ECLIPSE MEDIAN MATRIX

Frame and Circuit Cards

Instruction Manual

Eclipse Median Matrix Instruction Manual

Part Number 810347Z Rev. 6

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CONTENTS

FIGURES

IMPORTANT SAFETY INSTRUCTIONS

Please read and follow these instructions before operating an Eclipse Median system. Keep these instructions for future reference.

Please read and follow these instructions before operating an Eclipse Median system.

1. WARNING: To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture.
2. Do not use the apparatus near water.
3. Clean only with a dry cloth.
4. Do not block any ventilation openings. Install in accordance with the manufacturer's instructions. Install product according to the directions in the Installation Chapter of this manual.
5. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat. Do not place naked flame sources such as candles on or near the matrix.
6. Do not defeat the safety purpose of the polarized plug or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding-type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
7. Protect power leads from being walked on or pinched particularly at plugs, at convenience receptacles, and at the point where they exit from the apparatus.

Note: A "convenience receptacle" is an extra AC power outlet located on the back of a piece of equipment, intended to allow you to power other equipment.

8. Only use attachments/accessories specified by the manufacturer.
9. Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.
10. Unplug the apparatus during lightning storms or when unused for long periods of time.
11. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as a power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
12. Where the mains plug or an appliance coupler is used as the disconnect device, the disconnect device shall remain readily operable.

Please familiarize yourself with the safety symbols in Figure 1. When you see these symbols on an Eclipse Median system, they warn you of the potential danger of electric shock if the system is used improperly. They also refer you to important operating and maintenance instructions in the manual.

This symbol alerts you to the presence of uninsulated dangerous voltage within the product's enclosure that might be of sufficient magnitude to constitute a risk of electric shock. Do not open the product's case.

This symbol informs you that important operating and maintenance instructions are included in the literature accompanying this product.

Figure 1: Safety Symbols

EMC AND SAFETY

The Eclipse Median meets all relevant CE, FCC, UL, and CSA specifications set out below:

EN55103-1 Electromagnetic compatibility. Product family standard for audio, video, audio-visual, and entertainment lighting control apparatus for professional use. Part 1: Emissions.

EN55103-2 Electromagnetic compatibility. Product family standard for audio, video, audio-visual, and entertainment lighting control apparatus for professional use. Part 2: Immunity.

UL60065 7th edition.

CAN/CSA C22.2 No. 60065-03.

And thereby compliance with the requirement of Electromagnetic Compatibility Directive 89/336/EEC and Low Voltage Directive 73/23/EEC as amended by 93/68/EEC.

THE ECLIPSE MEDIAN: AN OVERVIEW

The Eclipse Median combines a central matrix with slots for up to seven client cards and up to eight interface modules into one compact unit. The Median uses the same ECS software, cards, interfaces and panels as the the Eclipse Omega.

Clear-Com designed the Eclipse Median with modular components that help you to plan, build, or customize your communication system to meet the most rigorous demands of modern broadcast, performing arts, industrial, aerospace, and military environments, while using a space-saving format.

The Eclipse Median houses up to 112 analog ports, up to 8 interface modules, and dual redundant power supplies in a 6 rack unit chassis.

FEATURES

Features of the Eclipse Median matrix system include:

- A six rack-unit frame housing up to 112 RJ-45 analog ports and up to eight interface modules.
- Full audio bandwidth throughout the signal chain, producing superior broadcast audio quality. The system maintains 24-bit sampling and 30 Hz to 22 kHz frequency response.
- Up to seven available analog port cards supporting 16 analog ports each for connecting to panels and interfaces.
- Slots housing eight interface modules for connecting the matrix to telephones, two-way radios, camera intercoms, party lines, and other forms of communication.
- One PSU powers all onboard CPU, port, and interface cards, while a second PSU provides backup power in case of outages.
- Power supplies automatically switch to the correct voltage, for compatibility around the world.
- Two CPU cards provide fail-safe redundancy.
- Individual crosspoint level adjustments in smooth 0.3555 dB increments.
- Eight general purpose inputs and eight relays, located directly on the matrix.
- Full compatibility with selected Matrix Plus 3 panels and interfaces, selected 4000 Series II panels, V-Series panels and FreeSpeak/CellCom antennas and splitters.

