INSTRUCTIONS FOR INSTALLATION AND OPERATION

MODEL V4481 SCC-HD MATRIX 44® HIGH-DENSITY VIDEO SWITCHING SYSTEM

1. INTRODUCTION

This manual provides information on the installation of the V4481SCC-HD Matrix 44 High-Density Switcher Card Cage, including how to install the card cage and how to connect it to the rest of the system. This system should only be installed by a qualified technician using approved materials and wiring practices in accordance with the national, state, and local electrical codes. Read these instructions through completely before attempting installation. Refer to Figure 1-1, V4481SCC-HD Card Cage Front and Rear Panels.

NOTE: This instruction manual should be used ONLY if the Matrix 44 switching system is controlled by an external CPU (either the VPS1300 or VPS1200 CPU). This manual does not provide installation instructions for the V1344SCPU-HD internal CPU. If the V1344SCPU-HD is installed in the V4481SCC-HD card cage, refer to Instruction Manual X779 to install the system.

Matrix 44 is a microprocessor-based video switching system that automatically routes video signals from a requested camera position to a specified monitor. Removable printed circuit boards, featuring plug-in connectors, permit on-site service and minimize down-time of the entire CCTV system.

The V4481SCC-HD card cage is supplied with a mother board, a video amplifier board, and a power supply. The card cage also contains slots for the following boards: an address decoder card or an internal system CPU (optional), an expander card, and up to 16 video switcher cards. Refer to Table 1 • 1, Matrix 44 System Components.

The specific combination of these cards in a given card cage and the number of card cages required for a system are determined by the size and configuration of the video system it is supporting. One high-density Matrix 44 card cage containing 16 video switcher boards can support a system of 128 cameras and eight monitors. The maximum number of cameras and monitors a system can support depends upon the system CPU.

If the V4481SCC-HD is connected to an external Nova Powermax VPS 1300 CPU (expanded version), the system can support a maximum of 1024 cameras and 256 monitors. With custom software and hardware, there is virtually no upper limit to the number of cameras and monitors in a system.


WARNING: TO PREVENT RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS UNIT TO RAIN OR MOISTURE.
IMPORTANT SAFEGUARDS

GRAPHIC SYMBOL EXPLANATION

The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock.

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the unit.

1. Read Instructions - All the safety and operating instructions should be read before the video product is operated.

2. Retain Instructions - All the safety and operating instructions should be retained for future reference.

3. Heed Warnings - All warnings on the video product and in the operating instructions should be adhered to.

4. Follow Instructions - All operating and use instructions should be followed.

5. Cleaning - Step a applies to equipment that can be disconnected from the CCTV system without seriously jeopardizing security, Step b applies to equipment that must operate continuous such as video switching equipment at military installations.
   a. Disconnect this video product from its power source before cleaning. Do not use caustic, abrasive, or aerosol cleaners. Use a damp cloth for cleaning.
   b. Use a damp cloth to clean the equipment. Do not allow moisture or liquids to enter any vents. Do not use caustic, abrasive, or aerosol cleaners.

6. Attachments - Do not use attachments not recommended by Vicon as they may cause hazards.

7. Water and Moisture - Do not use this video product in any location where it may be exposed to water or moisture. This does not apply to outdoor camera housings, outdoor pan-and-tilt drives, and other equipment designed for direct exposure to outdoor environments.

8. Accessories - Do not placethisvideo product and any uninsulated surface. The video product may fall, causing serious injury to a person and serious damage to the video product. Use only with a mounting accessory recommended by Vicon, or sold with the video product. Any mounting of the video product should follow Vicon's instructions, and a mounting accessory recommended by Vicon should be used.

9. Ventilation - Slots and openings in the cabinet are provided for ventilation and to ensure reliable operation of the video product and to protect it from overheating. These openings must not be blocked or covered. The openings should never be blocked by placing the video product on a bed, sofa, rug, or similar surface. This video product should not be placed in a built-in installation such as a bookcase or rack unless proper ventilation is provided or Vicon's instructions have been adhered to.

10. Power Sources - This video product should be operated only from the type of power source indicated on the marking label. If you are not sure of the type of power supply to your installation site, consult your Vicon dealer or local power company. For video products intended to operate from battery power, or other sources, refer to the operating instructions.

11. Grounding - This video product should be operated only from a video ground-type plug, a plug having a third (ground) pin. This plug only fits into a ground-type power outlet. This is a safety feature. If you are unable to insert the plug into the outlet, contact your electrician to replace your obsolete outlet. Do not defeat the safety purpose of the grounding-type plug.

12. Power-Cord Protection - Power supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit from the video product.

13. Outdoor Cable Grounding - If an outside cable system is connected to the video product, be sure the cable system is grounded so as to provide some protection against voltage surges and built-up static charges. Section 810 of the National Electrical Code, ANSI/NFPA 70-1984, provides information with respect to proper grounding of the lead-in wire to an antenna discharge unit, size of grounding conductors, location of antenna-discharge unit, connection to grounding electrodes, and requirements for the grounding electrode.

