

# InfoServer 150 System Specification

This document describes the InfoServer 150 and InfoServer 150VXT Systems.

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- 0.2 - 07/31/91 Ken Caruso - Updates based on Internal review
- 0.3 - 08/20/91 Ken Caruso - Updates w Cable P/N's and misc.
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**July 1991**

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# CHAPTER 1

## INTRODUCTION

### 1.1 SCOPE AND ORGANIZATION OF THIS DOCUMENT

This document is the functional specification for the InfoServer 150 and InfoServer 150VXT systems. It is organized into 8 chapters as outlined below:

- Chapter 1 - contains an introduction to the product.
- Chapter 2 - summarizes the system and subsystem architecture.
- Chapter 3 - describes the possible configurations
- Chapter 4 - describes the physical characteristics of the system.
- Chapter 5 - describes the external and internal cabling of the system.
- Chapter 6 - describes the power and cooling sub-systems.
- Chapter 7 - describes the reliability and serviceability requirements of the system.
- Chapter 8 - summarizes the required testing and evaluation of the system.

### 1.2 InfoServer 150 and 150VXT General Descriptions

The InfoServer 150 is a high performance logical block server that is based on the VAXServer 3100 Model 10E hardware and the InfoServer Software kernal. This software kernal implements the LAD/LAST protocol which enables client systems access to InfoServer 150 storage, via Ethernet, as if the storage was a locally attached device. Performance is enhanced by utilizing system memory as a cache for storage data. The MOP protocol is supported and provides the means of loading system images from the server. The LAT protocol, also supported by the InfoServer SW kernal and allows remote management of InfoServer 150 from any LAT terminal.

Client software support will eventually include VMS, Ultrix, MSDOS, MAC and OS2. The InfoServer 150 system allows CD and R/W media sharing with multiple client systems on the network simultaneously if they have the appropriate client software drivers.

Some major product applications are:

- Software distribution
- On-line documentation and database access
- Boot server for VAX 6000 class systems
- Page file for X-terminal support.

The InfoServer 150VXT is derived from the InfoServer 150. The only difference is, at the time of this writing, the inclusion of an RZ24 SCSI 3.5" R/W disk instead of the RZ23L SCSI R/W disk. Product differentiation beyond this one difference is accomplished by varying the system capability with various software packages. Refer to the Product SPD for precise information concerning SW capability.

The remainder of this specification will use the term "InfoServer 150", generically, unless specific discussion is required to distinguish between the two models.

# CHAPTER 2

## INFOSERVER 150 FUNCTIONAL OVERVIEW

### 2.1 SYSTEM OVERVIEW

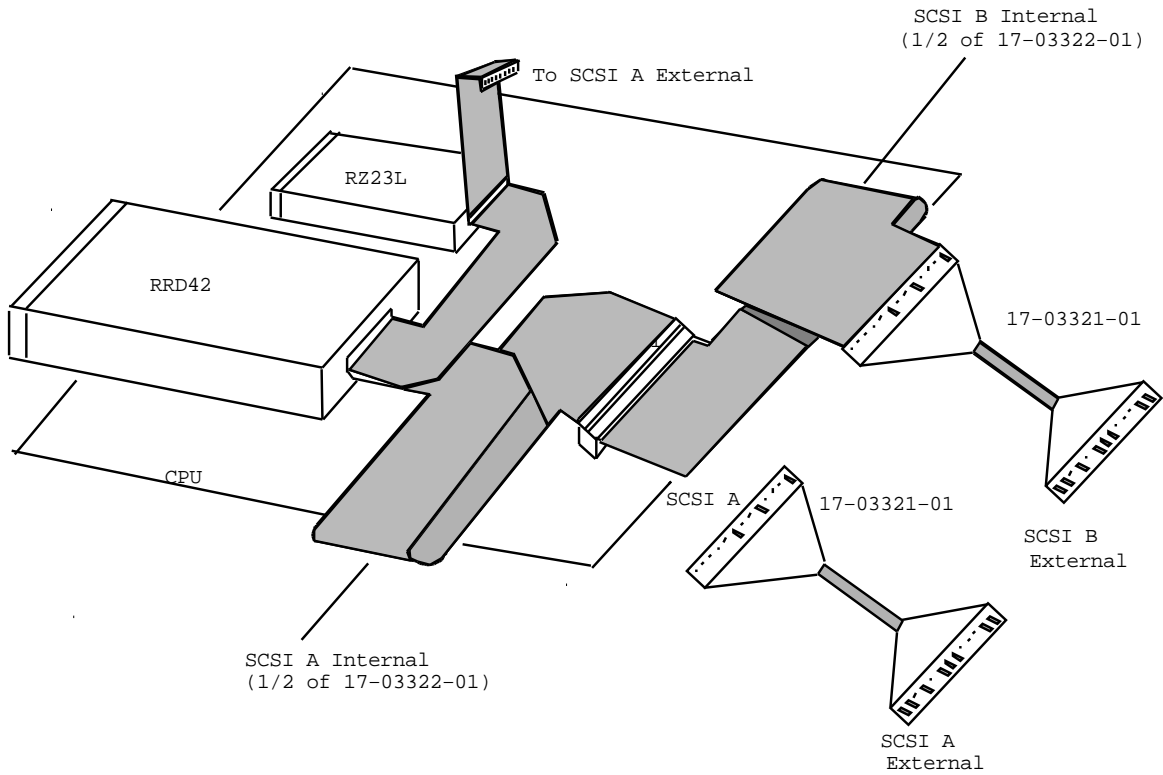
The InfoServer 150 uses the VAXServer 3100 Model 10E power, packaging and CPU components as a starting basis for the product. Firmware changes are implemented to the CPU Base System ROMs, internal cabling is altered and a new product badge is attached to the enclosure to create the InfoServer variants.

The System CPU module has the following functions/features: CVAX chip running at 60ns cycle time, 4 MB of system memory, 256KB ROM, ethernet interface (thinwire and AUI), 4 serial lines, two SCSI ports (SCSI A and SCSI B) for internal and external SCSI storage devices, and a diagnostic display.

InfoServer 150 supports qualified SCSI 3.5" read/write and 5.25" CD read-only half height storage devices internal to the system enclosure. The two SCSI expansion buses allow the connection to up to twelve qualified SCSI devices externally. Refer to the InfoServer System Software SPD for qualified device support.



