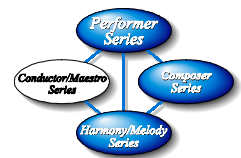


Conductor VMS Series 43 Workstation (Signature Class)





This instruction provides specific hardware installation, troubleshooting, maintenance, and repair and replacement procedures information necessary for the Conductor VMS (Signature Class) Series 43 workstation. Depending on the type of workstation, there are additional instructions that explain how to set up and use the workstation. Refer to the table of reference documents in Section 1 for more information on these instructions.

This instruction can be used as a guide by system engineers. It is not a tutorial and assumes the reader has a general knowledge of installing and maintaining process control systems.

Some sections of this instruction have been prepared in procedure format. There is a sequence flowchart that follows the introduction to the section and any nonprocedural information. This flowchart directs personnel to the appropriate procedure located in the back of this instruction. By treating each task as a separate entity, the procedures provide an easy method for finding the information needed to perform each task. The procedures can be removed and placed in separate folders or notebooks, or carried to the job site.

The procedures have check boxes in the margin by each step. When performing a procedure, check each box as each step is completed.

Do not perform any procedures related to installation, maintenance or repair until reading and understanding this instruction.

Throughout this instruction a question mark (?) is used to indicate revision levels in part numbers and variables in nomenclature positions. In most cases, if the variable is at the end of a nomenclature item the question mark is not included.

This instruction covers C-I-SV43S workstations.



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Safety Summary

GENERAL WARNINGS

Equipment Environment

All components, whether in transportation, operation or storage, must be in a noncorrosive environment.

Electrical Shock Hazard During Maintenance

Disconnect power or take precautions to insure that contact with energized parts is avoided when servicing.

SPECIFIC WARNINGS

Stabilize the base pedestal before removing the shipping pallet bolts. If the base pedestal is not stabilized, it could tip over and cause injury to personnel and damage to equipment. (p. 3-3, PR4-1)

Disconnect power before attempting these procedures. Failure to do so could result in severe or fatal shock, or equipment damage. (p. PR8-1, PR9-1, PR10-2, PR11-1, PR12-1, PR48-1, PR50-1, PR52-1)

There are exposed AC and DC connections inside the cabinet. These exposed electrical connections present a shock hazard that can cause injury or death. (p. PR13-1, PR23-1, PR31-1, PR32-1, PR41-1, PR42-1, PR43-1, PR57-1, PR59-1, PR60-1, PR61-1)

Disconnect the AC line cord or power lines from the operating branch circuit coming from the source before attempting electrical connections. Instruments powered by AC line voltage constitute a potential for personnel injury due to electric shock. (p. PR24-1, PR25-1)

Wear eye protection whenever working with cleaning solvents. When removing solvents from printed circuit boards using compressed air, injury to the eyes could result from splashing solvent as it is blown off the printed circuit board. (p. PR50-1)

Safety Summary (continued)

**SPECIFIC
CAUTIONS**

Attach moving equipment to, or lift by the beam. Lifting by other means will cause equipment damage. (p. 3-3, PR4-1, PR7-1)

Make sure that all voltage labels and voltage switch settings on the peripheral devices, power supply, and power entry panel show the correct operating voltage. Equipment damage may result if the incorrect voltage is connected. Make sure the console main power circuit breaker is off before changing operating voltage settings or equipment damage may result. (p. PR24-1, PR25-2, PR33-1, PR34-1, PR35-1, PR36-1, PR37-1, PR38-1, PR39-1, PR40-1, PR58-1)

Remove power from all peripheral equipment and the console before installing or removing peripheral equipment. Equipment damage may result. (PR33-1, PR34-1, PR35-1, PR36-1, PR37-1, PR38-1, PR39-1, PR40-1, PR58-1)

Never connect the tape drive to the CPU with the CPU or tape drive power on. Failure to comply may result in damage to both the CPU busses and the tape drive. (p. PR39-1)



Support Services

Elsag Bailey will provide assistance in the operation and repair of its products. Requests for sales or application services should be made to your nearest sales or service office. Elsag Bailey can also provide installation, repair and maintenance contract services.

When ordering parts, use nomenclature or part numbers and part descriptions from equipment manuals. Parts without a description must be ordered from the nearest sales or service office. Recommended spare parts lists, including prices are available through the nearest sales or service office.

Elsag Bailey has modern training facilities available for training your personnel. On-site training is also available. Contact your nearest Elsag Bailey sales office for specific information and scheduling.

Additional copies of this instruction, or other instructions, can be obtained from the nearest Elsag Bailey sales office at a reasonable charge.

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Overview

The Conductor VMS™ (Signature Class) Series 43 workstation is an advanced technology operator workstation. It fulfills ergonomic, process and information interface requirements. The workstation combines the functionality of the Conductor VMS Series 43 workstations with the latest internationally directed ergonomic guidelines. This produces a coherent, effective and attractive union of form and function. It addresses the needs of the industrial environment regarding durability, serviceability and operator safety. The workstation is configurable from single stand-alone, to multibay workstations.

In addition to the interface facilities between the operator and the process normally associated with DCS workstations, the Conductor VMS (Signature Class) Series 43 workstation provides a variety of multifunction components. These accommodate document storage, conferencing, ample writing space and other features commonly found in traditional office furniture.

This instruction contains information and procedures necessary to install, maintain and repair the Conductor VMS (Signature Class) Series 43 workstation.

Intended User

This instruction is intended for use by technical personnel responsible for the installation, maintenance and repair of the Conductor VMS (Signature Class) Series 43 workstation.

System engineers and technicians with a background in process control systems should read this instruction thoroughly before installing and using the system. **Do not** put the workstation into operation until reading and understanding this instruction. It is a reference for installers with installation and maintenance experience on process control equipment. It is not a tutorial.



Workstation Description

The Conductor VMS (Signature Class) Series 43 workstation consists of a series of fundamental building blocks connected in various ways to form customized arrays. Refer to [Section 2](#) for a detailed description of array configurations and building blocks.

Features

The Conductor VMS (Signature Class) Series 43 workstation has several features and benefits that distinguish it from other workstations.

Ergonomic Design. Designed to international guidelines to increase safety, productivity and comfort.

Fully Adjustable. Accommodates operators of different size from the fifth percentile female to the 95th percentile male.

Swivel/Tilt Monitor. Tilts 20 degrees about the horizontal axis and swivels 30 degrees about the vertical axis. Provides optimum viewing angle and access to adjustable pods.

High Resolution 21-Inch Monitor. 20-percent more viewing space than a standard monitor for displaying multiple windows of process and enterprise information.

Adjustable Work Surfaces. Raise and lower at the touch of a button.

Drawing and Drawer Tables. Drawing layout space, conferencing areas and storage.

Control Room Design Versatility. Allows multiple floor plan arrangements.

Durable and Attractive. Nonscratch soft edges, laminated surfaces and special paints ensure lasting good looks and durability.

Engineered for Maintainability and Evolutionary Enhancements. Easy access components and allowances for future processor form factors.

Workstation Application

The Conductor VMS (Signature Class) Series 43 workstation serves as the primary process and information interface for process operators, supervisors, engineers and instrument technicians. It also provides facilities such as writing surfaces, document storage, printer stands, wireways, and accommodations for telephone and radio communications.

Instruction Content

This instruction contains information on C-I-SV43S workstations. It is organized into eight sections, five appendices and a set of procedures. After becoming completely familiar with it and the workstation, it may be used as a reference.

- | | |
|------------------------------------|--|
| Introduction | Describes this product instruction and the workstation. Includes a glossary of terms and abbreviations (Table 1-1), reference documents (Table 1-2), nomenclature (Table 1-3) and specifications (Tables 1-5, 1-6, 1-7, 1-8 and 1-9). Table 1-4 lists the valid nomenclature combinations. Use this table to insure that the workstation components ordered fit together. Table 1-10 lists available accessories. Table 1-11 lists the design standards to which the workstation was designed. |
| Description and Operation | Describes the functional operation of the workstation and associated equipment. |
| Site Selection and Planning | Contains site selection and planning information as it pertains to the workstation. Includes physical and environmental requirements. |
| Installation | Provides an introduction into the procedures involved in placing the workstation into operation. Provides installation sequence flowcharts that direct installation personnel to the appropriate procedures. |
| Troubleshooting | Contains a table of error messages and corrective action, and a troubleshooting sequence flowchart that guides troubleshooting personnel to the appropriate procedures. |
| Maintenance | Provides an introduction into the routine maintenance of the workstation. Includes a preventive maintenance schedule that includes references to applicable procedures. |



Repair and Replacement	Provides an introduction into the procedures involved in replacing workstation components. Includes a repair and replacement sequence flowchart that directs repair personnel to the appropriate procedures.
Replacement and Spare Parts	Includes spare and replacement parts lists.
Appendix A - Footprints	Contains to-scale physical footprint drawings to help in control room design and array component placement.
Appendix B - Dimension Drawings	Provides dimension drawings for a stand-alone workstation, typical arrays, tables, work surfaces and the auxiliary panel.
Appendix C - Factory Wiring	Contains factory wiring diagrams for the various workstation components. Includes cable part numbers.
Appendix D - Redundant Ethernet Networks	Provides general information on redundant Ethernet™ networks.
Appendix E - Quick Reference	Provides useful information including circuit board drawings showing the locations of specific components and switch and jumper settings.
Procedures PR1 through PR68	Provide procedures for each task.

How to Use this Instruction

Read this entire instruction through in sequence before attempting to install, maintain or repair the workstation. After gaining a complete understanding of this instruction and the workstation, it can be used as a reference.

Some sections of this instruction have been prepared in procedure format. There are flowcharts that follow the introduction to the section and any nonprocedural information. These flowcharts direct personnel to the appropriate procedure. By treating each task as a separate entity, the procedures provide an easy method for finding the information needed to perform each task. The procedures can be removed and placed into separate folders or notebooks, or carried to the job site.

Each procedure lists the recommended tools to perform that procedure. Specific tool sizes are listed when required, such as Allen wrench size, socket size, wrench size, etc. Screwdrivers

are listed as long or short when necessary due to access restrictions.

Document Conventions

This document uses standard text conventions to represent keys, display items and user data inputs:

Key Identifies a keyboard key.

Example:

Press **ENTER**.

Display item Any item displayed on a screen appears as italic text.

Example:

Running

User data input **Bold** - Identifies any part of a command line that is **not** optional or variable and must be entered exactly as shown.

Italic - Identifies a variable parameter entered in a command line.

[] - Indicates an optional parameter; text within the brackets follows the previously described conventions.

Examples:

ei 108,87,*key1,key2,x-coord,y-coord*
ELE *volume filename.exe*

Glossary of Terms and Abbreviations

Table 1-1 lists the terms and abbreviations as they apply to the Conductor VMS (Signature Class) Series 43 workstation.

Table 1-1. Glossary of Terms and Abbreviations

Term	Definition
Annunciator display panel (ADP)	Assembly of 32 pushbuttons and LEDs. Used for alarm processing or calling of assigned displays.
Array	Assembly of two or more bays.

**Table 1-1. Glossary of Terms and Abbreviations** *(continued)*

Term	Definition
Auxiliary panel	Steel panel structure that mounts to the beam, providing space for customer mounting of auxiliary equipment (telephones, pushbuttons, panel board instruments, two-way radios, etc.).
Auxiliary terminal	Operator input capabilities via a keyboard, mouse, trackball, touch screen, etc. Referred to as an auxiliary terminal because it communicates with Symphony Enterprise Management and Control System via its assigned main terminal.
Auxiliary monitor	Additional display device, such as a CRT, LCD, etc. Connected directly to a main terminal having dual graphic output capability. Placed to the immediate left or right of the main terminal to form a side-by-side monitor configuration.
Base pedestal	Fundamental structure supporting the beam. Encloses any terminal electronics (NIU, workstation or PC processor, PEP, network terminations, alarm contacts, etc.). Wireway for customer cabling between the floor and devices in the auxiliary panel.
Bay	Segment or section of a workstation. Assembly of building blocks (base pedestal, beam, monitor enclosure, etc.) that form a functional entity (main terminal, auxiliary terminal, a table connected to another bay, etc.).
Beam	Triangular structure mounted on the base pedestal. Supports either the auxiliary panel or monitor enclosure. Wireway for interbay connections. Supports fixed or adjustable work surfaces.
Bellows	Flexible covers enclosing and protecting interconnecting wiring between pods and the monitor enclosure.
Bookcase with wedge table	Wedge table supported by a bookcase for manual storage, etc. The wedge table is a stationary work surface shape that fills in the gaps in certain array configurations.
Drawer table	Table having a set of drawers with a work surface of convenient size for paperwork activities. Mounts on either end of an array.
Drawing table	Conference table for either end of an array. Accommodates large process drawings as well as multipersonnel meetings.
Elbow	Triangular structure that connects two adjacent beams. Fastens work surface wedges and tables to the beam.
End cap	Decorative cover for the ends of beams not connected by elbows. Stand-alone workstations have an end cap on both ends of the beam.
Flying beam	Beam suspended between two adjacent base pedestals.
Footprint	Plan view of the surface area occupied by an array configuration.
INFI-NET®	Advanced data communication highway.
Lifting mechanism	Raises or lowers a work surface to desired elevation. Uses an electric drive assembly.

Table 1-1. Glossary of Terms and Abbreviations (continued)

Term	Definition
Loop termination unit (TU)	Fundamental link to the INFI-NET system and Symphony Enterprise Management and Control System. Mounted in the base pedestal of main terminals.
Main terminal	Operator input capabilities via a keyboard, mouse, trackball, touch screen, etc., and a monitor (CRT, LCD, etc.). Main terminals have a loop termination unit that interfaces to the Symphony Enterprise Management and Control System.
Monitor	Any technology capable of displaying dynamic data to an operator, such as CRTs, LCDs, VFDs and plasma. The Conductor VMS (Signature Class) Series 43 workstation uses the CRT as the display technology.
Monitor base plate	Foundation plate for the monitor enclosure. Supports the monitor assembly, operator I/O controller, cables and monitor enclosure components.
Monitor enclosure	Housing for the monitor and operator I/O controller. Mounts on the swivel/tilt mechanism. Supports optional left and right pods.
Operator I/O controller	Electronics assembly providing the necessary interface to the operator key-boards, ADP assemblies and touch screen. Mounted beneath the monitor in the monitor enclosure.
Operator keyboard	Mylar® keyboard assembly for performing display acquisition, data input and control actions. Houses the floppy disk drive, and connections for the QWERTY keyboard, mouse and trackball.
Pedestal	See base pedestal.
Pedestal cover	Removable, box-like structure on the rear of the base pedestal. Enables access to internal components mounted inside the base pedestal.
Pod mechanism	Assembly of mechanical components enabling positioning of the pod by turning a single knob.
Pod	Adjustable wing-like enclosure connected to either side of the monitor enclosure. Each pod accommodates none, one or two ADP assemblies.
Power entry panel (PEP)	Located inside the footrest of the base pedestal. Provides termination and distribution of all AC power for the bay. Contains surge suppressors and circuit breaker.
Printer stand	Provides support for printer. Can be used as stand-alone or as part of an array. Features removable printer cart to load paper from front. Available with small or large work surface.
Side-by-side monitors	Two bay configuration consisting of one main terminal and one auxiliary monitor mounted to the left or right of the main terminal. Main terminal employs a single processor with dual graphics capability.
Stabilizer	Extensions on either side of the footrest of the base pedestal and auxiliary panel. Provide stability and must be used with base pedestal, auxiliary panel bays and printer stands that are not securely anchored to the floor.

**Table 1-1. Glossary of Terms and Abbreviations** *(continued)*

Term	Definition
Stand-alone	Single bay configuration that includes an extra large work surface.
Swivel/tilt base plate	Foundation plate for the swivel/tilt mechanism. Provides the primary mechanical link between the beam and the assembly consisting of the swivel/tilt mechanism and the monitor enclosure.
Swivel/tilt mechanism	Allows the monitor to tilt 20° about the horizontal axis and swivel 30° about the vertical axis. Mounts between the monitor enclosure and the beam.
TU	Termination unit.
Work envelope	Three-dimensional space typically occupied or used by a human being in performing a task.
Work surface	Horizontal surface mounted to the beam and used to support the keyboard, mouse, trackball, etc. A surface used for writing, document storage, etc. Supported by fixed arms or lifting mechanism.
Work surface style	Style number identifying each unique work surface shape. Work surfaces are available in several different shapes to accommodate a variety of array configurations.

Reference Documents

Table 1-2 lists the Elsag Bailey documents referred to in, or used in conjunction with this instruction.

Table 1-2. Reference Documents

Number	Title
I-E96-500	Site Planning and Preparation
I-E96-197-10	Signature Series Workstation Site Planning and Selection Guide
WBPEEU1220773A0	Operation, Conductor VMS
WBPEEU1220774A0	Configuration, Conductor VMS
WBPEEU1220775A0	File Utilities, Conductor VMS
WBPEEU1220776A0	Display Builder Reference
D3055195	Signature Series Workstation Installation Drawing

Nomenclature

Table 1-3 contains the nomenclature used in this instruction. This table only includes the positions necessary to adequately identify and describe the workstation. Refer to the Conductor VMS (Signature Class) Series 43 workstation data sheet identified in Table 1-2 for the complete nomenclature that identifies options such as bay type, pods, touchscreen, color, language, and work surface type and mounting. Table 1-4 lists the valid nomenclature combinations. Items such as tables, elbows, printer stands, etc. can be found in Table 1-10.

Table 1-3. Signature Bays

Nomenclature	Description
C-I-SV43S-A	Auxiliary terminal
C-I-SV43S-C ²	Auxiliary monitor for side-by-side configuration
C-I-SV43S-M	Main terminal
C-I-SV43S-S	Signature shell with monitor only
C-I-SV43S-T ³	Auxiliary terminal with dual graphic output
C-I-SV43S-X ³	Main terminal with dual graphic output

NOTES:

1. For complete nomenclature, refer to the Conductor VMS (Signature Class) Series 43 Workstation Data Sheet identified in Table 1-2.
2. Requires C-I-SV43S-T auxiliary terminal with dual graphic output or C-I-SV43S-X main terminal with dual graphic output in adjacent bay.
3. Requires C-I-SV43S-C auxiliary monitor in adjacent bay.

Table 1-4. Valid Nomenclature Combinations (Table 1-3)

Nomenclature Position and Valid Selections (Positions 1 through 10 are C-I-SV43S-)								
11	12	13	14	15	16	17	18	19
M	1,2,3,4	0,1,2,3,9	0,1,2,3,9	0,T	0,1	0,2,4,5,6,7	1,2,3,4,5	1,2,3
X		0,1,2,3,9 ¹	0,1,2,3,9 ¹				2,3,4,5	
A		0,1,2,3,9	0,1,2,3,9				1,2,3,4,5	
T							2,3,4,5	
C ²	0,1,2,3,4	0,1,2,3,9 ¹	0,1,2,3,9 ¹					
S	1,2,3,4	0,1,2,3,9	0,1,2,3,9	0			0,1,2,3,4,5 ³	0,1,2,3 ³

NOTES:

1. There can be a total of four ADP assemblies between C-I-SV43S-X main terminal with dual graphic output and C-I-SV43S-C auxiliary monitor.
2. C-I-SV43S-C auxiliary monitor must be adjacent to C-I-SV43S-T auxiliary terminal with dual graphic output or C-I-SV43S-X main terminal with dual graphic output.
3. A zero in position 18 requires a zero in position 19 and vice versa.



Specifications

The specifications are organized by category:

- Table 1-5: AC power quality requirements.
- Table 1-6: Operating parameters (typical).
- Table 1-7: Dimensions.
- Table 1-8: Environmental.
- Table 1-9: Specifications.

Table 1-5. AC Power Quality Requirements

Property	Characteristic/Value
Line voltage	
120 VAC (nominal)	90 to 132 VAC
240 VAC (nominal)	180 to 264 VAC
Overvoltage Category (OVC)	III
Line frequency	
50/60 Hz (nominal)	47 to 63 Hz
Total harmonic distortion	<5%
Maximum interruption	20 msecs (DEC™ Power Line Standard 122)

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

Table 1-6. Operating Parameters (Typical)¹

Type	Nominal Input Voltage (VAC)	Input Current (A)		Nominal Power (W)	Crest Factor	Power Factor	Nominal Heat Dissipation (BTU/Hr)
		Nominal Operating ²	Nominal Inrush				
C-I-SV43S-M	120	3.2	81.0	310	3.2	0.80	1,058
	240	2.0	75.0	326	4.8	0.68	1,112
C-I-SV43S-X	120	3.1	71.0	308	2.6	0.82	1,051
	240	1.6	65.0	308	2.4	0.81	1,051
C-I-SV43S-A	120	2.0	56.3	202	3.7	0.84	689
	240	1.1	46.5	214	5.5	0.81	731

Table 1-6. Operating Parameters (Typical)¹ (continued)

Type	Nominal Input Voltage (VAC)	Input Current (A)		Nominal Power (W)	Crest Factor	Power Factor	Nominal Heat Dissipation (BTU/Hr)
		Nominal Operating ²	Nominal Inrush				
C-I-SV43S-T	120	3.1	71.0	308	2.6	0.82	1,051
	240	1.6	65.0	308	2.4	0.81	1,051
C-I-SV43S-C	120	1.0	15.4	118	2.0	0.98	403
	240	0.5	29.3	116	2.1	0.97	396
C-I-SV43S-S	120	1.0	15.4	118	2.0	0.98	403
	240	0.5	29.3	116	2.1	0.97	396

NOTES:

- To approximate maximum values for current, power and heat dissipation, multiply typical values by 1.33.
- Add 1.2 A for each component with the optional lifting mechanism (only when the lifting mechanism is activated and in operation). All values calculated from the operating current are also affected.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

Table 1-7. Dimensions¹

Type	Width		Depth		Max Height		Weight	
	cm	in.	cm	in.	cm	in.	kg	lbs
Stand-alone with S1 work surface	159.5	62.8	156.4	61.6	129.5	51.0	210	461
Single bay	100.0	39.4	150.8	59.4	129.5	51.0	207	456
Auxiliary panel with S1 work surface	100.0	39.4	154.1	60.7	113.5	44.7	286	630
Large drawing table	109.1	43.0	124.7	49.1	70.7	27.8	31	69
Drawer table	70.0	27.6	98.1	38.6	71.2	28.0	57	125
Printer stand with large work surface	70.0	27.6	137.6	54.2	72.9	28.7	Not available	
Printer stand with small work surface	70.0	27.6	103.3	40.7	72.9	28.7	Not available	
Bookcase with wedge table	37.2	14.6	44.9	17.7	71.5	28.2	Not available	
Typical export shipping crate	170.2	67.0	124.5	49.0	142.2	56.0	227	500

NOTE:

- Dimensions do not include the recommended minimum work envelope of 1.0 m (39.4 in.).

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE



Table 1-8. Environmental

Environment	Altitude		Temperature		Relative Humidity %
	m	ft	°C	°F	
Operating	0 to 3,048	0 to 10,00	15 to 40	59 to 104	20 to 80 noncondensing
Nonoperating ¹	0 to 12,192	0 to 40,000	-40 to 66	-40 to 151	95 ²
Storage	0 to 12,192	0 to 40,000	5 to 50	41 to 122	10 to 95 noncondensing

NOTES:

1. Nonoperating environment is defined as a transportation or storage period of less than 60 days.
2. The value of 95% is at a reference temperature of 66°C (151°F) and the humidity may condense.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

Table 1-9. Specifications¹

Property	Characteristic/Value
Display	
Displays or graphics	1,500
Dynamics per display	400
Operator configurable displays	25
Operating system	Open VMS AXP
Tags/points	30,000
Generated windows	8
Logs	
Event logs	1 log up to 20,000 events
Sequence of events reports	160
Logs (total of trend, trip and snapshot)	300
Trends	
Total (workstation collected)	
Operator assigned (2 sec)	20
Trends (collected)	
With DISPLAY ONLY usage type	10,000
With SAVE TO DISK or ARCHIVE usage type	2,000
Enhanced trends	Configuration dependent
Hardware	
Annunciator display panels (ADP)	Up to 4 per keyboard
Pushbuttons or LEDs per ADP	32
CRT resolution	1280 x 1024 pixels at 72 Hz
Keyboards ²	Up to 8

Table 1-9. Specifications¹ *(continued)*

Property	Characteristic/Value
Hardware <i>(continued)</i>	
Alarm contact ratings (alarms TU PCB) and over voltage category (OVC)	5.0 A at 250 VAC (OVC I) 5.0 A at 150 VAC (OVC II) 5.0 A at 100 VAC (OVC III) 0.3 A at 110 VDC (OVC II) 0.3 A at 100 VDC (OVC III) 0.3 A at 30 VDC (OVC III)
RAM	128 Mbytes
Floppy disk	1.44 Mbytes
Hard disk	Two 1.05-Gbyte drives
Processor	DEC 64 bit, Alpha™ AXP RISC, 233 MHz
CD ROM drive	600 Mbytes, 150 to 300-kbytes/sec transfer rate
External accessories	
Optical disk	1.2 Gbytes (600 Mbytes per side) or 594 Mbytes (297 Mbytes per side)
DAT magnetic tape (120 m)	4 Gbytes in native mode, 8 Gbytes (typical) with data compression
Printers (graphics and text)	Up to 4 of each type (graphics and text) via server

NOTES:

1. Specifications are for main terminals only.
2. Six output relays per keyboard and 20 logical tones. Each tone can be configured to make one of 15 different pitches. Each tone can be sent to any or all keyboards.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

Accessories

Table 1-10 lists the accessories available for use with the Conductor VMS (Signature Class) Series 43 workstations.

Table 1-10. Accessories

Accessory	Description
1948385?1	Antistatic field kit. Contains two wrist straps, a ground cord assembly, an alligator clip and a static dissipating work surface.
4079002 ¹	Lexmark Color JetPrinter 4079 PLUS 11 in. by 17 in. color screen copy printer



Table 1-10. Accessories *(continued)*

Accessory	Description
C3540A ¹	HP® 1600C 8.5 in. by 11.0 in. color screen copy printer
IIPRT02	Black and white printer
IIPRT03	Color printer (up to 64 colors)
IIPRT05	High speed black and white printer
IIPRT08C	Color/black and white screen copy printer
IIPRT09	24-pin color printer
IIDMT03B	DAT tape drive
IIDOP04B	Optical disk drive
IIPRS01	Printer terminal server
P-MF-SSA ²	Auxiliary panel
P-MF-SSB ²	Bookcase with wedge table
P-MF-SSE ²	Elbows, end caps and stabilizers
P-MF-SSP ²	Printer table
P-MF-SST ²	Drawer and drawing tables

NOTES:

1. Manufacturer part number.
2. Base nomenclature only. For complete nomenclature refer to the Conductor VMS (Signature Class) Series 43 Workstation Data Sheet identified in Table 1-2.

Design Standards

The Conductor VMS (Signature Class) Series 43 workstation was engineered to comply with several international standards. Refer to Table 1-11 for a list of these standards.

Table 1-11. Design Standards

Property	Standard	Description
Emitted radiation	EN 55011	Limits and Methods of Measurement of Radio Disturbance Characteristics of Industrial, Scientific and Medical (ISM) Radio-Frequency Equipment
General requirements	CSA C22.2 No. 1010.1-92	Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use, Part 1: General Requirements
Certification	CSA	Certified for use in a controlled environment (pending)

Table 1-11. Design Standards (continued)

Property	Standard	Description
CE mark directives	73/23/EEC	Low voltage directive
	89/336/EEC	EMC directive
	92/31/EEC	
	89/392/EEC	Machinery directive
	90/683/EEC	CE marking directives
	93/68/EEC	
	93/405/EEC	
Power factor/ harmonics	IEC 555-2	Disturbances in Supply Systems Caused by Household Appliances and Similar Electrical Equipment, Part 2: Harmonics First Edition
ESD surge protection	EN1004-2 Level 4 (15 kV)	Testing and Measurement Techniques, Section 2: Electrostatic Discharge Requirements
RFI	EN1004-3 Level 3	Testing and Measurement Techniques, Section 3: Radiated Electromagnetic Field Requirements
Transients	EN1004-4 Level 3	Testing and Measurement Techniques, Section 4: Electrical Fast Transient/Burst Requirements
Surge withstand	EN1004-5 Level 3	Testing and Measurement Techniques, Section 5: Surge Immunity Requirements
Radiation (X-ray)	IEC 1010-1 Section 12.2	Safety Requirements for Electrical Equipment for Measurement Control and Laboratory Use, Part 1: General Requirements; Section 12.2: Equipment Producing Ionizing Radiation
Corrosive environments	ISA S71.04 Severity Level 1 (control room environment)	Environmental Conditions for Process Measurement and Control Systems - Airborne Contaminants
General requirements	ISA S82.01-1994	Safety Standard for Electrical and Electronic Test, Measuring, Controlling, and Related Equipment - General Requirements
Shock	MIL-STD 202	Test Methods for Electronic and Electrical Component Parts
Vibration	MIL-STD 810E	Environmental Test Methods and Engineering, Method 514.4 Category 1 - Basic Transportation

**Table 1-11. Design Standards** *(continued)*

Property	Standard	Description
Enclosure classification	IP10 and NEMA 1	Suitable for Indoor Locations
Magnetic field emissions	Swedish SWEDAC Standard MPR8, VLF and ELF	Test Methods for Visual Display Units: Visual Ergonomics, Emission Characteristics (formerly MPR2)

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE



Introduction

This section describes the Conductor VMS (Signature Class) Series 43 workstation arrays and the building blocks used to form these arrays. Figures 2-1, 2-2, 2-3 and 2-4 show the external and internal components of a stand-alone workstation.

Workstation Description

The Conductor VMS (Signature Class) Series 43 workstation consists of a series of fundamental building blocks connected in various ways to form customized arrays.

Array Configurations

The Conductor VMS (Signature Class) Series 43 workstation consists of three basic functional module array configurations. These configurations are then connected to other building blocks to form customized multibay workstations. Refer to **Building Blocks** for a description of each individual component.

NOTES:

1. All flying beam configurations require a base pedestal bay on both the left and right side of the flying beam.
2. Refer to **Physical Configuration Rules** in Section 4 for guidelines on building arrays.

Single Monitor

This is a one monitor per bay, single keyboard configuration with a processor mounted in the base pedestal (Fig. 2-5). The processor can be either a main or an auxiliary. The design allows the monitor to be mounted at the center, or 150 millimeters (5.9 inches) to the left or right of center of the beam.



Dual Monitors/Dual Auxiliary Monitors

These are two monitor, single keyboard configurations. The dual monitors have a main processor with dual graphics capability mounted in the base pedestal (Fig. 2-6). The dual auxiliary monitor has a an auxiliary processor with dual graphics output capability mounted in the base pedestal. Both dual monitor configurations have one monitor mounted on a flying beam (or another base pedestal) to the left or right of the first base pedestal bay. When a flying beam supports the second monitor, the flying beam must be mounted between two base pedestal bays. The design allows the monitors to be mounted at the center, or 150 millimeters (5.9 inches) to the left or right of center of the beam or flying beam.

Building Blocks

Customized arrays are formed by connecting a series of fundamental building blocks in various ways.

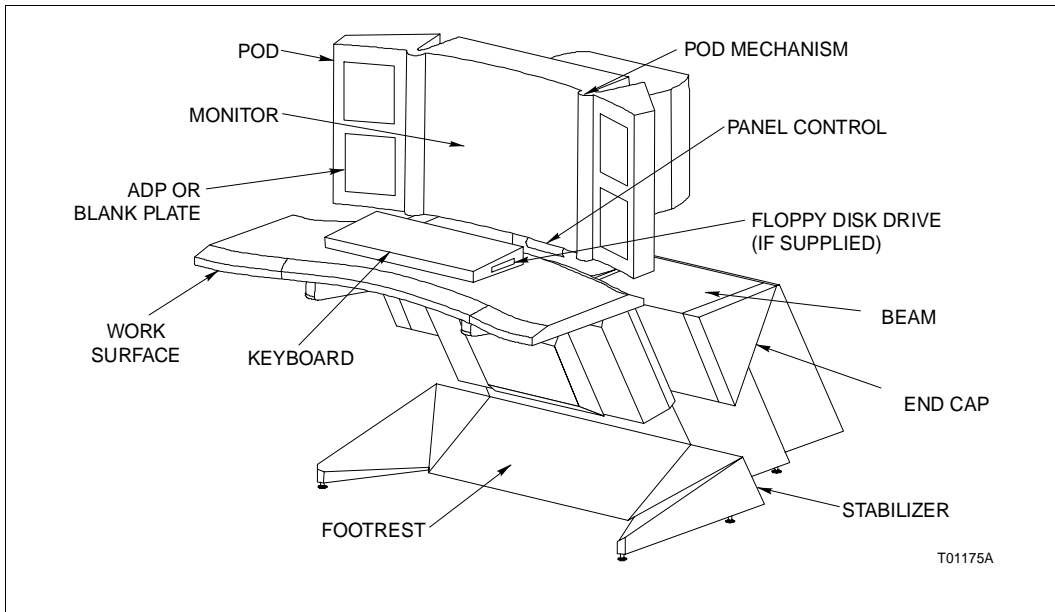


Figure 2-1. External Components (Front View)

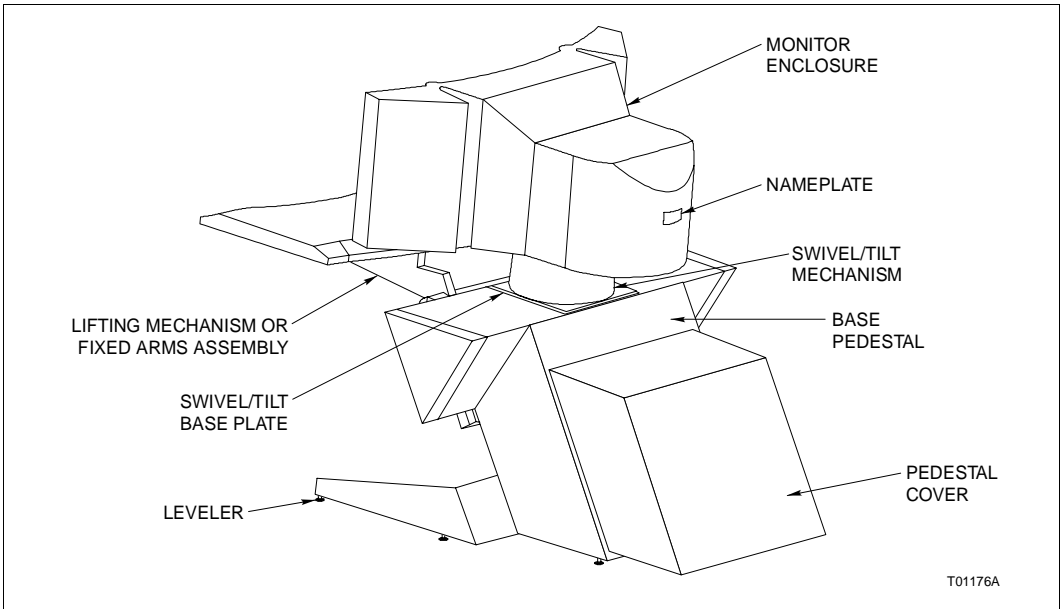


Figure 2-2. External Components (Rear View)

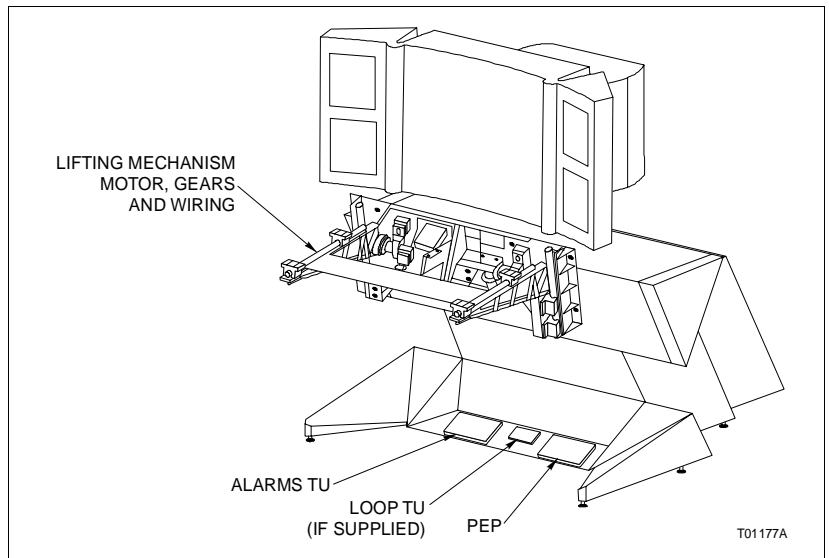


Figure 2-3. Internal Components (Front View)

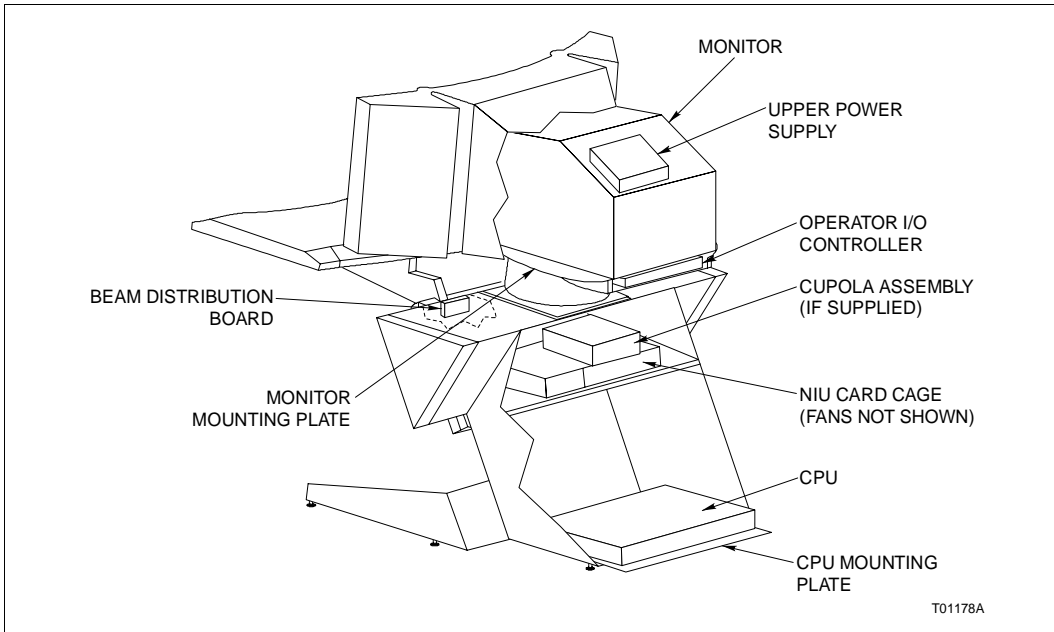


Figure 2-4. Internal Components (Rear View)

Base Pedestal

The base pedestal is the fundamental structure that supports the beam (Fig. 2-6). It encloses any terminal electronics (loop TU, processor, power entry panel (PEP), alarm contacts, etc.). It functions as a wireway for customer cabling between the floor and devices mounted in the auxiliary panel.

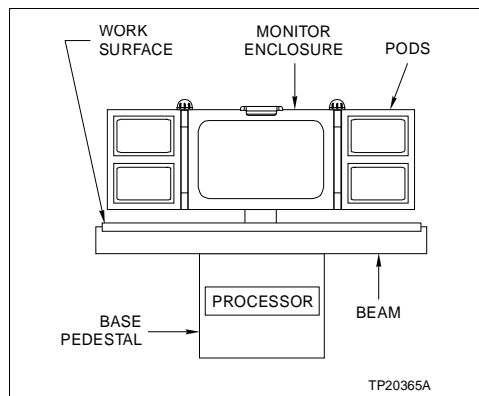


Figure 2-5. Single Monitor

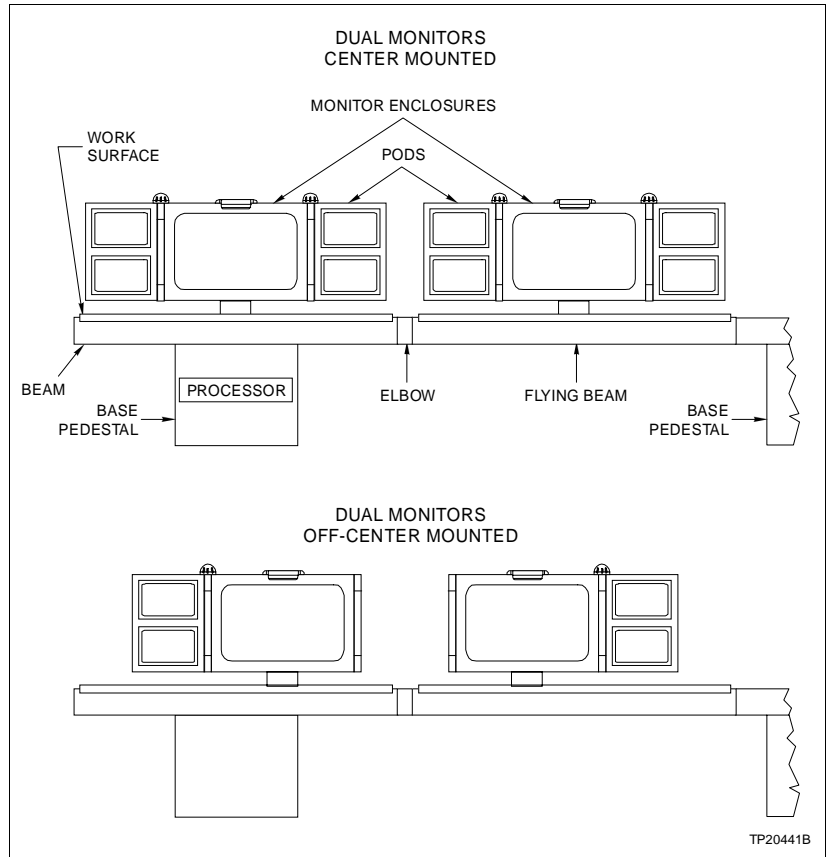


Figure 2-6. Dual Monitors

Beam

The beam is the triangular structure mounted on the base pedestal (Fig. 2-6). It supports either the auxiliary panel or the monitor enclosure. It provides wireways for interbay wiring connections and support for fixed or adjustable work surfaces (Fig. 2-7).

Flying Beam

The flying beam is a beam suspended between two adjacent base pedestals (Fig. 2-6). Compared to the base pedestal, the flying beam allows more leg room underneath and requires less floor space. It can only be used for C-I-SV43S-C workstations and auxiliary panel bays (P-MF-SSA).



Elbow

The elbow is a triangular structure connecting two adjacent beams. It provides wireways for interbay wiring connections. (Fig. 2-7). It connects the bookcase with wedge table, the drawing and drawer tables and the printer stand to the beam. It comes in straight or 45-degree configurations.

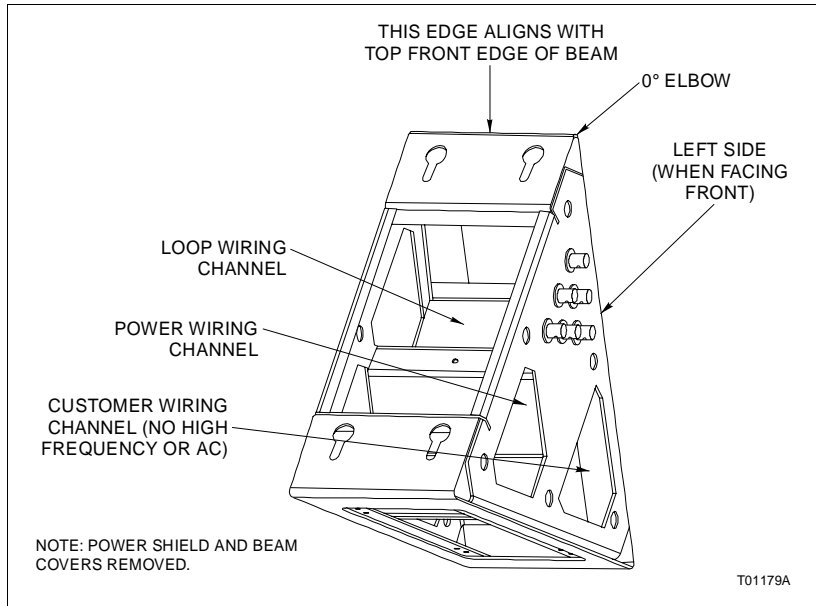


Figure 2-7. Wiring Channels

End Cap

The end cap is a decorative cover for the ends of beams that are not connected by elbows. Stand-alone workstations have an end cap on both ends of the beam (Fig. 2-1).

Monitor Enclosure

The monitor enclosure houses the monitor and the operator I/O controller (Fig. 2-6). It mounts on the swivel/tilt mechanism and supports the pods. It mounts either to the center, or 150 millimeters (5.9 inches) to the left or right of center of the beam or flying beam.

NOTE: Pods cannot be installed between monitor enclosures where one monitor enclosure is mounted 150 millimeters (5.9 inches) toward the other.

Pods

The pods are the adjustable wing-like enclosures connected to either side of the monitor enclosure (Fig. 2-6). Each pod accommodates none, one or two ADP assemblies. The pod mechanism is an assembly of mechanical components enabling positioning of the pod by turning a single knob. The adjustable pods optimize reach distances.

Workstation Work Surface S1

Workstation work surface S1 is an extra wide work surface used with the stand-alone workstation (Fig. 2-8). It is fixed or raised and lowered at the touch of a button using the optional lifting mechanism. It supports a keyboard and a pointing device. Besides providing a large writing surface, the extra area is a convenient place for manual storage, etc.

Workstation Work Surfaces S2 through S5

Workstation work surfaces S2 through S5 are the curved, single bay and curved, in-line, single bay array work surfaces used with multibay workstations (Fig. 2-8). They are fixed or raised and lowered at the touch of a button using the optional lifting mechanism. They support keyboards and pointing devices.

Auxiliary Panel Work Surfaces S1 through S4

Auxiliary panel work surfaces S1 through S4 are the straight, single bay array work surfaces used in conjunction with the auxiliary panel (Fig. 2-8). They are fixed or raised and lowered at the touch of a button using the optional lifting mechanism.

Bookcase with Wedge Table

This is a wedge table supported by a bookcase for manual storage, etc. It is a stationary work surface shape (Fig. 2-8). It fills in the gaps between work surfaces in certain array configurations.

Drawing Table

The drawing table is a conference table for either end of an array (Fig. 2-8). It accommodates large process drawings as well as multipersonnel meetings. It provides approximately one



square meter (10.8 square feet) of flat, horizontal working surface.

Drawer Table

The drawer table is a table with a set of drawers and a convenient size work surface for paperwork activities (Fig. 2-8). It mounts on either end of an array. It provides two utility drawers beneath a table having approximately 0.5 square meters (5.4 square feet) of flat, horizontal working surface.

Printer Stands

The printer stands (Fig. 2-8) have removable printer carts to allow paper to be loaded from the front. They are available with long or short work surfaces. They can be used as stand-alone units or as part of an array. Stand-alone units must either use stabilizers or be securely anchored to the floor.

Stabilizers

Stabilizers are extensions attached to either side of the footrest of the base pedestal. They provide stability and **must** be used with base pedestal bays, auxiliary panel bays and printer stands that are not securely anchored to the floor.

Auxiliary Panel

The auxiliary panel mounts to the beam, providing space for mounting of customer-supplied auxiliary equipment (telephones, pushbuttons, panel board instruments, two-way radios, etc.). The front panel is approximately 0.35-square meters (3.77-square feet) in area. The auxiliary panel accommodates devices up to 450-millimeters (17.7-inches) in depth.

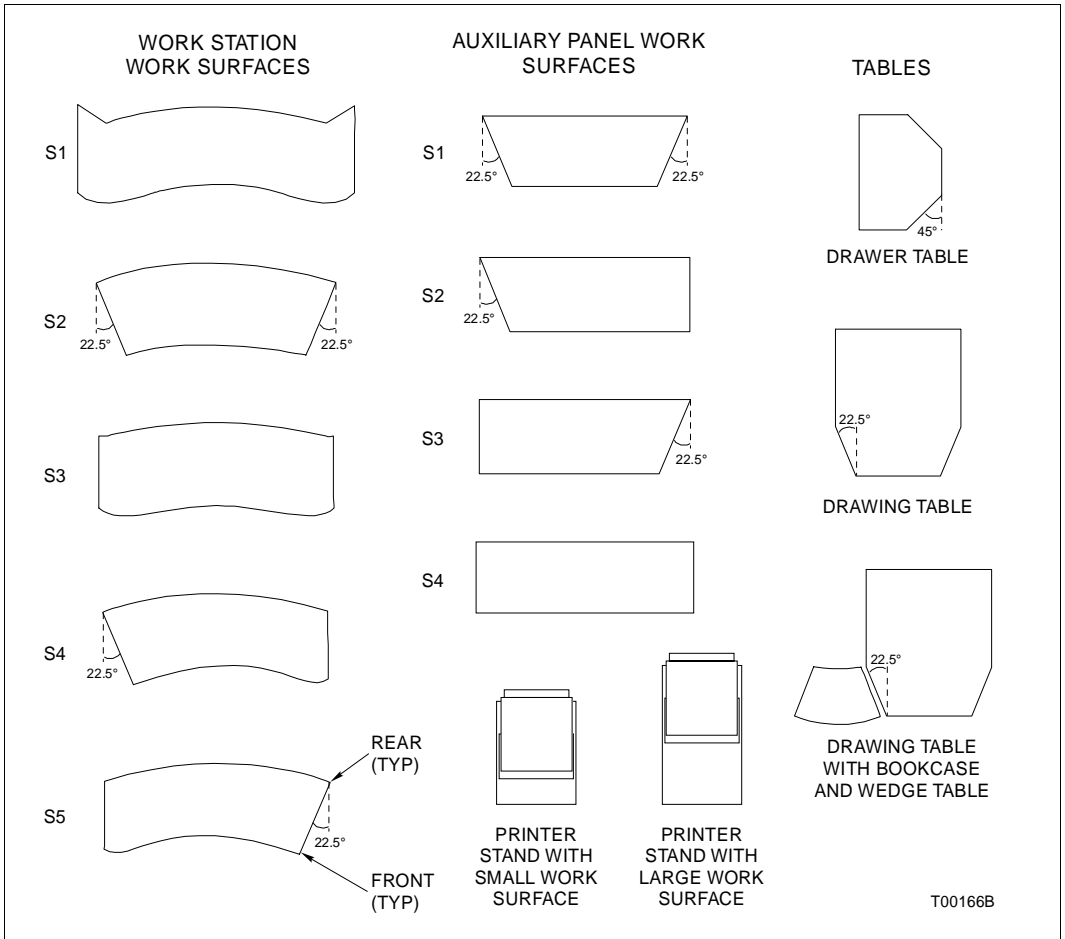


Figure 2-8. Work Surfaces, Tables and Bookcase





Introduction

This section covers the recommended physical and environmental conditions for the control room that houses the Conductor VMS (Signature Class) Series 43 workstation. These considerations are important, because they not only affect the operation of the workstation, but also the productivity and safety of personnel.

Elsag Bailey can specify the physical and environmental requirements of the workstation, but can only make general recommendations for a suitable environment for personnel. To provide a safe and comfortable working environment, consult a human factors engineer or other source on process control system ergonomics.

The workstation functions properly across a range of environmental conditions (Table 1-8) that fall beyond environmental extremes for people. Designing the site environment with respect to the comfort zone for human beings insures the environmental requirements of the workstation will be met.

Physical Requirements

The physical requirements include the load bearing of floors, work space and envelopes, and mechanical shock and vibration damping.

Load Bearing of Floors

The floor of the installation site must be capable of bearing the weight of the equipment. The surface area of the levelers that contact the floor is 3.060 square centimeters (0.474 square inches). To calculate the load bearing of the floor at each leveler, divide the total weight of the equipment (refer to Table 1-7) by the product of the surface area of the leveler and the number of levelers in contact with the floor.

Example: Calculate the load bearing of the floor at each leveler for a stand-alone workstation with S1 work surface.



- From Table 1-7, a stand-alone workstation with S1 work surface weighs 210 kilograms (461 pounds).
- There are four levelers in contact with the floor.
- The surface area of each leveler is 3.060 square centimeters (0.474 square inches).

Performing the calculation in metric units yields:

$$\text{load bearing at each leveler} = \frac{210 \text{ kg}}{4 \times 3.060 \text{ cm}^2} = 17.157 \frac{\text{kg}}{\text{cm}^2}$$

Performing the calculation in US units yields:

$$\text{load bearing at each leveler} = \frac{461 \text{ lbs}}{4 \times 0.474 \text{ in.}^2} = 243.143 \frac{\text{lbs}}{\text{in.}^2}$$

Space and Work Envelopes

Elsag Bailey recommends a work envelope of at least one meter (3.3 feet) around installed workstations so that maintenance personnel can conveniently work in a squatted position. Additional spacing may be required to allow for removal of components.

Control rooms should be large enough to hold system hardware and allow service and operating personnel to simultaneously move through and work in the area without being in the way of each other. Additional room may be needed for routing, shielding and spacing signal wiring or AC power distribution. Section 4 contains information on AC power wiring and system grounding. Refer to the information in that section if necessary when planning for the space requirements of a particular system. For detailed information on space requirements concerning energized components, refer to **Site Planning and Preparation**.

Table 1-7 lists the nominal dimensions of the various Conductor VMS (Signature Class) Series 43 workstation components. The dimensions in Table 1-7 do not include the work envelope surrounding the components.

A minimum 91.4-centimeter (36-inch) doorway is required for the workstation components to pass into the control room. Workstation component weights are listed in Table 1-7. Be sure to move these components with equipment rated for these weights. Keep in mind that the shipping crate and pallet add to those weights. The dimensions and weight of a typical export shipping crate and pallet are listed in Table 1-7.

WARNING

Stabilize the base pedestal before removing the shipping pallet bolts. If the base pedestal is not stabilized, it could tip over and cause injury to personnel and damage to equipment.

The shipping pallet allows for insertion of the forks of a lift truck. Once the component is in or near the control room, and after stabilizing the component, the shipping pallet bolts identified in Procedure PR4 can be removed.

CAUTION

Attach moving equipment to, or lift by the beam. Lifting by other means will cause equipment damage.

Once the stabilized component is freed from its shipping pallet, use suitable moving equipment to move it to, and position it in the control room.

Mechanical Shock and Vibration

Do not subject the workstation to mechanical shock during or after installation. The control room should be free from shock and vibration that could affect the performance of system operators.

When designing the control room, shield workstation operators from excessive low frequency vibration. High amplitude horizontal or vertical vibration near the resonant frequency of the human body (approximately five hertz) hampers vision, hand coordination and reaction time.

It is not practical to project mechanical shock and vibration tolerances for all possible conditions at various installation sites. If expecting excessive levels of vibration, do a site survey to decide if work areas or equipment need vibration damping.

The workstation has two methods of securing it at the installation site. If supplied with stabilizers, no further securing



methods are required. If there are no stabilizers, the workstation must be securely anchored to the floor. If the control room has a raised false floor, the anchoring mechanism must not be fastened to the false floor.

Figures B-1, B-3, B-6 and B-13 show the locations for the anchor bolts (or other suitable fasteners). Figure B-8 shows a typical anchoring scheme. This is an example only and may or may not reflect the actual installation.

Environmental Requirements

The environmental requirements of an installation site include air quality, replacement rate, velocity and pressure; temperature, humidity and lighting. This includes special environmental constraints when transporting and storing the workstation.

The ambient environment affects both the equipment and the performance and comfort of workstation operators. Personnel should not have to expend so much mental and physical energy coping with environmentally imposed stress that it diminishes their capacity to do their work. Controlling environmental distractions helps increase productivity and provides a safer and more comfortable place to work.

Refer to ***American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) Fundamentals*** for more information on the effects of environment on human beings.

Air Quality

The workstation enclosures are IP10 and NEMA 1 rated. Almost all industrial processes contain gaseous, solid (particulate) or liquid contaminants. Some contaminants can cause corrosive damage to the workstation. Increased temperature or humidity can accelerate the corrosive effects of contaminants. Solid airborne contaminants accelerate wear to moving parts. Solid contaminants can accumulate on surfaces and result in heat buildup, electrical part shorting or improper operation of mechanical and electromechanical components. Components susceptible to solid contaminants include switches, relays, printers and disk drives.

Select an installation site that is free of corrosive and conductive contaminants to maintain the reliability and life span of the workstation. When installing a workstation in an area that is not completely free of any gases, liquids and airborne solids (such as dust):

- The particulate in the area must be nonconductive and cannot exceed severity level one as defined in Instrument Society of America (ISA) Standard S71.04, ***Environmental Conditions for Process Measurement and Control Systems Contamination Influences***.
- Maintain a preventive maintenance program to curtail dust buildup.

The air replacement rate inside the control room should be at least 7,080 cubic centimeters per second (15 cubic feet per minute) per occupant. The air velocity should be less than or equal to 22.9 centimeters per second (45 feet per minute). The atmospheric pressure inside the control room should be maintained at 25 Pascals (0.1 inch of water) greater than that of the outside atmospheric pressure.

Temperature and Humidity

Temperature and humidity levels must be maintained to provide a comfortable ambient environment for personnel and to control electrostatic charge buildup. Maintain air conditioned control room environments at a temperature of 21 to 23 degrees Celsius (70 to 74 degrees Fahrenheit) with a minimum of 40 percent relative humidity. When sizing air conditioning equipment, consider the heat dissipation of the workstation during normal operation. Refer to Table 1-6 to determine the heat that will be generated within a particular workstation. Use this information to decide if the particular site needs additional temperature or humidity control. Figure 3-1 shows the comfort zone for human beings as defined by ASHRAE. Keep the environment within these limits. The graph shown is for persons dressed in typical winter and summer clothing who are performing light, mainly sedentary activity.

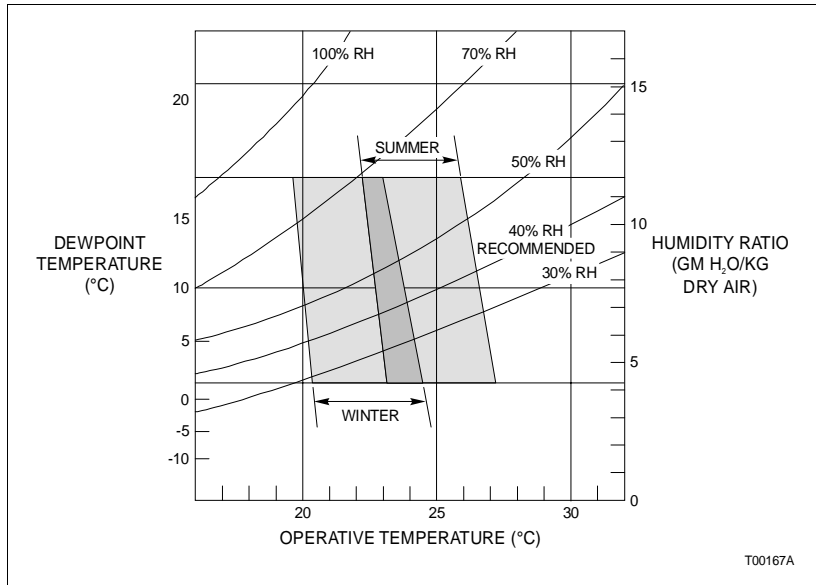


Figure 3-1. Environmental Comfort Zone

Lighting and Reflectivity

Based on various ergonomic studies, lighting and reflectivity affect operator comfort and fatigue levels. To maximize comfort and minimize fatigue:

- The recommended light intensity in the workstation work areas is 350 to 400 lux (33 to 37 foot-candles) on horizontal work surfaces, keyboards and displays.
- The recommended light intensity in data preparation areas is 970 to 1080 lux (90 to 100 foot-candles) on horizontal work surfaces.
- Control the lighting to reduce glare on monitor screens. Glare can cause reading errors and muscular fatigue.
- Install louvered lighting to further reduce glare.
- Lighting should be adjustable so that system operators can adjust the intensity level to meet their individual needs.
- Use adjustable task lighting if supplemental lighting for individual work spaces is required.

- Provide for ceiling reflectivities of greater than 80 percent, wall reflectivities of less than 60 percent and floor reflectivities of less than 20 percent.

Electrical Noise Immunity

Refer to ***Site Planning and Preparation*** for information on controlling electrical noise, the effects of lightning strikes and overvoltage transients.

Communications Equipment

Care should be taken when using transmitting type communication equipment near the workstation. Keep all covers on the workstation during normal operation. Only use transmitting type communication equipment at a distance of two meters (6.6 feet) or more from the workstation. It is best to use communication equipment that does not generate RFI such as a wire telephone or intercom system.

Electrostatic Discharge

In addition to the electromagnetic, power and radiated noise reducing techniques, there should be an effort to eliminate electrostatic discharge from the site. Electrostatic discharge causes static sensitive devices to fail prematurely.

To prevent electrostatic discharge:

- Use antistatic carpeting or other floor coverings in the control room.
- Provide antistatic mats and wear a wrist strap connected to earth ground when working with internal components.
- Always maintain a humidity level of 40 percent or higher.

Transportation and Storage Environment

The environmental requirements for the workstation during transportation and storage differ from the operational requirements.

The Conductor VMS (Signature Class) Series 43 workstation should remain in its original packaging for transportation and



storage. Nonoperating environmental conditions apply during storage of less than 60 days and transportation. Storage environmental conditions apply during storage of more than 60 days. The nonoperating and storage environments are listed in Table 1-8.

When operating equipment during the construction period, the operating environmental conditions apply. Protect the equipment from exposure to excessive dust during the construction period.

When storing equipment containing power supplies, the power supplies should be powered at least once a year for an hour or more.

Fire Protection

Each installation site should have adequate fire protection. Fire protection must meet local fire and safety codes.

Usually, the Elsas Bailey system being installed at a site has been custom designed for the process control needs of that site. Therefore, additional fire protection may be desirable to protect the investment. Additionally, the loss of process data or other information (stored on electronic media) due to fire can interrupt business and possibly cause a large economic loss.

If more information is needed about fire protection, refer to the American National Standards Institute/National Fire Protection Association Standard ANSI/NFPA no. 75, ***Protection of Electronic Computer/Data Processing Equipment*** or other applicable international fire codes. The NFPA standard contains complete information on the design of fire protection systems for electronic equipment.

Do not use dry chemical extinguishers. Dry chemical extinguishers will destroy printed circuit board traces.



Introduction

This section contains information needed when installing the Conductor VMS (Signature Class) Series 43 workstation. It includes information on special handling, unpacking and inspection, safety considerations, physical configuration rules for the workstation and wiring considerations.

Following these topics are installation sequence flowcharts that guide personnel, seeking to perform a specific installation task, to the proper procedure needed to perform that task.

Special Handling

The Conductor VMS (Signature Class) Series 43 workstation contains sensitive electronic circuitry. This circuitry contains semiconductor devices that are subject to damage by static electricity.

A static field kit (refer to Table 1-10) is available for personnel working on components containing semiconductor devices. It contains two wrist straps, a ground cord assembly, an alligator clip and a static dissipating work surface. The intention is to connect the technician and the static dissipating work surface to the same ground point to prevent electrostatic discharge damage to the static sensitive devices.

When handling static sensitive devices:

1. Most assemblies with semiconductor devices come in a special antistatic bag. Keep the assembly in the bag as much as possible whenever the assembly is not installed.
2. Remove assemblies containing semiconductor devices from their antistatic container only under certain conditions:
 - a. When at a static-free workstation or when the bag is grounded at a field test sight.
 - b. Only after neutralizing the conductive area of the container.



- c. Only after firm contact with an antistatic mat and/or firmly gripped by grounded personnel.
3. Personnel handling assemblies with semiconductor devices should be neutralized to a static-free workstation by a grounding wrist strap connected to the station or to a good ground point at the field sight.
4. Do not allow clothing to contact semiconductor devices. Most clothing generates static electricity.
5. Avoid touching connectors or components.
6. Avoid partial connection of semiconductor devices. Most devices can be damaged by floating leads, especially the power supply connector. If an assembly must be placed in a live system, it should be done quickly. Do not cut leads or lift circuit paths when troubleshooting.
7. Be sure to ground any test equipment.
8. Avoid static charges during removal and replacement. Make sure the assembly is fully clean around its leads, but do not rub or clean with an insulating cloth.
9. Remove dust from components using an antistatic field service vacuum.