14. Lightning - For added protection for this video product when it is not used for long periods of time, disconnect it from its power source and from the cable system. This prevents damage to the video product due to lightning and power-line surges.

15. Power Lines - An outside cable system should not be located in the vicinity of overhead power lines or other electric light or power circuits, or where it can fall into such power lines or circuits. When installing an outside cable system, extreme care should be taken to keep from touching such power lines or circuits as contact with them may be fatal.

16. Overloading - Do not overload wall outlets and extension cords as this can result in a fire or electric shock.

17. Object and Liquid Entry - Never push objects of any kind into this video product through openings as they may touch dangerous voltage points or short out parts that could result in a fire or electric shock. Never spill liquid of any kind on the video product.

18. Servicing - Do not attempt to service this video product yourself as opening or removing covers may expose you to dangerous voltage or other hazards. Refer all servicing to qualified service personnel.

19. Damage Requiring Service - Disconnect this video product from its power source and refer servicing to qualified service personnel under the following conditions. Note that step c does not apply to outdoor camera housings, outdoor pan-and-tilt drives and other equipment specifically designed for direct exposure to outdoor environments.
   a. When the power-supply cord or plug is damaged.
   b. If it has been dropped or the cabinet has been damaged.
   c. If the video product has been exposed to rain or water.
   d. If the video product does not operate normally by following the operating instructions. Adjust only those controls that are covered by the operating instructions, as improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the video product to its normal operation.
   e. If the product has been dropped or the cabinet has been damaged.
   f. When the video product exhibits a distinct change in performance — this indicates a need for service.

20. Replacement Parts - When replacement parts are required, be sure the service technician has used replacement parts specified by Vicon or that have the same characteristics as the original part. Unauthorized substitutions may result in fire, electric shock, or other hazards.

21. Safety Check - Upon completion of any service or repairs to this video product, ask the service technician to perform safety checks to determine that the video product is in proper operating condition.
COAXIAL CABLE RECOMMENDATIONS

CAUTION: Careful selection of the proper cable is essential to obtain the best performance from this equipment. Vicon assumes no responsibility for poor performance when cables other than those recommended are installed. In all cases, coaxial cable impedance should be 75 ohms.

Materials
Use only cable with a pure copper center conductor. Do not use cable with either a copper-plated steel or an aluminum center conductor because these do not transfer signals effectively in the frequency range used in CCTV networks. A center conductor with low DC resistance is required for effective CCTV operation.

Solid-core bare copper conductor is best suited to video applications, except where flexing occurs. If the coaxial cable will be subjected to flexing during normal use, select a cable with a stranded center conductor.

The preferred dielectric material is cellular (foam) polyethylene. It has better electrical characteristics than solid polyethylene, but is more vulnerable to moisture. Therefore, use only solid polyethylene dielectric cable with a heavy exterior insulation in applications subject to moisture.

The shield must be copper braid providing 95% or better coverage.

Installation Tips
Do not stretch cable or subject it to sharp bends.

Keep the cable out of contact with hot pipes or any other heat source. Even if there is not enough heat to cause obvious damage to the cable, transmission characteristics will be affected.

In locations where the cable must be continuously flexed (for example, with scanners or pan-and-tilt drives), use cable intended for such movement. This cable will have stranded wire center conductor.

Use only crimp-type BNC connectors.

Cable Types and Operating Distances
The most commonly used cable types are RG-59/U and RG-6/U. Each is actually a family of cables with widely varying electrical characteristics, some of which are not suitable for CCTV applications.

The maximum camera-to-unit distance for the three most common cables is listed in Table A. The characteristics of the cables in this table should be used as a guideline when cables other than Belden are used. Materials and construction must follow the guidelines above. Table B gives some equivalent cable numbers of other manufacturers. Vicon recommends the following coaxial cable types, unless otherwise specified elsewhere in this manual.

<table>
<thead>
<tr>
<th>TABLE A</th>
<th>RECOMMENDED CABLES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable Type</td>
<td>Belden Type No.</td>
</tr>
<tr>
<td>RG-11/U</td>
<td>8213</td>
</tr>
<tr>
<td>RG-6U</td>
<td>9248</td>
</tr>
<tr>
<td>RG-59/U</td>
<td>8281</td>
</tr>
<tr>
<td></td>
<td>9259</td>
</tr>
<tr>
<td>9650</td>
<td>—</td>
</tr>
</tbody>
</table>

BC = bare copper, TC = tinned copper

<table>
<thead>
<tr>
<th>TABLE B</th>
<th>DC RESISTANCE (OHMS) PER 1000 FEET OF EQUIVALENT CABLES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable Type</td>
<td>Belden Type No.</td>
</tr>
<tr>
<td>RG-11/U</td>
<td>8213</td>
</tr>
<tr>
<td>RG-6/U</td>
<td>9248</td>
</tr>
<tr>
<td></td>
<td>8281</td>
</tr>
<tr>
<td></td>
<td>9259</td>
</tr>
<tr>
<td></td>
<td>0650</td>
</tr>
</tbody>
</table>
This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

If this equipment does cause interference to radio and television reception, which can be determined by turning equipment off and on, the user is encouraged to try and correct the interference by one or more of the following measures:

- Reorient the receiving antenna.
- Relocate the equipment with respect to the receiver.
- Relocate the equipment away from the receiver.