**Figure 1: InfoServer 150 3D System Cabling View**



**Figure 2: Front View Of InfoServer 150**

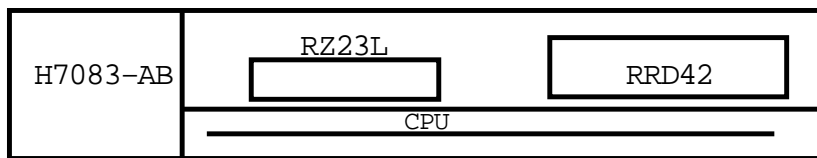
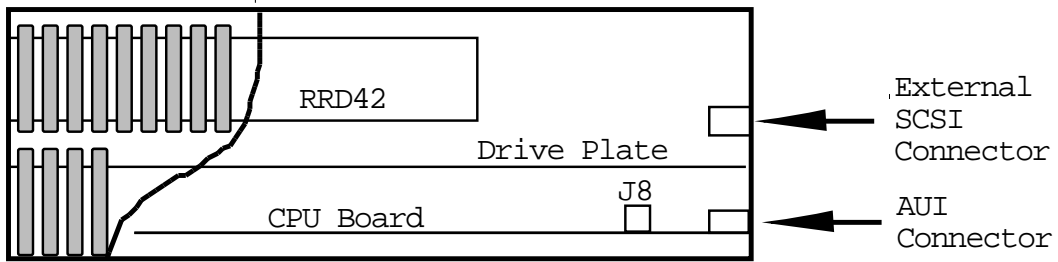


Figure 3: Right side View Of InfoServer 150 with RRD42 Drive



## 2.2 CPU BOARD

The CPU board is a variant of the KA41 CPU board used in the VAXServer 3100 Model 10E system. The variant is -06 on the 54-18856 module assembly.

The CPU board is composed of, but not limited to, the following functionality and components:

1. DC580 CVAX, 60ns cycle time chip
2. 4 MB of parity protected RAM memory
3. 256 KB of ROM memory—unique to the InfoServer 150
4. 32 byte Ethernet address ROM
5. Time of Year Clock, including 50 bytes Battery backed up RAM
6. Ethernet Interface
7. Two SCSI controllers
8. 4 Serial Lines (1 with limited modem control)
9. Start-up Diagnostics

### 2.2.1 Central Processor

The central processor consists of a DC580 CVAX. The key features of the central processor include:

1. Implements a subset of the VAX instruction set.†
2. Implements a subset of the VAX data types.
3. Full VAX memory management.
4. A 32-bit memory data bus.

### 2.2.2 Ram Memory

The CPU board provides 4 MB of RAM memory. The memory is longword aligned and can be read or written in one bus cycle. Memory data integrity is provided by a parity associated with each byte of memory.

The CPU board also contains a 128 KB parity protected SCSI RAM array. This RAM array is used to buffer SCSI device transfers.

### 2.2.3 ROM Memory

The CPU board 256 KB ROM contains the following:

1. Diagnostic Code
2. Console Code
3. Processor Restart Code
4. I/O Driver Code

---

† For details see the CVAX chip spec.

5. A separate 128 KB ROM contains the SCSI controller related code

The function of the Base System ROMs is detailed in the "FUNCTIONAL SPECIFICATION for TEAMMATE II SYSTEM FIRMWARE".

#### **2.2.4 Ethernet Address ROM**

The CPU board contains 32 byte ROM that holds a unique 32-bit network address for each InfoServer 150 system.

#### **2.2.5 Time of Year Clock**

The CPU board contains a battery backed up time of year clock that keeps the date and time of day. An external, rechargeable, nickle-cadmium battery provides power to the time of year clock when system power is off. When starting from a fully charged state, the battery will maintain valid time and date for a minimum of 100 hours. The battery is automatically recharged when system power is on. In addition to these functions the TOY Ram is used to store user set up features.

#### **2.2.6 Ethernet Interface**

The system board permits attachment of Thinwire or Thickwire Ethernet to the system (one logical port). Selection being made by a switch on the rear panel.

#### **2.2.7 Serial Lines**

The CPU board provides four asynchronous SLUs. Three of the SLUs are used for general purpose and are DEC 423 compatible. The fourth SLU provides a RS 232 communication port with modem control. All but one DEC 423 port are disabled during normal operation of the InfoServer System Software. See Table 9 for signal/pin definition.

#### **2.2.8 Mass Storage**

The CPU board contains dual Small Computer Standard Interface (SCSI) controllers to provide mass storage interfaces on the InfoServer 150.

The SCSI Controllers are designated SCSI A and SCSI B. Both ports are used to connect to user SCSI Peripherals (e.g. R/W disks, Tapes, Magneto Optical drives and CDROM drives). The SCSI A port connects to an internal read/write storage device for server software use. The SCSI A port is brought outside of the enclosure to allow connection to additional SCSI devices. The SCSI B port also exits the enclosure to allow the attachment of up to seven external SCSI mass storage devices. The total number of devices (internal and external) permitted on the system is fourteen.

### **2.3 CPU REGISTERS**

Refer to the KA41-AA Specification for further detail on module operation, registers and characteristics. All registers are similar with the exception of the value returned when SYS\_TYPE is read. A unique value of SYS\_TYPE is returned and is documented in the next section.

### 2.3.1 SYS\_TYPE (2004 0004h)

SYS\_TYPE Format (Read Only)

```

3          2 2          1 1          0 0          0
1          4 3          6 5          8 7          0
+-----+-----+-----+-----+-----+
| SYS_TYPE | REVISION | SYS_DEPEND | ARCH_IDENT |
+-----+-----+-----+-----+

```

```

SYS_TYPE = 08h
REVISION = 01h
SYS_DEPEND = 04h
ARCH_IDENT = 02h

```

<31:24> SYS\_TYPE. This field is assigned by the VAX architecture group. InfoServer products MUST return a value of 08H.

<23:16> REVISION. This field is assigned by the VAX architecture group. It MUST return a NON-Zero value. InfoServers return a value of 01H.

<15:08> SYS\_DEPEND. This field is unique to the InfoServer 150 implementation. The value assigned is 04H. Other values possible are as follows:

```

00H          Reserved
01H          Reserved
02H          90 ns InfoServer
04H          60 ns InfoServer
05H - FFH   Reserved

```

<07:00> ARCH\_IDENT. This field distinguishes between Server and Multi-User CPU's. The InfoServer MUST return a value of 02H. Other values possible as follows:

```

01H          MultiUser
02H          Server
03H - FFH   Reserved

```

## 2.4 STORAGE DEVICES

Table 1 below lists the mass storage devices supported by the InfoServer 150.

**Table 1: InfoServer 150 Internally Supported Storage Devices**

Unit	Controller	Size/Type	Storage
RZ23L	SCSI	3.5" R/W	121 MB
RZ24	SCSI	3.5" R/W	209 MB
RRD42	SCSI	5.25" CD	600 MB

### 2.4.1 External Mass Storage

The InfoServer storage capacity can be increased by the addition of external SCSI devices. Two 68 Pin connectors on the rear of InfoServer 150 enclosure provide expansion of both the SCSI A and SCSI B buses. Digital qualified, SCSI compatible, devices may be attached to the external SCSI ports. Refer to the InfoServer Software SPD for qualified device support.

