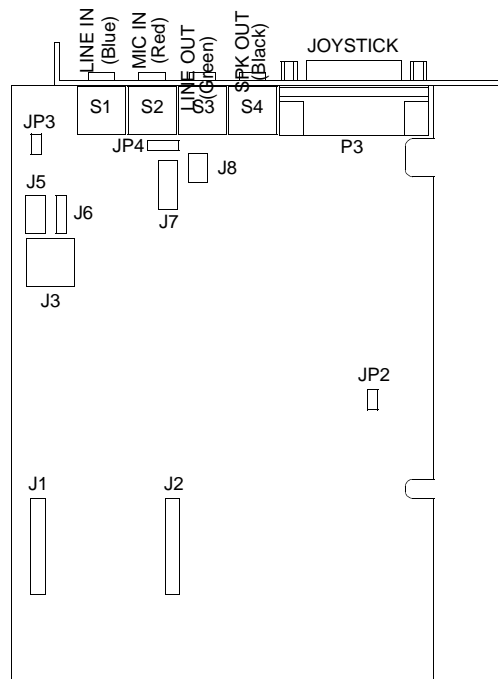
NOTE See the HDI 1500 Master Compatibility Matrix for the part number and compatible software version of system PCBs.

Figure 13-17 **PC Motherboard**



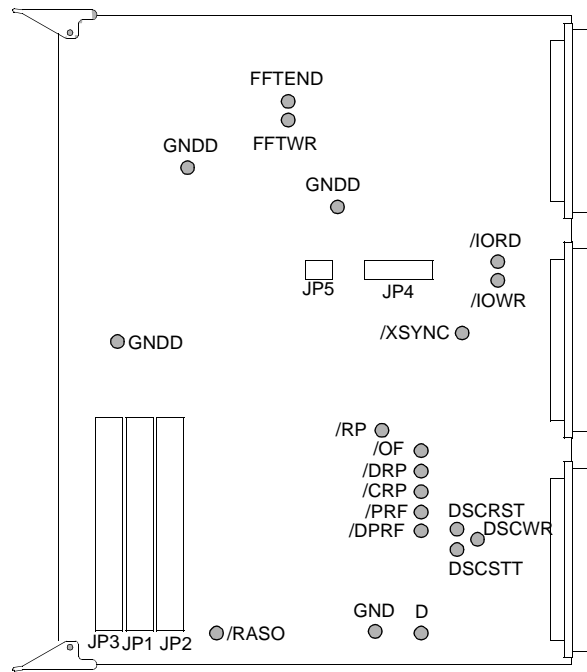
NOTE See the HDI 1500 Master Compatibility Matrix for the part number and compatible software version of system PCBs.

Figure 13-18 **Probe Selector Assembly**



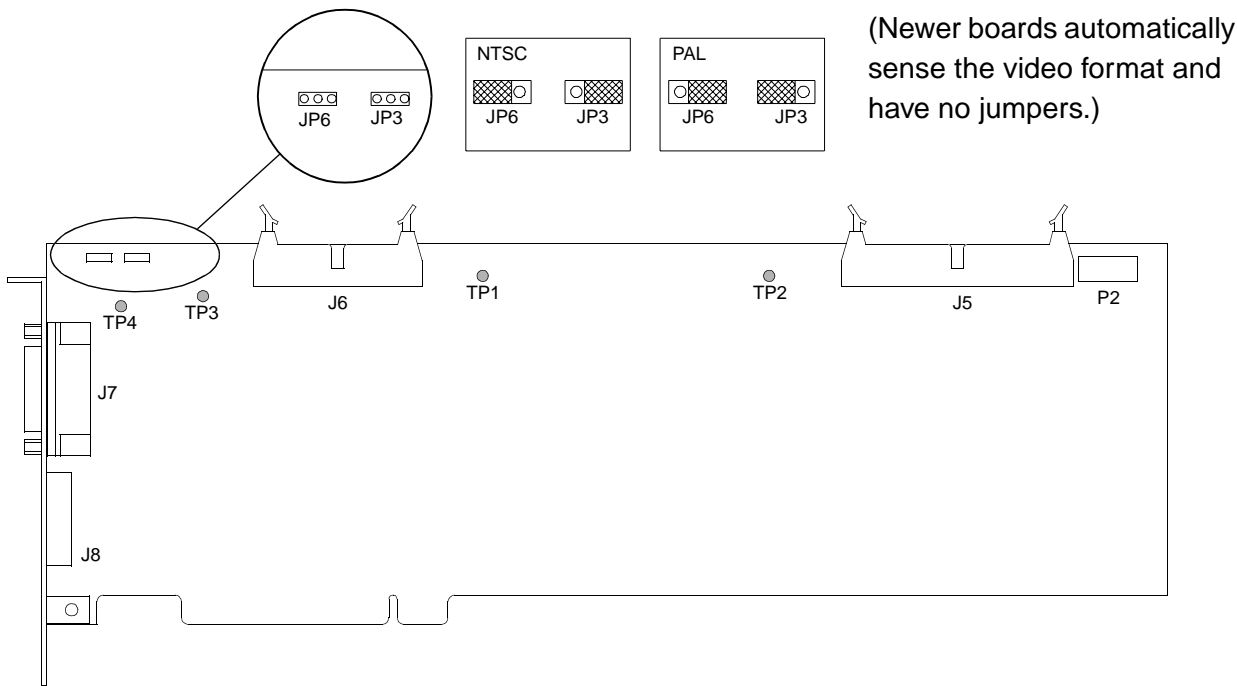
NOTE See the HDI 1500 Master Compatibility Matrix for the part number and compatible software version of system PCBs.

Figure 13-19 **Sound Card (v1.08.10)**



NOTE See the HDI 1500 Master Compatibility Matrix for the part number and compatible software version of system PCBs.

Figure 13-20 System Controller PCB



NOTE See the HDI 1500 Master Compatibility Matrix for the part number and compatible software version of system PCBs.

Figure 13-21 Video Manager PCB

Hard Drive Configuration

In systems with a second hard drive, the drive with the system software must be configured to operate as the Master and the other one must be configured to operate as the Slave. The configuration settings are dictated by jumper positions on the drives, which may vary depending on the drive type and manufacturer. As shown in the example of [Figure 13-22](#), the drives will have some sort of a Jumper Configuration Table with the needed information. As necessary during troubleshooting or replacement, verify the jumper position is correct for the role of the drive.

14 Parts

Introduction

This section contains parts information for the HDI 1500 system. For replacement parts that are dependent upon system features and software versions (primary PCBs and certain hardware assemblies), see the HDI 1500 Master Compatibility Matrix (P/N 9015-0679).

Use the figures and parts table in this section to locate and identify system parts. Part numbers are shown on the illustrations as well as listed and described in the corresponding tables. Figures are keyed to the tables and the tables to the figures, as applicable. Use the part number, and description provided, if needed, to order a part. Verify the level of replacement for a given part is in accordance with current service philosophy before ordering the part.

Parts Ordering Information

Field Service Engineers

For parts ordering procedures, FSEs should refer to their standard operating procedures.

Customers

Customers may order parts through an FSE or directly from the Philips Customer Service Order Processing Department. Customers ordering parts through an FSE will need to provide the following information:

- Shipping address
- Purchase order number of equipment
- Part numbers or sales order numbers
- Part descriptions and quantity needed

How to Find a Part Number

In this section, part numbers in the exploded view system illustrations (figures) point to the system parts. The part numbers in these figures link to the parts table ([Table 14-1](#)) containing descriptive information about the part. The parts table, arranged as follows, is alphabetized by description for your convenience. A separate table ([Table 14-2](#)) lists peripherals.

Using the Figures and Tables

► How to use the figures and tables in this section:

- If you need a part number, find the drawing of the part in the appropriate figure. The part number or reference to where the part number appears points to the drawing. If you need the part description, click on the blue part number hypertext link to go to the corresponding item in the parts table.
- If you have the part number and want to look up the description in the table, use Acrobat Reader's Find function to locate the part number. Then, if needed, you can click on the blue hypertext figure link to go to the corresponding illustration.
- If you are using a printed version of this manual and need more than just the part number shown on the figure, the parts are alphabetized in the table by description, so you can look up the part by description.

Parts Table Definitions

Located On. This column lists all of the figures on which the part is found.

Part Number. This column lists the part number for an item. Use this number when ordering parts from Philips. If a table is referenced in this column, the part number is on that table. For example, the part numbers for cables are in [Section 11, "Cabling"](#).

Part Description. The name or common description of the item is listed here. Where appropriate, the description column also includes size, tolerance, type or model, and material data for the part. [Table 14-1](#) is alphabetized by this column.

Attaching parts must be ordered separately. They are not provided with the assembly, subassembly, or component being attached.

Notes/Reference. Manufacturer's part numbers, sometimes alternate part numbers, special applications, and other information pertaining to a specific part are listed in this column. For top assemblies containing many replaceable parts, the applicable figure or table for further breakdown of parts is listed here.

Figure Definitions

Part Number. The part number for each part or subassembly shown in an illustration is a hypertext cross-reference linking to the parts/cable tables containing parts descriptions and additional information.

See Figure. “See Figure” is a hypertext cross-reference linking to a detail (sub-assembly) figure where another detail figure or the part number hypertext link cross-reference appears; or a reference to the table containing parts descriptions and additional information.

System View. The “SYSTEM VIEW” illustration page, [Figure 14-1](#) contains links to “PARENT VIEW” illustrations.

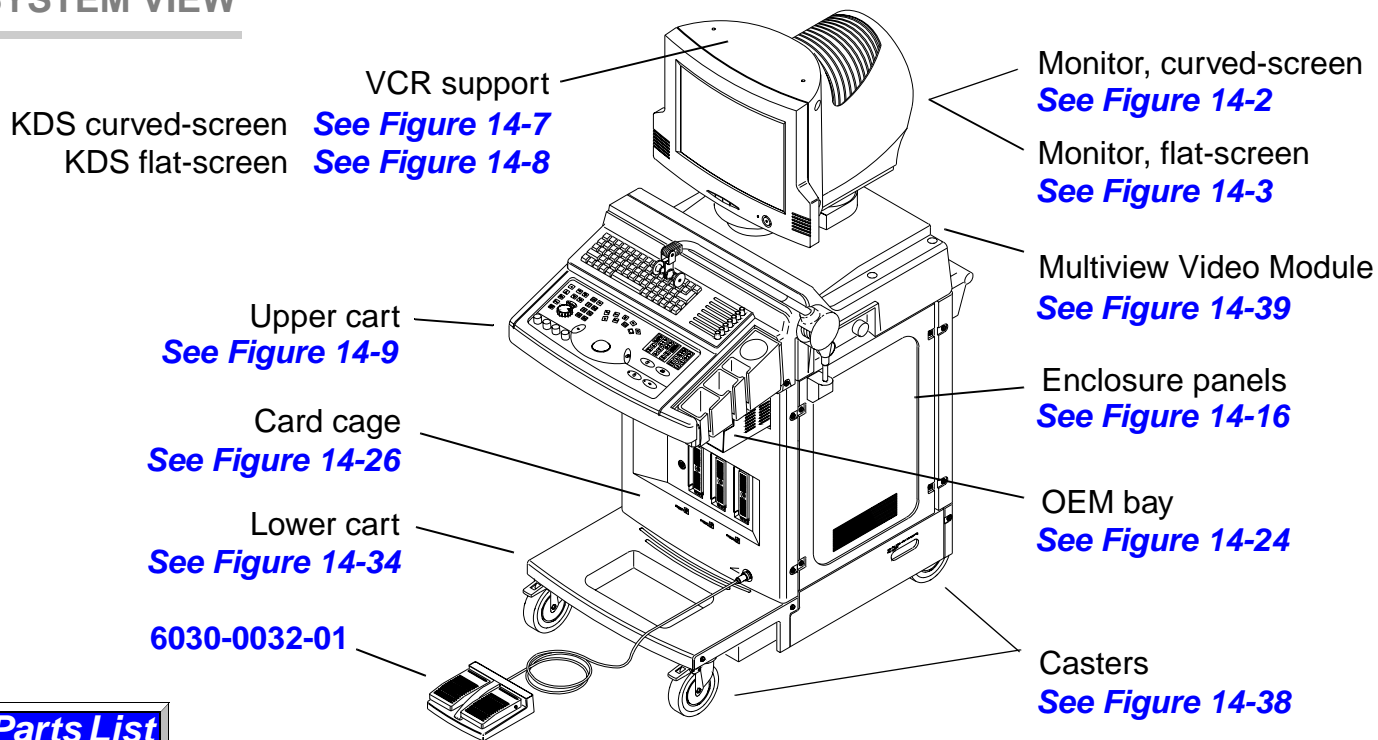
Parent View. “PARENT VIEW” indicates an illustration that provides links to additional parts breakdown, indicated with a “See Figure” reference.

System View Button. The “System View” button is a hypertext cross-reference linking to the “SYSTEM VIEW” illustration page, [Figure 14-1](#). You can return to the page by clicking the “System View” button in the lower left corner of any figure in this section.

Parts List Button. The “Parts List” button is a hypertext cross-reference linking to the “Parts Table” containing parts descriptions and additional information.

Parts Illustrations

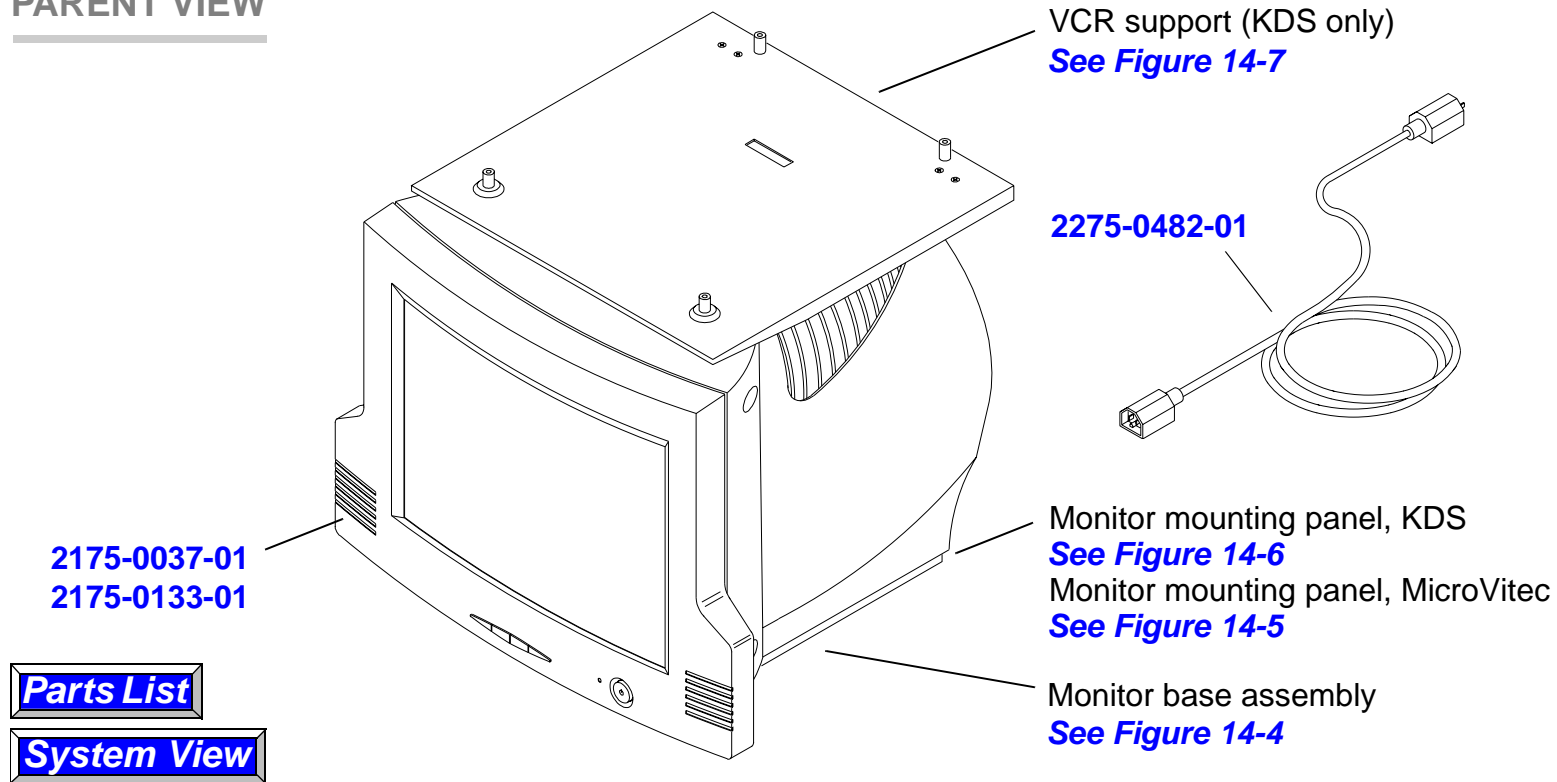
SYSTEM VIEW

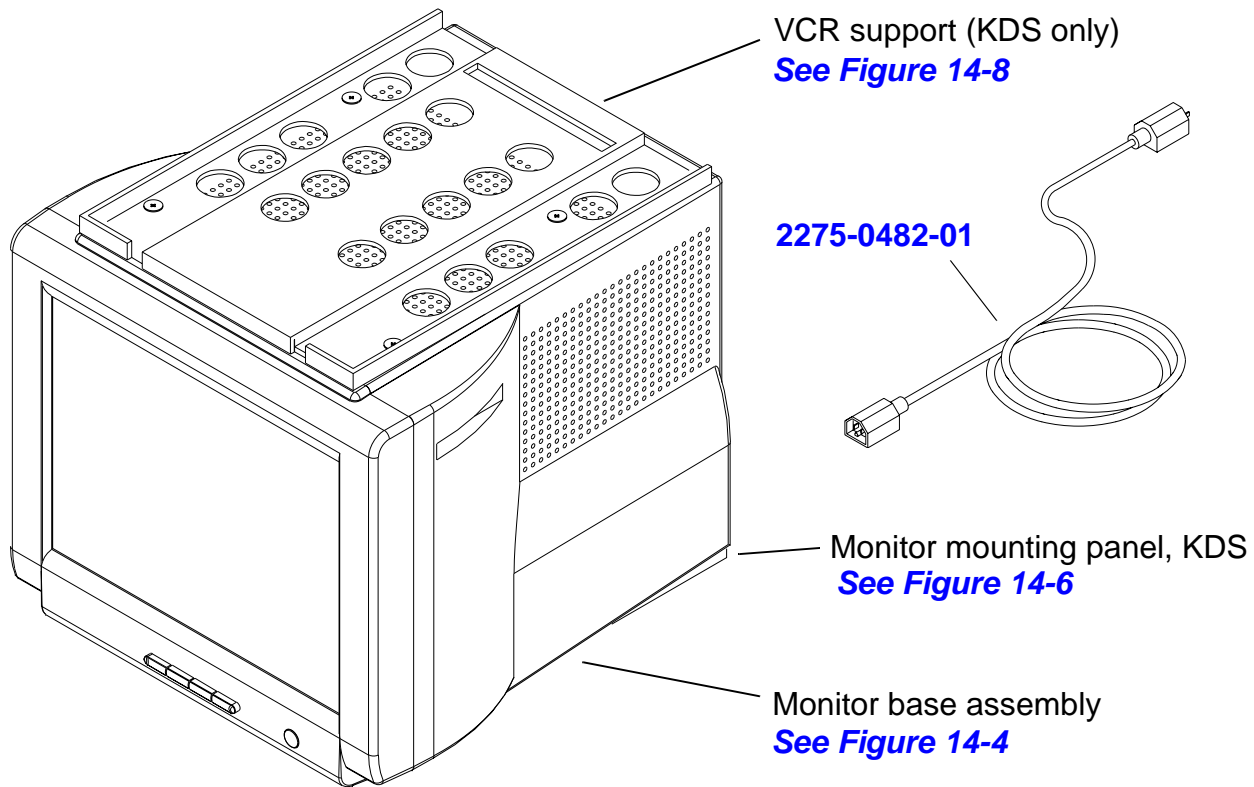


Parts List

Figure 14-1

HDI 1500 System Main Components

PARENT VIEW**Figure 14-2****15-Inch Curved-screen Video Monitor (KDS)**

PARENT VIEW**Parts List****System View****Figure 14-3****15-Inch Flat-screen Video Monitor (KDS)**

