

Firefox Workstation Packaging

Revision 3.0

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Revision History

Date	Version	Content/Changes
28 Dec 87	3.0	Changed I/O cover from 3-wide to 6-wide Changed box to BA213 series Added ThinWire/ThickWire Ethernet info Added more definition to cables
01 May 87	2.0	Added cover and cables Changed module outline
07 Feb 87	1.0	First external release

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2. Workstation Packaging

Firefox is composed of standard DIGITAL corporate components and those components unique to Firefox. This section describes the hardware packaging of Firefox, which is pictured in Figure 2-1.

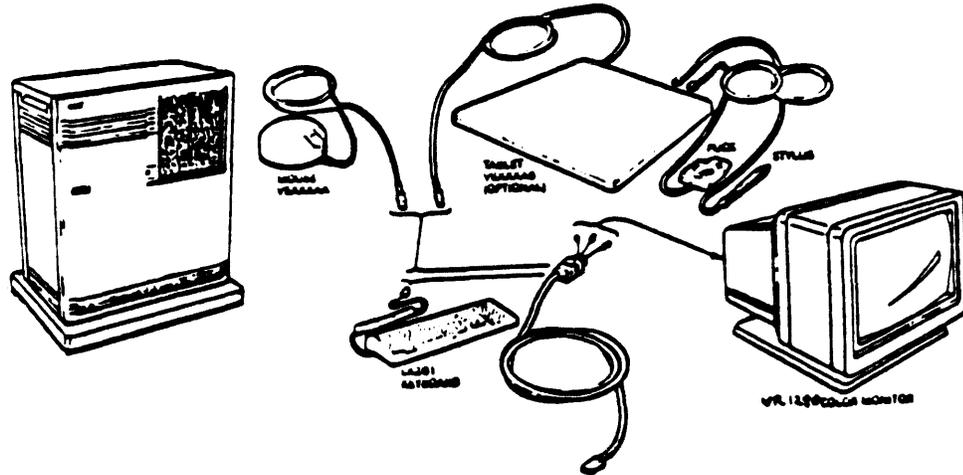


Figure 2-1: Firefox Workstation Packaging

The Firefox workstation has the following physical components:

System box	Firefox uses the Fbox. The Fbox is derived from the standard Sbox (BA213-A). The backplane is specific to Firefox. Nine slots hold modules unique to Firefox. Three slots are available for standard Q-bus peripherals in an optional configuration. The Fbox houses the RFXX hard disk drive and TFXX cartridge-tape drive.
Monitor	A new monitor (VR295) is required.
Keyboard	The standard LK201 or LK301 keyboard family is used.
Mouse	The corporate mouse (VSXXX-AA) is used.
Tablet	The graphics tablet (VSXXX-AB) is optional.

2.1. Terminology

Dual CPU module	The Firefox processor module containing two CVAX processors and their associated logic; plugs into the M-bus on the backplane
DSSI	DIGITAL Small Storage Interconnect; a new architecture for mass storage
Fbox	Firebox, the Firefox-specific version of the BA213-series box
Graphics base module	The Firefox graphics processing module
Graphics expansion module	The optional Firefox graphics module containing sixteen planes of video memory
Graphics frontplane	The module that attaches to the front of all three graphics modules; it contains three high-density connectors, four LEDs, and three BNCs

Graphics cover	A triple-slot piece of metal with holes in it that the video BNCs stick through
Graphics cover assembly	The graphics cover plus the graphics frontplane
Graphics output module	The Firefox module that contains the video-output logic and eight planes of video memory
I/O module	The Firefox module that contains the controllers for Ethernet, mass storage, time-of-year clock, console/printer, keyboard, mouse/tablet, and modem; plugs into the M-bus on the backplane
I/O cover module	The module with the I/O connectors and ethernet transceivers
I/O cover	A six-slot piece of metal with holes in it that the hex display and I/O connectors stick through
I/O cover assembly	The I/O cover, I/O cover module, battery, and battery holder
Sbox	Skunkbox, the corporate BA213-series box, with a 12-slot Q-bus backplane

2.2. System Box

The Fbox is the Firefox package. It meets the principal requirements of low cost and modularity in combination with adequate space for the required modules and mass storage. It is similar to the standard Sbox. The differences between the two are shown in Table 2-1.

Table 2-1: Fbox/Sbox Differences

Fbox	Sbox
Disk controller in slot 4	Disk Controller in slot 1 or 12
3 slots with Q-bus backplane connectors	12 slots with Q-bus backplane connectors
9 slots with comet connectors	No comet connectors

The following are the similarities between the Fbox and the Sbox:

- Part of BA213 series
- One or two plug-in modular power supplies
- Four cavities for mass storage devices
- Low noise level
- Same card cage and plastics
- Halt and Reset switches on the DSSI control panel

Figure 2-2 shows the dimensions of the BA213-series box. Dress panels are in place. The black panel is a sliding door that covers the insertion slot for the tape drive, write-protect switches, power switch, Halt and Reset switches, and panel-removal latch.

Three levels of security are provided by a three-position key. Position 1 is locked. Position 2 allows removal of media and access to the disk-drive operator controls and Halt and Reset switches. Position 3 allows access to the power switch and panel-removal latch.

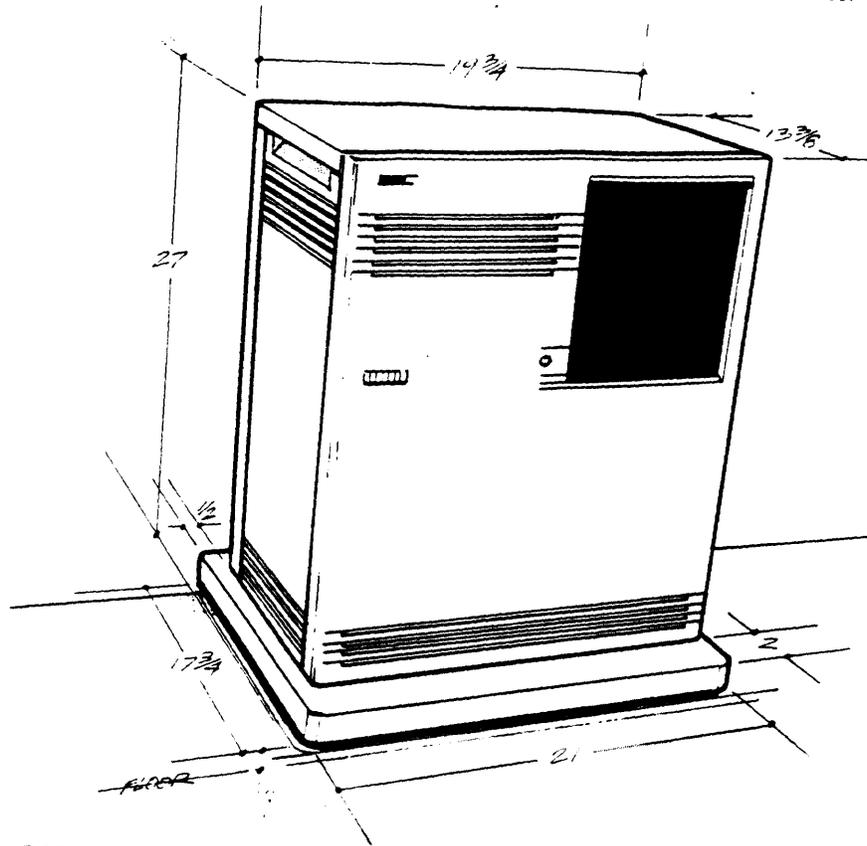


Figure 2-2: BA213-series box, Panels in Place

The Sbox, with dress panels removed and one module pulled halfway out, is shown in Figure 2-3.