Do not use a lead (graphite) pencil to set dipswitches. This can contaminate switch contacts and cause the component to malfunction.

Unpacking and Inspection

When the Conductor VMS (Signature Class) Series 43 workstation is received it should be unpacked and inspected.

1. Check for any obvious damage to the crate or its contents. If damage is evident, notify the carrier and an Elsag Bailey sales representative.
2. Remove any loose packing from the crate.
3. Inspect the nameplate and verify the unit received matches the desired function.

4. If storing the workstation prior to installation, leave it in the original crate, if possible. Store in an area free from corrosive vapors and extremes in temperature and humidity.
5. Do not store the workstation in an area that would take it out of the specifications listed in Table 1-8.

Safety Considerations

It is critical to read, understand and heed all instructions, warnings and cautions located throughout this instruction and on the equipment itself. Only qualified personnel must be allowed to install, operate, maintain and repair this equipment.

The Conductor VMS (Signature Class) Series 43 workstation was designed to allow installation without anchoring; however, there is a possibility of tipping if stabilizers are not installed. Be sure to stabilize the workstation components when removing any fasteners that secure them to their shipping pallets. Never sit or stand on work surfaces, beams, tables or any other part of the workstation.

Do not remove or install printed circuit boards, or modules or components containing them with power applied. This could damage the circuit board. Remove power to all AC wiring when removing or connecting AC wires to prevent injury to personnel and equipment damage. To prevent equipment damage, remove DC power to all DC wiring when removing or connecting DC wires, circuit boards, or modules or components connected to them.

Physical Configuration Rules

The following are some guidelines for building workstation arrays:

- Stabilizers cannot be used between bays that are separated with 45-degree elbows.
- Auxiliary panel bays and monitor enclosures can be mounted on either base pedestal bays or flying beams. They must face the same side.



- Auxiliary panels on flying beams must have an auxiliary panel in an adjacent bay to accommodate customer wiring and anchoring devices.
- Monitors can be shifted 150 millimeters (5.9 inches) to the left or right of center of the beam or flying beam. Pods cannot be between monitors that are shifted toward each other.
- Flying beams can span only one bay. Base pedestals must be in adjacent bays.
- Auxiliary monitors (C-I-SV43S-C) must be adjacent to main terminals.
- The AC power bus in the beam can handle up to 40 amps at 120 VAC. This is sufficient to supply four pairs of main and auxiliary terminals.
- Drawer or drawing tables can only be the end bays of arrays.
- Adjacent beams are connected using either a zero-degree or a 45-degree elbow.

Wiring Considerations

This section discusses AC power wiring, communications wiring and grounding for the workstation. For the procedures to accomplish these tasks, refer to the installation sequence flowcharts at the end of this section for the path to the proper procedure.

For detailed information on AC power distribution and system grounding, refer to:

- ***Site Planning and Preparation.***
- ***Recommended Practice for Powering and Grounding Sensitive Electronic Equipment (IEEE Emerald Book),*** ANSI/IEEE 1100.
- ***Recommended Practice for Grounding of Industrial and Commercial Power Systems (IEEE Green Book),*** ANSI/IEEE 142.

Do not attempt to install any system or related equipment before consulting and understanding these documents as well as any other applicable international standards.

The workstation uses color coded wire. Table 4-1 lists the wire colors and their respective signals.

Table 4-1. Wiring Color Code

Color	Signal
Brown	AC hot
Blue	AC neutral
Green/yellow	AC common
Brown	+5 VDC
White/green	DC common
Violet	-12 VDC
White/violet	+12 VDC
Green	- remote voltage sense
White	+ remote voltage sense

AC Power Wiring

The beam power wiring has a cross section of 8.4 square millimeters (eight AWG) and is rated at 40 amps. To determine how many components to connect to the same service, add the operating currents for each component. Table 1-6 lists these operating currents. Procedure PR25 provides an example.

NOTES:

1. Include 1.20 amps for each optional lifting mechanism, even though it only applies when the drive motor is activated.
2. Table 1-6 lists the typical operating currents. To approximate the maximum values, multiply the typical values by 1.33.

Access

Figures B-1, B-3 and B-6 show physical footprints of the wiring access cutouts in the bottoms of the base pedestal and auxiliary panel. When wiring printer stands in arrays, the printer and power cables are routed through the beams and elbows. When wiring stand-alone printer stands, the printer and power cables are routed from underneath to either side casting at the customer mounting holes (Fig. B-13).



Connections

The base pedestal of all main terminals contains a power entry panel (PEP) that routes AC power to the various components. It contains a terminal block that accepts bare copper wire for 120/240 VAC power, an AC line filter and surge suppressor, and a 12-amp circuit breaker for over current protection. There are also ten IEC 320 outlets for power distribution.

The ten outlets can be used for:

- Main lifting mechanism motor.
- Upper power supply (main monitor).
- Main monitor.
- Computer.
- Second lifting mechanism.
- Lower power supply.
- Second monitor.
- DAT drive.
- Customer-installed auxiliary panel instruments.

The beams also contain a power wiring bus and terminal blocks for beam-to-beam wiring. Refer to the procedures for specific instructions.

Communications Wiring

The Conductor VMS (Signature Class) Series 43 workstation supports INFI-NET and Ethernet communications. The communications wiring is standard in all beams.

Access

Figures **B-1**, **B-3** and **B-6** show physical footprints of the wiring access cutouts in the bottoms of the base pedestal and auxiliary panel.

Connections

The base pedestal of all main terminals contains a loop TU. It is the fundamental link to the INFI-NET system. Ethernet connections are made directly at the CPU. Refer to the procedures for specific instructions.

Grounding

The power entry panel provides grounding of the AC input to the workstation chassis. Use one of the studs on the inside of the base pedestal to connect the building ground.

This instruction does not discuss the details of grounding systems. Good grounding practices prevent problems and reduce system downtime. A complete and properly grounded electrical system is vital for personnel safety, equipment protections and normal process system operation. Digital process control systems require a single-point grounding system that has two paths: One path for an alternating current ground (safety ground) and one path for a direct current ground (system common).

For detailed information on system grounding, refer to **Site Planning and Preparation**.

Software Installation and Start-up

After installing the main workstation and all auxiliary workstations, install the software and configure the system. Refer to the appropriate instructions listed in Table 1-2 to load the software, configure and operate the system.

Installation Sequence

Refer to Figure 4-1 or 4-2 for the installation sequence for the main components stand-alone workstations or arrays. Figure 4-3 completes the installation sequence. Each block of the flow represents a single task that must be completed before continuing with the sequence.

In some cases, more than one path can be taken during installation. For paths that are in parallel, either complete all of the tasks in all of the paths before continuing or complete all of the tasks in only those paths that apply before continuing. At least one path must be completed.

Some blocks contain alphanumeric codes. These codes identify the procedure that describes the steps to complete an indicated task. Complete all of the steps given in a procedure before continuing to the next procedure.



The procedures have check boxes in the margin by each procedural step. When performing a procedure, check each box as each step is completed.

By treating each task as a separate entity, the procedures provide an easy method for finding the information needed to perform each task in the installation sequence.

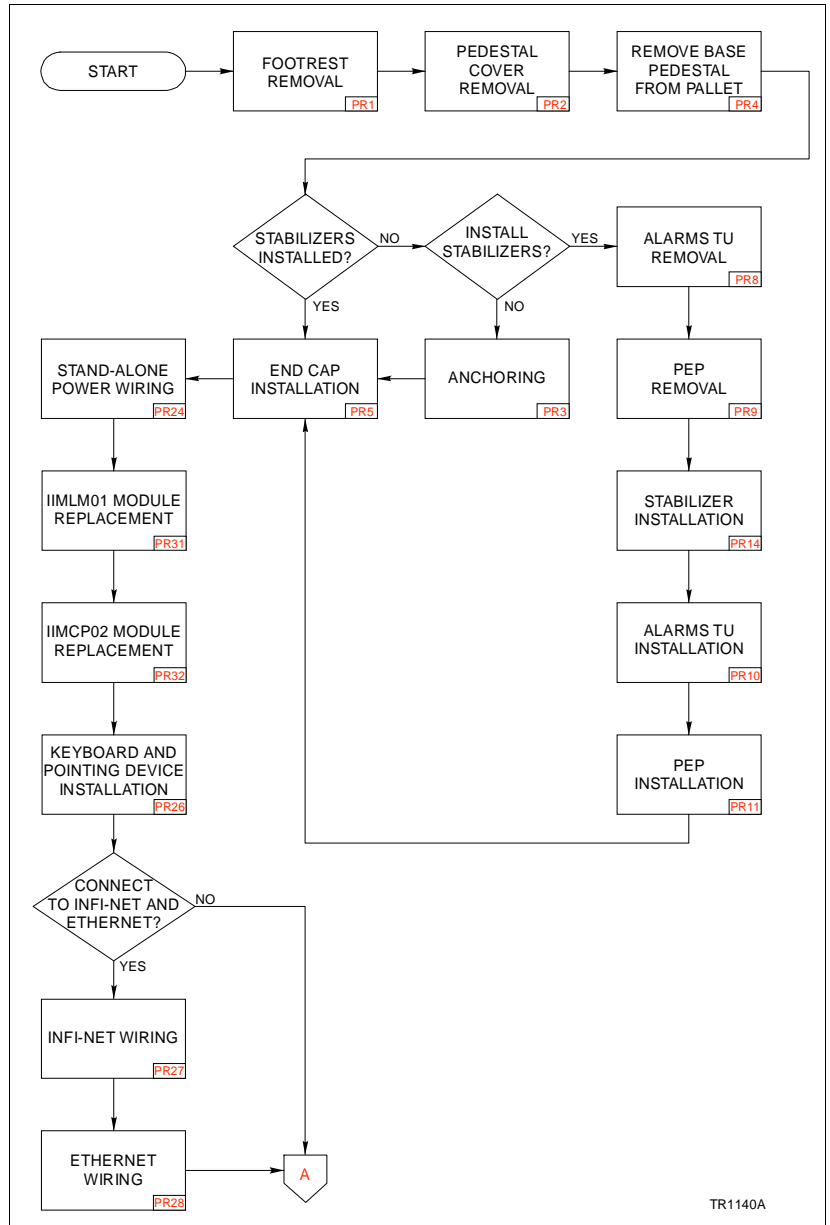
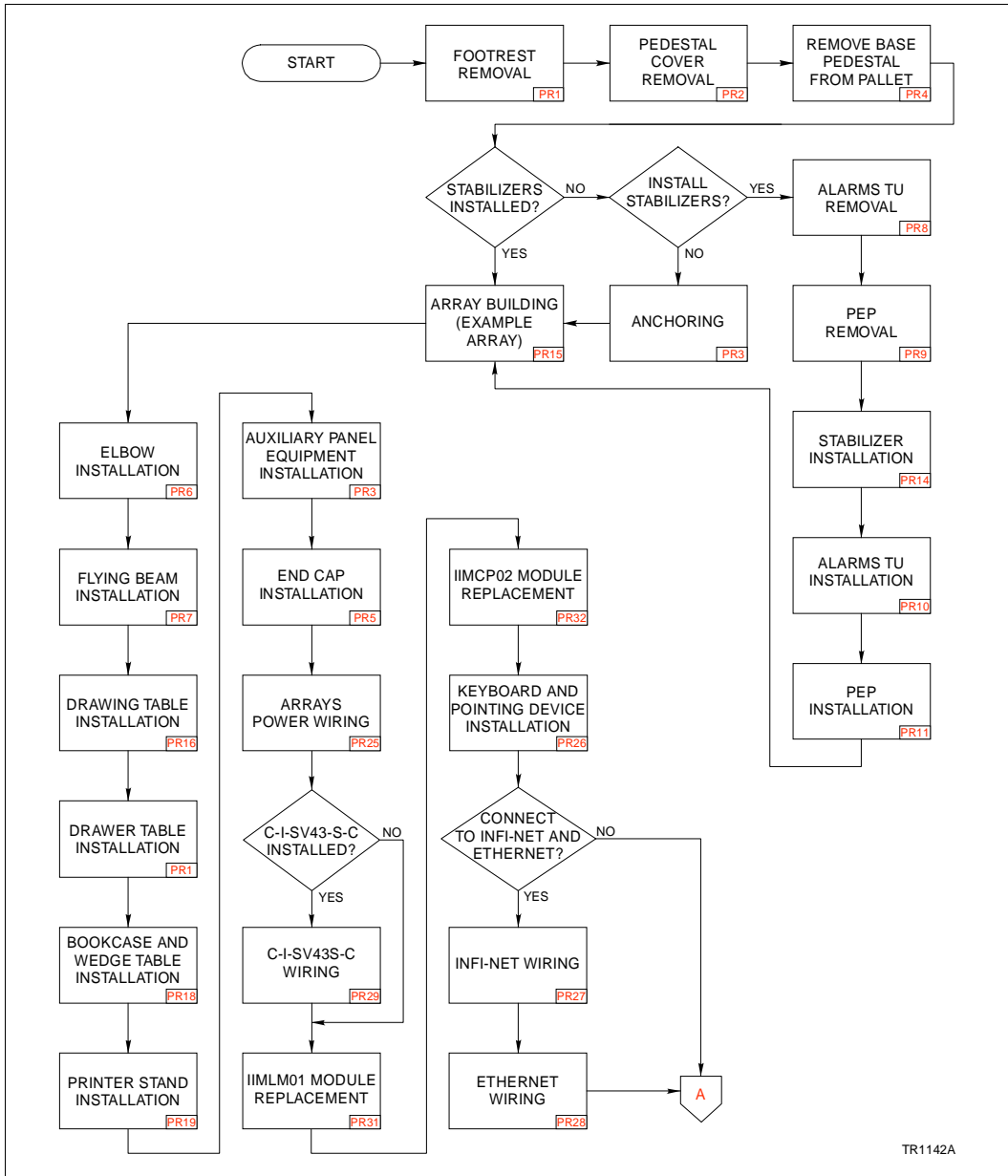
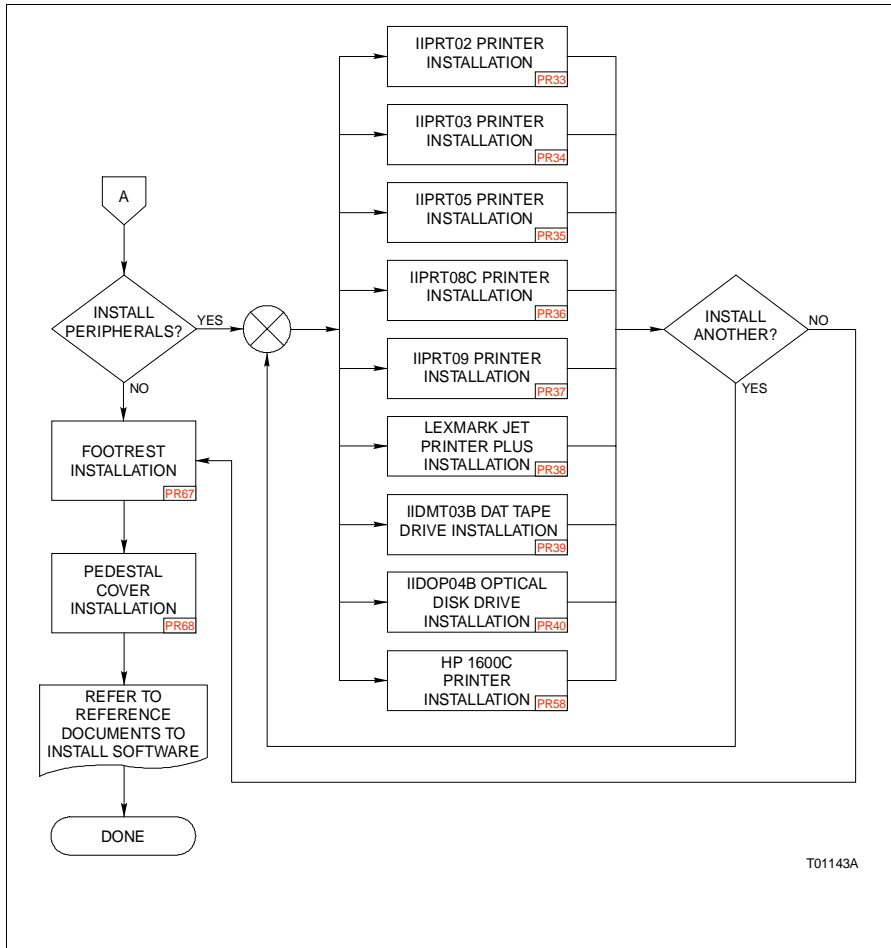


Figure 4-1. Stand-Alone Installation Sequence Flowchart - Main Components



TR1142A

Figure 4-2. Array Installation Sequence Flowchart - Main Components



T01143A

Figure 4-3. Installation Sequence Flowchart - Peripherals





Introduction

This section provides some basic troubleshooting guidelines for the Conductor VMS (Signature Class) Series 43 workstation. It is not meant to be all inclusive. Be sure to have all the manufacturer's documentation on non-Elsag Bailey Process Automation components accessible. Also refer to Table 1-2 for any applicable Elsag Bailey documents. Many of those documents also provide troubleshooting information. If problems exist that are not included in any of the documentation, contact the local Elsag Bailey service office for assistance.

This section contains a general troubleshooting table and a troubleshooting sequence flowchart that directs troubleshooting personnel to the appropriate procedures.

NOTE: Put circuit boards containing MOS devices into antistatic bags when stored or shipped back to the factory. Do not repair circuit boards in the field. All repairs and adjustments should be performed by qualified personnel.

Troubleshooting

Table 5-1 is a general troubleshooting guide. If the general troubleshooting guide does not eliminate the problem, refer to Figure 5-1 and follow the troubleshooting sequence.

Table 5-1. Troubleshooting Guide

Symptom	Possible Problem or Solution
No power indicator on circuit	No AC power at workstation. Check AC wiring on input. Check AC on PEP. Check breaker light on PEP.
Breaker off but indicator on	Check breaker contacts. Check breaker wiring. Check AC input wiring.
Improper/ incomplete start-up	Refer to diagnostic message at start-up for possible problems. Refer to the CPU instruction shipped with the workstation.
Start-up OK but no loop TU response	Check NIU settings (checksum on port A at 19.2 kilobyte). Check NIU cables. Try using NIU diagnostic port to test IIMLM01 and IIMCP02 modules.



Table 5-1. Troubleshooting Guide *(continued)*

Symptom	Possible Problem or Solution
Start-up OK but no keyboard response	Check keyboard assignment. Check all cables. Check caps lock position. Check keyboard assembly seating. Check configuration (keyboards). Check upper power supply.
Start-up OK but no monitor picture	Check monitor AC power. Check VGA cable. Check monitor switches (SYNC switch set to VGA). Check 75-ohm termination. Check brightness and contrast controls.
No printer response	Check AC power. Check cables. Check printer setup. Check configuration (printers).

Troubleshooting Sequence

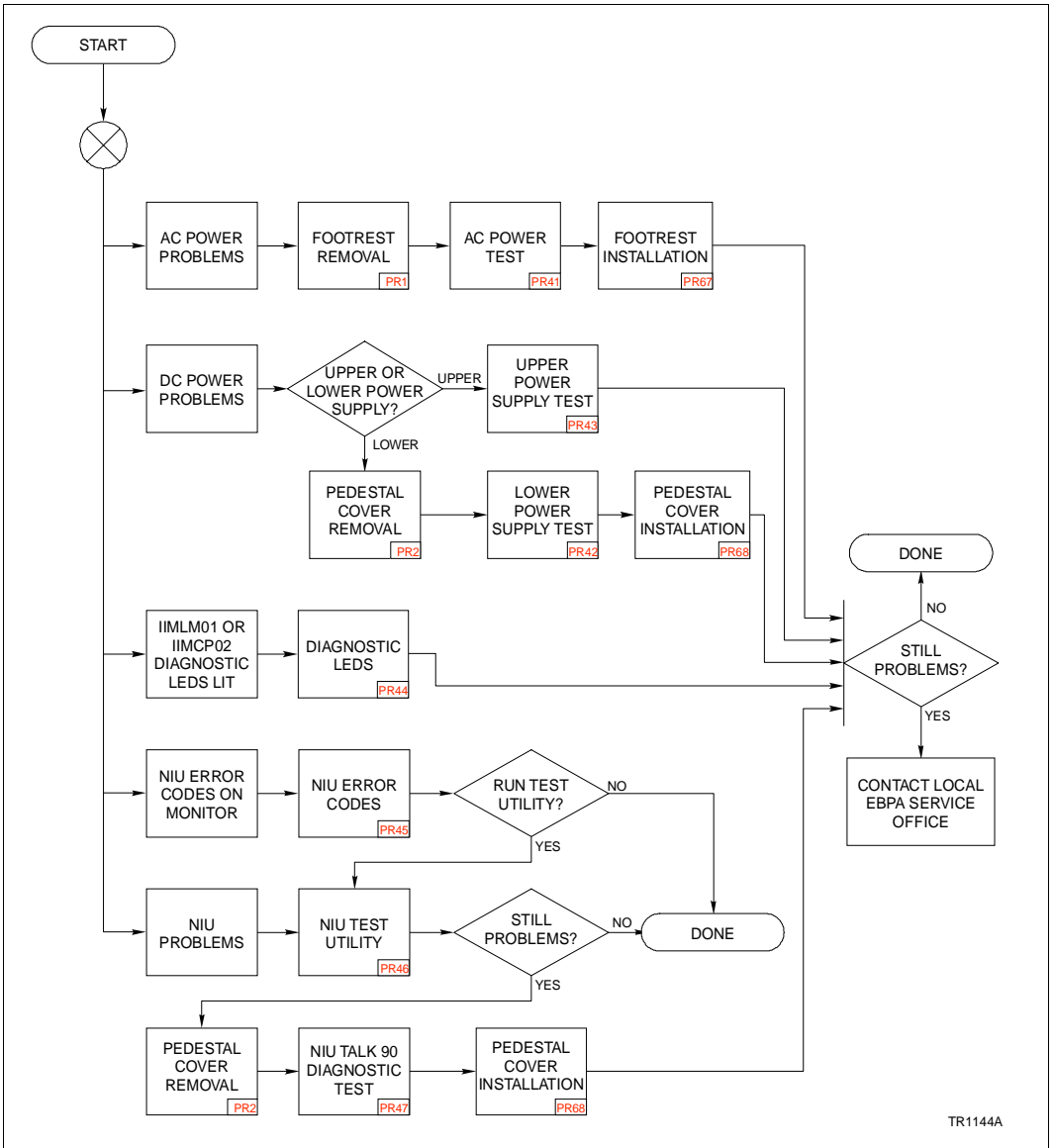
Refer to Figure 5-1 for the troubleshooting sequence for the Conductor VMS (Signature Class) Series 43 workstation. Each block of the flow represents a single task that must be completed before continuing with the sequence.

In some cases, more than one path can be taken. For paths that are in parallel, either complete all of the tasks in all of the paths before continuing or complete all of the tasks in only those paths that apply before continuing. At least one path must be completed.

Some blocks contain alphanumeric codes. These codes identify the procedure that describes the steps to complete an indicated task. Complete all of the steps given in a procedure before continuing to the next procedure.

The procedures have check boxes in the margin by each procedural step. When performing a procedure, check each box as each step is completed.

By treating each task as a separate entity, the procedures provide an easy method for finding the information needed to perform each task in the troubleshooting sequence



TR1144A

Figure 5-1. Troubleshooting Sequence Flowchart





Introduction

This section contains a preventive maintenance schedule for the Conductor VMS (Signature Class) Series 43 workstation (Table 6-1). This table has a procedure reference next to the task when applicable. The reference indicates the procedure number where the procedure for that task can be found.

Be sure to follow all warnings, cautions and notes. Put boards containing semiconductors into antistatic bags when stored or shipped back to the factory. Do not repair printed circuit boards in the field. All repairs and adjustments should be performed by qualified personnel.

The maintenance of any stand-alone product or control system affects the reliability of that product. Elsag Bailey recommends that all equipment users practice a preventive maintenance program that will keep the equipment operating at an optimum level.

The procedures referred to in this section contain instructions that the customer should be able to perform on site. These preventive maintenance procedures should be used as a guideline to assist in establishing good preventive maintenance practices. Select the minimum steps required to meet the needs of your system.

Personnel performing preventive maintenance should meet the following qualifications:

- Maintenance personnel should be qualified electrical technicians or engineers that know the proper use of test equipment.
- Maintenance personnel should be familiar with the workstation, have experience working with process control systems, and know what precautions to take when working with live AC power.



Preventive Maintenance Schedule

Table 6-1 is the preventive maintenance schedule for the Conductor VMS (Signature Class) Series 43 workstation. The table lists the preventive maintenance tasks in groups according to their specified maintenance interval. Some tasks in Table 6-1 are self explanatory. Instructions for tasks that require further explanation are found in the procedures or in the manufacturer's documentation supplied with the workstation.

Table 6-1. Preventive Maintenance Schedule

Task	Procedure	Frequency
General cleaning, including, but not limited to: Monitor Printed circuit boards Keyboards	PR49 PR50 PR51	As required
Check printer, clean and lubricate. ¹	N/A	1 month
With power on, be sure fans are turning. With power off, wipe dust off all fan blades.	N/A	
Check cabinet and modules for dust. Clean as necessary using an anti-static vacuum.	N/A	3 months
Clean DAT tape drive heads after 50 hours of operation. ¹	N/A	
Check floppy disk drive. Clean and inspect.	N/A	
Adjust printer. ¹	N/A	
Clean CD ROM. ¹	N/A	
Check power supply outputs. Adjust power supplies if needed.	PR42, PR43	
Check alarm and display LEDs.	N/A	6 months
Check all signal, power and ground connections within the cabinet and verify that they are secure.	PR48	
Check the quality of the plant power and grounding system. Follow the power and grounding system verification procedures in Site Planning and Preparation .	N/A	12 months
Inspect and check the PEP. In high vibration environments testing may be necessary at shorter intervals.	PR52	2 years
Replace power supplies. Call Elsag Bailey sales and service for information.	PR57, PR60	5 years

Table 6-1. Preventive Maintenance Schedule *(continued)*

Task	Procedure	Frequency
Complete all appropriate tasks in this table.	N/A	Shutdown

NOTE:

- 1. Refer to manufacturer's manuals for detailed procedures.





Introduction

This section provides repair and replacement procedures for the Conductor VMS (Signature Class) Series 43 workstation.

NOTE: Follow the procedures for working with static sensitive devices when performing the repair and replacement procedures.

Repair and Replacement Sequence

Refer to Figure 7-1 for the repair and replacement sequence for the Conductor VMS (Signature Class) Series 43 workstation. Figure 7-1 points to either Figure 7-2, 7-3, 7-4, 7-5 or 7-6 depending on the area of the workstation the component to be repaired or replaced resides.

Each block of the flow represents a single task that must be completed before continuing with the sequence. In some cases, more than one path can be taken during repair and replacement procedures. For paths that are in parallel, either complete all of the tasks in all of the paths before continuing or complete all of the tasks in only those paths that apply before continuing. At least one path must be completed.

Some blocks contain alphanumeric codes. These codes identify the procedure that describes the steps to complete an indicated task. Complete all of the steps given in a procedure before continuing to the next procedure. By treating each task as a separate entity, the procedures provide an easy method for finding the information needed for each task in the repair and replacement sequence.

The procedures have check boxes in the margin by each procedural step. When performing a procedure, check each box as each step is completed.

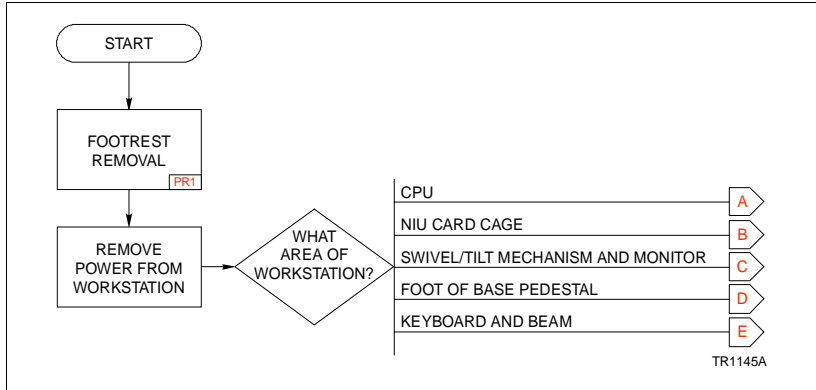


Figure 7-1. Repair and Replacement Sequence Flowchart

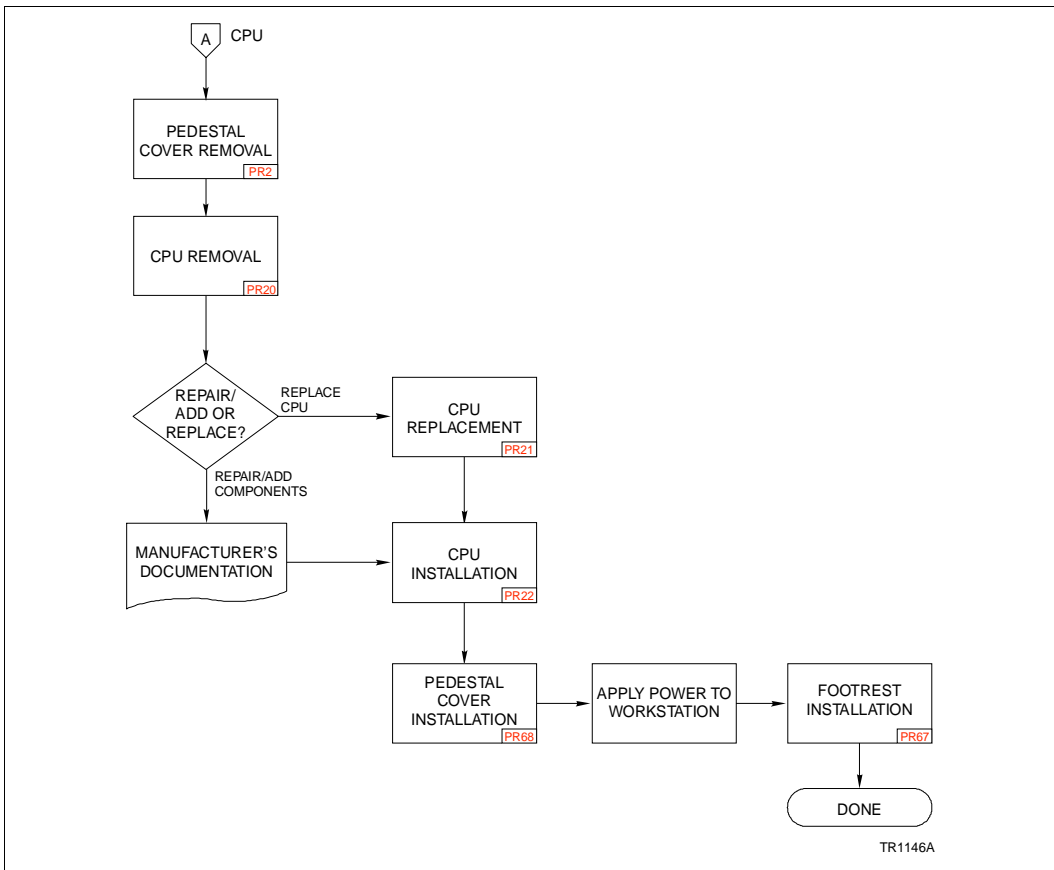


Figure 7-2. CPU

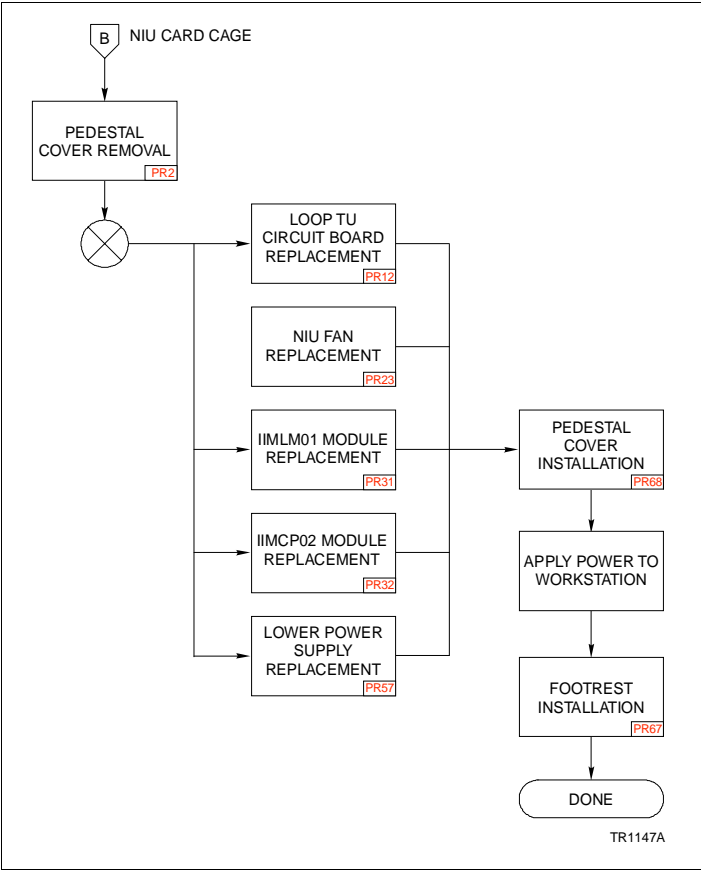


Figure 7-3. NIU Card Cage

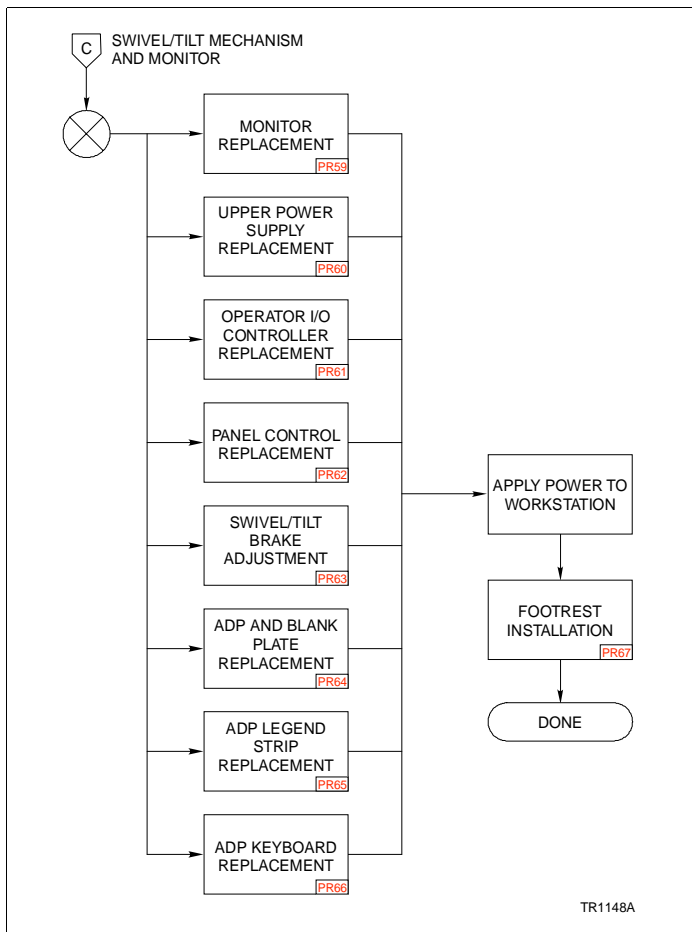


Figure 7-4. Swivel/Tilt Mechanism and Monitor

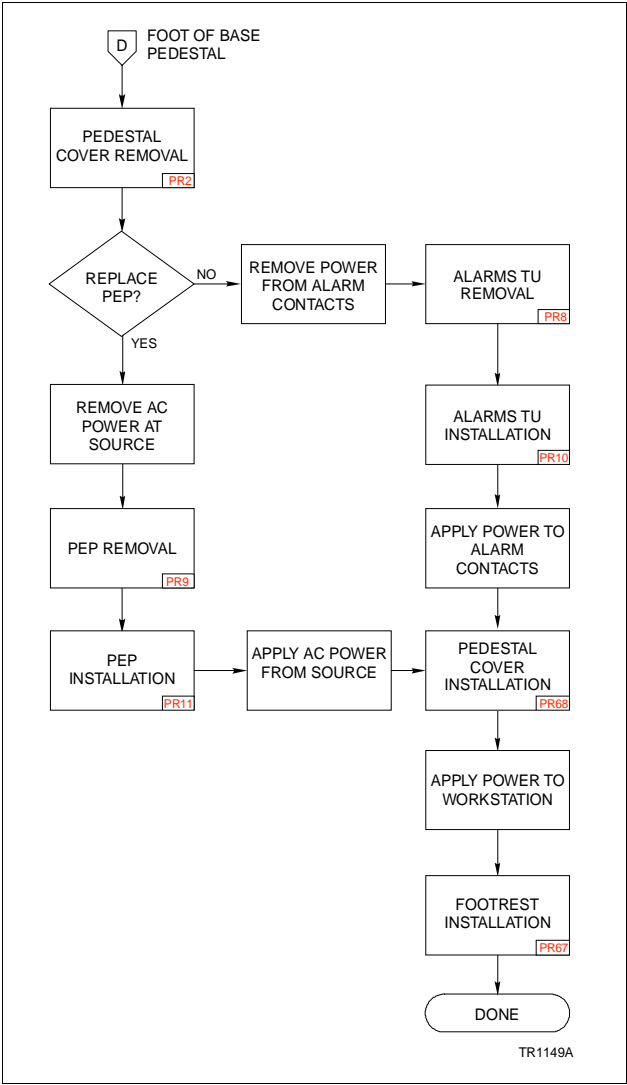


Figure 7-5. Foot of Base Pedestal

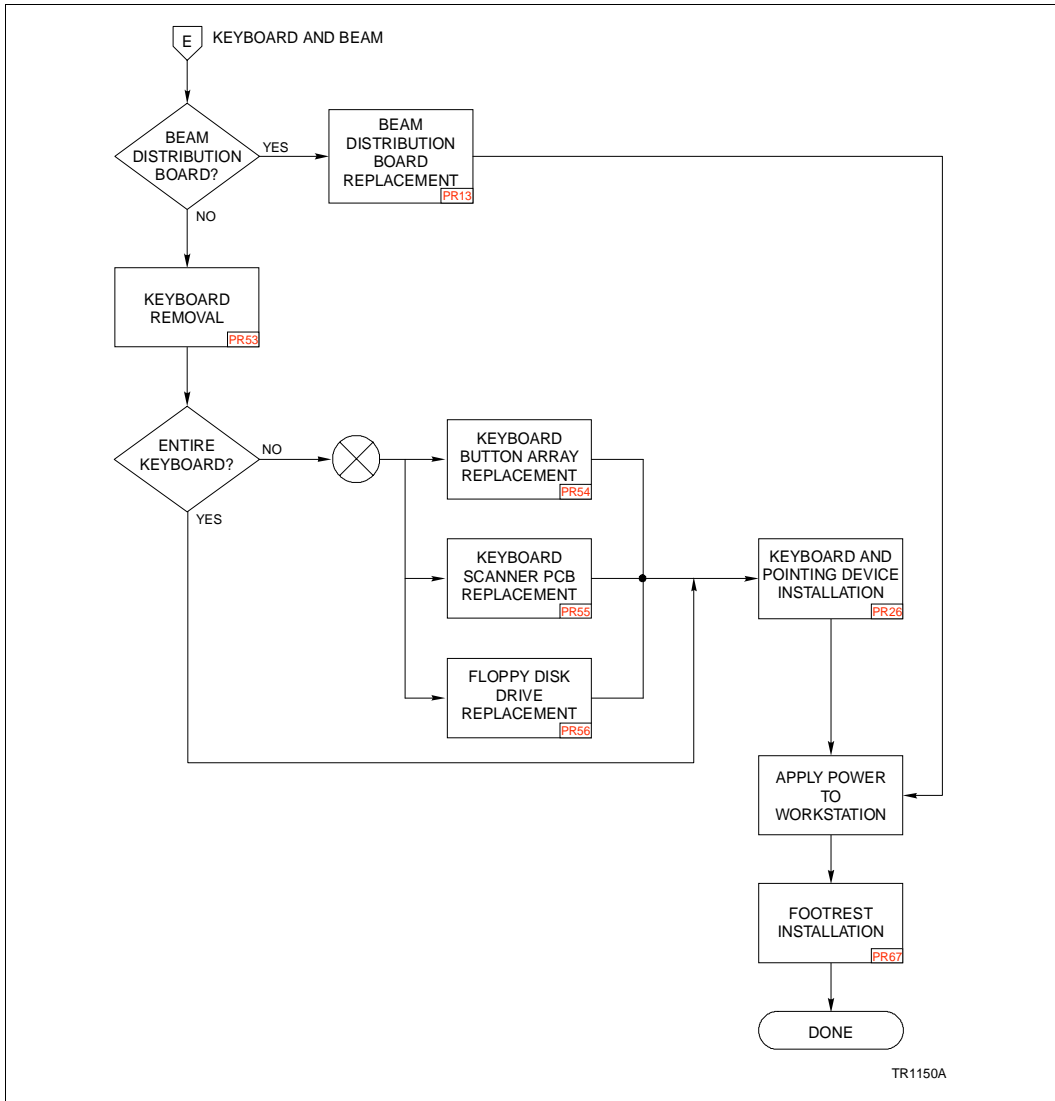


Figure 7-6. Keyboard and Beam



Spare Parts

Table 8-1 lists the recommended spare parts for the Conductor VMS (Signature Class) Series 43 workstation.

Table 8-1. Spare Parts (Recommended)

Part No.	Description	Applicable Types					
		C-I-SV43S-					
		A	C	M	S	T	X
6642865?1H ¹	Alpha Station 255/233 (for main terminal)			•			
6642865?2H ¹	Alpha Station 255/233 (for main terminal with dual graphics output)						•
6642865?3H ^{1,2}	Alpha Station 255/233 (for auxiliary terminal with dual graphics output)					•	
1959514?1	Base CPU, Alpha Station 255/233, PB47A-BA			•		•	•
1959514?2	1.08-Gbyte hard drive, PBXRZ-ED			•		•	•
1959514?3	5.25-inch, 600-Mbyte CD ROM drive, PBXRD-CB			•		•	•
1959514?4	Graphics board, DEC part no. PBXGB-AA			•		•	•
1959514?5	32-Mbyte RAM SIMM (4 x 8-Mbyte), MSP01-BA			•		•	•
1959514?6	64-Mbyte RAM SIMM (4 x 16-Mbyte), MSP01-BB			•			•
1949514?7	Thinwire converter, PBXDC-DA			•		•	•
1949207?5	SCSI cable, BC09D-03			•		•	•
1949207B7H	1.44-Mbyte floppy disk drive			•		•	•
IIAKB03A	VMS style (QWERTY) keyboard, LK46W-AA			•		•	•
IIATB04	Trackball, PS-2 compatible			•		•	•
1949416?1	Tektronix XP400 (for auxiliary terminal)	•					
1949429?1	3-button mouse	•					
IIATB04	Trackball, PS-2 compatible	•					
1949207B7H	DEC 1.44-Mbyte floppy disk drive			•			•
1949311?1	21-inch monitor	•	•	•	•	•	•
1949311?2	21-inch monitor with touchscreen	•	•	•	•	•	•
IIDMT03B	DAT tape drive, TLZ09-DA/DB	•		•		•	•


Table 8-1. Spare Parts (Recommended) *(continued)*

Part No.	Description	Applicable Types					
		C-I-SV43S-					
		A	C	M	S	T	X
1949139?1	Head cleaning cassette for IIDMT03A DAT tape drive (TLZ04-HA)	•		•		•	•
1949012?1	Blank cartridge for IIDMT03B DAT tape drive (TLZ07-CA, 120 mm)	•		•		•	•
1947950?5	Power cord for IIDMT03B DAT tape drive	•		•		•	•
1949134?50	External SCSI cable for IIDMT03B DAT tape drive, 1.8 m (6.0 ft)	•		•		•	•
6641480?2	Operator I/O controller	•		•		•	•
1949325?2	Upper power supply	•		•		•	•
1949325?1	Lower power supply	•		•		•	•
6641620?1	Panel control	•	•	•	•	•	•
6641273?1	ADP assembly	•	•	•		•	•
6641500?1	Power entry panel (PEP)	•		•	•	•	•
6641392?1	Loop TU circuit board assembly			•			•
6641394?1	Alarms TU circuit board assembly	•		•		•	•
1949364?1	Lifting mechanism switch	•	•	•	•	•	•
1949360?1	Limit switch, lifting mechanism	•	•	•	•	•	•
1949478?1	Xformer, 120/240 VAC, 56V, DC lifting mechanism	•	•	•	•	•	•
6641684?1?	Keyboard with floppy disk drive			•			•
6641684?2?	Keyboard without floppy disk drive					•	
6641484?1	Keyboard circuit board assembly			•		•	•
1949322??	Keyboard button array			•		•	•
IIMLM01	Multibus loop module			•		•	•
IIMCP02	Multibus communications processor			•		•	•
6641770?1	Pod mechanism, left	•		•		•	•
6641770?2	Pod mechanism, right	•		•		•	•
6641573?1	Pod knob	•		•		•	•
6641790?1	Fan assembly	•		•		•	•
6641630?1	ADP blank plate	•	•	•		•	•
1949298?1	Short ADP cable	•	•	•		•	•
1949298?2	Long ADP cable	•	•	•		•	•
1949505?1	ADP keyboard	•	•	•		•	•

Table 8-1. Spare Parts (Recommended) *(continued)*

Part No.	Description	Applicable Types					
		C-I-SV43S-					
		A	C	M	S	T	X
6641482?1	Beam distribution board	•	•	•		•	•
6641832?1	Coax bundle, 6-wire	•	•	•	•	•	•
6641830?1	Beam top cover, 350 mm	•	•	•	•	•	•
6641830?2	Beam top cover, 200 mm	•	•	•	•	•	•
6641830?3	Beam top cover, 250 mm	•	•	•	•	•	•
6641885?1	Foot cover mat	•	•	•	•	•	•
197896?1	CPU mounting kit	•		•		•	•
194776?23001	3-A slow blow fuse, DC lifting mechanism	•	•	•	•	•	•
1949409?2	DC motor, lifting mechanism	•	•	•	•	•	•
198576?1	M8 Allen wrench	•	•	•	•	•	•
1948385?1	Antistatic field kit	•	•	•	•	•	•
6642294?1	Auxiliary panel front panel (steel), ISAUX						

NOTES:

1. To order an Alpha Station 255/233 mounted to its mounting plate, drop the H from the end of the part number.
2. This model must be ordered with a minimum of 32-Mbytes of RAM.





Purpose/Scope

1 min.

This procedure shows how to remove the footrest from the base pedestal.

Parts None.

Tools • M8 Allen wrench.

Procedure

1. Use the M8 Allen wrench to remove the two screws that secure the footrest to the lower front of the base pedestal (Fig. PR1-1).

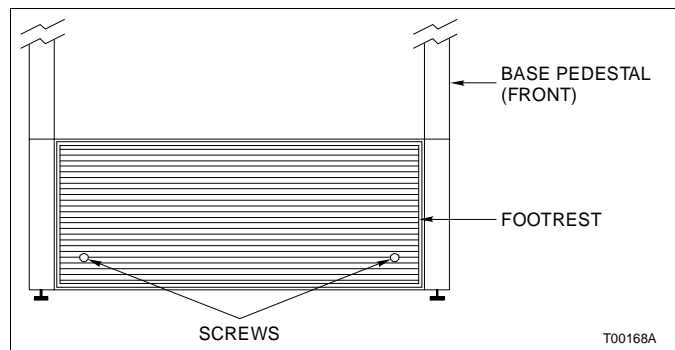


Figure PR1-1. Footrest Removal

2. Lift up and pull outward on the footrest to remove it.





Purpose/Scope

2 min.

This procedure shows how to remove the pedestal cover from the rear of the base pedestal.

Parts None.

Tools • M8 Allen wrench.

Procedure

1. Use the M8 Allen wrench to loosen the two captive screws on the sides of the pedestal cover (Fig. PR2-1).

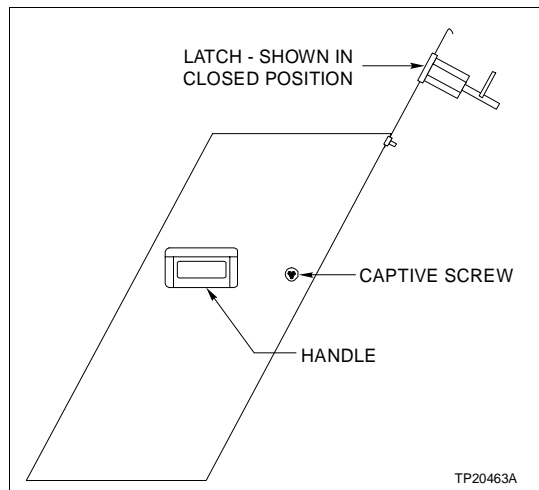


Figure PR2-1. Pedestal Cover Removal

2. Use the M8 Allen wrench to turn the two latches on the back of the pedestal cover $\frac{1}{2}$ -turn to the open position.
3. Grasp the pedestal cover by the handles on each side and remove it.





Purpose/Scope

1 hr

Due to the numerous installation methods possible, this procedure is intended only as a reference. It is beyond the scope of this instruction to include all of the possible anchoring mechanisms. The example shown in Figure PR3-3 is for illustration purposes only and may or may not reflect the actual installation.

Parts Dependent on the installation.

Tools Dependent on the installation.

Procedure

There are two ways to secure the workstation at the installation site. If supplied with stabilizers, no further securing methods are required. If there are not stabilizers, the workstation must be securely anchored to the floor.

If the control room has a raised false floor, the anchoring mechanism must not be fastened to the false floor.

Figure PR3-1 shows the location of the customer mounting holes for the base pedestal. The cable entry cutouts are included in this figure as a reference. Figure PR3-2 shows the location of the customer mounting holes for the printer stand. Figure PR3-3 shows a typical anchoring scheme. This is an example only and may or may not reflect the actual installation.

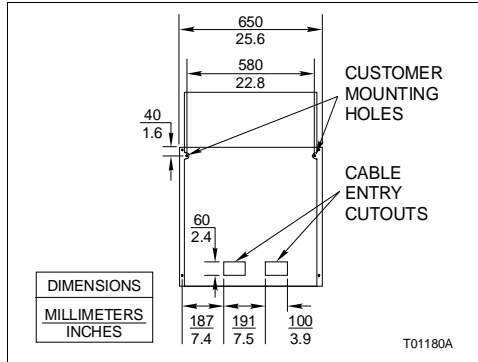


Figure PR3-1. Base Pedestal Anchoring Dimensions

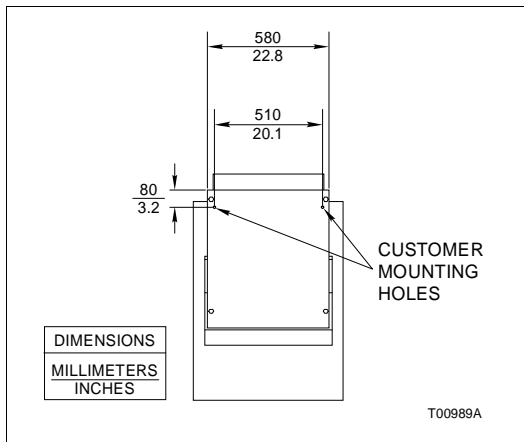


Figure PR3-2. Printer Stand Anchoring Dimensions

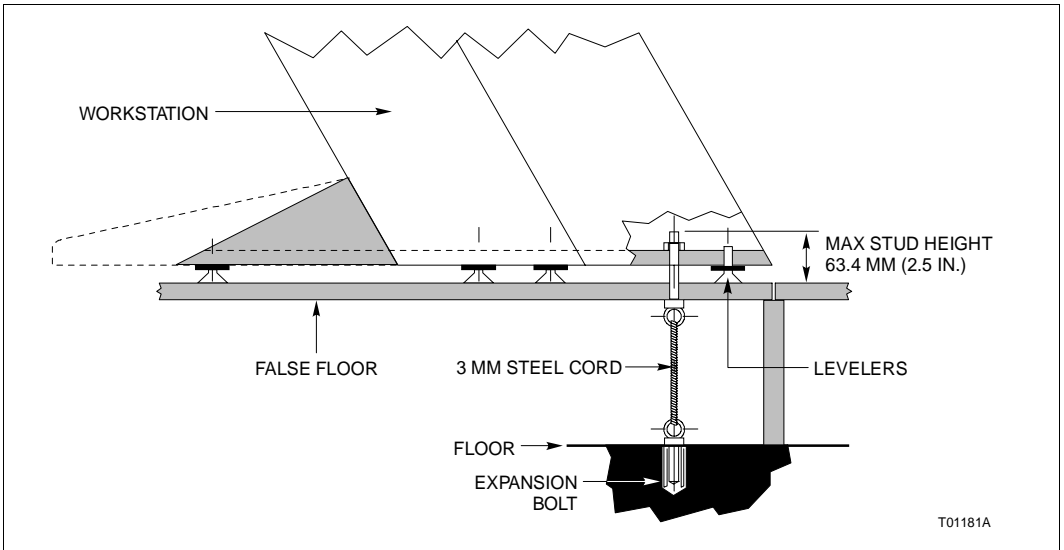


Figure PR3-3. Anchoring Scheme (Typical)



Remove Base Pedestal From Pallet



PR4

Purpose/Scope

10 min.

This procedure explains how to remove, and shows the location of, the bolts holding the base pedestal to the pallet.

Parts None.

- Tools
- Ratchet with $\frac{3}{8}$ -inch drive.
 - Extension bar.
 - $\frac{1}{2}$ -inch socket.
 - $\frac{3}{8}$ -inch socket.

Safety Considerations

WARNING

1. Stabilize the base pedestal before removing the bolts. If the base pedestal is not stabilized, it could tip over and cause injury to personnel and damage to equipment.

CAUTION

1. Attach moving equipment to, or lift by the beam. Lifting by other means will cause equipment damage.

Procedure

Two carriage bolts inside the rear of the base pedestal and one lag bolt inside the front of the base pedestal secure the base pedestal to the pallet.



1. To avoid the risk of tipping, use suitable means to stabilize the base pedestal.

NOTE: The method used to stabilize the base pedestal is dependent on customer equipment.



2. Use the ratchet with extension bar and $\frac{3}{8}$ -inch socket to remove the two carriage bolts inside the rear of the base pedestal (Fig. [PR4-1](#)).

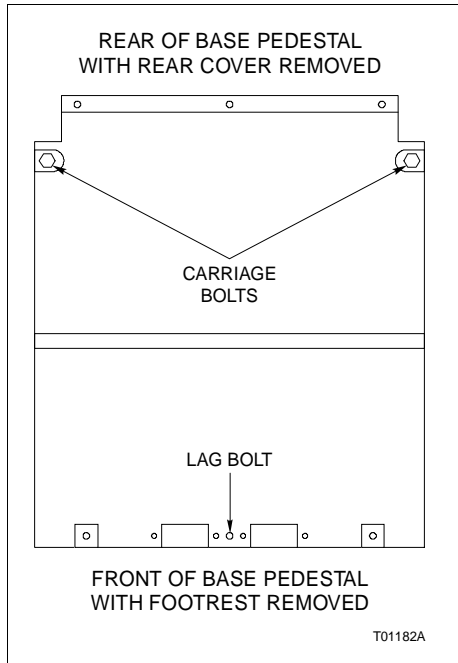



Figure PR4-1. Pallet Bolt Locations

- 3. Use the ratchet with extension bar and ½-inch socket to remove the lag bolt located inside the front of the base pedestal .
-  4. Use suitable means to lift the base pedestal off of the pallet. Always lift by the beam. Do not lift by the work surface, monitor, pods, etc.

NOTE: The method used to lift and move the base pedestal is dependent on customer equipment.



Purpose/Scope

5 min.

This procedure explains how to install end caps on stand-alone workstations or on the end bays of arrays.

Parts

Number	Qty	Description
200030A050S050	3	Nut, M5 hex keps (end cap mounting nuts)
6642184?1	1	End cap

Tools • M5 nut driver.

Procedure

End caps close up beam ends on stand-alone workstations or on end bays of arrays. End caps are not structural members. Do not modify them to carry loads.

1. Mount the end cap to the beam by inserting its three mounting studs through three of the six mounting holes and weld nuts in the beam (Fig. PR5-1). The orientation is not important as long as the top edge of the end cap aligns with the top edge of the beam.
2. Thread the three end cap mounting nuts onto the weld studs from the inside of the beam.
3. Tighten the three end cap mounting nuts using the M5 nut driver.

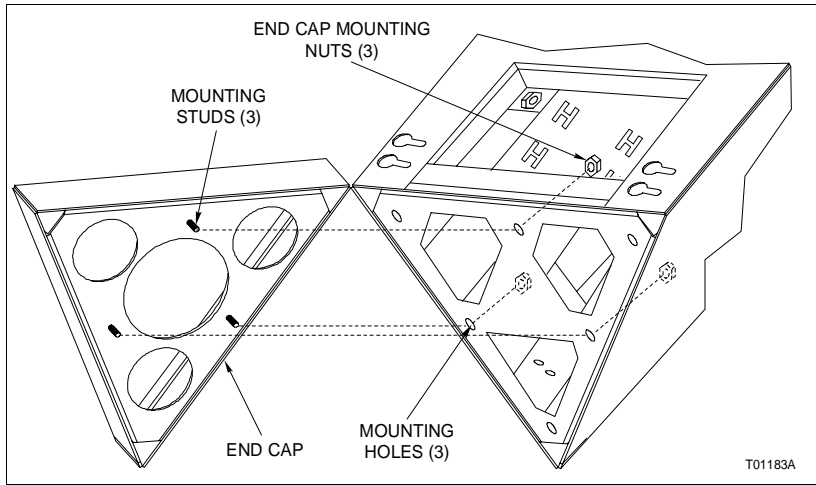


Figure PR5-1. End Cap Installation



Purpose/Scope

5 min.

This procedure explains how to attach elbows to the ends of beams.

Parts

Number	Qty	Description
200003A080S200	12	Cap screw, M8 x 20 socket head (elbow mounting screws)
200038A080A1016	12	Lockwasher, M8 external toothed (elbow mounting washers)
6642241?1	1 ¹	0° Elbow
6642247?1	1 ¹	45° Elbow
R2041-1995CM	1	Brown wire (set aside for later assembly)
R2041-1996CM	1	Blue wire (set aside for later assembly)
R2041-1997CM	1	Green/yellow wire (set aside for later assembly)

NOTE:

1. The procedure applies to both types of elbows. The mounting hardware quantities apply to each elbow, not both.

- Tools
- M8 Allen wrench.
 - Phillips head screwdriver.

Procedure

The elbows are packaged fully assembled. The mounting hardware and wires are in separate bags. Elbows come in two styles. There is a zero-degree elbow (Fig. [PR6-1](#)) for building straight portions of arrays and a 45-degree elbow (Fig. [PR6-2](#)) for building curved portions of arrays.

1. Remove the elbow access cover by using the Phillips head screwdriver to remove the four access cover screws. Set the cover and screws aside for later assembly.
2. Unlock and remove the elbow and beam top covers by sliding them toward the front of the elbow or beam. Once



unlocked, lift them off of the elbow or beam. Set them aside for later assembly.

- 3. Align the six elbow mounting holes with the six beam mounting holes.
- 4. Place an elbow mounting washer over an elbow mounting screw.
- 5. Insert the elbow mounting screw and washer pair, from the inside of the elbow, through the top center elbow mounting hole into the top center beam mounting hole and finger tighten.
- 6. Repeat Steps 4 and 5 for the remaining elbow mounting holes.
- 7. Tighten all six screws with the M8 Allen wrench.

NOTE: The beam power wires and six of each of the screws and lock washers were not used in this procedure. They are used later when other components are attached to the elbow and when power wiring is performed.

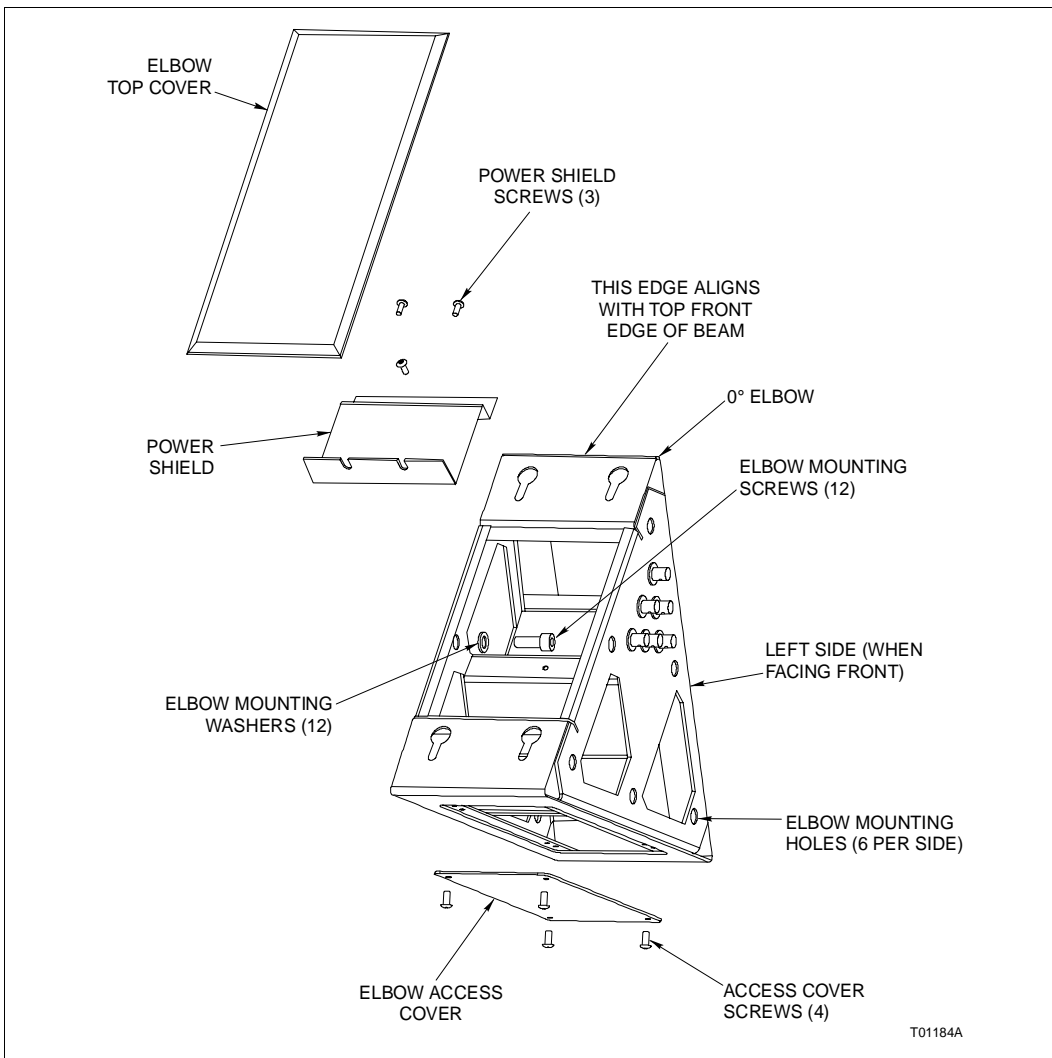


Figure PR6-1. 0° Elbow Installation

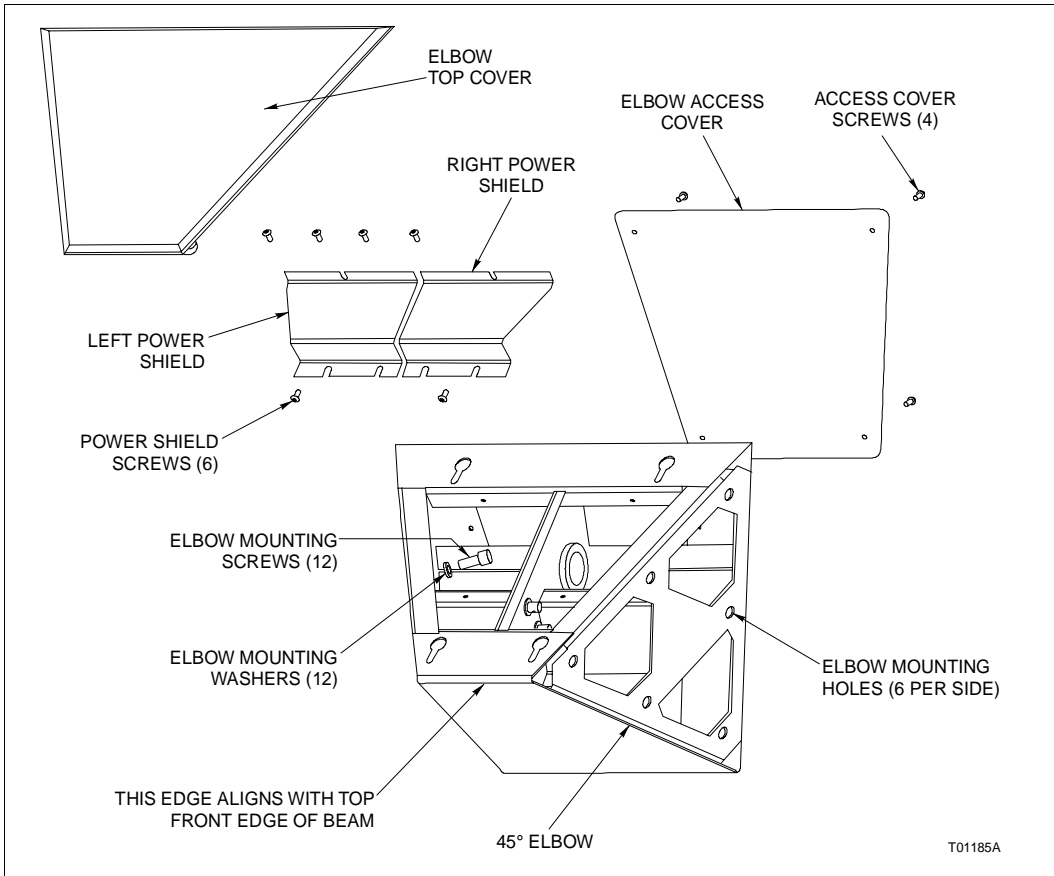


Figure PR6-2. 45° Elbow Installation



Purpose/Scope

10 min.