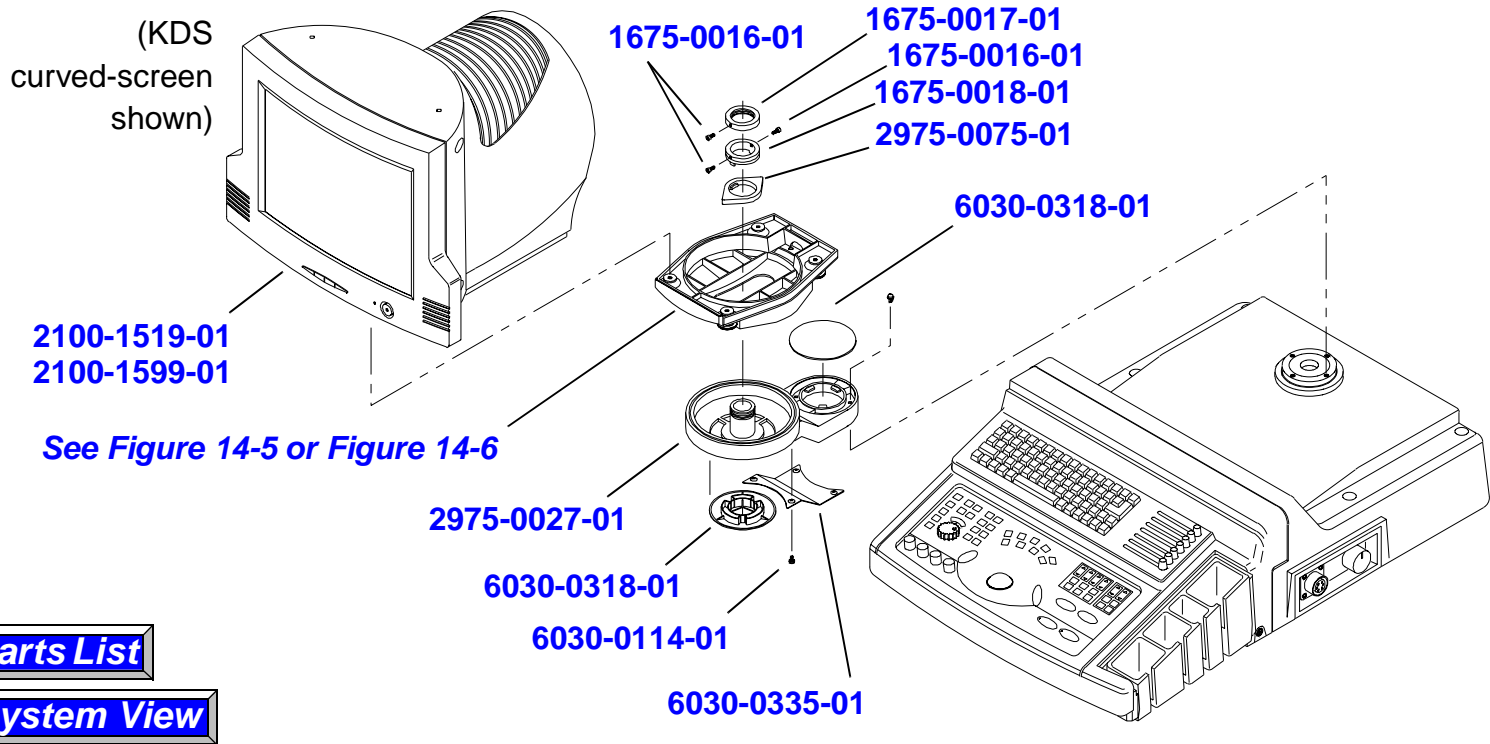


Figure 14-4 Monitor Base Assembly

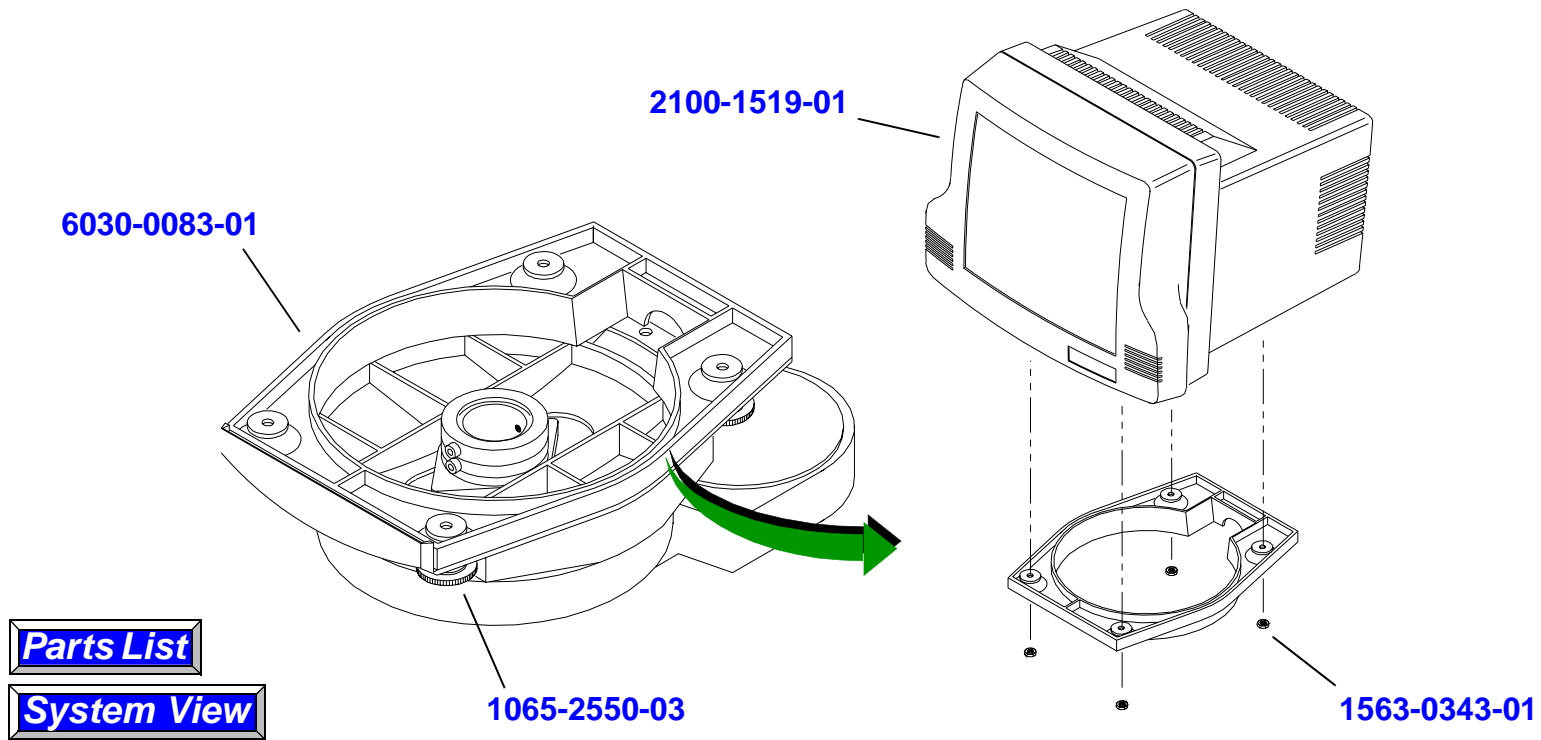


Figure 14-5

Monitor Mounting Panel (MicroVitec)

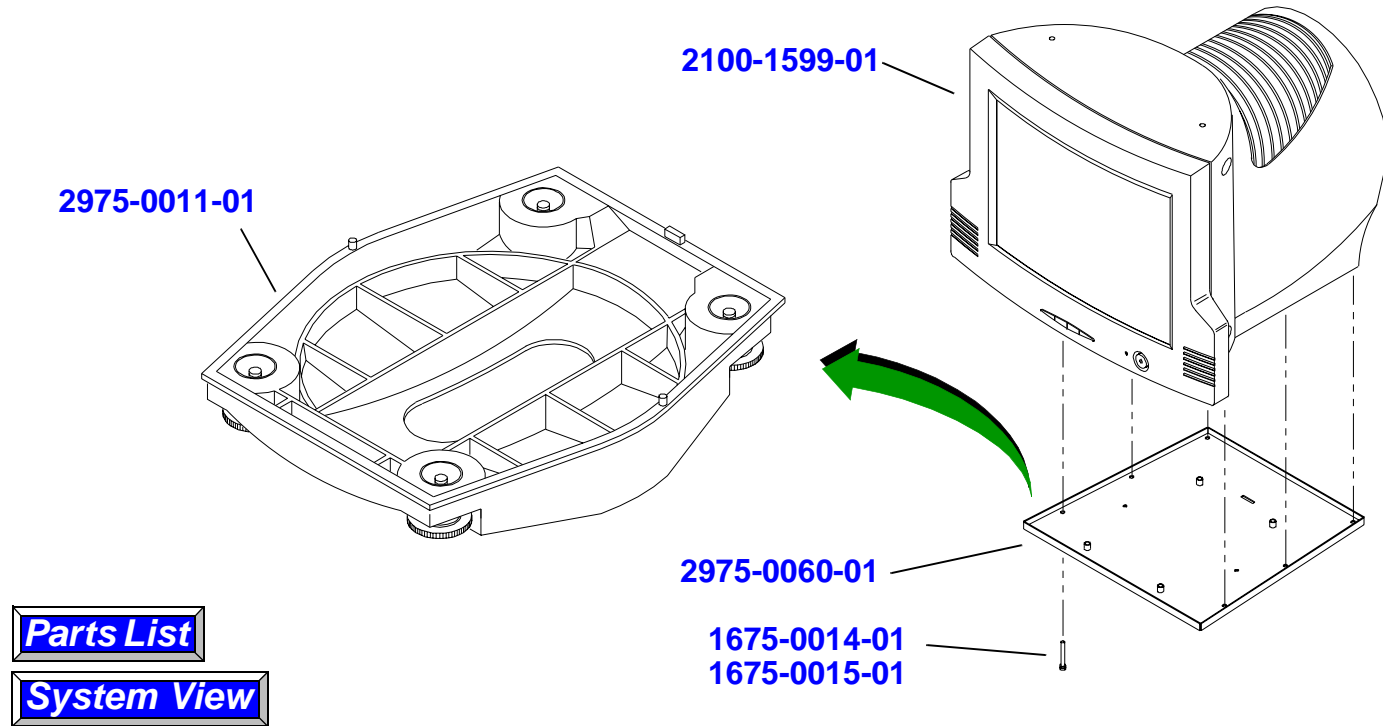


Figure 14-6

Monitor Mounting Panel (KDS Curved-screen)

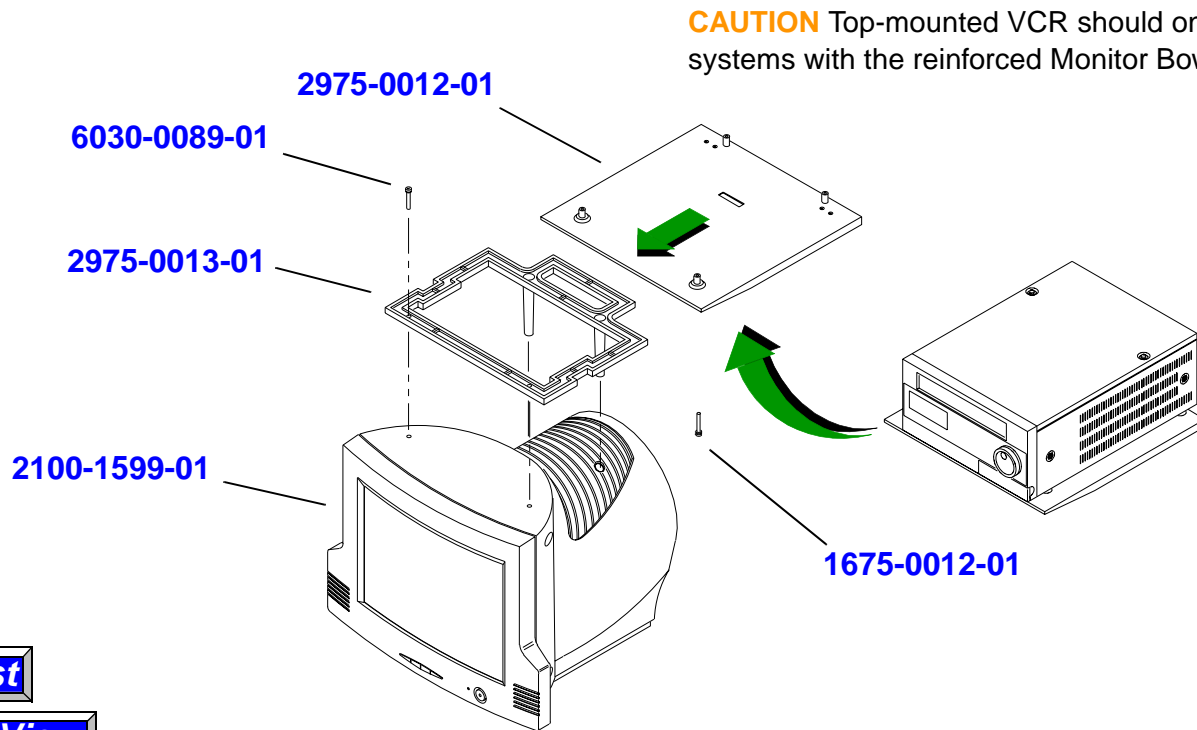


Figure 14-7

Monitor VCR Support (KDS Curved-screen only - phase 1.5 systems and above)

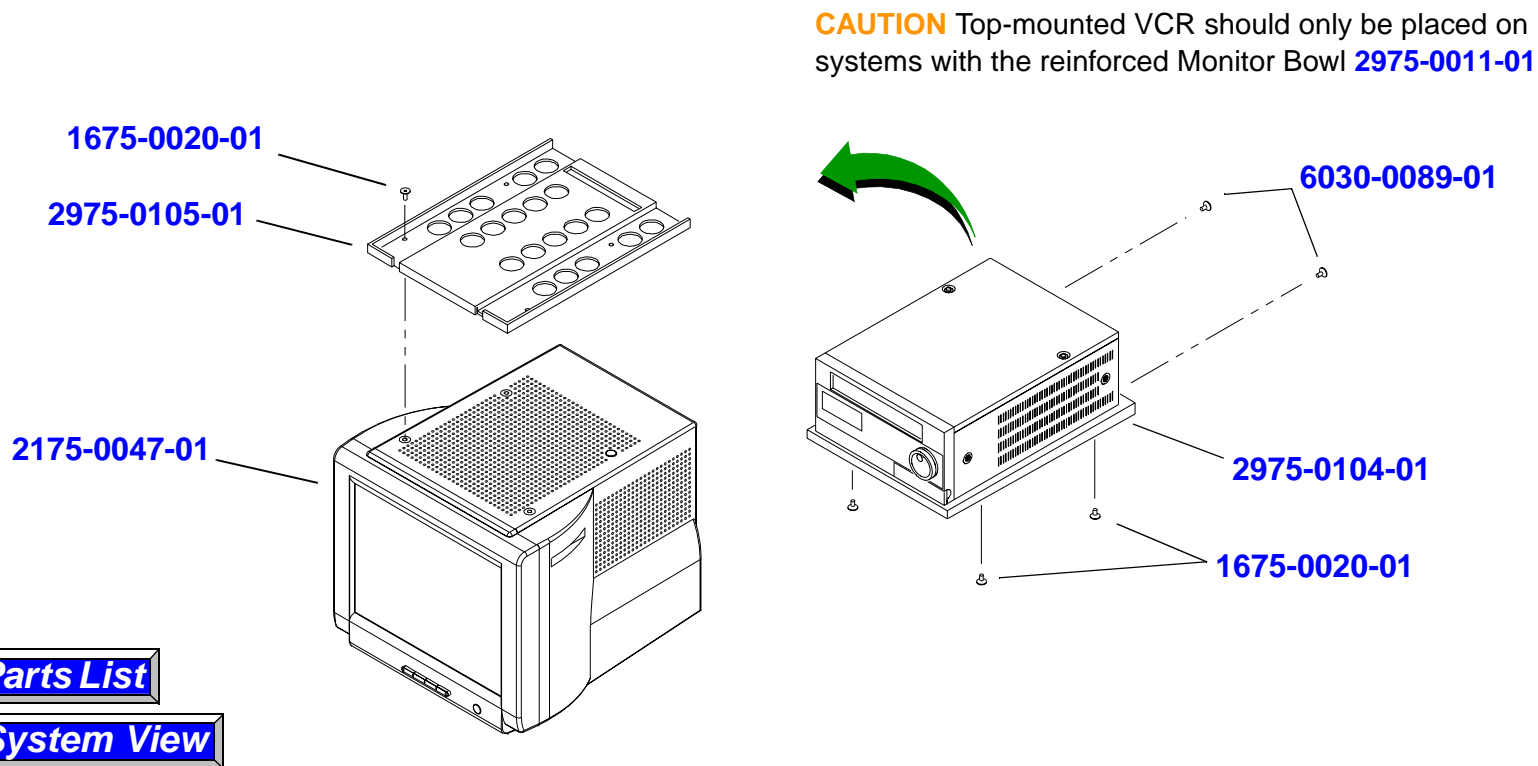


Figure 14-8

Monitor VCR Support (KDS Flat-screen only)

PARENT VIEW

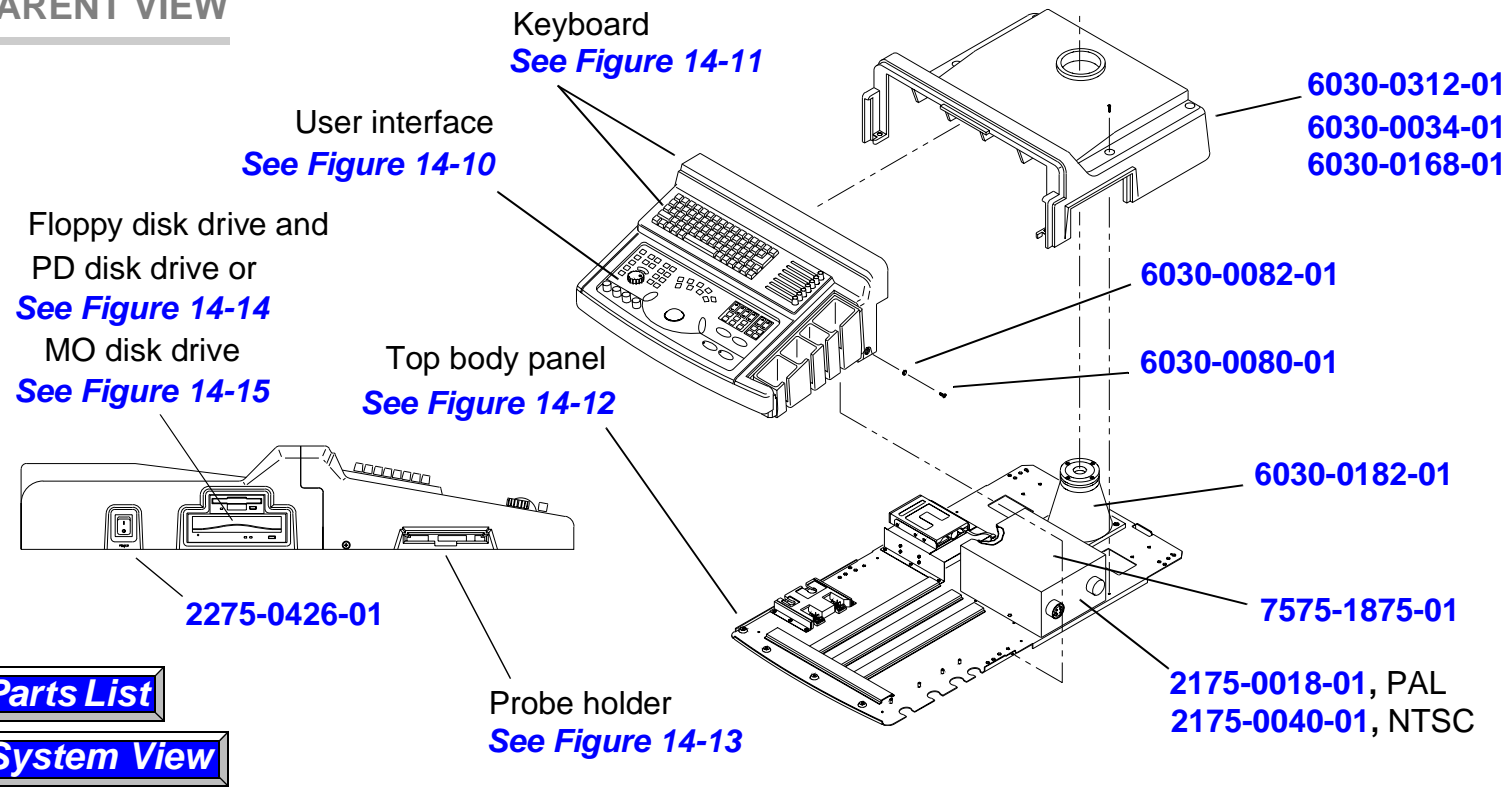
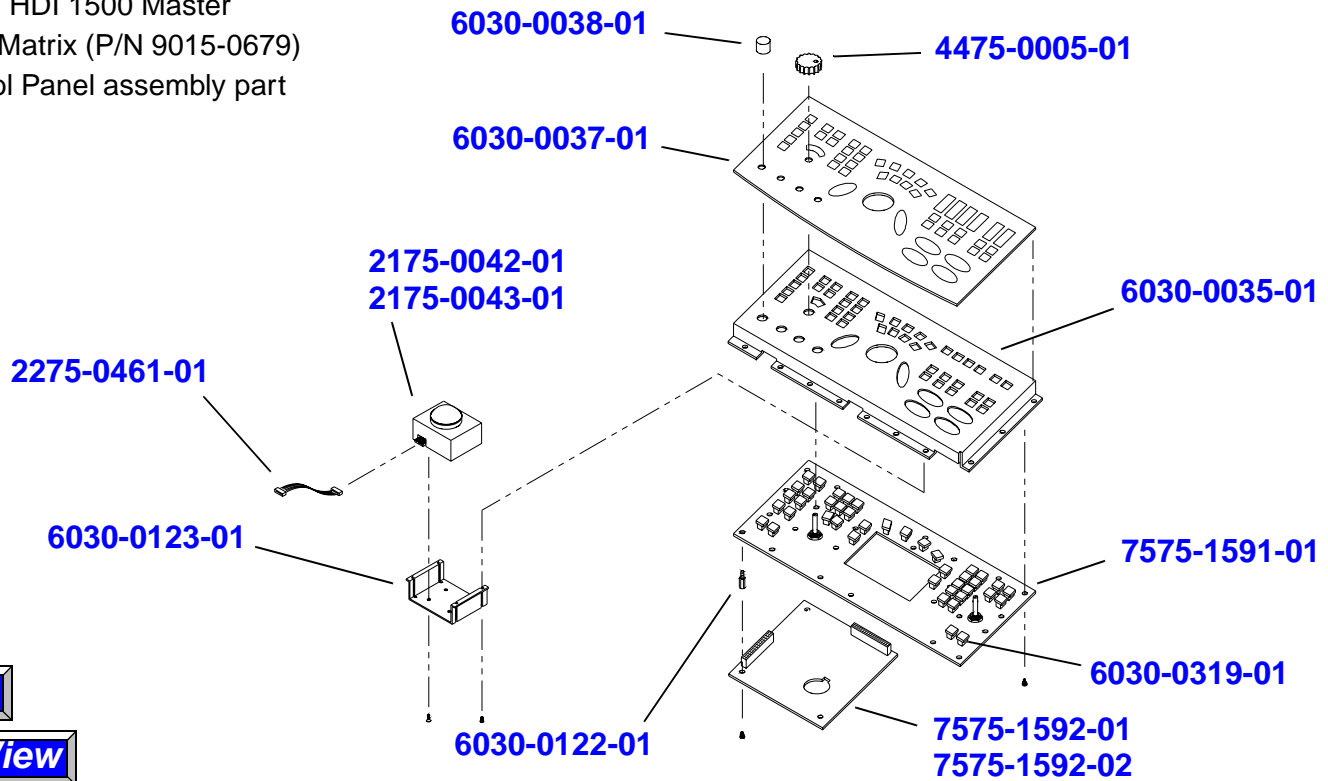


Figure 14-9 Upper Cart

Note: See the HDI 1500 Master Compatibility Matrix (P/N 9015-0679) for UIF/Control Panel assembly part numbers.