- Matrices that link across cities, nations, or continents through trunk lines and fiber.
- Uses the same fiber-networking interface as the Eclipse Omega matrix.
- Connection to FreeSpeak/CellCom antennas and splitters using the E-QUE interface.
- Multiple E-QUE interfaces can be fitted to a single matrix to support E1 and T1 protocols.
- Connection to IP enabled V-Series panels and Concert users over IP networks using the IVC-32 interface.
- Multiple IVC-32 interfaces can be fitted to a single matrix.
- VOX-programmable audio which visually cues you at the matrix when audio transmits on a connected intercom panel or interface at a programmed threshold.
- "Virtual" operation in which a complete networked system can be operated and maintained from anywhere in the world. The system provides both local area network and Internet access to the central matrix.
- Visual and intuitive Eclipse Configuration System (ECS) programming software.

THE ECLIPSE MEDIAN MATRIX

A complete Eclipse Median system consists of a central matrix and the remote audio devices—intercom panels, interfaces, 4-wire equipment—connected to it. Each element of the Eclipse Median system is briefly described in this chapter and more fully described later in this manual and in the Eclipse set of manuals.

The Eclipse set of manuals includes individual booklets on each matrix, panel, and interface in the system, as well as the *Eclipse Matrix Installation Instruction Manual* (part 810298Z).

MATRIX ASSEMBLY

As shown in Figure 1-1 the matrix assembly consists of the following components:

- The metal housing for the circuit cards and power supplies, called the "matrix".
- The removable and replaceable circuit cards
- The removable and replaceable power supplies
- The rear panel connectors which link the circuit cards to devices and media such as intercom panels, interfaces, wireless equipment and optical fiber.

Figure 1-1: The Eclipse Median Assembly

MATRIX CHASSIS

The matrix chassis is a metal rectangular box which measures six rack units high and 19-inches wide (26.9 cm x 48.3 cm). It has slots for 2 CPU cards, 7 circuit cards, 8 interface modules, and 2 power supplies.

RJ-45 and fiber-optic connectors are located on removable plates on the rear of the chassis. These connect the circuit cards to intercom devices and media such as panels, interfaces, 4-wire audio equipment, wireless equipment and fiber-optic cables.

CIRCUIT CARDS

The matrix holds three types of circuit cards: CPU cards, port cards, and interface cards. The cards slide vertically into the front of the matrix and connect to the matrix's backplane.

CPU Card

The CPU card is the master configuration card in the Eclipse Median system. It provides the serial data and Ethernet connection to the connected PC computer. The CPU card also coordinates the data flow between the other cards in the system, allowing them to communicate with each other. The computer memory chip which stores four complete system configurations is located on the CPU card, so that a selected configuration can be retrieved and activated directly from the card.

Like the other cards in the system, the CPU card fits in the Eclipse Median matrix. The card fits vertically in a six rack unit (6 RU) space and connects to the matrix's backplane.

One CPU card is required for each Eclipse Median system. Two cards can be installed to provide redundancy in the case of outages or repair needs.

MVX-A16 Analog Port Card

An MVX-A16 analog port card controls the operation of panels and interfaces connected to it. Panels and interfaces connect to the port card through an RJ-45 connectors or “port” on the matrix’s rear panel. Shielded category-5 cable attaches the panel or interface to the RJ-45 connector.

The MVX-A16 analog port card sends balanced audio and RS-422 data signals to connected audio equipment through 4-pair shielded category-5 cable. The card connects up to 16 remote audio devices such as intercom panels, interfaces, or 4-wire audio equipment to the central matrix. Each audio device connected to a port card communicates with all other audio devices in the system and with the central matrix.

For intelligent linking, shielded category-5 cable is run from a port on one Eclipse Median to a port on a second Eclipse Median to form a trunkline connection.

E-FIB Fiber Interface

E-FIB fiber interfaces connect Eclipse matrices together to provide a high speed, dual redundant link to transfer audio samples and data between systems. These connections can be configured in various ways to provide protection against the loss of a link or a node.