- Plug the equipment into a different electrical outlet so that the computer and receiver are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions.


**WARNING:** Power must be removed from this unit before removing circuit modules or ribbon cables.

**CAUTION:** This unit contains circuit cards with integrated circuit devices that can be damaged by static discharge. Take all necessary precautions to prevent static discharge.

### TABLE 1

**MATRIX 44 SYSTEM COMPONENTS**

<table>
<thead>
<tr>
<th>MODEL NUMBER</th>
<th>PRODUCT CODE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>V44S1 SCC-HD</td>
<td>4622-1 0 4622-1 1</td>
<td>Matrix 44 high-density switcher card cage. Includes power supply, output amplifier, and motherboard. Accommodates up to 16 V441 OS-HD switcher cards. Available in 120 VAC (4622-10) and 230 VAC (4622-1).</td>
</tr>
<tr>
<td>V441 OS-HD</td>
<td>4164</td>
<td>Video switcher card. Can accommodate up to 8 video inputs per card. The card cage can accommodate up to 16 V441 OS-HD cards, for a capacity of 128 video inputs by 8 monitor outputs.</td>
</tr>
<tr>
<td>V4411 RP-BNC</td>
<td>4641</td>
<td>Rear connector panel with 8 BNC connectors and 1 ribbon cable connector.</td>
</tr>
<tr>
<td>V4411 RP-RIB</td>
<td>4640</td>
<td>Rear connector panel with 2 ribbon cable connectors.</td>
</tr>
<tr>
<td>V4430ADEC-HD</td>
<td>0379</td>
<td>Address decoder card. Used to define video output (monitor) addresses. Decodes and routes CPU control signals.</td>
</tr>
<tr>
<td>V4441SEXP-HD</td>
<td>4625</td>
<td>Switcher expander card. Used for camera expansion when number of cameras exceeds 128.</td>
</tr>
<tr>
<td>V4450RCP-HD</td>
<td>0381</td>
<td>Rear closure panel. For rear closure of unused card positions.</td>
</tr>
<tr>
<td>V75TR-1</td>
<td>4638</td>
<td>Terminator for ribbon cable connector.</td>
</tr>
<tr>
<td>V75T</td>
<td>3260</td>
<td>75-ohm terminator for BNC connector.</td>
</tr>
<tr>
<td>V44RC-21-1</td>
<td>4639</td>
<td>21-inch coaxial ribbon cable assembly for distributing video between V4410S-HD switcher cards.</td>
</tr>
<tr>
<td>V44RCB-12-1</td>
<td>4637</td>
<td>12-inch coaxial ribbon cable assembly for distributing video signals from V4410S-HD to external devices. Terminated with eight BNC connectors.</td>
</tr>
</tbody>
</table>
V4481SCC-HD Card Cage Front and Rear Panels

NOTE: The rear panel of each card cage will vary depending upon the systems configuration.
2. INSTALLATION

The V448 1 SCC-HD Matrix 44 High-Density Switcher Card Cage should only be installed by a qualified technician using approved materials and wiring practices in accordance with the national, state, and local electrical codes. The system configuration (such as the one shown in Figure 2-1) should be planned before any installation procedures are performed.

NOTE: In figures depicting matrix switching systems, it is conventional to show camera expansion by placing the second card cage to the right of the first as shown in Figure 2-1. In such figures, it is also conventional to show monitor expansion by placing the second card cage below the first. In the actual physical installation, the cages may be placed either horizontally or vertically, relative to each other.

All Matrix 44 systems are preconfigured and internally set up at the factory. The printed circuit cards are all installed in the card cages at the factory, and camera and monitor addresses are also set at the factory. Consequently, installation at the user’s site requires no adjustment of any internal printed circuit card.

Refer to Appendix A for Matrix 44 card locations and addressing procedures if additional modules were ordered separately from the card cage or if modules were removed from the card cage for any reason.

This manual details the installation of the components of the Matrix 44 video switching system. The installation of other optional system components is detailed in the manuals for those items. Some of these optional devices are rack-mounted, and it is important that all of these be included when the rack layout is planned.

Other system components may also be rack-mounted but normally are not located in the same racking console as the switcher card cages and their options, so they would not require consideration in planning the CPU console layout.

The V4481SCC-HD may be used with an internal CPU (V1344SCPU-HD) or with one of several external CPUs. This manual does not include installation instructions for the system CPU. If the V4481SCC-HD is used with the V1344SCPU-HD, refer to Instruction Manual X779. If an external CPU is used with the V4481SCC-HD, use this manual and the appropriate CPU instruction manual to install the system.

2.1 Rack Preparation

Listed below are several guidelines for rack installation:

1. Plan the layout of the equipment in the racks before installing any equipment.

2. Allow a minimum of 1.75 inches of vertical rack space between racked components for ventilation. Racked components that are a single EIA rack unit in height (1.75 in.) may be grouped in pairs, each pair being separated from other components by 1.75 inches.