This procedure explains how to install a flying beam, whether it supports a monitor or auxiliary panel, between two base pedestal bays. In order to install a flying beam, there must be a base pedestal bay on each end. The flying beam provides support for auxiliary monitors and auxiliary panels.

Parts

Number	Qty	Description
200003A080S200	12	Cap screw, M8 x 20 socket head (elbow mounting screws) (from previous elbow installation to other bays)
200038A080A1016	12	Lockwasher, M8 external toothed (elbow mounting washers) (from previous elbow installation to other bays)

Tools • M8 Allen wrench.


Safety Considerations

CAUTION

1. Attach moving equipment to, or lift by the beam. Lifting by other means will cause equipment damage.

Procedure

This procedure assumes that one of the supporting base pedestal bays is secured to its position and the other one is as close to its final installed position as possible. It also assumes that the attaching elbows are installed on the proper ends of the supporting base pedestal bays.

- 1. Unlock and remove the beam top covers by sliding the beam top cover toward the front of the beam. Once unlocked, lift the beam top covers off of the beam.
-  2. Using suitable means (multiple personnel, slings, etc.), lift the flying beam, by the beam only, and align the six mounting



holes on its end with the six mounting holes on the elbow attached to the secured base pedestal bay.

- 3. Move and align the other base pedestal bay so that its elbow aligns with the other end of the flying beam.
- 4. Place an elbow mounting washer over an elbow mounting screw.
- 5. Insert the elbow mounting screw and washer pair, from the inside of the elbow, through the top center elbow mounting hole into the top center beam mounting hole and finger tighten.
- 6. Repeat Steps 4 and 5 for the remaining elbow mounting holes.
- 7. Tighten all six elbow mounting screws with the M8 Allen wrench.
- 8. Repeat Steps 4 through 7 for the other end of the flying beam.



Purpose/Scope

5 min.

This procedure explains how to remove the alarms TU.

Parts None.


Tools • M5 nut driver.

Safety Considerations

WARNING

1. Disconnect power before attempting these procedures. Failure to do so could result in severe or fatal shock, or equipment damage.

Procedure

-  1. Disconnect the power from the workstation.
- 2. Disconnect the power from the alarm contacts.
- 3. Remove the alarm termination terminal block (Fig. [PR8-1](#)). There is no need to remove the wires.
- 4. Remove and label all the cables from the remaining alarms TU connectors.
- 5. Use the M5 nut driver to remove the four alarms TU mounting nuts. Access the front two nuts from the front of the workstation and the rear two nuts from the rear.
- 6. Remove the alarms TU.

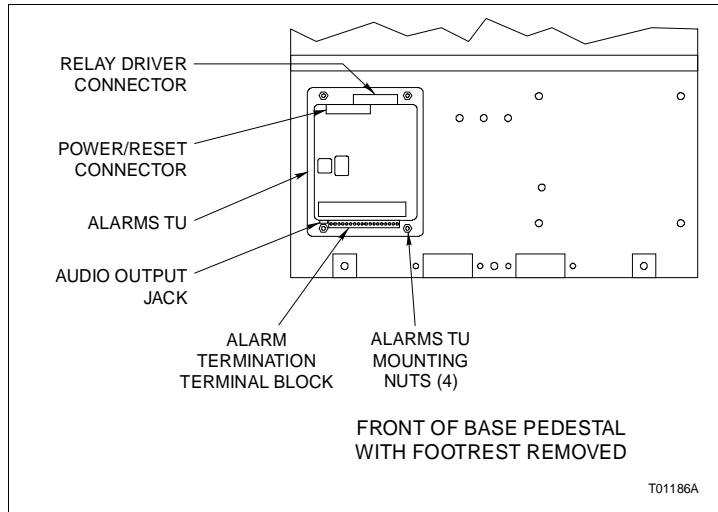


Figure PR8-1. Alarms TU Removal



Purpose/Scope

5 min.

This procedure explains how to remove the power entry panel (PEP).

Parts None.


Tools • M5 nut driver.

Safety Considerations

WARNING

1. Disconnect power before attempting these procedures. Failure to do so could result in severe or fatal shock, or equipment damage.

Procedure

-  1. Disconnect the power from the service to the workstation.
- 2. Remove the AC power terminal block (Fig. PR9-1). There is no need to remove the wires from the terminal block.
- 3. Remove and label all the cables from the IEC 320 outlets.
- 4. Use the M5 nut driver to remove the four PEP mounting nuts. Access the front two nuts from the front of the workstation and rear two nuts from the rear.
- 5. Remove the PEP cover.

NOTE: There are two wires connected from the wrist strap ground to E1 and E2 on the PEP circuit board. These wires are 15 cm (5.9 in.) long to provide adequate room to work once the cover is removed.
- 6. Use the M5 nut driver to remove the chassis ground nut (Fig. PR9-1), leaving the spacer in place.
- 7. Remove the PEP base assembly.

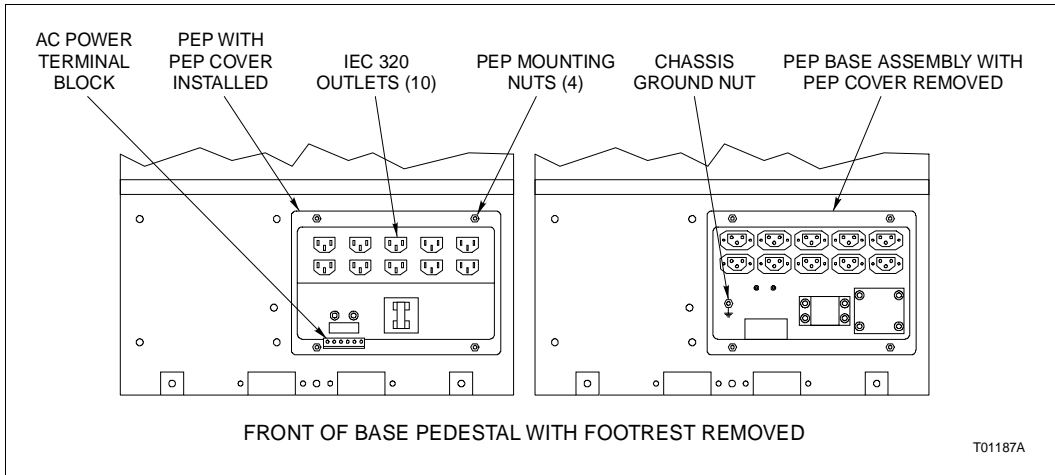


Figure PR9-1. PEP Removal



Purpose/Scope

5 min.

This procedure explains how to install the alarms TU.

Parts

Number	Qty	Description
200030A050S050	4	Nut, M5 x 0.8 hex keps (alarms TU mounting nuts)
6642863?2	1	Alarms TU


Tools • M5 nut driver.

Safety Considerations

WARNING

1. Disconnect power before attempting these procedures. Failure to do so could result in severe or fatal shock, or equipment damage.

Procedure

-  1. Remove power from the workstation.
- 2. Remove power from the alarm contacts.
- 3. Remove the alarm termination terminal block (Fig. [PR10-1](#)) from the alarms TU to be installed.

NOTE: If this is a new alarms TU, the alarms termination terminal block from the removed alarms TU can be used instead of this one, since the wires are still connected.
- 4. Place the alarms TU in the workstation so that the four mounting holes fit over the four mounting studs in the base pan.
- 5. Install the four alarms TU mounting nuts and tighten them with the M5 nut driver. Access the front two nuts from the front of the workstation and the back two from the rear.

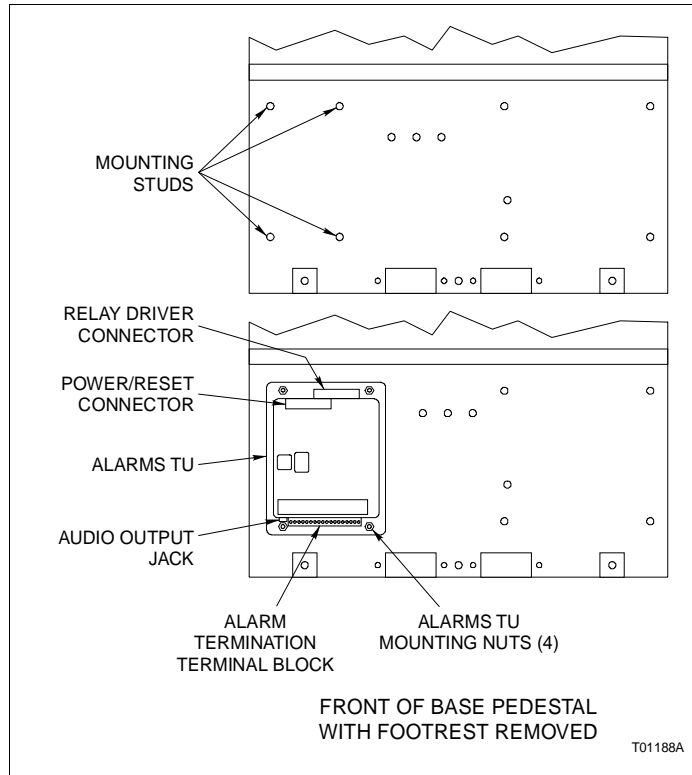


Figure PR10-1. Alarms TU Installation

- 6. Install the alarm termination terminal block.
- 7. Install all other required cables.



Purpose/Scope

5 min.

This procedure explains how to install the power entry panel (PEP).

Parts

Number	Qty	Description
197688?23	1	Spacer
200030A050S050	1	Nut, M5 x 0.8 hex keps (chassis ground nut)
200030A050S050	4	Nut, M5 x 0.8 hex keps (PEP mounting nuts)
6641500?1	1	Power entry panel (PEP) assembly


- Tools
- M5 nut driver.
 - Torque wrench for torquing nuts to 4.1 to 5.4 Newton meters (3.0 to 4.0 foot-pounds).

Safety Considerations

WARNING

1. Disconnect power before attempting these procedures. Failure to do so could result in severe or fatal shock, or equipment damage.

Procedure

-  1. Disconnect power from the service to the workstation.
- 2. Remove the AC power terminal block (Fig. [PR11-1](#)) from the PEP to be installed.

NOTE: If this is a new PEP, the AC power terminal block from the removed PEP can be used instead of this one, since the wires are still connected.
- 3. If the wires from the wrist strap grounds are not connected to E1 and E2 on the PEP circuit board, connect them now.



- 4. Verify that the spacer is still installed on the chassis ground stud on the base pan. If it is not, install it now.
- 5. Install the PEP base assembly so that the four mounting holes and the chassis ground hole fit over the four mounting studs and the chassis ground stud (with spacer installed) in the base pan.

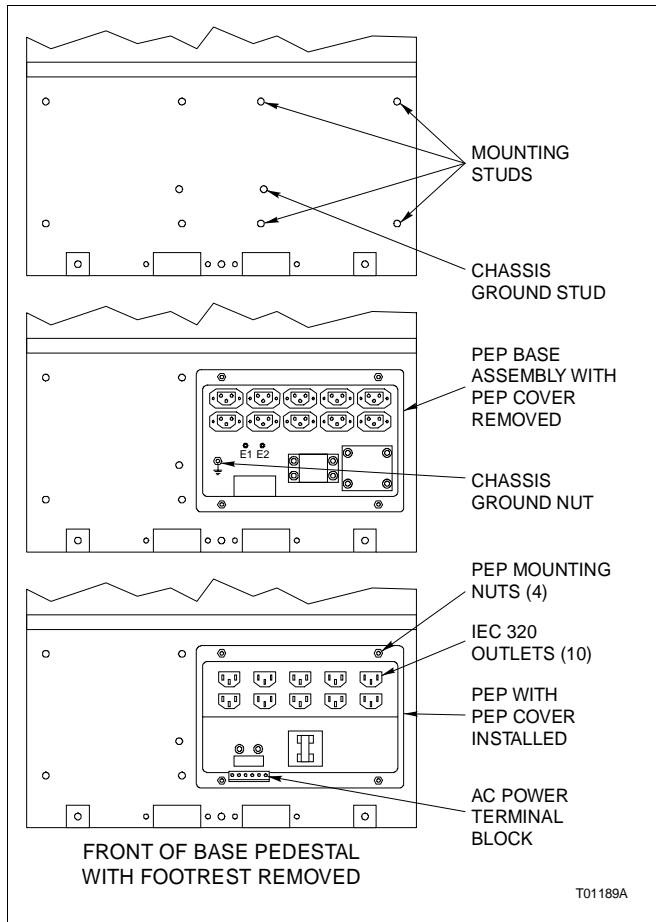


Figure PR11-1. PEP Installation

- 6. Install the chassis ground nut on the chassis ground stud and use the torque wrench to tighten the chassis ground nut to 4.1 to 5.4 Newton meters (3 to 4 ft-lbs).
- 7. Install the PEP cover.

- 8. Install the four PEP mounting nuts and use the torque wrench to tighten them to 4.1 to 5.4 Newton meters (3 to 4 ft-lbs). Access the front two nuts from the front of the workstation and the back two nuts from the rear.
- 9. Install the AC power terminal block.
- 10. Install the cables to the IEC 320 outlets.



Loop TU Circuit Board Replacement



PR12

Purpose/Scope

5 min.

This procedure explains how to replace the loop TU circuit board.

Parts

Number	Qty	Description
6641392?1	1	Loop TU circuit board

Tools • M5 nut driver.

Safety Considerations

WARNING

1. Disconnect power before attempting these procedures. Failure to do so could result in severe or fatal shock, or equipment damage.

Procedure



1. Remove power from the workstation.

2. Use the M5 nut driver to remove the four cover nuts (Fig. [PR12-1](#)).

3. Remove the cover.

NOTE: If both loops are used for INFI-NET wiring, the design allows loop TU circuit board replacement without taking the system off-line.

4. Remove the INFI-NET cables from the LOOP 1 connectors and install them on the LOOP 1 connectors on the new loop TU circuit board (Fig. [PR12-2](#)).

5. Remove the INFI-NET cables from the LOOP 2 connectors and install them on the LOOP 2 connectors of the new loop TU circuit board.

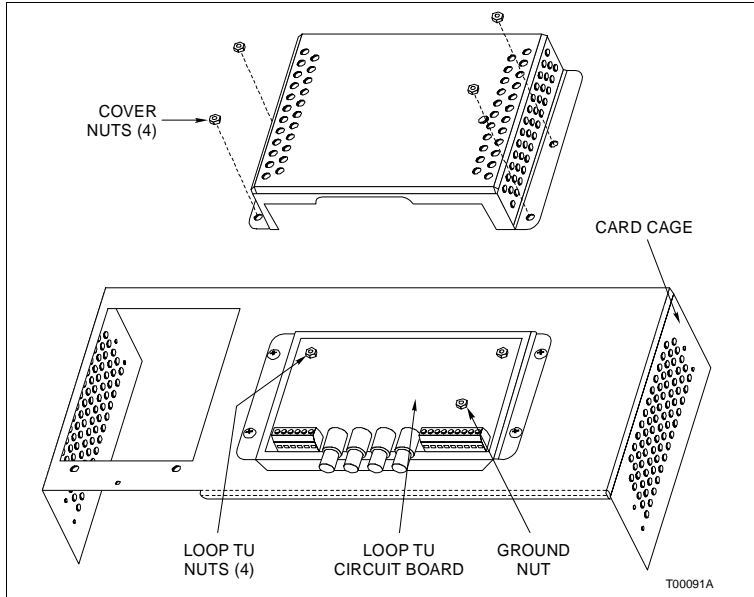


Figure PR12-1. Loop TU Circuit Board Replacement

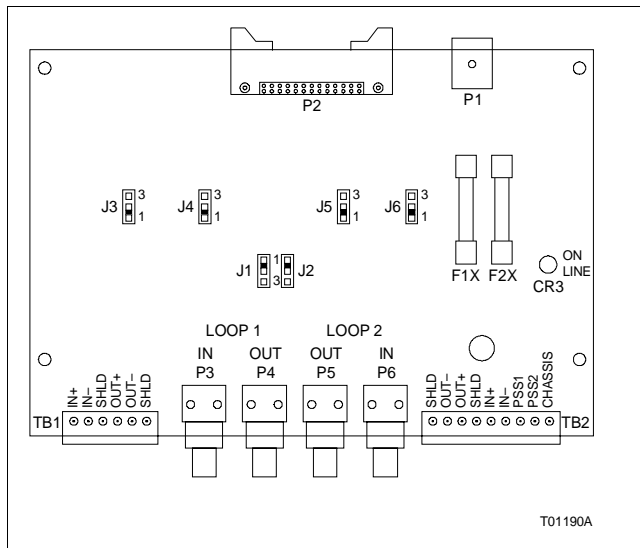


Figure PR12-2. Loop TU Circuit Board

- 6. Use the M5 nut driver to remove the four loop TU nuts and the ground nut.

- 7. Remove the loop TU circuit board.
- 8. Verify that the jumpers on the new loop TU circuit board are set to the coax position.

NOTE: The design does not allow for twinaxial INFI-NET wiring as this would invalidate the CE mark.

- 9. Install the loop TU circuit board.
- 10. Install the four loop TU nuts and the ground nut and tighten them with the M5 nut driver.
- 11. Install the cover.
- 12. Install the four cover nuts and tighten them with the M5 nut driver.



Beam Distribution Board Replacement



PR13

Purpose/Scope

10 min.

This procedure explains how to replace the beam distribution board.

Parts

Number	Qty	Description
6641482?1	1	Beam distribution board


Tools • Small-tipped Phillips head screwdriver.

Safety Considerations

WARNING

1. There are exposed AC and DC connections inside the cabinet. These exposed electrical connections present a shock hazard that can cause injury or death.

Procedure

-  1. Remove power from the workstation.
- 2. Unlock and remove the right beam top cover by sliding it toward the front of the beam. Once unlocked, lift it off of the beam (Fig. PR13-1).
- 3. Label and remove all cables from the beam distribution board.
- 4. Use the small-tipped Phillips head screwdriver to remove the eight beam distribution board screws.
- 5. Verify that SW1 on the new beam distribution board is set to the proper position for C-I-SV43S workstation operation.
- 6. Install the new beam distribution board and secure it to the beam with the eight beam distribution board screws.
- 7. Install the cables removed in Step 3.

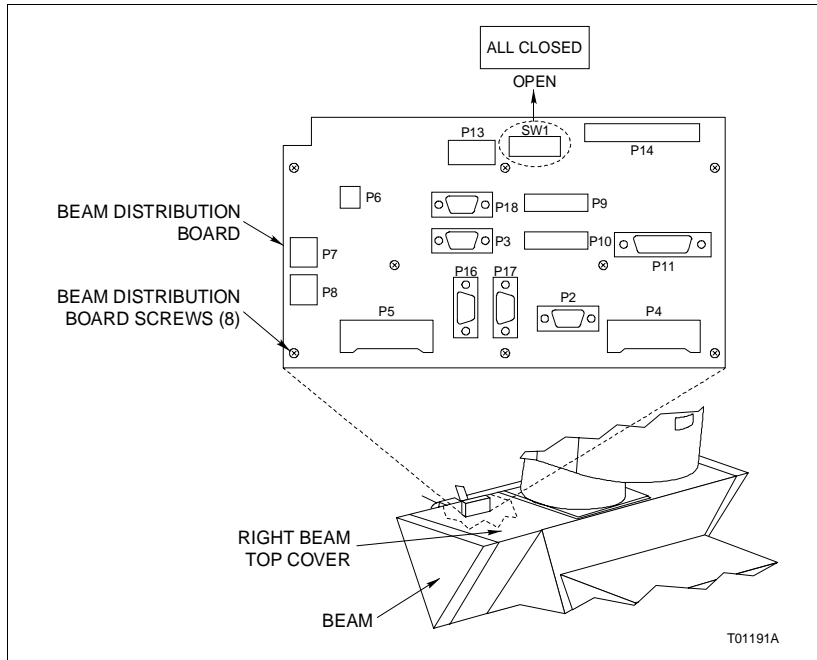


Figure PR13-1. Beam Distribution Board Replacement

- 8. Install the right beam top cover.



Purpose/Scope

20 min.

This procedure explains how to install stabilizers on base pedestal bays.

Parts

Number	Qty	Description
193250?1	2	Levelers (per stabilizer)
200010A080S500	3	Cap screw, M8 hex head (per stabilizer)
200037A080A1020	3	Lockwasher, M8 helical spring (per stabilizer)
6641515??	1	Stabilizer

Tools • M8 nut driver.

Procedure

1. Remove the caps covering the mounting holes (Fig. [PR14-1](#)).
NOTE: The PEP and alarms TU must be removed before performing this procedure. Refer to [PR8](#) and [PR9](#).
2. Install the levelers in the holes in the bottom of the stabilizer.
3. Align the stabilizer mounting holes with the holes in the base pedestal side casting.
4. Place a lockwasher on the three hex head cap screws and insert them through the holes in the base pedestal side casting.
5. Tighten the hex head cap screws with the M8 nut driver.
6. Repeat this procedure for the other side (if required).

NOTE: The levelers on the stabilizer replace those on the front edge of the base pedestal. Remove or place these levelers in their upward-most position before leveling the base pedestal or array. After levelling the base pedestal or array, position the front edge levelers (if not removed) so that they just contact the floor.

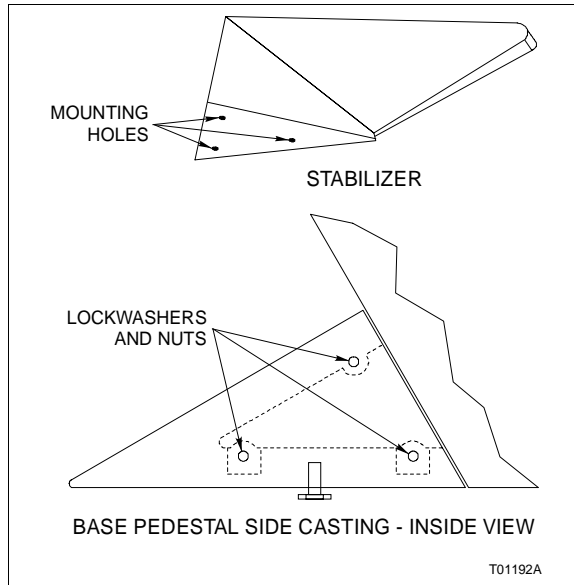


Figure PR14-1. Stabilizer Installation



Purpose/Scope

4 hrs

Due to the numerous possible array combinations, it is beyond the scope of this instruction to include them all. This procedure is designed to guide installation personnel through the mechanical assembly of an example array. The intention is to cover as many mechanical interfaces as possible.

Parts Dependent on installation and listed in individual procedures.

Tools Dependent on installation and listed in individual procedures.

Array Example

The array shown in Figure [PR15-1](#) consists of:

- Main processor base pedestal bay.
- Auxiliary processor base pedestal bay.
- Auxiliary monitor on a flying beam.
- Auxiliary panel base pedestal bay.
- Drawer table on left end of array.
- Drawing table with bookcase and wedge table on right end of array.
- 0° and 45° elbows.

The array will be built outward from each side of the main processor base pedestal bay. It is assumed that the control room has been laid out for this array configuration and that all preliminary steps have been taken to ready the individual bays for installation. A typical sequence might be:

NOTES:

1. This is an example installation sequence only. For detailed instructions on performing the individual actions, refer to the individual procedures indicated in the applicable steps.
 2. The numbered steps in this procedure do not correspond to the numbers in Figure [PR15-1](#).
1. Position the main processor base pedestal bay.

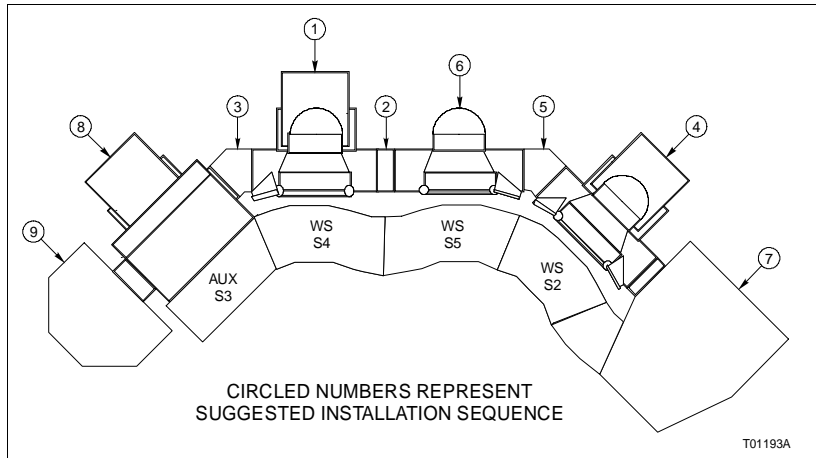


Figure PR15-1. Array Example

2. Adjust the levelers.
3. Anchor the main processor base pedestal bay to the floor (PR3).
4. Attach the 0° elbow to the right end of the beam of the main processor base pedestal bay (PR6).
5. Attach the 45° elbow to the left end of the beam of the main processor base pedestal bay (PR6).
6. Position the auxiliary processor base pedestal bay close to its final anchored position.
7. Adjust the levelers.
8. Attach the other 45° elbow to the left side of the of the beam of the auxiliary processor base pedestal bay (PR6).
9. Attach the left end of the auxiliary monitor flying beam to the right end of the 0° elbow that is attached to the main processor base pedestal bay (PR7).
10. Attach the right end of the auxiliary monitor flying beam to the 45° elbow that is attached to the auxiliary processor base pedestal bay (PR7).
11. Anchor the auxiliary processor base pedestal bay to the floor (PR3).

12. Attach the drawing table with bookcase and wedge table to the right side of the auxiliary processor base pedestal bay (PR16).

13. Adjust the levelers.

14. Attach the right side of the beam of the auxiliary panel base pedestal bay to the left side of the 45° elbow that is attached the main processor base pedestal bay (PR6).

15. Anchor the auxiliary panel base pedestal bay to the floor (PR3).

16. Attach the drawer table to the left side of the beam of the auxiliary panel base pedestal bay (PR17).

17. Adjust the levelers.





Purpose/Scope

20 min.

This procedure explains how to assemble and install a drawing table with or without a bookcase and wedge table.

Parts

Number	Qty	Description
6642211?1	1	Table leg
200001A080S160	6	Socket screw, button head, M8 x 16
200003A040S400	8	Cap screw, socket head, M4 x 40
200036A040A1008	8	Flat washer, M4

Tools

- Large soft cloth or bubble wrap.
- M4 Allen wrench.
- M8 Allen wrench.

Procedure

The drawing table is shipped fully assembled except for the table leg.

1. Place the large soft cloth or bubble wrap on the floor or workbench where the drawing table will be placed.
2. Place the drawing table, laminate side down on the large soft cloth or bubble wrap.
3. Use the eight cap screws and eight washers to attach the table leg to the drawing table as shown in Figure [PR16-1](#). Tighten them using the M4 Allen wrench.

NOTE: Figure [PR16-1](#) shows the drawing table without bookcase and wedge table. The assembly procedure for the drawing table with bookcase and wedge table is the same.

4. Align the drawing table elbow with the end elbow of the existing array.

NOTE: A drawing table can only be the end bay of an array.

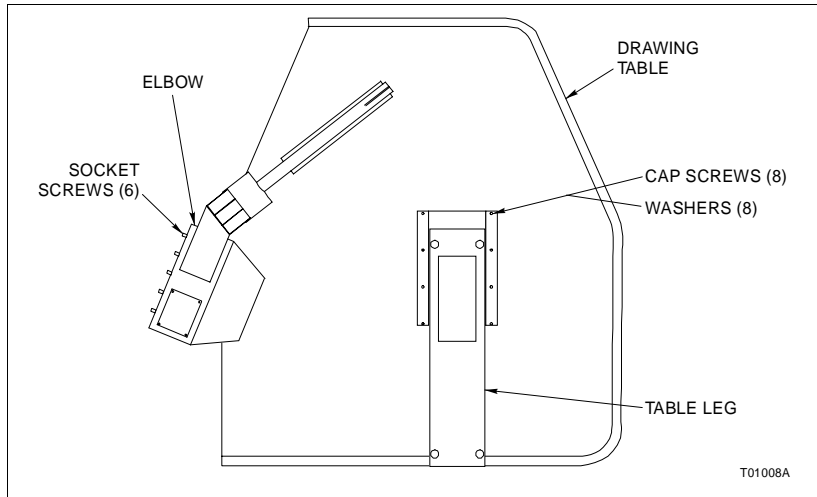


Figure PR16-1. Drawing Table Assembly

- 5. Install the six socket screws, from the inside of the drawing table elbow, through and into the end elbow of the existing array and tighten them with the M8 Allen wrench.
- 6. Adjust the levelers.



Purpose/Scope

10 min.

This procedure explains how to assemble a drawer table.

Parts

Number	Qty	Description
6641876?1	1	Work surface
6642829?1	2	Shim
200001A080S160	6	Socket screw, button head, M8 x 16
200003A040S400	9	Cap screw, socket head, M4 x 10
200036A040A1008	5	Washer, flat, M4
200048A050A1016	4	Washer, flat, fender, M5

- Tools
- Large soft cloth or bubble wrap.
 - M4 Allen wrench.
 - M8 Allen wrench.

Procedure

The drawer table is shipped fully assembled except for the work surface and zero degree elbow with table support.

1. Place the large soft cloth or bubble wrap on the floor or workbench where the drawing table will be placed.
2. Place the work surface, laminate side down on the large soft cloth or bubble wrap.
3. Set the shims on the work surface so that the holes in the shims align with the holes in the work surface.
4. Place the drawer assembly on the work surface.
5. Attach it using four cap screws and fender washers and tighten them with the M4 Allen wrench (Fig. [PR17-1](#)).
6. Place the zero degree elbow with table support on the work surface.

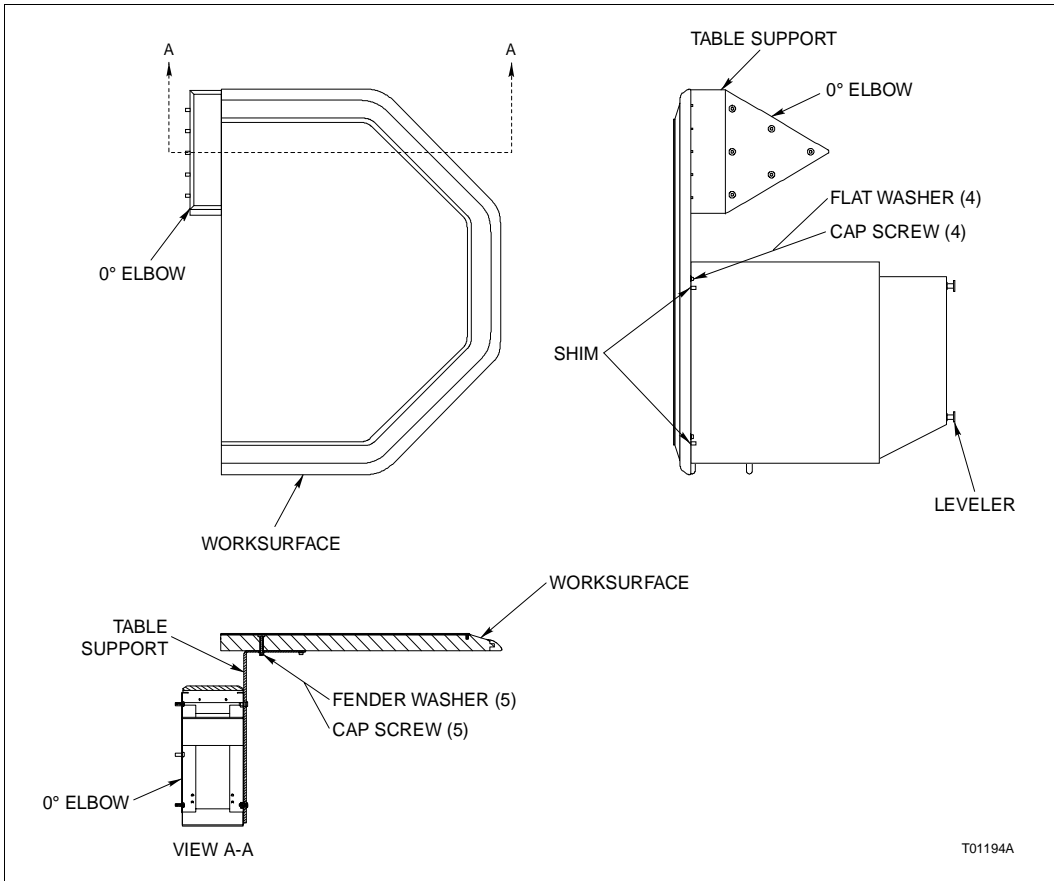


Figure PR17-1. Drawer Table Assembly

- 7. Attach it using five cap screws and flat washers and tighten them with the M4 Allen wrench.
- 8. Align the drawer table elbow with the end elbow of the existing array.
 - NOTE:** A drawer table can only be the end bay of an array.
- 9. Install the six socket screws, from the inside of the drawer table elbow, through and into the end elbow of the existing array and tighten them with the M8 Allen wrench.
- 10. Adjust the levelers.

Bookcase with Wedge Table Installation



PR18

Purpose/Scope

20 min.

This procedure explains how to assemble and install a bookcase with wedge table.

Parts

Number	Qty	Description
200003A040S400	4	Cap screw, socket head, M4 x 40
200036A040A1008	4	Washer, flat, M4

Tools

- M4 Allen wrench.
- M8 Allen wrench.

Procedure

The bookcase with wedge table is shipped fully assembled except for the elbow and support arm assembly.

1. There are four latch plungers that hold the vertical dividers in the bookcase. Remove the latch plungers and dividers for easier access when performing this procedure.
2. Insert the support arm of the elbow and support arm assembly through the rear of the bookcase with wedge table.
3. Align the holes in the support arm with those in the underside of the bookcase with wedge table work surface.
4. Install the four cap screws and flat washers and tighten them with the M4 Allen wrench.
5. Install the dividers and latch plungers.
6. Align the bookcase with wedge table elbow with the elbow of the existing array.
7. Install the six socket screws, from the inside of the bookcase with wedge table elbow, through and into the end elbow of the existing array and tighten them with the M8 Allen wrench.
8. Adjust the levelers.





Purpose/Scope

10 min.

This procedure explains how to assemble a printer stand.

Parts

Number	Qty	Description
6643034?1	1	Large tabletop
6643034?2		Small tabletop
NDKAC14008	6	Screw, phillips pan head thread forming (0.164-18)

Tools

- Phillips head screwdriver.
- M6 nut driver.

Procedure

The printer stand is shipped fully assembled except for the tabletop.

1. Place the tabletop on the base assembly, aligning the six holes in the tabletop with those in the base assembly.
2. Secure the tabletop to the base assembly using the six phillips head screws and tighten them with the phillips head screwdriver.

NOTES:

1. Stabilizers are required on printer stands that are not securely bolted to the floor. Procedures [PR3](#) and [PR14](#) discuss anchoring and stabilizer installation respectively.
2. Stabilizers can not be placed between adjacent printer stands.
3. End caps are required for stand alone printer stands and must be ordered separately.
4. Route cables to printer stands in arrays from adjacent units through the beams and connecting elbows. Route cables to stand-alone printer stands from underneath, to either side casting at the customer mounting hole locations.



5. The removable printer cart allows paper to be loaded from the front rather than the rear. Consult local building and fire codes before positioning the printer stand against the wall.



Purpose/Scope

5 min.

This procedure explains how to remove the CPU from the base pedestal.

Parts None.

Tools • Small-tipped magnetic Phillips head screwdriver.

Procedure

1. Use the small-tipped magnetic Phillips head screwdriver to remove the two retaining screws (Fig. PR20-1).

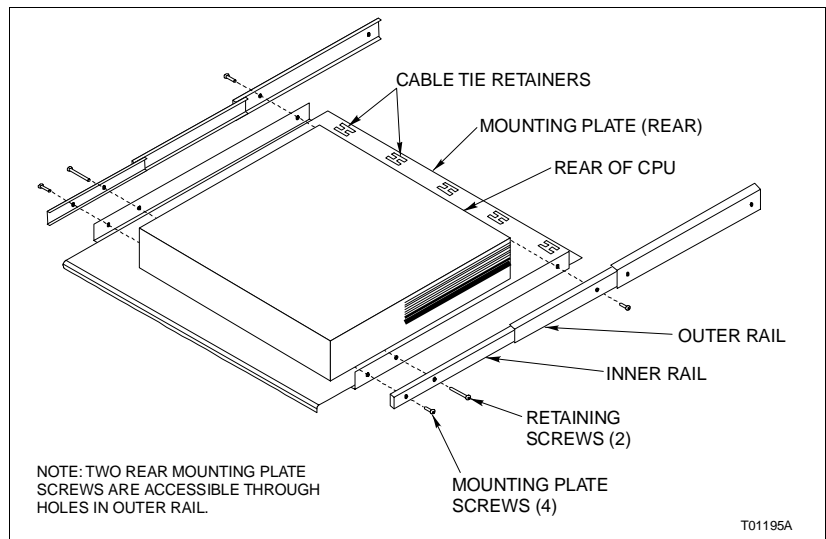


Figure PR20-1. CPU Removal

2. Pull the mounting plate out to its full extension to allow access to the cables attached to the CPU.
3. Remove the cable ties from the cable tie retainers.
4. Label and disconnect all cables attached to the CPU.



- 5. Use the small-tipped magnetic Phillips head screwdriver to remove the two front mounting plate screws.
- 6. Slide the mounting plate in until the two rear mounting plate screws are accessible through the holes in the outer rail.
- 7. Use the small-tipped magnetic Phillips head screwdriver to remove the two rear mounting plate screws.
- 8. Lift the CPU, with mounting plate attached, out of the base pedestal and move it to a suitable location.
- 9. Refer to the documentation that came with the CPU to remove covers from, make repairs to and add devices to the CPU.



Purpose/Scope

20 min.

This procedure explains how to remove the CPU from and install the CPU on its mounting plate. This procedure need only be performed if replacing the CPU with a new one. A CPU mounting kit, kit number 197896?1 is available and the parts are listed in the table that follows.

Parts

Number	Qty	Description
1990050?1	1	Alcohol pad
1990051?1	4	Mounting pad
1990052?21	1	Glue
NCMAB21006	4	Screw, truss head (0.25-20 x 0.375) (mounting pad screws)
NTJBC11030	4	Lockwasher

Tools

- Phillips head screwdriver.
- 5 to 9-kg (10 to 20-lb) weight.

Procedure

1. Use the Phillips head screwdriver to remove the four mounting pad screws and lockwashers that hold the mounting plate to the mounting pads that are glued to the bottom of the CPU (Fig [PR21-1](#)).

NOTES:

1. Keep the mounting plate for installation of the new CPU.
 2. Some CPUs can be ordered with the mounting plate installed. If this is the case, this procedure does not need to be performed.
2. Figure [PR21-2](#) applies to the Tektronix XP400 and Figure [PR21-3](#) applies to the Alpha Station 255/233. The figure shows where on the bottom of the CPU the mounting pads must be glued.

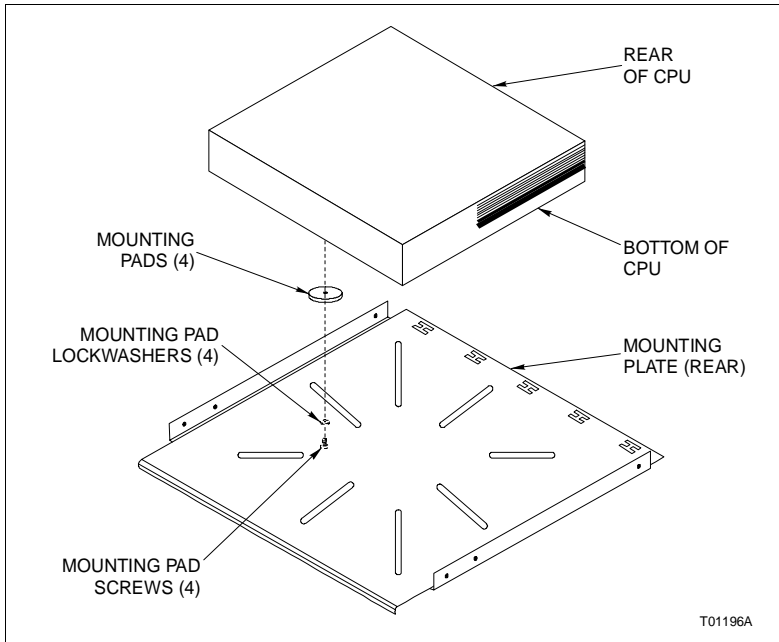


Figure PR21-1. Removing CPU from Mounting Plate

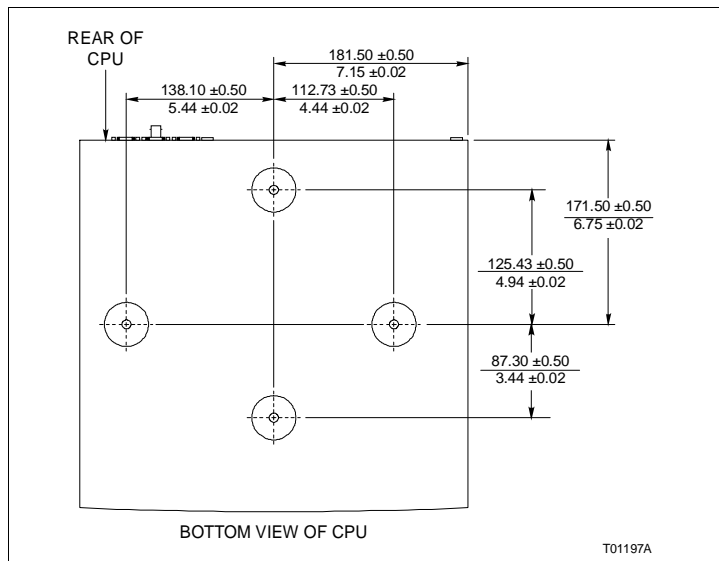


Figure PR21-2. Tektronix XP400 CPU Mounting Dimensions

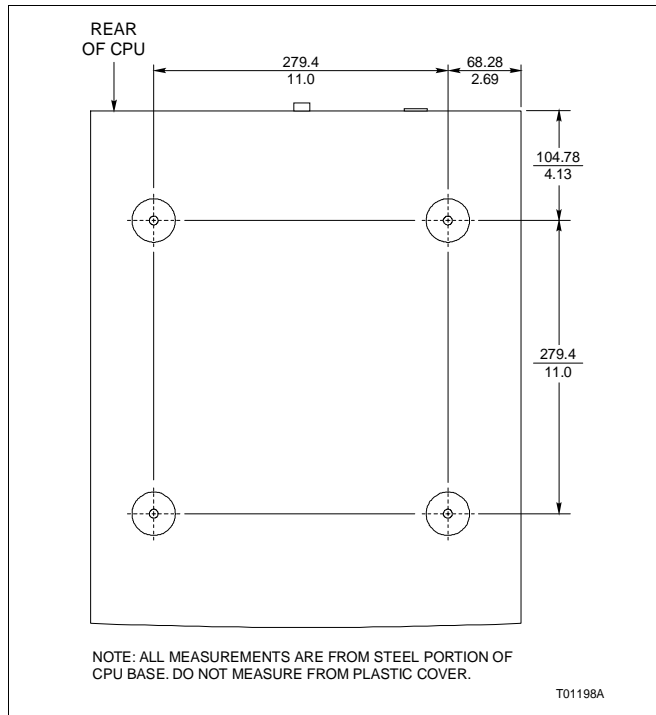


Figure PR21-3. Alpha Station 255/233 Mounting Dimensions

- 3. Use the alcohol pad to clean the mounting pad and the mounting areas on the CPU.
- 4. Form two complete rings of glue on the bottom of the mounting pads. Be careful not to apply so much glue that when the weight is applied it forces the glue up through the hole in the mounting pad.
- 5. Put the pads in place.
- 6. Hold the mounting pads in place with the 5 to 9-kg (10 to 20-lb) weight for two to three minutes to allow the glue to set.
- 7. Place the CPU on the mounting plate so that the screw holes in the mounting pads properly align with the slots in the mounting plate (Fig. PR21-4).
- 8. Install the four mounting plate screws and lockwashers and tighten them with the Phillips head screwdriver.

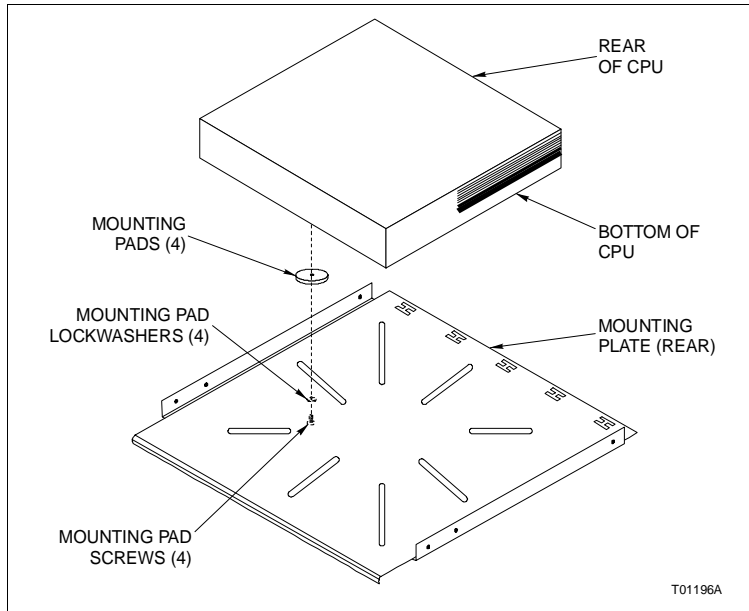


Figure PR21-4. Mounting CPU on Mounting Plate (Typical)



Purpose/Scope

5 min.

This procedure explains how to install a CPU. It is attached to its mounting plate.

Parts

Number	Qty	Description
1943785?3	A/R	Cable ties
200019A040S100	4	Screw, M4 x 0.7 x 10 Phillips pan head from CPU removal procedure (mounting screws)
200019A040S300	2	Screw, M4 x 0.7 x 30 Phillips pan head from CPU removal procedure (retaining screws)

Tools • Small-tipped magnetic Phillips head screwdriver.

Procedure

1. Place the CPU in the rear of the base pedestal so that the front holes on the mounting plate align with the front holes in the inner rail (Fig. [PR22-1](#)).
2. Install two of the mounting plate screws into the front mounting holes and tighten them with the small-tipped magnetic Phillips head screwdriver.
3. Adjust the mounting plate so that the two rear mounting plate holes in the inner rail are accessible through one of the holes in the outer rail.
4. Install the other two mounting plate screws through the outer and inner rails and into the two rear holes in the mounting plate and tighten them with the small-tipped magnetic Phillips head screwdriver.
5. Connect all necessary cables to the CPU.
6. Retain the cables by using cable ties to secure them to the cable tie retainers.
7. Slide the mounting plate in all the way.

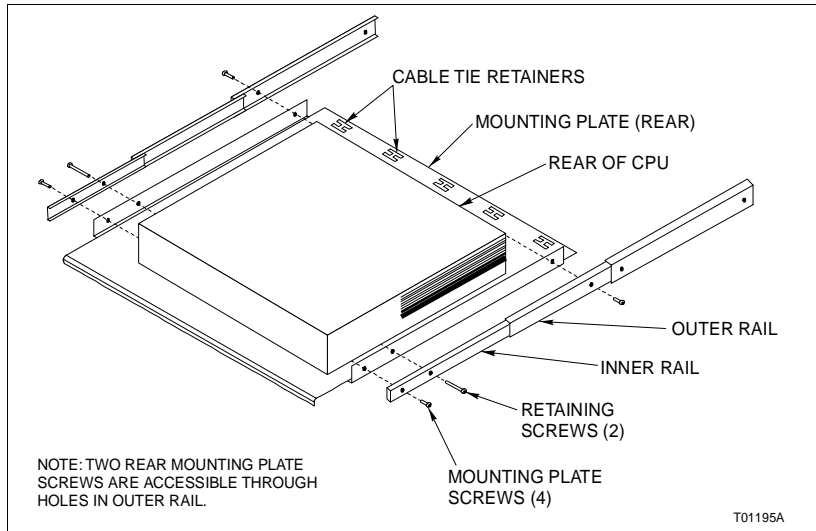


Figure PR22-1. CPU Installation

- 8. Install the two retaining screws and tighten them with the small-tipped magnetic Phillips head screwdriver.



Purpose/Scope

10 min.

This procedure explains how to replace the NIU fans.

Parts

Number	Qty	Description
6641790?1	1	NIU fan

Tools

- Right angle Phillips head screwdriver.

Safety Considerations

WARNING

1. There are exposed AC and DC connections inside the cabinet. These exposed electrical connections present a shock hazard that can cause injury or death.

Procedure



1. Remove power from the workstation.



2. Disconnect the NIU fan from P3 or P11 (depending on which fan) on the NIU backplane (Fig. [PR23-1](#)).



3. Use the right angle Phillips head screwdriver to remove the four NIU fan screws.



4. Remove the NIU fan.



5. Install the new NIU fan, being careful to orient it such that the blades turn in the direction to blow air out of the base pedestal (fan wires closest to the beam).



6. Use the right angle Phillips head screwdriver to install the four NIU fan screws.



7. Connect the cable to P3 or P11 (depending on which fan) on the NIU backplane.

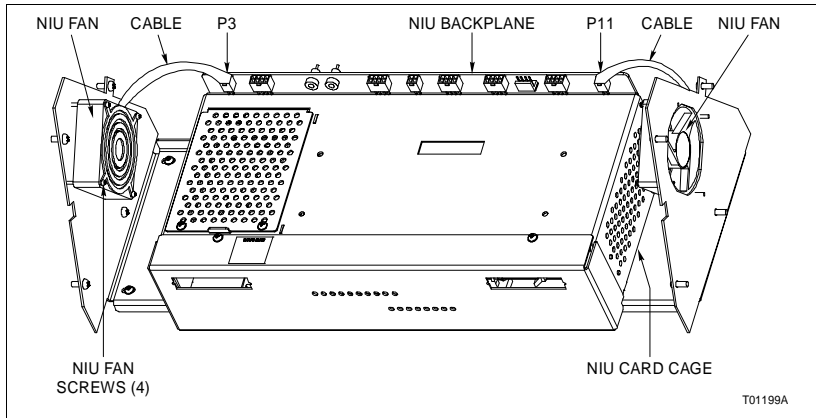


Figure PR23-1. NIU Fan Replacement



Purpose/Scope

20 min.

This procedure explains how to connect the power wiring for stand-alone workstations or those arrays where it is desired to connect separate power wiring directly to each component with a PEP.

Parts Dependent on installation.

- Tools
- Small-tipped flat blade screwdriver.
 - Others as dictated by the installation.

Safety Considerations

WARNING

1. Disconnect the AC line cord or power lines from the operating branch circuit coming from the source before attempting electrical connections. Instruments powered by AC line voltage constitute a potential for personnel injury due to electric shock.

CAUTION

1. Make sure that all voltage labels and voltage switch settings on the peripheral devices, power supply, and power entry panel show the correct operating voltage. Equipment damage may result if the incorrect voltage is connected. Make sure the console main power circuit breaker is off before changing operating voltage settings or equipment damage may result.


Procedure

Stand-alone workstations require wiring only from the service into the workstation and up to the PEP.

The PEP accepts bare copper wire sizes as large as a 3.3-square millimeter cross section (12 AWG). It has a European style compression terminal block for making the power wiring connections for 120/240 AC power. Nothing needs to be switched for the different power levels. There is also a 12-amp



circuit breaker for overcurrent protection as well as an on/off switch, an AC line filter and surge suppressor, and two wrist strap grounds. There are ten IEC 320 outlets for power distribution. Factory-installed components are already connected to these outlets.

-  1. Disconnect power from the operating branch circuits that will power the workstation.
- 2. Bring the power wiring from the service up through one of the cable entry cutouts in the bottom of the base pedestal. Figure PR24-1 shows the location of the cable entry cutouts.

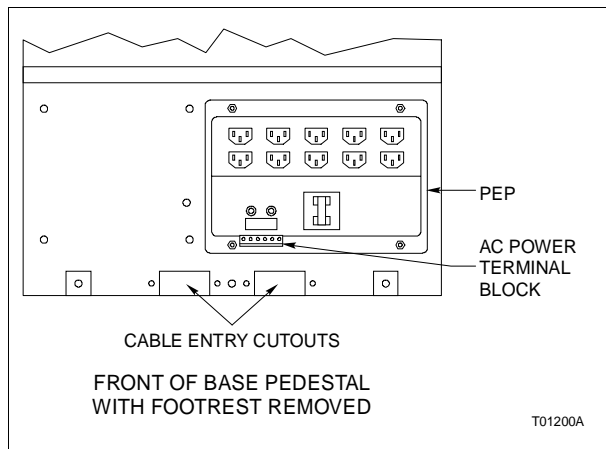


Figure PR24-1. Cable Entry Cutout and PEP Locations

- 3. Use the small-tipped flat blade screwdriver to loosen the terminal block screws (Fig. PR24-2).

NOTE: The AC power terminal block may be removed prior to inserting the wires.
- 4. Insert the wires into the appropriate locations on the terminal block as shown in Figure PR24-2.
- 5. Use the small-tipped flat blade screwdriver to tighten the terminal block screws.
- 6. If connecting the power wiring directly to each PEP in an array, repeat Steps 1 through 5 for each PEP.

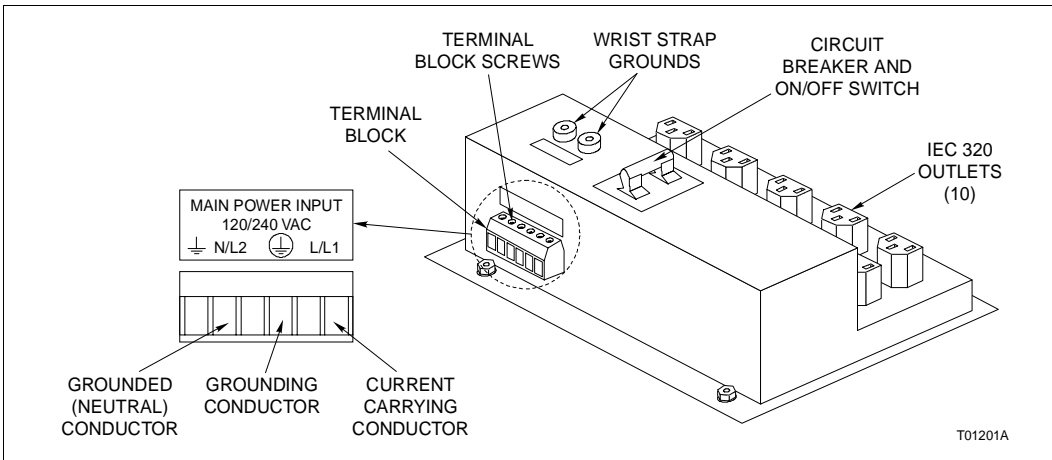



Figure PR24-2. Power Entry Panel (PEP)

- 

7. Verify that the voltage switch setting on the rear of the CPU for C-I-SV43S-M, C-I-SV43S-T and C-I-SV43S-X workstations (Fig. PR24-3) and the power input module for the lifting mechanism (Fig. PR24-4) on all workstations (if supplied) are set to the proper input voltage level.

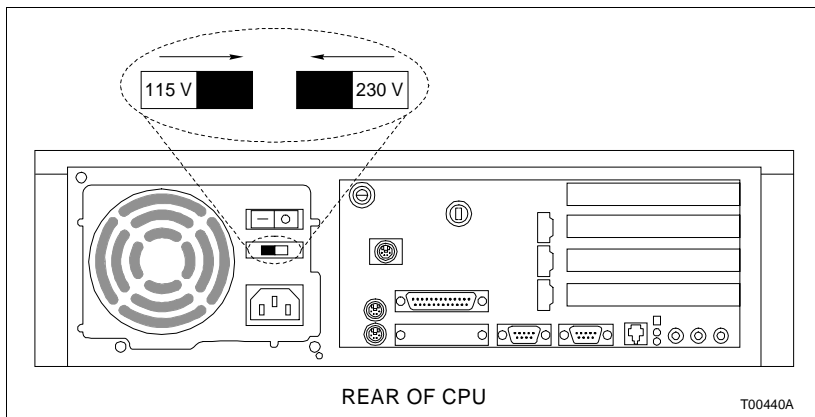


Figure PR24-3. C-I-SV43S-M, C-I-SV43S-T and C-I-SV43S-X Workstation CPU

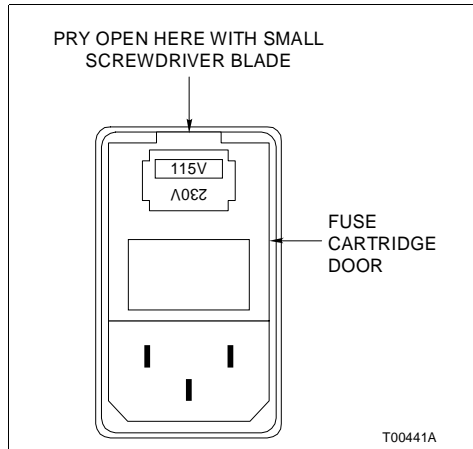


Figure PR24-4. Lifting Mechanism Power Input Module



Purpose/Scope

4 hrs

NOTE: The time to perform this procedure depends on the installation.

This procedure explains how to connect the power wiring for workstation arrays when using the beam power bus.

Parts

Number	Qty	Description
R2041-1995CM	1 ¹	Brown wire (from previous procedure)
R2041-1996CM	1 ¹	Blue wire (from previous procedure)
R2041-1997CM	1 ¹	Green/yellow wire (from previous procedure)
Customer-supplied	1 ²	Power wiring to go from beam down to PEPs
Customer-supplied	1 ²	Power wiring to go from service to beam

NOTES:

1. Quantity shown is per elbow.
2. Quantity shown is 1 per PEP and 1 per service.

- Tools
- Small-tipped flat blade screwdriver.
 - Flat blade screwdriver.
 - Others as dictated by the installation.

Safety Considerations

WARNING

1. Disconnect the AC line cord or power lines from the operating branch circuit coming from the source before attempting electrical connections. Instruments powered by AC line voltage constitute a potential for personnel injury due to electric shock.

**CAUTION**

1. Make sure that all voltage labels and voltage switch settings on the peripheral devices, power supply, and power entry panel show the correct operating voltage. Equipment damage may result if the incorrect voltage is connected. Make sure the console main power circuit breaker is off before changing operating voltage settings or equipment damage may result.

General

The PEP accepts bare copper wire sizes as large as a 3.3-square millimeter cross section (12 AWG). It has a European style compression terminal block for making the power wiring connections for 120/240 AC power. Nothing needs to be switched for the different power levels. There is also a 12-amp circuit breaker for overcurrent protection as well as an on/off switch, an AC line filter and surge suppressor, and two wrist strap grounds. There are ten IEC 320 outlets for power distribution. Factory-installed components are already connected to these outlets.

Install the power wiring for arrays using the beam power bus or a separate service for each component with a PEP. If doing the latter, refer to [PR24](#).

For workstation arrays, the beam power bus wiring has a cross section of 8.4 millimeters (eight AWG) and is rated at 40 amps. Each elbow comes with three short patch wires to make beam to beam connections. To determine how many components to connect to the same service, add the operating currents for each component. The following table lists these operating currents as well as other pertinent operating parameters.

NOTES:

1. Include 1.20 amps for each optional lifting mechanism, even though it only applies when the drive motor is activated.
2. The table lists the typical operating currents. To approximate the maximum values, multiply the typical values by 1.33.

Type	Nominal Input Voltage (VAC)	Input Current (A)		Nominal Power (W)	Crest Factor	Power Factor	Nominal Heat Dissipation (BTU/Hr)
		Nominal Operating ²	Nominal Inrush				
C-I-SV43S-M	120	3.2	81.0	310	3.2	0.80	1,058
	240	2.0	75.0	326	4.8	0.68	1,112
C-I-SV43S-X	120	3.1	71.0	308	2.6	0.82	1,051
	240	1.6	65.0	308	2.4	0.81	1,051
C-I-SV43S-A	120	2.0	56.3	202	3.7	0.84	689
	240	1.1	46.5	214	5.5	0.81	731
C-I-SV43S-T	120	3.1	71.0	308	2.6	0.82	1,051
	240	1.6	65.0	308	2.4	0.81	1,051
C-I-SV43S-C	120	1.0	15.4	118	2.0	0.98	403
	240	0.5	29.3	116	2.1	0.97	396
C-I-SV43S-S	120	1.0	15.4	118	2.0	0.98	403
	240	0.5	29.3	116	2.1	0.97	396

Example: A typical Signature Series workstation array, powered by a 120 VAC service, consists of:

- Four C-I-SV43S-X10000022 main terminals with dual graphic outputs in base pedestal bays with optional lifting mechanisms for the work surfaces.

$$i_{max} = [(4 \times 3.10) + (4 \times 1.20)] \times 1.33 = 22.88 \text{ amps}$$

- Four C-I-SV43S-C00000000 auxiliary monitors on flying beams.

$$i_{max} = (4 \times 1.00) \times 1.33 = 5.32 \text{ amps}$$

- Four C-I-SV43S-M10000022 main terminals in base pedestal bays with optional lifting mechanisms for the work surfaces.

$$i_{max} = [(4 \times 3.20) + (4 \times 1.20)] \times 1.33 = 23.41 \text{ amps}$$

- One P-MF-SSA-11120000 auxiliary panel bay with an optional lifting mechanism for the work surface.

$$i_{max} = (1 \times 1.20) \times 1.33 = 1.60 \text{ amps}$$

NOTE: The operating current for the auxiliary panel bay used in this example does not include any customer-installed devices.