Each E-FIB fiber interface consists of a front card with various status indicators and a rear card with two Duplex LC Terminated fiber optic connectors (TXVRA and TXVRB).

E-QUE E1/T1 Interface

The E-QUE E1/T1 interface allows the Eclipse matrix connectivity to FreeSpeak/CellCom antennas and FreeSpeak/CellCom antenna splitters. Each E-QUE interface consists of a front card with a reset button and various status indicators, and a rear card with eleven RJ45 ports giving eight standard ports, DECT sync in and out and a LAN port for diagnostic use.

Each E-QUE front card has status LEDs for power, port activity and LAN status. The port activity LEDs indicate whether there is a device connected to an E1 port and that a connection has been established between this port and the connected device.

The E-QUE interfaces must be fitted in the rightmost available slots (furthest away from the CPU cards) on the Median and up to four E-QUE interfaces can be fitted on a matrix.

IVC-32 IP Interface

The IVC-32 interface allows the Eclipse matrix to connect to IP enabled V-Series panels and Concert users via an IP network.

Each IVC-32 interface consists of a front card with a reset button and various status indicators, and a rear card with eleven RJ45 ports giving eight E1/T1 ports (not used), DECT sync in and out (not used) and a LAN port for IP connectivity.

Each IVC-32 front card has status LEDs for power, port activity and LAN status. The LAN indicators show whether there is a LAN connection and the IP activity on the LAN port.

The IVC-32 cards must be fitted in the rightmost available slots (furthest away from the CPU cards) on the Median and up to four IVC-32 interfaces can be fitted to a matrix.

Interface Modules

An interface module converts the 4-wire signals transmitted from the matrix to other types of signals that communicate with such external devices as telephones, camera intercoms, two-way radios, and so on. In this way, non-4-wire devices can communicate with the matrix.

The Median houses any of the following interfaces modules:

- **FOR-22**. A two-channel, universal 4-wire interface with transformer isolation, opto-isolation for logic input, and relay contacts for relay out.
- **CCI-22**. A two-channel, isolated translator of 4-wire audio from the matrix to two-wire intercom circuits, such as Clear-Com party line products.
- **TEL-14**. Allows two standard 2-wire POTS telephone lines to connect to matrix ports.
- **RLY-6**. Provides six relays that can be wired for general purpose use and controlled directly from the matrix.
- **GPI-6**. Provides a method to read external switch closures and control voltages and translate them to operations in the matrix.
- **AES-6.** Provides a method to connect third party and digital devices to the matrix.

Additional interfaces may be added to the Median via separate interface module frames: the IMF-3, IMF-102, and DIF-102. See the manual *Interface Module Frames* in the Eclipse manual set for more information.

Note: The DIG-2 and VeNiX (ISDN) interface modules are not compatible with the Median frame format.

POWER SUPPLIES

The Eclipse Median has two Euro Cassette power supply units that can be easily installed or removed as needed. One power supply unit can power an entire matrix; the second unit provides a backup in case of failure or damage to the first unit.

In addition, the two supplies have separate IEC connectors to AC mains, and are designed for completely automatic and transparent changeover between supplies in the event of a power outage in one of the AC mains circuits.

An over-temperature sensor is connected to both an audible failure alarm and a warning light, allowing the system operator to diagnose and correct any power anomalies while the system remains operational.

MVX-A16 ANALOG PORTS

The matrix's MVX-A16 interface RJ-45 connectors are called analog ports. Shielded category-5 cable is used to connect an analog port to intercom panels or interfaces.

ECLIPSE CONFIGURATION SYSTEM (ECS)

The Eclipse Configuration System (ECS) controls the operation of the remotely connected audio devices by sending signals to the circuit cards in the matrix, which then relay the signals to the remote audio devices.

"Configurations"—which are the operating parameters of complete system setups, can be created from the ECS computer. Up to four complete system configurations can be stored in the computer's memory to retrieve and activate when needed. An unlimited number of configurations can be stored on the ECS computer to be downloaded to the matrix as required.