3. The manufacturer of the racking console may or may not include screws for attaching the racked components to the console. Determine if they will be supplied. If not, be sure to have an adequate supply of UNF-standard No. 10-32 x 3/8 screws for installation.

4. Take an inventory of all rack equipment including hardware, brackets, blank panels, etc. Reorder any missing parts immediately. This avoids delays in the middle of the assembly process.

5. Use at least one blower/fan per rack. Place it in the bottom of the rack. Thus, air is drawn in at the bottom of the rack and vented at the top.
2.2 Unpacking and Inspection

All Vicon equipment is tested and inspected before leaving the factory. It is the carrier’s responsibility to deliver the equipment in the same condition as it left the factory.

2.2.1 INSPECTION FOR VISIBLE DAMAGE

Immediately inspect the cartons upon delivery. On all copies of the carrier’s freight bill, make a note of any visible damage.

Make sure the carrier’s agent (the person making the delivery) signs the note on all copies of the bill. If the agent does not have claim forms, contact the carrier’s office.

2.2.2 INSPECTION FOR CONCEALED DAMAGE

As soon as possible after delivery, unpack the unit and inspect it for concealed damage. Do not discard the carton or packing materials. If the unit is damaged, contact the carrier immediately and request forms for filing a damage claim. Make arrangements for a representative of the carrier to inspect the damaged equipment.

If the equipment must be returned for repair, follow the Shipping Instructions at the end of this manual.

2.3 Installation of Matrix 44 High-Density Card Cage in Rack

The Matrix 44 high-density card cage is shipped from the factory with all the modules installed and the addresses set. The card cage is designed for mounting in a standard 19-inch rack (RS-310).

Refer to Appendix A for Matrix 44 card locations and addressing procedures if additional modules were ordered separately from the card cage or if modules were removed from the card cage for any reason.
2.3.1 CARD CAGE INSTALLATION

NOTE: It is recommended that two installers work together to mount the card cages in the rack.

Some rack manufacturers supply special mounting hardware. Determine how this hardware is to be used before attempting to install any racked equipment. One installer should position the rack while a second installer secures it to the front standard.

2.4 System Cabling

This section provides information on the cabling required to connect the system components. Refer to page 1-3 for Coaxial Cable Recommendations.

When installing the V44RC-21-1 or V44RCB-12-1 cable assemblies, orient the connector so that the locking lever locks into the notch on the right side on the connector on the panel.

NOTE: When using these cable assemblies with older connector panels, cut off the locking lever for proper fit.

NOTE: Words in capital letters (e.g., PWR or CONTROL OUT) indicate the names used on the card cage panels.

2.4.1 COAXIAL CABLE CONNECTIONS BETWEEN CAMERAS AND SWITCHER CARD CAGES

Camera inputs are connected to the input BNC connectors on the video switcher subpanels on the rear panel of the card cage. Refer to Figure 2-2. The individual video switcher subpanels are numbered 1-8, 9-16, 17-24, 25-32, and so on. The BNC connectors are used for video input. The ribbon cable connectors are used to loop video out to additional card cages. The lowest number camera is connected to the top BNC on each subpanel. For instance, camera 1 should be connected to the top BNC connector on panel 1-8. Camera 8 should be connected to the bottom BNC connector on subpanel 1-8, and so on.

If there are no more than eight monitor outputs in the system, terminate all the looping video output ribbon cable connectors with the V75TR-1 ribbon cable terminators. If there are 9 to 16 monitor outputs, the system requires a second card cage for monitor expansion. The video switcher subpanels in the second card cage may contain two ribbon cable connectors or one ribbon cable connector and eight BNC connectors to loop out to external devices. Connect a ribbon cable from the looping out ribbon cable connectors on card cage 1 subpanels to one of the ribbon cable connectors on card cage 2. See Figure 2-2. If there are no more than 16 monitors, the other ribbon cable connector or unused BNC connectors on the second cage must be terminated.

If the system has 17 or more monitor outputs, it is necessary to loop to another switcher card cage. Install looping ribbon cables or coaxial cables terminated with BNC connectors from card cage 1 to 2, from 2 to 3, and so on until the last card cage is connected. Terminate the unused video ribbon cable connectors or unused BNC connectors on the last card cage.

NOTE: In Section 2.4.1.1 (Monitor Expansion) and Section 2.4.2.1 (Camera Expansion), the interconnections between the card cages may be made with individual coaxial cables terminated with BNC connectors or with coaxial ribbon cables terminated with coaxial ribbon cable connectors. In order to keep the figures as clear as possible, the figures referenced in these sections show card cage interconnections made with ribbon cables. Model V44RC-21-1 is a 21-inch coaxial ribbon cable assembly used for distributing video between V441 OS-HD switcher cards. Longer ribbon cables are available on special order.

