

HDI 3000

Field Service Manual

Consists of hard-copy manual 4720-0015-06 Rev A



A Philips Company



ATL Ultrasound
P.O. Box 3003
Bothell, WA 98041-3003
USA
Internet www.atl.com

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About This Manual

Audience

This manual supports the field service maintenance and repair of the HDI 3000 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 available in two versions: Portable Document Format (PDF), for viewing on a laptop-computer screen, and hard copy. In the PDF a list of bookmarks replaces the table of contents, and the bookmarks, index entries, 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:

- All procedures are numbered. You must complete steps in the sequence they are presented to ensure a reliable result.
- Bulleted lists indicate general information about a particular function or procedure. They do not imply a sequential procedure.
- Control names are spelled and capitalized in the manual as they are on the system.
- Menu items or titles appearing on the monitor are spelled and capitalized in the manual as they are on the monitor.
- Scanheads and pencil probes both are referred to as scanheads, unless the distinction is important to the meaning of the text.
- Pages changed or added after the initial release are identified by a change date at the bottom of the page. A change bar (■) in the outside margin denotes the specific part of a page that was changed on that date. On pages with change dates but no change bars, only the page number has changed.

Questions or Comments About the Manual

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

- atl-bothell.techpubs@philips.com
- Technical Publications, MS 264
ATL Ultrasound
P.O. Box 3003
Bothell, WA 98041-3003

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 ATL office. ATL office addresses and telephone numbers are in the “Read This First” section of the system reference manual (P/N 4703-0015-XX).

1 General Information

1-1

Introduction

The HDI 3000 system is a general-purpose, mobile, software-controlled, diagnostic ultrasound system (**Figure 1-1**). Its function is to acquire, process, and display ultrasound data.

The operator can measure anatomical structures and generate reports for health care professionals. The primary users are physicians and sonographers in clinics and hospital departments that provide diagnostic ultrasound services.

The system has a basic set of imaging modes and measurement tools. There also are modes and measurement tools which are only available when a specific mode or analysis package is purchased and enabled for customer use. Upgrade security is controlled through the use of system-specific passwords and software.

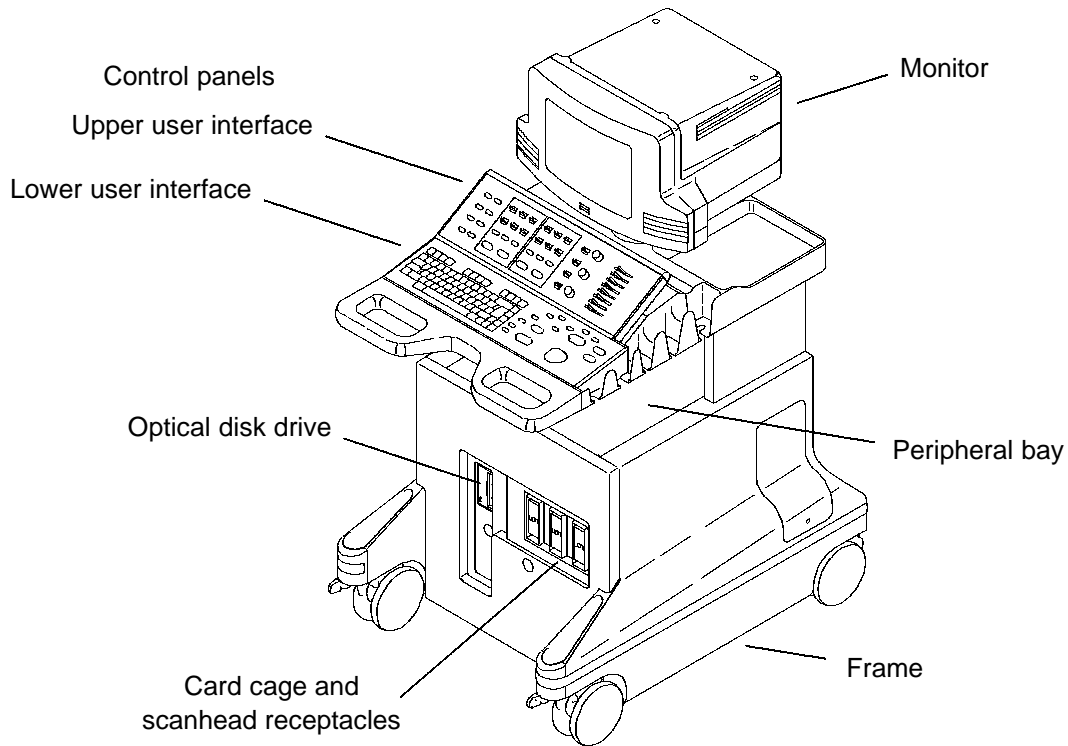


Figure 1-1. HDI 3000 System (Front)

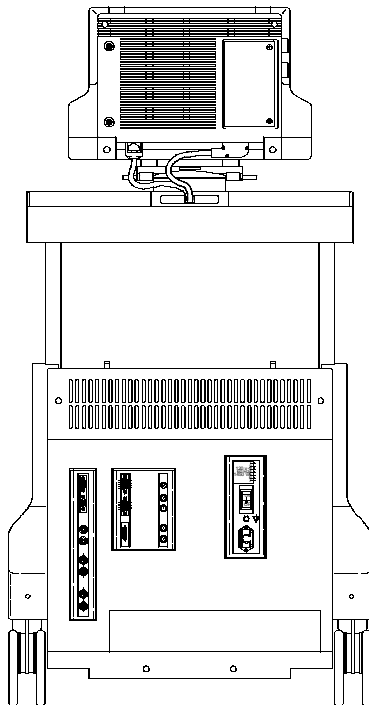


Figure 1-2. HDI 3000 System (Rear)

1-1.1

Applications

General Imaging, Radiology, OB, GYN/Fertility, Vascular, Cardiac, and Intraoperative

1-1.2

Scanheads

The following scanhead types are supported:

- phased arrays
- linear arrays
- convex arrays
- compact linear array
- CW pencil probes
- Bi-plane and multi-plane transesophageal

Refer to: [Section 4, “Theory of Operations”](#), for front end theory; [Section 6, “Performance Tests”](#), for operating parameters; and [Section 13, “Configuration”](#), for compatibility and replacement data.

1-1.3

Physical Description

Frame

The frame provides the primary structural support for the system. It has a one-piece weldment. Front casters are swivel mounted, rear casters are fixed with brake locks. Casters have integral shock mounts. The frame provides a lockable swivel mount for the monitor.

Card Cage

The removable card cage slides into the frame and is secured. It incorporates a center motherboard, or centerplane, with modules inserted from the front and rear. The card cage is designed to allow for future motherboard, power supply, and fan module upgrades. Rear mounted fans provide forced air cooling.

Eight slots are dedicated with appropriate shielding for channel boards. External connections are provided through connectors mounted on brackets attached directly to the card cage modules to eliminate cabling to remote connectors. All power supplies, disk drives and PCBs are slide-in modules with card-edge connectors, switches, and LEDs, as necessary.

Peripheral Bay

Peripherals are installed into the cart with their control panels accessible to the operator. PRINT and REC on the control panel are the only system controls for peripherals.

The open peripheral bay will accept a variety of peripherals. Peripherals are mounted by one or more straps on a universal adapter plate. The plate can easily be modified or replaced to accommodate future peripherals. A VCR mounts on top of the monitor.

Control Panels

Controls are located on the upper and lower user interface assemblies. Operator controls consist of a full-size keyboard, a trackball and an array of pushbuttons, toggle switches, slidepots, and rotary controls. Pressing certain switches displays menus on the video screen. The trackball is then used to select from the menus. Slidepots control TGC. Rotary controls are used for gain control.

Included on the control module assembly are scanhead holders, storage trays at the rear, and the handle used to move the system. The keyboard wrist rest also serves as an ESD ground for the operator.

Monitor

The monitor assembly includes a single 14-inch or 15-inch, 120 Vac, 50/60 Hz non-interlaced monitor, monitor enclosure, and mounting for the VCR. VCR and monitor are removable for mobile systems. The monitor is mounted on a swivel base that is mounted on the frame. Video resolution is 480 x 640 pixels in NTSC format and 576 x 768 pixels in PAL format.

The monitor senses the input video format and will also display interlaced video with horizontal sync frequencies, nominally 15.7 KHz, with vertical sync signal frequencies between 50 Hz and 60 Hz.

Cables

Internal power cables are routed from the AC Input Module (ACIM) through the right rear of the system (with the observer facing the rear of the system) to the OEM or module requiring power. Internal signal cables are routed from the Internal Interface Module (IIM) through the left rear of the system to each OEM or the monitor. All internal cables are connected to the right side of the motherboard. Refer to [Section 11, “Cabling,”](#) for more information.

1-2

Safety Requirements

- Classification:
 - Class I equipment with Type BF and CF 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
- JIS T-1000 Series, Japanese Industrial Standard, Medical Electrical Equipment
- UL 2601-1, Underwriters Laboratories, Medical Electrical Equipment
- Agency approvals:
 - Canadian Standards Association (CSA)
 - Japanese Ministry of Health and Welfare
 - ISO 9001, EN46001 Quality Assurance Standard; Certificate #FM28256 issued by the British Standards Institution (BSI) for Quality Systems
 - CE marked to the European Community Medical Device Directive 93/42/EEC per Annex II, as a Class IIa device, in accordance with Annex IX (BSI Certificate #0604)

2 *Specifications*

2-1

Scanheads

Table 2-1 contains the scanhead name that appears on the system monitor, the scanhead label, the scanhead frequency, and the Doppler frequency of system scanheads.

Table 2-2 contains a summary of scanhead types, capabilities, and advantages.

Table 2-1. Scanhead Information

Scanhead Name	No. Elem.	Scanhead Label	Operating Frequency	Doppler Frequency
L7-4 38 mm	128	Linear Array L7-4	7.0 - 4.0 MHz	4.0 MHz
LI9-5	128	Linear Array LI9-5	9.0 - 5.0 MHz	5.0 MHz
LAP L9-5	128	Linear Array LI9-5	9.0 - 5.0 MHz	6.0 MHz
L10-5 38 mm	192	Linear Array L10-5	10.0 - 5.0 MHz	6.0 MHz
L12-5 38 mm	192	Linear Array L12-5	12.0 - 5.0 MHz	6.0 MHz
L12-5 50 mm	256	Linear Array L12-5	12.0 - 5.0 MHz	6.0 MHz
C3.5 76 mm	128	Curved Array C3.5	3.5 MHz	3.0 MHz
C4-2 40 mm	128	Curved Array C4-2	4.0 - 2.0 MHz	2.5 MHz
C5-2 40 mm	128	Curved Array C5-2	5.0 - 2.0 MHz	2.5 MHz
C5 IVT 11 mm	114	Curved Array C5 IVT	5.0 MHz	4.0 MHz
C7-4 40 mm	128	Curved Array C7-4	7.0 - 4.0 MHz	4.0 MHz
C8-4v 11 mm	128	Curved Array C8-4v	8.0 - 4.0 MHz	5.0 MHz
C8-5	128	Curved Array C8-5	8.0 - 5.0 MHz	5.0 MHz
C9-5 ICT 8 mm	128	Curved Array C9-5	9.0 - 5.0 MHz	5.0 MHz
CL10-5	128	Compact Linear CL 10-5	10.0 - 5.0 MHz	6.0 MHz
CT8-4 40 mm	128	Curved Array CT8-4	8.0 - 4.0 MHz	6.0 MHz

Scanhead Name	No. Elem.	Scanhead Label	Operating Frequency	Doppler Frequency
P3-2 20 mm	64	Phased Array P3-2	3.25 - 1.75 MHz	2.0 MHz
P5-3 16 mm	64	Phased Array P5-3	5.0 - 3.0 MHz	3.0 MHz
P7-4 8 mm	64	Phased Array P7-4	7.0 - 4.0 MHz	4.0 MHz
MPT7-4	64	Phased Array MPT7-4	7.0 - 4.0 MHz	4.0 MHz
BPT9-5	2x64	Phased Array BPT9-5	9.0 - 5.0 MHz	6.0 MHz
TCD Static	1	D2 TC		2.0 MHz
D2 Static	2	D2 CW		2.0 MHz
D5 Static	2	D5 CW		5.0 MHz
D10 Static	2	D10 CW		10.0 MHz

Table 2-2. Scanhead Types, Capabilities, and Advantages

Type	Capabilities	Advantages
Linear array		
<ul style="list-style-type: none"> - L7-4 40 mm - LI9-5 33 mm - LAP L9-5 - L10-5 38 mm - L12-5 38 mm - L12-5 50 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 - CL10-5 and LI9-5 for intraoperative applications
Curved Array		
<ul style="list-style-type: none"> - C3.5 76 mm - C4-2 40 mm - C5-2 40 mm - C5 IVT 11R - C7-4 40mm - C8-4v - CT8-4 - 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 - CT8-4 for intraoperative applications

Phased Array		
<ul style="list-style-type: none"> - P3-2 20 mm - P5-3 16 mm - P7-4 8 mm - BPT9-5 - MPT7-4 	<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 - P3-2 possesses contrast specific imaging capability
Pencil Probes		
<ul style="list-style-type: none"> - D2 CW - D5 CW - D10 CW 	<ul style="list-style-type: none"> - CW Doppler 	<ul style="list-style-type: none"> - Good CW Doppler sensitivity
<ul style="list-style-type: none"> - D2 TC 	<ul style="list-style-type: none"> - Pulsed Doppler 	<ul style="list-style-type: none"> - Good pulsed Doppler sensitivity

2-2 System Specifications

2-2.1 Physical Dimensions

- Width: 71.4 cm (28.1 in)
- Height: 156.0 cm (61.4 in) with VCR
140.0 cm (55.0 in) without VCR
121.9 cm (48 in) when monitor is removed for transport
- Depth: 99.3 cm (39.1 in)
- Weight: 172-200 kg (380-440 lb) (depends upon the hard-copy device that is installed)

2-2.2 System Architecture

- Digital front end
- Extended signal processing
- Modular microcomputer structure

2-2.3

Imaging Modes

- Gray-scale 2D
- M-mode
- Doppler
- Power (CPA and PMI)
- Color 2D
- Color M-Mode
- Tissue Harmonic Imaging
- Contrast Specific Imaging

2-2.4

Update Methods

- Update or Duplex
- Triple Mode
- Simultaneous

2-2.5

Clinical Options

- Abdominal Surgery
- Abdominal
- Adult Cardiology
- Advanced Breast Imaging
- Cardiology CSI
- Cardiology THI
- Cerebrovascular
- General Imaging CSI
- Gynecological and Fertility
- Musculoskeletal
- Neurosurgery
- Obstetrical
- Pediatric/Fetal Cardiology

- Pediatric General Imaging
- Peripheral Vascular
- Prostate
- Small Parts and Superficial
- Tissue Harmonic Imaging
- Transesophageal Cardiology
- Transcranial Doppler
- Vascular Surgery

2-2.6

Gain

- Slidepot controls for TGC
- 2D gain rotary control
- Doppler gain rotary control
- Color gain rotary control

2-2.7

Gray Shades

- 256 in 2D
- 256 in M-mode
- 128 in Color M-mode
- 256 in Doppler

2-2.8

Image Processing

- 2D graymaps
- 3D CPA
- Dynamic contrast enhancement
- Chroma maps
- Doppler graymaps
- Color maps
- CPA maps
- CPA blending
- CPA display type
- Dynamic motion differentiation

2-2.9

Scan Conversion

- Sector for phased and curved array scanheads
- Rectangular for linear array scanheads, steered for Color and Doppler imaging

2-2.10

Frame Rate

Depends on scanhead used, scanning mode, depth, etc.

2-2.11

User Control System

- Monitor brightness, contrast, lightbar, and background color controls. (There is also a reset for factory defaults on brightness, contrast, and light bar.)
- Rotary controls
- Slidepot controls
- Keyboard
- Volume control
- Dedicated primary imaging controls
- Menus and Superkeys for secondary imaging controls
- Color and tint controls for VCR playback

2-2.12

Digital Signal Processing

- Selectable dynamic range
- Automatic system bandwidth adjustment
- Selectable receive bandwidth patient optimization
- Software-controlled bandwidth, filter, and frequency

2-2.13

Image Modification

- Zoom and pan of real-time or frozen 2D image
- Up to eight times magnification of 2D images
- High Definition Zoom
- Up to five times M-mode zoom
- Color persistence
- 2D persistence

2-2.14

Programmability

- Application and scanhead optimization
- Tissue Specific Imaging (TSI) Patient Optimization
- Quick save of user settings by application and scanhead
- On-screen programming for internal and external hardcopy devices

2-2.15

Display Annotation

- Patient name and identification
- Institution
- Time and date
- Biopsy guide line
- Title, text, arrows, scanhead position, and body marker annotation
- Tissue-specific body markers

- Additional Image Information
- Tissue Specific Imaging (TSI) Patient Optimization
- Image management status
- TI and MI values
- M cursor

2-2.16

Image Presentation

- Up/down orientation
- Left/right orientation

2-2.17

Scanheads

Refer to [Table 2-1](#) and [Table 2-2](#).

2-2.18

Biopsy Guide Availability

Refer to [paragraph 13-9.55](#).

2-2.19

2D

- Image orientation marker
- Selectable graymaps
- 2D gain control
- Up to 5 transmit focal zones
- 2D persistence
- Dynamic range
- Chroma maps (grayscale colorization)
- 2D sector size and steering
- Zoom
- HD Zoom

2-2.20

M-Mode

- Three sweep speeds
- Time markers
- M-mode review
- M cursor
- M-mode zoom

2-2.21

Doppler

- Digital wall filters
- Pulsed wave (PRF range: 1.25 - 22.7 kHz)
- Continuous wave (Sample rate: 1.50 - 41.7 kHz)
- Adjustable sample volume (1.5 - 20 mm)
- Adjustable zero baseline
- Normal or inverted display
- Three user controlled sweep settings

- Doppler gain control
- Doppler review
- Doppler graymaps
- Low flow capability
- Equivalent 5 MHz annotation
- Thump filter for CW Doppler
- High Q Automatic Doppler Results Display
- □ Doppler maximum measurable velocities (**Table 2-3** and **Table 2-4**)
- Angle correction
- Doppler accuracy

Table 2-3. PW Doppler Maximum Measurable Velocities (MMV)

Scanhead	Doppler Freq. (MHz)	Angle Correction (degrees)	MMV (meters/sec)
BPT9-5	6.0	0	3.50
C3.5 76mm	3.0	0	5.80
C4-2 40mm	2.5	0	7.00
C5-2 40mm	2.5	0	7.00
C5 IVT	4.0	0	4.40
C8-4v IVT	5.0	0	3.50
C8-5	5.0	0	3.50
C7-4 40mm	4.0	0	4.40
C9-5 ICT	6.0	0	3.50
CL10-5	6.0	0	2.90
CT8-4	4.0	0	4.40
D2 TCD	2.0	0	8.80
L7-4 38mm	4.0	0	4.40
LI9-5 33mm	6.0	0	2.90

L10-5 38mm	6.0	0	2.90
L12-5 38mm	6.0	0	2.90
L12-5 50mm	6.0	0	2.90
MPT7-4	4.0	0	4.40
P3-2 20mm	2.0	0	8.80
P5-3 16mm	3.0	0	5.80
P7-4 11mm	4.0	0	4.40

Table 2-4. CW Doppler Maximum Measurable Velocities (MMV)

Scanhead	Doppler Freq. (MHz)	Angle Correction (degrees)	MMV (meters/sec)
BPT9-5	4.0	0	8.0
D2 CW	2.0	0	16.0
D5 CW	5.0	0	6.40
D10 CW	10.0	0	3.20
MPT7-4	4.0	0	8.0
P3-2 20mm	2.0	0	16.0
P5-3 16mm	3.0	0	10.70
P7-4 11mm	4.0	0	8.0

2-2.22

Color

- 2D Color
- M-Mode Color
- Color gain control
- Selectable color maps
- Velocity, variance, and power displays
- Dynamic Motion Differentiation (DMD)
- Sensitivity
- Priority threshold
- Line density
- Color persistence

2-2.23

Power

- 2D Color Power Angio Imaging
- 3D Color Power Angio Imaging
- Power Motion Imaging
- Selectable maps
- Dynamic Motion Differentiation
- Adjustable background-on or off
- Display (Topography)
- Background (Blend)
- Dynamic Range
- Persistence

2-2.24

Physio

- ECG
- High-level ECG
- Pulse
- Phono
- Auxiliary

Table 2-5. Physio ECG Performance Characteristics

Lower Frequency Cut-off	0.3 Hz \pm 0.03 Hz
Upper Frequency Cut-off	> 25 Hz \pm 2.5 Hz
Nominal Input Amplitude	1 mVp-p
Minimum Sensitivity	5 X 10 ⁻³ V

Table 2-6. Physio High Level ECG Performance Characteristics

Lower Frequency Cut-off	$0.5 \text{ Hz} \pm 0.1 \text{ Hz}$
Upper Frequency Cut-off	$> 27 \text{ Hz} \pm 2.7 \text{ Hz}$
Gain Range	$21 \text{ dB} \pm 1 \text{ dB}$
Minimum Sensitivity	$5 \times 10^{-3} \text{ V}$

Table 2-7. Physio Pulse Performance Characteristics

Transducer Type	Fukuda Denshi	Other
Lower Frequency Cut-off	$0.5 \text{ Hz} \pm 0.1 \text{ Hz}$	$0.5 \text{ Hz} \pm 0.1 \text{ Hz}$
Upper Frequency Cut-off	$> 50 \text{ Hz}$	$> 50 \text{ Hz}$
Gain Range	$45 \text{ dB} \pm 1 \text{ dB}$	$35.5 \text{ dB} \pm 1 \text{ dB}$
Minimum Sensitivity	$50 \times 10^{-6} \text{ V}$	$2 \times 10^{-3} \text{ V}$

Table 2-8. Physio Auxiliary Performance Characteristics

Lower Frequency Cut-off	0.5 Hz \pm 0.1 Hz
Upper Frequency Cut-off	> 800 Hz
Gain Range	28.5 dB \pm 1 dB
Minimum Sensitivity	5 X 10 ⁻³ V

Table 2-9. Physio Phono Performance Characteristics

Phono Filter	Low Frequency Cut-off	Upper Frequency Cut-off	Gain Range		Minimum Sensitivity	
			Fukuda Denshi	Other	Fukuda Denshi	Other
Off	28 \pm 2.8 Hz	810 \pm 81 Hz	51 \pm 1 dB	56 \pm 1 dB	50 X 10 ⁻⁶ V	50 X 10 ⁻⁶ V
Low	78 \pm 7.8 Hz	385 \pm 38.5 Hz	51 \pm 1 dB	56 \pm 1 dB	15 X 10 ⁻⁶ V	15 X 10 ⁻⁶ V
Medium	90 \pm 9.0 Hz	620 \pm 62 Hz	51 \pm 1 dB	56 \pm 1 dB	15 X 10 ⁻⁶ V	15 X 10 ⁻⁶ V
High	180 \pm 18 Hz	800 \pm 80 Hz	51 \pm 1 dB	56 \pm 1 dB	10 X 10 ⁻⁶ V	10 X 10 ⁻⁶ V

2-2.25

Calculations (CALCS)

- General Imaging
- Cardiology

2-2.26

Measurement Tools

- Distance
- Area
- Time/slope
- Volume
- Heart rate
- High Q set region
- High Q mean trace
- High Q peak trace
- Calibration
- Optional hip angle

- Optional d:D ratio
- Optional % diameter reduction
- Optional % area reduction

2-2.27

Image Storage and Retrieval

- Cine loop Image Review, 2D
- Cine loop Image Review, 3D
- Doppler Review
- M-mode Review
- Image Management Option, DEFF, and DICOM compatible
- VCR Playback and Frame Grab

2-2.28

Optional Hardcopy Devices

- Super VHS VCR
- Multi-Image camera
- Color page printer
- Report printer
- Black-and-white page printer

2-2.29

External Connections

- RGB-S (Red, Green, Blue, and Sync) video 50/60 Hz frame rate, non-interlaced for external video monitors: Sub-D 9-pin connector
- RGB-S-CB (Red, Green, Blue, Sync, and Composite Blanking) video 25/30 Hz frame rate, interlaced for external hardcopy devices: Sub-D 15-pin connector
- Composite gray scale for external hardcopy output: BNC connector

- External hardcopy device on-screen programming input: BNC connector
- VCR-S Video output: Locking S-video connector
- VCR composite video output: BNC connector
- VCR-S Video input: Locking S, video connector
- VCR composite input: BNC connector
- VCR audio output (left/right): dual RCA jacks
- VCR audio input (left/right): dual RCA jacks
- External line printer output, RS-232A: Sub-D 9-pin connector
- System diagnostic I/O (Ethernet), USD port RS-232A: Sub-D 9-pin connector

2-2.30

Electrical Parameters

See [Table 5-3](#).

2-2.31

Monitor

One 14-inch or 15-inch, high-resolution, color monitor

2-2.32

Languages

- English (upper/lower user interface, system software, manuals)
- French (upper/lower user interface, system software, manuals)
- German (upper/lower user interface, system software, manuals)
- Italian (upper/lower user interface, system software, manuals)
- Danish (lower user interface, display text, manuals)
- Finnish (lower user interface, display text, manuals)
- Norwegian (lower user interface, display text, manuals)
- Swedish (lower user interface, display text, manuals)

2-2.33

Storage

- Unified cable management system
- Footswitch
- Two general purpose trays

2-2.34

Temperature, Pressure, and Humidity Limits

- Storage and Shipping
 - High: 149°F (65°C) Low: -31°F (-35°C)
 - All at 1060 hPa to 303 hPa (1.05 ATM to 0. 3 ATM)
 - 15% to 95% relative humidity
- Operating Environment
 - High: 104°F (40°C) Low: 50°F (10°C)
 - All at 1060 hPa to 700 hPa (1.05 ATM to 0. 7 ATM)
 - 15% to 95% relative humidity

2-3

System Installation Specifications

System installation specifications include system environmental requirements, uncrated and crated dimensions, and power requirements. Refer to [Table 5-1](#), [Table 5-2](#), and [Table 5-3](#) for these specifications.

3 *Safety*

3-1 Safety Information

3-1.1 Introduction

Please read this information before using an ATL ultrasound system. It applies to the ultrasound system, scan-heads, 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.

3-1.2

Electrical Safety

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

WARNINGS

- **Before connecting and applying power, all ACIM (power input panel) mounting screws must be in place and properly secured to complete the system ground path.**
- **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-hole outlet. The grounding wire must not be removed or defeated.**

WARNINGS

- **Do not remove the protective covers on the system; hazardous voltages are present inside. Cabinet panels must be in place while the system is in use. All internal adjustments and replacements must be made by a qualified ATL customer service representative.**
- **Do not operate this system in the presence of flammable gases or anesthetics. Explosion can result.**
- **Always inspect the scanhead or pencil probe face, housing, and cable before use. Do not use the scanhead or pencil probe if the face is cracked, chipped, or torn, the housing is damaged, or the cable is abraded.**
- **Always disconnect the system from the wall outlet prior to cleaning the system.**

- **Connection of optional devices not supplied by ATL 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 • A for 120 Vac and 500 • A 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

- **Always place the system ON/STANDBY switch to STANDBY for five to ten seconds before setting the system I/O circuit breaker to OFF.**
- **Always wait five to ten seconds after placing the ON/STANDBY switch to STANDBY before placing the switch to ON. A power-down sequence, similar to the initialization that occurs when power is first turned on, saves certain operating parameters and turns off power supplies in a sequential order. Review the power subsystem discussion in [Section 4, “Theory of Operation”](#).**

- **Always verify that the power cord voltage label matches the voltage on the device before plugging in the power cord. On 230 Volt systems VCR power is 230 Volts but the monitor is 120 Volts. Applying 230 Volts to the monitor will destroy it.**
- **This equipment contains components which are electrostatic sensitive. Proper 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 ATL warranties.**

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 200 kg (440 pounds), depending upon configuration, and it could cause injury to you or others if it rolls over feet or into shins.**

WARNINGS

- **ATL recommends pushing the system, instead of pulling it, and to exercise 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.**
- **During normal operation, the system power transformer (located behind the rear cover) is hot to the touch. Use care when working near the transformer to avoid being burned.**

Equipment Protection

CAUTIONS

- Excessive bending or twisting of a scanhead or pencil probe cable may cause failure or intermittent operation of the system.
- Ensure that scanhead cables are secure. Use the cable management system to ensure that scanhead cables are protected from damage.
- 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. Only some scanheads can be sterilized. For information on disinfection and sterilization, see the *Using Disinfectants and Gels* manual, part number 4700-0249-XX.
- Inspect the system power cord and plug on a regular basis. Ensure that they are not damaged in any way.

- **The power supplies continue to operate when the system is in standby. Ensure that the circuit breaker is off, before unplugging the system from the wall outlet.**
- **For optimal performance, your ATL ultrasound system should be connected to a 15 Ampere dedicated circuit with an isolated ground.**

3-2

Safety 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.

These symbols are used on the outside of the system:



Grounded patient connection. Protection against electrical shock is provided by connection of chassis to the safety ground.



Isolated patient connection.



Isolated patient connection for applied parts in direct contact with major vessels. (Type CF)



I and O on the circuit breaker represent ON and OFF.



On the power switch, represents ON and STANDBY.



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.



IPX-1

Drip-proof appliance on scanhead, pencil probe, or foot-switch. This instrument may be safely handled in a damp environment.



IPX-7

Water-proof appliance (scanheads only). This instrument may be safely immersed.



Identifies equipotential ground (located next to ground stud on the rear panel).

The following symbols are used inside the system:



Identifies high voltage components operating above 750 VAC (RMS) or 750 VDC.



Identifies the point where the system safety ground is fastened to the chassis.

Save these instructions.

Safety Tests

CAUTION

Always use correct electrostatic discharge (ESD) procedures when any system covers have been removed. Refer to Section 3 of the *General Field Service Manual*, P/N 4720-0219-XX.

4 Theory of Operation

4-1

Introduction

This section describes the electronics of the system and how the echo data flows through it. Also included are descriptions of the control architecture, software architecture, and electronic hardware.

4-2

Operating System

The software operating system is supported by X-Windows software. X-Windows is an industry-standard software system that allows the development of graphical user interfaces, which consist of windows, graphics, and displayed text.

X-Windows is made up of a server and a client. The server resides on the PCM, and the client resides on the CPU.

- The server completely controls all input and output devices
- The client communicates with the server using Ethernet, an asynchronous byte-stream protocol
- CPU software controls all ultrasound functions

4-3

Partitioning

The electronics of the system can be divided into five basic functional subsystems (**Figure 4-1**). Each subsystem contains several modules that perform specific functions within the subsystem:

- Power Subsystem
- Control Subsystem
- Acquisition Subsystem
- Processing Subsystem
- Display Subsystem

4-3.1

System Block Diagram

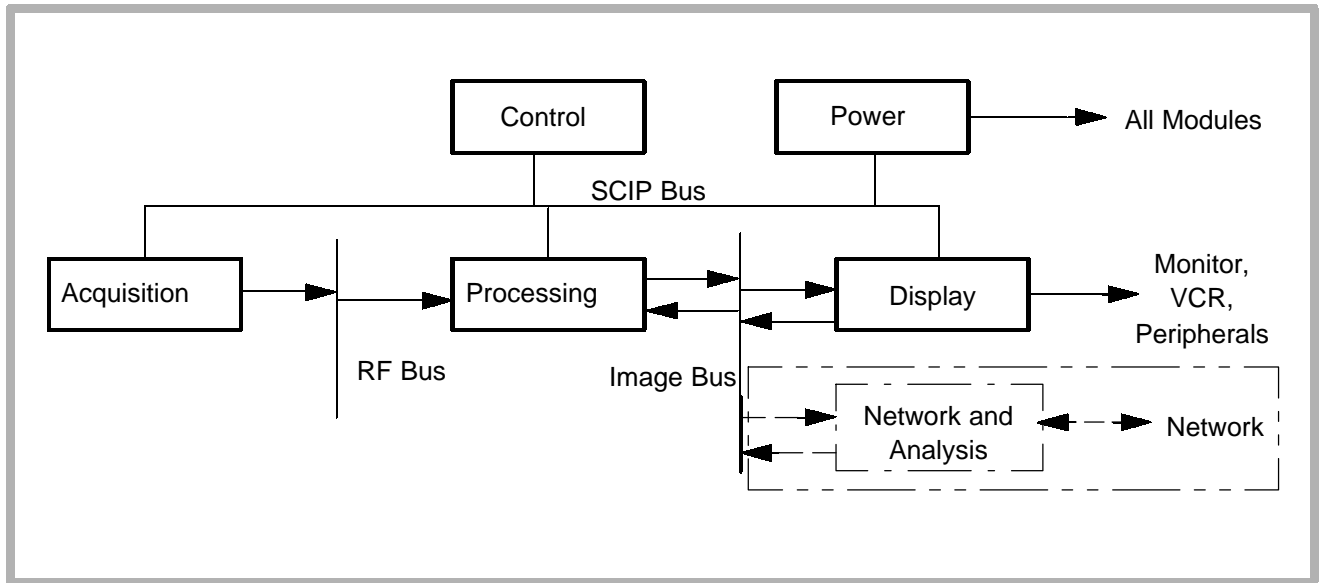


Figure 4-1. System Block Diagram

4-3.2

Power Subsystem

Major components include AC Input Module (ACIM), Master Power Supply (MPS), Analog Power Supply (APS), and Digital Power Supply (DPS). An additional power supply slot on the centerplane allows for system expansion. The Power Subsystem is illustrated in [Figure 4-2](#).

System power is not field-configurable. Four versions of the ACIM provide 120 Vac/50 Hz, 120 Vac/60 Hz, 230 Vac/50 Hz, and 230 Vac/60 Hz configurations.

The Power Subsystem also includes a shielded line cord, On/Off circuit breaker, ferro-resonant isolation transformers, resonant filter capacitors, manual ON/STANDBY switch (on UIF), software-controlled power ON/STANDBY switch (CPU), and overload protection in the individual power supplies (watchdog circuitry on MPS). All power supplies plug directly into the centerboard to supply all DC power.

There are no power supply adjustments. All voltages are monitored and adjusted under the control of the MPS. The subsystem converts high voltage AC into DC voltages and buses these DC voltages over the centerboard to the modules that require them. Status LEDs on the ACIM and MPS are covered in [Section 9, “Troubleshooting”](#). Refer to [paragraph 4-4.5](#) for Output Power Monitor theory.

The voltages supplied by the individual power supplies are:

Digital Power Supply

+5 Vdc

Analog Power Supply

± 6 Vdc

± 15 Vdc

± 80 Vdc

± 105 Vdc (for variable pulsers)

Master Power Supply

-5.2 Vdc 0-24 Vdc (fans)

± 12 Vdc

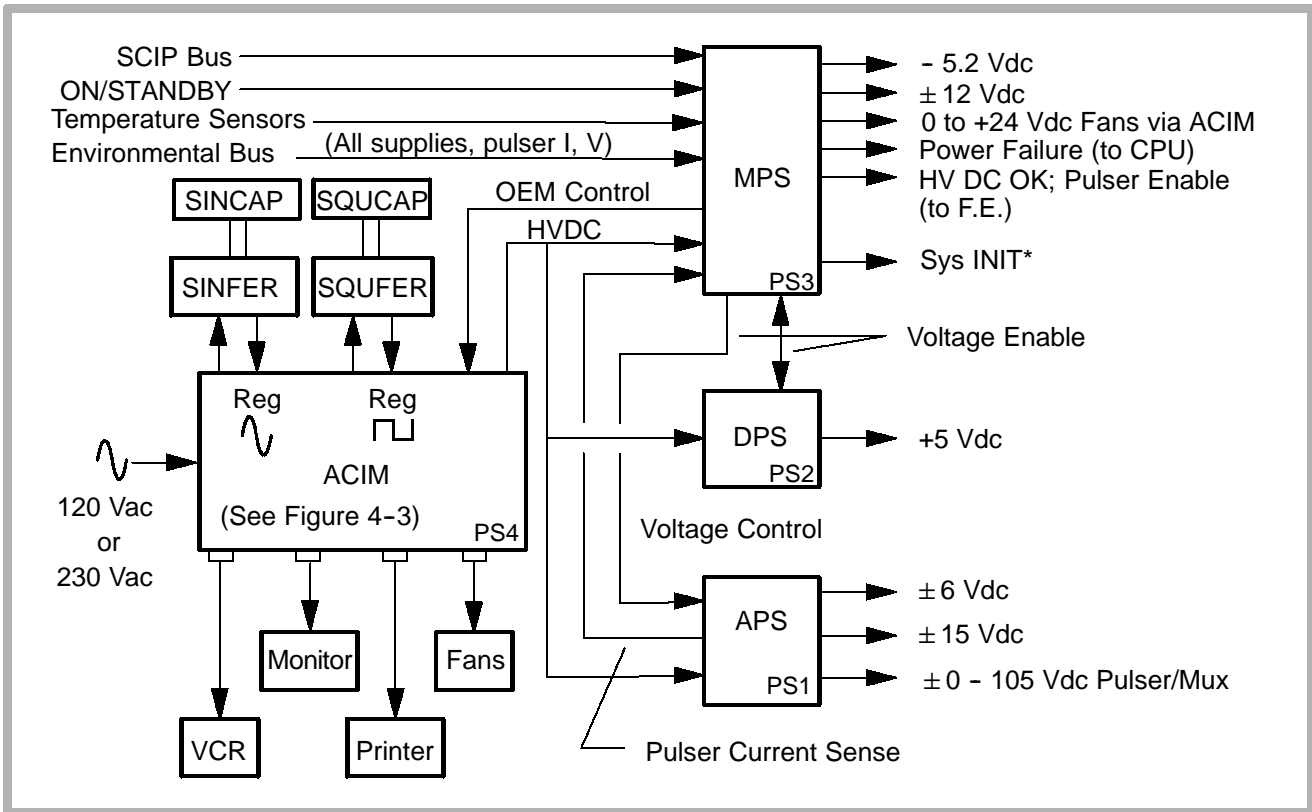


Figure 4-2. Power Subsystem

Power Subsystem Operation

The Power Subsystem operates in three modes:

- **Power-Up:** Initialization period during which MPS boots up to standby after system circuit breaker is turned on
- **STANDBY:** Power supplies on, no power to card cage or internal OEMs, system INIT* set low

CAUTION

HVDC is present on centerplane during STANDBY.

- **ON:** All power rails turned on, system initialized, no faults detected

Refer to [paragraph 4-4.5](#), Output Power Monitor Theory for information about watchdog circuits mentioned below.

Power-Up Mode – occurs when the system circuit breaker is turned on or if the watchdog timer resets the micro-controller on the Master Power Supply. During power-on the following occurs:

- All Power Subsystem outputs are disabled.
- MPS firmware performs a calibration and self-test of the Power Subsystem hardware and logs any detected failures.
- MPS firmware performs routine monitoring of Power Subsystem and system air-stream temperatures.
- MPS firmware routinely updates the LED display with the current status of the Power Subsystem; the LED corresponding to any PCB found to have a fault flickers to indicate a fault is currently detected on that PCB (see [Section 9, “Troubleshooting”](#)).
- Fans speed varies to maintain normal operating temperature.
- The system is placed into STANDBY mode.

STANDBY to On Mode - MPS monitors the ON/STANDBY signal from UIF via the SCIP bus. When the ON/STANDBY switch is set to ON, the following occurs:

- Card cage enabled and monitored for operation within ON mode limits.
- Fans speed varies to maintain normal operating temperature.
- When card cage power is within parameters, the system begins initialization; system INIT* set to high.
- PCM initializes SCIP bus and UIF. After time delay for PCM to initialize, OEM power is enabled..
- MPS monitors Power Subsystem and air-stream temperature and updates LEDs.

On to STANDBY Mode - MPS monitors the ON/STANDBY signal from CPU via the SCIP bus. When the ON/STANDBY switch is set to STANDBY, the system is set to STANDBY mode as follows:

- MPS requests permission to enter STANDBY mode from CPU via SCIP bus and starts a time-out to prevent software latchup.
- CPU initiates a wait period and saves active operating parameters to non-volatile RAM. If CPU does not respond, MPS proceeds with standby sequence.
- Power removed from internal OEMs.
- System INIT* is set low to reset the system.
- Card cage supplies are disabled (fans set to minimum speed).
- Contents of static RAM are copied to non-volatile RAM (time, temperature, status).
- MPS monitors Power Subsystem and air-stream temperature and updates LEDs.

AC Input Module (ACIM) - PS4

- AC input receptacle, circuit breaker (main power switch), ground stud and LED display (LEDs provide diagnostic information. See [Section 9, "Troubleshooting."](#))
- Provides power interface to system fans, OEMs and transformers
- Provides HVDC to MPS, DPS, and APS ([Figure 4-3](#))

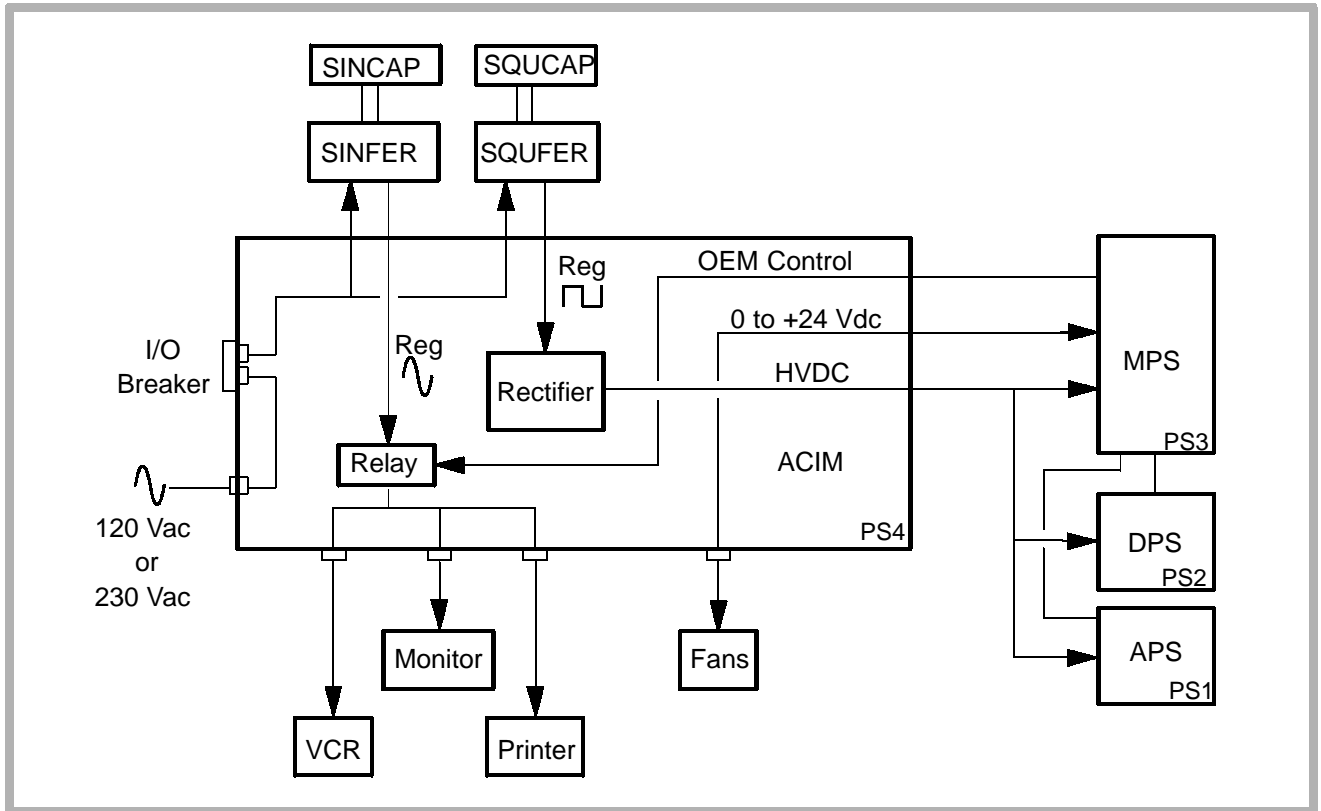


Figure 4-3. ACIM Module

Master Power Supply (MPS) - PS3

- Controls ON/STANDBY mode transitions (three modes of operation) – Power-up, STANDBY, and ON
- Provides ± 12 Vdc, -5.2 Vdc, and 0–24 Vdc (for fans)
- Controls and monitors pulser voltage concurrence with current S/H AP&Is
- Controls internal system temperature through fan speed control
- Monitors all DC rails and updates status LEDs on MPS and ACIM
- Performs self-tests and sub-group diagnostics

Analog Power Supply (APS) - PS1

- Provides regulated ± 6 Vdc, ± 15 Vdc, ± 80 Vdc, and 0-105 Vdc outputs
- Pulser current to voltage conversion for MPS - used for AP&I monitoring
- Power Subsystem board identification and reporting via the Power Subsystem bus
- Powers up with its output voltages disabled, it is enabled or disabled by MPS

Digital Power Supply (DPS) - PS2

- Provides +5 Vdc to card cage
- Powers up with its output voltages disabled, it is enabled or disabled by MPS

4-3.3

Control Subsystem

The Control Subsystem ([Figure 4-4](#)) monitors user input, gives status to the user through UIF, provides system coordination, provides data storage, and service access.

The Control Subsystem consists of:

- System CPU Module (CPU)
- Image Memory Module (IMEM)
- Disk drives (part of Disk Drive, ECG, and Audio module - DDEA)

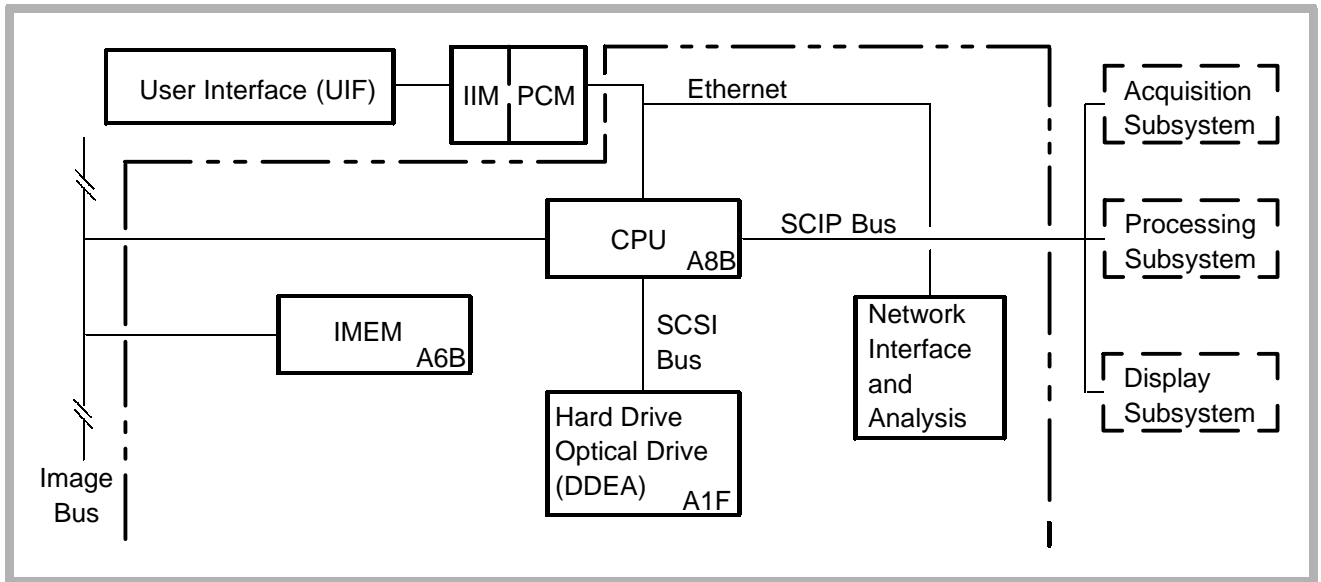


Figure 4-4. Control Subsystem Block Diagram

System CPU (CPU) - A8B

- Motorola 68040 microprocessor; VX Works operating system
- Loads modules requiring operating software at boot-up
- Transfers scanhead tables to the FEC as needed
- Generates coefficients and data tables for Processing Subsystem
- Performs analysis calculations
- Queries Power Subsystem for AP&I status
- X-bus interface to Display Subsystem (PCM)
- Time and date
- Stores user setups
- Verifies major H/W, F/W, S/W revision, upgrade compatibility
- Performs system diagnostics and stores results

Image Memory (IMEM) - A6B

- 16 MB RAM for data storage (standard on systems without 3D or DiskLink)
32 MB RAM for data storage (standard)
64 MB RAM (optional)
- Stores data from ADAPTR (Advanced Digital Audio, Physio, and Translator Module) for transfer to PSP or PCM, or both
- History buffers for 2D Echo, 2D Color, M-mode Echo, Color M-mode, Scrolling Doppler, Physio, and High Q Analysis

Disk Drive, ECG, and Audio (DDEA) - A1F

- Houses 128 MB, 230 MB, or 540 MB optical drive
- Houses hard drives of varying capacities but all are formatted to 2100 MB as required by the operating system software.

4-3.4

Acquisition Subsystem

The Acquisition Subsystem (**Figure 4-5**) controls the transducer, generates the electrical impulse (pulser) that creates the sound wave, and converts the returning echo information into digital data.

The Acquisition Subsystem consists of:

- Front End Controller Module (FEC)
- Scanhead Select Module (S/HSEL)
- Four Channel Boards (CB0 - CB3), or
Eight Channel Boards (CB0 - CB7 on older systems)
- Analog Interface Module (AIM)
- Doppler Acquisition Module (DOPACQ) The DOPACQ PCB is installed only on systems with the CW option.

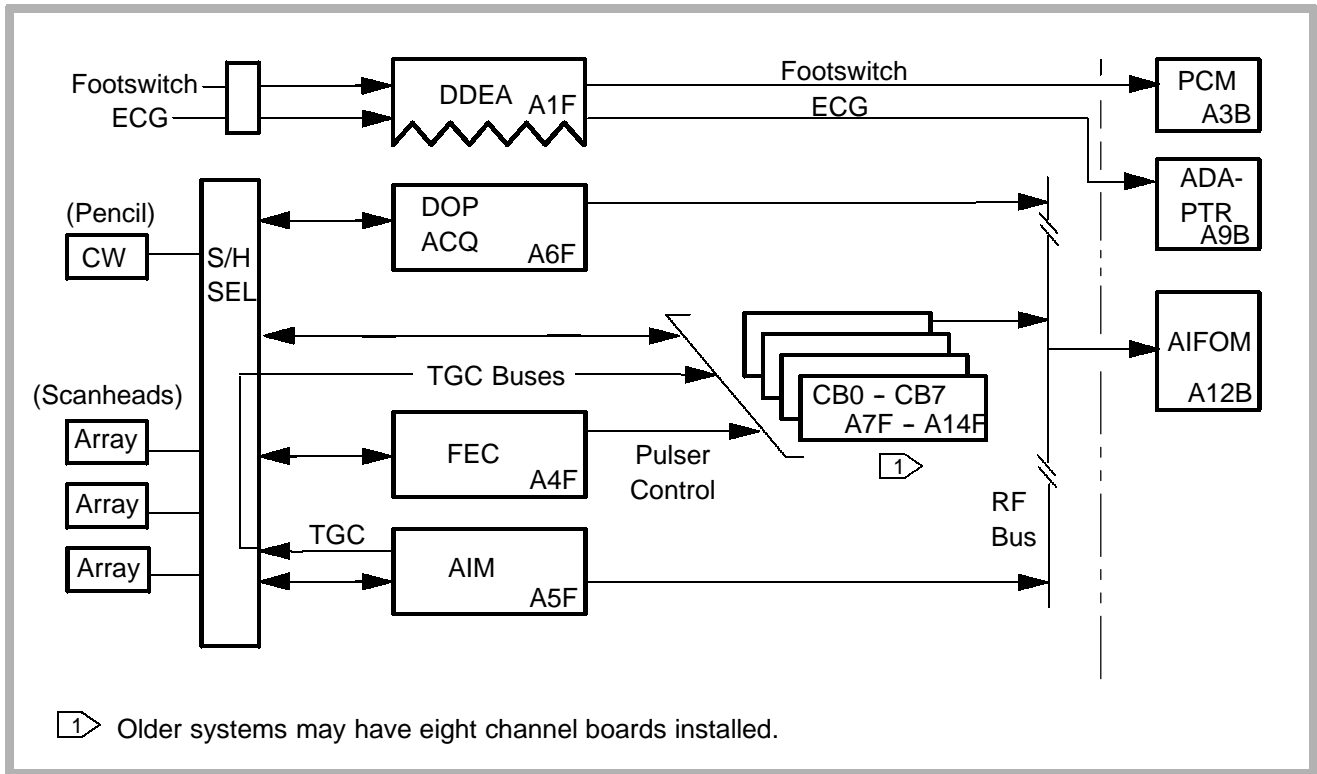


Figure 4-5. Acquisition Subsystem

Front End Controller (FEC) - A4F

The FEC downloads operational parameters from CPU and provides real-time control of the front end for transmit, receive, and beamforming functions.

- Interfaces with CPU via SCIP bus to determine scanning sequence and mode of operation
- Provides timing signals for Tx and Rx cycle
- Controls scanhead selection, personality, and HV Mux through the AIM and Scanhead Select module
- Sends scanhead operating parameters to CBs through FEC bus
- Receives scanning sequence instructions from CPU and generates digital TGC, PRI and other timing sequencing
- Bus Interfaces: SCSI, FEP, Clock, SHC, TGC, RF, TTag, FEC, Sync, SC, and SCAN (see [paragraph 4-5](#))

Channel Boards

- Channel Board RAM is loaded with operational parameters for selected scanhead. Parameters define Tx, Rx and beamforming behavior for each scan line and depth. Transfers data under FEC control for each new PRI

NOTE: Either four or eight Channel Boards may be installed. If four are installed, they will be installed in A7F – A10F (**Figure 4-6**). If eight are installed, they will be installed in A7F – A14F (**Figure 4-7**).

- Transmit apodization/power control under FEC control
- Power monitor circuitry
- Transmits to, and receives from transducer elements under FEC control
- Digitizes RF, beamforms, adds TGC, and sends digital Rx data to Processing Subsystem over the RF Bus for all modes
- Anti-aliasing filtering

- 128 transmit pulser elements (16 per Channel PCB on systems with 8 Channel PCBs. 32 per Channel PCB on systems with 4)
- 128 synthesized channel receive apertures
- Bus Interfaces: Summing, TGC, RF, Clocks, Timing, FEC, FEP

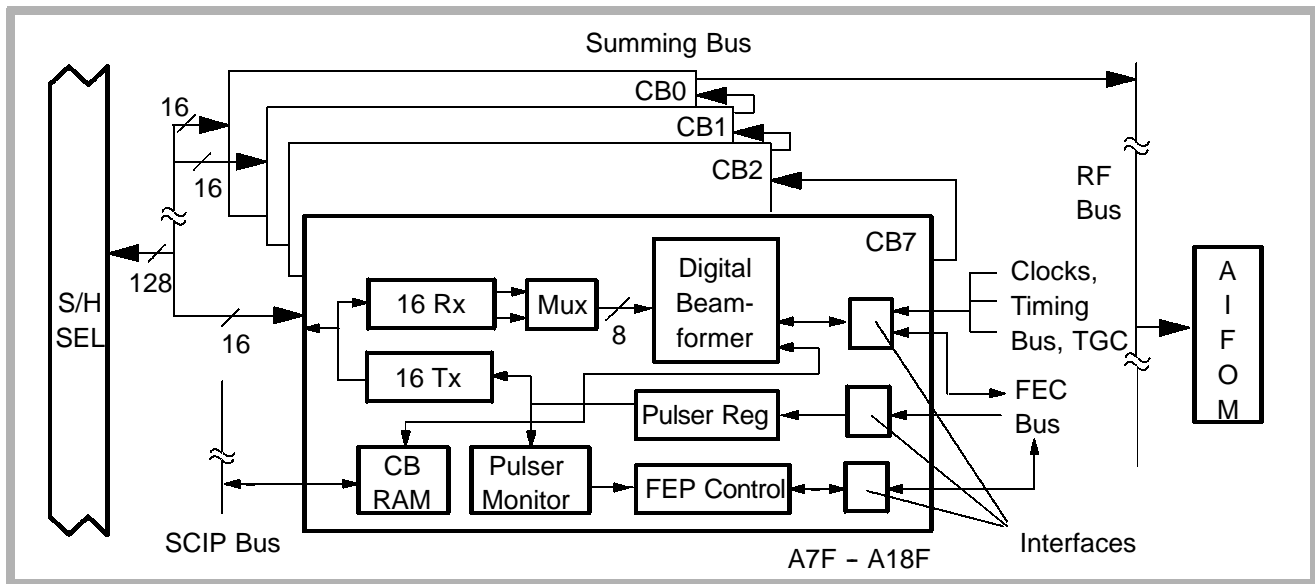


Figure 4-6. Channel Boards (Systems with 8 Channel PCBs)
 (For pulser monitor and power monitor theory, see **Figure 4-15**)

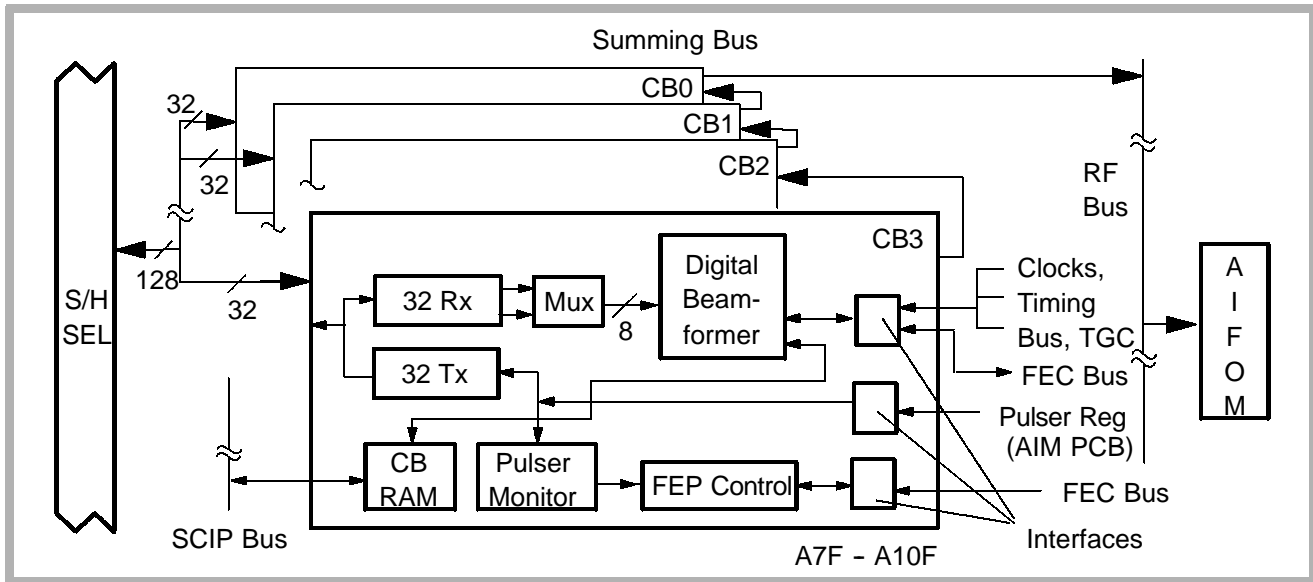


Figure 4-7. Channel Boards (Systems with 4 Channel PCBs)
 (For pulser monitor and power monitor theory, see **Figure 4-15**)

Analog Interface Module (AIM) - A5F

- Generates two-stage TGC control signal
- D/A conversion of TGC
- Relay control for desired scanhead on S/HSEL
- All front end and system clocks (240 MHz system oscillator)
- Scanhead temperature sensing to FEC via FEP
- Sends S/HSEL status and personality data to FEC via FEP bus
- Buffers and provides HV Mux selection data to the scanhead
- Supplies high voltage to HV Muxes on S/HSEL

Doppler Acquisition (DOPACQ) - A6F

- Tx/Rx Doppler for static CW and static PW (TCD)
- Intermediate Frequency Rx for steered CW Doppler
- Digitizes Doppler to AIFOM
- Generates I/Q for static Doppler and steered CW

Scanhead Select Module (S/HSEL)

- Connection and mux for transducer elements and the channel boards for array transducer
- Provides connection for static CW and TCD transducers to DOPACQ

4-3.5

Processing Subsystem

The Processing Subsystem (**Figure 4-8**) filters the echo information, and transforms it for display processing. Post-processing, data storage for zoom, and Cineloop Review take place in this subsystem.

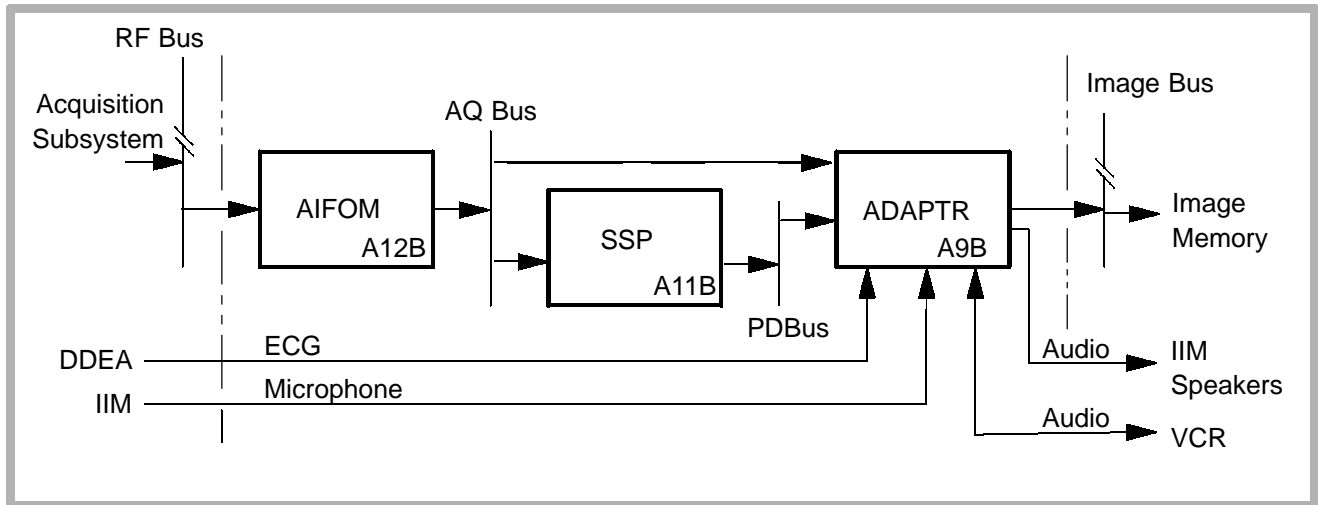


Figure 4-8. Processing Subsystem

Advanced Intermediate Frequency Output Module (AIFOM) - A12B

- Synthetic aperture
- Converts RF data into quadrature (I and Q) data for beam-former data in Doppler modes
- Demodulates received RF digitized waveform to either amplitude- or phase-shifted data in 2D modes
- Dynamic Range

Sample Space Processor (SSP) - A11B

- Processes Color Flow, Spectral Doppler, and M-mode data
- Persistence
- Smoothing
- FFT
- High Q Automatic Doppler Analysis calculations
- Color Doppler filtering

Advanced Digital Audio, Physio, and Translator Module (ADAPTR) - A9B

- Triggers acquisition from front end based on SC bus command and local timer
- Audio to speakers and VCR
- Processes microphone and VCR audio; A/D conversion, gain and filtering
- Provides D/A audio reproduction for audio sources

4-3.6

Display Subsystem

The Display Subsystem ([Figure 4-9](#)) formats the echo information for display, and transfers it to the video monitor and peripheral devices.

User Interface (UIF)

- Upper and lower control panels (UCP and LCP)
- Control Panel Interface Module (CPI)
- User interface for pull down menus for functions that are user options and dedicated controls for functions used during examinations

NOTE: *System self-diagnostics includes the UIF as part of the Display Subsystem.*

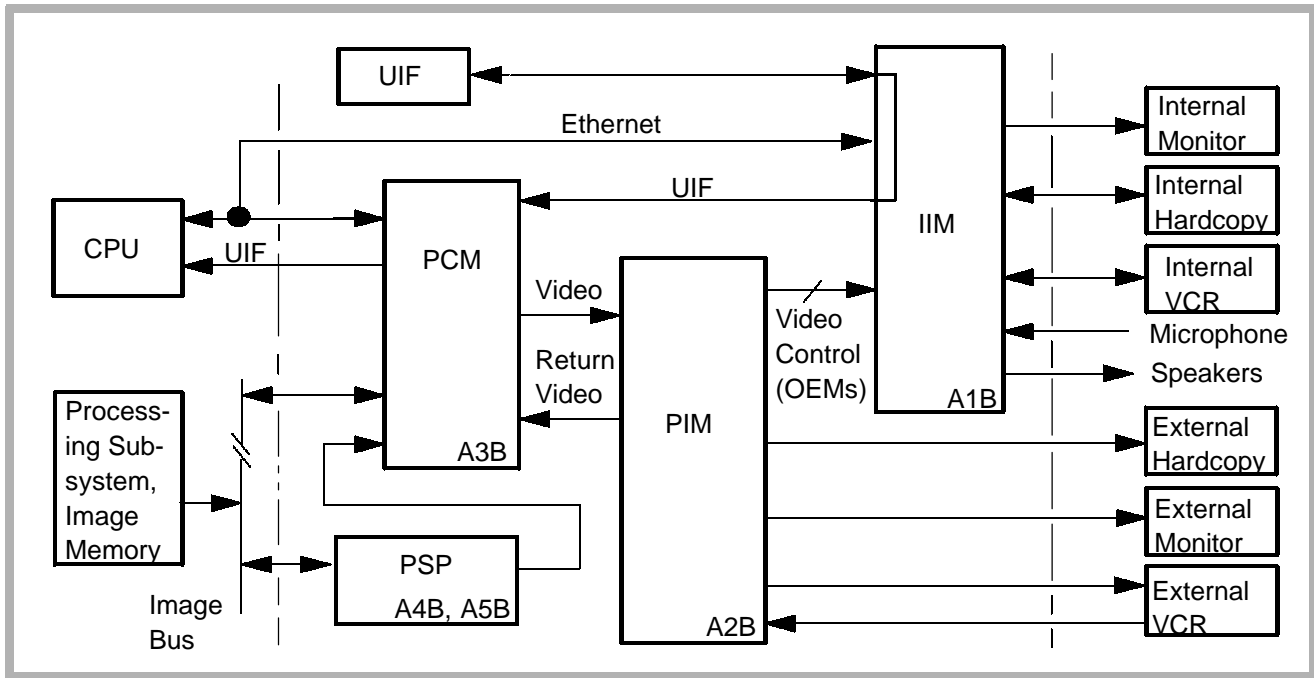


Figure 4-9. Display Subsystem

Pixel Space Processor (PSP1 & 2) - A5B, A4B

- Scan conversion
- Zoom
- Static and scrolling graphics
- Freeze (buffer memory located on PSP1)

Pixel Conversion Module (PCM) - A3B

- Controls UIF window displays (X-windows)
- Gray scale and color LUTs
- Converts non-interlaced 60/50Hz to interlaced 30/25Hz for OEMs
- Gray and color bar generator

Peripheral Interface Module (PIM) - A2B

- Encode/decode NTSC and PAL composite Y/C video
- System video sync (video clock)
- Controls Internal OEMs through IIM

Internal Interconnect Module (IIM) - A1B

- Audio buffers for internal OEMs
- Interconnections between system and UIF, monitor, and devices

4-4

Data Paths

4-4.1

2D Data Path

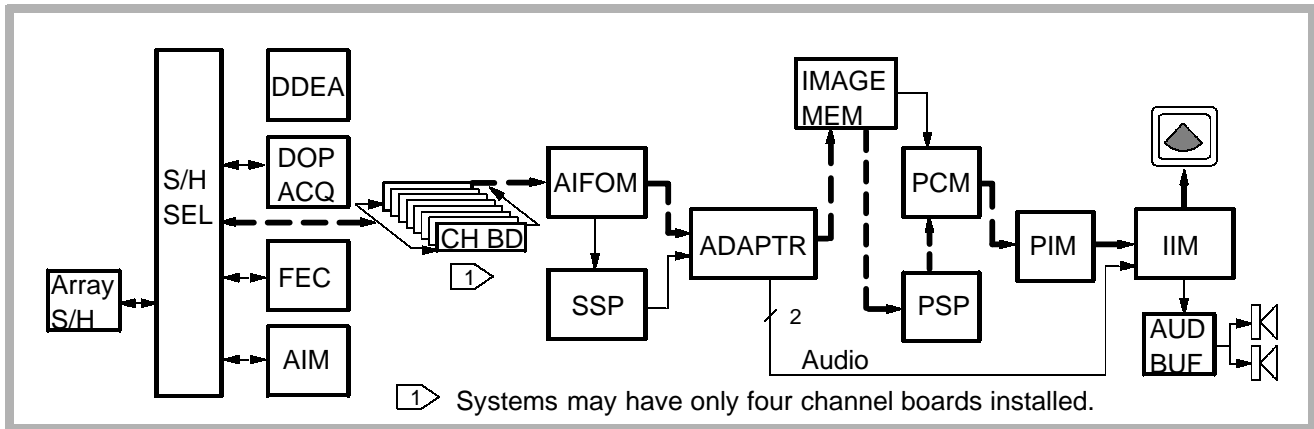


Figure 4-10. 2D Black and White Signal Path

4-4.2

PW Doppler, Color, and M-Mode Data Path

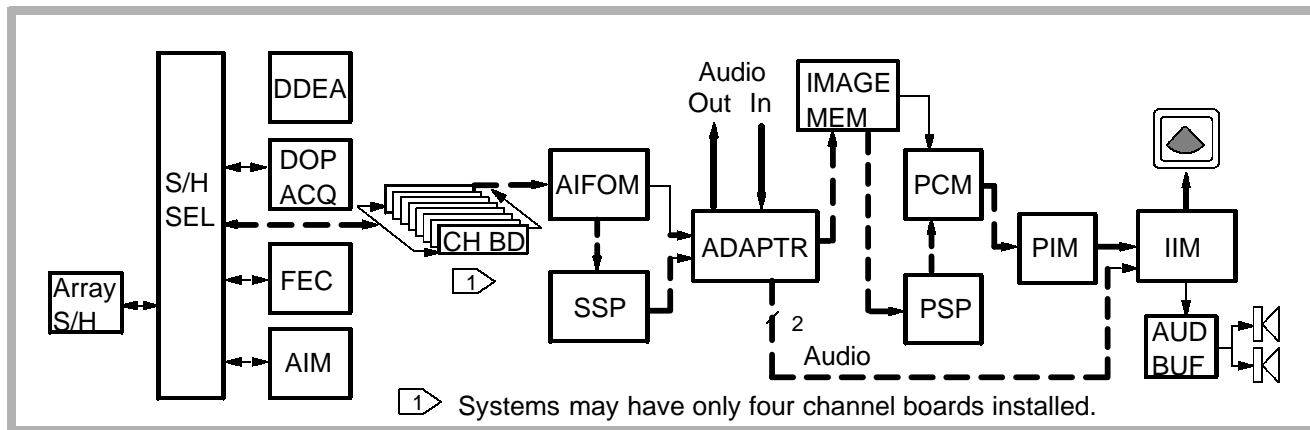


Figure 4-11. PW Doppler, Color, M-Mode and Color M-Mode Path

4-4.3

CW and Static PW Doppler Data Path

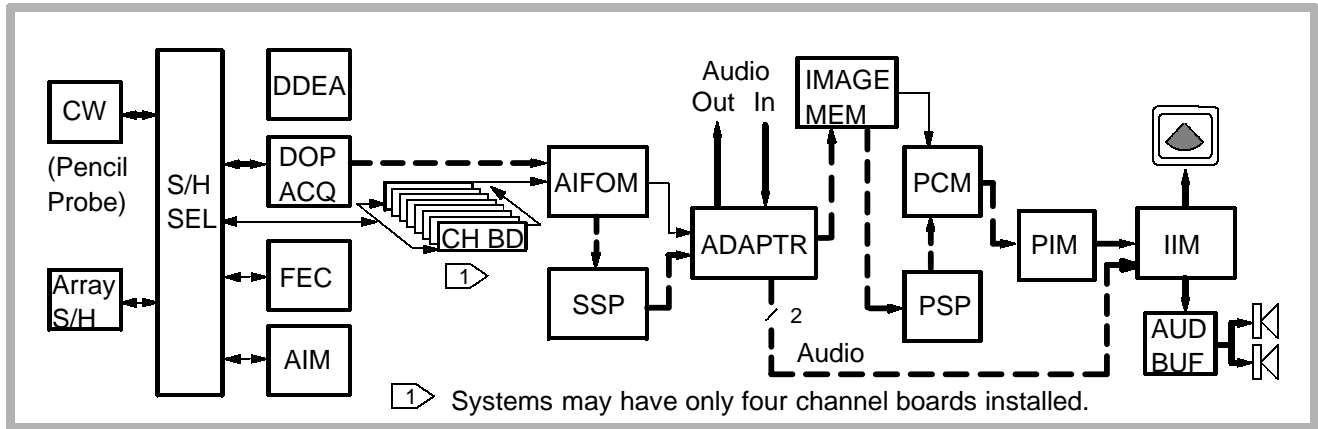


Figure 4-12. CW and Static PW Doppler (TCD) Signal Path

4-4.4

VCR Playback Path

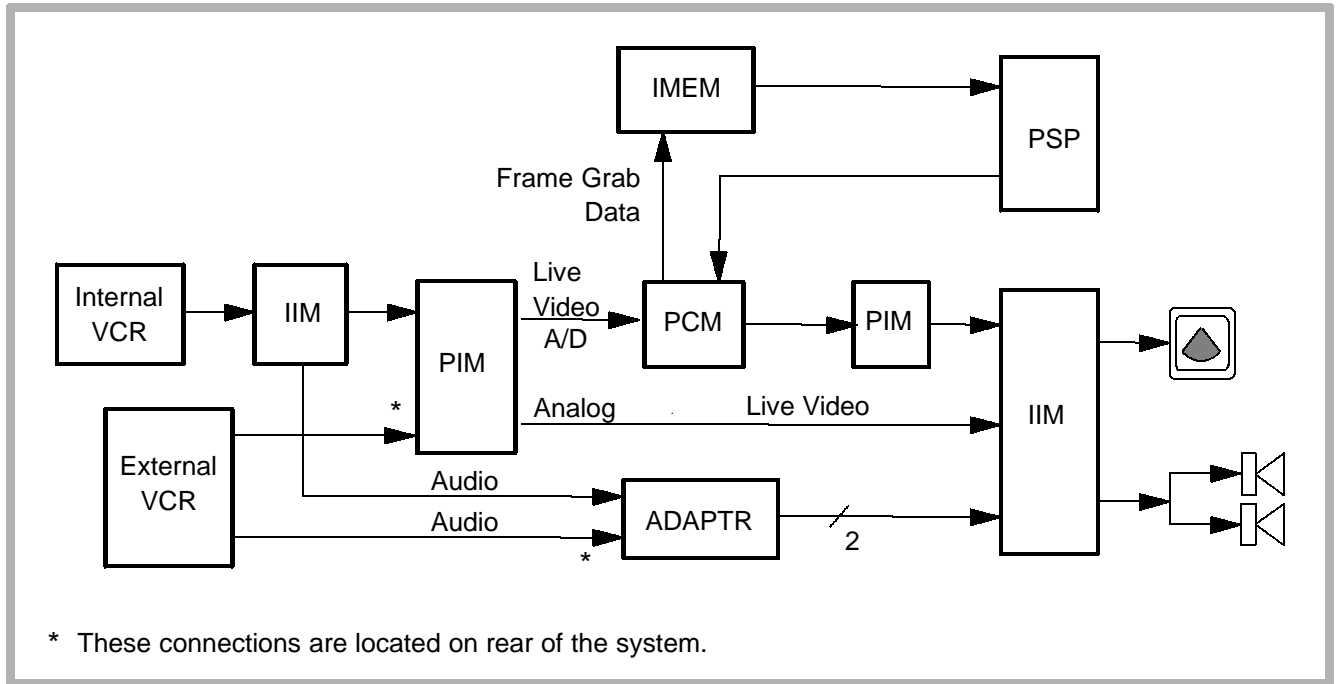
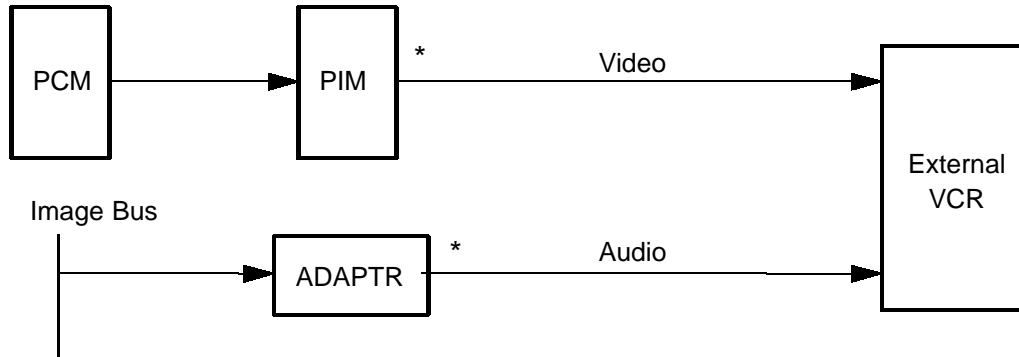


Figure 4-13. VCR Play Signal Path



* These connections are located on the rear of the system.

Figure 4-14. External VCR Record Signal Path

4-4.5

Output Power Monitor Theory

Output power monitor circuitry (**Figure 4-15**) provides patient safety by ensuring that the system is operating within acoustical power and intensity (AP&I) limits. It also protects hardware from destructive or unsafe conditions. It consists of AP&I software, which resides on the System CPU; Power Subsystem monitors in each power supply that report to the Master Power Supply; pulser monitors in each channel board; and a beamformer monitor.

The output power monitor is designed to detect any single failure in the system, for example, a faulty power supply, a faulty beamformer, a software failure, a defective scanhead or scanhead data files. Mode information (PRI, voltage, burst, and so on) sent to the beamformer is also verified before allowing the beamformer to start. This prevents the system from inadvertently creating a temporary over-power condition.

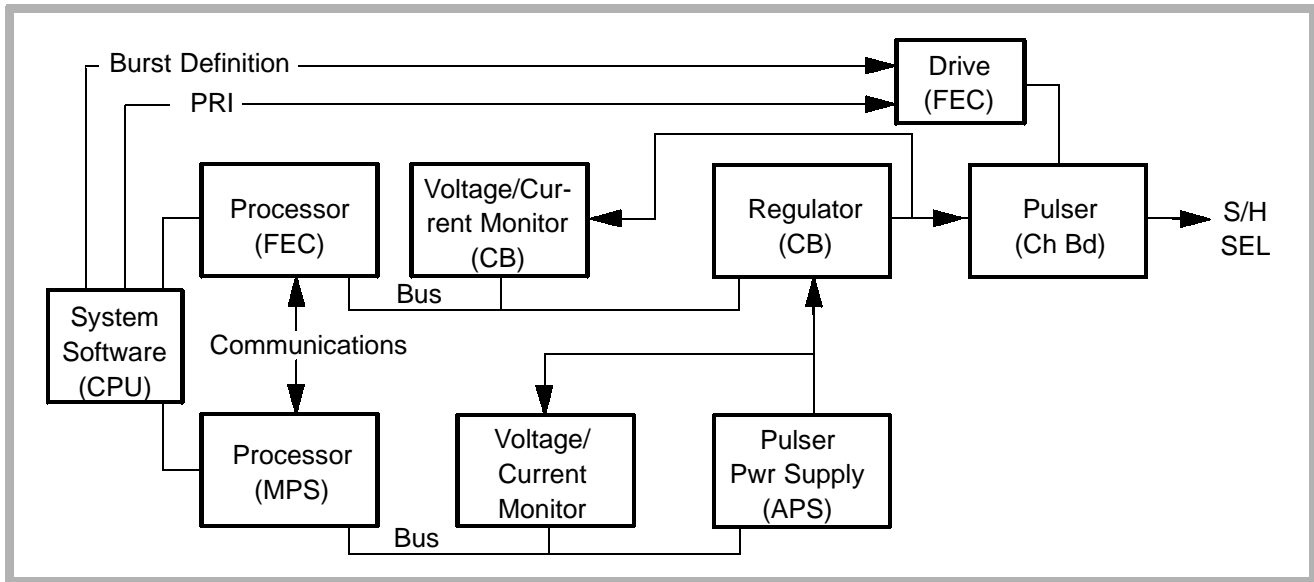


Figure 4-15. Power Monitor Block Diagram

Both software and hardware watchdogs disable the transmit function when errors are detected. Software watchdogs monitor variable parameters (for example, AP&Is vary from scanhead to scanhead). When the software watchdog in the system CPU receives an error report from a (FEC or MPS) power monitor, it disables the system from transmitting and disables the signal data path. Hardware watchdog circuits disable or shut down the system when maximum, and in some cases minimum, parameters are exceeded (for example, minimum power supply output voltage or minimum current limits).

The CPU uses the AP&I software program and system control settings to calculate the required power output for the selected transducer and operating modality. These values are sent to the channel boards to control generation of pulsers for the beamformer. Voltage and current monitors compare the measured pulser control values with the allowable limits listed in the AP&I software tables.

NOTE: Software AP&I tables contain power maximums for each transducer in its allowed operating modes. This data is included in the system reference manual.

The power monitor also provides system and hardware protection through hardware watchdog circuitry for maximum voltage, maximum pulser currents and output electrical power. When measured parameters exceed allowable values, the power monitor circuitry disables the supply and signals the error to the system CPU.

The beamformer monitors the average pulser voltage supplied to the beamformer, pulser output voltage and average current. If the monitored values exceed the maximums for voltage and pulser currents, maximum pulser output electrical power and maximum pulser power dissipation, the beamformer software watchdog disables the beamformer and signals the system controller.

Time-outs in the system software verify that the system software can communicate with the FEC and the Power Subsystem. If either subsystem is not active and functioning, the system stops the beamformer and shuts down the pulser supply. Time-outs are initiated at regular intervals and acknowledged by the affected circuits, if operating properly. Time-out alerts usually are reset if mode, power or some other function is changed.

4-5

Bus Functions

4-5.1

Control Subsystem Buses

Serial Control Interface Processor (SCIP)

- Relieves Module Operation Processor (MOP) in servicing control bus activity
- Master-slave multi-drop communication network
- SCIP prom on each PCB manages data flow on this bus.

Small Computer System Interface (SCSI)

- Interfaces optical and hard disk drives to CPU
- Provides an external port for future use
- Interface circuitry on CPU manages data flow on this bus.

4-5.2

Acquisition Subsystem Buses

FEC Bus

Provides operational parameters and controls use of them by CBs. The Gate Array Sequencer circuitry on the FEC controls data flow on this bus.

Timing Bus

Carries real-time control signals to CBs, AIM, and DOPACQ

- Carefully controlled to ensure sync with front end clocks
- Start and stop Tx/Rx cycle
- Controls output of the front end ultrasound data on SUM and RF buses
- Line Sequencer circuitry controls data flow on this bus.

Power Supply Sync Bus

Transfers real-time high voltage power supply status between FEC and MPS to sync starting, stopping and power level changes in the system

SUM Bus

Daisy-chained bus that passes from CB to CB carrying the partially beamformed sum. Each CB sums its channels. It then sums its result with the sum of the previous CB and passes the result to the next CB. Summing ASICs on CBs control data flow on this bus.

S/H Control Bus

Unidirectional bus between FEC (master) and AIM.

Digital TGC Bus

- Carries current digital value of TGC curves and digital values for pulser voltage regulators.
- AIM receives digital TGC values for D-to-A conversion to analog TGC voltages.
- AIM receives digital pulser values for D-to-A conversion to a high-voltage analog DC value for each channel.
- The FEC manages data flow on this bus.

Analog TGC Bus

Two differential analog buses on S/HSEL driven by AIM and received by all CBs for two variable gain stages. The FEC controls this bus via the Digital TGC bus.

CW Sum Bus

- Differential current bus on the S/HSEL driven by CBs.
- AIM receives and processes current representation value of beamformed CW data.

FEP Bus

Extension of CPU bus on FEC bus used for nonreal-time tasks such as output power monitoring and scanhead interface control. This is a digital bus controlled by the FEC.

Time Tag Bus

Used by digital signal processing modules for time tag data. FEC generates time tag signals. The FEP bus is an extension of the FEC's CPU bus. It is used for nonreal-time tasks such as output power monitoring and scanhead interface control.

RF Bus

Carries signal data from the front end to the AIFOM and I&Q data from the AIFOM to the Acquisition subsystem. The FEC manages data flow on this bus.

4-5.3

Processing Subsystem Buses

RF Bus

Same as in [paragraph 4-5.2](#).

AQ Bus

Provides 2D and Doppler signal data to the SSP and ADAPTR PCB. ABICS circuitry on each PCB manages data flow on this bus.

PD Bus

Provides 2D data to the ADAPTR PCB. ABICS circuitry on each PCB manages data flow on this bus.

Image Bus

Provides raw image data to the Display Subsystem. Interface circuitry on each PCB manages data flow on this bus.

4-5.4

Display Subsystem Buses

Image Bus

Same as in [paragraph 4-5.3](#)

Video Bus

Provides (scan converted) video data path between the PCM and PSP PCBs. Interface circuitry on each PCB manages data on this bus.

5 *Installation*

5-1 **Pre-Installation**

5-1.1 **Introduction**

The purpose of the on-site evaluation is to ensure a trouble-free installation and to assist the customer in providing an environment that supports the reliable performance of an ATL ultrasound system. These instructions are intended to guide you through a comprehensive inspection that ensures all physical, electrical, and environmental conditions are appropriate for optimal system operation.

Refer to the system specifications in [Table 5-1](#), [Table 5-2](#), and [Table 5-3](#) when evaluating the site.