# CHAPTER 3

## INFOSERVER 150 CONFIGURATIONS

### 3.1 Saleable Configurations

The InfoServer 150 is manufactured in two hardware only configurations. Saleable systems include combinations of add-on, external SCSI peripherals and factory installed Software offerings. Systems are not sold without Software. The exact configuration of these systems will not be specified in this document, however system configuration guidelines are given below.

#### 3.1.1 System Configuration Guidelines - Internal

An InfoServer 150 is restricted to the following combination of storage device options listed in Table 2.

---

**Table 2: Internal Storage Options for InfoServer 150**

---

Shelf	Device
Lower	(1) RZ23L and (1) RRD42 CD Drive

---

An InfoServer 150VXT is restricted to the following combination of storage device options listed in Table 3.

---

**Table 3: Internal Storage Options for InfoServer 150VXT**

---

Shelf	Device
Lower	(1) RZ24 and (1) RRD42 CD Drive

---

#### 3.1.2 SCSI ID Assignments

Table 4 below shows the ID assignments for both SCSI ports:

**Table 4: Recommended SCSI Port ID Assignments‡**

ID	SCSI A (Int. & Ext.)		ID	SCSI B(Ext. only)
7	SCSI expansion box		7	SCSI expansion box
6	SCSI A adapter		6	SCSI B Adapter
5	SCSI expansion box		5	SCSI expansion box
4	SCSI expansion box		4	SCSI expansion box
3	SCSI expansion box		3	SCSI expansion box
2	RRD42		2	SCSI expansion box
1	RZ24 / RZ23L		1	SCSI expansion box
0	SCSI expansion box		0	SCSI expansion box

‡

### 3.1.3 System Configuration Guidelines - External

The InfoServer storage capacity can be increased by the addition of external SCSI devices. Two 68 Pin connectors on the rear of InfoServer 150 enclosure provide expansion of both the SCSI A and SCSI B buses. Digital qualified, SCSI compatible, devices may be attached to the external SCSI ports. Refer to the InfoServer Software SPD for qualified device support.

Configuration guidelines are driven by the total bus length rule. The configuration guidelines for external devices are as follows:

- i Max 7 SCSI peripheral devices per bus
- ii SCSI bus length must not exceed 6 Meters
- iii Max 5 RRD42-FA's per bus
- iv Max 3 SZ12 expansion boxes per bus, while observing max # of devices per bus.
- v One TK50Z-GA/G3 per SCSI bus
- vi TK50Z-GA/G3 must be last device on bus
- vii First cable must be BC56H-03 (68 pin high-density to 50 pin lo-density)
- viii BC19J-1E cables must be used for device interconnection
- ix External devices must source TERMPWR to bus
- x Last device on bus must be terminated
- xi SCSI B bus should be expanded to capacity first

‡ ID's 1,2 and 6 for the SCSI A bus are required settings. The remaining ID's will be external devices. The SCSI B Adapter ID is fixed at 6.

### 3.2 SCSI Cable Length

**Table 5: InfoServer 150 SCSI Cable Lengths**

Configuration	Devices	SCSI A Length	SCSI B Length
Minimum Config SCSI A:	RZ, RRD42-AA	38"	21"
Typical Config SCSI A: SCSI B:	RZ, 1 RRD42-AA 3 RRD42-FA	38"	150"
Maximum Config SCSI A: SCSI B:	RZ,RRD42-AA, 5 RRD42-FA 4 RRD42-FA, 1 TK50Z-GA	231"	216"

### 3.3 External SCSI Cables

**Table 6: External SCSI Cables**

Cable	17 Class P/N	Length
BC56H-03	17-02008-01	36"
BC19J-1E	17-01351-04	18"

### 3.4 External SCSI Bus Termination

SCSI A and SCSI B external ports must be terminated with a 12-29635-01 "Connector, Terminator, Micro D Female Connector w/cover and pull strap" (A-PS-1229635-0-0), when not in use. Note that far end termination must be provided for SCSI buses which are expanded beyond the system box. Near end termination is provided on the KA41 cpu module.



# CHAPTER 4

## INFOSERVER 150 PHYSICAL SPECIFICATIONS

### 4.1 Enclosure

The InfoServer 150 enclosure is the same enclosure used by the VAXServer 3100 Model 10E, with the following exceptions:

1. The VAXServer 3100 Model 10E Distribution module is eliminated. The resulting rear bulkhead openings are used for SCSI ports with the External SCSI data cables (p/n 17-03321-01).
2. The VAXServer 3100 Model 10E SCSI B cable (p/n 17-02463-01) is deleted. The rear bulkhead opening is covered with a metal plate.
3. A new product badge "InfoServer 150" or "InfoServer 150VXT"
4. A manufactured assembly, 70-27100-05 is created for the InfoServer 150.
5. A manufactured assembly, 70-27100-06 is created for the InfoServer 150VXT.

---

**Table 7: InfoServer 150 Enclosure Dimensions**

---

	Inches	CM
Width	18.26	46.38
Depth	15.52	39.42
Height	4.07	10.33

---

The enclosure of InfoServer 150 has a plastic decorative front and rear bezel. The top, bottom, and sides of InfoServer 150 are sheet metal.

#### 4.1.1 Enclosure Color

The enclosure color is Digital 068 Grey.

## 4.2 External Switches

The InfoServer 150 contains the following external switches.

1. Power on switch—

The AC power on switch is located on the rear of the System. This switch controls the application of AC power to the InfoServer 150 power supply.

2. Halt switch –

The halt switch is a momentary contact push-button switch located in the rear of the InfoServer 150. This switch will, when pressed, apply a HALT signal to the System processor.

3. Break Enable switch –

This switch will enable and disable the System from halting on the reception of a BREAK sequence on COMMS port #3. A LED is illuminated when the switch is in the "enable halt" mode.

4. Network Select switch –

The Network Select Switch is a push-button switch, which when operated selects either the thinwire or AUI Ethernet port. An LED indicator is illuminated to show which port has been selected.

## 4.3 EXTERNAL LEDs

In addition to the two LEDs mentioned above, the InfoServer 150 contains the following externally visible LEDs.

1. Power On LED –

The power on LED will be illuminated when AC power is applied to the InfoServer 150 power supply. This LED is visible from the front of the enclosure.

2. System State Indicator LEDs –

The eight system state indicator LEDs are located on the system board and are visible from the rear of the enclosure. These LEDs are used during testing and initialization. The LEDs are divided into two fields of four. The left field of four LEDs indicates the current state of the system; the meaning of the right field of four LEDs is dependent on the state of the first field. For details on the possible states and substates that the eight LEDs indicate, refer to "FUNCTIONAL SPECIFICATION FOR TEAMMATE II SYSTEM FIRMWARE".

3. RRD42 Busy Indicator

This LED indicates when the drive is being accessed.