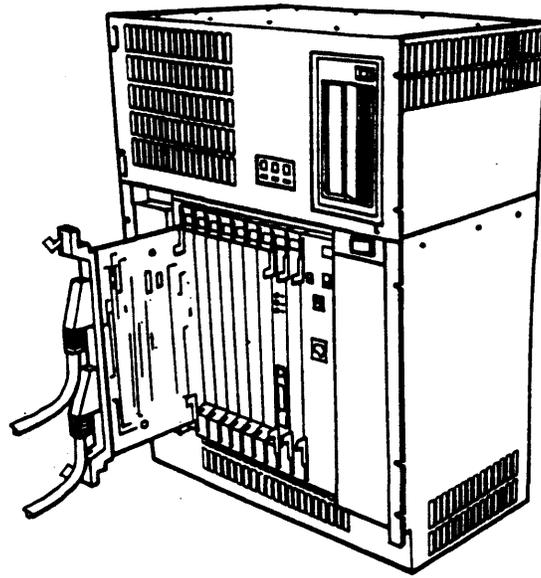


Figure 2-3: Sbox, Panels Removed

There are 12 module slots in the card cage of the Sbox. The power supplies are positioned at either end of the card cage, and two variable-speed fans are located below it. The upper portion of the Sbox houses the four mass storage cavities. The Fbox is the same as the Sbox in these features but differs in the mechanical covers for the slot area.

The Fbox with dress panels removed is shown in Figure 2-4.

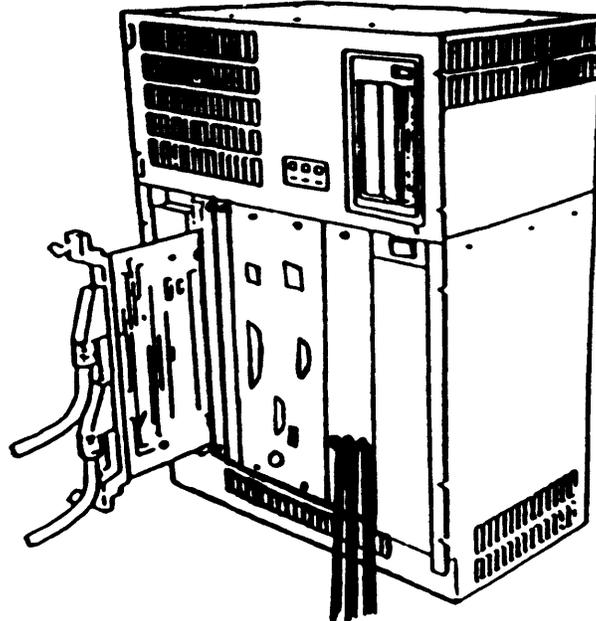


Figure 2-4: Fbox, Panels Removed

2.2.1. DSSI Control Panel

The DSSI control panel (54-17388-01) resides in front of the mass storage cavities. The function of this panel is to act as a remote front panel and implement the operator control signals for the three possible RF units. It also implements power supply status, the Halt switch, and the Reset switch. The RF drives and the control panel communicate by using the Remote Front Panel signals.

DSSI functionality will be implemented and controlled by write-protect switches and indicators, drive online/offline switches and indicators, and drive fault indicators. There will be three sets of these switches and indicators to control three RF drives. There will also be unit ID switches to set the addresses of the drives.

The front panel will provide three separate power-OK (POK) signals to the three RF drives. To allow proper power-up sequencing of the drives, the second POK signal will be delayed by seven seconds from the other two POK signals.

The DSSI control panel will be mounted to an assembly that is part of the system box. This assembly will provide space for a user to attach a language label; that label will indicate the functionality of the controls and LEDs in clear, easy-to-understand phrases. Language labels will be available in eleven languages.

2.2.1.1. Remote Front Panel Interface

Each of the RF drives connects to the control panel via a 10-pin ribbon cable located at the rear of the drive. The signal names assigned to the pin numbers are listed in Table 2-2. "Data out" means data from the drive.

Table 2-2: RF Remote Front Panel Connector Pin Assignments

Pin	Function
1	Ground
2	RFP_DATA_OUT_L
3	RFP_ADDR<2>
4	RFP_DATA_IN_L
5	+5V
6	+5V
7	RFP_STROBE_L
8	RFP_ADDR<1>
9	RFP_ADDR<0>
10	Ground

The RFP_DATA_IN switch value is interpreted according to the address assignments that appear in Table 2-3.

Table 2-3: Switch Functions

Address	Function
000	BUSID<0>
001	BUSID<1>
010	BUSID<2>
011	Reserved
100	Fault
101	Run/stop
110	Write Protect
111	Loopback Input

The RFP_DATA_OUT indicator signal is interpreted according to the address assignments shown in Table 2-4.

Table 2-4: Indicator Functions

Address	Function
000	Reserved
001	Reserved
010	Reserved
011	Ready
100	Fault
101	Run/stop
110	Write Protect
111	Loopback Output

For each drive, the DSSI control panel will implement the following:

- Write-protect switch and indicator (a switch containing an indicator LED)
- Ready/stop switch and indicator (a switch containing an indicator LED)
- Fault indicator (LED)
- Bus ID
- Loopback output connected to loopback input
- Power OK

The write-protect switches are push-button maintained and whenever the switch is pressed in, the associated disk drive is write-protected and the LED is illuminated. When the switch is out, either the drive is write-enabled or it can be write-protected by the host. The color will be amber.

The ready switches are push-button maintained, and will allow access to the drive. Whenever the switch is pressed in, the associated disk drive is off-line and cannot be accessed; the LED is not illuminated. When the switch is in the out position (access to the drive is allowed), the LED will indicate drive activity; the color will be green.

- The LED will not be illuminated when the drive is being accessed
- It will be illuminated when the drive is available to be accessed

The fault-indicator LEDs are turned on by the drive logic when it detects an error that it classified as a fault. The color will be red.

The bus ID, or unit ID, switches are BCD-encoded plastic lens caps that fit into a programmable-unit-select switch. Each of these programmable units must have a lens cap installed. The user will choose which lens cap to install. The caps will be encoded with plastic tabs corresponding to the number on the face of the lens cap. Each Firefox system will be provided with a 12-28766-19, a kit of eleven lens caps: three blank lens caps and eight lens caps numbered 0 through 7.

2.2.1.2. Power Supply Status

A green LED (DCOK LED) to the right of the Halt and Reset switches indicates the status of the output voltages of the power supplies. In a single-power-supply system, it indicates that the output voltages are within tolerance. In a two-power-supply system it indicates that both power supplies are within tolerance. If the LED on the control panel is out, the user has to look at the individual LEDs on the power supplies to determine which power supply is at fault.

2.2.1.3. Halt and Reset

The Halt and Reset switches are provided on the RF control panel.

The Halt switch is push-button maintained. Pressing Halt asserts BHALT on the backplane, which causes all processors in the system to halt (enter console mode). The LED contained in the Halt switch is illuminated when the switch is pressed in. The color is red.

The Reset switch is momentary. The signal generated by this switch is debounced on the DSSI control panel. Pressing Reset causes BDCOK to pulse. A pulse on BDCOK initializes some registers, causes self-test to occur, and then reboots the system. The LED contained in the Reset switch is controlled by a bit in a register. This bit is used by the console code to indicate that the system is in run mode. When the LED is illuminated, its color is green.

2.2.1.4. Power OK

The three power-OK signals, one for each of the RF drives, are on J4. The power-OK signal for drive 1 will be delayed from the other two power-OK signals (drives 0 and 2) by a minimum of seven seconds. The pinout for J4 appears in Table 2-5.

Table 2-5: Pinout for J4 (Power-OK Connector)

Pin	Signal
1	Drive 0 power OK
2	Drive 2 power OK
3	Drive 1 power OK

The connector J6 provides two more instances of the power-OK signals that will be used when the system contains more than three DSSI devices. Pinout for J6 appears in Table 2-6.

Table 2-6: Pinout for J6 (Power-OK Connector)

Pin	Signal
1	Drive 0 power OK
2	Drive 2 power OK

2.2.1.5. Physical Description

The size of the DSSI control panel printed circuit board is approximately 4 inches by 6 inches. It is a four-layer PC board, .096 inches thick (nominal), with one ounce copper. The two inner layers are power and ground. The two outer layers are signal layers. All components are mounted on side 1 of the module.

A preliminary component location is shown in Figure 2-5.