5-1.2

Required Materials

- Tool Kit and Digital Voltmeter (DVM)
- Oscilloscope
- ONEAC Line Viewer
- Three-prong Test Plug (6005-0564-01)
- ATL General Service Manual (4720-0219-XX)
- Power Line Data Sticker (4765-0247-XX)
- Fluke LAN Tester

5-1.3

Environmental Requirements

Verify the system is to be operated in a room that meets the environmental requirements listed in [Table 5-1](#).

Table 5-1. System Specifications

Parameter	Metric Value	U.S. Value
Height ¹	136 cm	53.6 in
Width	70.1 cm	28.1 in
Depth	97.2 cm	39.1 in
Weight with Peripherals ¹	200 kg	440 lbs
Fully Crated Shipping Weight (VCR separate)	295 kg	650 lbs
Ambient Operational Temperature ²	16 to 40° C	61 to 104° F
Internal Operational Temperature ²	16 to 55° C	61 to 131° F
Internal Operational Humidity	15 to 95% RH (non-condensing)	
Storage Temperature ³	-35 to 65° C	-31 to 149° F
Storage Humidity	15 to 95% RH (non-condensing)	
Heat Output ⁴	5284 BTU/Hr at 1548 W	

1. Height with VCR is 136.0 cm (53.6 in); height with monitor removed is 106.7 cm (42 inches); weight without monitor or peripherals is 172 kg (380 lbs).
2. Atmospheric pressure must be between 1013 hPa to 709 hPa (1.0 to 0.7 Atm).
3. Atmospheric pressure must be between 1013 hPa to 303 hPa (1.0 to 0.3 Atm).
4. Heat output at current draw listed in Table 5-3. Peripherals will increase heat load. Discuss with the facilities engineer the possible requirement for additional air circulation to handle the heat load from the system.

Table 5-2. System Crate Dimensions

Dimensions	Wood Crate	Corrugate Crate
Height	61 in / 155 cm	61 in / 155 cm
Width	39 in / 99 cm	38 in / 96.5 cm
Depth	45 in / 114 cm	43 in / 109 cm

5-1.4

Electrical Power Requirements

WARNING

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

- To verify a dedicated/isolated line:
 1. Explain to the facilities representative that the system requires a dedicated/isolated line meeting the power requirements as listed in [Table 5-3](#).

2. Verify that the outlet to be used is a dedicated/isolated line:
 - a. Have the facility representative open the circuit breaker.
 - 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/isolated outlet box.
3. Verify the proper wiring of the outlet using a three-wire test plug. This plug also tests for the presence of a ground, but it cannot detect neutral/ground reversals.
4. Inform the facility representative of the current draw of the system and its acceptable voltage range. 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. To determine line loss, if a facility representative is available:
 - a. Have the facility representative measure the voltage at the primary of the line's circuit breaker in the distribution sub-panel.
 - b. Measure the voltage at the wall outlet.
 - c. Calculate the percentage of voltage loss across the line using the formula:

$$\text{Percent line loss} = [(A - B)/A] \times 100$$

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.

- d. Continue with [step 8](#).

7. If a facility representative is not available:
 - a. Measure the voltage at the outlet with the load on and then with the load off.
 - b. Calculate the percentage of voltage loss across the line using the formula:

$$\text{Percent line loss} = [(A - B)/A] \times 100$$

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.

8. Use an ONEAC line viewer and oscilloscope to measure power-line noise following the procedures specified in Section 3, "Power", of the *General Service Manual* (4720-0219-XX). Repeat with a load applied, for example, another ultrasound system.
9. Record your power quality observations and measurements.
10. 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.

Table 5-3. Power Specifications

Measurement (system only)	100 Vac, 50 Hz	120 Vac, 50 Hz 120 Vac, 60 Hz	230 Vac, 50 Hz 230 Vac, 60 Hz
Hot/Neutral	90-110 Vac	96-132 Vac	184-253 Vac
Current Draw (normal / peak) ¹	8.0 / 10.7 A	6.7 / 9.0 A	3.4 / 4.7 A
Power Draw (normal / peak) ¹	800 / 1075 VA	800 / 1075 VA	800 / 1075 VA
	775 / 1050 W	775 / 1050 W	775 / 1050 VA
Power Dissipation ² , Maximum/ Intermittent	1548/1800 W		
Neutral-to-Ground	< 3 Vac RMS		
Line Loss	< 3%		
Distortion	< 20%		
Common Mode Noise	< 1.5 Vp-p		
Normal Mode Noise	< 10 Vp-p		

1. Current draw and power draw specifications are for the rated voltage ranges.
2. Peripherals will increase heat load.

5-1.5

Electrostatic Discharge

During normal system operation, the presence of electrostatic discharge (ESD) can cause system lock-ups and reliability problems.

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 can result from low humidity, 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 during the following steps.

1. Check for the presence of ESD by walking around where the system will be installed and touching grounded surfaces.

2. Ask the operators if they have experienced static discharge in the work area.
3. Suggest possible ESD minimizing devices and their usage, for example, static mats, humidifiers, and sprays.

Some facts about ESD:

- ESD voltages in excess of 2,000V cause a shock.
- ESD is audible above 5,000V.
- ESD is visible above 10,000V.

5-1.6

Electromagnetic and Radio Frequency Interference

Electromagnetic interference (EMI) and radio frequency interference (RFI) typically cause image noise. EMI and RFI can be generated by a variety of electrical devices and may not be apparent until installation. The interference can be transmitted over power lines or radiated through the air.

1. Use an AM radio tuned between stations around 1600 KHz as an EMI/RFI tester while walking around the room.
2. Note any obvious or potential noise generators. Typical generating devices include (but are not limited to) gel warmers, coffee pots, air conditioners, fans, photocopiers, computers, printers, electric typewriters, lab equipment, surgical equipment, MRI units, elevators, radios, light dimmers, and refrigerators.

5-1.7

Dust

Air circulation requirements of the system and the location of its air filter can cause dust to accumulate rapidly on the air filter and cause the system to overheat. Advise the customer about the need to maintain a low level of dust in the room.

Refer to [Section 8, "Preventive Maintenance"](#) for the fan filter cleaning procedure.

5-1.8

Lighting

Ambient light can interfere with the viewing of video monitors. A darkened room is preferred. Note if there are shades or blinds, small lamps or dimmer switches in the room which can be used to control ambient light.

5-1.9

System Specifications

Wiring Requirements

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

5-1.10

Image Management Network Requirements

The network can be configured entirely with cable supplied by ATL. However, more commonly, the customer or their contractor will install the network cabling according to ATL-provided cabling guidelines. If in-wall cabling is used, it is the customer's responsibility to install the correct type of cable in accordance with all applicable building and fire codes. It is also the customer's responsibility to maintain the in-wall cabling for the life of the system. The most common type of cable used is 10 Base-T (unshielded twisted pair). Refer to **Table 5-4** to identify what type of network cable is installed.

- Perform the following steps before installing the NetLink option:
 1. Identify the system administrator (and backup person, if possible).
 2. Obtain the following information from the system administrator:
 - A list of all equipment that is part of the Image Management network
 - Logical diagram of the network showing topology, subnets, etc.
 - Diagram of the network
 - Locations of equipment
 - Locations of all LAN attachment points
 - Locations of power outlets and connector types
 - Locations of any dedicated analog phone lines
 - All necessary Internet Protocol (IP) addresses and subnet information.

3. Verify the network cabling has been properly installed:
 - a. Determine the type of cabling installed (**Table 5-4**).
 - b. If 10 Base 2 cabling has been installed, verify that it has been terminated on each end with a 50 ohm terminator. If the cables are terminated behind wall plates, remove the wall plates to determine the cable type.
 - c. Use the network layout diagram to determine the location of all LAN attachment points.

Table 5-4. Network Cable Types

Cable Type	Cable Identifier	Cable Terminator
10 Base 2	BNC connectors on wall plate	50 ohm terminator on both cable ends
10 Base T	Modular phone type connectors on the wall plate.	No terminator required but recommended

4. Contact OEM equipment installers about the installation.
5. Call ATL to check device compatibility prior to connecting new devices (printers, archive devices) to the network.
6. Proceed to [paragraph 5-3](#) to install NetLink.

5-2

System Installation

5-2.1

Introduction

This section contains inspection and installation procedures.

NOTE: Some parts of this section include policies, equipment requirements, and procedures that may apply only to U.S. field use. Distributors, affiliates, or other authorized service personnel, should use their equivalent document.

Before the system is delivered, perform a site inspection as described in [paragraph 5-1](#). After you have completed the inspection and installation of the system, verify correct operation using the performance tests in [Section 6, “Performance Tests.”](#)

5-2.2

Materials and Equipment

- Three-prong Test Plug (6005-0564-01)
- FSE Tool Kit
- Oscilloscope
- ONEAC Line Viewer
- DVM (digital volt meter)
- Pre-installation and Installation FSRs
- Quality Assurance Audit (PM) label (4100-0941-XX) and label overlay (4100-0941-XX)
- Service manuals for the peripheral devices included in the system

5-2.3

Preliminary Inspection

- Inspect the shipping crate before unpacking the system.
 1. Examine the shipping crate for damage caused by rough handling. Look for evidence that the crate was opened.
 2. Verify that the Shockwatch and Tiltwatch indicators on the outside of the carton have not been activated. If the indicators appear red in color, check the system for further damage.
 3. Report any damage or pilferage to the carrier and to the ATL traffic department.

Uncrating Instructions

Wood Crate

————— CAUTION —————

Before uncrating the system, ensure that the area in front of the shipping crate ramp is clear for at least nine feet. (The ramp is the front side and is labeled “OPEN THIS END”.)

- To uncrate the system from a wood crate:
 1. Remove the four bolts securing the top and remove the top (**Figure 5-1** and **Figure 5-2**).
 2. Remove the six bolts securing the ramp (the crate front).
 3. Lower the hinged ramp.
 4. Remove the front and side cardboard/foam panels.
 5. Remove the front caster chock.
 6. Verify the upper UIF panel is securely latched (slide button is in up position) on the left side of the UIF panel.

7. Verify the monitor is correctly installed and latched:
 - a. Grasp the monitor under one speaker and lift. If the latch is properly latched, the monitor will not raise.
 - b. Repeat [step a](#) on the opposite side of the monitor.
 - c. If the monitor is not secured properly, remove the VCR, then remove the monitor from the system.
 - d. Re-install the monitor ensuring the monitor mounting prongs mate into both latches.
 - e. Repeat [steps a](#) and [b](#) to verify the monitor assembly is secure.

CAUTION

It is possible for the monitor to be installed in the tilt swivel base without the locking prongs mating with the latches. In this case, the latches can still be placed in the correct latching positions, but the monitor will not be secure.

WARNING

Use care when moving the system down the ramp. Serious injury or equipment damage can result if the system becomes out of control.

8. Verify the caster brakes are released and roll the system down the ramp.
9. Knock the wood crate down flat and return to ATL.

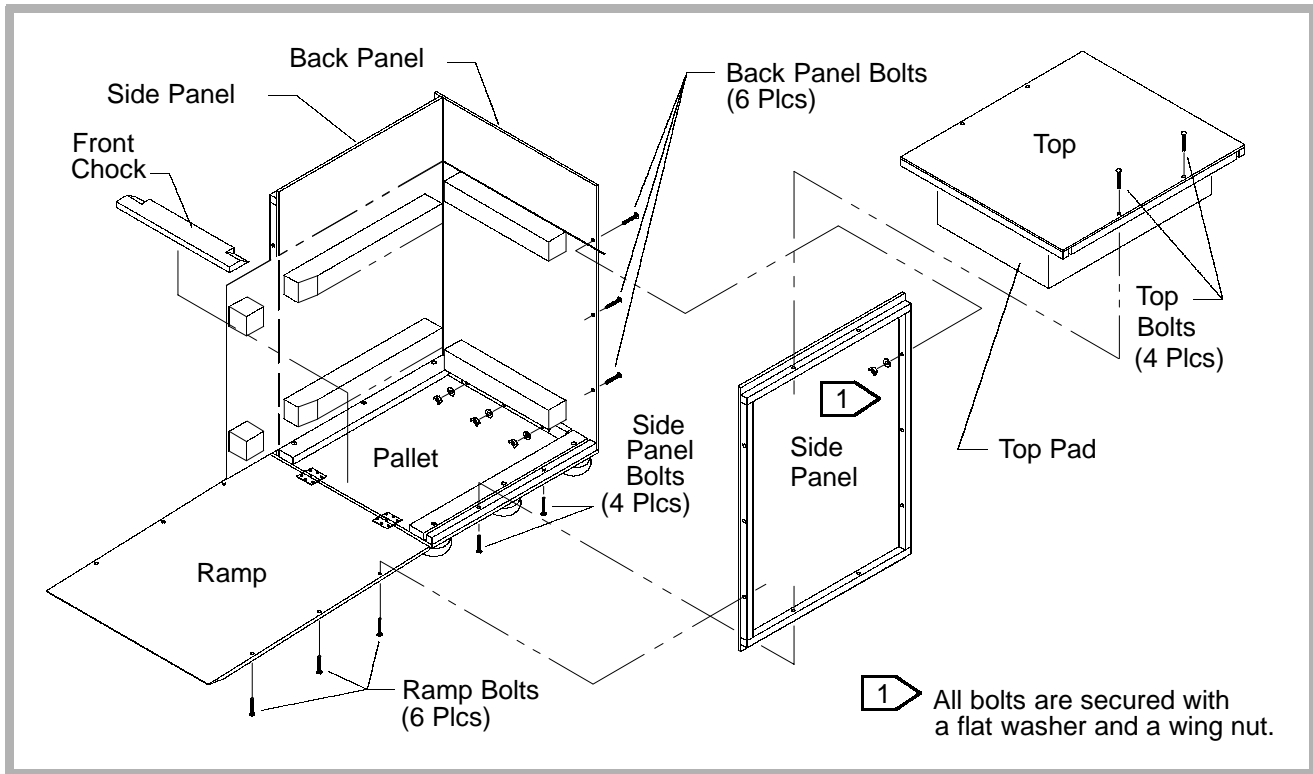


Figure 5-1. Wooden Crate Details

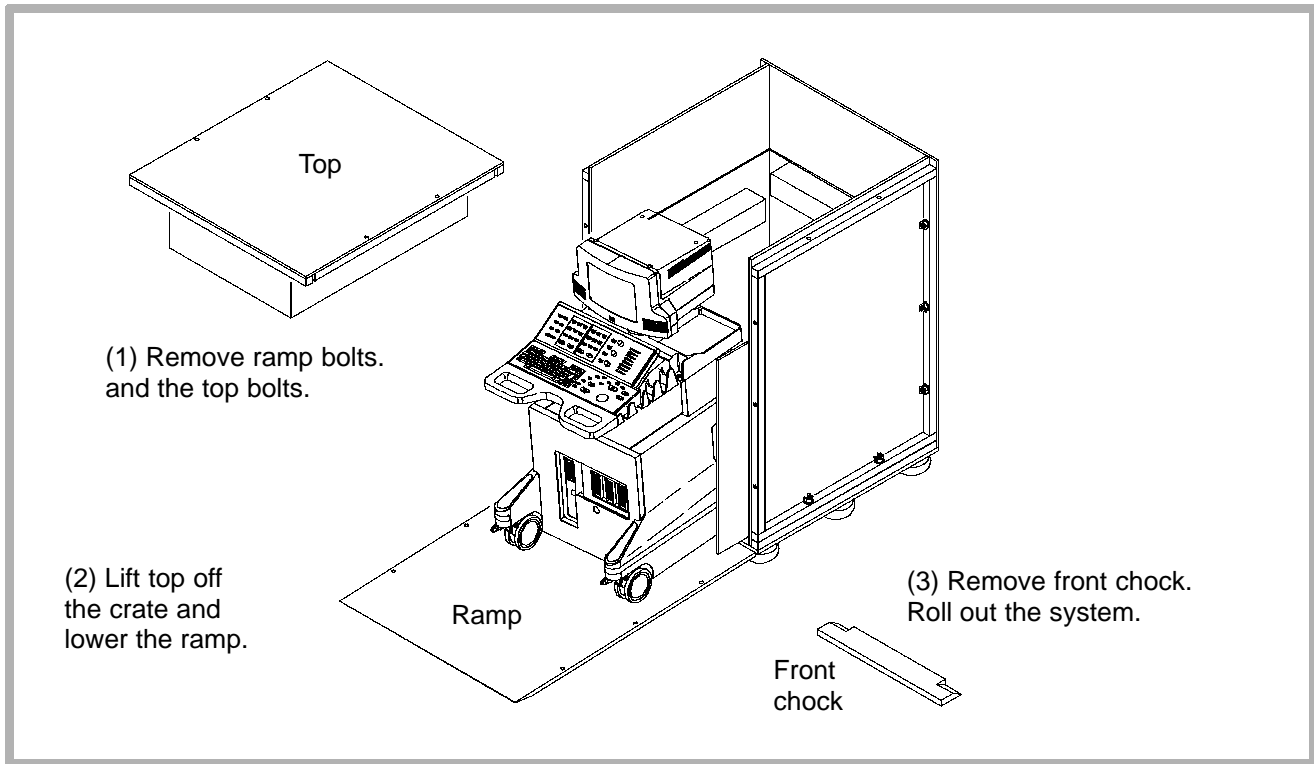


Figure 5-2. Unpacking Details

Corrugate Crate

CAUTION

Before uncrating the system, ensure that the area in front of the shipping crate ramp is clear for at least nine feet. (The ramp is the front side and is labeled “OPEN THIS END”.)

- ❑ To uncrate the system from a corrugate crate:
 1. Inspect the tilt and shock indicators on the outside of the crate. If the indicators show red, inspect and test the system to determine if it was damaged during shipment.

WARNING

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

2. Remove (cut) the two plastic strapping bands from around the corrugate container ([Figure 5-3](#)).

3. Remove the top cover from the corrugate crate.
4. Remove any accessories placed on the corrugate tray in front of the monitor (**Figure 5-4**).
5. Cut the taped edges of the container and remove the two-piece corrugate box from around the system.
6. Remove accessories and other loose-packed items not removed in [step 4](#).
7. Remove the two 9/16-inch bolts securing the front section of the inner crate to the pallet. This piece also serves as a ramp.
8. Position the tall end of the ramp so that it butts up against the pallet at the front of the system with the beveled end of the ramp sloping to the floor.

WARNING

Use care when moving the system down the ramp. Serious injury or equipment damage can result if the system becomes out of control.

9. Verify the upper UIF panel is securely latched (slide button is in up position) on the left side of the UIF panel.
10. Verify the monitor is correctly installed and latched:
 - a. Grasp the monitor under one speaker and lift. If the latch is properly latched, the monitor will not raise.
 - b. Repeat [step a](#) on the opposite side of the monitor.
 - c. If the monitor is not secured properly, remove the VCR, then remove the monitor from the system.
 - d. Re-install the monitor, ensuring the monitor mounting prongs mate into both latches.
 - e. Repeat [steps a](#) and [b](#) to verify the monitor assembly is secure.

CAUTION

It is possible for the monitor to be installed in the tilt swivel base without the locking prongs mating with the latches. In this case, the latches can still be placed in the correct latching positions, but the monitor will not be secure.

11. Carefully pull the system off of the pallet and down the ramp.
12. Properly dispose of the shipping materials. Do not return these materials to ATL.

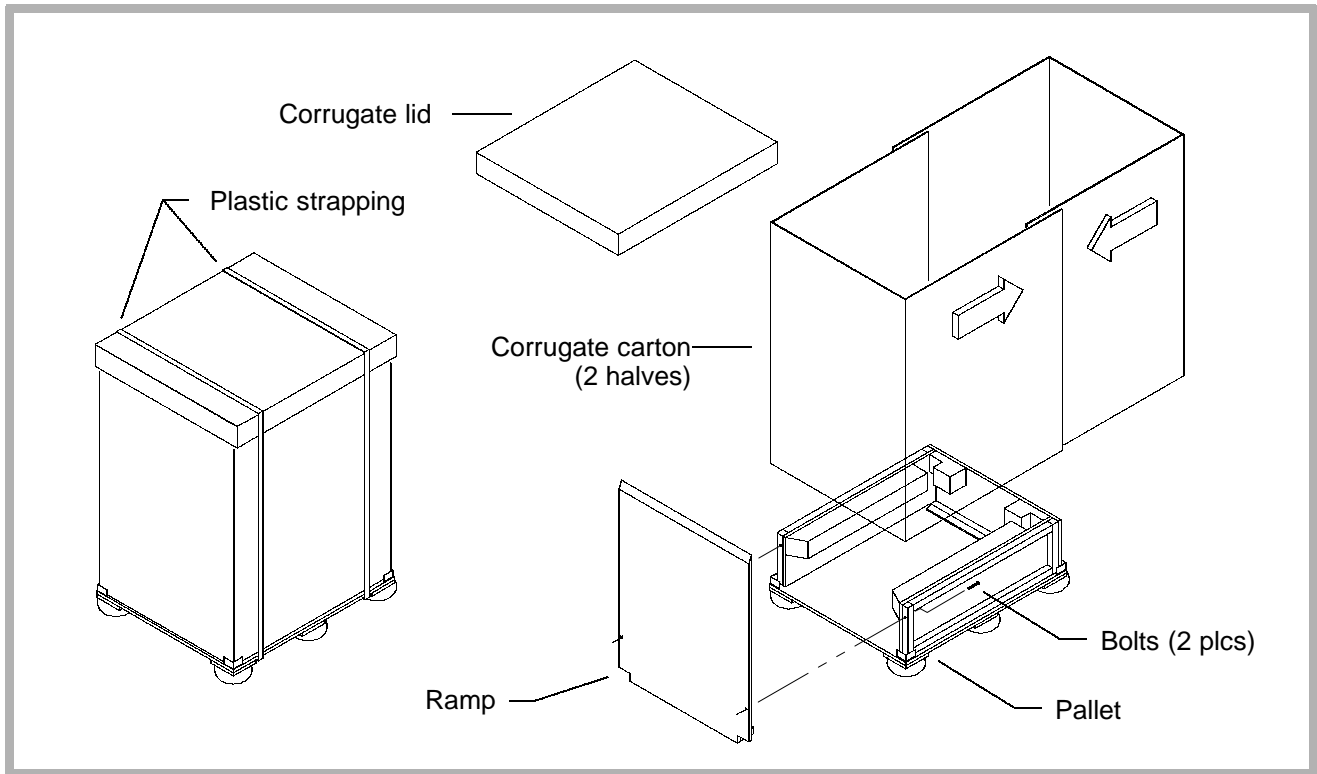


Figure 5-3. Corrugate Crate Details

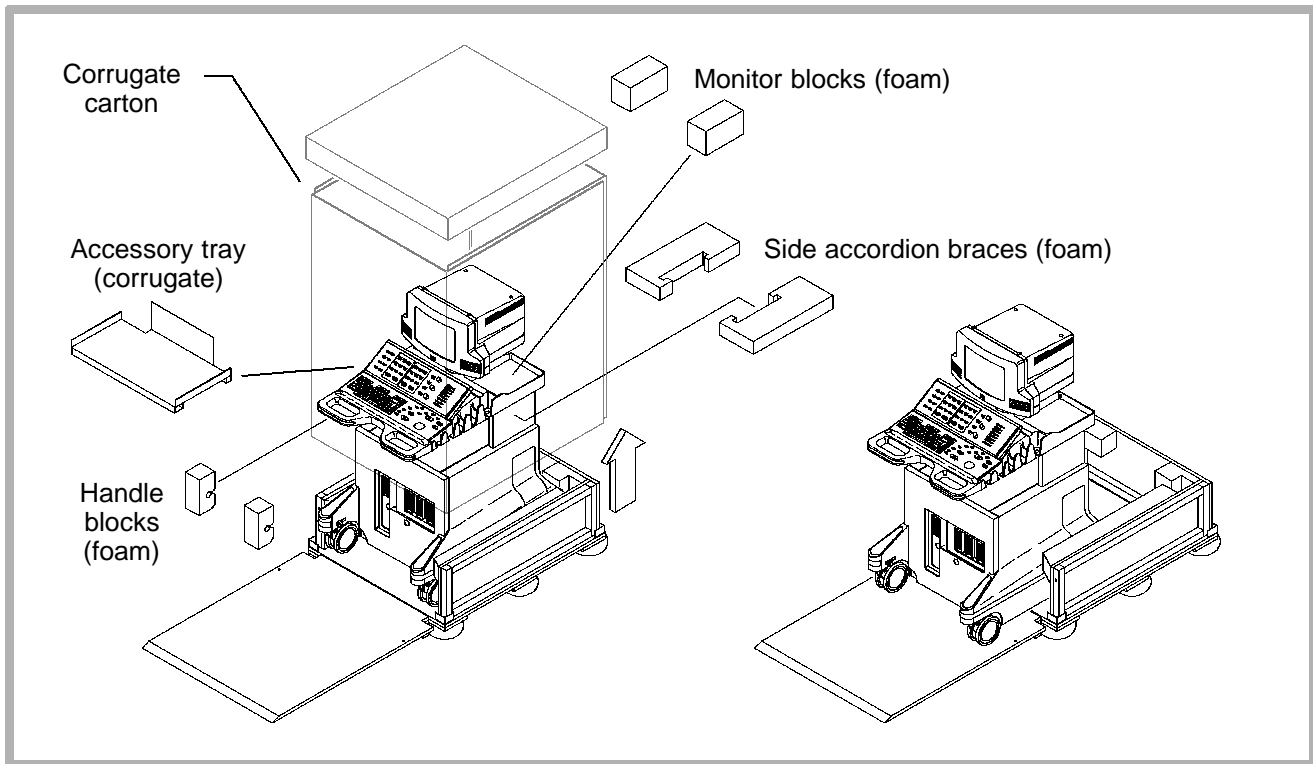


Figure 5-4. Corrugate Crate Unpacking Details

General Inspection

WARNING

Dangerous voltages are present inside the system. Do not connect the system to AC line voltage until correct line voltage has been verified and a thorough inspection of the system has been performed.

- ❑ To perform a general inspection:
 1. Inventory the shipment against the packing list.
 2. Inspect the video monitor for damage.
 3. Mount the monitor on the system ([paragraph 10-2](#))
 4. Connect power and signal cables to the monitor. Verify that the *shorter* power cord, labeled “120 Volts” and “MONITOR” is connected to the monitor.

CAUTION

The VCR power cord can be connected to the monitor by mistake. On 230 Volt systems, this will apply 230 Volts to the 120 Volt monitor which will damage the monitor.

5. Verify that the monitor swivels correctly on its base from left to right and up and down.
6. Inspect the outside surfaces of the system for damage.
7. Verify that the system rolls and turns smoothly on its casters.
8. Remove the front, rear, and right side covers.
9. Verify the hardcopy device is undamaged and firmly fastened to the system.
10. Inspect the VCR and mount it securely on top of the monitor.
11. Remove any loose packing material, dust, or debris from the interior of the system.

5-2.6

Mechanical Inspection

CAUTION

Do not damage cables connected to modules or peripherals.

- ❑ To perform a mechanical inspection:
 1. Verify all modules are secure.
 2. Inspect the remaining fasteners.
 3. Seat and tighten modules and connectors as necessary.

5-2.7

Setup

1. Dispose of packing materials and clean up the unloading area.
2. Move the system to the installation location.
3. Verify proper wall outlet wiring and voltage levels with a three-prong test plug and a DVM.

WARNING

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

4. Connect scanheads, peripheral cables, and the power cable.
5. Center the monitor Brightness and Contrast controls.
6. Verify that the system fans are operating.
7. Verify proper system operation with the procedures in Section 6, "Performance Tests".

5-2.8

VCR Control Settings

NOTE: To ensure proper system operation, turn on all OEMs prior to checking system functionality.

Panasonic AGMD830P VCR

The VCR can be programmed using the on-screen programming menu or the VCR front panel display screen. To use the VCR's front panel screen, refer to the OEM manual or the *VCR and Report Printers Field Service Manual*, P/N 4720-0223-XX.

1. For systems with software versions at or above 038.15, press Setups and select Peripherals, Internal VCR, and Panasonic MD830. Select Close at the bottom of the display.
2. Set the MENU switch on the VCR to SET. Set the MODE LOCK switch to OFF.
3. Press Superkey and Video simultaneously to toggle through the on-screen menus (internal VCR, internal color printer, etc.). The VCR menu lists on-screen menu items from **Table 5-5**.

4. Verify the VCR parameter settings. Refer to **Table 5-6** for VCR front panel control functions while in programming mode.
5. Press Setups and change the VCR configuration to SVHS to return to normal configuration.
6. Set VCR Menu switch to OFF.

Table 5-5. Panasonic AGMD830P NTSC 120V VCR Setup

Parameter	Setting
Tilt Down Panel	
MODE LOCK	OFF
MENU	SET
On Screen Menu	
VISS	Off
Tape Select	T-120 (NTSC) or E-810 (PAL)
Auto Back	On
Tape In Mode	Stop
Tape End Mode	Stop
REC Tape End	Stop
STBY Off Time	5 Min.
Bit Length	8 Bit
Stop Bit	Stop-1
Parity	None
Baud Rate	9600
Hour Meter	XXXX Hr

Parameter	Setting
HI-FI REC	On
Audio Dub	CH1
Edit (NTSC only)	Off
YC Filter (NTSC only)	Off

Table 5-6. VCR Programming Controls

VCR Control	Programming Operation
Stop	Moves the selection item cursor forward
Rewind	Moves the selection item cursor backward
Play	Returns to the previous menu page
Record	Advances to the next menu page
Fast Forward	Moves the menu selection to the item below
Inside Search Dial	Moves the menu selection to the item above or below

5-2.9

Printer Control Settings

For printers that use on-screen programming, use the following procedure to setup the printer menus.

1. Press Menu on the printer front panel.
2. Press Superkey and Video simultaneously to toggle through the on-screen menus.
3. Set the printer control settings as specified in the printer setup tables below ([Table 5-7](#) through [Table 5-20](#).)
4. Set the Menu switch to OFF.

**Table 5-7. Sony UP-5250 Color Video Printer Setup
(Early Model)**

Parameter	Setting
Menu 1	
Print QTY	001
Multi Pix	1
Separate	****
Input SEL	RGB
FRM/FLD	Frame
Sharpness	M
Menu 2 (Color Adjust)	
Display	Full
Preset	1
Red	0
Green	0
Blue	0
Dark	-1

Parameter	Setting
Light	1
Select SETUP menu to verify the following settings	
Size	Wide
H Shift	0
V Shift	0
Monitor	E To E
Display	On
Remote 2	M & Print
Baud Rate	Not Used
LCD CONTR	0

Table 5-8. Sony UP-5250MD Color Video Printer Setup

Parameter	Setting
Front Panel	
Manual/Auto	Manual
Gain	Center detent
Hue/Color	Center detent
Color	Center detent
Source/Memory	S
Memory Page	1A1B
Rear Panel	
RGB/R-Y/Y/B-Y	RGB
RGB 75• Termination	ON
NTSC 75• Termination	ON
Monitor RGB	Center detent
Menu 1	
Print Quantity	001
Multi Pix	1

Parameter	Setting
Separate	Asterisks show if 1 is selected for Multi Pix, otherwise set this feature to OFF.
Input SEL	R Appears as RGB when selected.
FRM/FLD	Frame
Sharpness	M
Menu 2	
Display	Full
Preset	1
Red	-1
Green	0
Blue	0
Dark	+1
Light	0

Select SETUP menu to verify the following settings	
Size	Wide
H Shift	6 Dots Right (or adjust image for best fit to Print out)
V Shift	0 Lines (or adjust image for best fit to print out)
Monitor	E To E
Display	On
Remote 2	M & Print
Baud Rate	Not Used
LCD CONTR	0

**Table 5-9. Sony UP-5600MD/UP-5600MDU Color Video Printer
Setup**

Parameter	Setting
Color Adjustment Setup Menu	
Preset	1
Red C-R	+5
Green M-G	+5
Blue Y-B	+5
Dark	-5
Light	+5
Save	1, EXEC
Analog Setup Menu	
Hue (NTSC only)	Default
Color	Default
Gain	Default
AGC	OFF
Moni C-R	Default

Parameter	Setting
Moni M-G	Default
Moni Y-B	Default
System Setup Menu	
Display	ON
Beep	ON
LCD	ON
LCD-CNTR	Center
Baud Rate	Default
Monitor	EE
User Set	1
Print Setup	
H-Shift	-24 Dots (NTSC) -16 Dots (PAL)
V-Shift	-8 Lines (NTSC) -10 Lines (PAL)
H-Size	952 Dots (NTSC) 924 Dots (PAL)

Parameter	Setting
V-Size	480 Lines (NTSC) 576 Lines (PAL)
Setups	
Separate	ON
Dup-Image	OFF
Sharpness	+4
System Function Menu	
Remote2	C&Print
Remote3A	Print (Does not matter. Used only with Sony footswitch)
Remote3B	Back-Sp (Does not matter. Used only with Sony footswitch)
Remote3C	CAP/SRC (Does not matter. Used only with Sony footswitch)
Clear	Part

Parameter	Setting
Capture	Single
Timer	OFF
Control Panel Button Setups	
Motion Correct	OFF
Input Select	RGB
Multi-Picture	1
Print QTY	1
Display P in P	OFF
Caption ON/OFF	OFF
Rear Panel Switches	
R/G/B/Sync 75 Ohm	ON
S-Video 75 Ohm	OFF
NTSC/PAL	Set to appropriate video format (UP5600MD has NTSC/PAL switch UP5600MDU is NTSC only.)

Table 5-10. Mitsubishi CP700 Color Video Printer Setup

Parameter	Setting
Color Adj	
BRT	0
CONT	-8
R-Sub	0
B-Sub	0
Center	OFF
Analog Adj	
BRT	0
CONT	0
R-Sub	0
B-Sub	0
Center	OFF
Signal Set	
Input	RGB
Field	NML

Parameter	Setting
AFC	OFF
Additional	
Strobe	OFF
Multi: 1 for 1	OFF
Mode	DIFF
Images	2
Separate	ON
Print	
Mode	L (large)
Grad	ECHO
APT	H1
Comment	OFF
Mirror	OFF
System	
Size	USER
H-Posi	0

Parameter	Setting
Copy	OFF
Top	-8
Bottom	10
Left	-16
Right	6
Page Inc	ON
Live Sel	DIGITAL
Convert	ON
Buzzer	ON
Rear Panel Switch Settings	
IMPEDANCE - RGB	75 Ω
IMPEDANCE - SYNC	HIGH

**Table 5-11. Mitsubishi CP700 Color Video Printer Memory SW
Menu Control Settings Setup**

Parameter	Setting
Time	
Month	Not used with ultrasound systems.
Date	
Year	
Hour	
Minute	
Second	
Key Set	
KEY LOCK	OFF
MEM&PRN	ON
MEM&STOP	OFF
MEM&MON	OFF
PRINT&CLR	OFF
CLEAR KEY	ONE

Signal Set	
IN Sync	0.3V
OUT Sync	0.3V
Sync	NEGA
RGB SOG OUT	OFF
H Start	NML
Spcl Timing	OFF
MON R-Sub	0
MON B-Sub	0
Print Set	
PRN DIR	NML
PRN Speed	NML
Margin Cut	OFF
V Position	34
Echo Gamma Adj.	a: (64, 0) b: (128, 0) c: (192, 0)

System Setting	
PRG All Init	OFF
Baud Rate	9600
Remote Busy	H

Table 5-12. Mitsubishi CP800 Color Video Printer Setup

Parameter	Setting
Color Adj	
BRT	-8
CONT	-4
R-Sub	0
B-Sub	0
Center	[>]
Analog Adj	
Color	N/A
Tint	N/A

Parameter	Setting
BRT	0
CONT	0
R-Sub	0
B-Sub	0
Center	[>]
Signal Set	
Input	RGB
Field	NML
AFC	OFF
Additional	
Multi	OFF
Buzzer	Tone 1
Print	
Mode	Auto
Grad	ECHO
Gamma Adj	

Parameter	Setting
Color	All
Hi	0
Mid	0
Low	0
Low Point	64
Mid Point	128
Hi Point	192
Apt	N
Com	OFF
Mirror	OFF
Comment	[>]
Size/Timing	
H-Posi	0
H-Start	NOR
Size	WIDE
Signal Set 1	

Parameter	Setting
Field	NML
AFC	OFF
Sync	EXT
R-SUB	0
B-SUB	0
Signal Set 2	
IN SYNC	TTL SOG
OUT SYNC	TTL
SYNC	NEGA
RGB SOG OUT	OFF
SPCL TIMING	OFF
Print Set	
DIR	NORMAL
MARGIN CUT	OFF
AUTO CUT	ON
OP MODE	4P

Parameter	Setting
System Set	
Page Inc	ON
Live Sel	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

Table 5-13. Codonics NP-1660 Printer Setup1660

Parameters	Settings			
	CVPAPER	CVTRANS	DVPAPER	DVFILM
TCR	0	0	-	-
Gamma ¹	1.25	1.00	1.00	1.25
Contrast ¹	10	5	0	5
Anti-alias	Better	Better	Better	Better
Rotate	Auto	Auto	Auto	Auto
Scale	Sharp ¹	Sharp ¹	Bilinear	Sharp ¹
MCM	170	170	-	-
DMAX ¹		-	-	7

1. Adjustable in the field. None of the other settings are recommended for field-adjustment.

Table 5-14. Sony UP1850 Color Video Printer Setup

Parameter	Setting
Menu 1	
Print QTY	1
Input Sel	RGB
FRM/FLD	FRAME
Sharpness	MID
Color Adjust	
Load	1
Red	0
Green	0
Blue	0
Dark	+1
Light	-2
Signal Adjust	
Color	0
Gain	0

Parameter	Setting
Offset	0
AGC	Off
Multiplex	
Split Mem	Off
Interval	Off
Separate	Off
DUP Image	Off
Image Size	L
Mirror	Off
Pick Image	Ignore

Set Up	
H Shift	0
V Shift	0
RM2 Mode	M&P
RM2 ACT	1ACT
Monitor Adjust	
Moni Red	0
Moni Blue	0
Display	Off
Monitor	E to E
Sync on G	Off
Rear Panel Dip Switches	
SW1	Up
SW2 - SW8	Down

Table 5-15. Sony UP860/870 Video Printer

Parameter	Setting
Front Panel	
Contrast	Center
Brightness	Center
Thru/EE Switch	Thru
Posi/Neg Switch	Posi
Rear Panel	
Dip Switches	All ON, except switch 1 OFF
I II III Switch	II
D Adj	Center

Table 5-16. Sony UP890 Video Printer

Parameter	Setting
Front Panel	
Print Size	Normal
Contrast	10:00
Brightness	11:30
Thru/EE Switch	EE
STD/SIDE	STD
Rear Panel	
Dip Switches	All ON
GAMMA	II
Paper Type	IV

Table 5-17. Sony UP910 Video Printer

Parameter	Setting
Front Panel	
Dip Switches, NTSC	All OFF
Dip Switches, PAL	All OFF, except switch 5 ON
Contrast	Center
Brightness	Center
Rear Panel	
75 Ohm	ON

Table 5-18. Mitsubishi P91 B&W Video Printer

Switch	Adjustment-Function	Setting
Front Panel		
BRIGHT	Print brightness	-3
CONTRAST	Print contrast	-2
GAMMA	Gamma curve	5
PRT SIZE	Print size	Normal

Switch	Adjustment-Function	Setting
Rear Panel		
1	Impedance	ON
2	Trap	ON
3	Gain	ON
4	Image	ON
5	AFC	ON
6	DIR	ON
7	Memory	ON
8	Scan	ON
9	Saving	ON
10	Paper	ON
HPOSI	-	ON
AFC	-	ON

Table 5-19. Aspect Multi-Image Camera

Parameter	Setting
Brightness	35
Contrast	45
Polarity	+

Table 5-20. System Setups for Video Printers and Aspect MIC

Parameter	Setting
Use Print Button To	Print Local (Internal)
Environment	Print All
Print Color Images to B&W Printer	Yes
Store to Optical Disk During Exam	OFF

5-2.10

Final Inspection and Documentation

1. Perform a Pre-Installation Inspection if one was not previously completed. Record all pertinent information on the Pre-Installation and Installation FSRs.
2. Verify electrical power quality using the system and its peripherals as the final load. Also compare your pre-install observations of ambient temperature, RFI, and ESD conditions to present conditions. Record all measurements and observations on the Installation FSR.
3. Insert Manual Changes and Operating Notes into the system Reference Manual. Have the Operating Instructions and the Reference Manual available for review with the system operator so that questions can be answered during the system presentation.
4. Complete a Quality Assurance Audit (PM) sticker and attach it to left side of the monitor.
5. Tell the facilities representative that the system is installed and ready for any safety tests that they normally conduct.

5-2.11

System Presentation

When the system and the customer documents are ready, present them to the operators using the following in-service procedure.

1. Review the Customer Order Acknowledgement (COA) with the customer to familiarize them with the system and its options and to assure them that they have received what they ordered.
2. Present the *HDI 3000 Getting Started, Scanheads and Safety, Reference Manual*, and Operating Notes. Describe these publications and emphasize that all information needed to operate the system and peripherals is in them. As questions come up, guide the operators through these publications.
3. Show the operators how to turn on the system and any external OEMs. Explain the differences between the main circuit breaker and the On/Standby switch.

4. Describe the initialization process and explain that the system programs itself in this process.
5. Explain the reasons for the following cautions:

CAUTIONS

- **Always place the system ON/STANDBY switch to STANDBY for five to ten seconds before setting the system I/O circuit breaker to OFF.**
- **Always wait five to ten seconds after placing the system ON/STANDBY switch to STANDBY before placing the switch back to ON. A power-down sequence, similar to the initialization that occurs when power is first turned on, saves certain operating parameters and then turns off power supplies in a sequential order.**
- **This equipment contains components which are electrostatic sensitive. Proper 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 ATL warranties.**

6. Explain why it is important for them to never remove covers from the system because of ESD and warranty considerations.
7. Once the system is fully initialized, give the operators a brief demonstration of system controls. Limit the discussion of the MENU buttons to the concept that pull-down menu boxes contain higher level commands for the functions selected by the mode buttons. Review the following:
 - How to set Time and Hospital Name
 - How to enter patient data
 - Monitor Brightness/Contrast controls
 - Mode buttons
 - Rotary controls
 - Up/down spring-loaded control switches
 - TGC slide controls

- Trackball and SELECT button; include their use with pull-down menus
 - Volume control
 - VCR and hardcopy device operation
 - Signal ports, including scanheads
8. Describe and demonstrate system maintenance procedures to be performed as needed:
- Fan filter cleaning
 - System cleaning
 - Scanhead disinfection
 - B/W printer head cleaning
 - Other peripherals, as necessary

5-2.12

Completing the Installation

1. Discuss the present status of the system with your customer and review the hardcopy prints that were taken during the system check out. Be sure to cover any environmental concerns as well, making suggestions as appropriate.
2. Ask your customer if there are any questions that they have about the new system or ATL. Document issues on the Installation FSR and make a commitment to follow-up on them.
3. Review the customer procedures to place a service call or to call for technical assistance.
4. Complete the Installation FSR.

NetLink Installation

NetLink is installed using a site disk created from the host table, device table and device files which are part of the HDI 3000 Image Management system setups. The following steps summarize the installation process.

1. Determine configuration information: all IP addresses, model IDs, subnet addresses or masks, device aliases, and port numbers. Obtain the information from the network administrator.
2. Use the configuration information and a site disk to create the host table, device table, and device files. Use the ultrasound system to edit, install, and copy the configuration files.
3. Syntax problems are described in an error message. Edit the files, fix the syntax, and apply until no errors occur.

4. Use the Image Management Network Administration setups to verify the network configuration (host table, device table, and device files). Verify that the printers are displayed in the appropriate lists on the B/W and Color Printer setups panels. Also, verify that the ultrasound system appears in the Ultrasound System Net ID and that all of the archive devices appear in the archive list.
5. Use the Image Management Network Administration setups to create a backup copy of the configuration files on the system hard disk.
6. Select the correct printer and archive device(s). Create an exam, take several images, and close the exam. Verify the images are printed and that the exam appears on all archive devices.
7. If devices are to be added to the device table after the original network installation, use the Upgrade selection or copy new configuration files.

8. Back up the network configuration files after upgrades or modifications to the host or device tables, and back up entire system files to an MO disk after any configuration change.

Detailed instructions for installing NetLink are contained in the *HDI 3000 Reference Manual* (P/N 4703-0015-XX).

5-3.1

Host Table, Device Table, and Device Files

The host table must contain the correct alias, IP address, port number, model ID, title, and subnet for each device on the network. The device table maps each model ID in the host table to a file that describes the capability of the device with that model ID. The device files contain the capabilities of single devices that are potential network devices. These capabilities include such things as printer type, film size, film format type, orientation, destination, and density.

Most of the attributes or capabilities listed in the device file appear as setups on the Image Management Net Admin: B/W Printers and Color Printers system setups screens. From these screens you can select the settings for these setups. The relationships among the setups is dependent and logical. You must first select a printer type before the film sizes for the printer that you select can be established.

The information in the host table, device table, and device files establishes the network configuration. This information must be consistent, or an error message will be displayed on the system monitor when the configuration files are saved.

The host table, device table, and device files establish the following relationships and must be setup to reflect the network configuration:

- TCP/IP addressing for server and clients on the network
- DICOM print connections
- Print media selection
- Print media size selection
- Print film type selection
- Print orientation selection
- Print contrast and density settings
- Print format
- DICOM storage device connections

Once the network configuration has been established and set-up, create a site disk by copying the host table, device table, and device files.

6 *Performance Tests*

6-1

Introduction

This section contains a series of performance tests to be performed on the system following installation, upgrade, or repair. The purpose of these tests is to verify the correct operation of the system hardware and firmware. The checklist included at the end of this section can be used to ensure that all tests are performed.

The major test sections in this procedure are organized to follow a logical progression through each of the major system modes. It is not a requirement to perform the sections in any particular order. However, it is best to perform the tests in order to promote a thorough and consistent testing process.

WARNINGS

- **Measurement accuracy must be verified after installation, after every repair involving PCB or power supply module replacement and during every preventive maintenance inspection.**
- **Wrist straps should not be worn when working on a system with its power turned on. The +5 Vdc supply is a very high current supply. Use caution when troubleshooting.**

NOTE: Before performing these tests the site power should be inspected in accordance with the pre-site inspection procedures detailed in the Site Inspection section of the *General Field Service Manual*.

6-2

Test Equipment and Materials

FSE Tool Kit (193-90003-01)

RMI Model 413 Tissue Equivalent Phantom (199-12204-00)

RMI Model 406 Dual Attenuation Phantom (2100-1610-01)

ECG/Scanhead Leakage Tester (6005-0555-01)

6-3

Initial Setup

WARNING

The following series of tests requires applying power to the system while protective covers are removed. Dangerous voltages are present. Use extreme caution.

The initial setup procedure consists of observing system power-up and initialization, verifying system configuration against the customer order acknowledgement (COA), and adjusting the monitor for optimal viewing.

6-3.1

System Power Up and Initialization

This section verifies the status of system power supply voltages as reported by the power supply boards.

NOTE: Before proceeding, refer to [paragraph 4-3.2](#), Power Subsystem, and review the discussion of the three power states (Off, Standby, and On).

1. Turn system off and disconnect power cord before proceeding.
2. Perform the system electrical inspection as described in [Section 5](#).
3. Connect an array scanhead to the system.
4. Turn on all OEMs prior to checking system functionality.
5. Load OEM paper or film, as required.
6. Connect the system power cord to a hospital grade AC outlet: specifically, a single branch circuit, 15 or 20 Ampere, 120 Vac, with an isolated and insulated ground wire (or the equivalent International circuit).

7. Set the system circuit breaker to ON (I).
8. Wait 15 seconds, then set the ON/STANDBY switch to ON (⊙).
9. Verify that the upper five LEDs on the ACIM light individually in a sequential order.
10. Verify power indicators are illuminated on internal peripherals.
11. Turn on power to all external peripherals and verify power indicators are illuminated.

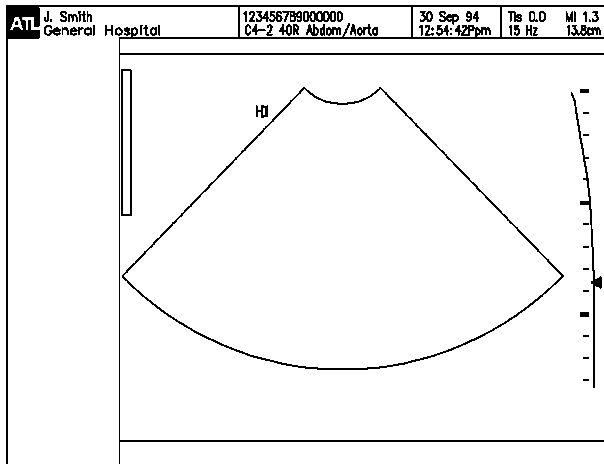
NOTE: Observe the required warm-up period for each peripheral before conducting image quality tests. Refer to the OEM manual supplied with the peripheral or the appropriate peripheral field service manual.

12. After completion of the initialization process, verify the following:
 - The scanhead connected in [step 3](#) of this procedure is selected and enabled.

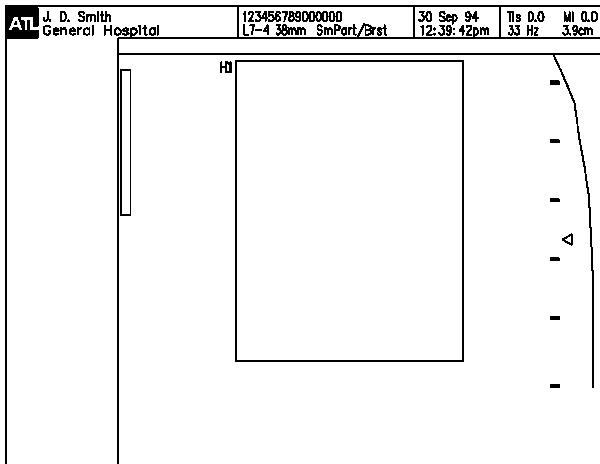
- A real-time 2D image (sector or linear) is displayed on the monitor (**Figure 6-1**).

13. Throughout the performance tests, verify the following:

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



Sector Display



Linear Display

Figure 6-1. Power-up Displays

6-3.2

System Configuration

Refer to [paragraph 9-4.5](#) to check the installed system options against the COA.

6-3.3

Adjusting the Monitor for Optimal Viewing

The following procedure is used to set up the monitor for optimal viewing, and to check the range of contrast and brightness of the monitor.

1. Set BRIGHTNESS and CONTRAST fully counterclockwise (CCW). Verify that the video display has a flat black appearance (some white details will remain).
2. Rotate CONTRAST fully clockwise (CW). Verify that the level of contrast varies.
3. Readjust CONTRAST for best contrast.
4. With the room lighting set to normal scanning conditions, readjust the BRIGHTNESS and CONTRAST controls for customer approval and the best image as follows:
 - a. Set CONTRAST and BRIGHTNESS to minimum (CCW).

- b. Increase BRIGHTNESS until a faint image appears on the video monitor.
 - c. Increase CONTRAST until the gray shades of the image progress from black to white.
 - d. Increase CONTRAST until the white of the gray bar blooms.
 - e. Decrease CONTRAST until the white of the gray bar is normal.
 - f. Horizontal and vertical lines appear straight (within ± 0.5 mm).
5. Select a color mode. Verify that each individual color appears vivid and uniform.

6-4

User Interface Tests

The following tests verify various system defaults and user-selectable configuration items, and selection of scanheads and applications.

6-4.1

Keyboard

1. Press Text or Title. Title allows annotation entry in the upper part of screen; Text enters characters at cursor's active position.
2. Press each alphanumeric key and verify the appropriate character is displayed.
3. Press Shift and the arrow keys and verify the appropriate symbols are displayed.
4. Press Shift and verify the shift functions for keys with shift characters.
5. Press remaining keys and verify proper operation. For example, Bksp, Return, Erase Annot.

6-4.2

Installation Defaults Setup

1. Press the Setups key and click on Display.
2. Enter the appropriate Institution name, date and time. Click on the diamonds to select desired time and date formats.
3. Exit Setups.

6-4.3

Patient Data

1. Press Patient Data. Enter your name in the New Patient field.
2. Enter the system sales order (SO) number in the ID field.
3. Select additional data. Enter your birth date in Date of Birth.
4. Verify your age is displayed correctly.
5. Select Previous Exam and Close. Then Close the Patient Data menu.

6-4.4

Scanhead Initialization

1. Press the Scanhead key.
2. Connect the following scanheads or equivalents as shipped with the system:

L10-5 C5 IVT P3-2 D5CW

3. Verify the scanheads connected are correctly displayed.
4. Select the desired scanhead. and scanhead application. Verify that the correct scanhead is identified at the top of the screen.
5. Verify that the patient data and other information is correctly displayed and that the clock is updating.

2D Primary Controls

2D Gain

NOTE: The TGC graphic on the display does not correlate to the TGC slidepot positions. The TGC graphic on the display represents the actual curve used by the beam-former.

1. Image the 406 or 413 phantom while performing these steps.
2. Set all TGC slidepots to the center position.
3. Verify that adjusting the 2D GAIN from minimum to maximum moves the displayed TGC line from a flat line at the left edge of the depth markers to a flat line at the right edge of the display.
4. Verify that as the 2D GAIN is increased and decreased, there is a corresponding increase and decrease in echo intensity.
5. Set 2D GAIN to mid-range.

TGC Slide Pots

1. If the TGC display is not present, press **Setups**, select **Display** and turn **TGC Display ON**. (Moving a TGC slidepot will only bring up the TGC display for three seconds.)
2. Set **2D GAIN** to mid-range or higher.
3. Verify that adjusting each TGC slidepot from minimum to maximum moves the corresponding portion of the displayed TGC line from the left edge of the depth markers to the right edge of the display.
4. Verify that increasing and decreasing the TGC gain results in a corresponding increase and decrease in echo intensity (depends on overall gain settings).
5. Set all TGC slidepots to the center position.

Focal Zones (number of focal zones)

1. Verify that pressing # ZONES up increases the number of focal zones.
2. Verify that pressing # ZONES down decreases the number of focal zones.

Focus

1. Verify that pressing FOCUS up moves the focal zone up.
2. Verify that pressing FOCUS down moves the focal zone down.

Depth

1. Verify that pressing DEPTH up decreases the displayed depth and that the frame rate increases.
2. Verify that pressing DEPTH down increases the displayed depth and that the frame rate decreases.

Output

1. Verify that pressing OUTPUT up increases the Mechanical and Thermal Indices.
2. Verify that pressing OUTPUT down decreases the Mechanical and Thermal Indices.

Top/Bottom

1. Verify that pressing TOP/BOT up or down inverts the image top to bottom.
2. Verify that depth markers, focal zone marker, and the orientation marker invert.
3. Verify that adjusting the top TGC slide pot still controls the near field part of the image while the image is inverted.

L/R Invert

1. Place the scanhead on the phantom with the orientation marker to the left. Verify that the image orientation marker corresponds to the orientation mark on the scanhead.
2. Verify that pressing L/R INVERT switches the image and the orientation marker left to right.

Sector Width

1. With a sector scanhead, verify that pressing SEC WIDTH down decreases the sector width.
2. Verify that the frame rate increases as the sector width is decreased.
3. Verify that pressing SEC WIDTH up increases the sector width.
4. Verify that the frame rate decreases as the sector width is increased.

Zoom

1. Verify that pressing ZOOM up increases the image magnification.
2. Verify that the image orientation marker repositions to the far upper left of the display.
3. Verify the depth markers re-scale with the zoomed image.
4. Verify that moving the trackball allows all portions of the image to be viewed.
5. Set the zoom to normal magnification.
6. Verify the image, image orientation marker, and depth markers return to the normal state.

HD Zoom

1. Press HD ZOOM and verify the zoom box is displayed and that the trackball will position the box anywhere within the image.
2. Verify that pressing SELECT fixes the position of the upper left corner of the box and that the trackball now positions the lower right corner of the box to size it.
3. Position and size the box to surround a distinct feature (cysts or pins) within the phantom.
4. Press HD ZOOM and verify the image zooms so that the area defined within the box is displayed to fill the image.
5. Press HD ZOOM and verify the image returns to normal magnification and that the box is no longer displayed.

Dual

1. Press DUAL and verify that the sector is displayed on the left half of the display and is updating.
2. Press UPDATE and verify another sector is displayed on the right half of the display.
3. Verify the right sector is updating and the left sector is frozen.
4. Press UPDATE to toggle the live and frozen images from the left sector to the right and the right sector to the left.
5. Verify that adjusting any imaging control affects only the live sector and that each sector independently retains its imaging control settings from the last time it was active.
6. Press DUAL and verify that a single full size sector is displayed.

2D Secondary Controls

Initial Setup

1. Select 2D mode and the desired scanhead.
2. Press 2D/M M to call up the 2D secondary control menu.

Gray Maps

1. Select GRAY MAPS....
2. Verify that selecting each of the gray maps changes the gray scale assignment of the gray bar and the image data.
3. Press Close between each map selection to observe changes.

NOTE: With 038.15 software and above, it is not necessary to press Close to verify the map changes.

Dynamic Range

1. Select DYN RANGE....
2. Verify that selecting increased dynamic range settings changes the range of echoes that are displayed in the image and that the image “smooths out”.

Chroma

1. Select CHROMA....
2. Select Chroma 1.
3. Verify that when Chroma is selected the 2D portion of the image is colorized.
4. Repeat [steps 2](#) and [3](#) for Chroma 2, Chroma 3, and Chroma 4.
5. Select Off from the 2D secondary control menu.
6. Select Close twice to return to 2D imaging.

NOTE: Chroma mapping allows the assignment of colors to gray scale echo intensities. No diagnostic claims are made for Chroma mapping. There are Chroma maps available on the 2D/MMode menu.

Persistence

Verify that increasing persistence smooths the image and mid level echoes move in slow motion in response to scanhead movement.

1. Press 2D/M M, select Persistence - Low, then CLOSE.
2. Move the scanhead right and left. Note motion.
3. Press 2D/M M, select Persistence - High, then CLOSE.
4. Move the scanhead right and left. Compare motion to the motion in [step 2](#).

2D Line Density

1. Select the desired scanhead and application.
2. Verify that increasing line density increases the sharpness of the resolution pins displayed in the image.
3. Verify that increasing line density decreases the frame rate.

Frame Rate

Change frame rate and verify that increasing frame rate increases the frame rate displayed on the monitor.

Biopsy

1. Select a CIVT (or a fake CIVT) scanhead.
2. Select Generic and General (applications) to initialize the scanhead.
3. Select Biopsy on the 2D/M M menu.
4. Verify the trackball moves the cursor up and down the biopsy guideline and the distance is displayed in the lower center of the screen.
5. Return to 2D/M M menu and deselect Biopsy.

2D Color Primary Controls

Initial Setup

1. Select a scanhead.
2. Select 2D Color mode.

Color Box

1. Verify the trackball will position the Color Box anywhere within the image.
2. Verify that pressing SELECT fixes the position of the upper left corner of the box and that the trackball now positions the lower right corner of the box to size it.

Steer (Linear Scanheads Only)

1. Press Steer. Verify the color box changes shape shifting left or right pivoting around its center.
2. Press Steer again several times. Verify that the system cycles through the various steering angles on the display.

Filter

Verify that the filter control changes the screen annotation.

Baseline

1. Press BASELINE up and verify the baseline of the color bar moves to the top of the color bar and that the color scale updates accordingly.
2. Press BASELINE down and verify the baseline of the color bar moves to the bottom of the color bar and that the color scale updates accordingly.

Scale

Verify that pressing SCALE up and down will increase and decrease the range of the color bar scale image data.

Priority

1. Press PRIORITY up and verify the write priority mark on the gray bar moves to the top of the bar and color overwrites the corresponding gray shades.
2. Press PRIORITY down and verify the write priority mark on the gray bar moves to the bottom of the gray bar and gray shades overwrite the color.

Invert

Press INVERT and verify the color bar inverts.

2D Color Secondary Controls

Initial Setup

1. Connect any phased, curved, or linear scanhead to the system.
2. Select the Generic/General optimized preset.
3. Select Color Mode.
4. Display the color annotation.
5. Press the Color menu button.

Color Maps

1. Select Color Maps.
2. Verify that selecting each of the color maps changes the color assignment of the color bar.

Persistence

1. Select Persistence.
2. Verify that selecting higher settings slow the color image update rate.

Line Density

Verify that selecting higher settings increases the image sharpness.

Color Display

1. Press Superkey and CDisp.
2. Verify the color bar and the image color data are not displayed.
3. Press Superkey and CDisp.
4. Verify the color bar and the image color data are displayed.

Units

Verify that selecting FREQ or VEL changes the scaling annotation of the color bar.

NOTE: Units do not apply to Power mode.

Doppler Primary Controls

Initial Setup

1. Select DOPPLER.
2. Verify the Doppler image information is displayed.
3. Select and initialize the L12-5 scanhead.
4. Press UPDATE.
5. Verify the Doppler display is scrolling.

Wall Filter

Press Filter up and verify that the wall filter annotation changes from low to medium to high.

Baseline

Press Baseline up and down to verify the Doppler baseline can be positioned from the top to the bottom of the scale.

Scale

Press Scale up and verify the range displayed on the Doppler scale changes.

Angle Correction

1. Press Superkey + $\pm 60^\circ$ and verify the M Line changes from $+60^\circ$ to -60° to 0° .
2. Press Ang Cor. Verify the M Line moves and the annotation graphics update by 2° increments.

Sample Volume Size

Press SV Size and verify the displayed sample volume changes size and the annotation is updated with the new size.

Steer

Press Steer and verify that the system cycles through each of the steering angles and that the M Line pivots around the sample volume.

NOTE: Position the M Line near the center of the image to see each of the three steering angles.

Invert

Press INVERT and verify the Doppler spectral data and the scale inverts relative to the baseline.

Volume

1. Obtain a spectral trace.
2. Press VOLUME up/down and verify the speaker volume increases/decreases.
3. Verify that frequencies above the center frequency emanate from the left speaker and that frequencies below the center frequency emanate from the right speaker.

6-4.10

Doppler Secondary Controls

NOTE: Obtain a Doppler image (carotid) while performing the tests in this section.

Initial Setup

1. Connect any phased, curved, or linear scanhead to the system.
2. Select the Generic/General optimized preset.
3. Select Doppler.
4. Press the Doppler menu button to display the Doppler secondary control menu.

Doppler Gray Maps

1. Select Gray Maps.
2. Verify that selecting each of the gray maps changes the grayscale assignment of the Doppler data.
3. Verify that the selected grayscale map is displayed in the Doppler annotation.

Scale Units

Verify that the Doppler scale displays the scale units selected.

Doppler Sweep Speed

1. Select each Doppler sweep speed.
2. Verify that the right to left display movement (sweep speed) changes accordingly.

Display Format

1. Select the Small, Medium, and Large display formats and verify that the Doppler display changes accordingly.
2. Select 2D.

6-4.11

M-mode Primary Controls

Initial Setup

1. Connect any phased, curved, or linear scanhead to the system.
2. Select the Generic/General optimized preset.
3. Select M-mode.

M-Line

Verify that the trackball smoothly moves the M-line from the left image edge to the right image edge.

6-4.12

M-mode Secondary Controls

Initial Setup

Press 2D/MM to display the 2D/M-mode secondary control menu.

Sweep Speed

1. Select Speed.
2. Verify that as higher settings are selected, that the M-mode display rate increases.

Display Format

Select the “Small”, “Medium”, and “Large” display formats and verify that the M-mode display changes accordingly.

6-5

Mode Tests

6-5.1

2D

Array Element/Channel Test

1. Select 2D mode and an L12-5 scanhead. (If an L12-5 scanhead is not available, use another linear or curved array scanhead with 128 elements.) Set OUTPUT, 2D GAIN and TGC to maximum, # Focal Zones to 1, and FOCUS to less than maximum depth.
2. Slowly slide the narrow edge of a six-inch metal ruler from one end of the face of the scanhead to the other.
3. Verify that a single vertical band of echoes moves across the image in coordination with the motion of the ruler.

2D Penetration

1. Select a cardiology scanhead and the Adult Card - Gen Adult Card application.
2. Scan the phantom to obtain an image that clearly shows both the horizontal and vertical rows of pins.
3. Press DISTANCE to activate a cursor.

NOTE: Do not place the cursor under cysts or pins.

NOTE: Always apply the phantom reference value and tolerance to the measurement.

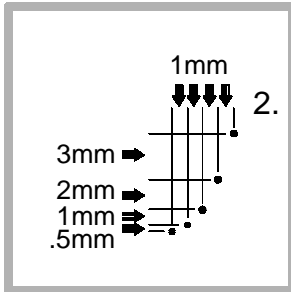
4. Set the cursor at the deepest vertical position where the scatter echoes start to break up and tissue definition is lost.
5. Verify scanhead performance.

Image Quality

1. Adjust the position of the scanhead on the phantom to obtain an image that clearly shows both the horizontal and vertical rows of pins.
2. Verify the image presents a uniform homogeneous echo pattern from the point of closest focus to the limit of penetration.
3. Adjust the focal zone position to correspond to the depth of a cyst.
4. Verify that the cystic structure at the focal zone is echo free, round, and with sharp wall definition.

2D Axial and Lateral Resolution

1. Obtain a phantom image of a set of array resolution pins. Refer to the diagram (left). Distances between the pins may vary by phantom model. Reference your phantom user manual for measurement details.



2. To determine axial resolution, use the left column. The first adjacent pins that display a space between them is considered resolved.
 - Example: If the phantom image displays white between the second and third pins from the bottom, the Axial resolution is read as 1 mm.
3. To measure lateral resolution, count the increments in the top row to the first resolved pin.
 - Example: If the image displays (resolves) the third pin from the bottom, lateral resolution is 2 mm.

2D Spatial Resolution or Measurement Accuracy

1. Adjust the position of the scanhead on the phantom to obtain an image that clearly shows both the horizontal and vertical rows of pins.
2. Press FREEZE and measure the distance between the the centers of two pins that are vertically spaced 6 cm apart.
3. Verify the distance measured is $6.00 \text{ cm} \pm 0.06 \text{ cm}$.
4. Measure the distance between the centers of two pins that are horizontally spaced 6 cm apart.
5. Verify the distance measured is $6.00 \text{ cm} \pm 0.12 \text{ cm}$.
6. Measure the distance between two depth markers spaced 2.0 cm apart.
7. Verify the distance measured is $2.00 \text{ cm} \pm 0.04 \text{ cm}$.

Cineloop Manual Playback

NOTE: If a cursor is displayed, the trackball controls the cursor. To access Cineloop, the measurement must be completed or aborted.

1. Slowly slide the scanhead across the phantom.
2. Press FREEZE.
3. Verify that trackball movement left or right scrolls through the captured Cineloop frames.

Cineloop Automatic Playback

1. Display the Cineloop menu.
2. Verify that PLAY/PAUSE starts and pauses Cineloop and the image data indicates LOOP.
3. Verify that selecting SWEEP/LOOP changes between sweep and loop mode and that the image data reflects the current mode selected.

4. Verify that selecting + SPEED increases the playback speed.
5. Verify that selecting - SPEED decreases the playback speed.
6. Verify that selecting TRIM displays the Cineloop trim graphic.
7. Verify that TRACKBALL and SELECT allow positioning of both trim markers.
8. Verify that selecting PLAY/PAUSE loops through the frames defined by the trim markers.

Annotation

1. Connect a P3-2 scanhead to the system.
2. Select the Adult Card/General optimized preset.
3. Press Body Marker and verify a body marker is displayed. Press again and verify that the system scrolls through the various body markers.

4. Use the trackball to position the body marker anywhere within the image.
5. Press Superkey and SH Pos. Verify the scanhead marker is displayed on the body marker.
6. Use the trackball to position the scanhead marker anywhere within the body marker.
7. Press Superkey and SH Pos. Verify the scanhead marker is rotated.
8. Press Erase Annot. Verify the body marker and scanhead marker are cleared from the display.
9. Press Title to display the cursor in the default home position. Enter data into the title field.
10. Press Erase Annot. Verify the text disappears from the display.
11. Press Text to display the cursor in the default home position. Enter data into the title field.

12. Press Erase Annot. Verify the text disappears from the display.
13. Press Title to exit the annotation function.

6-5.2

Color Power Angio

Initial Setup

1. Connect an L12-5 scanhead to the system.
2. Select the Generic/General optimized preset.
3. Select Power Imaging Mode
4. Obtain an image that clearly shows fluid flow.
5. Verify that the power imaging background is of uniform texture and color.
6. Verify that the colorized Doppler information is displayed within the vessel.
7. Display the PWR secondary menu.

Power Maps

1. Select Power Maps.
2. Verify that selecting each of the color maps changes the color assignment of the color bar and the power imaging background.

Persistence

1. Select Persistence.
2. Verify that selecting higher settings slow the color image update rate.

Line Density

Verify that selecting higher settings increase the image sharpness.

3D CPA

1. Adjust the scanhead position to obtain an image that clearly shows fluid flow.
2. Press LOOP and acquire data.
3. Press FREEZE.
4. Press Cine/3D to display the Cine/3D secondary menu.
5. Select Create 3D.
6. Verify the system indicates it is rendering a 3D image.
7. When rendering is complete, verify the system is sweeping through the 3D Cineloop.
8. Press FREEZE.

6-5.3

Simultaneous Modes

Initial Setup

1. Connect an L12-5 scanhead to the system.
2. Select the Cerebrovascular/Carotid optimized preset.

Simultaneous 2D + PW Doppler

1. Select DOPPLER.
2. Press the Doppler menu button to display the Doppler secondary control menu.
3. Select 2D Update.
4. Select Simul.
5. Verify that both 2D and Doppler are active.

Simultaneous 2D + PW Doppler + Color

1. Select Color mode.
2. If the Doppler secondary control menu is not displayed, press the Doppler menu button.
3. Select 2D Update.
4. Select Simul.
5. Verify that 2D, Doppler, and Color are active.

Simultaneous 2D + PW Doppler + CPA

1. Select DOPPLER.
2. If the Doppler secondary control menu is not displayed, press the Doppler menu button.
3. Select 2D Update.
4. Select Simul.
5. Select 2D mode.
6. Select Power Imaging.
7. Verify that 2D, Doppler, and CPA are active.

6-5.4

PW Doppler Noise Bands

1. Connect a P3-2 scanhead to the system.
2. Select the Generic/General optimized preset.
3. Select Doppler mode.
4. Set the system controls as indicated in [Table 6-1](#).

Table 6-1. PW Doppler Noise Band Control Settings

Control	Setting
Output	Maximum
Sample Volume Depth	9.0 cm
Sample Volume Size	1.5 mm

5. Reduce the Dop Gain just until the background noise disappears.
6. Observe the spectral display for noise bands.
7. Obtain a Doppler spectral trace.
8. Increase and decrease the PRF and observe the display for noise bands.
9. Repeat [steps 5](#) through [8](#) for sample volume sizes of 2, 3, and 5 mm.

6-5.5

Steered CW Doppler Noise Bands

1. Connect a P3-2 scanhead to the system.
2. Select the Generic/General optimized preset.
3. Select Doppler mode.
4. Set the system controls as indicated in [Table 6-2](#).

Table 6-2. Steered CW Doppler Noise Band Control Settings

Control	Setting
Output	Maximum
Sample Volume Depth	9.0 cm

5. Select CW. Select UPDATE.
6. Adjust the Doppler gain to obtain clearly visible background noise in the scrolling display.
7. Adjust the D-line ± 15 degrees around the centerline of the 2D image to locate the position that produces the most CW noise.

8. Adjust the Doppler gain according to **Table 6-3** and verify the spectral display is clear of noise bands.
9. Repeat this procedure using the P5-3 scanhead.

Table 6-3. CW Doppler Gain Control Settings for Noise Band Tests

PRF (Hz)	Doppler Gain	
	P3-2	P5-3
41667	53	52
31250	56	55
25000	59	58
20000	61	61
15625	65	65
14286	66	66
11905	69	69
10000	72	72
8333	75	75
5000	83	83
3731	86	86

2500	93	93
1515	95	95

6-5.6

DiskLink

Begin Exam

1. Press Patient Data.
2. Enter “Y” to select New Patient.
3. Enter your name in the name field.
4. Press Patient Data to begin the new exam.

Storing Black and White Images

1. Press PRINT to store the image to the hard disk.
2. Verify the system freezes the image.
3. Verify the system beeps.
4. Verify the system unfreezes the image.

5. Verify that the Page Format Graphic and the Print Store Nonessential Annotation indicates a black and white image has been stored.
6. Press FREEZE.
7. Press PRINT to store six additional images.
8. Press DEL IMAGE.
9. Select Delete.
10. Verify that the Page Format Graphic and the Print Store Nonessential Annotation indicates the last black and white image has been deleted.

Storing Color Images

1. Select Color Mode.
2. Increase the Color Gain until color pixels are displayed.
3. Press PRINT to store the image to the hard disk.
4. Verify the system freezes the image.

5. Verify the system beeps.
6. Verify the system unfreezes the image.
7. Verify that the Page Format Graphic and the Print Store Nonessential Annotation indicates that a color image has been stored.
8. Press FREEZE.
9. Press PRINT to store 6 additional images.
10. Press DEL IMAGE.
11. Select Delete.
12. Verify that the Page Format Graphic and the Print Store Nonessential Annotation indicates the last color image has been deleted.
13. Press END EXAM.

Reviewing Images

1. Press NET/DISK.
2. Select Hard Disk to display the exam directory on the hard disk.
3. Verify the information entered for the exam just completed is correct.
4. Select the exam just completed.
5. Select Review Images.

NOTE: The Page Up/Page Down keys are the F7/F8 keys (the seventh and eighth keys to the right in the row of function keys).

6. Select the Zoom Graphic on one of the stored images.
7. Verify the image is displayed in one-on-one format.
8. Select Meas/Edit.
9. Verify the image appears like a normal acquisition screen.
10. Press Review.
11. Verify the image is displayed in multi-image format.

Copying Images

1. Begin a new exam.
2. Press PRINT to store an image.
3. Press END EXAM.
4. Insert a formatted optical disk in the system drive.
5. Press Review.
6. Select Exam Dir to display the list of exams on the hard disk.
7. Select the last exam.
8. Select Copy To, then select OK to copy the image to the optical disk.
9. Display the Exam Directory on the optical disk.
10. Select the exam just copied to the optical disk.
11. Select Copy To, then select OK to copy the image to the hard disk.

12. Display the Exam Directory on the hard disk.
13. Select the exam just copied to the hard disk.
14. Select Review Images.
15. Verify that the image quality of each of the images is the same and that image quality has not degraded.
16. Press Patient Data.
17. Enter “Y” to select New Patient. Do not enter data in the Name or ID fields.
18. Press Patient Data to begin the new exam.
19. Display the Exam Directory on the hard disk.
20. Delete all exams.
21. Display the Exam Directory on the optical disk.
22. Delete all exams.
23. Press Setups.
24. Select Image Management Directory.

25. Select Printer Selection to display the Image Management Printer setup panel.

26. Set the printer setup options as indicated in **Table 6-4**.

Table 6-4. Image Management Printer Setup Options

Option	Setting
B&W Film Format	2-on-1
Color Film Format	4-on-1
Printed Image Destination	All to B/W Printer

NOTE: If “Printed Image Destination” is set to “All to B/W Printer”, the images stored to the optical disk will be black and white images only.

27. Select Setups Directory.

28. Select Image Management Directory.

29. Select General Options.

30. For the “Store Images During Exam” option, select “At End of Exam.”

31. Select Close.
32. Press NET/DISK and eject the optical disk by selecting Eject Disk.

6-5.7

NetLink

1. Press Setups.
2. Select Image Management and press SELECT.
3. Select Printers and press SELECT.
4. Select a B&W print destination. Also select whether the B&W images are to be sent to the color printer.
5. Select Close and press SELECT.
6. Press Patient Data.
7. Enter "Y" to select New Patient.
8. Enter your name in the name field.
9. Press Patient Data to begin the new exam.
10. Scan an RM-413 or 406 phantom.

11. Save the image and the exam.
12. Press END EXAM to end the exam.
13. Press PRINT and verify the image has been printed on the network printer.

6-5.8

ECG

1. Connect a P3-2 scanhead to the system.
2. Select the Adult Card/General preset.
3. Connect the ECG cable to the system.
4. Connect the white ECG cable to the RA terminals on the ECG simulator, the black cable to the LA terminals, and the red cable to the LL terminals.
5. Set the ECG simulator settings as indicated in [Table 6-5](#).

Table 6-5. ECG Simulator Option Settings

Option	Setting
Output	2.0 mV
Rate	180 BPM
OFF/ECG/PULSE	ECG

6. Verify the ECG R wave is a positive going pulse.
7. Verify the measured heart rate stabilizes at 180 BPM \pm 1 BPM.
8. Set the ECG simulator rate to 120.
9. Verify the measured heart rate stabilizes at 120 BPM \pm 1 BPM.
10. Set the ECG simulator rate to 60.
11. Verify the measured heart rate stabilizes at 60 BPM \pm 1 BPM.
12. Display the physio secondary control menu.

13. Increase and decrease the ECG gain. Verify that the amplitude of the ECG waveform increases and decreases.
14. Increase and decrease the ECG position. Verify that the vertical position of the ECG waveform moves up and down on the display.
15. Select Configure.
16. Set Trigger A and Trigger B to on.
17. Slowly increase and decrease the A Delay. Verify the A Trigger above the ECG waveform moves to the right and left.
18. Slowly increase and decrease the B Delay. Verify the B Trigger above the ECG waveform moves to the right and left.
19. Position both triggers so they are clearly visible.
20. Press UPDATE to enable trigger mode.
21. Slowly slide the scanhead across the phantom and verify the image is updated at each trigger.

22. Slowly slide the scanhead across the phantom again, then press FREEZE.
23. Verify that the Trackball movement left or right scrolls the Cineloop marker along the ECG waveform and that the image is updated as the marker crosses each trigger.
24. Press FREEZE and verify the image updates continuously.
25. Select M-mode.
26. Center the ECG waveform in the vertical center of the M-mode display.
27. Set the ECG simulator rate to 30.
28. Verify the measured heart rate stabilizes at 30 BPM \pm 1 BPM.
29. Observe the ECG waveform. Press FREEZE as soon as a new QRS waveform is displayed.
30. Display the Meas secondary control menu.
31. Select Time/Slope.

32. Position the cursor on a distinct point on the QRS waveform and press Select.
33. Position the second cursor on the corresponding location on the next QRS waveform to the left or right.
34. Verify the measured time interval is $2.00\text{s} \pm 0.04\text{s}$.
35. Press Del Meas.
36. Disconnect the ECG simulator.

6-5.9

Multiplane TEE Scanhead Face Temperature

Refer to the *MPT7-4 Scanhead Field Service Manual* (4720-0292-XX) to determine whether the particular ultrasound system and scanhead are capable of detecting a scanhead over-temperature condition.

ISEM Tests

System Setup

1. Press SETUP.
2. Select Peripheral from the Directory of Setups.
3. Set the Internal Printer option to Select Sony Color.
4. Exit Setups.
5. Connect a P3-2 scanhead to the system.
6. Select the Adult Card/General preset.
7. Select 2D Color mode.
8. Display a large color box filled with color.

ISEM Setup

1. If the shipping disk is installed, eject the disk.
2. Verify the system LED is lit on the video control box.
3. Select Stress Echo as the video source. Verify the ISEM menu bar is displayed above a blue screen, and that the Stress Echo LED is lit.
4. Select Digital / Live. Verify that system video is displayed.
5. Select Setup on the Menu Bar.
6. Select Input Source.
7. Set the video source options as indicated in [Table 6-6](#).

Table 6-6. ISEM Video Source Settings

Parameter	Setting
Video Source	RGB
Video Sync Type	Composite
ECG Source	Hidden
Machine Type	HDI 3000

8. Select OK.
9. Select Setup on the menu bar, then select Video Calibration.
10. Set the video calibration settings as indicated in **Table 6-7**.

Table 6-7. ISEM Video Calibration Settings

Parameter	Setting
Audible ECG	On
ECG Threshold	23%
Brightness	60%
Contrast	50%
Graphics	68%

11. Select OK.
12. Select Setup on the menu bar, then select Control Panel.
13. Set the date and time setup options as indicated in **Table 6-8.**

Table 6-8. ISEM Date and Time Setup Options

Parameter	Setting
Date Format	Month-Day-Year
Time	Current Time
Date	Current Date
Mouse Tracking Speed	Default Value

14. Click on Done to close the Control Panel window.
15. Press CNTL+N to begin a new patient.
16. Enter your name into the name field.
17. Enter a made-up ID number into the ID field.
18. Select OK.

ISEM Footswitch

1. Press ALT+A and select Page-full, then OK. Verify the footswitch icons are displayed.
2. Press the left footswitch and verify the system indicates that images are being captured.
3. Press the middle footswitch and verify the system indicates it is preparing the image for storage.
4. Press the right footswitch and verify the footswitch icons and the status bar disappear.

ISEM Hand Controller




1. Press ALT+A and select Page-full, then OK. Verify the footswitch icons are displayed.
2. Press the  key on the hand controller and verify the system indicates that images are being captured.
3. Press the  key on the hand controller and verify the system indicates it is preparing the image for storage.
4. Capture several more images.
5. Press the  key on the hand controller and verify the footswitch icons and the status bar disappear.
6. Select 2D mode.

Image Review

1. Select Patient Files then select Patient Directory.
2. Select the patient name entered in [step 16](#) of the ISEM Setup test procedure.
3. Select Load.
4. Verify the menu bar indicates image x of y, where x is the image number and y is the number of images captured.
5. Press the left and right arrow keys on the hand controller to sequence through the images. Verify that each of the images accurately reflect the system image.

Hard Disk Clean-up

1. Select Display, then select Close all Collections.
2. Select Patient Files, then select Patient Directory and OK.

NOTE: Do not delete the patient files named “TEST, NTSC (or PAL), and Monitor Setup.

3. Highlight the patient entries created during this test, then select Delete... and OK.
4. Verify the selected files have been deleted.
5. Select Cancel.
6. Select System as the video source. Verify the system monitor is no longer displaying ISEM video, and that the System LED is lit.

6-5.11

OEM Tests

OEMs are only tested for basic functionality and their interface to the system.

VCR

1. Press the COLOR control.
2. Press Play + REC and verify the VCR begins recording.
3. Record several minutes of image data and audio.
4. Rewind the cassette and press PLAY.

5. Verify the playback image is stable.
6. Adjust Doppler gain and color gain. Verify color hue and intensity is adjusted on the monitor.
7. Verify that audio plays back.
8. Pause the image during playback.
9. Verify the paused image is stable.
10. While in the Pause mode verify that the VCR will search forward and reverse where the speed of the search is dependent on the directional movement of the VCR search control.
11. Verify that positive flow audio is on the left speaker, and negative flow is on the right speaker.
12. Verify that audio volume can be varied with the volume control.
13. Press STOP on the VCR.
14. Press EJECT on the VCR.

B/W Video Printer

Verify that pressing PRINT initiates a B/W hardcopy print.

Color Video Printer

1. Select Color Doppler mode and obtain a color image.
2. Press PRINT to take a print.
3. Verify that the print LED blinks when PRINT is pressed, and 45 to 90 seconds later, blinks again three times to indicate completion of print (refer to color printer service manual).
4. Verify that the prints have the correct image size, blanking, and color reproduction.

Multi-image Camera

1. Acquire an image using your phantom.
2. Set the system depth, TGC, and gain controls to mid-range. Adjust the 2D maps to achieve a mid-level gray.
3. Press FREEZE.
4. Take a print of a positive 2D image and a print of a scrolling video display (M-mode or Doppler).
5. Take six exposures for each sheet of film. After the sixth exposure, verify the camera alternately displays “Complete” then “Remove Cassette”.
6. Re-install the dark slide with the black border of the dark slide outward, and remove the film cassette from the camera.

7. Process the film and verify the following:
 - a. There is no video blanking visible within 1.0mm of any image border.
 - b. The graybar transitions evenly from white to black.
 - c. The print graphics are clear, legible, and not cut-off.
 - d. The print density is even throughout the print.
 - e. There is no fogging, chemical marks, roller scratches, smudges, or light leaks.

6-5.12

Performance Test Checklist

- Initialization
- Setup Parameters
- Video Monitors
 - Contrast
 - Brightness
 - Linearity
- Control Panel Test
 - Keyboard
 - Menu controls
 - Dedicated pushbuttons
 - Footswitches
 - Trackball
 - Miscellaneous controls
- 2D Tests
 - Gain, Output, and Depth
 - Freeze

2D Measurements	<input type="checkbox"/>
Biopsy Guides	<input type="checkbox"/>
Cineloop	<input type="checkbox"/>
Save-Recall Test	<input type="checkbox"/>
Zoom	<input type="checkbox"/>
Color Power Angio	<input type="checkbox"/>
Color	<input type="checkbox"/>
2D	<input type="checkbox"/>
Color Capture	<input type="checkbox"/>
M-Mode	<input type="checkbox"/>
Spectral Doppler	<input type="checkbox"/>
Pulsed Doppler	<input type="checkbox"/>
Spectral Doppler Auto Update	<input type="checkbox"/>
Simultaneous Spectral Doppler	<input type="checkbox"/>
M-Mode	<input type="checkbox"/>
Simultaneous M-Mode	<input type="checkbox"/>
Dual M-Mode	<input type="checkbox"/>

HD Zoom	<input type="checkbox"/>
Access Disk Link	<input type="checkbox"/>
Access Network Link	<input type="checkbox"/>
ECG/Physio	<input type="checkbox"/>
ECG	<input type="checkbox"/>
Heart Rate	<input type="checkbox"/>
Headphones	<input type="checkbox"/>
Phased Array Scanhead	<input type="checkbox"/>
Scanhead Control	<input type="checkbox"/>
Focal Zones and Focal Depth	<input type="checkbox"/>
Sector Angle	<input type="checkbox"/>
Image Quality	<input type="checkbox"/>
Linear Array Scanhead	<input type="checkbox"/>
Scanhead Control	<input type="checkbox"/>
Focal Zones and Focal Depth	<input type="checkbox"/>
Image Quality	<input type="checkbox"/>
Curved Array Scanhead	<input type="checkbox"/>

Scanhead Control	<input type="checkbox"/>
Focal Zones and Focal Depth	<input type="checkbox"/>
Image Quality	<input type="checkbox"/>
Multi-plane TEE Scanhead	<input type="checkbox"/>
Internal Hardcopy	<input type="checkbox"/>
VCR	<input type="checkbox"/>
Multi-Image Camera	<input type="checkbox"/>
Page Printer	<input type="checkbox"/>
ISEM	<input type="checkbox"/>
External Hardcopy	<input type="checkbox"/>
Rear Panel Port Tests	<input type="checkbox"/>
Miscellaneous Tests	<input type="checkbox"/>
Microphone and Audio Dub	<input type="checkbox"/>
Speakers	<input type="checkbox"/>

7 Adjustments

7-1 Power Supply Voltage Adjustments

There are no power supply voltage adjustments. The voltages are monitored by the MPS PCB. If a voltage is not within $\pm 7\%$ of the specified value, the MPS shuts the system down.