The total operating current for this array is:

$$i_{max} = 22.88 + 5.32 + 23.41 + 1.60 = 53.21 \text{ amps}$$

This is over the 40-amp limit so two services are needed. It depends on the installation as to the most convenient and efficient combination of components supplied by each service. Each PEP in the workstation has a 12-amp circuit breaker and is a branch circuit off of the service. Figure PR25-1 shows how the installation used in this example could be wired.

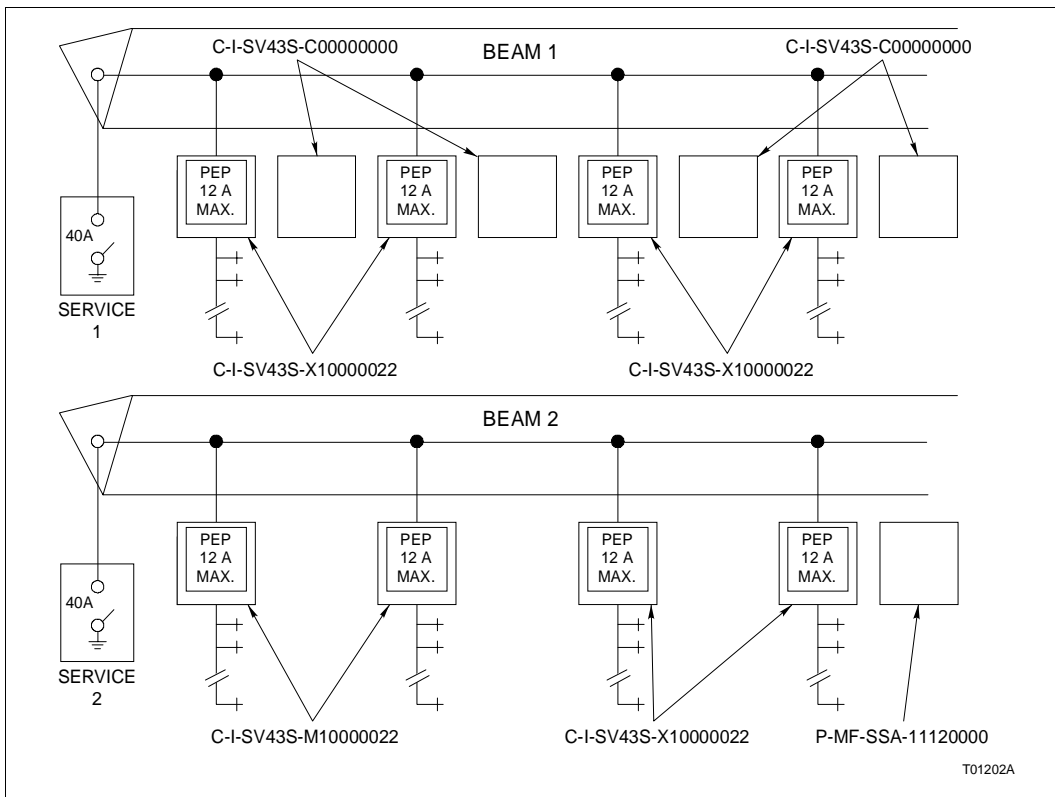


Figure PR25-1. AC Power Wiring Example

Procedure

1. Disconnect power from the operating branch circuits that will power the workstation.



- 2. Unlock and remove the beam top covers by sliding the beam top cover toward the front of the beam. Once unlocked, lift the beam top covers off of the beam.
- 3. Use the M4 Allen wrench to remove the power shield screws from the elbows and the ends of all the beams and remove the power shields. Figure PR25-2 shows the power shield on a 0° elbow. This arrangement is typical of the 45° elbow and the beam.

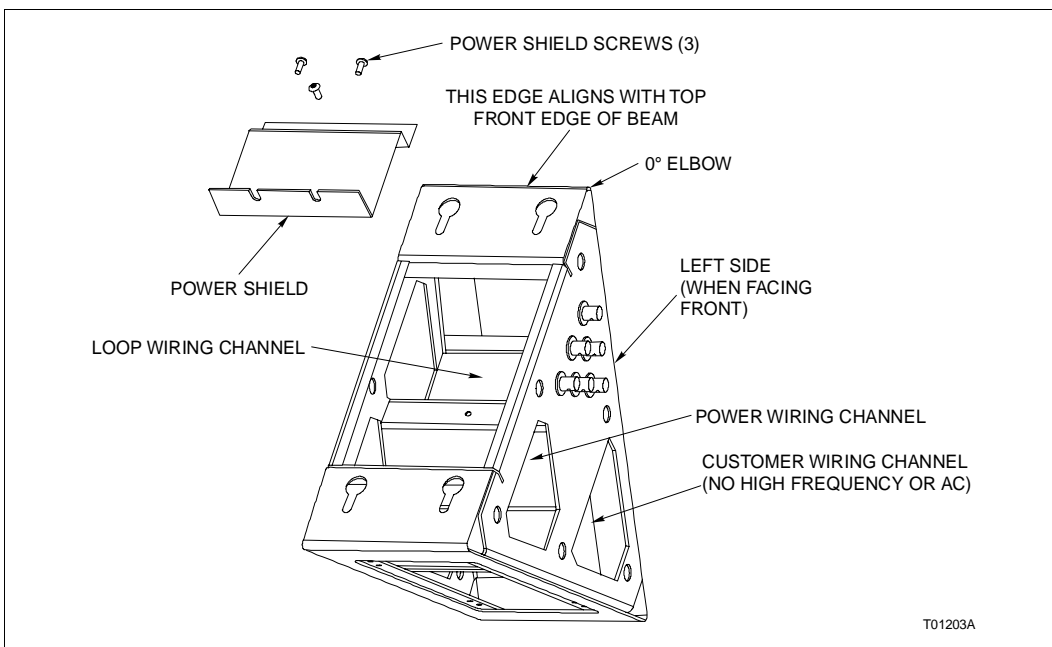


Figure PR25-2. Elbow (Typical)

- 4. Use the flat blade screwdriver to remove the terminal block screws and insert the three wires provided with each elbow to match the configuration shown in Figure PR25-3.
- 5. Run the wires through the power wiring channel in the elbow and connect them to the terminal block in the next beam.
- 6. Continue in this manner until all beam wiring is completed.

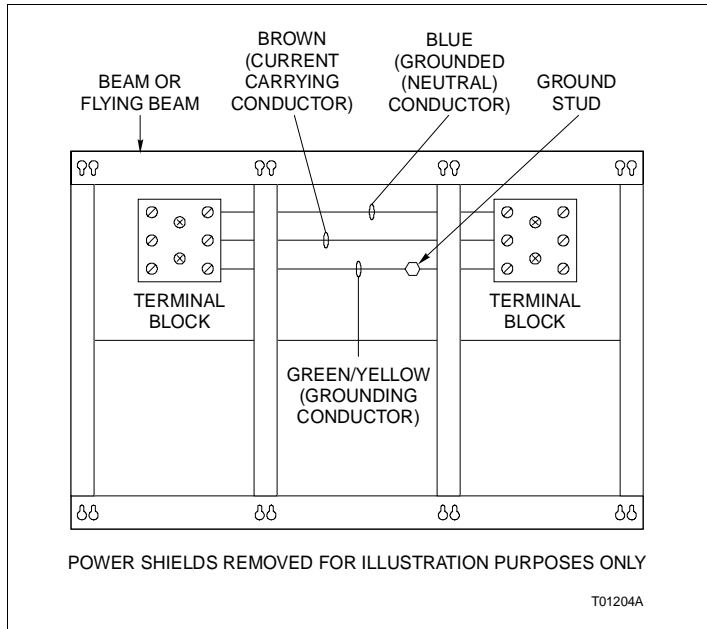


Figure PR25-3. Beam Power Bus

- 7. Connect the customer-supplied power wiring to the appropriate terminal blocks and run it down through the base pedestal to get to the desired PEPs.
- 8. Use the small-tipped flat blade screwdriver to loosen the PEP terminal block screws (Fig. PR25-4).
- 9. Insert the wires in the appropriate locations on the PEP terminal block.

NOTE: The power entry panel terminal block may be removed prior to inserting the wires.
- 10. Use the small-tipped flat blade screwdriver to tighten the PEP terminal block screws.
- 11. Bring the power wiring from the service up through one of the cable entry cutouts in the bottom of the base pedestal of the beam in which the power wiring will be connected and run it up to the beam. Figure PR25-5 shows the location of the cable entry cutouts.

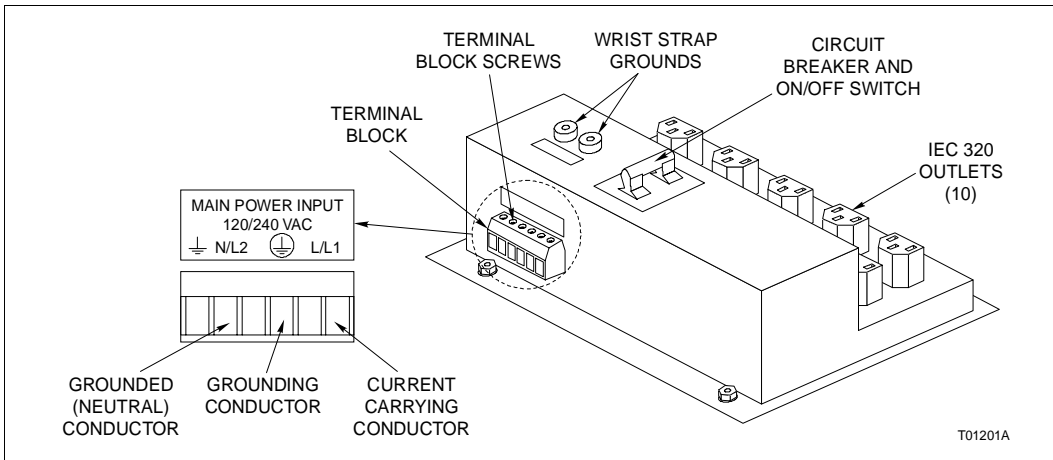


Figure PR25-4. Power Entry Panel (PEP)

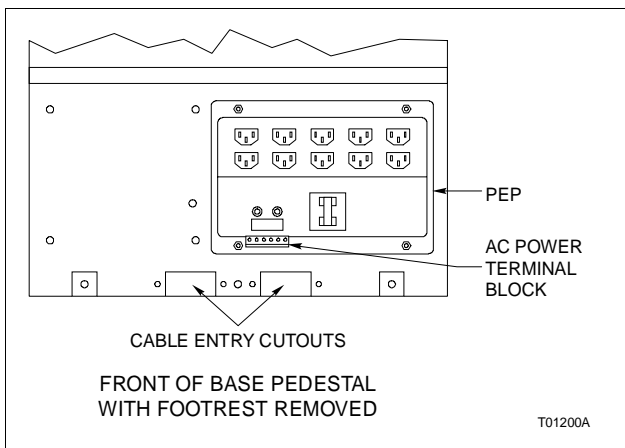


Figure PR25-5. Cable Entry Cutout and PEP Locations

- 12. Insert those wires into the appropriate positions in the beam terminal block.
- 13. Use the flat blade screwdriver to tighten all beam terminal block screws.
- 14. Using the M4 Allen wrench, install all the power shields.
- 15. Replace the beam top covers.



□



16. Verify that the voltage switch setting on the rear of the CPU for C-I-SV43S-M, C-I-SV43S-T and C-I-SV43S-X workstations (Fig. PR25-6) and the power input module for the lifting mechanism (Fig. PR25-7) on all workstations (if supplied) are set to the proper input voltage level.

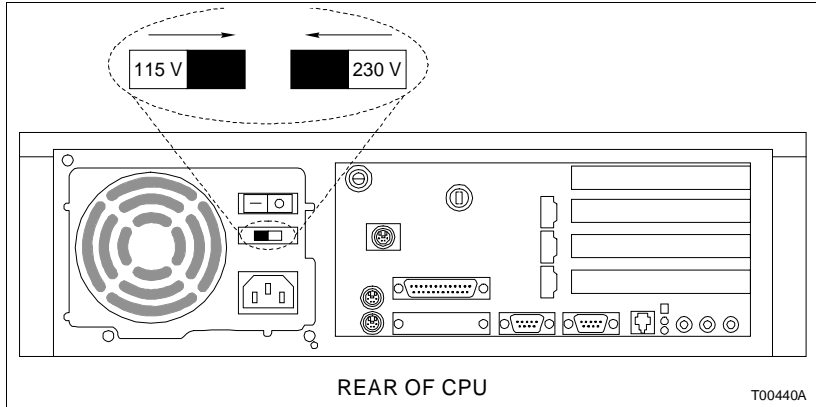


Figure PR25-6. C-I-SV43S-M, C-I-SV43S-T and C-I-SV43S-X Workstation CPU

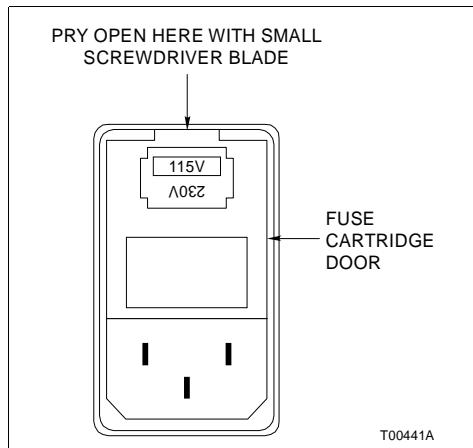


Figure PR25-7. Lifting Mechanism Power Input Module

Keyboard and Pointing Device Installation



PR26

Purpose/Scope

1 min.

This procedure explains how to install the keyboard and pointing devices (mouse and trackball).

Parts

Number	Qty	Description
6641684?11	1	Keyboard assembly with floppy disk drive, English language
6641684?13		Keyboard assembly with floppy disk drive, Russian language
6641684?16		Keyboard assembly with floppy disk drive, Norwegian/Danish language
6641684?17		Keyboard assembly with floppy disk drive, Swedish language
6641684?21		Keyboard assembly without floppy disk drive, English language
6641684?23		Keyboard assembly without floppy disk drive, Russian language
6641684?26		Keyboard assembly without floppy disk drive, Norwegian/Danish language
6641684?27		Keyboard assembly without floppy disk drive, Swedish language

Tools None.

Procedure

1. The keyboard stud comes taped to the top of the keyboard. Remove it and install it in the location shown in Figure [PR26-1](#).
2. Attach the keyboard cables, which come through the cable opening in the work surface (Fig. [PR26-2](#)), to the keyboard.
3. Install the pointing device (if supplied) into the proper receptacle.

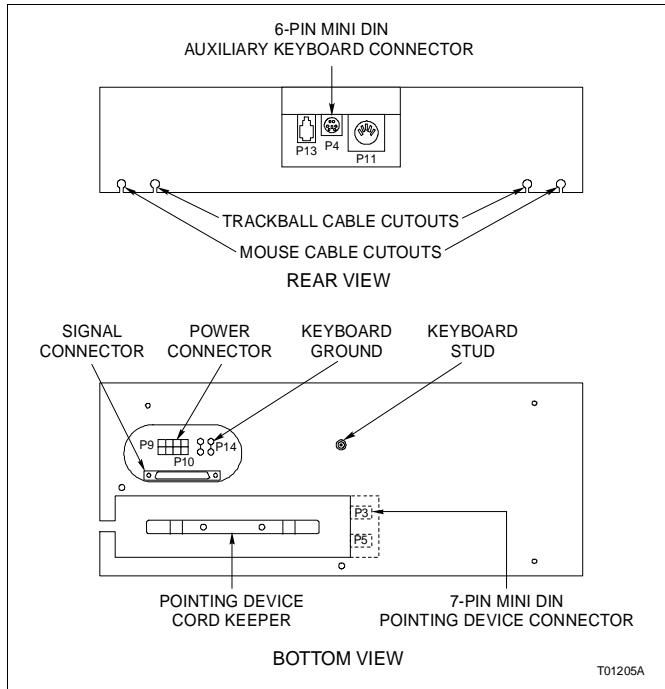


Figure PR26-1. Keyboard and Pointing Device Connections

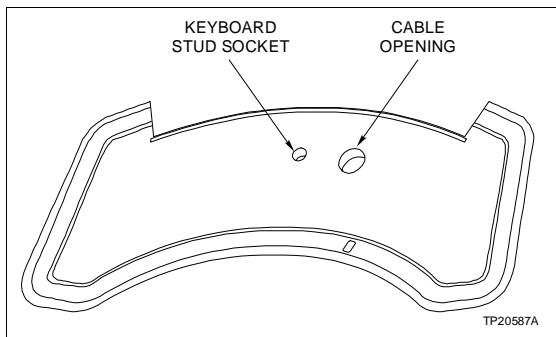


Figure PR26-2. Keyboard Openings (Typical)

- 4. Determine how much pointing device cable is needed and wrap the rest around the pointing device cord keeper on the bottom of the keyboard.
- 5. Install the pointing device cord into the pointing device cut-outs as desired for left or right-handed operation.

- 6. Align the keyboard stud attached to the bottom of the keyboard with the keyboard stud socket in the work surface and snap it into place.





Purpose/Scope

50 min.

This procedure explains how to connect INFI-NET wiring.

Parts

Number	Qty	Description
6641832?1	1 per beam	Loop bundle

Tools None.

Procedure

1. Unlock and remove the beam top covers by sliding the beam top cover toward the front of the beam. Once unlocked, lift the beam top covers off of the beam.
2. Bring the INFI-NET cables to the first main terminal up through one of the cable entry cutouts in the bottom of the base pedestal. Figure [PR27-1](#) shows the location of the cable entry cutouts.
3. Connect them to the proper IN connectors on the loop TU.
4. Separate the loop bundle cables.
5. Connect them, as required, to the proper OUT connectors on the loop TU.
6. Run those cables up through the base pedestal and into the beam.
7. Connect them to the proper elbow loop connectors as shown in Figure [PR27-2](#).
8. Connect the cables in the next beam to the other side of the elbow loop connectors.
9. If the next bay is anything but a main terminal, run the cables through the beam and attach them to the loop connectors in the next elbow. If the next bay is a main terminal, run



the cables down from the beam into the base pedestal and connect them to the proper IN connectors on the loop TU.

- 10. Continue in this manner until all of the bays in the array are wired.
- 11. To go from array to array, use the cable entry cutouts in the bottom of the base pedestal.
- 12. Replace the beam top covers.

NOTE: Using twinaxial cable invalidates the CE mark.

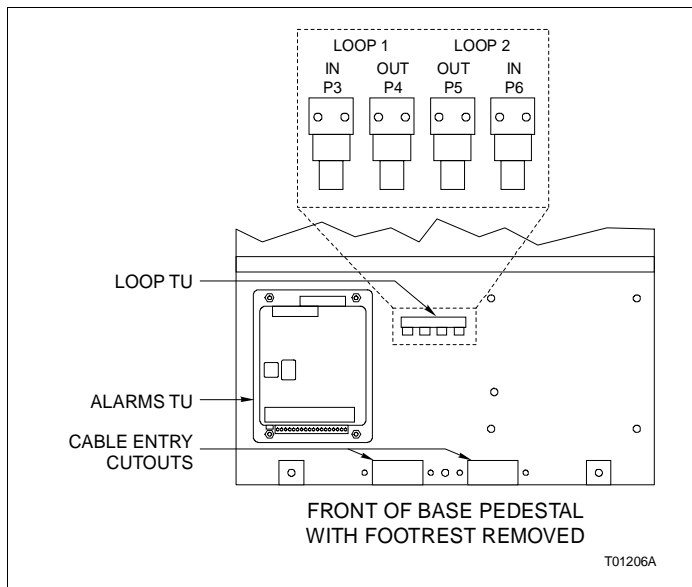


Figure PR27-1. Cable Entry Cutouts and Loop TU

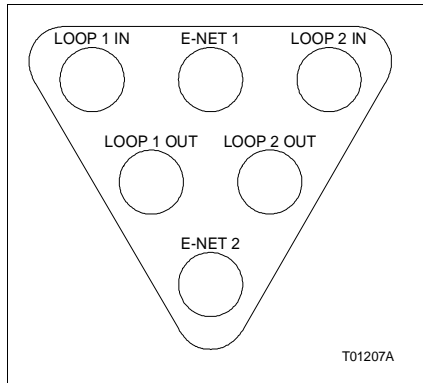


Figure PR27-2. Elbow Loop Connectors





Purpose/Scope

50 min.

This procedure explains how to connect Ethernet wiring.

Parts

Number	Qty	Description
6641832?1	1	Loop bundle (per beam)

Tools None.

Procedure

Ethernet is a network protocol complying with IEEE Standard 802.3. It is a CSMA/CD protocol (with no token). All devices on the ethernet network listen to the data transmissions. When the line is open, a device with a message to send can transmit at a rate of up to ten megahertz. The ethernet link supports DECnet™ and TCP/IP protocol. Refer to the CPU documentation for more information.

Follow these ethernet configuration rules closely to correctly set up the network.

- An Ethernet message can pass through up to two repeaters or network bridges before it reaches its destination.
- Ethernet networks require a terminator at each end of the cable.

NOTES:

1. Be careful using hardware from more than one manufacturer. Similar parts can have different specifications that can limit performance.
 2. This procedure is a general procedure. Its intention is to indicate where the cables connect and how they run between bays and arrays.
 3. Refer to [Appendix D](#) for information on redundant Ethernet networks.
1. Unlock and remove the beam top covers by sliding the beam top cover toward the front of the beam. Once unlocked, lift the beam top covers off of the beam.



- 2. Connect the Ethernet cable directly to the tee that is attached to the Ethernet port on the back of the CPU.
- 3. Separate the loop bundle cables.
- 4. Run the cable from the CPU through the base pedestal and into the beam.
- 5. Connect it to the proper elbow loop connector as shown in Figure PR28-1.

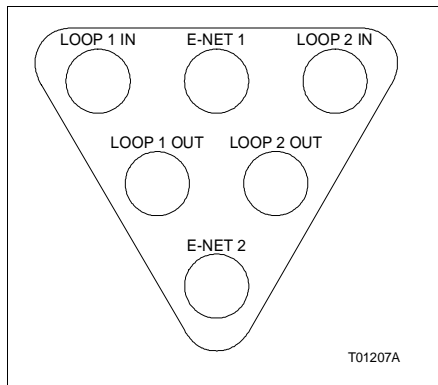


Figure PR28-1. Elbow Loop Connectors

- 6. Connect the cable in the next beam to the other side of the elbow loop connector.
- 7. Depending on the configuration, either run the cable through the beam and attach it to the loop connector in the next elbow, or run the cable down from the beam into the base pedestal and connect it to the Ethernet connector on the back of the CPU.
- 8. Continue in this manner until all of the bays in the array are wired.
- 9. To go from array to array, use the cable entry cutouts in the bottom of the base pedestal.
- 10. When completed with the Ethernet wiring, install the beam top covers.

Standard Ethernet Configurations

Figures PR28-2 and PR28-3 show standard Ethernet connections. The maximum total length of the workstation thinwire segment is 185 meters (607 feet).

Alternative Connections to Plant Wide Networks

In general, network bridges connect one network to another. Although a repeater can be used, a bridge provides better performance and security because it can be programmed to pass all or some of the message signals. A repeater will pass all of the message signals.

The direct barrel connection is another type of connection. Direct barrel connections between thinwire and thickwire are not permitted. Direct transceiver-to-transceiver connections are not permitted. Figure PR28-4 shows connections to a plant wide thickwire network.

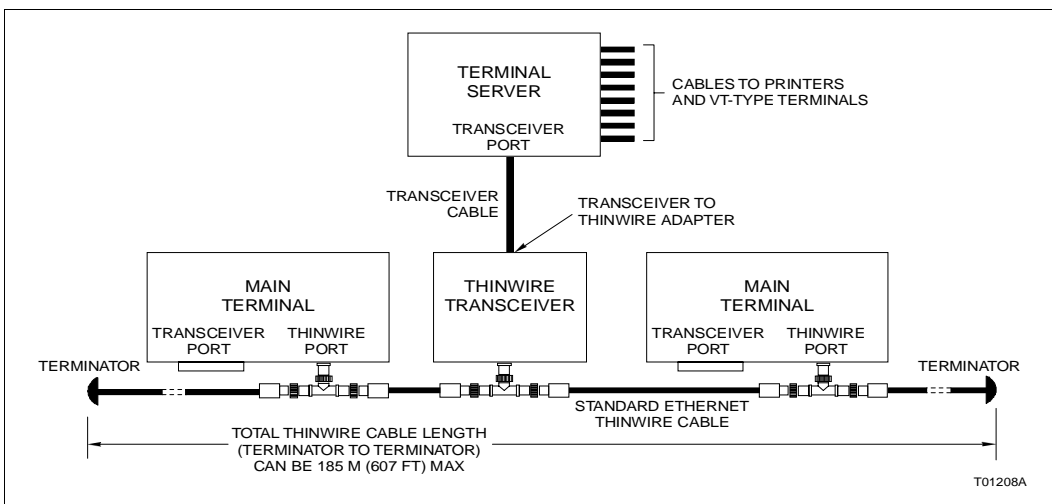


Figure PR28-2. Ethernet Thinwire (Isolated Network Workstation)

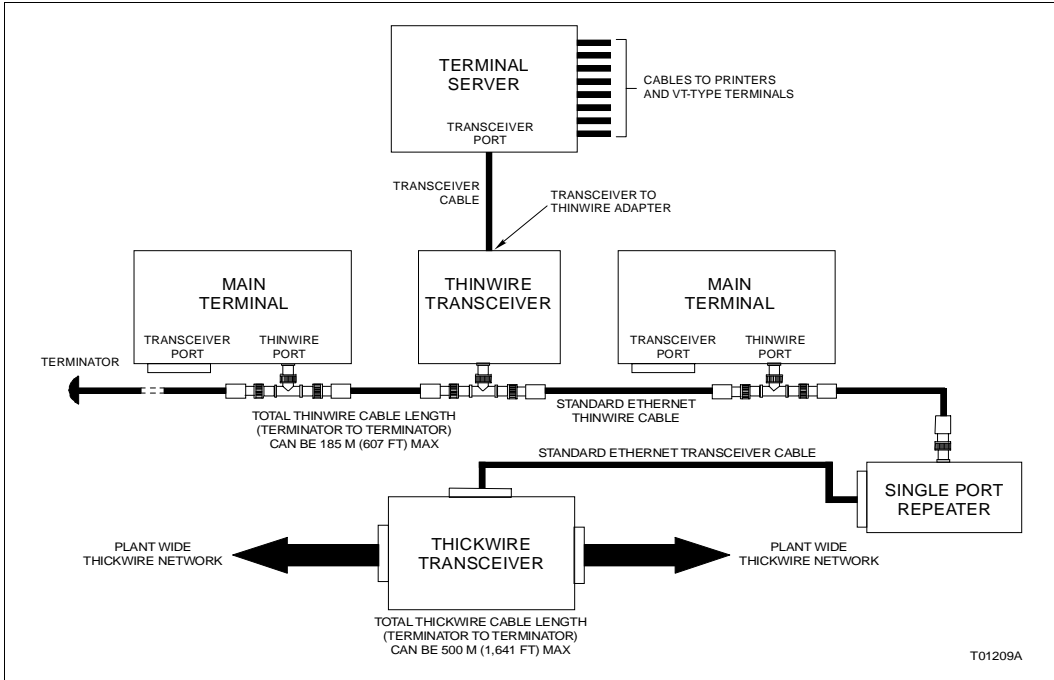


Figure PR28-3. Ethernet Thinwire to Plant Wide Thickwire Network (Standard)

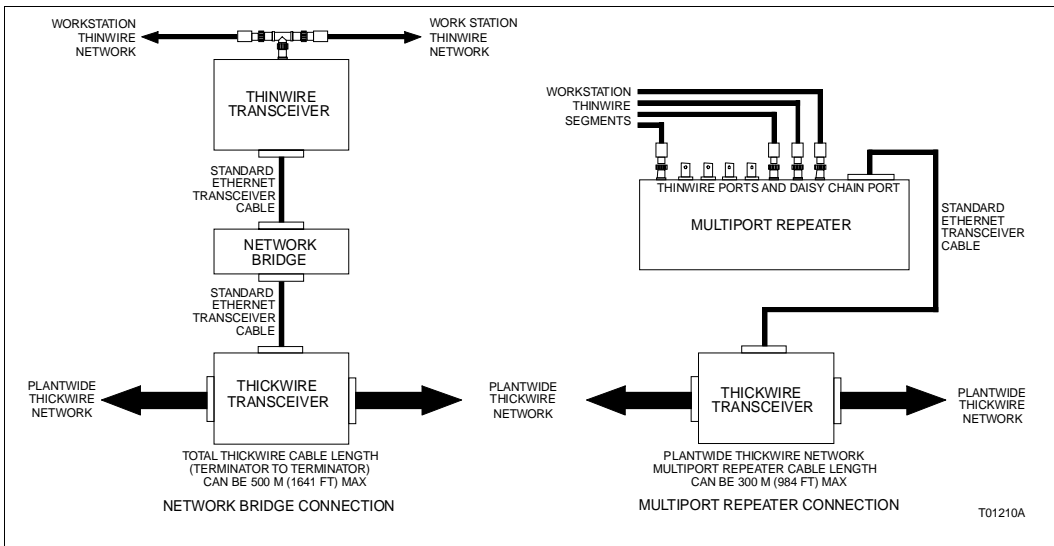


Figure PR28-4. Ethernet Thinwire to Plant Wide Thickwire Network (Alternative)

Concentrator Configuration

A concentrator replaces a thickwire segment and several (the exact number depends on manufacturer and model) transceivers with a single box. This box allows several devices (workstations, terminal servers, etc.) to connect to the plant wide network through only one device as opposed to multiple transceivers and cable segments. Refer to Figure PR28-5 for an example.

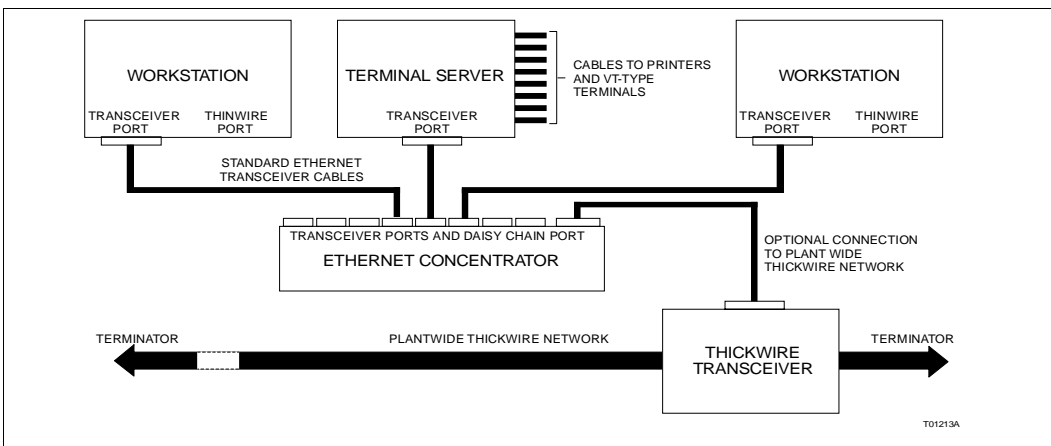


Figure PR28-5. Concentrator Configuration



C-I-SV43S-C Workstation

Wiring



PR29

Purpose/Scope

20 min.

This procedure explains how to connect cables from C-I-SV43S-C workstations to C-I-SV43S-T or C-I-SV43S-X workstations.

Parts None.

Tools None.

Procedure

Once the C-I-SV43S-C workstations are installed, there are as many as five cables that need to be connected to an adjacent C-I-SV43S-T or C-I-SV43S-X workstation. All of the cables are laid in the beam channel when the workstation is shipped from the factory.

1. Unlock and remove the beam top covers by sliding the beam top cover toward the front of the beam. Once unlocked, lift the beam top covers off of the beam.
2. Connect the lifting mechanism power cable to P6 on the PEP of the adjacent workstation (Fig. [PR29-1](#)).
3. Connect the monitor power cable to P8 on the PEP of the adjacent workstation.
4. Connect the VGA cable that comes from the PC video connector on the monitor to the BNC connectors in the adjacent beam.
5. Connect the beam/touchscreen cable that comes from P3 of the beam distribution board to P3 on the beam distribution board in the adjacent beam (Fig [PR29-2](#)).
6. Connect the beam/ADP cable that comes from P10 on the beam distribution board to P10 on the beam distribution board on the adjacent workstation.
7. Install the beam top covers.

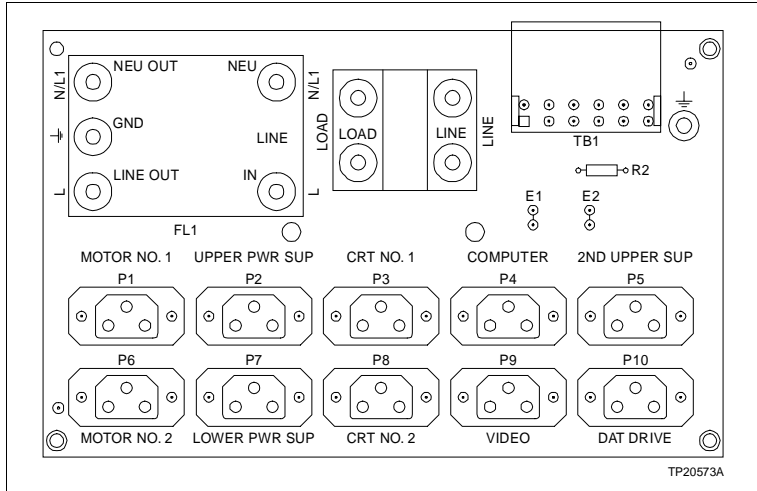


Figure PR29-1. Power Entry Panel (PEP)

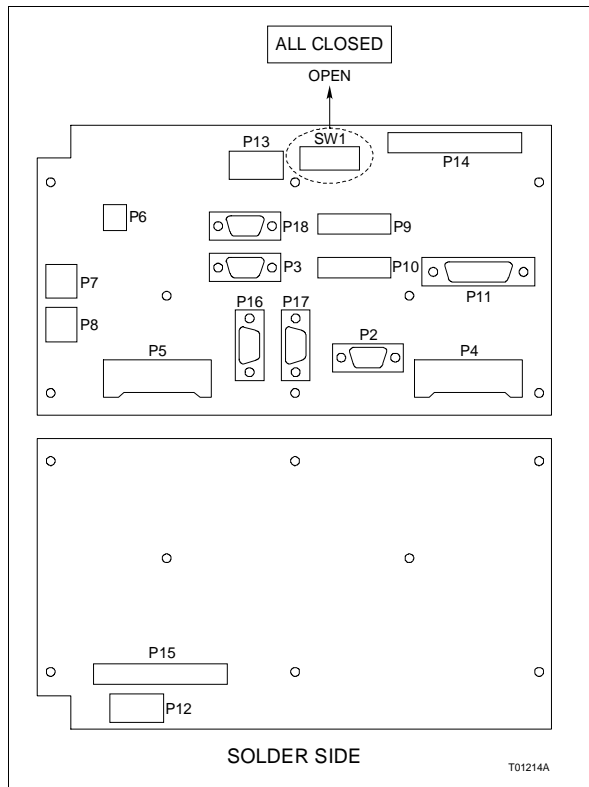


Figure PR29-2. Beam Distribution Board

Auxiliary Panel Equipment Installation



PR30

Purpose/Scope

1 hr

This procedure explains how remove and install the front panel of the auxiliary panel.

Parts None.

- Tools
- Phillips head screwdriver.
 - 2.5-mm nut driver.
 - 8-mm box wrench.

Procedure

The auxiliary panel bay houses customer-installed equipment such as phones, controllers, emergency shutoff switches and other devices normally found in control rooms.

This procedure provides instructions to remove and install the front panel so that cutouts can be made on the workbench. The other information given here is for reference. The customer equipment installation, cooling and wiring procedures are the responsibility of the customer.

The auxiliary panel provides rails for tail brace supporting brackets in cases where heavy equipment is installed. These support brackets are the responsibility of the customer and are not included in this procedure.

The auxiliary panel uses a natural convection cooling methodology. In the upper half, a series of slots in the front of the base pan allow cool air to enter. The rising warmed air will exit at the upper rear through the vent cover. It is possible to mount cooling fans inside the auxiliary panel bay. Possible locations for these fans might be directly behind the vent cover (air blowing out) or behind the slots in the base pan (air blowing in).

The lower half of the auxiliary panel bay contains no active cooling, although fans can be mounted in the side castings of the base pedestal bay. A power source (12 VDC) and power cabling are also required. Fan installation and cooling are the responsibility of the customer and will not be covered here.



Maintain proper spacing of power and signal wiring within the auxiliary panel. Consult local safety codes and the National Electric Code. Wiring for the auxiliary panel is the responsibility of the customer.

Custom panel cutouts and fan installation can be ordered as special options from Elsag Bailey.

- 1. Use the 2.5-mm socket driver to remove the three vent cover screws and lockwashers (Fig. PR30-1).

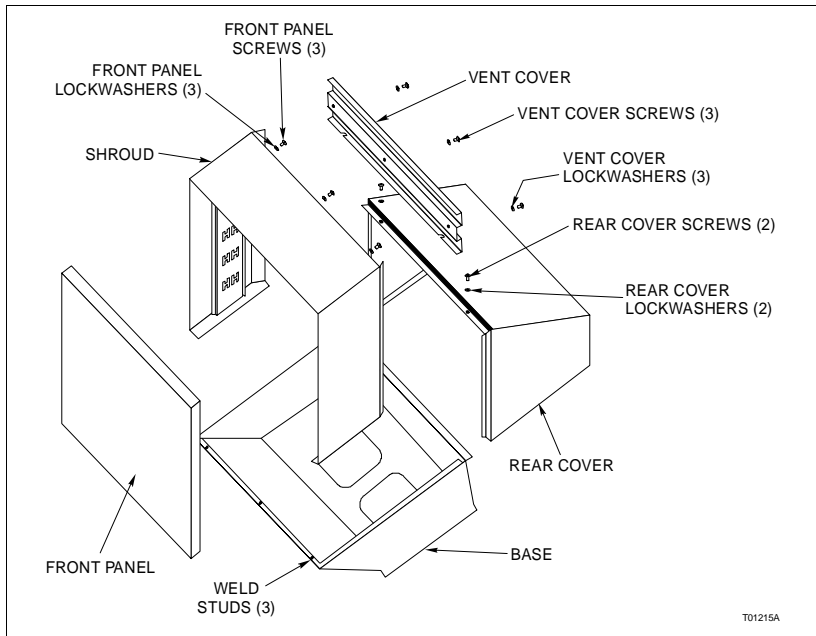


Figure PR30-1. Auxiliary Panel

- 2. Remove the vent cover.
- 3. Use the 2.5-mm socket driver to remove the two rear cover screws and lockwashers.
- 4. Remove the rear cover.
- 5. Use the Phillips head screwdriver to remove the three front panel screws and lockwashers that secure the front panel to the lip of the shroud.

- 6. Use the 8-mm box wrench to remove the three front panel nuts and lockwashers that secure the lower lip of the front panel to the weld studs in the base.
- 7. Lift the front panel off of the base.
- 8. Make the cutouts for customer-installed equipment. Figure PR30-2 shows the allowable cutout area.

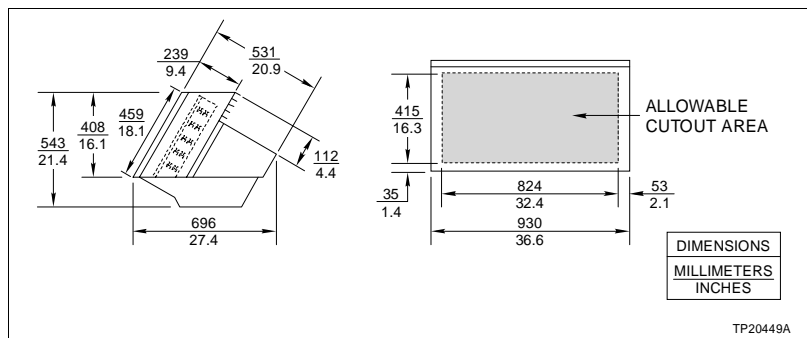


Figure PR30-2. Auxiliary Panel Customer Cutout Area

- 9. Install the customer equipment in the front panel.
- 10. Place the front panel over the weld studs in the base.
- 11. Install the three front panel nuts and lockwashers and tighten them with the 8-mm box wrench.
- 12. Install the three front panel screws and lockwashers and tighten them with the Phillips head screwdriver.
- 13. Route the customer equipment wiring.
- 14. Install the rear cover by installing the two rear cover screws and lockwashers and tightening them with the 2.5-mm socket driver.
- 15. Install the vent cover by installing the three vent cover screws and lockwashers and tightening them with the 2.5-mm socket driver.





Purpose/Scope

10 min.

This procedure explains how to replace the IIMLM01 module. It applies when removing the module to set it up during installation or when replacing it due to failure.

Parts IIMLM01 module (only if replacing with a new one).

Tools • Phillips head screwdriver.

Safety Considerations

WARNING

1. There are exposed AC and DC connections inside the cabinet. These exposed electrical connections present a shock hazard that can cause injury or death.

Procedure



1. Remove power from the workstation.



2. Remove all cables from the front of the NIU card cage.



3. Use the Phillips head screwdriver to remove the two NIU front cover screws (Fig. [PR31-1](#)).

NOTES:

1. Follow the proper procedures for working with static sensitive devices when performing this procedure.

2. There are two wrist strap grounds, E3 and E4 on the NIU backplane to ground personnel while performing these procedures.

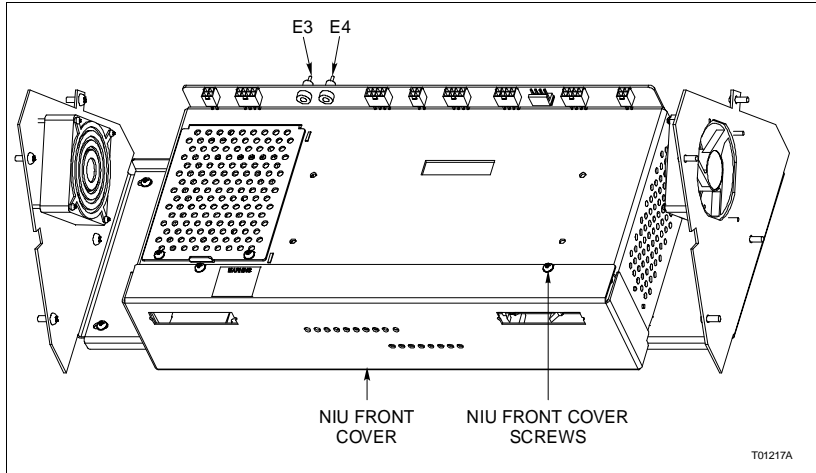


Figure PR31-1. NIU Card Cage with Covers Installed

- 4. Slowly remove the NIU front cover being careful not to pinch any wires between the NIU front cover and the NIU card cage.
- 5. Unplug and remove the IIMLM01 module from the NIU backplane (Fig. PR31-2).

NOTE: If setting up the IIMLM01 module during installation, perform the rest of the procedure with the original module. If replacing it, perform the rest of the procedure on the new module.

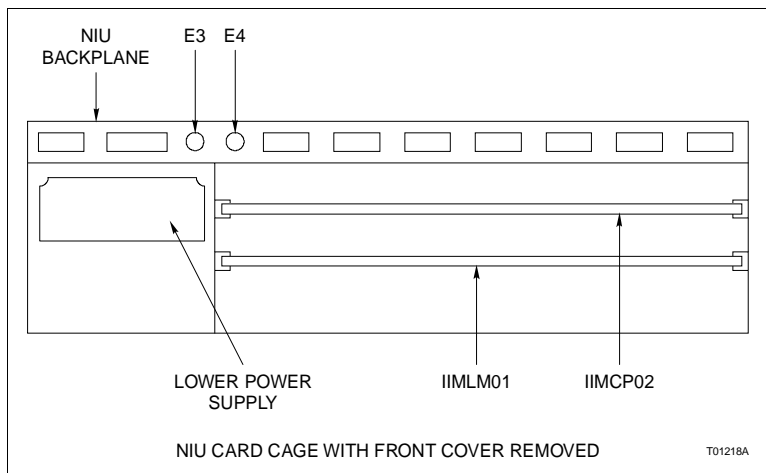


Figure PR31-2. NIU Card Cage with Covers Removed

- 6. Refer to Figure PR31-3 and Table PR31-1 and set the jumpers and switches as desired, filling in the customer settings in Figure PR31-3 and Table PR31-1.

NOTE: The settings shown in Figure PR31-3 and the bold entries in Table PR31-1 indicate factory default settings.

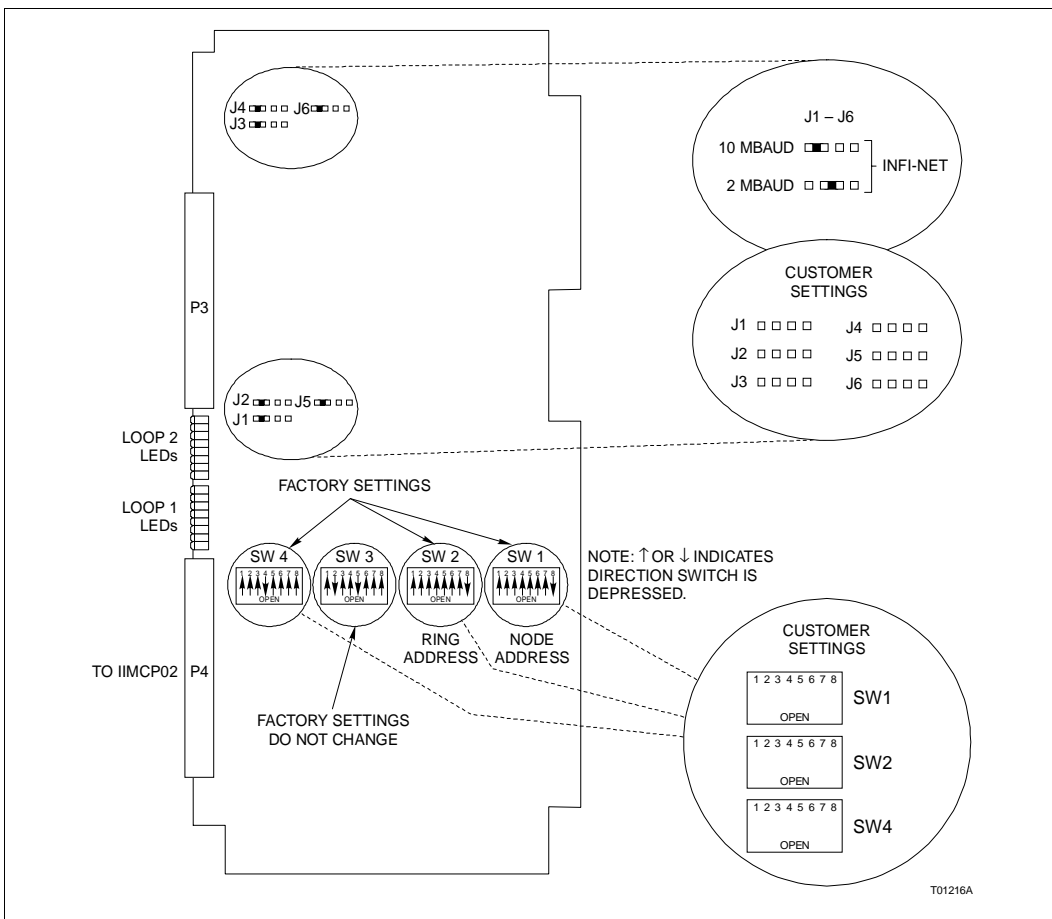


Figure PR31-3. IIMLM01 Module

Table PR31-1. IIMLM01 Switch Settings

Switch ¹	Position	Description	Switch Setting ²	Customer Setting
SW1	1-8	Loop node number	1-0FA hex (pole 8 is LSB)	
SW 2	1-8	Ring number	1-0FA hex (pole 8 is LSB)	



Table PR31-1. IIMLM01 Switch Settings *(continued)*

Switch ¹	Position	Description	Switch Setting ²	Customer Setting
SW3	1	Device compatibility	0 = MCP	
			1 = BCM	
	2	ROM checksumming	0 = no checksumming	
			1 = checksumming enabled	
	3	Run mode	0 = normal operation	
			1 = test mode	
	4	Busy test	0 = normal operation	
1 = busy NAK all loop messages if run mode switch set to 1				
5	Broken loop indication	0 = disable flashing of LEDs		
		1 = normal operation		
6	Diagnostic enable	0 = normal operation		
		1 = diagnostics enabled - normal operation disabled		
7-8	Loop type	00 = 10-MHz INFI-NET system		
		01 = 2-MHz INFI-NET system		
		10 = undefined		
		11 = plant loop system		
SW4	1-3	I/O expander bus address select	0-7	
	4-8	LED display select	0-1F hex	

NOTES:

- 1. 0 = closed or on, 1 = open or off.
- 2. Items in bold indicate factory default settings.

- 7. Install the module into the proper slot in the NIU card cage and gently press it into place.
- 8. Install all of the cables removed in Step 2.
- 9. Install the NIU front cover, being careful not to pinch any wires between the NIU front cover and the NIU card cage.



Purpose/Scope

10 min.

This procedure explains how to replace the IIMCP02 module. It applies when removing the module to set it up during installation or when replacing it due to failure.

Parts IIMCP02 module (only if replacing with a new one).

Tools • Phillips head screwdriver.

Safety Considerations

WARNING

1. There are exposed AC and DC connections inside the cabinet. These exposed electrical connections present a shock hazard that can cause injury or death.

Procedure



1. Remove power from the workstation.



2. Remove all cables from the front of the NIU card cage.



3. Use the Phillips head screwdriver to remove the two NIU front cover screws (Fig. [PR32-1](#)).

NOTES:

1. Follow the proper procedures for working with static sensitive devices when performing this procedure.

2. There are two wrist strap grounds, E3 and E4 on the NIU backplane to ground personnel while performing these procedures.

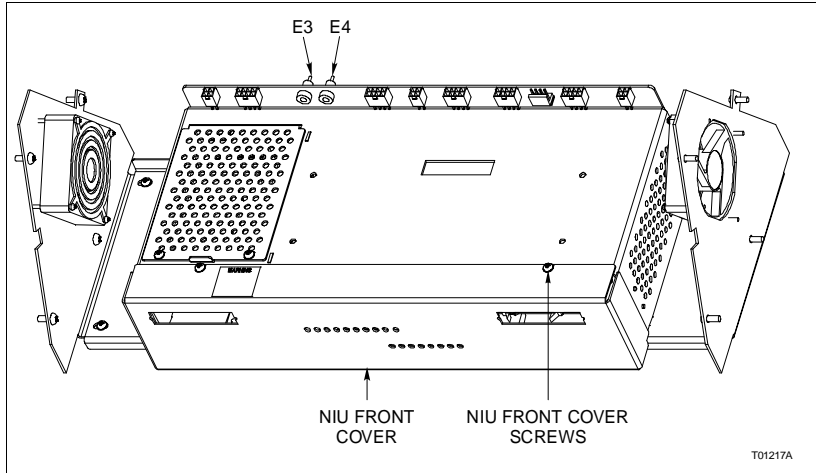


Figure PR32-1. NIU Card Cage with Covers Installed

- 4. Remove the NIU front cover, being careful not to pinch any wires between the NIU front cover and the NIU card cage.
- 5. Unplug and remove the IIMCP02 module from the NIU backplane (Fig. PR32-2).

NOTE: If setting up the IIMCP02 module during installation, perform the rest of the procedure with the original module. If replacing it, perform the rest of the procedure on the new module.

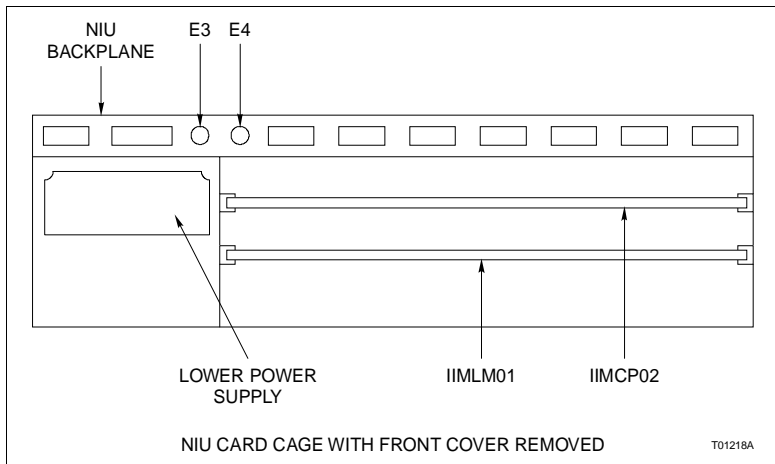


Figure PR32-2. NIU Card Cage with Covers Removed

- 6. Refer to Figure PR32-3 and Table PR32-1 and set the jumpers and switches as desired, filling in the customer settings in Figure PR32-3 and Table PR32-1.

NOTES:

1. The settings shown in Figure PR32-3 and the bold entries in Table PR32-1 indicate factory default settings.
2. The jumper settings shown in Figure PR32-3 are factory set and should not be changed; however, verify that they are in their correct positions.

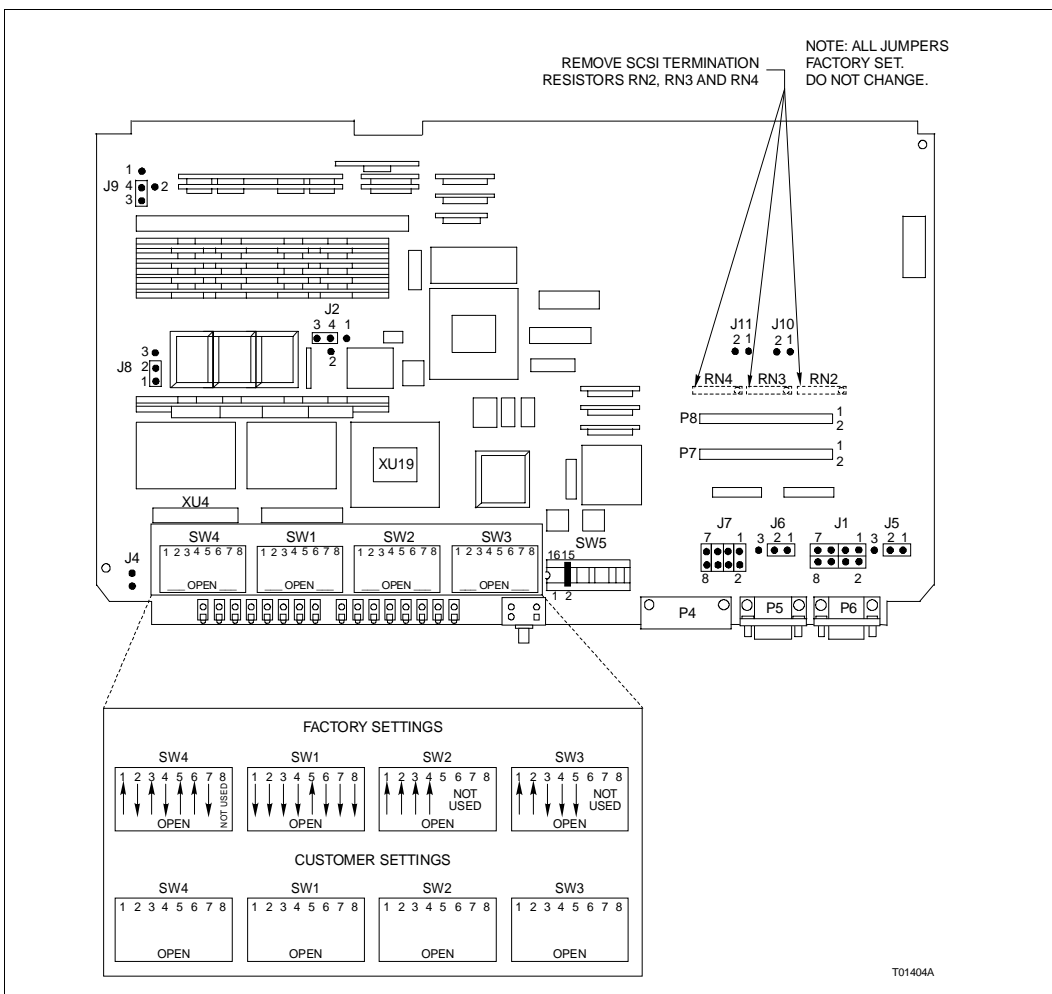


Figure PR32-3. IIMCP02 Module



Table PR32-1. IIMCP02 Switch Settings

Switch ¹	Position	Description	Switch Setting ²	Customer Settings
SW1	1-4	Port A (P5) baud rate	1111 = 19200	
	5-8	Port B (P6) baud rate	0111 = 9600	
SW2	1	MLM handshake timeout	0 = enabled	
			1 = disabled	
	2	MLM diagnostics	0 = disabled	
			1 = enabled	
	3	Diagnostic utilities	0 = disabled	
			1 = enabled	
4	Hardware diagnostics	0 = disabled		
		1 = enabled		
5-8	Not used	—		
SW3	1	SCSI port	0 = disabled	
			1 = enabled	
	2-4	SCSI address	011	
	5	SCSI parity checking	0 = disabled	
1 = enabled				
6-8	Not used	111		
SW4	1	ROM checksumming	0 = enabled	
			1 = disabled	
	2-3	Serial port settings	00 = 8 data, 1 stop, no parity	
			01 = 8 data, 1 stop, even parity	
			10 = 8 data, 1 stop, odd parity	
			11 = 8 data, 2 stop, no parity	
	4	Port B (P6) mode	0 = NIU command mode	
			1 = NIU utility mode	
	5	Modem password protection	0 = disabled	
			1 = enabled	
6	Port addressing mode	0 = disabled		
		1 = enabled		
7	Command checksumming	0 = disabled		
		1 = enabled		

Table PR32-1. IIMCP02 Switch Settings (continued)

Switch ¹	Position	Description	Switch Setting ²	Customer Settings
SW4 (continued)	8	Not used	—	

NOTES:

1. 0 = closed or on, 1 = open or off.
2. Items in bold indicate factory default settings.

- 7. Install the module into the proper slot in the NIU card cage and gently press it into place.
- 8. Install all of the cables removed in Step 2.
- 9. Install the NIU front cover, being careful not to pinch any wires between the NIU front cover and the NIU card cage.





Purpose/Scope

20 min.

This procedure explains how to install the IIPRT02 printer.

Parts

Number	Qty	Description
1947422?210??	1	Printer cable (?? specifies length)
IIPRT02	1	Black and white printer

Tools None.

Safety Considerations

CAUTION

1. Make sure that all voltage labels and voltage switch settings on the peripheral devices, power supply, and power entry panel show the correct operating voltage. Equipment damage may result if the incorrect voltage is connected. Make sure the console main power circuit breaker is off before changing operating voltage settings or equipment damage may result.
2. Remove power from all peripheral equipment and the console before installing or removing peripheral equipment. Equipment damage may result.

Procedure

Printers can be connected to either a terminal server (IIPRS02) for main terminals or the printer port on auxiliary terminals. A maximum of four logging printers can be accessed by the workstation. Shared printers must be connected to a terminal server on the Ethernet link.



The terminal server has DB-25 style connectors. A null modem cable connects the printer to any of the terminal server ports.

The **DEFINEDEVICES** command must be completed for the software to recognize the printer. Refer to the **File Utilities, Conductor VMS** instruction.



The line cord must have isolated safety ground referenced to the same point as the workstation electronics safety ground, without connection to conduit/structural ground. The AC receptacle must be an isolated ground duplex type.

NOTE: Use the front feed as the paper source.

-  1. Verify that all voltage switch settings are correct.
-  2. Remove power from the peripheral device, the workstation and all related equipment.
- 3. Connect one end of the printer cable to the DB-25 serial connector of the printer (Fig. PR33-1).

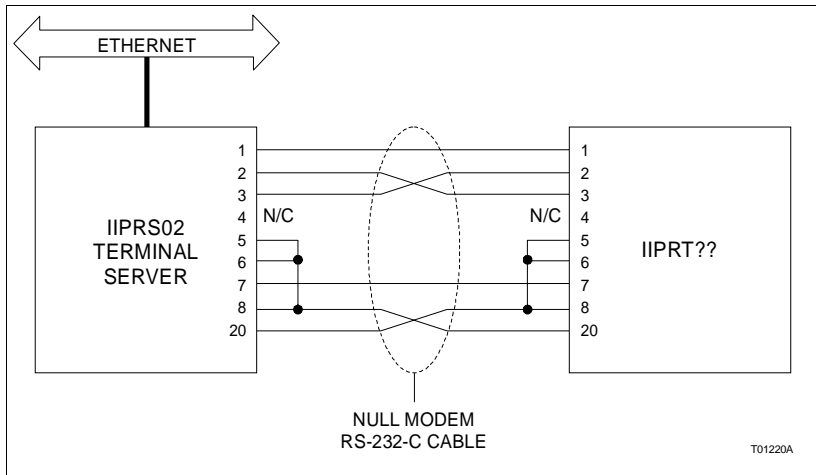


Figure PR33-1. Printer Cable Configuration

- 4. Connect the other end of the printer cable to the terminal server.
- 5. Tighten the connector hood screws.
- 6. Connect the power cable to the printer.
- 7. Connect the other end of the power cable to a local AC outlet.
- 8. Turn on the printer power.

9. Follow the manufacturer's instructions to print out the system configuration.

NOTE: Be sure to print out the system configuration as opposed to the current configuration.

10. If the system configuration values in the printout do not agree with those shown in Table PR33-1, follow the manufacturer's instructions to select the appropriate item and make the changes.

Table PR33-1. IIPRT02 Printer Settings

Top Level	Sub Level	Setting
CONTROLLER: 78406524 REL: 2.14 44A516665-G20 GENERATOR: 78406525 REL: 1.02 44A516665-G50		
SYSTEM PARAMETERS		
CHARACTER SET	EPSON®	ITALIC
	IBM®	CS1
	ANSI	CS1
NATIONAL SET	EPSON	USA
	ANSI	USA
CHARACTER TABLE	EPSON	CODE 437
	IBM	CODE 437
	ANSI	CODE 437
LCD LANGUAGE	—	ENGLISH
IBM OPTIONS	COMP CHR	17
	AUTO CR	NO
ANSI OPTIONS	RIS ENABLE	YES
	SI/SO CTL	NO
	AUTO CR	NO
	PRIME ON DEL	NO
	CONTRL IN DG	YES
	EXPAND UP	YES
	ALT GRAPHICS	NO
	8 BIT CTRL	NO
ENQ CODE	NO	



Table PR33-1. IIPRT02 Printer Settings *(continued)*

Top Level	Sub Level	Setting
ANSI OPTIONS <i>(continued)</i>	S/SUB SCRIPT	NO
	ESC+CTRL CODE	NO
	VT NOT SET	YES
	FIXED FONTS	NO
OTHER OPTIONS	AUTO LF	NO
	DOUBLE LF	NO
	AUTO WRAP	NO
	AUTO TEAR	NO
	RETRACT TIME	10
	CONFIRM PARK	NO
	PAPER OVERLA	NO
	INTERLOCK	YES
	NVRAM SAVE	YES
	CLEAR MARGIN	YES
	2 BOX OPTION	NO
	CAN CODE	YES
	BACKUP	NONE
	GUARD BAR	NO
	POSTNET COMP	NO
	SLASH ZERO	NO
	BELL ENABLE	YES
	NATIVE COMND	YES
	ONLIN DFAULT	PRIO
	ONLIN AT LOD	NO
RIBBON TYPE	BLACK	
GAP ASSIGN	PATH	
BUFFER SETUP	DOWNLOAD	NO
	BUFF SIZE	32K
	HIGH TRIP	90%
	LOW TRIP	40%
INTERFACE	TYPE	BOTH
	SWITCH TIME	10

Table PR33-1. IIPRT02 Printer Settings (continued)

Top Level	Sub Level	Setting
PARALLEL OPTIONS	AFXT	YES
	SLCT-IN	NO
	RCV DC1/DC3	YES
	INIT ENABLE	NO
	FAULT LEAD	NO
	ACK TIMING	BEF
	STRB POLARIT	-
	FLT POLARITY	-
	SLCT POLARIT	+
	PE POLARITY	+
SERIAL OPTIONS	BAUD RATE	9600
	DATA BITS	8
	PARITY TYPE	NONE
	STX/ACK	NO
	ROBUST XON	NO
	XON/XOF STAT	BUFF
	DTR STATUS	ON/BU
	RTS STATUS	NONE
	SRTS STATUS	ON/BU
	DTR POLARITY	HI
	RTS POLARITY	HI
	SRTS POLARIT	HI
KEY LOCKOUT	ONLINE	NEV
	FF/LOAD	NEV
	LINEFEED	NEV
	MENU	NEV
	PAPER UP	ONL
	PAPER DN	ONL
	TEAROFF	NEV
	PRK/PATH	NEV
FORMAT	ONL	
PATH OPTIONS	TRACTOR	PUSH
	ASF TYPE	NONE

**Table PR33-1. IIPRT02 Printer Settings** *(continued)*

Top Level	Sub Level	Setting
PATH/FORMAT	REAR	CURRENT
	FRONT	CURRENT
	MANUAL	CURRENT
	PULL	CURRENT
	PSHPL	CURRENT
PROGRAM UNITS	—	FIXED
ALIGNMENT	—	0



Purpose/Scope

20 min.