NOTE: Model V44RCB-12-1 is a 12-inch coaxial ribbon cable assembly for distributing video signals from the V4410S-HD switcher cards to external devices. The V44RCB-12-1 ribbon cable assembly is terminated with eight BNC connectors. This cable assembly may be used as necessary in Sections 2.4.1 and 2.4.2.
Figure 2-2
Camera Connections and Looping Video to Switcher Card Cages
2.4.2 COAXIAL CABLE CONNECTIONS BETWEEN SWITCHER CARD CAGES AND MONITORS

Monitor outputs are connected to the output BNC connectors on the monitor subpanels on the rear panel of the card cage. Each card cage has only one monitor output subpanel. Refer to Figure 2-3. The individual monitor subpanels are labeled MON 1-8, MON 9-16, and so on. The lowest number monitor is connected to the top BNC on each subpanel. For instance, monitor 1 should be connected to the top BNC connector on the panel labeled MON 1-8. Monitor 8 should be connected to the bottom BNC connector on subpanel MON 1-8, and so on.

If the system size does not exceed 128 cameras, no additional card cages are required for camera expansion. The monitors or VCRs are connected directly to the monitor output BNCs on the card cage. See Figure 2-3. Terminate any unused connectors on the monitor output cards.

2.4.2.1 Camera Expansion

2.4.2.1.1 Systems with 129-256 Cameras

For systems with 129 to 256 cameras, an additional card cage is required for camera expansion. One V4441 SEXP-HD expander card is placed in the additional card cage. The video inputs from both card cages are combined onto eight monitor outputs in the second card cage, as shown in Figure 2-5, Group B.

The monitor output ribbon cable connector or BNC connectors on the first card cage must be connected to the corresponding expander card in the video output (second) card cage (Figure 2-4). Connect the monitor output BNC connectors on the video output card cage to monitors or VCRs.

For systems with more than 128 cameras and more than 8 monitors, such as the system shown in Figure 2-1, camera expansion and monitor expansion card cages are necessary. Follow the procedures in both Sections 2.4.1.1 and 2.4.2.1 to install such a system.

2.4.2.1.2 Systems with More than 256 Cameras

Matrix 44 switching systems are based on 8-monitor blocks of switch banks. Each 8-monitor block has video inputs from every camera in the system.

Systems that exceed 256 cameras (Figure 2-5, Groups C - E) use switch banks of 256 camera inputs for each 8-monitor block. The outputs of each switch bank are combined in a monitor-select card cage (Figure 2-5, card cages c - e). The monitor-select card cage requires a V4430ADEC-HD address decoder card and one V4410S-HD switcher card for the monitor outputs from each video input switch bank (each group of 256 cameras).
NOTE: B = Group B switch bank, (i.e., 256 cameras).
A-B = Either group A or B switch banks (Le., 256 or less cameras, 1-128 or 129-256 cameras).
c,d,e = Monitor-select card cage (systems with greater than 256 cameras).

NOTE: The \ symbols on the card cage input and output lines represent multiple cables, i.e., 8 represents 8 cables, even though one line is drawn.

Figure 2-5
Camera Expansion Using Matrix Switch Banks (S-Monitor Blocks)
For example, a system with 532 camera inputs and 8 monitor outputs requires two video input switch banks of 256 camera inputs (two card cages per switch bank) and a video input switch bank of 20 inputs (one card cage). The outputs are combined in the monitor-select card cage, which requires three V4410S-HD cards (one card for each video input switch bank). The 532-camera, S-monitor system requires a total of six V4481SCC-HD card cages. Refer to Figure 2-5, Group D.

Follow the procedures in Section 2.4.2.1.1 to connect the cables between two card cages in the same switch bank (129 - 256 cameras). Connect the monitor output ribbon cable connector or BNC connectors on the last card cage in each switch bank to the corresponding V4410S-HD card in the monitor-select card cage. Connect the monitor output BNC connectors on the monitor-select cage to monitors or VCRs. Refer to Figure 2-6.

2.4.3 CARD CAGE INTERCONNECTIONS
The Matrix 44 switching system must be controlled by a CPU. If the V1344SCPU-HD internal CPU is used, refer to Instruction Manual X779. If an external CPU (VPS1300 or VPS1200) is used, the V4481SCC-HD card cages must be connected to the CPU. Refer to the appropriate CPU instruction manual.

2.4.3.1 Interconnection Configurations
The card cages can be interconnected serially in a daisy-chain configuration. In the daisy-chain configuration, the card cages are connected one after another on a single communication route, starting with the CPU. If there is a communication failure anywhere in the line, all card cages beyond that point also become inoperable. See Figure 2-7.

2.4.3.2 Selecting the Ribbon Cables
The card cages communicate with each other via ribbon cables. The length of the cable should not exceed 10 feet (3 m).

Before beginning the interconnection procedures described in the next section, it is necessary to select the proper ribbon cables. The V4481SCC-HD card cages are connected to each other via 25-pin D-shell connectors located on the rear panel of the V4430ADEC-HD.

2.4.3.3 Card Cage Interconnection Procedure
Refer to Figure 2-7 and the appropriate CPU instruction manual for additional information. Use the following procedure to install cables from the CPU to the V4430ADEC-HD. Follow these procedures if the card cages are connected in a daisy-chain configuration.

CAUTION: All card cages in the system must have a power turned OFF whenever ribbon cables are connected to or disconnected from the CPU. Failure to observe this caution can cause damage to the modules from static electricity.