7-2 Trackball

Trackball assemblies with a removable pressure ring can be adjusted and cleaned without removing the assembly from the control panel. Follow the procedure in [paragraph 8-3](#) to clean and adjust the assembly.

7-3

Electrohome Monitor Adjustments

Monitor field adjustments include contrast, brightness, color background, and lightbar brightness (**Figure 7-1**). The adjustments can be set to factory default settings or to any setting desired by the user.

The adjustment settings are retained in an EEPROM in the monitor. However, to limit the number of settings written to the EEPROM, there is a delay of 30 seconds between the time the adjustment is made and the time the settings are stored. If the ultrasound system is powered down before the monitor has stored the new settings to the EEPROM, the previous control settings will be used the next time the monitor is powered up.

When a control is pressed, the current control setting is displayed for approximately 3 seconds.

All other monitor adjustments are microprocessor controlled. The procedures and the software required to manually adjust the microprocessor controlled adjustments are currently being developed.

- ❑ To set the monitor controls to the factory default settings:
 1. Simultaneously press the up and down contrast controls twice to set the monitor to the factory default of 80.
 2. Simultaneously press the up and down brightness controls twice to set the monitor to the factory default of 20.
 3. Simultaneously press the lightbar controls twice to set the monitor to the factory default of 16.
 4. Press the background color control to select the background color on the display. Color 1 is the factory default option. (Color 1 adds a blue tint to the background, Color 2 is neutral, and Color 3 adds a red tint.)
 5. Press the lightbar brightness control to adjust control panel illumination.
 6. To store the factory default settings in the monitor EEPROM, wait 30 seconds before powering down the system.

- ❑ To set the monitor controls to user defined settings:
 1. Refer to the control locations in **Figure 7-1** and adjust the contrast, brightness, color background, and lightbar brightness to the control settings desired by the user.
 2. Wait 30 seconds before powering down the system to retain the factory default settings in the monitor EEPROM.

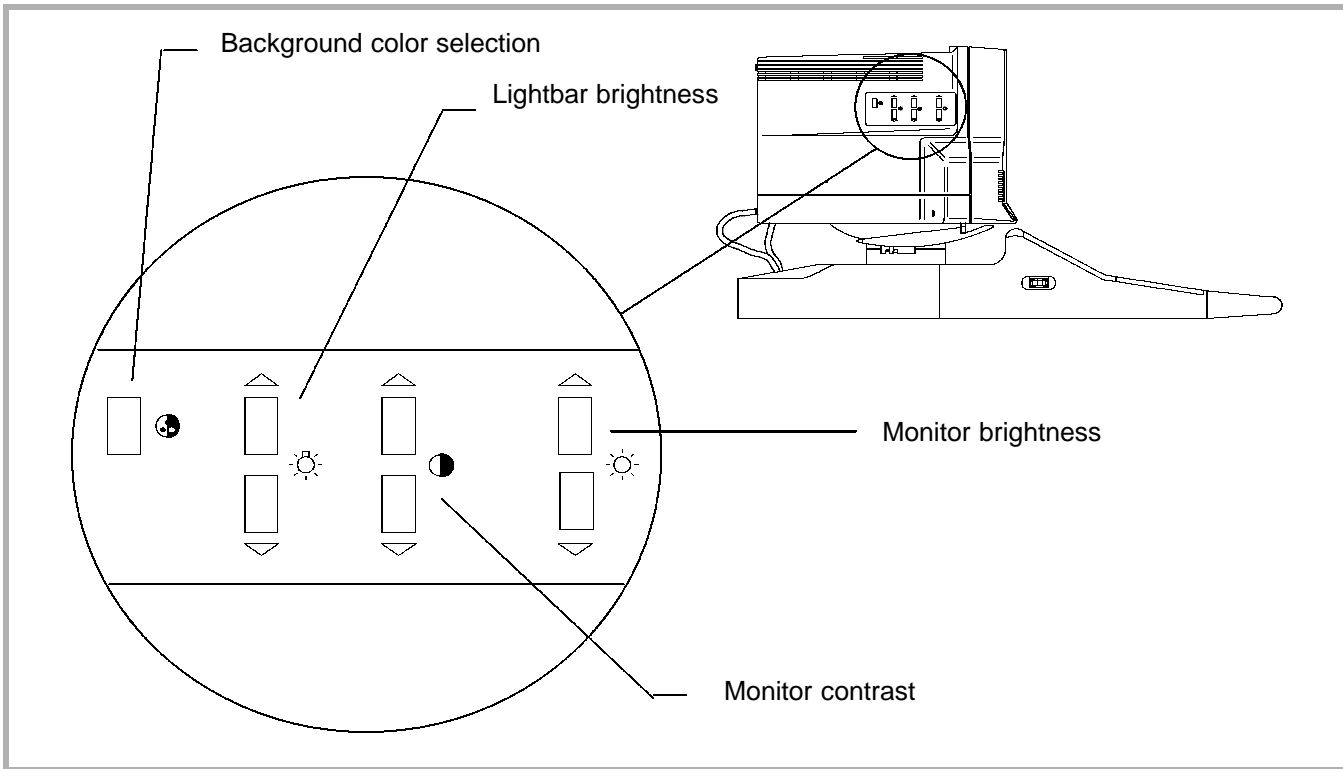


Figure 7-1. Monitor Control Locations

Data Ray Monitor Adjustments

The Data Ray monitor operates with an RGB video signal using either a 15 kHz or 31 kHz scan rate at 60 Hz or 50 Hz video input signal. The monitor automatically detects the type of video input signal and routes the signal to the correct circuitry for that particular type of video.

There are four columns of adjustments arranged vertically on the monitor adjustment PCB. The adjustment column that should be selected depends on the scan rate and the type of video input signal. An LED above each adjustment column lights to indicate the type of video input signal currently being received by the monitor. Refer to **Table 7-1** for the LED numbers for each type of video and **Figure 7-2** for the adjustment locations.

The monitor operates using a 15 kHz scan rate when displaying VCR playback video and 31 kHz when displaying image data.

Table 7-1. Data Ray Video Monitor Operating Modes and LEDs

Video Input Signal	Scan Rate (Frequency)	LED
RGB 60 Hz	15 kHz (Interlaced)	D305
	31 kHz (Non-Interlaced)	D307
RGB 50 Hz	15 kHz (Interlaced)	D306
	31 kHz (Non-Interlaced)	D308

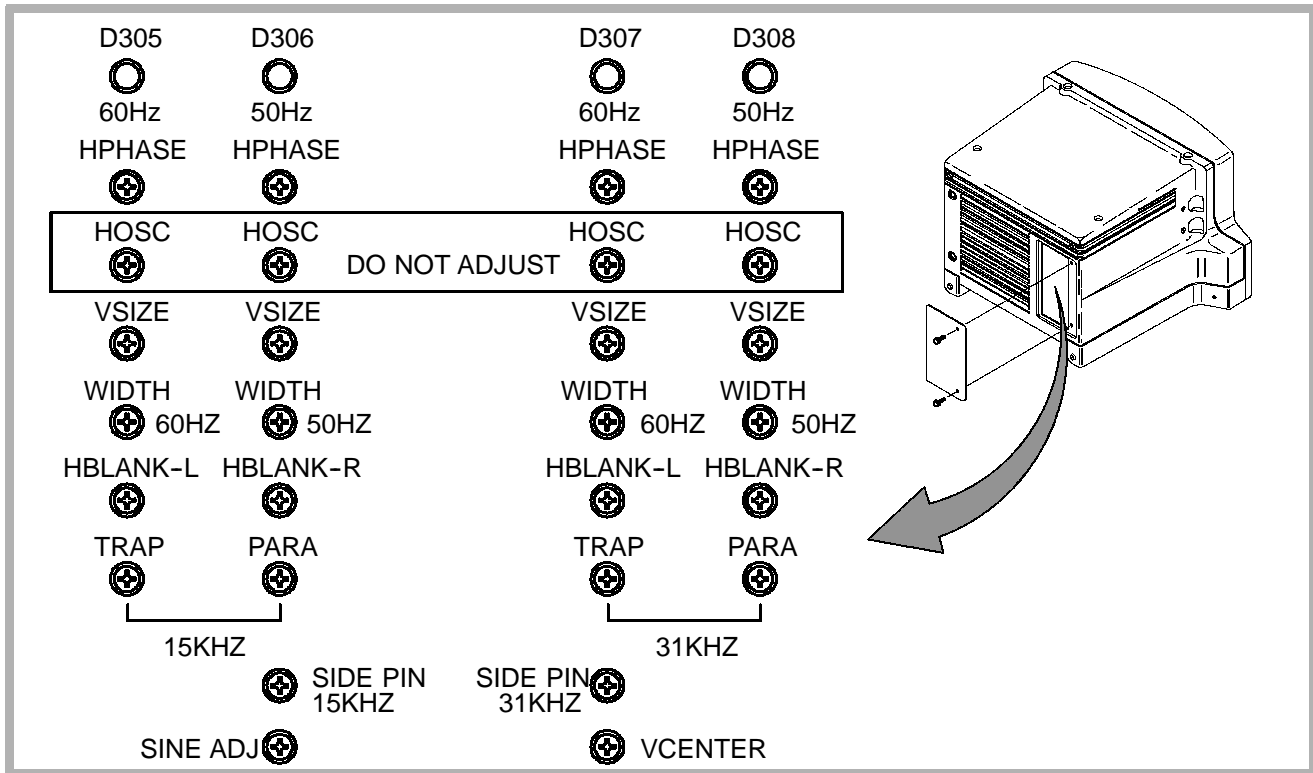


Figure 7-2. Data Ray Monitor Adjustment PCB

7-4.1

Cautions and Indications

Field adjustment of the monitor is not recommended due to the number and the interactive nature of the adjustments. If it is necessary to field adjust the Data Ray monitor, observe the following cautions:

- Many color monitor adjustments require equipment not available to field personnel. DO NOT make any adjustments other than those described in **Table 7-2**.
- Review the entire adjustment procedure. Notice and understand the interactive nature of the adjustments.
- Use caution when making adjustments to prevent accidental adjustment of the wrong pot. A misadjusted pot may not be able to be correctly adjusted in the field.

- The 60 Hz and 50 Hz video adjustments interact. DO NOT adjust 50 Hz video controls on a 60 Hz video system or 60 Hz video controls on a 50 Hz video system.
- After making any adjustment(s), verify that the monitor is fully functional using both 15 kHz and 31 kHz scan rates (VCR playback video and image data). Re-adjust the monitor if necessary.

7-4.2

Data Ray Monitor Adjustment Procedure

1. Remove the access cover on the rear of the monitor assembly to access the Monitor Adjustment PCB (**Figure 7-2**).
2. Turn the system and VCR power on. Warm up the monitor for ten minutes.
3. With image data displayed on the monitor, use the lit LED on the Monitor Adjustment PCB to identify the correct column of adjustments.

NOTE: An LED should be lit to indicate the correct column of adjustments. If an LED is not lit, use a 31 kHz column of adjustments for image data. The left column is for 60 Hz video systems; the right column for 50 Hz.

4. Refer to the adjustments in **Table 7-2** and adjust the monitor as necessary.

NOTE: The Focus adjustment is located on the Main PCB (**Figure 7-3** and **Table 7-3**) mounted vertically on the right side of the monitor (as viewed from the rear of the monitor). Remove the monitor assembly cover to access the Focus adjustment.

WARNING

High voltages exist within the monitor. Use care during adjustment.

5. Insert a video tape containing images into the VCR. Press PLAY.
6. Repeat **steps 3** and **4**.

NOTE: An LED should be lit to indicate the correct column of adjustments. If an LED is not lit, use a 15 kHz column of adjustments. The left column is for 60 Hz video systems; the right column for 50 Hz.

7. Check the interaction of the adjustments by repeating [steps 3](#) through [6](#), adjusting as necessary.

Table 7-2. Data Ray Monitor Adjustments

Adjustment	Purpose	Specification	Notes
HPHASE	Horizontal centering	Image centered on the display. No information cut off on either side of the image.	1
HOSC	Horizontal oscillator	DO NOT ADJUST	
VSIZE	Image vertical size	180 mm nominal image height. Adjust using cross-hatch test pattern.	1, 4
WIDTH	Image horizontal size	240 mm nominal image width. Adjust using cross-hatch test pattern. This adjustment affects 15 kHz and 31 kHz scan rates.	4

Adjustment	Purpose	Specification	Notes
HBLANK-L	Horizontal blanking, left	Adjust to show active video plus a 2 mm (minimum) blank border using cross-hatch test pattern. This adjustment interacts with HBLANK-R.	4
HBLANK-R	Horizontal blanking, right	Adjust to show active video plus a 2 mm (minimum) blank border using cross-hatch test pattern. This adjustment interacts with HBLANK-L.	4
TRAP	Monitor trapezoid	See “Normal Image” in Figure 7-4 . There is only one adjustment for each scan rate.	2
PARA	Monitor parallelogram	See “Normal Image” in Figure 7-4 . There is only one adjustment for each scan rate.	2
SIDE PIN	Monitor pin cushion and barrel	See “Normal Image” in Figure 7-5 . There is only one adjustment for each scan rate.	2

Adjustment	Purpose	Specification	Notes
SINE ADJ	Monitor sine	See “Normal Image” in Figure 7-6 . This adjustment affects 15 kHz and 31 kHz scan rates.	3
VCENTER	Vertical centering	This adjustment affects both 15 kHz and 31 kHz scan rates.	3

1. Use 15 kHz 60 Hz adjustment if D305 is lit. Use 15 Khz 50 Hz adjustment if D306 is lit. Use 31 kHz 60 Hz adjustment if D307 is lit. Use 31 kHz 50 Hz adjustment if D308 is lit.
2. Use 15 kHz adjustment if D305/D306 is lit. Use 31 kHz adjustment if D307/D308 is lit.
3. Use this adjustment for either scan rate (15 / 31 kHz) and either type of video signal (60 / 50 Hz). Adjust at one scan rate, switch video signals, and check or adjust at the other scan rate. Repeat to check for normal image.
4. Refer to Video Test Patterns Utility test pattern 3 in [paragraph 9-4.6](#).

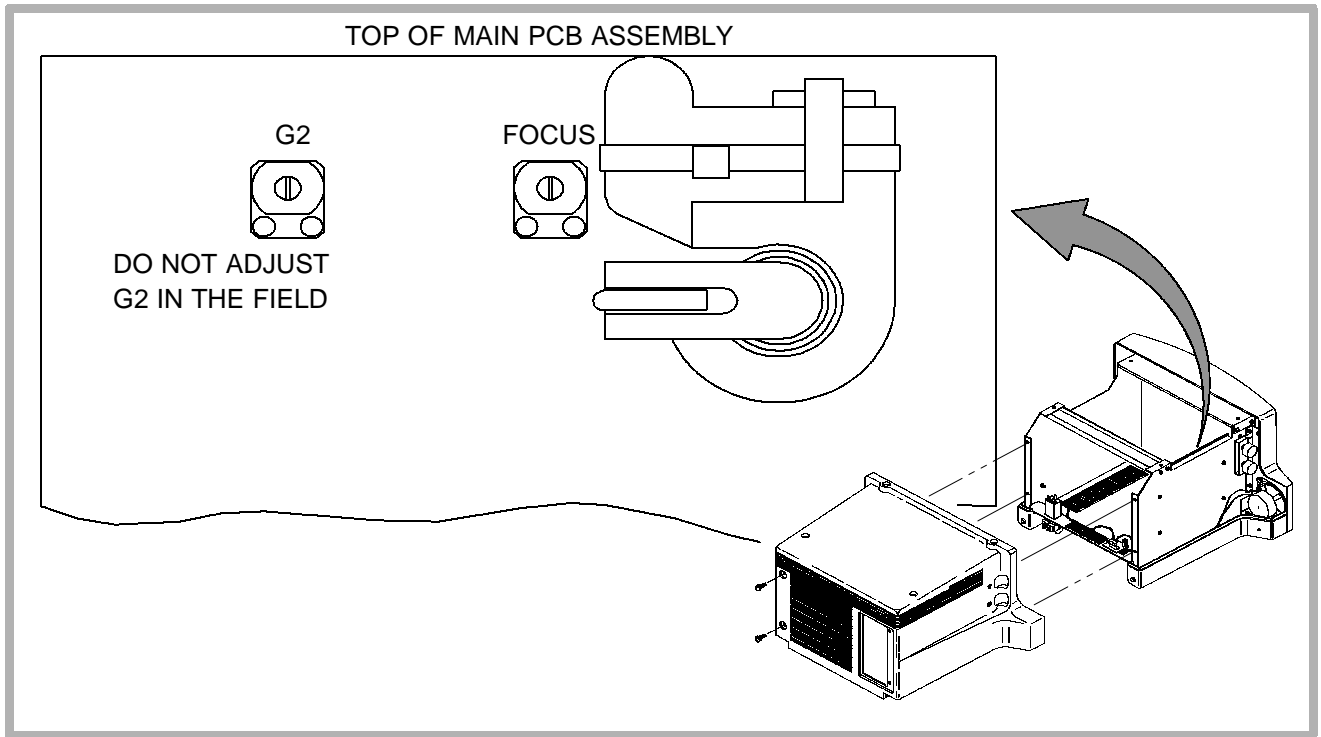


Figure 7-3. Data Ray Monitor Main PCB Adjustment

Table 7-3. Data Ray Monitor Adjustment - Main PCB

Adjustment	Purpose	Specification
FOCUS	Optimize focus with fine detail on the screen	Factory set for best overall image at given settings. The quality is limited by the characteristics of the CRT and is affected by brightness and contrast settings. Adjust using “y” test pattern. Refer to Video Test Patterns Utility test pattern 4 in paragraph 9-4.6. Also may be adjusted with fine detail displayed on the screen, such as Doppler. The adjustment is next to the high voltage transformer.

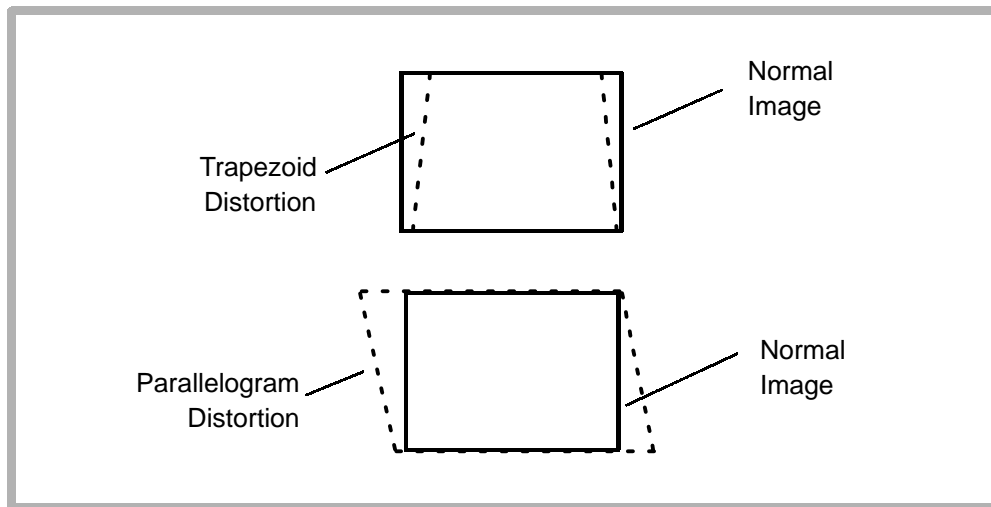


Figure 7-4. Trapezoid and Parallelogram Distortion

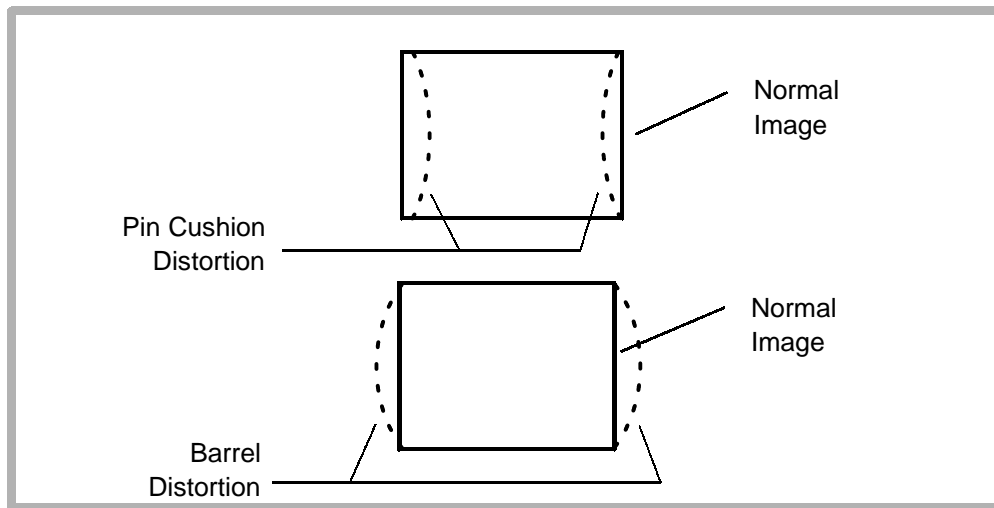


Figure 7-5. Pin Cushion and Barrel Distortion

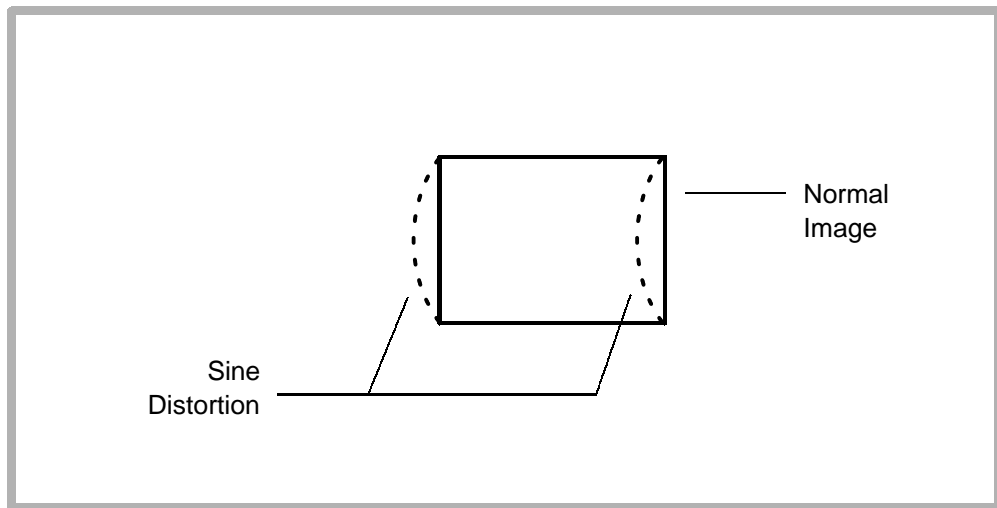


Figure 7-6. Sine Distortion

8 *Preventive Maintenance*

Preventive maintenance inspections are part of the USA Customer Service Quality Assurance (QA) Program. Also included in the USA QA program are performance tests and procedures for insuring customer satisfaction.

8-1

Fan Filter

1. Remove the filter from under the front of system.
2. If the system has a metal filter, order a plastic filter as a replacement ([Table 14-3](#)).
3. Vacuum and reinstall the filter.
4. Demonstrate filter cleaning procedure to customer.

Optical Disk Drive Head Cleaning

The recommended interval for cleaning the lens (head) internal to the (optional) optical disk drive is once every six months.

The procedure for head cleaning is to insert a head cleaning cartridge (Table 14-7) into the optical drive with power applied.

The head cleaning cartridge will load, automatically clean the head, and automatically unload when the cleaning cycle has completed (approximately 10 seconds).

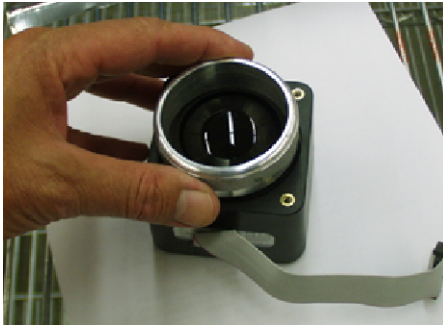
The condition of the head cleaning cartridge is important to the process. Inspect the condition of the cleaning brush by opening the shutter of the cleaning cartridge. Check to see if the tip of the cleaning brush is open. If it is, use a newer head cleaning cartridge.

Trackball

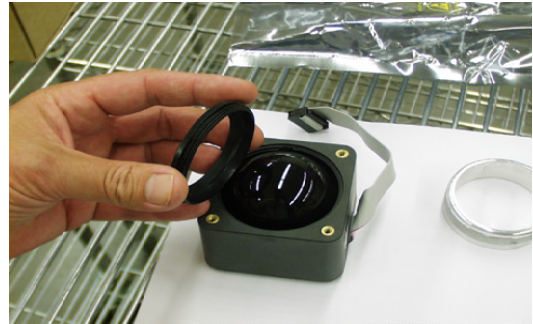
1. Check trackball operation for excessive drag or inconsistent cursor movement. Clean for smoother operation or replace it.
2. Replace failed trackballs with the type having the adjustable seal ring (**Figure 8-1**, **Table 14-15**).

NOTE: You can clean and adjust the adjustable-seal trackball without removing the assembly from the control panel.

3. Adjust trackball seal ring with the seal-adjustment tool until the drag is satisfactory to the user.
4. If you are unable to adjust the tension adequately, remove the seal adjustment ring and lift out the trackball. Use tape to lift it out if you do not remove the assembly from the system.
5. Clean and reassemble the trackball assembly.
6. Repeat **step 3**.



Loosen the seal with the seal-adjustment tool.



Remove the seal.



Remove the trackball, and clean the assembly.



Reassemble the trackball assembly, and tighten the seal for acceptable drag.

Figure 8-1. Trackball Seal

Other Maintenance

1. Verify screws are securely in place on all PCB hold down tabs (PIM, CPU, ADAPTR, ACIM, DDEA, and IIM).
2. Verify all screws are securely in place on the Scanhead Select PCB. Tighten the screws in the correct sequence. Do not over-tighten. Damaged screws or PEM nuts may require card cage replacement.
3. For domestic U.S. field service, copy the diagnostic data to an optical disk, send the disk to ATL Technical Service (MS 440), and reset the error log. Write your name, FSE number, and the system serial number on the disk so it may be returned to you.
4. Use Uplink to update Machine Options SW Backup on HD. Leave the disk in a customer accessible location.
5. Clean the trackball per [paragraph 8-3](#).
6. Verify all cooling fans are operational.

7. Inspect the casters for signs of cuts or excessive wear.
Replace if necessary.
 - Verify the caster hubcaps are not missing.
 - Verify that the caster brakes are operational. If they are broken, order a brake lever knob.
8. Verify that the OEM bay contains no OEMs which are hard-wired to the ACIM.
9. Re-attach loose rubber bumpers and touch up paint scratches.
10. Run the Machine Comprehensive Test, verify system functionality, and check image quality.
11. Perform other cleaning and inspection procedures as per Customer Service policy.
12. Fill out a quality assurance label. Attach it to the system per Customer Service policy. Cover the label with a label overlay:
 - Label, P/N 4100-0940-01
 - Overlay, P/N 4100-0941-01

9 *Troubleshooting*

9-1

Introduction

The HDI 3000 Ultrasound System contains extensive software and hardware diagnostic capabilities. However, the system must boot up before the operator has access to diagnostics. This section contains information on the core bootup fault isolation procedure, system alerts, general fault isolation, and system diagnostics.

Core Bootup Fault Isolation

The HDI 3000 System requires the following PCBs for core bootup: ACIM, APS, DPS, MPS, AIM, CIM, IIM, PIM, PCM, SYSCPU, DDEA, and CTRBRD. It also requires the control interface module cables, the video cable, and the monitor for core bootup.

NOTE: Core bootup may take up to 25 minutes if there are malfunctioning PCBs or missing PCBs.

- The core bootup fault isolation procedure is as follows:
 1. If the system does not boot from the hard drive, insert the backup disk into the optical drive and attempt to boot the system from the optical drive.
 2. If the system boots up from the optical drive, troubleshoot the hard drive. The hard drive should be loaded with base-line software.
 3. Set the ON/STANDBY switch to STANDBY and circuit breaker to off. Unplug the system power cord.

CAUTION

Ensure that the circuit breaker is set to off before removing PCBs.

4. Verify all card cage PCBs required for bootup (ACIM, APS, DPS, MPS, AIM, CPANEL, IIM, PIM, PCM, SYSCPU, and DDEA) are securely seated into the CTRBRD.
5. Verify that all cables to the IIM and ACIM are properly connected.
6. Set the circuit breaker and the ON/STANDBY switch to on.
7. If the system does not boot from the hard drive, turn the circuit breaker to off, and remove the PSP1, PSP2, FEC, IMEM, SSP, ADAPTR, and AIFOM. Reboot the system.

If the system boots up with the PCBs removed, one of the removed PCBs was preventing other PCBs from accessing a bus. Insert the PCBs individually until you determine the faulty PCB.

NOTE: It will take several minutes (up to 25 minutes) for the system to boot without the PSP1, PSP2, FEC, IMEM, SSP, ADAPTR, and AIFOM PCBs. The system will generate many error messages.

8. Check the LEDs on each PCB. Refer to **Figure 9-1**, **Figure 9-2**, **Table 9-1** and **Table 9-2**.

NOTE: The system monitors the power supply enable voltages to ensure they are within tolerance. If the voltages are not within $\pm 7\%$, the system will shut down. If the system shuts down, none of the voltages will be enabled (all voltages will be 0V). If the system shuts down due to a power supply failure, check the MPS LEDs using **Figure 9-1** and **Table 9-2**. Refer to **Figure 9-3**, **Figure 9-4**, **Figure 9-5**, **Figure 9-6**, and **Figure 9-7** for PCB voltage locations.

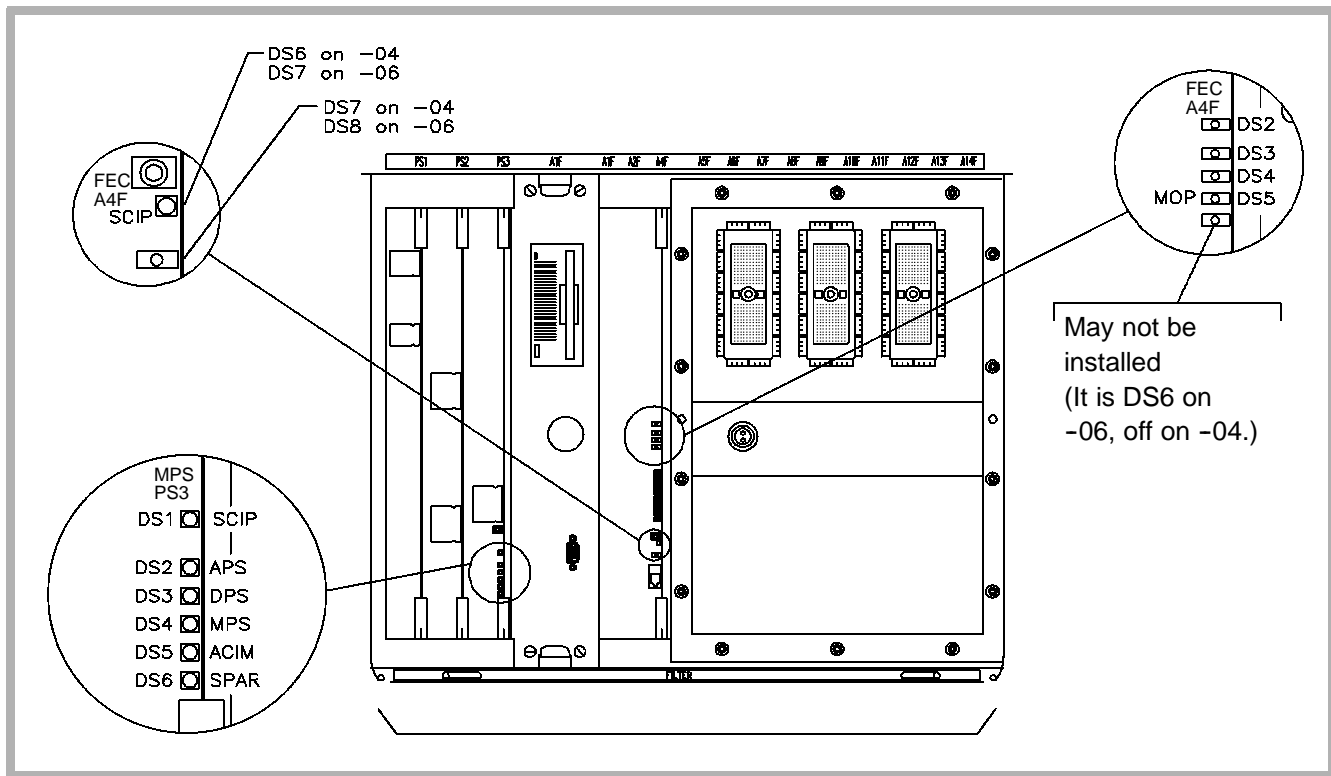


Figure 9-1. Card Cage PCB LED Locations (Front)

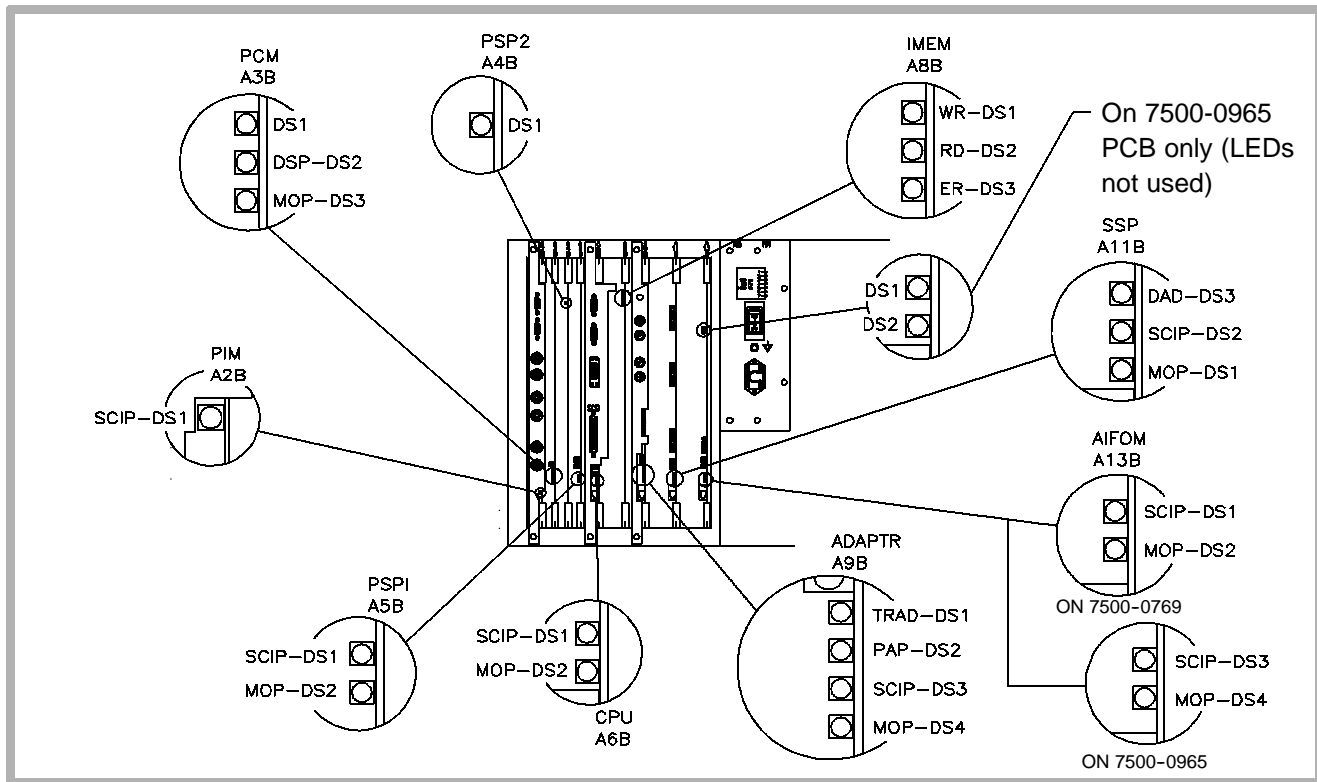


Figure 9-2. Card Cage PCB LED Locations (Rear)

Table 9-1. Normal Core Bootup and PCB LED Sequence

Core Bootup Sequence	Field Replaceable Unit - Visual Indication¹
Standby power/Main power switch off <ul style="list-style-type: none"> • AC power to ACIM • MPS boots • Connection made to ON/STANDBY switch 	MPS - DS1 flickers, DS2 - DS6 off
	ACIM - #5 - #6 on. If going from 2D to standby, #3 may flicker
	Fans - Low velocity when system is in STANDBY
System power on <ul style="list-style-type: none"> • MPS tells APS and DPS to boot up • APS and DPS supply power to CTRBRD • PCBs get power and begin initializing • PIM generates test pattern • CPNL, CIM, IIM, PCM data path established 	CPU - SCIP quick flash, 1 Hz after 5 seconds
	PCM - DS2 flickers, 1 Hz after 5 seconds
	PIM - DS2 flickers, 1 Hz after 5 seconds
	CPNL - 5 flashes after 5 seconds then off
	Monitor - PIM test pattern, color/gray bar
	Subsystem PCBs - refer to Table 9-2 for SCIP and MOP information

Core Bootup Sequence	Field Replaceable Unit - Visual Indication ¹
System power on <ul style="list-style-type: none"> • CPU and PCM complete bootup • PCM test pattern generated • CPU/PCM establish client/server (ethernet)² • HD loads applications and operating system to CPU 	CPU - SCIP flickers at 1 Hz, MOP flickers at 2 Hz
	PCM - DS1 on, all others pulse
	Monitor - dark screen, blue screen flash, gray pattern, ATL logo from PCM
	MPS - DS1 flickers at 1 Hz, DS6 - DS2 pulse sequentially
System Initialization <ul style="list-style-type: none"> • CPU begins loading subsystem PCBs • CPU/PCM client/server operational • HD/DDEA completes loading applications and operating system • ID's and configuration is checked • System operational files loaded and scanheads initialized 	CPU - SCIP flickers at 1 Hz, MOP flickers at 2 Hz
	PCM - top LED stays on, all others pulse
	Monitor - ATL logo
	SHSEL - relays energize. System bootup time is approx. 1 minute

Core Bootup Sequence	Field Replaceable Unit - Visual Indication ¹
Core bootup complete <ul style="list-style-type: none"> • CPU using applications, SW, and MO files, checks configuration • CPU checks bootup error status • UIF enabled 	Subsystem PCBs - refer to Table 9-2
	Monitor - displays 2D image and static graphics

1. The sequence described is the normal sequence of events during core bootup. If these visual indications are not observed, refer to the Core Bootup Fault Isolation procedure.
2. If a red cross is displayed on the monitor with an ethernet address, or a pink screen is displayed without an ethernet address, it indicates the PCM Flash code wasn't successfully loaded.

Table 9-2. PCB LED Functions and Status after Core Bootup

PCB	Slot Location	LED Status
Card Cage, Front		
MPS	PS3	DS1 - SCIP LED ¹
		DS6 - DS1 scroll with system ON, are off when the system is in STANDBY, and flicker in ON/STANDBY if an error occurs
FEC	A4F	DS2 - not used
		DS3 - not used
		DS4 - flickers during data transfers from AIFOM
		DS5 - MOP LED ²
		DS6 - not used (installed on the -06 PCB only)
		DS6/DS7 - SCIP LED ¹ (DS6 for -04 PCB, DS7 for -06)
		DS7/DS8 - lights only during reset (DS7 for -04 PCB, DS8 for -06)
Card Cage, Rear		
PIM	A2B	DS1 - SCIP LED ¹
PCM	A3B	DS1 - flickers when Ethernet communications with the CPU are active
		DS2 - DSP LED, flickers during image bus processing
		DS3 - MOP LED ²

PCB	Slot Location	LED Status
PSP2	A4B	DS1 - flickers when scan converting. During power up is momentarily on while its program is loaded from PSP1
PSP1	A5B	DS1 - SCIP LED ¹
		DS2 - MOP LED ²
CPU	A6B	DS1 - SCIP LED ¹
		DS2 - MOP LED ²
IMEM	A8B	DS1 - Write LED, flickers during scanning
		DS2 - Read LED, flickers during scanning
		DS3 - IBUS ERROR LED, is normally off
ADAPTR	A9B	DS1 - TRAP LED, flickers in all scanning modes. In 2D or Doppler the rate is so fast, the LED appears constantly on. In Color the rate is visible (TRAP = Translation Processor)
		DS2 - PAP LED, off in all modes (PAP = Physio-Audio Processor)
		DS3 - SCIP LED ¹
		DS4 - MOP LED ²

PCB	Slot Location	LED Status
SSP	A11B	DS1 - MOP LED ² Will blink faster if the system is in M-mode, Doppler, or Color. If nothing is in flash EPROMs, the LED continues to blink at the bootup rate
		DS2 - SCIP LED ¹ When receiving messages the LED will flicker
		DS3 - DAD LED, Off after bootup. If in Doppler the LED is on or off. If in Color the LED blinks at an irregular rate, unless the system is in Freeze mode. If in M-mode the LED blinks at a regular rate (DAD = Data Dispatcher processor)
AIFOM 7500-0769	A13B	DS1 - SCIP LED ¹
		DS2 - MOP LED ²
AIFOM 7500-0965	A13B	DS1 - not used
		DS2 - not used
		DS3 - SCIP LED ¹
		DS4 - MOP LED ²

1. The Serial Communications Interface Processor (SCIP) communicates between the PCB and the CPU. The SCIP LED blinks at one-second intervals after bootup.
2. The Module Operation Processor (MOP) controls PCB operation. The MOP LED blinks at one-second intervals during system bootup, and at a two-second rate after bootup.

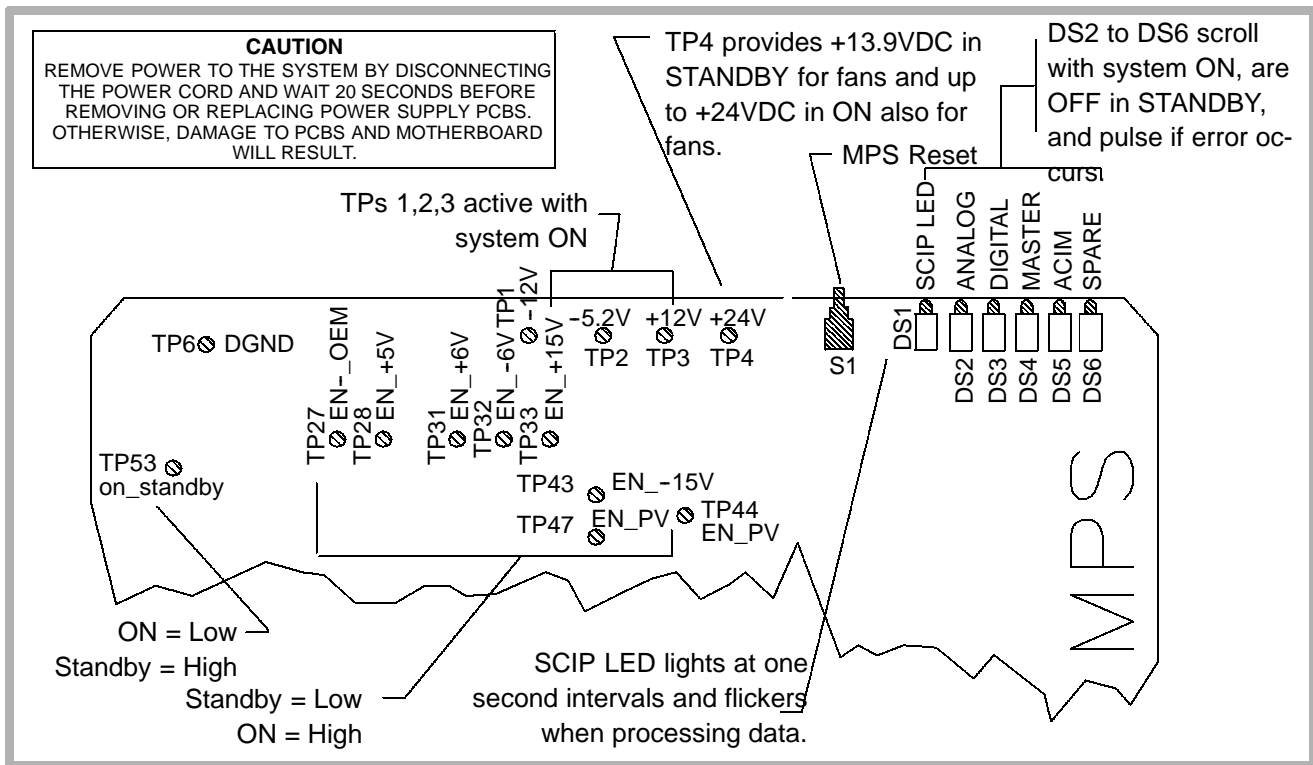
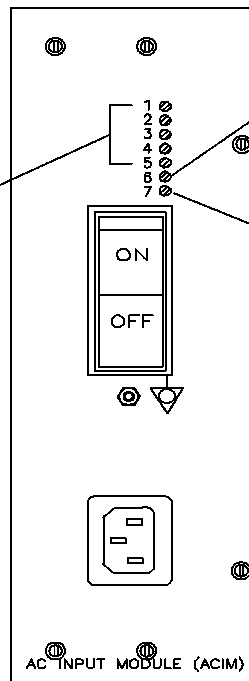


Figure 9-3. MPS Voltage Measurement Locations (PS3) 7500-0765-04

CAUTION

REMOVE POWER TO THE SYSTEM BY DISCONNECTING THE POWER CORD AND WAIT 20 SECONDS BEFORE REMOVING OR REPLACING POWER SUPPLY PCBS. OTHERWISE, DAMAGE TO PCBS AND MOTHERBOARD WILL RESULT.

ACIM LEDs 1-5 are the same as MPS LEDs DS2-DS6. LEDs 1-5 scroll with system ON, are OFF in STANDBY, and pulse if error occurs.



ACIM LED 7 indicates HVDC +170VDC from rectifier to PCBs.

ACIM LED 6 indicates power to HVDC after internal fuse F1 (12A 25VDC FB).

Figure 9-4. ACIM Voltage Measurement Locations (PS5)
3500-1578-02/03, 3500-1579-02/03, 3500-1580-01

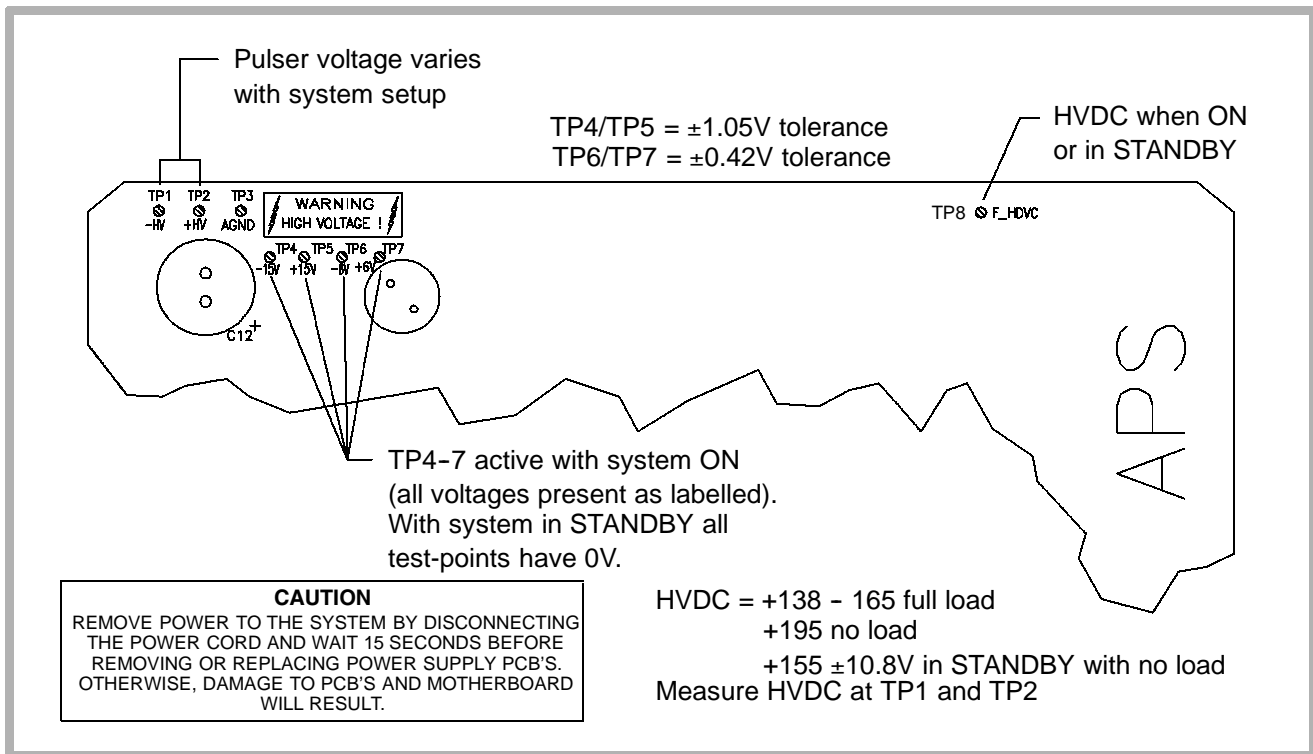


Figure 9-5. APS Voltage Measurement Locations (PS1) 7500-0764-04

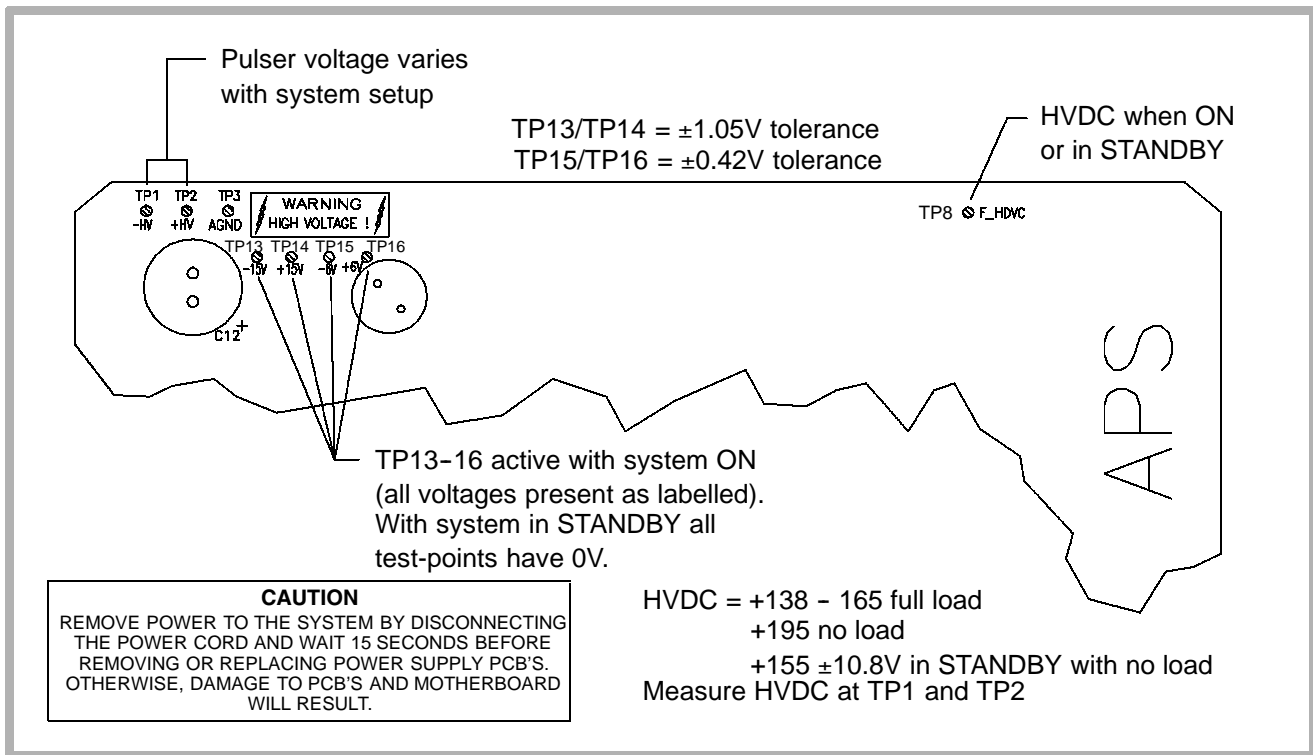
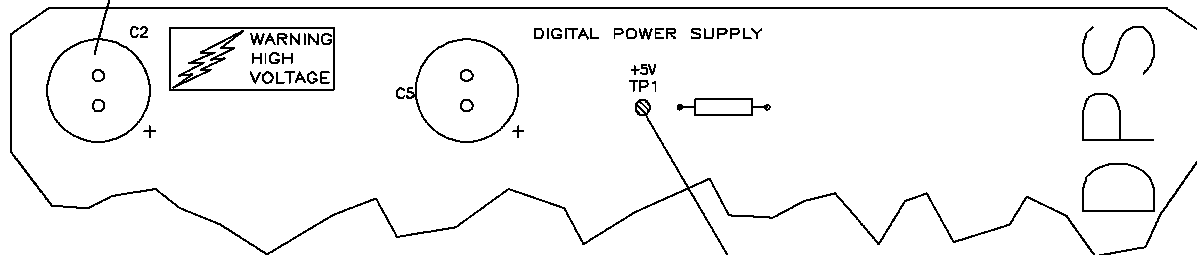


Figure 9-6. APS Voltage Measurement Locations (PS1) 7500-0764-05 and Higher

Measure HVDC from the positive to negative terminals of C2 when in ON or 0V when in STANDBY.



CAUTION

REMOVE POWER TO THE SYSTEM BY DISCONNECTING THE POWER CORD AND WAIT 15 SECONDS BEFORE REMOVING OR REPLACING POWER SUPPLY PCB'S. OTHERWISE, DAMAGE TO PCB'S AND MOTHERBOARD WILL RESULT.

Measure +5VDC $\pm 0.35V$ at TP1 when the system is ON

Figure 9-7. DPS Voltage Measurement Locations (PS2) 7500-0766-02

9-3

Alert Information

9-3.1

System Dialog Alerts

System dialog alerts have yellow banners at the top of the alert and are displayed upon system bootup. System dialog alerts typically indicate configuration problems, hardware faults, or other hardware issues. If a system dialog alert is displayed, use the following procedure to capture the error information:

NOTE: This procedure is not applicable to U.S. (domestic) systems with 038.15 software and above. Domestic systems with 038.15 software and above will not display a second screen of error information.

1. Simultaneously press Superkey and F6 (CSI) function key on the keyboard. A second screen is displayed listing additional information about the specific error.

NOTE: The F6 key may be unlabelled on some systems. If so, it is the sixth key from the left in the row of keys above the numeric keys on the keyboard.

2. If the system has a printer, take a print of the second error screen. If there is no printer installed, write down the error information.
3. Use the arrow keys to scroll up or down to access all the error information, if necessary.
4. Shut the system off. If a system dialog alert has been displayed, do not use the system until it has been checked and or repaired.

9-3.2

Run-time Alerts

Run-time alerts are displayed during normal system operation and indicate the system has detected a performance problem. These performance problems are caused by hardware faults or by system sensitivity to a particular series of keystrokes made by the operator. Run-time alerts are distinguishable from system dialog alerts by the blue banner at the top of the alert. If a run-time alert is displayed, use the following procedure to capture the error information:

NOTE: This procedure is not applicable to U.S. (domestic) systems with 038.15 software and above, which will not display a second screen of error information.

1. Simultaneously press Superkey and F6 (CSI) function key on the keyboard. A second screen is displayed listing additional information about the specific error.

NOTE: The F6 key may be unlabelled on some systems. If so, it is the sixth key from the left in the row of keys above the numeric keys on the keyboard.

2. If the system has a printer, take a print of the second error screen. If there is no printer installed, write down the error information.
3. Use the arrow keys to scroll up or down to access all the error information, if necessary.
4. Reboot the system and check system operation.

NOTE: If the error does not re-occur after rebooting the system and checking all operating modes, the customer may continue working. If the error re-occurs, troubleshooting is necessary. If a run-time alert has been displayed, the operator may reboot the system and resume system operation.

5. Use the trackball to move the cursor to Close. Press SELECT.
6. Continue using the system if desired.

9-3.3

Keyboard Test

The keyboard test enables the user to check the operational status of all the controls located on the upper and lower user interface assemblies.

1. Verify the system has booted up.
2. Simultaneously press and hold the Superkey and Shift keys, and then press the characters indicated in [Table 9-3](#)

to initiate the keyboard test. A window is displayed on the monitor indicating the status of each control (**Figure 9-8**).

Table 9-3. Keyboard Test Language Differences

Test	Keystrokes Required		
	English	French	German
Keyboard Test	B then W	B then Z	B then W

3. Activate each control and notice that the display changes as each control is exercised.
4. To exit the keyboard test, repeat the control sequence required to enter the test.

Control Panel Messages

Key Release	FO-2A
Trackball	2F 22 98-00-02
2d Gain	EF 00-FF
Doppler Gain	FC 01-FF
Color Gain	FF 02-FF
TGC Slidepots	73-75-75-74-72-72-71-74

Figure 9-8. Keyboard Test Window

9-3.4

User Interface Assembly LED Tests

The user interface assembly LED tests verify operation of the LEDs on the upper and lower user interface assemblies. There are two LED tests. One test is used to simultaneously and continuously light the LEDs; the other to simultaneously flash the LEDs. There is no test status displayed on the monitor during either test. The keys required to initiate the test using the French and German user interface assemblies are labelled differently than the English user interface assembly, however, the keys are physically located in the same position on the keyboard.

1. Simultaneously press and hold the Superkey and Shift keys and then press the characters indicated in **Table 9-4** to toggle the 15 user interface assembly LEDs on and off.
2. Simultaneously press and hold the Superkey and Shift keys and then press the characters indicated in **Table 9-4** to flash the 15 user interface assembly LEDs.
3. To exit the user interface assembly test, repeat the control sequence required to enter the test.

Table 9-4. User Interface Assembly LED Test Language Differences

Test	Keystrokes Required		
	English	French	German
User Interface LED Test	B then A	B then Q	B then A
User Interface LED Test (Flashing)	Z	W	Y

9-3.5

User Event Log

The user event log is helpful in determining the cause of system lockups by recording the sequence of user events (key-strokes or control activations) that resulted in the system lockup. The log records the last 500 keystrokes or control activations and the time they were entered from the system keyboard. The event sequence is retained even if the system power switch and the circuit breaker are turned off. Any one of ten pages of user events are displayed with 50 events on each page. The user events may include keystrokes, slidepot changes, control knob rotations, or trackball movements.

1. Verify the system has booted up.
2. Simultaneously press and hold the Superkey and Shift keys. Press the characters indicated in **Table 9-5** to display the user event log for the desired language. A page is displayed with 50 events listed.

Table 9-5. User Event Log Language Differences

Test	Keystrokes Required		
	English	French	German ¹
User Event Log	=	=	"spacebar"

1. Not implemented in software versions below 31.X. Also must select BOF and USER LOG from the displayed test panels.
3. Any of ten pages may be displayed (**Figure 9-9**). Select the Next button on the bottom of the display to display the next page or the Prev button to display the previous page. Press SELECT.
4. Select the Reset Log button to clear all entries from the event log. Press SELECT.
5. To exit, select the Close button on the bottom of the display. Press SELECT. The display returns to the previous imaging mode.

<i>User Log</i>					
09:22:55	Start ->	Measure	09:23:25	Button	Store
09:22:56	Trkball	trackball_Meas (20)	09:23:26	End ->	Menu
09:23:00	TbBtn	Select	09:23:28	Trkball	Nobody (5)
09:23:00	Start ->	Measure	09:23:29	Button	Setups
09:23:00	Trkball	trackball_Meas (9)	09:23:29	Start ->	Setups
09:23:02	TbBtn	Select	09:23:32	PushBtn	Display
09:23:03	Button	Store	09:23:35	PushBtn	Off
09:23:04	End ->	Measure	09:23:37	PushBtn	Close
09:23:04	Start ->	Menu	09:23:37	End ->	Setups
09:23:10	PushBtn	Close	09:23:38	Trkball	Nobody (9)
09:23:10	End ->	Menu	09:23:39	Button	Distance
09:23:10	Trkball	Nobody (15)	09:23:39	Start ->	Measure
09:23:13	Button	Distance	09:23:39	Trkball	trackball_Meas (14)
09:23:13	Start ->	Measure	09:23:41	TbBtn	Select
09:23:17	TbBtn	Select	09:23:41	Start ->	Measure
09:23:17	Start ->	Measure	09:23:41	Trkball	trackball_Meas (27)
09:23:18	Trkball	trackball_Meas (8)	09:23:49	Button	Del Meas
09:23:21	Button	Update	09:23:49	End ->	Measure
09:23:22	Button	Store	09:23:50	Button	Del Meas
09:23:22	End ->	Measure	09:23:52	Trkball	Cineloop Review (5)
09:23:22	Start ->	Menu	09:23:53	Button	Setups
09:23:23	Button	Store	09:23:53	Start ->	Setups
09:23:23	End ->	Menu	09:23:56	PushBtn	Peripherals
09:23:24	Button	Store	09:24:00	PushBtn	Yes
09:23:25	Start ->	Menu	09:24:21	PushBtn	System Defaults

Close Reset Log Prev Next 3 of 10

Figure 9-9. User Event Log

9-3.6

Formatting a Blank Optical Disk

- ❑ To format a blank optical disk:
 1. Boot up the system.
 2. Press the DAASR key or press the NET/DISK key, depending on which upper user interface assembly is installed in the system.
 3. Verify that the blank optical disk is not write-protected (not write-protected = notch closed).
 4. Insert the disk into the optical drive.
 5. Select the Format Disk option displayed at the top left of the display. The optical drive LED will light during formatting.
 6. Select the Eject Disk option to eject the formatted disk.

Formatting an Optical Disk/Copying Presets

- To format a blank optical disk and copy Tissue Specific Presets to the optical disk:
 1. Boot up the system.
 2. Press SETUPS on the keyboard. The Directory of Setup Options is displayed.
 3. Verify that the blank optical disk is not write-protected (not write-protected = notch closed).
 4. Insert the disk into the optical drive.
 5. Select Tissue Specific Presets. Press SELECT. The display appears as in **Figure 9-10**.
 6. Select Copy and press SELECT. The process of formatting and copying the presets to the optical disk takes several minutes.

NOTE: If the optical disk is not formatted, the system will display prompts asking you whether you wish to format it. If you choose to format, the prompts will also be displayed to guide you through the format procedure. If you have formatted the disk, repeat [step 6](#) and continue with the procedure.

7. To install the presets from the optical disk to the hard drive, select Install and press SELECT.

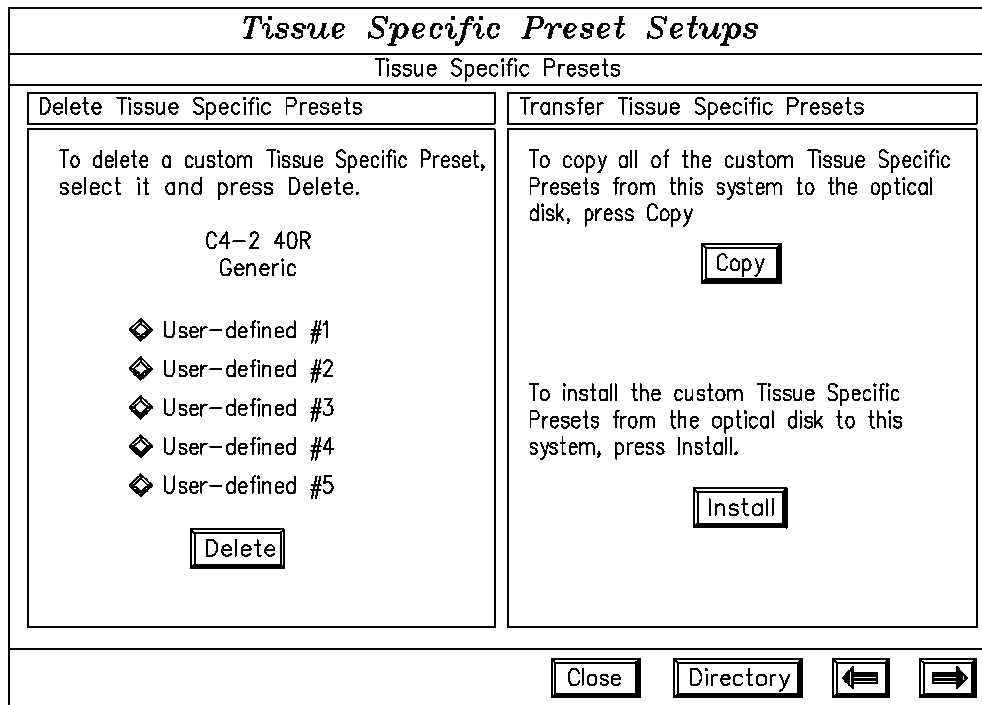


Figure 9-10. Formatting Optical Disk/Copying Tissue Specific Presets

Accessing User Diagnostics

The user diagnostics enable the user to access several diagnostic capabilities. These capabilities enable the user to quickly diagnose system operational status or acquire the information needed to assist others in system diagnosis.

- To access the user diagnostics:
 1. Boot up the system.
 2. Press SETUPS on the keyboard. The Directory of Setup Options is displayed.
 3. Use the trackball to move the cursor to Diagnostics in the lower left corner of the display.
 4. Press SELECT. The following tests and utilities are displayed:
 - Comprehensive Test
 - Check Installed Software
 - Show Bootup Status Report

- Show Machine Configuration
 - Show Installed Options
 - Backup Diags Data
 - Video Test Patterns Utility
5. Move the cursor to the desired test or option. If the test or option is not highlighted with reverse video, press SELECT to highlight it.
 6. Refer to [paragraph 9-4.1](#) to run the Comprehensive Test. For all other tests or options move the cursor to Start and press SELECT to initiate or display the results. Information on the other tests and options is listed in [paragraph 9-4.2](#) through [paragraph 9-4.5](#).

9-4.1

Comprehensive Test

The Comprehensive Test is used to determine system operational status. The test comprises numerous sub-tests. If a sub-test fails, the system completes the remaining sub-tests. When the Comprehensive Test has been completed a pass or fail is displayed on the monitor.

The Comprehensive Test should be run any time a system error is displayed or if the user suspects problems with the system. If an error message is displayed during the test, reboot the system with the ON/STANDBY switch.

The test takes up to 25 minutes to run, depending on which software version is installed in the system.

- ❑ To invoke the Comprehensive Test:
 1. Perform [steps 1 through 4](#) of [paragraph 9-4](#) to access the Comprehensive Test.
 2. Move the cursor to Comprehensive Test. If the Comprehensive Test is not highlighted with reverse video, press SELECT to highlight it.
 3. Move the cursor to the START button. Press SELECT. A windowed message is displayed stating:

“This test will take more than fifteen (15) minutes. Also, the display will appear to be ‘corrupted’ at times (or blank) but it should return to normal after several minutes. Should I continue?”
 4. Move the cursor to the Continue button. Press SELECT. The test status is indicated by a row of “periods” across the results window. If a failure occurs, an error code is displayed.
 5. To exit the Diagnostics Menu, use the trackball to select Close. Press SELECT. The following note is displayed:

NOTE: System parameters have changed. It is necessary to reboot the machine before further scanning can be done.

6. Use the trackball to select the Reboot option. Press SELECT to reboot the system.

9-4.2

Check Installed Software

This test comprises Cyclic Redundancy Checks of all read-only system software files (also known as CRCs). If a CRC fails, it may indicate a disk drive problem. If this is the case, re-install the system software and check the DDEA PCB.

1. Perform [steps 1 through 4](#) of [paragraph 9-4](#) to access the user diagnostics.
2. Move the cursor to Check Installed Software.
3. Press SELECT to highlight the option with reverse video.
4. Move the cursor to Start. Press SELECT. A message is displayed stating "Please wait, this process will take approximately 2 minutes."

5. Use the trackball to select OK. Press SELECT. The Start button changes to a Stop button. When the test is complete the results are displayed in the results window and the Stop button turns into the Start button again. The results are displayed as Completed: PASS (or FAIL).
6. Press Stop to abort the test if needed.

9-4.3

Show Bootup Status Report

During system bootup the CPU queries the individual PCBs and displays the bootup status on the monitor.

1. Perform [steps 1 through 4](#) of [paragraph 9-4](#) to access the user diagnostics.
2. Move the cursor to Show Bootup Status Report.
3. Press SELECT to highlight the option with reverse video.
4. Move the cursor to Start. Press SELECT to initiate the option. The system instantaneously displays a note stating that the “Bootup status reported NO errors.” Test results are displayed as Completed: PASS (or FAIL).

9-4.4

Show Machine Configuration

The Show Machine Configuration option displays the machine ID number, hard disk part number, and software version (software build) number. The machine ID number is a unique number assigned to each system and is programmed into a chip on the SYSCPU PCB. All machine options to be installed onto a particular system must contain the correct machine ID number for that particular system or no options will be enabled.

1. Perform [steps 1 through 4](#) of [paragraph 9-4](#) to access the user diagnostics.
2. Move the cursor to Show Machine Configuration.
3. Press SELECT to highlight the option with reverse video.
4. Move the cursor to Start. Press SELECT to initiate the option. The results are displayed as:

Machine ID: 0000005f1969

Hard-Disk Software: 4252-07XX-XX 04X.XX (the “X’s” indicate numerical placeholders)

9-4.5

Show Installed Options

The Show Installed Options selection displays the system options that are installed on a particular system whether those options were purchased when the system was ordered or for an upgrade. Refer to the COA (Customer Order Acknowledgement) for the customer ordered features, and check the installed options list for the options configured for the system. If there is a discrepancy, order a Machine Options Configuration disk (MO disk - P/N 4252-0738-01) for that particular system. Re-install the files from the new machine options disk onto the hard drive and check the configuration again.

1. Perform [steps 1 through 4](#) of [paragraph 9-4](#) to access the user diagnostics.
2. Move the cursor to Show Installed Options.
3. Press SELECT to highlight the option with reverse video.
4. Move the cursor to Start. Press SELECT to initiate the option.

5. Refer to **Table 9-6** for a list of the machine options possible with each released software version. Machine options will be added as the system matures through the product life cycle.

NOTE: Machine options for the following software versions are the same: 32.14 and 32.19; 33.09 and 33.27; 34.17 and 34.18; 36.03, 36.05 and 36.06; 39.05 and 39.08; and 47.08 and 47.10.

Table 9-6. Machine Options/Software Build Compatibility Matrix

	Part Number	Description	Software Version																Notes		
			2 4	2 4	2 4	3 0	3 1	3 2	3 2	3 3	3 4	3 4	3 5	3 6	3 8	3 9	4 0	4 0		4 5	4 6
1	8501-8507-01	Extended Doppler Capability	•	•	•																4
2	8501-8507-02	Extended Doppler Capability EMI		•	•																4
3	8501-8523-01	English Language/UIF	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	1

	Part Number	Description	Software Version																Notes			
			2 4 .0 9	2 4 .1 1	2 4 .0 7	3 0 .0 5	3 1 .0 3	3 2 .1 4	3 2 .0 9	3 3 .1 7	3 4 .1 0	3 5 .1 3	3 6 .0 5	3 8 .1 5	3 9 .0 5	4 0 .1 6	4 0 .2 3	4 5 .0 4		4 6 .0 4	4 7 .0 8	
4	8501-8524-01	German Language/UIF	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	1	
5	8501-8525-01	French Language/UIF	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	1	
6	8501-8523-02	English Language				•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	1	
7	8501-8524-02	German Language					•	•	•	•	•	•	•	•	•	•	•	•	•	•	1	
8	8501-8525-02	French Language					•	•	•	•	•	•	•	•	•	•	•	•	•	•	1	
9	8501-9622-01	Italian Language																•	•	•	1	
10	8501-9058-01	Danish Language																•	•	•	1	
11	8501-9060-01	Norwegian Language																•	•	•	1	
12	8501-9062-01	Swedish Language																•	•	•	1	
13	8501-9064-01	Finnish Language																•	•	•	1	
14	8501-8533-01	Voltage/Video 120 NTSC	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	2
15	8501-8534-01	Voltage/Video 230 NTSC	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	2
16	8501-8536-01	Voltage/Video 230 PAL	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	2

	Part Number	Description	Software Version																Notes			
			2 4 .0 9	2 4 .1 1	2 4 .0 7	3 0 .0 5	3 1 .0 3	3 2 .0 4	3 2 .1 4	3 3 .0 9	3 4 .1 7	3 5 .1 0	3 6 .0 3	3 8 .1 5	3 9 .0 5	4 0 .1 6	4 0 .2 3	4 5 .0 4		4 6 .0 4	4 7 .0 8	
17	8501-8536-02	Voltage/Video 230 PAL IEC-601-1		•	•				•	•	•	•	•	•	•	•	•	•	•	•	2,3	
18	8501-8665-01	NTSC Video				•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	2
19	8501-8666-01	PAL Video				•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	2
20	8501-8563-01	Capability, L7-4 38 mm						•	•	•	•	•	•	•	•	•	•	•	•	•	•	6
21	8501-8565-01	Capability, L10-5 38 mm				•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	7
22	8501-8567-01	Capability, C4-2 40R	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
23	8501-8574-01	Capability, CIVT5							•	•	•	•	•	•	•	•	•	•	•	•	•	5
24	8501-8576-01	Capability, P3-2 20 mm	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
25	8501-8579-01	Capability, P5-3 16 mm	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
26	8501-8585-01	Clin. Opt., Vasc: TCD	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
27	8501-8586-01	Clin. Opt., Vasc: Cerebro Vasc	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
28	8501-8587-01	Clin. Opt., Vasc: Peripheral	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	

	Part Number	Description	Software Version																Notes			
			2 4 .0 9	2 4 .1 1	2 4 .0 7	3 0 .0 5	3 1 .0 3	3 2 .0 4	3 2 .1 9	3 3 .0 7	3 4 .1 7	3 5 .1 0	3 6 .0 3	3 8 .1 5	3 9 .0 5	4 0 .1 6	4 0 .2 3	4 5 .0 4		4 6 .0 4	4 7 .0 8	
29	8501-8589-01	Clin. Opt., Vasc: Introp	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
30	8501-8595-01	Clin. Opt., Genim: Abdomen	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
31	8501-8596-01	Clin. Opt., Genim: Small Parts	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
32	8501-8597-01	Clin. Opt., Genim: Prostate	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
33	8501-8598-01	Clin. Opt., Genim: Pediatric	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
34	8501-8600-01	Clin. Opt., OB	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
35	8501-8601-01	Clin. Opt., Gyn/Fert	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
36	8501-8604-01	Capability, D5 CW	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
37	8501-8606-01	Capability, D10 CW	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
38	8501-8607-01	Capability, D2 TC	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
39	8501-8612-01	Capability, C3.5 76R	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
40	8501-8621-01	Capability, C7-4 40R						•	•	•	•	•	•	•	•	•	•	•	•	•	•	6
41	8501-8622-01	Capability, C9-5 ICT			•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	6

	Part Number	Description	Software Version																Notes		
			2 4 .0 9	2 4 .1 1	2 4 .1 7	3 0 .0 5	3 1 .0 3	3 2 .0 4	3 2 .1 4	3 3 .0 9	3 4 .1 7	3 3 .1 0	3 3 .0 3	3 3 .1 5	3 3 .0 5	4 0 .1 6	4 0 .2 3	4 5 .0 4		4 6 .0 4	4 7 .0 8
42	8501-8625-01	Capability, CL10-5 26 mm				•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
43	8501-8626-01	Capability, P7-4 11 mm							•	•	•	•	•	•	•	•	•	•	•	•	6
44	8501-8652-01	Color Power Angio	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
45	8501-8653-01	Capability, MPT7-4							•	•	•	•	•	•	•	•	•	•	•	•	
46	8501-8654-01	Clin. Opt., Card: Adult				•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
47	8501-8655-01	Clin. Opt., Card: Ped/Fetal Echo				•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
48	8501-8656-01	Clin. Opt., Card: Transesophag.							•	•	•	•	•	•	•	•	•	•	•	•	8
49	8501-8657-01	Capability, CW2				•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
50	8501-8668-01	DiskLink																			13
51	8501-8683-01	NetLink													•	•	•	•	•	•	
52	8501-8687-01	Steered CW							•	•	•	•	•	•	•	•	•	•	•	•	9, 10
53	8501-8688-01	Color M-Mode																			11, 12
54	8501-8689-01	Frame Grab																			9

	Part Number	Description	Software Version																Notes			
			2 4 .0 9	2 4 .1 1	2 4 .0 7	3 0 .0 5	3 1 .0 3	3 2 .0 4	3 2 .1 4	3 3 .0 9	3 4 .1 7	3 5 .1 0	3 6 .0 3	3 8 .1 5	3 9 .0 5	4 0 .1 6	4 0 .2 3	4 5 .0 4		4 6 .0 4	4 7 .0 8	
55	8501-8694-01	Triple Mode									•	•	•	•	•	•	•	•	•	•	•	
56	8501-8695-01	3D Color Power Angio Imaging									•	•	•	•	•	•	•	•	•	•	•	
57	8501-8696-01	Capability, C8-5												•	•	•	•	•	•	•	•	
58	8501-8697-01	Capability, CT8-4									•	•	•	•	•	•	•	•	•	•	•	
59	8501-8698-01	Capability, LI9-5												•	•	•	•	•	•	•	•	
60	8501-8699-01	Capability, L12-5 38 mm														•	•	•	•	•	•	7
61	8501-9100-01	Capability, C8-4v												•	•	•	•	•	•	•	•	
62	8501-9102-01	Clin. Opt., Neurosurgical															•	•	•	•	•	
63	8501-9103-01	Clin. Opt., Abdominal Surgery												•	•	•	•	•	•	•	•	
64	8501-9104-01	Clin. Opt., Card: Musculoskeletal												•	•	•	•	•	•	•	•	
65	8501-9108-01	Clin. Opt., Card: CSI														•	•	•	•	•	•	
66	8501-9109-01	TSI Patient Optimization												•	•	•	•	•	•	•	•	
67	8501-9127-01	Clin. Opt., Harmonic Research												•	•	•	•	•	•	•	•	

			Software Version																Notes				
			2 4 .0 9	2 4 .1 1	2 4 .1 7	3 0 .0 5	3 1 .0 3	3 2 .0 4	3 2 .1 4	3 3 .0 9	3 4 .1 7	3 4 .1 0	3 5 .0 3	3 6 .1 5	3 8 .0 5	3 9 .1 5	4 0 .1 6	4 0 .2 3		4 5 .0 4	4 6 .0 4	4 7 .0 8	
68	8501-9134-01	Capability, BPT9-5																	•	•	•	•	
69	8501-9155-01	WebLink													•	•	•	•	•	•	•	•	
70	8501-9165-01	Clin. Opt., Card: THI														•	•	•	•	•	•	•	
71	8501-9166-01	ResearchLink																					14
72	8501-9167-01	Service Access Diagnostics														•	•	•	•	•	•	•	
73	8501-9169-01	Clin. Opt., Adv. Breast Imaging															•	•	•	•	•	•	
74	8501-9266-01	Capability, LAP L9-5																				•	•
75	8501-9342-01	Capability, L12-5 50mm																					•
76	8501-9424-01	Capability, C5-2 40R															•	•	•	•	•	•	•
77	8501-9450-01	Clin. Opt., Rad. CSI																	•	•	•	•	•
78	8501-9451-01	Clin. Opt., Vasc. CSI																	•	•	•	•	•
79	8501-9601-01	3D Grayscale																	•	•	•	•	•
80	8501-9602-01	Clin. Opt., OB THI																	•	•	•	•	•

	Part Number	Description	Software Version																Notes			
			2 4 .0 9	2 4 .1 1	2 4 .0 7	3 0 .0 5	3 1 .0 3	3 2 .1 4	3 2 .0 9	3 3 .1 7	3 4 .1 0	3 4 .1 3	3 5 .0 5	3 6 .1 5	3 8 .0 5	3 9 .1 6	4 0 .2 3	4 0 .0 4		4 5 .0 4	4 6 .0 4	4 7 .0 8
81	8501-9603-01	Clin. Opt., Abdominal THI															•	•	•	•	•	
82	8501-9617-01	Tissue Harmonic Imaging															•	•	•	•	•	
83	8501-9618-01	Clin. Opt., Gyn/Fert/THI															•	•	•	•	•	
84	8501-9654-01	Enhanced Memory															•	•	•	•	•	

NOTES:

1. Items 3 through 8 are mutually exclusive. Items 6 through 8 are preferred.
2. Items 9 through 14 are mutually exclusive. Items 13 and 14 are preferred.
3. Due to a software bug, this part number is not a recognized part number for software versions 30.05 through 32.04.
4. For software versions 30.05 and above Extended Doppler is determined by hardware (8500-8507-01).
5. 32.14 is the minimum software for this scanhead due to AP&I table corrections.
6. 32.04 is the minimum software for this scanhead due to AP&I table corrections.
7. 30.05 is the minimum software for this scanhead due to AP&I table corrections.

8. This feature appeared on the system matrix at 30.05, but it is not released.
9. This feature was determined by hardware in 30.05.
10. Extended Doppler (8500-8507-01) is required to support this feature.
11. This feature was standard for all systems shipped at 30.05.
12. This feature was disabled in 31.03 soon after release.
13. This feature is NRR for 33.09 software and FCD for 33.27 software.
14. For research purposes only. Not a purchasable feature.

9-4.6

Video Test Patterns Utility

The Video Test Pattern Utility is used to isolate monitor, printer, and VCR video problems.

1. Access user diagnostics, [steps 1 through 4](#) of [paragraph 9-4](#)
2. Move the cursor to Video Test Patterns Utility. The option is highlighted with reverse video.
3. Move the cursor to Start. Press SELECT. A note is displayed stating:
“The test patterns will be displayed one at a time. Press the spacebar to view the next pattern, 1 through 0 to view a specific pattern, or any other key to quit.”
4. Move the cursor to OK. Press SELECT. A grayshade test pattern is displayed.
5. Use the spacebar to move through the individual test patterns or refer to the test pattern numbers in [Table 9-7](#) and press the appropriate number to obtain the desired test pattern.

Table 9-7. Video Test Patterns

Test Pattern Number	Description
1	Sixteen grayshade bars displayed vertically. White bars on left, black on right
2	Eight color bars displayed vertically. White, yellow, light blue, green, purple, red, dark blue, and black
3	Cross hatch pattern. Black background, with white grid
4	Entire screen displays the letter "y" in every character position. White letters on a black background
5	Quartered display with circle in the center of the display. Black background with white pattern
6	Quartered display with circle in the center of the display. White background with black pattern
7	White rectangle on black background
8	White screen
9	Flat black screen
0	Flat black screen with grid of white dots

9-5

Remote Diagnostics

The HDI 3000 has a full suite of remote diagnostic capabilities. Contact your local technical support center for more information.

10 *Disassembly*

WARNING

Always turn power off, disconnect the main power cord from the wall outlet, and wait at least 30 seconds before removing or installing any PCB, module or component.

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.
- Do not pull and reinsert PCBs or other modules while main circuit breaker is ON. To reset PCBs, use the reset button provided on the card edge of many modules.

Card Cage PCBs and Modules

General procedure

1. Turn off the system circuit breaker and disconnect power cord.
2. Remove covers as necessary to gain access to the part requiring replacement.
3. Loosen captive screws on those boards with shields, or loosen the retaining clips as necessary.

CAUTION

Several modules require that adjacent modules be removed in order to provide ease of removal or allow correct alignment. For example, remove the PIM, PCM, PSP1, and PSP2 to correctly align the IIM module by hand to prevent misalignment of the PCB to the centerplane.

- ❑ To remove the IIM:
 1. Remove the right side panel in addition to rear panel.
 2. Remove all cable connectors from both the IIM and PIM.
 3. Remove modules immediately to the right (to slot A3B).
 4. Remove the IIM.

- ❑ To insert the IIM:
 1. Remove both modules immediately to the right (to slot A3B).
 2. Use your right hand to align the IIM with the card guides and to ensure the connectors mate correctly with the centerplane.

CAUTION

Use caution when inserting the IIM into the centerplane. If connector pins are bent during insertion of the IIM, damage to the IIM or centerplane may result.

3. Replace the PIM and PCM.
 4. Tighten all fasteners to ensure proper EMI/RFI shielding.
- To replace the system hard drive:
1. Remove system covers to access the DDEA mounting hardware.
 2. Remove the DDEA assembly from the card cage.
 3. Remove the right assembly cover (as viewed from the front of the DDEA) to access the drives mounting hardware.
 4. Disconnect power and the SCSI control cable from the hard drive.
 5. Remove the hard drive mounting hardware (the hard drive is mounted to the left assembly cover).
 6. On the replacement drive, set the SCSI termination settings according to **Figure 13-1** and **Table 13-4**.
 7. Mount the new drive and connect power.