## 4.4 ENVIRONMENTAL SPECIFICATIONS

The InfoServer 150 conforms to DEC STD 102 Thermal Class B limits. Internal peripheral devices require different limits. See Appendix A for Specification Tables.

# CHAPTER 5

## INFOSERVER 150 CONNECTORS AND CABLING

### 5.1 EXTERNAL CONNECTORS

InfoServer 150 contains the following external connectors, which are located on the rear panel of the enclosure as shown in Table 8 and Figure 4 below.

---

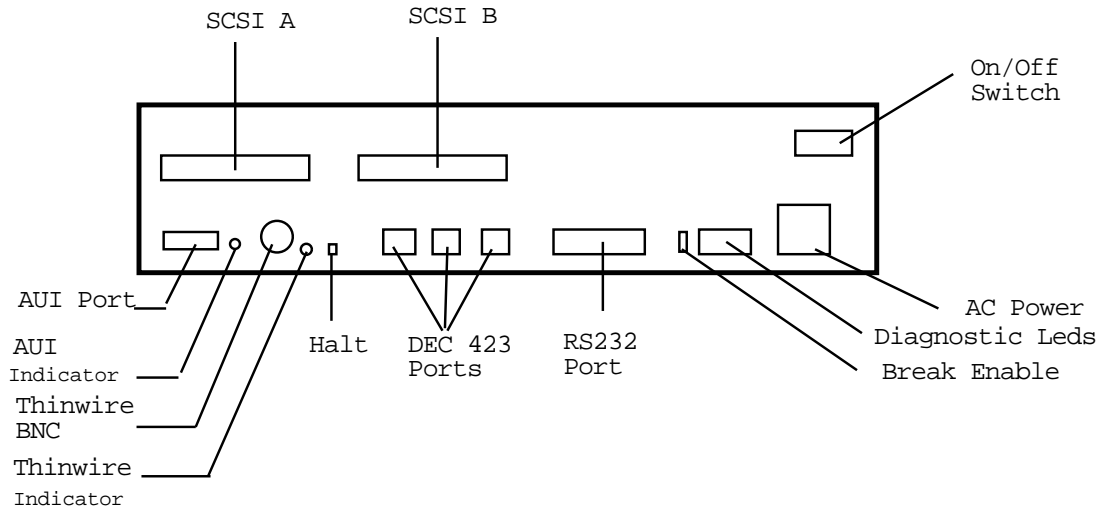
**Table 8: InfoServer 150 External connectors**

---

One	-	Communications Port (25 pin D-Sub)	mounted on CPU board
Three	-	Async Port (6 pin MMJ)	mounted on CPU board
One	-	Ethernet AUI (15-pin D-sub)	mounted on CPU board
One	-	Ethernet Thinwire (BNC)	mounted on CPU board
Two	-	SCSI bus connector (63-pin)	Rear panel mounted
One	-	AC Power Input Connector	mounted on PSU

---

**Figure 4: InfoServer 150 System Rear View**



### 5.1.1 RS232 modem, communications Port (J13 on CPU board)

The communication port will support RS232 as specified in DEC STD 052. The pinning for the 25 way male D-Sub is shown in Table 9. Unused pins are terminated per DEC STD 052.4.

**Table 9: InfoServer 150 25 way D Sub Pinout**

Pin	Signal(CCITT)	DIN	DEC	Source
1†	101	E1	CHASSIS GND	
2	103	D1	TX	DTE
3	104	D2	RX	DCE
4	105	S2	RTS	DTE
5	106	M2	CTS	DCE
6	107	M1	DSR	DCE
7	102	E2	SIG GND	
8	109	M5	CD	DCE
9	NOT USED			
10	NOT USED			
11	NOT USED			
12	112	M4	SPD	DCE
13	NOT USED			
14	NOT USED			
15	NOT USED			
16	NOT USED			
17	NOT USED			
18	141	PS3	LLBK	DTE
19	NOT USED			
20	108.2	S1.2	DTR	DTE
21	NOT USED			
22	125	M3	RI	DTE
23	111	S4	DSRS	DTE
24	NOT USED			
25	142	PM1	TMI	DCE

† OPTIONAL; via a jumper on the CPU board

### 5.1.2 DEC423 ports (J4, J6, J10 on CPU board)

The three async ports are compatible to DEC423 as specified in DEC STD 052, data leads only. The pinning for the MMJ is shown in table Table 10, Unused pins are terminated per DEC STD 052.4.

---

**Table 10: InfoServer 150 Modified Modular Jack Pin out**

---

Pin	Signal	Direction
1	Pulled up to +5v via 150 ohm resistor	None
2	Transmit Data +	Out
3	Transmit Data -	Out
4	Receive Data -	In
5	Receive Data +	In
6	3k Ohm to Frame ground	None

---

### 5.1.3 Ethernet Connections

InfoServer 150 provides a connection to the Ethernet by either Thinwire (BNC) or AUI (15 pin D-sub) connection, but not both simultaneously.

#### 5.1.3.1 AUI Connection (J2 on CPU board)

For AUI (Thickwire) connection, the female 15-pin D-sub connector will be used. the pin-out of the connector is shown in Table 11 below.

---

**Table 11: InfoServer 150 AUI Ethernet Connector Pin out**

---

Pin	Description
1	Chassis Ground
2	Collision +
3	Transmit +
5	Receive +
6	+12 volts return, logic ground
9	Collision -
10	Transmit -
12	Receive -
13	+12 volts, fuse protected

---

#### 5.1.3.2 Thinwire Connection (J3 on CPU board)

A female BNC connector is used for attachment of the Thinwire Ethernet.

### 5.1.4 SCSI Bus Connectors (JA and JB on rear bulkhead (68 pin))

The SCSI ports will be brought out of the InfoServer 150 box using a 68-pin ANSI recommended standard connector. The form of this connector is shown in Figure 5 below and the pin-out of this connector is shown on Table 20 and Table 21 in Appendix B. This connector conforms to ANSI X3.131-1990, Shielded Alternative 1 Connector type, Single-Ended Driver/Receiver type, "B" cable, although the wire routing is unique to Digital's implementation.