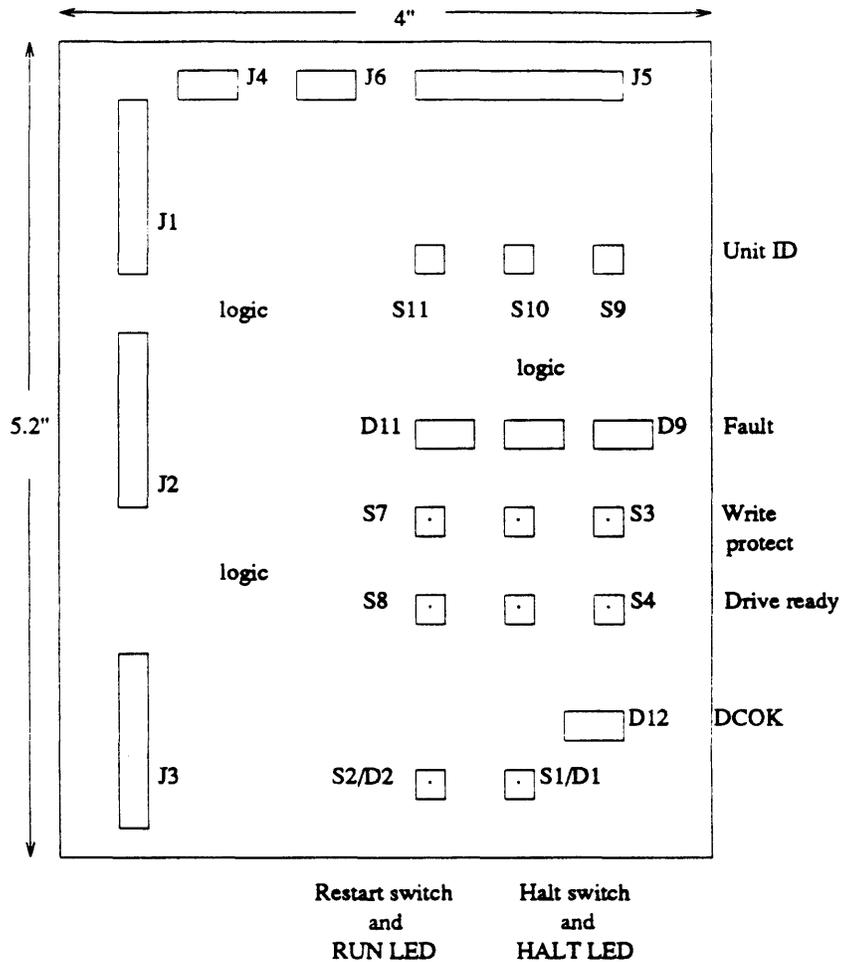


Figure 2-5: Proposed Layout of the DSSI Control Panel

Mapping and function of the components on the DSSI control panel appear in Table 2-7. Drive 0 is assumed to be the rightmost RF drive, Drive 1 to be in the middle, and Drive 2 to be the leftmost RF drive.

Table 2-7: Component Mapping on the DSSI Control Panel

Reference Designator	Component	Function
J1	10-pin right-angle header	Drive 0 front panel interface signals
J2	10-pin right-angle header	Drive 1 front panel interface signals
J3	10-pin right-angle header	Drive 2 front panel interface signals
J4	3-pin right-angle header	Power OK for three DSSI devices
J5	10-pin right-angle header	Backplane signals
J6	2-pin right-angle header	Power OK for two additional DSSI devices
S1	Maintained switch	Halt switch
D1	Red light-emitting diode	Halt indicator
S2	Momentary switch	Reset switch
D2	Green light-emitting diode	RUN indicator
S3	Maintained switch	Drive 0 write-protect switch
D3	Amber light-emitting diode	Drive 0 write-protect indicator
S4	Maintained switch	Drive 0 ready switch
D4	Green light-emitting diode	Drive 0 available indicator
S5	Maintained switch	Drive 1 write-protect switch
D5	Amber light-emitting diode	Drive 1 write-protect indicator
S6	Maintained switch	Drive 1 ready switch
D6	Green light-emitting diode	Drive 1 available indicator
S7	Maintained switch	Drive 2 write-protect switch
D7	Amber light-emitting diode	Drive 2 write-protect indicator
S8	Maintained switch	Drive 2 ready switch
D8	Green light-emitting diode	Drive 2 available indicator
S9	Programmable switch	Drive 0 unit ID
S10	Programmable switch	Drive 1 unit ID
S11	Programmable switch	Drive 2 unit ID
D9	Red light-emitting diode	Drive 0 fault indicator
D10	Red light-emitting diode	Drive 1 fault indicator
D11	Red light-emitting diode	Drive 2 fault indicator
D12	Green light-emitting diode	DCOK indicator

2.2.2. DSSI Devices

The two rightmost mass storage devices are powered by the right power supply (one RF hard disk and one TF tape). In the minimum Firefox configuration, only one hard disk can be used. The additional power supply must be installed for additional hard disks. The two leftmost mass storage devices are powered by the left power supply (two additional RF hard disks).

The 50-pin DSSI cable from the I/O module does not connect to the DSSI control panel. A 50-conductor round cable connects to the I/O module and then is routed up to the mass storage cavities, to the right of the tape. A 50-conductor flat ribbon cable plugs into the round cable, then daisy-chains between the tape and the three hard disks, ending in a connector after the last disk. Another cable, one end with a 50-pin header plugs into the ribbon cable and then attaches with a high-density D-sub to the DSSI control panel bracket. After the DSSI control panel cover is put in place, a high-density terminator is plugged into the high-density D-sub. Part numbers are shown in Table 2-8.

Table 2-8: DSSI Cable Part Numbers

Part Number	Description
17-01930-01	50-conductor round (I/O module to mass storage area)
17-01836-03	50-conductor ribbon (connects mass storage devices)
17-01835-03	50-conductor with high-density D-sub (mass storage to DSSI control panel bracket)
TBD	DSSI high-density terminator

If the storage expansion box is used, the terminator must be removed and the expansion box cable plugged into the high-density D-sub.

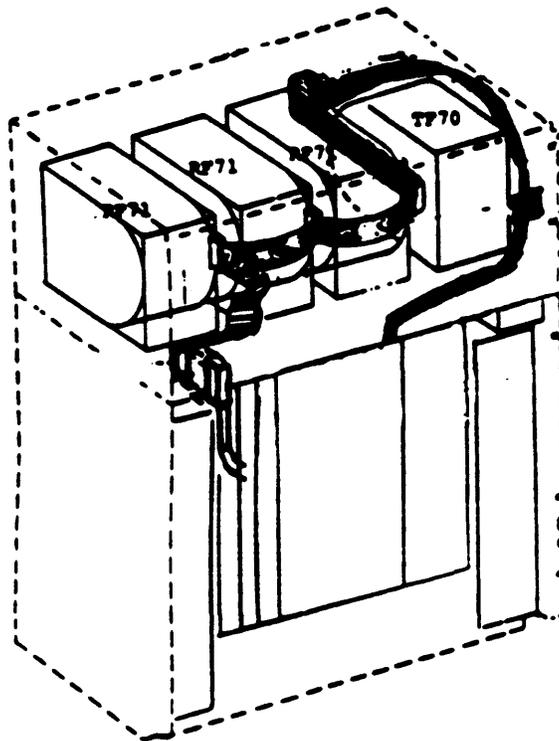


Figure 2-6: DSSI Cable Routing

2.2.3. Modular Power Supplies

The Fbox supports one or two modular power supplies plugged directly into the backplane.

The H7868 power supply operates by means of line rectification with energy storage in bulk input capacitors followed by a 45-KHz switching regulator stage.

The H7868 provides a +5-volt output, a +12-volt output, and two fan outputs whose voltages vary in response to ambient temperature variations. The available power to the +5-volt and +12-volt outputs is 230 watts with 284 Watts start-up surge capability for winchester disk drives. To allow for wiring and backplane drops, the voltage of the +5-volt and the +12-volt outputs at the power supply is 0.1 volt higher than specified.

Intended system load is as follows:

- +5 volts Logic
- +12 volts Communications and disk-drive motor(s)
- Fan out Cooling fans (offset by 0.8 volts to avoid acoustic beating)

Table 2-9: Power Supply Output Ratings

Output	Minimum Load	Maximum Load
+5.1 volts	4.5 amperes	33 amperes
+12.1 volts	0 amperes	7 amperes (11.5 amperes surge for 30 seconds)
Fan	0 amperes	0.7 amperes @ -12.8 volts, 0.43 amperes @ -7.8 volts

Note that simultaneous loading of the +5-volt and +12-volt outputs may not exceed 230 watts.