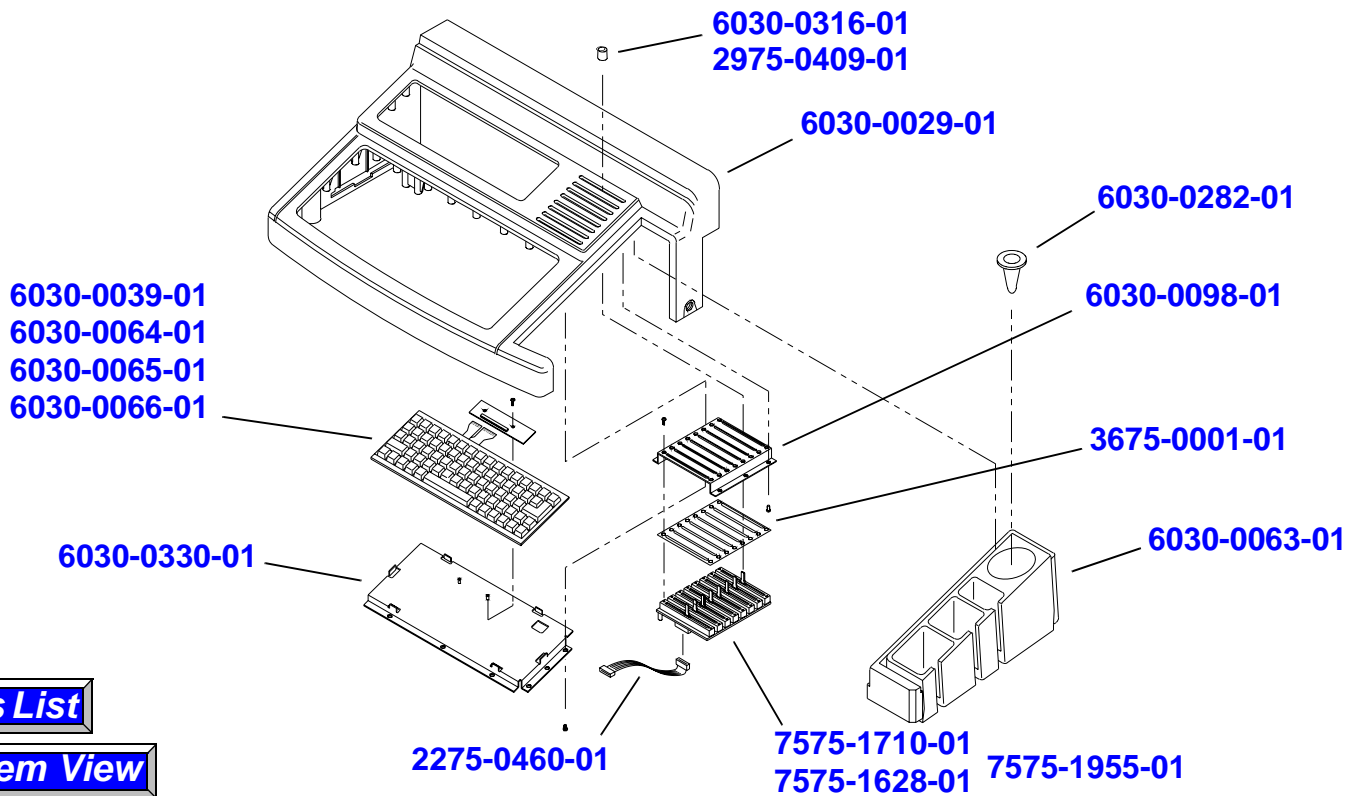


Parts List

System View

Figure 14-10

User Interface (Control Panel)



Parts List

System View

Figure 14-11 User Interface (Keyboard)

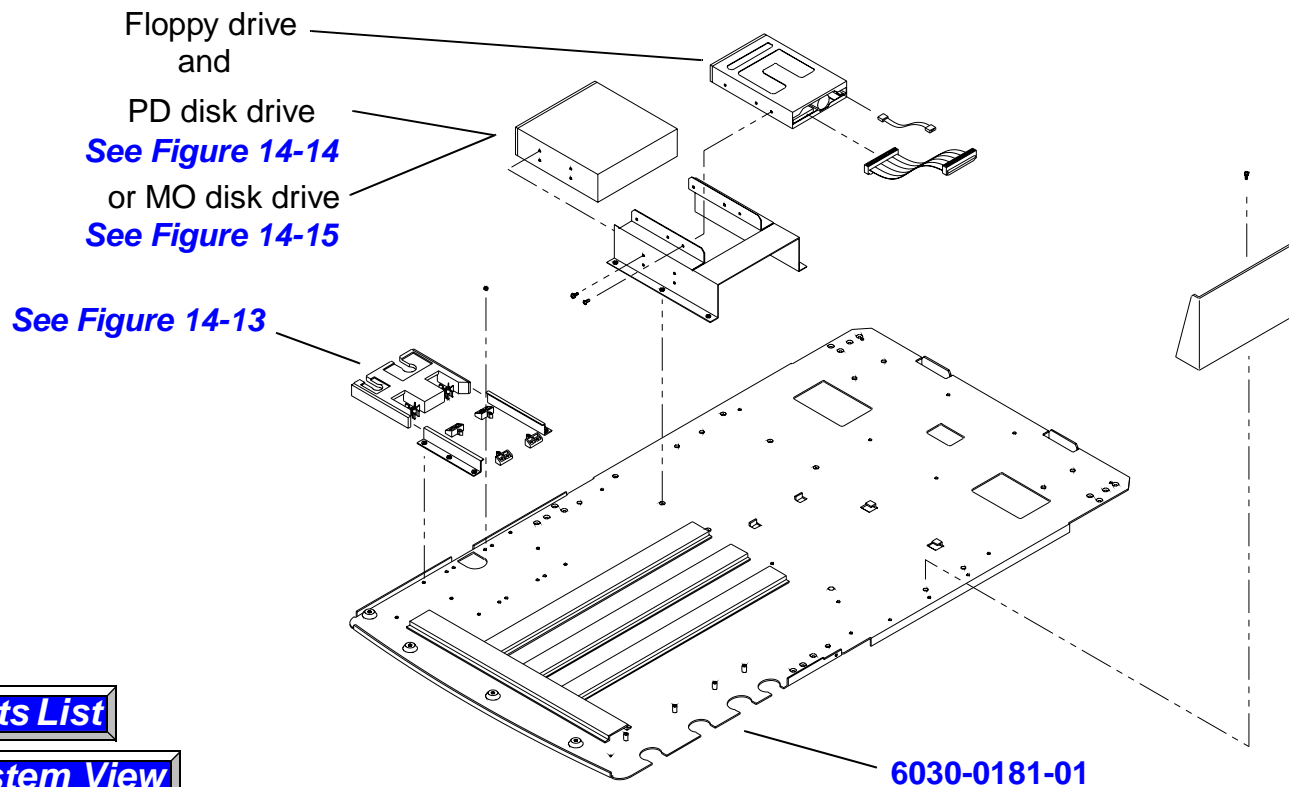
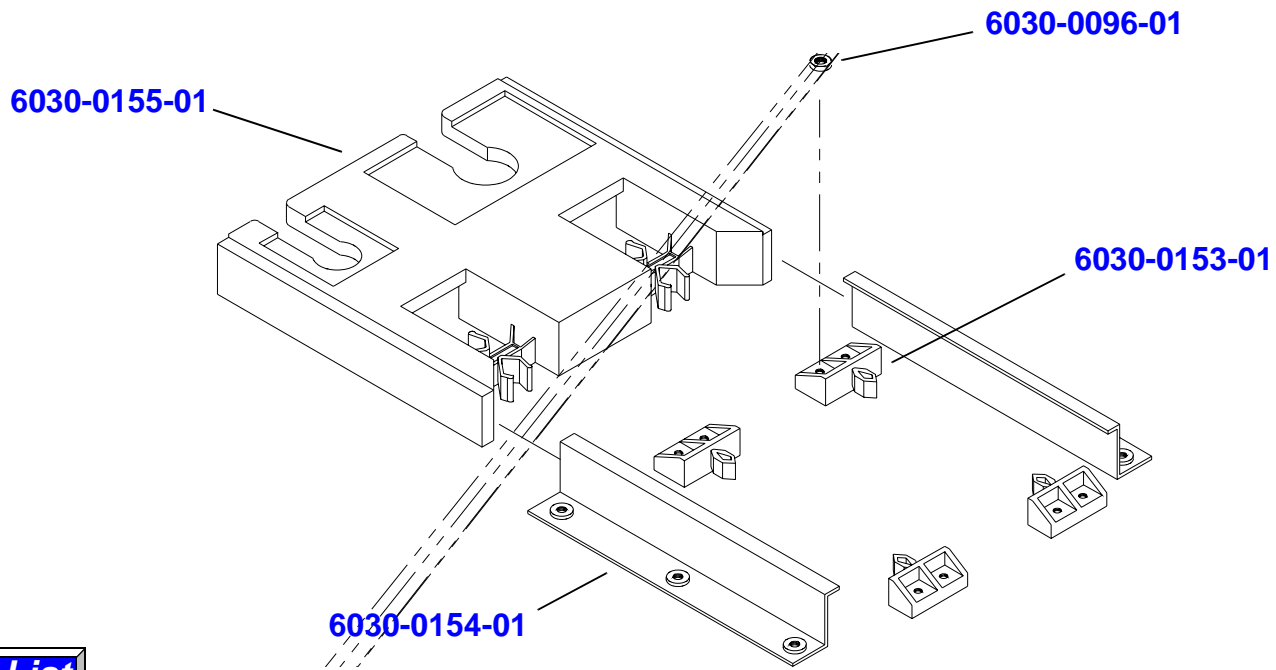
[Parts List](#)[System View](#)

Figure 14-12

User Interface (Top Body Panel)

[Parts List](#)[System View](#)**Figure 14-13****Probe Holder**

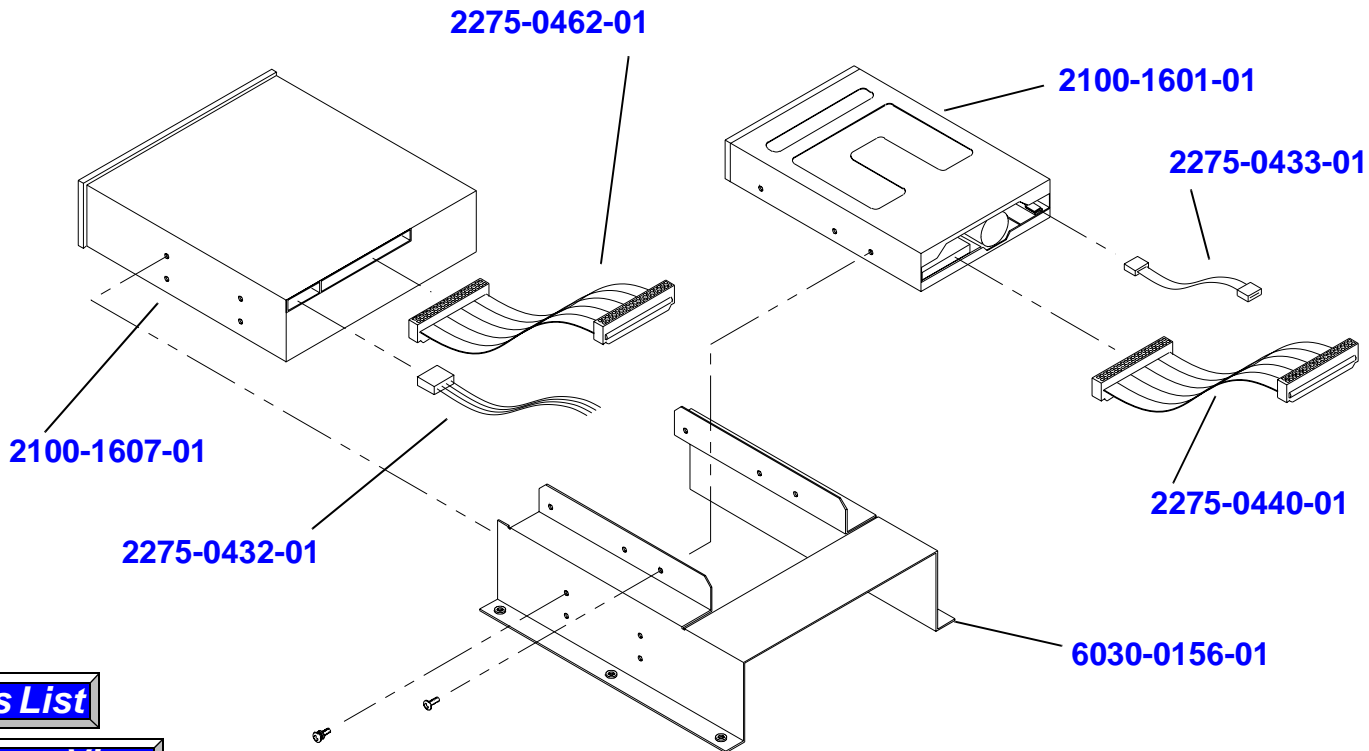
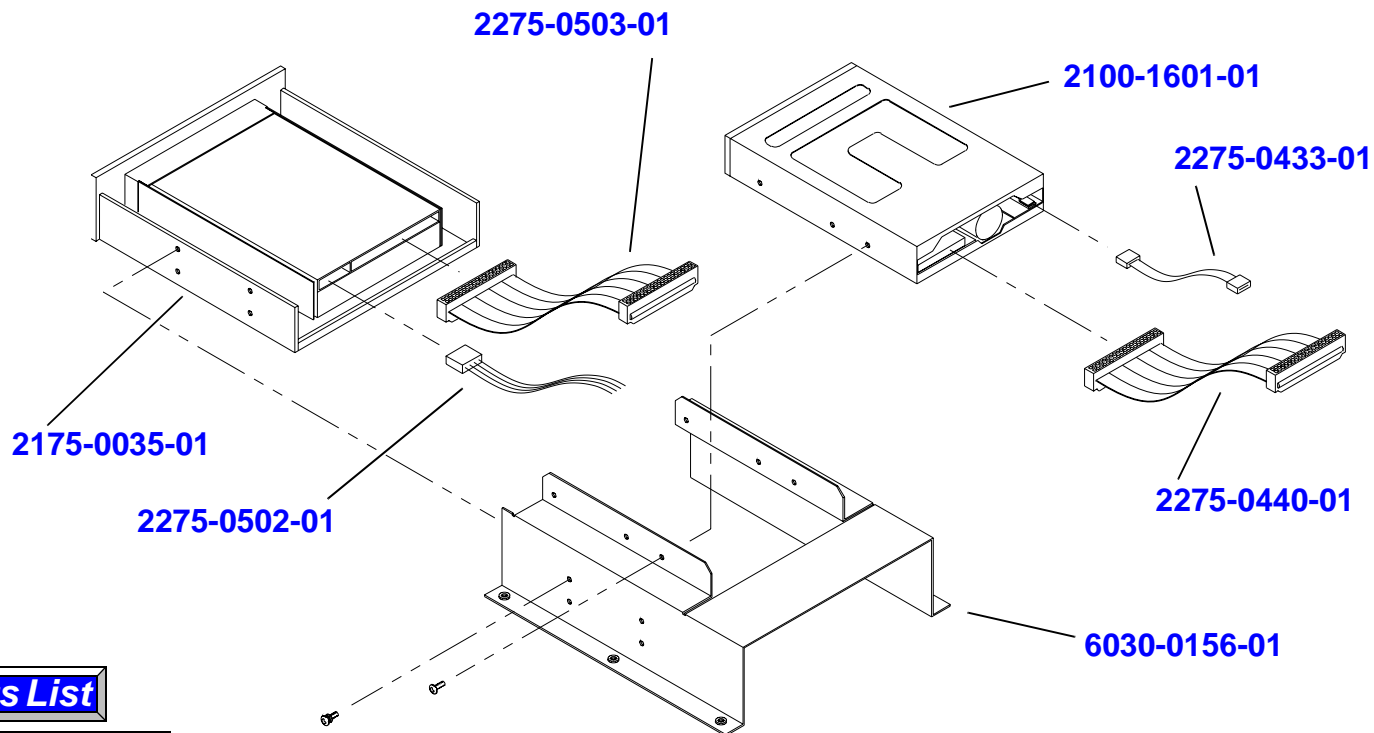
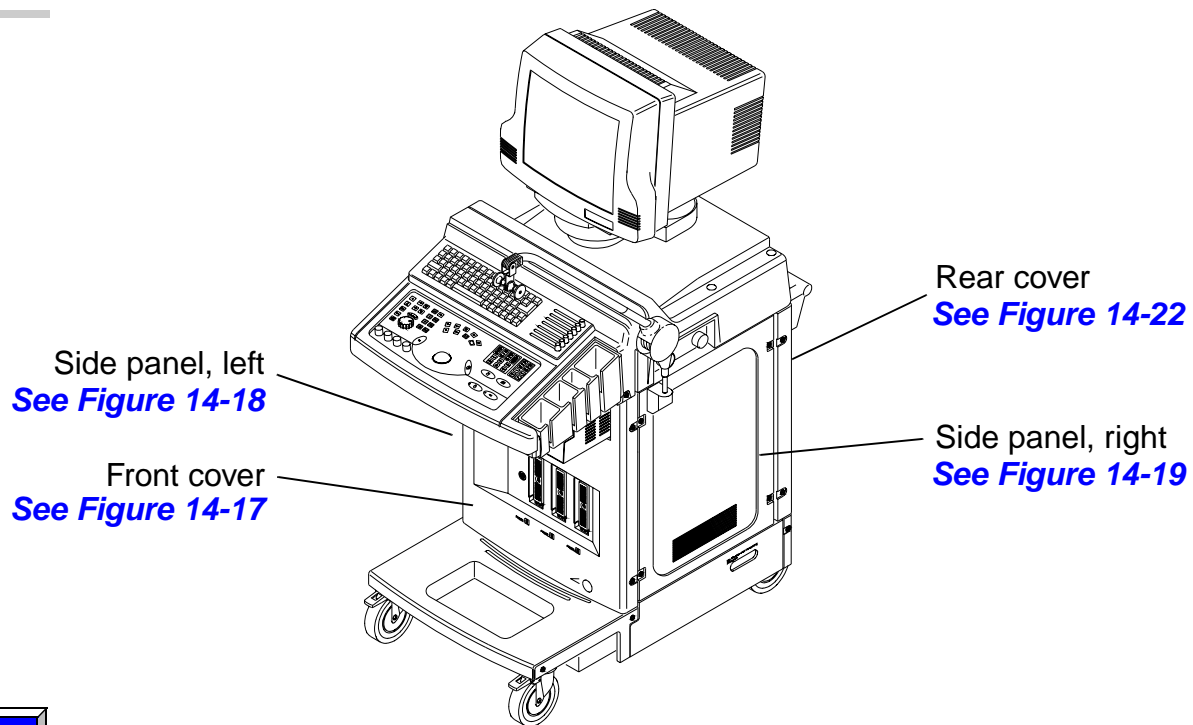