8. Attach the SCSI cable to the hard drive using the 50 to 80 pin adapter (**Table 14-5**).
 9. Assemble and install the DDEA module.
 10. Power up the system and verify operation.
- To replace the MO drive in the DDEA module:
1. Remove system covers to access the DDEA mounting hardware.
 2. Remove the DDEA assembly from the card cage.
 3. Remove the right assembly cover (as viewed from the front of the DDEA) to access the drives mounting hardware.
 4. Disconnect the power and control cable from the MO drive.
 5. Remove drive-mounting hardware.
 6. On the replacement drive, set the SCSI termination settings according to **Figure 13-2** and **Table 13-5**.
 7. Mount the new drive and connect power and the control cables.

8. Assemble and install the DDEA module.
9. Power up the system, and verify read and write operation of the drive by saving and viewing data to an optical disk.

10-2

Monitor

NOTE: Always place the monitor on its back to prevent damage to the locking tabs when the monitor is not installed on the system. (Four plastic feet are on the back of the monitor.)

- To install the monitor:
 1. Turn off the system circuit breaker and disconnect power cord.
 2. Place the monitor on the system with the tabs inserted into the latching assemblies.
 3. Slide the latching levers forward to engage the locking tabs.
 4. Rotate the retaining levers out and up to secure the monitor.

5. Connect the video/audio cable and engage the slide lock.
6. Connect the power cord to the monitor and rotate the cable lock to secure the connector to the monitor.

To remove the monitor:

1. Turn off the system circuit breaker and disconnect power cord.
2. Remove the VCR.
3. Release the cable lock on the power cord connector on the lower rear of the monitor by rotating it to the rear of the system.
4. Disconnect the power cord from the monitor.
5. Slide the locking plate on the monitor signal cable to the left.
6. Disconnect the signal cord connector from the monitor.
7. Rotate down and slide to the rear the retaining levers under each side of the monitor to release the monitor tabs.
8. Lift the monitor up and off of the system.

10-3

Control Panel PCBs, Trackball, and On/Standby Switch

- □ To remove the Control Panel PCBs or trackball (**Figure 10-1**):
 1. Turn off the system circuit breaker and disconnect power cord.
 2. Push in the release below the lock bar retaining tab (1) and slide the tab down (2, above On/Standby switch).
 3. Slide the lock bar to the right and remove it (3).
 4. Lift the upper user interface assembly to gain access to the CIM or the lower user interface assembly and trackball.
 5. Disconnect and remove components as necessary.

NOTE: *Upper and lower user interface assembly cables are interchangeable. Refer to Control Panel figure in Section 14 “Parts” to verify that they are correctly installed on the CIM.*

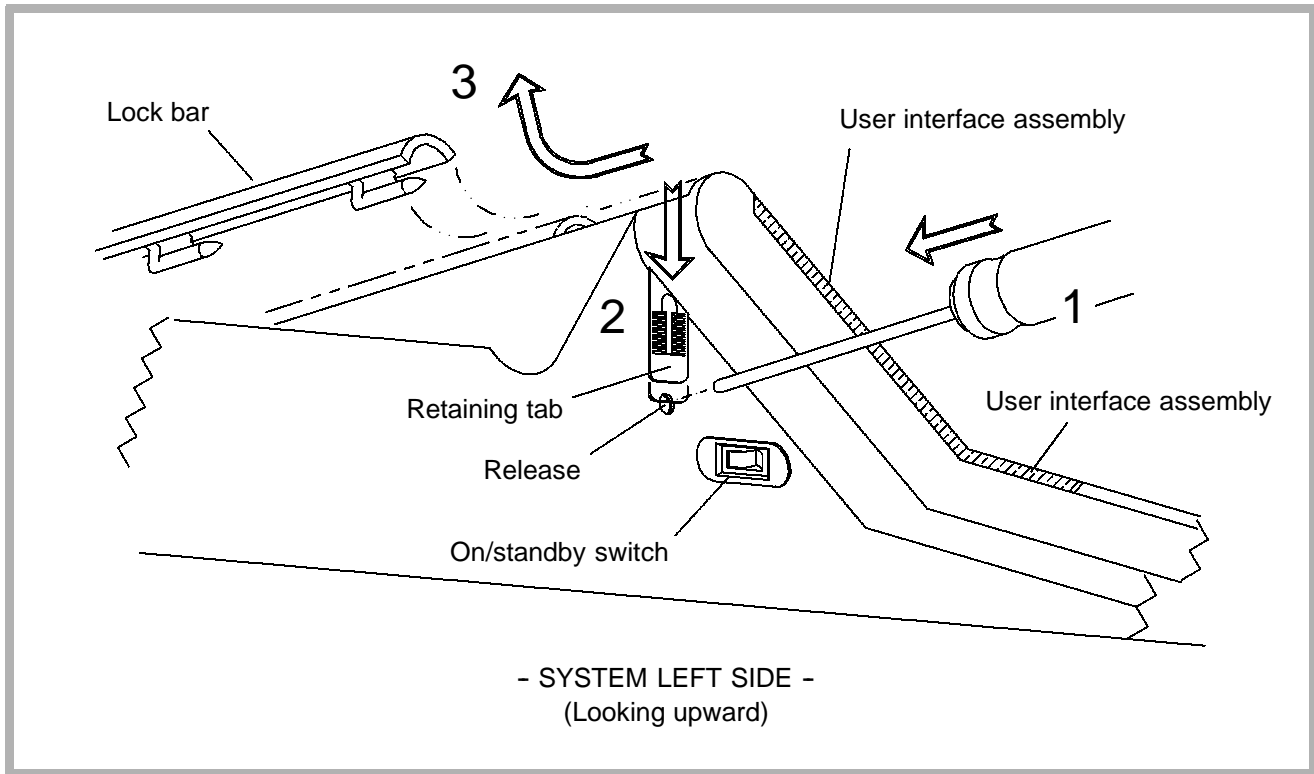
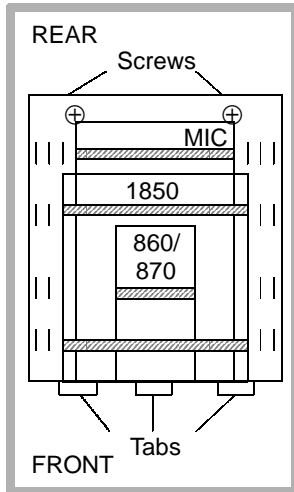


Figure 10-1. Control Panel Details

10-4

Internal OEMs

□ □ To install an Internal OEM (**Figure 10-2**):



1. Lay two straps on a flat surface; place OEM device upside down on straps.
2. Place OEM tray upside down on OEM.
 - Center the OEM between the sides of the tray with the captive screw to the rear of the OEM (see detail at left).
 - The front of the tray should slightly overhang the OEM.
3. Pass straps through the first slots outside of the OEM with the ring, velcro and buckle as shown.
4. Adjust buckle as tight as possible. Then loosen velcro, pull on both ends of the strap until snug, and reattach velcro. Repeat for second strap.
5. Secure tray in OEM bay with tabs in slots.

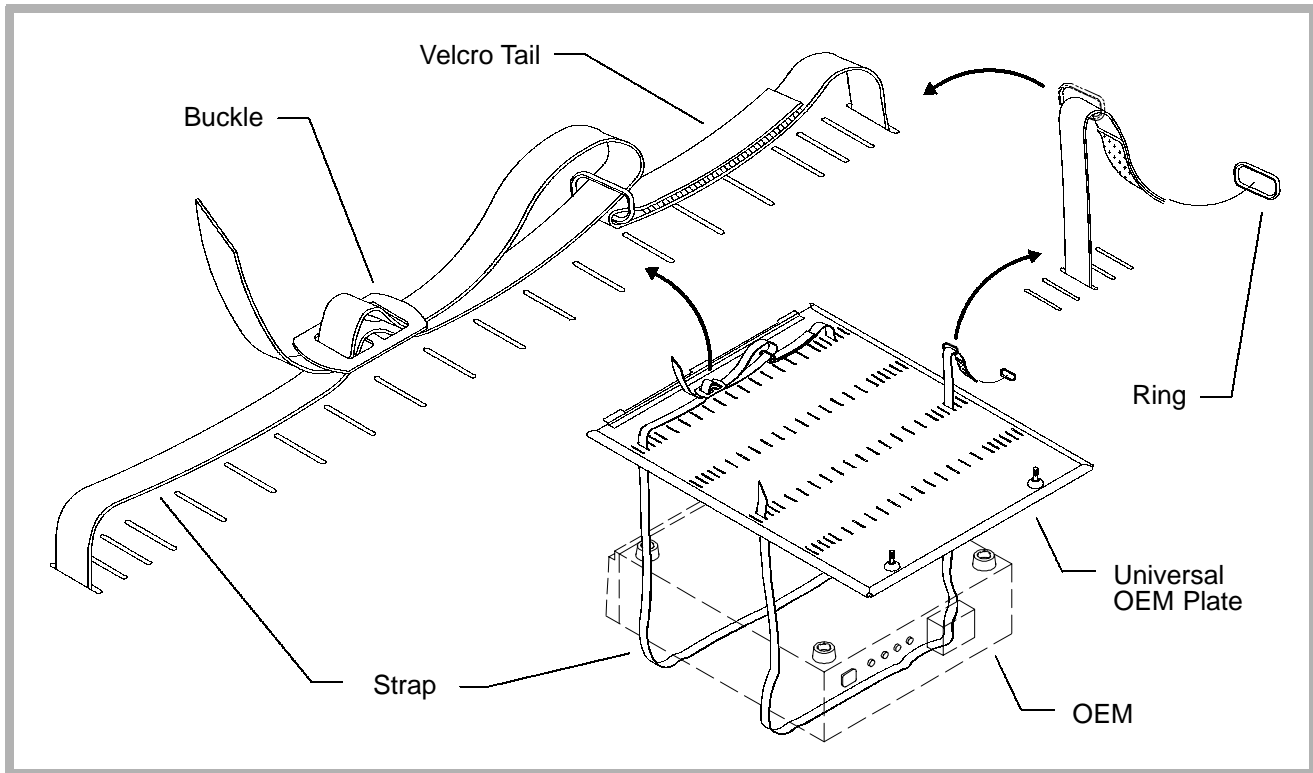


Figure 10-2. Internal OEM Installation

10-5

Scanhead Select Module Removal and Installation

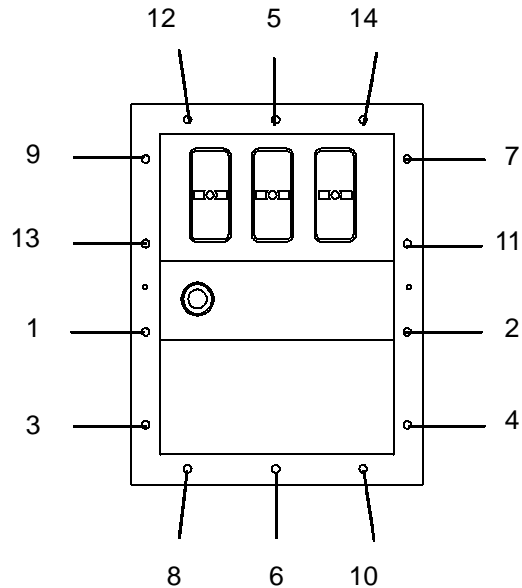
- To remove the Scanhead Select Module:
 1. Turn off the system circuit breaker and disconnect power cord.
 2. Disconnect scanheads from the system.
 3. Remove the system front cover.
 4. Starting with screw number 14, loosen the screws in the reverse sequence shown in **Figure 10-3**.
 5. Remove the Scanhead Select Module.
 6. Visually inspect the module.

- To install the Scanhead Select Module:
 1. Align the Scanhead Select Module over the Channel boards and flush against the system. Ensure that the module connects with the Channel board connectors and is level and square on the front of the system.
 2. Hand tighten the screws in the order shown in **Figure 10-3**.
 3. Replace missing or damaged screws with part number 1563-0258-01.

CAUTION

Overtightening the screws may damage the Scanhead Select Module gasket and/or metal shield, requiring replacement of the module.

4. Use a 7/64 Allen wrench to tighten the screws in the order shown. The base of the screw heads should be flush with the Scanhead Select Module.
5. Connect the system power cord and turn on the system.
6. Reconnect scanheads and verify system operation.
7. Install the system front cover.



CAUTION: *Carefully align the S/HSEL Module over the Channel Boards. Do not damage the RF gasket.*

Figure 10-3. S/HSEL Installation Details

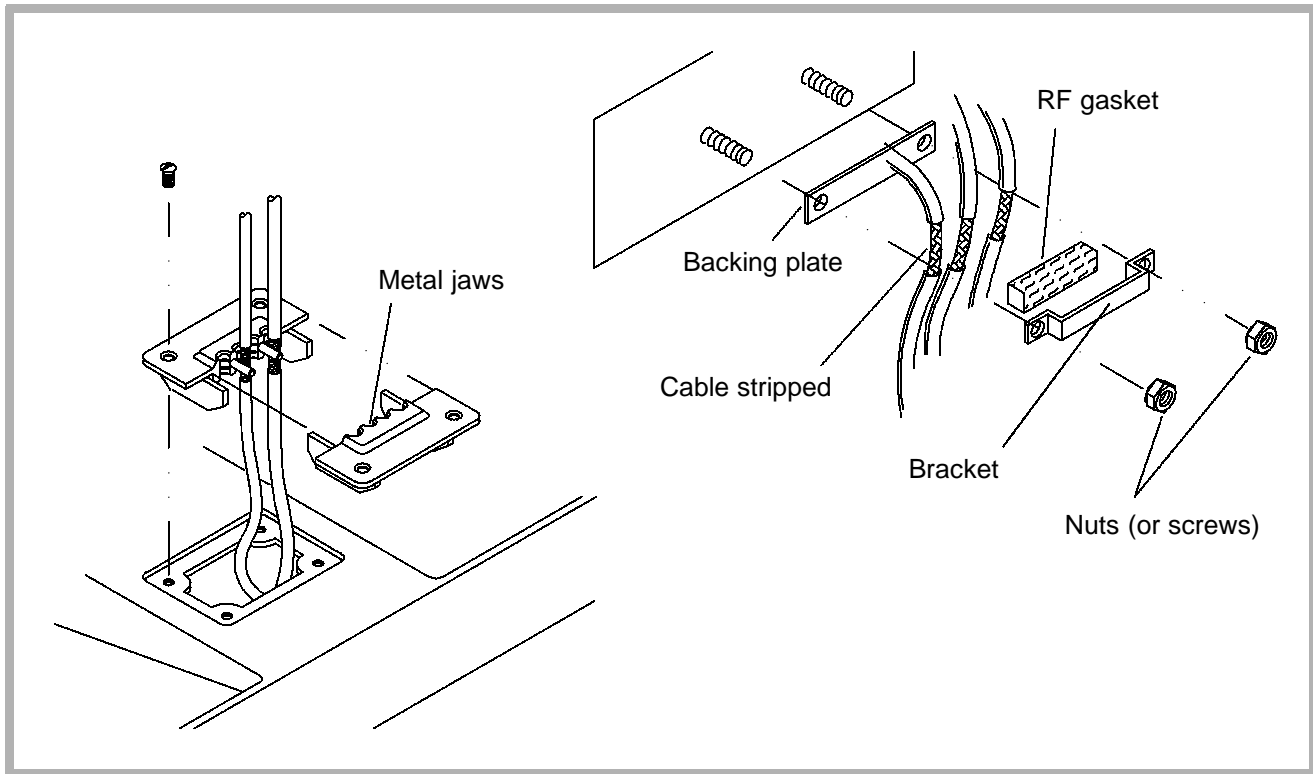


Figure 10-4. Monitor Cable Clamp Installation

11 Cabling

11-1

System Cabling and Connectors

11-1.1

Centerplane and PCB Layout

Figure 11-1 shows the numbering pattern of centerplane and PCB connectors. Also shown is the general layout of PCBs, the general locations of test points, LEDs, reset and interrupt switches, and a phone jack on modules so configured. Not all modules have all of these card edge features and a few may have a different layout.

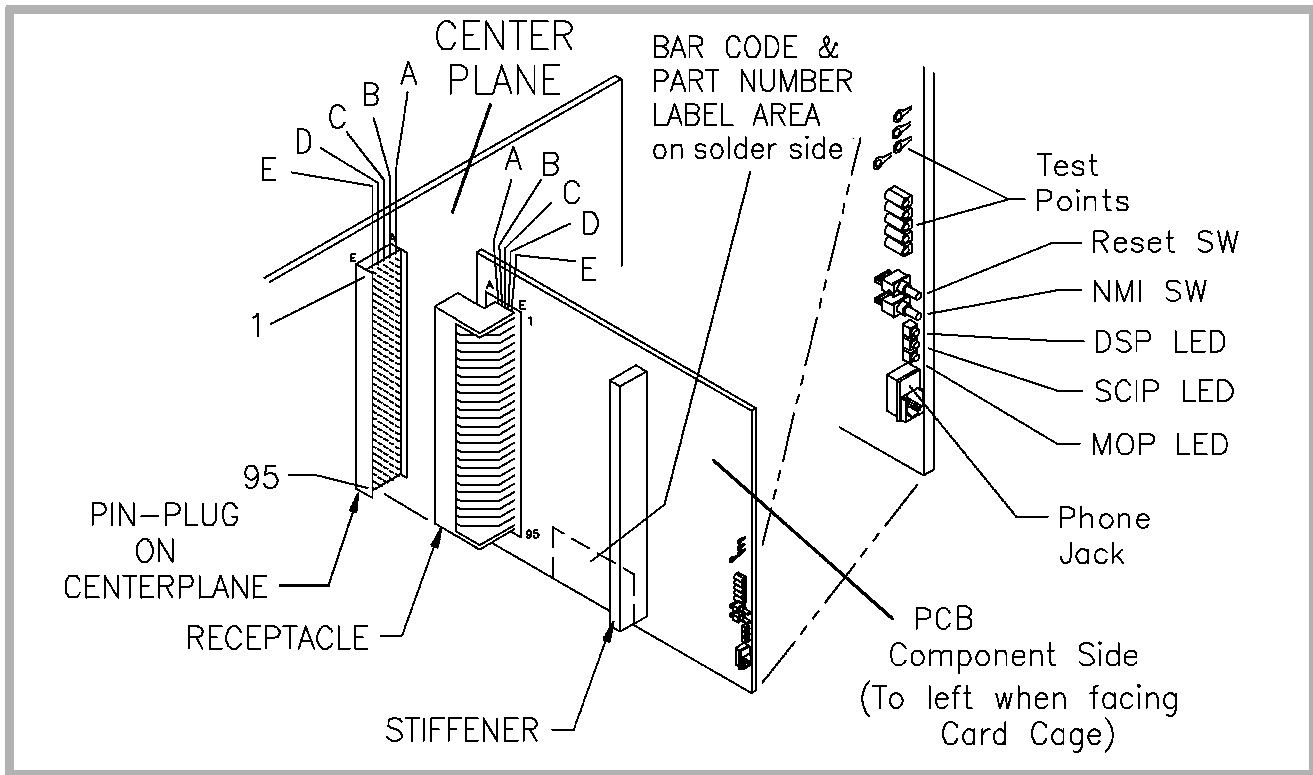


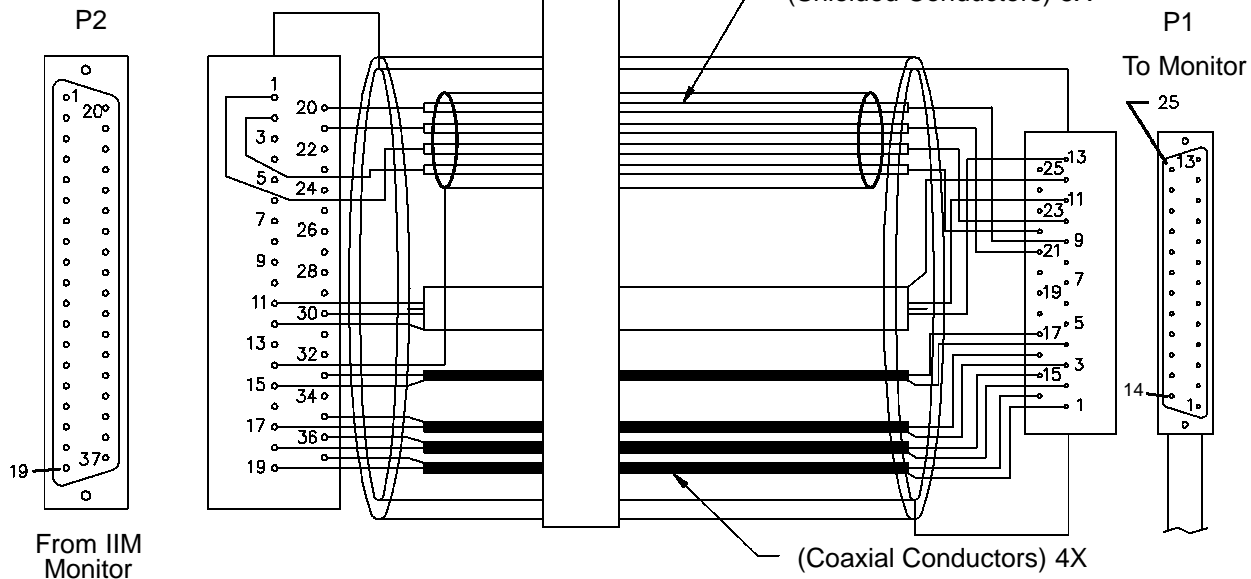
Figure 11-1. Centerplane Connector and Card Edge Features

11-1.2

Signal Cables

System and OEM (internal and external) signal cables are illustrated in **Figure 11-2** through **Figure 11-23**. Pinout information for these cables are provided in **Table 11-1** through **Table 11-23**.

2275-0325-XX

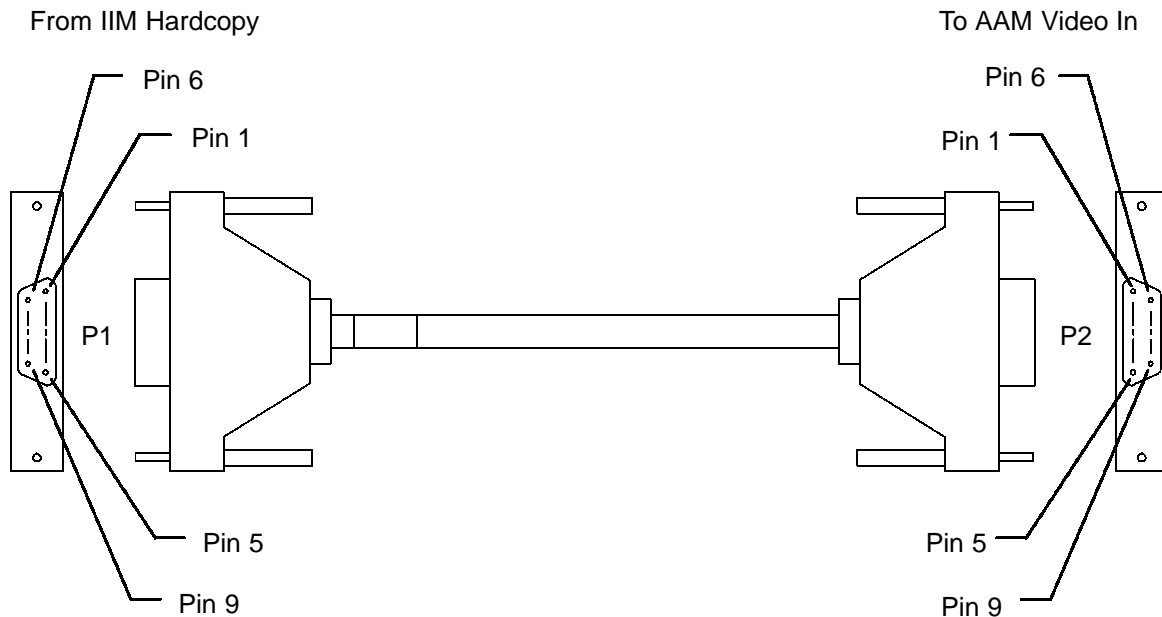


See Table 11-1

Figure 11-2. Monitor Signal Cable (P/N 2275-0325-XX)

Table 11-1. Monitor Signal Cable (P/N 2275-0325-XX)

From IIM (Monitor)	To Monitor	Function
P2-1	P1-10	GND
P2-20	P1-9	L_SPKR
P2-2	P1-22	GND
P2-21	P1-21	R_SPKR
P2-14	-	AUDIO SHIELD
P2-11	P1-11	MICR+
P2-30	P1-13	MICR-
P2-12	P1-12	MICR_SHIELD
P2-33	P1-17	CSYNC_INTMON
P2-15	P1-4	GND
P2-17	P1-16	BLUE_INTMON
P2-35	P1-3	BLUE_INTMON_REF
P2-18	P1-15	GREEN_INTMON
P2-36	P1-2	GREEN_INTMON_REF
P2-19	P1-14	RED_INTMON
P2-37	P1-1	RED_INTMON_REF



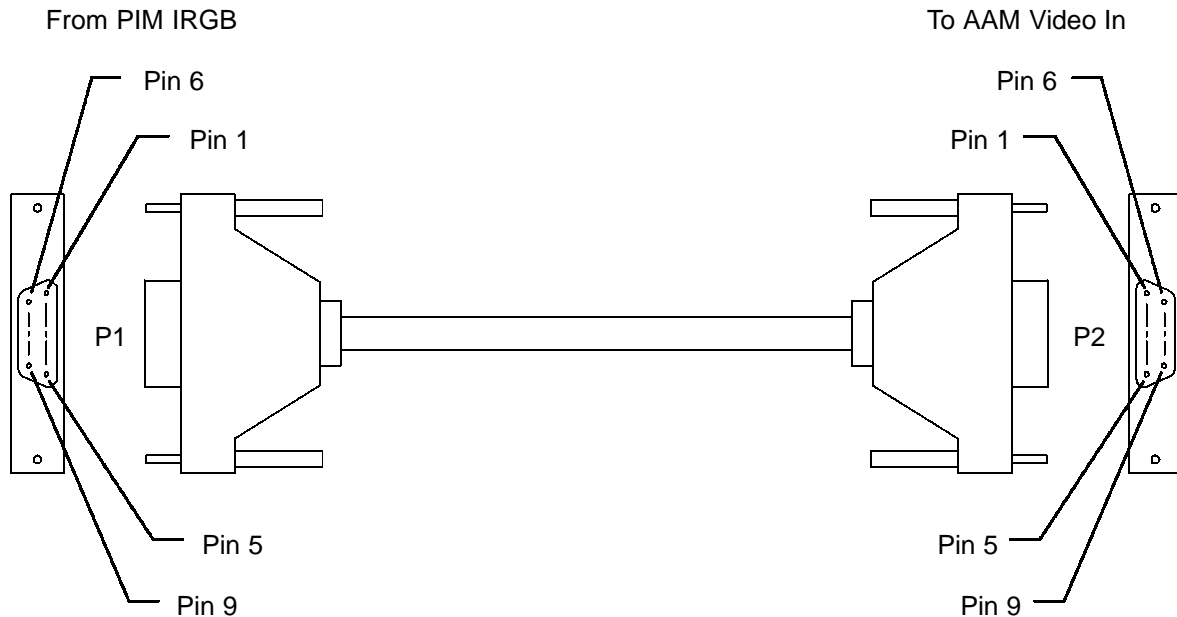
See [Table 11-2](#)

Figure 11-3. Access Acquisition Module Internal Video In Signal Cable Assy (P/N 2275-0327-XX)

**Table 11-2. Access Acquisition Module Internal Video In Signal Cable Assy
(P/N 2275-0327-XX)**

From IIM (Hardcopy)	To AAM (Video In)	Function
P1-1	P2-5	RED SIGNAL
P1-20	P2-4	RED_RETURN
P1-2	P2-3	GREEN SIGNAL
P1-21	P2-4	GREEN_RETURN
P1-3	P2-1	BLUE SIGNAL
P1-22	P2-2	BLUE_RETURN
P1-4	P2-6	SYNC SIGNAL
P1-23	P2-2	SYNC_RETURN

2275-0328-XX



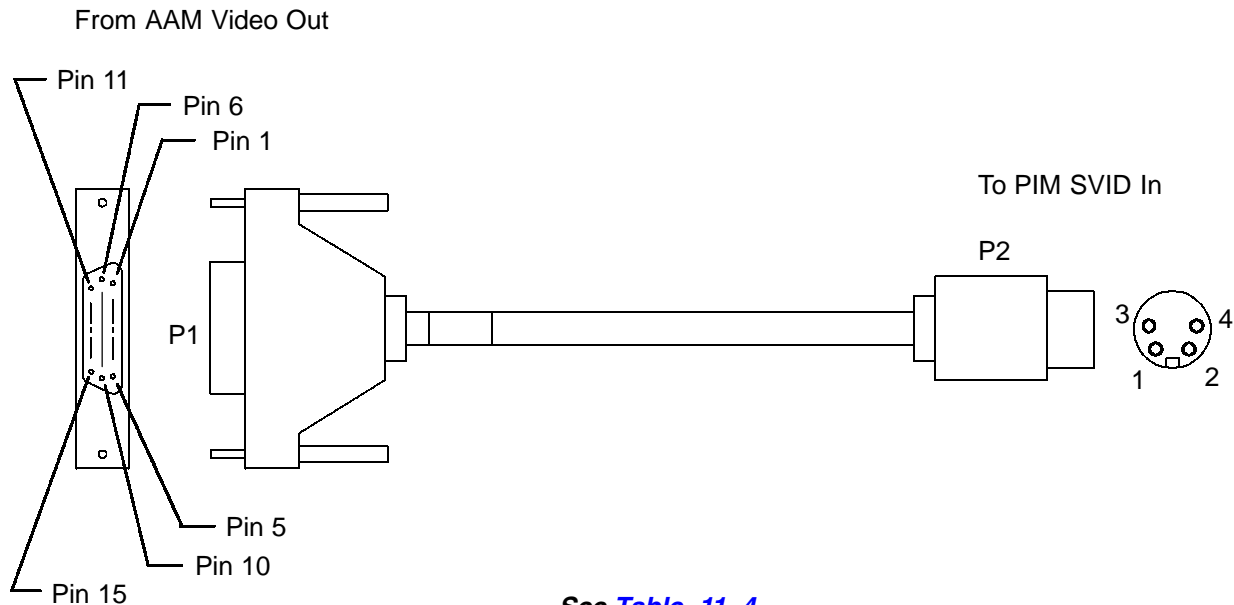
See [Table 11-3](#)

Figure 11-4. Access Acquisition Module External Video In Signal Cable Assy (P/N 2275-0328-XX)

**Table 11-3. Access Acquisition Module External Video In Signal Cable Assy
(P/N 2275-0328-XX)**

From PIM (IRGB)	To AAM (Video In)	Function
P1-1	P2-5	RED SIGNAL
P1-6	P2-4	RED_RETURN
P1-2	P2-3	GREEN SIGNAL
P1-7	P2-4	GREEN_RETURN
P1-3	P2-1	BLUE SIGNAL
P1-8	P2-2	BLUE_RETURN
P1-4	P2-6	SYNC SIGNAL
P1-9	P2-2	SYNC_RETURN

2275-0329-XX
2275-0330-XX

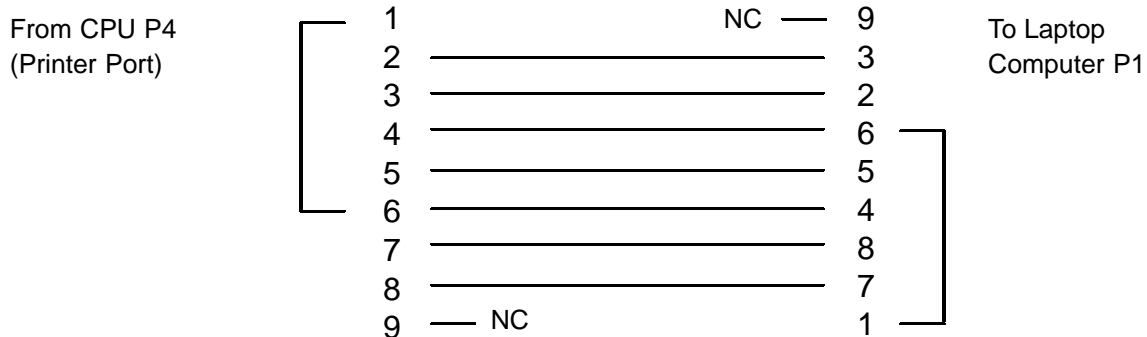


**Figure 11-5. Access Acquisition Module Video Out Signal Cable Assy
(P/N 2275-0329/0330-XX)**

**Table 11-4. Access Acquisition Module Video Out Signal Cable Assy
(P/N 2275-0329/0330-XX)**

From AAM (Video Out)	To PIM (SVID IN)	Function
P1-9	P2-3	Y SIGNAL
P1-10	P2-1	Y_RETURN
P1-15	P2-4	C SIGNAL
P1-5	P2-2	C_RETURN

2275-0337-XX



P4 is the second connector from the top of the CPU PCB (9 pin Dsub, male).

Either end of the cable may be used on the HDI 3000 or the laptop connectors.

The only wires needed for communication between the HDI 3000 and a laptop computer are the TX, RX, and GND wires.

See Table 11-5

Figure 11-6. Serial Data Cable Assy (P/N 2275-0337-XX)

Table 11-5. Serial Data Cable Assy (P/N 2275-0337-XX)

From CPU	To Laptop	Signal Function (P4 on CPU)
P4-1 to P4-6	-	CD
P4-2	P1-3	RX
P4-3	P1-2	TX
P4-4	P1-6 to P1-1	DTR
P4-5	P1-5	GND
P4-6	P1-4	DSRn
P4-7	P1-8	RTS
P4-8	P1-7	CTS
P4-9	-	NO CONNECTION
-	P1-9	

3500-1404-XX

See [Table 11-6](#)

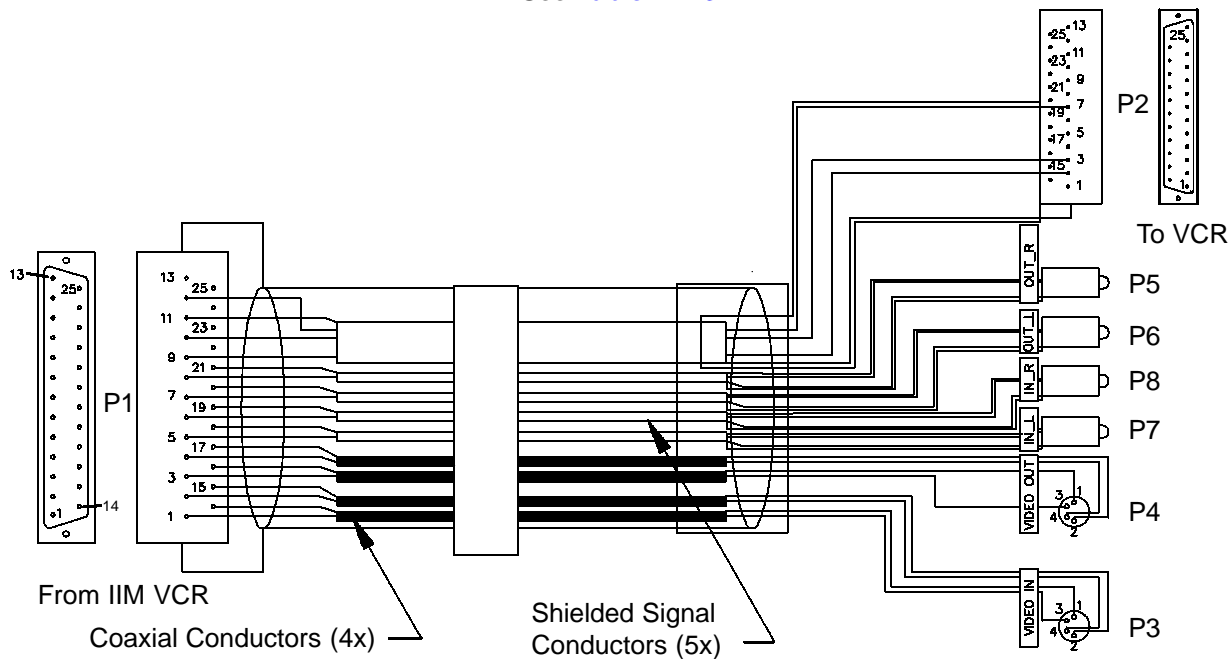


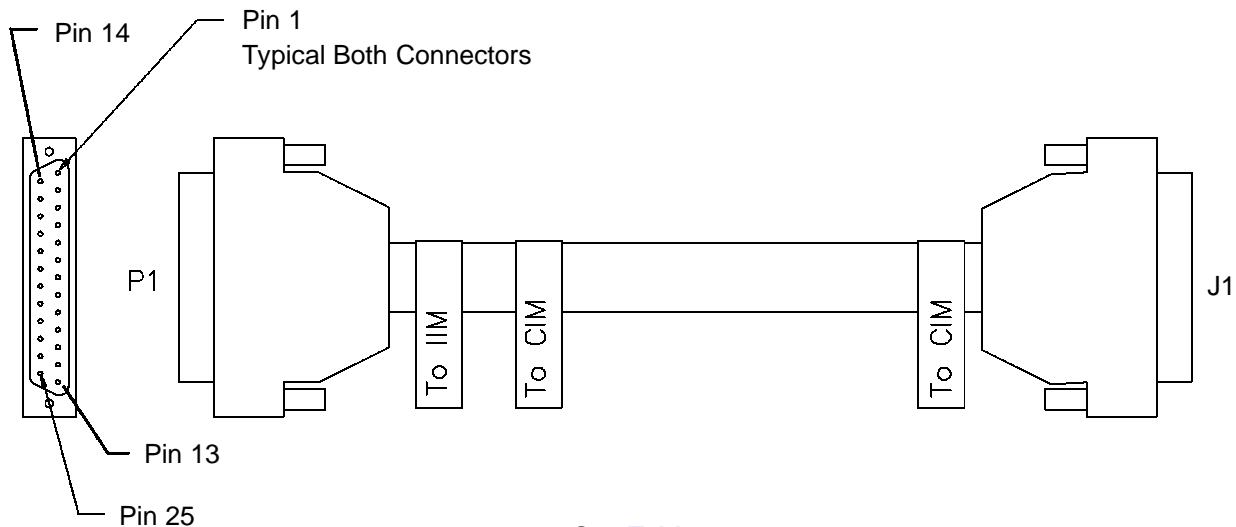
Figure 11-7. Internal VCR Cable (P/N 3500-1404-XX)

Table 11-6. Internal VCR Cable (P/N 3500-1404-XX)

From IIM (VCR)	To VCR	Function
P1-1	P3-3	VCR_IN_Y
P1-14	P3-1 (Shield)	VCR_IN_Y return
P1-2	P3-4	VCR_IN_C
P1-15	P3-2 (Shield)	VCR_IN_C return
P1-9	P2-2	TX
P1-10	P2-3	RX
P1-12	P2-7	Return
P1-11	P2-Shell	Shield
P1-3	P4-3	VCR_OUT_Y
P1-16	P4-1 (Shield)	VCR_OUT_Y return
P1-4	P4-4	VCR_OUT_C
P1-17	P4-2 (Shield)	VCR_OUT_C return
P1-5	P7-Center	IN_L
P1-18	P7-Shield	IN_L_RET

From IIM (VCR)	To VCR	Function
P1-6	P8-Center	IN_R
P1-19	P8-Shield	IN_R_RET
P1-7	P6-Center	OUT_L
P1-20	P6-Shield	OUT_L_RET
P1-8	P5-Center	OUT_R
P1-21	P5-Shield	OUT_R_RET

3500-1405-XX



See [Table 11-7](#)

All wires have corresponding pins on both plugs.

Figure 11-8. IIM Control Panel Cable Assy (P/N 3500-1405-XX)

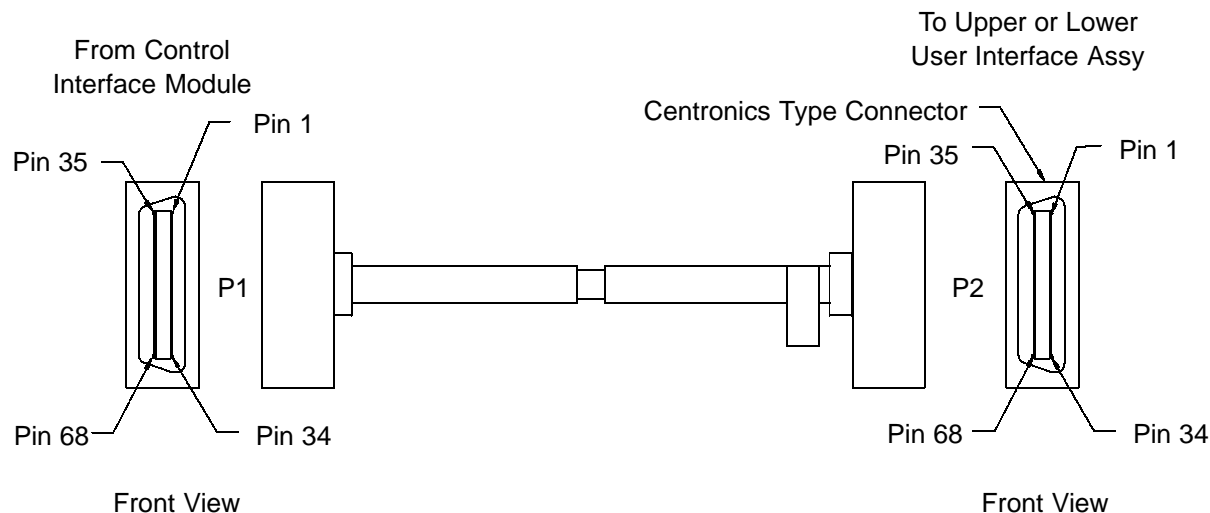
Table 11-7. IIM Control Panel Cable Assy (P/N 3500-1405-XX)

From IIM (VCR)	To CIM	Function¹
P1-25	J1-25	PCM_TX-_FP
P1-13	J1-13	PCM_TX+_FP
P1-24	J1-24	FP_RX-_PCM
P1-12	J1-12	FP_RX+_PCM
P1-11	J1-11	GND
P1-21	J1-21	GND
P1-8	J1-8	FP_ON_STANDBY*
P1-20	J1-20	FP_RST*
P1-7	J1-7	SYS_INIT*
P1-19	J1-19	GND
P1-6	J1-6	-12V OUT
P1-18	J1-18	GND
P1-5	J1-5	+12V OUT
P1-17	J1-17	GND
P1-4	J1-4	+5V OUT

From IIM (VCR)	To CIM	Function¹
P1-16	J1-16	GND
P1-3	J1-3	+5V OUT
P1-15	J1-15	GND
P1-2	J1-2	+5V OUT
P1-14	J1-14	GND
P1-1	J1-1	+5V OUT

1. Wires grouped in pairs are twisted wire pairs.

3500-1458-XX



See [Table 11-8](#)

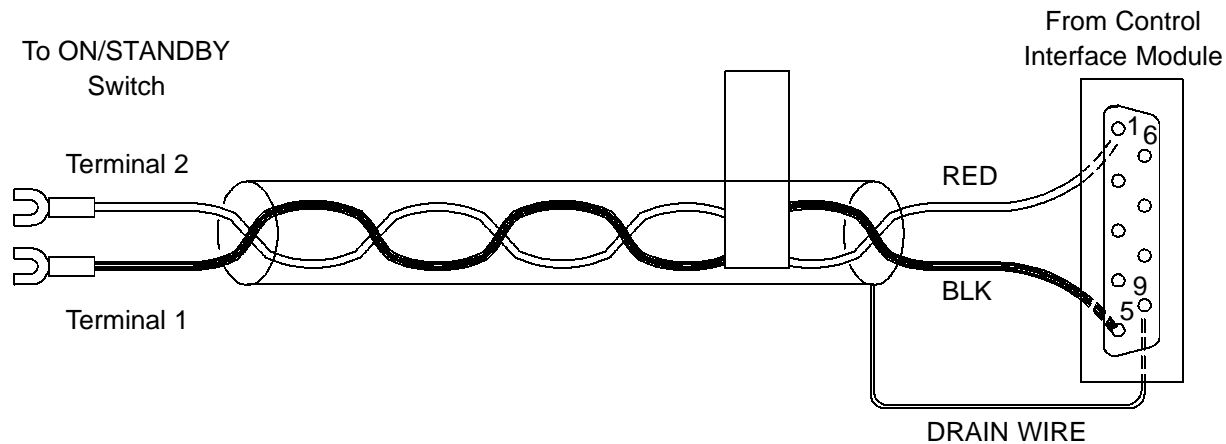
All wires have corresponding pins on both plugs.

**Figure 11-9. Control Interface Module/User Interface Cable Assy
(P/N 3500-1458-XX)**

**Table 11-8. Control Interface Module/User Interface Cable Assy
(P/N 3500-1458-XX)**

From CIM	To User Interface Assy
P1-1	P2-1
P1-2	P2-2
P1-3	P2-3
P1-X	P2-X
P1-67	P2-67
P1-68	P2-68

3500-1460-03



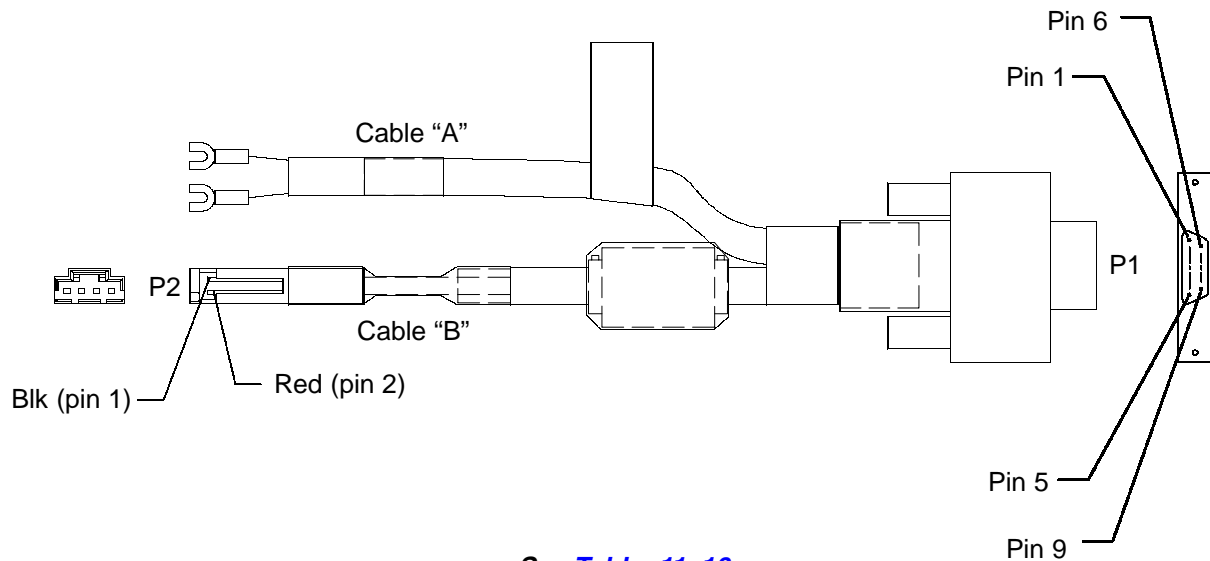
See [Table 11-9](#)

Figure 11-10. On/Standby Switch Cable (P/N 3500-1460-03)

Table 11-9. On/Standby Switch Cable Assy (P/N 3500-1460-03)

From CIM	To Switch	Function
P1-1	Terminal 2	ON/STANDBY
P1-5	Terminal 1	GND
P1-9	-	DRAIN (GND)

3500-1460-04



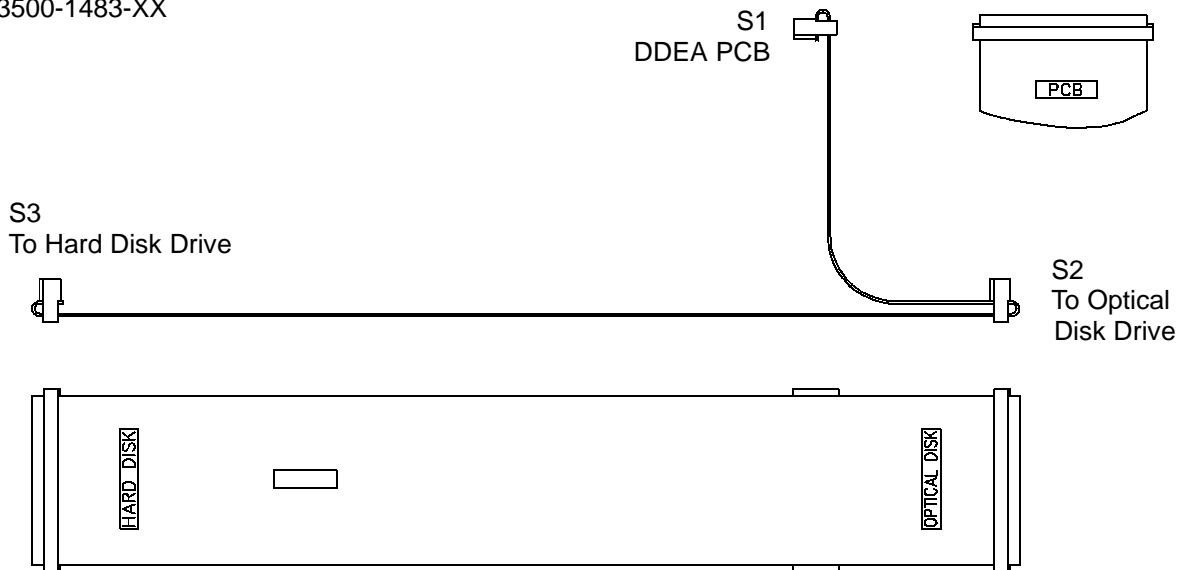
See [Table 11-10](#)

Figure 11-11. On/Standby Switch Cable (P/N 3500-1460-04)

Table 11-10. On/Standby Switch Cable Assy (P/N 3500-1460-04)

From P1	To Cable A	To Cable B	Function
P1-1	Spade Lug (red)	-	ON/STANDBY
P1-6	Spade Lug (blk)	-	GND
P1-5	Drain	-	DRAIN (GND)
P1-4	-	P2-1 (blk)	+12 Vdc Return
P1-8	-	P2-2 (red)	+12 Vdc
P1-5	-	Drain	GND

3500-1483-XX



See [Table 11-11](#)

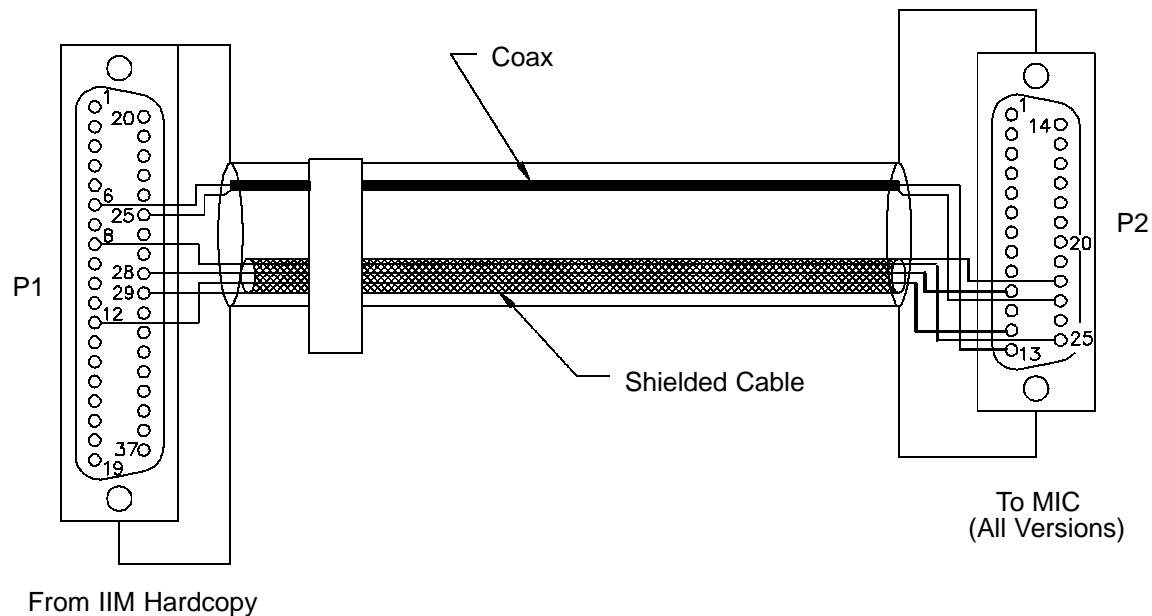
All wires have corresponding pins on both plugs.

Figure 11-12. Disk Drive Signal Cable Assy (P/N 3500-1483-XX)

Table 11-11. Disk Drive Signal Cable Assy (P/N 3500-1483-XX)

From DDEA	To Optical Drive	To Hard Drive
S1-1	S2-1	S3-1
S1-2	S2-2	S3-2
S1-3	S2-3	S3-3
S1-X	S2-X	S3-X
S1-49	S2-49	S3-49
S1-50	S2-50	S3-50

3500-1539-XX



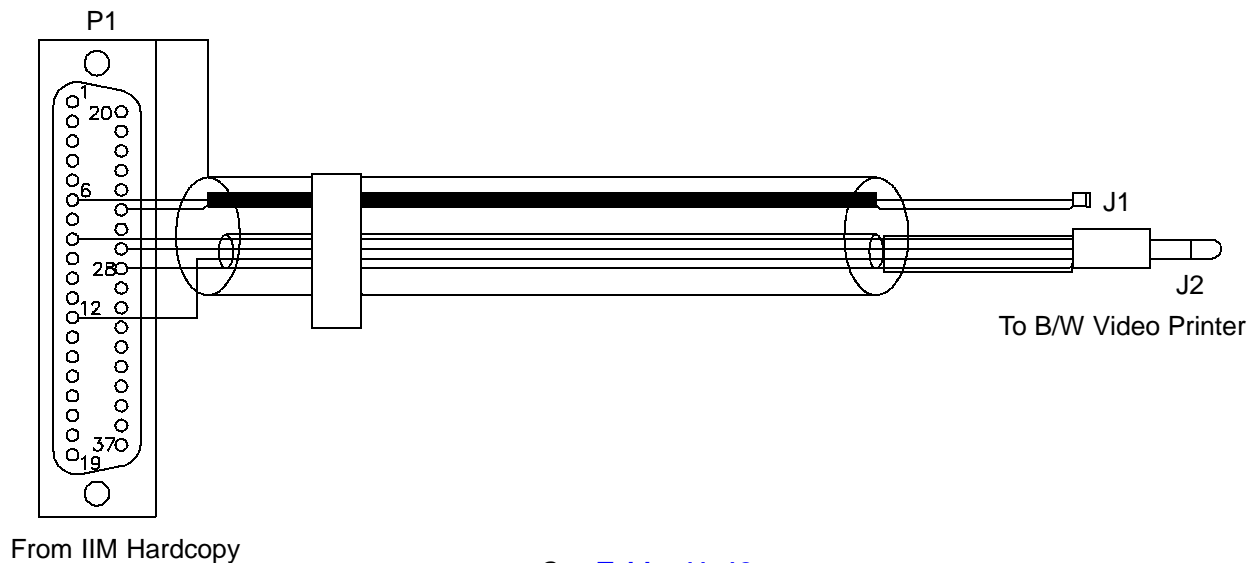
See [Table 11-12](#)

Figure 11-13. Internal MIC Cable (P/N 3500-1539-XX)

Table 11-12. Internal MIC Cable (P/N 3500-1539-XX)

From IIM (Hardcopy)	To MIC	Function
P1-6	P2-13	VIDEO (coax)
P1-25	P2-23	VIDEO Return (coax shield)
P1-8	P2-25	PRINT (shielded cable)
P1-12	P2-12	READY (shielded cable)
P1-28	P2-10	RETURN (shielded cable)
P1-29	P2-22	SHIELD (shielded cable)

3500-1540-XX



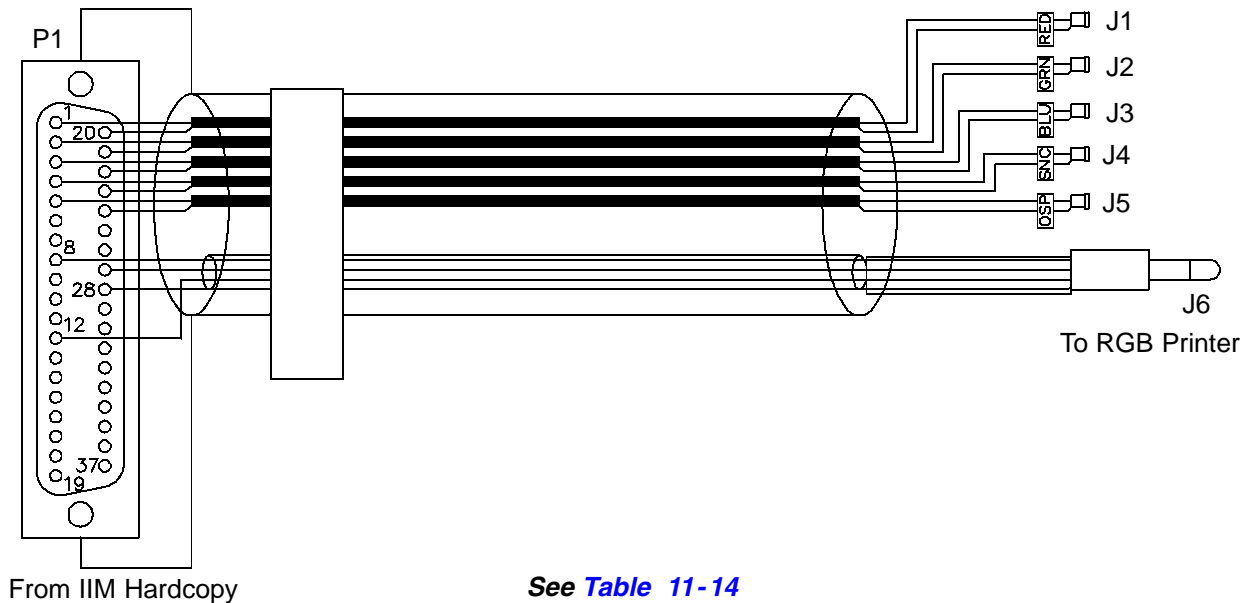
See [Table 11-13](#)

Figure 11-14. Internal B/W Video Printer Cable (P/N 3500-1540-XX)

Table 11-13. Internal B/W Video Printer Cable (P/N 3500-1540-XX)

From IIM (Hardcopy)	To B/W Printer	Function
P1-6	J1 Center	VIDEO
P1-25	J1 Shield	VIDEO_RETURN
P1-8	J2 Tip	PRINT
P1-12	J2 Ring	READY
P1-27	J2 Housing	RETURN
P1-28	J2 Shell	(Drain wire)

3500-1541-XX



See [Table 11-14](#)

Figure 11-15. Internal RGB Printer Cable (P/N 3500-1541-XX)

Table 11-14. Internal RGB Printer Cable (P/N 3500-1541-XX)

From IIM (Hardcopy)	To RGB Printer	Function
P1-1	J1 Center	RED (R)
P1-20	J1 Shield	RED_RETURN
P1-2	J2 Center	GRN (G)
P1-21	J2 Shield	GRN_RETURN
P1-3	J3 Center	BLU (B)
P1-22	J3 Shield	BLUE_RETURN
P1-4	J4 Center	SNC (Sync)
P1-23	J4 Shield	SNC_RETURN
P1-5	J5 Center	OSP (VIDEO OUT)
P1-24	J5 Shield	OSP_RETURN (VIDEO OUT RETURN)
P1-8	J6 Tip	-
P1-12	J6 Ring	-
P1-27	J6 Housing	-
P1-28	Shield (Drain)	(Shield connected to housing at J6)

3500-1565-XX

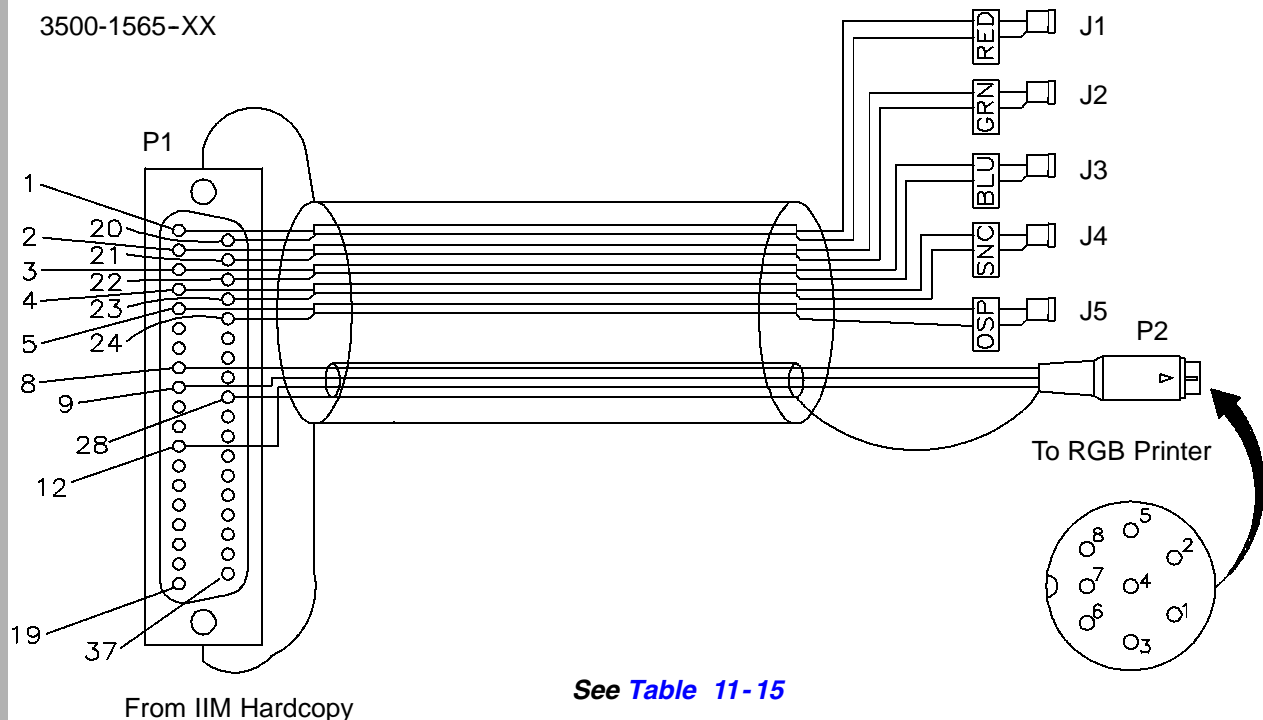
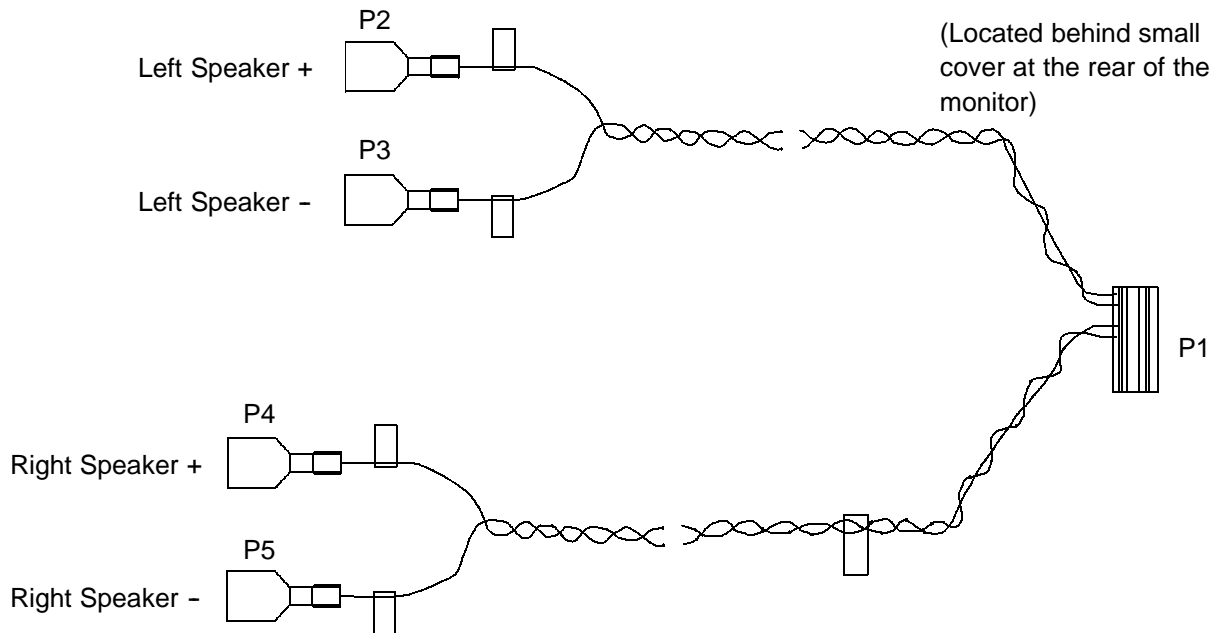


Figure 11-16. RGB Mitsubishi Printer Cable (P/N 3500-1565-XX)

Table 11-15. RGB Mitsubishi Printer Cable (P/N 3500-1565-XX)

From IIM (Hardcopy)	To RGB Printer	Function
P1-1	J1 Center	RED (R)
P1-20	J1 Shield	RED_RETURN
P1-2	J2 Center	GRN (G)
P1-21	J2 Shield	GRN_RETURN
P1-3	J3 Center	BLU (B)
P1-22	J3 Shield	BLUE_RETURN
P1-4	J4 Center	SNC (Sync)
P1-23	J4 Shield	SNC_RETURN
P1-5	J5 Center	VIDEO OUT
P1-24	J5 Shield	VIDEO OUT_RETURN
P1-8	P2-5	REMOTE (PRINT)
P1-12	P2-4	BUSY
P1-9	P2-2	MEMORY
P1-28	P2-1	Shield (Drain)

3500-1582-XX



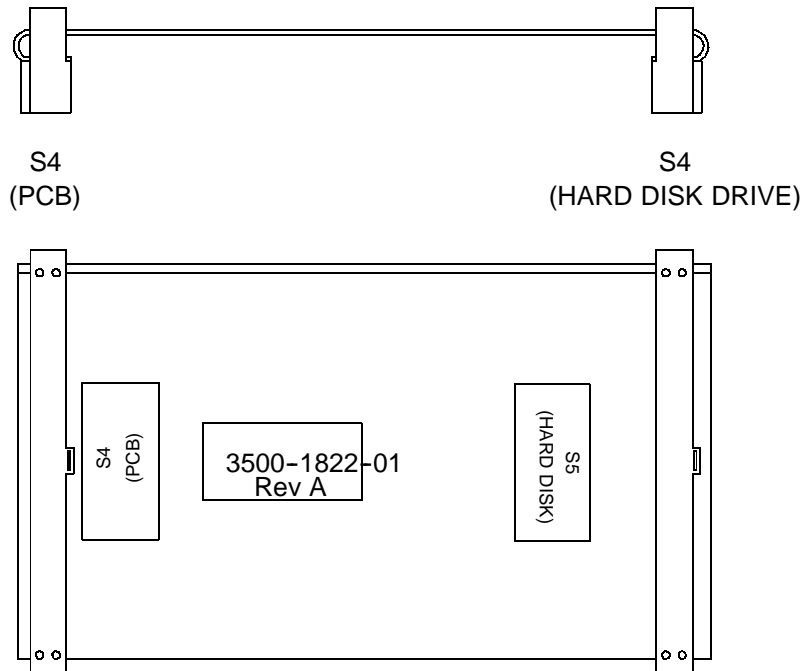
See Table 11-16

Figure 11-17. Monitor Speaker Cable Assy (P/N 3500-1582-XX)

Table 11-16. Monitor Speaker Cable Assy (P/N 3500-1582-XX)

From Monitor PCB	To P2	To P3	To P4	To P5	Function
P1-1	1	-	-	-	Speaker Left +
P1-2	-	1	-	-	Speaker Left -
P1-3	-	-	-	-	-
P1-4	-	-	1	-	Speaker Right +
P1-5	-	-	-	1	Speaker Right -
P1-6	-	-	-	-	No connection
P1-7	-	-	-	-	No connection
P1-8	-	-	-	-	No connection

3500-1822-XX



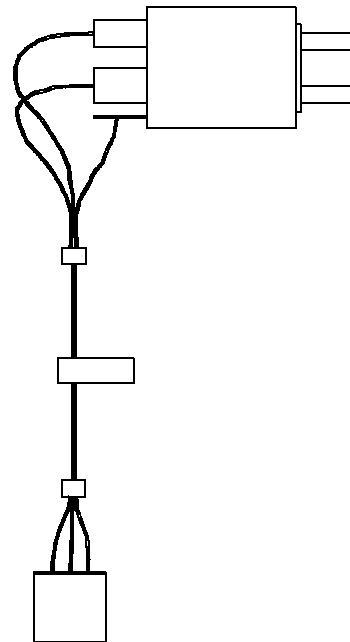
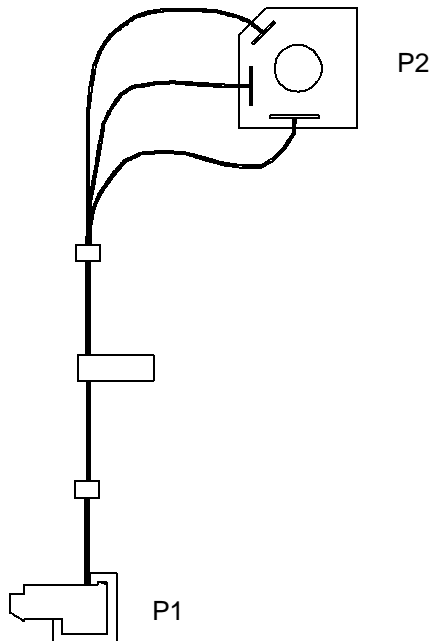
All wires have corresponding pins on both plugs. *See Table 11-17*

Figure 11-18. DDEA Hard Disk Drive Signal Cable Assy (P/N 3500-1822-XX)

Table 11-17. DDEA Hard Disk Drive Signal Cable Assy (P/N 3500-1822-XX)

From S4 (PCB)	To S5 (Hard Disk Drive)
S4-1	S5-1
S4-2	S5-2
S4-3	S5-3
S4-X	S5-X
S4-49	S5-49
S4-50	S5-50

3500-1835-XX



See [Table 11-18](#)

Figure 11-19. DDEA Physio Jack Cable Assy (P/N 3500-1835-XX)

Table 11-18. DDEA Physio Jack Cable Assy (P/N 3500-1835-XX)

From P1	To P2	Function
P1-1	P2-4	Tip Shunt
P1-2	P2-5	Tip Spring
P1-3	P2-1	Sleeve

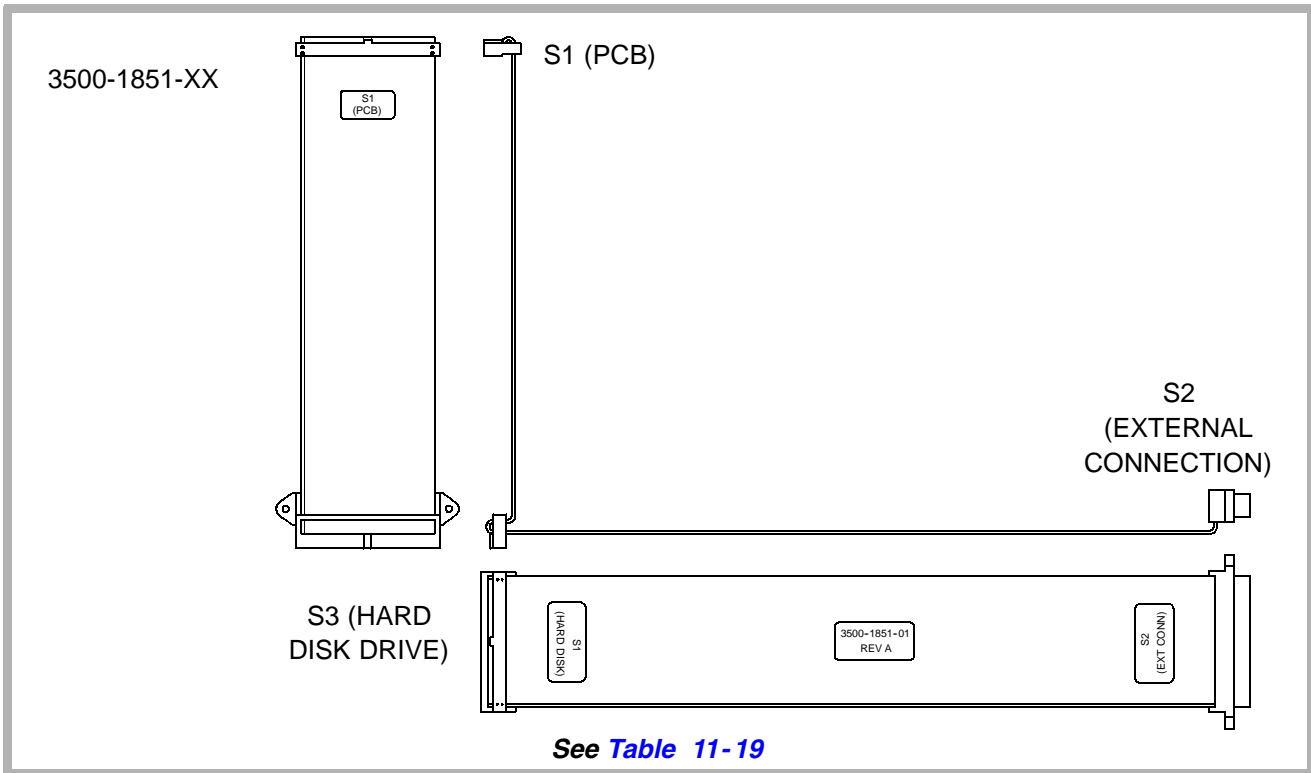
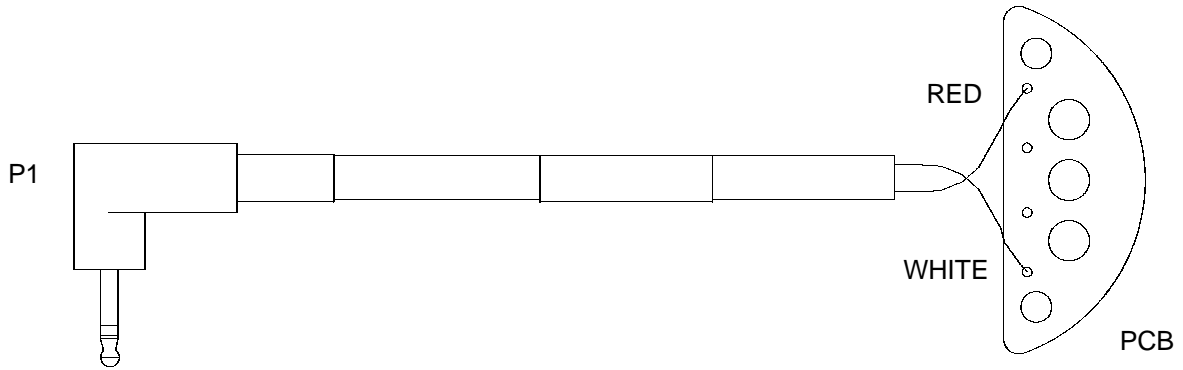


Figure 11-20. Disk Drive Signal Cable Assy, No Optical Drive (P/N 3500-1851-XX)

Table 11-19. Disk Drive Signal Cable Assy, No Optical Drive (P/N 3500-1851-XX)

From S1 (PCB)	To S2 (External Connection)	To S3 (Hard Disk Drive)
S2-1	S2-1	S3-1
S2-2	S2-2	S3-2
S2-3	S2-3	S3-3
S2-X	S2-X	S3-X
S2-50	S2-50	S3-50

3500-2632-XX



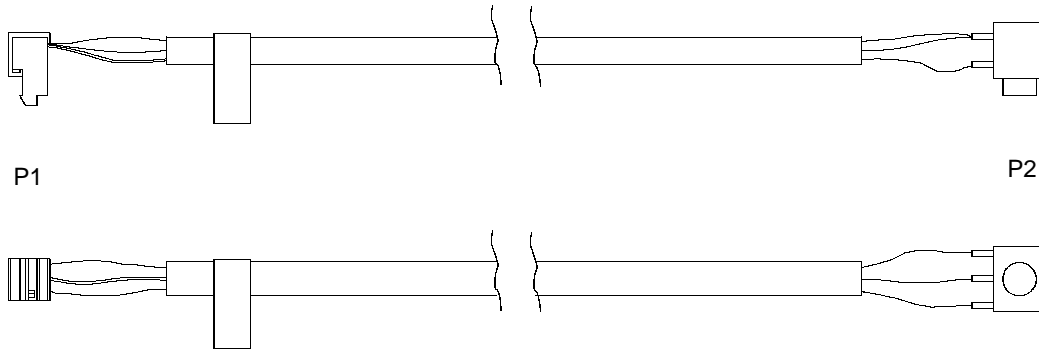
See [Table 11-20](#)

Figure 11-21. Microphone Cable Assy (P/N 3500-2632-XX)

Table 11-20. Microphone Cable Assy (P/N 3500-2632-XX)

From P1 (Plug)	To PCB	Function
Ring	Red	Audio
Tip	White	Audio Return
Shield	No connection	Ground

3500-2656-XX



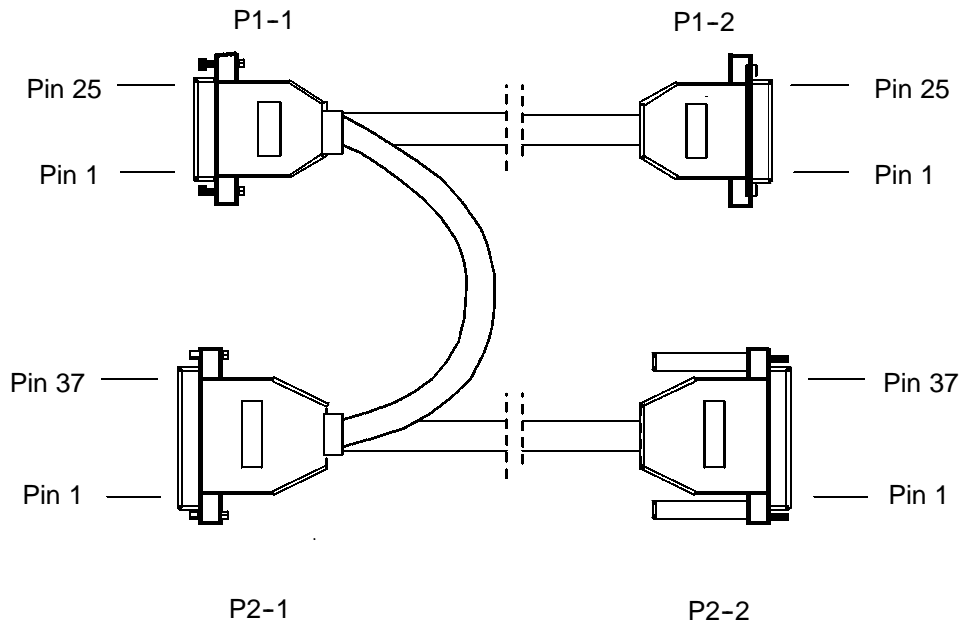
See [Table 11-21](#)

Figure 11-22. Microphone Access Panel Cable Assy (P/N 3500-2656-XX)

Table 11-21. Microphone Access Panel Cable Assy (P/N 3500-2656-XX)

From P1 (PCB)	To P2 (Plug)	Function
P1-1	Ring	Audio
P1-2	Shield	Ground
P1-3	Tip	Audio Return

3500-2772-XX



See [Table 11-22](#) and [Table 11-23](#)

Figure 11-23. ISEM Adapter Cable Assy (P/N 3500-2772-XX)

Table 11-22. ISEM Adapter Cable Assy (P/N 3500-2772-XX)

From P2-1	To P2-2	From P1-1	To P1-2	Function
19	19	14	14	RED_VIDEO
37	37	1	1	RED_RETURN
18	18	15	15	GREEN_VIDEO
36	36	2	2	GREEN_RETURN
17	17	16	16	BLUE_VIDEO
35	35	3	3	BLUE_RETURN
33	33	17	17	COMPOSITE_SYNC
15	15	4	4	SYNC_RETURN
21	21	21	21	RIGHT_SPEAKER+
2	2	22	22	RIGHT_SPEAKER-
20	20	9	9	LEFT_SPEAKER+
1	1	10	10	LEFT_SPEAKER-
3	3	4	4	GROUND
11	11	11	11	UPHONE+
30	30	13	13	UPHONE-
12	12	12	12	UPHONE_SHIELD

Table 11-23. ISEM Adapter Cable Assy Jumper (P/N 3500-2772-XX)

From P1-1	To P2-1	Function
5	7	+12 VOLT
8	6	GROUND
24	5	-12 VOLT
6	4	+5 VOLT
NO CONNECTION	25 ¹	GROUND
19	8	SCL
18	27	SDA
20	9	GROUND

1. Connected to P2-1 pin 6.

11-1.3 Power Cables

System and OEM (internal and external) power cables are illustrated in [Figure 11-24](#) through [Figure 11-31](#). Pinout information for these cables are provided in [Table 11-24](#) through [Table 11-28](#).

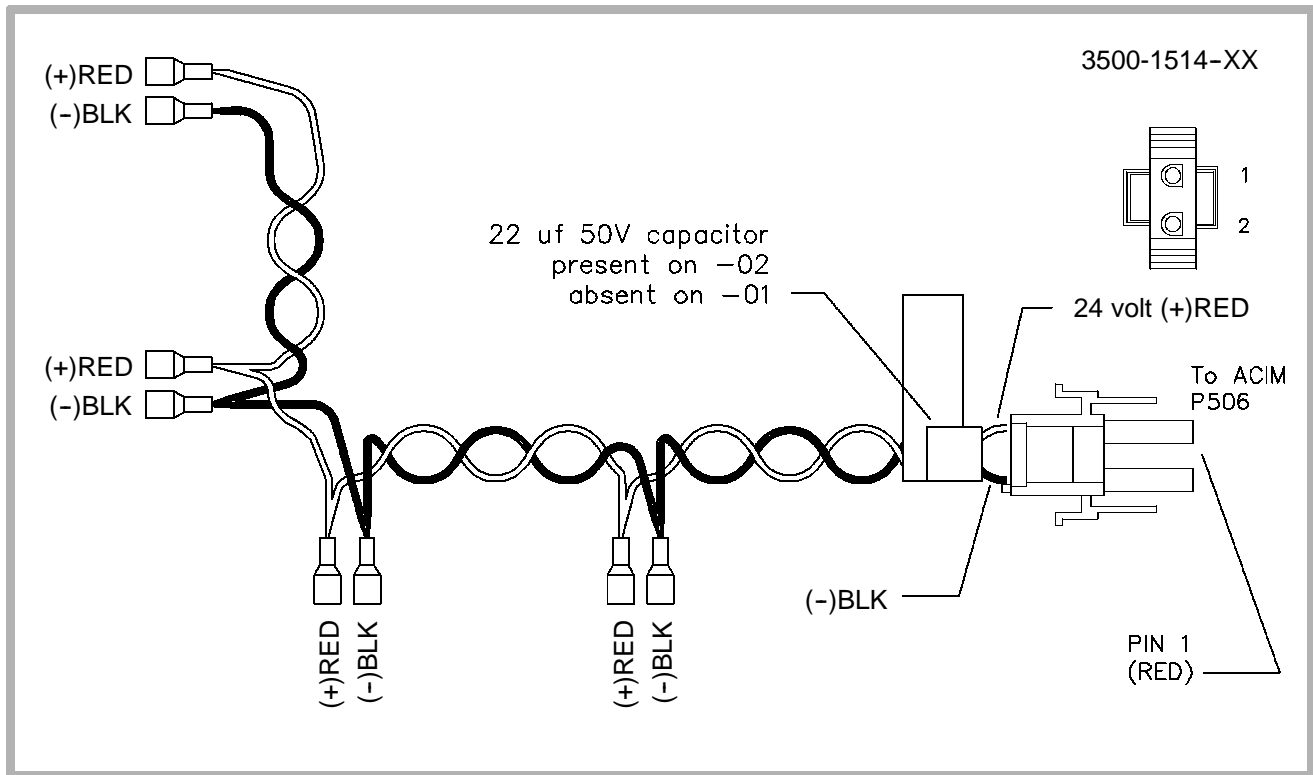
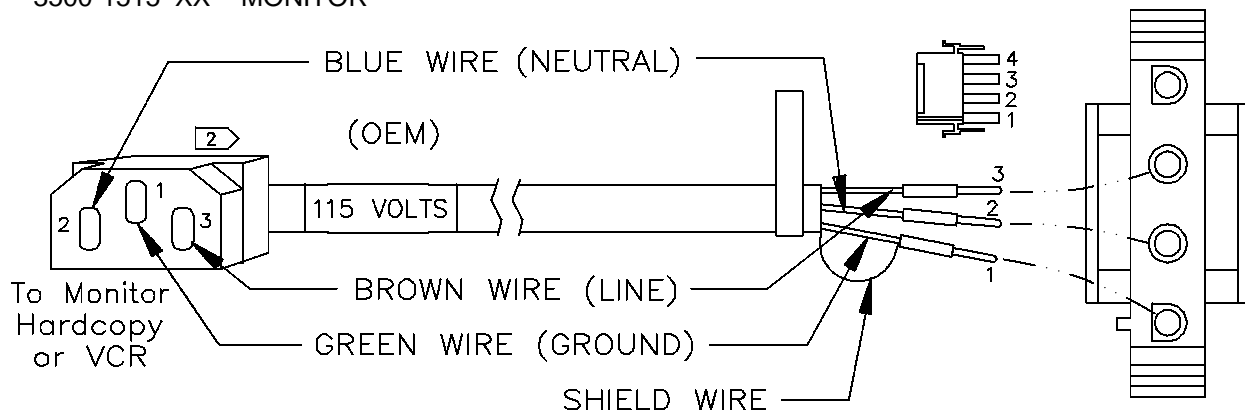


Figure 11-24. Fan Power Cable (P/N 3500-1514-XX)

3500-1516-XX - VCR 1
 3500-1517-XX - HARDCOPY 1
 3500-1681-XX - MONITOR 1
 3500-1515-XX - MONITOR

To 3500-1578 ACIM:
 Hardcopy - P503
 VCR - P504
 Monitor - P505



- 1 Power cables are not interchangeable. Lengths will vary.
- 2 Monitor power cable 3500-1681-01 may have a right angle connector on the monitor end.