**Figure 5: External SCSI Connector, 68 Way MicroD**



### **5.1.5 AC Power Input Connector**

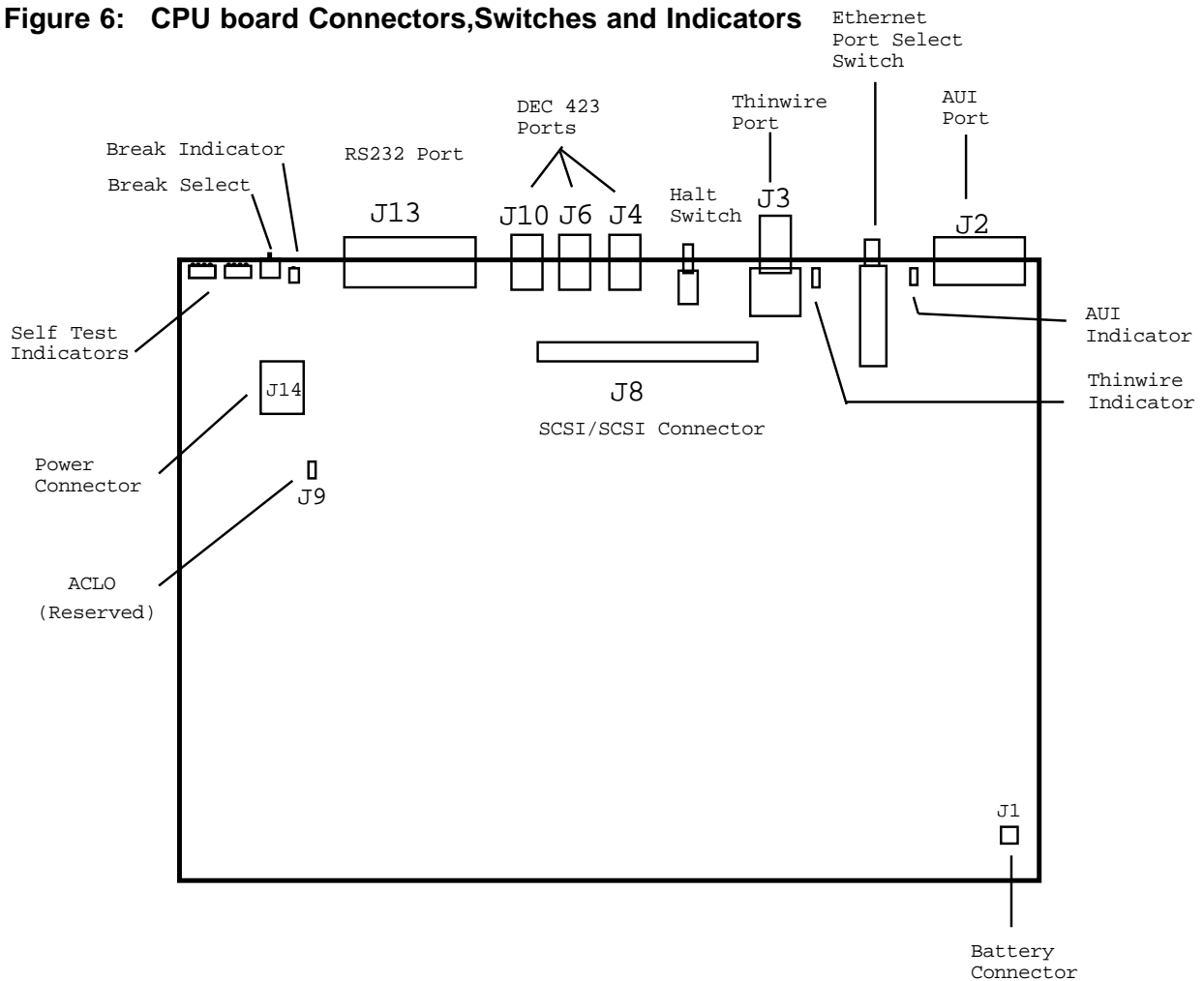
The AC Power Input Connector is used to provide AC power to the InfoServer 150. For more information on the InfoServer 150 power system refer to Chapter 6.

## **5.2 Internal Connectors, Switches and Indicators**

Referring to Figure 6 below, the InfoServer 150 system will contain the following internal connectors.

- \* CPU board SCSI/SCSI bus (J8)
- \* Power Supply to CPU board (J14)
- \* Battery Connection (J1)

**Figure 6: CPU board Connectors, Switches and Indicators**



**5.2.1 SCSI Connector (100 pin J8)**

This connection is used to carry the two SCSI busses to the SCSI devices. The cable used to carry these signals is a twin 50 way ribbon (17-03322-01) for signal distribution with the SCSI busses both connecting to a 17-03321-01 to allow routing of the SCSI busses externally. For connection details refer to Table 22 in Appendix B.

**5.2.2 Power Supply To CPU board (J14)**

The power supply connects to the CPU board by a 14-pin gold plated connector. For connection details refer to Table 23 in Appendix B.

**5.2.3 Battery connection (J1)**

The re-chargable battery for the TOY clock and RAM is connected to the CPU board via J1.



## 5.2.4 ACLO connector (J9)

This connector is reserved for future use.

## 5.2.5 CPU board jumper positions

Functional positioning of the CPU jumpers are shown in Table 12.

**Table 12: jumper table**

Jumper	State	Function
LK1	In	Normal connection of DMG
	Out	DMG isolated from board to allow test
LK2,LK3,LK6	X,X,In	DZ top speed is 19.8 Kbaud
	In,Out,Out	DZ top speed is 19.2 Kbaud
	Out,In,Out	DZ top speed is 38.4 Kbaud
LK4,LK5	In,In	Sysconfig register normal operation mode
	Out,X	Invalid
	X,Out	Invalid
LK7	Out	Modem port pin 1 floating
	In	Modem port pin 1 grounded
LK8	In	Thick wire 802.3 compliance
	Out	Thick wire non 802.3 compliance
LK9	In	69.1968MHz crystal connected to board
	Out	69.1968MHz crystal isolated from board
LK10	In	66.6MHz crystal connected to board
	Out	66.6MHz crystal isolated from board
LK11	In	5.0688MHz crystal connected to board
	Out	5.0688MHz crystal isolated from board
W2	In	SCSI reset on power fail active
	Out	SCSI reset on power fail inactive
W4	In	19-23890-03 fitted
	Out	19-23890-01 fitted

### 5.3 Internal Cables

The following cables are used to interconnect the various peripherals inside the InfoServer 150 system.

**Table 13: InfoServer 150 Internal cables**

CABLE	FROM	TO	FUNCTION
17-03322-01	J8	RRD42	SCSI A & B BUS
17-03321-01	17-03322-01	Back Panel	Ext SCSI Connectors
17-02219-01	H7083-AB	Drives	DC Pwr Dist.

# CHAPTER 6

## POWER SUPPLY AND SYSTEM COOLING

### 6.1 COMPONENT POWER REQUIREMENTS

Table 14 lists the current requirements for the various subsystems and components that may be found in an InfoServer 150 system.

### 6.2 POWER SUPPLY

The InfoServer 150 uses the H7083-AB power supply, refer to A-SP-H7083-0-DBF for further information concerning the power supply. The H7083 power supply supports the following requirements:

1. 122 Watts maximum steady state
2. 170 Watts transient for 1 ms max
3. Short Circuit Protection
4. Over Temperature Shutdown
5. Automatic Line Voltage Select (110/220V)

The H7083-AB power subsystem does not support the following functions:

1. Customer Replaceable Fuse
2. AC Power Fail warning
3. Fan Speed Control
4. Switched AC Outlet

### 6.3 COOLING

Cooling for InfoServer 150 is provided by two 80mm DC fans (p/n 12-29977-04). These fans are part of the power supply assembly. Fan voltages are fixed, one fan is set to 8.9V and the second fan is set to 8.2V (approximate settings, one diode drop difference, to avoid acoustic beating).