The Eclipse Configuration System runs on four versions of Windows: Windows 2000, Windows XP, Windows Server 2003 and Windows Vista. When running ECS on the four Windows operating systems, the client and server can run on separate machines connected over a network.

Note: Windows Vista is not fully supported for ECS; please refer to the ECS manual (part 810299Z) for further information.

Using ECS the system administrator can create point-to-point and fixed group or party-line communications among the connected audio devices, assign a "label" to each port/panel, inhibit or enable features at any connected panel and configure connections between matrices. The ECS system can be set up to run on a client/server model over a network, allowing the system administrator to control the matrix remotely.

INTERCOM AND ACCESSORY PANELS

All intercom panels connect to the central matrix via shielded category-5 cable terminated with RJ-45 connectors. The shielded category-5 cable connects to the matrix through the MVX-A16 analog circuit card. The following Clear-Com intercom panels are compatible with the Eclipse Median matrix system:

- V12LD, V24LD, V12PD, V24PD, V12LDD, V12PDD, V12LDE and V12PDE V-Series panels
- 4215E, 4224E, 4226E, 4294E, 4212E, 4222E, 4203E, 4206E, 4230E and 4230VE 4000 Series II panels
- i-Station family, including expansion panels
- ICS-2003 intercom panels, including expansion panels
- ICS-52 and ICS-92 intercom panels, including expansion panels
- ICS-62 and ICS-102 intercom panels, including expansion panels
- ICS-1008 and ICS-1016 intercom panels, including expansion panels
- ICS-21, ICS-22 and ICS-24 panels have limited support

Each of these panels is described in its own manual. For a full description of the operation, installation, and maintenance of a panel, refer to that panel's respective manual.

INTERFACE MODULES

In addition to installing interfaces directly in the Median, you can install interface modules in one of Clear-Com's three interface frames: the IMF-3, IMF-102, or DIF-102.

Interface modules convert the 4-wire signals of a central matrix port to other types of signals that communicate with devices such as telephones, camera intercoms, two-way radios, and so on. In this way non-4-wire devices can communicate with the central matrix.

Each interface module has hardware connectors to connect to both the central matrix and to the external device that communicates with the central matrix. Most interface modules connect to the central matrix via shielded category-5 cable terminated with RJ-45 connectors. The DIG-2 digital interface module, however, connects to the central matrix via double-shielded 24 AWG conductor category-6 enhanced (CAT-6E) STP cable.

The type of cable used to connect the interface module to the non-4-wire device varies with the device. Each of these connections is described more fully in the individual manual for each interface.

The following interface modules are compatible with the Eclipse Median matrix:

- TEL-14 telephone interface module.
- CCI-22 dual party-line interface module.
- FOR-22 four-wire interface .
- GPI-6 general purpose inputs interface module.
- RLY-6 relay (general-purpose outputs) interface module.
- AES-6 digital interface module used with V-Series panels fitted with the AES-3 option card and 4000 Series panels fitted with the PDE4536 option card. It may also be used with AES-3 compliant third party equipment.
- DIG-2 digital interface module (transparent to the system, configured in ECS as the type of panel it is connected to). Only used for V-Series panels fitted with the T-Adapter option card and ICSxx T type panels.

Each of these interfaces is described in its own manual. For a full description of the operation, installation, and maintenance of an interface, refer to the individual manual for that interface.

2 OPERATING AN ECLIPSE MEDIAN

The Eclipse Median chassis houses the circuit cards, power supplies, and connectors that form the central hardware of the system. Measuring 19-inches wide and 6 rack units high (48.3 cm x 26.9 cm), the matrix chassis installs in a standard equipment rack.

Various types of Eclipse Median circuit cards perform unique functions. System cards control overall system operation, analog interfaces control the operation of connected panels and interfaces and communications interfaces allow communication with wireless equipment, fiber optic links and IP networks.

Two Euro Cassette power supplies provide fail-safe redundancy in the event of a component failure or an AC circuit outage. Front-panel lights give information about the condition of the power supplies, allowing the system operator to take preventative corrective action.