Figure 11-25. Monitor and Internal OEM Cables, 115 Vac

3500-1546-XX - VCR 1

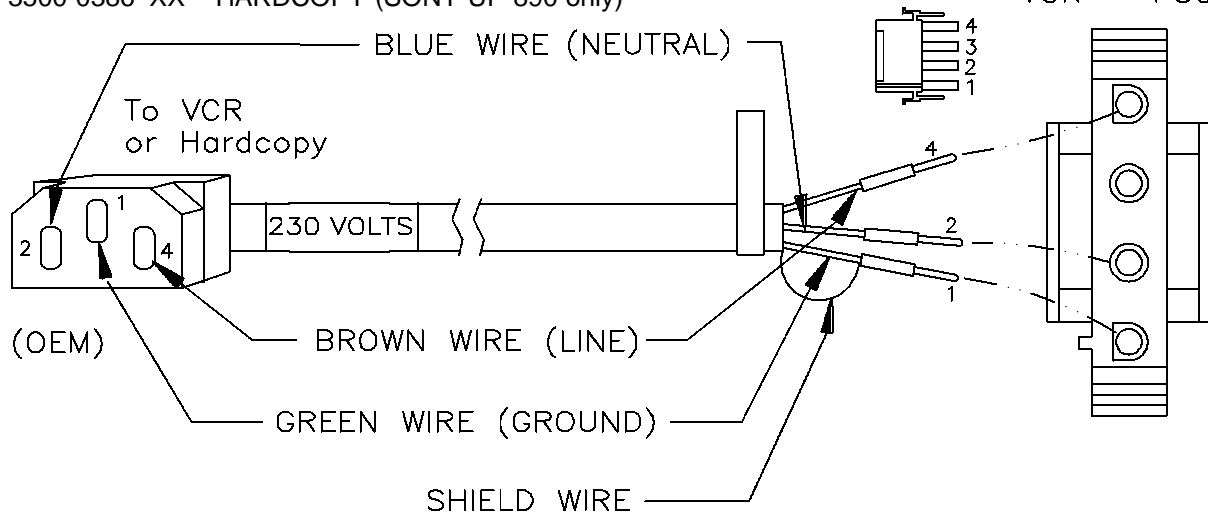
3500-1547-XX - HARDCOPY 1

3500-0386-XX - HARDCOPY (SONY UP-890 only)

To 3500-1579/1580 ACIM:

Hardcopy - P503

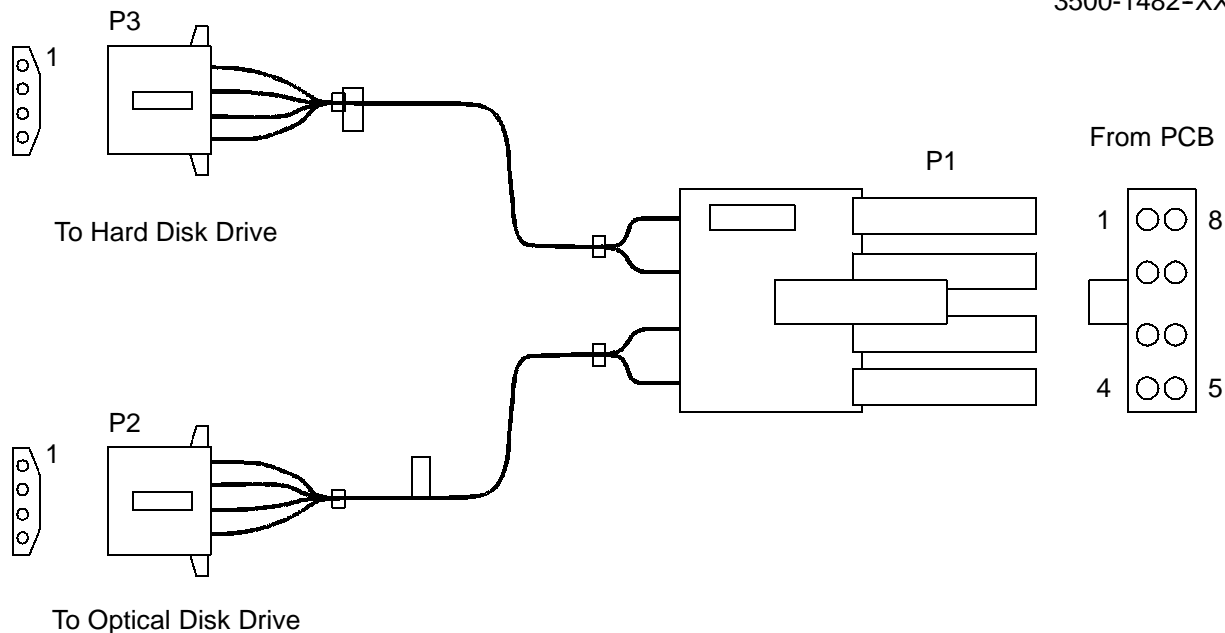
VCR - P504



1 Power cables are not interchangeable. Lengths will vary.

Figure 11-26. Internal OEM Cables, 230 Vac

3500-1482-XX



See [Table 11-24](#)

Figure 11-27. Disk Drive Power Cable Assy (P/N 3500-1482-XX)

Table 11-24. Disk Drive Power Cable Assy (P/N 3500-1482-XX)

From DDEA PCB	To Optical Drive	To Hard Drive	Function
P1-1	P2-1	-	+12 Vdc
P1-2	P2-4	-	+ 5 Vdc
P1-3	-	P3-1	+ 12 Vdc
P1-4	-	P3-4	+ 5 Vdc
P1-5	P2-2	-	+ 12 Vdc Return
P1-6	P2-3	-	+ 5 Vdc Return
P1-7	-	P3-2	+ 12 Vdc Return
P1-8	-	P3-3	+ 5 Vdc Return

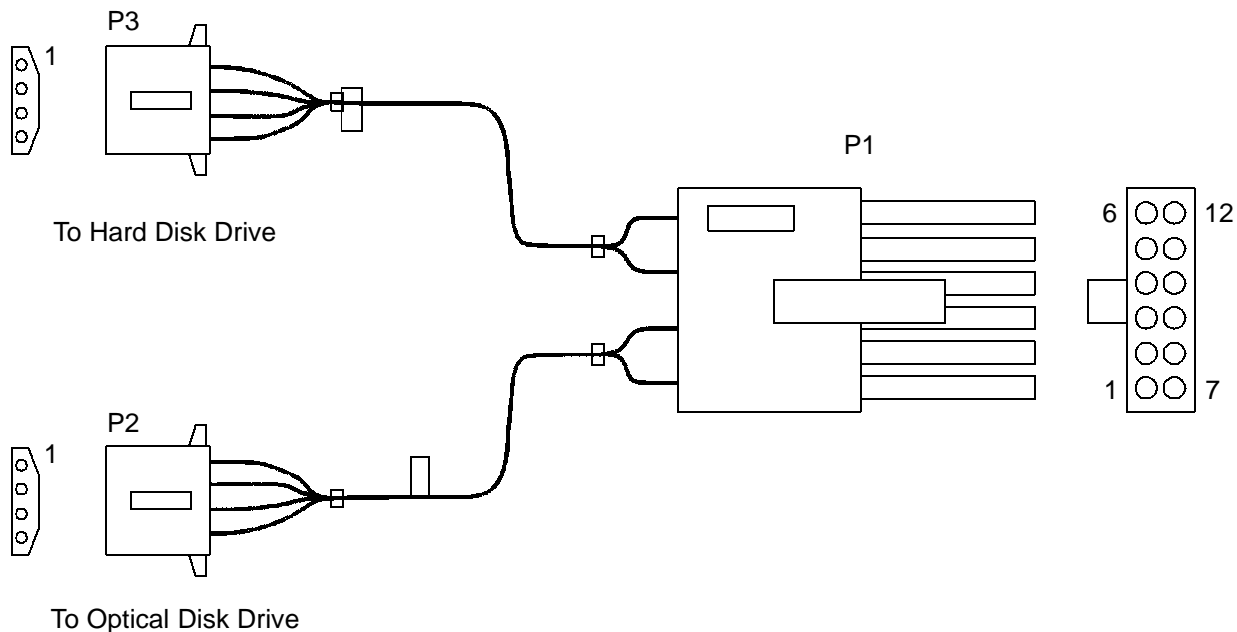
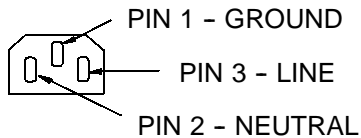


Figure 11-28. Disk Drive Power Cable Assy (P/N 3500-1482-03)

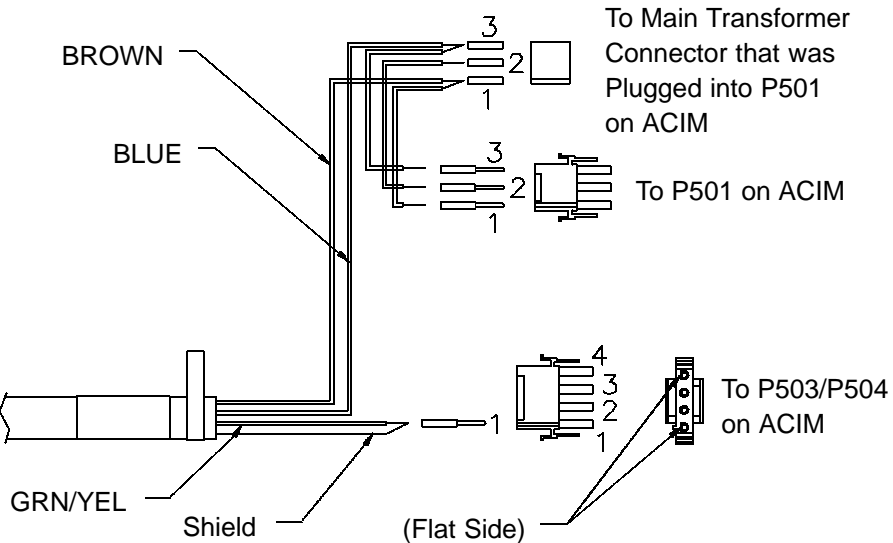
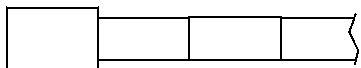
Table 11-25. Disk Drive Power Cable Assy (P/N 3500-1482-03)

From DDEA PCB	To Optical Drive	To Hard Drive	Function
P1-1	P2-1	-	+12 Vdc
P1-2	P2-4	-	+ 5 Vdc
P1-3	-	-	-
P1-4	-	-	-
P1-5	-	P3-1	+ 12 Vdc
P1-6	-	P3-4	+ 5 Vdc
P1-7	P2-2	-	+ 12 Vdc Return
P1-8	P2-3	-	+ 5 Vdc Return
P1-9	-	-	-
P1-10	-	-	-
P1-11	-	P3-2	+ 12 Vdc Return
P1-12	-	P3-3	+ 5 Vdc Return

3500-1721-XX - 60Hz
3500-1722-XX - 50Hz



To Power Connector
on UP-5600

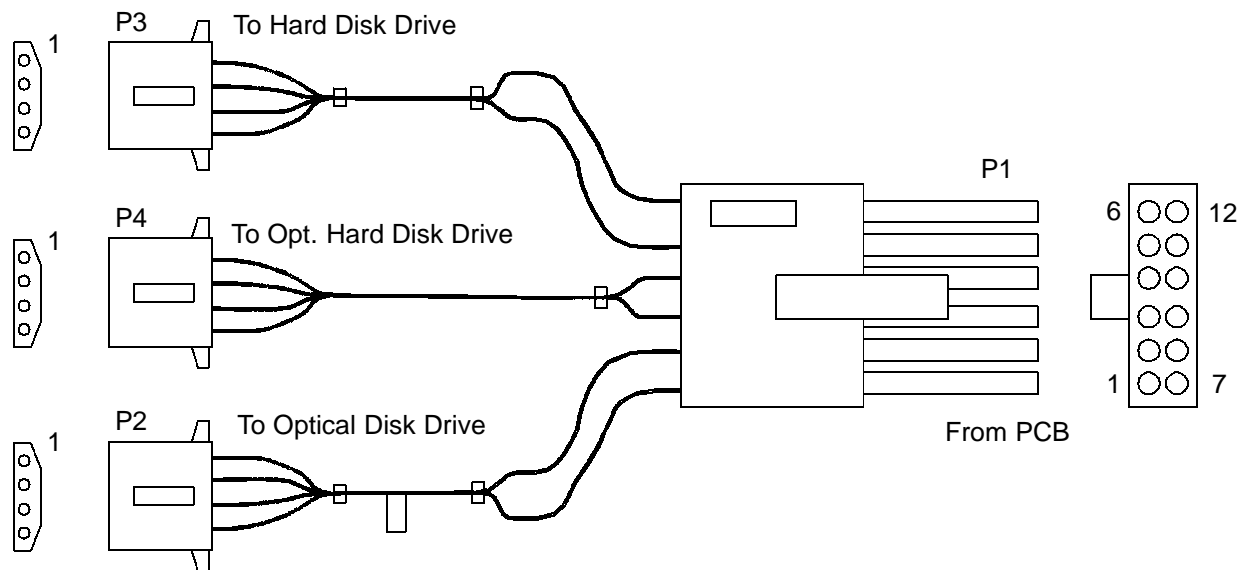


See [Table 11-26](#)

**Figure 11-29. Sony UP5600 Power Cable Assy
(P/N 3500-1721/1722-XX)**

**Table 11-26. Sony UP5600 Power Cable Assy
(P/N 3500-1721/1722-XX)**

To P503/P504 on ACIM	To P501 on ACIM	Function
Pin 1	-	GND from ACIM
Pin 2	-	Not used
Pin 3	-	Not used
Pin 4	-	Not used
-	Pin 1	155V Square Wave, 50 Hz from Main Transformer
-	Pin 2	155V Square Wave, 60 Hz from Main Transformer
-	Pin 3	155V Square Wave Ground from Main Transformer



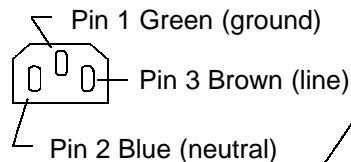
See [Table 11-27](#)

Figure 11-30. Disk Drive Power Cable Assy (P/N 3500-1823-XX)

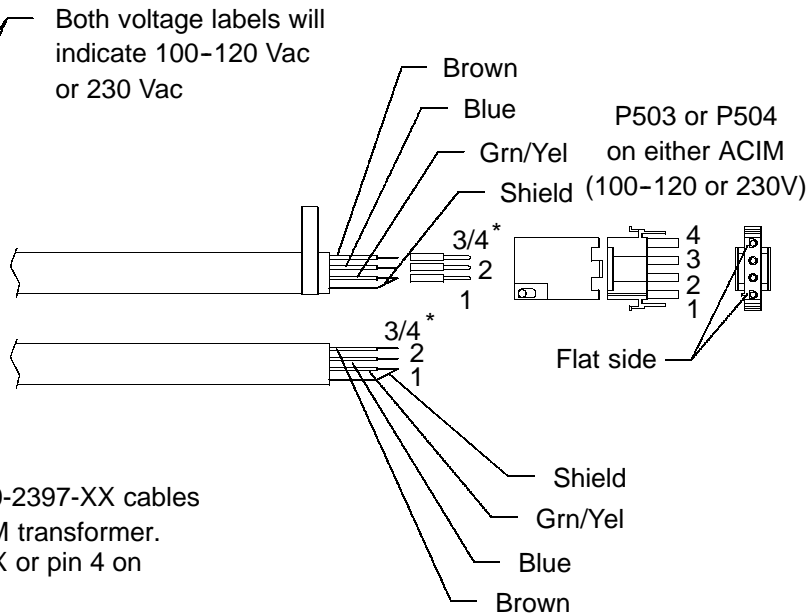
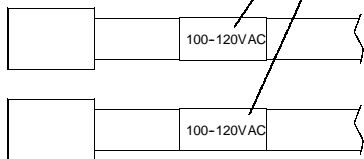
Table 11-27. Disk Drive Power Cable Assy (P/N 3500-1823-XX)

From DDEA PCB	To Optical Drive	To Hard Drive	To Optional Hard Drive	Function
P1-1	P2-1	-	-	+12 Vdc
P1-2	P2-4	-	-	+ 5 Vdc
P1-3	-	-	P4-1	+ 12 Vdc
P1-4	-	-	P4-4	+ 5 Vdc
P1-5	-	P3-1	-	+ 12 Vdc
P1-6	-	P3-4	-	+ 5 Vdc
P1-7	P2-2	-	-	+ 12 Vdc Return
P1-8	P2-3	-	-	+ 5 Vdc Return
P1-9	-	-	P4-2	+ 12 Vdc Return
P1-10	-	-	P4-3	+ 5 Vdc Return
P1-11	-	P3-2	-	+ 12 Vdc Return
P1-12	-	P3-3	-	+ 5 Vdc Return

3500-1873-XX 100-120 Vac
 3500-2397-XX 230 Vac



Both voltage labels will indicate 100-120 Vac or 230 Vac



To power connectors on OEMs

Use the 3500-1873-XX and 3500-2397-XX cables only with the 2601-0071-XX OEM transformer.

* Wired to pin 3 on 3500-1873-XX or pin 4 on 3500-2397-XX.

See [Table 11-28](#)

Figure 11-31. Dual Hardcopy Power Cable Assy (P/N 3500-1873/2397-XX)

**Table 11-28. Dual Hardcopy Power Cable Assy
(P/N 3500-1873/2397-XX)**

To P503/P504 on ACIM	To OEM Power Connectors	Function
Pin 1	Pin 1	GND from ACIM (Green/Yellow)
Pin 2	Pin 2	Neutral (Blue)
Pin 3	Pin 3	Line voltage (100-120V) on 3500-1873-XX. Not used on 3500-2397-01 (Brown)
Pin 4	Pin 3	Line voltage (230V) on 3500-2397-XX. Not used on 3500-1873-01 (Brown)

11-1.4

System Connectors

Connector locations are shown in [Figure 11-32](#) and [Figure 11-33](#). Connector pinouts (signals) are shown in the figures for the individual cables. The S/HSEL PCB has three “universal” Cannon array transducer connectors and a Lemo static probe connector.

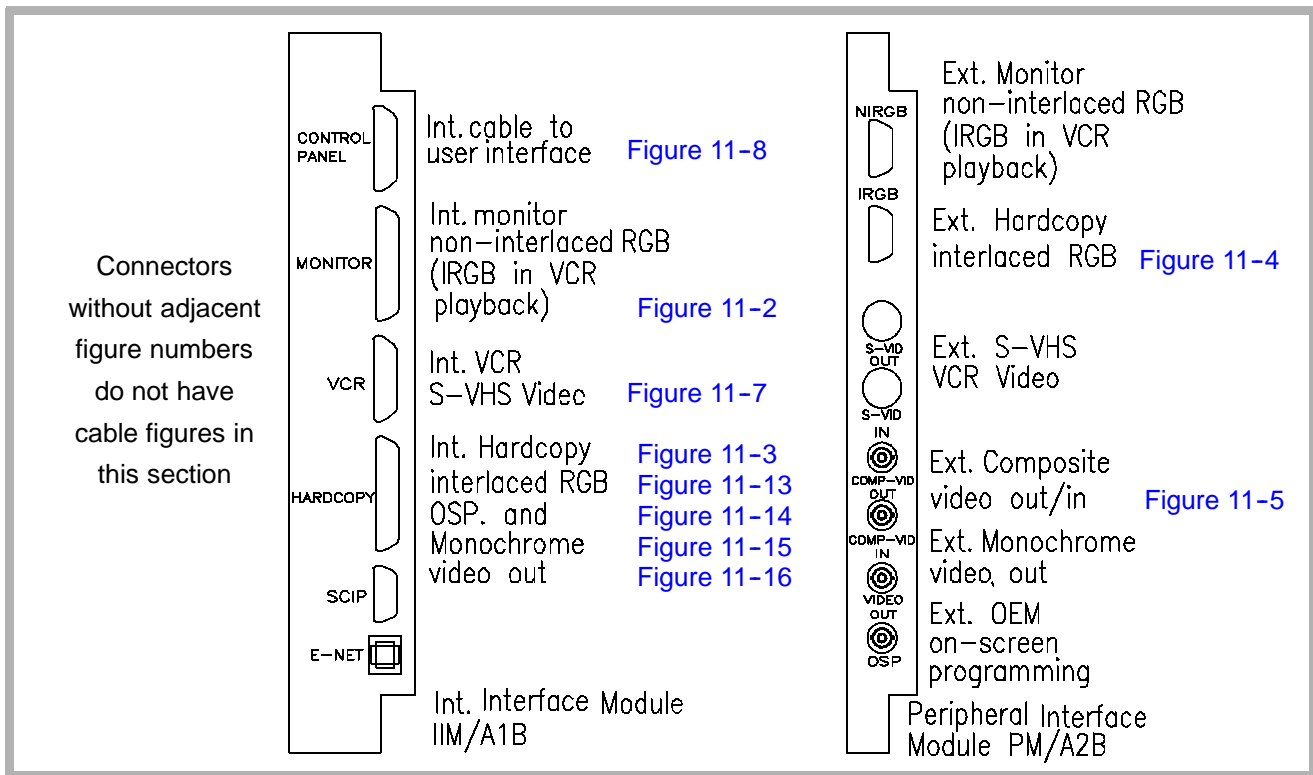


Figure 11-32. Connector Locations (1 of 2)

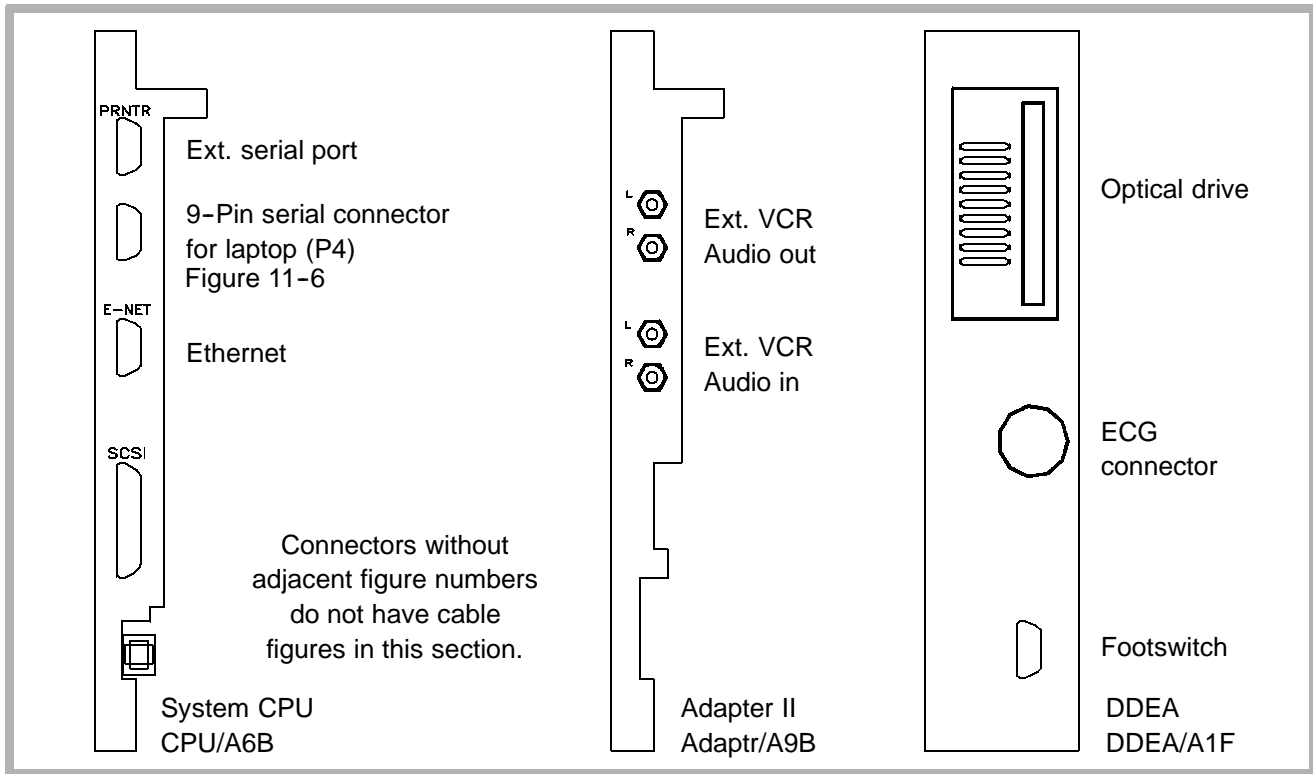


Figure 11-32. Connector Locations (2 of 2)

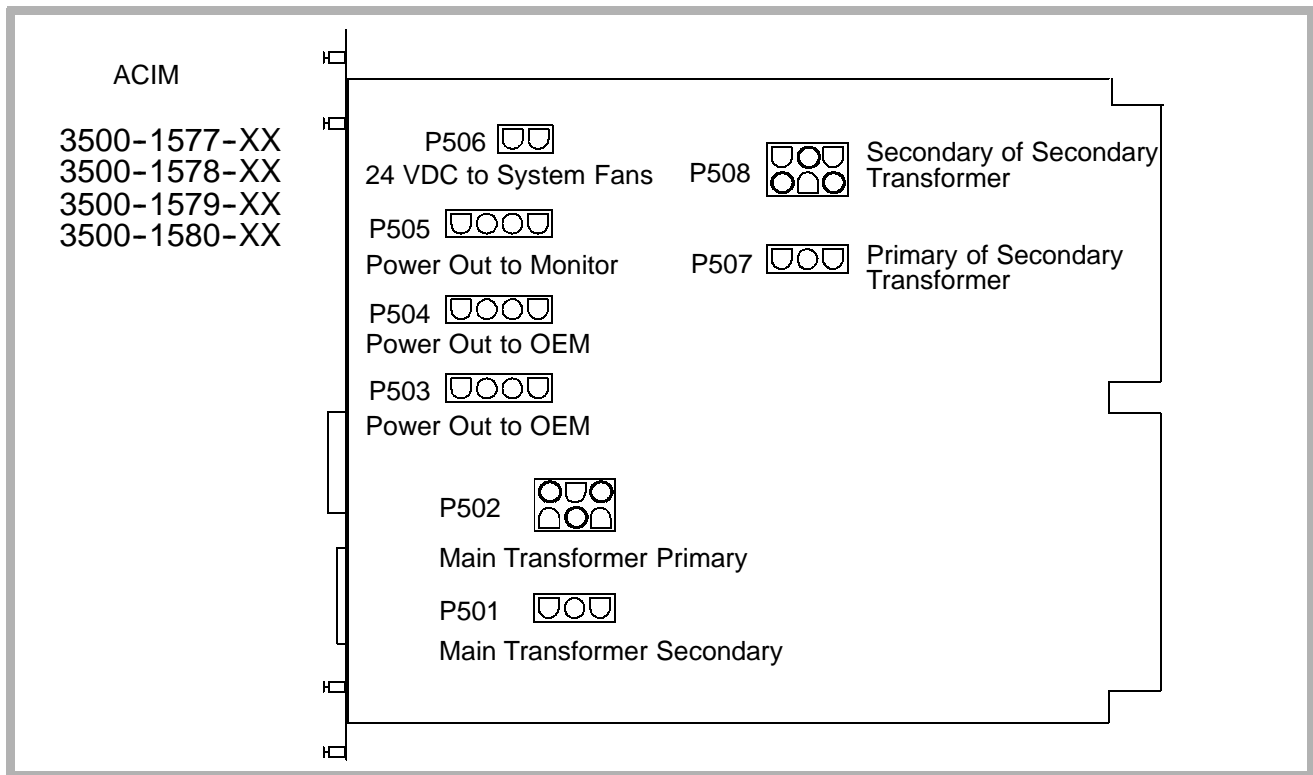


Figure 11-33. ACIM Connector Diagram

11-1.5

System Interconnect Cabling

Notes for the system interconnect cabling are shown in **Figure 11-34**. System signal and power cabling are illustrated in **Figure 11-35** and **Figure 11-36**.

- 1 2275-0327-XX and 2275-0394-XX = Internal installation
2275-0395-XX and 2275-0396-XX = External installation
- 2 Part number 4500-5512-01 is an external disk drive test cable.
- 3 To obtain video loop-through when the ISEM is installed, video is routed from the monitor connector on the IIM PCB to the ISEM Video In then out the ISEM Video Out connector to the monitor. (Two 3500-2633-XX cables are required.)
- 4 When the ISEM is not installed, only one 3500-2633-XX is required.
- 5 Mitsubishi printer only.
- 6 Connect this end to P503 or P504 for UP5600 printer installation.
- 7 If a UP5600 is installed, disconnect the main transformer connector to P501 on the ACIM. Connect the UP5600 as shown.
- 8 ON/STANDBY switch controls system logic voltage to turn ultrasound system ON & OFF.
- 9 Cable 2275-0337 connects to 10101 serial port and is for laptop diagnostics use only.

Figure 11-34. Notes for HDI 3000 Signal/Power Interconnect Diagrams
([Figure 11-35](#) and [Figure 11-36](#))

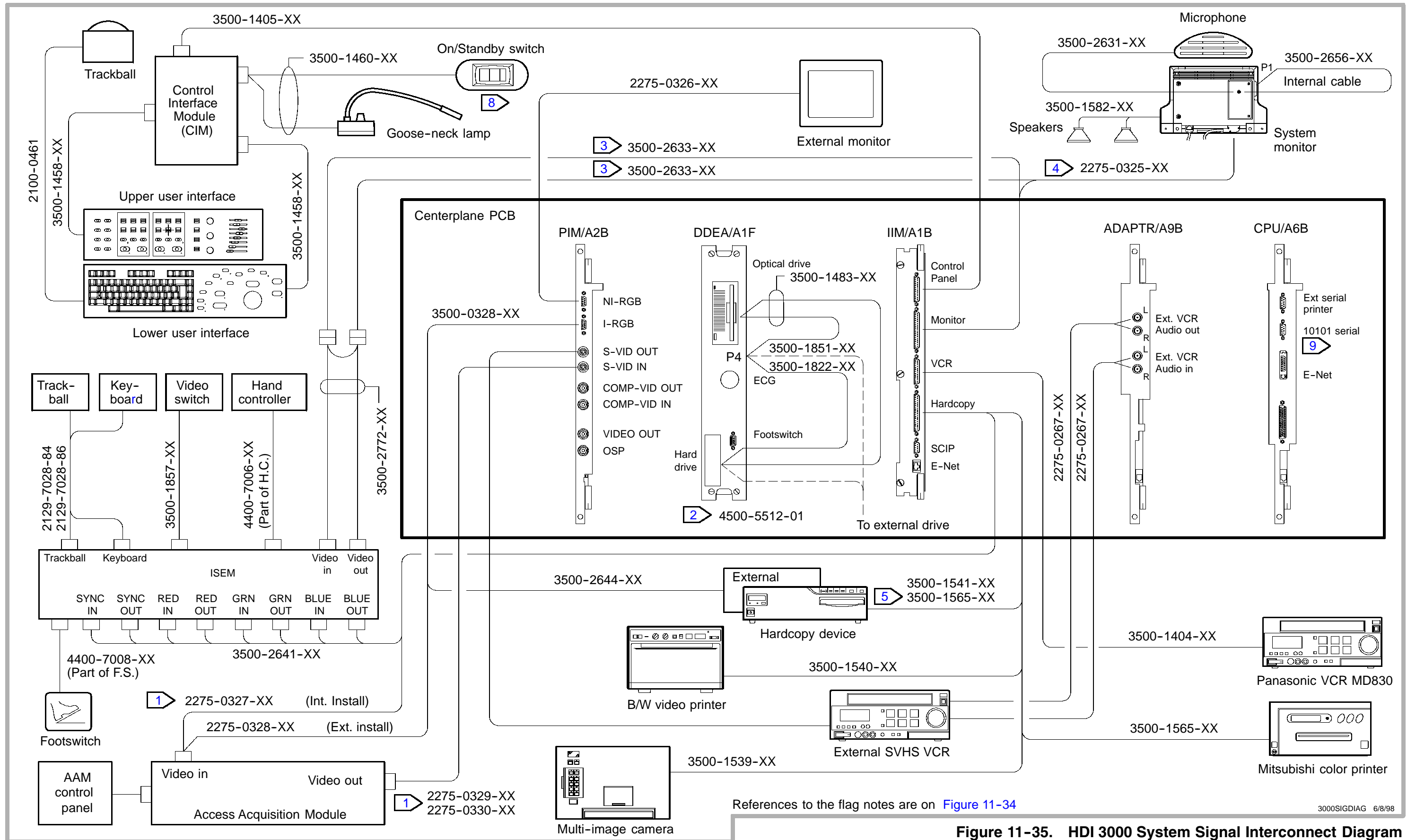


Figure 11-35. HDI 3000 System Signal Interconnect Diagram

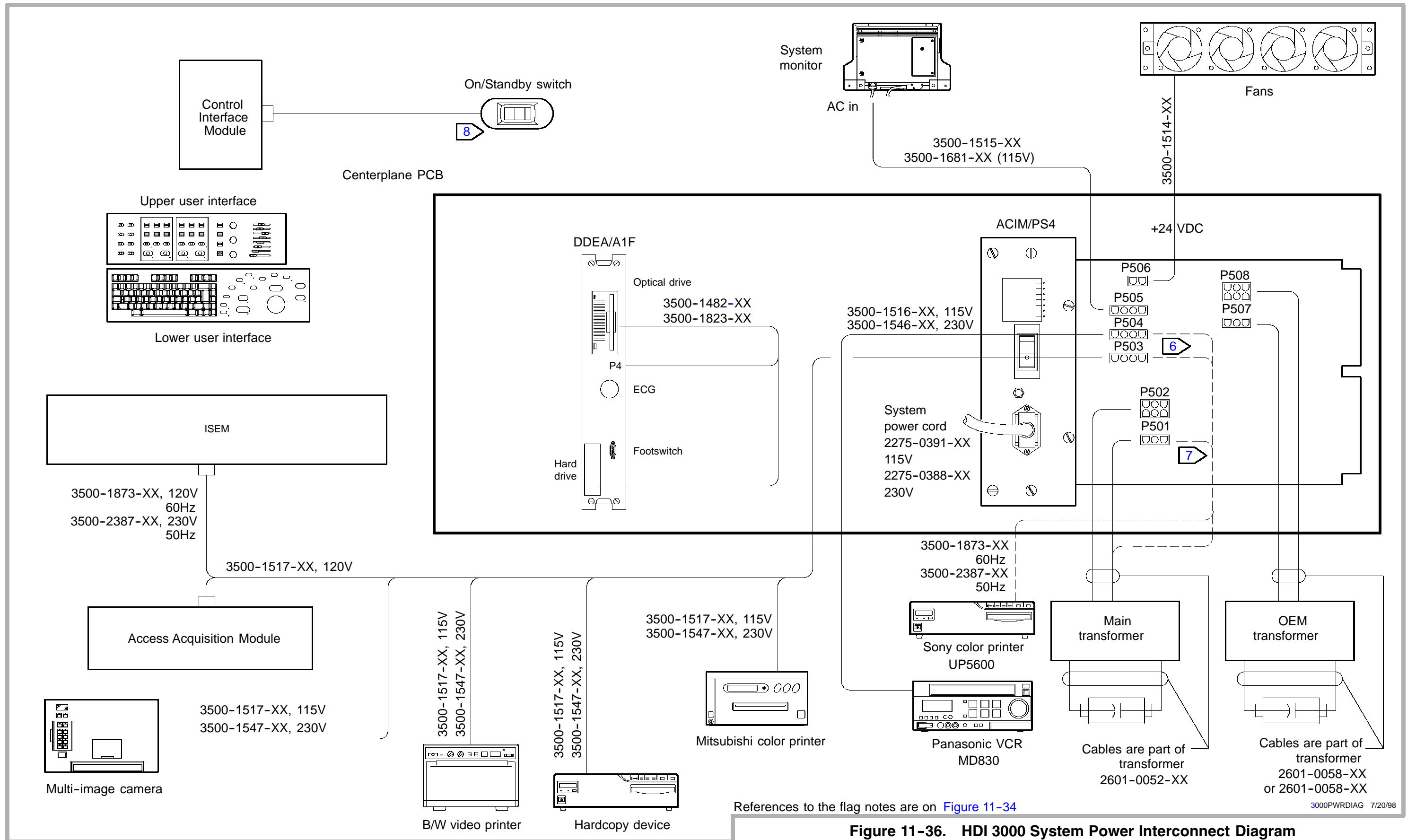


Figure 11-36. HDI 3000 System Power Interconnect Diagram

12 Change History

This section lists the software and hardware changes associated with a specific software release number. Unless noted under the Hardware Changes paragraph, the hardware changes are not required for that particular software release.

The part numbers listed after the software versions are the optical disk part numbers for that software version.

12-1

021X Software Releases

Scanheads Supported

Linear Array

- L7-4 40 mm Broadband Linear Array
- L10-5 38 mm Broadband Linear Array
- CL10-5 Broadband Compact Linear Array

Curved Array

- C3.5 76 mm Curved Array
- C4-2 40 mm Broadband Curved Array
- C5 IVT 11 mm Curved Array Intravaginal Scanhead
- C7-4 40 mm Broadband Curved Array
- C9-5 ICT 8 mm Broadband Intracavity Scanhead

Phased Array

- P3-2 20 mm Broadband Phased Array
- P7-4 Broadband Phased Array

Static CW Doppler

- TCD Static D2 TC
- D5 Static D5 CW
- D10 Static D10 CW

Features Not Supported

- Color M-mode
- Frame Grab
- ECG/Physio
- Footswitch
- Save/Recall
- DAASR MENU
- FRAME control
- PRINT PG control
- LOOP control

12-1.1

021.06 (NRR Software)

Released 4252-0720-21 on November 7, 1994 (Demos only).

New Features

Refer to Features Supported in [paragraph 12-1](#).

Problems Corrected

Not applicable.

Known Problems

Refer to Operating Notes, part number 4707-0015-02. Also refer to the service errata in NPB 99, Rev A, for diagnostic problems or issues that could cause problems or difficulty when installing or repairing the system.

Hardware Changes

There are no hardware changes to document for NRR.

12-1.2

021.08 (RFD Software)

Released 4252-0720-23 on November 15, 1994 (Demos only).

New Features

Refer to Features Supported in [paragraph 12-1](#).

Problems Corrected

Not applicable.

Known Problems

Refer to Operating Notes, part number 4707-0015-03. Also refer to the service errata in NPB 99, Rev A, for diagnostic problems or issues that could cause problems or difficulty when installing or repairing the system.

Hardware Changes

There are no hardware changes to document for RFD.

12-2

023X Software Releases

12-2.1

023.05 (FCD Software)

Released 4252-0743-06 on December 2, 1994.

New Features

- P5-3 phased array scanhead
- Biopsy guides for use with linear and curved array scanheads

Problems Corrected

There are no problems corrected with 23.05 software.

Known Problems

Refer to Operating Notes, part number 4707-0015-06 (23.05/23.06).

Hardware Changes

There are no hardware changes to document for 23.05 software.

12-2.2

023.06 (8.1)

Released 4252-0745-01 on December 23, 1994.

New Features

There are no new features with 23.06 software.

Problems Corrected

Corrected PSP1 bootup error.

Known Problems

Refer to Operating Notes, part number 4707-0015-06 (23.05/23.06).

Hardware Changes

Four noise filter capacitors were added to the fan power cable to prevent possible damage to the fans. PCB and PROM dash numbers are incorporated into the appropriate replacement matrices.

12-3

024X Software Releases

12-3.1

024.09 (8.1.5)

Released 4252-0744-10 on January 13, 1995.

New Features

- French and German language versions, including operation manual sets and keyboards. English language systems shipped in January. French and German systems shipped in mid-February 1995. German manuals delivered in March.
- 240V NTSC video voltage capability

Problems Corrected

Improvements to the system error handling software which reduce the frequency of appearance of system diagnostic alert boxes. The text within the boxes was changed to make it more meaningful to non-technical users.

Known Problems

Refer to Operating Notes, part numbers 4707-0015-07 and -08.

12-3.2

024.11 (8.1.6)

Released 4252-0752-02 on March 7, 1995.

New Features

Automates the software upgrade process. If the system is booted with the 024.11 optical disk, the old system software and machine options are automatically backed up to the optical disk, the new software is copied to the hard drive, a software integrity scan is performed on the new software installed on the hard drive, and the flash down-load is enabled for the next boot.

Problems Corrected

- Corrects intermittent update of system clock display.
- Corrects intermittent flash down-load errors to the PCM.
- Corrects error messages associated with various error codes. Refer to NPB 104 for the specific error codes.

- Corrects a run-time alert associated with scanhead selection.
- Allows Doppler to scroll after after sample volume cursor movement and activation of the update key during Color and Doppler imaging.
- Retains all Tissue Specific Imaging Presets, System Set-ups, and machine options during system upgrades.

Known Problems

Refer to Operating Notes, part number 4707-0015-09.

Hardware Changes

The following PCBs were revised to support EMI compliance. The PCB changes shipped in mid-February 1995. No other changes were made to the PCBs.

- DOPACQ
- PIM
- CPU
- ADAPTR
- ACIM

In addition to ACIM changes to support EMI compliance, an additional ACIM was released to support a 240V/60 Hz voltage configuration.

12-3.3

024.17 (8.1.9)

Released 4252-0746-01 on June 30, 1995.

New Features

There are no new features with 24.17 software.

Problems Corrected

Revised AP&I files for the C9-5 and L10-5 scanheads.

Known Problems

Refer to Operating Notes, part number 4707-0015-12.

Hardware Changes

There are no hardware changes for 24.17 software.

12-4

030X Software Releases

12-4.1

030.05 (8.2)

Released 4252-0754-06 on June 30, 1995.

New Features

- Additions to Cardiology Feature Set
 - ECG - with auto heart rate display, and ECG triggers
 - Steered CW Doppler
 - Color M-mode (only on phased array scanheads)
 - Cardiology High Q (requires ECG signal from the patient)
 - Cardiology analysis package (2D, M-mode, and Doppler)
 - D2 CW pencil probe transducer
 - MPT7-4 Multi-plane TEE scanhead (available 8/95)
 - Cardiac body markers

- Tissue Specific Imaging for cardiac applications phased array scanheads
- New Dynamic Contrast Enhancement algorithm
- Stress echo - Stand-alone ImageVue or ImageVue DCR capability (with video out, and R wave detection)
- Cardiology Feature Set Changes
 - Optimizes P3-2 scanhead for adult cardiology
 - Optimizes P5-3 scanhead for small adult cardiology
 - Optimizes P7-4 scanhead for pediatric cardiology
 - Improves VCR record and playback
 - Reduces Herbie artifact
 - Improves Color wall filters and Dynamic Motion Differentiation
 - In scrolling M-mode, 2D Gain affects both 2D and M-mode. TGC affects only 2D image.

- VCR Framegrab
 - Cineloop capture - 2 seconds
 - High quality freeze frame - press FREEZE on the control panel to grab an image
 - No framegrab in VCR pause mode
 - Manual calibration enables measurement from any videotape
 - Hardcopy print from VCR images
- C9-5 Biopsy Guide
 - Replaces the currently offered C9-5 biopsy guide (prostate applications) for new shipments
 - Adds vaginal and fertility applications (also includes prostate applications as did the previous guide)
 - Increases patient comfort by improved design

- Power Motion Imaging
 - Modifies CPA to facilitate visualization of cardiac wall motion. Activated by depressing PWR IMG key in adult echo or TEE clinical option. (In all other clinical options, including fetal echo, depressing PWR IMG selects CPA.)
- Report Print Capability
 - Supports report print capability as a standard feature (printer is a purchasable option)
 - Supports two options for printing data: 1) print to an off-line computer report generator (i.e. Digisonics), or 2) print to a report printer connected directly to the HDI 3000
 - Serial communication port
 - Supports all HDI 3000 reports including OB, Vascular, Radiology, and cardiology. (This includes OB graphs.)
 - Supports Okidata OL400e Report Printer (only supported in a 120V configuration)

- Hardcopy Print Capability from External Video Inputs (Requires an operational framegrabber. The displayed image must be framegrabbed before being sent to the external composite video connector.)
 - Supports printing of recalled images from external video sources (DIM, AAM, etc.) using the HDI 3000 S-video input port
 - Supports printing of displayed images to any print device using the external video connectors on the back of the HDI 3000
- Footswitch
 - Supports a temporary 3-pedal footswitch with the following functions; freeze, Doppler scroll stop/start, and print. (The function of the third footswitch may be changed by the user from print to VCR record start/stop.)

- Increases displayed size of:
 - On-screen and printed images (linear increases 10%, phased 6%, curved 6%)
 - Dual images (sector and linear)
 - Character font (from 12 to 14 point); reports, menus, and error messages remain at 12 point
 - Measurement cursors
- Other Display Changes
 - Improves readability of measurement results, both on screen and on prints
 - Modifies color scheme on menus and cursors to reduce eye-strain and improve readability
 - Increases Doppler and M-mode scroll length
 - Changes the inactive dual image to the left image
 - Changes image orientation of dual images to the same orientation as that for a single image

- Changes cursor color to white. On white images the cursor is outlined in black
- Increases the width of the Doppler baseline for improved visibility
- Increases the width of the horizontal and vertical graphics, i.e. velocity scale markers, ECG trace, depth markers to improve the VCR playback quality
- Moves the color and gray-scale bars to the right of the screen to allow for a larger image and font size
- Removes non-essential TI annotation from the upper left side of the screen

- Functions added to Control Panel and Keyboard
 - Adds M CURSOR toggle to the 2D/MMODE control panel section. (Selecting this toggle from a 2D display provides an M-line and sample volume graphic for full 2D image size cursor placement. The user must press M-mode or Doppler to begin scrolling.)
 - Adds Biopsy Superkey for quickly enabling/disabling the biopsy guide graphic for the selected scanhead (select Superkey “T”).
 - Adds Print Local Superkey (currently not functional).
 - Adds Field A/B Superkey (currently not functional).
 - Adds 2D TSI OPT label to function key F5. (currently not functional).

- Other Control Panel and Keyboard Changes
 - Moves SETUPS key to function key F3.
 - Moves function key F7 to F6. This is the unmarked key for entering Error Diagnostics (must press Superkey first).
 - Removes IMAGE INFO key. The capability is now located within the SETUPS menu.
 - Requires depression of Superkey prior to selection of SH POS (scanhead position key).
 - Renames STORE key to CALCS (no functional change has been made).
 - Renames DAASR key to NET/DISK and supports: 1) optical disk ejection (formerly done by pressing EJECT on the control panel), and 2) optical disk format.
 - Replaces PRINT PG key with END EXAM key (currently not functional).
 - Replaces EJECT key with REVIEW key.
 - Replaces FRAME key with DEL IMAGE key.

- System Response Time Changes
 - Decreases system bootup time 50 percent (from approximately 2 minutes to 1 minute)
 - Significantly reduces time required to display protocols and reports
 - Enables faster scanhead selection following system bootup
 - Improves trackball response when reviewing Cineloop images and when moving the sample volume cursor and the color box
 - Reduces major mode transition time
- Analysis and Measurement Changes
 - Modifies breast and leg body markers.
 - Adds testicular body marker.
 - Changes the shape of the ellipse graphic to a circle.

- Changes Hadlock fetal growth values for AC, BPD, FL, and HC so the growth values are no longer limited to age calculations of under 40 weeks.
- Adds auto launch tools to automatically launch the correct measurement tool for a specific measurement type. (For example, selecting Simpson's Volume automatically launches the correct measurement tool. Distance and area do not need to be selected first.)
- Changes manual Doppler tracing in non-cardiology applications so that tracing begins at the onset of systole and ends at end diastole. Previous software versions required tracing to begin at the onset of systole and end at peak systole of the next cardiac cycle.
- OEM Changes
 - Changes Aspect MIC operation so that the camera no longer beeps twice after PRINT is depressed
 - Changes system operation so that prints are no longer blurry as a result of unfreezing the system too quickly

- Other Feature Improvements
 - Improves High Q tracing sensitivity in all applications, enables faster lock-on times, and improves peak detection.
 - Enables access to High Definition Zoom (HD Zoom) when in color or Doppler mode.
 - Enables availability of fetal echo Tissue Specific Imaging within the OB clinical option. Supports P3-2, P5-3, P7-4, C7-4, C4-2, C3.5, C9-5, and C5 IVT. Dedicates Color Map 7 for fetal echo Tissue Specific Imaging (displays greater variation in color hues). Supports CW on phased array scanheads.
 - Dedicates Color Maps 6, 7, and 8 as cardiac maps and enhances the display for visualizing turbulence with variance.
 - Modifies all Color Maps for display of variance.
 - Displays Continuous Trace measurements with incremental dots rather than solid lines.

- Features added to Diagnostics
 - Video test patterns available from SETUPS menu
 - Color Signal path End-to-End Test
 - Color Signal path Back-End Test
 - Scanhead and Acquisition Signal Path Gain Test
 - Tests for new PCBs including CPU, AIFOM, and ECG
 - Check disk utility to verify integrity of hard disk
 - Separate hardware and software machine options

- Other Diagnostics Changes
 - Cleans up bootup error handling
 - Changes user interface for ChanWalk utility
 - Changes software install process
 - Improves the Error Log reporting tools
 - Generates automated Error ID's for system software

Features Not Supported

- French and German language software versions
- PAL systems
- 230V systems
- Integrated connectivity (includes Save/Recall, network archive/print of images, and disk archive/print of images)
- MPT7-4 Multi-plane TEE scanhead (available August 1995)
- Physio capability (pulse, pressure, phono, etc.)

Problems Corrected

- Significantly decreases system response time during bootup, scanhead selection, trackball response, and the time required to display protocols and reports.
- Optimizes P3-2, P5-3, and P7-4 phased array scanheads for cardiology.
- Increases size of images, fonts, measurement cursors, Doppler baseline width and other display parameters.
- Improves High Q tracing sensitivity in all applications, enables faster lock-on times, and improves peak detection.
- Enables access to High Definition Zoom (HD Zoom) when in color or Doppler mode.
- Enables availability of fetal echo Tissue Specific Imaging within the OB clinical option. Supports P3-2, P5-3, P7-4, C7-4, C4-2, C3.5, C9-5, and C5 IVT. Dedicates Color Map 7 for fetal echo Tissue Specific Imaging (displays greater variation in color hues). Supports CW on phased array scanheads.

- Dedicates Color Maps 6, 7, and 8 as cardiac maps and enhances the display for visualizing turbulence with variance.
- Modifies all Color Maps for display of variance.

Known Problems

Refer to Operating Notes, part number 4707-0015-11.

Hardware Changes

The following PCBs were revised to support ECG and other issues related to release of 30.05 software. The new PCBs shipped with systems on June 30, 1995.

- DDEA
- PIM
- PCM
- DOPACQ
- PSP2

- FEC
- ADAPTR
- APS
- Control Panel PCB

The following was released to support features released with 30.05 software. The hardware shipped with systems on June 30, 1995.

- Upper and Lower User Interface Assemblies (Control panels)
- C9-5 biopsy guide kit
- Temporary footswitch assembly

12-4.2

031.03 (8.2.1)

Released 4252-0755-03 on July 28, 1995.

New Features

- French and German language software
- PAL video capability
- Backward compatibility with previous hardware

Features Not Supported

- Integrated connectivity (includes Save/Recall, network archive/print of images, and disk archive/print of images)
- MPT7-4 Multi-plane TEE scanhead (available August 1995)
- Physio capability (pulse, pressure, phono, etc.)

Known Problems

Refer to Operating Notes, part number 4707-0015-13.

Hardware Changes

There are no hardware changes for 31.03 software.

12-4.3

032.04 (8.2.2)

Released 4252-0756-02 on August 31, 1995.

New Features

- All features of 031.03 software
- MPT7-4 Multiplane TEE scanhead
- English, French and German language software versions
- Color M-mode (re-instated with 032.04 software)

Features Not Supported

- Integrated connectivity - includes NetLink (network archive/print of images) and DiskLink (archive/print of images)
- Physio capability (pulse, pressure, phono, etc.)

Problems Corrected

- Changes P7-4, C7-4, L7-4, and C9-5 scanhead AP&I files.
- Prevents VCR frame grabbed measurements from patient B from being stored into the patient A report. This condition occurred when the current patient was different from the patient being reviewed on video tape and the measurement results were saved into the current patient's report. A message has been added to the calibration prompt stating "Measurements performed will be added to the current patient file."
- Adds a screen saver which is enabled with the current Auto Freeze feature. To enable the screen saver, enter the Display Setup Menu, and select ON for the Auto Freeze setup. When the system automatically freezes the display, the screen also goes blank. The only indication that the system is in this state is that the Freeze LED is lit. Pressing any key takes the system out of the screen saver mode. Users who prefer not to have the screen saver enabled on their system can disable the screen saver feature by selecting OFF in the Auto Freeze setup.

- Displays the CPA map number at the map annotation on the display. (For example, the display now reads “Map 3” instead of “Map”.)
- Corrects system operation so that after initial power-up and selecting color mode, Doppler, and UPDATE, the color bar and color Doppler no longer disappear.
- Changes HD Zoom box size back to the default size when re-entering HD Zoom. Also, the zoom box remains the size adjusted by the user until a new option or scanhead is selected.
- Changes system operation so that the system retains the number of focal zones used during 2D imaging when exiting color mode.
- Displays the depth graphic on the inactive image when exiting VCR playback in Dual mode.
- Corrects the fourth German abbreviation (LVPWd) in the Fetal M-mode sidebar.

- Changes the Power Motion Imaging gain settings for all pediatric cardiac presets to a default level of 49% on the P3-2, P5-3, and P7-4 scanheads. The previous gain default was 65%.
- Changes a number of CPA presets for all scanheads for Abd/Renal, Peripheral/Venous, Gyn-Fertility/Pelvic, Small Parts/Thyroid, Abd/General Abd, and Abd/Aorta applications.
- Deletes the LV Mass measurement in the cardiac analysis package using the ellipsoid protocol. The LV Mass measurement using the area/length protocol is still available.
- Corrects system operation so that incorrect persistence values, write priority values, and color maps are no longer saved when doing a Quick Save prior to entering CPA after powering up the system.

- Corrects system operation so that when using a manual or High Q measurement method, entering a second or third measurement into the same location displays the new (or same) angle correction value in the report. The angle correction value is now correctly displayed in the report for all applications and all scaling modes (velocity, frequency, and 5 MHz equivalency).
- Supports Sony UP-5600 color printer operation for European shipments.

Known Problems

Refer to Operating Notes, part number 4707-0015-15.

Hardware/Firmware Changes

There are no hardware changes required for 31.03 software, however, the following hardware and firmware was simultaneously released with 032.04 software to support use of four Channel PCBs (instead of eight):

7500-0974-XX	Channel PCBs
7500-0976-XX	Scanhead Select PCB
7500-0977-XX	AIM PCB
8000-0999-05	PROM Kit, FEC PCB
4201-1695-24	FEC PROM
4201-1696-24	FEC PROM

12-4.4

032.14 (8.2.3)

Released 4252-0757-08 on November 1, 1995.

New Features

- System Features
 - Supports all features of 032.04 software
 - Supports frame grab of external video sources
 - Supports operation of the system cooling fans at half-speed when the ON/STANDBY switch is set to STANDBY
- DiskLink Features (Non-revenue release only)
 - Supports PAL and NTSC images
 - Supports portable exams by providing extended on-board image storage capability that is retained upon system power-down
 - Stores exams on hard drive and optical disk

- Recalls images stored on the optical or hard drives for printing through the external HDI 3000 video connector
- Stores up to 400 black and white images or 200 color images on the hard drive
- Stores up to 200 black and white images or 100 color images on the optical drive
- Supports Data Exchange File Format (DEFF) standard of optical disk image storage. (The DEFF standard is compatible with TIFF-based software)
- Supports optical disk printing to the existing 3M Optical DIR (This is the only validated print device for the initial release)
- Provides on-screen graphics for quick reference to the number of images printed per page of film and total number of images per exam
- Allows the user to mark images for printing during or after the exam

- Displays an exam directory for exams stored on the hard drive and optical disk for easy exam selection
- Provides on-screen review capability in 1-on-1 or 4-on-1 display formats
- Provides image or exam deletion capability. Also, provides image replacement capability
- Allows the user to restart an exam without re-entering Patient Data
- Permits exams to be copied from the hard drive to optical disk and vice versa

Features Not Supported

- System Features
 - Integrated network connectivity - NetLink (network archive/print of images)
 - Physio capability (pulse, pressure, phono, etc.)
- DiskLink Features (Non-revenue release only)
 - Loop capture and extended loop memory
 - Edit capability of image annotation
 - Measurement on images recalled from disk
 - Support of Kodak, 3M DDR (laser), and AGFA printers

Problems Corrected

- Corrects AP&I values for the C5 IVT, D2 TC, and L7-4 scanheads
- Corrects software errors in 031.03 software which prevented booting the system from the optical disk

- Fixes an intermittent run-time alert (1202.4D03.4F01) when changing sector width
- Corrects the installed versus expected PCM CRC values which were incorrect in software version 032.04
- Corrects the displayed position of the skinline for the CL10-5 scanhead
- Supports external VCR frame grab operation
- Corrects a problem with system operation which prevented the user from frame grabbing a VCR image with an active MPT7-4 scanhead
- Fixes an intermittent run-time alert error which occurred when reducing color sector size prior to entering color or when exiting color with a reduced sector size
- Corrects an error in the machine option file which required PAL systems to be targeted when upgraded to 032.04 software

- Fixes a problem which disabled the ECG trace when saving a custom TSI under an existing custom TSI
- Prevents erasure of the image text annotation from erasing the title text
- Displays the angle correction value in the report for all applications and all scaling modes. The angle correction was not displayed when entering a second or third measurement into the same location using manual or High Q measurement methods
- Supports operation of the system cooling fans at half-speed when the ON/STANDBY switch is set to STANDBY

Known Problems

Refer to Operating Notes:

4707-0015-16	English
4787-0015-16	French
4777-0015-16	German

Hardware/Firmware Changes

There are no hardware requirements for 032.14 software, however DiskLink operation requires a -04 Lower User Interface Assembly for English, French, and German operation.

The following firmware was released with 32.14 software:

8000-0996-05	PROM Kit, MPS
4201-1668-14	PROM, MPS, U17

12-4.5

032.19 (8.2.4)

Released 4252-0765-03 on November 17, 1995.

New Features

There are no new features released with 032.19 software.

Problems Corrected

- Corrects erratic ECG operation in Color Cineloop review.
- Disables Volume Flow measurements in frequency mode (versus velocity mode).

- Displays Doppler history data at the previous scaling size after the display range (height) has been changed.
- Corrects corruption of Doppler history data after the display height has been changed.
- Corrects lockup or garbage data in Doppler history buffer after selection of Color, DPI, or CW modes.
- Corrects corrupted Doppler history time base when using ECG.
- Corrects distance caliper problems with the Doppler Area and Heart Rate measurements when using DEL MEAS.
- Corrects mis-alignment of High Q and Doppler history data.
- Corrects loss of radiology High Q display update due to timer failure.
- Corrects erroneous flow time data when doing a manual cardiac High Q trace.

Known Problems

Refer to Operating Notes:

4707-0015-17	English
4787-0015-17	French
4777-0015-17	German

Hardware/Firmware Changes

There are no hardware or firmware changes required for 032.19 software.

12-4.6

033.09 (8.2.11)

Released 4252-0767-01 on January 19, 1996.

New Features

Triple mode operation on the C4-2, C7-4, C9-5, L10-5, CL10-5, and L7-4 scanheads.

Problems Corrected

- Fixes incorrect or missing High Q values obtained from images made with static probes. Operating Notes for the previous software version advised the use of manual measurements with static probes instead of High Q automatic measurement.
- Eliminates the 1200 mmHg limit on dP/dt cardiology calculations.
- Eliminates the 10 liter/minute limit for Doppler cardiac output calculations.
- Adds a decimal place to the Resistive Index (RI) and Pulsatility Index (PI) calculation. The RI and PI calculations now have two decimal places (XX.XX).

- Changes the function of the DEL MEAS control so it is consistent with all protocols. Previously, pressing the DEL MEAS control twice removed all previous measurements when using the M-mode Mitral Valve and Tricuspid Valve protocols (all points tool). The function of the DEL MEAS control has been changed so a single control depression deletes all previous measurements.
- Prevents the User Diagnostics from disabling the use of keyboard equivalents, user annotation, and reports. System operation has been changed to reinstate these features without rebooting the system after use of the User Diagnostics.
- Prevents mode changes while in Cineloop playback from removing the ECG trace.

- Corrects system operation so that the Time Average Mean (TAM) label is no longer displayed as an “X” cursor under certain conditions. This condition occurred when the user started a volume flow tool and entered the required 2D distance measurement and the set region measurement. Using this scenario, the normal TAM and Volume Flow (VF) were displayed. If the user then deleted and restarted the set region measurement an “X” cursor was displayed as the TAM label.
- Corrects the d:D ratio. Errors occurred when the initial ratio was increased to 50 by adjusting the baseline. The values would then incorrectly decrease to 45 as the baseline was further adjusted upward. When a value of 45 was reached, the ratio corrected itself and the correct value of 55 was displayed. Once a ratio of 55 was displayed, the d:D ratio operated normally (incrementally increasing as the baseline was adjusted upward). Due to the d:D ratio tool not tracking the top/bottom function, this tool should not be used if the image is inverted Top/Bottom.

- Corrects a French and German translated prompt, which instructs the user on the method of measuring heart rate. The English version of the prompt was changed from “end of diastole to start of systole” to “onset of systole to onset of systole”.
- Corrects an intermittent memory test failure (yellow banner error 4702-4701-0A01) which was occurring frequently with software upgrades at 032.04 software and up with a -07 PCM (7500-0683-07).
- Changes the cardiology presets as indicated in **Table 12-1**.

Table 12-1. Cardiology Preset Changes for 033.09 Software

Application	Mode	Scanhead	New Preset
Pediatric cardiology, general	2D	All	Gray map 8
Pediatric cardiology, neonate	2D	All	Gray map 8
Adult cardiology, difficult	2D	All	50 dB
Adult cardiology, difficult	2D	All	Gray map 2
Adult cardiology, general	2D	All	Gray map 8
All cardiology	M-mode	All	50 mm/sec scroll rate
All cardiology	2D	P3-2	Isppa to 152; gain decreased 4 dB
All cardiology	2D	P5-3	Isppa to 205; gain decreased 5 dB
All cardiology	CW	All	10 KHz PRF scale

Known Problems

Refer to Operating Notes:

4707-0015-22	English
4787-0015-22	French
4777-0015-22	German

Hardware/Firmware Changes

Triple mode requires the 7500-0768-07 SSP PCB which was previously released.

An FEC PROM kit (P/N 8000-0999-06) was released with 033.09 software and is required to display errors which occur during individual Channel PCB transmit and RAM tests.

12-4.7

033.27 (8.2.15)

Released 4252-0768-01 on March 15, 1996.

New Features

- System Features
 - Supports all features of 033.09 software

- DiskLink RFD Features
 - All features of the DiskLink non-revenue release (Refer to features listed under 032.14 software)
 - Displays a graphic in the upper right corner of the display to indicate the number of print images taken for that page of film.
 - Displays an icon in the upper left corner of the display to indicate that an image file is currently being written to the optical disk.
 - Provides on-screen annotation to indicate the total number of images printed for that exam.
 - Creates a new Access Link setups menu to support all system setups pertinent to DiskLink. The menu consists of two pages of setups.
 - Stores up to 600 black-and-white images or 300 color images on the hard drive.
 - Stores up to 200 black-and-white images or 100 color images on the optical drive.

Features Not Supported

- System Features
 - Integrated network connectivity - NetLink (network archive/print of images)
 - Physio capability (pulse, pressure, phono, etc.)
- DiskLink Features
 - Loop capture and extended loop memory.
 - Edit capability of image annotation.
 - Measurement on images recalled from disk.
 - Direct image review from the optical disk. Prior to reviewing exams on the optical disk, the exams must be copied to the hard disk and then reviewed through the hard disk directory.

Known Problems

Refer to Operating Notes:

4707-0015-25	English
4787-0015-25	French
4777-0015-25	German

Hardware/Firmware Changes

There are no new hardware requirements for 033.27 software, however DiskLink operation requires a -04 Lower User Interface Assembly for English, French, and German operation.

Released 4252-0772-04 on June 7, 1996.

New Features

- ENTOS CT8-4 scanhead for abdominal surgery applications
- 3D CPA
- Enhanced CPA
- Optimized P5-3 scanhead for radiology applications
- Abdominal surgery, vascular surgery, and musculoskeletal clinical options. (The intraoperative clinical option was renamed the vascular surgery clinical option.)
- TSI Patient Optimization
- -04 upper and -05 lower user interface assemblies fully functional
- Remote diagnostics and changes to error log
- Hardware changes including “goose-neck” control panel lamp assembly and OEM hand-controller tray

- User Defined OB Table Measurement and Analysis Changes
 - Enables the user to define a maximum of four OB tables per measurement currently available on the system (i.e. BPD, HC, AC, and FL). Tables and equations can be created for Fetal Age and Fetal Growth. Equations can be created for fetal weight. Creating and entering the information for these tables is done through the Setups key access to OB calculations.
 - Adds input range restrictions to the user-defined OB equations.
 - Measurements are standard with OB clinical option.

- Auto HC and AC Calculation Measurement and Analysis Changes
 - Enables automatic calculation of the head circumference (HC) and abdominal circumference (AC) from two distance measurements. AC is automatically calculated from TAD and ADD measurements. HC is calculated from BPD and OFD measurements. Calculation results are automatically displayed on the protocol and in the report after both measurements are complete.
 - Overwrites the automatically calculated HC and AC measurements in the protocol and the report if the ellipse/trace method is used.
- Miscellaneous measurement and analysis changes
 - Changes the abbreviations used in fetal M-mode protocol so they are the same as in the R/L Ventricle protocol used in adult cardiology. Starts Fetal M-mode with an auto-launched tool.
 - Displays the LMP in the Gyn/Fert report.

- Replaces the percentile display with ranges (in weeks) for the Fetal Biometry measurements. (EFW percentiles will remain unchanged.)
- Calculates the LMP and GA from an EDD. This will be displayed in the patient data entry and report.
- Disables the 2D LV Mass by ellipse method due to inaccurate calculations. The user has the ability to calculate the LV Mass by the 2D LV Mass Area Length method.

Features Not Supported

- Integrated network connectivity - NetLink (network archive/print of images)
- Contrast Specific Imaging (CSI)
- All DiskLink features not supported for 033.27 software
- Physio capability (pulse, pressure, phono, etc.)

Known Problems

Refer to Operating Notes:

4707-0015-29	English
4787-0015-29	French
4777-0015-29	German

Hardware/Firmware Changes

There are no new hardware or firmware requirements for 034.17 software, however features released with 034.17 software require certain hardware.

- 3D CPA operation requires a 32 MB IMEM PCB.
- DiskLink is supported on 034.17 and higher systems only if the CPU is a 7500-0759-08 or -09. DiskLink is supported on systems below 034.17 software with any 7500-0759-XX CPU installed except the -07.

- The -04 upper and the -05 lower user interface assemblies are required for the TSI Patient Optimization feature. Systems shipped with these user interface assemblies were mapped to keyboard Map 3 which made many of the changed keys non-functional. If a system is upgraded to 034.17 software, change the keyboard map to Map 4 to enable use of the non-functional keys. Refer to S.B. 3000-12 Rev A for information.

12-4.9

034.18 (8.3.2b)

Released 4252-0772-05 on July 3, 1996.

New Features

There are no new features released with 034.18 software.

Problems Corrected

- Disables the Persistent Patient Data file update-and-save capability when system power is turned off. This capability was released with 034.17 software but has been disabled due to inconsistent operation.

- Improves the quality and the consistency of frame-grabbed VCR images.

Features Not Supported

- Integrated network connectivity - NetLink (network archive/print of images)
- Contrast Specific Imaging (CSI)
- All DiskLink features not supported for 033.27 software
- Physio capability (pulse, pressure, phono, etc.)

Known Problems

Refer to Operating Notes:

4707-0015-31	English
4787-0015-31	French
4777-0015-31	German

Hardware/Firmware Changes

There are no new hardware or firmware requirements for 034.18 software.

12-4.10

035.10 (8.3.3)

Released 4252-0773-09 on November 8, 1996.

New Features

- C8-4v (IVT) scanhead for intravaginal applications
- ENTOS LI9-5 scanhead for abdominal surgical applications
- Clinical options for Cardiology CSI (P3-2 2D/Harmonic and PMI/Harmonic)
- Physio capability (pulse, phono, etc.)
- Triple mode for LI9-5 and C8-4v scanheads
- Five analysis protocols for OB applications, including Long Bones, Cranium, 2D Echo, Other OB, and Echo Doppler
- New breast bodymarker
- VCR frame counter

- TSI Patient Opt capability for certain scanheads
- Hip angle measurement tool for the L7-4 and L10-5 scanheads when using the Pediatric clinical option
- Ability of the ISEM to frame-grab VCR images
- Permanent measurement labels
- Contrast Specific Imaging (CSI) is supported by 035.10 software; however, the CSI key (F6), which is used on all language versions of the -05 lower UIF panel, is not currently functional

Problems Corrected

- Makes several corrections to German translated software, including the following: changes “Keiner” to “keiner” and “VF” to “FV”, adds a hyphen to “Aok-Segel”, corrects spelling of the word “Transkraniale”, and rearranges displayed diagnostic instructions so they are no longer truncated at the display edges

- Changes the displayed location of the scan plane indicator so it remains in the same location in relation to the body-marker
- Changes VCR operation so that the VCR pauses when frame-grab images are played back
- Changes system operation so that the 2D echo sector width is now independent of the 2D color echo sector width
- CW control is an independent mode control. Use of the control no longer requires use of PW Doppler
- Displays the Doppler scale markers so they are not clipped on the right side of the image when reviewed on a non-scan external monitor
- Increases the largest PAL scrolling display height to 384 pixels
- Changes system operation so that the system remains scrolling on transition between PW and CW Doppler. This does not apply when simultaneous PW Doppler is active

- Changes the selection of the bodymarker so that selection is tied to the tissue specific preset in the small parts clinical option.
- Changes system operation so that using Text A-D does not overwrite displayed annotation
- Changes system operation so that the fetal heart rate is included in the fetal biometry, fetal M-mode, and fetal Doppler protocols. Selecting the fetal heart rate from these protocols initiates the heart rate tool for measurement of the fetal heart rate from a scrolling display
- Adds ejection fraction and fractional shortening calculations to the fetal M-mode protocol.
- Adds functionality of the Superkey Counter (L) key, Superkey Dop Chroma (H) key, and the Superkey 2D Chroma (Y) key, which were not functional with -05 English, French, and German lower user interface assemblies and 034.17 software or below. Systems released with 035.10 software do not require the -05 lower user interface assemblies; however, some features released with 035.10 require the new keytops to facilitate use.

Features Not Supported

Integrated network connectivity – NetLink (network archive/print of images)

Known Problems

Refer to Operating Notes:

4707-0015-34	English
4787-0015-34	French
4777-0015-34	German

Hardware/Firmware Changes

There are no hardware requirements for 035.10 software; however, the following hardware is required for features supported by 035.10 software. This hardware will be available only for new build systems.

- The PIM PCB (P/N 7500-0717-09) was changed to support a VCR-to-DCR interface. The PCB is forward and backward compatible.

- The PIM PROM (4201-1539-15) was changed to support the VCR frame counter. The PROM requires 035.10 software and higher.
- The PSP1 PCB was changed to support a PAL frame rate fix (P/N 7500-0713-12/13). The PCB is forward and backward compatible. However, the frame rate fix requires the new PCB and 035.10 software.
- Four new DDEA PCBs were released to support physio and MO drive capability. The DDEA PCBs that support physio and the external MO drive will not be available until January 1997.
- The FEC PCB has changed for jumper cleanup (P/N 7500-0818-10). The PCB is only required for ECG and physio.
- The MO drive will no longer be a standard feature. A new DDEA PCB is required for systems without the MO drive (3500-1826-01 for systems with ECG and physio and 3500-1827-01 for systems without ECG and physio). An external MO drive will be issued to each CSR and dealer service organization to complete system upgrades.

The following hardware has been released simultaneously with 035.10 software:

- Two cost-reduced versions of the AIM PCB were released. The 7500-1075-01 AIM PCB is the “de-populated version” and supports the non-cardiology (radiology) front end (8500-9182-01 for NTSC systems or 8500-9154-01 for PAL systems). The 7500-1075-01 AIM PCB requires 035.10 software.

The 7500-0977-03 AIM PCB is the fully functional version and supports the cardiology front end (8500-9181-01 for NTSC systems or 8500-9153-01 for PAL systems). The 7500-0977-03 AIM PCB is forward and backward software compatible.

- The FEC (7500-0818-10), PSP2 (7500-0714-08), and ADAPTR (7500-0761-08) PCBs were released for jumper cleanup.

The following firmware was released with 035.10 software:

8000-0993-04 PROM Kit, PIM

4201-1539-15 PROM, PIM

12-4.11

036.03 (8.3.4)

Released 4252-0779-04 on February 3, 1997.

New Features

- C8-5 14R convex array scanhead for pediatric radiology and vascular applications.
- Tissue specific presets that support the pediatric clinical option for the P7-4, P5-3, C7-4, L7-4, L10-5, CL10-5, and the C8-5 scanheads. The C8-5 is also intended for cerebrovascular, and peripheral vascular clinical options.

Problems Corrected

- Modifies printed OB reports to include the “c” indicator for back-calculated measurements. The “c” indicator is displayed next to the LMP date on the displayed report only when the EDD is entered. It also is displayed next to the AC or HC value when entering APD and TAD or when entering BPD and OFD. Previously, in all three instances, the “c” indicator was displayed on the monitor but would not print with the report printer. (For German systems “c” = “b”; French “c” = “c”.)
- Fixes the software upgrade program so that the OB tables are correctly set after a software upgrade
- Fixes derived image measurements when tracing the Doppler waveform on taped images. The measurements that were suspect were: Velocity Time Integral, Acceleration Time, Acceleration, Ejection Time, Flow Duration, and Reverse Duration.

- Corrects a problem with High Q Automatic Doppler Analysis so that the results obtained from using the Set Region selection on the Meas Tools menu are no longer suspect when the Doppler display scrolls for a long period of time without being reset.
- Corrects manually calibrated Doppler area measurement errors
- Corrects a problem with FEC PCB software to prevent high voltage from being applied to the scanhead connectors after the scanheads have been disconnected. The blue banner power supply message is no longer displayed on the monitor when this occurs.
- Corrects a problem with system operation that causes the system to stop scanning if the active scanhead is quickly disconnected and a new scanhead is quickly connected and activated
- Restores capability to measure across dual linear images.

Features Not Supported

- Integrated network connectivity – NetLink (network archive/print of images)
- C8-5 biopsy guide

Known Problems

Refer to Operating Notes:

4707-0015-36 English

4787-0015-36 French

4777-0015-36 German

Hardware/Firmware Changes

There are no hardware requirements for 036.03 software.

036.05 (8.3.4)

Released 4252-0779-06 on March 5, 1997.

New Features

There are no new features associated with 036.05 software.

Problems Corrected

- Corrects a problem where the Doppler baseline disappears during normal Doppler operation. This problem is only exhibited on systems with the new PSP1 PCB (P/N 7500-0713-XX) and 036.03 software.
- Deletes hash marks (timing mark intervals) which were intermittently displayed at the top of the monitor during Doppler review

Features Not Supported

The unsupported features are the same as those for 036.03 software.

Known Problems

Refer to Operating Notes:

4707-0015-37 English

4787-0015-37 French

4777-0015-37 German

Hardware/Firmware Changes

There are no hardware requirements for 036.05 software.

036.06 (8.3.4)

Released 4252-0779-07 on April 14, 1997.

New Features

There are no new features associated with 036.06 software.

Problems Corrected

- Corrects a problem that causes the system to freeze the image intermittently while scanning or prevents the system from scanning upon bootup. This problem occurs only with 035.10 through 036.05 software and occurs in systems with an older ADAPTR PCB (P/N 7500-0761-11 and below).
- Corrects an intermittent bootup problem caused by the system thinking the hard drive was not there when it really was. (If the hard drive boots the system slower than the system expects, the system software times-out and causes a bootup error.) The error occurs during less than ten percent of the system bootups.

- Changes the CPU boot PROM to correct the restore process for the system non-volatile RAM (NVRAM) . If the NVRAM is corrupted during system operation, restoration requires the CSR to answer “Yes” to the prompt displayed during the next bootup. Previously, there was a file name error in the CPU boot PROM. When the system attempted to boot up, the wrong file name was written to NVRAM. The result was an unbootable system. The only way to restore the system was to replace the system CPU.
- Fixes a problem during review of dual Cineloop sequences where the image counter increments and decrements as expected, but the displayed image remains the same. This problem occurs in systems with 035.10 software or higher.

Features Not Supported

The unsupported features are the same as those for 036.05 software.

Known Problems

Refer to Operating Notes:

4707-0015-46	English
4787-0015-46	French
4777-0015-46	German

Hardware/Firmware Changes

There are no hardware requirements for 036.06 software.

The following firmware was released with 036.06 software:

8000-0994-06	PROM Kit, CPU
4201-1849-07	PROM, CPU_OS_16M_HI
4201-1850-07	PROM, CPU_OS_16M_LO

038.15 (8.4)

Released 4252-0780-15 on July 11, 1997.

New Features

- NetLink
- WebLink Connectivity
- Color M-mode for C4-2 and C7-4 scanheads
- Frequency Conversion Technology (FCT)
- C8-5 biopsy guide bracket
- Neurosurgery clinical option
- Advanced Breast Imaging clinical option (Breast protocol and report)
- Improvements to Card CSI, ECG, SV movement, and text annotation
- Service Access Diagnostics option (remote diagnostics for domestic U.S. systems only)

Problems Corrected

- Improves the signal-noise ratio when using Card CSI (Cardiology Contrast Specific Imaging), resulting in improved image sensitivity. Also, changes the default gray map in 2D Harmonic Tissue Specific Preset to Map 1. These feature improvements are standard with the Card CSI clinical option.
- Changes the ECG triggering capability to allow the user to skip ECG waveforms between successive image captures. By skipping waveforms and not pulsing the beamformer between the ECG waveforms, the user prolongs the life of the microbubbles used during Contrast Specific Imaging.

- Sets the number of ECG skips to 0, 1, 3, or 7. If the number of skips is set to 1, the system acquires information from the beamformer on every other ECG waveform. If the number of skips is set to 3, the system acquires information every fourth ECG waveform. Also, the ECG triggering capability now enables the user to increase the output power during triggering. These feature improvements are standard with ECG capability.
- Improves system operation so that Doppler spectral data is updated every 250 milliseconds during continuous movement of the sample volume cursor. A short blank section appears in the spectrum indicating the information has been updated.

- Modifies the Patient Data Entry Form to add a field for an Accession Number. The Accession Number is an optional number that may be assigned to each patient file by the institution for its internal image management purposes. For example, the number may be used in conjunction with radiology information systems to identify patient files. The Accession Number data field accepts up to 16 digits.
- Allows text annotation to be displayed on the far left side of the display. The Text A, B, C, and D keys now display annotation for the following clinical options:
 - Abdominal Surgery
 - TEE
 - Card CSI
 - Vascular Surgery
 - GYN/Fert
 - Pediatrics
 - Advanced Breast Imaging

- Permits the text cursor to begin a new line directly under the first character of the previous line when the Return key is pressed.
- Adds a prompt at the top of the Patient Data Entry Form asking the user if a new patient is to be entered. A message notifies the user that “Entering Y will clear patient report.”
- Changes patient data entry so that all characters entered into the Patient Name field are displayed on the monitor and in printed reports.
- Displays the Doppler scale graphics slightly to the left of the monitor’s right edge to enable viewing of scaling data on monitors with no overscan capabilities.
- Re-labels the “PMI Harmonics” option (listed under the Card CSI selection) to “Power Harmonic”, which is the ATL trademarked name.

- Changes the default 2D left/right orientation for the MPT7-4 scanhead to the standard 2D orientation. Also, implements the TSI Patient Opt key for the MPT7-4. The scanhead now supports the “Gen” and “Pen” modes using the TSI Patient Opt key. No “Res” mode is supported by the MPT7-4.
- Changes the calibration process for VCR and stored Access Link images to permit the user to either accept a previous calibration or recalibrate the displayed image for each measurement attempted.
- Corrects misalignment of biopsy guide brackets when using HD Zoom following HD Zoom expansion.
- Adds a menu item to the Display Setups menu (Adult MMode Vol Calc Method) to allow the user to choose between the Teicholz and Cubed calculation methods for the 2D RT/LT Ventricle Cardiology Protocol.

- Adds the following power-down dialog boxes to inform the user of the system status when the standby switch is set to off:
 - “Initiating power-down. Will power down when finished saving files” appears at the top middle portion of the screen.
 - “Saving files. Will power down when finished” appears at the center of the display.
 - “Waiting for End Exam to complete. Please wait” appears at the center of the display.
 - “Waiting for MO formatting to complete. Please wait” appears at the center of the display.
 - “Waiting for MO spooling activity to complete. Please wait. XX files remaining.” appears at the center of the display. The system completes the file transfer it was performing when it was powered down. If there are other files remaining to be sent, they are sent when the system is powered up again.)

- “Spooling to network. XX seconds elapsed.” appears at the center of the display. The number of seconds increments in 30-second intervals (0, 30, 60, 90, etc.).
- Adds the following items to the Net/Disk Menu:
 - “Disk Capacity”, which indicates the amount of disk space remaining (previously displayed on-screen when exiting the Patient Data Form).
 - “Status”, which is displayed only with Network Link feature, indicating status of the archive and print devices.
- Enhances several Cardiology calculations to display additional calculated results and adds a new label that can be saved permanently to each protocol. Also, adds several new protocols and rearranges the existing protocols. Refer to the Cardiology Supplement (P/N 4701-0025-04 Rev A) for the specific changes. The changes are standard with the Cardiology clinical option and include the PISA (Proximal Isovelocity Surface Area) calculation.

- Adds a machine option to block accessibility of non-ATL-authorized service personnel from the second level of machine diagnostics. These diagnostics were previously available via a password. With the machine option turned off, the password no longer enables diagnostics. ATL customer service, however, is able to remotely interrogate the machine if a modem is connected to the system. Remote diagnostics capability is primarily targeted at domestic (U.S.) systems. Access to diagnostics on International systems does not change. User diagnostics (i.e. configuration, comprehensive test, etc.) via the Setups panel are not affected by these changes.
- Adds ResearchLink, an option listed in the machine options file, but which is not a purchasable feature. ResearchLink is for engineering use only.
- Changes system operation to enable the MO drive to read or write to optical disks of up to the disk capacity (128, 230, or 540 MB). Previous software versions enabled use of only 128 MB regardless of the disk capacity.

- Corrects system operation so that when printing using DiskLink, the system automatically enters freeze mode during spectral Doppler operation when the END EXAM control is pressed. The system remains frozen until the current patient file has completed printing or spooling. This ensures the real-time Doppler analysis is updated while the system is closing the current patient file. The user must unfreeze the system to return to scanning.
- When entering text into the comments section of a report the text now wraps to the next line directly under the first character of the previous line.
- Changes system operation so that when an image is annotated, pressing the Return key places the text cursor at the beginning of the next line directly under the first character of the previous line.
- Adds approximately 40 body markers to the existing set of body markers. The available body markers are dependent upon the Tissue Specific Preset.

- Changes system operation so that the system displays Doppler scan angle increments of 22.5 degrees for the probe marker. Sixteen scanhead positions are available.
- Fixes a problem that causes the hard drive to be corrupted when nearly full of images.
- Increases the maximum number of exams that can be stored on a hard disk to 150 (with the 1 gigabyte hard drive). The following message is displayed when the number of exams approaches the limit: “The patient exam limit has been reached. Delete exams from the hard disk.”
- Changes system operation to automatically correct NVRAM errors, if it is corrupted.
- Changes the E point measurement prompt during M-mode from “Position cursor at peak E velocity.” to “Position cursor at E point.”
- Changes system operation to enable Disk Link presets to be saved during an upgrade. Also, adds measurement capability to DiskLink images.

- Changes system operation so that the Superkey and “I” keys and the PRINT keys function identically when tagging images for printing.
- Changes several French and German text string translations so they no longer overrun the allotted area. (Most of the text strings are for Access Link General Options Setup screen and Printer Setup screen.)

Features Not Supported

- BPT9-5 Biplane Transesophageal scanhead
- L12-5 Linear scanhead

Known Problems

Refer to Operating Notes:

4707-0015-43	English
4787-0015-43	French
4777-0015-43	German

Hardware/Firmware Changes

Software version 038.15 requires a 32 MB System CPU PCB (P/N 3500-2677-01).

The following firmware was released with 038.15 software:

8000-0994-07	PROM Kit, CPU
4201-1931-05	PROM, CPU_OS_32M_HI
4201-1932-05	PROM, CPU_OS_32M_LO

12-4.15

039.05 (8.4.1)

Released 4252-0791-05 on August 8, 1997.