**Table 14: Current Requirements of InfoServer 150 Components**

Item	+5V	+12V	-12V	-9V	
CPU board	2.75	.025	.022	.147	Amps
RZ23 Disk Drive					
–Avg Operating	.70	.39	—	—	Amps
–Start up surge	.70	2.0	—	—	Amps
RZ23L Disk Drive					
–Avg Operating	.28	.26	—	—	Amps
–Start up surge	.38	1.0	—	—	Amps
RRD42 Disk Drive					
–Avg Operating	.25	.8	—	—	Amps
–Start up surge	.25	1.5	—	—	Amps
SCSI A Term	.8	—	—	—	Amps
SCSI B Term	.8	—	—	—	Amps
AUI					
–Avg Operating	—	.44	—	—	Amps
–Start up surge	—	.51	—	—	Amps

# CHAPTER 7

## RELIABILITY AND SERVICEABILITY

### 7.1 InfoServer 150 Reliability (Theoretical Analysis)

#### 7.1.1 MTBF Assumptions for InfoServer 150

All system calculations were computed using:

- PREDIC Version 4.2-0
- Average Temperature rise 15°C
- Default stress Ratio 0.40
- Air speed 300 Ft/min
- Air Temp 25°C
- Ground Benign

Component	Temperature	Environment	MTBF
System board	25°C	Ground Fixed	100,748
	40°C	Ground Fixed	66,199
	25°C	Ground Benign	192,951
	40°C	Ground Benign	106,847

**Table 15: InfoServer 150 Base System Reliability Estimate**

COMPONENT	MTBF	LAMBDA x 10 <sup>-9</sup>
CPU board - 60ns	192951	5182
RZ23L	75000	13333
RRD42	100000	10000
Power Supply	568181	1760
FANS (ea @ 40°C)	75000	13333
SYSTEM TOTAL	17562	56941

## **7.2 SERVICEABILITY**

The following subsystems and modules are field replaceable units (FRU) in the InfoServer 150:

- Power Supply/Fan Assembly
- CPU board
- All Storage Devices and Adapters
- Peripheral Power Cables
- Internal SCSI Cables

### **7.2.1 Maintenance Documentation**

The InfoServer 150 Maintenance documentation needs will be covered by the MicroVAX 3100 Maintenance documentation set (EK-393AA-IL).

Refer to EK-A0372-IP for IPB information.

### **7.2.2 Diagnosis**

The InfoServer 150 diagnosis strategy is identical to the MicroVAX 3100 product family. Primary diagnosis is performed by Built In Self Test diagnostics and Rom Based Service Exercisers.

# **CHAPTER 8**

## **TESTING AND PRODUCT EVALUATION**

This section lists design standards and regulations. For detail product assurance testing refer to the InfoServer 150 Qualification Test Plan.

### **8.1 DIGITAL HARDWARE DESIGN STANDARDS**

InfoServer 150 will conform to the following DEC Standards:

1. DEC STD 002, AC Power Wiring, Grounding, Receptacle and Electrical Rating Information Requirements
2. DEC STD 032, VAX Architecture Standard
3. DEC STD 052, Operational Requirements for Asynchronous, Full Duplex, Serial Terminals and System Interfaces Operating As DTEs Connected To EIA RS-232-C and CCITT V.28 Point-To-Point Modems
4. DEC STD 102 Thermal Class B, Environmental Standard For Computers.
5. DEC STD 103 Class A, Electromagnetic Compatibility (EMC), Hardware Design Requirements
6. DEC STD 104, Product Acoustic Noise Acceptability (Open Office)
7. DEC STD 119, Digital Product Safety
8. DEC STD 120, Product Thermal Design Standard
9. DEC STD 122, AC Power Line Standard
10. DEC STD 134, The Digital Ethernet Specification
11. DEC STD 178-3, Digital Marking Requirements for Completed Products Intended to be sold

### **8.2 EXTERNAL REGULATIONS AND STANDARDS**

The InfoServer 150 will conform to the requirements of external regulations and standards listed below:

1. CEE 22.6, Specification for appliance Couplers for Domestic and Similar General Purposes
2. CSA C22.2 No. 220-M1986, Information Processing and Business Equipment
3. FCC Part 15J Level A, Federal Communications Commission (Commercial)
4. IEC 380, Standard For The Safety of Electrically-Energized Office Machines
5. IEC 435, Safety Requirements For Data Processing Equipment
6. UL STD 478 5th Edition, Information Processing and Business Equipment

7. VDE 0806, Regulations For Office Machines
8. VDE 0871 Level B, Radio Interference Suppression of Radio Frequency Equipment For Industrial, Scientific, and Medical, and Similar Purposes
9. GSmark



## APPENDIX A

### SPECIFICATION TABLES

**Table 16: InfoServer 150 Physical Specifications**

ENGINEER	PRODUCT	APPLICABLE VARIATIONS	DATE
K. Caruso	InfoServer150	S E A C D - A X _   _   _   _   _   _   _   _	7/91

PARAMETER	MIN	TYP	MAX	UNITS	SYMBOL
Height	--	10.33	--	centimeters	cm
	--	4.07	--	inches	in
Width	--	46.38	--	centimeters	cm
	--	18.26	--	inches	in
Expansion Width	--	N/A	--	centimeters	cm
	--	N/A	--	inches	in
Depth	--	39.42	--	centimeters	cm
	--	15.52	--	inches	in
Weight	--	11.4		kilograms	kg
	--	25.00		pounds	lb
Shipping Height	--	54.0	--	centimeters	cm
	--	21.25	--	inches	in
Shipping Width	--	51.0	--	centimeters	cm
	--	20.07	--	inches	in
Shipping Depth	--	62.7	--	centimeters	cm
	--	24.68	--	inches	in
Shipping Weight	--	18.2	--	kilograms	kg
	--	40.0	--	pounds	lb

**Table 16 (Cont.): InfoServer 150 Physical Specifications.**

PARAMETER	MIN	TYP	MAX	UNITS	SYMBOL
Operation Clearance	20.3	--	--	centimeters	cm
	8.0	--	--	inches	in
front	10.2	--	--	centimeters	cm
	4.0	--	--	inches	in
left side	5.1	--	--	centimeters	cm
	2.0	--	--	inches	in
right side	5.1	--	--	centimeters	cm
	2.0	--	--	inches	in
Data Cable (for terminal use)	Type	BC16E -25	Length	7.62	m
				300	in