Figure 14-14

PD (Phase) Drive and Floppy Disk Drive

**Figure 14-15****MO (Magneto Optical) Drive and Floppy Disk Drive
(v2.02.00 and higher)**

PARENT VIEW

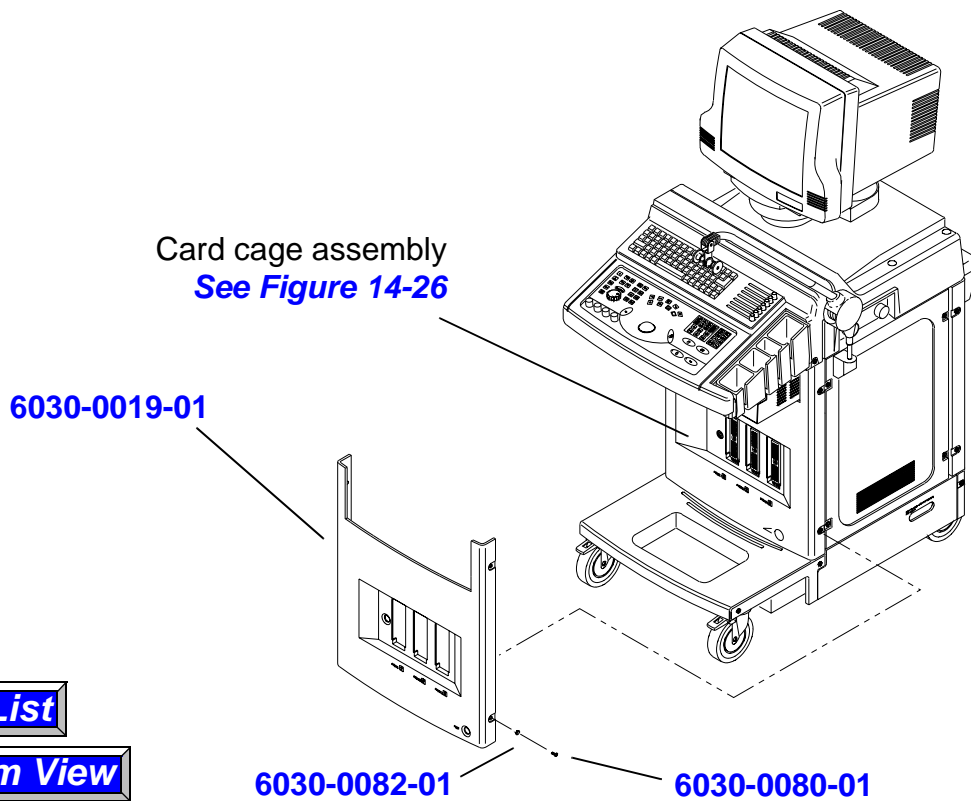


Parts List

System View

Figure 14-16

Enclosure Panels

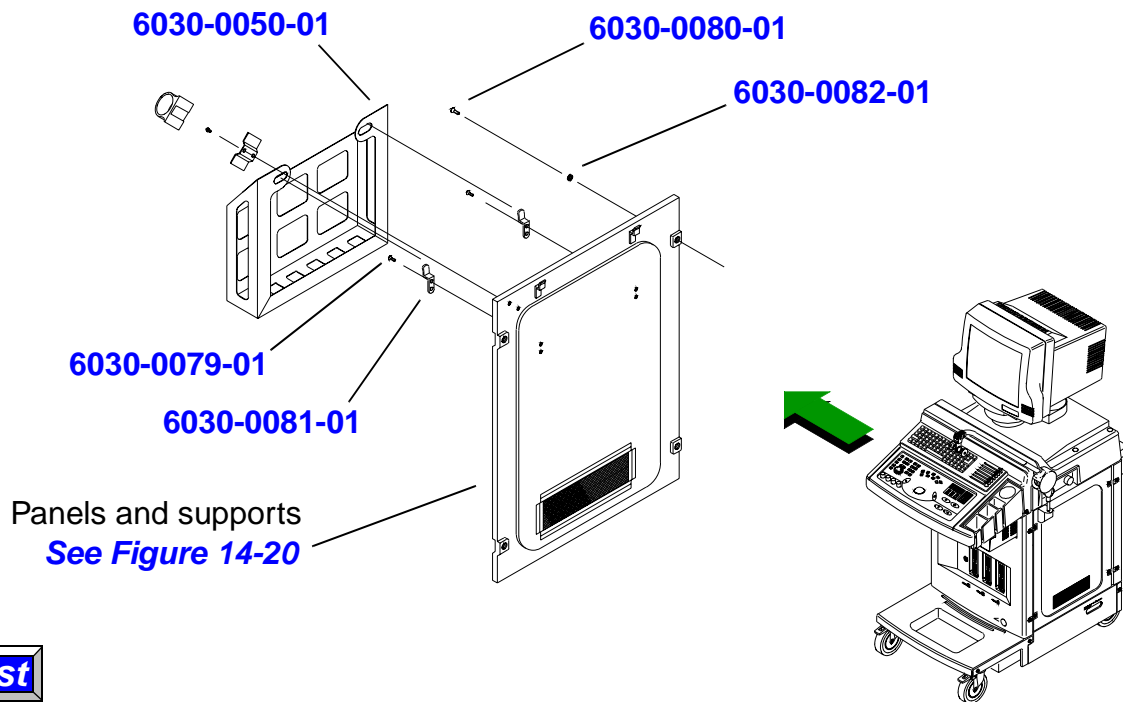


Parts List

System View

Figure 14-17

Front Cover

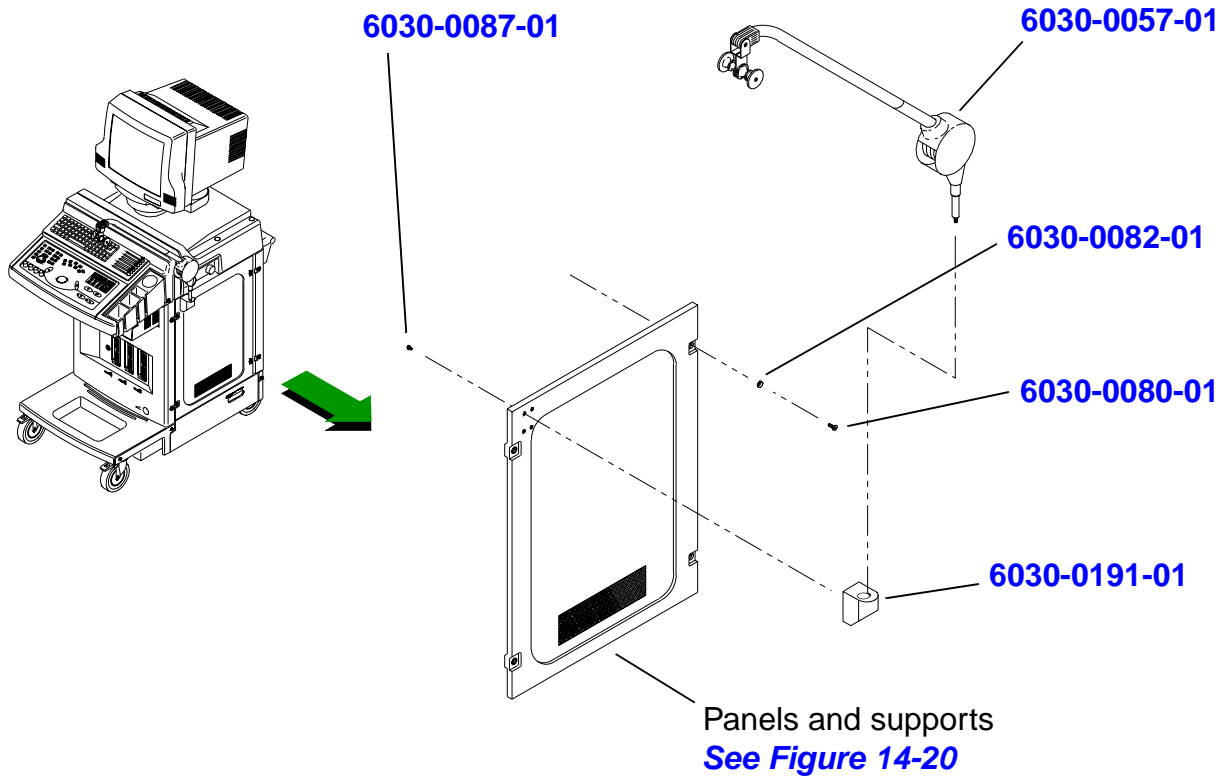


Parts List

System View

Figure 14-18

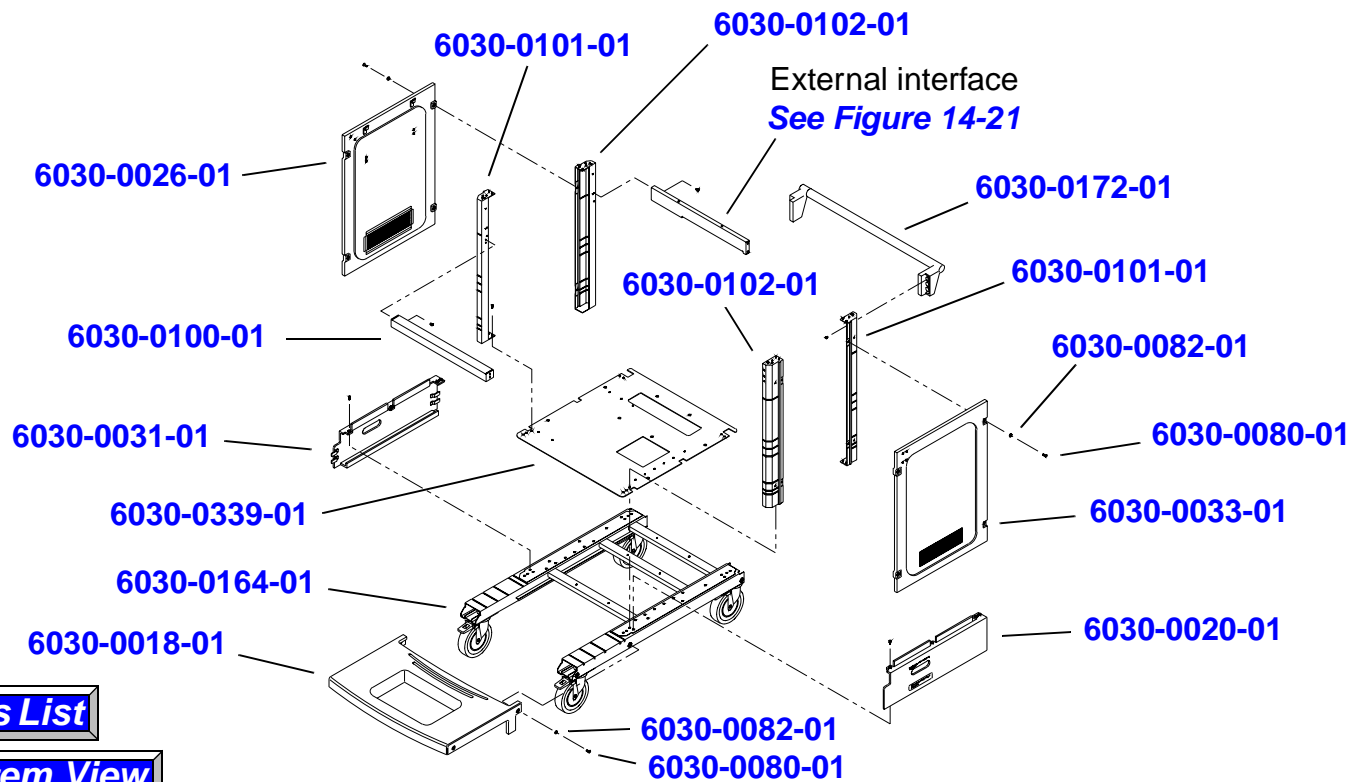
Side Panel (Left)



Parts List

System View

Figure 14-19 Side Panel (Right)

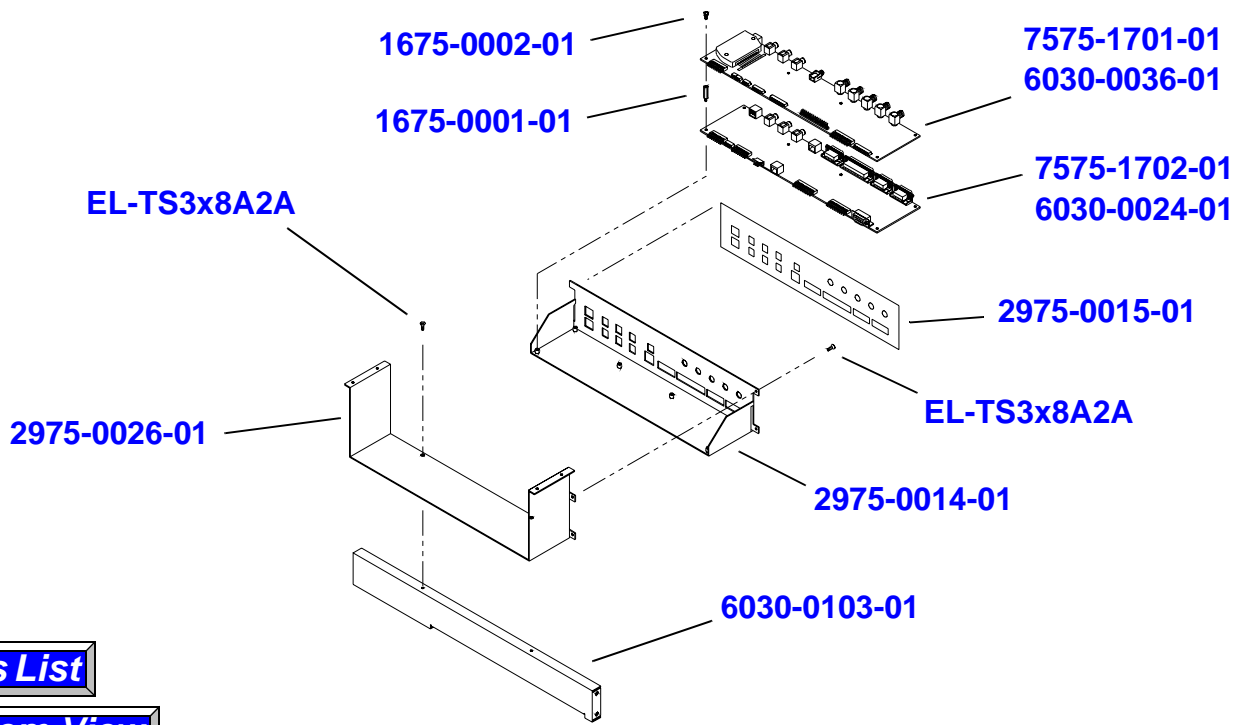


Parts List

System View

Figure 14-20

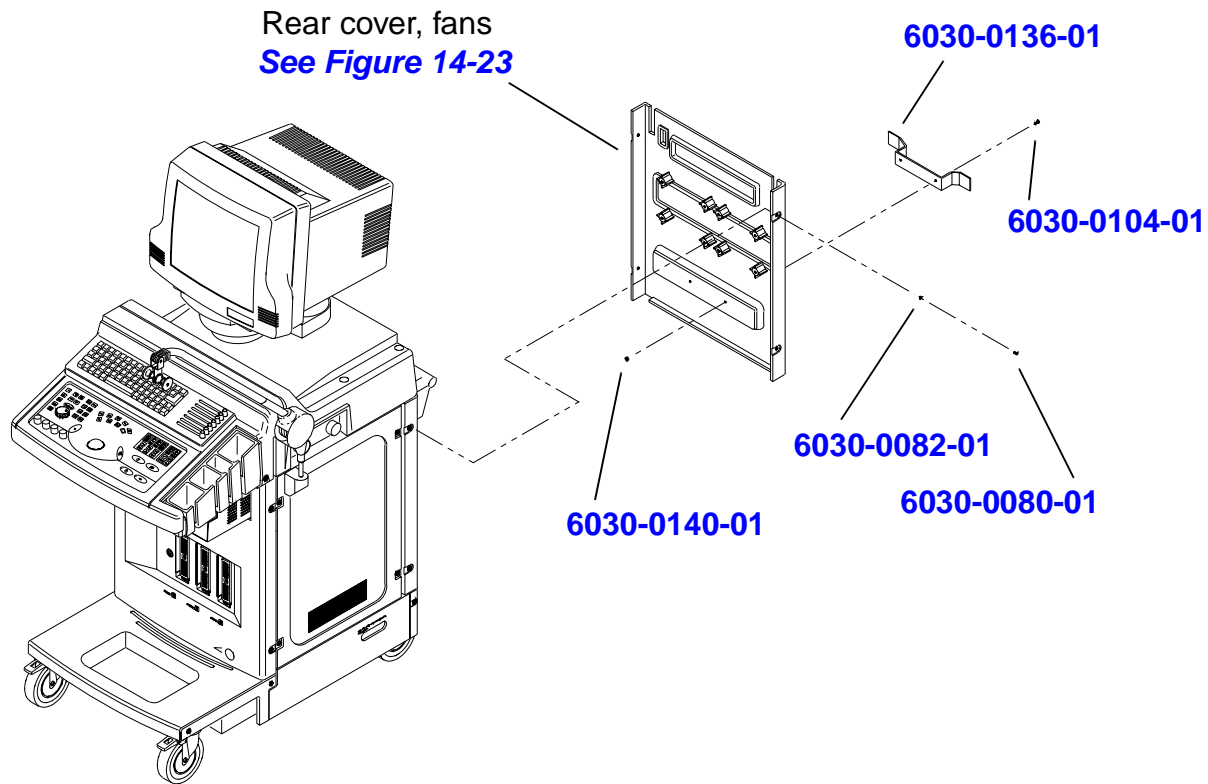
Panels and Supports



Parts List

System View

Figure 14-21 External Interface Rear Panel and Support



Parts List

System View

Figure 14-22

Rear Cover

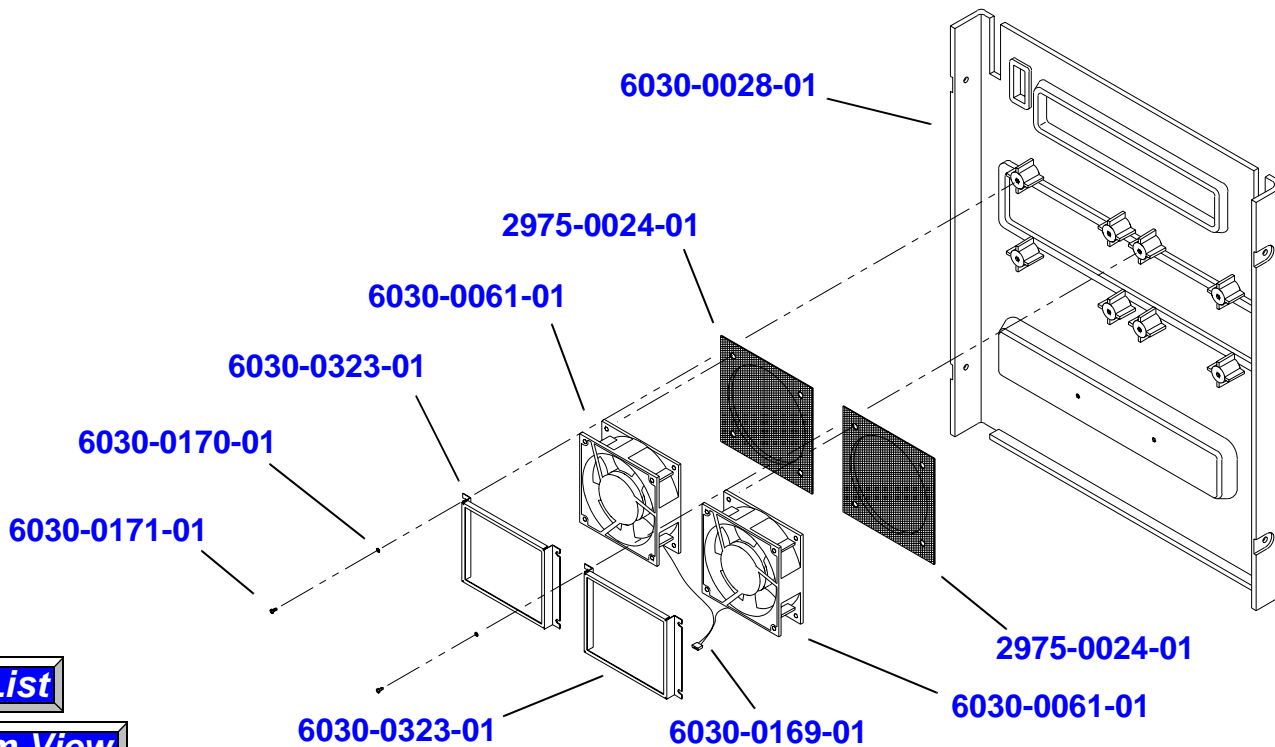
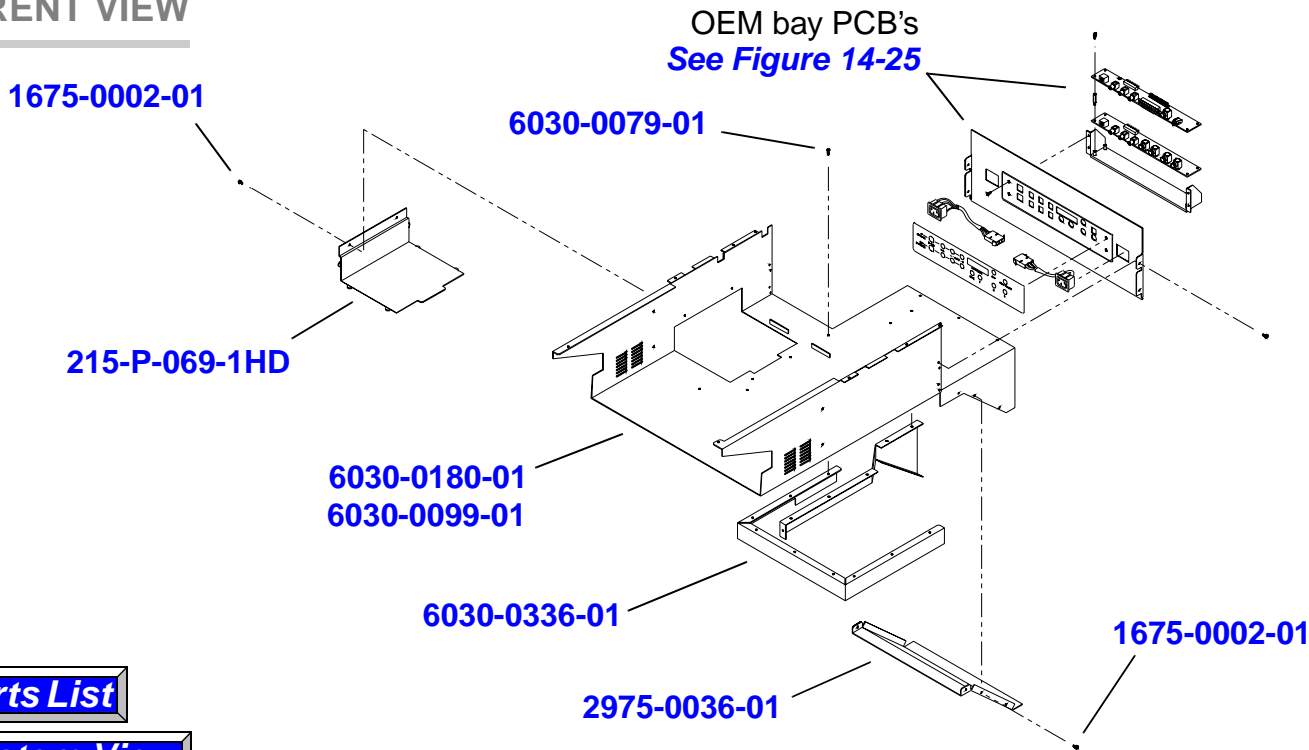