New Features

- L12-5 scanhead and biopsy guide
- C4-2 harmonic imaging

Problems Corrected

- Changes the system upgrade process so that user-defined text annotation is preserved when upgrading to 039.05 software. After upgrade to 039.05 software, text annotation includes 039.05 system default annotation and user-defined annotation that had been added to the previous software version. Up to 30 text annotations per clinical option can be stored. (The number of text annotations depends on whether the clinical option has system-defined text annotation associated with it.)
- Corrects the display of CO(S) and CO(P) values (systemic and pulmonic cardiac output) on NTSC systems to allow the third digit (most significant) to be displayed. Previously, the values were obscured by the CO(S) and CO(P) labels.
- Changes the German translation of the Cardiac CSI “top of image” annotation to “K KSB”. Also, changes the Research CSI “KSI” annotation to “KSB”.
- Corrects the spelling of “epididymis” in the Small Parts/Text D list.

Features Not Supported

Not applicable.

Known Problems

Refer to Operating Notes:

4707-0015-47	English
4787-0015-47	French
4777-0015-47	German

Hardware/Firmware Changes

There are no hardware requirements for 039.05 software, however, DDEA modules were released incorporating the 540 MB optical drive and new shock mounts for both drives.

The following firmware was released with 039.05 software:

8000-1308-01	PROM Kit, CPU, 32 MB CPU HI/LO
4201-1931-06	PROM, CPU_OS_32M_HI
4201-1932-06	PROM, CPU_OS_32M_LO

12-4.16

039.08 (8.4.1b)

Released 4252-0791-08 on November 5, 1997.

New Features

Not applicable.

Problems Corrected

- Changes all references to Frequency Conversion Technology (FCT) to Tissue Harmonic Imaging (THI).
- Changes the Access Link feature name to Image Management.
- Optimizes the receive filter parameters for general imaging CSI (C4-2) to improve image quality in hard-to-image patients.

- Changes system operation so that when annotating an image, the text wraps around to the first character of the line above. Changing the text annotation corrects the following issues with the Text A - D cursor position when annotating an image:
 - Text key home position defaults to the far left of the display when the Return key is pressed.
 - Under certain operational conditions, the home position defaults further to the left side of the display on the same text line.
 - Text key home position defaults to the Title field in the top left of the display instead of the Text field.
- Adds a Twin B report and EFW data when doing an obstetrical twin exam. Previously, Twin A data was used for Twin A and Twin B reports.
- Deletes singleton data when switching from a singleton exam to a twin exam.

- Removes the statistical factor that was added to the Hadlock EFW Fetal Growth Equation percentile displayed in the patient report. Removal of the statistical factor enables the results displayed on the patient report and the corresponding OB graph to be consistent.
- Removes “Twin A” titles from inappropriate clinical options/protocols. Previously, for example, if twins were selected on the new patient data screen, and you selected a TSI with general calculations, the “Twin A” title was displayed under the calculations name and list of available calculations.
- Removes arrows that spontaneously appeared or remain displayed on DiskLink reviewed images after arrows were initiated on those images.
- Prevents system errors that occur when loading the OB files (age, weight, growth files, and percent files) from causing a system crash.
- Corrects the Upgrade System from Optical Disk procedure.

- Saves additional information to the error log during a system task crash. When a system task crashes, the system normally invokes the stack trace utility in the error log and redirects its output to a file. This file had only a stack trace from the most recent crash. The additional information that has been added is the time-stamp of the crash, task information, and memory usage information.
- Modifies the error handling of OB table loading so that if the system unsuccessfully attempts to load an OB age or weight table, the attempt will be aborted and an error logged.
- Corrects High Q Deceleration Time manual tracing error when minimum diastole occurs before peak systole in non-cardiology spectral traces.
- Changes system software so that the year 2000 can be input into the date field of the patient data header without affecting system operation. (The year 2000 is input as "00".)

Features Not Supported

Not applicable.

Known Problems

Refer to Operating Notes:

4707-0015-51 English

4787-0015-51 French

4777-0015-51 German

Hardware/Firmware Changes

There are no hardware requirements for 039.08 software.

12-5

040X Software Releases

12-5.1

040.16 (8.4.2)

Released 4252-0804-16 on June 12, 1998.

New Features

- C5-2 40R Broadband Curved Array scanhead for abdominal and obstetrical imaging
- Reusable biopsy guide brackets for the C5-2, P7-4, and P5-3 scanheads
- Tissue Harmonic Imaging (THI) on the C4-2 and C5-2 scanheads The applications supported include abdominal, obstetric, and gyn/fertility.
- Pediatric cardiology and obstetrics clinical options for the C8-5 scanhead. Refer to [Table 12-2](#) for the Tissue Specific Presets associated with each clinical option.
- Adult cardiology clinical option for the CL10-5 scanhead. Refer to [Table 12-2](#) for the Tissue Specific Presets.

Table 12-2. Clinical Options Released with 040.16 Software

Clinical Option	Tissue Specific Presets	Scanhead
Pediatric Cardiology	Ped Neonate	C8-5
Obstetrics	General OB Fetal Echo	C8-5
Adult Cardiology	Adult Echo	CL10-5

- Incremental ECG triggering capability (successive ECG cycles spaced from 1 to 20). Skipping ECG waveforms and not pulsing the beamformer between the ECG waveforms prolongs the life of the microbubbles used during Contrast Specific Imaging.
- Integrated 3D Grayscale provides 3D gray-scale volume-rendered data for qualitative analysis. The rendered volume rotates from side-to-side up to 100 degrees. Integrated 3D Grayscale is similar to integrated 3D Color Power Angio.

- Triple mode and M-mode capability added to P3-2 THI option
- NetLink compatibility with additional printers and network devices. Refer to **Table 12-3** for manufacturers and models.

Table 12-3. NetLink OEM Compatibility Added with 040.16 Software

OEM Type	Manufacturer/Model
Printers	AGFA LR3300 AGFA MCL Codonics (V2) ¹ Fuji FLD Kodak KELP Kodak KEMCI Kodak KDSMCI Sterling LP400

PACS	AGFA EMED GE Vantage PACS Imation Cemax Icon Archive Manager Philips EasyVision Siemens MagicStore Archive Siemens MagicView 50 Siemens MagicView 1000
Mini-PACS	ALI

1. V2 allows new image magnification type.

- Image memory (IMEM PCB) changed from 32 to 64 MB to support DiskLink, NetLink, and enhanced Cineloop functions (up to 220 black-and-white frames). On systems without NetLink and DiskLink, memory size has been increased from 16 MB to 32 MB.
- General Imaging CSI added to C5-2 scanhead. Supports only 2D Harmonic TSI.

Problems Corrected

Scanheads

- Corrects a system lockup issue when using the C8-5 scanhead in Pediatric Cardiology during PMI (Power Motion Imaging).
- Adds Ped Card Neonate Tissue Specific Imaging (TSI) to C8-5 scanhead capability.
- Enhances the Cardiology CSI Power Harmonics setups for the P3-2 scanhead.
- Adds Power Harmonics 2 Tissue Specific Preset to the P3-2 Cardiology Clinical Option
- Adds 2D Harmonics to the C5-2 General Imaging CSI Tissue Specific Preset.
- Eliminates the banner alert when using the CL10-5 and selecting Color and Doppler and pressing Update.
- Eliminates intermittent color noise when using the MPT7-4 scanhead.

- Limits acoustic power to the C4-2 scanhead. Acoustic power was lowered by approximately 1 dB to comply with FDA limits. One dB is not considered clinically significant to require clinical testing.
- Changes the P3-2 scanhead files to improve image quality when performing General Imaging and Cardiology CSI power harmonics. This change does not involve changes to the AP&I files and does not require clinical testing.
- Lowers the simultaneous 2D/PW average 2D PRF to be within an acceptable range for the AP&I range check. Previously, if the AP&I range check failed, the FEC PCB was prevented from scanning which resulted in a system lockup.

ECG Improvements

- Corrects ECG trigger interval annotation.
- Corrects the location of ECG markers during VCR playback of triggered 2D acquisition. Previously, the ECG marker would not correctly indicate the displayed frame.

Body Markers

- Adds body markers from the Abdominal clinical option to the RAD CSI clinical option.
- Displays body markers that were not visible upon initial bootup in any mode of system operation. The body markers were displayed upon the subsequent bootup.

Annotation

- Changes operation of the Text A-D annotation keys so that:
 - characters from a second annotation overwrite characters from the first.
 - text placement returns to the default text location after changing patients.
 - when the Text A-D keys are pressed, the system displays the next predefined annotation after the Erase Annotation key is pressed.

- on PAL systems, the text does not display below the edge of the monitor.
- translated annotation no longer overwrites calculation values located in the system sidebar.
- Fixes incorrect annotation wrap-around when performed at the far right of the display.

Measurements and Analysis

- Corrects various issues (such as incorrect headings and non-printed values) with the Adult Cardiac Report.
- Corrects a system lockup issue when using a page printer and attempting to print OB graphs three times.
- Deletes the area value calculated for the aortic valve using the continuity equation and displayed as the LVOT area value. Previously, the LVOT area and the aortic valve area were displayed as the same value.

- Corrects spectral Doppler data when the sample volume cursor is moved during triple mode while using the CL10-5 scanhead.
- Adds access to cardiac calculations with the CL10-5 scanhead.
- Adds the “c” for the LMP on the Gyn report when the LMP is auto-calculated from the Established Due Date.
- Eliminates a system lockup condition when the report comments field is full.
- Synchronizes image updates and scaling information during image zoom.

Miscellaneous

- Changes on-screen THI labeling consistent with that on the HDI 5000 system.
- Updates device files, host tables, and device tables.
- Decreases system response time when changing between 2D and Color mode.

- Fixes color artifacts in the left two-thirds of the color box when entering color Doppler for the first time.
- Displays the print annotation on the left of the display on DiskLink systems configured without NetLink.

Features Not Supported

-01/-02 versions of the upper and lower UIF assemblies

Known Problems

Refer to Operating Notes:

4707-0015-49 Rev C	English
4787-0015-49 Rev C	French
4777-0015-49 Rev C	German

Hardware/Firmware Changes

There are no hardware requirements for 040.16 software. However, a 64 MB IMEM PCB (P/N 7500-0776-04 with 64 MB SIMMS) was simultaneously released with 040.16 software. The additional memory increases the number of Cineloop black-and-white frames from 99 to 220 and reduces the likelihood that the system will stop responding to user input if images are stored rapidly. Also, systems without NetLink and DiskLink can store up to 200 Cineloop black-and-white frames if they have a 32 MB IMEM PCB (P/N 3500-1867-01) installed.

12-5.2

040.23 (8.4.2b)

Released 4252-0825-04 on August 4, 1998.

New Features

BPT9-5 bi-plane transesophageal scanhead (P/N 4000-0420-01) for pediatric cardiac applications.

Problems Corrected

Corrects near field color noise when using the CL10-5 scanhead for intraoperative applications with the 7500-0974-08 Channel boards. The near field noise was also noticeable to a lesser extent with the L10-5 and L12-5 scanheads.

Features Not Supported

-01/-02 versions of the upper and lower UIF assemblies

Known Problems

Refer to Operating Notes:

4707-0015-54 Rev A English

4787-0015-54 Rev A French

4777-0015-54 Rev A German

Hardware/Firmware Changes

There are no hardware requirements for 040.23 software.

12-5.3

045.04 (8.4.3a)

Released 4252-0827-04 on October 20, 1998.

New Features

- Italian language software, upper and lower user interface assemblies, and manuals
- Danish, Finnish, Norwegian, and Swedish lower user interface assemblies

Problems Corrected

Measurement Corrections

- Corrects measurement units displayed after a report has been edited. Previously, under certain conditions, measurement units from a second measurement replaced units from a first measurement, even though the numerical value of the first measurement did not change.
- Corrects a measurement error in PW Doppler calculations after switching from CW Doppler.

Connectivity

- Changes the HDI 3000 setups to eliminate the setup option that is not used for the Imation 3M 959 printer. Previously, the setups display had options that would direct each print to the print magazine located in the printer or to the print processor attached to the printer. However, printer software had been set up to direct the print only to the processor if the processor was mechanically attached to the printer.
- Changes the HDI 3000 setups to specify the print destination for the Kodak KDSMCI and KEMCI printers as the print processor (not the print magazine).
- Modifies device files for Kodak printers and Imation 3M 959 printer.
- Adds the 14x14 print size to printer setups for Kodak 1120, 2180, and XLP printers.
- Restores DiskLink compatibility with PAL versions of Image-Vue DCR.

- Corrects an intermittent problem that causes diagnostic tests to be missing from the diagnostic menus after abnormal system shutdowns.
- Implements new DICOM functionality for Picture Archiving and Communication System (PACS).
- Implements chunky conversion before sending the RGB pixel image data to a network archive device. Chunky conversion packages the RGB data in information “packets” without regard to the color data in the packet. Previously, the data was sent planar, meaning all of the red data was sent, then green, then blue. With this change, the HDI 3000 is compatible with all Siemens MagicView and MagicStore products for color image transfer.

Translations

- Changes translations of the terms “Contrast Specific Imaging” and “Tissue Harmonic Imaging” from German, French, and Italian back to English. European translations of these terms were confusing.

- Fixes French translations on the Setups display.
- Displays missing THI annotation on French and German systems when using THI.
- Changes the French translations for “Image Management”, “Color Printer Setups”, and “B&W Printer Setups” to fit on the setup “buttons” in the Directory of Image Management Setup Options.
- Incorporates the international attention symbol into all on-screen safety and caution statements and dialog boxes in system software, and adds translation of the statements and dialogs to the manuals.

Upgrades

- Fixes the software upgrade process broken between 8.4.2 and 8.4.2b so that the system software can be upgraded from the existing software version without first being downgraded.

Features Not Supported

-01/-02 versions of the upper and lower UIF assemblies

Known Problems

Refer to Operating Notes:

4707-0015-58 Rev A	English
4787-0015-58 Rev A	French
4777-0015-58 Rev A	German
4827-0015-58 Rev A	Italian
4847-0015-58 Rev A	Brazilian
4887-0015-58 Rev A	Danish
4807-0015-58 Rev A	Dutch
4837-0015-58 Rev A	Finnish
4907-0015-58 Rev A	Greek
4877-0015-58 Rev A	Portuguese
4817-0015-58 Rev A	Swedish
4797-0015-58 Rev A	Spanish

Hardware/Firmware Changes

There is no new hardware required to support software version 045.04. However, Italian upper and lower user interface assemblies were released to support the Italian language. Also, Danish, Norwegian, Swedish/Finnish lower user interface assemblies have been released to support the respective languages. (Swedish and Finnish languages use the same lower user interface assembly.)

Three keycaps are required to support Danish, Norwegian, and Swedish/Finnish languages on the lower user interface assembly. These nine keycaps have been released in a keycap set (P/N 4400-0095-01) with a tool to remove existing keycaps. To change a system to Danish, Norwegian, Swedish, or Finnish, the respective 8501 machine options file must be installed, and three keycaps changed on the existing lower user interface assembly. The remaining six keycaps in the keycap set may be discarded.

You must have a machine options file for the appropriate language to change the system language. Changing the keycaps alone will not change the system language. Language upgrades must be processed through Sales Order Processing.

12-5.4

046.04 (8.4.3b)

Released 4252-0846-04 on January 29, 1999.

New Features

- LAP L9-5 Broadband Laparoscopic Scanhead and Abdominal Surgery clinical option
- New 7-digit CPU ID chip (P/N 2070-1981-01)

Problems Corrected

- Adds NetLink compatibility with the MLP-190 Kodak printer.
- Shortens the model field name from “8500-0030-01 (HDI 3000, Level 8)” to “HDI 3000”. This information was listed in the Display Features List in the system diagnostics.
- Corrects communication issues between the HDI 3000 system and the Sterling (Polaroid) Helios, Digital 200, Digital 400, HPS 400, and solid inkjet printers. Also, corrects communication issues between the HDI 3000 system and the Sterling DPS server.

Features Not Supported

-01/-02 versions of the upper and lower UIF assemblies

Known Problems

Refer to Operating Notes:

4707-0015-58 Rev A	English
4787-0015-58 Rev A	French
4777-0015-58 Rev A	German
4797-0015-58 Rev A	Spanish
4807-0015-58 Rev A	Dutch
4817-0015-58 Rev A	Swedish
4827-0015-58 Rev A	Italian
4837-0015-58 Rev A	Finnish
4847-0015-58 Rev A	Brazilian
4877-0015-58 Rev A	Portuguese
4887-0015-58 Rev A	Danish
4907-0015-58 Rev A	Greek

Hardware/Firmware Changes

There is no new hardware required to support software version 046.04 or the LAP L9-5 laparoscopic scanhead.

Two CPU PROMs have been released simultaneously with 046.04 software. The CPU PROMs are required to support a new 7-digit CPU ID chip (replaces P/N 2070-1188-01) that will be released at a later date. The new ID chip requires the new PROMs. The old ID chip will work with the old or new PROMs. The new CPU ID chip and CPU PROMs require software version 046.04 and above.

The new CPU PROMs (P/Ns 4201-2015-03 and 4201-2016-03) may be used with the old (5-digit) or new CPU ID chip (P/Ns 2070-1188-01, old and 2070-1981-01, new). The old CPU PROMs (P/Ns 4201-1931-06 and 4201-1932-06) must be used only with the old CPU ID chip.

12-5.5

047.08 (8.4.3c)

Released 4252-0848-06 on May 14, 1999.

New Features

L12-5 50 mm broadband linear array scanhead and small parts, pediatric, advanced breast, cerebrovascular, peripheral vascular, musculoskeletal, and generic clinical options

Problems Corrected

Scanheads

- Removes the Pelvic TSI from those available for the LAP L9-5 scanhead.
- Modifies the scanhead annotation displayed in the TSI header to match those displayed by the HDI 5000.
- Corrects a problem requiring the user to reselect the C5-2, P3-2, or L10-5 scanhead when using the trim function after acquiring 3D data.

- Changes the L12-5 38 mm, L12-5 50 mm, and CL10-5 scanhead PW, Color, and CPA power default settings to offset the decrease associated with the Level 8.4.3c and 8.5 sustaining programs.
- Modifies the L12-5 38mm, CL10-5, LI9-5, L7-4, P7-4, C7-4, C8-4v, C5-2, C4-2, MPT7-4, and D2TC acoustic output files. These changes are required due to changes made in manufacturing testing methods.

Dual Imaging

- Prevents the left image from disappearing behind the right image when the image is frozen, zoomed, or panning during dual imaging.
- Adds seamless dual imaging (no line between the displayed images).

Networking

- Corrects an issue where the ultrasound system rebroadcasts network messages sent by other network devices.

- Addresses system slowdown issues with NetLink and DiskLink configured.
- Prevents DICOM images from being sent to the wrong patient's study at the DICOM workstation, when the previous patient's exam is reviewed and images are stored using the "Print" key.
- Enables README.TXT files and HELPFILES in the system software device files directory to be viewed on the ultrasound system. These text files contain information that is helpful when setting up network devices.

Diagnostics

- Eliminates false voltage clip error messages from being reported to the error log. The false errors are seen only systems with 8.4.x software when using muxed scanheads (L10-5, L12-5) that have lower voltage limits, or on the CL10-5. The errors were not reported to the user.

- Corrects a PCM error resulting from using the trackball and pressing SELECT when performing an OB exam and using Fetal Biometry. Previously, the system had to be reset using the system circuit breaker.
- Prevents L12-5 damage when running the Machine Comprehensive Test.
- Updates the expected configuration file with the PCBs expected for software version 047.08.

Miscellaneous

- Disables the print key when a dialog box is displayed asking, “Are you sure you want to delete the last image?”
- Displays the table or equation used to generate the EFW in the final OB report. Also displays the associated range as do other measurements in the OB package.
- Modifies French, German, and Italian software, adding information about placing the cursor on the Doppler baseline when calibrating an image. The information has been added to the velocity and frequency label strings.

- Decreases the amount of time required to access information from the hard disk, including the time required to boot up the system, download information, transfer data to optical disk, or retrieve patient data on systems with DiskLink.
- Enables the system to transition from duplex Doppler to scrolling Doppler without displaying a blue banner error message.
- Enables the system to simultaneously display images and image loops side-by-side for comparison. This is accomplished by storing all images in a patient exam in a single series. Previously, images were stored in multiple series and could not be combined or displayed side-by-side for comparison.

Features Not Supported

-01/-02 versions of the upper and lower UIF assemblies

Known Problems

Refer to Operating Notes:

4707-0015-59 Rev A	English
4777-0015-59 Rev A	German
4787-0015-59 Rev A	French
4797-0015-59 Rev A	Spanish
4807-0015-59 Rev A	Dutch
4817-0015-59 Rev A	Swedish
4827-0015-59 Rev A	Italian
4837-0015-59 Rev A	Finnish
4847-0015-59 Rev A	Brazilian
4877-0015-59 Rev A	Portuguese
4887-0015-59 Rev A	Danish
4907-0015-59 Rev A	Greek

Hardware/Firmware Changes

There is no new hardware required to support software version 047.08 or the L12-5 50 mm scanhead.

12-5.6

047.10 (8.4.3d)

Released 4252-0848-08 on April 20, 2000.

New Features

Software version 047.10 is a corrective build only. There are no new features released with this software version and no new hardware requirements.

Problems Corrected

- Displays a dialog box stating “Ending Exam” when the user attempts to use the new Patient Data Entry screen and forgets to press the End Exam key at the end of the previous exam. Previously, when this happened, the system performed the normal “end-exam” process but did not provide system status to the user.

- Adds a low-level optical disk format option to the user diagnostics menu. This option enables operators to format optical disks.
- Allows the user to perform a CW exam using the D2CW probe when the BPT9-5 scanhead is connected. Previously, there was no Doppler signal when this was attempted.
- Adds the estimated fetal weight percentile number to the hardcopy printed OB report. Previously, the percentile number was shown on the display, but did not print on the report.
- Corrects an intermittent problem that results in the Doppler spectral trace not being updated when the sample volume cursor is moved.
- Prevents the system from hanging after deleting all images from the hard disk if one of the images is not readable. Unreadable images may result from turning off the system before the image has been fully saved to disk, a hard disk error, or a power supply problem.

- Corrects a DiskLink issue with the patient exam directory showing patient exams as being sent to the optical disk when they are not.

Features Not Supported

Same as those for the previous software version (047.08 software).

Known Problems

Refer to Operating Notes:

4707-0015-63 Rev A	English
4777-0015-63 Rev A	German
4787-0015-63 Rev A	French
4797-0015-63 Rev A	Spanish
4807-0015-63 Rev A	Dutch
4817-0015-63 Rev A	Swedish
4827-0015-63 Rev A	Italian
4837-0015-63 Rev A	Finnish

4847-0015-63 Rev A	Brazilian
4877-0015-63 Rev A	Portuguese
4887-0015-63 Rev A	Danish
4907-0015-63 Rev A	Greek

Hardware/Firmware Changes

There are no new hardware requirements for software version 047.10.

13 Configuration

13-1

Compatibility

The part number, dash level, and firmware software level of each PCB is determined by the CPU at boot up.

The system software contains a hardware and software configuration file that lists the part numbers and dash levels of installed PCBs and PROMs. If a different dash level PCB or PROM is installed, and “Save as Installed” is then selected, this file is updated. This should only be done if the replacement has been determined to be compatible with the system configuration. *The original configuration information cannot be retrieved after this file is modified. Refer to [Section 9, Troubleshooting](#), for more information.*

Hardware configuration and compatibility must be based on the information in the PCB and PROM replacement matrices in this section. Hardware configuration involves verifying that PCBs and PROMs are compatible with the specific system software.

13-2

Usage Rules for PCB Matrices

1. Find the matrix for the PCB to be ordered. The PCB matrices are listed by slot location. The front card cage PCBs are listed first as they are installed from left to right, then the back, from left to right.
2. Find the software column matching the system software.
3. Find the PCB with an “R” in the software column.
4. If there is more than one “R”, select the one with a “Y” that matches the system’s features. Order that PCB.

5. If there is no “R” option, use the following information to choose a PCB:
 - “A” indicates “alternate”. The factory may ship an alternate (equivalent) PCB instead of the PCB ordered.
 - “L” means “Like-for-Like”. Only order this PCB if the part number and dash level are exactly the same as the PCB being replaced.
 - “C” indicates this PCB is compatible with the software and PCBs in the same column.
6. Refer to the PROM matrix if the PCB requires firmware.

13-3

Usage Rules for PROM Matrices

A number of PCBs require operating software PROMs (firmware). The software for the CPU determines the overall system software level (for example, 39.08). The software on other PCBs will never be higher than that of the CPU, and can be at a lower level.

System features may or may not be compatible with a specific PCB revision. The different codes that can be found here are:

Y - yes, feature is compatible with this PCB dash level,

N - no, feature is not compatible with this PCB dash level.

Order the software PROM kit required by the PCB part number being ordered.

13-4

Usage Rules for Jumper and PROM Diagrams

- There are no jumpers that require configuration by field service representatives. There are no switches on PCBs.
- There are no diagrams for PCBs that do not have jumper headers or firmware PROMs installed.
- The relative position of firmware PROMs and certain jumpers are shown on the jumper and PROM diagrams.
- Only those jumpers requiring headers are shown on these diagrams.

- Jumpers requiring a jumper header are shown only for reference when verifying their integrity.
- If the jumper has three pins, the physical position of the header is indicated.
- It is understood that if jumpers are not shown on the diagram, they are either hardwired or are not jumpered with a header.

13-5

Usage Rules for Scanhead Matrix

Not all scanhead types may be supported by a specific system software level.

- Order scanheads by scanhead type or name and part number and current dash level.
- Backward compatible (Bkwd Comp.) indicates the previous versions which the latest dash level replaces.

13-6

Ordering System Software

Machine Option (MO) files must be ordered for a specific system. Request optical disk 4252-0738-01 and specify the system S.O. and I.D. numbers. An optical disk with current build system files will then be created for that system I.D.

Table 13-1. System Software Level Part Numbers

Software Level	Build Level	Optical Disk ¹		Notes
		Part No.	Dash	
033.09	8.2.11	4252-0767	01	2
033.27	8.2.15	4252-0768	01	2
034.17	8.3.2	4252-0772	04	2
034.18	8.3.2b	4252-0772	05	2
035.10	8.3.3	4252-0773	09	2
036.03	8.3.4	4252-0779	04	2
036.05	8.3.4	4252-0779	06	2
036.06	8.3.4	4252-0779	07	2
038.15	8.4	4252-0780	15	2

039.05	8.4.1	4252-0791	05	2
039.08	8.4.1b	4252-0791	08	2
040.16	8.4.2	4252-0804	16	2
040.23	8.4.2b	4252-0825	04	2
045.04	8.4.3a	4252-0827	04	2
046.04	8.4.3b	4252-0846	04	2
047.08	8.4.3c	4252-0848	06	2
047.10	8.4.3d	4252-0848	08	2

1. Software part numbers are listed for reference. Generic upgrade MO disks with system software are not available for the HDI 3000. System specific upgrade disks must be ordered for each software upgrade. Order upgraded software when replacing the DDEA or the hard drive. Follow [paragraph 13-8](#) or follow your local service procedures.
2. The system software language is determined by the machine options file ordered by the customer. Software versions 033.09 through 040.23 are available in English, French, and German. Software versions 045.04 and up are also available in Italian.

13-7

Replacement Code Legend (All Matrices)

R	Recommended replacement level
A	Alternate acceptable replacement level
C	PCB is compatible with software, but is no longer stocked.
L	Order like for like
Y	Yes, compatible with feature
N	Not compatible with feature
P	Purge
-	Indicates incompatibility for a specific software version

13-8

Repairing a DDEA Module

Repair all DDEA modules to the component level whenever possible. Determine if the system has ECG or an optical drive before ordering any parts.

To replace unreliable or unrepairable modules, order the entire DDEA assembly. To order, follow the matrix in [paragraph 13-9.6](#).

13-8.1

DDEA Component Replacement

- The Interface PCB and optical drive must be ordered like for like.
- □ Use the procedure in [paragraph 13-8.2](#) when the hard drive fails.

NOTE: The MO drive SCSI connector must be terminated when the IBM hard drive is installed. Hard drives in DDEA modules with or without an optical drive have the same SCSI termination settings, ([Figure 13-1](#)).

- Use [Table 13-2](#) to order other replaceable components.
- When replacing any drive in any DDEA configuration, the SCSI bus must be terminated. See [paragraph 13-8.3](#).

Table 13-2. DDEA Module Replaceable Components

Part Number	Component¹
2100-0791-01	Mag Optical Drive, 128 MB, Epson
2100-0858-01	Mag Optical Drive, 230 MB, Panasonic
2100-1416-01	Mag Optical Drive, 640 MB, Fujitsu M2513
2100-1512-01	Mag Optical Drive, 640 MB, Fujitsu Mod MCC3064SS
7500-1020-XX ²	DDEA PCB with ECG Physio circuitry
7500-0843-XX	DDEA PCB without ECG circuitry
3100-0274-01	ECG Connector

1. Order 8000-1682-01 MO drive dependency kit if upgrading to the 640 MB optical drive; it includes a necessary bracket.
2. 7500-1020-08 requires 47.10 software system files.

13-8.2

Replacing System Hard Drives

- To replace a system hard drive:
 1. Verify the hard disk is actually defective by using the core boot fault isolation procedure ([paragraph 9-2](#)) and by running Check Installed Software under Diagnostics in the Set-ups menu ([paragraph 9-4.2](#)).

NOTE: Do not order blank hard drives (P/N 2100-XXXX-XX). These have not been formatted for the system and can not read or write.

CAUTION

HD and MO drives are very delicate. Handle with care to avoid ESD and electrical- and physical-shock damage to the drives during removal and installation.

2. Determine the type of hard drive in the DDEA (IBM or Quantum).

3. Order one of the following:
 - Hard drive kit (P/N 3500-3066-02, [Table 13-3](#)) when replacing a Quantum or non-IBM drive.
 - IBM hard drive (P/N 3500-3129-01) when replacing an IBM hard drive installed in the system.
4. Before installing the drive, set the SCSI jumpers according to [Figure 13-1](#).
5. If the DDEA has an MO drive, verify the settings to [Figure 13-2](#).

- To order **pre-loaded hard drives**, a drive with the correct options and software version, your order must include the following information:
- A request to have the software and options loaded.
 - The current software level: Enter the 4252-XXXX-XX part number on a separate line item. You can get this from the system configuration information in the system setups, or refer to [Table 13-1](#).

- For domestic orders only, a base ID (chip ID) and the machine options part number 4252-0738-01. International made-for-stock orders do not require a base ID.

Table 13-3. Hard Drive Kit Components

Part Number	Component
3500-3066-02	System hard drive kit, IBM 9.1 Gb ¹
3500-3129-01	● Hard Disk Drive, IBM 9.1 Gb ¹
3100-2867-01	● Cable Adapter to IBM HD connector
3100-2896-01	● Jumper, PCB pin, for Optical Drive
8000-1938-01	● Ops Notes Kit
2208-0064	● Cable Clamp

1. The capacity of all hard disks is 2.1 MB, as configured for operating system limitations.

13-8.3

Drive Jumper and Switch Positions

- To configure the DDEA, follow **Figure 13-1** for the hard drive and **Figure 13-2** for the MO drive in either of these cases:
 - The IBM drive (P/N 2100-1636-0X) is installed for the first time
 - The MO drive is replaced
- Configure the DDEA to **Table 13-4** for modules without the IBM hard drive installed. Set the hard drive SCSI settings to **Table 13-4** and the MO drive settings to **Table 13-5**.
- Check or set MO drive SCSI termination settings any time an MO drive is replaced (**Figure 13-2**).
- To configure a DDEA without an optical drive use:
 - **Figure 13-1** for IBM hard drives
 - **Table 13-4** for other hard drives

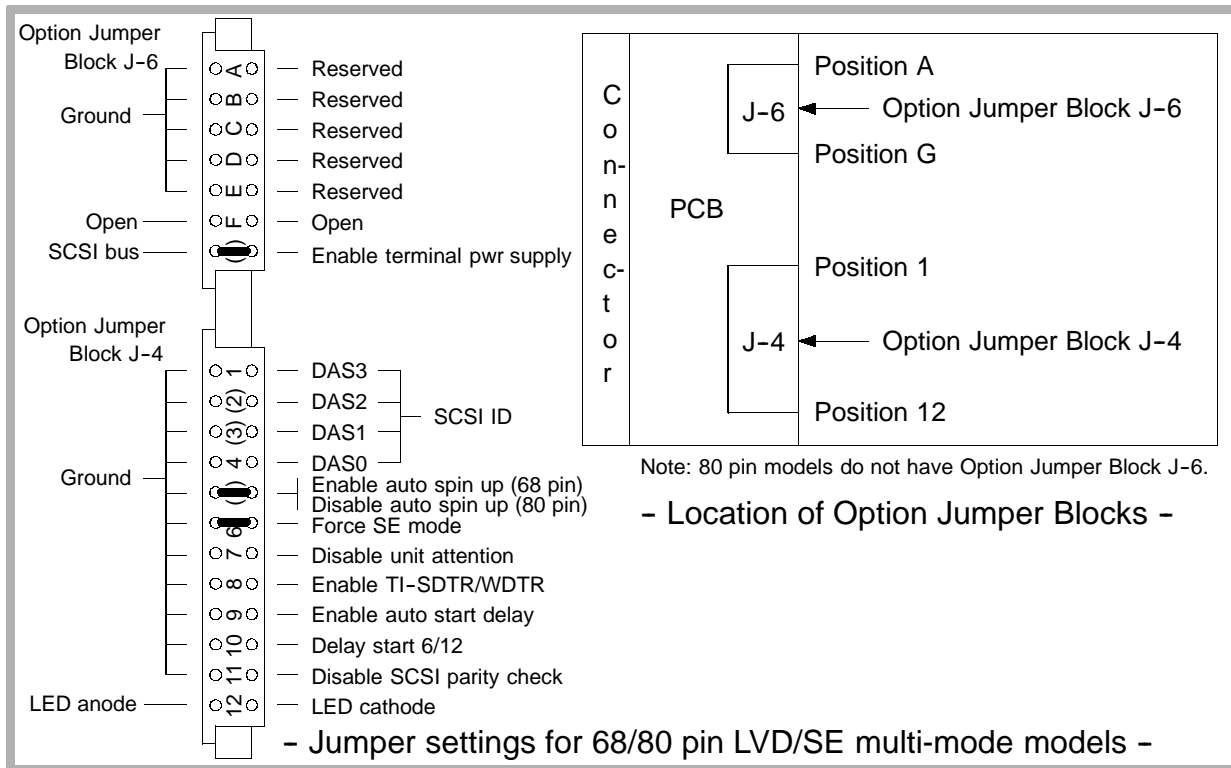
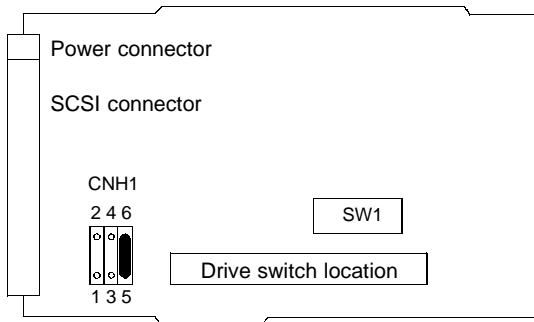
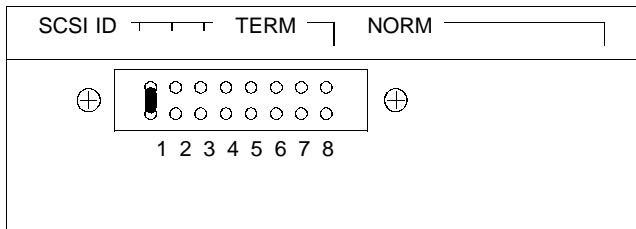


Figure 13-1. IBM Hard Drive SCSI Termination

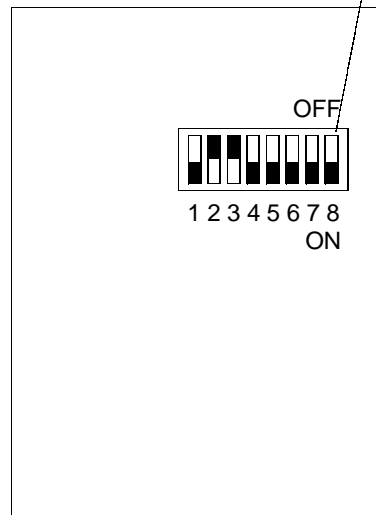


- Fujitsu optical drive, rear view -



- Epson optical drive, rear view -

Set switch 8 to ON to enable the SCSI termination.



- Top view of Panasonic optical drive -

Figure 13-2. MO Drive SCSI Termination

Table 13-4. Hard Drive Jumper, LED, and Switch Status

Drive Part Number	Drive Size (MB)	Jumper/LED Status ^{1,2}							
		A0	A1	A2	A3	P0	PK	TE	LED
2100-0837-01	270	Off	Off	Off	-	On	-	-	-
2100-0867-01	540	Off	Off	Off	-	-	Off	On	-
2100-1324-01 ³	1280	Off	Off	Off	-	-	Off	On	-
2100-1375-01	1080	Off	Off	Off	-	-	Off	On	-
2100-1445-01 ⁴	2100	Off	Off	Off	-	-	Off	On	Off
2100-1517-01	3200	Off	Off	Off	-	-	Off	On	Off
2100-1636-01 ⁵	9100	Off	Off	Off	Off	JP4-6 ON	JP4-5 ON	JP6-G ON	-

1. Jumper positions listed are for DDEA module with MO drive installed. DDEA modules without MO drive have no jumpers installed.
2. The dashes indicate that particular jumper does not exist on that particular drive.
3. The Quantum 1280 Fireball TM does not have the PK jumper; however, the 1280 Fireball does.
4. The reserved jumper for the 2100-1445-01 hard drive is not installed. This other hard drives in this table do not have this jumper.
5. The 2100-1636-01 IBM hard drive requires the 3100-2867-01 68 to 50 pin adapter.

Table 13-5. Magneto-Optical Drive Switch/Jumper Positions

Drive Part Number	Drive Size (MB)		Switch/Jumper Positions ¹							
			1	2	3	4	5	6	7	8
2100-0858-01	230		On	Off	Off	On	On	On	On	Off
2100-1416-01	540/640	SW1	Off	Off	On	Off	Off	On	Off	Off
		SW2	Off	Off	Off	Off	Off	Off	Off	Off
		CNH	Off	Off	Off	-	-	-	-	-
2100-1512-01	640	SW1	Off	Off	On	Off	Off	On	Off	Off
2100-1630-01 ²	640	SW1	Off	Off	On	Off	Off	On	Off	Off

1. The dashes indicate that particular switch or jumper does not exist on that particular drive.
2. External MO drive.

13-9

PCB Replacement Tables

13-9.1

PS1 Analog Power Supply (APS)

7500-0764	Replacement Levels					Features		Notes
Dash No.	33.09	33.27 and up				ST CW	ECG	
04, 05	C	C				N	N	
06, 07, 08	R	R				Y	Y	
09	-	R				Y	Y	

13-9.2

PS2 Digital Power Supply (DPS)

7500-0766	Replacement Levels					Features		Notes
Dash No.	33.09	33.27 and up				ST CW	ECG	
02	C	C				N	N	
03	R	R				Y	Y	
04	-	R				Y	Y	

13-9.3

PS3 Master Power Supply (MPS)

7500-0765	Replacement Levels					Features		Notes
Dash No.	33.09	33.27 up						
04, 05	C	C						
06	R	R						Preferred
07, 08	-	R						Reworked by customer service

13-9.4

PS3 MPS PROMs

7500-0765	PROM Kit		Replacement Levels					Location, P/N, Dash		
Dash No.	Part No.		33.09	33.27 up	47.08 up					
04, 05, 06	8000-0996	05	R	R				U17	4201-1668	14
07, 08	8000-0996	05	-	R	R			U17	4201-1668	14
07, 08	8000-0996	07	-	-	R			U17	4201-1668	16

13-9.5

PS3 MPS PROM Checksums and CRCs

PROM Part No.	Dash No.	Check-sum	CRC
4201-1668	14	EA74	C422
4201-1668	16	F9B9	620E

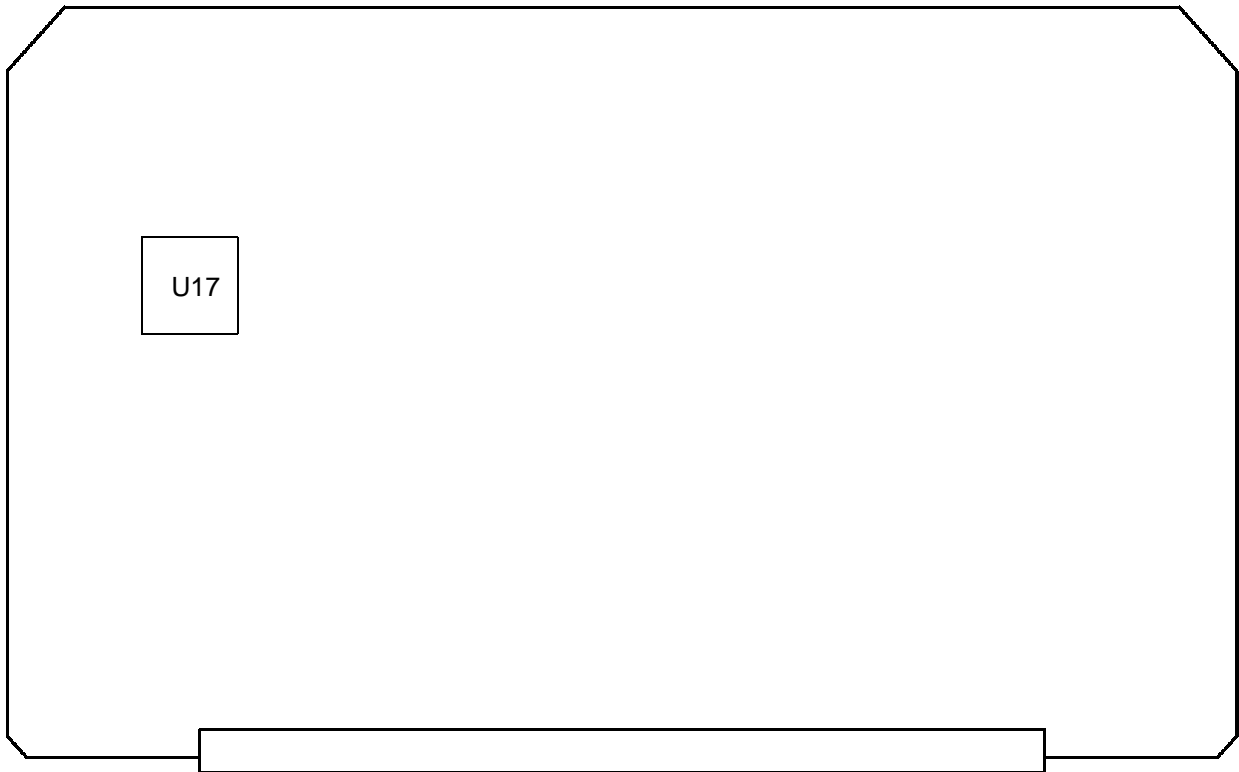


Figure 13-3. MPS PROM Location

13-9.6

A1F Disk Drive ECG Assy (DDEA)¹

NOTE: For Disk Drive ECG Audio (DDEA) assembly replacement, see [paragraph 13-8](#).

Part Number		Replacement Levels	Features					Notes
			ECG/Physio	ECG	Disk Link	MO Disk Cap	Hard Disk Cap	
3500-2760	05	33.09 and up	N	N	Y	640	9.1Gb	1, 3
3500-2761	07	33.09 and up	Y	Y	Y	640	9.1Gb	1, 2
3500-2762	05	33.09 and up	Y	Y	Y	none	9.1Gb	1, 2

1. When placing an order for a DDEA module, specify the following information in the comments section: 1) that the DDEA hard drive should be pre-loaded with customer's version software and options 2) the correct system software level 3) any machine option changes from options listed in customer service database, and 4) Machine ID number located on the Show Machine Configuration Option under Setups/Diagnostics.
2. Made from 7500-1020-XX PCB, with ECG/Physio circuitry.
3. Made from 7500-0843-XX PCB, without ECG/Physio circuitry.

13-9.7

A4F Front End Controller PCB (FEC)

7500-0818	Replacement Levels					Features		Notes
Dash No.	33.09	33.27 and up				CV and ECG	ECG/ Physio	
04	C	C				N	N	
06	A	A				N	N	
08	C	C				Y	N	
09	A	C				Y	N	
10	-	C				Y	Y	
11	R	R				Y	Y	
12, 13, 14	-	R				Y	Y	

13-9.8

A4F FEC PROMs

7500-0818	PROM Kit		Replacement Levels					Location, P/N, Dash		
Dash No.	Part No.		33.09	33.27 and up						
04, 06	8000-0999	05	R	N				U24	4201-1695	24
								U25	4201-1696	24
									U128	4201-1582
		06	-	R				U24	4201-1695	25
								U25	4201-1696	25
								U128	4201-1582	08
08, 09, 11, 13	8000-0999	05	R	N				U24	4201-1695	24
								U25	4201-1696	24
									U128	4201-1582
		06	-	R				U24	4201-1695	25
								U25	4201-1696	25
								U128	4201-1582	08
10, 12, 14	8000-0999	05	-	N				U24	4201-1695	24
								U25	4201-1696	24

7500-0818	PROM Kit		Replacement Levels							
Dash No.	Part No.		33.09	33.27 and up				Location, P/N, Dash		
								U128	4201-1582	08
		06	-	R				U24	4201-1695	25
								U25	4201-1696	25
								U128	4201-1582	08

13-9.9 A4F FEC PROM Checksums and CRCs

PROM Part No.	Dash No.	Check-sum	CRC
4201-1582	08	4C23	CCA3
4201-1695	24	40D9	A1DC
	25	55A9	E1B3
4201-1696	24	2631	A1DC
	25	D08C	E1B3

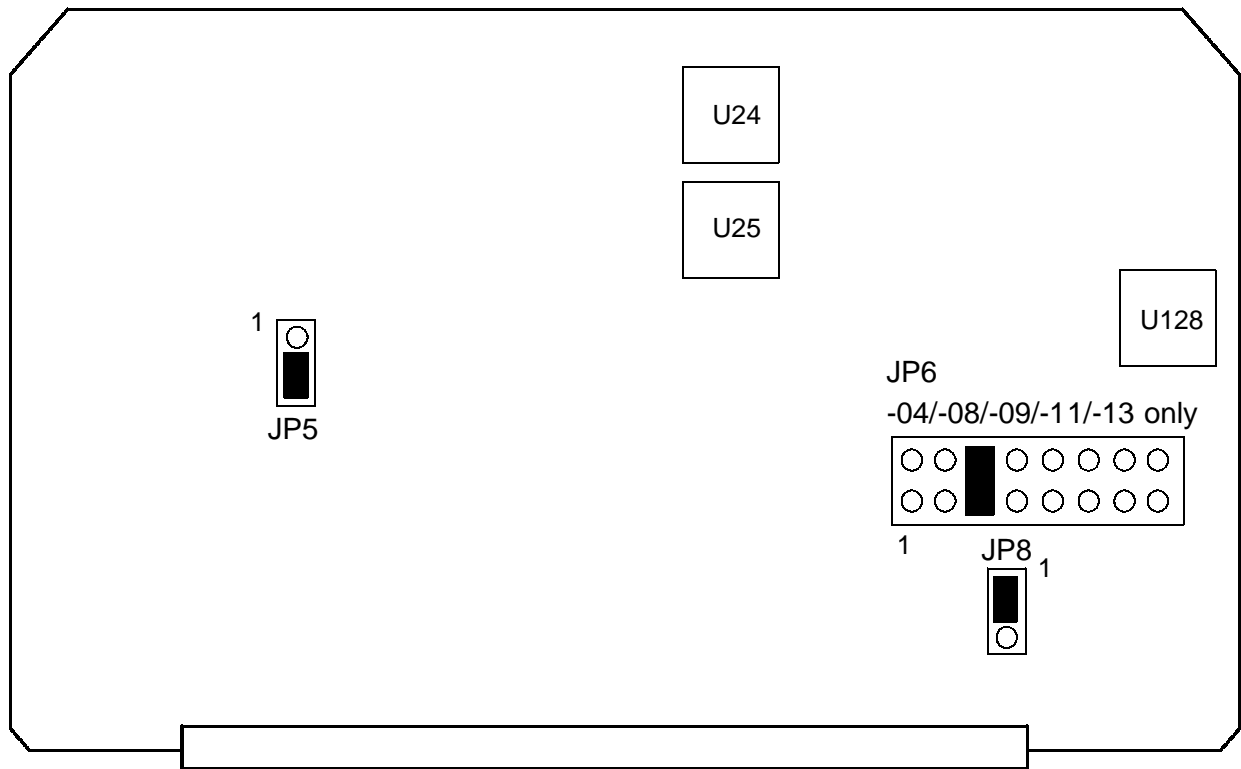


Figure 13-4. FEC Jumper and PROM Locations

13-9.10

A5F Analog Interface Module PCB (AIM)

Part Number		Replacement Levels				Features		Notes
		33.09 thru 34.18	35.10 thru 38.15	39.05 thru 47.08	47.08 and up	4/8 Chan PCBs		
7500-0770	04, 05 06, 07	R	R	R	-	8		1 (smallfoot CBs)
7500-0977	02, 03, 04, 05	A	A	A	-	4		2 (bigfoot CBs)
	06, 07, 09	R	R	R	-	4		2, 3
	08	-	-	C	-	4		2
	09	R	R	R	R	4		2
7500-1075	01	-	P	P	-	4		Purged from field

1. Requires 7500-0819 Channel PCBs, 7500-0822 Scanhead Select PCB. Cannot be used with PCBs listed in Note 2.
2. Requires 7500-0974 Channel PCBs, 7500-0976 Scanhead Select PCB. Cannot be used with PCBs listed in Note 1.
3. The -07 and -09 both identify themselves as -07 from the Configuration utility.

13-9.11

A6F Doppler Acquisition PCB (DOPACQ)

7500-0762	Replacement Levels					Features		
Dash No.	33.09 and up					CW TCD	ST CW CW TCD	Notes
04, 08, 10	C					Y	Y	
05	A					Y	N	
06, 07, 09, 11	R					Y	Y	1

1. The -09 and -11 both identify themselves as -09 from the Configuration utility.

13-9.12

A7F - A14F Channel Board PCBs (CB)

Part Number		Replacement Levels				Features		Notes
		33.09	34.17 and up			4/8 Chan PCBs		
7500-0819	06, 07	R	R			8		1
7500-0974	03, 04	L	L			4		2
	07	-	L			4		2
	08	-	L			4		2, 3
	09	-	L			4		2,

1. Requires 7500-0770 AIM PCB and 7500-0822 Scanhead Select PCB. Cannot be used with PCBs listed in Note 2.
2. Requires 7500-0977 AIM PCB, 7500-0976 Scanhead Select PCB, and -24 or higher FEC PROMs. Cannot be used with PCBs listed in Note 1.
3. The -08 causes near-field color noise with linear and curved array scanheads using Small Parts Superficial TSI settings.

13-9.13**A1B Internal Interface Module PCB (IIM)**

7500-0779	Replacement Levels					Features		
Dash No.	33.09 and up					Mic Audio Fix		Notes
03, 04	C					N		
05	R					Y		

13-9.14

A2B Peripheral Interface Module PCB (PIM)

7500-0717 Dash No.	Replacement Levels				Features				Notes
	33.09 thru 34.18	35.10 and up			Acc Acq Mod	ISEM	PAL ST CW	Frame grab	
05, 06	C	C			N	-	N	N	
07	A	A			Y	-	N	Y	
08	C	C			Y	N	N	Y	
09	-	C			N	N	N	Y	1
10	-	R			N	N	Y	Y	2
11	-	R			N	N	Y	Y	1, 2
12	-	R			Y	Y	Y	Y	1, 2

1. Allows DCR to capture system VCR playback images.
2. Corrects Steered CW noise bands on PAL systems. Order -10 or higher for PAL systems.

13-9.15**A2B PIM PROMs**

7500-0717	PROM Kit		Replacement Levels				Location, P/N, Dash			
Dash No.	Part No.		33.09 thru 34.18	35.10 and up						
05, 06, 08	8000-0993	03	R	-				U72	4201-1539	14
	8000-0993	04	-	R				U72	4201-1539	15
07	8000-0993	03	R	-				U73	4201-1539	14
	8000-0993	04	-	R				U73	4201-1539	15
09, 10, 11, 12	8000-0993	04	-	R				U73	4201-1539	15

13-9.16**A2B PIM PROM Checksums and CRCs**

PROM Part No.	Dash No.	Check-sum	CRC
4201-1539	14	D923	F57D
4201-1539	15	D8CC	9A76

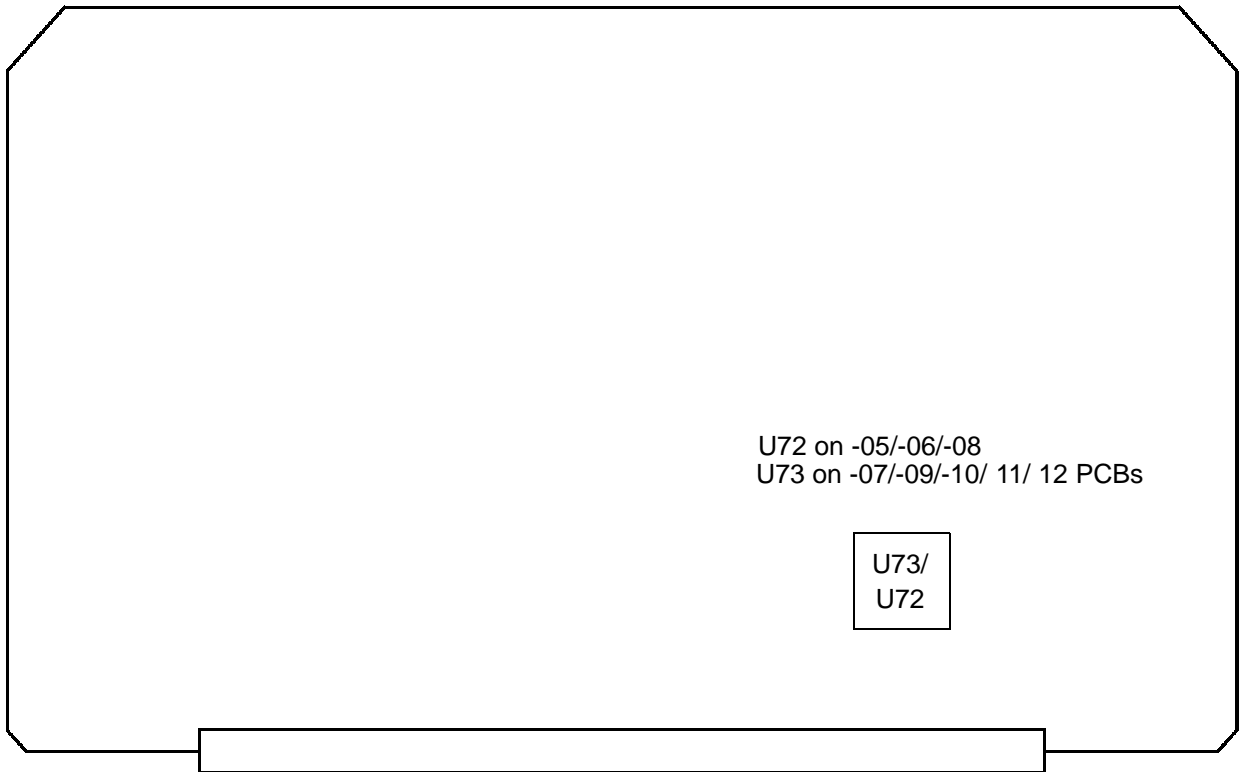


Figure 13-5. PIM PROM Locations

13-9.17

A3B Pixel Conversion Module (PCM)

7500-0683	Replacement Levels					Features			Notes
Dash No.	33.09	33.27 and up				ISEM	Frame grab	Disk Link	
06	C	C				N	N	N	
07	R	R				N	N	N	
08	R	R				Y	Y	Y	
09	R	R				N	Y	Y	Use on systems without ISEMS
10	R	R				N	Y	Y	
11	R	R				N	Y	Y	
12	R	R				Y	Y	Y	

13-9.18**A3B PCM PROMs**

7500-0683	PROM Kit		Replacement Levels				Location, P/N, Dash			
Dash No.	Part No.		33.09 thru 34.18	35.10 and up						
06 - 12	8000-0991	03 ¹	-	R				U23/35	4201-1718	09

1. The 8000-0991-03 PROM kit may be shipped with 4201-1885-01 as an alternate.

13-9.19**A3B PCM PROM Checksums and CRCs**

PROM Part No.	Dash No.	Check-sum	CRC
4201-1718	10	95AA	F557
4201-1885	01	95AA	F557

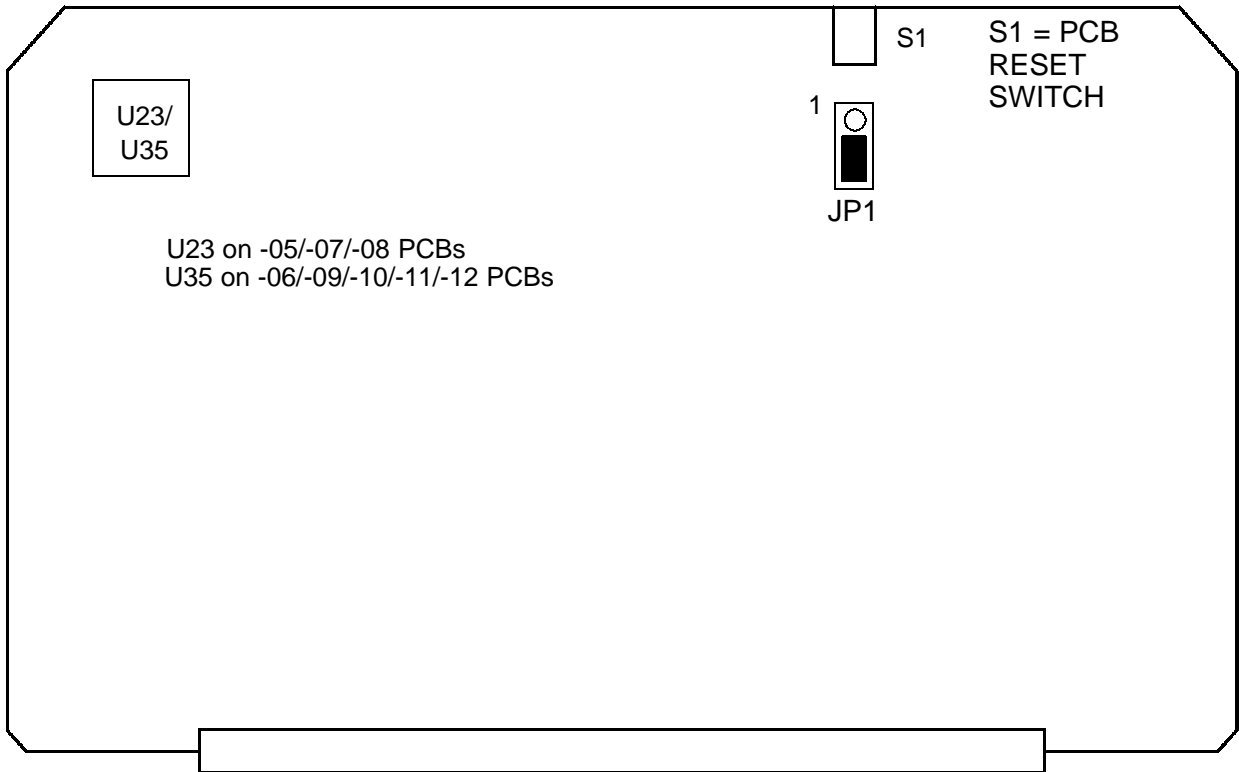


Figure 13-6. PCM Jumper and PROM Locations

13-9.20**A4B Pixel Space Processor 2 (PSP2)**

7500-0714		Replacement Levels				Features		Notes
Dash No.	33.09	33.27 thru 35.10	36.03 and up			Card.		
06	C	C	C			N		No PROMs
07	R	R	C			Y		No PROMs
08	-	R	R			Y		No PROMs
09	-	-	R			Y		No PROMs

13-9.21**A5B Pixel Space Processor 1 (PSP1)**

7500-0713		Replacement Levels				Features		Notes
Dash No.	33.09 thru 34.18	35.10 and up				ST CW		
08, 09	C	C				N		
10, 11	R	C				Y		
12, 13, 14	-	R				Y		1

1. Corrects frame rate issues on PAL systems.

13-9.22**A5B PSP1 PROMs**

7500-0713	PROM Kit		Replacement Levels					Location, P/N, Dash		
Dash No.	Part No.		33.09 thru 34.18	35.10 and up						
08, 09, 10, 11	8000-0992	04	R	R				U55	4201-1697	13
								U134	4201-1582	08
12, 13, 14	8000-0992	04	-	R				U55	4201-1697	13
								U134	4201-1582	08

13-9.23**A5B PSP1 PROM Checksums and CRCs**

PROM Part No.	Dash No.	Check-sum	CRC
4201-1697	13	03E3	B4B9
4201-1582	08	4C23	CCA3

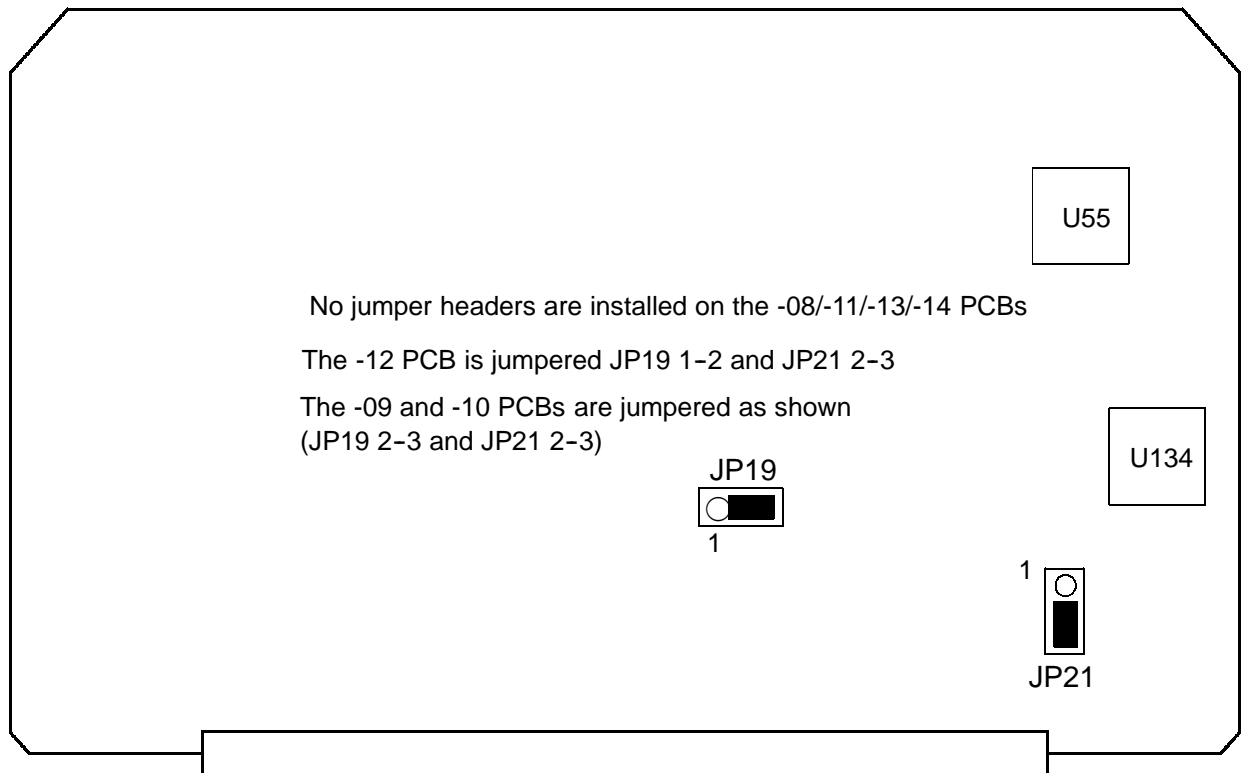


Figure 13-7. PSP1 Jumper and PROM Locations

13-9.24

A6B System CPU (CPU)

Part Number		Replacement Levels				Features		Notes
		33.09 thru 36.06	38.15 and up			Disk Link @ 33.27	Disk Link @ 34.17 and up	
7500-0759	04	C	-			Y	N	
	05	C	-			Y	N	
	07	C	-			N	N	
	08, 10	R	-			Y	Y	
	09	A	-			Y	Y	
3500-2677	01	-	A			Y	Y	1
	02	-	R			Y	Y	1

1. 3500-2677-XX comprises 7500-0759-09/10 PCB and two 16 MB SIMMs. Refer to 7500-0759-XX PCB silhouette for PROM locations.

13-9.25

A6B CPU PROMs

PCB		PROM Kit		Replacement Levels					Location, P/N, Dash			
Part No.		Part No.		33.09 thru 36.05	36.06	38.15	39.05 thru 45.04	46.04 and up				
7500-0759	04 05	8000-0994	05	R	-	-	-	-	U91	4201-1849	06	
									U79	4201-1850	06	
									U89	4201-1582	08	
		06	-	R	-	-	-	-	U91	4201-1849	07	
										U79	4201-1850	07
										U89	4201-1582	08
		8000-1196	01	R	-	-	-	-	U91	4201-1601	13	
									U79	4201-1602	13	
									U89	4201-1582	08	
7500-0759	07 08 09 10	8000-0994	05	R	-	-	-	-	U68/U91	4201-1849	06	
									U59/U79	4201-1850	06	
									U57/U89	4201-1582	08	
		06	-	R	-	-	-	-	U68/U91	4201-1849	07	
										U59/U79	4201-1850	07

PCB		PROM Kit		Replacement Levels					Location, P/N, Dash		
Part No.		Part No.		33.09 thru 36.05	36.06	38.15	39.05 thru 45.04	46.04 and up			
									U57/U89	4201-1582	08
3500-2677	01 02	8000-0994	07	-	-	R	-	-	U68	4201-1931	05
				U59	4201-1932	05					
				U57	4201-1582	08					
		8000-1308	01	-	-	-	R	R	U68	4201-1931	06
	U59			4201-1932	06						
	U57			4201-1582	08						
		8000-1688 ¹	02	-	-	-	-	R	U68	4201-2015	04
	U59			4201-2016	04						
	U57			4201-1582	08						

1. To be used only with new CPU ID chip (P/N 2070-1981-01).

13-9.26**A6B CPU PROM Checksums and CRCs**

PROM Part No.	Dash No.	Check-sum	CRC
4201-1582	08	4C23	CCA3
4201-1601	13	85A3	4ACD
4201-1602	13	8240	4ACD
4201-1849	06	D177	6EF3
4201-1849	07	18F5	16B5
4201-1850	06	0CC4	6EF3
4201-1850	07	3D3B	16B5
4201-1931	05	2132	7F26
4201-1931	06	3B0F	4BBB
4201-1932	05	D744	7F26
4201-1932	06	29C3	4BBB
4201-2015	04	EF4F	758D
4201-2016	04	38A3	758D

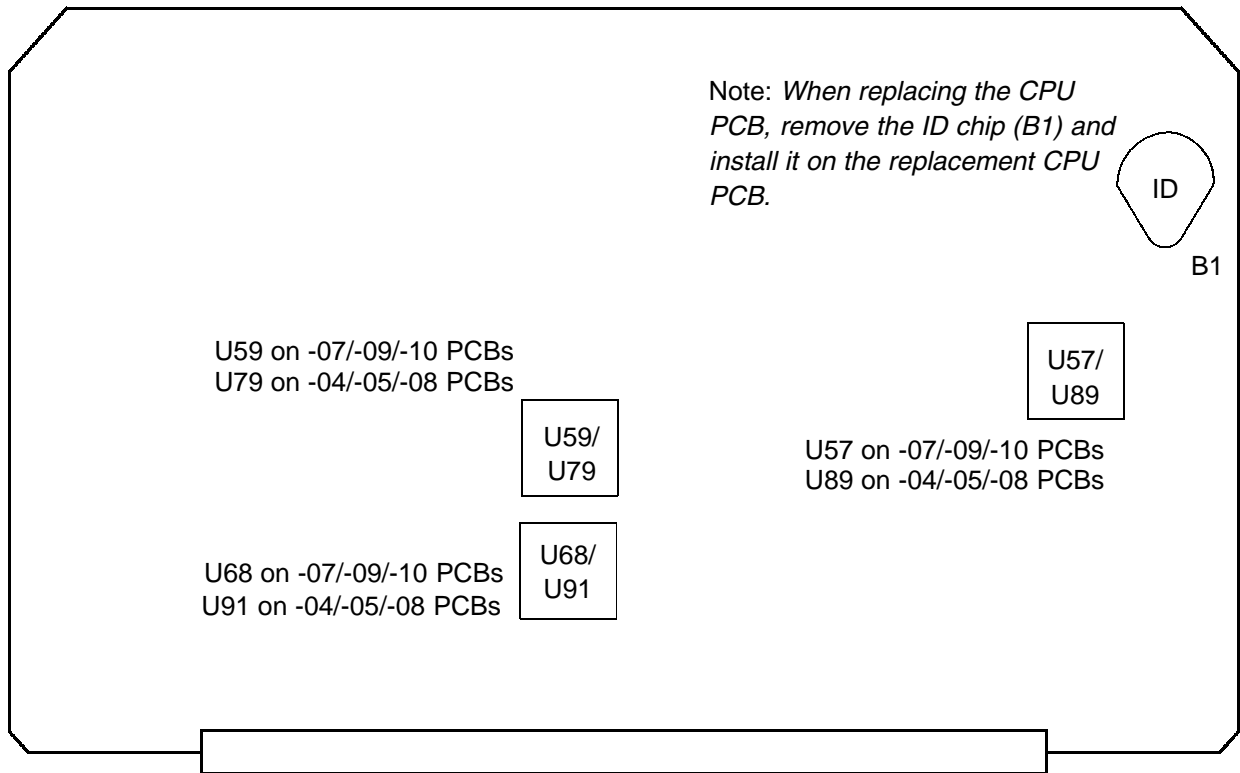


Figure 13-8. CPU PROM Locations (7500-0759-XX)

13-9.27

A8B Image Memory PCB (IMEM)

Part Number		Replacement Levels				Features		Notes
		33.09	33.27 and up			Disk Link	3D CPA	
7500-0931	02	R	A			Y	Y	32 MB
3500-1839	01	L	L			N	N	16 MB with SIMMs, 1
3500-1867	01	-	R			Y	N	32 MB with SIMMs, 2
3500-2757	01	-	R			Y	Y	64 MB with SIMMs, 3

1. 3500-1839-XX comprises 7500-0776-04 PCB and four 4 MB SIMMs.
2. 3500-1867-XX comprises 7500-0776-04 PCB and two 16 MB SIMMs.
3. 3500-2757-XX comprises 7500-0776-04 PCB and four 16 MB SIMMs.

13-9.28

A9B Adv. Digital, Aud., Physio, & Translator (ADAPTR)

Part Number		Replacement Levels			Features		Notes
		33.09 and up	39.05 and up	47.10 and up	ECG	Audio Imprv.	
7500-0761	04, 05	C	C	C	N	N	
	06, 07, 08	C	C	C	Y	N	
	10, 11	A	A	C	Y	Y	
	12, 13	R	R	C	Y	Y	1
7500-1328	01, 02,	-	R	C	Y	Y	
	03, 04	N	N	R	Y	Y	Do not use below SW level 47.10

1. Includes microphone audio fix.

13-9.29

A9B ADAPTR PROMs

PCB		PROM Kit		Replacement Levels					Location, P/N, Dash		
Part No.		Part No.		33.09 and up	39.05 and up	47.10 and up					
7500-0761	04	8000-0995	03	R	-	-			U57	4201-1693	08
	05								U59	4201-1582	08
	07										
	11										
	13										
	06	8000-0995	03	R	-	-			U52	4201-1693	08
	08								U56	4201-1582	08
	10										
	12										
7500-1328	01	8000-0995	03	-	R	-			U57	4201-1693	08
	02							U59	4201-1582	08	
		03	8000-0995	03	-	-	R		U57	4201-1693	08
		04							U59	4201-1582	08

13-9.30**A9B ADAPTR PROM Checksums and CRCs**

PROM Part No.	Dash No.	Check-sum	CRC
4201-1582	08	4C23	CCA3
4201-1693	08	71CB	63A5

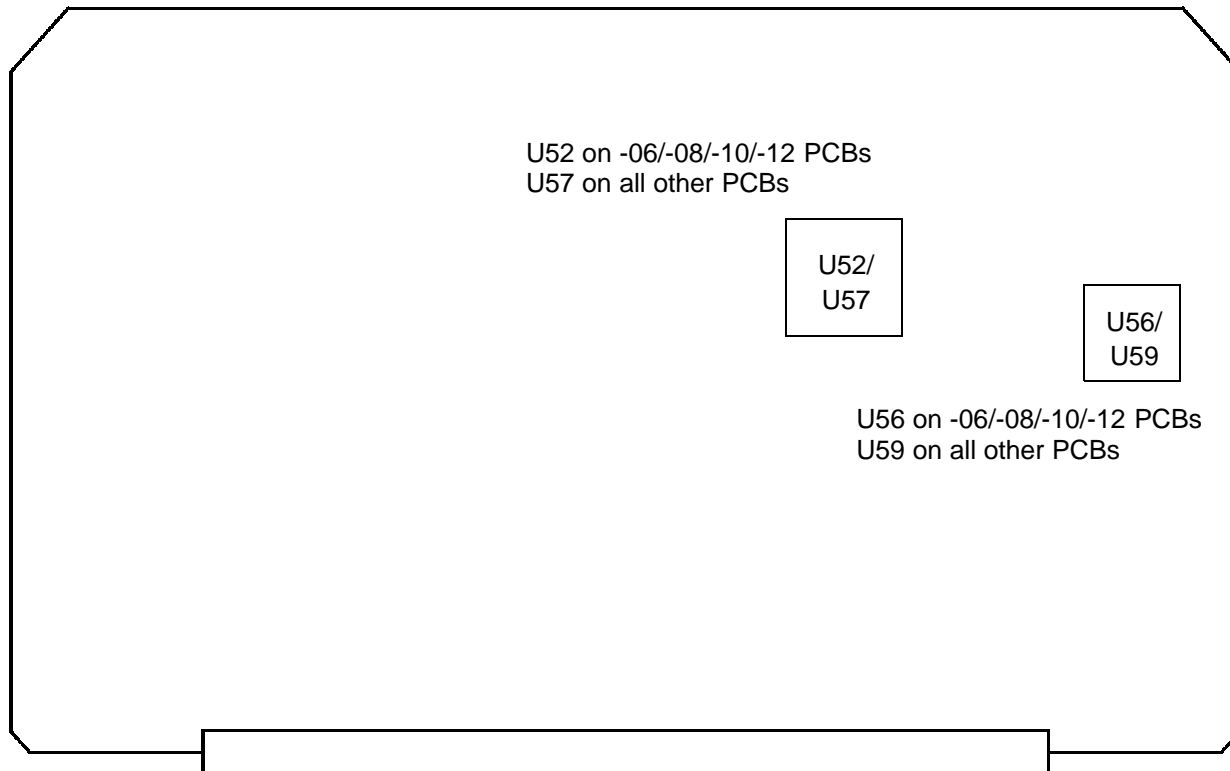


Figure 13-9. ADAPTR Jumper and PROM Locations

13-9.31

A11B Sample Space Processor (SSP)

7500-0768	Replacement Levels					Features		
Dash No.	33.09 and up	39.08 and up	40.16 and up			Triple Mode		Notes
05	P	P				N		Purge
06	C	C				N		
07	R	R				Y		
08, 09	-	R				Y		
10	-	-	R			Y		

13-9.32**A11B SSP PROMs**

7500-0768	PROM Kit		Replacement Levels				Location, P/N, Dash			
Dash No.	Part No.		33.09 and up							
06, 07, 08, 09, 10	8000-0997	02	R					U32	4201-1694	07
								U113	4201-1582	08

13-9.33**A11B SSP PROM Checksums and CRCs**

PROM Part No.	Dash No.	Check-sum	CRC
4201-1582	08	4C23	CCA3
4201-1694	07	8956	99CD

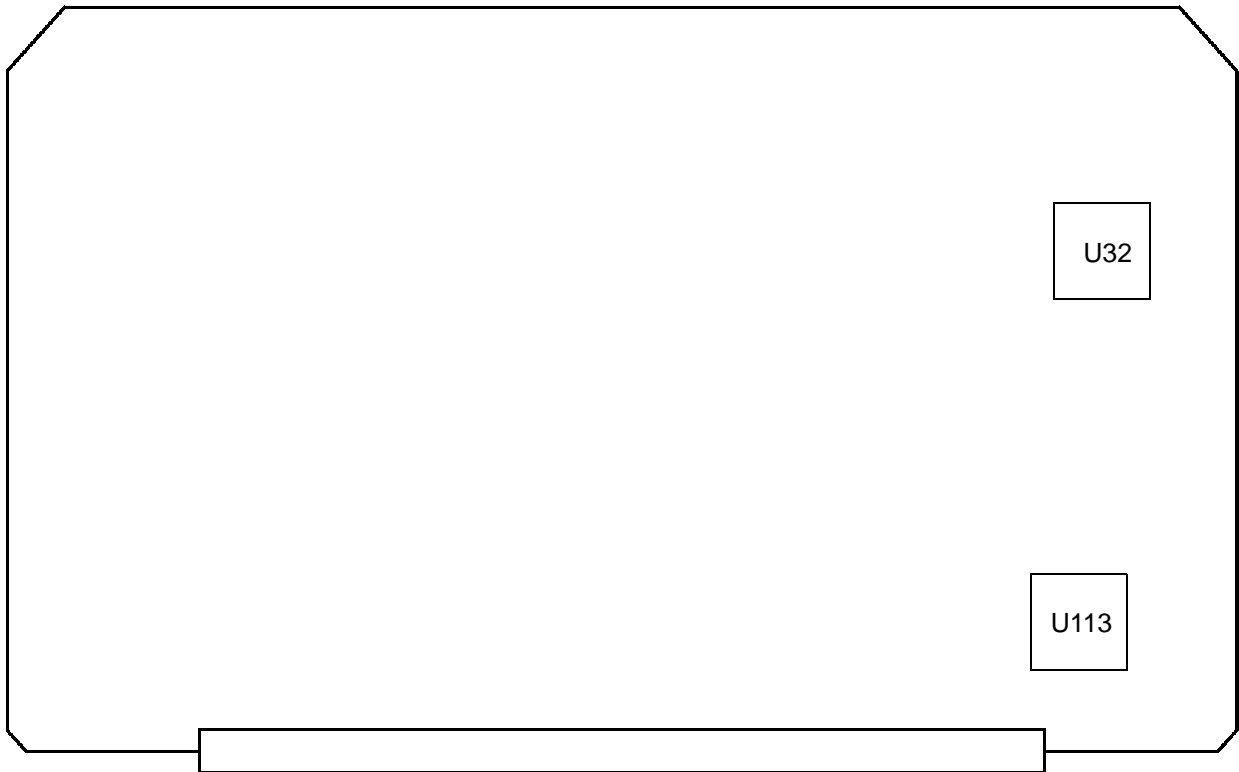


Figure 13-10. SSP PROM Locations

13-9.34**A13B Advanced IF Output Module (AIFOM)**

Part Number		Replacement Levels				Features		Notes
		33.09 and up						
7500-0769	05	A						
7500-0965	01, 02	P						
	03, 05	R						

13-9.35

A13B AIFOM PROMs

		PROM Kit		Replacement Levels							
Part No.		Part No.		33.09 thru 33.27	34.17 and up				Location, P/N, Dash		
7500-0769	05	8000-0998	02	R	A				U24	4201-1692	07
									U53	4201-1582	08
			03	-	R				U24	4201-1692	08
									U53	4201-1582	08
7500-0965	01 02 03 05	8000-0998	02	R	A				U32	4201-1692	07
									U48	4201-1582	08
			03	-	R				U32	4201-1692	08
									U48	4201-1582	08

13-9.36**A13B AIFOM PROM Checksums and CRCs**

PROM Part No.	Dash No.	Check-sum	CRC
4201-1582	08	4C23	CCA3
4201-1692	07	E844	FA5A
	08	F577	A9A6

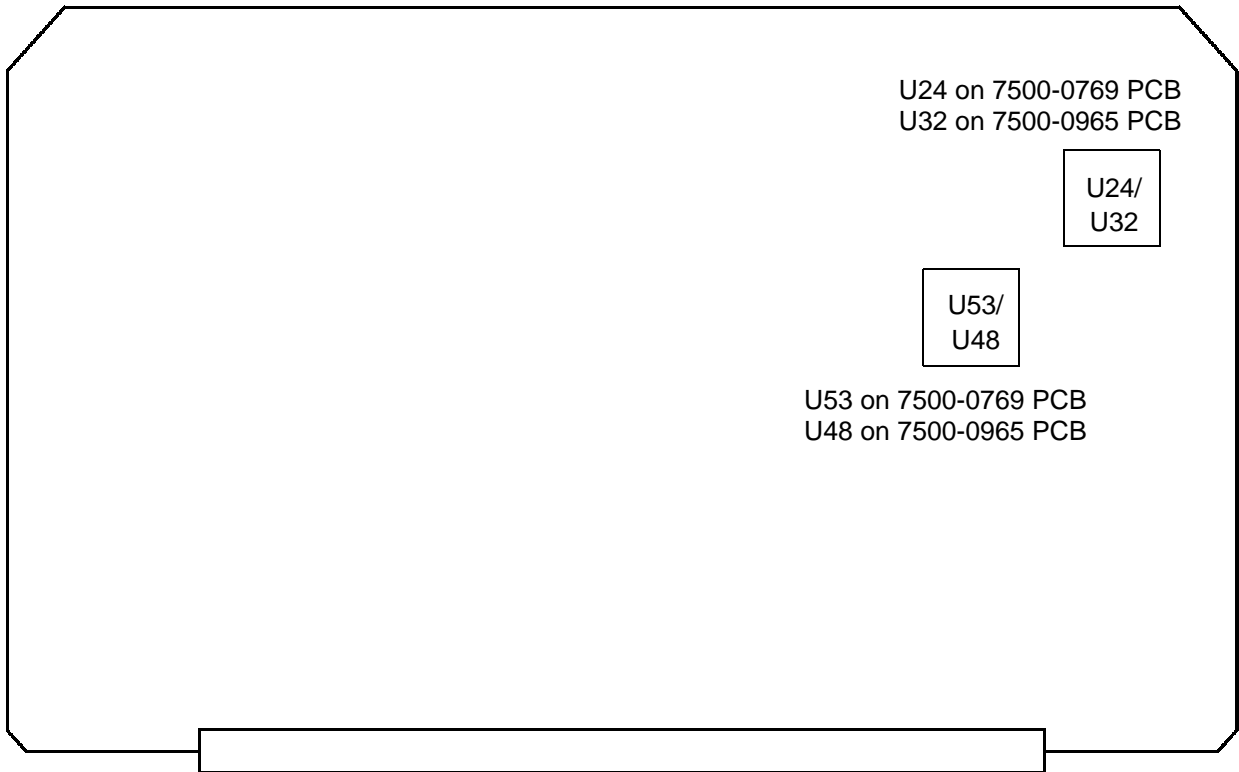


Figure 13-11. AIFOM PROM Locations

13-9.37

Control Interface Module (CIM)

7500-0674	Replacement Levels					Features		Notes
Dash No.	33.09 and up					Goose-neck Light		
05	R					N		
06	R					Y		
07	A					Y		

13-9.38

CIM PROMs

7500-0674	PROM KIT		Replacement Levels					Location, P/N, Dash		
Dash No.	Part No.		33.09 and up							
05, 06, 07	8000-1000	02	R					U40	4201-1683	08

13-9.39

CIM PROM Checksum

PROM Part No.	Dash No.	Check-sum	CRC
4201-1683	08	BC99	-

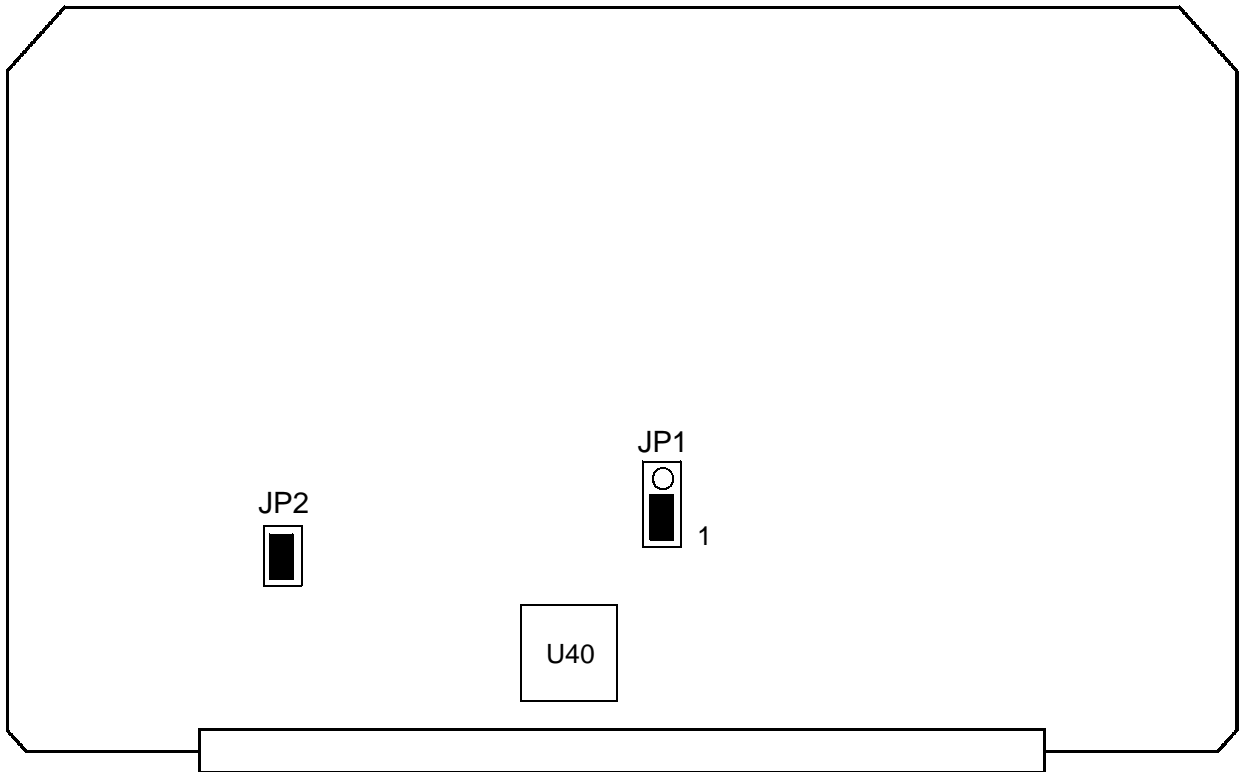


Figure 13-12. CIM Jumper and PROM Locations

13-9.40

PS5 AC Input Module (ACIM)

Part Number		Replacement Levels				Features		Notes
		33.09	33.27 and up					
3500-1577	01	-	R					100-120 Vac/50 Hz
3500-1578	02	A	A					120 Vac/60 Hz
	03	R	A					
	04 ¹	A	A					
	05	-	R					100-120 Vac/60 Hz
3500-1579	02 ¹	A	A					240 Vac/50 Hz
	03	R	R					
3500-1580	01	R	R					230 Vac/60 Hz

1. Not EMI compliant.

13-9.41

Centerplane PCB (CTRBRD)

Part Number		Replacement Levels				Features		Notes
		33.09 and up						
3500-1496	02	A					1	
	03	R					2	

1. Contains 7500-0858-02 Front and 7500-0859-02 Rear Centerplane PCBs.
2. Contains 7500-0858-03 Front and 7500-0859-03 Rear Centerplane PCBs.