Each power supply has a fan output that can drive two 4.5-inch DC brushless fans (12-23609-04). These outputs may also have no fans connected. In the Firefox application, the rightmost power supply will drive both fans, and the leftmost power supply fan output will not be connected. Fan current is not included in the specified +5-volt or +12-volt loads.

A switch on the front of the power supply will allow a full power-down, power-up signal sequence of BPOK and BDCOK without removal of the input power.

For overload protection, a resettable circuit breaker is provided to protect the input wiring. This circuit breaker is externally accessible and is rated at 7.5 amperes. The circuit breaker will not trip under normal operating conditions.

There are two versions of the power supply :

- H7868-A: 100-120 VAC nominal
- H7868-B: 220-240 VAC nominal

2.2.3.1. Backplane Connections

The backplane connection to the power supply is through a 56-pin card-edge connector. The pinout for this connector is described in Table 2-10.

Table 2-10: Backplane Connector Pinout

Signal Name	Connector Pin Numbers	Maximum Current
+5 volts	5 - 21	33 amperes
Ground	22 - 48	36 amperes
+12 volts	49 - 53	3 amperes
Fan A	2	0.7 amperes
Fan B	4	0.7 amperes
Fan ground	1, 3	1.4 amperes
BDCOK H	54	100 milliamperes
BPOK H	56	100 milliamperes
BEVNT	55	100 milliamperes

When two power supplies are used in the same system, the Line Time Clock (BEVNT) signal, +5-volt lines, +12-volt lines, and fan outputs of each power supply must not be connected to each other. However, BPOK and BDCOK can be paralleled.

2.2.3.2. Mass Storage Connections

Power is delivered to the mass storage devices is through a 9-pin MTA connector attached to the front of the power supply.

Table 2-11: Mass Storage Connector Pinout

Signal Name	Connector Pin Numbers	Max Current
Ground	1, 3, 8, 9	9 amperes
+5V	6, 7	
+12V	4, 5	
Key (pin removed)	2	N/A

2.2.3.3. BDCOK

This signal is asserted high on the bus to indicate that the DC voltages on the outputs are within the specified limits. The negated state of this signal remains valid under all conditions of +5-volt and +12-volt outputs being out of tolerance. The negated state of this signal is used by devices to protect nonvolatile data from corruption by circuits whose performance is not reliable in the absence of valid D.C. voltages.

2.2.3.4. BPOK

This signal is asserted high on the bus to indicate that the power system is in a state that allows normal operation of the system. The negated (low) state of this signal remains valid under all conditions when normal operation is not allowed. The assertion of BPOK indicates to the system that a sufficient reserve of D.C. power has been established to guarantee an orderly shutdown of the system. The time interval between the assertion of BDCOK and BPOK can be used by devices in the system to do some housecleaning prior to execution of instructions by the CPU(s).

BPOK deasserts at a root-mean-square input voltage below 88 volts. This negation of BPOK indicates to the system that a DC power failure is likely.

2.2.3.5. MTBF

The MTBF goal of the H7868 power supply is 60 K hours (at 50 degrees Celsius).

The calculated MTBF is shown in Table 2-12.

Table 2-12: H7868 Calculated MTBF

Temperature (degrees Celsius)	Calculated MTBF (hours)
25	121,987
40	86,627
50	61,825

2.2.3.6. Physical Attributes

The power supply weight is 6.5 pounds nominal.

The size is approximately 10.5 inches × 10.1 inches × 2.5 inches with a 2.5-inch extension on the 10.5-inch dimension for the AC input connector.

2.2.4. Backplane

The Firefox backplane is unique to the Firefox system. Its dimensions are the same as those of the Sbox backplane.

2.2.4.1. Module Placement

The backplane has twelve slots populated as shown in Table 2-13.

Table 2-13: Positioning of Modules in the Backplane

Slot	Module	Required or Optional
1	Graphics expansion module	Optional
2	Graphics output module	Required
3	Graphics base module	Required
4	Workstation I/O module	Required
5	Dual-CVAX processor module	Required
6	Memory module (8 or 16 Mbytes)	Required
7	Dual-CVAX processor or memory module	Optional
8	Memory module	Optional
9	Q-bus adapter or memory module	Optional
10	Q-bus module	Optional
11	Q-bus module	Optional
12	Q-bus module	Optional

2.2.4.2. Acceptable Module Outlines

The three Q-bus slots (slots 10-12) can be populated by Q-bus modules with a dual or quad form factor. These options, which can be used only when a Q-bus adapter module is installed, appear in Figures 2-7 and 2-8.

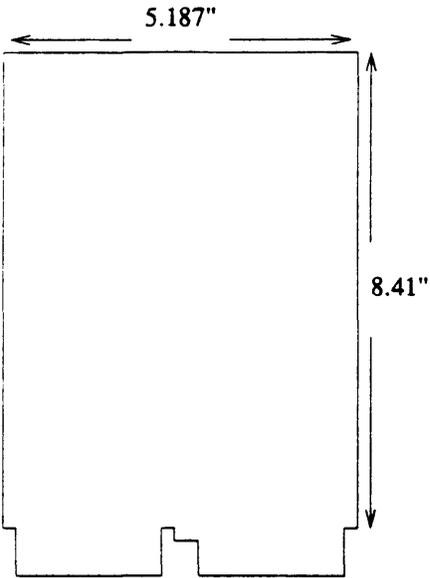


Figure 2-7: Dual Form Factor

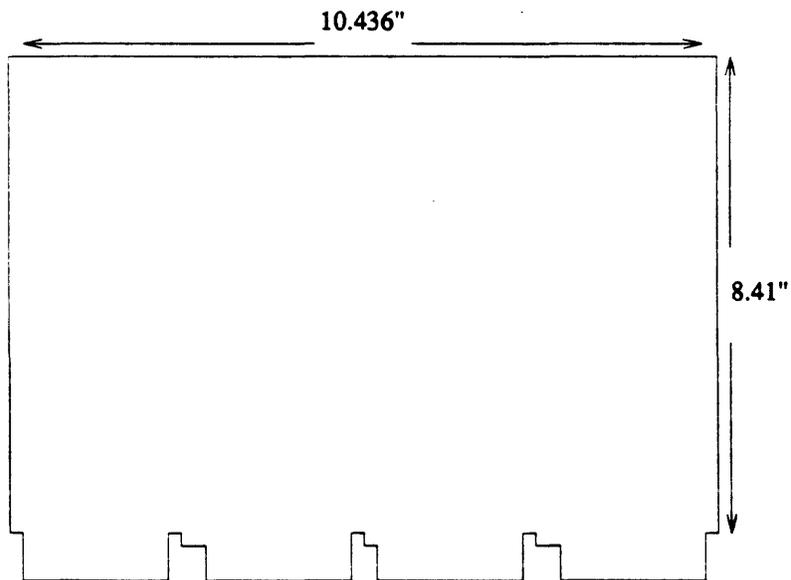


Figure 2-8: Quad Form Factor

The nine other slots (slots 1-9) are populated with a new form factor, called L-series quad. These slots use comet connectors (L-series) in the backplane, and the modules are quad size; hence the name L-series quad. This form factor closely matches the L-series hexadecimal form, except that it has two tabs instead of three. The new L-series quad form factor is shown in Figure 2-9.