Each MVX-A16 interface connects to an individual panel on the back of the Eclipse Median matrix. This panel holds the RJ-45 sockets for connecting to intercom panels and interface modules.

The Eclipse Median matrix is completely modular, allowing cards, power supplies, and connector panels to be added or removed to meet operational needs.

USING THE ECLIPSE MEDIAN MATRIX

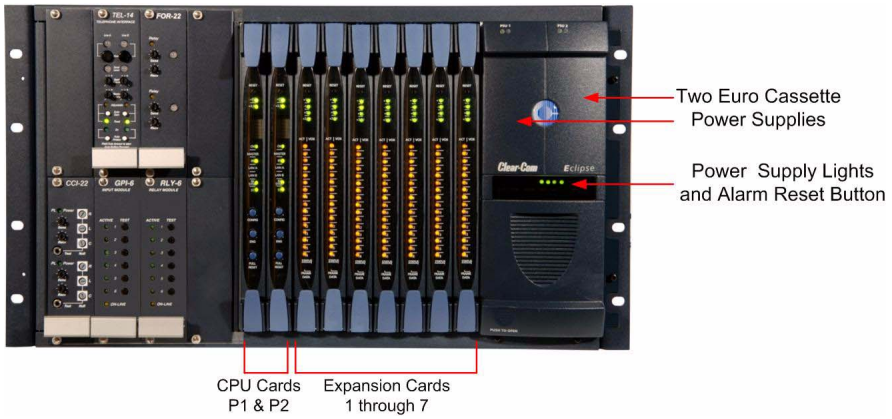


Figure 2-1: Front Panel of Eclipse Median

CENTRAL PROCESSOR UNIT (CPU) CARD

The central processor unit (CPU) card holds the circuitry that allows the system to connect to, and communicate with, the following interfaces:

- An external personal computer
- Externally connected alarms
- Eight general-purpose inputs (GPIs)
- Eight general-purpose outputs (GPOs)
- Two separate local area network (LAN) connections for Ethernet-based communication with a network
- An external interface that provides additional GPIs and GPOs

In addition, the card's operational memory holds up to four complete preassigned system configurations to access and activate either directly from the CPU card or from the ECS configuration software.

***Note**: General Purpose Outputs are also referred to as "relays."*

CREATING AND STORING SYSTEM CONFIGURATIONS

A "configuration" is a complete set of operating parameters for the system which includes talk and listen paths for each connected intercom panel. Depending on the interfaces installed, the configuration can also include more sophisticated features such as paging, call signaling, interrupt foldback (IFB), ISO, groups, automatic DTMF dialing, routing, and many other features.

***Note**: If the configuration does not remain in memory after you power off, please see the first section in Chapter 3, "Reconnecting the CPU Card's Backup Battery."*

When an external computer is connected to the matrix the system administrator can retrieve the current configuration information stored in the CPU microprocessor's memory (using the Eclipse Configuration Software) and display the configuration on the computer's screen.

The system administrator can then apply the current configuration, modify it, or create a new configuration with the Eclipse Configuration Software. If the system administrator creates more than one configuration the unused configurations can be stored on the computer's hard disk or on CD-ROM to use later, allowing the system to be reconfigured as required.

The CPU card itself will store up to four complete configurations in its operational memory that can be applied either directly from the CPU card or from the connected computer.

SETTING THE DEFAULT IP ADDRESS

The CPU card LAN ports can be reset to their default IP addresses by pressing and holding the 'ENG' and 'FULL RESET' buttons on the CPU front card and then pressing the 'RESET' button at the top and then holding the 'ENG' and 'FULL RESET' buttons until the card resets. This will reset the LAN1 ethernet port to the factory default address of 172.16.2.100 and all other ethernet ports to the 0.0.0.0 (blank) address. If the system is fitted with two CPU cards (master and slave) ensure that the default IP address procedure is only carried out on the master CPU.

ETHERNET OPERATION

The CPU card ethernet ports are normally connected to a LAN and used to communicate with clients such as ECS and Production Maestro. The ethernet port functionality depends on the IP address setup.

If an IP address of 0.0.0.0 is configured on the second ethernet port, it will not be used for Tx or Rx. This is the default setup if the default IP address is set as described above.