13-9.42

Scanhead Select Module (S/HSEL)

Part Number		Replacement Levels				Features		Notes
		33.09 and up				4/8 Chan PCBs		
7500-0822	02	R				8		1
7500-0976	01	A				4		2
	02	R				4		2

1. Requires 7500-0819 Channel PCBs, 7500-0770 AIM PCB. Cannot be used with PCBs listed in Note 2. Channel Board Kit 8000-1130-xx contains the 0819 Channel PCBs, 0770 AIM PCB, and 0822 S/HSEL PCB.
2. Requires 7500-0974 Channel PCBs, 7500-0977 AIM PCB, and 7500-0976 Scanhead Select PCB. Cannot be used with PCBs listed in Note 1. Channel Board Kit 8000-1131-xx contains the 0974 Channel PCBs, 0977 AIM PCB, and 0976 S/HSEL PCB.

13-9.43

Upper User Interface Assembly (Control Panel), English

Part Number		Replacement Levels				Disk Link		Notes
		33.09 thru 39.05	39.08 and up					
3500-1645	02	A	-			N		1
	03	A	-			N		1
	04	R	C			Y		1
	05	R	R			Y		1

1. With 31.03 software and higher, the -03 Lower UIF must be used with the -02 Upper UIF, the -04 Lower UIF must be used with the -03 Upper UIF, and the -05 Lower UIF must be used with the -04 or -05 Upper UIF.

13-9.44

Lower User Interface Assembly (Control Panel), English

Part Number		Replacement Levels				Disk Link		Notes
		33.09 thru 39.05	39.08 and up					
3500-1644	02	A	-			N		1
	03	A	-			N		1
	04	A	-			Y		1
	05	R	R			Y		1
	06	R	R			Y		1
	07	R	R			Y		1

1. With 31.03 software and higher, the -03 Lower UIF must be used with the -02 Upper UIF, the -04 Lower UIF must be used with the -03 Upper UIF, and the -05, -06 and -07 Lower UIF must be used with the -04 or -05 Upper UIF.

13-9.45

Upper User Interface Assembly (Control Panel), French

Part Number		Replacement Levels				Disk Link		Notes
		33.09 thru 39.05	39.08 and up					
3500-1654	02	A	-			N		1
	03	A	-			N		1
	04	R	C			Y		1
	05	R	R			Y		1

1. With 31.03 software and higher, the -03 Lower UIF must be used with the -02 Upper UIF, the -04 Lower UIF must be used with the -03 Upper UIF, and the -05 Lower UIF must be used with the -04 or -05 Upper UIF.

13-9.46

Lower User Interface Assembly (Control Panel), French

Part Number		Replacement Levels				Disk Link		Notes
		33.09 thru 39.05	39.08 and up					
3500-1652	02	A	-			N		1
	03	A	-			N		1
	04	A	-			Y		1
	05	R	R			Y		1
	06	R	R			Y		1
	07	R	R			Y		1

1. With 31.03 software and higher, the -03 Lower UIF must be used with the -02 Upper UIF, the -04 Lower UIF must be used with the -03 Upper UIF, and the -05, -06 and -07 Lower UIF must be used with the -04 or -05 Upper UIF.

13-9.47

Upper User Interface Assembly (Control Panel), German

Part Number		Replacement Levels				Disk Link		Notes
		33.09 thru 39.05	39.08 and up					
3500-1655	02	A	-			N		1
	03	A	-			N		1
	04	R	C			Y		1
	05	R	R			Y		1

1. With 31.03 software and higher, the -03 Lower UIF must be used with the -02 Upper UIF, the -04 Lower UIF must be used with the -03 Upper UIF, and the -05 Lower UIF must be used with the -04 or -05 Upper UIF.

13-9.48

Lower User Interface Assembly (Control Panel), German

Part Number		Replacement Levels				Disk Link		Notes
		33.09 thru 39.05	39.08 and up					
3500-1653	02	A	-			N		1
	03	A	-			N		1
	04	A	-			Y		1
	05	R	R			Y		1
	06	R	R			Y		1
	07	R	R			Y		1

1. With 31.03 software and higher, the -03 Lower UIF must be used with the -02 Upper UIF, the -04 Lower UIF must be used with the -03 Upper UIF, and the -05, -06 and -07 Lower UIF must be used with the -04 or -05 Upper UIF.

13-9.49**Upper User Interface Assembly (Control Panel),
Italian**

Part Number		Replacement Levels				Features		Notes
		45.04 and up						
3500-2860	01	R						

13-9.50**Lower User Interface Assembly (Control Panel),
Italian**

Part Number		Replacement Levels				Features		Notes
		45.04 and up						
3500-2859	02	R						

13-9.51

Lower User Interface Assembly (Control Panel), Danish

Part Number		Replacement Levels				Features		Notes
		45.04 and up						
3500-2909	01	R						1

1. Use the 3500-2909-01 Danish Lower UIF with the 3500-1645-05 English Upper UIF.

13-9.52

Lower User Interface Assembly (Control Panel), Norwegian

Part Number		Replacement Levels				Features		Notes
		45.04 and up						
3500-2910	01	R				Y		1

1. Use the 3500-2910-01 Norwegian Lower UIF with the 3500-1645-05 English Upper UIF.

13-9.53

Lower User Interface Assembly (Control Panel), Swedish

Part Number		Replacement Levels				Features		Notes
		45.04 and up						
3500-2911	01	R				Y		1

1. Use the 3500-2911-01 Swedish Lower UIF with the 3500-1645-05 English Upper UIF.

13-9.54

Scanhead Matrix

Scanhead Type/ Scanhead Name	Part Number	Dash Number			No. Elem.	Hardware Notes	S/W Comp. ²
		Cur- rent	Bkwd Comp. ¹	EMC ³			
PHASED ARRAY							
P3-2 20 mm	4000-0287	04	03/02	04	64		23.05
P5-3 16 mm	4000-0316	05	04/03/02	05/04	64	Biopsy guide avail.	23.05
P7-4 8 mm	4000-0322	03	02/01	03/02	64	Biopsy guide avail.	23.05
MPT7-4	4000-0317	08/09	07/04/03	-	64		32.04

Scanhead Type/ Scanhead Name	Part Number	Cur- rent	Bkwd Comp. ¹	EMC ³	No. Elem.	Hardware Notes	S/W Comp. ²
BPT9-5	4000-0420	01	-	01	2x64		40.23
BROADBAND LINEAR ARRAY							
L7-4	4000-0318	05	04/03/ 02/01	05	128	Biopsy guide avail.	23.05
LAP L9-5	4000-0658	04	-	-	128		46.04
LI9-5	4000-0408	01	-	-	128		35.10
L10-5	4000-0263	06	05/03/02	-	192	Biopsy guide avail.	23.05
L10-5	4000-0333	02	01	02	192	Biopsy guide avail.	23.05
L12-5 38 mm	4000-0396	02	-	01	192	Biopsy guide avail.	39.05
L12-5 50 mm	4000-0762	01	-	01	256	Biopsy guide avail.	47.08
CL10-5	4000-0315	05	04/03/ 02/01	05/04	128		23.05
CURVED ARRAY							
C3.5 76R	4000-0256	07	06/05/04	-	128	Biopsy guide avail.	23.05
C4-2 40R	4000-0320	06	05/03/02	03	128	Biopsy guide avail.	23.05
C5-2 40R	4000-0574	03	02/01	-	128	Biopsy guide avail.	40.16
C5 IVT	4000-0260	05	04	05	114	Biopsy guide avail.	23.05

Scanhead Type/ Scanhead Name	Part Number	Cur- rent	Bkwd Comp. ¹	EMC ³	No. Elem.	Hardware Notes	S/W Comp. ²
C7-4 40R	4000-0301	06	05/03/02	03	128	Biopsy guide avail.	23.05
C8-4v 11mm	4000-0409	02	-	02	128	Biopsy guide avail.	35.10
CT8-4 40mm	4000-0390	03	02	-	128		34.17
CVA C8-5 14R	4000-0676	03	-	02	128	Biopsy guide avail.	36.03
C9-5 ICT	4000-0280	12/11/ 10/09	09/07/ 06/05	12/11/ 10/09	128	Biopsy guide avail.	23.05
STATIC CW							
D2 TC	4000-0310	02	01	02	2		23.05
D2 CW	4000-0307	03	-	03	2		30.05
D5 CW	4000-0308	02	-	02	2		23.05
D10 CW	4000-0309	02	-	02	2		23.05

1. The “Bkwd Comp.” column lists dash numbers that are backward compatible with the listed scanhead.
2. The “S/W Comp.” column lists the minimum software build level required for use of the listed scanhead.
3. 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.

13-9.55**Scanhead Biopsy Guides**

Biopsy Guide	Part No.	Dash No.	Bkwd. Comp.¹	Fwd. Comp.	Hardware Notes	S/W Comp.²
Biopsy Guide Kit, P5-3	8000-1526	01				40.16
Biopsy Guide Kit, P7-4	8000-1527	01				40.16
Biopsy Guide Bracket L7-4, 38 mm, 5 MHz	1065-1910	02				24.09
Biopsy Guide Bracket L10-5, 38 mm, 7.5 MHz	1065-1908	02				24.09
Biopsy Guide Kit L12-5, 38 mm	2950-1211	01				39.05
Biopsy Guide Kit L12-5, 50 mm	8000-1739	01				47.08
Biopsy Guide Bracket C3.5, 76R, 3.5 MHz	1065-1907	02				24.09
Biopsy Guide Bracket C4-2 40R/C5-2 40R/C7-4	1065-1909	02				24.09

Biopsy Guide	Part No.	Dash No.	Bkwd. Comp.¹	Fwd. Comp.	Hardware Notes	S/W Comp.²
Biopsy Guide Bracket, C9-5 ICT	1065-1811	02			No longer sold. Supplies still avail.	24.09
Biopsy Guide Bracket, C5 IVT	8075-0580	02				24.09
Universal Biopsy Guide, C9-5 ICT	1065-2608	04	03, 02, 01			30.05
Biopsy Guide Kit, C8-4v	8000-1304 1065-2731	01 01				35.10
Biopsy Guide Kit, C8-5	1065-4585	01				36.03

1. The “Bkwd Comp.” column lists dash numbers that are backward compatible with the listed scanhead.
2. The “S/W Comp.” column lists the minimum software build level required for use of the listed scanhead.

14 *Parts*

14-1

Introduction

This section is intended to list the current recommended field replaceable parts for the HDI 3000 system. Replacement parts selections that are dependent upon system features must be made from the replacement matrices in [Section 13, “Configuration”](#).

Use the figures and tables in this section to locate and identify system parts. The tables are keyed to the figures: The index numbers in the tables correspond to the callouts on the figures. Use the part number and description provided 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

Customer Service Representatives

For parts ordering procedures, CSRs should refer to their Standard Operating Procedures.

Customers

Customers may order parts through a CSR or, if located in the United States, directly from the ATL Customer Service Order Processing Department. Customers ordering parts through a CSR will need to provide the following information:

- Shipping address
- Purchase order number of equipment
- Part numbers or sales order numbers
- Part descriptions
- Quantity

14-2.1

Table Definitions

Index Number

The index number (or locator number) cross-references a particular part or subassembly found in an illustration with its part number and description in the table.

Part Number

This column lists the part number for each item. Use this number when ordering parts. If the part number ends in “-XX” instead of a dash number, the correct dash number must be located using the Configuration section ([Section 13](#)).

If an item does not include a part number, this indicates that the item is included for reference but is not a field replaceable part.

Part Description

The name of the item or part is listed here. The description column also provides a breakdown of the equipment into its assemblies, subassemblies, and individual component parts through use of bulleted indented items. The bulleted indented items show the relationship of parts to their next higher assemblies.

Attaching parts are listed following the assemblies, subassemblies, and component parts they attach. Attaching parts for the assemblies, subassemblies, and component parts are listed with an asterisk preceding the description of the attaching part. Attaching parts must be ordered separately (i.e. they are not provided with the assembly, subassembly, or component being attached).

Top assemblies (items with no replaceable parts) do not have a bullet. Top assembly components or subassemblies are indented by one bullet (•). Those parts are included in the next higher assembly, but may be ordered separately. Subassembly components are indented with two bullets (••). Those parts are included in the next higher subassembly, but also may be ordered separately. For example:

Assembly

•

Subassembly

••

Lower-level subassembly or component

*

Attaching part for assembly, subassembly, or component

Where appropriate, the description column also includes size, tolerance, type or model, and material data for the part.

Qty (Quantity)

The Qty column lists the quantity of the listed item in the top level assembly.

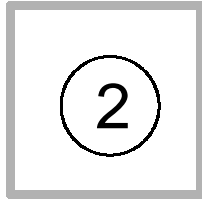
Notes/Reference

Miscellaneous information pertaining to a specific part may be shown in the Notes/Reference column. If the word “alternate” appears in the Notes/Reference column, that particular part is an alternate part for the part preceding it. “Equivalent” indicates that the part number has changed, but the physical part is the same.

14-2.2

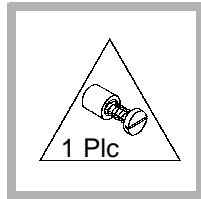
Figure Definitions

Index Number



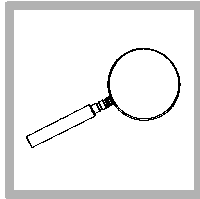
The index number (or locator number) cross-references a particular part or subassembly shown in an illustration with its part number and description in the table.

Triangle Symbol

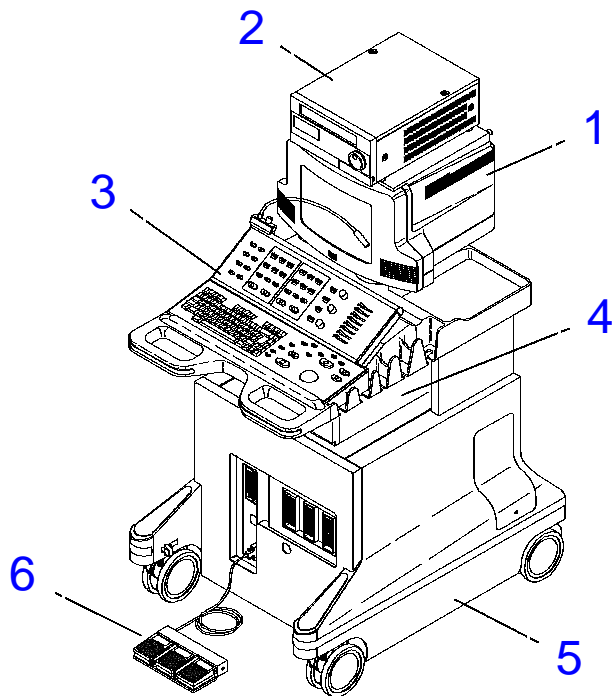


A triangle symbol next to a part indicates the part attaches by means of captive screws. The number of captive screws per part is also shown within the triangle symbol (“1 Plc” indicates the part is used one place; “2 Plcs” indicates the part is used two places, etc.).

Magnify Symbol



A magnifying glass symbol is used on illustrations where enlargement was required for more clarity.



See [Table 14-1](#)

Figure 14-1. HDI 3000 Main Components and Options

Table 14-1. HDI 3000 Main Components and Options

Figure 14-1

Index Number	Part Number	Part Description	Qty	Notes/ Reference
1	-	Video Monitor Assy	1	Table 14-10 Table 14-12
2	3500-1662-02	OEM, Panasonic MD830 VCR (Optional)	1	OEMs and cables on Table 14-18
3	-	User Interface Assy	1	Table 14-15 Table 14-16
4	-	Integrated Stress Echo Module (Optional)	1	Table 14-17
	-	OEMs, Printers, Cameras, etc. (Optional)	-	Table 14-18
5	-	Cart Weldment	1	
6	3500-1535-01	Footswitch, 3-Position	1	
	3500-1730-01	Footswitch, 4-Position	1	Alternate

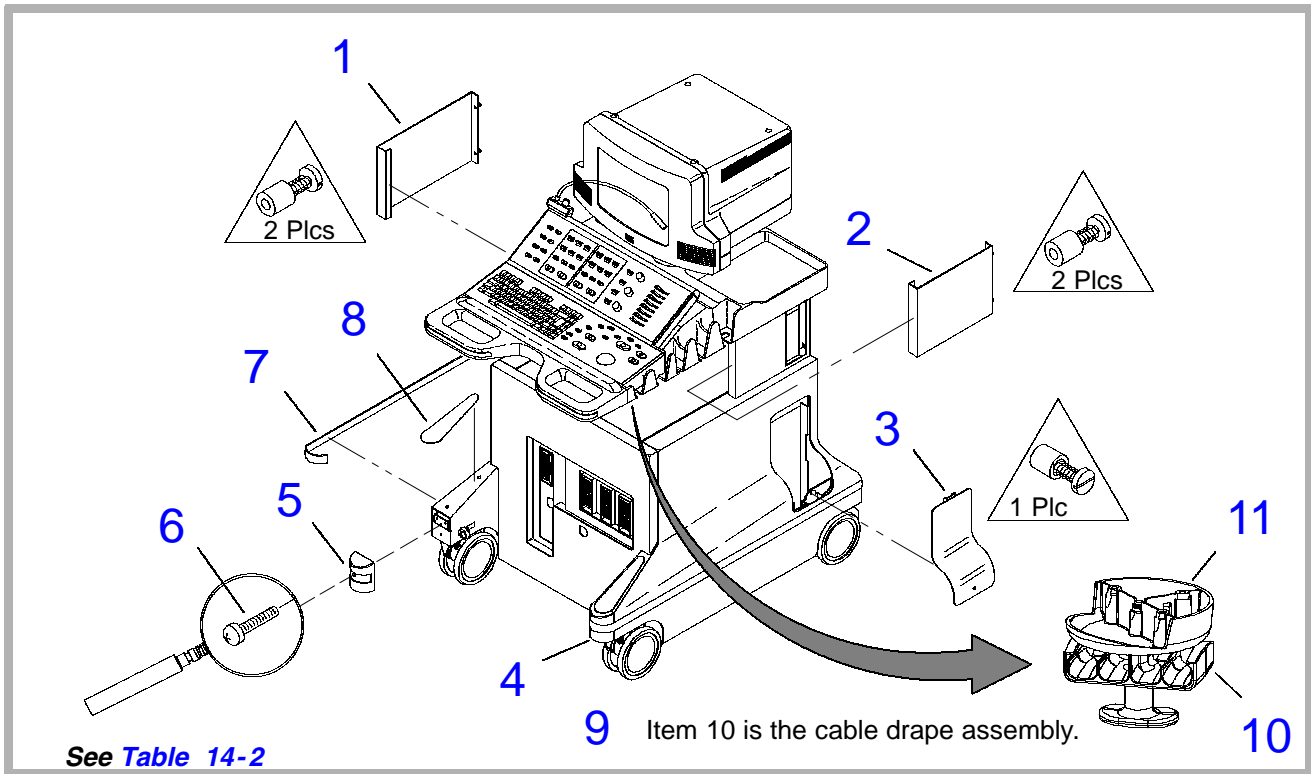


Figure 14-2. HDI 3000 System, External Small Parts (1 of 2)

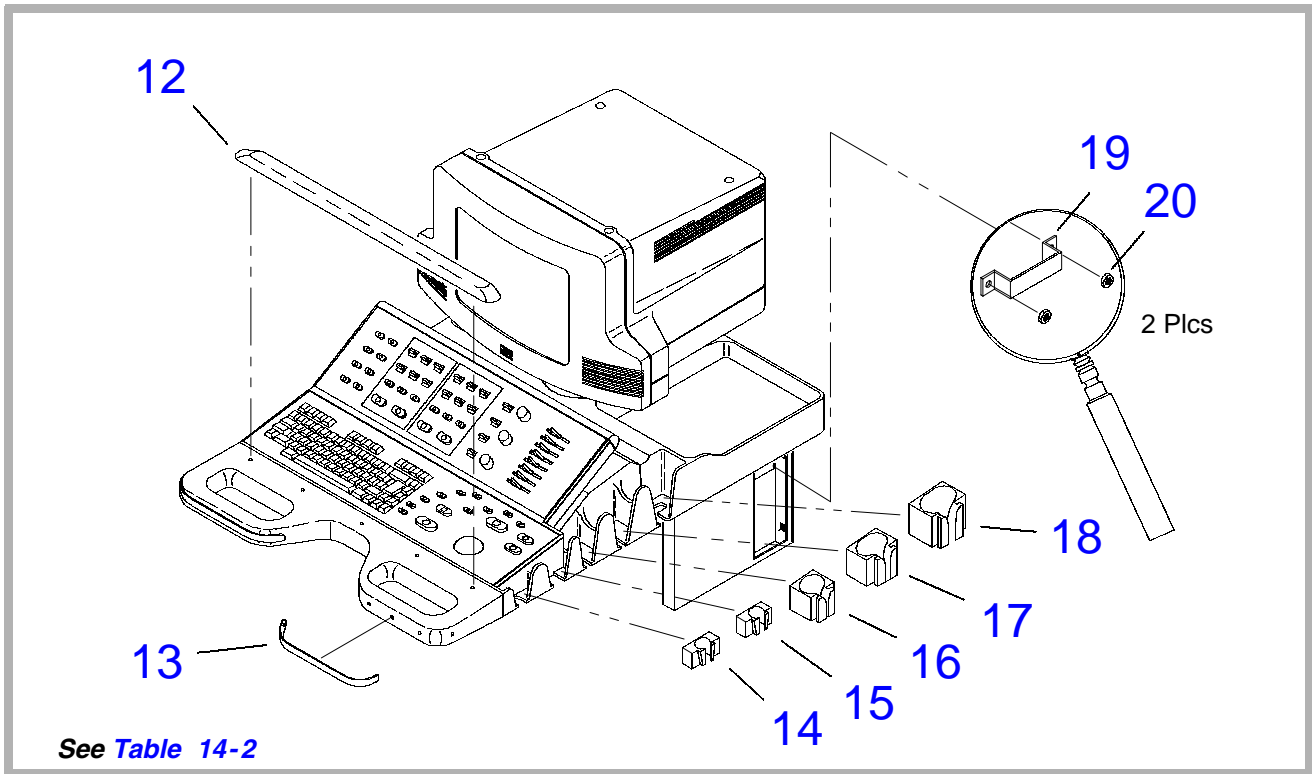


Figure 14-3. HDI 3000 System, External Small Parts (2 of 2)

Table 14-2. HDI 3000 System, External Small Parts

Figure 14-2 (1 of 2)

Index Number	Part Number	Part Description	Qty	Notes/ Reference
1	1065-4909-02	Panel, Side, Left, Dark Gray	1	
	1065-4911-02	Panel, Side, Left, CV Systems, Dark Gray	1	
2	1065-4908-02	Panel, Side, Right, Dark Gray	1	
	1065-4910-02	Panel, Side, Right, CV Systems, Dark Gray	1	
3	1065-2254-04	Panel, IIM Access	1	
	1065-2254-03	Panel, IIM Access	1	Alternate
4	1065-2541-02	Bumper Cap, Right (item 6 is attach. part)	1	
	1065-2721-01	Bumper Cap, Right (item 6 is attach. part)	1	Alternate
	1065-4694-01	Bumper Cap, Right	1	Alternate
5	1065-2542-02	Bumper Cap, Left	1	
	1065-2720-01	Bumper Cap, Left	1	Alternate
	1065-4695-01	Bumper Cap, Left	1	Alternate

Index Number	Part Number	Part Description	Qty	Notes/Reference
6	1518-0051	* Screw, 10/32 x 1/2, Panhead	2	
7	1065-4705-01	Bumper, Side Strap, Dark Gray	2	
8	1065-4638-01	Pad, Foot Rest, Dark Gray	2	
9	3500-1834-01	Cable Drape Assy	1	
10	1065-2899-01	● Rotor, Cable Manager	1	
11	1065-2901-01	● Support, Cable Manager	1	
Figure 14-3 (2 of 2)				
12	3500-2739-01	Wrist Support, Self-Adhesive, Dark Gray	1	
	1065-2972-01	● Insert, Wrist Support	1	Not shown
	1065-2998-01	● Retainer, Push-In	1	Not shown
	1065-2823-01	● Wrist Support	1	Not shown
13	1065-4637-02	Bumper, Handle, Self-Adhesive, Dark Gray	2	
14	1065-2612-02	Insert, Scanhead Holder (HT-A Pocket)	1	
15	1065-2613-02	Insert, Scanhead Holder (HT-B Pocket)	1	
16	1065-2614-02	Insert, Scanhead Holder (HT-1 Pocket)	1	

Index Number	Part Number	Part Description	Qty	Notes/ Reference
17	1065-2615-02	Insert, Scanhead Holder (HT-2 Pocket)	1	
18	1065-2616-02	Insert, Scanhead Holder (HT-3 Pocket)	1	
19	1065-2370-02	Cable Keeper (Behind items 1 and 2)	2	
20	1541-0002	* Nut, 6-32, Keps	4	

1. Part is no longer available in light gray color. Mix-and-match light gray and dark gray bumpers and covers as accepted by the user.

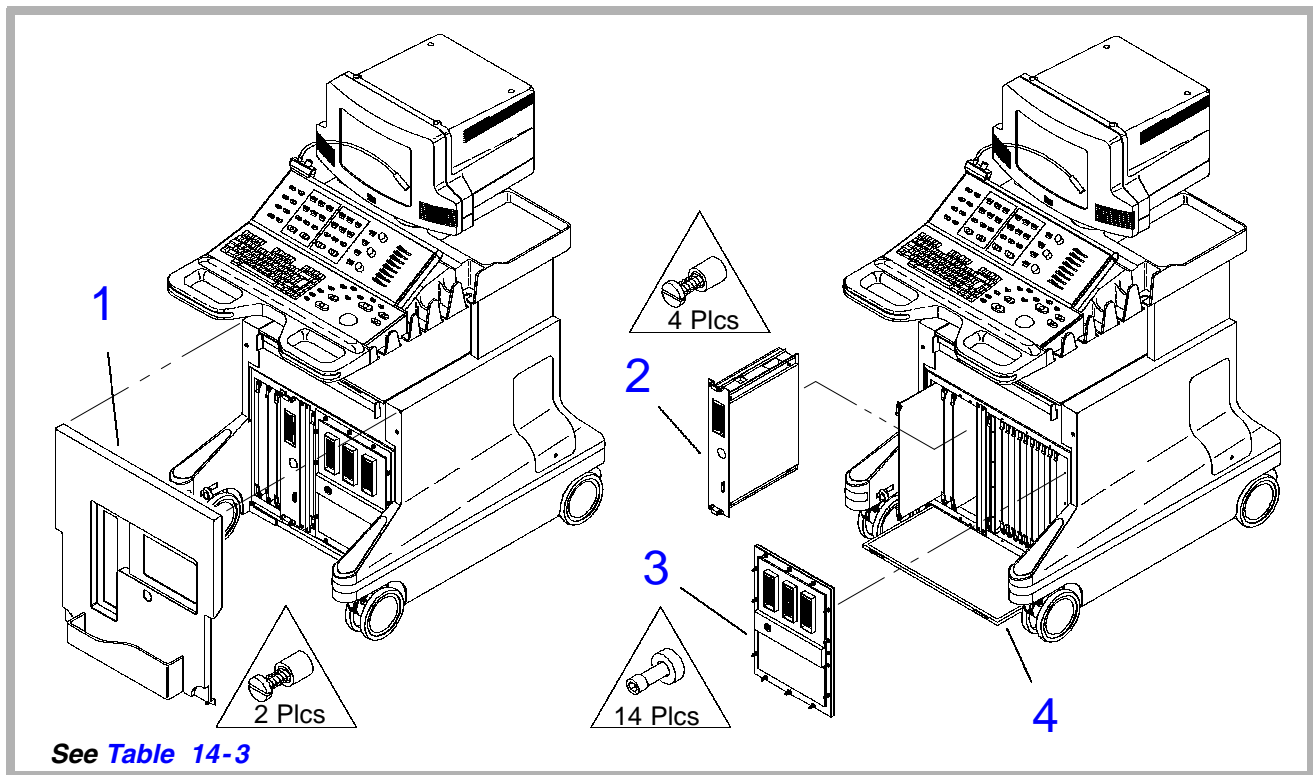


Figure 14-4. HDI 3000 System, Front (1 of 2)

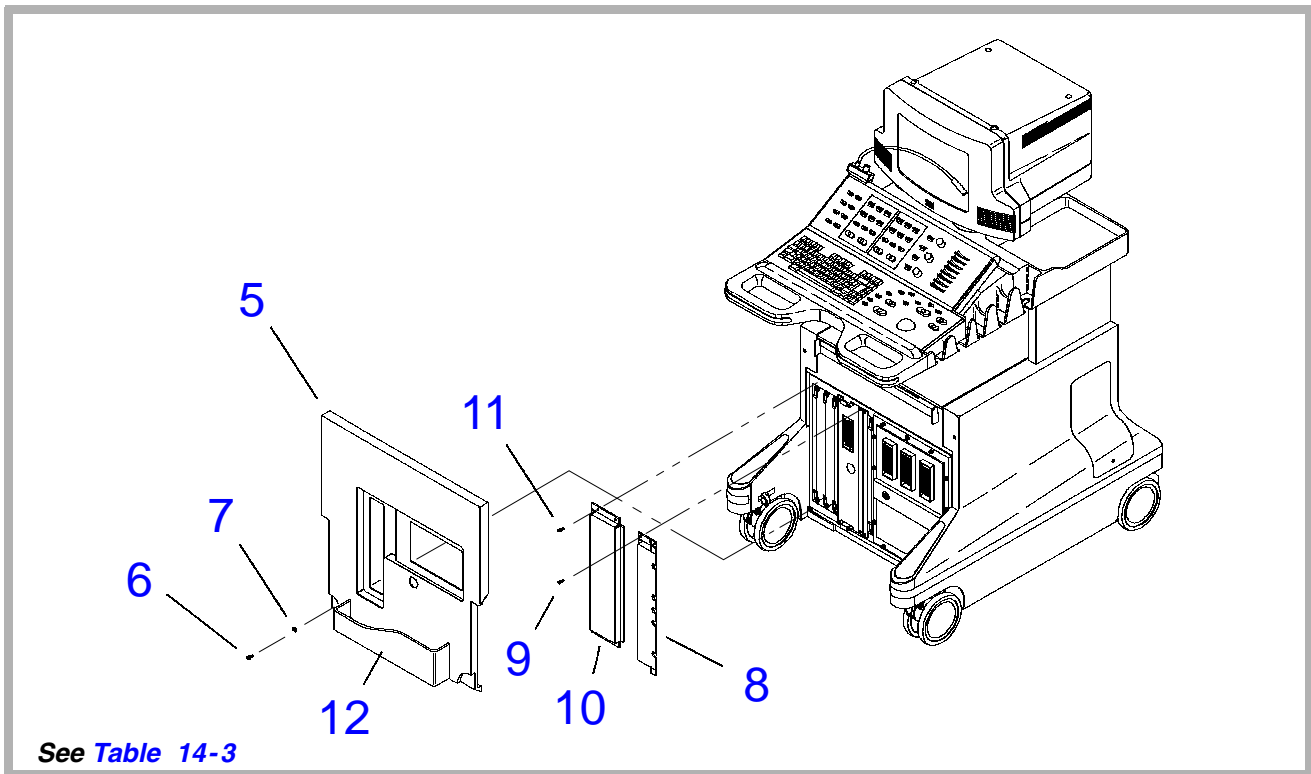


Figure 14-5. HDI 3000 System, Front (2 of 2)

Table 14-3. HDI 3000 System, Front

Figure 14-4 (1 of 2)

Index Number	Part Number	Part Description	Qty	Notes/ Reference
1	3500-1692-03	Cover, Front Enclosure Assy (replace with items 5-11)	1	
2	-	A1F DDEA - Disk Drive Module	1	Table 14-5
3	-	S/HSEL - S/H Select MUX	1	Table 14-5
4	2950-1148-01	Air Filter, Plastic	1	
	1065-2353-01	Air Filter, 23 x 20.3 x 0.43, 30 PPI	1	

Figure 14-5 (2 of 2)

5	3500-1871-02	Cover, Front Assy	1	
	3500-2850-02	Cover, Front Assy	1	Alternate
6	1518-0043	* Screw, 10-32 x 3/4, Pnh, Pd, St, Zn	2	
7	1560-0051	* Washer, Fl,#10, 0.0203ID, 0.5OD, St, Zn	2	
8	3500-1876-01	Shield Assy, Card Cage, Front Right	1	
9	1516-0113	* Screw, 6-32 x 1	4	

Index Number	Part Number	Part Description	Qty	Notes/ Reference
10	3500-1877-01	Shield Assy, Card Cage, Front Left	1	
11	1516-0113	* Screw, 6-32 x 1	4	
12	1065-2953-01	Tray, Enclosure	1	

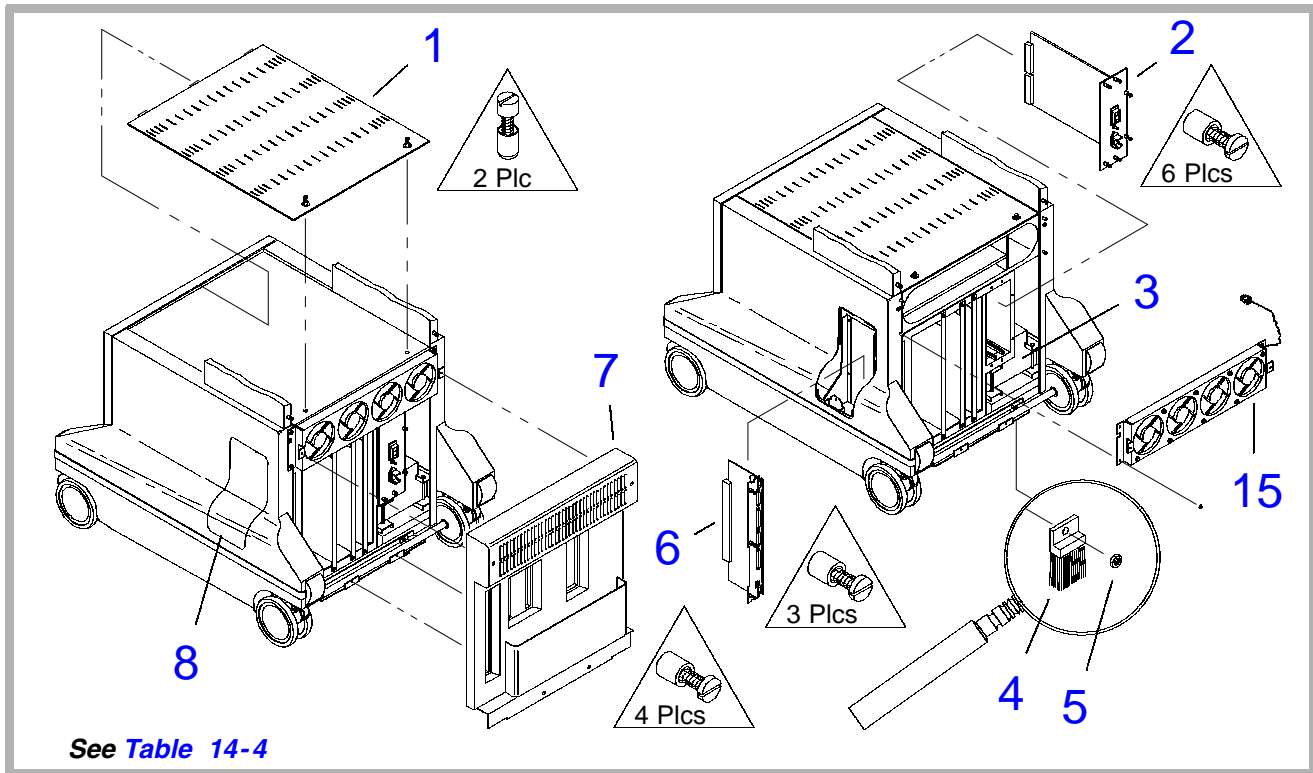
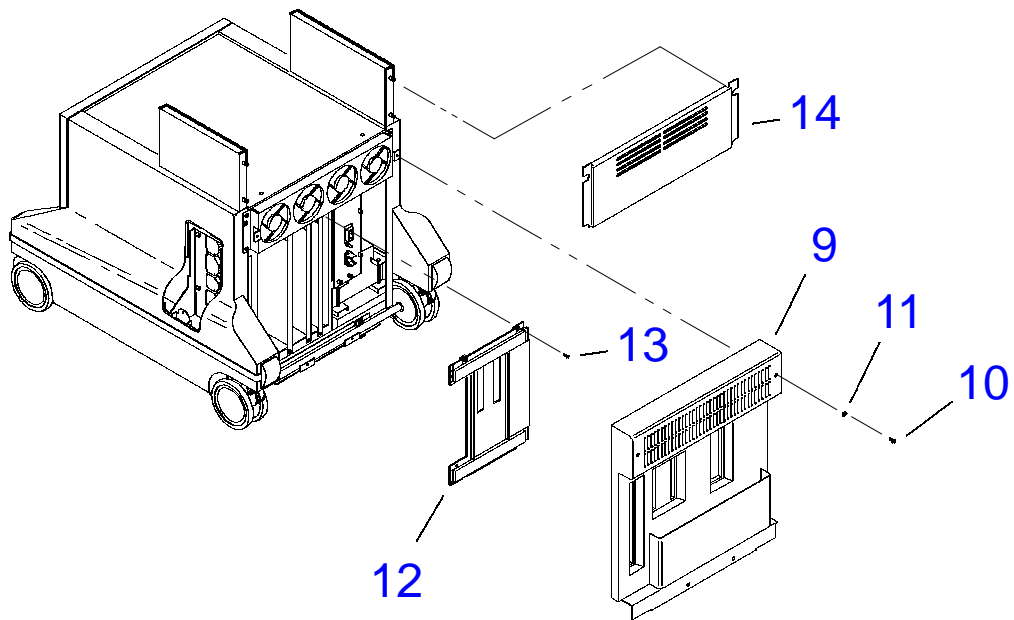


Figure 14-6. HDI 3000 System, Rear (1 of 4)



See [Table 14-4](#)

Figure 14-7. HDI 3000 System, Rear (2 of 4)

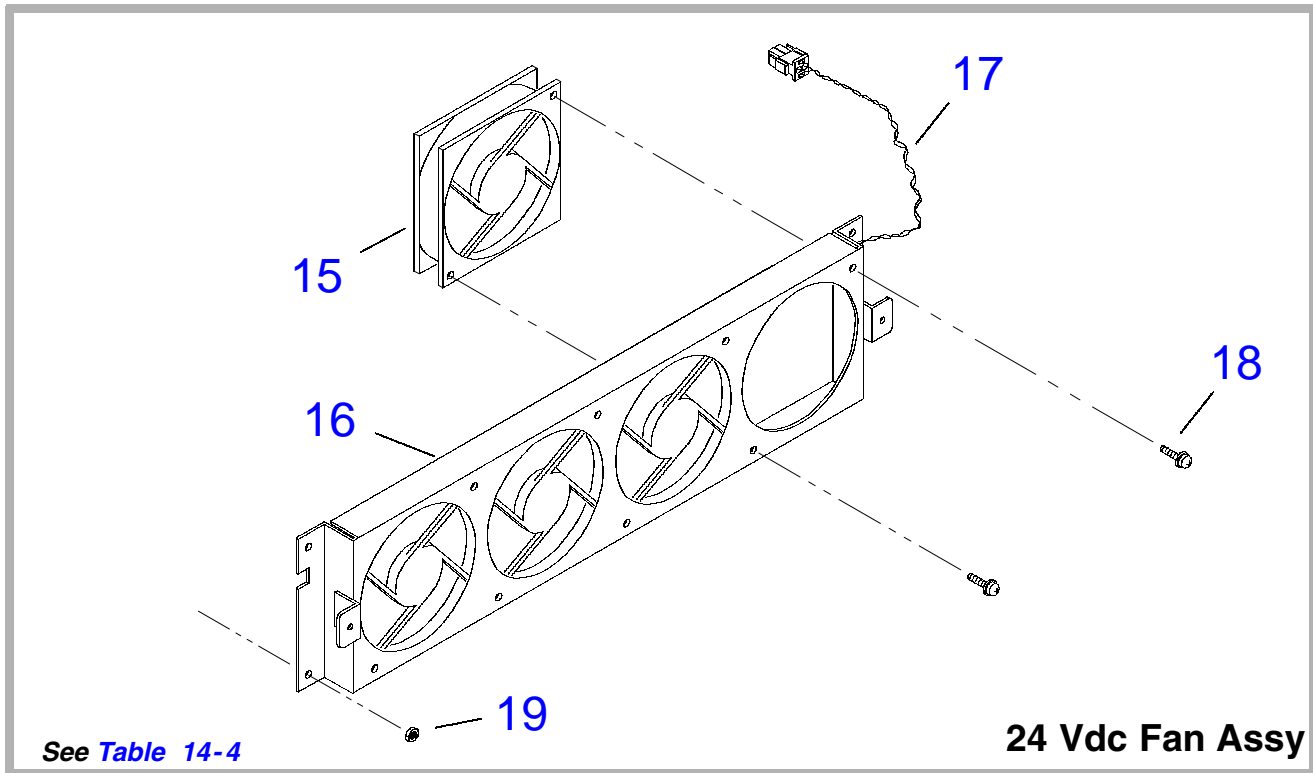


Figure 14-8. HDI 3000 System, Rear (3 of 4)

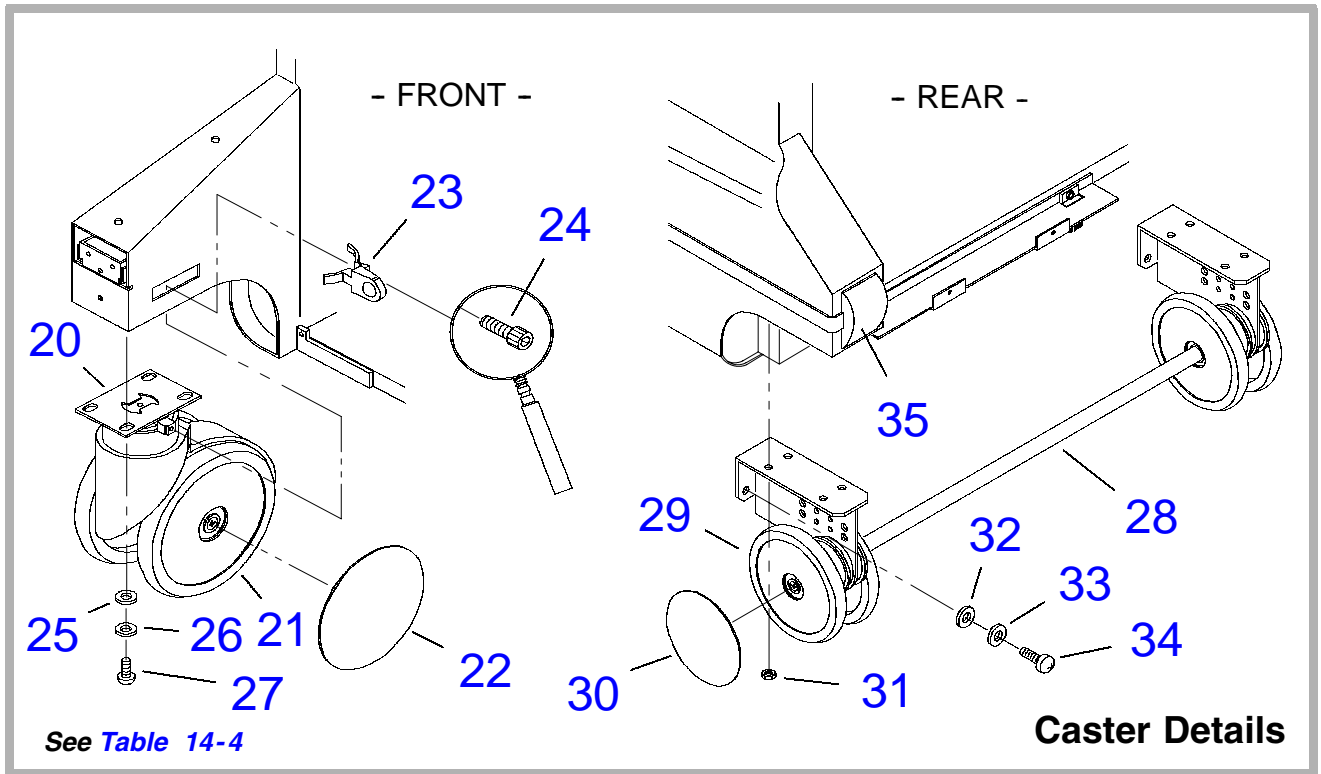


Figure 14-9. HDI 3000 System, Rear (4 of 4)

Table 14-4. HDI 3000 System, Rear

Figure 14-6 (1 of 4)

Index Number	Part Number	Part Description	Qty	Notes/ Reference
1	1065-2385-04	Plate, Universal OEM	1	
	1065-2386-01	OEM Strap, Universal	2	
	-	OEM (MIC, printer, etc.)	-	Table 14-18
2	-	PS4 ACIM - AC Input Module	1	Table 14-9
3	-	Power Transformer Assy, 1200 VA	1	Table 14-9
	-	OEM Power Transformer Assy, 240 VA	1	Table 14-9
4	2950-0782-01	Brush, Antistatic	1	
5	1541-0002	* Nut, 6-32, Keps, St, Zn	1	
6	-	A1B IIM - Internal Interface Module	1	Table 14-9
7	3500-1693-03	Cover, Rear Enclosure Assy	1	Replace with items 9-13
8	1065-2254-04	Panel, IIM Access	1	
	1065-2254-03	Panel, IIM Access	1	Alternate

Index Number	Part Number	Part Description	Qty	Notes/Reference
Figure 14-7 (2 of 4)				
9	3500-1872-01	Cover Assy, Rear	1	
	3500-2851-01	Cover Assy, Rear	1	Alternate
10	1518-0043	* Screw, 10-32 x 3/4, Pnh, Pd, St, Zn	4	
11	1560-0051	* Washer, Fl,#10, 0.0203ID, 0.5OD, St, Zn	4	
12	3500-1878-04	Shield Assy, Card Cage, Rear	1	
13	1516-0113	* Screw, 6-32 x 1	4	
14	1065-4945-01	Panel, Back of OEM Bay, Dark Gray	1	
Figure 14-8 (3 of 4)				
15	2100-0856-01	Fan, 24 Vdc, 120 CFM, 4.7 Inch Square TB, w/6-32	4	
	2100-0839-01	Fan, 24 Vdc, 125 CFM, 4.7 Inch Square UL/CSA	4	Alternate
16	1065-2365-03	Bracket, Fan	1	
17	3500-1514-03	Cable Assy, Fan, 24 VDC	1	
18	1516-0074	* Screw, 6-32 x 3/8,Pnh,Int Sem,Pd,St,Zn	8	

Index Number	Part Number	Part Description	Qty	Notes/ Reference
19	1541-0002	* Nut, 6-32, Keps, St, Zn	4	
Figure 14-9 (4 of 4)				
20	2950-0657-06	Caster Assy, Swivel, Brake Shock Absorb	2	Front
21	2950-0857-01	● Wheel, Caster Assy	2	2 ea. caster
22	2950-0818-02	● Hubcap, Front, Caster Assy	2	2 ea. caster
23	1065-2611-02	Knob, Brake Lever	2	
24	1530-0157-01	* Screw, 10-32x5/8, Skh, Cap, Hd., Nylok, Zn	2	
25	1560-0020	* Washer, Fl, 1/4, .6250D, .065T, St, Zn	8	
26	1561-0001	* Washer, Int Lk, 1/4, .4780D, .025T	8	
27	1519-0034	* Screw, 1/4-20 x 3/4, Pnh, Pd, St, Zn	8	
28	2950-0658-04	Caster Assy, Axle, Shock Absorbing	1	Rear
29	2950-0857-01	● Wheel, Axle Assy	4	2 ea. side
30	2950-0818-02	● Hubcap, Rear, Axle Assy	2	1 ea. side
31	1544-0012	* Nut, 1/4-20, Keps, St, Zn	8	
32	1560-0020	* Washer, Fl, 1/4, .6250D, .065T, St, Zn	8	

Index Number	Part Number	Part Description	Qty	Notes/ Reference
33	1561-0001	* Washer, Int Lk, 1/4, .4780D, .025T	8	
34	1519-0034	* Screw, 1/4-20 x 3/4, Pnh, Pd, St, Zn	8	
35	1065-4704-01	Bumper Cap, Rear, Dark Gray	2	

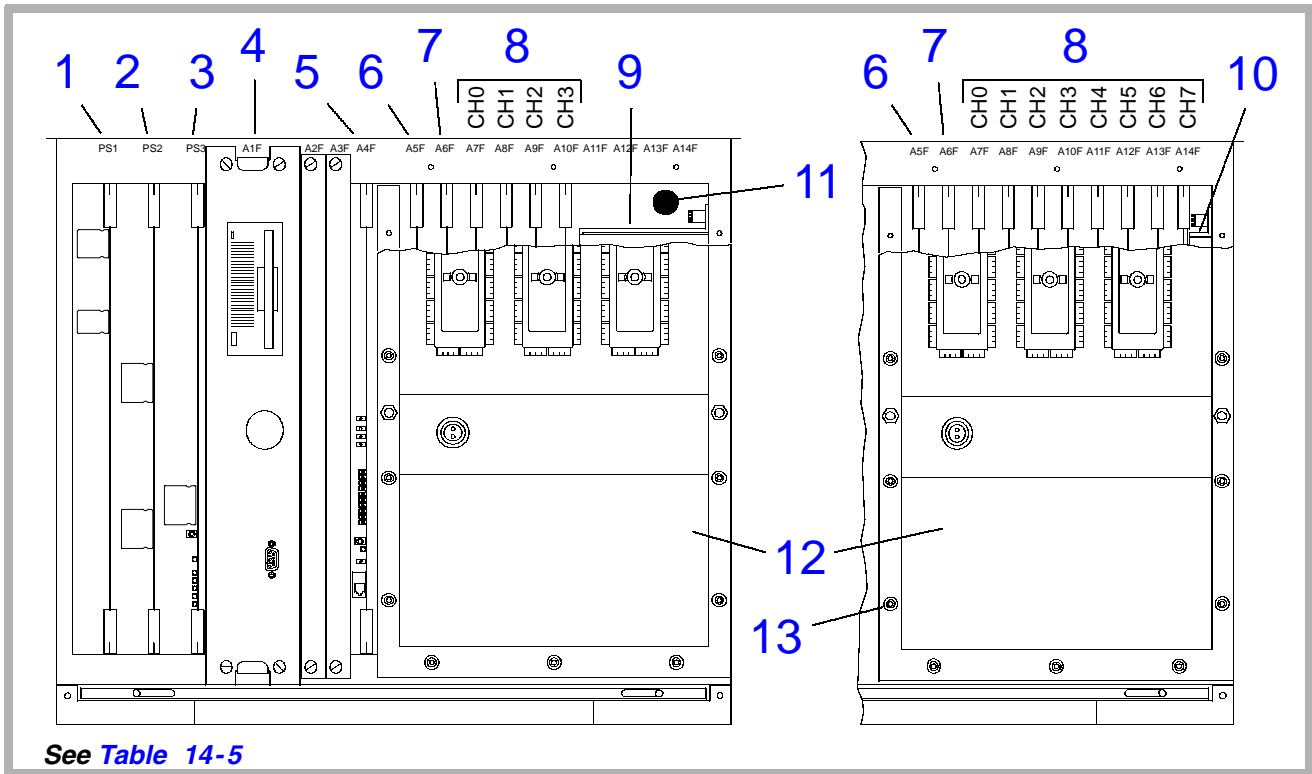


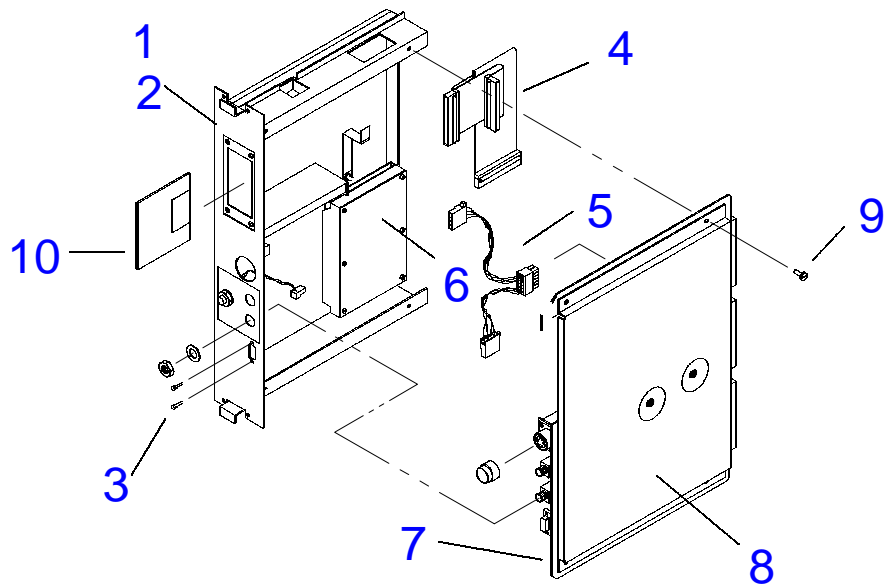
Figure 14-10. Card Cage, Front

Table 14-5. Card Cage, Front

Figure 14-10

Index Number	Part Number	Part Description	Qty	Notes/ Reference
1	7500-0764-XX	PS1 APS - Analog Power Supply	1	See Section 13
2	7500-0766-XX	PS2 DPS - Digital Power Supply	1	
3	7500-0765-XX	PS3 MPS - Master Power Supply	1	
4	-	A1F DDEA-Disk Drive Module w/o ECG	1	Table 14-7
5	7500-0818-XX	A4F FEC - Front End Controller	1	See Section 13
6	7500-0770-XX	A5F AIM - Analog Interface Module	1	
7	7500-0762-XX	A6F DOPACQ - Doppler Acquisition	1	
8	7500-0819-XX	A7F-A14F CB0-CB7 - Channel Boards	8	8 Channel
	7500-0974-XX	A7F-A10F CB0-CB3 - Channel Boards	4	4 Channel
9	1065-2732-02	Air Deflector, Card Cage	1	4 Channel
10	1065-2381-01	Air Deflector, Card Cage	1	8 Channel

Index Number	Part Number	Part Description	Qty	Notes/ Reference
11	3500-1496-XX	Centerplane Assy	1	Illustrated in Figure 11-1
	7500-0858-XX	●□ Centerplane PCB, Front	1	
	7500-0859-XX	●□ Centerplane PCB, Rear	1	
	1560-0046	* Washer,FI, 0.156ID, 0.375OD, 0.049T, St, Zn	20	Not shown
	1530-0144-01	* Screw, 6-32 x 1-1/8,Pnh,Sems,Pd,St,Zn	20	Not shown
12	7500-0822-XX	S/HSEL - S/H Select MUX, 8 Channel	1	See Section 13
	7500-0976-XX	S/HSEL - S/H Select MUX, 4 Channel	1	
13	1563-0258-01	* Screw, 6-32 x 0.88, Captive, HD, SS, Tin	14	



See [Table 14-6](#)

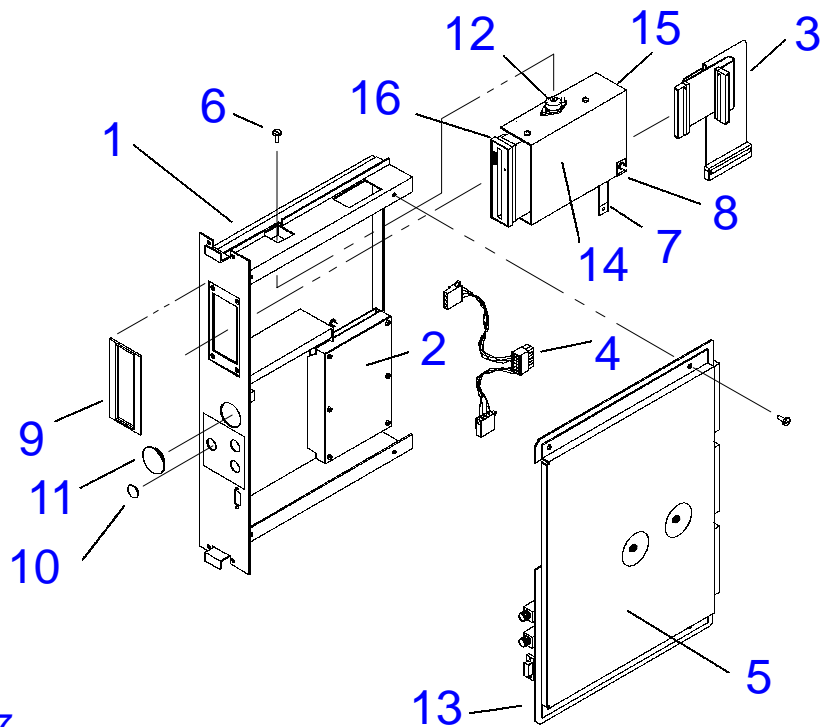
Figure 14-11. DDEA, Parts Common to All

Table 14-6. Disk Drive Module (DDEA) Parts Common to All**Figure 14-11**

Index Number	Part Number	Part Description	Qty	Notes/ Reference
1	3500-2762-XX	A1F DDEA-Disk Drive Module (only for system without MO Drive or ECG)	1	See paragraph 13-9.6
2	1065-1946-05	● Panel, Mounting, DDEA Module	1	
3	3100-1387	● Screw, 18-25H, .31L Stud, Pair	1	
4	3500-1483-03	● Cable Assy, Disk Drive SCSI, DDEA	1	
	3500-1851-01	● Cable Assy, Disk Drive SCSI (for use in DDEA with no MO Drive)	1	
5	3500-1482-03	● Cable Assy, Disk Drive Power, DDEA	1	

Figure 14-11

Index Number	Part Number	Part Description	Qty	Notes/ Reference
6	3500-3066-02	Hard Drive Kit, 3.5", 9.1 Gb, SCSI (IBM)	1	See paragraph 13-9.6
	3500-3129-01	● Hard Drive, 3.5", 9.1 Gb, SCSI (IBM w/ SCSI adapter and pre-loaded SW)	1	
	3100-2867-01	●● Adapter LVD 68P, SCSI, Hard Drive	1	Not shown
	3100-2896-01	●● Jumper, for Optical Drive	1	
	2208-0064	●● Cable clamp	1	
	9903-03309	●● Label	1	
	4500-5512-01	Cable Assy, External Disk Drive Test	1	Not shown
7	3600-0246-01	● Gasket, RFI, Finger Clip, BE-CU, 2.5" (for RH DDEA cover)	1	
8	1065-1947-03	● Cover, RH DDEA Module	1	
9	1516-0112	● Screw, 6-32x1/4, Pnh, Sem, Pd, St, Zn	1	
10	2100-0792-01	Optical Disk, 3.5", 128 MB	1	
	2100-1410-01	Optical Disk, 3.5", 230 MB	1	



See [Table 14-7](#)

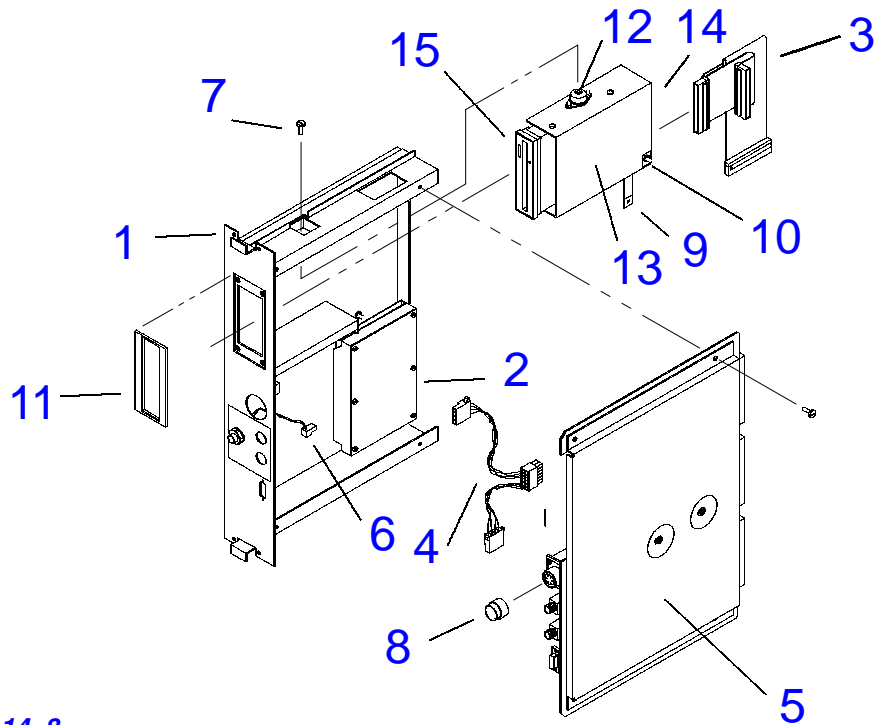
Figure 14-12. DDEA without ECG

Table 14-7. Disk Drive Module (DDEA) without ECG

Figure 14-12

Index Number	Part Number	Part Description	Qty	Notes/ Reference
1	3500-2760-XX	A1F DDEA-Disk Drive Module (with MO Drive and without ECG)	1	See paragraph 13-9.6
2	See Table 14-6	● Hard Drive		
3	3500-1483-03	● Cable Assy, Disk Drive SCSI, DDEA	1	
4	3500-1482-03	● Cable Assy, Disk Drive Power, DDEA	1	
5	7500-0843-XX	● PCB Assy, DDEA (without ECG)	1	
6	1514-0060	* Screw, 4-40 x 3/8, Pnh, Sem, Pd, St, Zn	3	
7	2275-0234-01	● Ground Strap, Insul, 6.01 x 0.5W	1	
8	1541-0002	● Nut, 6-32, Keps, St, Zn	2	
9	1065-4681-01	● Bezel, DDEA Module	1	
10	2950-1040-01	● Plug, Hole, Physio, Painted	1	
11	2950-1041-01	● Plug, Hole, ECG, Painted	1	
12	2950-1164-01	● Isolator, 3.1lb Min, 5lb Max Load	3	

Index Number	Part Number	Part Description	Qty	Notes/ Reference
13	3600-0242-01	● Shield Strip, Finger, 1.13 x 4.0L	1	
	8000-1682-01	Dependency Kit, 1512 MO Drive (with Bracket)	1	Not shown, see paragraph 13-9.6
14	2100-XXXX-XX	● Magneto Optical Disk Drive, 3.5"	1	See paragraph 13-9.6
15	1065-5058-01	● Bracket, MO Disk Drive	1	
	1065-2244-03	● Bracket, MO Disk Drive	1	Alternate
16	1065-4682-01	●Seal, Suport, MO Drive, DDEA	1	
	2100-1419-01	Kit, Cleaning, Optical Drive, Fujitsu	1	Not shown



See [Table 14-8](#)

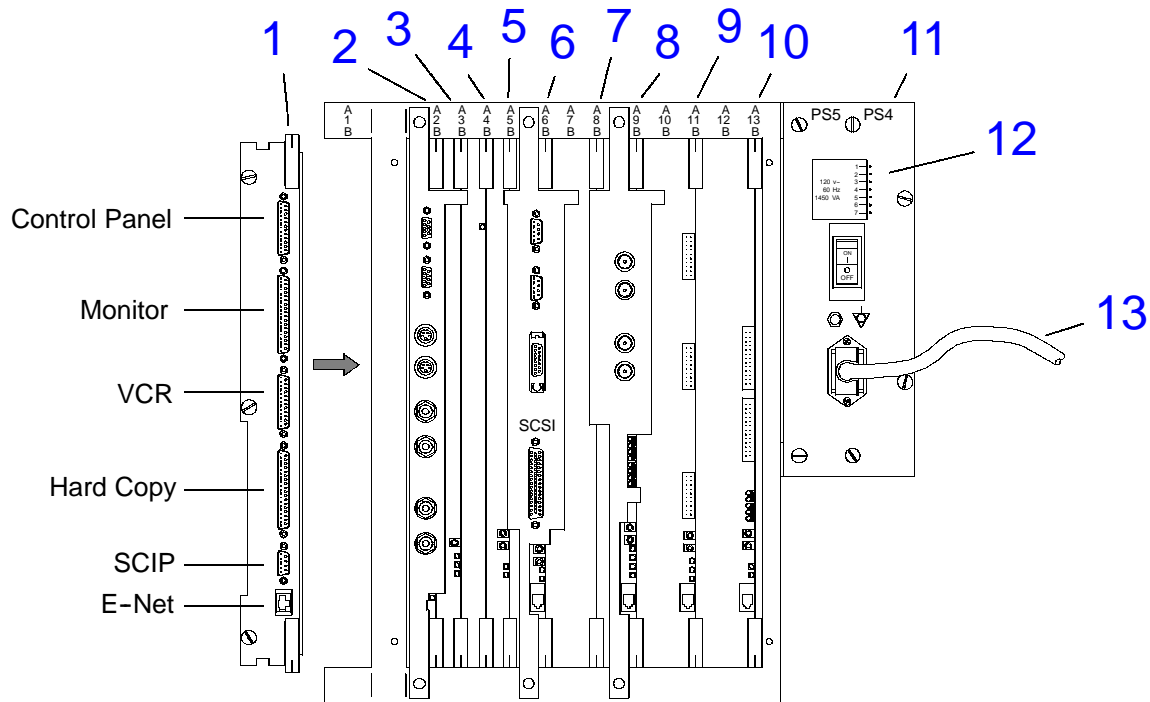
Figure 14-13. DDEA with ECG/Physio

Table 14-8. Disk Drive Module (DDEA) with ECG/Physio

Figure 14-13

Index Number	Part Number	Part Description	Qty	Notes/ Reference
1	3500-2761-XX	A1F DDEA-Disk Drive Module, with ECG Physio PCB	1	See paragraph 13-9.6
2	See Table 14-6	● Hard Drive		
3	3500-1483-03	● Cable Assy, Disk Drive SCSI, DDEA	1	
4	3500-1482-03	● Cable Assy, Disk Drive Power, DDEA	1	
5	7500-1020-05	● PCB Assy, DDEA w/ECG	1	
6	3500-1835-01	● Cable Assy, Jack, Physio	1	
7	1514-0060	* Screw, 4-40 x 3/8, Pnh, Sem, Pd, St, Zn	3	
8	1065-0130-01	● Spacer, Connector, Plastic	1	
9	2275-0234-01	● Ground Strap, Insul, 6.01 x 0.5W	1	
10	1541-0002	* Nut, 6-32, Keps, St, Zn	2	
11	1065-4681-01	● Bezel, DDEA Module	1	
12	2950-1164-01	● Isolator, 3.1lb Min, 5lb Max Load	3	

Index Number	Part Number	Part Description	Qty	Notes/ Reference
	8000-1682-01	Dependency Kit, 1512 MO Drive (with Bracket)	1	Not shown, see paragraph 13-9.6
13	2100-XXXX-XX	<ul style="list-style-type: none"> ● Magneto Optical Disk Drive, 3.5" 		See paragraph 13-9.6
14	1065-5058-01	<ul style="list-style-type: none"> ● Bracket, MO Disk Drive 	1	
	1065-2244-03	<ul style="list-style-type: none"> ● Bracket, MO Disk Drive 	1	Alternate
15	1065-4682-01	<ul style="list-style-type: none"> ● Seal, Support, MO Drive, DDEA 	1	
	2100-1419-01	Kit, Cleaning, Optical Drive, Fujitsu	1	Not shown



See [Table 14-9](#)

Figure 14-14. Card Cage, Rear (1 of 4)

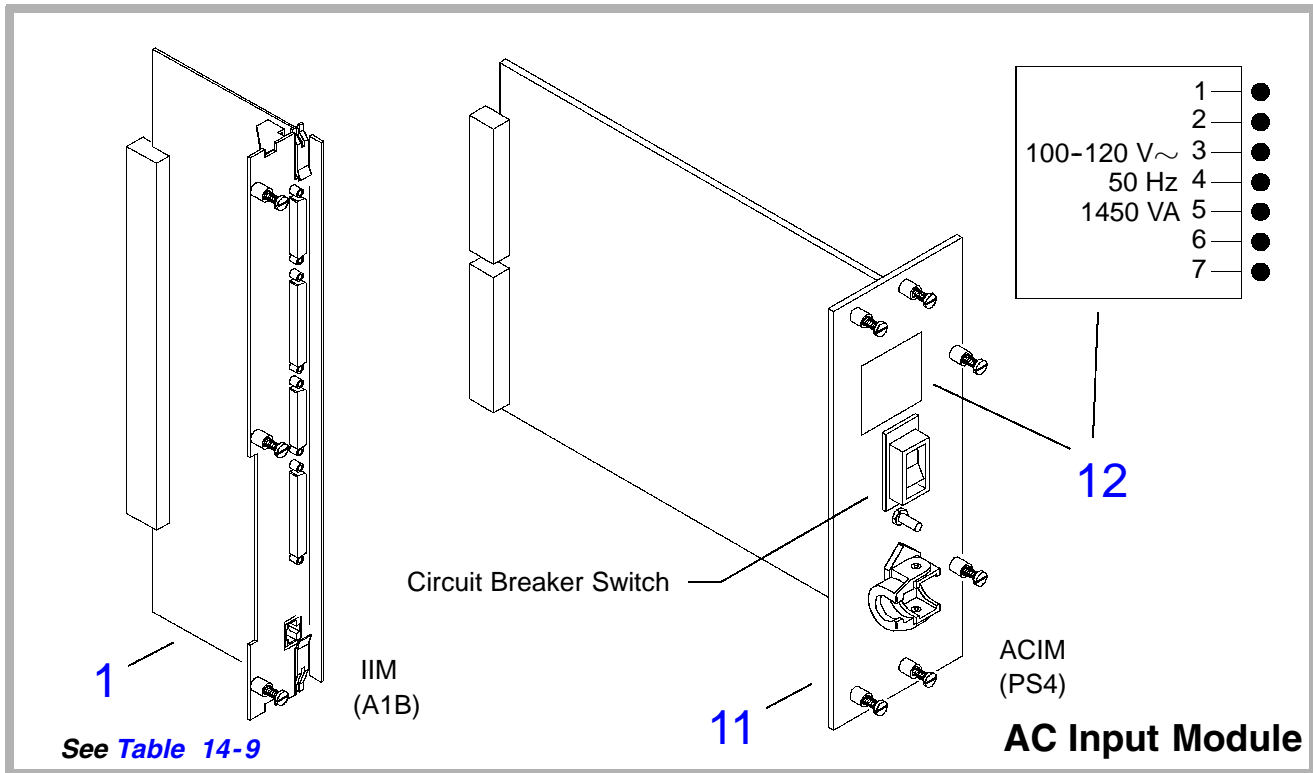
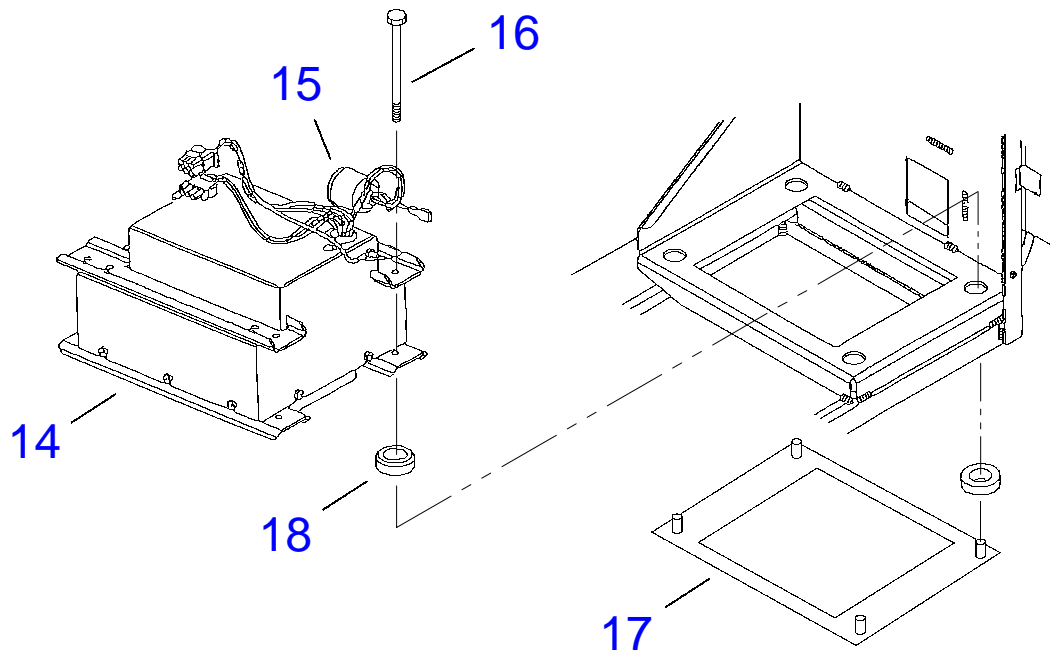


Figure 14-15. Card Cage, Rear (2 of 4)



See *Table 14-9*

Power Transformer Assy

Figure 14-16. Card Cage, Rear (3 of 4)

Item 20 and item 34 both mount to the same location.
If replacing item 20 with item 34, also order the transformer
mounting bracket (item 37) and two stud plates (item 35).