1. Set the power switch on the CPU to OFF. Refer to the appropriate CPU instruction manual.

2. Select a cable with a 25-pin D-shell rectangular connector on each end to connect the V1300X-VC CPU to the V4430ADEC-HD.

3. Plug the connector on one end of the selected cable into the appropriate connector on the CPU. Refer to the CPU instruction manual. Figure 2-7 shows an example of the Matrix 44 system connected to the V1300X-VC-F video control CPU.

4. Route the cable to the V4430ADEC-HD in the first Matrix 44 card cage.

5. Set the power switches on all Matrix 44 card cages to OFF (Figure 2-8). The Matrix 44 card cage switch can be accessed by loosening the four (4) captive screws on the front panel of the card cage (Figure 1-1) and removing the front panel.

6. Connect the CONTROL OUT connector J3 on the first V4430ADEC-HD to the CONTROL IN connector J4 on the next V4430ADEC-HD as shown in Figure 2-7. Continue routing cables as shown in Figure 2-7 until all connections are complete.

As shown in Figure 2-7, CONTROL OUT connector J3 on the V4430ADEC-HD rear panel is not always used. If connector J3 is not used, a cover plate may be installed over J3 to cover the open connector. Refer to Figure 2-9.
Figure 2-7
Typical CPU to V4430ADEC-HD Connections (Daisy-Chain Configuration)

Figure 2-S
Location of Card Cage Power Switch

(16) V4430S-HD VIDEO SWITCHER CARDS
output amplifier
2.4.3.4 V1200X-TDC Connections
If the Matrix 44 switching system is used with a VPS 1200 CPU, V1200X-TDC time/date/title card cages may be connected to the V4430ADEC-HD. Refer to the V1200X-TDC Instruction Manual X403 to connect J1 and J2 on the V4430ADEC-HD to a V1200X-TDC.

2.5 Power Connections

The V4481SCC-HD card cage is supplied with a detachable 120 V line cord. Plug the connector on one end of the line cord into the connector labeled PWR on the rear panel of the CPU. Insert the plug on the other end of the line cord into an appropriate power outlet.

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Figure 2-9
Connector J3 Cover Plate
APPENDIX A

A. MATRIX 44 CARD LOCATIONS AND ADDRESSES

The V4481SCC-HD Matrix 44 high-density card cage is supplied with a mother board, a video amplifier board, and a power supply. The card cage also contains slots for the following boards: an address decoder card, an internal system CPU (optional), expander cards, and up to 16 video switcher cards. Refer to Table 1-1 for a list of Matrix 44 system components and their descriptions.

Figure A-1 shows the card arrangement in a 128-camera, 8-monitor system. A smaller system has fewer V4410S-HD switcher cards, depending on the number of video inputs. For instance, a 40-camera system requires only five V4410S-HD cards (40 cameras/8 cameras per card), leaving 11 empty card slots. A larger system, with greater than 128 cameras or 8 monitors, requires 2 or more card cages.

A.1 Addressing Matrix 44 Switcher Components

Vicon ships the Matrix 44 systems with the matrix switching addresses correctly set. However, when expanding a system or replacing an existing card, the addresses must be set properly.

The addresses of the Matrix 44 cards (V4410S-HD switcher cards, V4430ADEG-HD cards, and V4441SEXP-HD expander cards) define video signal inputs and outputs for the system. Additional cards must have their addresses set before installation in a card cage.

Video input (camera) addresses are set on the V4410S-HD switcher cards. The video input address permits the system to select a specific video input.

Video output (monitor) addresses are set on the V4430ADEG-HD address decoder cards. The video output address permits the system to specify to which monitor (or other output device) a selected camera input is routed. In single-card-cage systems, the video outputs are automatically identified as 1-8 and no addressing is required.

Figure A-1
Location of Cards in 128-Camera, 8-Monitor System
In systems with more than 128 video inputs, one or more V4441SEXP-HD expander cards are used. One expander card is located in the last card cage of each video input switch bank. The eight monitor outputs from the first cage are routed to the video inputs of expander card in the second card cage in a switch bank. The address of the V4441SEXP-HD is set to give correct identification to the incoming video from the previous card cage.

A.1.1 ADDRESSING V4410S-HD SWITCHER CARDS

The first step in setting card addresses is to identify the correct address for the card in question. When systems are shipped, each card is marked on the front edge with the camera input numbers.

Refer to Section 2.4.2.1.2 for definitions of video input switch banks and monitor-select switch banks.

A.1.1.1 V4410S-HD Cards Used in Video Input Switch Banks

In a single-card-cage system, only the V4410S-HD cards require addressing. Looking at the card cage from the front, the left card is addressed for video inputs 1-8, the second card 9-16, and so on. The sixteenth card from the left is addressed for inputs 121-128. Refer to Figure A-2.

The highest address setting a V4410S-HD card can have is 249-256. Therefore, if a system exceeds 256 camera inputs, each additional switch bank of 256 inputs (257-512, 513-768, and 769-1024) reuses addresses 1-256. For example, the first V4410S-HD card in the second switch bank (switch bank 257-512) is used for cameras 257-296. However, since a switcher card address cannot exceed 249-256, this card must have its address set for 1-8. The next card (inputs 265-272) must have its address set for 9-16.