All matrix to matrix traffic is sent out on both ethernet ports. This applies to both directed and broadcast packets. All matrix to matrix traffic is also received on both ethernet ports. If the traffic is transaction related, the second (duplicate) message received is not consumed, but simply dropped.

The matrices listen for client connections on both ethernet ports. Once the connection is made it is added to the list of connections to service. Broadcast type Tx data is duplicated out on each connection e.g. HCI connection to the matrix from 3rd party applications.

The ECS Server makes a connection on either the main or backup ethernet port of each system in the linked set. If both are up, this will default to the primary port. In the event that connection is lost to the currently active port on a matrix the ECS server will swap over to using the other ethernet port. If this connection is lost only on one matrix in a linked set, the others will not be affected.

Configuration Restrictions

The network ID on the first ethernet port must be different to that of the second port. The network ID is defined by the IP address and the network mask for the port. For example a network address of 172.16.2.1 and a mask of 255.255.0.0 gives a network ID of 172.16. Therefore in this scheme the second port could not have an IP address starting with 172.16. If the network mask is extended to 255.255.255.0 the network ID becomes 172.16.2 so the second port could have an address of 172.16.3.1 and a mask of 255.255.255.0 giving a network ID of 172.16.3 for the second port.

If both ethernet ports are set up with the same network ID this condition results in data loss on one or both of the ethernet ports.

Ethernet redundancy and the use of a default gateway is not recommended. An IP address and gateway combination on an ethernet port means that all Tx traffic to any address is possible on the port. Traffic that actually matches the other ethernet port can therefore be sent out on the wrong port.

FAIL-SAFE OPERATION

The CPU card's non-volatile memory stores all information about the current operating configuration and the three additional configurations, allowing the system to restore itself automatically after a power failure, after replacement of a port card, or after replacement of a panel.

An Eclipse Median system will operate with either one or two CPU cards. When a second card is installed that card stores the four configurations in its RAM as a backup to the main card. If the main card is removed or becomes non-operational for any reason, the system will automatically switch to the second card as backup.

OPERATING THE CPU CARD

The following sections describe the CPU card's status lights and controls, which are illustrated in Figure 2-2.

① RESET BUTTON

Pressing the reset button causes the CPU card to stop its current activity and to restart. The same configuration that was active before the system was reset will be active after the system was reset.

During the reset, configuration information reloads to the card's operational memory from its non-volatile memory and the card starts running again from the beginning.

Note: The reset button is slightly recessed from the front panel to prevent it from being accidentally pressed. A tool such as a bent paper clip is needed to press this button.

② POWER SUPPLY LIGHTS

+ 5-Volt Light

When lit, the "+5V" light indicates that the matrix's +5-volt power supply is actively supplying power to the CPU card.

+3.3-Volt Light

When lit, the "+3.3V" light indicates that the matrix's +3.3-volt power supply is actively supplying power to the CPU card.

③ DOT MATRIX LIGHTS

The rectangular array of lights just below the power-supply lights displays a number (either 1, 2, 3, or 4) to indicate the currently selected configuration. The Eclipse Configuration System (ECS) controls these lights.