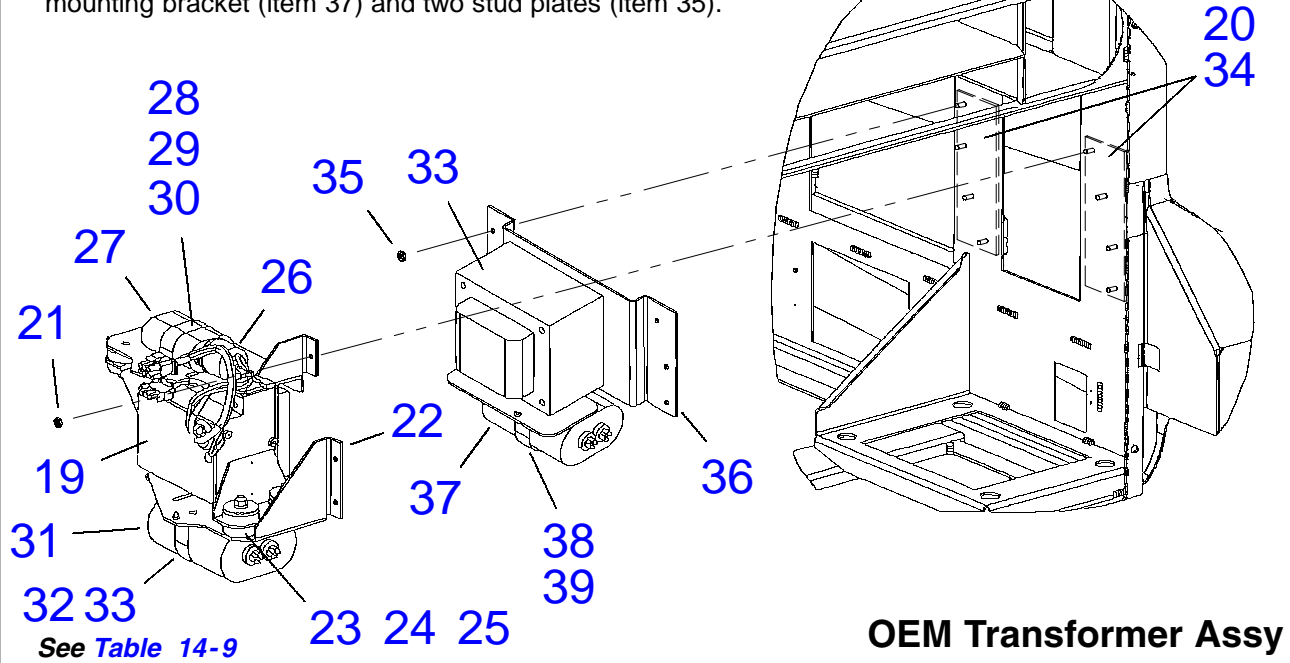


Figure 14-17. Card Cage, Rear (4 of 4)

Table 14-9. Card Cage, Rear

Figure 14-14 and Figure 14-15 (1 of 4 and 2 of 4)				
Index Number	Part Number	Part Description	Qty	Notes/ Reference
1	7500-0779-XX	A1B IIM - Internal Interface Module	1	Section 13
2	7500-0717-XX	A2B PIM - Peripheral Interface Module	1	
3	7500-0683-XX	A3B PCM - Pixel Conversion Module	1	
4	7500-0714-XX	A4B PSP2 - Pixel Space Processor 2	1	
5	7500-0713-XX	A5B PSP1 - Pixel Space Processor 1	1	
6	7500-0759-XX	A6B SYSCPU - System CPU	1	Uses old/ new CPU PROMs
	3500-2677-XX	A6B SYSCPU - System CPU, 32 MB	1	
	2070-1188-01	SYSCPU ID Chip (requires specific MO files to reflect the machine ID number. Has "5f" prefix to 6-digit number)	1	
	2070-1981-01	SYSCPU ID Chip (requires specific MO files to reflect the machine ID number) Has "65f" prefix to 7-digit number	1	

Index Number	Part Number	Part Description	Qty	Notes/Reference
7	7500-0931-XX	A8B IMEM - Image Memory, 32 MB	1	
	3500-1839-XX	A8B IMEM - Image Memory, 16 MB	1	4 MB x 4 SIMMs
	3500-1867-XX	A8B IMEM - Image Memory, 32 MB	1	16 MB x 2 SIMMs
	3500-2757-XX	A8B IMEM - Image Memory, 64 MB	1	16 MB x 4 SIMMs
8	7500-XXXX-XX	A9B ADAPTR - Adv. Digital/Audio/Physio and Translator	1	See Section 13
9	7500-0768-XX	A11B SSP2 - Sample Space Proc 2	1	
10	7500-XXXX-XX	A13B AIFOM 2 - Adv. IF Output Module	1	
11	3500-1578-XX	PS4/PS5 ACIM-AC Input Module, 100-120V/60Hz	1	
	3500-1577-XX	PS4/PS5 ACIM-AC Input Module, 100-120V/50Hz	1	
	3500-1579-XX	PS4/PS5 ACIM-AC Input Module, 230V/50Hz	1	

Index Number	Part Number	Part Description	Qty	Notes/ Reference
	3500-1580-XX	PS4/PS5 ACIM-AC Input Module, 230V/60Hz	1	
	3100-2148-01	Receptacle, IEC, Male, 10A, Pnl/PCB	1	
	2208-0143-01	Plug Lock, Inside, Detach Power Cord (for 3100-2148-01)	1	
	3402-0026-01	Filter, Power, Line, 15A, 250V, Pnl Mt	1	
	2208-0144-01	Plug Lock, Outside, Detach Power Cord (for 3402-0026-01)	1	
12	4100-0943-02	Label, ACIM Voltage, 100-120V/50Hz	1	
13	2265-0056-02 2275-0391-01	Power Cord, Unshld, Hosp Plug	1	120V, 9'10"
	2275-0324-01 2275-0388-01	Power Cord, Harmonized, CEE-22 & 7	1	240V, 10A
	8000-1366-01	Power Cord Cable Clamp Kit	1	Not shown

Index Number	Part Number	Part Description	Qty	Notes/ Reference
Figure 14-16 (3 of 4)				
14	2601-0052-05	Power Transformer Assy, Ferro-Res, 1200 VA, w/Shld	1	50-60 Hz
15	2950-0512-01	● Terminal Boot, Cap Insulator, Rubber	1	
16	1530-0145-01	● Bolt, 1/4-20 x 4-1/2, Hex, St, Zn	4	
17	1065-2498-02	● Bracket, Sinewave Xfmr	1	
18	2950-0613-01	● Isolator, Vibration, Xfmr	4	
Figure 14-17 (4 of 4)				
19	2601-0058-03	OEM Power Transformer, Ferro-Res, 240 VA, w/Shld	1	
20	1065-2533-02	* Plate, Stud, Sinewave Xfmr	2	
21	1543-0002	* Nut, 10-32, Keps, St	8	
22	1065-2361-02	● Bracket, Sinewave Xfmr	1	
23	2950-0613-01	● Isolator, Vibration, Xfmr	4	
24	1565-0023-01	● Washer, Flat, 1/4, 1.25 OD, Fnde, St, Zn	4	

Index Number	Part Number	Part Description	Qty	Notes/ Reference
25	1544-0012	● Nut, 1/4-20, Keps, St, Zn	4	
26	2950-0512-01	● Terminal Boot, Cap Insulator, Rubber	1	
27	3700-0202-01	● Cap, 6 •f, 660VAC 10%, Xfmr	1	
28	2950-0614-01	* Bracket, Capacitor	1	
29	1516-0074	* Screw, 6-32 x 3/8, Pnh, Sem, Pd,St,Zn	2	
30	3700-0175-01	● Cap, 30 •f, 660VAC 10%, Xfmr Res Paper	1	
31	2950-0513-01	* Bracket, Capacitor	1	
32	1516-0074	* Screw, 6-32 x 3/8, Pnh, Sem, Pd,St,Zn	2	
33	2601-0071-01	OEM Power Transformer, 350VA, 1 Pri/2Sec, Shielded	1	
34	1065-2533-02	* Plate, Stud, Sinewave Transformer	2	
35	1543-0002	* Nut, 10-32, Keps, St	8	
36	1065-3019-01	● Mounting Bracket, Transformer	1	

Index Number	Part Number	Part Description	Qty	Notes/ Reference
37	3700-0175-01	● Cap, 30 •f, 660VAC 10%, Xfmr Res Paper	1	
38	2950-0513-01	* Bracket, Capacitor	1	
39	1516-0074	* Screw, 6-32 x 3/8, Pnh, Sem, Pd,St,Zn	2	

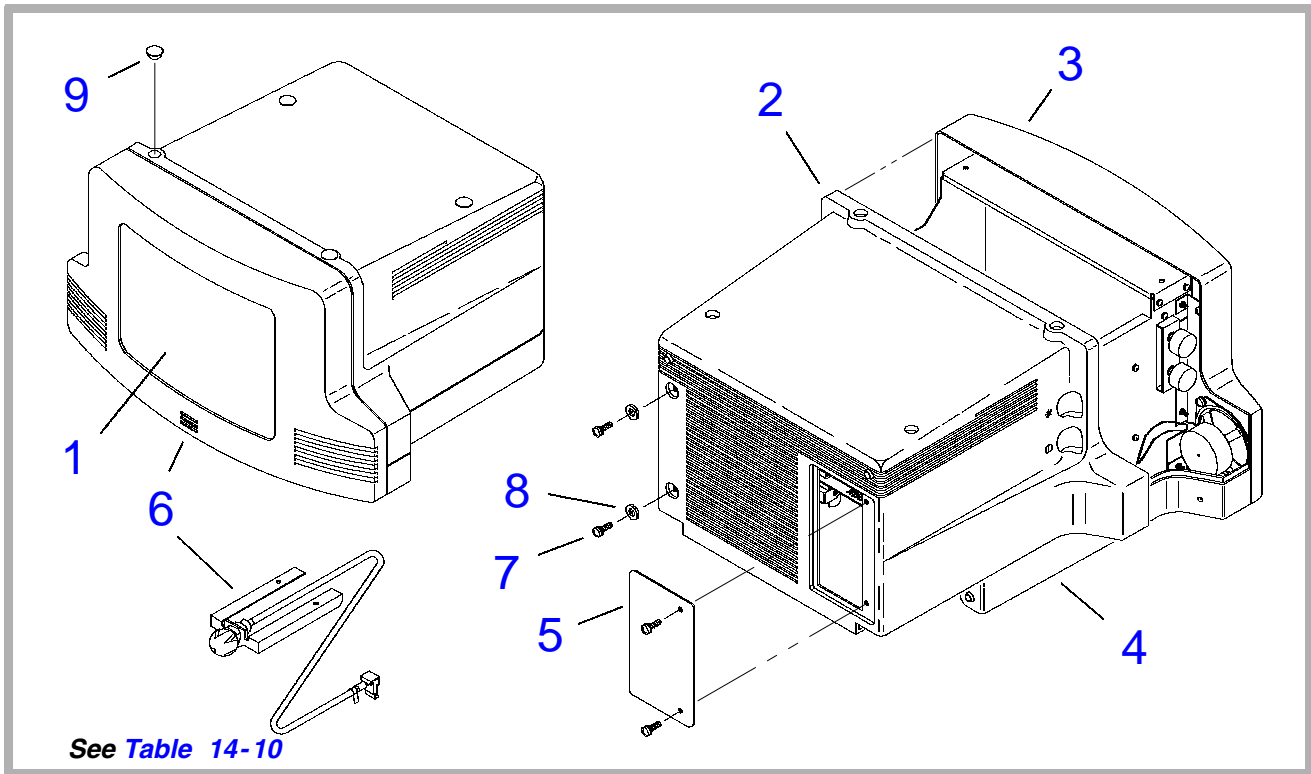


Figure 14-18. Data Ray Video Monitor Assembly (1 of 2)

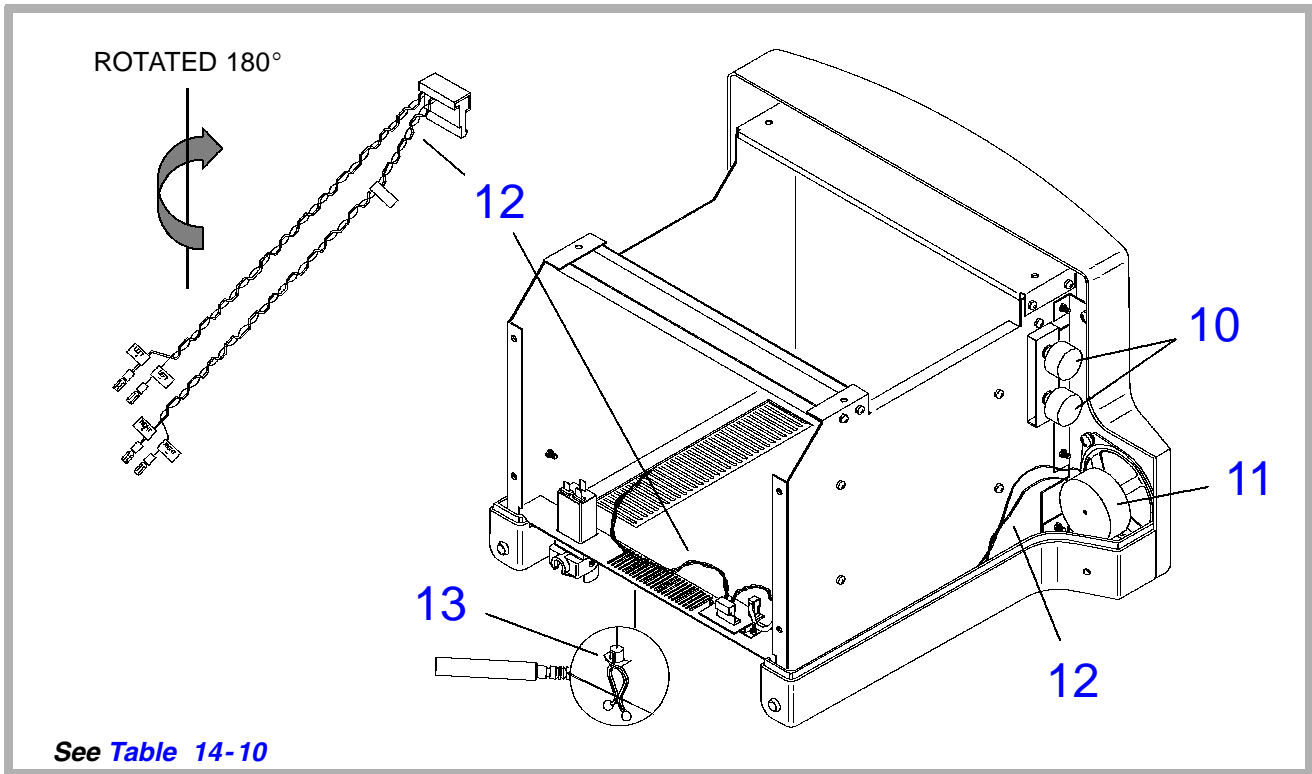


Figure 14-19. Data Ray Video Monitor Assembly (2 of 2)

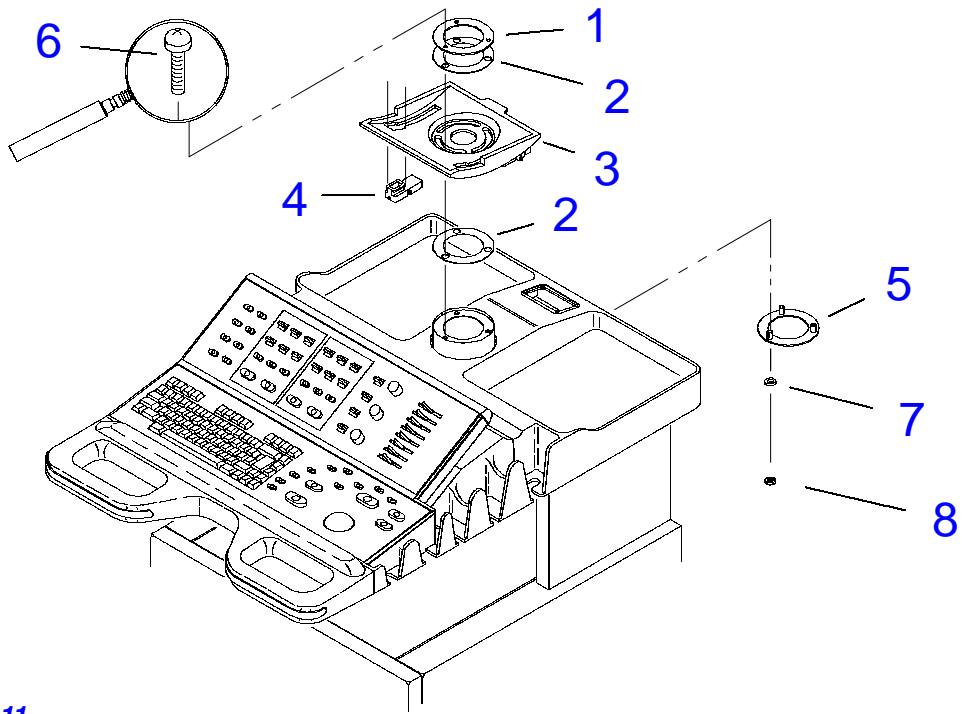
Table 14-10. Data Ray Video Monitor Assembly

Figure 14-18 (1 of 2)

Index Number	Part Number	Part Description	Qty	Notes/ Reference
-	3500-1315-03	Video Monitor Assy, Use 1065-1717-XX or 1065-2682-01 Base, Tilt Mechanism	1	
-	3500-1315-04	Video Monitor Assy, Use only 1065-2682-01 Base, Tilt Mechanism	1	
-	3500-1874-01	Video Monitor Assy, Use only 1065-2682-01 Base, Tilt Mechanism	1	
-	3500-1874-03	Video Monitor Assy, Use only 1065-1789-01 Base, Tilt Mechanism	1	
1	2100-0855-03	● Monitor, 14", Color, 120V, Data Ray	1	
	2100-0855-02	● Monitor, 14", Color, 120V, Data Ray	1	Alternate
	2100-0746-05	● Monitor, 14", Color, 120V, Data Ray	1	Alternate
2	1065-1791-04	● Cover, 14", Color Monitor	1	
3	1065-1790-02	● Bezel, 14", Color Monitor	1	
4	1065-1789-05	● Base, 14", Color Monitor	1	

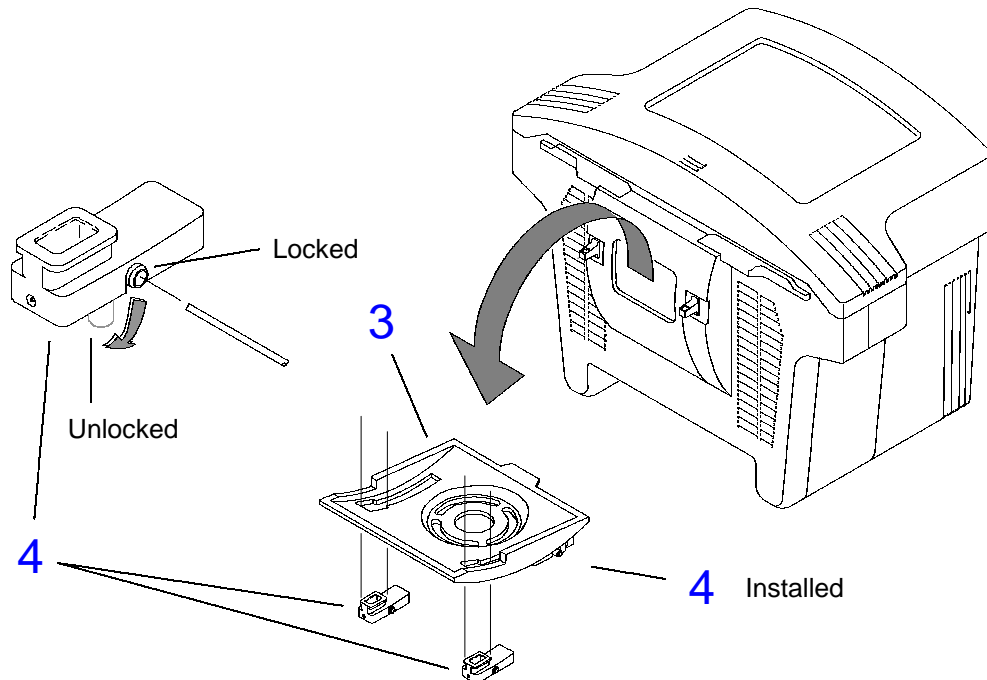
Index Number	Part Number	Part Description	Qty	Notes/Reference
5	3500-1841-01	● Panel, Access Cover, Monitor, FOG	1	
6	3500-1317-01	● Microphone Module Assy	1	Replace w/ item 14
7	1518-0051	* Screw, 10-32 x 1/2, Pnh,Sem,Pd,St,Zn	4	
8	1560-0051	* Washer, Fl, #10, .203ID,.500D,.04T,St,Zn	2	
9	2950-0587-01	● Hole Plug, 0.562D,1/8 Max,Pnl,Wht,Ny	4	w/o VCR
Figure 14-19 (2 of 2)				
10	1065-1795-02	● Knob, Brightness/Contrast, Monitor	2	
11	2100-0794-01	● Speaker, 3.5", 8 Ohm,SHLD, 6W,Ftball	2	
	1065-1723-01	● Brkt, Bezel/Speaker Mounting, Left	1	Not shown
	1065-1724-01	● Brkt, Bezel/Speaker Mounting, Right	1	Not shown
12	3500-1582-03	● Cable Assy, Speaker, Monitor	1	
13	2208-0147-01	● Standoff, Wire, 3/16,Push-in, Twist, NY	2	
14	3500-2631-02	Assy, Microphone Module (Replaces item 6. Requires items 15, 16)	1	Not shown

Index Number	Part Number	Part Description	Qty	Notes/ Reference
15	3500-1841-01	Panel Assy, Access, with Microphone Plug (Replaces item 5. Requires items 14, 16)	1	Not shown
16	3500-2656-01	Cable Assy, Microphone Access Panel (Requires items 14, 15)	1	Not shown



See [Table 14-11](#)

Figure 14-20. Data Ray Video Monitor Base (1 of 3)

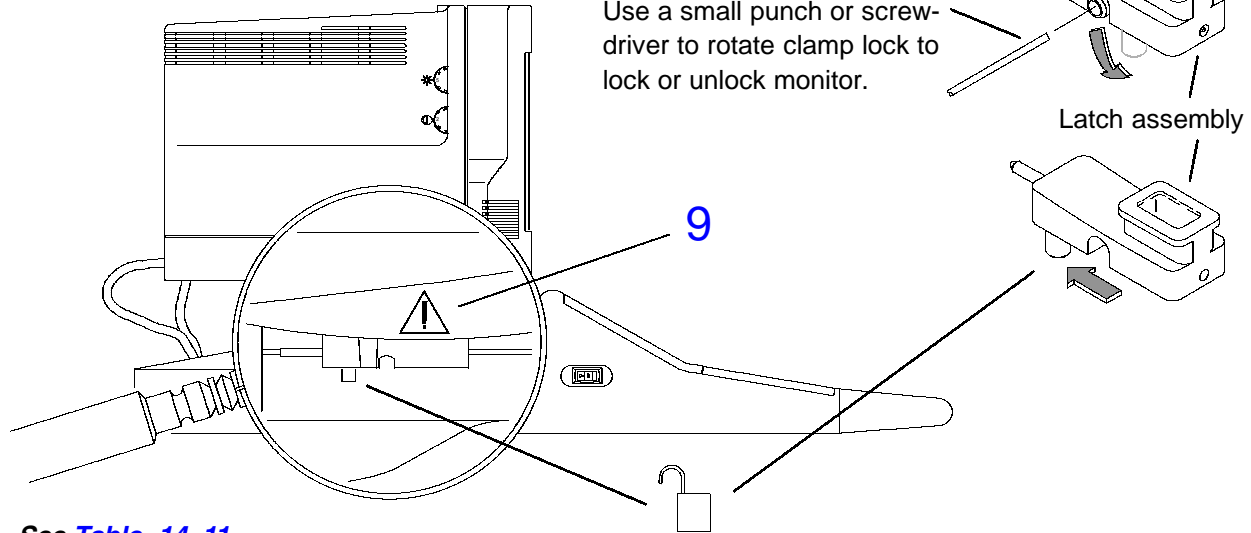


See [Table 14-11](#)

Figure 14-21. Data Ray Video Monitor Base (2 of 3)

CAUTION

To prevent damage to the monitor, item 4 must be in the locked position on both sides of the monitor before moving the system.



See [Table 14-11](#)

Figure 14-22. Data Ray Video Monitor Base (3 of 3)

Table 14-11. Data Ray Video Monitor Base

Figure 14-20 and Figure 14-21 (1 of 3 and 2 of 3)				
Index Number	Part Number	Part Description	Qty	Notes/ Reference
1	1065-2438-01	Ring, Clamping, Monitor Swivel	1	
2	1065-2439-01	Bearing, Monitor Swivel	2	
3	1065-1717-05	Base, Tilt Mechanism, Fog, Use with 3500-1315-03 or below	1	
	1065-2682-02	Base, Tilt Mechanism, Fog, Use with any monitor assembly	1	
4	3000-0363-04	Clamp Lock Assy, Monitor, (w/safety latch)	2	
5	1065-2372-01	Plate, Monitor Swivel	1	
6	1530-0329-01	* Screw, 10-32 x 1.25, Panhead	3	
7	1560-0051	* Washer, Fl, #10, 0.203ID, 0.50OD, St, Zn	3	
8	1543-0002	* Nut, 10-32, Keps, St, Zn	3	
Figure 14-22 (3 of 3)				
9	4100-1568-01	Label, Warning, Monitor Lock	2	

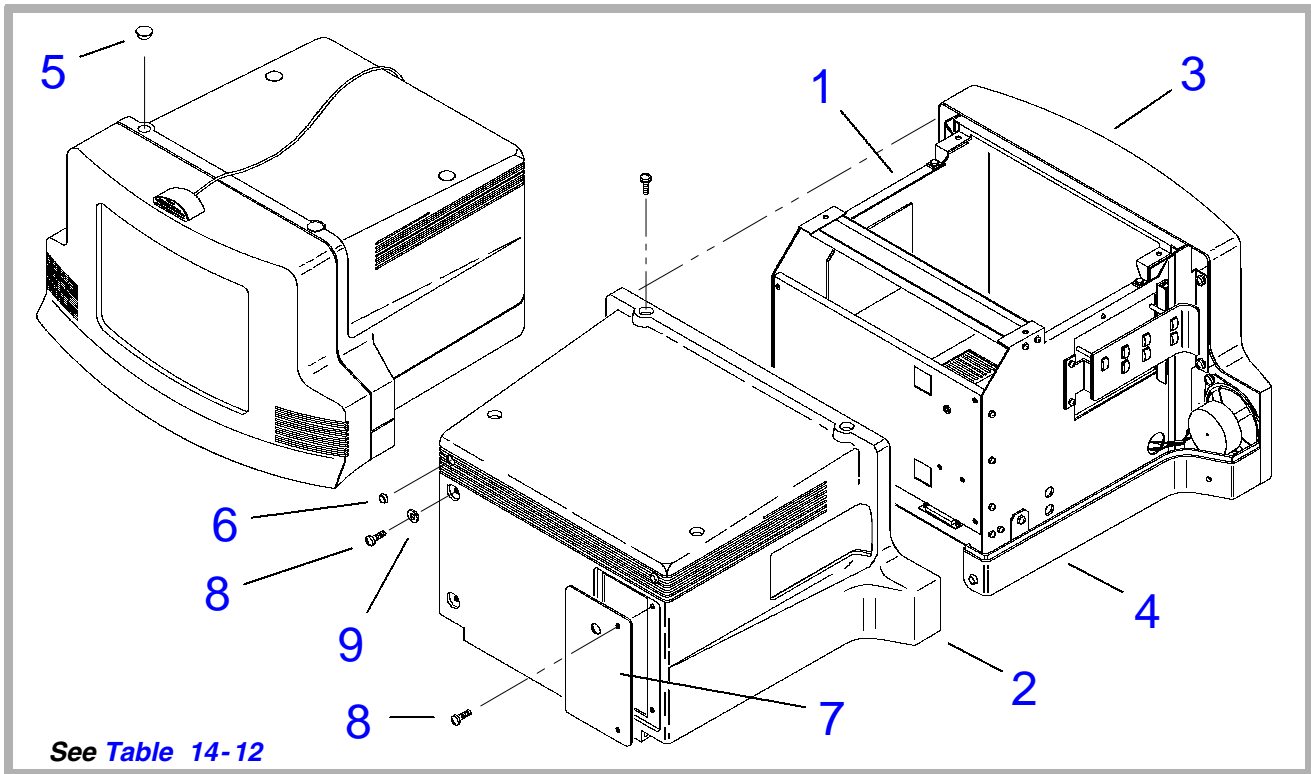


Figure 14-23. Electrohome Video Monitor Assembly (1 of 4)

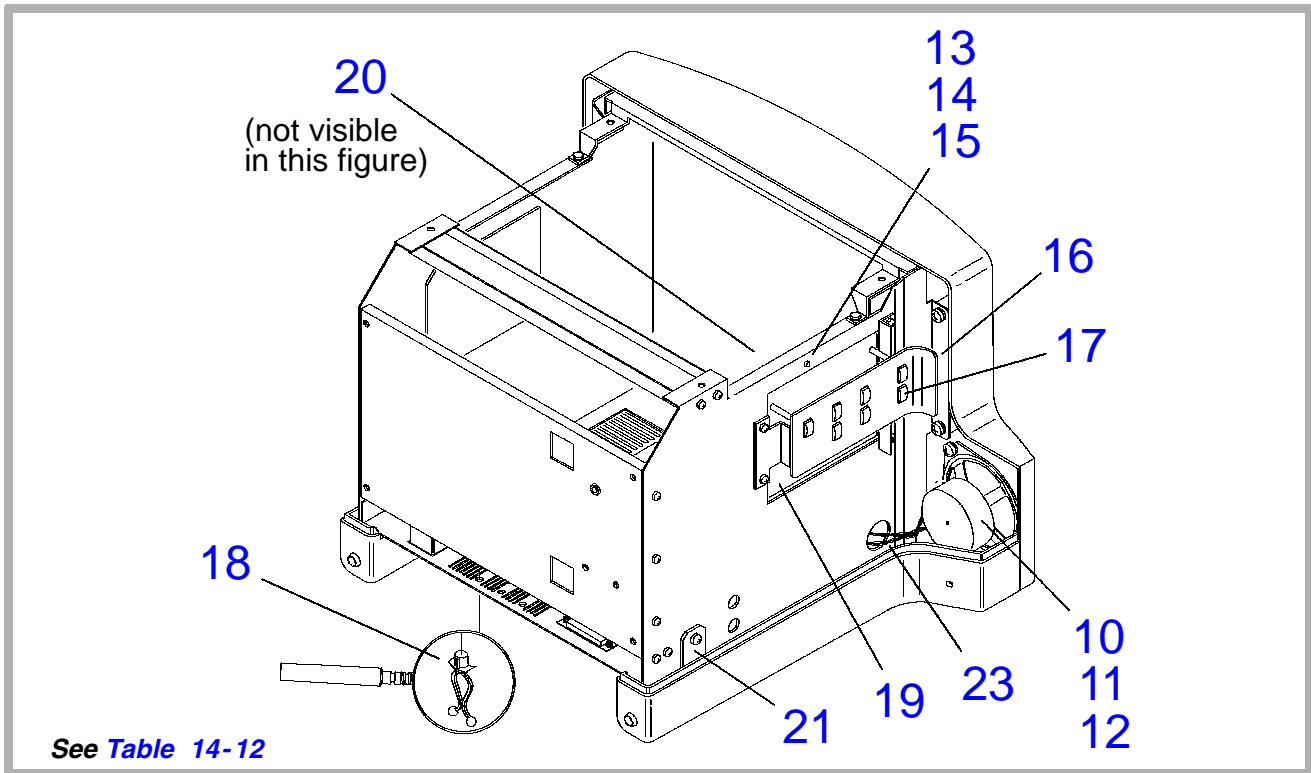


Figure 14-24. Electrohome Video Monitor Assembly (2 of 4)

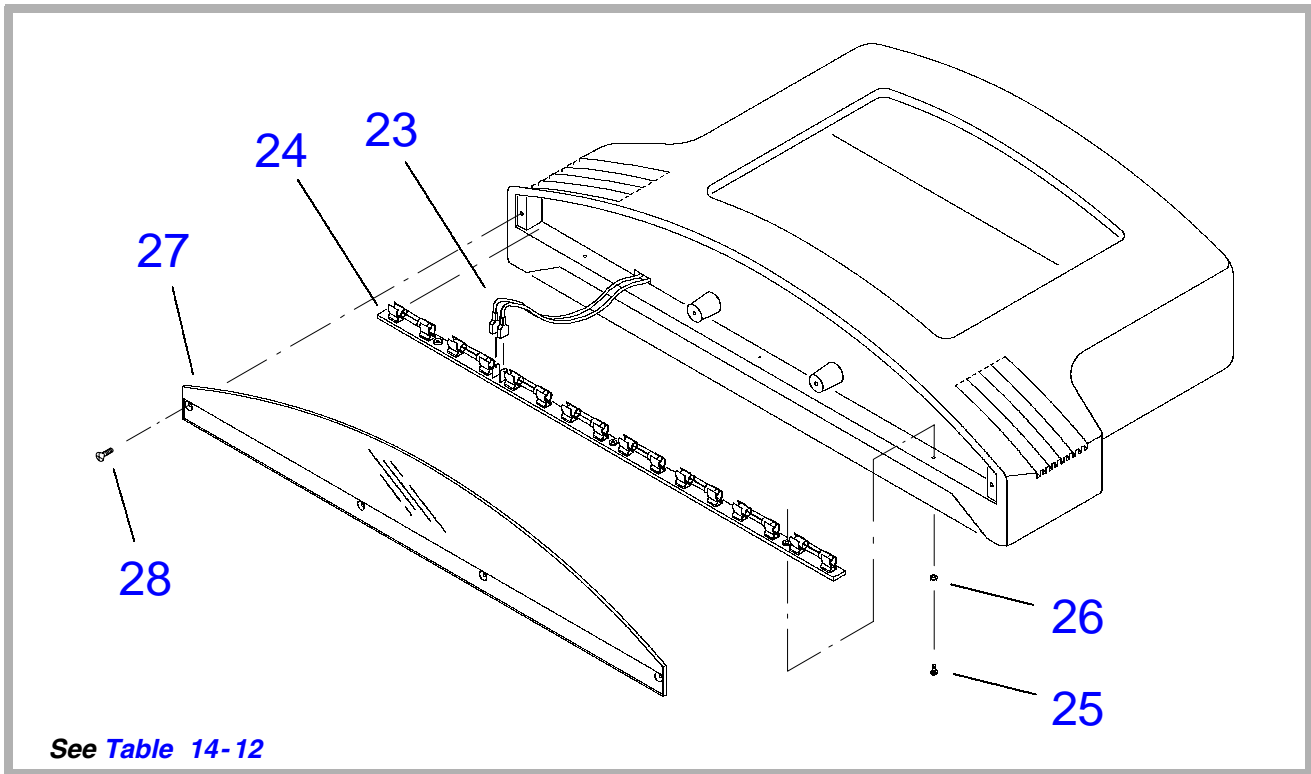


Figure 14-25. Electrohome Video Monitor Assembly (3 of 4)

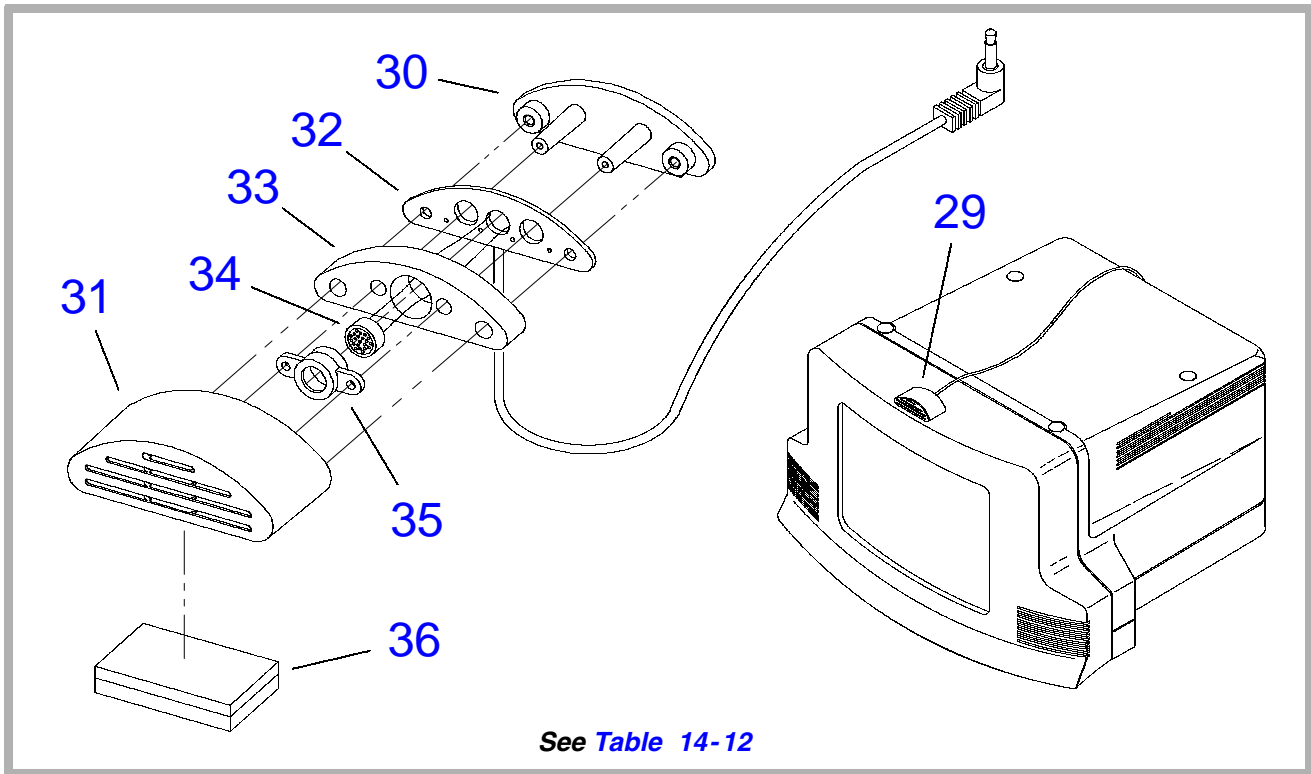


Figure 14-26. Electrohome Video Monitor Assembly (4 of 4)

Table 14-12. Electrohome Video Monitor Assembly

Figure 14-23 (1 of 4)

Index Number	Part Number	Part Description	Qty	Notes/ Reference
-	3500-2532-10	Video Monitor Assy, HDI 15"	1	
-	3500-2532-09	Video Monitor Assy, HDI 15"	1	Alternate
1	2100-1346-05	● Monitor, 15", Color, Open Chassis, HDI	1	
2	1065-1791-05	● Cover, 15", Color Monitor	1	
3	1065-4317-01	● Bezel, Monitor, 15", Color	1	
4	1065-1789-05	● Base, 14", Color Monitor	1	
5	2950-0587-01	● Hole Plug, 0.562D, 1/8 Max, Pnl, Wht, Nylon, without VCR	4	
6	2950-0586-01	● Bumper, 5DX.14H, Clr Vinyl, Adhsvbac	4	
7	1065-4676-01	Panel, Cover, Monitor	1	
8	1630-0098-01	Screw, M5X12, Pnh, Pd, Int Sems, St, Bo	4	
9	1560-0051	Wshr, Fl, #10, .203ld, .500D, .04T, St, Zn	2	

Figure 14-24 (2 of 4)

Index Number	Part Number	Part Description	Qty	Notes/Reference
10	2100-1235-01	● Speaker, 3.5",8Ohm,SHLD,8W,Ex,Rng	2	
11	1065-4501-01	● Isolator, Speaker, Monitor	2	
12	1065-4502-01	● Washer, Isolation, Speaker, Monitor	4	
13	2275-0387-01	● Cable Assy, LED, 3MM, 4"L	1	
14	2405-0124-01	● LED, Green, T1, 4MCD, Clear, PCB	1	
15	2950-1161-01	● Lens, LED, 3MM, Green, Low Profile	1	
16	1065-4314-01	● Bracket, Controls, Monitor, 15" Color	1	
17	1065-4446-01 1065-4548-01	● Button, Push, Monitor Control	7	
18	2208-0147-01	● Standoff, Wire,3/16,Push-in, Twist, Ny	2	
19	7500-1312-01	● PCB Assy, Monitor Control	1	
20	3500-2656-02	● Cable Assy, Microphone, Access Pnl	1	
21	1065-4345-01	● Beam, Mounting, Rear, Monitor	1	
22	3500-2613-01	● Cable Assy, Monitor, Upper Bezel	1	Not shown

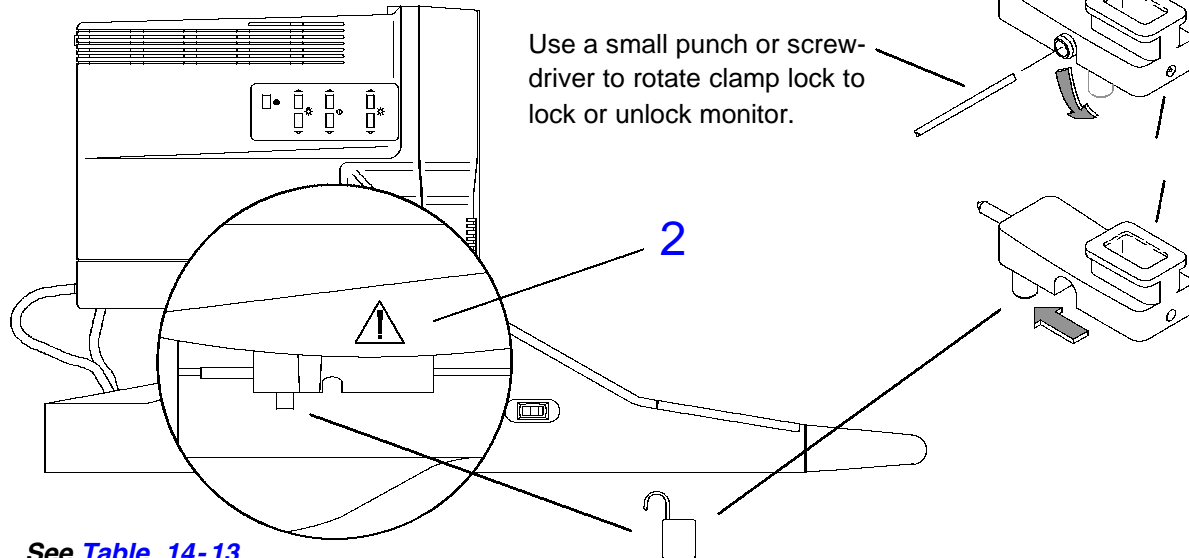
Figure 14-25 (3 of 4)

23	3500-2614-01	● Cable Assy, Monitor, Lower Bezel	1	
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Index Number	Part Number	Part Description	Qty	Notes/ Reference
24	7500-1313-01	● PCB Assy, Monitor Light Bar	1	
25	1516-0113	● Screw, 6-32X1/2.Pnh, Sem, Pd, St, Zn	3	
26	1560-0061	● Washer, Flat, #6, .31200, .032T, St, Zn	3	
27	1065-4233-01	● Diffuser, Light, Monitor	1	
28	1516-0014	● Screw, 6-32X3/8, Flh, Pd, 100D, Ss	4	
Figure 14-26 (4 of 4)				
29	3500-2631-01	Microphone Module Assy	1	
30	1065-4503-01	● Base, Microphone Module	1	
31	1065-4504-01	● Cover, Microphone Module	1	
32	3500-2632-02	● Cable Assy, Microphone	1	
33	1065-4671-01	● Insert, Foam, Forward, Mic Module	1	
34	2100-1403-01	● Microphone Cartridge, Cond., Electret	1	
35	2950-1155-01	● Holder, Microphone	1	
36	9901-0035	● Velcro, Hook & Loop, Wht.1" Wd	1	

CAUTION

To prevent damage to the monitor, item 12 must be in the locked position on both sides of the monitor before moving the system.



See [Table 14-13](#)

Figure 14-27. Electrohome Video Monitor Base (1 of 3)

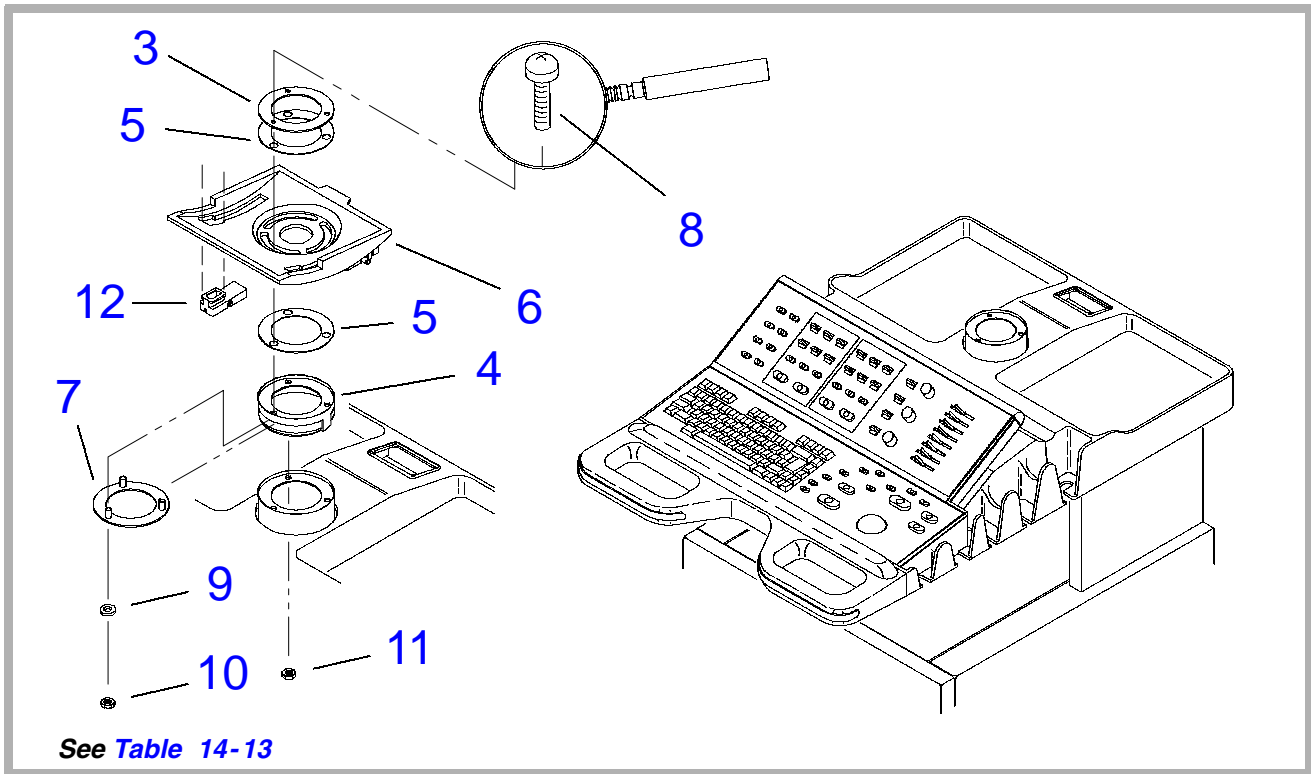
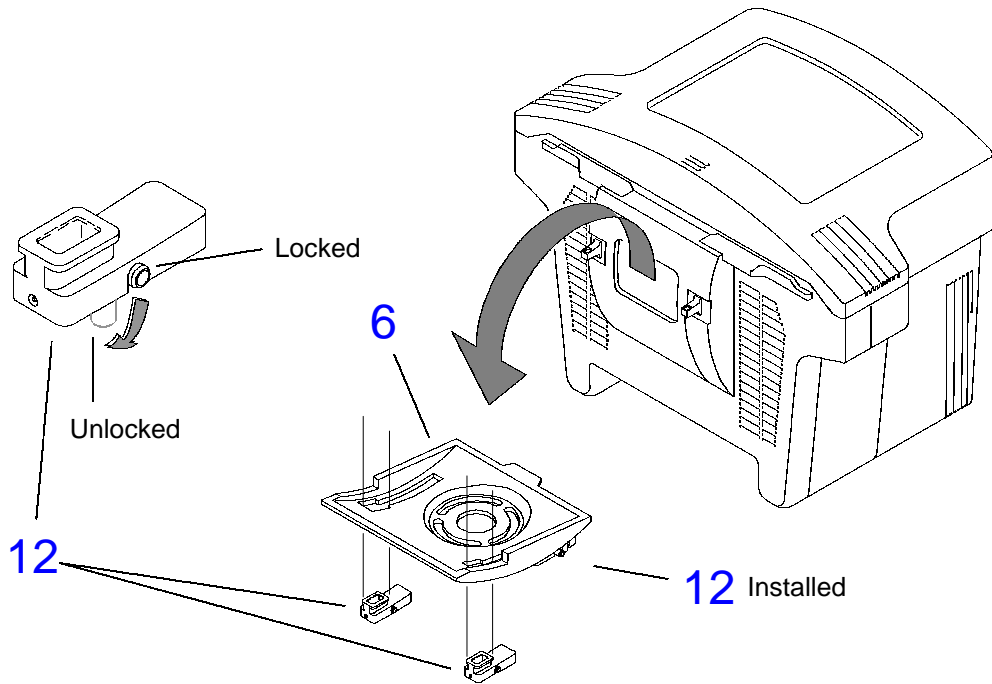


Figure 14-28. Electrohome Video Monitor Base (2 of 3)



See [Table 14-13](#)

Figure 14-29. Electrohome Video Monitor Base (3 of 3)

Table 14-13. Electrohome Video Monitor Base

Figure 14-27, Figure 14-28, and Figure 14-29				
Index Number	Part Number	Part Description	Qty	Notes/ Reference
1	3500-2812-03	Tilt Base Assembly with Adapter	1	
2	4100-1568-01	● Label, Warning, Monitor Lock	2	
3	1065-2438-01	● Ring, Clamping, Monitor Swivel	1	
4	1065-4565-03	● Adapter, Monitor Height/Position	1	
5	1065-2439-01	● Bearing, Monitor Swivel	2	
6	1065-2682-02	● Base, Tilt Mechanism, Fog	1	
7	1065-2372-03	● Plate, Monitor Swivel	1	
8	1530-0297-01	* Screw, 10-32 x 1, Pnh, Pd, Sems, St, Zn	3	
9	1560-0051	* Washer, Fl, #10, 0.203ID, 0.50OD, St, Zn	3	
10	1543-0002	* Nut, 10-32, Keps, St, Zn	3	
11	1544-0012	* Nut, 1/4-20, Keps, St, Zn	3	
12	3000-0363-04	Clamp Lock Assy, Monitor,(w/safety latch)	2	

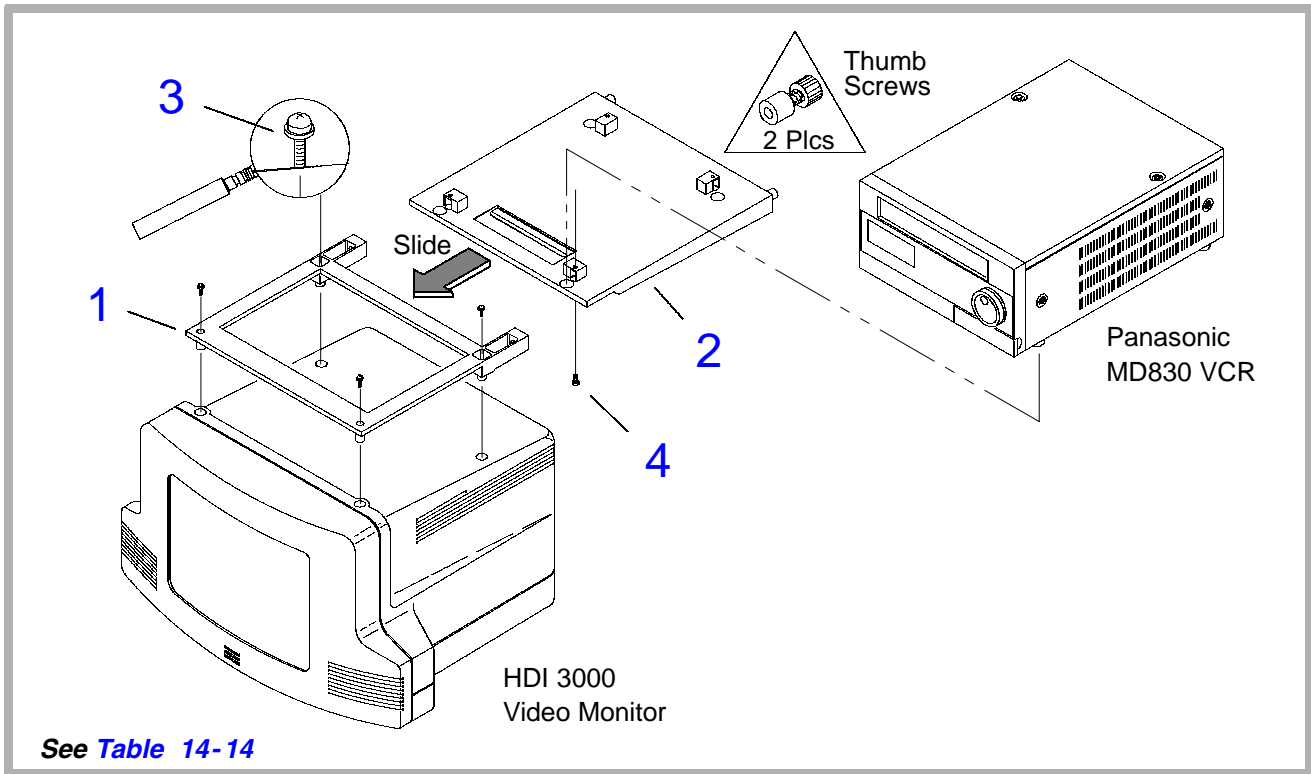
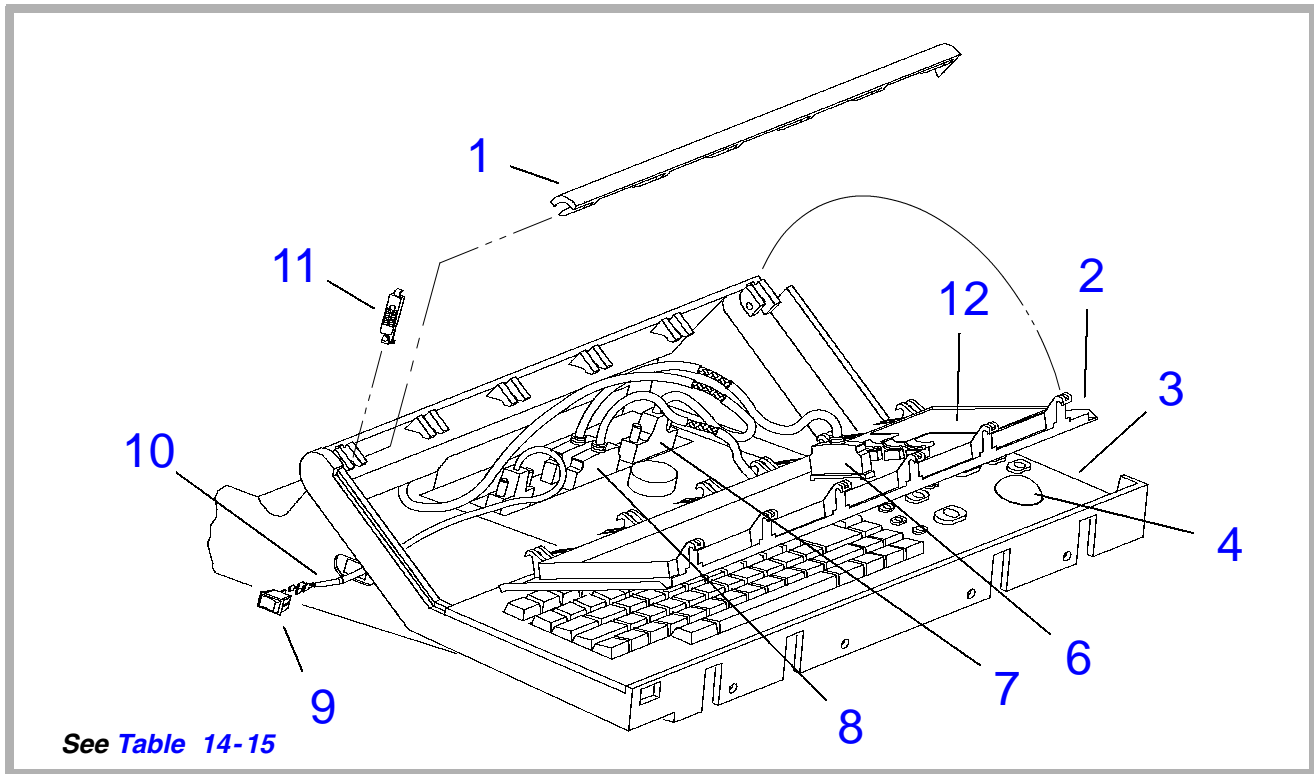


Figure 14-30. Video Monitor VCR Mounting

Table 14-14. Video Monitor VCR Mounting

Figure 14-30

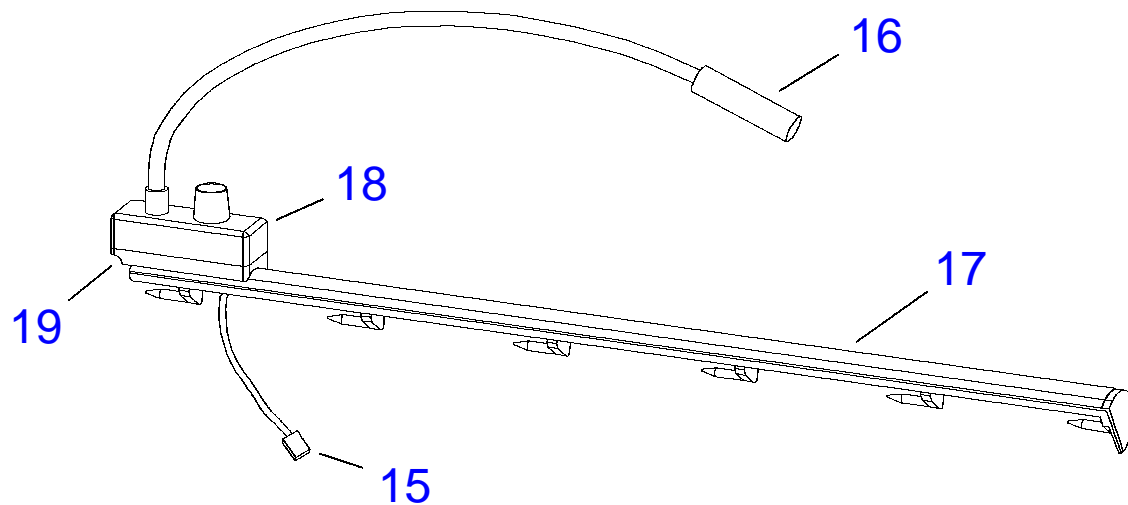
Index Number	Part Number	Part Description	Qty	Notes/ Reference
1	1065-2683-01	Support, VCR	1	
2	1065-1803-05	Bracket, VCR Mounting	1	
	1065-3021-01	Bracket, VCR Mounting, for Sony SVO-9500MD VCR	1	Hitachi systems
3	1518-0051	* Screw, 10-32 x 1/2, Pnh, Sem, Pd, St, Zn (Data Ray)	4	
	1065-0098-01	* Screw, M5X12, Pnh, Pd, Int Sems, St, Bo (Electrohome)	4	
4	1630-0058-01	* Screw, M4X10, Pnh, Pd, Sems S/R Lk, St, Zn	4	



See Table 14-15

Figure 14-31. Control Panels (1 of 2)

14 Item 14 is the Goose-neck Lamp Assembly



See *Table 14-15*

Goose-neck Lamp Assy

Figure 14-32. Control Panels (2 of 2)

Table 14-15. Control Panels**Figure 14-31 (1 of 2)**

Index Number	Part Number	Part Description	Qty	Notes/ Reference
1	1065-2138-03	Lock Bar, Control Panel	1	
2	3500-1645-XX	UCP - Upper User Interface Assy	1	English
	3500-1654-XX	UCP - Upper User Interface Assy	1	French
	3500-1655-XX	UCP - Upper User Interface Assy	1	German
	3500-2860-XX	UCP - Upper User Interface Assy	1	Italian
3	3500-1644-XX	LCP - Lower User Interface Assy	1	English
	3500-1652-XX	LCP - Lower User Interface Assy	1	French
	3500-1653-XX	LCP - Lower User Interface Assy	1	German
	3500-2859-XX	LCP - Lower User Interface Assy	1	Italian
	3500-2909-XX	LCP - Lower User Interface Assy	1	Danish
	3500-2910-XX	LCP - Lower User Interface Assy	1	Norwegian
	3500-2911-XX	LCP - Lower User Interface Assy	1	Swedish
4	2100-1656-01	Trackball	1	

Index Number	Part Number	Part Description	Qty	Notes/Reference
5	2100-1657-01	Trackball Seal Adjustment Tool (Illustrated in paragraph 8-3)	1	Not shown
6	3500-1458-03	Cable Assy, CIM/UCP (or LCP)	1	
7	3500-1405-02	Cable Assy, IIM/CIM	1	
8	3500-1458-03	Cable Assy, CIM/LCP (or UCP)	1	
9	3300-0307-01	Switch, On/Standby	1	Low Volt.
10	3500-1460-01	Cable Assy, On/Standby Switch	1	
11	1065-2139-02	Latch, Lock Bar	1	
12	3500-1563-01	Slidepot Assy	1	
13	4400-0089-02	Keycap Set, Eng (3500-1644-06 and up)	1	Not shown
	4400-0090-02	Keycap Set, Fre (3500-1652-06 and up)	1	
	4400-0091-02	Keycap Set, Ger (3500-1653-06 and up)	1	
Figure 14-32 (2 of 2)				
14	3500-1870-01	Goose-neck Lamp Assy (Data Ray monitor only)	1	

Index Number	Part Number	Part Description	Qty	Notes/ Reference
15	3500-1460-02	● Cable Assy, On/Standby Switch, Goose-neck Lamp	1	
16	2100-1219-01	● Lamp, 12" Goose-neck, 12V Low intensity	1	
17	1065-3010-01	● Lock Bar, UIF Assy, Modified	1	
18	1065-3009-01	● Block, Mounting Lamp	1	
19	1065-3008-03	● Plate, Lamp Adapter	1	
20	3900-0034-01	Bulb, Goose-neck Light, 14VDC	1	Not shown

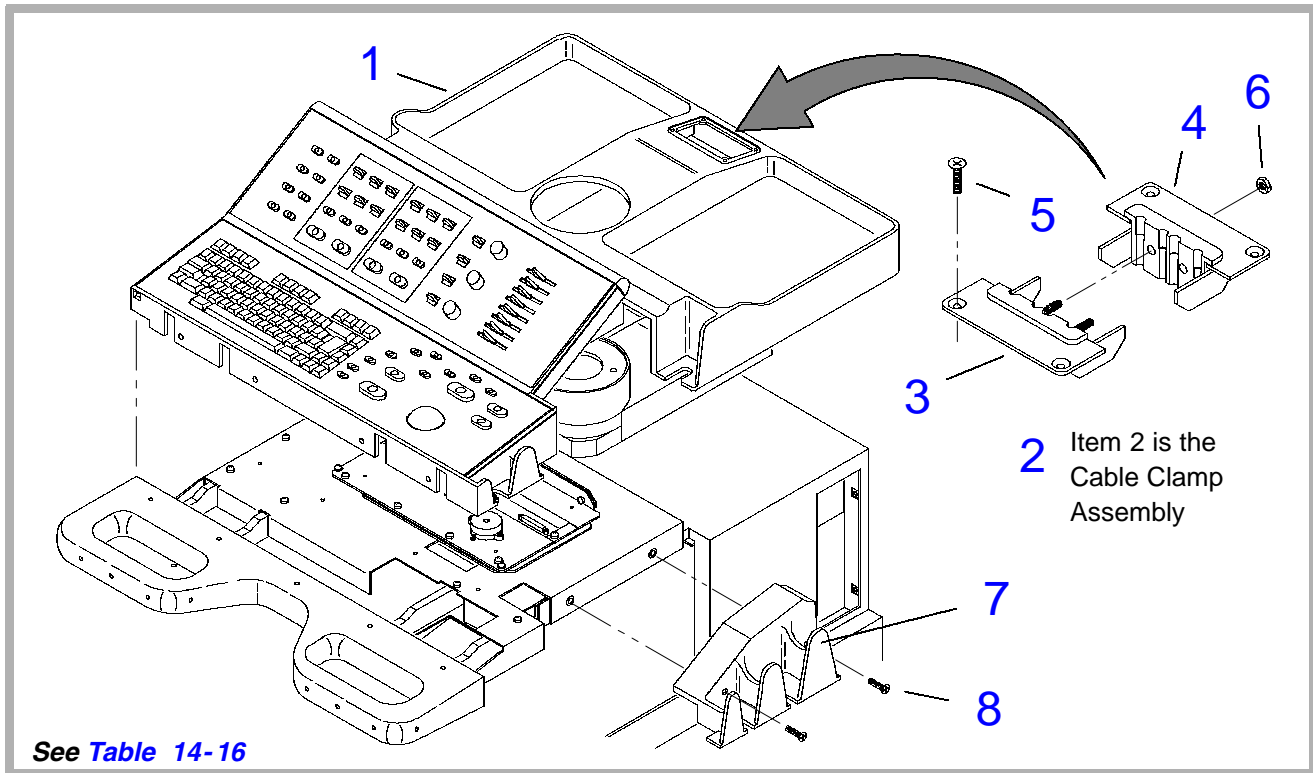
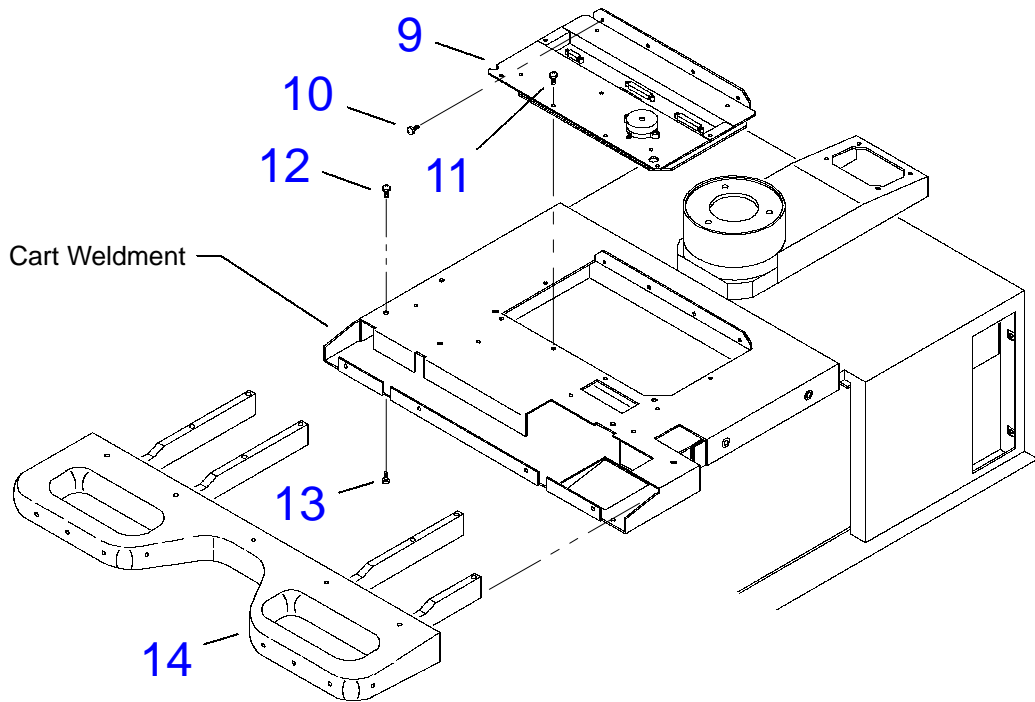


Figure 14-33. Command Module (1 of 2)



See *Table 14-16*

Figure 14-34. Command Module (2 of 2)

Table 14-16. Command Module

Figure 14-33 (1 of 2)

Index Number	Part Number	Part Description	Qty	Notes/ Reference
1	1065-1822-04	Housing, Command Module	1	
2	3500-1651-03	Cable Clamp Assembly	1	
3	1065-2576-02	● Plate, Cable Clamp, Left	1	
4	1065-2577-02	● Plate, Cable Clamp, Right	1	
5	1530-0156-01	* Screw, 10-32 x 1, Flh, Pd, Fog White	4	
6	1543-0002	* Nut, 10-32	2	
7	1065-1832-01	Retainer, Bladder, MFI	1	
8	1530-0156-01	* Screw, 10-32 x 1, Flh, Pd, 82D, St, Fog White	2	

Figure 14-34 (2 of 2)

9	7500-0674-XX	PCB Assy, CIM - Control Interface Module (-06 for goose-neck lamp, -05 for no lamp)	1	
	1065-2447-03	● Bracket, Control Interface	1	
	3403-0001	● Piezo Alarm,85dB,2.8KHz,W/11" Min LD	1	

Index Number	Part Number	Part Description	Qty	Notes/ Reference
	1630-0027-01	● Screw, NFND,4-40x3/8,Ph,Pd,Sem,Ss	4	
10	1516-0074	* Screw, 6-32x3/8, Pnh, Int Sem, Pd,St,Zn	4	
11	1516-0074	* Screw, 6-32x3/8, Pnh, Int Sem, Pd,St,Zn	6	
12	1518-0051	* Screw, 10-32x1/2, Pnh, Sem, Pd, St, Zn	7	
13	1518-0051	* Screw, 10-32x1/2, Pnh, Sem, Pd, St, Zn	8	
14	1065-2610-05	Handle Casting	1	

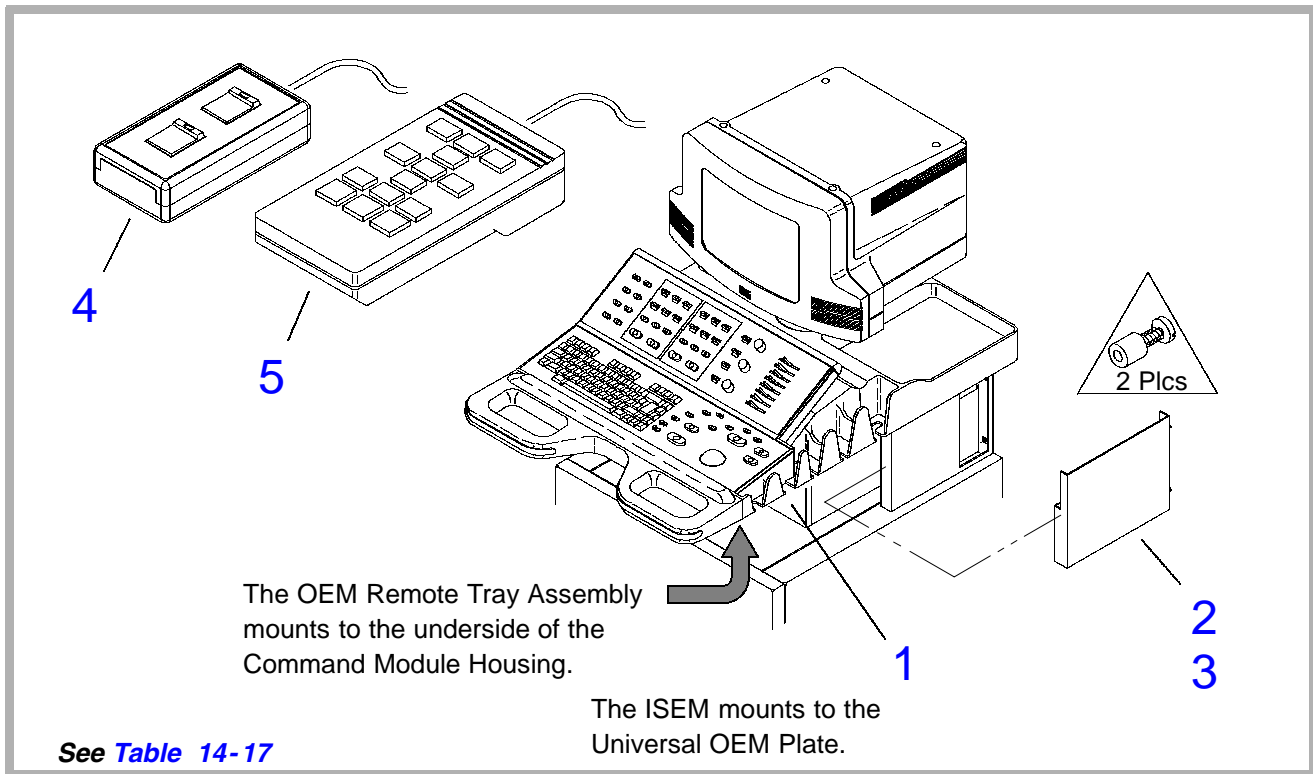


Figure 14-35. Integrated Stress Echo Module (ISEM) (1 of 2)

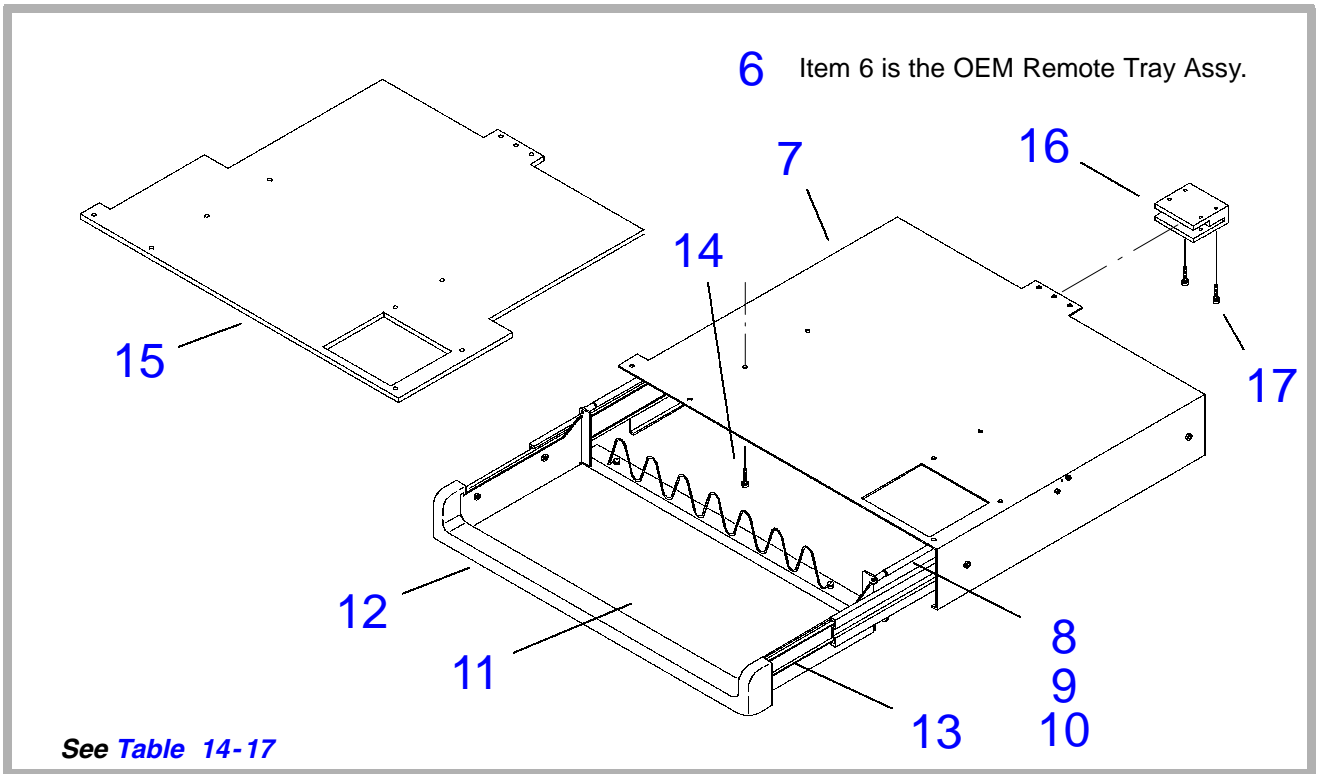


Figure 14-36. Integrated Stress Echo Module (ISEM) (2 of 2)

Table 14-17. Integrated Stress Echo Module (ISEM)

Figure 14-35 (1 of 2)				
Index Number	Part Number	Part Description	Qty	Notes/ Reference
1	2100-1361-01	ISEM, 2.0 Software, 3.5" MO Drive, 16 MB, NTSC	1	
	2100-1366-01	ISEM, 2.0 Software, 5.25" MO Drive, 16 MB, NTSC	1	
	2100-1367-02	ISEM, 2.0 Software, 3.5" 540MB MO Drive, 32 MB, NTSC	1	
	2100-1368-01	ISEM, 2.0 Software, 5.25" MO Drive, 32 MB, NTSC	1	
	2100-1434-02	ISEM, 3.0 Software, 3.5" 540MB MO Drive, 64 MB, NTSC	1	
	2100-1435-02	ISEM, 3.0 Software, 5.25" MO Drive, 64 MB, NTSC	1	
	2100-1340-01	ISEM, 1.61 Software, 3.5" MO Drive, 16 MB, PAL	1	

Index Number	Part Number	Part Description	Qty	Notes/Reference
	2100-1371-01	ISEM, 1.61 Software, 5.25" MO Drive, 16 MB, PAL	1	
	2100-1370-03	ISEM, 1.62 Software, 3.5" 540 MB MO Drive, 32 MB, PAL	1	
	2100-1369-02	ISEM, 1.62 Software, 5.25" MO Drive, 32 MB, PAL	1	
2	1065-2981-01	Cover, Cable, Right, Notched	1	
	1065-2981-02	Cover, Cable, Right, Notched	1	
3	1065-4178-01	Cover, Cable, Right, Notched, Adapter	1	
4	3500-1857-01	Video Switch Assy	1	Fits on Tray
5	4400-7006-11	Hand Controller	1	Fits on Tray
Figure 14-36 (2 of 2)				
6	3500-1856-02	OEM Remote Tray Assy	1	
7	1065-2903-05	● Bracket, Mounting Tray	1	
8	1065-2904-03	● Rod, Detent, Tray	2	
9	1065-2905-02	● Block, Detent, Left	1	

Index Number	Part Number	Part Description	Qty	Notes/Reference
10	1065-2906-02	● Block, Detent, Right	1	
11	1065-2907-07	● Tray, OEM Remote	1	
12	1065-2992-03	● Handle, OEM Remote Tray	1	
13	2950-1066-01	● Slides, No Lock, 3-Section, 17" Travel, Left/Right	1	Come in pairs
	2950-0850-01	● Slides, Lock, 3-Section, 17", Left/Right	1	
14	1518-0051	* Screw, 10-32x1/2, Pnh, Sem, Pd, St, Zn	8	
15	1065-2969-01	Plate, OEM Remote Tray, Adapter	1	
16	1065-2975-01	Clamp, Retaining, OEM Remote Tray	1	
17	1518-0043	* Screw, 10-32x3/4, Pnh, Sem, Pd, St, Zn	2	
	2275-0325-03	Cable Assy, System Monitor, 58", Thmb Screw	1	Not shown
	3500-1541-04	Cable Assy, Sony RGB Printer	1	Not shown
18	2275-0326-01	Cable Assy, External OEM	1	Not shown, demo installations only
	2275-0375-01	Cable Assy, 6Ft, Ext. ISEM Video Out to Monitor	1	

Index Number	Part Number	Part Description	Qty	Notes/Reference
	2275-0376-01	Cable Assy, Monitor to Ext ISEM Video In	1	

Table 14-18. OEMs and OEM Cables (Not Illustrated)

OEM Description	Part Numbers		
	OEM	Power Cable	Signal Cable
Printer, Codonics NP1660MD, NetLink, North America	2100-1566-01	-	2275-0335-01
Printer, Codonics NP1660MD, NetLink, International	2100-1567-01	-	2275-0335-01
Color Printer, Mitsubishi, CP700, 120V	3500-3071-01 ¹ 2100-1327-01	3500-1873-02	3500-1541-04
Color Printer, Mitsubishi, CP700, 240V	3500-3072-01 ¹ 2100-1328-01	3500-2397-03	3500-1541-04
Color Printer, Mitsubishi, CP800, 120V	3500-3063-01 ¹ 2100-1535-01	3500-1873-02	3500-1541-04

OEM Description	Part Numbers		
	OEM	Power Cable	Signal Cable
Color Printer, Mitsubishi, CP800, 240V	3500-3064-01 ¹ 2100-1536-01	3500-2397-03	3500-1541-04
Color Printer, Mitsubishi, CP50E, 240V	-	3500-1547-05	3500-2643-01
Color Printer, Sony UP5600-60Hz, 120Vac, NTSC (Domestic US use only)	2100-1476-01	3500-1873-02	3500-1541-04
Color Printer, Sony UP5600-60Hz, 155Vac, NTSC	2100-0847-01	3500-1873-02	3500-1541-04
Color Printer, Sony UP5600-50Hz, 155Vac, PAL	3500-1694-01	3500-2397-03	3500-1541-04
Color Printer, Sony UP1850, 120V, NTSC	2100-0824-01	3500-1517-05	3500-1541-04
Color Printer, Sony UP1850, 240V, PAL	2100-0830-01	3500-1547-05	3500-1541-04
Color Printer (Large), Sony UP5250MD, 120V, NTSC	2100-0742-01	3500-1517-05	3500-1541-04
Color Printer (Large), Sony UP5250MD, 240V, PAL	2100-0743-01	3500-1547-05	3500-1541-04
B&W Printer, Mitsu, UP91, 120V, NTSC	2100-1680-01	3500-1517-05	3500-1540-04

OEM Description	Part Numbers		
	OEM	Power Cable	Signal Cable
B&W Printer, Sony UP860, 120V, NTSC	2100-0734-01	3500-1517-05	3500-1540-03
B&W Printer, Sony UP870, 240V, PAL	2100-0735-01	3500-1547-05	3500-1540-03
B&W Printer, Sony UP890, 120/230V, NTSC/PAL (use either power cable)	2100-0862-01	3500-1517-05 3500-0386-01	3500-1540-03
B&W Printer, Sony UP910CE, Large Format, 240V, 50Hz, PAL	2100-0759-01	3500-1547-05	3500-1540-03
B&W Printer, Sony UP910MD, 120V, NTSC2	2100-0701-01	3500-1517-05	3500-1540-03
Aspect MIC Camera, 120V, NTSC, English	3500-1664-01	3500-1517-05	3500-1539-03
Aspect MIC Camera, 240V, PAL, English	3500-1665-01	3500-1547-05	3500-1539-03
Aspect MIC Camera, 240V, PAL, French	3500-1671-01	3500-1547-05	3500-1539-03
Aspect MIC Camera, 240V, PAL, German	3500-1667-01	3500-1547-05	3500-1539-03
Dual Hardcopy, 100-120V ²	-	3500-1873-01	-
Dual Hardcopy, 230V ² (PAL only)	-	3500-2397-02	-
VCR, SVHS, NTSC, HIFI, 120V, RS-232 (for use with Data Ray monitors) MD830P	3500-1662-02	3500-1516-05	3500-1404-04

OEM Description	Part Numbers		
	OEM	Power Cable	Signal Cable
VCR, SVHS, PAL, HIFI, 230V, RS-232 (for use with Data Ray monitors)	3500-1663-01	3500-1546-05	3500-1404-04
VCR, SVHS, NTSC, HIFI, 120V, RS-232 (for use with Electrohome monitors)	3500-1662-02	3500-2780-01	3500-1404-05
VCR, SVHS, PAL, HIFI, 230V, RS-232 (for use with Data Electrohome monitors)	3500-1663-01	3500-2781-01	3500-1404-05
VCR, Sony SVO-9500MD	3500-1875-01	3500-1516-05	3500-1404-04
Data Ray Video Monitor (power cable is 115V with right angle connector on monitor end)	3500-1315-03 3500-1874-03	3500-1515-04 3500-1681-03	2275-0325-03
Electrohome Video Monitor (power cable is 115V with right angle connector on monitor end)	3500-2532-03	3500-2616-01	3500-2633-02
Any external OEM with coax connector (P/N is for RGB cable) ³	-	-	2275-0326-01
Any external OEM with coax connector (P/N is for BNC cable, 6 ft length) ⁴	-	-	2275-0176

OEM Description	Part Numbers		
	OEM	Power Cable	Signal Cable
Access Acquisition Module, 115V, NTSC, Internal Installation ⁵	2100-7071-01	3500-1517-05	2275-0327-01 2275-0329-01
Access Acquisition Module, 115V, NTSC, External Installation ⁵	2100-7071-01	3500-1517-05	2275-0328-01 2275-0330-01
LED Pg Printer, Okidata OL400e, 120V, Ext.	2100-0866-01	-	2275-0337-01
OEM Power Adapter, 125V, 10A ⁶	-	2275-0373-01	-
ISEM, 3.5"/32 Mb, NTSC	2100-1367-01	3500-1873-01	3500-2633-02
ISEM, 5.25"/32 Mb, NTSC	2100-1368-01	3500-1873-01	3500-2633-02
ISEM, 3.5"/64 Mb, NTSC	2100-1434-02	3500-1873-01	3500-2633-02
ISEM, 5.25"/64 Mb, NTSC	2100-1435-02	3500-2397-02	3500-2633-02
ISEM, 3.5"/32 Mb, PAL	2100-1370-03	3500-2397-02	3500-2633-02
ISEM, 5.25"/32 Mb, PAL	2100-1369-02	3500-2397-02	3500-2633-02

1. Includes feet.
2. Cable can be used only with the 2601-0071-01 OEM transformer.
3. Order one cable for external OEM with RGB video.

4. Order two cables for external OEM with B&W video.
5. The top and bottom signal cable part numbers are for the video in and video out cables, respectively.
6. Used to connect an OEM with a hardwired power cord to a PC power connector.
7. RGB cable P/N 3500-1541-04 is 53 inches, P/N 3500-2641-02 is the same RGB cable at 61 inches.

Table 14-19. Miscellaneous System Labels (Not Illustrated)

Index Number	Part Number	Part Description	Qty	Notes/ Reference
1	4100-0942-02	ACIM Voltage, 100-120V/60 Hz	1	
2	4100-0944-02	ACIM Voltage, 230-240V/50 Hz, 7.5A		
3	4100-0945-01	ACIM Voltage, 230V/60 Hz, 7.5A		
4	4100-0943-02	ACIM Voltage, 100-120V/50 Hz		
5	4100-0968-01	Ground and AC Input	1	
6	4100-0968-01	Ground and AC Input	1	
7	119-24481-04	International Symbol	1	
8	4100-0271	System Warning	1	
9	4100-0274	System Access. Equipment Warning	1	
10	4100-0956-01	PCB & Slot ID	1	
11	4100-0958-01	OEM Baseplate	1	
12	4100-0959-01	SBY-ON, System	1	
13	4100-0960-01	Power Input, Monitor	1	
14	4100-0961-01	PIM	1	

Index Number	Part Number	Part Description	Qty	Notes/ Reference
15	4100-0962-01	CPU/ADAPTR	1	
16	4100-1255-01	ADAPTR	1	
17	4100-1256-01	CPU	1	
18	4100-0963-01	CW Connector	1	
19	4100-0964-01	Scanhead Connectors	1	
20	4100-0966-02	System ID	1	
21	4100-0971-01	System Warning	1	
22	4100-0987-01	HDI 3000 CV	1	
23	4100-1359-01	HDI 3000 CV	1	Alternate
24	4100-0993-01	Caution Shorted Pins During PCB Install	1	
25	4100-0299	2D/TM, 4000B, Footswitch	1	
26	4100-0296	Freeze Frame, 4000B, Footswitch	1	
27	4100-0297	VCR, 4000B, Footswitch	1	
28	4100-0757-01	Footswitch, Water-resistant	1	
29	4100-1041-01	Latching Monitor, Right-Hand	1	

Index Number	Part Number	Part Description	Qty	Notes/ Reference
30	4100-1042-01	Latching Monitor, Left-Hand	1	
31	4100-1045-01	Cable Voltage, SLV 100-120Vac	1	
32	4100-1387-01	Warning, Power Cord	1	
33	9903-0338-01	1.0 x 0.5, Plystr, Wht, Ammo-Pak	1	
34	4100-1568-01	Warning, Monitor Lock	1	
35	4100-1238-01	Right Side Cover	1	
36	4100-1560-01	System, Year 2000 Compliance	1	
37	4100-1597-01	PCB Slot ID	1	

Table 14-20. Miscellaneous System Accessories (Not Illustrated)

Index No.	ATL Part No.	Description	Qty	Notes
	8500-9116-01	Accessory Tool Kit	1	Hitachi sys.
	9905-0396-01	● Screwdriver, #1 Phillips, 3-1/8" Shaft	1	Hitachi sys.
	9905-0397-01	● Screwdriver, 7/64 Ball Hex, 6" Shaft	1	Hitachi sys.
	9903-0517-01	● Bag, Zipper, Ring Binder, 9.5" x 6"	1	Hitachi sys.

Index No.	ATL Part No.	Description	Qty	Notes
	2301-0700-01	Paint, Touch Up, Fog White, 1 oz. Bottle	1	
	2301-0701-01	Paint, Touch Up, Fog White, 16 oz. Aerosol	1	
	2100-0792-01	Optical Disk, 3.5" 128 MB (blank)	1	
	2100-1410-01	Optical Disk, 3.5" 230 MB (blank)	1	
	2100-1419-01	Kit, Cleaning, Optical Drive, Fujitsu	1	

15 Glossary

15-1

Acronyms and Abbreviations

4V ²	Peak pressure gradient
A	Amperes
A1B	A1B-A13B identify card cage slot positions
AC	Alternating current
ACIM	AC Input Module (main power input panel)
A/D	Analog-to-digital conversion
ADAPTR	Advanced Digital, Audio, Physio, and Translator (module)
AIFOM	Advanced IF Output Module
AIM	Analog Interface Module
Amps	Amperes
AP&I	Acoustic Power and Intensity

APS	Analog Power Supply
AQ	Acquisition (bus)
AQ Bus	Acquisition Bus
Assy	Assembly
AT	Acceleration time; averaging time
B/W	Black and white
CB, Ch Bd	Channel Board
Cap	Capacitor
CFM	Cubic feet per minute
Conn	Connector
CPI	Control Panel Interface (module)
CPU	System CPU (system controller module)
D	Diameter
D/A	Digital-to-analog
DC	Direct current

DDEA	Disk Drive, ECG, and Audio (module)
DOPACQ	Doppler Acquisition (module)
DPS	Digital Power Supply
DT	Deceleration time
ECG	Electrocardiograph
EDF	End diastolic velocity and frequency
ESP	Extended Signal Processing
FEC	Front End Controller (module)
FFT	Fast Fourier Transform
FI	Flat
FIh	Flathead
FNDE	Fender washer
FOOTSW	Footswitch
F/W	Firmware
GB	Gigabyte

H	High
Hd	Hex drive
Hosp	Hospital
HR	Heart rate
HVAC	High voltage alternating current
HVDC	High voltage direct current
H/W	Hardware
Hz	Hertz
ID	Inside diameter (screws or hardware) or system identification number
IF	Intermediate frequency
IIM	Internal Interface Module
IMEM	Image Memory (module)
Ins	Inside
Int	Internal

ISEM	Integrated Stress Echo Module
L	Long or length
lb	Pound
lb/min	Pound per minute
LCP	Lower Control Panel (module)
LED	Light emitting diode
LEP	List of Effective Pages
Lk	Lock
LUT	Look-up table
Max	Maximum
MB	Megabyte
MDF	Minimum diastolic velocity and frequency
MO	Magneto-optical (drive) or machine option (files)
MON	Monitor
MOP	Module Operations Processor

MPS	Master Power Supply
Mt	Mounting
Mux	Multiplexer
NTSC	National Television Standards Committee (video standard)
Ny	Nylon
OD	Outside diameter
OEM	Original Equipment Manufacturer, peripheral device such as a printer, VCR, or camera
OSP	On-screen programming
Oz	Ounces
PAL	Phased Alteration by Line (European video standard)
PCM	Pixel Conversion Module
PD	Processed Data (bus) or Phillips drive (screw)
PI	Pulsatility index

PIM	Peripheral Interface Module
PLL	Phase loop locking
Pnh	Pan head
Pnl	Panel
Plystr	Polyester
Ppr	Paper (capacitor)
PRF	Pulse repetition frequency
PRI	Pulse repetition interval
PS1	PS1–PS4 identify card cage slot positions
PSP1, PSP2	Pixel Space Processor (module)
PSF	Peak systolic frequency
PSV	Peak systolic velocity
RF	Radio frequency
RFI	Radio frequency interference
RI	Resistive index

Rkr	Rocker (switch)
Rx	Receive or receiver
SBY	Standby
SC	System Control (Interface Processor)
SCIP	System Control Interface Processor
SCSI	Small Computer Serial Interface
S/D	Systolic/diastolic ratio
SEM	Screw has captive internal tooth washer
S/H	Scanhead
Shld	Shield or shielded
S/HSEL	Scanhead Select (module)
Skh	Socket head
Spst	Single pole, single throw switch
SS	Stainless steel
SSP	Sample Space Processor (module)

St	Steel
S-VHS	Super VHS, a VCR video format
Sw	Switch
S/W	Software
T	Thick
TAF	Time-averaged frequency
TAM	Time-averaged mean velocity
TAP	Time-averaged peak velocity
TGC	Time gain compensation
TOC	Table of Contents
TTag	Time Tag (bus)
Tx	Transmit or transmitter
UART	Universal Asynchronous Receiver Transmitter
UCP	Upper Control Panel (module)
UIF	User interface (LCP, UCP, and CPI)

Unshld	Unshielded
VA	Volt amps
Vac	Volts AC
Vdc	Volts DC
VTI	Velocity-time integral
W	Wide (refers to a distance measurement) or watt (unit of electrical power)
w/	with
Wht	White
w/o	without
Xfmr	Transformer
Zn	Zinc

15-2

Terms

Artifact	An undesirable imaging anomaly created as the result of acoustic effects or system processing.
Box	An image made up of a sequential set of columns that is usually smaller than the sector size would allow. Most commonly refers to the color flow image color box.
Burst	The transmitted waveform.
Drain	In a coaxial or shielded cable, a wire that is in contact with the shield's braid or foil for the length of the cable. It is used to make the mechanical attachment and consequently the electrical path from the shield to the connector or plug.
Fast Fourier Transformation	Mathematical method used with Doppler shift data to calculate the frequency spectrum that results in the Doppler display.

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, and so on, then field two fills in rows 2, 4, 6, and so on. See “non-interlaced.”

Module
Operations
Processor

Board-level microprocessor dedicated to carrying out the functions of its hardware module. Communicates with the system CPU via a SCIP bus. Typically runs tasks such as initialization of registers, self-test, interpreting commands from the System CPU, and orchestrating real-time tasks on the hardware module.

Noise band	<p>Any level of random background noise when the system speaker (not headphone) volume is set for a typical user setting (generally just above a mid-range setting).</p> <p>Also, any regular line or trace that clearly appears in the scrolling display (as three pixels per inch or more) at a level that is greater than the background noise.</p>
Non-interlaced	<p>Video format where the video rows are processed in sequence (1, 2, 3, 4, 5, 6, and so on) and updated at a 60 Hz rate. See “interlaced.”</p>
National Television Standards Committee	<p>525-line, 60Hz, composite video, usually color.</p>
Original Equipment Manufacturer	<p>A peripheral device (VCR, printer, camera).</p>

On-screen programming	Refers to on-screen programming of a VCR, or other OEM device.
Phased Alteration by Line	625-line, 50Hz composite video, usually color.
Pulse repetition frequency	Rate at which ultrasound pulses are sent into the tissue. Based primarily on depth desired, but also depends on other variables such as dead time.
Pulse repetition interval	The time between ultrasound pulses. This time determines how much processing can take place and still keep up with the data acquisition.
System Control Interface Processor	Set of processors that reside on all modules that communicate with the CPU PCB. SCIP refers to the communication system, which includes protocol, firmware, and hardware.

Universal
Asynchronous
Receiver
Transmitter Port

Serial communication port located on the card edge of the FEC. Also called debug port or diagnostic port.

Watchdog

A level detector, a comparator circuit, or a time-out circuit, that ensures the proper functioning of a supply, a regulator, or other circuitry. Disables the monitored circuit, if it is out of specification or the timer is not reset.