This procedure explains how to install the IIPRT03 printer.

Parts

Number	Qty	Description
1947422?210??	1	Printer cable (?? specifies length)
IIPRT03	1	Color printer

Tools None.

Safety Considerations

CAUTION

1. Make sure that all voltage labels and voltage switch settings on the peripheral devices, power supply, and power entry panel show the correct operating voltage. Equipment damage may result if the incorrect voltage is connected. Make sure the console main power circuit breaker is off before changing operating voltage settings or equipment damage may result.
2. Remove power from all peripheral equipment and the console before installing or removing peripheral equipment. Equipment damage may result.

Procedure

Printers can be connected to either a terminal server (IIPRS02) for main terminals or the printer port on auxiliary terminals. A maximum of four logging printers can be accessed by the workstation. Shared printers must be connected to a terminal server on the Ethernet link.



The terminal server has DB-25 style connectors. A null modem cable connects the printer to any of the terminal server ports.

The **DEFINEDEVICES** command must be completed for the software to recognize the printer. Refer to the **File Utilities, Conductor VMS** instruction.



The line cord must have isolated safety ground referenced to the same point as the workstation electronics safety ground, without connection to conduit/structural ground. The AC receptacle must be an isolated ground duplex type.

NOTE: Use the front feed as the paper source.

-  1. Verify that all voltage switch settings are correct.
-  2. Remove power from the peripheral device, the workstation and all related equipment.
- 3. Connect one end of the printer cable to the DB-25 serial connector of the printer (Fig. PR34-1).

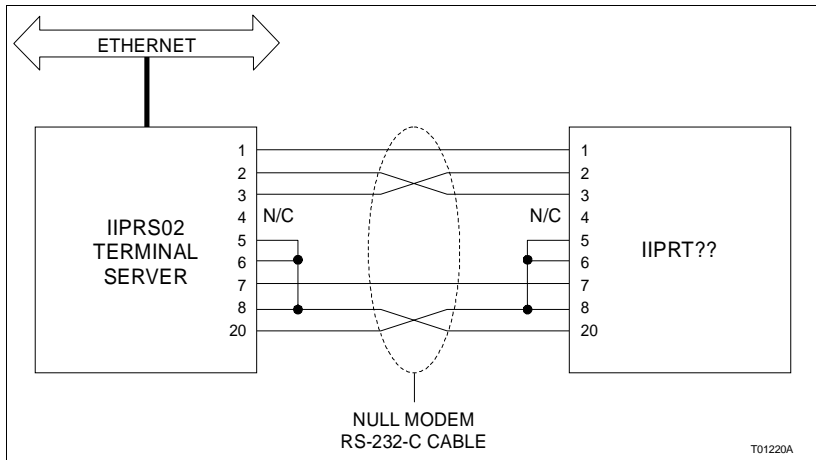


Figure PR34-1. Printer Cable Configuration

- 4. Connect the other end of the printer cable to the terminal server.
- 5. Tighten the connector hood screws.
- 6. Connect the power cable to the printer.
- 7. Connect the other end of the power cable to a local AC outlet.
- 8. Turn on the printer power.

9. Follow the manufacturer's instructions to print out the system configuration.

NOTE: Be sure to print out the system configuration as opposed to the current configuration.

10. If the system configuration values in the printout do not agree with those shown in Table PR34-1, follow the manufacturer's instructions to select the appropriate item and make the changes.

Table PR34-1. IIPRT03 Printer Settings

Top Level	Sub Level	Setting
CONTROLLER: 78406524 REL: 2.14 44A516665-G20 GENERATOR: 78406525 REL: 1.02 44A516665-G50		
SYSTEM PARAMETERS		
CHARACTER SET	EPSON®	ITALIC
	IBM®	CS1
	ANSI	CS1
NATIONAL SET	EPSON	USA
	ANSI	USA
CHARACTER TABLE	EPSON	CODE 437
	IBM	CODE 437
	ANSI	CODE 437
LCD LANGUAGE	—	ENGLISH
IBM OPTIONS	COMP CHR	17
	AUTO CR	NO
ANSI OPTIONS	RIS ENABLE	YES
	SI/SO CTL	NO
	AUTO CR	NO
	PRIME ON DEL	NO
	CONTRL IN DG	YES
	EXPAND UP	YES
	ALT GRAPHICS	NO
	8 BIT CTRL	NO
ENQ CODE	NO	



Table PR34-1. IIPRT03 Printer Settings *(continued)*

Top Level	Sub Level	Setting
ANSI OPTIONS <i>(continued)</i>	S/SUB SCRIPT	NO
	ESC+CTRL CODE	NO
	VT NOT SET	YES
	FIXED FONTS	NO
OTHER OPTIONS	AUTO LF	NO
	DOUBLE LF	NO
	AUTO WRAP	NO
	AUTO TEAR	NO
	RETRACT TIME	10
	CONFIRM PARK	NO
	PAPER OVERLA	NO
	INTERLOCK	YES
	NVRAM SAVE	YES
	CLEAR MARGIN	YES
	2 BOX OPTION	NO
	CAN CODE	YES
	BACKUP	NONE
	GUARD BAR	NO
	POSTNET COMP	NO
	SLASH ZERO	NO
	BELL ENABLE	YES
	NATIVE COMND	YES
	ONLIN DFAULT	PRIO
	ONLIN AT LOD	NO
RIBBON TYPE	FOUR COLOR PROCESS	
GAP ASSIGN	PATH	
BUFFER SETUP	DOWNLOAD	NO
	BUFF SIZE	32K
	HIGH TRIP	90%
	LOW TRIP	40%
INTERFACE	TYPE	BOTH
	SWITCH TIME	10

Table PR34-1. IIPRT03 Printer Settings (continued)

Top Level	Sub Level	Setting
PARALLEL OPTIONS	AFXT	YES
	SLCT-IN	NO
	RCV DC1/DC3	YES
	INIT ENABLE	NO
	FAULT LEAD	NO
	ACK TIMING	BEF
	STRB POLARIT	-
	FLT POLARITY	-
	SLCT POLARIT	+
	PE POLARITY	+
SERIAL OPTIONS	BAUD RATE	9600
	DATA BITS	8
	PARITY TYPE	NONE
	STX/ACK	NO
	ROBUST XON	NO
	XON/XOF STAT	BUFF
	DTR STATUS	ON/BU
	RTS STATUS	NONE
	SRTS STATUS	ON/BU
	DTR POLARITY	HI
	RTS POLARITY	HI
	SRTS POLARIT	HI
KEY LOCKOUT	ONLINE	NEV
	FF/LOAD	NEV
	LINEFEED	NEV
	MENU	NEV
	PAPER UP	ONL
	PAPER DN	ONL
	TEAROFF	NEV
	PRK/PATH	NEV
FORMAT	ONL	
PATH OPTIONS	TRACTOR	PUSH
	ASF TYPE	NONE



Table PR34-1. IIPRT03 Printer Settings *(continued)*

Top Level	Sub Level	Setting
PATH/FORMAT	REAR	CURRENT
	FRONT	CURRENT
	MANUAL	CURRENT
	PULL	CURRENT
	PSHPL	CURRENT
PROGRAM UNITS	—	FIXED
ALIGNMENT	—	0



Purpose/Scope

20 min.

This procedure explains how to install the IIPRT05 printer.

Parts

Number	Qty	Description
1947422?210??	1	Printer cable
IIPRT05	1	High speed black and white printer

Tools None.

Safety Considerations

CAUTION

1. Make sure that all voltage labels and voltage switch settings on the peripheral devices, power supply, and power entry panel show the correct operating voltage. Equipment damage may result if the incorrect voltage is connected. Make sure the console main power circuit breaker is off before changing operating voltage settings or equipment damage may result.
2. Remove power from all peripheral equipment and the console before installing or removing peripheral equipment. Equipment damage may result.

Procedure



Printers can be connected to either a terminal server (IIPRS02) for main terminals or the printer port on auxiliary terminals. A maximum of four logging printers can be accessed by the workstation. Shared printers must be connected to a terminal server on the Ethernet link.

The terminal server has DB-25 style connectors. A null modem cable connects the printer to any of the terminal server ports.

The **DEFINEDEVICES** command must be completed for the software to recognize the printer. Refer to the **File Utilities, Conductor VMS** instruction.



The line cord must have isolated safety ground referenced to the same point as the workstation electronics safety ground, without connection to conduit/structural ground. The AC receptacle must be an isolated ground duplex type.

-  1. Verify that all voltage switch settings are correct.
-  2. Remove power from the peripheral device, the workstation and all related equipment.
- 3. Connect one end of the printer cable to the DB-25 serial connector of the printer (Fig. PR35-1).

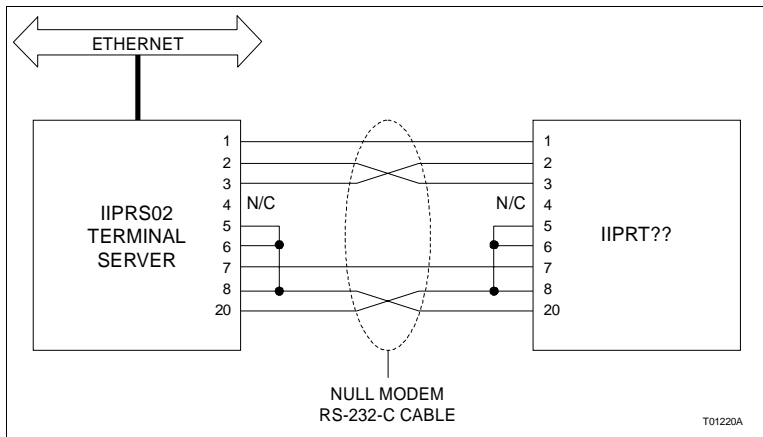


Figure PR35-1. Printer Cable Configuration

- 4. Connect the other end of the printer cable to the terminal server.
- 5. Tighten the connector hood screws.
- 6. Connect the power cable to the printer.
- 7. Connect the other end of the power cable to a local AC outlet.
- 8. Turn on the printer power.
- 9. Press **ON LINE** to get local (LO) mode.
- 10. Press and hold **PRG** to print the current setup.

- 11. Select the applicable printer from the list that follows.
- 12. If the setup values in the text do not agree with those shown in Table PR35-1, select the appropriate item and make the changes.

Table PR35-1. IIPRT05 Printer Settings

Item	Control	Description	Setting
The present configuration is: Firmware: 44A513152 SY - 44A5131531M			
1	Font	Style	44A513153 Data Processing
		CPI	12.0
		Country	USA
		Mode	Normal
		Horizontal expansion	X1
		Vertical expansion	X1
2	LPI	Lines per inch	6 LPI
3	Forms control (in.)	Form length	11.0 in.
		Form is -	-007
		Offset from top of form	0.0 in.
		Top margin	0.0 in.
		Bottom margin	0.0 in.
4	Interface control	Interface type	Serial
		Input buffer length	11008
		Interface straps A:	0 1 2 3 12345678901234567890123456789012 00001011000010110000101100000000
		Interface straps B:	0 1 2 3 12345678901234567890123456789012 11000100000000000000000000000000
		Speed	9600
		Parity	Even
5	Margin settings (columns)	Left margin	None
		Right margin	13.2 in.
6	Horizontal tabs (columns)	—	None
7	Vertical tab stops (in.)	—	Default



Purpose/Scope

20 min.

This procedure explains how to install the IIPRT08C printer.

Parts

Number	Qty	Description
1947422?210??	1	Null modem cable (?? specifies length)
1949396?1	1	Connector
1949396?2	1	Serial/parallel converter
IIPRT08C	1	Screen copy printer

Tools None.

Safety Considerations

CAUTION

- 1. Make sure that all voltage labels and voltage switch settings on the peripheral devices, power supply, and power entry panel show the correct operating voltage. Equipment damage may result if the incorrect voltage is connected. Make sure the console main power circuit breaker is off before changing operating voltage settings or equipment damage may result.**
- 2. Remove power from all peripheral equipment and the console before installing or removing peripheral equipment. Equipment damage may result.**

Procedure

Printers can be connected to either a terminal server (IIPRS02) for main terminals or the printer port on auxiliary terminals. A maximum of four logging printers can be accessed by the workstation. Shared printers must be connected to a terminal server on the Ethernet link.

The terminal server has DB-25 style connectors. A null modem cable connects the printer to any of the terminal server ports.



The **DEFINEDVICES** command must be completed for the software to recognize the printer. Refer to the **File Utilities, Conductor VMS** instruction.

The line cord must have isolated safety ground referenced to the same point as the workstation electronics safety ground, without connection to conduit/structural ground. The AC receptacle must be an isolated ground duplex type.

The IIPRT08C color/black and white printer is a high resolution color inkjet printer. The last digit of the nomenclature determines the operating voltage of the printer: 1 = 120 VAC, 2 = 220 VAC, 3 = 240 VAC, 4 = 100 VAC.



Use the buttons and indicators on the control panel to operate the printer. For more information, refer to the manufacturer's documentation.

The IIPRT08C prints on 8-½ by 11-inch and European (A4) size transparencies and copies. This printer offers both color and black and white printing. Note that the black and white is monochrome and not gray scale.

The printer will print a full size window display from the workstation on a single page. CX JetSeries CutSheet paper is recommended for color copies. A good quality photocopier paper should be used for black and white copies.

HP[®] glossy media and HP transparency media require a ten-minute drying time. Do not place anything on it during this time. Remove these sheets from the printer so that other printouts do not stack on them.

The printer can have two optional expansion RAM cartridges. These cartridges have very little effect on performance during graphics output and are not recommended for printers used with the workstation.

-  1. Verify that all voltage switch settings are correct.
-  2. Remove power from the peripheral device, the workstation and all related equipment.
- 3. Connect the cable supplied with the printer from the printer to the serial/parallel converter (Fig. [PR36-1](#)).

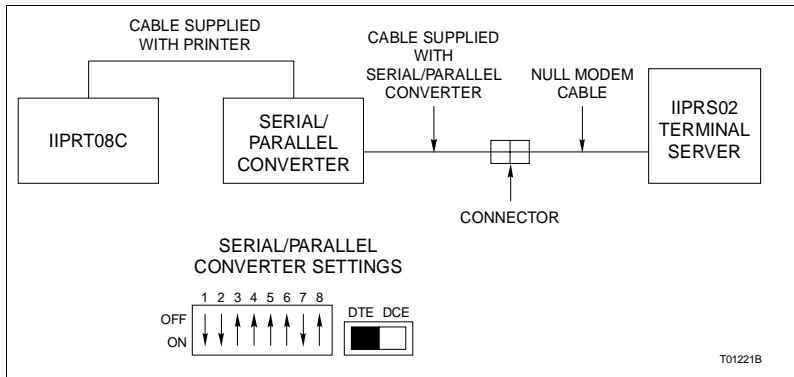


Figure PR36-1. Printer Cable Configuration and Dipswitch Settings

- 4. Connect the cable supplied with the connector from the connector to the serial/parallel converter.
- 5. Connect the null modem cable from the connector to the IIPRS02 terminal server.
- 6. Load the print media.
- 7. Press the power switch. The READY indicator lights.





Purpose/Scope

20 min.

This procedure explains how to install the IIPRT09 printer.

Parts

Number	Qty	Description
1947422?210??	1	Printer cable (?? specifies length)
IIPRT09	1	24-pin color printer

Tools None.

Safety Considerations

CAUTION

1. Make sure that all voltage labels and voltage switch settings on the peripheral devices, power supply, and power entry panel show the correct operating voltage. Equipment damage may result if the incorrect voltage is connected. Make sure the console main power circuit breaker is off before changing operating voltage settings or equipment damage may result.
2. Remove power from all peripheral equipment and the console before installing or removing peripheral equipment. Equipment damage may result.

Procedure

Printers can be connected to either a terminal server (IIPRS02) for main terminals or the printer port on auxiliary terminals. A maximum of four logging printers can be accessed by the workstation. Shared printers must be connected to a terminal server on the Ethernet link.

The terminal server has DB-25 style connectors. A null modem cable connects the printer to any of the terminal server ports.



The **DEFINEDEVICES** command must be completed for the software to recognize the printer. Refer to the **File Utilities, Conductor VMS** instruction.



The printer is a 24-pin dot matrix color printer with 360 by 360 DPI. The printer connects through an asynchronous serial interface at 9600 baud. The last digit of the nomenclature determines the operating voltage of the printer: 1 = 120 VAC and 2 = 240 VAC.

NOTE: The printer is a color line printer and cannot be used for screen copies.

The line cord must have isolated safety ground referenced to the same point as the workstation electronics safety ground, without connection to conduit/structural ground. The AC receptacle must be an isolated ground duplex type.

-  1. Verify that all voltage switch settings are correct.
-  2. Remove power from the peripheral device, the workstation and all related equipment.
- 3. Connect one end of the printer cable to the DB-25 serial connector of the printer (Fig. PR37-1).

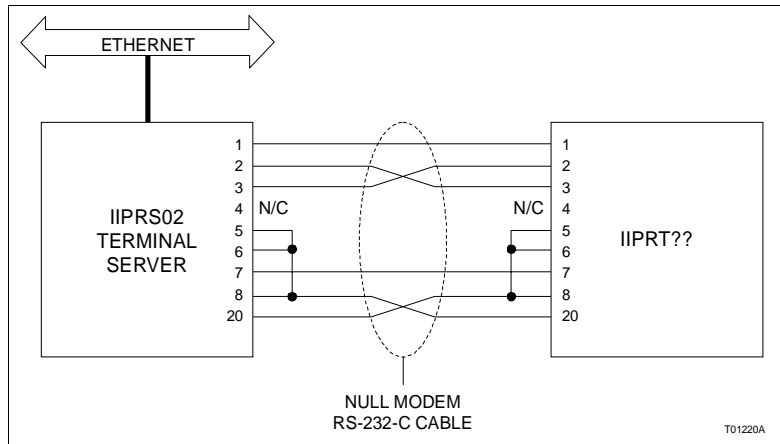


Figure PR37-1. Printer Cable Configuration

- 4. Connect the other end of the printer cable to the terminal server.
- 5. Tighten the connector hood screws.
- 6. Connect the power cable to the printer.

- 7. Connect the other end of the power cable to a local AC outlet.
- 8. Turn on the printer power.
- 9. Press **ON LINE** to get local (LO) mode.
- 10. Press and hold **PRG** to print the current setup.
- 11. Select the applicable printer from the list that follows.
- 12. If the setup values in the text do not agree with those shown in Table PR37-1, select the data to be changed and follow the manufacturer's instructions to make the appropriate corrections.

Table PR37-1. IIPRT09 Printer Settings

Control	Description	Setting
Printer control	Emulation mode	Epson Lq
Font	Print mode	LQ
	Type style	Courier
	Pitch	10 CPT
	Style	Normal
	Size	Single
	Smoothing	No
General control	Graphics	Unidirectional
	Paper out override	No
	Print registration	0
	Operator panel functions	Full operation
	Ribbon selection	Magenta
	Reset inhibit	No
	Page width	13.6 in.
	Auto Lf	No
	Auto Cr (Ibm)	No
	Form tear-off	Off
	Menu line	6
Rear feed	Line spacing	6 LPT
	Skip over perforation	No
	Page length	11 in.



Table PR37-1. IIPRT09 Printer Settings *(continued)*

Control	Description	Setting
Bottom feed	Line spacing	6 LPT
	Skip over perforation	No
	Page length	11 in.
Cut sheet	Line spacing	6 LPT
	Page length	11 in.
	Paper/transparency	Paper
Symbol sets	Character set	Set I
	Code page	USA
	Language set	American
	Zero character	Slashed
General interface	Max receive buffer	SK
	Print suppress effective	Yes
	Auto feed XT (Epson)	Valid
	CPU compensation	Standard
Serial interface	Parity	None
	Serial data 7/8 bits	8
	Protocol	X-ON/X-OFF
	Diagnostic test	No
	Busy line	DTR
	Baud rate	9600
	DSR signal	Valid
	DTR signal	Ready on power up
	Busy time	200 msec

Lexmark JetPrinter Plus Installation



PR38

Purpose/Scope

20 min.

This procedure explains how to install the Lexmark JetPrinter Plus printer.

Parts

Number	Qty	Description
1947422?210??	1	Printer cable (?? specifies length)
1319143	1	Lexmark serial/parallel converter
1328365 ¹	1	Lexmark 8-Mbyte memory upgrade
4079002 ¹	1	Lexmark Color JetPrinter 4079 PLUS 11 in. by 17 in. color screen copy printer

NOTE:

1. Manufacturer's part number.

Tools None.

Safety Considerations

CAUTION

1. Make sure that all voltage labels and voltage switch settings on the peripheral devices, power supply, and power entry panel show the correct operating voltage. Equipment damage may result if the incorrect voltage is connected. Make sure the console main power circuit breaker is off before changing operating voltage settings or equipment damage may result.
2. Remove power from all peripheral equipment and the console before installing or removing peripheral equipment. Equipment damage may result.

Procedure

Screen printers can be connected to a terminal server. The terminal server has DB-25 style connectors. A printer cable connects the printer to any of the terminal server ports.





The **DEFINEDVICES** command must be completed for the software to recognize the printer. Refer to the **File Utilities, Conductor VMS** instruction.

The line cord must have isolated safety ground referenced to the same point as the workstation electronics safety ground, without connection to conduit/structural ground. The AC receptacle must be an isolated ground duplex type.

The Lexmark JetPrinter Plus is a PostScript color printer. It prints on 11-inch by 17-inch paper and transparencies.

Use the buttons and indicators on the control panel to operate the printer. For more information, refer to the manufacturer's documentation.

HP glossy media and HP transparency media require a ten-minute drying time. Do not place anything on it during this time. Remove these sheets from the printer so that other print-outs do not stack on them.

-  1. Verify that all voltage switch settings are correct.
-  2. Remove power from the peripheral device, the workstation and all related equipment.
- 3. Connect the male to female serial cable from the serial/parallel converter to the printer cable (Fig. PR38-1).

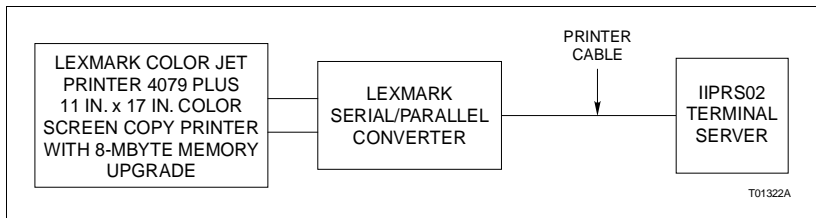


Figure PR38-1. Printer Cable Configuration

- 4. Connect the other end of the printer cable to the IIPRS02 terminal server.
- 5. Load the print media.
- 6. Press the power switch. The READY indicator lights.

IIDMT03B DAT Tape Drive Installation



PR39

Purpose/Scope

20 min.

This procedure explains how to install the IIDMT03B DAT tape drive.

Parts

Number	Qty	Description
1947950?5	1	Power cord
1949134?50	1	External SCSI cable, 1.8 m (6.0 ft)
IIDMT03B	1	DAT tape drive

Tools None.

Safety Considerations

CAUTION

1. Make sure that all voltage labels and voltage switch settings on the peripheral devices, power supply, and power entry panel show the correct operating voltage. Equipment damage may result if the incorrect voltage is connected. Make sure the console main power circuit breaker is off before changing operating voltage settings or equipment damage may result.
2. Remove power from all peripheral equipment and the console before installing or removing peripheral equipment. Equipment damage may result.
3. Never connect the tape drive to the CPU with the CPU or tape drive power on. Failure to comply may result in damage to both the CPU busses and the tape drive.



Procedure

The IIDMT03B DAT tape drive is a SCSI compatible storage device that reads and writes to digital audio tape.

The DAT tape drive has two SCSI ports. One port is for connection to the workstation, the other port is for another SCSI device or a terminator.



DAT tape drive installation consists of configuring the switches and connecting cables. Refer to the manufacturer’s documentation for more information.

-  1. Verify that all voltage switch settings are correct.
-  2. Remove power from the peripheral device, the workstation and all related equipment.
- 3. Set the SCSI address on the SCSI address switch located on the rear panel of the DAT tape drive to 5 (Fig PR39-1). To do so, press the + or — button until the desired address (5) appears through the window.

NOTE: The DAT tape drive must be powered down and then up for new switch settings to take effect, or it must receive a SCSI bus reset.

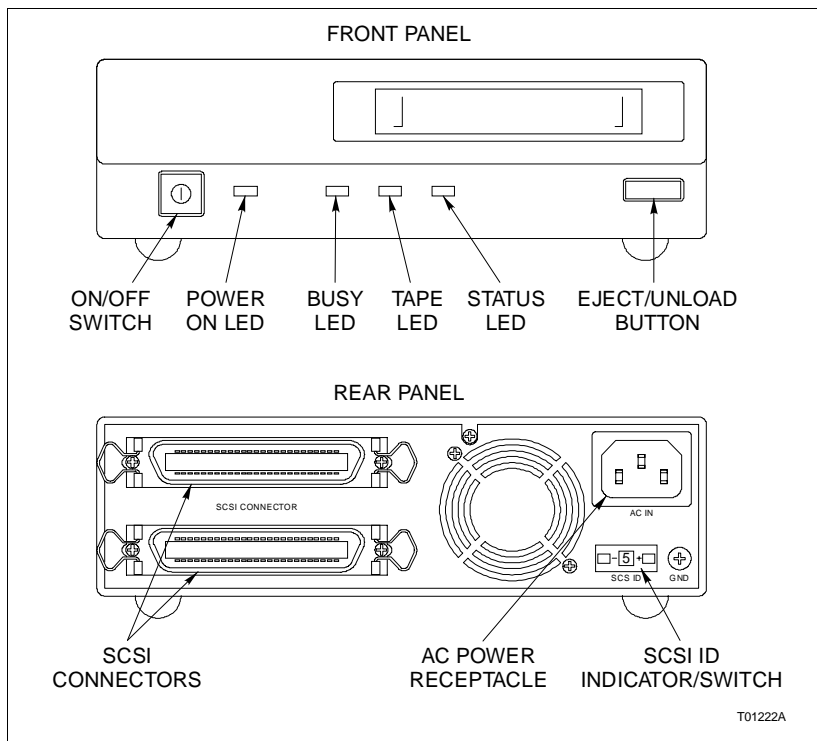



Figure PR39-1. DAT Tape Drive

-  4. Verify that power to both the tape drive and the workstation are off.
- 5. Attach the external SCSI cable to one of the SCSI connectors the back of the DAT tape drive.
- 6. Remove the SCSI terminator from the SCSI connector on the NIU card cage. (Fig. PR39-2).

NOTE: A SCSI terminator must always be connected to the last device on the external SCSI bus.

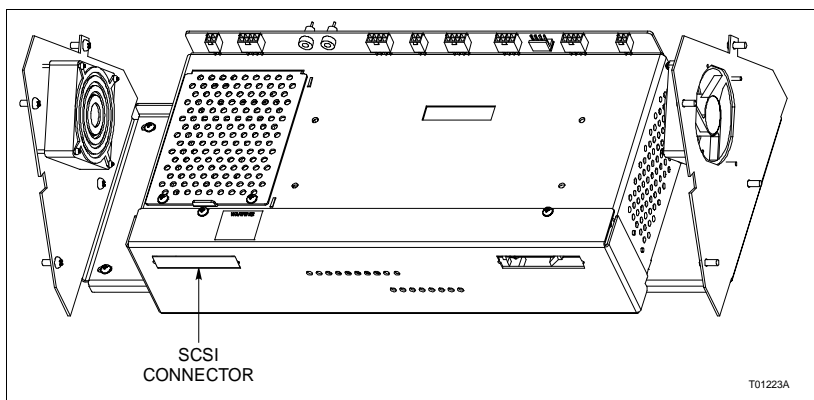


Figure PR39-2. SCSI Port

- 7. Attach the other end of the external SCSI cable to the SCSI connector on the NIU card cage.
- 8. Connect one end of the power cable to the DAT tape drive.
- 9. Connect the other end of the power cable to a local AC outlet .
- 10. To verify successful installation of the DAT tape drive, execute the power-on self-test (POST).
 - a. Press the power switch to apply power to the DAT tape drive.
 - b. Observe that after a two-second delay, with no cassette in the drive, the LEDs flash off and on twice, followed by each LED lighting in a sequence from left to right until the completion of the POST. If there is a cassette in the drive, the Tape and Busy LEDs continue flashing for



approximately 20 seconds after completion of the POST until the tape is loaded.

c. After successful completion of the POST, all LEDs are extinguished (except the Power On LED). If a cassette is loaded, the Tape LED remains lit. If the cassette is write-protected, the Status LED also remains lit.

d. If the Status LED flashes at a slow rate (about once every four seconds), then the POST failed. Attempt to clear the failure by executing the POST again. If the POST fails again, refer to the manufacturer's documentation that came with the DAT tape drive.

NOTE: Remember to clean the tape heads after 50 hours of DAT tape drive operation.

IIDOP04B Optical Disk Drive Installation



PR40

Purpose/Scope

20 min.

This procedure explains how to install the IIDOP04B optical disk drive.

Parts

Number	Qty	Description
1949134?50	1	External SCSI cable
IIDOP04B	1	Optical disk drive

Tools None.

Safety Considerations

CAUTION

1. Make sure that all voltage labels and voltage switch settings on the peripheral devices, power supply, and power entry panel show the correct operating voltage. Equipment damage may result if the incorrect voltage is connected. Make sure the console main power circuit breaker is off before changing operating voltage settings or equipment damage may result.
2. Remove power from all peripheral equipment and the console before installing or removing peripheral equipment. Equipment damage may result.

Procedure


The IIDOP04B optical disk drive is a SCSI compatible storage device that reads and writes to removable disks. Next to the **EJECT** button is the emergency eject hole for removing disks without power. An eject tool is provided with the unit.

NOTE: The workstations only support the rewritable media format at 1,024 bytes per sector.



1. Verify that all voltage switch settings are correct.



-  2. Remove power from the peripheral device, the workstation and all related equipment.
- 3. Set the SCSI address on the SCSI ID switch located on the rear panel of the optical disk drive to 6 (Fig. PR40-1).

NOTE: If the SCSI ID is changed, it will be necessary to power cycle the optical disk drive so that it recognizes the new ID. It may also be necessary to reboot the host system.

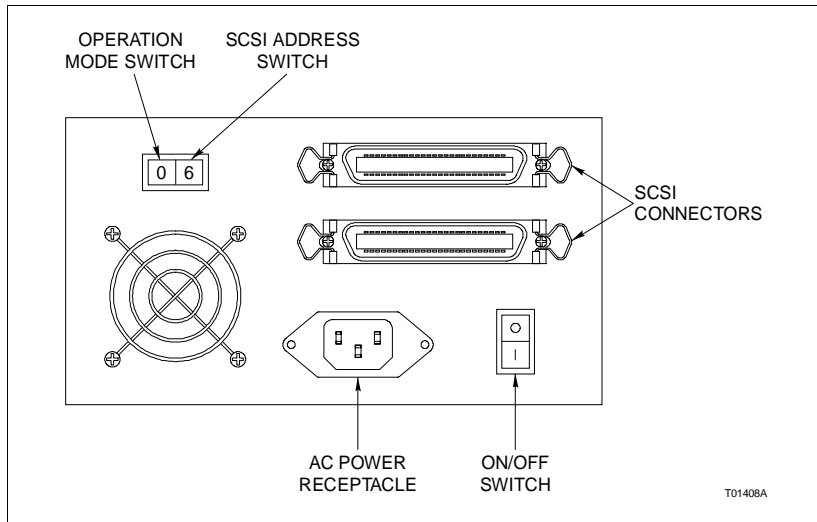


Figure PR40-1. Optical Disk Drive

- 4. Locate and set the operation mode switch on the rear panel of the optical disk drive to 0.
- NOTE:** If the operation mode is changed, it will be necessary to power cycle the optical disk drive so that it recognizes the new mode. It may also be necessary to reboot the host system.
- 5. Attach the external SCSI cable to the optical disk drive.
 - 6. Remove the SCSI terminator from the SCSI connector on the NIU card cage. (Fig. PR40-2).

NOTE: A SCSI terminator must always be connected to the last device on the external SCSI bus.

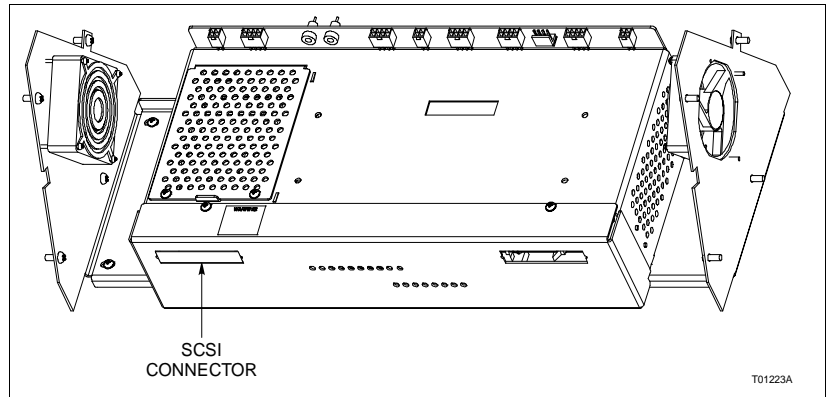


Figure PR40-2. SCSI Port

- 7. Attach the other end to the SCSI connector on the NIU card cage.
- 8. Connect one end of the power cable to the optical disk drive.
- 9. Connect the other end of the power cable to a local AC outlet .
- 10. Refer to the manufacturer's instructions for more information on installation, connection and troubleshooting.





Purpose/Scope

10 min.

This procedure explains how to check the AC power at the PEP.

Parts None.


Tools • Digital multimeter (DMM).

Safety Considerations

WARNING

1. There are exposed AC and DC connections inside the cabinet. These exposed electrical connections present a shock hazard that can cause injury or death.

Procedure

-  1. Switch the on/off switch on the PEP to the OFF position.
- 2. Label and remove all cables from the IEC 320 outlets on the PEP (Fig. PR41-1).

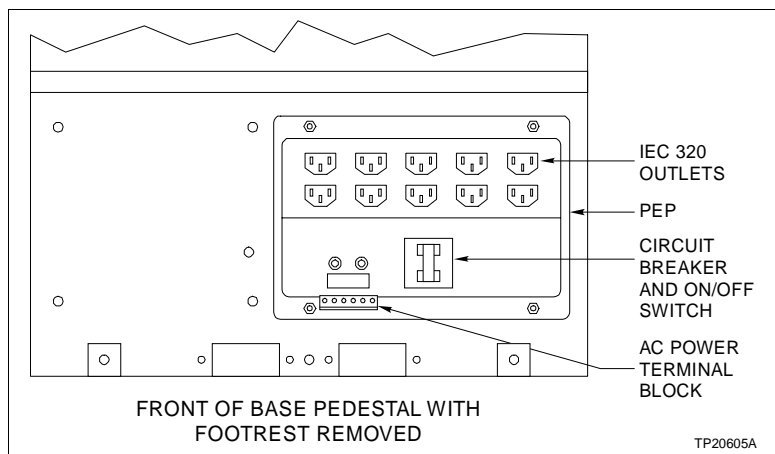


Figure PR41-1. Power Entry Panel (PEP)



- 3. Switch the on/off switch on the PEP to the ON position.
- 4. Use the DMM, set to measure AC RMS voltage, to measure the voltage at each of the ten IEC 320 outlets. The line voltage should be 90 to 132 VAC RMS for a 120-VAC input and 180 to 264 VAC RMS for a 240-VAC input.
- 5. Use the DMM to check each IEC 320 outlet to insure that neutral, live and ground are correctly wired, and that there are no ground faults.
- 6. Switch the on/off switch on the PEP to the OFF position.
- 7. Use the DMM to verify that there is no power to any of the IEC 320 outlets.



Purpose/Scope

10 min.

This procedure explains how to check the lower power supply.

Parts None.


- Tools
- Digital multimeter (DMM).
 - Phillips head screwdriver.

Safety Considerations

WARNING

1. There are exposed AC and DC connections inside the cabinet. These exposed electrical connections present a shock hazard that can cause injury or death.

Procedure

-  1. Switch the on/off switch on the PEP to the OFF position.
- 2. Use the Phillips head screwdriver to remove the two NIU front cover screws (Fig. [PR42-1](#)).
 - NOTE:** There are two wrist strap grounds, E3 and E4 on the NIU backplane to ground personnel while performing these procedures.
- 3. Remove the NIU front cover.
- 4. Use the Phillips head screwdriver to remove the two NIU top cover screws.
- 5. Remove the NIU top cover.
- 6. Label and disconnect all cables attached to the NIU backplane.
- 7. Unplug the IIMLM01 and IIMCP02 modules from the NIU backplane. They do not have to be pulled out all the way (Fig. [PR42-2](#)).

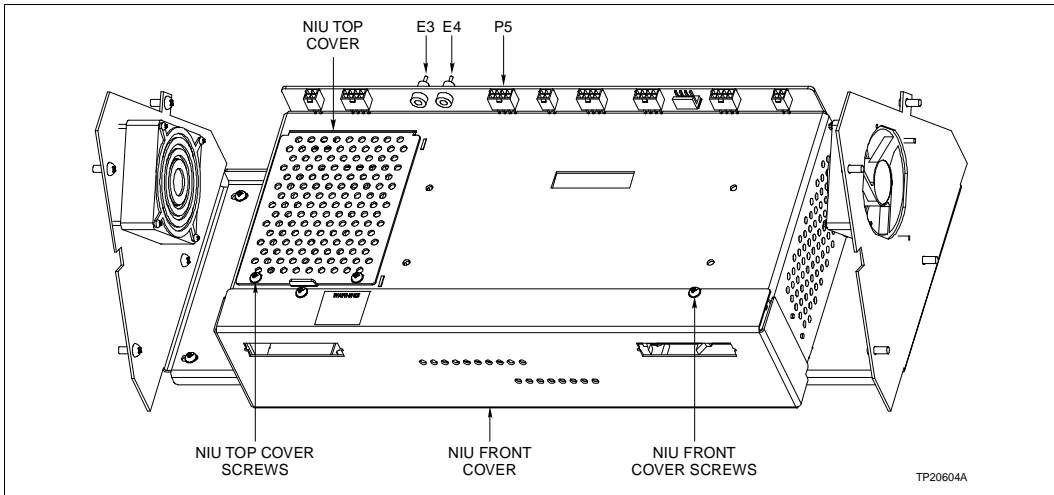


Figure PR42-1. NIU Card Cage with Covers Installed

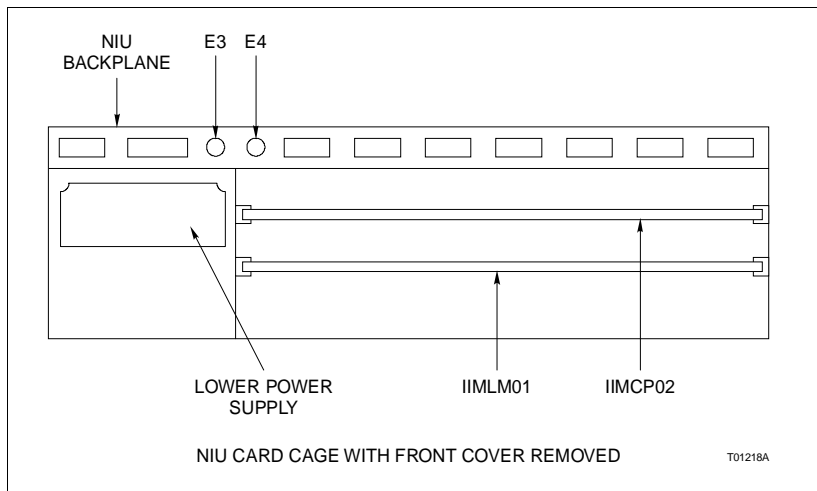


Figure PR42-2. NIU Card Cage with Covers Removed

- 8. Verify that all power wiring is correct.
- 9. Turn the on/off switch on the PEP to the ON position.
- 10. Use the DMM, set to measure VDC, to measure between P5-1 (-12 VDC) and P5-2 (common). The DMM should read -12.0 VDC (+1.0 VDC, -1.5 VDC).

-
- 11. Use the DMM, set to measure VDC, to measure between P5-5 (+12 VDC) and P5-2 (common). The DMM should read +12.0 VDC (+1.5 VDC, -1.0 VDC).
 - 12. Use the DMM, set to measure VDC, to measure between P5-7 (+5 VDC) and P5-2 (common). The DMM should read +5.00 VDC (+0.25 VDC, -0.00 VDC).

NOTE: Unstable operation may result if power supply voltages are not within tolerance.

- 13. Turn the on/off switch on the PEP to the OFF position.
- 14. Install the modules in the NIU.
- 15. Install all of the cables removed in Step 6.
- 16. Turn the on/off switch on the PEP to the ON position.
- 17. Check the voltage levels again and adjust them to within +0.05 VDC of their nominal values.
- 18. Turn the on/off switch on the PEP to the OFF position.
- 19. Install the NIU top cover.
- 20. Install the NIU front cover.





Purpose/Scope

10 min.

This procedure explains how to check the upper power supply.

Parts None.


- Tools
- Digital multimeter (DMM).
 - Phillips head screwdriver.

Safety Considerations

WARNING

1. There are exposed AC and DC connections inside the cabinet. These exposed electrical connections present a shock hazard that can cause injury or death.

Procedure

-  1. Switch the on/off switch on the PEP to the OFF position.
- 2. Use the Phillips head screwdriver to remove the four rear monitor cover screws (Fig. [PR43-1](#)).

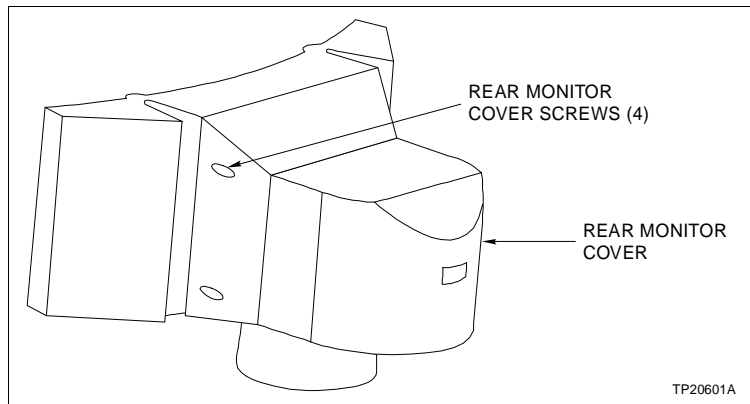


Figure PR43-1. Rear Monitor Cover



- 3. Remove the rear monitor cover.
- 4. Verify that all power wiring is correct.
- 5. Turn the on/off switch on the PEP to the ON position.
- 6. Use the DMM, set to measure VDC, to measure between P6-1 (+5 VDC) and P6-2 (common) on the operator I/O controller (Fig. PR43-2). The DMM should read +5.00 VDC (+0.25 VDC, -0.00 VDC).

NOTE: Unstable operation may result if power supply voltages are not within tolerance.

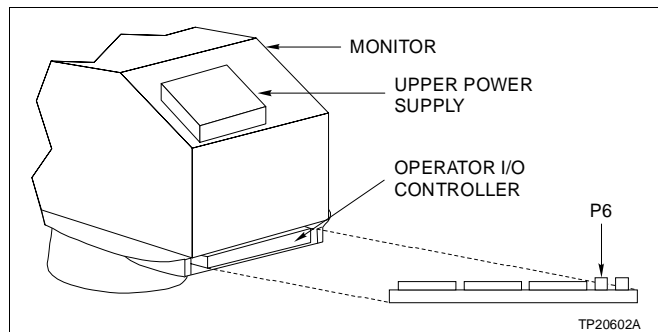


Figure PR43-2. Operator I/O Controller

- 7. Turn the on/off switch on the PEP to the OFF position.
- 8. Install the rear monitor cover.



Purpose/Scope

10 min.

This procedure explains how to check and evaluate the diagnostic LEDs visible through the front cover of the NIU.

Parts None.

Tools None.

Procedure

The normal operation of the LEDs on the IIMCP02 module is for the left set of eight LEDs to count up in binary. The right set of eight LEDs has the left-most two LEDs on to show communication with the IIMLM01 module. The right-most four LEDs scan from left to right to show the IIMCP02 module is operational.

The normal operation of the LEDs on the IIMLM01 module is for the left and right sets of LEDs to count up in binary. The left set of LEDs contains the MSB to show the parameter as defined by SW3 and SW4 settings.

- 1. The diagnostic LEDs are viewable through holes in the NIU front cover (Fig. PR44-1).

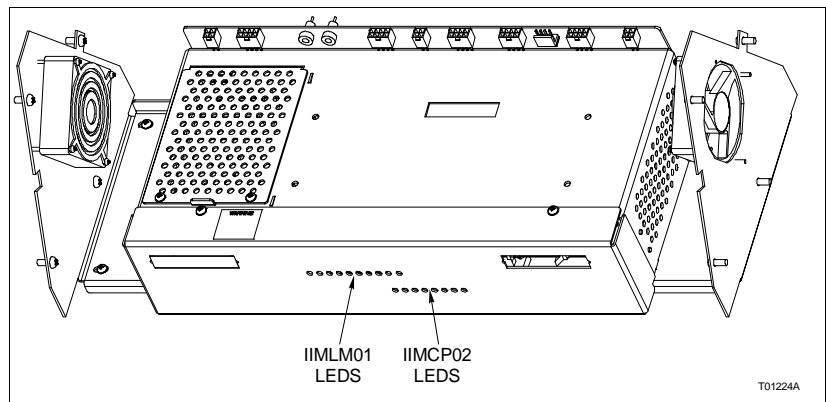


Figure PR44-1. Diagnostic LEDs



- 2. Refer to the following table to evaluate the IIMCP02 module failure LED codes. The error codes show up on the left set of LEDs and read from left to right.

MCP Module Code	LED Number ¹								Condition	Corrective Action
	8	7	6	5	4	3	2	1		
12	0	0	0	1	0	0	1	0	IIMLM01 not responding to IIMCP02 commands.	Check cable. Replace IIMCP02 module.
14	0	0	0	1	0	1	0	0	Expander bus message failure.	Check expander bus for connections to other modules.
15	0	0	0	1	0	1	0	1	Loop failure.	Check for break in loop cables.
16	0	0	0	1	0	1	1	1	IIMLM01 loop-back test failure.	Replace IIMLM01 module.
2n ²	0	0	1	0	n	n	n	n	Internal software error.	Reset IIMCP02 module. Replace IIMCP02 module if error continues.
31	0	0	1	1	0	0	0	1	Memory or CPU failure.	Replace IIMCP02 module.
32	0	0	1	1	0	0	1	0	Address or bus failure.	Reset IIMCP02 module. Replace IIMCP02 module if error continues.
33	0	0	1	1	0	0	1	1	Illegal instruction.	
35	0	0	1	1	0	1	0	1	Spurious exception.	
36	0	0	1	1	0	1	1	0	Divide by 0/check/format error.	
38	0	0	1	1	1	0	0	0	IIMLM01 not configured for IIMCP02 operation.	IIMLM01 SW2, pole 1 needs to be ON.
39	0	0	1	1	1	0	0	1	Duplicate node number on loop.	Change node number (IIMLM01 switch 4).
3E	0	0	1	1	1	1	1	0	IIMLM01 to IIMCP02 handshake failure.	Replace IIMLM01 or IIMCP02.
3F	0	0	1	1	1	1	1	1	Stop push-button activated.	Reset IIMCP02 module.

NOTES:

1. The LED representing the LSB is the right-most LED.
2. n = any module code beginning with a 2 and regardless of status of LEDs 1 through 4, the error condition will be due to internal software.

- 3. Refer to the following table to evaluate the IIMLM01 module failure LED codes. The error codes show up on the right set of LEDs and read from left to right.

MLM Module Code	LED Number ¹								Condition	Corrective Action
	8	7	6	5	4	3	2	1		
16	0	0	0	1	0	1	1	0	Loopback test failure.	Check cabling and loop TU circuit board. Replace IIMLM01.
31	0	0	1	1	0	0	0	1	Memory or CPU failure.	Replace IIMLM01
32	0	0	1	1	0	0	1	0	Address or bus error.	Replace loop TU circuit board. Replace IIMLM01 if error continues.
33	0	0	1	1	0	0	1	1	Illegal instruction.	
34	0	0	1	1	0	1	0	0	Trace/privilege violation.	
35	0	0	1	1	0	1	0	1	Spurious exception.	
36	0	0	1	1	0	1	1	0	Divide by 0/check/format error.	
37	0	0	1	1	0	1	1	1	Any trap instruction.	Check switches SW1 through SW4.
38	0	0	1	1	1	0	0	0	IIMLM01 not configured for IIMCP02 operation.	
3E	0	0	1	1	1	1	1	0	IIMLM01 to host hand-shake failure.	Replace loop TU circuit board. Replace IIMLM01 if error continues.

NOTE:

- 1. The LED representing the LSB is the right-most LED.





Purpose/Scope

10 min.

This procedure explains how to evaluate error codes that appear on the yellow operator message portion of the monitor.

Parts None.

Tools None.

Procedure

The yellow operator message portion of the monitor supplies error codes in decimal format. Error codes zero through 110 are NIU error codes. Error codes 300 through 313 are NIU error codes for internal workstation checking.

- 1. The NIU error codes appear in decimal format. Refer to Table [PR45-1](#) to check the cause of the error codes.

Table PR45-1. NIU Error Codes

Error Code	Description
0	No error.
1	Waiting for loop.
2	Improper format.
3	Illegal command.
4	Index already established.
5	Block already established at another index (Loop, PCU, MOD and block are all the same as another tag).
6	Command too long.
7	Bad reply from IIMCP02 module.
8	Export used as import.
9	Repeat NIU restart command.
10	Undefined index.
11	Memory full.
12	Host communication error.
13	IIMCP02 module not responding.


Table PR45-1. NIU Error Codes *(continued)*

Error Code	Description
14	Import used as export.
15	Time-out of loop response.
16	Number out of range.
17	Illegal key.
18	Need a restart command.
19	Module status used as import.
20	Message active on loop.
21	Import or export used as module status.
22	Exception report specifications lost.
23	No message queued, dequeue received.
24	Reply too large.
25	Illegal station mode command.
26	Illegal module number in command.
27	Time-out between bytes in command.
28	Index already established by another node.
29	Point type incompatible with command.
30	Watchdog time-out.
31	Checksum compare error.
32	Destination node off-line.
33	Call up command required.
34	NIU error.
35	NIU busy.
36	IIMCP02 module off-line.
37	Conflict with monitor mode.
38	Point type incorrect.
39	Destination ring off-line.
40	Destination node busy.
41	Destination ring busy.
100	Undefined message type for target module.
101	Busy — cannot respond at this time.
102	Mode for command does not agree with current module mode.
103	Message data out of range.
104	Invalid block number.

Table PR45-1. NIU Error Codes *(continued)*

Error Code	Description
105	Undefined block number — block is valid but not configured.
106	Block not readable — block number is valid but has no readable parameters.
107	Invalid function code for target module.
108	Function code and block number not compatible in target module.
109	Insufficient memory to write block in NVRAM and/or RAM.
110	Module not responding.
300	Invalid logical unit.
301	Invalid index or NIU.
302	Correct configuration. Invalid NIU restart option.
303	Invalid watchdog/delay count.
304	Correct configuration. Invalid PCU, module or block number.
305	Correct configuration. Invalid point type.
306	Invalid index range.
307	Invalid engineering units code.
308	Invalid logical alarm specifications.
309	Invalid module operations code.
310	Invalid function code.
311	Invalid block data count.
312	Invalid number of reports.
313	Plant Loop specific function called on an INFI-NET system.





Purpose/Scope

10 min.

This procedure explains how to run the NIU test utility.

Parts None.

Tools None.

Procedure

An off-line NIU test utility allows loop communications testing and restarting of the NIU. This is helpful when there is a problem bringing the workstation on-line and the NIU or loop is the suspected problem.

NOTES:

1. This utility causes an NIU restart. If the NIU is restarted while the workstation is on-line, normal operation is interrupted.
2. Access this utility from the OISENGR account.
3. Refer to the *File Utilities, Conductor VMS* instruction when performing this procedure.

- 1. Open a terminal window.
- 2. Type **CIUTEST** at the \$ prompt, and press **Return**.
- 3. After specifying the loop type to which the console connects, a menu of network interface unit commands appears. The commands allow resetting the NIU, testing loop communications through the **Demand Module Status** command or querying the network interface unit for additional information about itself.
- 4. To further isolate the problem, continue with procedure **PR47**.





Purpose/Scope

10 min.

This procedure explains how to run the NIU Talk 90 diagnostic test.

Parts

Number	Qty	Description
NKMR02?10	1	9-pin to 25-pin D connector serial cable
N/A	1	Dumb terminal

Tools None.

Procedure

If the NIU fails to come on-line, the problem may be in the network interface unit or workstation. The NIU Talk 90 utility can isolate the problem.

- 1. Connect the nine-pin to 25-pin D connector serial cable between the dumb terminal and port P6 on the IIMCP02 module (Fig. PR47-1).

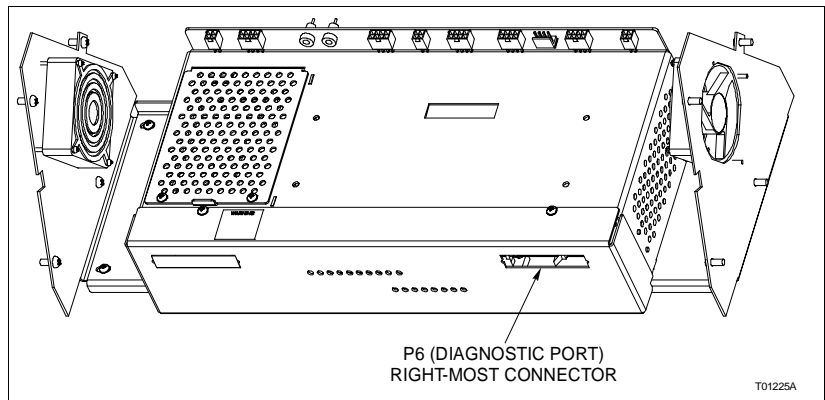


Figure PR47-1. Diagnostics Port P6

- 2. Set the terminal to 9600 baud and eight data, one stop, zero start and no parity bits.



- 3. Press the red button (reset) twice on the IIMCP02 module.
- 4. The diagnostic menu appears on the dumb terminal.
- 5. To select Talk 90, type **1** and press **Return**.
- 6. Enter **19** to select *CIU RESTART* from the menu and press **Return**.
- 7. Answer the prompts:
 - a. *Key* = **0** **Return**.
 - b. *Watchdog* = **0** **Return**.
 - c. *Options* = **255** **Return**.
 - d. *Reply Delay* = **0** **Return**.
 - e. *Interrupt* = **0** **Return**.
- 8. Check that the left set of LEDs on the IIMCP02 module all turn on, then off and that the green light on the loop TU circuit board in the cupola assembly turns off, then on (off-line to the loop, then on-line to the loop).
- 9. Enter a **1** on the dumb terminal to return to Talk 90.
- 10. Check that the dumb terminal displays a response of *0* errors. The terminal also displays the node address.
 - a. No errors indicates that the problem is in the workstation or in the cable between the workstation and the NIU.
 - b. Any indicated errors shows that the problem is in the NIU.
- 11. Substitute modules and run the test again to isolate the problem to the IIMCP02, loop TU circuit board or IIMLM01 module.

NOTE: A message referring to the SSM module indicates a problem on the IIMCP02 module.



Purpose/Scope

1 hr

This procedure explains how to check connections.

Parts None.

Tools Individual tools cannot be listed due to the numerous connections involved.


Safety Considerations

WARNING

1. Disconnect power before attempting these procedures. Failure to do so could result in severe or fatal shock, or equipment damage.

Procedure

Check all signal wiring, power and ground connections within the workstation to verify their integrity. When checking connections, always turn a screw, nut or other fastening device in the direction to tighten only. If the connection is loose, it will be tightened. If the connection is tight, the tightening action will verify that it is secure. There must not be any motion to loosen the connection.

-  1. Disconnect power from the workstation.
- 2. Check and verify that all phase, neutral and grounding conductor connections on the PEP are secure.
- 3. Check and verify that the ground nut on the inside of the PEP is secure and tightened to the specified torque value.
- 4. Check and verify that all other power connections within the workstation, including connections to the power supplies are secure.



- 5. Check and verify that all field wiring connections to the communication modules are secure.



Purpose/Scope

5 min.

This procedure explains how to clean the monitor.

Parts None.

- Tools
- Soft lint-free cloth.
 - Mild all-purpose commercial spray cleaner.

Procedure

1. Spray the mild all-purpose commercial spray cleaner on the soft lint-free cloth.
2. Use the soft lint-free cloth to remove dirt, fingerprints or grease from the monitor window and enclosure.





Purpose/Scope

1 hr

This procedure explains how to clean the printed circuit boards.

Parts None.

- Tools
- Clean, dry, filtered compressed air.
 - Antistatic vacuum.
 - Isopropyl alcohol (99.5 percent electronic grade).
 - Foam-tipped swab.
 - Distilled water.
 - Eberhard Faber® (400A) Pink Pearl® eraser.
 - Fiberglass or nylon burnishing brush.
 - Piece of scrap printed circuit board.
 - Soft lint-free cloths.

Safety Considerations

WARNING

- 1. Disconnect power before attempting these procedures. Failure to do so could result in severe or fatal shock, or equipment damage.**
- 2. Wear eye protection whenever working with cleaning solvents. When removing solvents from printed circuit boards using compressed air, injury to the eyes could result from splashing solvent as it is blown off the printed circuit board.**

Procedure


There are several printed circuit board cleaning procedures. These procedures cover printed circuit board cleaning and cleaning edge connectors. Use the procedures that meet the needs of each printed circuit board. Remove all dust, dirt, oil, corrosion or any other contaminant from the printed circuit board.



Perform all cleaning and handling of the printed circuit boards at static safe workstations. Always observe electrostatic sensitive device handling precautions when handling printed circuit boards.

-  Be sure to disconnect power to the workstation before accessing the printed circuit boards.


General Cleaning and Washing

-  1. Remove dust and residue from the printed circuit board surface using clean, dry, filtered compressed air or an anti-static field service vacuum.

or

- 1. Spray or wipe the printed circuit board with isopropyl alcohol (99.5% electronic grade).
- 2. Use a foam-tipped swab to wipe the printed circuit board.
- 3. When the printed circuit board is clean, remove excess solvent using clean, dry, filtered compressed air.

Edge Connector Cleaning (General)

-  1. Make a solution of 80% isopropyl alcohol (99.5% electronic grade) and 20% distilled water.
 - 2. Soak a soft lint-free cloth in the solvent mixture.
 - 3. Work the soft lint-free cloth back and forth parallel to the edge connector contacts.
 - 4. Repeat Steps 2 and 3 with a clean soft lint-free cloth.
 - 5. Dry the edge connector contact area by wiping with a clean soft lint-free cloth.


Edge Connector Cleaning (Tarnished or Deeply Stained)

- 1. Use the Eberhard Faber (400A) pink pearl eraser, or equivalent to remove tarnish or stains. Fiberglass or nylon burnishing brushes may also be used.

NOTES:

1. Minimize electrostatic discharge by using the 80% to 20% isopropyl alcohol to distilled water solution during burnishing.
2. Do not use excessive force while burnishing. Use only enough force to shine the contact surface. Inspect the edge connector after cleaning to assure no loss of contact surface.

Female Edge Connector Cleaning

-  1. Soak a soft lint-free cloth that is wrapped around the piece of scrap printed circuit board, or the foam-tipped swab in the 99.5% electronic grade isopropyl alcohol.
- 2. Insert the foam-tipped swab or cloth-covered printed circuit board into the edge connector and work it back and forth.
- 3. Rinse the edge connector contacts by spraying with 99.5% electronic grade isopropyl alcohol.
- 4. Remove excess alcohol and dry using dry, clean, filtered compressed air.





Purpose/Scope

5 min.

This procedure explains how to clean the keyboards.

Parts None.

- Tools
- Soft lint-free cloth.
 - Mild all-purpose commercial spray cleaner.
 - Antistatic vacuum.

Procedure

There are two keyboards for the workstation. Cleaning procedures differ depending on the keyboard.

Operator (Mylar) Keyboard

- 1. Wipe away dust with the soft lint-free cloth.
- 2. Spray the mild all-purpose commercial spray cleaner on the soft lint-free cloth.
- 3. Clean the dirt and film from the keyboard.

Engineering (QWERTY) Keyboard

- 1. Use the antistatic vacuum to remove dust from the keyboard.
- 2. Spray the mild all-purpose commercial spray cleaner on the soft lint-free cloth.
- 3. Clean the key caps and keyboard enclosure.





Purpose/Scope

1 hr

This procedure explains how to check and clean the PEP.

Parts None.


Tools • Flat blade torque screwdriver for zero to 2.7 Newton meters (zero to 24 inch-pounds).

Safety Considerations

WARNING

1. Disconnect power before attempting these procedures. Failure to do so could result in severe or fatal shock, or equipment damage.

Procedure

-  1. Remove power from the workstation.
- 2. Check the tightness of all power wiring screws.
- 3. If they are loose, use the flat blade torque screwdriver to tighten them to 2.7 Newton meters (24 in.-lbs).
- 4. Check and verify that the ground nut on the inside of the PEP is secure and tightened to the specified torque value.
- 5. Inspect and clean all PEP connections.





Purpose/Scope

1 min.

This procedure explains how to remove the keyboard.

Parts None.

Tools None.

Procedure

- 1. Verify that power is removed from the workstation.
- 2. Gently lift the keyboard vertically from the work surface just far enough to access the cables.
- 3. Label and remove all cables from the keyboard.



Keyboard Button Array Replacement



PR54

Purpose/Scope

10 min.

This procedure explains how to replace the keyboard button array.

Parts

Number	Qty	Description
1949322?1	1	Keyboard button array, English
1949322?3		Keyboard button array, Russian
1949322?6		Keyboard button array, Norwegian/Danish
1949322?7		Keyboard button array, Swedish

Tools

- Phillips head screwdriver.
- Flat blade screwdriver.

Procedure

NOTE: Follow the proper procedures for working with static sensitive devices when performing this procedure.