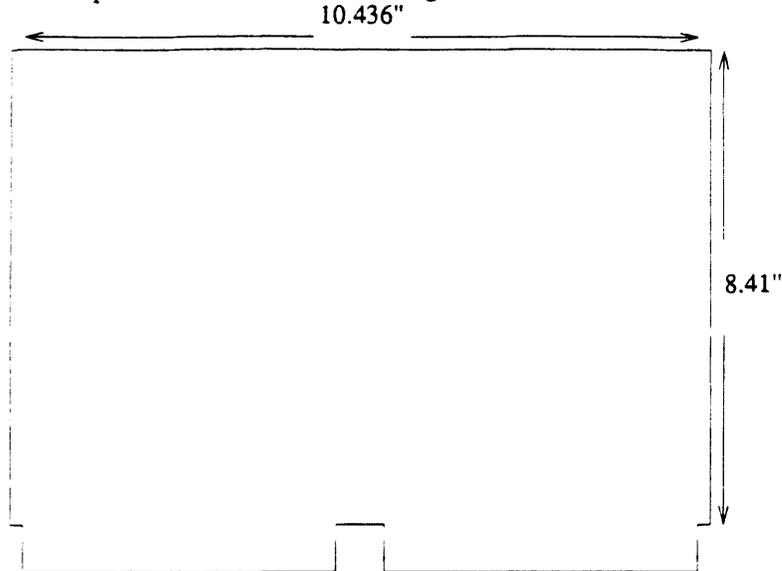


Figure 2-9: L-series Quad Form Factor

2.2.5. Covers

The modules' metal covers, which are important design features of the Fbox, form a continuous surface that becomes part of the RF shield. Connectors for the cables that exit from the box are mounted in the module covers. Cables that plug into these connectors travel down inside the dress panels and out through the guides and slots in the base platform. All nonbackplane communication hardware required between the workstation I/O module and the outside world (LEDs, switches, connectors, and so forth) is mounted in these handles.

The nine Firefox-specific slots have two covers.

- One six-slot I/O cover
- One three-slot graphics cover

2.2.5.1. I/O Cover Assembly

The I/O cover assembly consists of the I/O metal cover, an I/O cover module, and a battery and battery holder. It is placed over the Firefox workstation I/O module and five other modules that have no external connectors (these include the memory, dual-CVAX processor, and the Q-bus adapter).

The I/O cover module connects to the workstation I/O module via a 50-pin twisted-ribbon cable. Connectors on the I/O cover module protrude through the I/O cover. Table 2-14 lists the items that are seen on the front of the I/O cover assembly.

Table 2-14: I/O Cover Assembly Features

Feature	Implementation
ThickWire Ethernet	15-pin female D-sub connector
ThinWire Ethernet	BNC receptacle
Ethernet switch	Slide switch
Printer/console	6-pin female MMJ connector
Modem	25-pin male D-sub connector
Keyboard/mouse/tablet	15-pin male D-sub connector
System status	One hexadecimal display

The logic for both ThinWire and ThickWire Ethernet is present on the I/O cover module. However, only one of the Ethernet connections can be used at a given time. A slide switch determines which is active.

The battery is mounted in a battery holder that is inside the I/O cover. It is attached to the cover module by a two-wire cable that ends in a two-pin female connector. This female connector mates with a two-pin right-angle male connector on the I/O cover module. The battery automatically recharges when power is turned on. Battery power will last at least 100 hours when the power is turned off.

2.2.5.2. Graphics Cover Assembly

The graphics cover assembly consists of the graphics cover and the graphics frontplane. The graphics cover goes over the three graphics modules (graphics base module, graphics output module, and graphics expansion module). The graphics frontplane is a module with three 100-pin high-density connectors, three BNCs, and four LEDs. The high-density connectors on the graphics frontplane mate directly to high-density connectors on each of the graphics modules (base module, output module, and expansion module) in a 24-plane system. In an 8-plane system, the third high-density connector does not mate because the expansion module is not present. The three BNCs (red, green, and blue) and four LEDs (graphics subsystem status) protrude through the graphics cover. The graphics cover does not attach to the graphics frontplane; it mounts on top of the frontplane.

2.2.5.3. Q-bus Covers

When empty, each of the three Q-bus slots has a single-width blank cover (covers one slot). If a Q-bus is occupied by a module with no I/O, it retains its blank cover. If it is occupied by a module with external connectors, the blank cover is replaced by a cover specific to that module (the standard Sbox handle or cover). A "handle" is a type of cover that is riveted to a module; it usually has I/O.

2.3. Mass Storage

The mass storage tray on the top of the Fbox enclosure provides mounting space for four standard 5¼-inch mass storage devices. Each mass storage device is shock mounted and can be separately removed or installed.

2.3.1. RF30 Hard Disk Unit

The RF30 hard disk unit, illustrated in Figure 2-10, incorporates the following features:

- Size: half-height 5¼-inch Winchester disk
- Media: non-operator-removable disks
- Formatted capacity: 150 Mbytes
- Transfer rate: 12.0 Mbits/sec
- Seek time:
 - Track to track: 6 ms
 - Average: < 23 ms
 - Maximum: < 41 ms
- Average access time: 33.5 ms
- Rotational latency: 8.33 ms
- Weight: < 4 lbs
- Acoustic noise: < 5.7 dB (seeking)
- Minimum life expectancy: 5 years (80% POH)
 - MTBF: > 40K POH (steady-state goal at FRS)
 - MTTR: 1/2 hour (field)
- Power requirements:
 - Average power: 28 watts
 - +5 volts: **TBD A**
 - +12 volts: **TBD A**

The RF30 hard disk has three external connectors: a 50-pin DSSI connector (DEC PN 12-16832-03), a 4-pin power connector (DEC PN 12-18855-00), and a 10-pin remote front-panel connector (DEC PN 12-27247-02).

The remote front-panel interface supports the following:

- DSSI bus ID (0-7)
- Ready-status LED
- Fault switch
- Fault-status LED
- Write-protect switch
- Write-protect-status LED
- Run/stop switch
- Run/stop-status LED
- Loopback signal

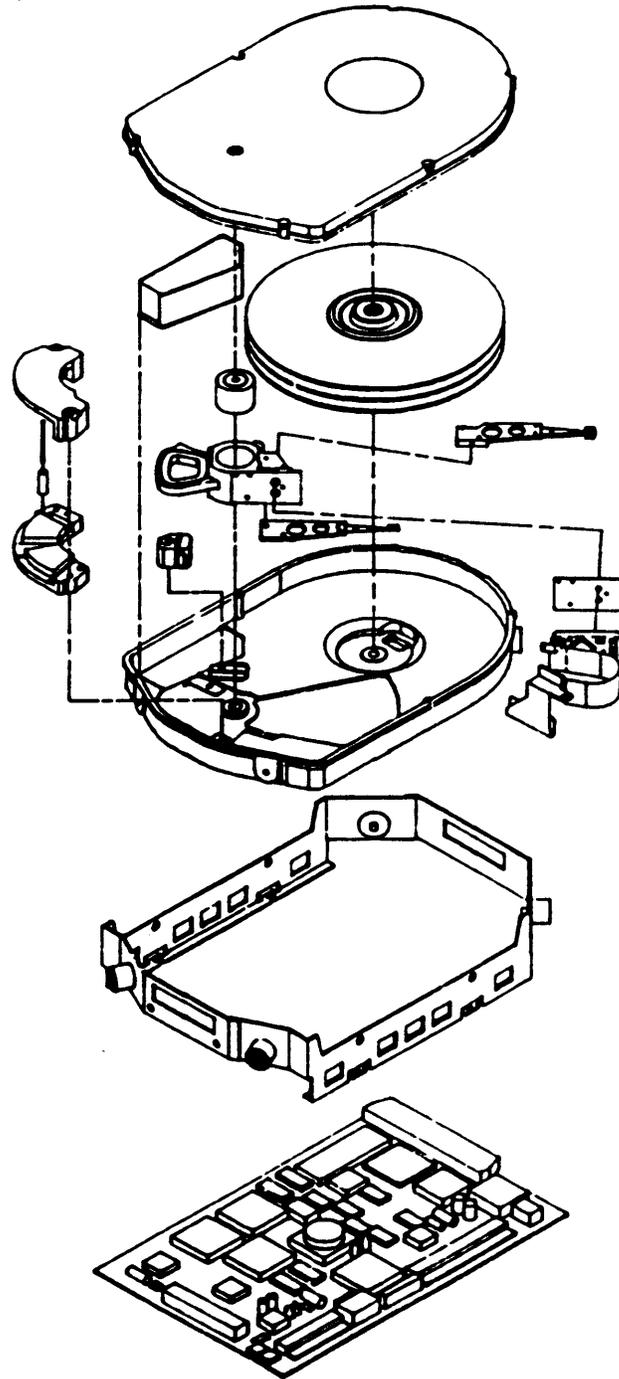


Figure 2-10: RF30 Mechanical Illustration

2.3.2. RF71 Hard Disk Unit

The RF71 hard disk unit, illustrated in Figure 2-11, has the following features:

- Size: full-height 5¼-inch Winchester disk
- Media: non-operator-removable disks
- Formatted capacity: 400 Mbytes
- Transfer rate: 12.0 Mbits/sec
- Seek time:
 - Track to track: **TBD** ms
 - Average: < 19.2 ms
 - Maximum: < **TBD** ms
- Average access time: 27.5 ms
- Rotational latency: 8.33 ms
- Weight: < 9 lbs
- Acoustic noise: < **TBD** dB (seeking)
- Minimum life expectancy: **TBD** years (TBD% POH)
 - MTBF: > 35K POH (steady-state goal at FRS)
 - MTTR: 1 hour (field)
- Power requirements:
 - Average power: 38 watts
 - +5 volts: **TBD** A
 - +12 volts: **TBD** A

The RF70 hard disk has three external connectors: a 50-pin DSSI connector (DEC PN 12-16832-03), a 4-pin power connector (DEC PN 12-18855-00), and a 10-pin remote front-panel connector (DEC PN 12-27247-02).