Figure 14-23

Rear Cover Fans

PARENT VIEW

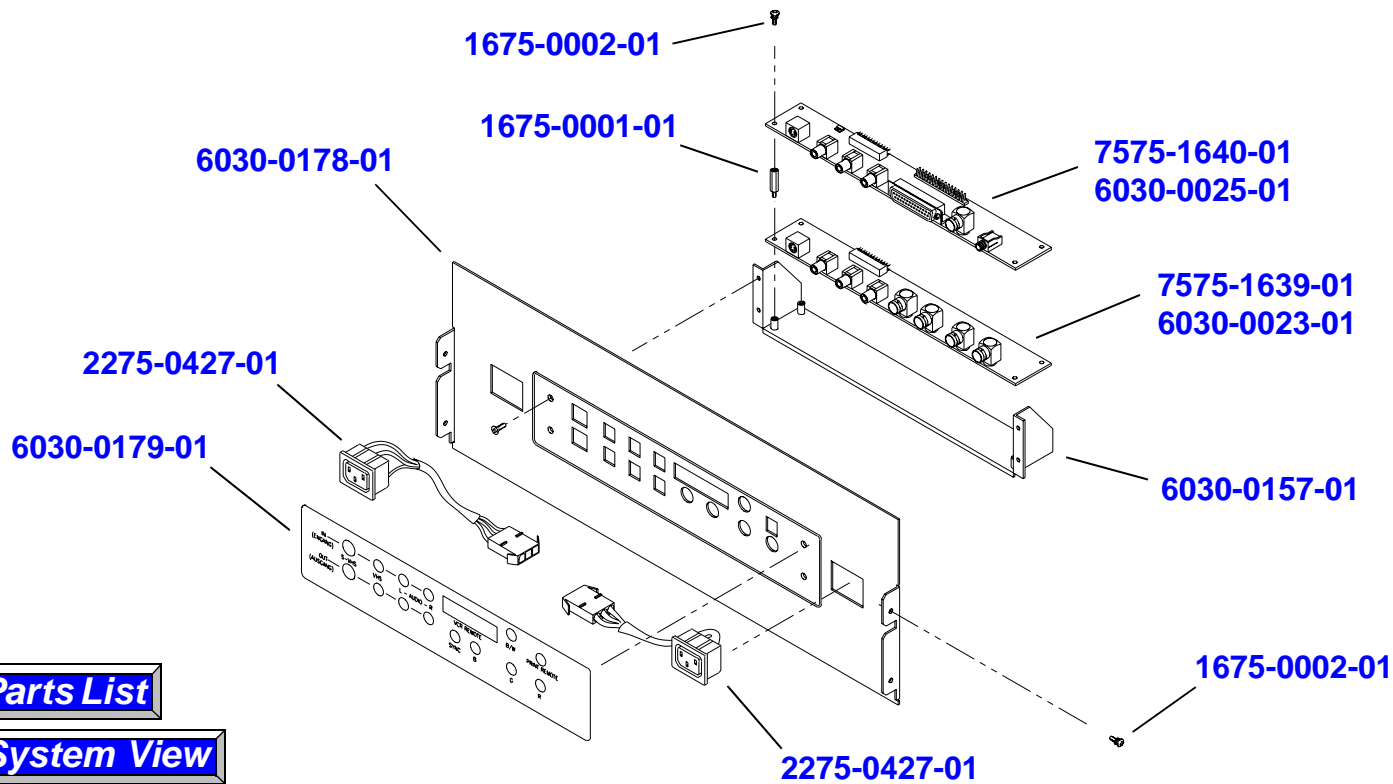


Parts List

System View

Figure 14-24

OEM Bay



Parts List

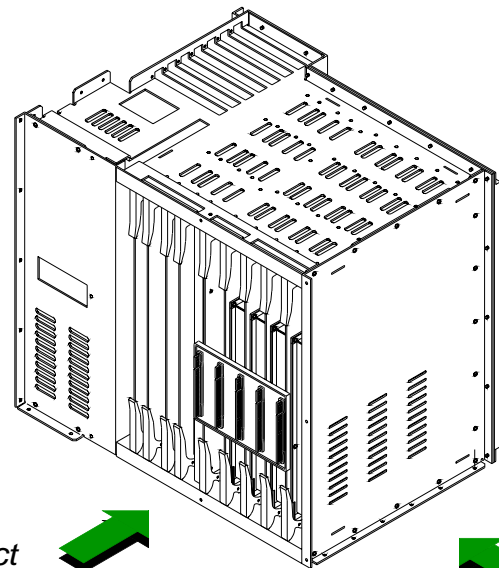
System View

Figure 14-25

OEM Bay Internal Rear Panel and Interface PCBs

PARENT VIEW

Side card cage
See Figure 14-30



Rear rack
See Figure 14-32



Scanhead select
See Figure 14-27
Front card cage
See Figure 14-29



Side rack
See Figure 14-31



Parts List

System View

See Figure 13-2

Figure 14-26

Card Cage Assembly

See Figure 14-26

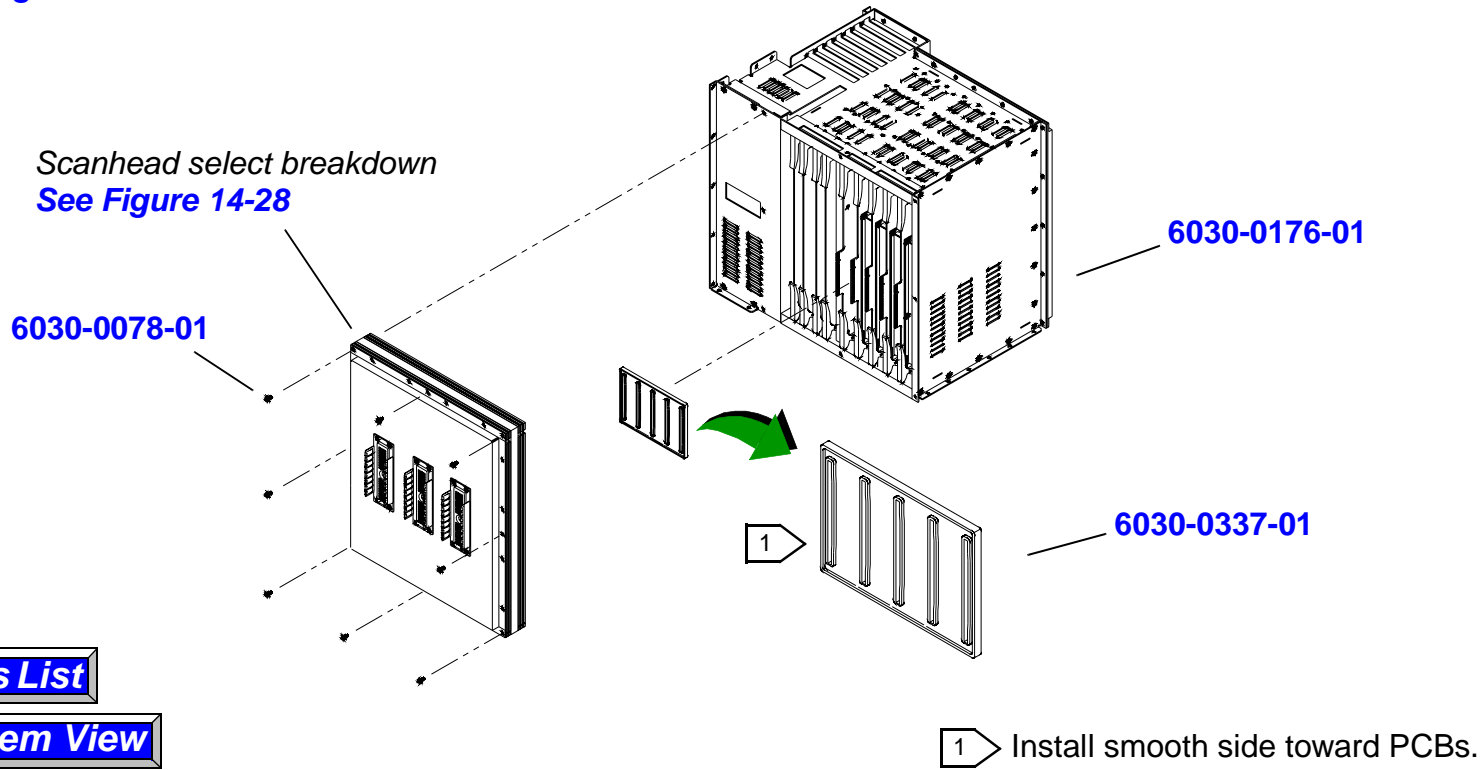


Figure 14-27

Scanhead Select Assembly (Front Card Cage Access)

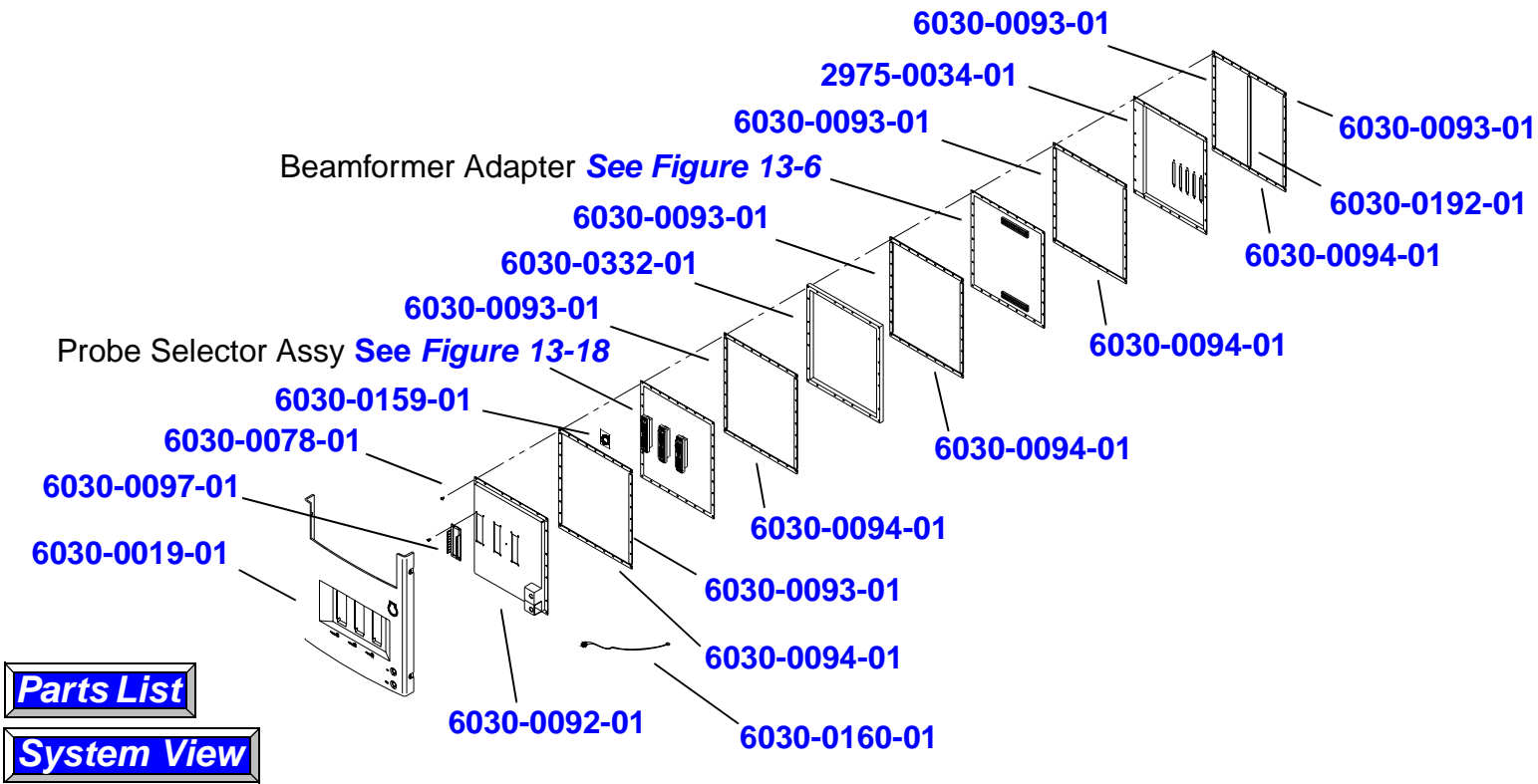


Figure 14-28 Scanhead Select Breakdown

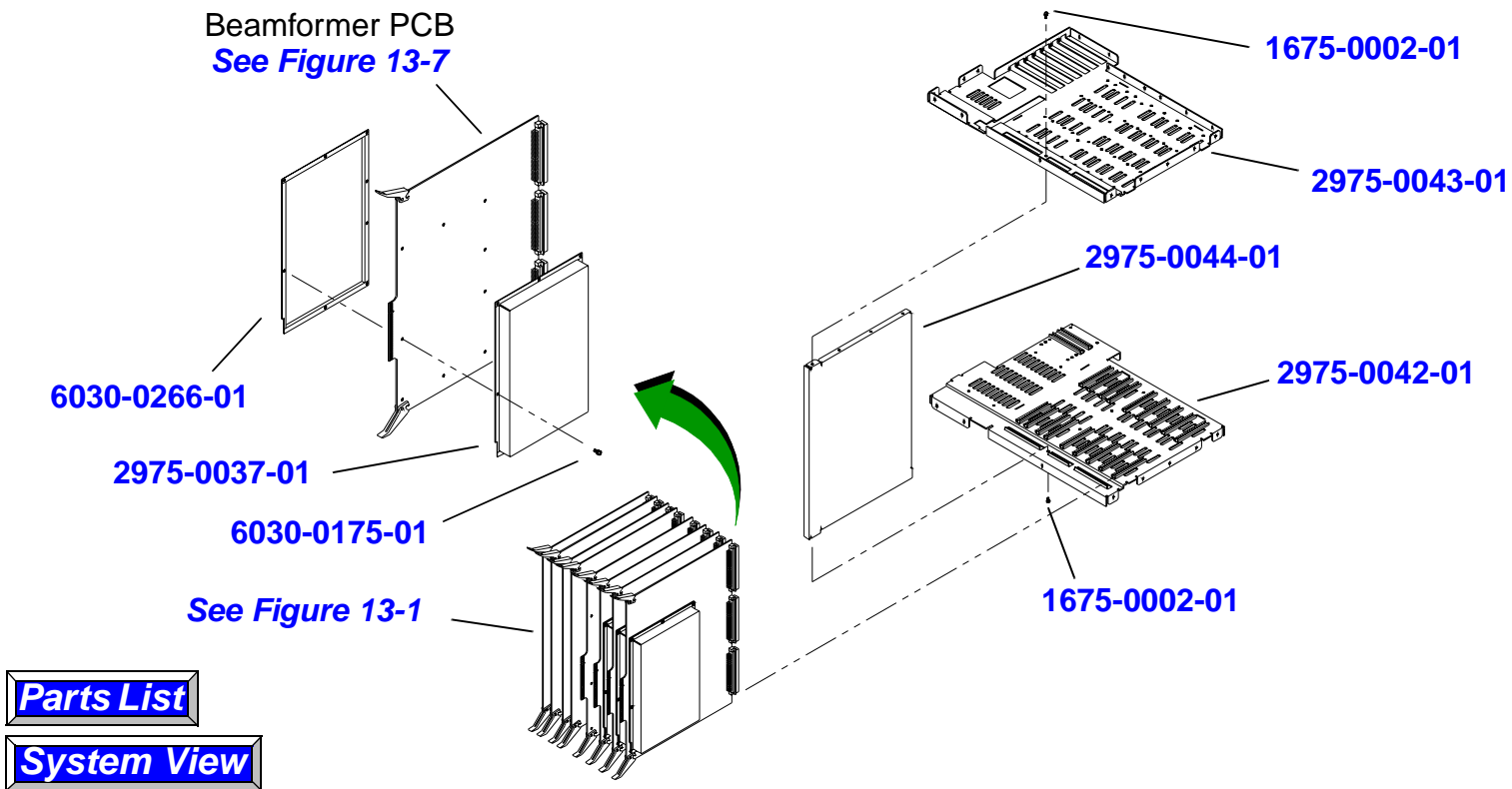


Figure 14-29

Card Cage Assembly (Front)

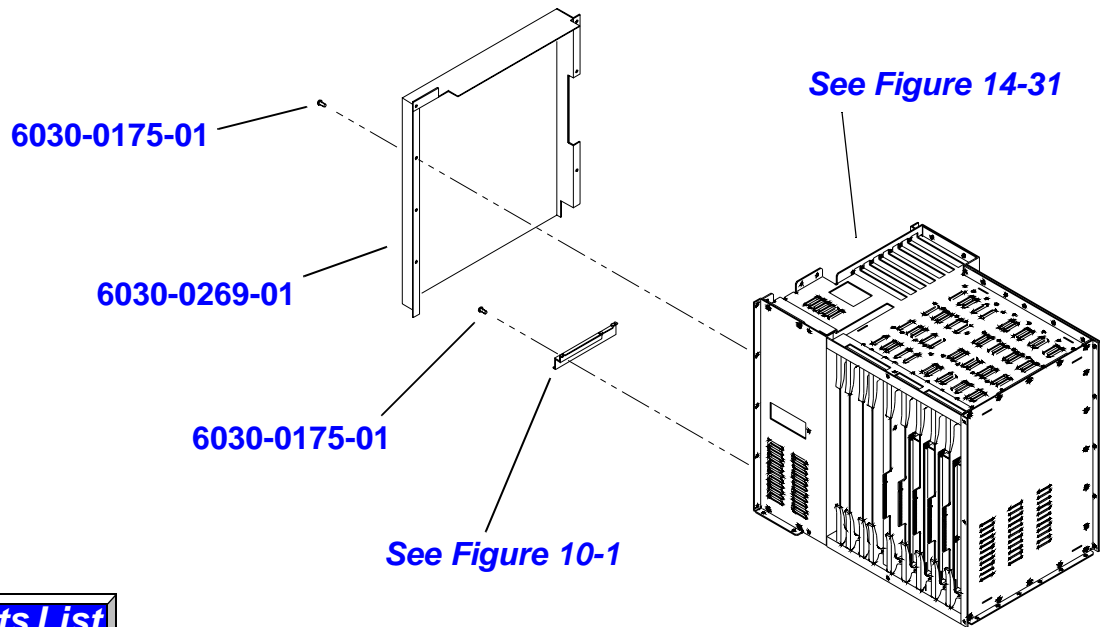


Figure 14-30

Card Cage Assembly (Side Card Cage Access)