1. The keyboard cover is held on by Velcro™ strips. Lift on the keyboard cover to remove it.
2. Use the Phillips head screwdriver to remove the nine (for keyboards with a floppy disk drive) or ten (for keyboards without a floppy disk drive) button array screws that secure the keyboard button array to the keyboard base (Fig. PR54-1).

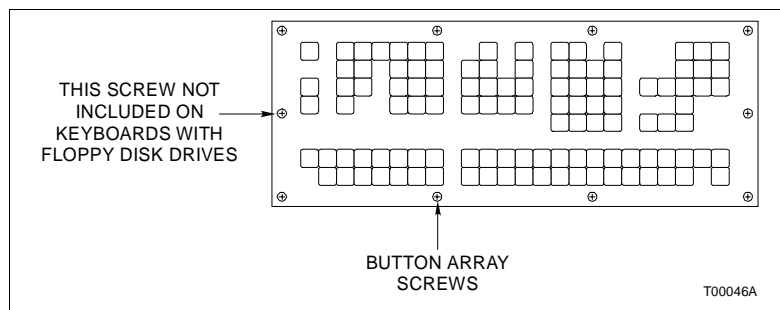


Figure PR54-1. Keyboard Button Array



- 3. Lift the entire keyboard assembly out of the keyboard base.
- 4. Remove the ground wire from P14 on the keyboard scanner PCB (Fig. PR54-2).

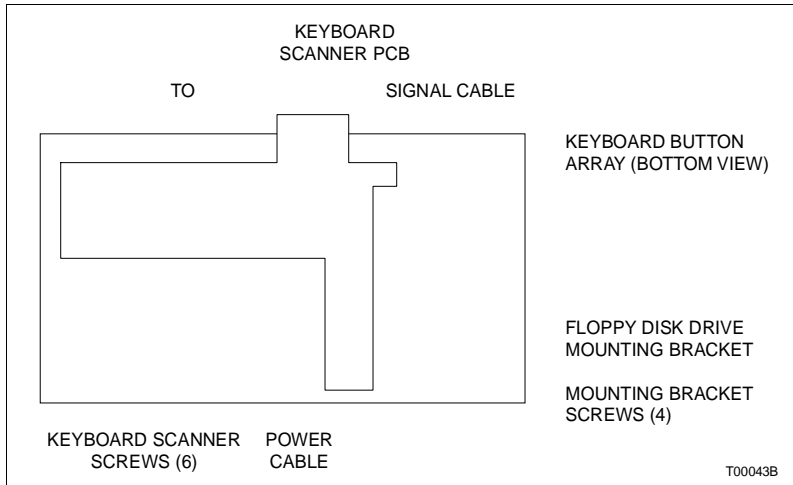


Figure PR54-2. Keyboard Button Array Replacement

- 5. Use the flat blade screwdriver to remove the six keyboard scanner screws that secure the keyboard scanner PCB to the keyboard button array.
- 6. If the keyboard assembly has a floppy disk drive, use the flat blade screwdriver to remove the four mounting bracket screws that secure the floppy disk drive mounting bracket to the keyboard button array.
- 7. Gently separate the keyboard button array from P1 and P2 on the keyboard scanner PCB.
- 8. Align the connectors on the back of the new keyboard button array with P1 and P2 on the keyboard scanner PCB and press firmly to seat them.
- 9. Install the six keyboard scanner screws and tighten them with the flat blade screwdriver.
- 10. If the keyboard assembly has a floppy disk drive, align the holes in the floppy disk drive mounting bracket with the spacers that are attached to the keyboard button array.

- 11. If the keyboard assembly has a floppy disk drive, install the four mounting bracket screws and tighten them with the flat blade screwdriver.
- 12. If the keyboard assembly has a floppy disk drive, verify that the signal and power cables are properly seated in the floppy disk drive and in P6 and P8 on the keyboard scanner PCB.
- 13. Connect the ground wire from the keyboard base to P14 on the keyboard scanner PCB.
- 14. Place the entire assembly in the keyboard base.
- 15. Install the nine (or ten) button array screws and tighten them with the Phillips head screwdriver.
- 16. Install the keyboard cover and press on the top and around the edges to secure the mating Velcro strips.



Keyboard Scanner PCB Replacement



PR55

Purpose/Scope

20 min.

This procedure explains how to replace the keyboard scanner PCB.

Parts

Number	Qty	Description
6641484?1	1	Keyboard scanner PCB

Tools

- Phillips head screwdriver.
- Flat blade screwdriver.

Procedure

NOTE: Follow the proper procedures for working with static sensitive devices when performing this procedure.

1. The keyboard cover is held on by Velcro strips. Lift on the keyboard cover to remove it.
2. Use the Phillips head screwdriver to remove the nine (for keyboards with a floppy disk drive) or ten (for keyboards without a floppy disk drive) button array screws that secure the keyboard button array to the keyboard base (Fig. PR55-1).

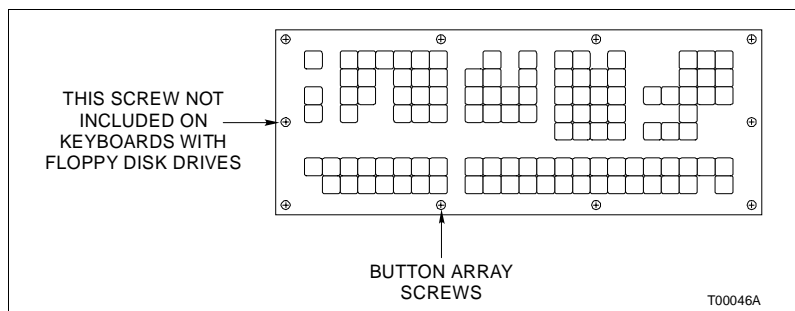


Figure PR55-1. Keyboard Button Array

3. Lift the entire keyboard assembly out of the keyboard base.



- 4. Remove the ground wire from P14 on the keyboard scanner PCB (Fig. PR55-2).

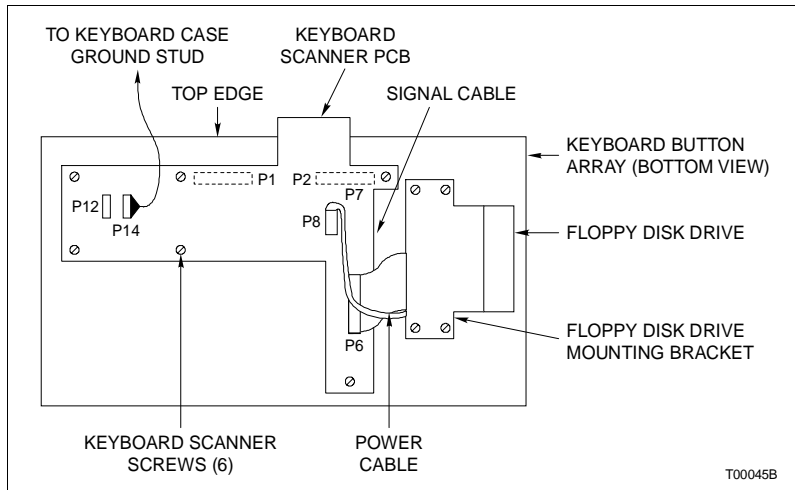


Figure PR55-2. Keyboard Scanner PCB Replacement

- 5. If the keyboard assembly has a floppy disk drive, remove the signal and power cables from P6 and P8 on the keyboard scanner assembly. Note the orientation of pin 1 on the signal cable.
- 6. Use the flat blade screwdriver to remove the six keyboard scanner screws that secure the keyboard scanner PCB to the keyboard button array.
- 7. Gently separate the keyboard button array from P1 and P2 on the keyboard scanner PCB.
- 8. Align the connectors on the back of the keyboard button array with P1 and P2 on the new keyboard scanner PCB and press firmly to seat them.
- 9. Install the six keyboard scanner screws and tighten them with the flat blade screwdriver.
- 10. If the keyboard assembly has a floppy disk drive, install the signal and power cables into P6 and P8 on the keyboard scanner PCB.
- 11. Connect the ground wire from the keyboard base to P14 on the keyboard scanner PCB.

- 12. Place the entire assembly in the keyboard base.
- 13. Install the nine (or ten) button array screws and tighten them with the Phillips head screwdriver.
- 14. Install the keyboard cover and press on the top and around the edges to secure the mating Velcro strips.





Purpose/Scope

10 min.

This procedure explains how to replace the floppy disk drive.

Parts

Number	Qty	Description
1949207B7H	1	Floppy disk drive

Tools

- Phillips head screwdriver.
- Small-tipped Phillips head screwdriver.

Procedure

NOTE: Follow the proper procedures for working with static sensitive devices when performing this procedure.

1. The keyboard cover is held on by Velcro strips. Lift on the keyboard cover to remove it.
2. Use the Phillips head screwdriver to remove the nine button array screws that secure the keyboard button array to the keyboard base (Fig. PR56-1).

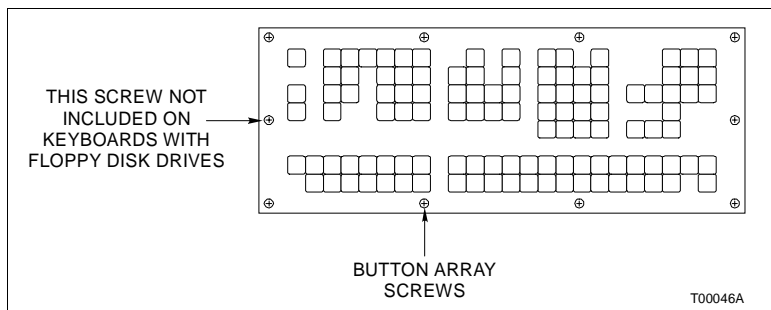


Figure PR56-1. Keyboard Button Array

3. Lift the entire keyboard assembly out of the keyboard base.
4. Remove the ground wire from P14 on the keyboard scanner PCB (Fig. PR56-2).

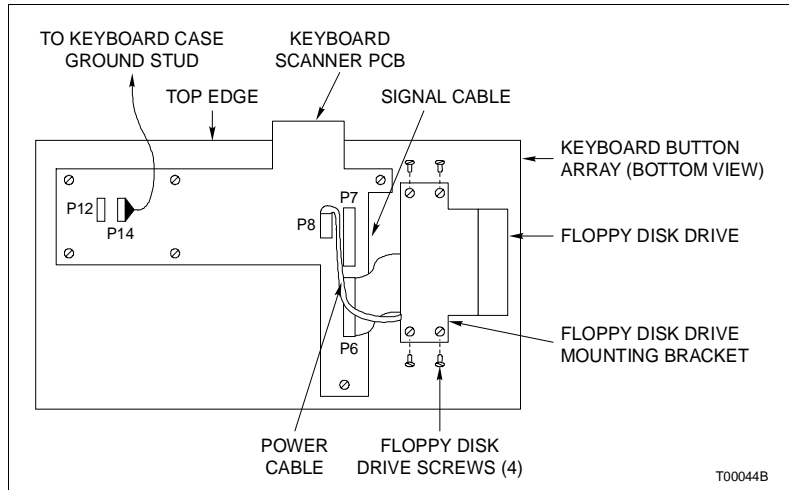


Figure PR56-2. Floppy Disk Drive Replacement

- 5. Remove the signal and power cables from the floppy disk drive. Note the orientation of pin 1 on the signal cable.
- 6. Use the small-tipped Phillips head screwdriver to remove the four floppy disk drive screws that secure the floppy disk drive to its mounting bracket.
- 7. Slide the floppy disk drive out of its mounting bracket.
- 8. Slide the new floppy disk drive into the mounting bracket, aligning the holes in the side of the floppy disk drive with those in the mounting bracket.
- 9. Install the four floppy disk drive screws and tighten them with the small-tipped Phillips head screwdriver.
- 10. Install the signal and power cables into the floppy disk drive. Be sure pin 1 on the signal cable aligns with pin 1 on the signal connector of the floppy disk drive.
- 11. Connect the ground wire from the keyboard base to P14 on the keyboard scanner PCB.
- 12. Place the entire assembly in the keyboard base.
- 13. Install the nine button array screws and tighten them with the Phillips head screwdriver.

- 14. Install the keyboard cover and press on the top and around the edges to secure the mating Velcro strips.



Lower Power Supply Replacement



PR57

Purpose/Scope

10 min.

This procedure explains how replace the lower power supply.

Parts

Number	Qty	Description
1949325?1	1	Lower power supply

Tools • Phillips head screwdriver.

Safety Considerations

WARNING

1. There are exposed AC and DC connections inside the cabinet. These exposed electrical connections present a shock hazard that can cause injury or death.

Procedure



1. Verify that power is removed from the workstation.

NOTES:

1. Follow the proper procedures for working with static sensitive devices when performing this procedure.

2. There are two wrist strap grounds, E3 and E4 on the NIU backplane to ground personnel while performing these procedures.

2. Label and remove all cables from the front of the NIU card cage.

3. Use the Phillips head screwdriver to remove the two NIU front cover screws (Fig. PR57-1).

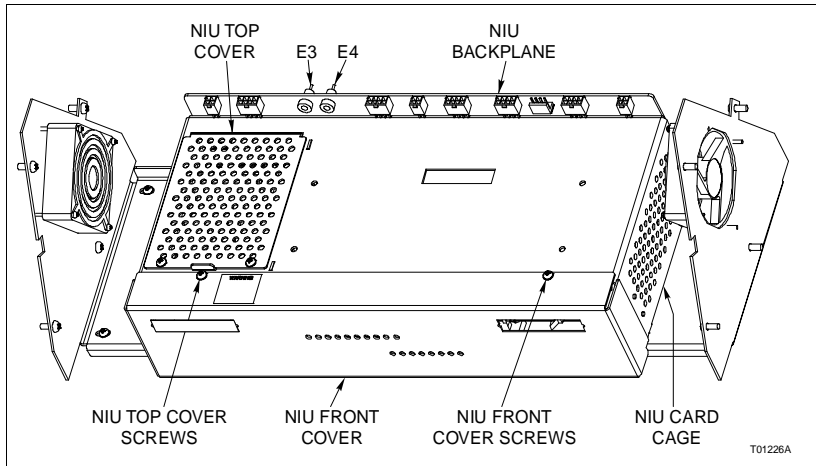


Figure PR57-1. NIU Card Cage with Covers Installed

- 4. Remove the NIU front cover, being careful not to pinch any wires between the NIU front cover and the NIU card cage.
- 5. Use the Phillips head screwdriver to remove the two NIU top cover screws and remove the NIU top cover.
- 6. Slowly pull the lower power supply mounting bracket out of the NIU card cage (Fig. PR57-2), labelling and disconnecting all cables from the lower power supply while doing so.

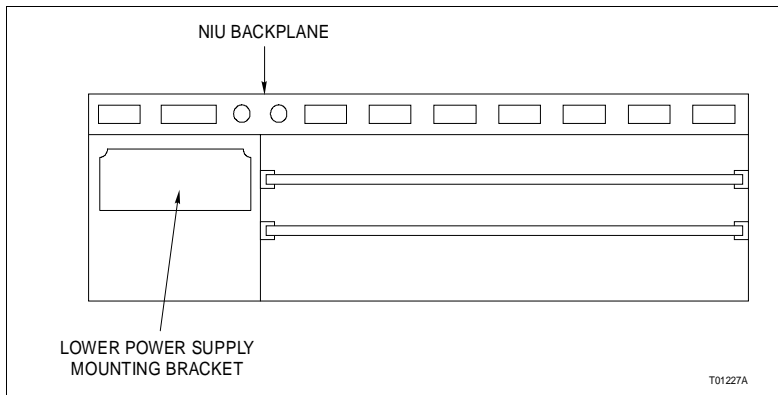


Figure PR57-2. Lower Power Supply

- 7. Use the Phillips head screwdriver to remove the four lower power supply screws that secure the lower power supply to the lower power supply mounting bracket (Fig. PR57-3).

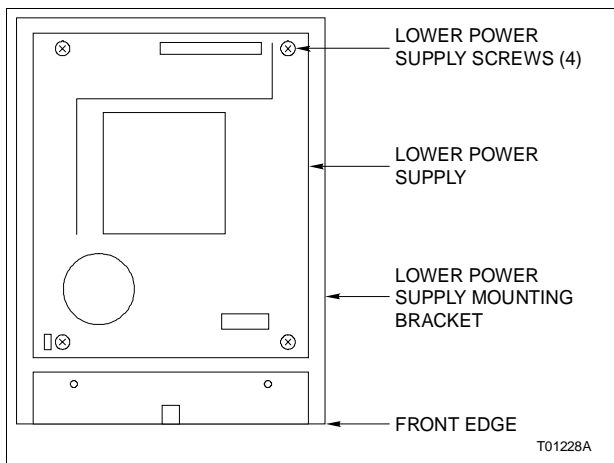


Figure PR57-3. Lower Power Supply Replacement

- 8. Align the mounting holes on the new lower power supply with the spacers on the lower power supply mounting bracket.
- 9. Install the four lower power supply mounting screws and tighten them with the Phillips head screwdriver.
- 10. Install the lower power supply mounting bracket in the NIU card cage, connecting the cables to the lower power supply while doing so.
- 11. Install the NIU top cover.
- 12. Install the NIU front cover, being careful not to pinch any wires between the NIU front cover and the NIU card cage.
- 13. Install all cables removed in Step 2.





Purpose/Scope

20 min.

This procedure explains how to install the HP 1600C printer.

Parts

Number	Qty	Description
C3540A	1	HP 1600C 8.5 in. by 11.0 in. color screen copy printer
HCBL05	1	Parallel cable
1949396?1	1	RJ45 to DB25 adapter
1949396?2	1	Serial/parallel converter
1947422?210??	1	Null modem cable (?? specifies length)

Tools None.

Safety Considerations

CAUTION

1. Make sure that all voltage labels and voltage switch settings on the peripheral devices, power supply, and power entry panel show the correct operating voltage. Equipment damage may result if the incorrect voltage is connected. Make sure the console main power circuit breaker is off before changing operating voltage settings or equipment damage may result.
2. Remove power from all peripheral equipment and the console before installing or removing peripheral equipment. Equipment damage may result.

Procedure

Printers can be connected to a terminal server (IIPRS02). The terminal server has DB-25 style connectors. A null modem cable connects the printer to any of the terminal server ports.

The **DEFINEDEVICES** command must be completed for the software to recognize the printer. Refer to the **File Utilities, Conductor VMS** instruction.





The line cord must have isolated safety ground referenced to the same point as the workstation electronics safety ground, without connection to conduit/structural ground. The AC receptacle must be an isolated ground duplex type.

The HP 1600C is a color printer compatible with PCL5. It prints on 8.5 -inch by 11-inch paper and transparencies.

Use the buttons and indicators on the control panel to operate the printer. For more information, refer to the manufacturer's documentation.

HP glossy media and HP transparency media require a ten-minute drying time. Do not place anything on it during this time. Remove these sheets from the printer so that other print-outs do not stack on them.

-  1. Verify that all voltage switch settings are correct.
-  2. Remove power from the peripheral device, the workstation and all related equipment.
- 3. Connect the parallel cable from the printer to the serial/parallel converter.(Fig. PR58-1).

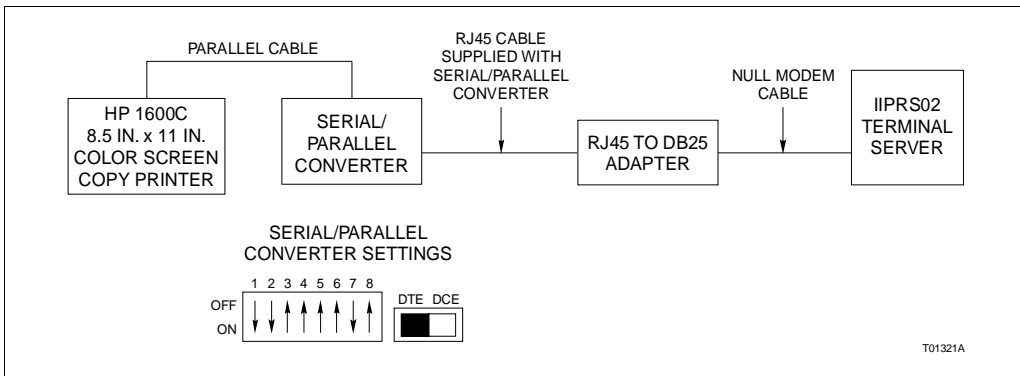


Figure PR58-1. Printer Cable Configuration and Dipswitch Settings

- 4. Connect the RJ45 cable from the serial/parallel converter to the RJ45 to DB25 adapter.
- 5. Connect the null modem cable from the RJ45 to DB25 adapter to the IIPRS02 terminal server

- 6. Load the print media.
- 7. Press the power switch. The READY indicator lights.





Purpose/Scope

20 min.

This procedure explains how to replace the monitor.

Parts

Number	Qty	Description
1949311?1	1	Color monitor
1949311?2		Color monitor with touchscreen


Tools • Long Phillips head screwdriver.

Safety Considerations

WARNING

1. There are exposed AC and DC connections inside the cabinet. These exposed electrical connections present a shock hazard that can cause injury or death.

Procedure

-  1. Verify that power is removed from the workstation.
- 2. Use the long Phillips head screwdriver to remove the four rear monitor cover screws (Fig. [PR59-1](#)).
- 3. Remove the rear monitor cover.
- 4. Label and disconnect all cables attached to the monitor.
- 5. If there is an upper power supply in the workstation, remove the four upper power supply screws and remove the upper power supply from the back of the monitor (Fig. [PR59-2](#)).
- 6. Use the long Phillips head screwdriver to remove the four monitor mounting screws that secure the monitor to the swivel/tilt mechanism (Fig. [PR59-3](#)).

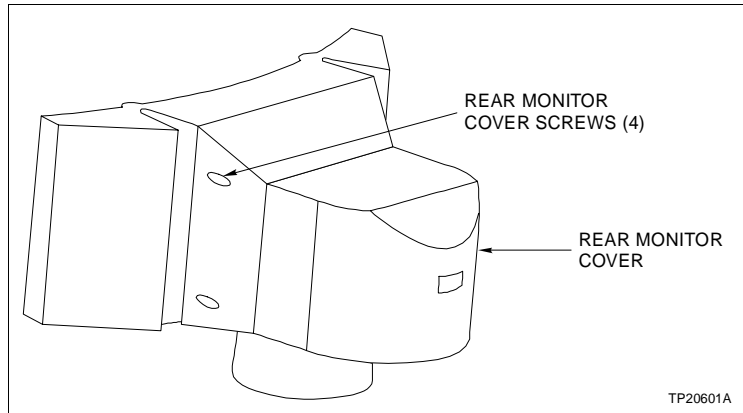


Figure PR59-1. Rear Monitor Cover

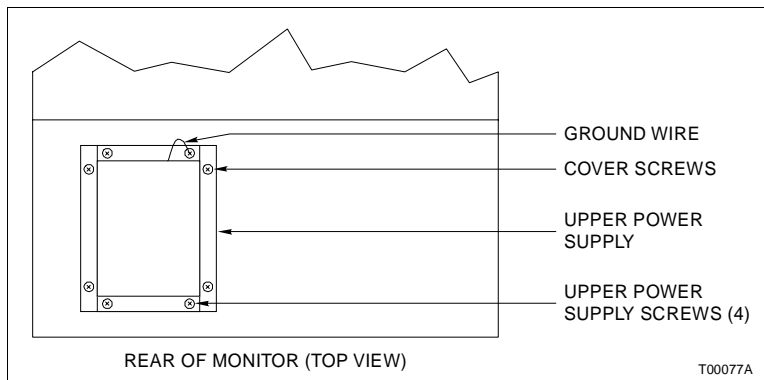


Figure PR59-2. Upper Power Supply

- 7. Slide the new monitor, front first, from the rear of the swivel/tilt assembly, into the monitor enclosure and align the monitor mounting slots with the monitor mounting holes in the swivel/tilt mechanism.

NOTE: The monitor mounting slots provide for some slight adjustment and positioning of the monitor in the monitor enclosure.

- 8. Install the monitor mounting screws and tighten them with the long Phillips head screwdriver.
- 9. Connect all the cables to the monitor that were removed in Step 4.

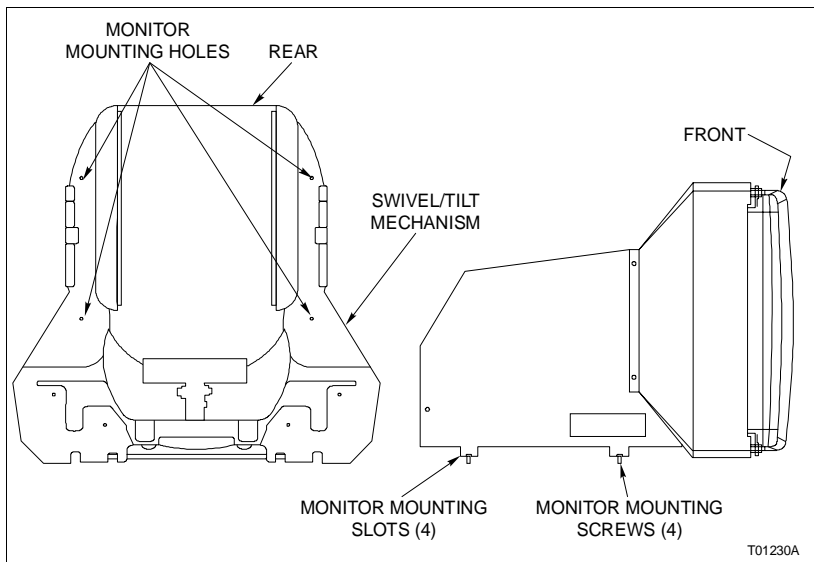


Figure PR59-3. Monitor Replacement

- 10. If the upper power supply was removed in Step 5, position it on the back of the new monitor, install the four upper power supply screws and tighten them with the Phillips head screwdriver.

NOTE: Be sure the ground wire is installed under the top right upper power supply screw.

- 11. Install the rear monitor cover.



Upper Power Supply Replacement



PR60

Purpose/Scope

10 min.

This procedure explains how to replace the upper power supply.

Parts

Number	Qty	Description
1949325?2	1	Upper power supply

Tools • Long Phillips head screwdriver.

Safety Considerations

WARNING

1. There are exposed AC and DC connections inside the cabinet. These exposed electrical connections present a shock hazard that can cause injury or death.

Procedure



1. Verify that power is removed from the workstation.

2. Use the long Phillips head screwdriver to remove the four rear monitor cover screws (Fig. PR60-1).

3. Remove the rear monitor cover.

4. Use the Phillips head screwdriver to remove the four cover screws that hold the cover on the upper power supply (Fig. PR60-2).

5. Label and remove all cables from the upper power supply.

6. Use the Phillips head screwdriver to remove the four upper power supply screws and remove the upper power supply.

7. Align the new upper power supply with the mounting holes in the monitor.

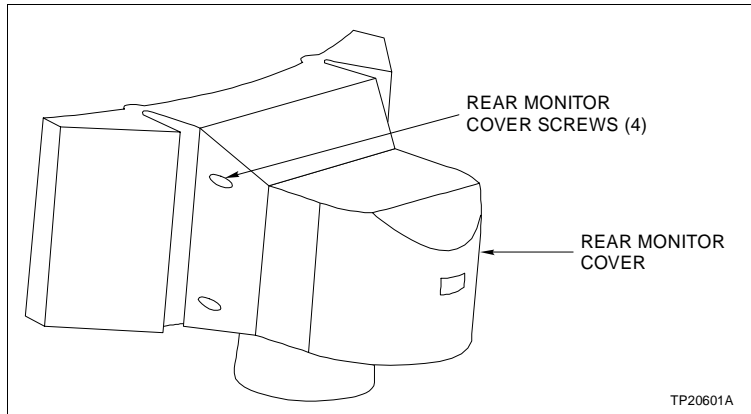


Figure PR60-1. Rear Monitor Cover

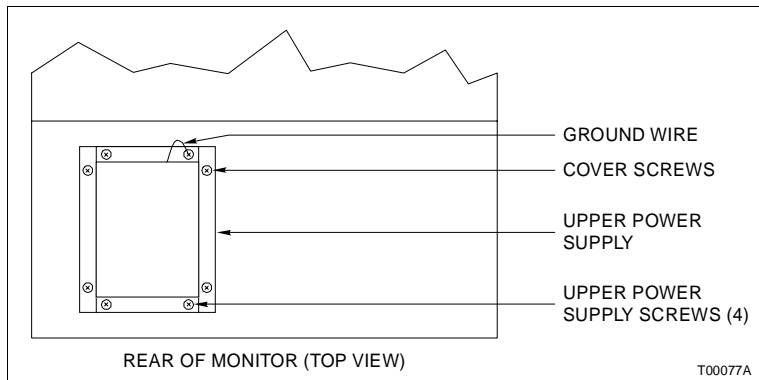


Figure PR60-2. Upper Power Supply

- 8. Install the four upper power supply screws and tighten them with the Phillips head screwdriver, making sure the ground wire is captured by the upper right screw.
- 9. Install all cables removed in Step 5.
- 10. Install the cover and use the Phillips head screwdriver to tighten the cover screws.
- 11. Install the rear monitor cover.

Operator I/O Controller Replacement



PR61

Purpose/Scope

20 min.

This procedure explains how to replace the operator I/O controller.

Parts

Number	Qty	Description
6641480?2	1	Operator I/O controller

Tools

- Phillips head screwdriver.

Safety Considerations

WARNING

1. There are exposed AC and DC connections inside the cabinet. These exposed electrical connections present a shock hazard that can cause injury or death.

Procedure



1. Verify that power is removed from the workstation.



2. Use the Phillips head screwdriver to remove the four rear monitor cover screws (Fig. [PR61-1](#)).



3. Remove the rear monitor cover.



4. Label and disconnect all cables from the operator I/O controller.



5. Gently lift up and pull out on the operator I/O controller to slide it out of the mounting rails in the swivel/tilt mechanism (Fig. [PR61-2](#)).



6. Verify that the jumpers are set as shown in Figure [PR61-3](#).

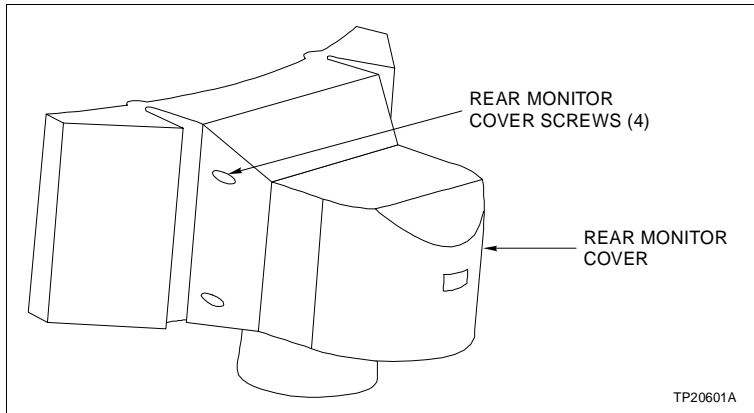


Figure PR61-1. Rear Monitor Cover

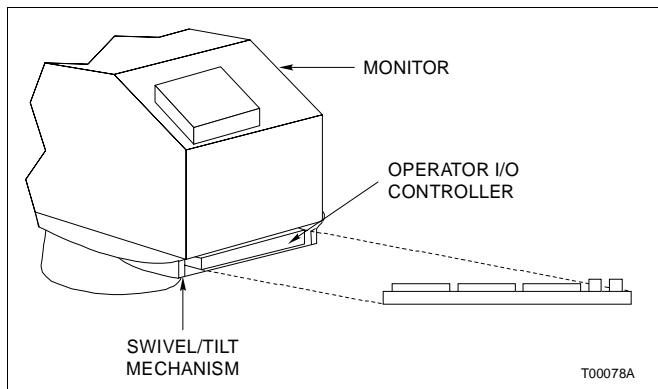


Figure PR61-2. Operator I/O Controller Replacement

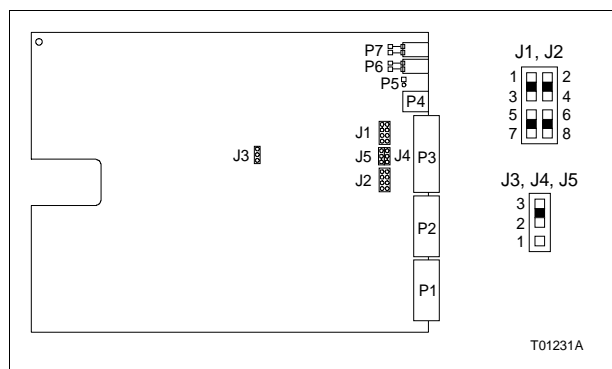


Figure PR61-3. Operator I/O Controller

- 7. Insert the new operator I/O controller into the mounting rails in the swivel/tilt mechanism and push it in until it snaps into place.
- 8. Connect all cables removed in Step 4.
- 9. Install the rear monitor cover.





Purpose/Scope

5 min.

This procedure explains how to replace the panel control.

Parts

Number	Qty	Description
6641620?1	1	Panel control

Tools

- Thin, rigid sheet of stock approximately 190 mm (7.5 in.) wide.

Procedure

1. Insert the thin rigid piece of stock into the space above the panel control (Fig. PR62-1).

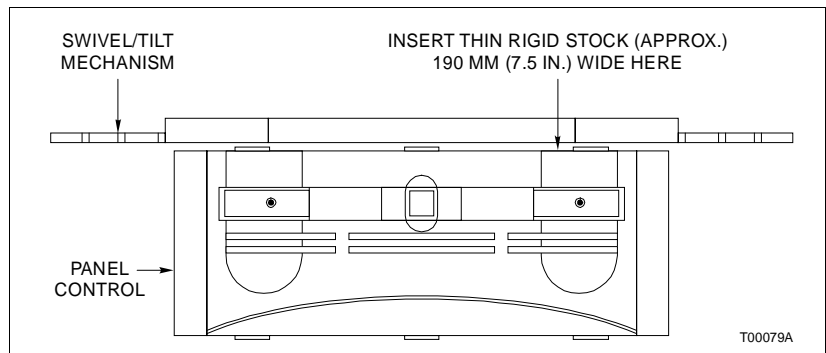


Figure PR62-1. Panel Control Replacement

2. While applying slight downward pressure on the thin rigid piece of stock, gently pull on the panel control until it is free of the swivel/tilt mechanism.
3. Label and remove the cables from the panel control.
4. Attach the cables to the new panel control.
5. Insert the panel control into the swivel/tilt mechanism and push gently until it is firmly seated.





Purpose/Scope

10 min.

This procedure explains how to adjust the swivel/tilt brake.

Parts None.

- Tools
- 10-mm open-end wrench.
 - M4 Allen wrench.
 - Thin, rigid sheet of stock approximately 190 mm (7.5 in.) wide.

Procedure

1. Insert the thin rigid piece of stock into the space above the panel control (Fig. PR63-1).

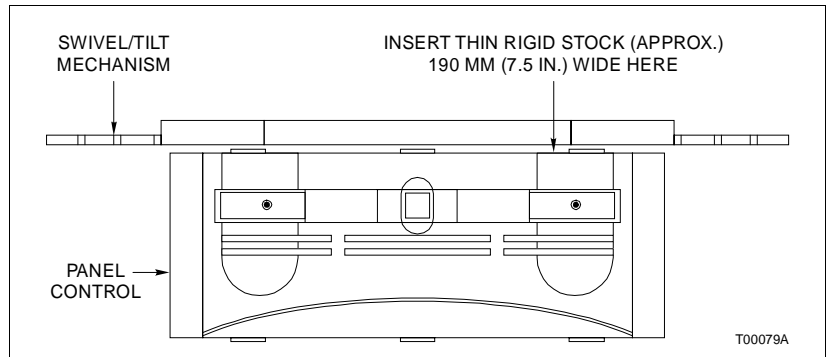


Figure PR63-1. Panel Control Replacement

2. While applying slight downward pressure on the thin rigid piece of stock, gently pull on the panel control until it is free of the swivel/tilt mechanism.
3. Label and remove the cables from the panel control.
4. Reach into the opening left vacant by the panel control and while using the M4 Allen wrench to hold the brake screw in place, use the 10-mm open-end wrench to tighten or loosen the brake nut as desired (Fig. PR63-2).

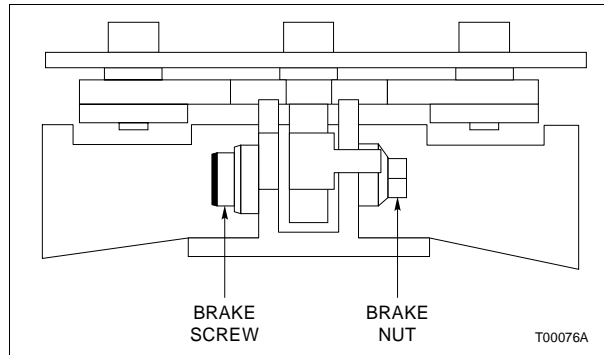


Figure PR63-2. Swivel/Tilt Brake Adjustment

- 5. Attach the cables to the panel control.
- 6. Insert the panel control into the swivel/tilt mechanism and push gently until it is firmly seated.

ADP and Blank Plate Replacement



PR64

Purpose/Scope

10 min.

This procedure explains how to replace an annunciator display panel (ADP) or blank plate.

Parts

Number	Qty	Description
6641273?1	1	ADP
6641630?1		Blank plate

- Tools
- Long Phillips head screwdriver.
 - M6 nut driver.

Procedure

Each pod on the left or right side of the monitor can hold up to two ADPs or blank plates (or a combination of ADPs and blank plates). The workstations can have up to four ADPs per workstation with a keyboard.

A blank plate goes into any position in a pod where an ADP does not exist. Customer modification of the blank plates to hold pushbuttons, phones and the like is possible. Additional weight added to the blank plates could, however, cause the swivel/tilt mechanism to become unbalanced. To maintain proper balance, it is recommended that not more than 900 grams (32 ounces) be added to a blank plate.

1. Verify that power is removed from the workstation.
2. Use the long Phillips head screwdriver to remove the two outer rear pod cover screws (Fig. [PR64-1](#)).
3. The top and bottom face of the bellows is flexible. While holding the bellows away from the pod, use the long Phillips head screwdriver to remove the two inner rear pod cover screws.
4. Remove the rear pod cover.

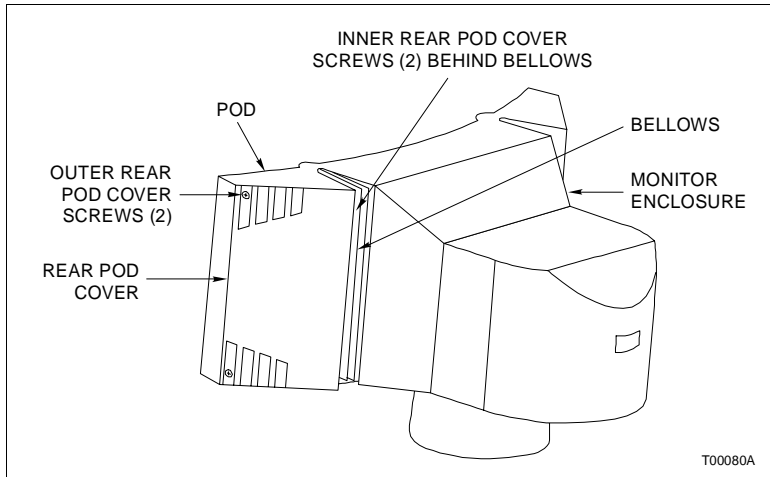


Figure PR64-1. Rear Pod Cover

- 5. Label and remove all cables attached to the ADP.
- 6. Rotate the four clips that hold the ADP or blank plate into the pod. It might be necessary to loosen the clip mounting screws (Fig. PR64-2).

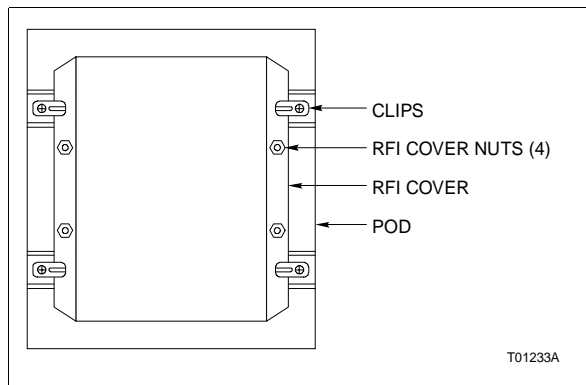


Figure PR64-2. ADP

- 7. Remove the ADP or blank plate.
- 8. If replacing an ADP, perform Steps 9 through 11. If replacing a blank plate, go on to Step 12.
- 9. Use the M6 nut driver to remove the four RFI cover nuts from the new ADP.

- 10. Remove the ADP and set the ADP address (SW1) on the new ADP according to which pod position the ADP will be installed (Fig. PR64-3).

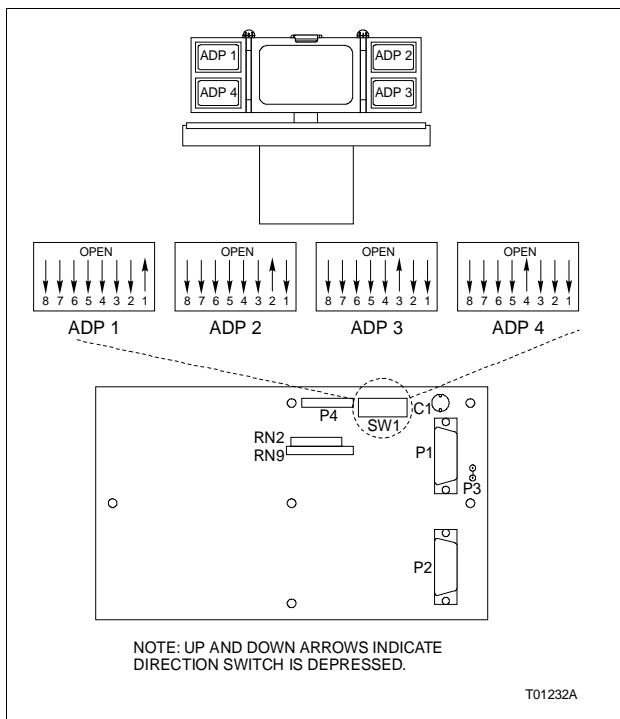


Figure PR64-3. ADP Circuit Board Assembly

- 11. Install the RFI cover.
- 12. Install the ADP or blank plate into the pod.
- 13. Rotate the four clips to hold the ADP or blank plate in the pod.
- 14. Connect all the cables removed in Step 5.
- 15. Install the rear pod cover.





Purpose/Scope

10 min.

This procedure explains how to replace ADP legend strips.

Parts None.

- Tools
- Long Phillips head screwdriver.
 - Customer-produced legend strips.

Procedure

The ADP comes with standard legend strips labeled 1 through 32. Customers can create their own custom legend strips.

1. Verify that power is removed from the workstation.
2. Use the long Phillips head screwdriver to remove the two outer rear pod cover screws (Fig. PR65-1).

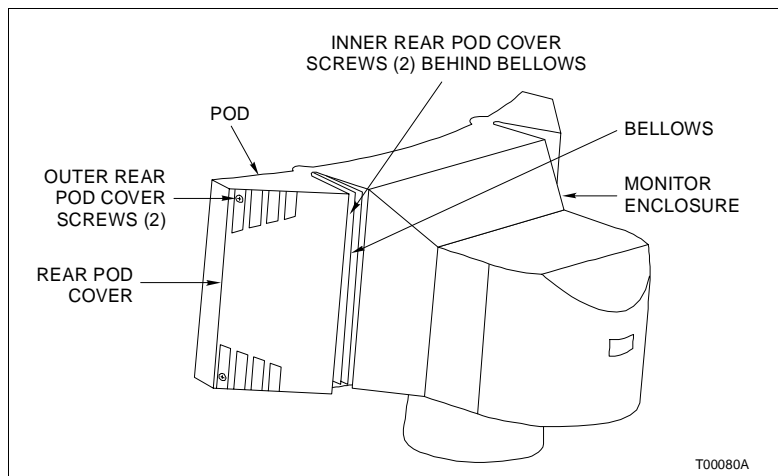


Figure PR65-1. Rear Pod Cover

3. The top and bottom face of the bellows is flexible. While holding the bellows away from the pod, use the long Phillips head screwdriver to remove the two inner rear pod cover screws.



- 4. Remove the rear pod cover.
- 5. Label and remove all cables attached to the ADP.
- 6. Rotate the four clips that hold the ADP into the pod. It might be necessary to loosen the clip mounting screws (Fig. PR65-2).

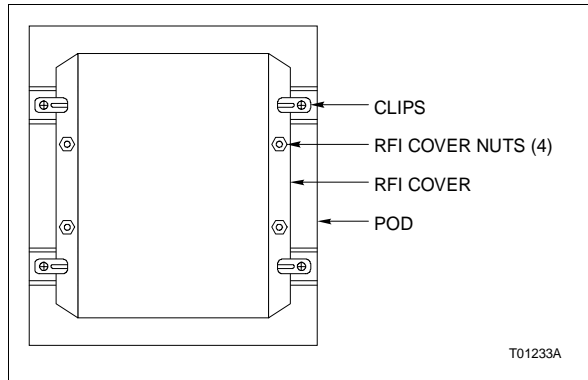


Figure PR65-2. ADP

- 7. Remove the ADP.
- 8. Pull on the legend strip tab to remove it (Fig PR65-3).

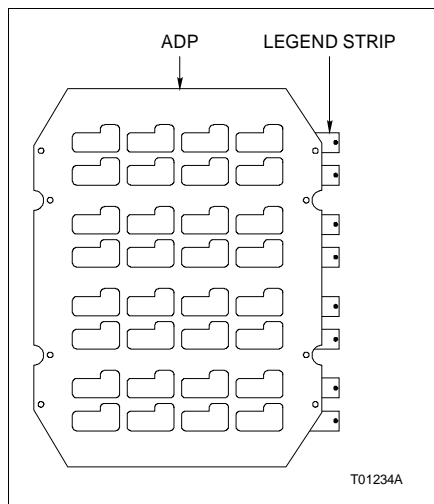


Figure PR65-3. ADP Legend Strips

- 9. Insert the customer-produced legend strips into place.

- 10. Install the ADP into the pod.
- 11. Rotate the four clips to hold the ADP in the pod.
- 12. Connect all the cables removed in Step 5.
- 13. Install the rear pod cover.





Purpose/Scope

10 min.

This procedure explains how to replace an annunciator display panel (ADP) keyboard.

Parts

Number	Qty	Description
1949505?1	1	ADP keyboard

Tools

- Long Phillips head screwdriver.
- M6 nut driver.
- M8 nut driver.

Procedure

1. Verify that power is removed from the workstation.
2. Use the long Phillips head screwdriver to remove the two outer rear pod cover screws (Fig. [PR66-1](#)).

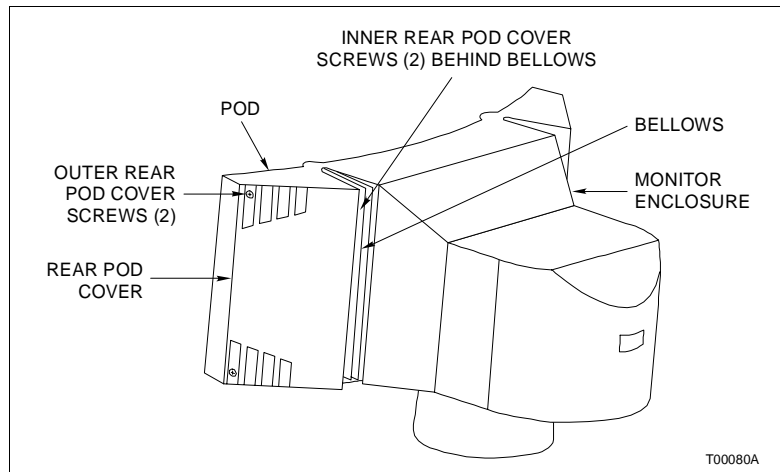


Figure PR66-1. Rear Pod Cover

3. The top and bottom face of the bellows is flexible. While holding the bellows away from the pod, use the long Phillips



head screwdriver to remove the two inner rear pod cover screws.

- 4. Remove the rear pod cover.
- 5. Label and remove all cables attached to the ADP.
- 6. Rotate the four clips that hold the ADP into the pod. It might be necessary to loosen the clip mounting screws (Fig. [PR66-2](#)).

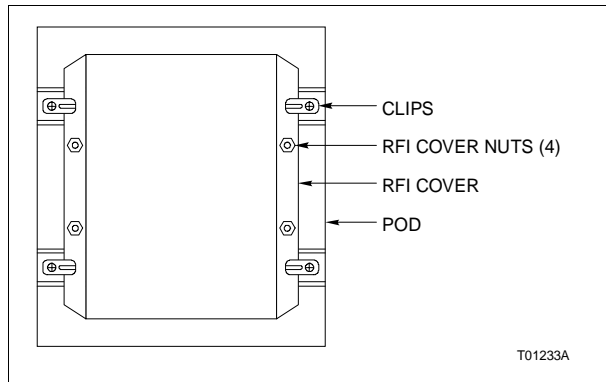


Figure PR66-2. ADP

- 7. Remove the ADP.
- 8. Use the M6 nut driver to remove the four RFI cover nuts from the ADP (Fig. [PR66-3](#)).

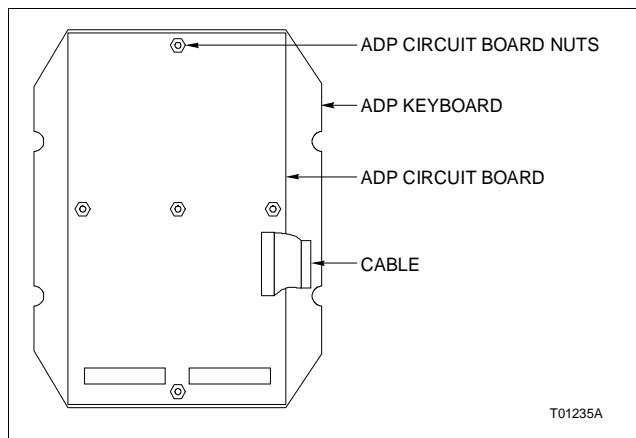


Figure PR66-3. ADP Keyboard

- 9. Remove the RFI cover.
- 10. Use the M8 nut driver to remove the five ADP circuit board nuts.
- 11. Remove the ADP circuit board.
- 12. Remove the cable that goes from the ADP circuit board to the ADP keyboard from the ADP keyboard.
- 13. Connect the cable from the ADP circuit board to the new ADP keyboard.
- 14. Place the ADP circuit board on the ADP keyboard so the five studs protrude through the ADP circuit board.
- 15. Install the five ADP circuit board nuts and tighten them with the M8 nut driver.
- 16. Install the RFI cover.
- 17. Install the ADP into the pod.
- 18. Rotate the four clips to hold the ADP in the pod.
- 19. Connect all the cables removed in Step 5.
- 20. Install the rear pod cover.





Purpose/Scope

1 min.

This procedure explains how to install the footrest.

Parts None.

Tools • M8 Allen wrench.

Procedure

1. Insert the footrest tabs into the slots in the base pedestal (Fig. PR67-1).

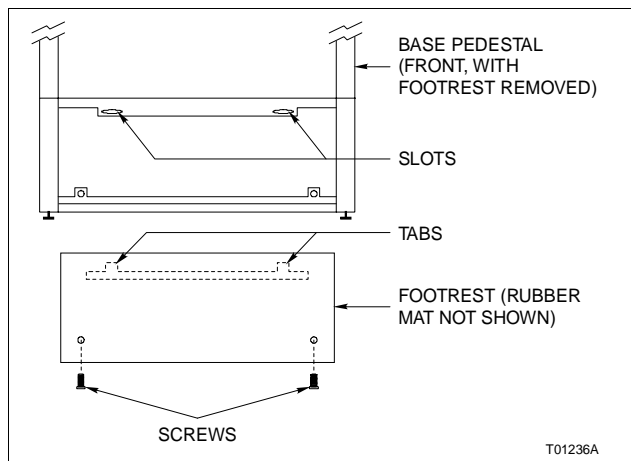


Figure PR67-1. Footrest Installation

2. Let the footrest fall flush with the base pedestal.
3. Install the two screws and tighten them with the M8 Allen wrench.





Purpose/Scope

2 min.

This procedure explains how to install the pedestal cover.

Parts None.

Tools • M8 Allen wrench.

Procedure

1. Be sure the latches are in the open position ($\frac{1}{2}$ -turn from closed position as shown in Fig. PR68-1).

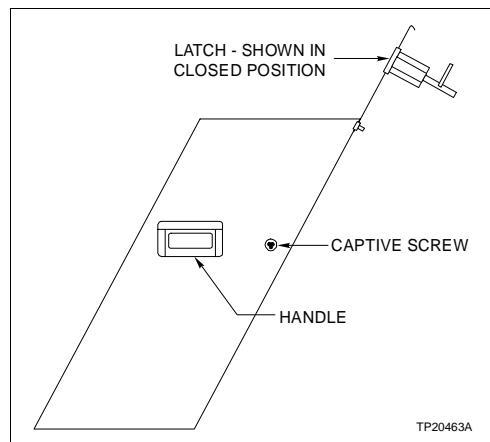


Figure PR68-1. Pedestal Cover Installation

2. Grasp the pedestal cover by the handles on each side and install it on the rear of the base pedestal.
3. Use the M8 Allen wrench to turn the two latches on the back of the pedestal cover $\frac{1}{2}$ -turn to the closed position so that they secure the pedestal cover to the base pedestal.
4. Use the M8 Allen wrench to tighten the two captive screws on the sides of the pedestal cover.





Introduction

Figures A-1, A-2, A-3 and A-4 are footprint cutouts of various Conductor VMS (Signature Class) Series 43 workstation components. Figures A-1 and A-2 have a scale of one millimeter equals 50 millimeters, and Figures A-3 and A-4 have a scale of ¼-inch equals one foot. These drawings are intended to help in control room layout and design.

To use the cutouts, make copies and cut out the various components and place them on grid paper of the proper scale. This will insure the most effective use of the available floor space.

NOTE: Copy machines tend to reduce things that are copied on them. If the footprint cutouts are copied, then the grid paper should also be copied.

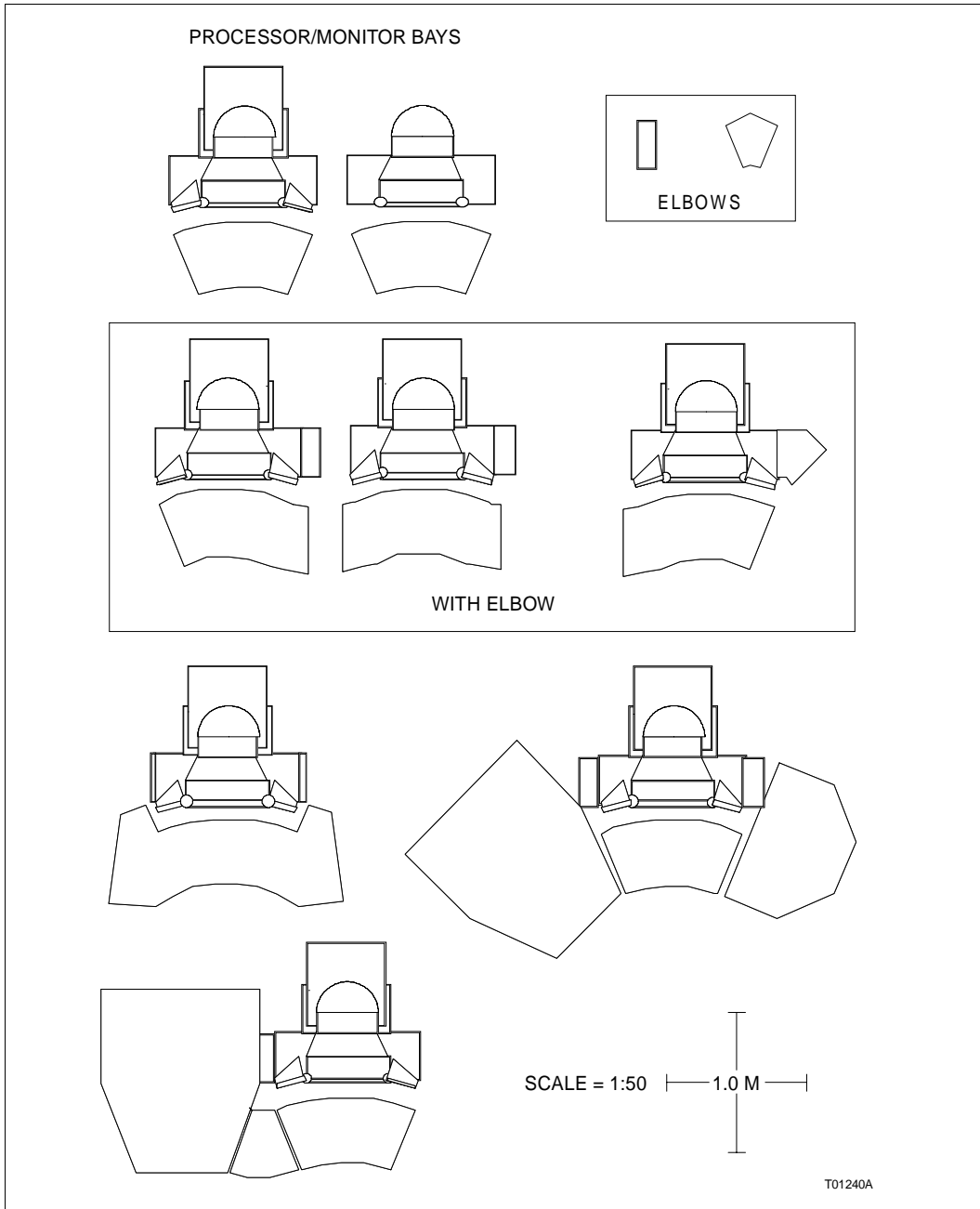


Figure A-1. Footprint Cutouts (1 mm = 50 mm)

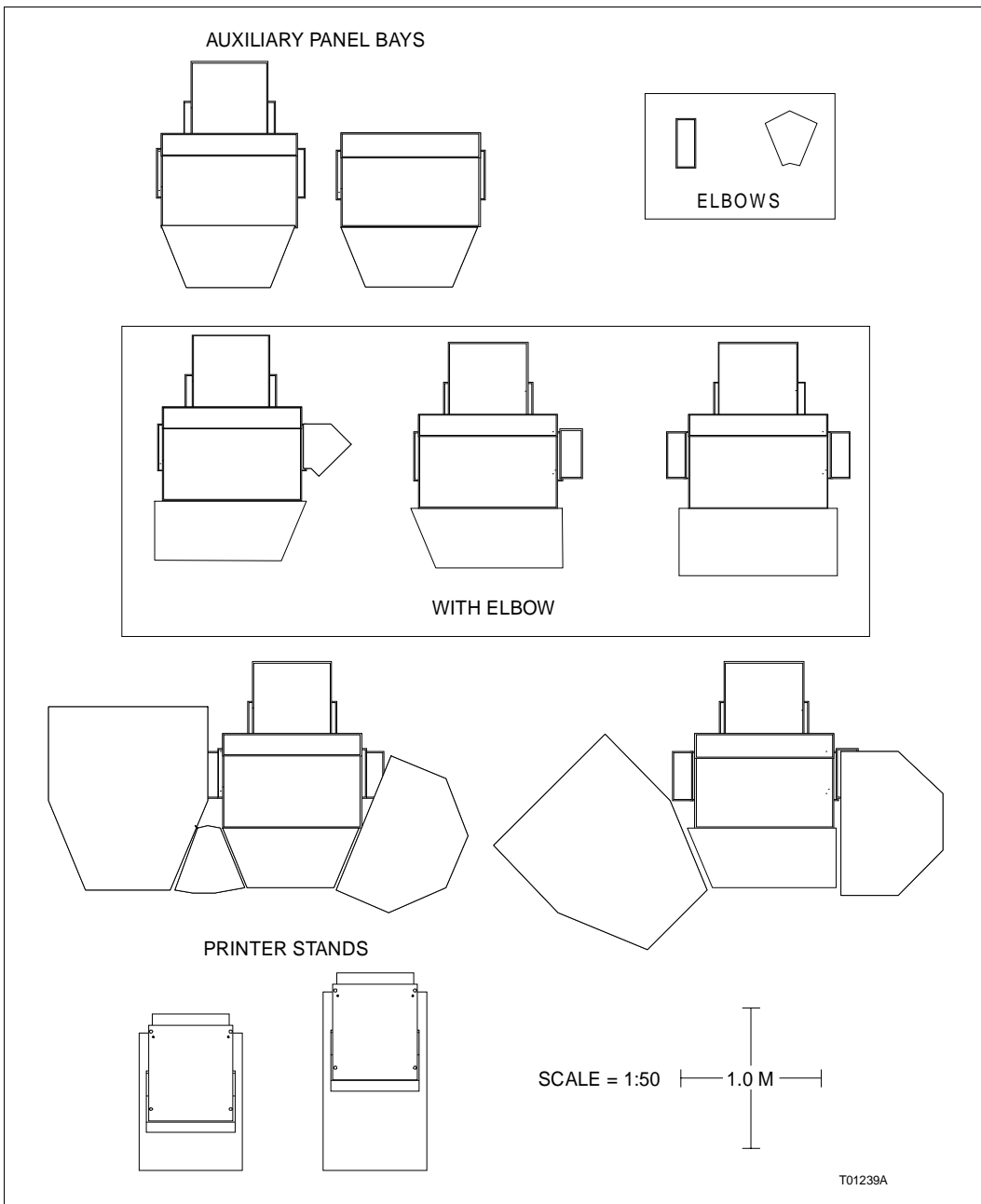


Figure A-2. Footprint Cutouts (1 mm = 50 mm)

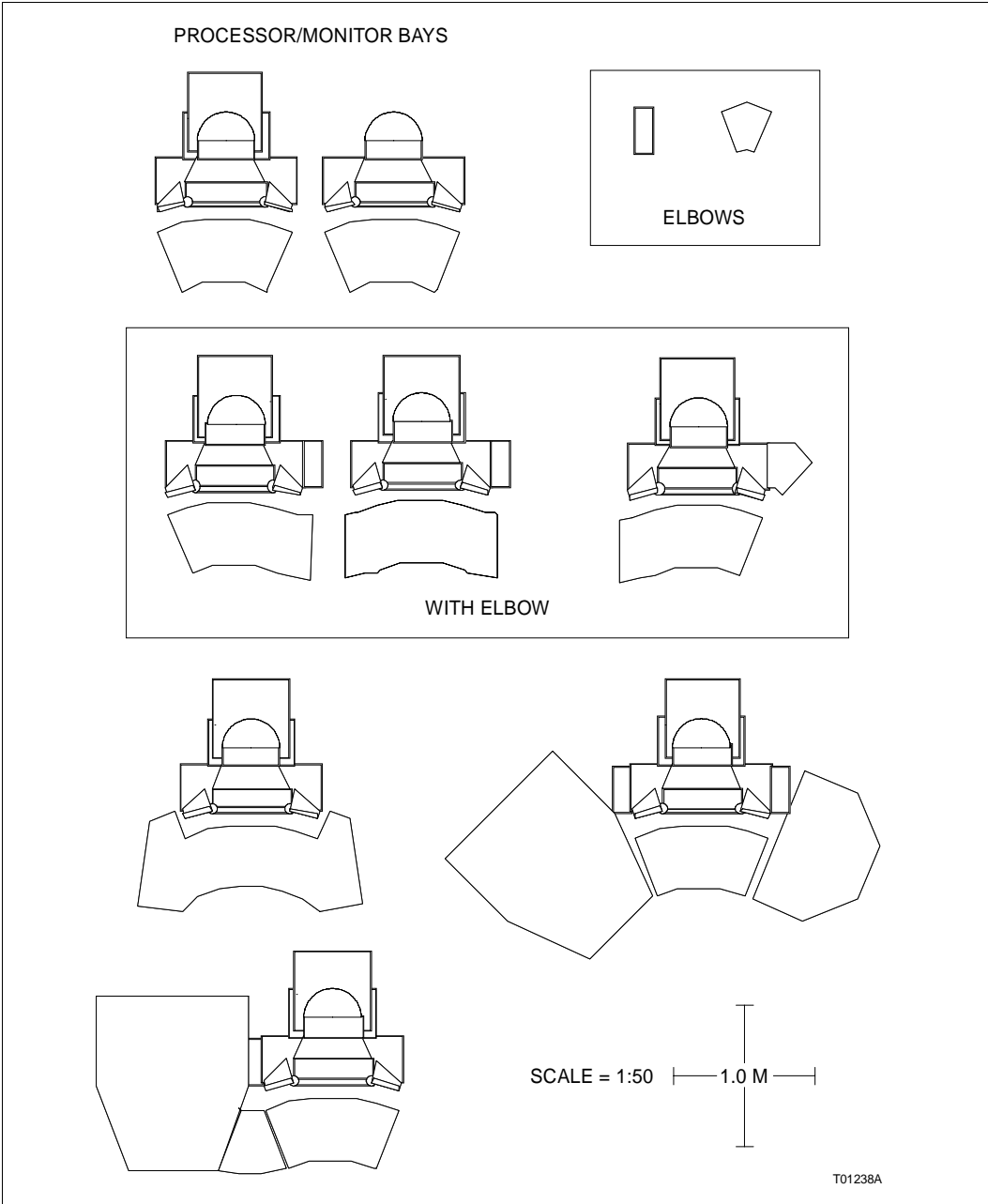


Figure A-3. Footprint Cutouts (1/4-inch = 1 ft)

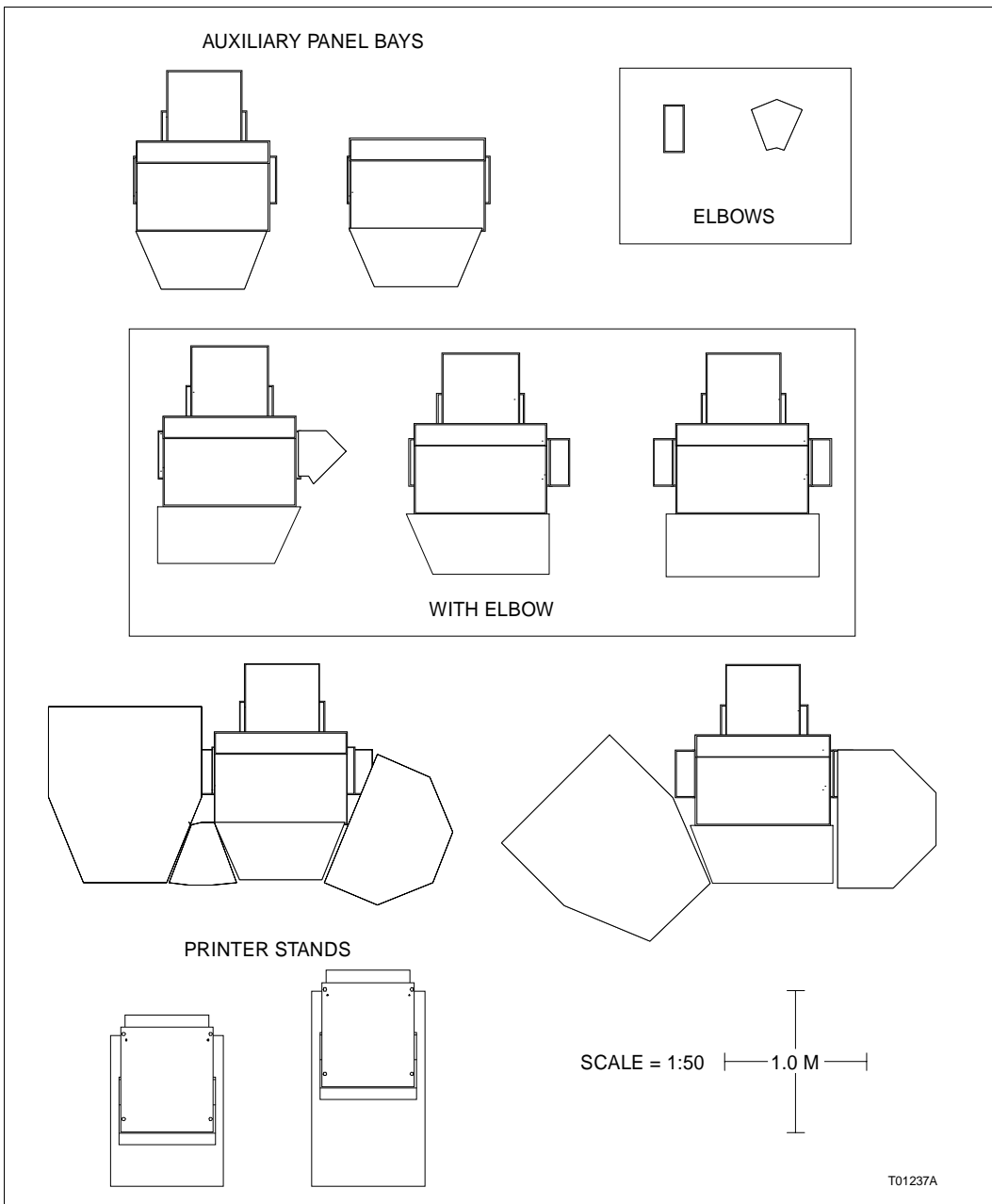


Figure A-4. Footprint Cutouts ($\frac{1}{4}$ -inch = 1 ft)





Introduction

This appendix contains installation and dimension drawings for various Signature Class Conductor Series 43 workstation components and arrays as well as a typical anchoring scheme drawing. Table B-1 lists the figure numbers and descriptions of the drawings.