The remote front-panel interface supports the following:

- DSSI bus ID (0-7)
- Ready-status LED
- Fault switch
- Fault-status LED
- Write-protect switch
- Write-protect-status LED
- Run/stop switch
- Run/stop-status LED
- Loopback signal

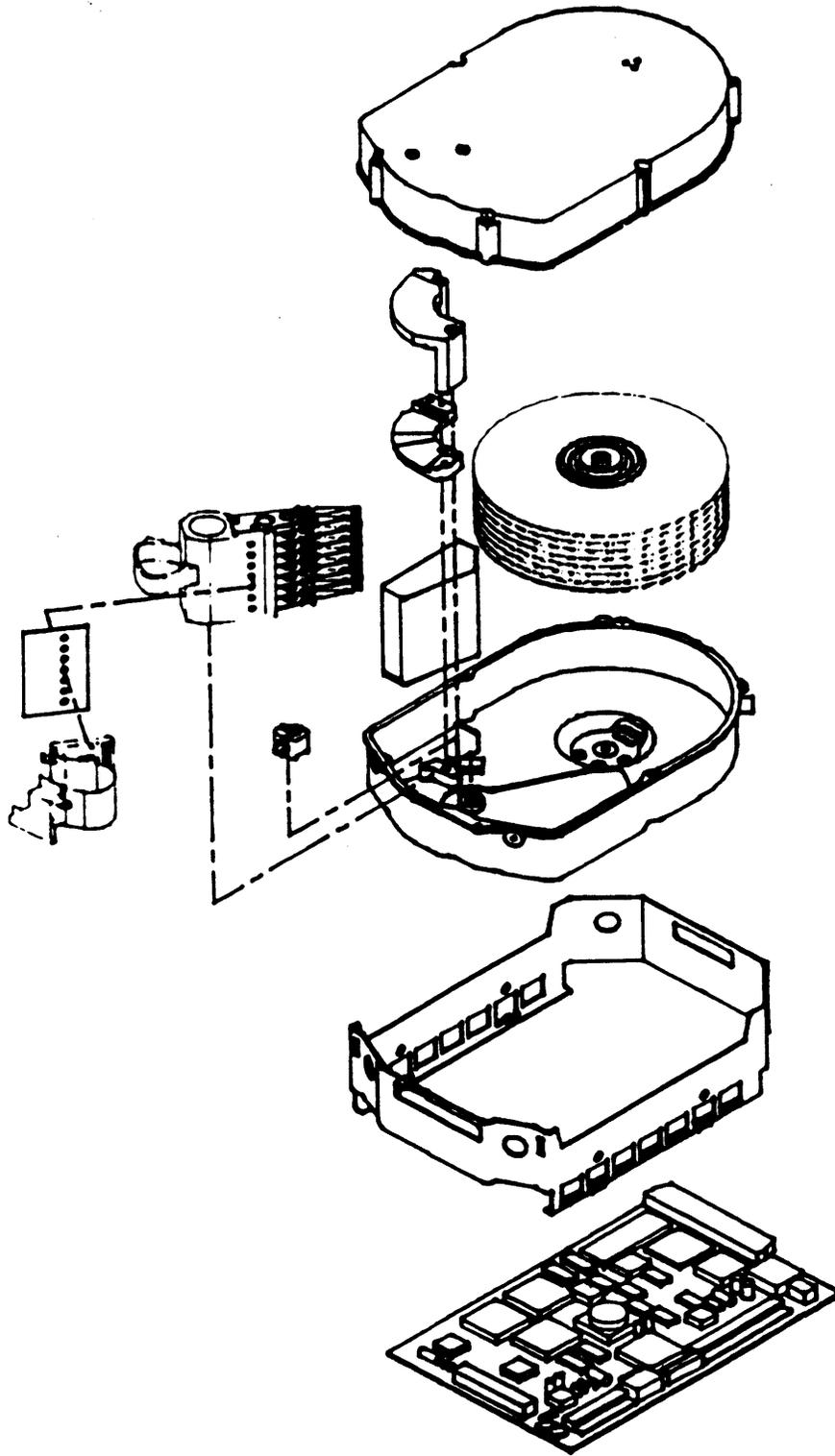


Figure 2-11: RF71 Mechanical Illustration

2.3.3. TF30 Cartridge Tape Unit

The TF30 cartridge tape unit is a TK50 with an imbedded DSSI controller. It can read and write TK50 cartridges. This tape unit has the following features:

- Size: half-height 5¼-inch cartridge tape unit
- Media: operator-removable ½-inch cartridge tapes
- Formatted capacity: 95 Mbytes
- Transfer rate: 500 Kbits/sec
- Recording density : 6.7K BPI
- Weight: < TBD lbs
- Acoustic noise: < TBD dB
- Minimum life expectancy: TBD years (TBD% POH)
 - MTBF: > 25K POH (steady-state goal at FRS)
 - MTTR: 1 hour (field)
- Power requirements:
 - +5 volts: TBD A
 - +12 volts: TBD A

The TF30 cartridge tape has TBD external connectors.

2.3.4. TF70 Cartridge Tape Unit

The TF70 cartridge tape unit has the following features:

- Size: full-height 5¼-inch cartridge tape unit
- Media: operator-removable ½-inch cartridge tapes
- Formatted capacity: 296 Mbytes
- Transfer rate: 1 Mbits/sec
- Recording density : 10K BPI
- Weight: < TBD lbs
- Acoustic noise: < TBD dB
- Minimum life expectancy: TBD years (TBD% POH)
 - MTBF: > TBD POH (steady-state goal at FRS)
 - MTTR: TBD hour (field)
- Power requirements:
 - +5 volts: TBD A
 - +12 volts: TBD A

The TF70 cartridge tape has TBD external connectors.

2.4. Monitor

Firefox uses the new VR295 monitor, which has the following basic features:

- Resolution: 1280 x 1024 pixels
- Size: 19-inch landscape orientation 338 mm x 270 mm
- Refresh rate: 66 Hz, noninterlaced
- RGB color
- Pitch of 97 pixels/inch (.31mm)
- 69-KHz horizontal frequency
- 114-MHz video bandwidth

The monitor will be an in-house design. It will have composite sync on green.

Inputs to the monitor are in the rear and are recessed in the cover. It has a tilt/swivel mechanism. During installation, the only set-up adjustments needed are for brightness and contrast. The monitor will operate in a usable fashion 30 seconds after turn-on.

The MTBF of the monitor will be greater than 25,000 hours. MTTR of the monitor will be one hour maximum.

2.5. Keyboard

The corporate LK201 keyboard family will be used for Firefox if the LK301 is not available. Main features of the LK201 keyboard are the following:

- Low profile and a detachable cord
- 105 keys in four groups: main keypad, editing keypad, numeric keypad, and function keys
- Four status LEDs
- International variants
- Several modes of operation under software control
- Self-testing and self-identifying with respect to revision level (not with respect to language variant)

Each end of the keyboard cable terminates in a four-pin MMJ connector. One end plugs into the keyboard, the other into a matching four-pin female connector embedded in the molded connector block at the end of the video cable. The electrical interface is EIA RS-423, running at 4800 baud.

The wire assignments in the keyboard cable are shown in Table 2-15.