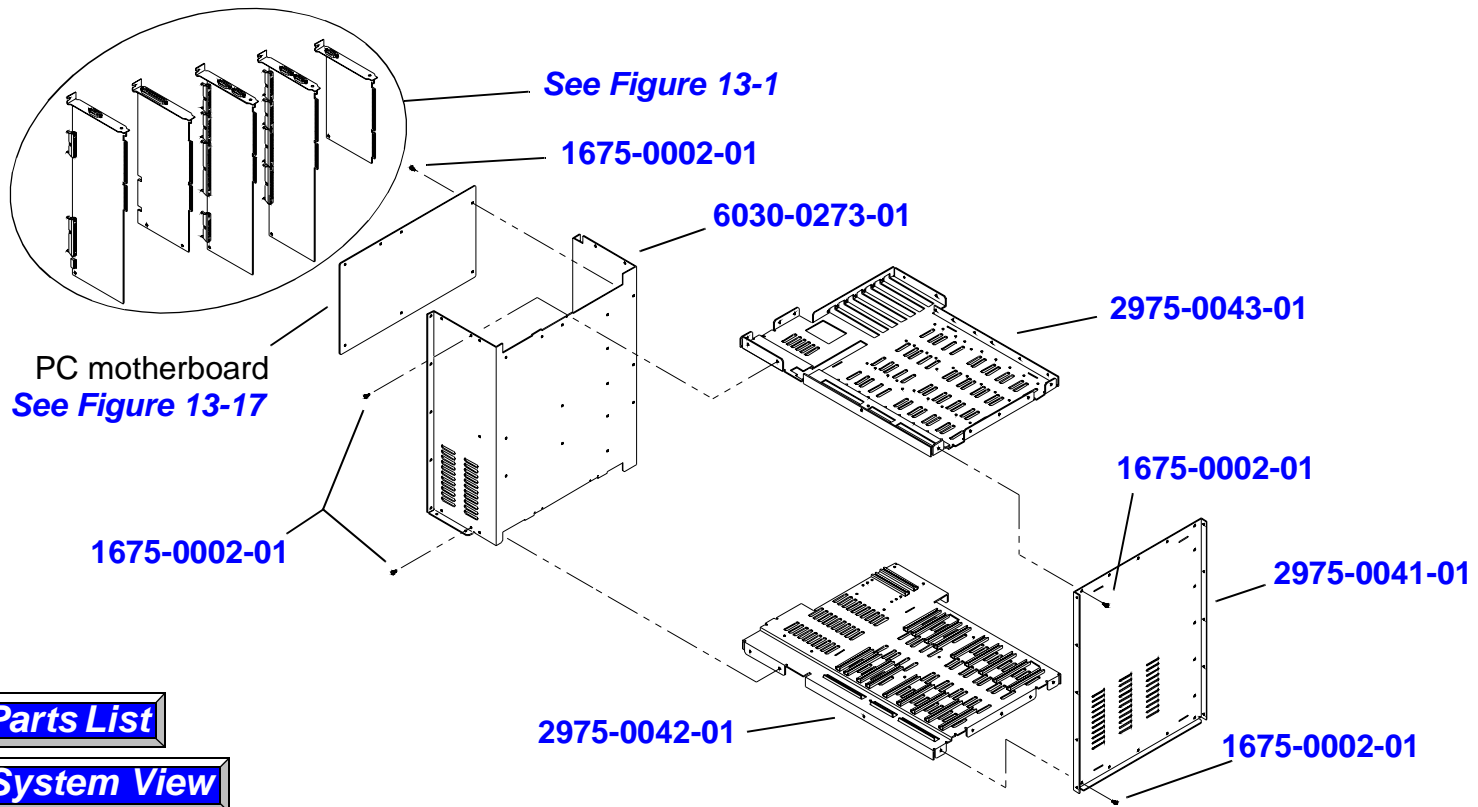


Figure 14-31 Side Card Cage and Rack

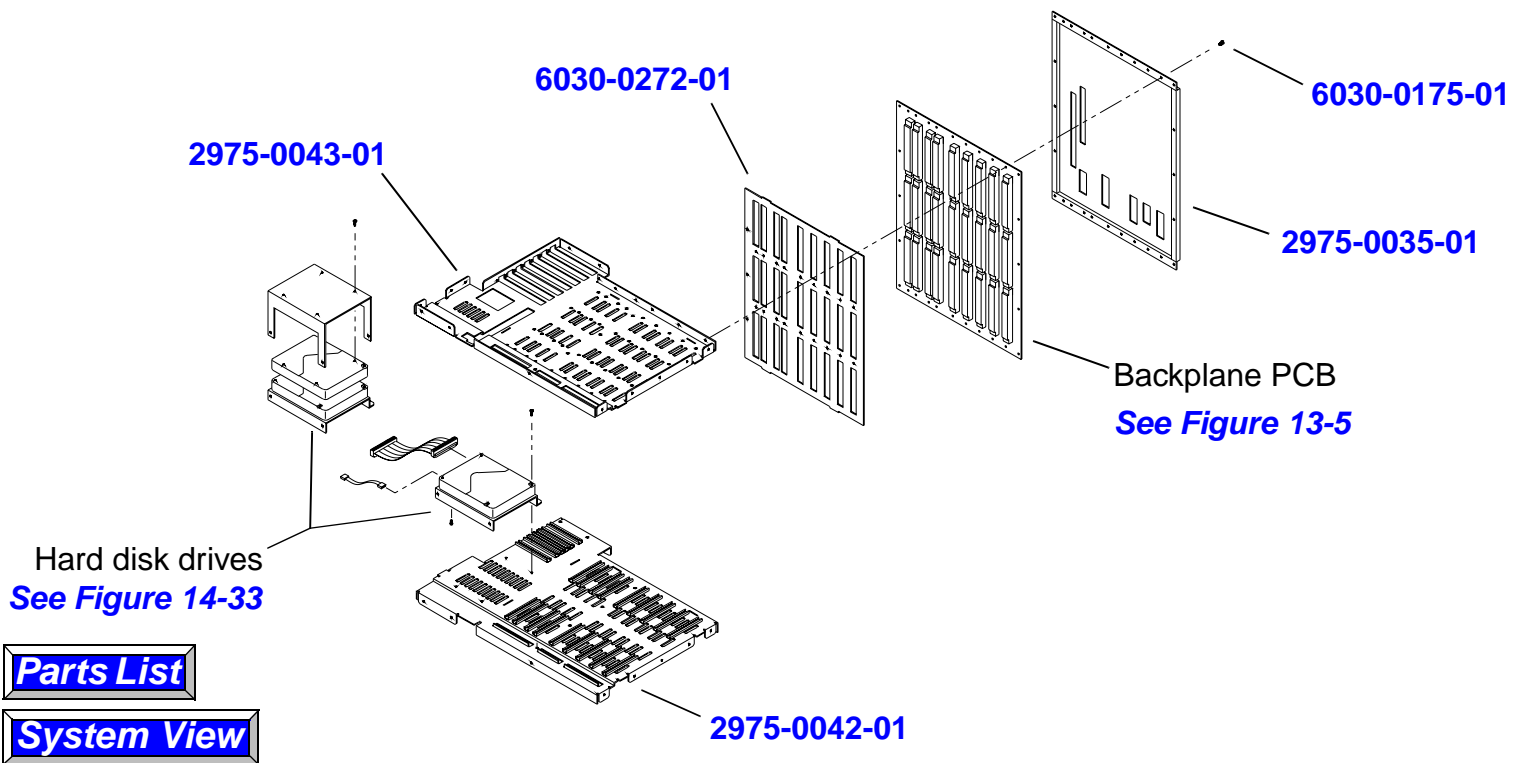


Figure 14-32 Card Cage Assembly (Bottom and Rear)

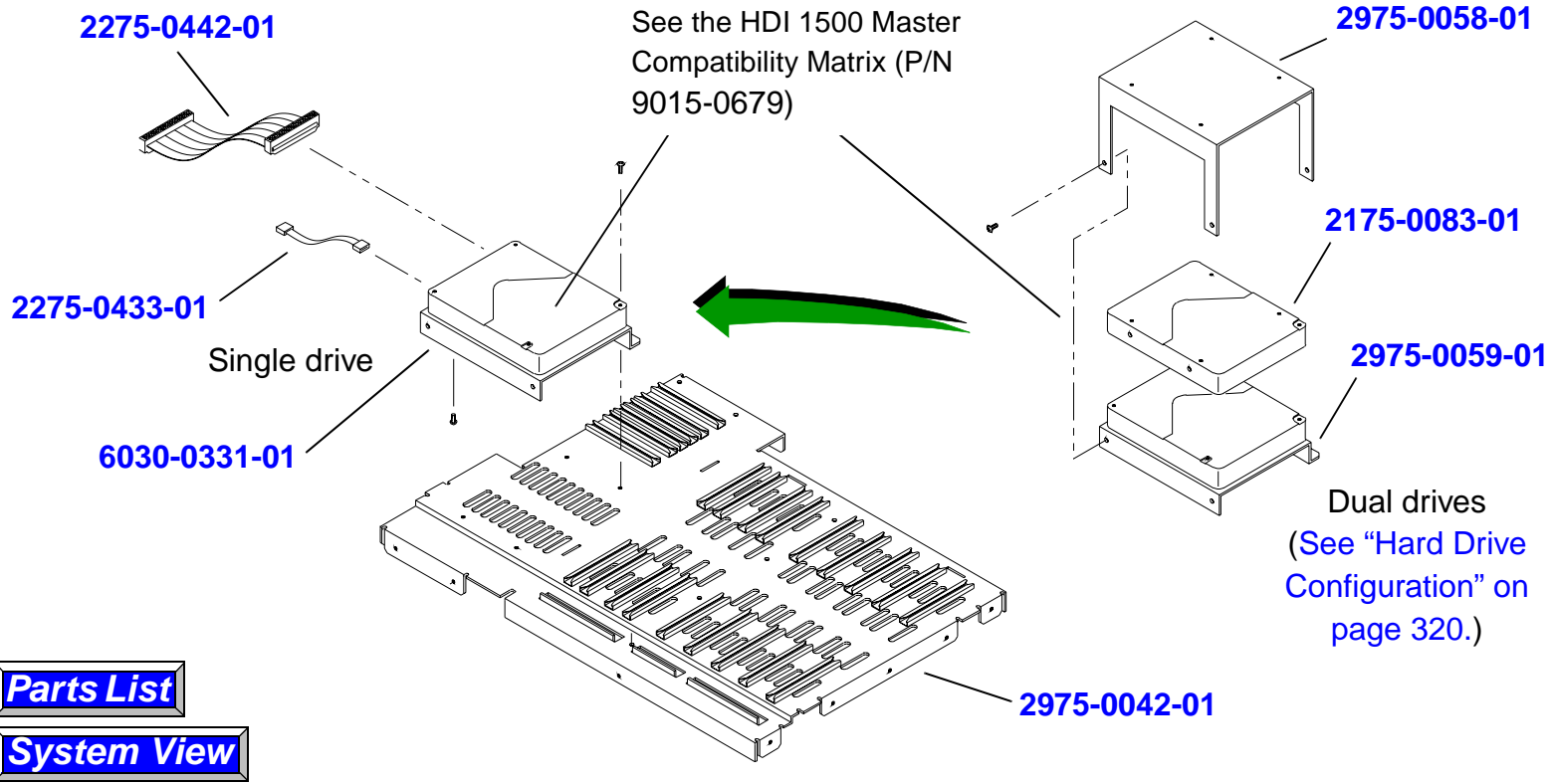
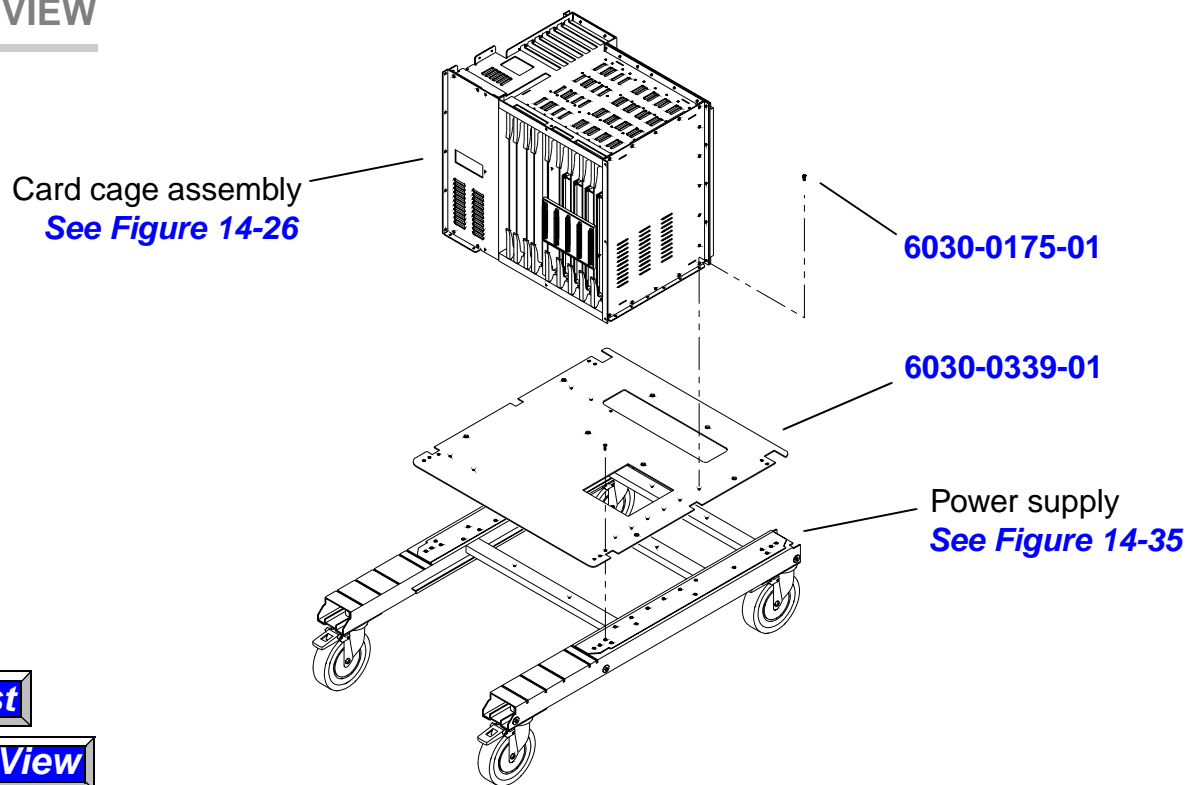
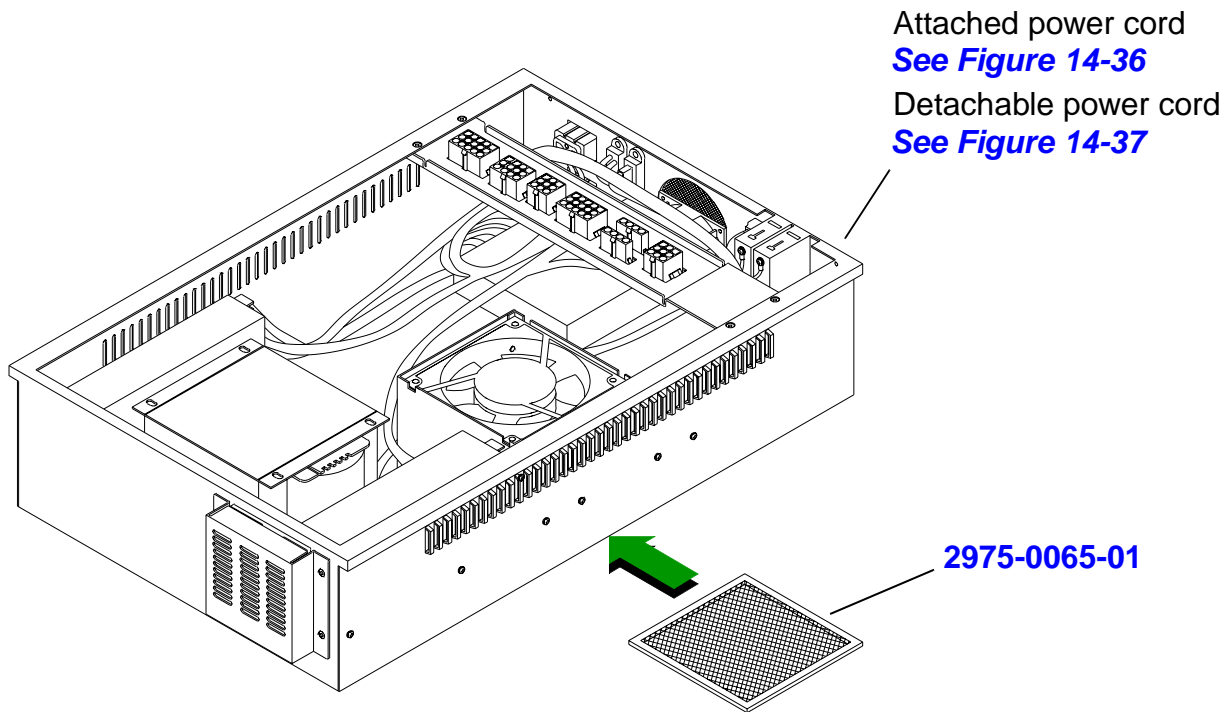
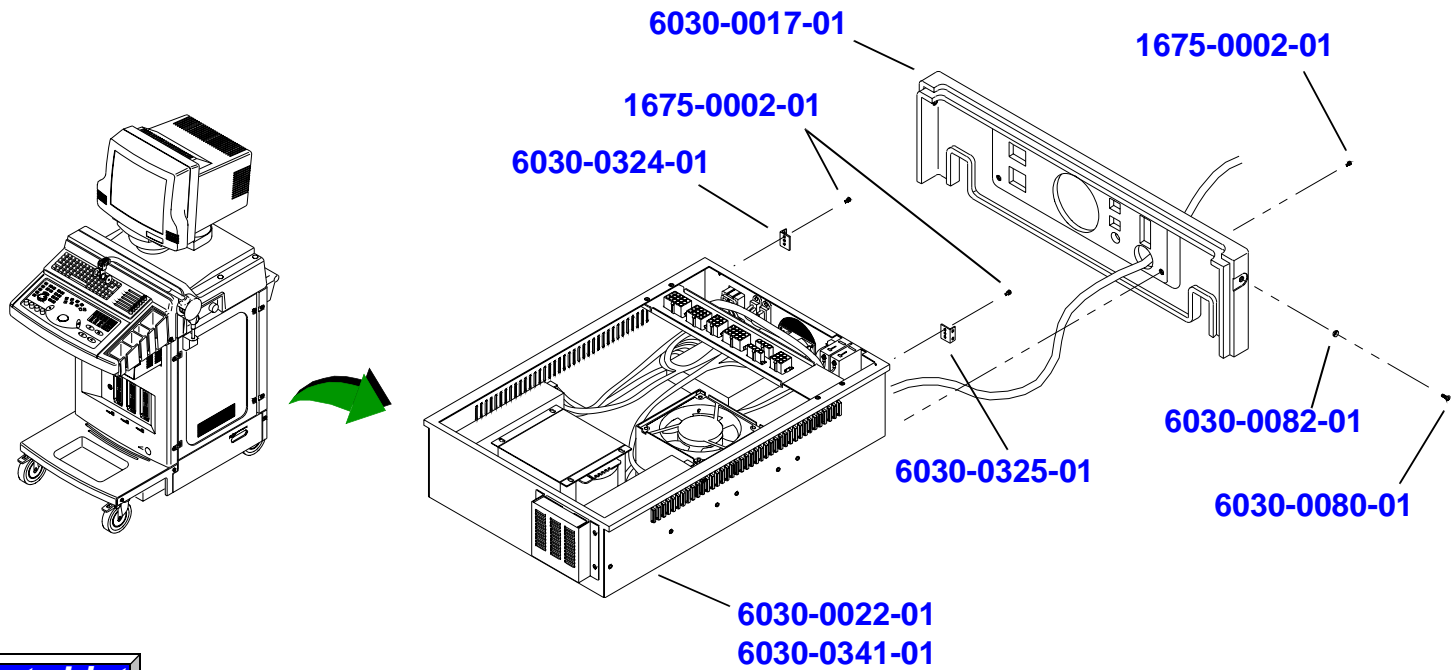