Table B-1. Installation and Dimension Drawings

Figure Number	Description
B-1	Stand-alone workstation installation drawing
B-2	Array installation drawing 1 (typical)
B-3	Array wiring access and mounting dimensions (typical)
B-4	Array installation drawing 2 (typical)
B-5	Array installation drawing 3 (typical)
B-6	Auxiliary panel installation drawing
B-7	Auxiliary panel customer cutout area
B-8	Anchoring scheme (typical)
B-9	Drawing table with bookcase and wedge table dimensions
B-10	Drawing table without bookcase and wedge table dimensions
B-11	Drawer table dimensions
B-12	Bookcase with wedge table dimensions
B-13	Printer stand dimensions
B-14	Workstation work surface S1 dimensions
B-15	Workstation work surface S2 dimensions
B-16	Workstation work surface S3 dimensions
B-17	Workstation work surface S4 dimensions
B-18	Workstation work surface S5 dimensions
B-19	Auxiliary panel work surface S1 dimensions
B-20	Auxiliary panel work surface S2 dimensions
B-21	Auxiliary panel work surface S3 dimensions
B-22	Auxiliary panel work surface S4 dimensions

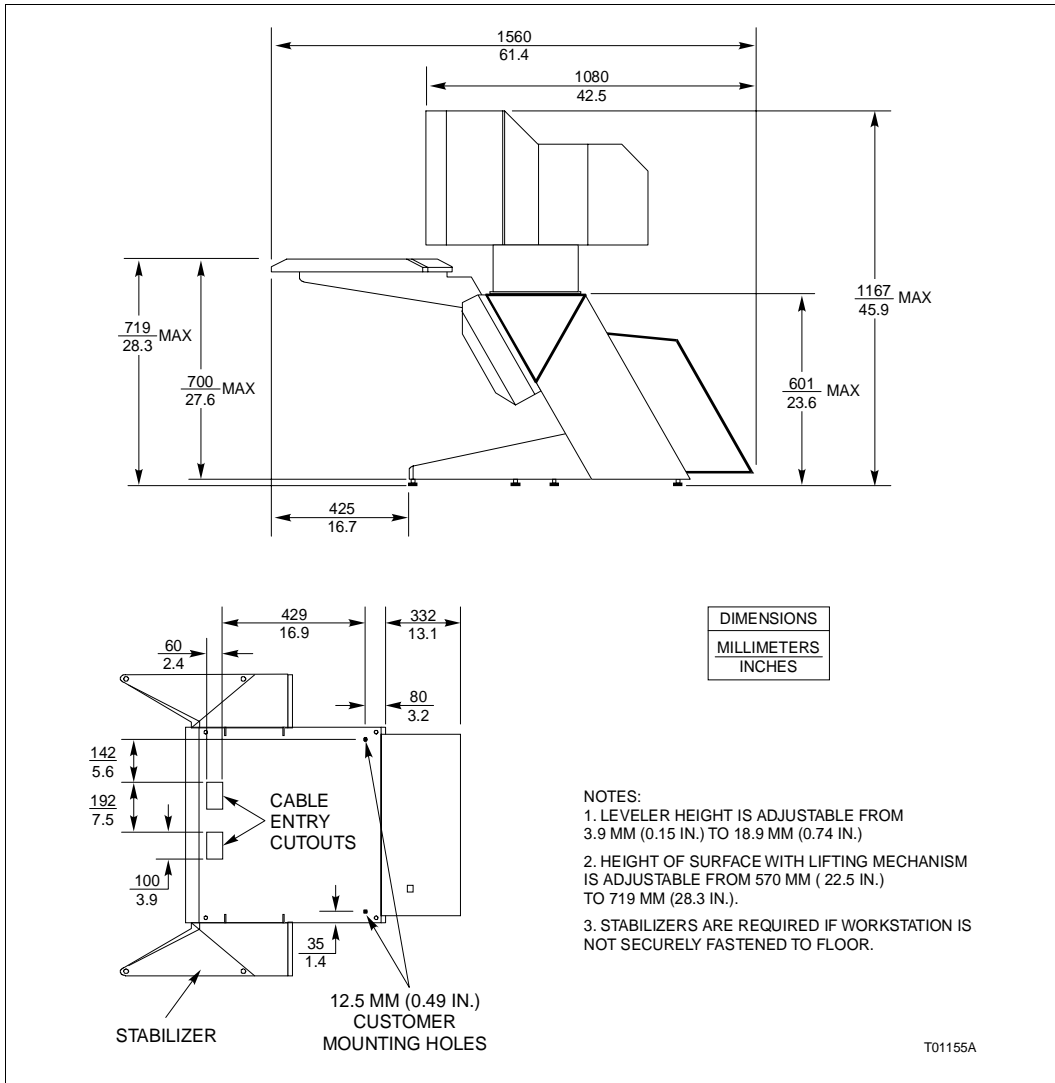


Figure B-1. Stand-Alone Workstation Installation Drawing

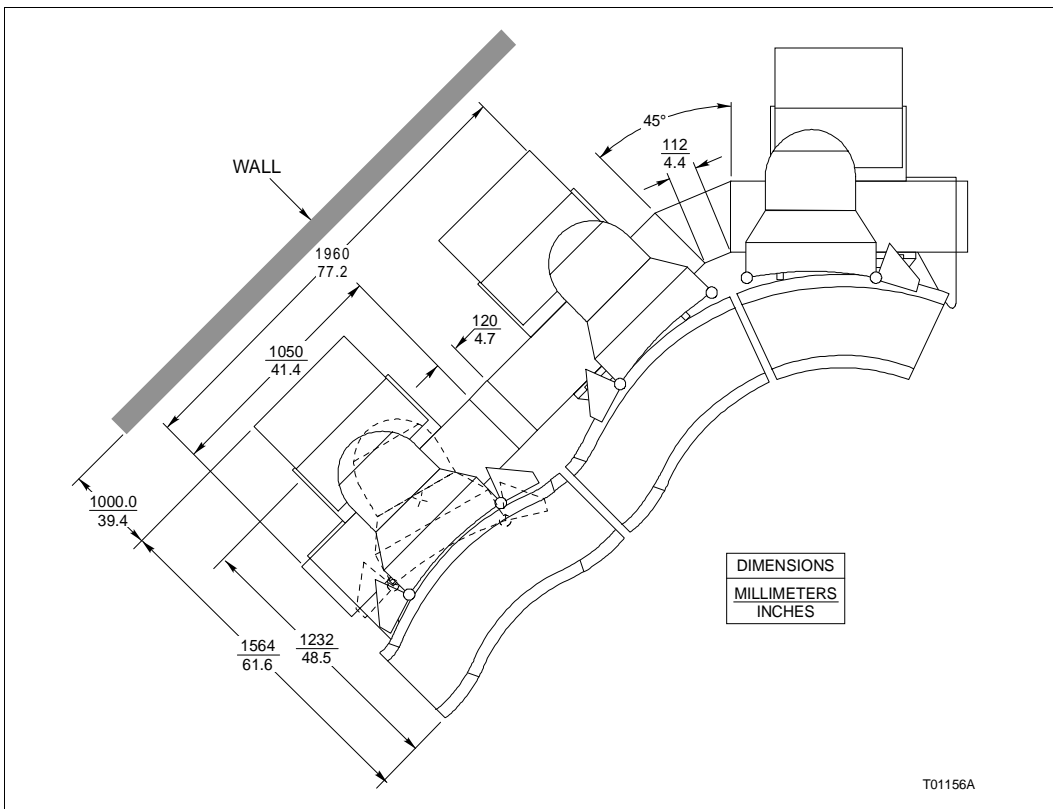


Figure B-2. Array Installation Drawing 1 (Typical)

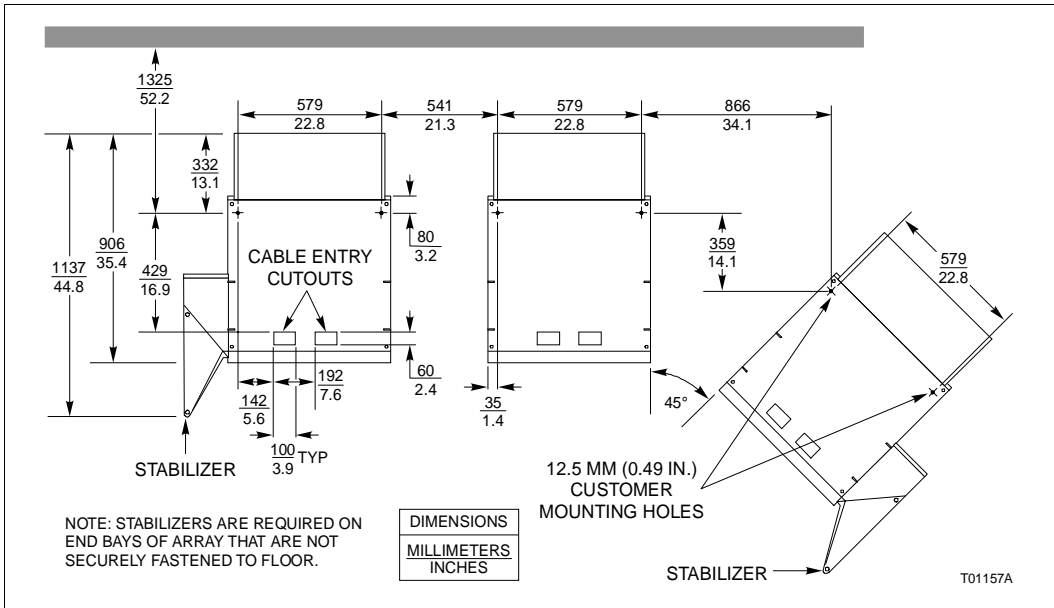


Figure B-3. Array Wiring Access and Mounting Dimensions (Typical)

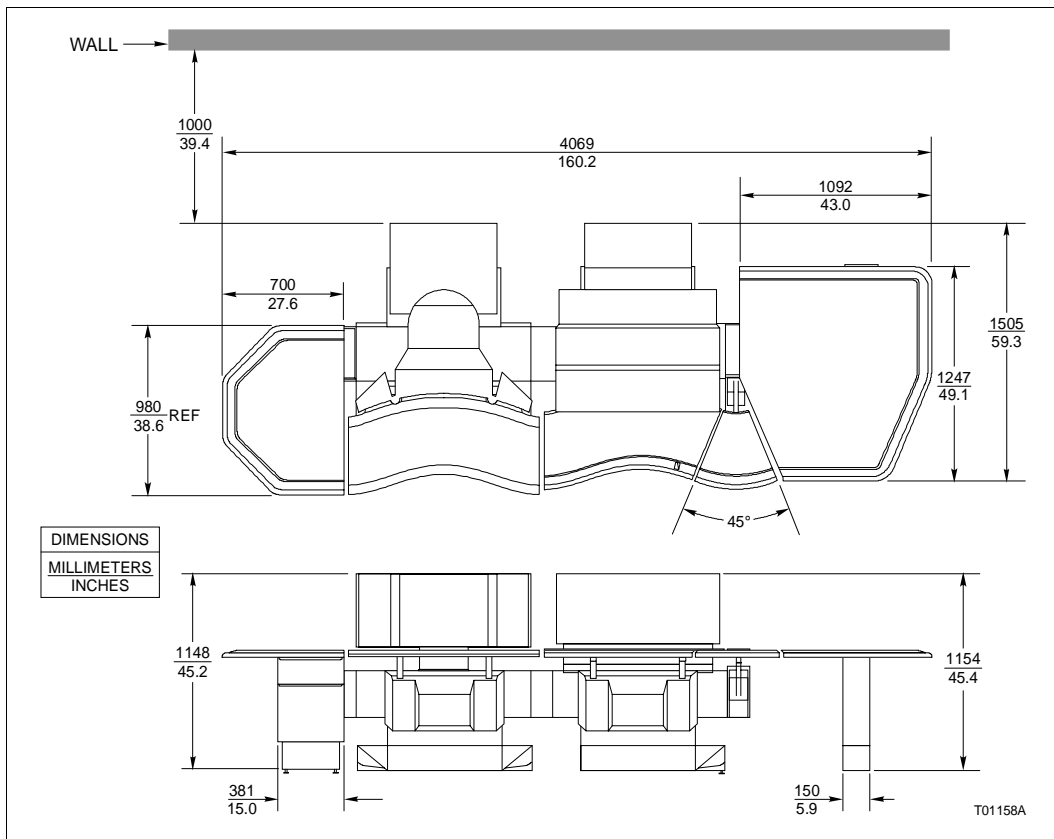


Figure B-4. Array Installation Drawing 2 (Typical)

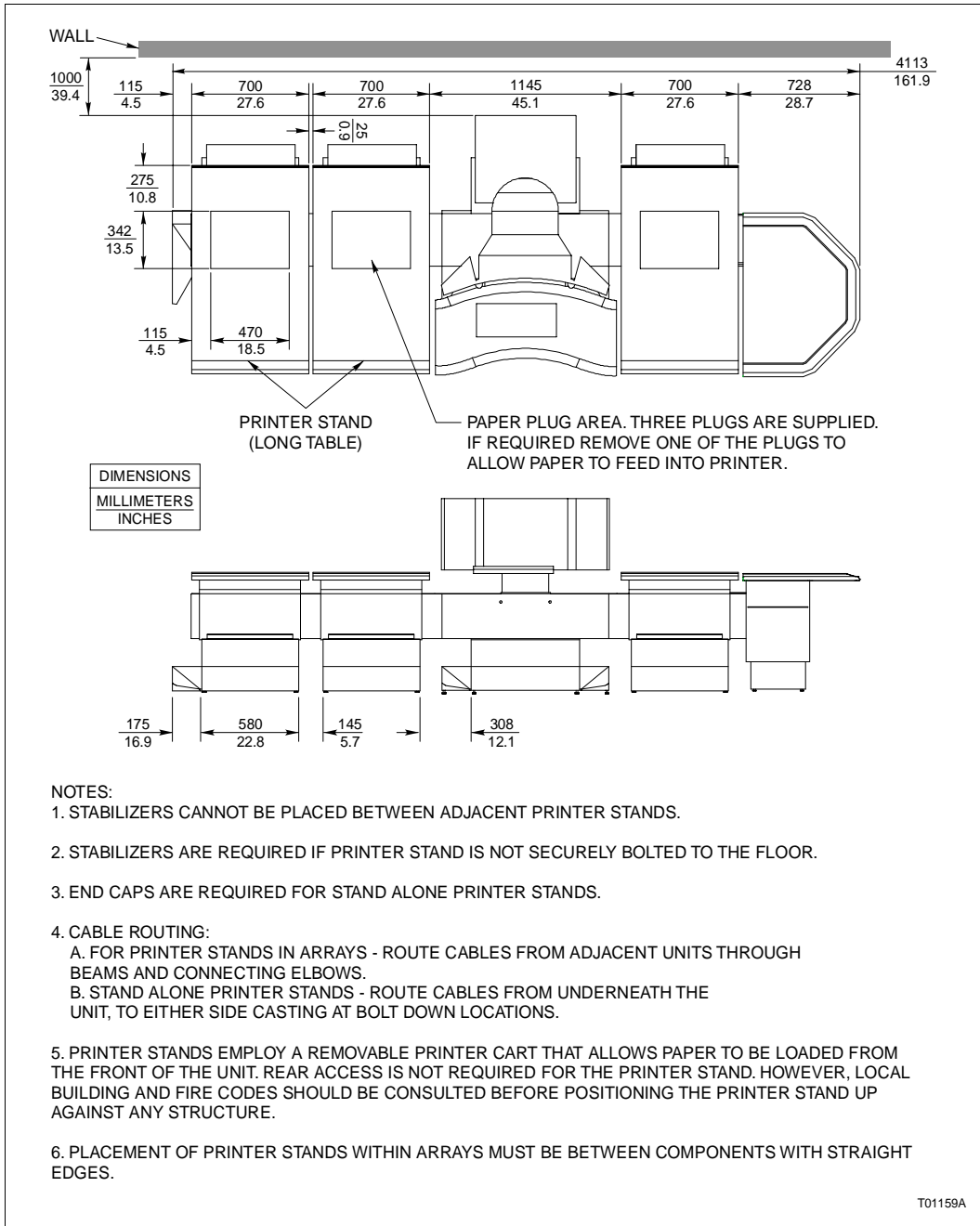


Figure B-5. Array Installation Drawing 3 (Typical)

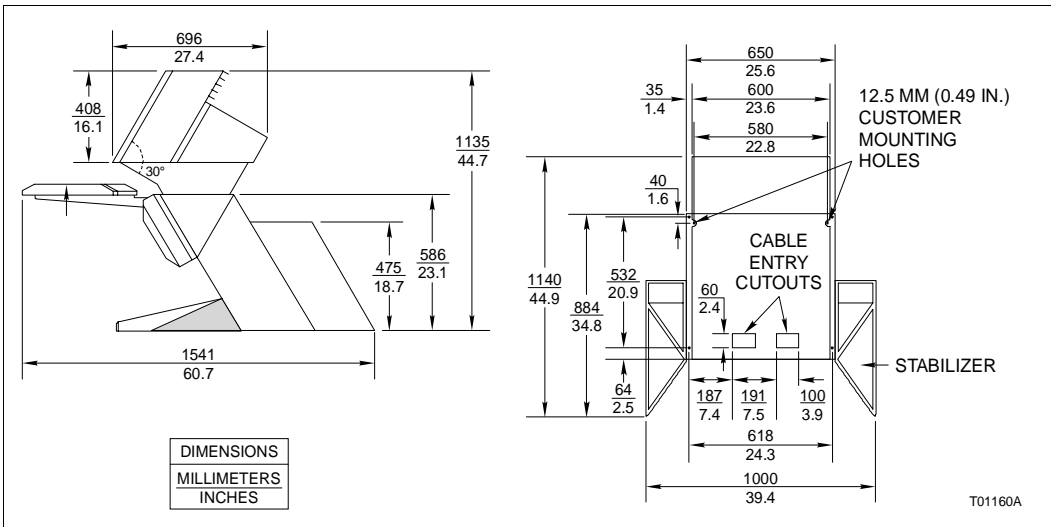


Figure B-6. Auxiliary Panel Installation Drawing

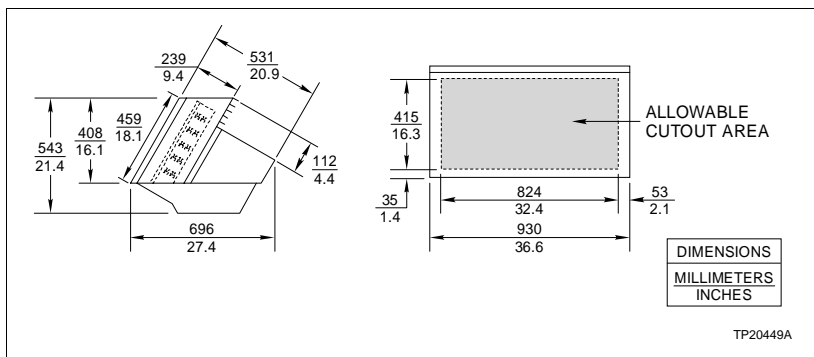


Figure B-7. Auxiliary Panel Customer Cutout Area

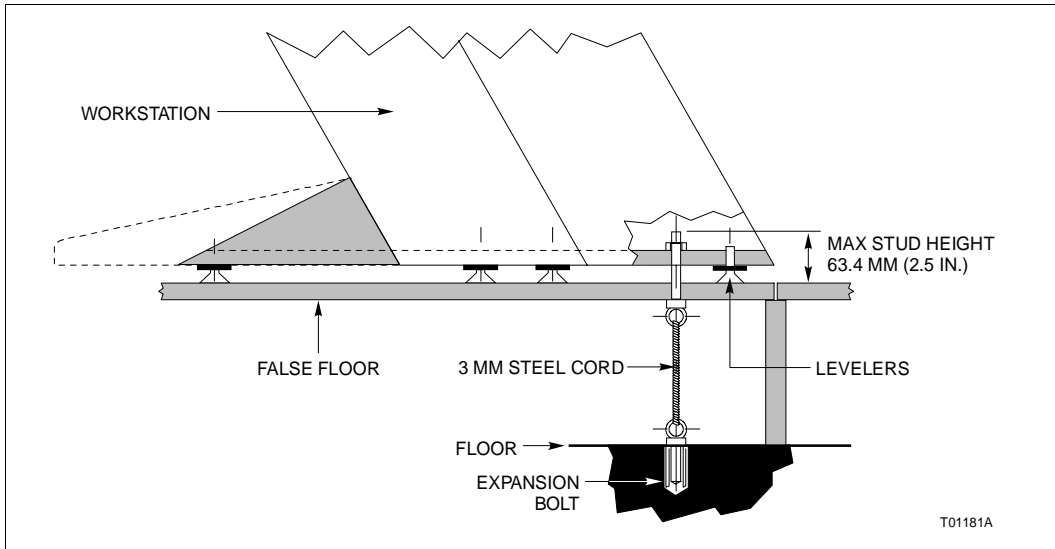


Figure B-8. Anchoring Scheme (Typical)

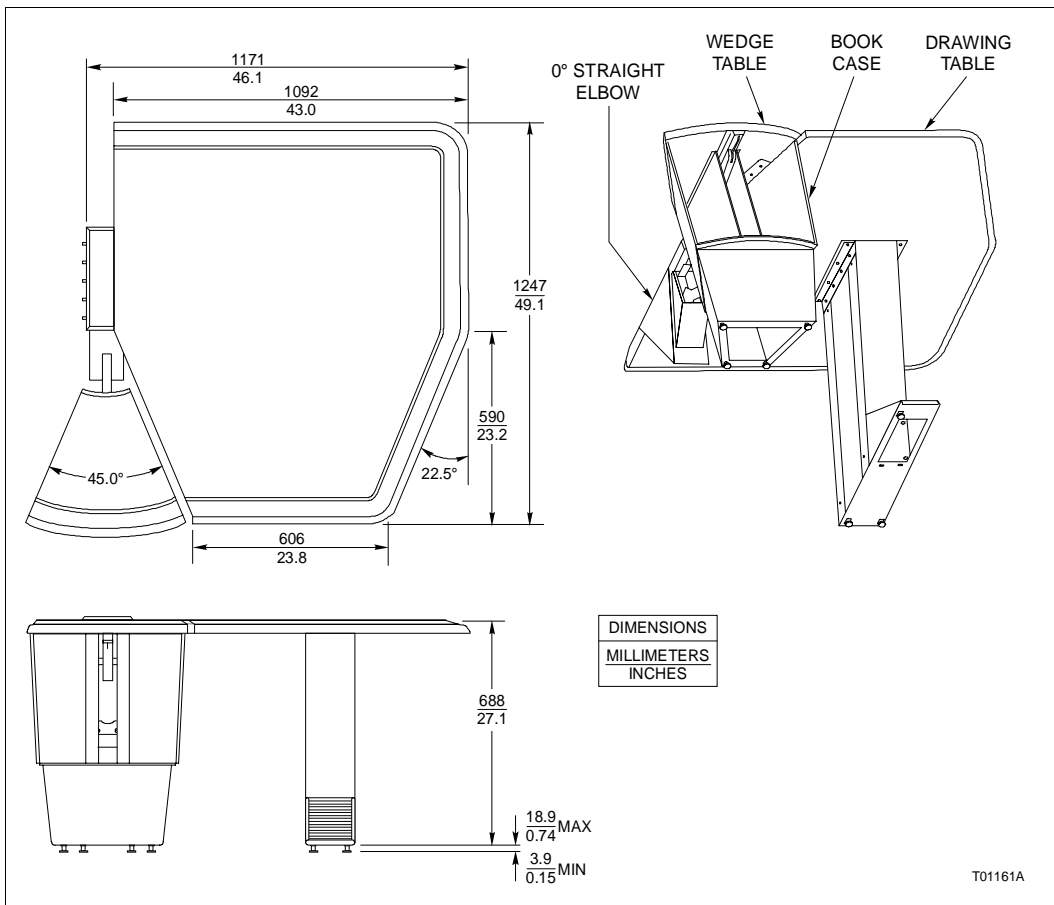


Figure B-9. Drawing Table with Bookcase and Wedge Table Dimensions

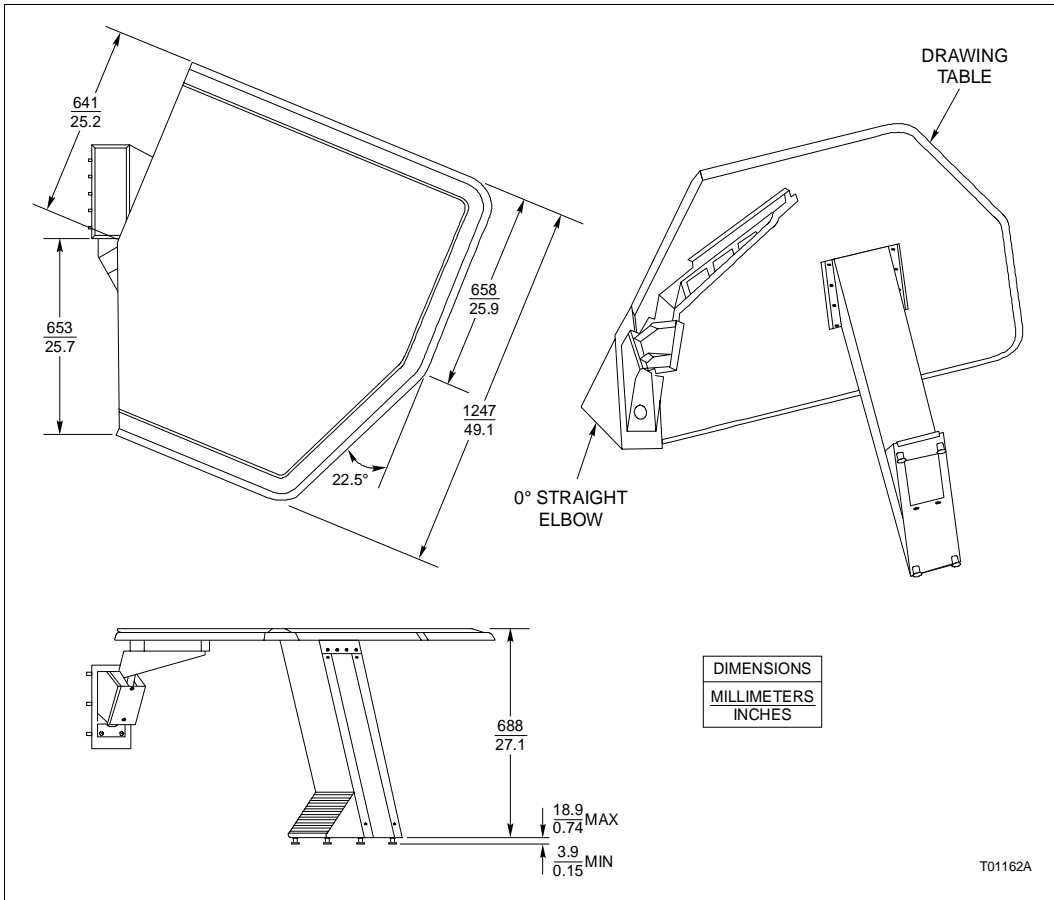


Figure B-10. Drawing Table without Bookcase and Wedge Table Dimensions

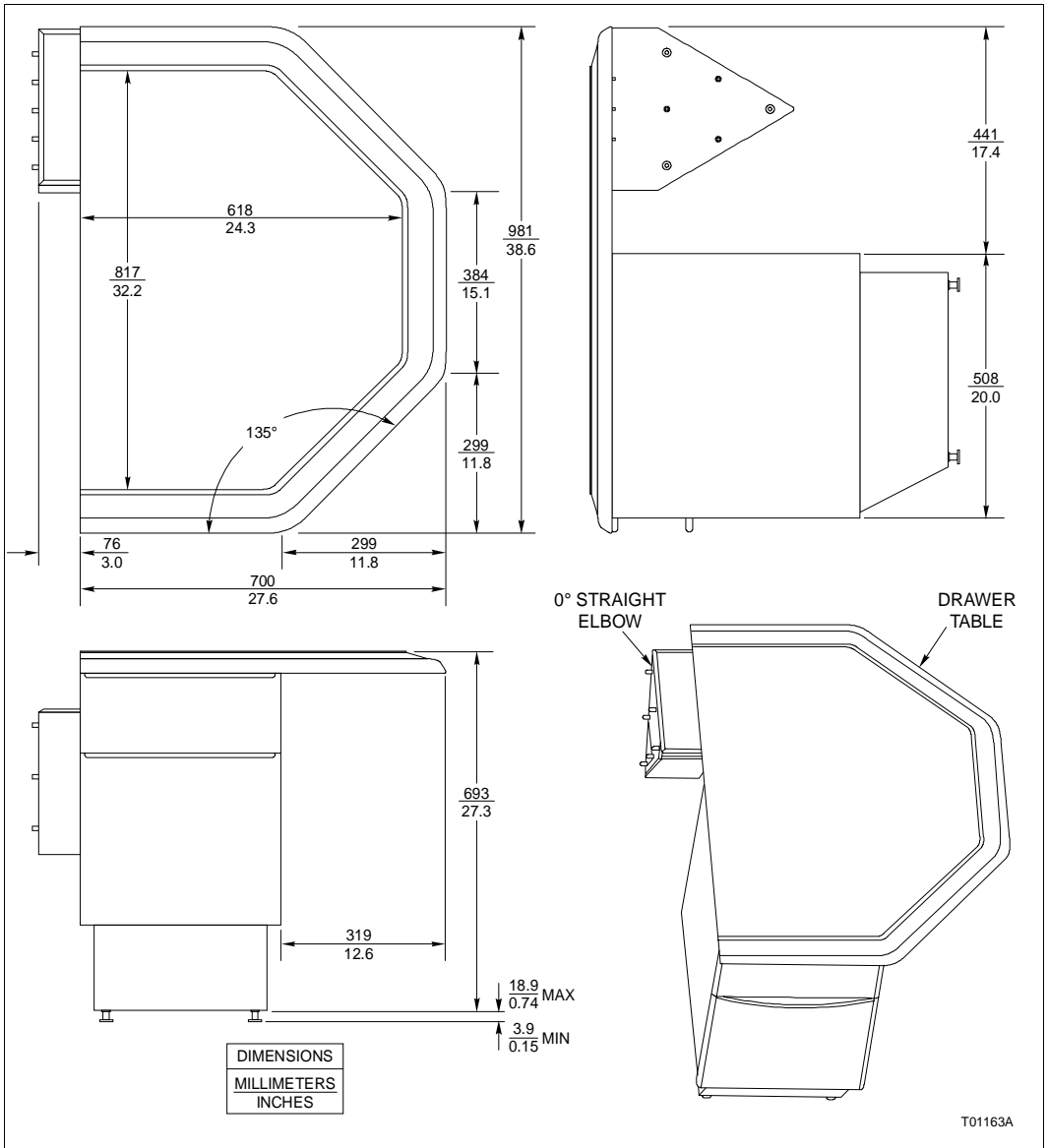


Figure B-11. Drawer Table Dimensions

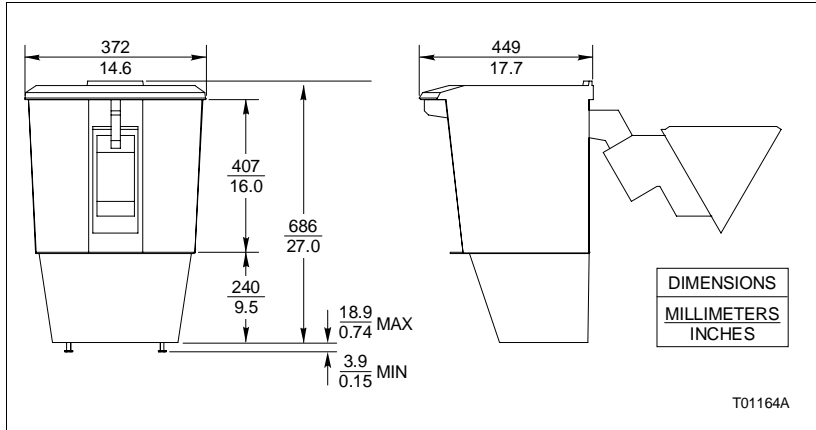


Figure B-12. Bookcase with Wedge Table Dimensions

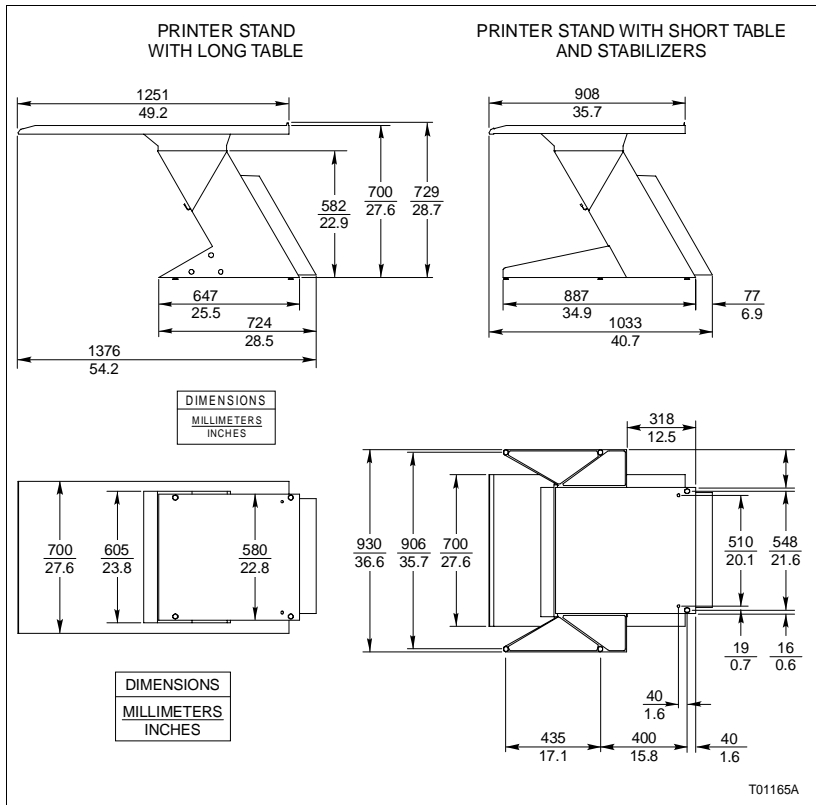


Figure B-13. Printer Stand Dimensions

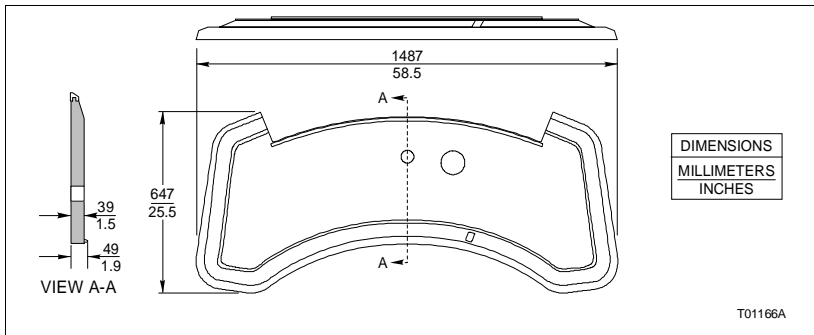


Figure B-14. Workstation Work Surface S1 Dimensions

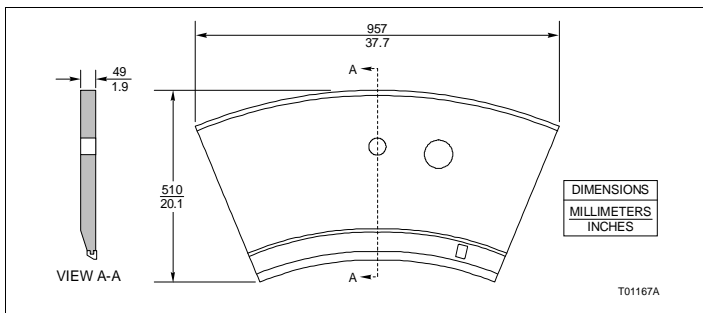


Figure B-15. Workstation Work Surface S2 Dimensions

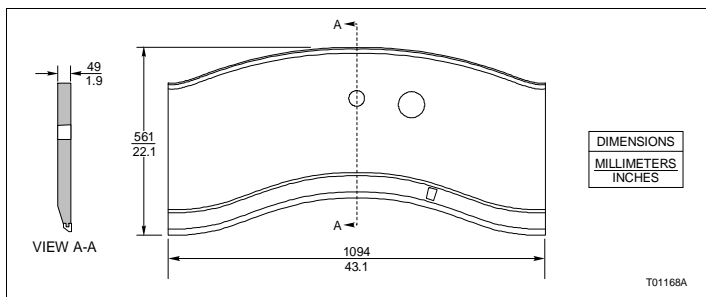


Figure B-16. Workstation Work Surface S3 Dimensions

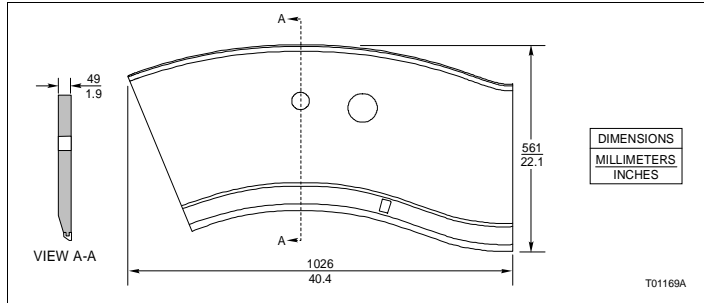


Figure B-17. Workstation Work Surface S4 Dimensions

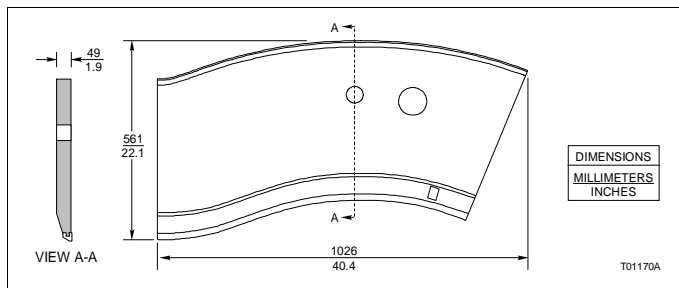


Figure B-18. Workstation Work Surface S5 Dimensions

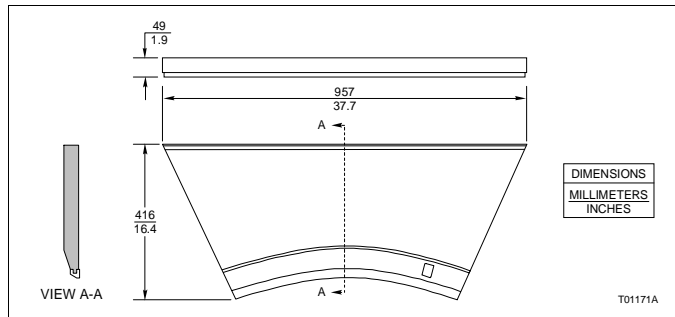


Figure B-19. Auxiliary Panel Work Surface S1 Dimensions

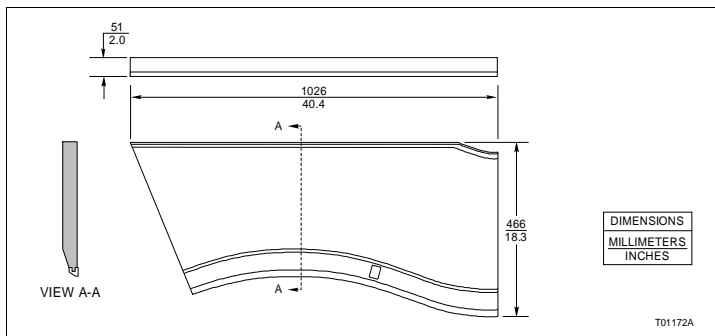


Figure B-20. Auxiliary Panel Work Surface S2 Dimensions

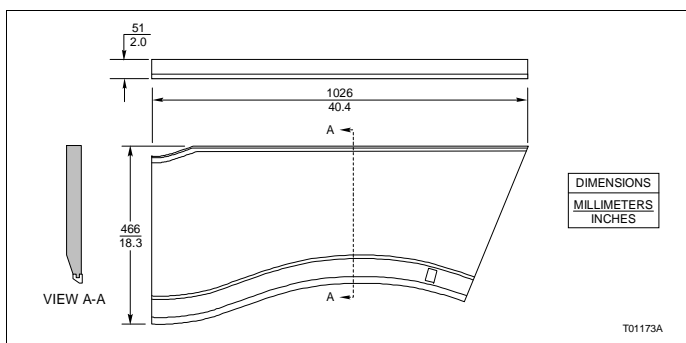


Figure B-21. Auxiliary Panel Work Surface S3 Dimensions

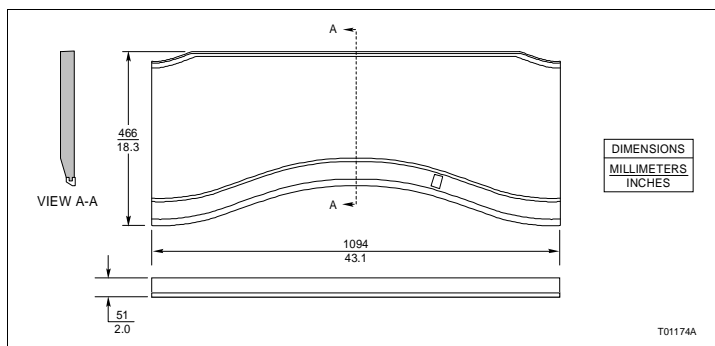


Figure B-22. Auxiliary Panel Work Surface S4 Dimensions





Introduction

This appendix contains factory cabling tables and diagrams for the various Conductor VMS (Signature Class) Series 43 workstations. This appendix shows factory cabling only and is intended as a reference or for repair. For specific customer cabling, refer to the appropriate procedure. There is a cabling diagram for each component. Only those cables between that component and any other components are shown.

This appendix is broken into sections. The first section shows the cabling diagrams common to all workstations. The remaining sections show cabling diagrams for components that are different for the various types of workstations. Tables **C-1** and **C-2** list the tables and figures included in this section.

Table C-1. Cable Part Number Tables

Table Number	Title
C-3	Upper power supply cables
C-4	Lower power supply cables
C-5	Operator I/O controller cables
C-6	Loop TU and cupola assembly cables
C-7	SCSI cables
C-8	Keyboard scanner cables
C-9	PEP cables
C-10	IIMLM01 and IIMCP02 cables
C-11	Alarms TU cables
C-12	Panel control cables
C-13	Ground straps
C-14	C-I-SV43S-A monitor cables
C-15	C-I-SV43S-C monitor cables
C-16	C-I-SV43S-M, C-I-SV43S-S, C-I-SV43S-T and C-I-SV43S-X monitor cables
C-17	C-I-SV43S-A beam distribution board cables
C-18	C-I-SV43S-C beam distribution board cables

**Table C-1. Cable Part Number Tables** *(continued)*

Table Number	Title
C-19	C-I-SV43S-M, C-I-SV43S-T and C-I-SV43S-X beam distribution board cables
C-20	ADP cables
C-21	Lifting mechanism cables
C-22	NIU backplane cables
C-23	C-I-SV43S-A computer cables
C-24	C-I-SV43S-M, C-I-SV43S-T and C-I-SV43S-X computer cables

Table C-2. Component Cabling Diagrams

Figure Number	Title
C-1	Upper power supply cabling
C-2	Lower power supply cabling
C-3	Operator I/O controller cabling
C-4	Loop TU and cupola assembly cabling
C-5	SCSI cabling
C-6	Keyboard scanner cabling
C-7	PEP cabling
C-8	IIMLM01 and IIMCP02 cabling
C-9	Alarms TU cabling
C-10	Panel control cabling
C-11	C-I-SV43S-A monitor cabling
C-12	C-I-SV43S-C monitor cabling
C-13	C-I-SV43S-M, C-I-SV43S-S, C-I-SV43S-T and C-I-SV43S-X monitor cabling
C-14	C-I-SV43S-A beam distribution board cabling
C-15	C-I-SV43S-C beam distribution board cabling
C-16	C-I-SV43S-M, C-I-SV43S-T and C-I-SV43S-X beam distribution board cabling
C-17	C-I-SV43S-C ADP cabling
C-18	C-I-SV43S-A, C-I-SV43S-M, C-I-SV43S-T and C-I-SV43S-X ADP cabling
C-19	C-I-SV43S-C lifting mechanism cabling

Table C-2. Component Cabling Diagrams (continued)

Figure Number	Title
C-20	C-I-SV43S-A, C-I-SV43S-M, C-I-SV43S-S, C-I-SV43S-T and C-I-SV43S-X lifting mechanism cabling
C-21	C-I-SV43S-A and C-I-SV43S-T NIU backplane cabling
C-22	C-I-SV43S-M and C-I-SV43S-X NIU backplane cabling
C-23	C-I-SV43S-A computer cabling
C-24	C-I-SV43S-M, C-I-SV43S-T and C-I-SV43S-X computer cabling

Common Cabling

This section shows the cabling where the connections are common to all workstations. This does not mean that each workstation has every cable. Each figure has an accompanying table showing which types of workstations have each cable. If a workstation type is not included in the table, that means it does not have that component. If a table lists no workstation types, that means the cables apply to all workstations.

Table C-3. Upper Power Supply Cables (Fig. C-1)

Cable No. Fig. C-1	Part No.	C-I-SV43S-			
		A	M	T	X
1	6641813?1	•	•	•	•
2	6641784?1			•	•

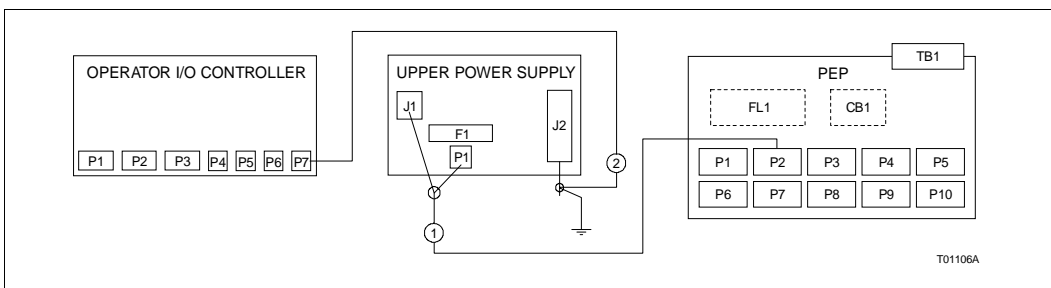


Figure C-1. Upper Power Supply Cabling (Table C-3)



Table C-4. Lower Power Supply Cables (Fig. C-2)

Cable No. Fig. C-2	Part No.	C-I-SV43S-			
		A	M	T	X
1	6641785?1	•	•	•	•
2	6641813?2	•	•	•	•

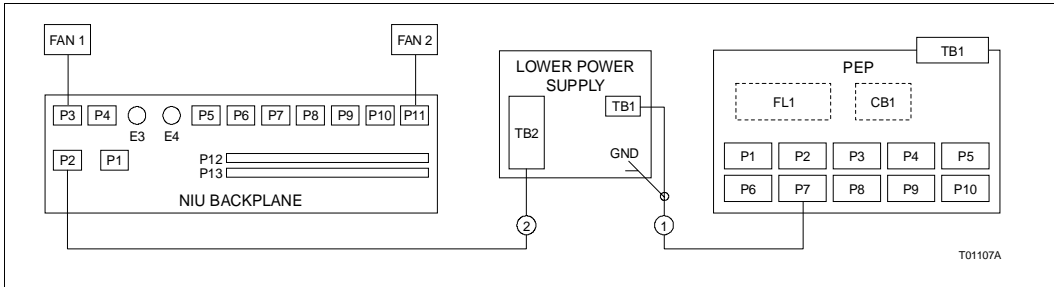


Figure C-2. Lower Power Supply Cabling (Table C-4)

Table C-5. Operator I/O Controller Cables (Fig. C-3)

Cable No. Fig. C-3	Part No.	C-I-SV43S-			
		A	M	T	X
1	1949298?2	•	•	•	•
2	1949298?2			•	•
3	1949299?2	•	•	•	•
4	1949354?2		•	•	•
5	6641782?1	•	•	•	•
6	6641736?1	•	•	•	•
7	6641784?1	•	•	•	•

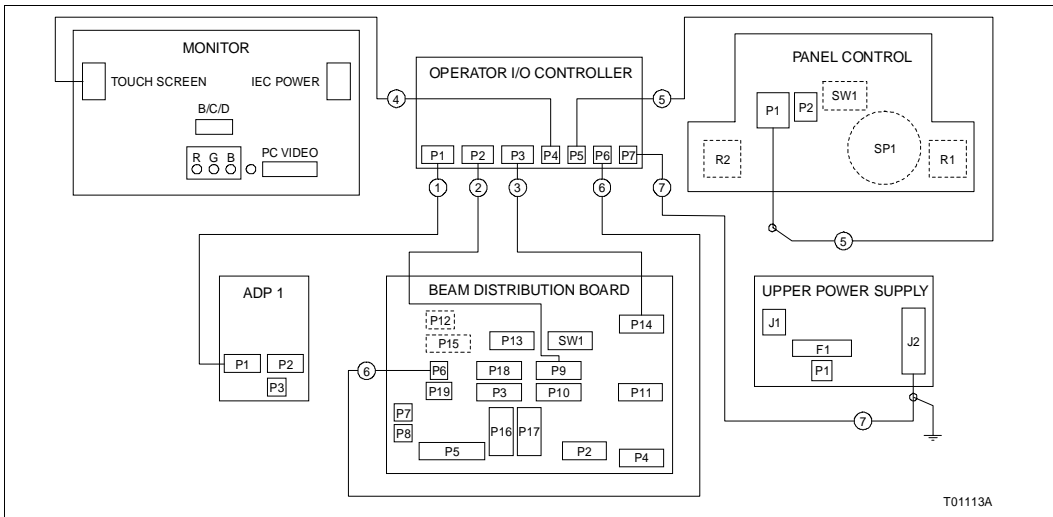
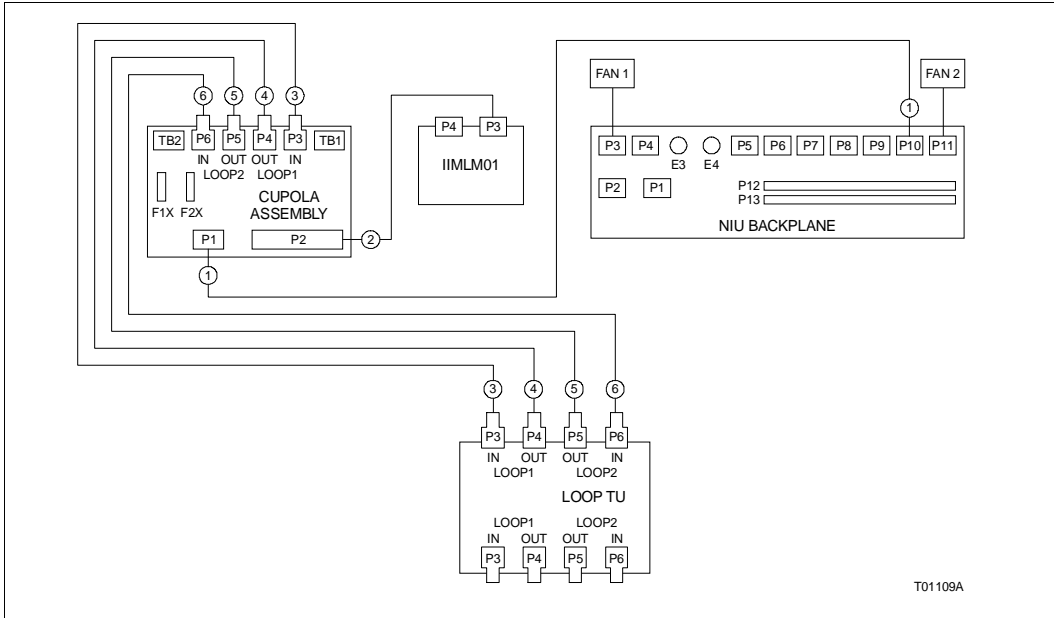


Figure C-3. Operator I/O Controller Cabling (Table C-5)

Table C-6. Loop TU and Cupola Assembly Cables (Fig. C-4)

Cable No. Fig. C-4	Part No.	C-I-SV43S-	
		M	X
1	6641786?2	•	•
2	66418128?26N20	•	•
3	6642849?1	•	•
4		•	•
5		•	•
6		•	•



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Figure C-4. Loop TU and Cupola Assembly Cabling (Table C-6)

Table C-7. SCSI Cables (Fig. C-5)

Cable No. Fig. C-5	Part No.	C-I-SV43S-	
		M	X
1	6641810?2	•	•
2	1949207?25	•	•

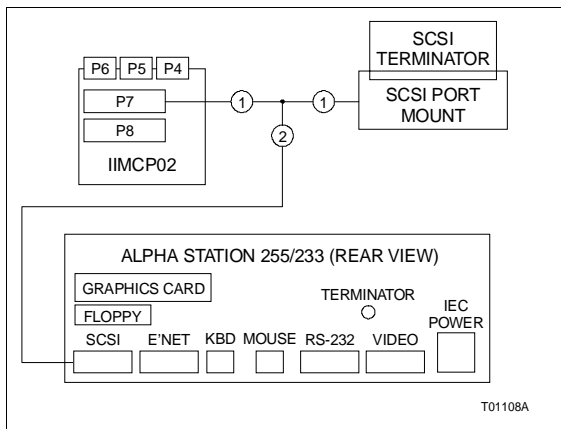


Figure C-5. SCSI Cabling (Table C-7)

Table C-8. Keyboard Scanner Cables (Fig. C-6)

Cable No. Fig. C-6	Part No.	C-I-SV43S-		
		A	M	X
1	6641811?34N4		•	•
2	1949344?1		•	•
3	6641781?1	•	•	•
4	1949299?1	•	•	•
5	R2041-1935	•	•	•

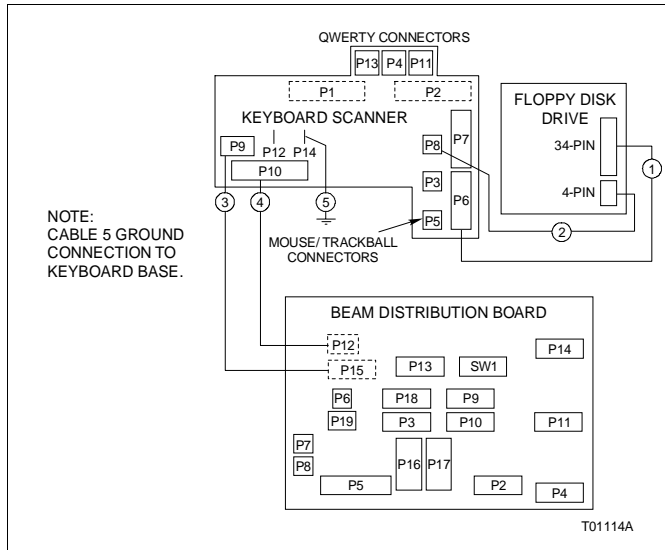


Figure C-6. Keyboard Scanner Cabling (Table C-8)

Table C-9. PEP Cables (Fig. C-7)

Cable No. Fig. C-7	Part No.	C-I-SV43S-				
		A	M	S	T	X
1	1947950?8	•	•	•	•	•
2	6641813?1	•	•		•	•
3	1947950?5	•	•	•	•	•
4	1947950?8	•	•		•	•
5	6641813?2	•	•		•	•

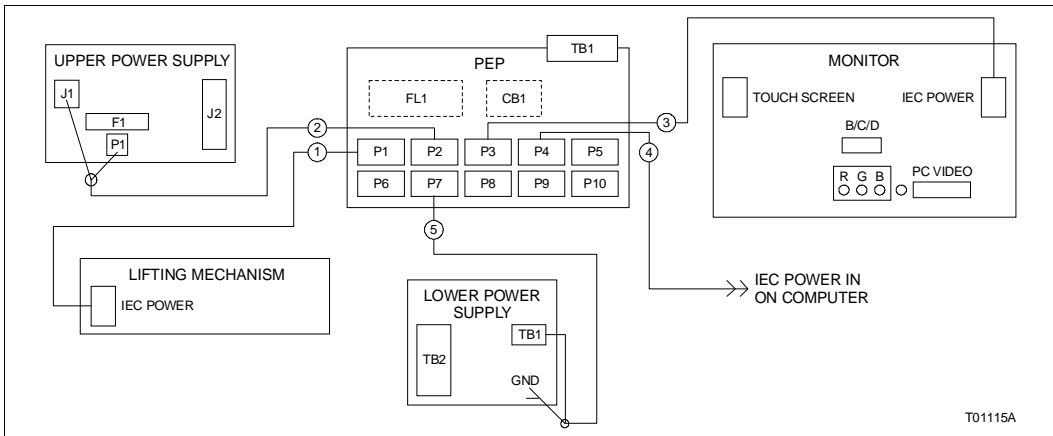


Figure C-7. PEP Cabling (Table C-9)

Table C-10. IIMLM01 and IIMCP02 Cables (Fig. C-8)

Cable No. Fig. C-8	Part No.	C-I-SV43S-	
		M	X
1	6634512?26N4	•	•
2	6641812?26N20	•	•
3	6641810?2	•	•

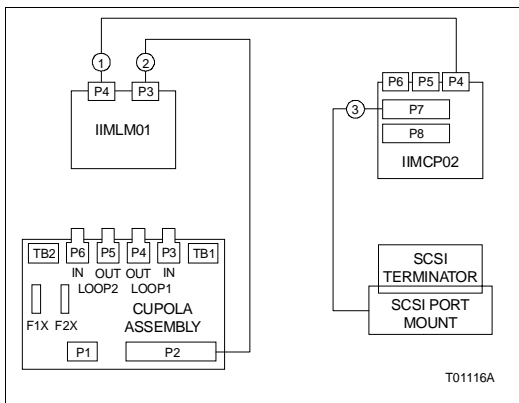


Figure C-8. IIMLM01 and IIMCP02 Cabling (Table C-10)



Table C-11. Alarms TU Cables (Fig. C-9)

Cable No. Fig. C-9	Part No.	C-I-SV43S-			
		A	M	T	X
1	6641783?1	•	•	•	•
2	6641812?26N40	•	•	•	•

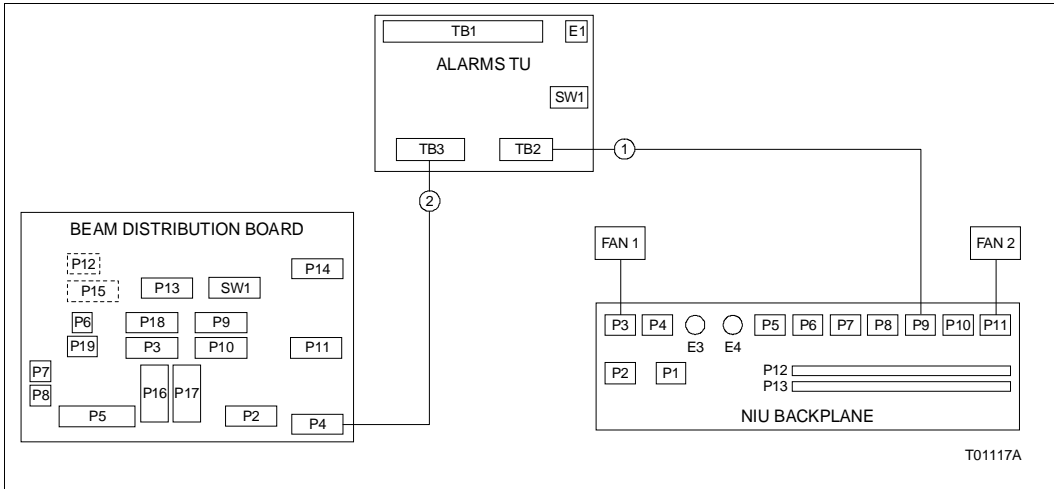


Figure C-9. Alarms TU Cabling (Table C-11)

Table C-12. Panel Control Cables (Fig. C-10)

Cable No. Fig. C-12	Part No.
1	6641782?1
2	6642250?1

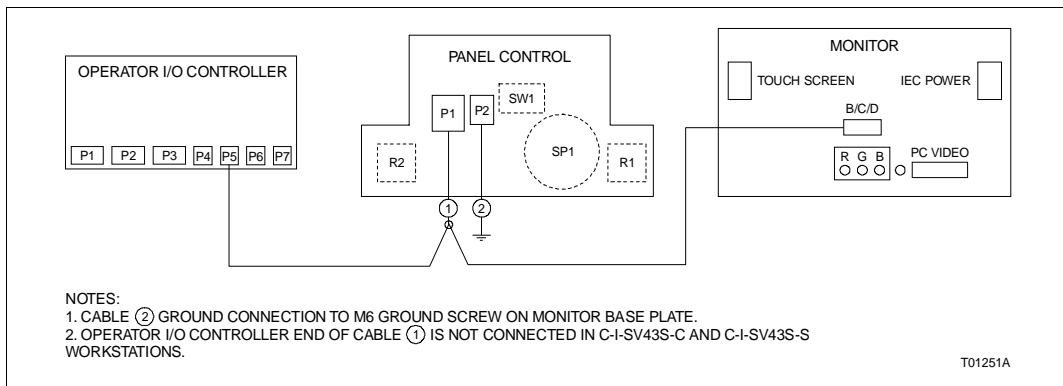


Figure C-10. Panel Control Cabling (Table C-12)

Table C-13. Ground Straps

Part No.	From	To
6642618?1	M5 stud on base pedestal	M5 stud on rear cover
6642618?2		M5 stud on footrest
6642618?3		M8 stud on beam
6642618?4	M8 stud on beam	M6 ground screw on swivel/tilt base
6642618?5	M6 ground screw on swivel/tilt base	M6 ground screw on swivel/tilt top
6642618?6	M6 ground screw on swivel/tilt top	M6 ground screw on monitor base plate



Monitor Cabling

The cabling connections to the monitor vary depending on the type of workstation.