**Table 17: InfoServer 150 Environmental Specifications**

ENGINEER	PRODUCT	APPLICABLE VARIATIONS	DATE
K. Caruso	InfoServer150	S E A C D - A X _   _   _   _   _   _   _   _   _	7/91

PARAMETER	MIN	TYP	MAX	UNITS	SYMBOL
Temperature (Operating)	10	--	40	degrees Celsius	oC
	50	--	104	degrees Fahrenheit	oF
Temperature (Nonoperating)	-40	--	66	degrees Celsius	oC
	-40	--	151	degrees Fahrenheit	oF
Temperature (Storage)	5	--	50	degrees Celsius	oC
	41	--	122	degrees Fahrenheit	oF
Temperature Rate of Change (Operating)	--	--	11	degrees Celsius per hour	oC/h
	--	--	20	degrees Fahrenheit per hour	oF/h
Relative Humidity (Operating)	10	--	80	percent relative humidity (non-condensing)	%RH
Relative Humidity (Nonoperating)	10	--	95 @46C	percent relative humidity	%RH
Relative Humidity (Storage)	10	--	95	percent relative humidity (non-condensing)	%RH

**Table 17(Cont.): InfoServer 150 Environmental Specifications.**

PARAMETER	MIN	TYP	MAX	UNITS	SYMBOL
Maximum Wet Bulb Temperature (Operating)	--	--	28	degrees Celsius	oC
	--	--	82	degrees Fahrenheit	oF
Maximum Wet Bulb Temperature (Storage)	--	--	32	degrees Celsius	oC
	--	--	90	degrees Fahrenheit	oF
Minimum Dew Point Temperature (Operating)	2	--	--	degrees Celsius	oC
	36	--	--	degrees Fahrenheit	oF
Heat Dissipation	--	--	190	watts	W
	--	--	650	Btu/h	Btu/h
Air Flow	--	0.019	--	cubic meters per second	M3/S
	--	40	--	cubic feet per minute	ft3/min
Airflow Intake and Exhaust Location	Intake Location		Left side	Exhaust Location	Right side
Altitude (operating)	--	--	2400	meters	m
	--	--	8000	feet	ft

**Table 17(Cont.): InfoServer 150 Environmental Specifications.**

PARAMETER		MIN	TYP	MAX	UNITS	SYMBOL
Altitude (Nonoperating)		--	--	4900	meters	m
		--	--	16000	feet	ft
Mechanical Shock (Operating)		Duration		10	milliseconds	ms
		Level		10	gravities	g
Vibration (Operating)	Freq. Range	5		500	hertz	Hz
	Vibra. Level	.01" DA		0.25 g		
Mechanical Shock (Nonoperating)		Duration		30	milliseconds	ms
		Level		40	gravities	g
Vibration (Nonoperating)	Freq. Range	5	50	300	hertz	Hz
	Vibra. Level	.003	0.02	.003	$g(\text{sqr})/\text{Hz}$	$g^2\text{Hz}$
Acoustics	Idle LNPE	--	4.9	--	Bels	B
	LPA	--	38	--	Decibels	dBA
	Operating LNPE	--	5	--	Bels	B
	LPA	--	41	--	Decibels	dBA

**Table 18: InfoServer 150 AC Input Power Specifications**

ENGINEER	PRODUCT	APPLICABLE VARIATIONS	DATE
K. Caruso	InfoServer150	S E A C D - A X _   _   _   _   _   _   _   _   _	7/91

PARAMETER	MIN	TYP	MAX	UNITS	SYMBOL
Voltage Nominal	--	120 /220	--	volts	V
Voltage Design Range	88 176	--	132 264	volts	V
Frequency Nominal	--	50/60	--	hertz	Hz
Frequency Range	47	--	63	hertz	Hz
Number of Phases	--	1	--	none	NA
RMS Current Phase A (Steady State)	--	--	2.4 @120V	amperes	A
(Max Output Power) Phase A	--	--	1.2 @240V	amperes	A
Neutral N	--	--	2.4 @120V	amperes	A
Neutral N	--	--	1.2 @240V	amperes	A
Ground G	--	--	--	milliamperes	mA

**Table 18(Cont.): InfoServer 150 AC Input Power Specifications.**

PARAMETER	MIN	TYP	MAX	UNITS	SYMBOL	
Peak Current (Steady State)	Phase A	--	--	3.3 @120V	amperes	A
	Phase B	--	N/A	N/A	amperes	A
	Phase C	--	N/A	N/A	amperes	A
	Neutral N	--	--	--	amperes	A
Ac Plug Type	IEC 320 C14 TYPE					
Ride-through Time	10			millisecond	ms	
Initial Inrush Current	--	--	45	amperes peak	A	
Start-up Current Amplitude	--	--	6.0	rms amperes	A	

**Table 18(Cont.): InfoServer 150 Ac Input Power Specifications.**

PARAMETER	MIN	TYP	MAX	UNITS	SYMBOL	
Start-up Current Duration	--	--	12	seconds	s	
Power Consumption	--	--	190	watts	W	
Apparent Power	--	288	436	volt amperes	VA	
Dc Output Watts Available	--	122	170	watts	W	
122 watt Converter Dc Output Amperes Available at each Dc Voltage	voltage					
	+5.1	--	--	14.5	amperes	A
	+12	--	--	5.0	amperes	A
	-12	--	--	0.5	amperes	A
	-9	--	--	0.2	amperes	A
Fuse or Circuit Breaker Rating	--	5	--	amperes	A	
Power Factor	--	0.6	--	none	PF	
Crest Factor	--	---	1.37	none	CF	



**Table 19: InfoServer 150 EMC Specifications**

ENGINEER	PRODUCT	APPLICABLE VARIATIONS	DATE
K. Caruso	InfoServer150	S E A C D - A X _   _   _   _   _   _   _   _   _	7/91

Broadband Conducted Immunity	100 spikes of 1 microsnd rise time	1000	Volts	
Narrowband Conducted Immunity	Frequency Range	10 Khz - 30 Mhz		
	V rms into 50 ohms	3	Volts	
Narrowband Radiated Immunity	Frequency Range	10 Khz - 1000 Mhz		
	Level (V/m)	3 V/m		
ElectroStatic Immunity			UNITS	SYMBOL
		15	kilovolt	kV

**APPENDIX B**  
**CONNECTOR DETAILS**

**NOTE**

**Signal names correspond to signal names found on K-CS-5418856-0-1 prints.**

**Table 20: External SCSI A Connector, JA, 68 pin**

Pin	Signal	Pin	Signal
1	Ground	35	N.U.
2	SC1B 0 L	36	Ground
3	Ground	37	N.U.
4	SC1B 1 L	38	N.U.
5	Ground	39	N.U.
6	SC1B 2 L	40	Ground
7	Ground	41	N.U.
8	SC1B 3 L	42	Ground
9	Ground	43	N.U.
10	SC1B 4 L	44	N.U.
11	Ground	45	N.U.
12	SC1B 5 L	46	Ground
13	Ground	47	Ground
14	SC1B 6 L	48	Ground
15	Ground	49	N.U.
16	SC1B 7 L	50	N.U.
17	Ground	51	N.U.
18	SC1 PR L	52	N.U.
19	SC1 ATN L	53	N.U.
20	SC1 BSY L	54	N.U.
21	SC1 ACK L	55	N.U.
22	Ground	56	N.U.
23	SC1 RST L	57	N.U.
24	SC1 MSG L	58	N.U.
25	SC1 SEL L	59	N.U.
26	SC1 C/D L	60	Ground
27	SC1 REQ L	61	N.U.
28	SC1 I/O L	62	N.U.
29	TERMPWR1	63	N.U.
30	Ground	64	N.U.
31	N.U.	65	N.U.
32	N.U.	66	Ground
33	N.U.	67	N.U.
34	N.U.	68	N.U.