Figure 14-33 Hard Disk Drives

PARENT VIEW**Figure 14-34****Lower Cart**

[Parts List](#)[System View](#)**Figure 14-35****Power Supply**



Parts List

System View

Figure 14-36

Power Supply w/Attached Power Cord

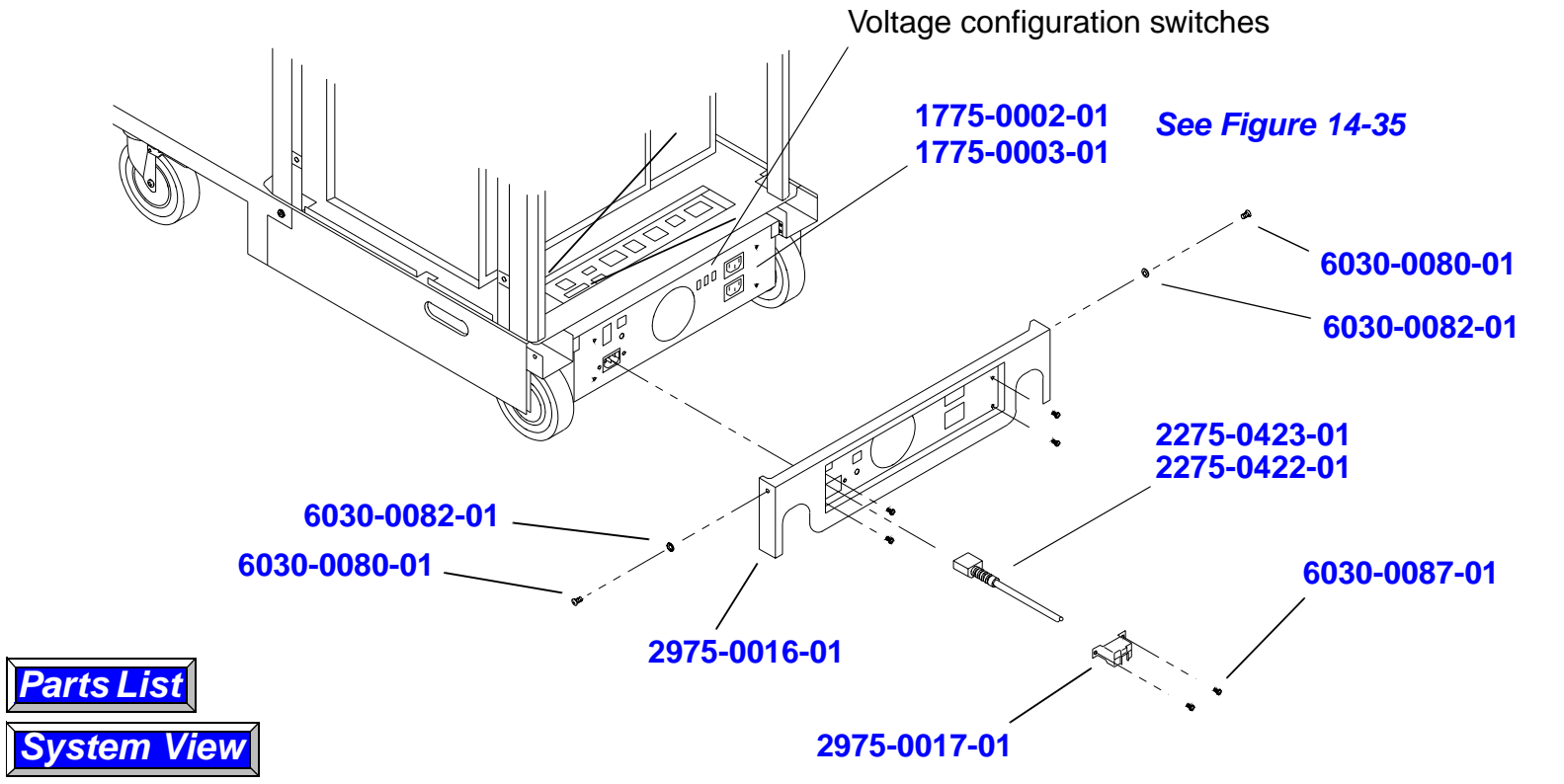


Figure 14-37 Power Supply w/Detachable Power Cord

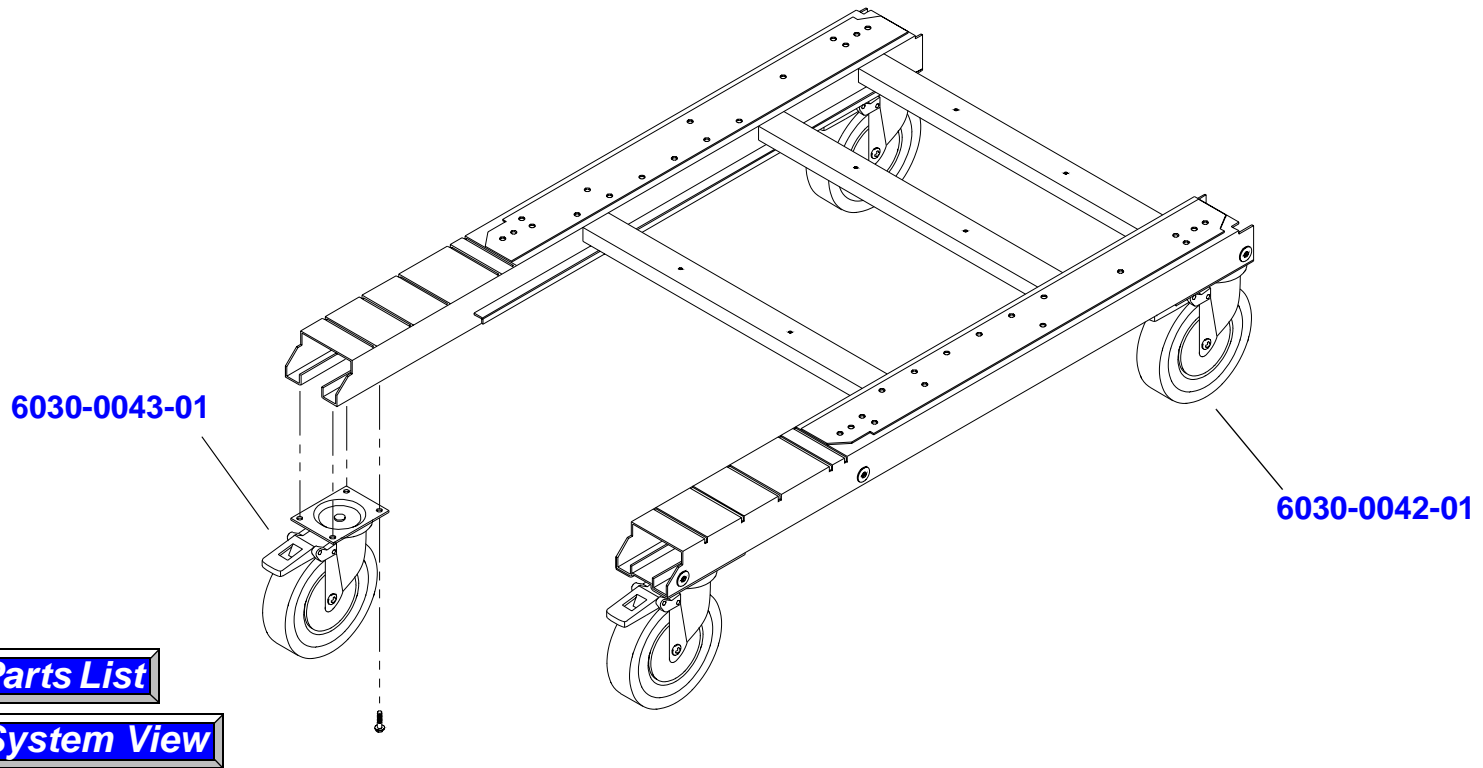
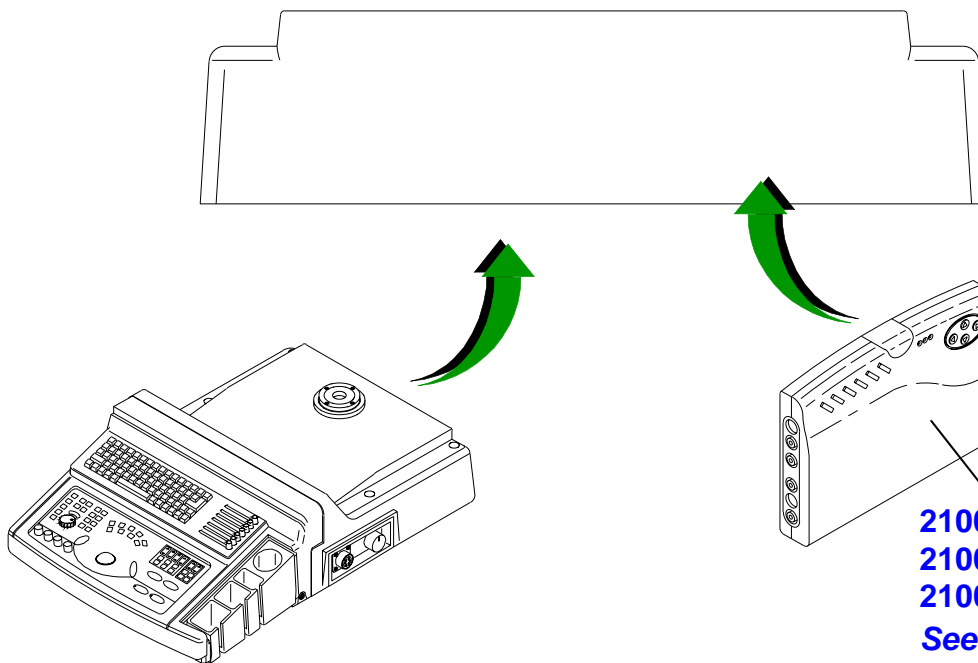


Figure 14-38

Caster Assemblies

- Rear view of cover assembly -



2100-1742-01, NTSC/PAL

2100-1888-01, NTSC

2100-1889-01, PAL

*See Figure 5-33 for
mounting*

Parts List

System View

Figure 14-39

Multiview Video Module Assy (Video Switch Box)

Parts List

Table 14-1 HDI 1500 System Parts List

Located On	Part Number	Part Description	Notes/Reference
Figure 14-32 Figure 13-1	See the HDI 1500 Master Compatibility Matrix (P/N 9015-0679)	Backplane PCB	Motherboard, HDI 1500 (Also see Figure 13-5)
Figure 14-18	6030-0050-01	Basket, Accessory	253-X-006A-UM
Figure 14-18	6030-0081-01	Basket Support, HDI 1500	233-P-024A
Figure 14-4	2975-0027-01	Base, Neck, Monitor, HDI 1500	221-D-002-3HD
Figure 13-13	2100-1849-01	Battery, Lithium, 3V, 220 Mah, Coin (CMOS)	On the Industrial PC Card
Figure 14-9 Figure 14-17 Figure 14-18 Figure 14-19 Figure 14-20 Figure 14-22 Figure 14-36 Figure 14-37	6030-0080-01	Bolt, 4800 Cover, Special, HDI 1500	EL-SB4x9
	2975-0295-01	Bolt, Special Thumb, HDI 4000	366-L-002-1A
Figure 14-33	2975-0059-01	Bracket, 2HDD, Lower, HDI 1500	235-P-118A
Figure 14-33	2975-0058-01	Bracket, 2HDD, Upper, HDI 1500	235-P-119A

Table 14-1 HDI 1500 System Parts List (Continued)

Located On	Part Number	Part Description	Notes/Reference
Figure 14-14 Figure 14-15	6030-0156-01	Bracket, CD, FDD, 7700M, HDI 1500	235-P-053A
Figure 14-28	6030-0159-01	Bracket, CW Conn, HDI 1500	235-P-100
Figure 14-33	6030-0331-01	Bracket, HDD, 2G/4G, SA8800	235-P-088A
Figure 14-11	6030-0330-01	Bracket, Kbd, Ack-500 8800	235-P-083-1
Figure 14-36	6030-0325-01	Bracket, Power, Back, Right	235-P-063-1
Figure 14-36	6030-0324-01	Bracket, Power Back, Left	235-P-062-1
Figure 14-11	6030-0098-01	Bracket, Slide Switch, SA7700, HDI 1500	235-P-015A
Figure 14-10	6030-0123-01	Bracket, Trackball, 4800	P-48-TB Bracket
Figure 14-8	2975-0105-01	Bracket, VCR Mnt, Flat Screen Monitor	228-P-706A (Mounts to monitor)
Figure 14-8	2975-0104-01	Bracket, VCR Mnt, On Flat Screen Mon	228-P-705A (Mounts to VCR)
Figure 14-10	6030-0319-01	Bushing, K-R, S/W, Alps, SKHJ, HDI 1500	246-M-004A
Figure 11-13 Figure 11-14	Table 11-2	Cables, Power Distribution	Version 1.08.10 Version 2.00.02
Figure 11-12 Figure 11-14	Table 11-1	Cables, Signal Interconnect	Version 1.08.10 Version 2.00.02
Not shown	6030-0313-01	Cap, 120PF, 50V, 5%, NPO, SMD	CS-C-121J-NP-F2
Figure 14-11	6030-0282-01	Cap, Gel Bottle, HDI 1500	

Table 14-1 HDI 1500 System Parts List (Continued)

Located On	Part Number	Part Description	Notes/Reference
Figure 14-4	6030-0318-01	Cap, Neck, Deco, HDI 1500	259-M-004A-HD
Figure 14-29	6030-0266-01	Case, B/F, Lower, SA8800	213-P-099A
Figure 14-29	2975-0037-01	Case, B/F, Upper, SA8800	213-P-098A
Figure 14-24	2975-0036-01	Case, Duct, Lower, SA8800	213-P-081-1
Figure 14-21	2975-0014-01	Case Interface, HDI 1500	213-P-065-2
Figure 14-32	2975-0035-01	Case, Mother, HDI 1500	213-P-079-2
Figure 14-30	6030-0269-01	Case, PC, SA8800, HDI 1500	215-P-105A
Figure 14-24	6030-0180-01	Case, Printer, HDI 1500	213-P-084-2HD
Figure 14-24	6030-0099-01	Case, Printer, SA8800, HDI 1500	213-P-084-2
Figure 14-28	2975-0034-01	Case PSA Rear SA8800	213-P-078-2
Figure 14-28	6030-0092-01	Case, PSA, Front, HDI 1500	213-P-100A
Figure 14-38	6030-0043-01	Caster, Front, 5-inch, with Swivel Lock	
Figure 14-38	6030-0042-01	Caster, Rear, 5-inch, with Swivel Lock and Brake	

Table 14-1 HDI 1500 System Parts List (Continued)

Located On	Part Number	Part Description	Notes/Reference
Figure 14-9 Figure 14-10	See the HDI 1500 Master Compatibility Matrix (P/N 9015-0679)	Control Panel, English, HDI 1500	
		Control Panel, French, HDI 1500	
		Control Panel, German, HDI 1500	
		Control Panel, Spanish, HDI 1500	
		Control Panel, Italian, HDI 1500	
Figure 14-11	6030-0029-01	Cover, Assy, Head, Front, HDI 1500	215-M-021E
Figure 14-9	6030-0312-01	Cover, Assy, Head, Rear, HDI 1500	215-M-020A-HD
	6030-0034-01 6030-0168-01	Cover, Assy, Head, Rear, HDI 1500	A215-016A-HD
Figure 14-23	6030-0028-01	Cover Body Back	215-M-011-3HD
Figure 14-20	6030-0031-01	Cover Body F/Wing-L	215-P-005B-HD
Figure 14-20	6030-0020-01	Cover Body F/Wing-R	215-P-052B-HD
Figure 14-17 Figure 14-28	6030-0019-01	Cover Body Front	215-M-091A
Figure 14-36	6030-0017-01	Cover, Body, Frame, Back	215-M-004C-HD
Figure 14-20	6030-0018-01	Cover, Body, Frame, Front	215-M-003B-HD
Figure 14-20	6030-0026-01	Cover, L Side, HDI 1500	215-P-015-9HD
Figure 14-37	2975-0016-01	Cover, Lower, Rear, HDI 1500	215-M-004-F-5

Table 14-1 HDI 1500 System Parts List (Continued)

Located On	Part Number	Part Description	Notes/Reference
Figure 14-25	6030-0178-01	Cover, Print, Back, HDI 1500	215-P-055-3HD
Figure 14-24	TBD	Cover, Printer Box, Side	215-P-069-1HD
Figure 14-20	6030-0033-01	Cover, R Side, HDI 1500	215-P-014A-HD
Not shown	2175-0036-01	Disk, MO, Blank	
Figure 14-14 Figure 14-15	2100-1601-01	Drive, Disk (Floppy), 3.5-inch, Samsung	FDD-3.5-SS
Figure 14-33	See the HDI 1500 Master Compatibility Matrix (P/N 9015-0679)	Drive, Disk (Hard), 2.5 GB, Quantum	HDD-SE2.5A-Q
		Drive, Disk (Hard), 3.5 GB, Quantum	HDD-EX3.2A-Q
		Drive, Disk (Hard), 4.3 GB, Quantum	HDD-EX4.3A-Q
		Drive, Disk (Hard), 6.4 GB, Quantum	HDD-EX6.4A-Q
		Drive, Disk (Hard), 8.4 GB, Quantum	HDD-LCT8.4A-Q (See "Hard Drive Configuration" on page 320.)
	2175-0083-01	Drive, Disk (Hard), 20 GB, Maxtor	HDD-20G-MAXTOR
Figure 14-15	2175-0035-01	Drive, Disk (MO), w/PC Rack	PC-MO-MCE3130SS (Fujitsu Magneto optical drive)
Figure 14-14	2100-1607-01	Drive, Disk, (Phased), PD/CD-ROM	PC-PD/CD-24X

Table 14-1 HDI 1500 System Parts List (Continued)

Located On	Part Number	Part Description	Notes/Reference
Figure 14-9	2175-0018-01	ECG Module, PAL	AY-422-ECG/P (Uses ECG cable 2275-0447-01)
Figure 14-9	2175-0040-01	ECG Module, NTSC	AY-422-ECG/N (Uses ECG cable 2275-0447-01)
Figure 14-23	6030-0061-01	Fan	FAN-F1225L12B
Figure 13-13	2175-0011-01	Fan, 12V (CPU PCB)	FAN-12V-586CPU
Figure 14-23	6030-0323-01	Fan Bracket, Body	235-P-010A
Figure 14-1	6030-0032-01	Footswitch (2 Pedal)	
Figure 14-20	6030-0164-01	Frame, AY, Bottom, HDI 1500	A225-017A-HD
Figure 14-9	6030-0182-01	Frame, Neck Mount, HDI 1500	225-D-011A-HD
Figure 14-7	2975-0013-01	Frame, VCR, HDI 1500	225-D-024A
Figure 14-28	6030-0192-01	Gasket, Middle, SA7700, HDI 1500	312-R-007-1
Figure 14-28	6030-0097-01	Gasket, Shielding, HDI 1500	324-Z-006A
Figure 14-28	6030-0094-01	Gasket, PSA, Horizontal, HDI 1500	312-R-005-1
Figure 14-28	6030-0093-01	Gasket, PSA, Vertical, 8800, HDI 1500	312-R-006-1
Figure 14-11	3675-0001-01	Gasket, TGC, HDI 1500	312-R-003A
Figure 14-27	6030-0337-01	Guide, B/F Board, SA8800	227-M-050A
Figure 14-13	6030-0153-01	Guide Lock Stopper, HDI 1500	227-M-015A
Figure 14-13	6030-0154-01	Guide Rail, Sub Probe, HDI 1500	227-P-014A
Figure 14-4	2975-0075-01	Guide, Slide, Swivel	227-M-066A

Table 14-1 HDI 1500 System Parts List (Continued)

Located On	Part Number	Part Description	Notes/Reference
Figure 14-20	6030-0172-01	Handle, Assy, HDI 1500	A252-011A-HD
Figure 14-22	6030-0136-01	Handle, Roll	252-P-010A-UM
Figure 14-19	6030-0191-01	Hanger, HDI 1500	255-L-002A
Figure 14-19	6030-0057-01	Hanger, Cable Manager, HDI 1500	A255-001A-HD
Figure 14-13	6030-0155-01	Holder, Sub Probe, HDI 1500	231-M-014A-HD
Figure 14-11	6030-0039-01	Keybd Alpha-Numeric English	260-Z-003B
	6030-0065-01	Keybd Alpha-Numeric French	260-Z-005A
	6030-0066-01	Keybd Alpha-Numeric German	260-Z-004A
	6030-0064-01	Keybd Alpha-Numeric Spanish	260-Z-006A
Figure 14-10	6030-0038-01	Knob, Rotary Encoder, HDI 1500	267-M-011A
Figure 14-10	4475-0005-01	Knob, Rotary Encoder, HDI 1500	267-M-002A-HD
Figure 14-11	6030-0316-01	Knob, TGC, HDI 1500	267-M-017A
Figure 14-11	2975-0409-01	Knob, TGC, HDI 1500, ABS Slidepot	267-M-703A
Not shown	4175-0001-01	Label, THI, HDI 1500	275-K-752A
Figure 14-31 Figure 13-1	See the HDI 1500 Master Compatibility Matrix (P/N 9015-0679)	Motherboard, PC	(Also see Figure 13-17)
Figure 14-8	2175-0047-01	Monitor, 15-inch, Flat CRT, Multi-scan, KDS	MNT-15-ATL-03 (KDS Flat-screen)

Table 14-1 HDI 1500 System Parts List (Continued)

Located On	Part Number	Part Description	Notes/Reference
Figure 14-4 Figure 14-5	2100-1519-01	Monitor, 15-inch, MicroVitec	MNT-15-ATL (MicroVitec)
Figure 14-4 Figure 14-6 Figure 14-7	2100-1599-01	Monitor, 15-inch, Multi-scan, Color, KDS	MNT-15-ATL-02 (KDS Curved-screen)
Figure 14-5	6030-0083-01	Monitor Base, HDI 1500	221-M-006-2 (MicroVitec monitor only)
Figure 14-6	2975-0011-01	Monitor Bowl, HDI 1500	227-M-065A (KDS monitor only)
Figure 14-39	2100-1742-01	Multiview Video Module Assy (Video Switch Box)	(NTSC/PAL)
Figure 14-39	2100-1889-01	Multiview Video Module Assy, NTSC (Video Switch Box)	
	2100-1888-01	Multiview Video Module Assy, PAL (Video Switch Box)	
Figure 14-13	6030-0096-01	Nut, 3 Pie, HDI 1500	EL-HEXN3x2
Figure 14-22	6030-0140-01	Nut, 4 Pie	EL-HEXN4x2.3
Figure 14-4	1675-0017-01	Nut, Special, Stem	317-L-003A
Figure 14-5	1065-2550-03	Nut, Thumb	
Figure 14-10	6030-0037-01	Overlay, Keyboard, English	315-K-045A
	6030-0047-01	Overlay, Keyboard, French	314-K-052B

Table 14-1 HDI 1500 System Parts List (Continued)

Located On	Part Number	Part Description	Notes/Reference
	6030-0046-01	Overlay, Keyboard, German	315-K-051A
	4175-0005-01	Overlay, Keyboard, Italian	314-K-054B
	6030-0048-01	Overlay, Keyboard, Spanish	314-K-058B
Figure 14-20 Figure 14-34	6030-0339-01	Panel, Body, Bottom, GAEA	226-P-051-1
Figure 14-12	6030-0181-01	Panel, Body, Top, SA8800, HDI 1500	226-P-053-7
Figure 14-6	2975-0060-01	Panel, Monitor, KDS, HDI 1500/ UM400C	226-P-082A
Figure 14-23	2975-0024-01	Panel, Net, Fan, Back, HDI 1500	225-P-052A-HD
Figure 14-29 Figure 14-31 Figure 14-32 Figure 14-33	2975-0042-01	Panel, Rack, Bottom, SA8800	211-P-028-2
Figure 14-29	2975-0044-01	Panel, Rack, Middle, SA8800	211-P-031A
Figure 14-31	6030-0273-01	Panel, Rack, PC, HDI 1500	211-P-032-4
Figure 14-32	6030-0272-01	Panel, Rack, Rear, SA8800	211-P-030A
Figure 14-31	2975-0041-01	Panel, Rack, Right, SA8800	211-P-026-1
Figure 14-29 Figure 14-31 Figure 14-32	2975-0043-01	Panel, Rack, Top, SA8800	211-P-029-3
Figure 14-7	2975-0012-01	Panel, VCR, HDI 1500	226-P-081

Table 14-1 HDI 1500 System Parts List (Continued)

Located On	Part Number	Part Description	Notes/Reference
Figure 14-28 Figure 13-1	See the HDI 1500 Master Compatibility Matrix (P/N 9015-0679)	PCB, ADAP, HDI 1500	Beamformer Adapter (Also see Figure 13-6)
Figure 14-29 Figure 13-1		PCB, Beamformer HDI 1500	Beamformer (1,2,3,4) (Also see Figure 13-7)
		PCB, Color Doppler HDI 1500	Color Doppler Processor (Also see Figure 13-8)
		PCB, CW HDI 1500	CW Doppler Processor (Also see Figure 13-9)
		PCB, DSC HDI 1500	Digital Scan Converter (Also see Figure 13-10 and Figure 13-11)
Figure 14-29 Figure 13-1		PCB, Echo/P, HDI 1500	Echo Processor (Also see Figure 13-12)
Figure 14-31 Figure 13-1		PCB, Industrial PC Card, HDI 1500	Pentium PC/CPU (Also see Figure 13-13)

Table 14-1 HDI 1500 System Parts List (Continued)