If the system exceeds eight monitors, the video signals are looped out to additional card cages for monitor expansion. Card cages used for monitor expansion must have the same camera addresses as the card cage that receives the video signal. Refer to Figure A-2. All card cages in the same column (columns are used to show monitor expansion) have the same camera addresses.

A.1.1.2 V4410S-HD Cards Used in Monitor-Select Switch Banks

In systems with more than 256 cameras, each S-monitor block requires a monitor-select card cage (refer to Section 2.4.2.1.2 if necessary). This card cage combines the outputs of each 256-camera switch bank into a single 8-monitor output set. The monitor-select card cage must have one V4410S-HD card for each switch bank (1-256, 257-512, 513-768, 769-1024). The V4410S-HD address for these cards are 1-8, 16-24, and 25-32, respectively.

A.1.2 SETTING V4410S-HD ADDRESS DIP SWITCHES

CAUTION: The Matrix 44 circuit boards contain integrated circuits (ICs) that are sensitive to static electrical discharge. Take all necessary precautions (including use of grounding equipment such as ground straps and conductive work pads) to avoid static discharge which can destroy ICs.

The address for each V4410S-HD card is set on DIP switch U7. Refer to Figure A-3 for the location of the DIP switch. Place the V4410S-HD card on a static-free work surface before beginning work.

The switch has eight positions; only positions one through five are used to set addresses. Refer to Table A-1 for switch settings. A numeral “1” in the table indicates ON; a “0” indicates OFF.

NOTE: DIP switches found on V4410S-HD cards may have the numbers oriented right-side-up or upside-down as you hold the card in the position shown in Figure A-3. This does not affect the addressing procedure. Simply set each switch ON or OFF as indicated in Table A-1.

A.1.3 SETTING V4430ADEC-HD ADDRESS DIP SWITCHES

Video output (monitor) addresses are set on the V4430ADEC-HD address decoder cards. The video output address specifies to which monitor (or other output device) a selected camera input is routed. In single-card-cage systems, the video outputs are automatically identified as 1-8 and no addressing is required.
Figure A-2
Switcher Card Addresses (Front View)

<table>
<thead>
<tr>
<th>1 9 17 25 33 41 49 57 65 73 81 89 97 105 113 121</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 16 24 32 40 48 56 64 72 80 88 96 104 112 120 128</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1 9 17 25 33 41 49 57 65 73 81 89 97 105 113 121</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 24 32 40 48 56 64 72 80 88 96 104 112 120 128</td>
</tr>
</tbody>
</table>

**KEY:**
- 1-8, etc.: V441 OS-HD SWITCHER CARDS
- AMP: VIDEO AMPLIFIER CARD
- PS: POWER SUPPLY
- ADEC: V4430ADEC-HD ADDRESS DECODER
- EXP: V4411EXP-HD EXPANDER CARD

**Figure A-2**
Switcher Card Addresses (Front View)
TABLE A-1

<table>
<thead>
<tr>
<th>Video Input Addresses</th>
<th>DIP Switch U7 Position Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-8</td>
<td>0 0 0 0 0</td>
</tr>
<tr>
<td>9-16</td>
<td>1 0 0 0 0</td>
</tr>
<tr>
<td>17-24</td>
<td>0 1 0 0 0</td>
</tr>
<tr>
<td>25-32</td>
<td>1 1 0 0 0</td>
</tr>
<tr>
<td>33-40</td>
<td>0 0 1 0 0</td>
</tr>
<tr>
<td>41-48</td>
<td>1 0 1 0 0</td>
</tr>
<tr>
<td>49-56</td>
<td>0 1 1 0 0</td>
</tr>
<tr>
<td>57-64</td>
<td>1 1 1 0 0</td>
</tr>
<tr>
<td>65-72</td>
<td>0 0 0 1 0</td>
</tr>
<tr>
<td>73—80</td>
<td>1 0 0 1 0</td>
</tr>
<tr>
<td>81-88</td>
<td>0 1 0 1 0</td>
</tr>
<tr>
<td>89-96</td>
<td>1 1 0 1 0</td>
</tr>
<tr>
<td>97-104</td>
<td>0 0 1 1 0</td>
</tr>
<tr>
<td>105-112</td>
<td>1 0 1 1 0</td>
</tr>
<tr>
<td>113-120</td>
<td>0 1 1 1 0</td>
</tr>
<tr>
<td>121-128</td>
<td>1 1 1 1 0</td>
</tr>
<tr>
<td>129-136</td>
<td>0 0 0 0 0</td>
</tr>
<tr>
<td>137-144</td>
<td>1 0 0 0 0</td>
</tr>
<tr>
<td>145-152</td>
<td>0 1 0 0 0</td>
</tr>
<tr>
<td>163-160</td>
<td>1 1 0 0 1</td>
</tr>
<tr>
<td>161-168</td>
<td>0 0 1 0 1</td>
</tr>
<tr>
<td>169-176</td>
<td>1 0 1 0 1</td>
</tr>
<tr>
<td>177-184</td>
<td>0 1 1 0 1</td>
</tr>
<tr>
<td>185-192</td>
<td>1 1 1 0 1</td>
</tr>
<tr>
<td>193-200</td>
<td>0 0 0 1 1</td>
</tr>
<tr>
<td>201-208</td>
<td>1 0 0 1 1</td>
</tr>
<tr>
<td>209-216</td>
<td>0 1 0 1 1</td>
</tr>
<tr>
<td>217-224</td>
<td>1 1 0 1 1</td>
</tr>
<tr>
<td>225-232</td>
<td>0 0 1 1 1</td>
</tr>
<tr>
<td>233-240</td>
<td>1 0 1 1 1</td>
</tr>
<tr>
<td>241-248</td>
<td>0 1 1 1 1</td>
</tr>
<tr>
<td>248-256</td>
<td>1 1 1 1 1</td>
</tr>
</tbody>
</table>