Table C-14. C-I-SV43S-A Monitor Cables (Fig. C-11)

Cable No. Fig. C-11	Part No.
1	1947950?5
2	6641782?1
3	6639637?4
4	1949448?1

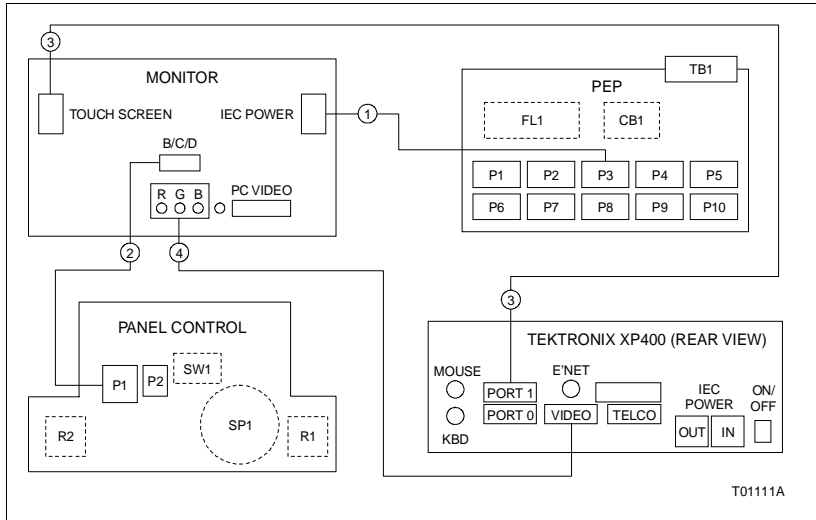


Figure C-11. C-I-SV43S-A Monitor Cabling (Table C-14)

Table C-15. C-I-SV43S-C Monitor Cables (Fig. C-12)

Cable No. Fig. C-12	Part No.
1	1947950?5
2	6641782?1
3	1949350?1
4	NKMC01-10

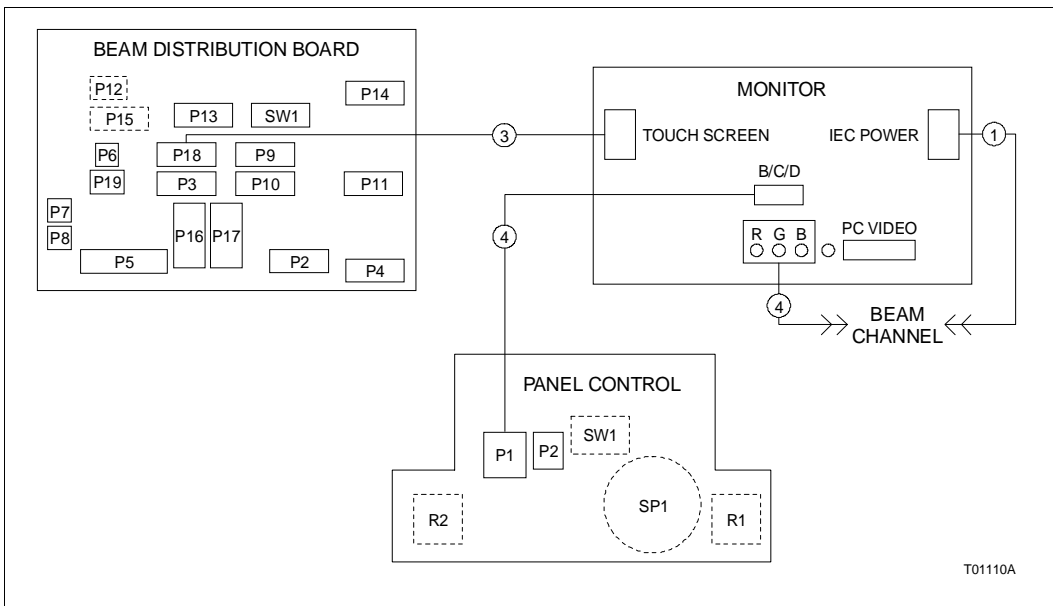


Figure C-12. C-I-SV43S-C Monitor Cabling (Table C-15)

Table C-16. C-I-SV43S-M, C-I-SV43S-S, C-I-SV43S-T and C-I-SV43S-X Monitor Cables (Fig. C-13)

Cable No. Fig. C-13	Part No.	C-I-SV43S-			
		M	S	T	X
1	1947950?5	•	•	•	•
2	6641782?1	•	•	•	•
3	1949354?1	•		•	•
4	1949138?1	•		•	•

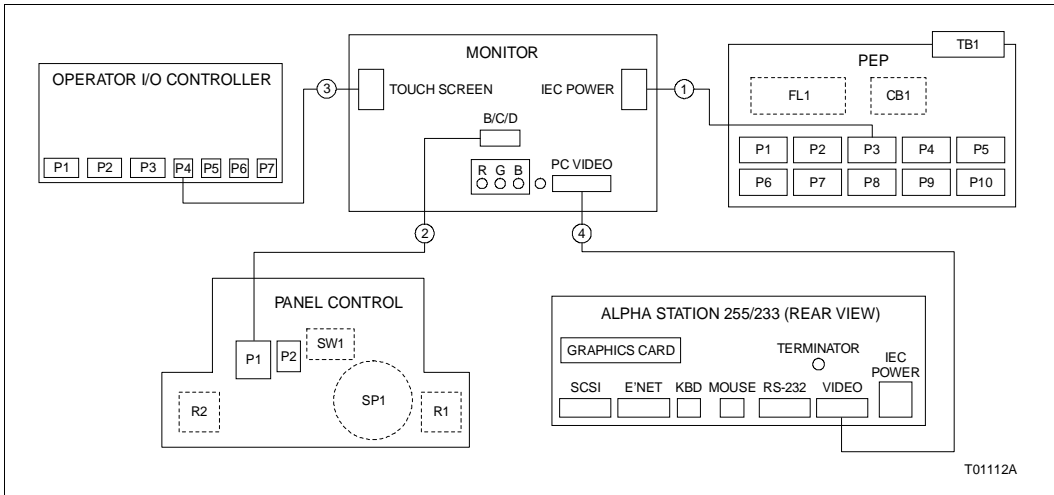


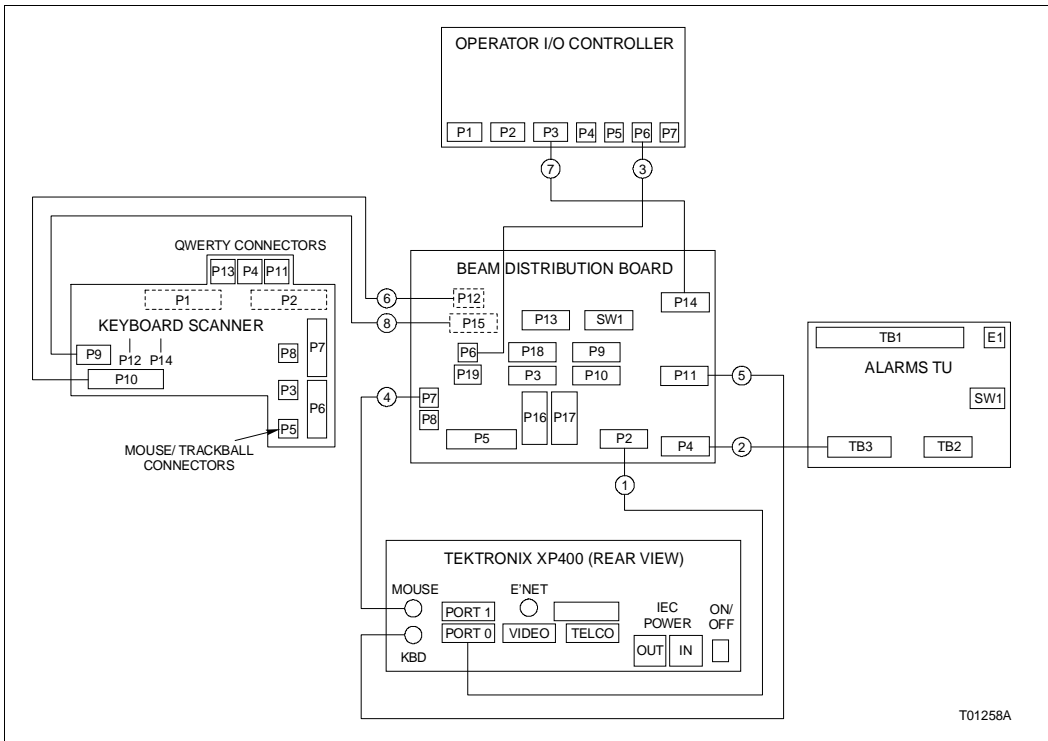
Figure C-13. C-I-SV43S-M, C-I-SV43S-S, C-I-SV43S-T and C-I-SV43S-X Monitor Cabling (Table C-16)

Beam Distribution Board Cabling

The cabling connections to the beam distribution board vary depending on the type of workstation.

Table C-17. C-I-SV43S-A Beam Distribution Board Cables (Fig. C-14)

Cable No. Fig. C-14	Part No.
1	6639637?2
2	6641812?26N40
3	6641736?1
4	1949355?1
5	6642340?1
6	1949299?1
7	1949299?2
8	6641781?1



T01258A

Figure C-14. C-I-SV43S-A Beam Distribution Board Cabling (Table C-17)

Table C-18. C-I-SV43S-C Beam Distribution Board Cables (Fig. C-15)

Cable No. Fig. C-15	Part No.
1	1949350?1
2	1949298?2
3	1949298?2
4	1949350?1

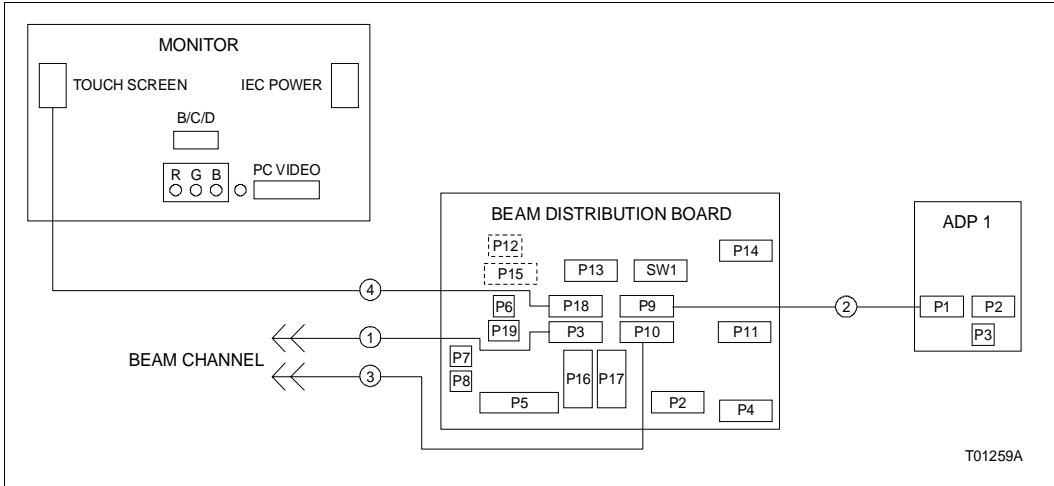


Figure C-15. C-I-SV43S-C Beam Distribution Board Cabling

Table C-19. C-I-SV43S-M, C-I-SV43S-T and C-I-SV43S-X Beam Distribution Board Cables (Fig. C-16)

Cable No. Fig. C-16	Part No.	C-I-SV43S-		
		M	T	X
1	1949637?2	•	•	•
2	6641812?26N40	•	•	•
3	1948938?59	•	•	•
4	6641736?1	•	•	•
5	1949355?1	•	•	•
6	6642340?1	•	•	•
7	1949299?1	•	•	•
8	6641737?1	•		•
9	1949299?2	•	•	•
10	6641781?1	•	•	•
11	1949298?2		•	•

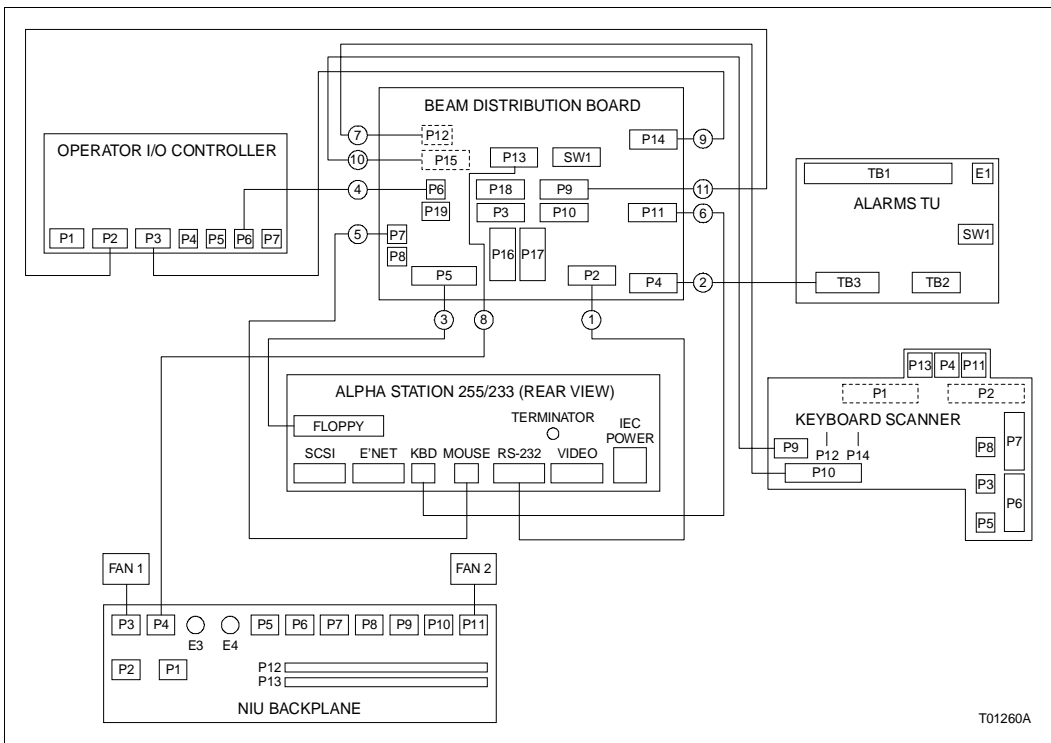


Figure C-16. C-I-SV43S-M, C-I-SV43S-T and C-I-SV43S-X Beam Distribution Board Cabling (Table C-19)

ADP Cabling

The cabling connections to the ADPs vary depending on the type of workstation.

Table C-20. ADP Cables (Figs. C-17 and C-18)

Cable No.	Figs. C-17 and C-18	Part No.
1		1949298?2
2		1949298?1
3		1949298?2
4		1949298?1



Table C-20. ADP Cables (Figs. C-17 and C-18) (continued)

Cable No. Figs. C-17 and C-18	Part No.
5	6642250 ? 1
6	
7	
8	

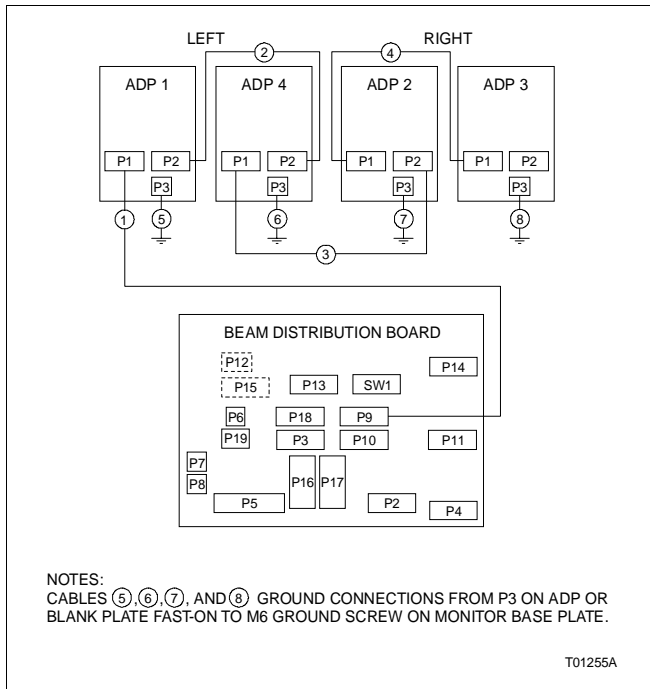


Figure C-17. C-I-SV43S-C ADP Cabling (Table C-20)

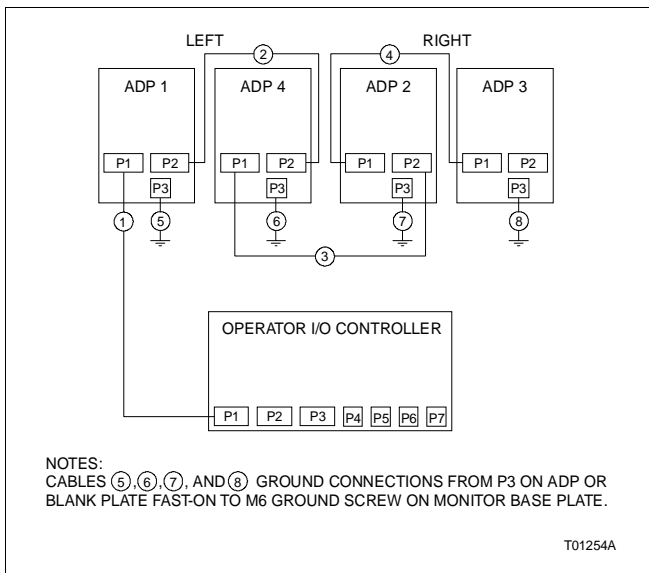


Figure C-18. C-I-SV43S-A, C-I-SV43S-M, C-I-SV43S-T and C-I-SV43S-X ADP Cabling (Table C-20)

Lifting Mechanism Cabling

The cabling connections to the lifting mechanism vary depending on the type of workstation.

Table C-21. Lifting Mechanism Cables (Figs. C-19 and C-20)

Cable No. Figs. C-19 and C-20	Part No.	C-I-SV43S-					
		A	C	M	S	T	X
1	1949298 ? 2	•	•	•	•	•	•
2	1949298 ? 2		•				

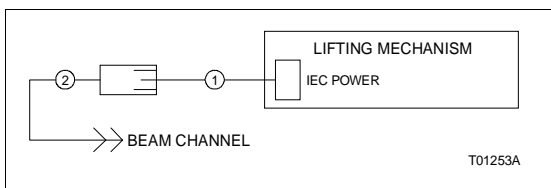


Figure C-19. C-I-SV43S-C Lifting Mechanism Cabling (Table C-21)

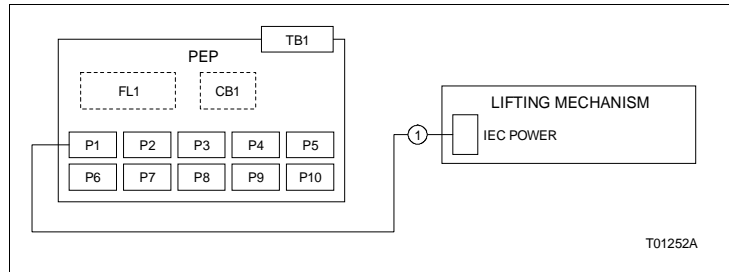


Figure C-20. C-I-SV43S-A, C-I-SV43S-M, C-I-SV43S-S, C-I-SV43S-T and C-I-SV43S-X Lifting Mechanism Cabling (Table C-21)

NIU Backplane Cabling

The cabling connections to the NIU backplane vary depending on the type of workstation.

Table C-22. NIU Backplane Cables (Figs. C-21 and C-22)

Cable No. Figs. C-21 and C-22	Part No.	C-I-SV43S-			
		A	M	T	X
1	6641785?1	•	•	•	•
2	6641790?1	•	•	•	•
3	6641737?1		•		•
4	6641783?1	•	•	•	•
5	6641786?2		•		•
6	6641790?1	•	•	•	•

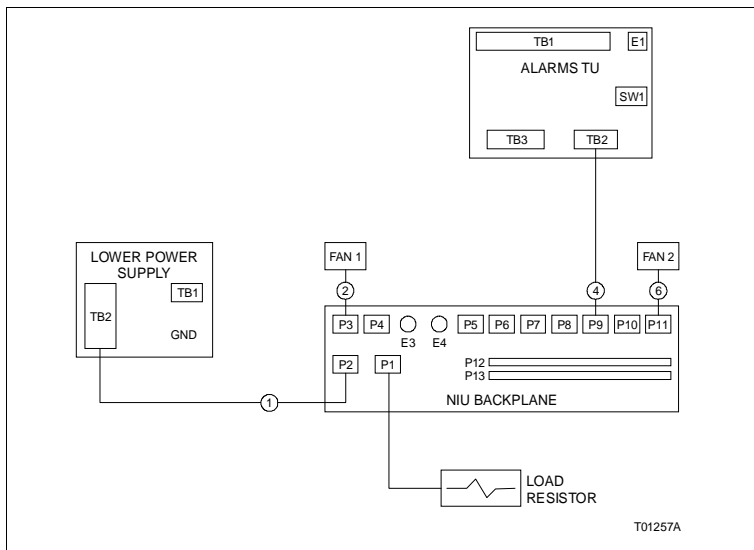


Figure C-21. C-I-SV43S-A and C-I-SV43S-T NIU Backplane Cabling (Table C-22)

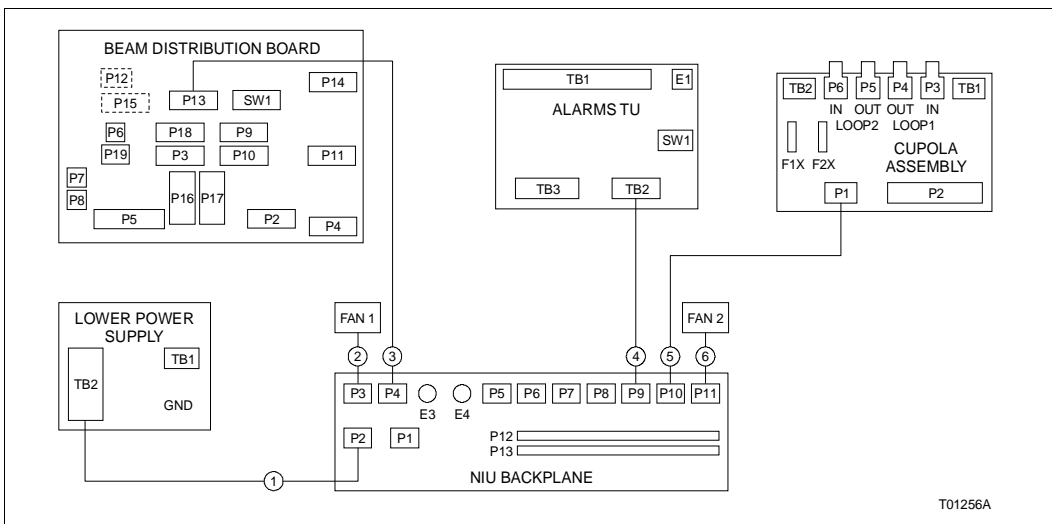


Figure C-22. C-I-SV43S-M and C-I-SV43S-X NIU Backplane Cabling (Table C-22)

Computer Cabling

The cabling connections to the computer vary depending on the type of workstation.



Table C-23. C-I-SV43S-A Computer Cables (Fig. C-23)

Cable No. Fig. C-23	Part No.
1	1949355?1
2	6642340?1
3	6639637?4
4	6639637?2
5	1949448?1
6	1947950?8

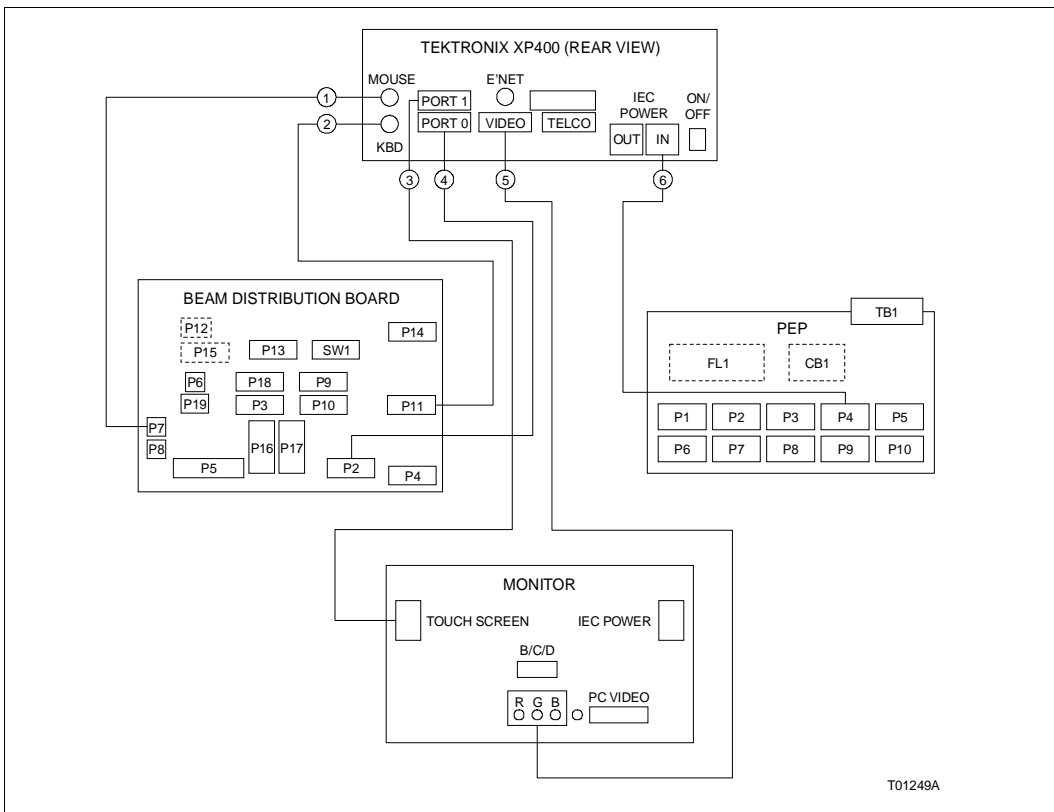


Figure C-23. C-I-SV43S-A Computer Cabling (Table C-23)

**Table C-24. C-I-SV43S-M, C-I-SV43S-T and C-I-SV43S-X
Computer Cables (Fig. C-24)**

Cable No. Fig. C-24	Part No.	C-I-SV43S-		
		M	T	X
1	1949207?5	•		•
2	6642340?1	•	•	•
3	1949355?1	•	•	•
4	1949637?2	•	•	•
5	1949138??	•	•	•
6	1947950?8	•	•	•
7	6641832?1		•	•
8	1948938?59	•		•

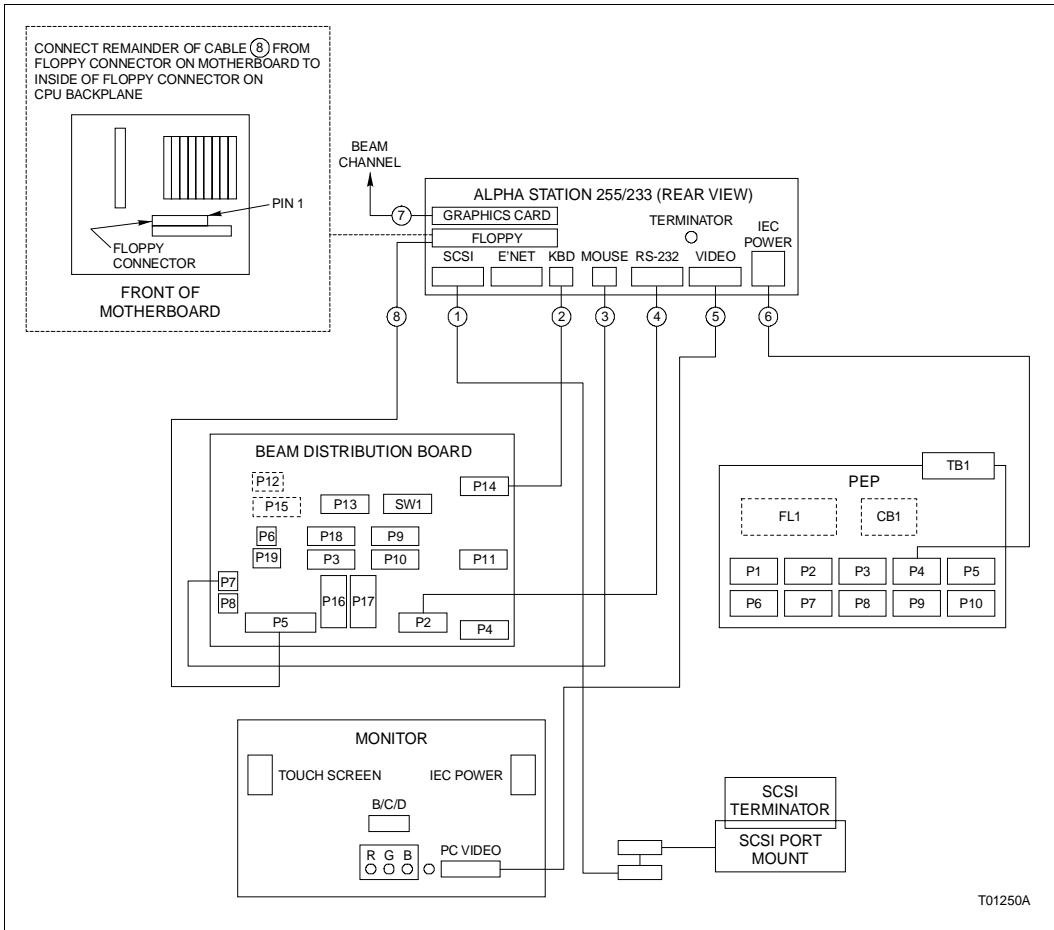


Figure C-24. C-I-SV43S-M, C-I-SV43S-T and C-I-SV43S-X Computer Cabling (Table C-24)



Introduction

This section explains how to set up redundant Ethernet networks. It contains examples of Ethernet connections for the main and auxiliary workstations. Refer to [PR28](#) for examples of thinwire, thickwire and stand-alone configurations.

Redundancy

Redundancy on the system requires a duplicate set of hardware and software that maintains control of the system if the primary set of hardware and software fails. The main workstation can access auxiliary workstations and printers over the Ethernet network making true redundancy not possible. However, partial redundancy is possible.

Redundant Configurations

Figure [D-1](#) shows how redundancy could be set up. A second duplicate main terminal is installed on the same Ethernet segment as the primary main terminal, its auxiliary terminals and terminal servers. The duplicate main terminal could be running all the time as a hot standby.

Figure [D-1](#) shows an example of how windows from the primary and duplicate main terminals could be assigned. If an auxiliary terminal fails, the windows assigned to that auxiliary terminal can be reassigned to the active auxiliary terminals. Note that primary and duplicate main terminals can send windows to each other.

Duplicate terminal servers can also be installed. If the primary terminal server fails, devices connected to the server can be wired to the backup. Also, the devices can connect to both servers through transfer switches. In either case, the ports must be reassigned through the software to activate the duplicate terminal server. Duplicate printers can also be used.



Redundant Ethernet Configurations

The only component in the system that cannot be made redundant is the Ethernet interface. The need for a redundant Ethernet can be reduced by preventing damage to the cable. Isolate the Ethernet segment cabling from the main Ethernet trunk by locating the cable in a separate conduit and keeping the cable within cabinets when possible.

Wiring two Ethernet segments in parallel offers a degree of redundancy. Figure D-2 shows how a failure of any Ethernet segment leaves at least half of the system up and running. The hardware needed to accomplish this will vary with the system.

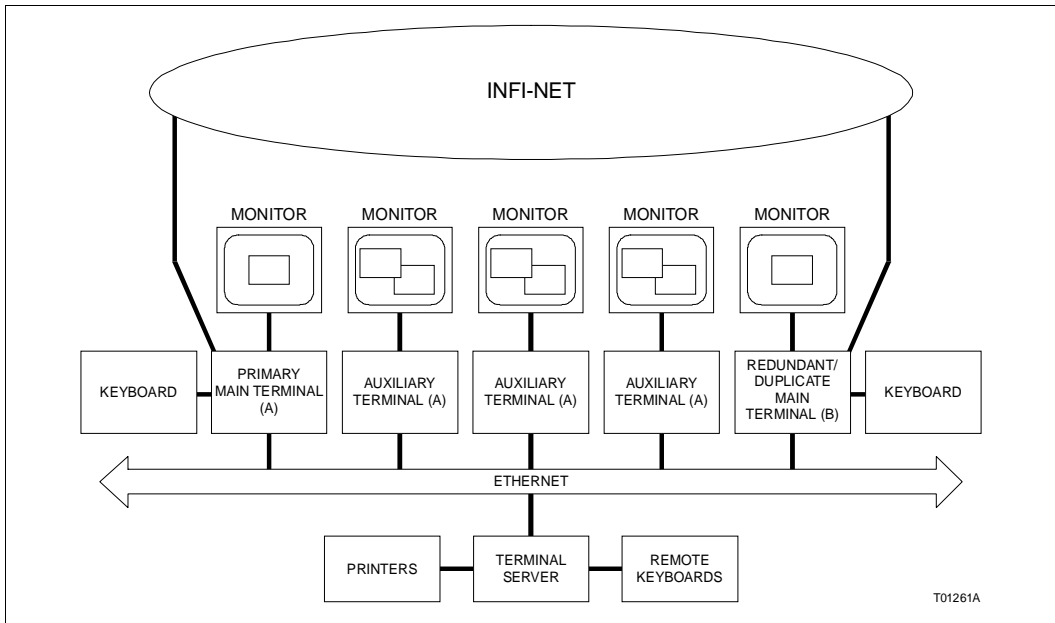


Figure D-1. Redundant Workstation Configuration

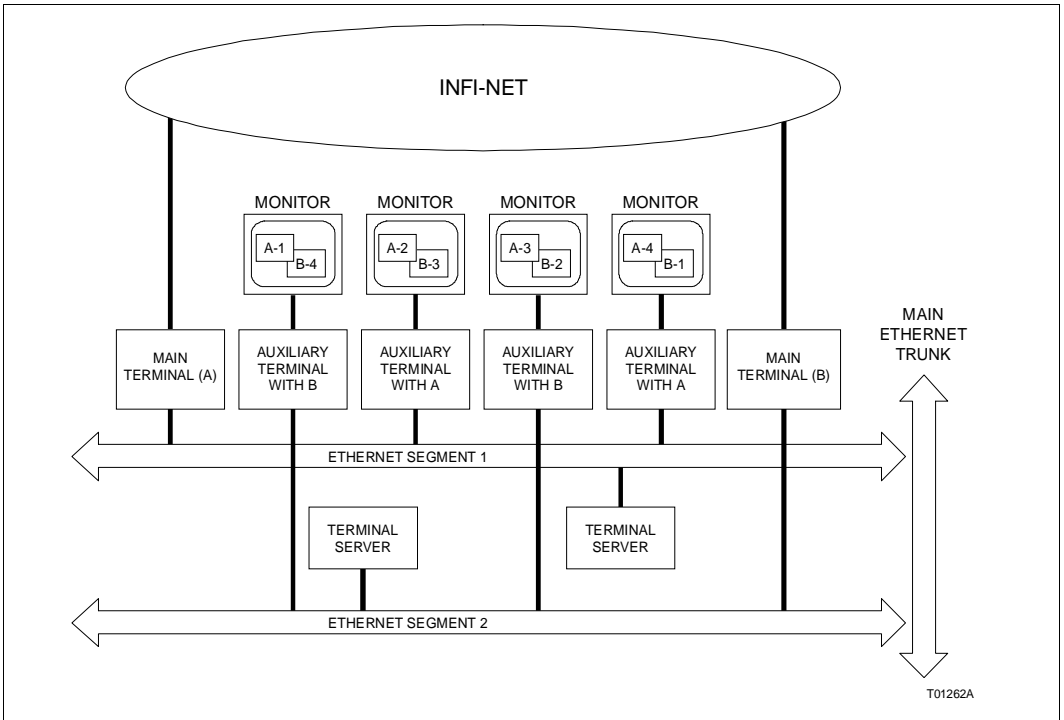


Figure D-2. Redundant Ethernet Configuration





Introduction

This section contains figures that provide information at a glance. It is intended only for those completely familiar with the Conductor VMS (Signature Class) Series 43 workstation and this instruction. Refer to the appropriate section or procedure for more detailed information. Table E-1 lists the figure numbers and descriptions of the figures.

Table E-1. Quick Reference Figures

Figure Number	Description
E-1	External components (front view)
E-2	External components (rear view)
E-3	Internal components (front view)
E-4	Internal components (rear view)
E-5	Alarms TU circuit board assembly
E-6	ADP circuit board assembly
E-7	Keyboard circuit board assembly
E-8	Loop TU circuit board assembly
E-9	PEP circuit board assembly
E-10	Beam distribution board assembly
E-11	NIU backplane circuit board assembly
E-12	Operator I/O controller circuit board
E-13	IIMLM01 Multibus Loop Module
E-14	IIMCP02 Multibus Communication Processor

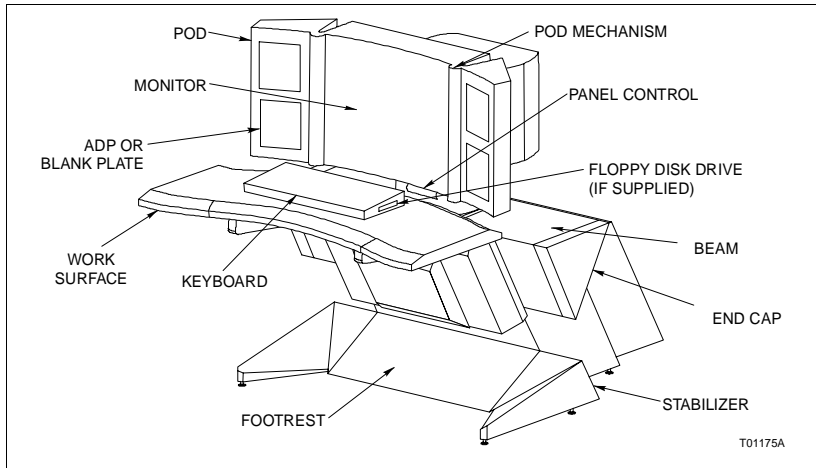


Figure E-1. External Components (Front View)

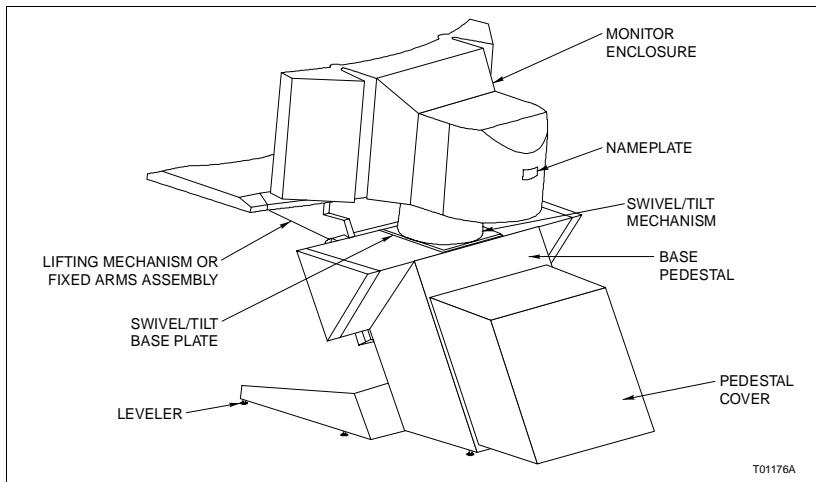


Figure E-2. External Components (Rear View)

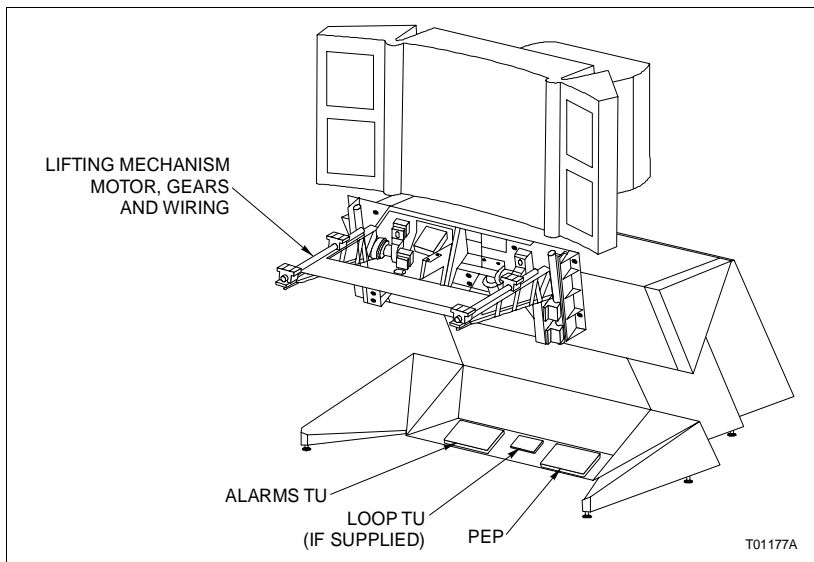


Figure E-3. Internal Components (Front View)

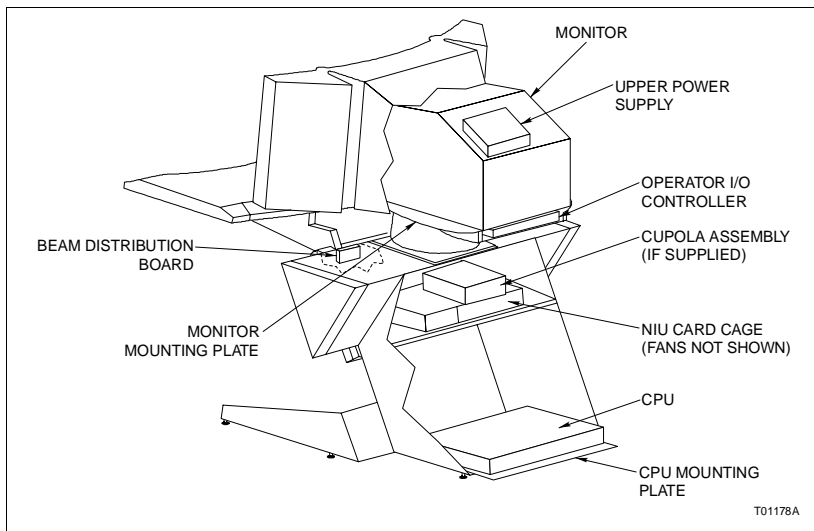


Figure E-4. Internal Components (Rear View)

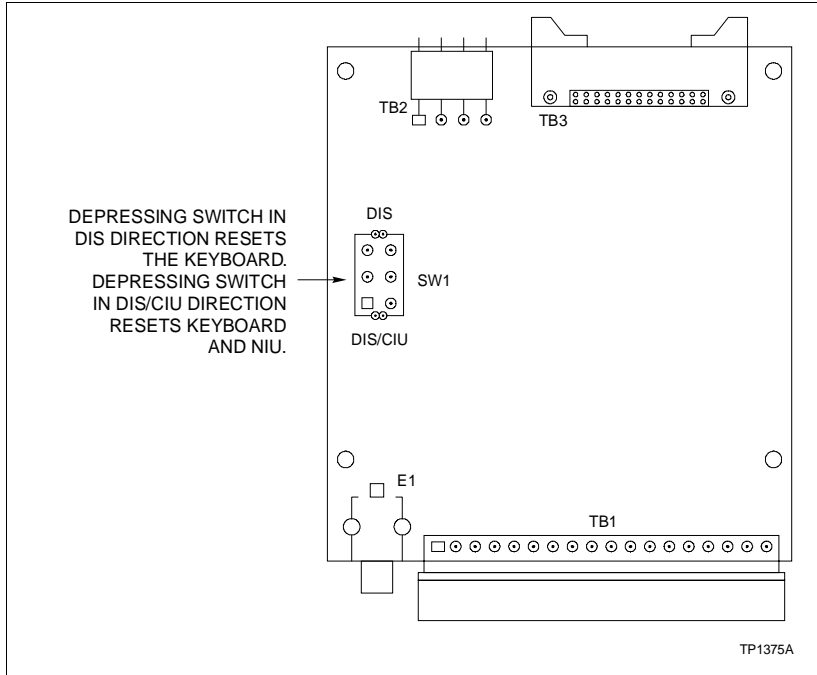


Figure E-5. Alarms TU Circuit Board Assembly

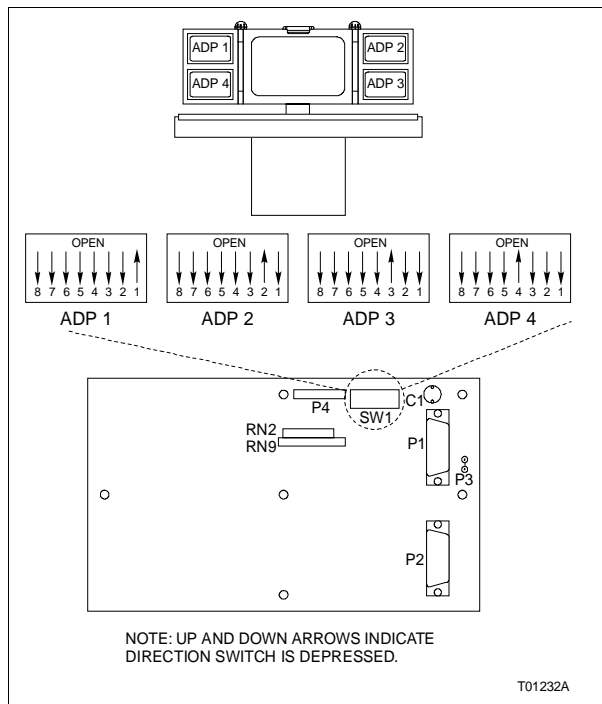


Figure E-6. ADP Circuit Board Assembly

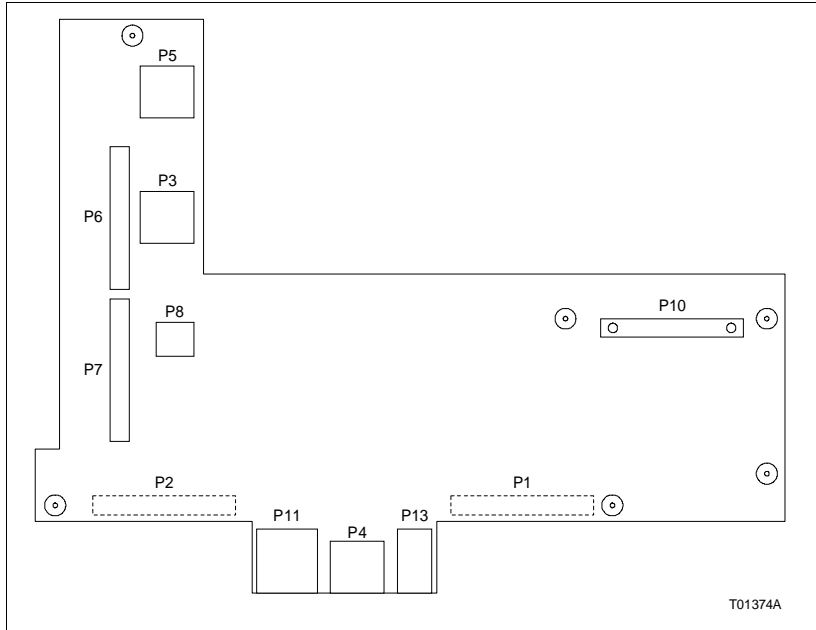


Figure E-7. Keyboard Circuit Board Assembly

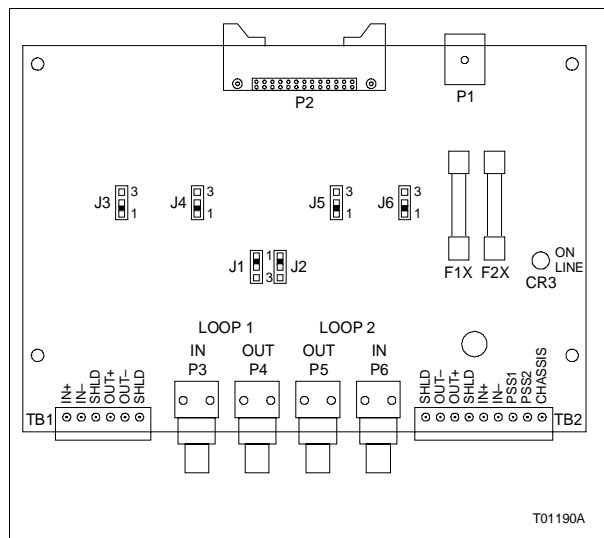


Figure E-8. Loop TU Circuit Board Assembly

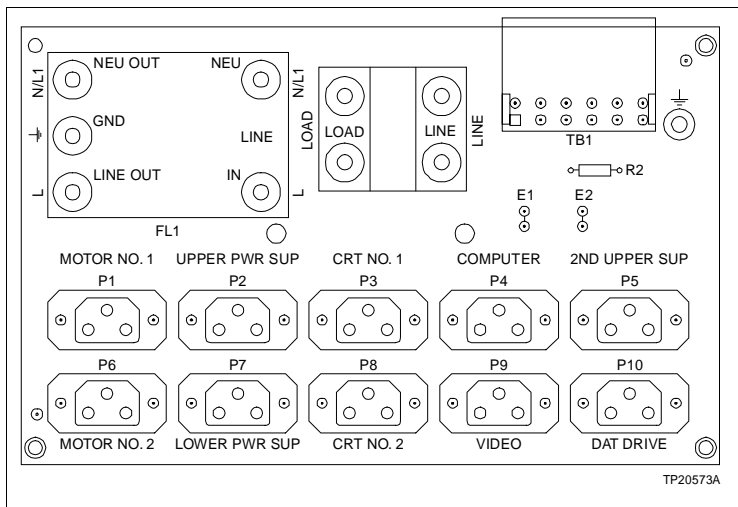


Figure E-9. PEP Circuit Board Assembly

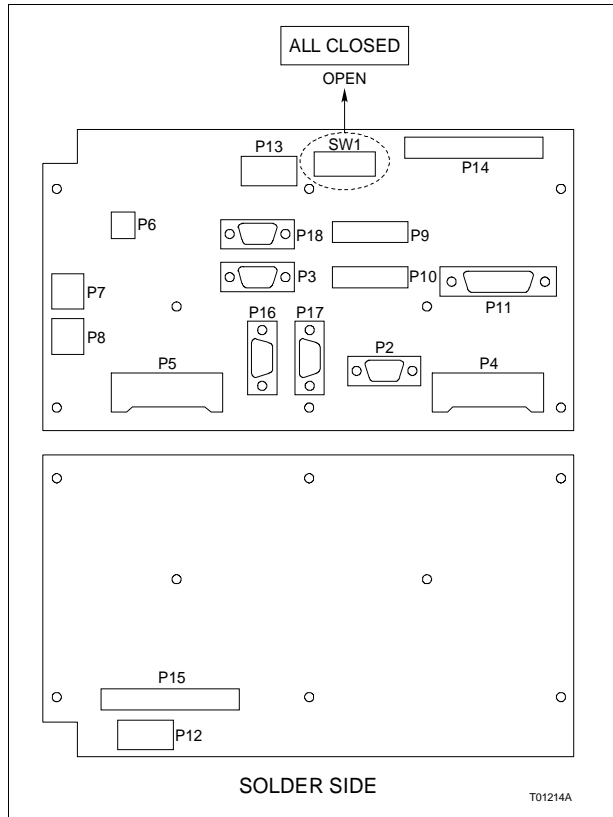


Figure E-10. Beam Distribution Board Assembly

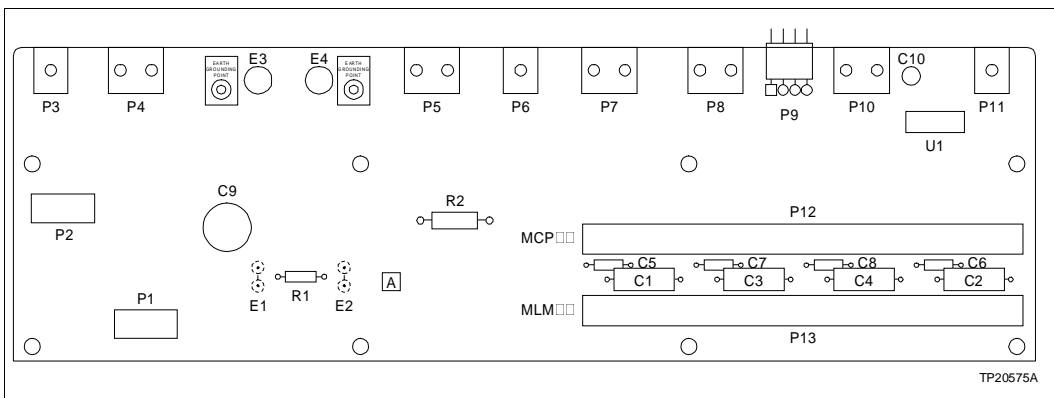


Figure E-11. NIU Backplane Circuit Board Assembly

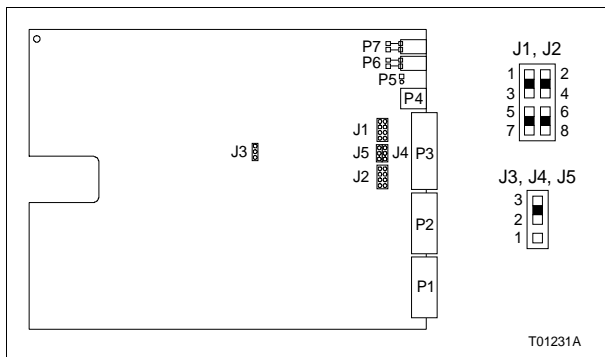


Figure E-12. Operator I/O Controller Circuit Board

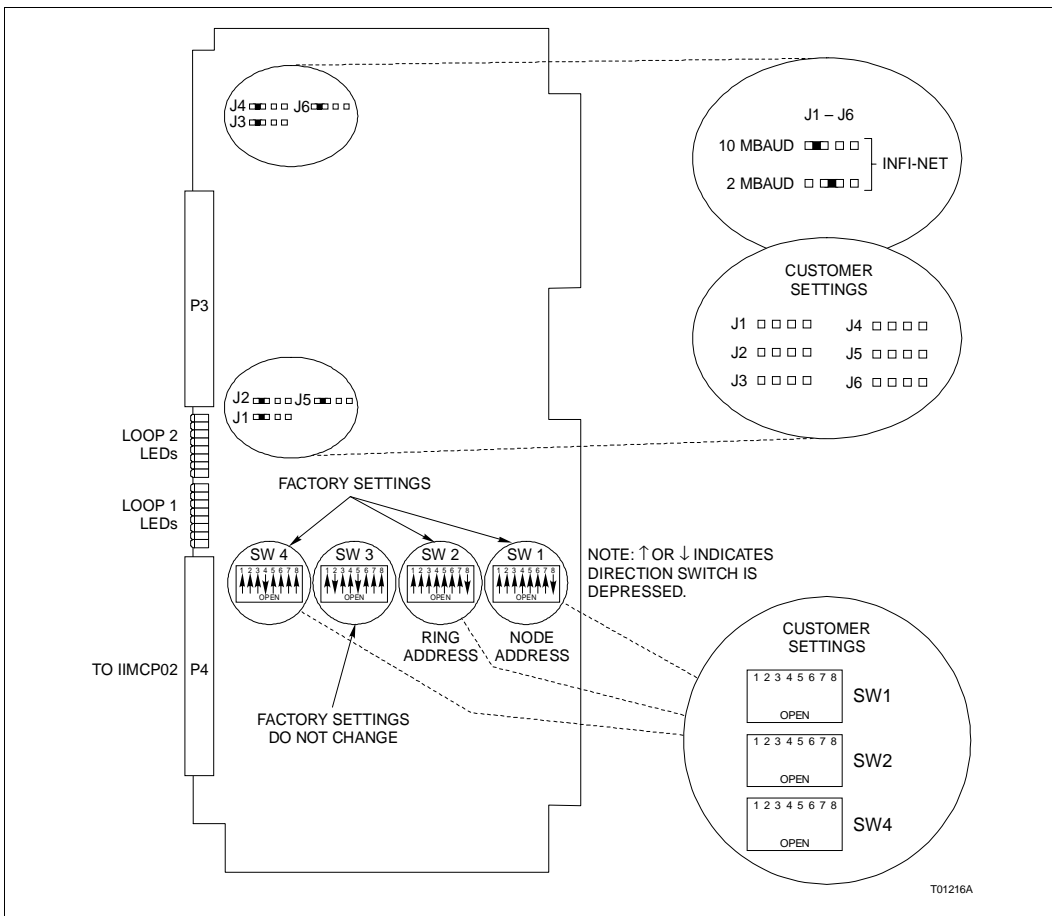


Figure E-13. IIMLM01 Multibus Loop Module

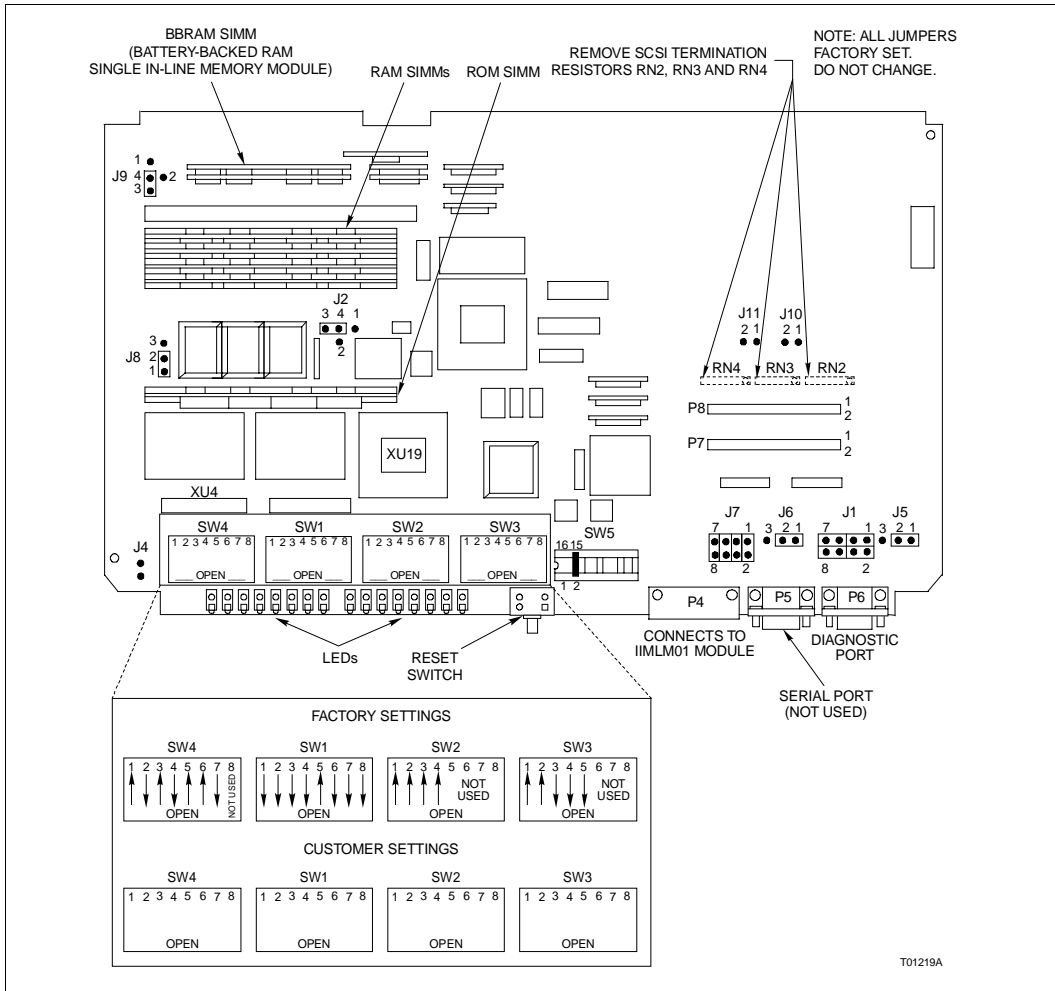


Figure E-14. IIMCP02 Multibus Communication Processor



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