Table 2-15: Keyboard Wire Assignments

Wire	Function	Signal Level
1	Receive data signal	EIA RS-423
2	Power return/signal reference	0 V
3	Power input	+12 V (350 milliamperes maximum)
4	Transmit data signal	EIA RS-423

2.6. Mouse

The corporate-standard VSXXX-AA mouse is used with Firefox. Its major features are the following:

- Three buttons
- Resolution: 200 counts/inch
- Tracking speed: 30 inches/sec
- Two electrical interfaces: RS-232 or TTL
- Two operating modes: incremental or polling
- Tracking rate: 55 reports/sec in incremental mode; up to 95 reports/sec in polling mode
- Self-testing and self-identifying with respect to revision level

The 5-foot mouse cable is shielded and contains six conductors. It terminates into a male seven-pin Micro-DIN-type connector that plugs into a seven-pin female connector embedded in the molded connector block at the end of the video cable.

The signals on these connector pins are shown in Table 2-16.

Table 2-16: Mouse Pin Signals

Pin	Signal	Description
1	GND	Signal and power return
2	TXD	Serial out from mouse
3	RXD	Serial in to mouse
4	GND/-12V	TTL/RS-232
5	+5V	Power
6		Not used
7		Not used
Shell		Protective ground

The mouse communicates at 4800 baud. Each frame consists of one start bit, eight data bits, one parity bit (odd), and one stop bit. Incoming parity and the most significant incoming data bit are ignored.

The mouse uses half-duplex communication. If a byte is sent to the mouse while it is transmitting, the mouse will abort the data being transmitted (force a break) and then process the new command immediately (except during self-test). If a byte is received between the characters of a multiple-byte report, the mouse is still transmitting and will abort the current report.

In incremental mode, the mouse reports at 55-Hz intervals anytime there is movement or a change in button position since the last report. In polling mode, the mouse reports in response to a Request Position command. In both cases, the mouse report consists of a three-frame message that contains the current positions of the three buttons and the X and Y displacements since the last report. The X and Y displacements are measured in 1/200-inch units and are expressed as a signed 6-bit values.

The mouse can be instructed to initiate a self-test. At the conclusion of this test, it transmits a four-frame message that indicates error status, hardware and firmware revision levels, and button status.

2.7. Tablet

The corporate-standard VSXXX-AB tablet is used. This is an optional component. If used, it replaces the mouse. The tablet may be used with either a stylus or a puck. The major features of the tablet are the following:

- Active area: 11 inches x 11 inches
- Four-button puck and a two-button stylus
- Resolution: 200 counts/inch
- Electrical interface: RS-232, with settable rates of 4800 or 9600 baud
- Two operating modes: incremental or polling
- Tracking rate: settable at 55, 72, or 120 reports/sec for incremental mode; up to 50 reports/sec in 4800-baud polling mode; or up to 80 requests/sec in 9600-baud polling mode
- Self-testing and self-identifying with respect to revision level and with respect to the fact that it is not a mouse

The tablet cable is a 5-foot shielded cable containing four conductors. Like the mouse, it terminates in a seven-pin male Micro-DIN-type connector. This connector plugs into the same female connector as the mouse cable, so only one can be in used at a time.

The signals on the pins are shown in Table 2-17.

Table 2-17: Tablet Pin Signals

Pin	Signal	Description
1	GND	Signal and power return
2	TXD	Serial out from tablet
3	RXD	Serial in to tablet
4		Not used
5		Not used
6	+12V	Power
7		Device present (connected to Pin 1)
Shell		Protective ground

In incremental mode, the tablet reports at the set rate any time there is a movement or a change in button position since the last report. In polling mode, the tablet reports in response to a Request Position command. In both cases, the tablet-position report consists of a five-frame message that contains the current positions of any buttons, a proximity bit, and the X and Y positions. The X and Y displacements are measured in 1/200-inch units and are expressed as unsigned 12-bit values.

The tablet can be instructed to initiate a self-test. At the conclusion of the test, it transmits a four-frame message that indicates error status, hardware and firmware revision levels, and button status.

2.8. Cables

Because of the design of the Fbox and the module covers, some standard cables cannot be used with Firefox. Firefox cables are described in Table 2-18.

Table 2-18: Cables

Cable	Status	Part Number
Monitor/keyboard/mouse	New cable, specific to VR295	17-01864-01
Comm/modem	New cable, specific to Firefox	17-01862-01
ThickWire Ethernet	New cable, specific to Firefox	17-01863-01
ThinWire Ethernet	Standard cable with T-connector	BC16T
Printer/console	Standard cable with MMJ connector	BC16E
Backplane to DSSI control panel	Standard to the BA213-series box	TBD
I/O cover module to I/O module	New cable, specific to Firefox	17-01861-01

2.8.1. Monitor/Keyboard/Mouse Cable

This cable is designed to be the unique interface between the Firefox system and the new VR295 monitor. The length of the cable is 15 feet. It ships with the Firefox system.

The cable is composed of three **TBD** coax (video) and ten strands of 30AWG wire (keyboard/mouse). Each coax is individually shielded. The serial lines, along with the required power and ground, are together in one shield. The three coax and the keyboard/mouse wires are molded together to form one cable. The exact form is **TBD**.

At the system end, the coax breaks out to three 75-ohm BNCs and the keyboard/mouse wires attach to one 15-pin, female, right-angle D-sub connector. The three BNCs attach to the graphics cover assembly. Because of their excellent signal integrity and FCC characteristics, 75-ohm BNCs are used. The female D-sub connector attaches to the 15-pin male D-sub on the I/O cover assembly.

At the monitor end of the cable, there is a connector block. Three shielded coax with 75-ohm BNC connectors emerge from this block and plug into the back of the monitor. Figure 2-12 shows the connector block mounted on the monitor, and the covered connector block is pictured in Figure 2-13.

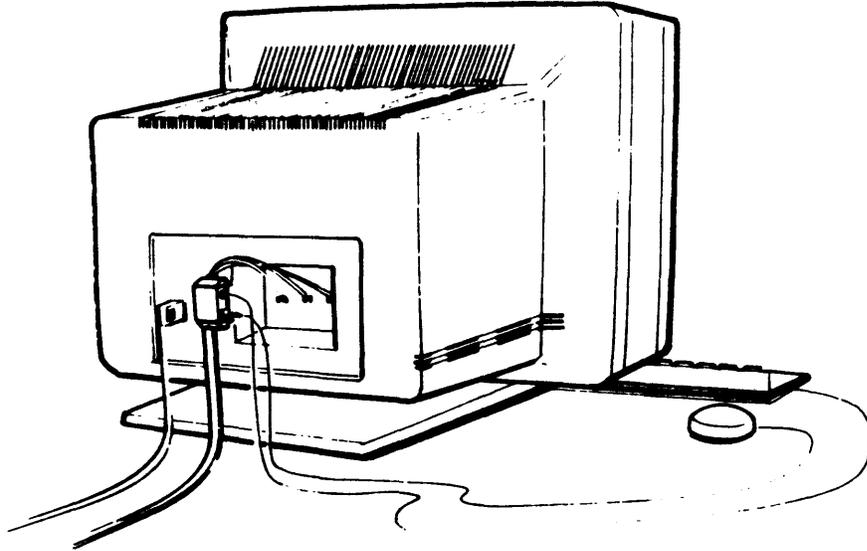


Figure 2-12: Uncovered Connector Block Mounted on the Monitor

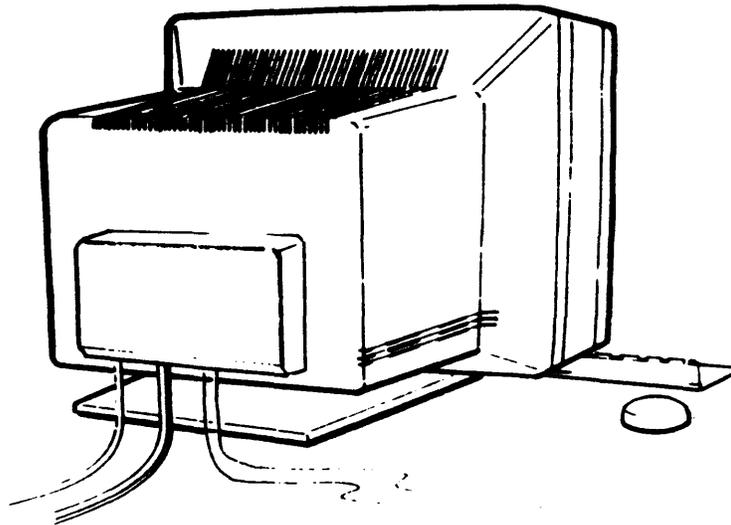


Figure 2-13: Covered Connector Block

The connector block also contains a PC board that maps the keyboard/mouse wires to the appropriate female modular connectors, one each for the keyboard and the mouse. The mapping for these wires is shown in Table 2-19.