Binary Settings: 1 = ON/CLOSED; 0 = OFF/OPEN

CAUTION: The Matrix 44 circuit boards contain integrated circuits (ICs) that are sensitive to static electrical discharge. Take all necessary precautions (including use of grounding equipment such as ground straps and conductive work pads) to avoid static discharge which can destroy ICs.

The address for V4430ADEC-HD cards is set on DIP switch SW 1. Refer to Figure A-4 for the location of the DIP switch. Place the V4430ADEC-HD card on a static-free work surface before beginning work.

Refer to Table A-2 for switch settings. A numeral “1” in the table means ON; a “0” indicates OFF.

NOTE: All V4430ADEC-HD cards must have strap (jumper) W2 enabled (in place) and strap W1 disabled (removed). All current V4430ADEC-HD cards are shipped in this configuration.

NOTE: DIP switches on V4430ADEC-HD cards may have the numbers oriented right-side-up or upside-down as you hold the card in the position shown in Figure A-4. This does not affect the addressing procedure. Simply set each switch ON or OFF as indicated in Table A-2.

Figure A-3
Location of DIP Switch U7 on V4410S-HD Switcher Card

NOTE: ON ACTUAL SWITCHES, NUMBERS MAY BE ORIENTED AS SHOWN OR MAY BE UPSIDE DOWN. THIS DOES NOT AFFECT THE ADDRESSING PROCEDURE. SIMPLY SET EACH SWITCH ON OR OFF AS INDICATED IN TABLE A-1.
A.1.4 SETTING V4441SEXP-HD ADDRESS
DIP SWITCHES

CAUTION: The Matrix 44 circuit boards contain A integrated circuits (Ks) that are sensitive to static electrical discharge. Take all necessary precautions (including use of grounding equipment such as ground straps and conductive work pads) to avoid static discharge which can destroy ICs.

Each video input switch bank that has 129-256 camera inputs (i.e., each switch bank that requires two card cages) requires one V4441SEXP-HD expander card in the second card cage of each switch bank. Refer to Section 2.4.2.1.2 and Figures 2-5 and 2-6 for a definition and examples of switch banks.

Since a video input switch bank can accommodate 256 camera inputs, and each card cage can accommodate 128 camera inputs, there is never more than two card cages in a switch bank. Therefore, there is never more than one V4441SEXP-HD in a card cage.

Two-position DIP switch U7 determines the address of the V4441SEXP-HD expander card. Refer to Figure A-5 for the location of DIP switch U7. Place the V4441SEXP-HD card on a static-free work surface before beginning work. Set both of the switches on U7 to OFF or “0.” All current V4441SEXP-HD cards are shipped in this configuration.
A.2 Inserting Cards in the Card Cage

Determine the correct card slot by referring to Figures A-1 and A-2. The component side of all cards faces to the left. Carefully slide the card into the plastic card guides until resistance is felt. Press firmly until the card snaps into the mating connector at the rear of the card cage.

### Shipping Instructions

Use the following procedure when returning a unit to the factory:

1. Call or write Vicon for a Return Authorization (R.A.) at one of the locations listed below. Record the name of the Vicon employee who issued the R.A.

   VICON INDUSTRIES INC.
   89 Arkay Drive
   Hauppauge, New York 11788
   516-952-CCTV (2288) or toll free 1-800-645-9116
   Fax: 516-951-CCTV (2288)

   For service or returns from countries in Europe, contact

   VICON INDUSTRIES (U.K.) LTD
   Brunel Way
   Fareham, PO15 5TX
   United Kingdom
   44/(0)1489/566300 Fax: 44/(0)1489/566322

2. Attach a sheet of paper to the unit with the following information:
   a. Name and address of the company returning the unit
   b. Name of the Vicon employee who issued the R.A.
   c. R.A. number
   d. Brief description of the installation
   e. Complete description of the problem and circumstances under which it occurs
   f. Unit's original date of purchase, if still under warranty

3. Pack the unit carefully. Use the original shipping carton or its equivalent for maximum protection.

4. Mark the R.A. number on the outside of the carton on the shipping label.