**Table 21: External SCSI B Connector, JB, 68 pin**

Pin	Signal	Pin	Signal
1	Ground	35	N.U.
2	SC2B 0 L	36	Ground
3	Ground	37	N.U.
4	SC2B 1 L	38	N.U.
5	Ground	39	N.U.
6	SC2B 2 L	40	Ground
7	Ground	41	N.U.
8	SC2B 3 L	42	Ground
9	Ground	43	N.U.
10	SC2B 4 L	44	N.U.
11	Ground	45	N.U.
12	SC2B 5 L	46	Ground
13	Ground	47	Ground
14	SC2B 6 L	48	Ground
15	Ground	49	N.U.
16	SC2B 7 L	50	N.U.
17	Ground	51	N.U.
18	SC2 PR L	52	N.U.
19	SC2 ATN L	53	N.U.
20	SC2 BSY L	54	N.U.
21	SC2 ACK L	55	N.U.
22	Ground	56	N.U.
23	SC2 RST L	57	N.U.
24	SC2 MSG L	58	N.U.
25	SC2 SEL L	59	N.U.
26	SC2 C/D L	60	Ground
27	SC2 REQ L	61	N.U.
28	SC2 I/O L	62	N.U.
29	TERMPWR2	63	N.U.
30	Ground	64	N.U.
31	N.U.	65	N.U.
32	N.U.	66	Ground
33	N.U.	67	N.U.
34	N.U.	68	N.U.

**Table 22: SCSI/SCSI Connector J8 On The CPU board**

Pin	Description	Pin	Description
1	Ground	51	Ground
2	SC1B<0>	52	SC2B<0>

**Table 22 (Cont.): SCSI/SCSI Connector J8 On The CPU board**

Pin	Description	Pin	Description
3	Ground	53	Ground
4	SC1B<1>	54	SC2B<1>
5	Ground	55	Ground
6	SC1B<2>	56	SC2B<2>
7	Ground	57	Ground
8	SC1B<3>	58	SC2B<3>
9	Ground	59	Ground
10	SC1B<4>	60	SC2B<4>
11	Ground	61	Ground
12	SC1B<5>	62	SC2B<5>
13	Ground	63	Ground
14	SC1B<6>	64	SC2B<6>
15	Ground	65	Ground
16	SC1B<7>	66	SC2B<7>
17	Ground	67	Ground
18	SC1PR	68	SC2PR
19	Ground	69	Ground
20	Ground	70	Ground
21	Ground	71	Ground
22	Ground	72	Ground
23	Ground	73	Ground
24	Ground	74	Ground
25	OPEN	75	OPEN
26	TERMPWR1	76	TERMPWR2
27	Ground	77	Ground
28	Ground	78	Ground
29	Ground	79	Ground
30	Ground	80	Ground
31	Ground	81	Ground
32	SC1ATN	82	SC2ATN
33	Ground	83	Ground
34	Ground	84	Ground
35	Ground	85	Ground
36	SC1BSY	86	SC2BSY
37	Ground	87	Ground
38	SC1ACK	88	SC2ACK
39	Ground	89	Ground

---

**Table 22 (Cont.): SCSI/SCSI Connector J8 On The CPU board**

---

Pin	Description	Pin	Description
40	SC1RST	90	SC2RST
41	Ground	91	Ground
42	SC1MSG	92	SC2MSG
43	Ground	93	Ground
44	SC1SEL	94	SC2SEL
45	Ground	95	Ground
46	SC1C/D	96	SC2C/D
47	Ground	97	Ground
48	SC1REQ	98	SC2REQ
49	Ground	99	Ground
50	SC1I/O	100	SC2I/O

---

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**Table 23: Power Supply Connector On The CPU board (J14)**

---

J10		J10	
Pin	Description	Pin	Description
1	-12v	8	+5v
2	Ground	9	+12v
3	Ground	10	+5v
4	Ground	11	Ground
5	+5v	12	Ground
6	+5v	13	-9v
7	DCOK H	14	-9v RET

---

## **APPENDIX C**

### **REFERENCE DOCUMENTS**

Additional detailed architectural and design information is available in the following specifications:

1. DEC STD 002 AC Power Wiring
2. DEC STD 032 VAX Architecture Standard
3. DEC STD 052 Serial Terminals and Serial System Interfaces
4. DEC STD 102 Environmental Standard
5. DEC STD 103 Electromagnetic Compatibility
6. DEC STD 104 Acoustic Noise Acceptability
7. DEC STD 119 Product Safety
8. DEC STD 120 Product Thermal Design Standard
9. DEC STD 122 AC Power Line Standard
10. DEC STD 134 DEC Ethernet Specification
11. DEC STD 178 Digital Marking Requirements For Products
12. TEAMMATE II System Specification, Rev X00, Date and Author unknown
13. TEAMMATE II System Specification, Rev 0.2, Norman Johnson
14. MicroProcessor, CMOS Single Chip, CVAX DC580, DC341, A-PS-2124674-0-0-C
15. RZ23L Disk Drive Specification
16. FUNCTIONAL SPECIFICATION for TEAMMATE-II SYSTEM FIRMWARE, Rev 0.2, 18-Jan-1989, LEDE
17. RRD42 Specification
18. H7083 Power Supply Specification, K-SP-H7083-DBF-X05, 29-Mar-1991, B. Berkey
19. InfoServer 150 Qualification Test Plan
20. InfoServer 150 Field Test Plan

## APPENDIX D

### INFOSERVER 150 DC POWER REQUIREMENTS

Components	Power Dissp.	InfoServer 150
CPU Board	15.91W	15.91W
RZ23L Drive	4.6W	4.6W
RRD42	10.95W	10.95W
AUI Ethernet	5.32W	5.32W
SCSI A terminator	4.08W	4.08W
SCSI B terminator	4.08W	4.08W
Totals	—	44.94W

The above table is a power requirements analysis on the expected typical InfoServer 150 configuration.