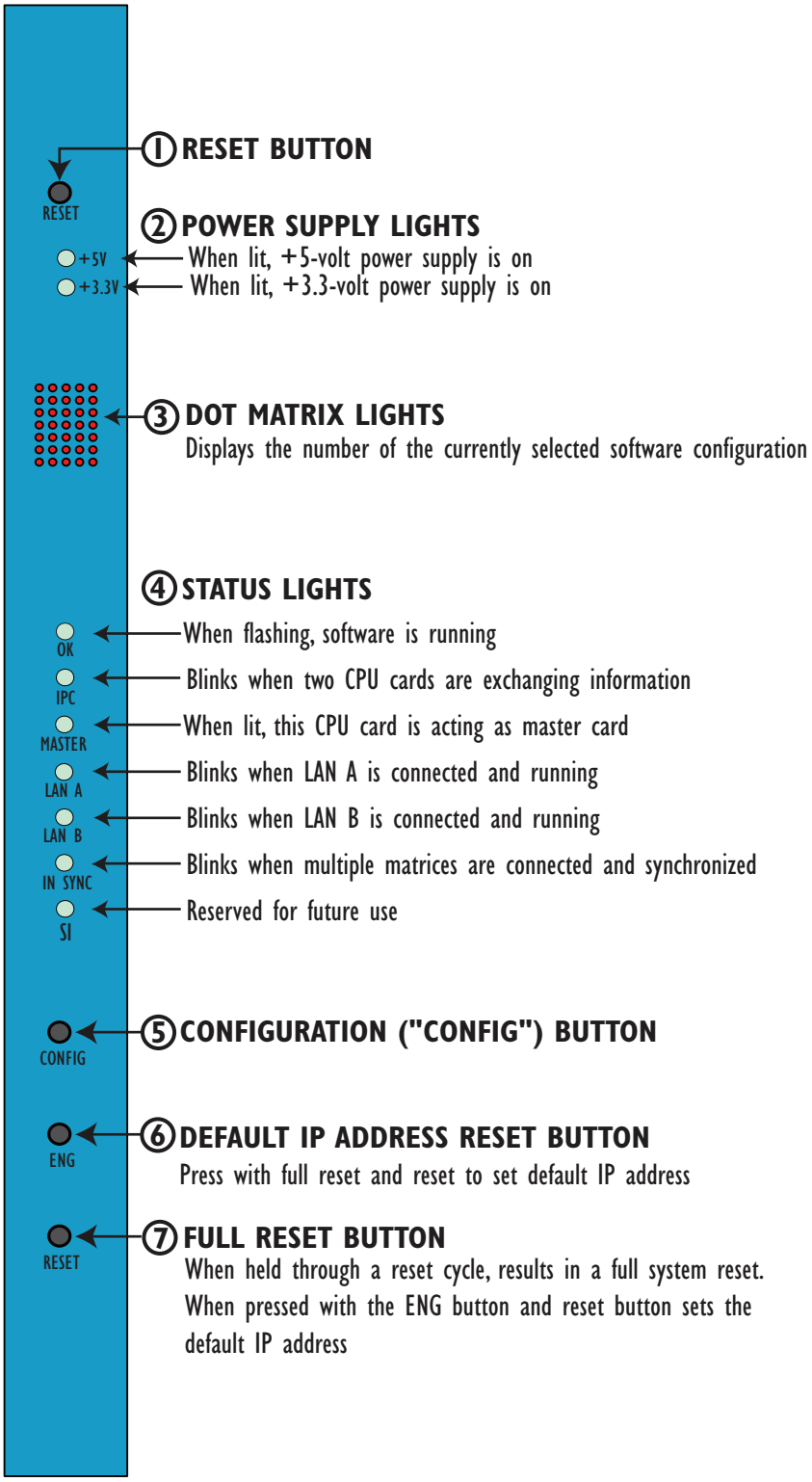


Figure 2-2: CPU Card's Front Panel Lights and Controls

④ STATUS LIGHTS

OK Light

When flashing, the “OK” light indicates that the CPU card is successfully communicating with the Eclipse Configuration System (ECS).

IPC (Interprocessor Communication) Light

The “interprocessor communication” (IPC) light only operates when there are two CPU cards in the matrix. When lit, the light indicates that the two CPU cards are exchanging information.

Master Light

An Eclipse Median system can have two CPU cards, although the system will operate with only one. If the primary card becomes unavailable for any reason, the second card can serve as backup while the primary card is repaired or replaced.

The “master” light illuminates on whichever CPU card is currently serving as master. If there is a backup CPU card in the matrix, its “master” light will not illuminate if the primary card is acting as master.

LAN A Light

When a local area network (LAN) is connected to the matrix’s “LAN A” port, the CPU card’s “LAN A” LED lights to indicate a connection to the Eclipse matrix LAN A.

LAN B Light

When a second local area network is connected to the matrix’s “LAN B” port, the CPU card’s “LAN B” LED lights to indicate a connection to the Eclipse matrix LAN B.