Located On	Part Number	Part Description	Notes/Reference
Figure 14-10	7575-1592-01	PCB, KEY I/F, HDI 1500	Key Interface 322-02-020-0A 422-02-020-0C
Figure 14-10	7575-1592-02	PCB, KEY I/F, HDI 1500	BD-422-KEY/I-OD
Figure 14-31 Figure 13-1	7575-1751-01	PCB, Matrox, Meteor2, HDI 1500	BD-METEOR2-M Multiview BD (Frame Grabber - v2.01.02 and higher with Stress Echo) (Also see Figure 13-14)
	See the HDI 1500 Master Compatibility Matrix (P/N 9015-0679)	PCB, 56K Modem card	Modem PCB (Also see Figure 13-15)
Figure 14-32 Figure 13-1	See the HDI 1500 Master Compatibility Matrix (P/N 9015-0679)	PCB, Mother HDI 1500	Backplane (Also see Figure 13-5)
Figure 14-9	7575-1875-01	PCB, OEM, ECG Board, HDI 4000 (Universal)	BD-432-ECG-1B (Uses ECG cable 2275-0562-01)

Table 14-1 HDI 1500 System Parts List (Continued)

Located On	Part Number	Part Description	Notes/Reference
Figure 14-31 Figure 13-1	See the HDI 1500 Master Compatibility Matrix (P/N 9015-0679)	PCB, PC Interface & Overlay HDI 1500	BD-322-PC/IO (Also see Figure 13-16)
		PCB, P/C Mother, HDI 1500	PC Motherboard (Also see Figure 13-17)
Figure 14-27 Figure 14-28		PCB, PSA, HDI 1500	Probe Selector Assy (Also see Figure 13-18)
Figure 14-21	7575-1702-01	PCB, Rear Panel Interface, Lower, External, HDI 1500	BD-422-R/LOW-MT 422-02-016-3B (v2.00.02 and higher)
	6030-0024-01	PCB, Rear Panel Interface, Lower, External, HDI 1500	322-02-016-1A Rear I/O (v1.08.10)
Figure 14-25	7575-1639-01	PCB, Rear Panel Interface, Lower, Internal, HDI 1500	BD-422-R/ILO 422-02-017-3A (v2.00.02 and higher) OEM Bay
	6030-0023-01	PCB, Rear Panel Interface, Lower, Internal, HDI 1500	322-02-017-2A (v1.08.10) OEM Bay

Table 14-1 HDI 1500 System Parts List (Continued)

Located On	Part Number	Part Description	Notes/Reference
Figure 14-21	7575-1701-01	PCB, Rear Panel Interface, Upper, External, HDI 1500	BD-422-R/UPP-MT 422-02-015-3A (v2.00.02 and higher)
	6030-0036-01	PCB, Rear Panel Interface, Upper, External, HDI 1500	322-02-015-1A 322-02-015-2A Rear I/O (v1.08.10)
Figure 14-25	7575-1640-01	PCB, Rear Panel Interface, Upper, Internal, HDI 1500	BD-422-R/IUP 422-02-018-3A (v2.00.02 and higher) OEM Bay
	6030-0025-01	PCB, Rear Panel Interface, Upper, Internal, HDI 1500	322-02-018-2A (v1.08.10) OEM Bay
Figure 14-10	7575-1591-01	PCB, S/K/M, HDI 1500	System Key Matrix 322-02-021-0A 422-02-021-0A
Figure 14-31 Figure 13-1	See the HDI 1500 Master Compatibility Matrix (P/N 9015-0679)	PCB, Sound card	Sound Card (Also see Figure 13-19) This PCB was never used to generate sound and is not needed.
Figure 14-29 Figure 13-1		PCB, System Controller HDI 1500	S/C (Also see Figure 13-20)

Table 14-1 HDI 1500 System Parts List (Continued)

Located On	Part Number	Part Description	Notes/Reference
Figure 14-11	7575-1710-01 7575-1628-01	PCB, TGC/VOL, HDI 1500, 1.5	TGC Volume BD-422-TGC/VOL-1A 316-02-022-01A
Figure 14-11	7575-1955-01	PCB, TGC/VOL, HDI 1500, ABS Slidepot	BD-422-TGC/VOL-1B
Figure 14-31 Figure 13-1	See the HDI 1500 Master Compatibility Matrix (P/N 9015-0679)	PCB, Video Manager, HDI 1500	V/M (Also see Figure 13-21)
Figure 14-4	6030-0335-01	Plate, Base, Neck, HDI 1500	228-P-014A-HD
Figure 14-24	6030-0336-01	Plate, Duct, Front, SA8800	228-P-039-1
Figure 14-36	6030-0341-01	Power Assy, 110V, HDI 1500, w/ Attached Power Cord	AY-422-PWR-110 (Power supply may come without fan filter, use old filter and order separate as necessary.)
Figure 14-36	6030-0022-01	Power Assy, 220V, HDI 1500, w/ Attached Power Cord	AY-422-PWR-220 (Power supply may come without fan filter, use old filter and order separate as necessary.)
Figure 14-37	2275-0423-01	Power Cord, Detachable, 110V	CORD-110-WELLIS
Figure 14-37	2275-0422-01	Power Cord, Detachable, 220V	CORD-220-WELLIS

Table 14-1 HDI 1500 System Parts List (Continued)

Located On	Part Number	Part Description	Notes/Reference
Figure 14-37	1775-0003-01	Power Supply, 110V Input, w/ Detachable Power Cord	AY-422-P/110-04 (Power supply may come without fan filter, use old filter and order separate as necessary.)
Figure 14-37	1775-0002-01	Power Supply, 220V Input, w/ Detachable Power Cord	AY-422-P/220-04 (Power supply may come without fan filter, use old filter and order separate as necessary.)
Figure 14-35	2975-0065-01	Power Supply Fan Air Filter	325-Z-006-1
Figure 14-11	6030-0063-01	Probe Holder, S/H	231-R-023-1HD
Figure 14-27 Figure 14-34	6030-0176-01	Rack Assy, Backplane, HDI 1500	A211-008A-HD
Not shown	2175-0114-01	Remote Control, Multiview, HDI 1500	Remocon-Multiview2 (This remote control works only with the 2100-1888-01 and 2100-1889-01 Multiview Modules)
Figure 14-30	TBD	Retainer, PCB	
Figure 14-37	2975-0017-01	Retainer, Power Cord	235-P-713A
Figure 14-5	1563-0343-01	Retainer, Shaft, .187-inch Dia Shaft	
Figure 14-4	1675-0018-01	Ring, Swivel Housing	217-L-002A
Figure 14-8	1675-0020-01	Screw, 4MMx30MM w/Lockwasher, Ss	EL-MS4x30A3ASWA

Table 14-1 HDI 1500 System Parts List (Continued)

Located On	Part Number	Part Description	Notes/Reference
Figure 14-6	1675-0014-01	Screw, 5x25 MM, Panel Securing	
Figure 14-6	1675-0015-01	Screw, 4x25 MM, Panel Securing	
Figure 14-23	6030-0171-01	Screw, M3 x 8, HDI 1500	EL-TS3x8A
Figure 14-21	TBD	Screw, M3 x 8, Dish	EL-TS3x8A2A
Figure 14-24 Figure 14-25 Figure 14-21 Figure 14-29 Figure 14-31 Figure 14-36	1675-0002-01	Screw, M3 x 8, w/Washer, HDI 1500, 1.5	EL-MS3x8A3AWA
Figure 14-4	6030-0114-01	Screw, M3 x 8, w/Washer, UM400	
Figure 14-18 Figure 14-24	6030-0079-01	Screw, M3 x 10, Dish	EL-MS3x10A2A
Figure 14-29 Figure 14-30 Figure 14-32 Figure 14-34	6030-0175-01	Screw, M3 x 10, w/Washer, HDI 1500	EL-MS3x10A3AWA
Figure 14-27 Figure 14-28	6030-0078-01	Screw, M3 x 38, HDI 1500	EL-MS3x38A3A
Figure 14-22	6030-0104-01	Screw, M4 x 8, Dish	EL-MS4x8A2A
Figure 14-7 Figure 14-8	6030-0089-01	Screw, M4 x 10, HDI 1500	EL-MS4x10A3A

Table 14-1 HDI 1500 System Parts List (Continued)

Located On	Part Number	Part Description	Notes/Reference
Figure 14-19 Figure 14-37	6030-0087-01	Screw, M4 x 10, w/Washer, HDI 1500	
Figure 14-7	1675-0012-01	Screw, M4 x 26, w/Lockwasher, HDI 1500	
Figure 14-4	1675-0016-01	Setscrew, M4 x 8	EL-MS4x8A9A
Not shown	2975-0420-01	Shield, Beamformer/CW	A213-701A
Figure 14-10	6030-0122-01	Spacer, 3x14	EL-HEXN3x14
Figure 14-10	6030-0035-01	Spacer KBD New	321-P-044A
Figure 14-25 Figure 14-21	1675-0001-01	Spacer, 3x20	EL-HEXN3x20
Figure 14-2	2175-0037-01	Speaker, HDI 1500	
Figure 14-2	2175-0133-01	Speaker, HDI 1500	AY-SPEAK-HDI15-1
Figure 14-21	2975-0015-01	ST Pad Interface HDI 1500	275-K-554C
Figure 14-25	6030-0179-01	Sticker, F/P, HDI 1500	275-K-351B
Figure 14-20	6030-0101-01	Support, Body, Filler, Left, HDI 1500	233-P-025C
Figure 14-20	6030-0102-01	Support, Body, Filler, Right, HDI 1500	233-P-068C
Figure 14-21	6030-0103-01	Support, External, I/F, 8800	233-P-015B
Figure 14-21	2975-0026-01	Support, External, I/F, HDI 1500	233-P-016B
Figure 14-20	6030-0100-01	Support, Filler, Front, 8800, HDI 1500	233-P-086A
Figure 14-25	6030-0157-01	Support, Pri-Cover, SA7700, HDI 1500	233-P-082A
Figure 14-28	6030-0332-01	Support, PSA, SA7700D	233-L-093A

Table 14-1 HDI 1500 System Parts List (Continued)

Located On	Part Number	Part Description	Notes/Reference
Figure 14-10	2175-0042-01	Trackball Assembly, 56mm	
	2175-0043-01	Trackball Assembly, 58mm	
	7575-1775-01		PCB assembly Part of trackball assy 422-02-026-0B
Figure 14-9	See the HDI 1500 Master Compatibility Matrix (P/N 9015-0679)	UIF, English, HDI 1500	
Figure 14-10		UIF, German, HDI 1500	
		UIF, Italian, HDI 1500	
		UIF, French, HDI 1500	
		UIF, Spanish, HDI 1500	
Figure 14-23	6030-0170-01	Washer, Flat, 3Pie, HDI 1500	EL-PWA3x8x0.5
Figure 14-18	6030-0082-01	Washer, Pretty, 4 x 12, SA4800, HDI	EL-SW14x12
Figure 14-19		1500	
Figure 14-20			
Figure 14-22			
Figure 14-36			
Figure 14-37			

Peripheral Part Numbers

Table 14-2 Peripheral Part Numbers

Located On	Part Number	Part Description	Notes/Reference
Color Video Printers			
Figure 5-35	2100-1327-01	CP700U Color Printer, NTSC, 120 Vac	
	2100-1328-01	CP700E Color Printer, PAL, 240 Vac	
	2100-1535-01	CP800U Color Printer, NTSC, 120 Vac	
	2100-1536-01	CP800E Color Printer, PAL, 240 Vac	
Figure 5-36	2100-1852-01	Sony UP-21MD Color Printer, NTSC/PAL	
black and white Video Printers			
Figure 5-9	2100-0862-01	Sony UP-890MD B&W Video Printer, 120/230V/ 50Hz/60Hz	
	2100-1855-01	Sony UP-895MD B&W Video Printer, 120/230V/ 50Hz/60Hz	
Figure 5-10	2100-1680-01	Mitsubishi PW91W(A) B&W Printer	
VCRs			
Figure 5-19	2100-0785-02	AG-MD830P, VCR, NTSC, HiFi, 120 Vac	
	2100-0829-01	AG-MD830E, VCR, PAL, HiFi, 240 Vac	
	2100-1774-01	AG-MD835P, VCR, NTSC, HiFi, 120 Vac	Only 2.5 systems with
	2100-1775-01	AG-MD835E, VCR, PAL, HiFi, 240 Vac	7575-1587-05 VM PCB

Table 14-2 Peripheral Part Numbers (Continued)

Located On	Part Number	Part Description	Notes/Reference
Network Printers			
Not shown	2100-1566-01	Codonics NP-1660 Printer, NTSC, 120 Vac	
	2100-1567-01	Codonics NP-1660 Printer, PAL, 240 Vac	

15 Scanheads

Introduction

This section summarizes the scanhead information for the HDI 1500 Ultrasound System.

Scanhead Specifications

Table 15-1 Scanhead Applications

Scanhead	Applications
L7-4	Cerebrovascular, General, Small Parts, Vascular, Venous
L12-5	Breast, Cerebrovascular, General, Small Parts, Vascular
CL10-5	General, Superficial, Vascular
C5-2	Abdomen, General, Gyn, OB, Renal
C7-4	Abdomen, General, Gyn, OB, Renal
C8-4v	General, OB, Urology
C8-5	General, Neonatal Head, Vascular
C9-5	General, Gyn, OB, Prostate
P4-2	Abdomen, Adult Cardiac, General
P5-3	Cardiac, General
P7-4	Abdomen, Adult Cardiac, General
D2CW	Adult Cardiac

Table 15-1 Scanhead Applications (Continued)

Scanhead	Applications
D5CW	General
MPT7-4	Cardiac, General

Table 15-2 Scanhead Information

Scanhead Name	No. Elem.	Scanhead Label	Operating Frequency	Doppler Frequency
L7-4 38 mm	128	Linear Array L7-4	8.0 - 5.0 MHz	5.0 MHz
L12-5 38 mm	192	Linear Array L12-5	8.0 - 5.0 MHz	6.0 MHz
CL10-5	128	Linear Array CL10-5	8.0 - 5.0 MHz	5.1 Mhz
C5-2 40 mm	128	Curved Array C5-2	5.0 - 3.0 MHz	2.5 MHz
C7-4 40 mm	128	Curved Array C7-4	5.5 - 2.1 MHz	4.0 MHz
C8-4v 10 mm	128	Curved Array C8-4v	6.2 - 7.6 MHz	5.6 MHz
C8-5	128	Curved Array C8-5	6.4 - 7.8 MHz	5.0 MHz
C9-5 ICT 8 mm	128	Curved Array C9-5	7.5 - 3.5 MHz	6.0 MHz
P4-2 10 mm	64	Phased Array P4-2	4.0 - 2.2 MHz	2.5 MHz
P5-3	64	Phased Array P5-3	2.4-4.4 MHz	3.08 MHz
P7-4 8 mm	64	Phased Array P7-4	7.0 - 4.0 MHz	4.0 MHz
D2 Static	2	D2 CW	-	2.0 MHz
D5 Static	2	D5 CW	-	2.0 MHz
MPT7-4	64	MPTEE	3.5-7.0 MHz	4.0 MHz

Table 15-3 Scanhead Types, Capabilities, and Advantages

Type	Capabilities	Advantages
Linear array		
<ul style="list-style-type: none"> - L7-4 40 mm - L12-5 38 mm - CL10-5 	<ul style="list-style-type: none"> - 2D, M-mode, pulsed Doppler, Power, and Color 	<ul style="list-style-type: none"> - Dynamic receive focus for optimal lateral resolution - Multiple transmit focal zones - Wide field of view - High frame rate - Excellent tissue definition and contrast resolution - Excellent small parts imaging
Curved Array		
<ul style="list-style-type: none"> - C5-2 40 mm - C7-4 40mm - C8-4v 10mm - C8-5 - C9-5 8 mm 	<ul style="list-style-type: none"> - 2D, M-mode, pulsed Doppler, Power, and Color 	<ul style="list-style-type: none"> - Combines the advantages of phased array and linear array scanheads - Multiple transmit focal zones - Sector format with wide field of view at skin surface - Good lateral resolution - Dynamic receive focus - Excellent resolution and detail - Design is lightweight and easy to use
Phased Array		
<ul style="list-style-type: none"> - P4-2 10 mm - P5-3 16 mm - P7-4 8 mm - MPT7-4 10 mm 	<ul style="list-style-type: none"> - 2D, M-mode, pulsed and CW Doppler, Power, Color, and Color M-mode 	<ul style="list-style-type: none"> - Multiple transmit focal zones - Dynamic receive focus - MPT7-4 for transesophageal applications

Table 15-3 Scanhead Types, Capabilities, and Advantages (Continued)

Type	Capabilities	Advantages
Pencil Probes		
- D2 CW - D5 CW	- CW Doppler	- Good CW Doppler sensitivity

Table 15-4 Scanhead Matrix

Scanhead Type/ Scanhead Name	Part Number	Current Dash No.	Bkwd. Comp. ¹	EMC ²	No. Elem.	Hardware Notes	S/W Comp. ³
PHASED ARRAY							
P7-4	4000-0322	04/03/02	-	04/03/02	64	Biopsy guide avail. ⁴	v1.08.05 and up
P4-2	4000-0660	02	-	02	64	Biopsy guide avail. ⁴	v1.08.05 and up
P5-3	4000-0316	04	-	05	64	Biopsy guide avail. ⁴	v2.01.00 and up
BROADBAND LINEAR ARRAY							
L7-4	4000-0318	05	-	05	128	Biopsy guide avail. ⁴	v1.08.05 and up
L12-5	4000-0396	02/01	-	02/01	192	Biopsy guide avail. ⁴	v1.08.05 and up
CL10-5	4000-0315	04	-	05	128		v2.01.00 and up

Table 15-4 Scanhead Matrix (Continued)

Scanhead Type/ Scanhead Name	Part Number	Current Dash No.	Bkwd. Comp. ¹	EMC ²	No. Elem.	Hardware Notes	S/W Comp. ³
CURVED ARRAY							
C5-2 40R	4000-0574	03/02/01	-	-	128	Biopsy guide avail. ⁴	v1.08.05 and up
C7-4 40R	4000-0301	06/05/03	-	06/05/03	128	Biopsy guide avail. ⁴	v1.08.05 and up
C8-4v IVT	4000-0409	02	-	02	128	Biopsy guide avail. ⁴	v1.08.10 and up
C8-5 (Philips version)	4000-0800	01	-	01	128	Biopsy guide avail. ⁴ (replace like-for-like)	v2.03.02 and up
C9-5 ICT	4000-0280	14/13/12/ 11/10/09	-	14/13/ 12/11/ 10/09	128	Biopsy guide avail. ⁴	v1.08.05 and up

Table 15-4 Scanhead Matrix (Continued)

Scanhead Type/ Scanhead Name	Part Number	Current Dash No.	Bkwd. Comp. ¹	EMC ²	No. Elem.	Hardware Notes	S/W Comp. ³
STATIC CW							
D2 CW	4000-0307	03	-	03	2	-	v1.08.05 and up
D5 CW	4000-0308	02	-	02	2	-	v2.00.02 and up
TRANSESOPHAGEAL							
MPT7-4	4000-0317	17	-		64	-	v2.00.02 and up

1. The “Bkwd Comp.” column lists dash numbers that are backward compatible with the listed scanhead.
2. The “EMC” column lists dash numbers of scanheads that may be ordered worldwide (must use EMC scanheads for Europe). Non-EMC scanheads may be ordered for domestic U.S. and other countries.
3. The “S/W Comp.” column lists the minimum software build level required for use of the listed scanhead.
4. See “Philips Supplies and Accessories” on page 33.

16 Glossary

Acronyms and Abbreviations

AC	alternating current
A	amperes
ADC	analog-to-digital conversion
Assy	assembly
B/W	black and white
COA	Customer Order Acknowledgment
CPU	central processing unit
CW	continuous-wave
DAC	digital to analog converter
D/A	digital-to-analog conversion
DC	direct current
DICOM	Digital Imaging and Communications in Medicine
DR	dynamic range
DVM	digital volt meter
ECG	electrocardiogram
EMC	electromagnetic compatibility
EMI	electromagnetic interference

ESD	electrostatic sensitive device or electrostatic discharge
I-RGB	interlaced red, green, and blue video
IVT	intravaginal transducer
LED	light emitting diode
LEP	list of effective pages
MUX	multiplexer
NTSC	National Television Standards Committee
OEM	original equipment manufacturer
PAL	Phased Alternating Line
PC	personal computer
PCB	printed circuit board
PD	phased drive
PW	pulsed-wave
RF	radio frequency
Rx	receive, receiver
S-VHS	Super VHS, a VCR video format
TGC	time gain compensation
Tx	transmit, transmitter
UIF	user interface
VCR	video cassette recorder

Terms

CAUTION	Information in the manual set that describes precautions necessary to protect the equipment.
Digital Imaging and Communications in Medicine	Standard for network communication. The system provides network communication with devices that comply with version 3.0.
electromagnetic interference (EMI)	Noise or other external signals generated by electrical devices that can disturb the performance of electronic devices.
I-RGB	Interlaced, red, green, and blue video. The system has a rear panel connector for video devices that use this type of video.
interlaced	Video format where two fields make up one 30 Hz frame. Video rows (scan lines) of the raster are interlaced, that is, field one provides rows 1, 3, 5, . . . , then field two fills in rows 2, 4, 6, See “non-interlaced”.
National Television Standards Committee	Standard video signal for all broadcast TV in the U.S. - 525-line, 60Hz, composite video, usually color.
non-interlaced	Video format where the video rows are processed in sequence (1, 2, 3, 4, 5, 6, . . .) and updated at a 60 rate. See “interlaced”.
QWERTY keyboard	A keyboard layout named for its six leftmost characters; the standard layout of most computer keyboards.

Phased Alternating Line

European video standard - 625-line, 50Hz composite video, usually color.

WARNING

Information in the manual set that describes precautions necessary to prevent injury or loss of life.