Table 2-19: Mapping of Keyboard/Mouse Signals in the Connector Block

Keyboard/Mouse D-Sub Connector Pin Numbers	Wire Color	Keyboard Modular Connector Pin Numbers	Mouse Modular Connector Pin Numbers
1, 8, 9, 15	TBD	3	1
2	TBD	4	
3	TBD	1	
4,5	TBD	2	6
6	TBD		2
7	TBD		3
13	TBD		5
14	TBD		4
10, 11, 12	No connection		

2.8.1.1. Keyboard/Mouse D-Sub Connector

At the system end of the cable, the keyboard/mouse signals enter the cable through a 15-pin female D-sub connector. The signal assignments are shown in Table 2-20.

Table 2-20: Keyboard/Mouse Connector Signal Assignments

Pin	Signal	Function
1	GND	Keyboard ground
2	KTX	Keyboard transmitted data (to keyboard)
3	KRX	Keyboard received data (from keyboard)
4	+12V	Keyboard power
5	+12V	Tablet power
6	MRX	Mouse received data (from mouse)
7	MTX	Mouse transmitted data (to mouse)
8	GND	Mouse ground
9	GND	Keyboard power return
10	MFMD1	Manufacturing mode input
11	LED4	Most significant bit of status display output
12	MFMD0	Manufacturing mode input
13	+5.3V	Mouse power
14	-10V	Mouse power
15	GND	Mouse power return

2.8.1.2. Keyboard Micro-DIN Connector

The corporate LK201 keyboard family is used for Firefox. Each end of the keyboard cable terminates in a four-pin MMJ connector. One end plugs into the keyboard and the other end into a matching four-pin female connector embedded in the molded connector block at the end of the monitor/keyboard/mouse cable. The pin assignments in this cable are shown in Table 2-21.

Table 2-21: Keyboard Signal Assignments

Pin	Signal	Function
1	RX	Receive data (serial-in to keyboard)
2	GND	Signal ground
3	+12V	Power
4	TX	Transmit data (serial-out from keyboard)

2.8.1.3. Mouse Micro-DIN Connector

The corporate-standard VSXXX-AA mouse is used. Alternately, the corporate-standard VSXXX-AB tablet is used (if used, it replaces the mouse). The 5-foot mouse cable is shielded and contains six conductors. The 5-foot tablet cable is shielded and contains four conductors. Both terminate into a male seven-pin Micro-DIN connector. This connector plugs into a seven-pin female connector embedded in the molded connector block at the end of the monitor/keyboard/mouse cable. The signals on these connector pins are shown in Table 2-22.

Table 2-22: Mouse/Tablet Signal Assignments

Pin	Signal	Description
1	GND	Signal and power return
2	TXD	Serial out from mouse/tablet
3	RXD	Serial in to mouse/tablet
4	-12V	Only used by mouse
5	+5V	Only used by mouse
6	+12V	Only used by tablet
7		Device present. Not used
Shell		Protective ground

2.8.2. Modem Cable

The modem cable has 25-pin D-sub connectors on each end. Its connections are the industry standard for modem signals. At the system end, the cable has a female right-angle connector that causes this cable to be unique to Firefox. It is similar to BC22E (17-00322). The length is TBD. This cable, which does not ship with the Firefox system, is available as an option. The signals on the connector pins at the system end of the modem cable (the end with the right-angle connector) are shown in Table 2-23.

Table 2-23: Modem Cable Signal Assignments at the System End

Pin	Signal	Function
1		Protective ground
2	TX	Transmitted data
3	RX	Received data
4	RTS	Request to send
5	CTS	Clear to send
6	DSR	Data-set ready
7	GND	Signal ground
8	CD	Carrier detect
9		Unconnected
10		Unconnected
11		Unconnected
12	SPDMI	Speed-mode indicator
13		Unconnected
14		Unconnected
15		Unconnected
16		Unconnected
17		Unconnected
18	LLPBK	Local loopback
19		Unconnected
20	DTR	Data-terminal ready
21		Unconnected
22	RI	Ring indicator
23	DSRS	Data-signaling rate select
24		Unconnected
25	TMI	Test-mode indicator

The connected signals go straight through the cable (i.e. pin 2 to pin 2).

2.8.3. ThickWire Ethernet Cable

The ThickWire Ethernet cable is a standard cable with a 15-pin, male, right-angle connector at the system end. It does not ship with the Firefox system. The signals on the connector pins at the system end are shown in Table 2-24.

Table 2-24: ThickWire Ethernet Signal Assignments at the System End

Pin	Signal	Function
1		Shield
2	COL+	Collision presence
3	TX+	Transmit
4	GND	Ground
5	RX+	Receive
6	GND	Power return
7	CTL+	Control output
8	GND	Ground
9	COL-	Collision presence
10	TX-	Transmit
11	GND	Ground
12	RX-	Receive
13	+12V	Power
14	GND	Ground
15	CTL-	Control output

2.8.4. ThinWire Ethernet Cable

The ThinWire Ethernet cable is a standard cable with a T connector at the system end. The T connector mates with a BNC connector on the I/O cover module. This cable does not ship with the Firefox system.

2.8.5. Printer/Console Cable

The printer/console cable is a standard cable that is available in three variations. It does not ship with the Firefox system. The types of printer/console cable are listed in Table 2-25.

Table 2-25: Printer/Console Cable Part Numbers

Part Number	Length
BC16E-10	10 feet
BC16E-25	25 feet
BC16E-50	50 feet

The pin assignments on the system end of the printer/console cable are as shown in Table 2-26.

Table 2-26: Printer/Console Cable Signal Assignments at the System End

Pin	Signal	Function
1	+5V	Power
2	TX	Transmit data
3	GND	Transmit ground
4	RX	Receive data
5	GND	Receive ground
6	GND	Power return

2.8.6. Backplane to DSSI Control Panel Cable

The backplane to DSSI control panel cable (BDSSI cable) contains power and ground for the DSSI control panel, the BDCOK signal, the BPOK signal, and the BHALT signal. The goal is for this cable, which ships with the Firefox system, to be the same as the standard Sbox BDSSI cable. The pin assignments for both ends of this cable are shown in Table 2-27.

Table 2-27: BDSSI Signal Assignments

Pin	Signal
1	+5V
2	+5V
3	BHALT
4	GND
5	GND
6	GND
7	BPOK
8	Spare
9	BDCOK
10	SRUN

2.8.7. I/O Cover Module to Workstation I/O Module Cable

The I/O cover module to workstation I/O module cable (I/O ribbon cable) contains the signals needed for communication between the two modules. They are power, ground, Ethernet, keyboard, mouse, modem, printer/console, and system-status. The I/O ribbon cable is unique to Firefox, although the connectors and twisted-ribbon cable are high-volume, industry-standard items. This cable is permanently attached to the I/O cover module. The pin assignments for both ends of this cable are shown in Table 2-28.

Table 2-28: I/O Ribbon Cable Signal Assignments

Pin	Signal	Pin	Signal
1	+12V	2	+12V
3	GND	4	GND
5	TX0	6	RX0
7	CTS2	8	GND
9	RTS2	10	DTR2
11	TX1	12	RX1
13	DSR2	14	GND
15	RI2	16	CD2
17	TX2	18	RX2
19	DSRS2	20	GND
21	SPDMI2	22	TMI2
23	TX3	24	RX3
25	+5V	26	+5VBAT
27	LLPBK2	28	GND
29	-12V	30	-12V
31	MFMD0	32	MFMD1
33	LED0	34	LED1
35	LED2	36	LED3
37	TX+	38	TX-
39	LED4	40	SPARE
41	COL+	42	COL-
43	GND	44	GND
45	RX+	46	RX-
47	GND	48	GND
49	+12V	50	+12V