Sync Light

When you connect multiple Eclipse matrices together, the “sync” light illuminates to indicate that the matrices are connected and synchronized.

SI Light

The “SI” light flashes to indicate communications activity.

⑤ CONFIGURATION “CONFIG” BUTTON

The CPU card can hold four complete system configurations in its operational memory. When the “CONFIG” button is pressed the

number of the currently active configuration (either 1, 2, 3, or 4) appears in the dot-matrix display.

Each time the button is subsequently pressed the next configuration number in the series appears in the dot-matrix display. The numbers cycle forward until all of the choices have been displayed, then start again at “1”.

When a *non-active* configuration’s number appears in the display, it flashes to indicate its non-active status. When an *active* configuration’s number (either 1,2, 3, or 4) appears in the display, it illuminates solidly (without flashing) to indicate that it is the active configuration.

To select one of the four configurations from the CPU card

1. Repeatedly press the CONFIG button until the desired configuration’s number (1,2,3, or 4) appears in the display.
2. When the desired number appears, press and hold the CONFIG button until the display stops flashing. This should take about three seconds.

   The selected configuration then becomes the system’s active operational configuration.

⑥ ENGINEERING “ENG” BUTTON

This button is used to reset the system to the default IP addresses.

⑦ FULL RESET BUTTON

When a full reset is performed all cards in the matrix reset regardless of any system preferences in the program software and non-volatile memory is cleared.

To perform a full reset

1. Press and hold the card’s lower RESET button (the “full reset” button).
2. Simultaneously press and release the card’s upper RESET button.
3. Continue holding the card’s lower RESET button for two seconds.

   The card performs a full reset.

The same configuration that was active before you reset the system will be active after you reset it.

When the cards and connected audio devices reset, they momentarily stop their current activity and restart. During this process configuration information is downloaded to the cards and remote audio devices from the CPU card’s non-volatile RAM.

Note: Under normal operating conditions it is not necessary to perform a full reset. Technical personnel might perform a full reset if they believe that the CPU card is operating incorrectly as a result of corruption of the microprocessor’s internal data or instruction sequence.

ANALOG PORT CARD DESCRIPTION

Analog port cards connect the central matrix to intercom panels and interfaces. In a linked system, port cards connect trunk lines. The analog card, designated the “MVX-A16”, supports normal audio feeds, user panels, and trunk lines.

All cards contain a voice detection mechanism (“VOX”) that is programmed from the ECS configuration software. VOX detection allows a system operator to know when the audio on a particular channel has exceeded a threshold. This is particularly useful for channels that are inactive periodically, so that an operator is visually cued when audio appears on the line.

Each analog port card has two system status lights. A port card’s FRAME DATA light illuminates to indicate the card’s successful communication with the CPU card. A port card’s STATUS light illuminates to indicate a failure in communication between the port card and the CPU card. When all port cards are lined up in the matrix, the system status lights form a horizontal row showing the overall state of the system.

ANALOG PORT CARD FRONT-PANEL LIGHTS AND CONTROLS

① Reset Button

Pressing the reset button causes the card and all connected audio devices to momentarily stop their current activity and to restart. The card’s “frame data” light goes off when the reset starts and comes back on when the reset is complete.

During the reset, configuration information downloads to the card and its connected audio devices from the CPU card. If the entire system is operating except for one port card, or one or more panels connected to the card, press the reset button for that card only.

Note: The reset button is slightly recessed from the front panel to prevent it from being accidentally pressed. A tool such as a bent paper clip is requied to press this button.

② Power Supply Lights

+12-Volt and -12-Volt Power Supply Lights

The matrix’s +12-volt and -12-volt power supplies provide electric current to these two green lights. When lit, these lights indicate that the matrix’s +12-volt and -12-volt power supplies are present and supplying electric current to the card.

+5-Volt Power Supply Light

The matrix's +5-volt power supply provides electric current to this green light. When lit, the light indicates that the +5 supply is present and supplying electric current to the card.

+3.3-Volt Power Supply Light

The matrix's +3.3-volt power supply provides electric current to this green light. When lit, the light indicates that the +3.3-volt supply is present and supplying electric current to the card.

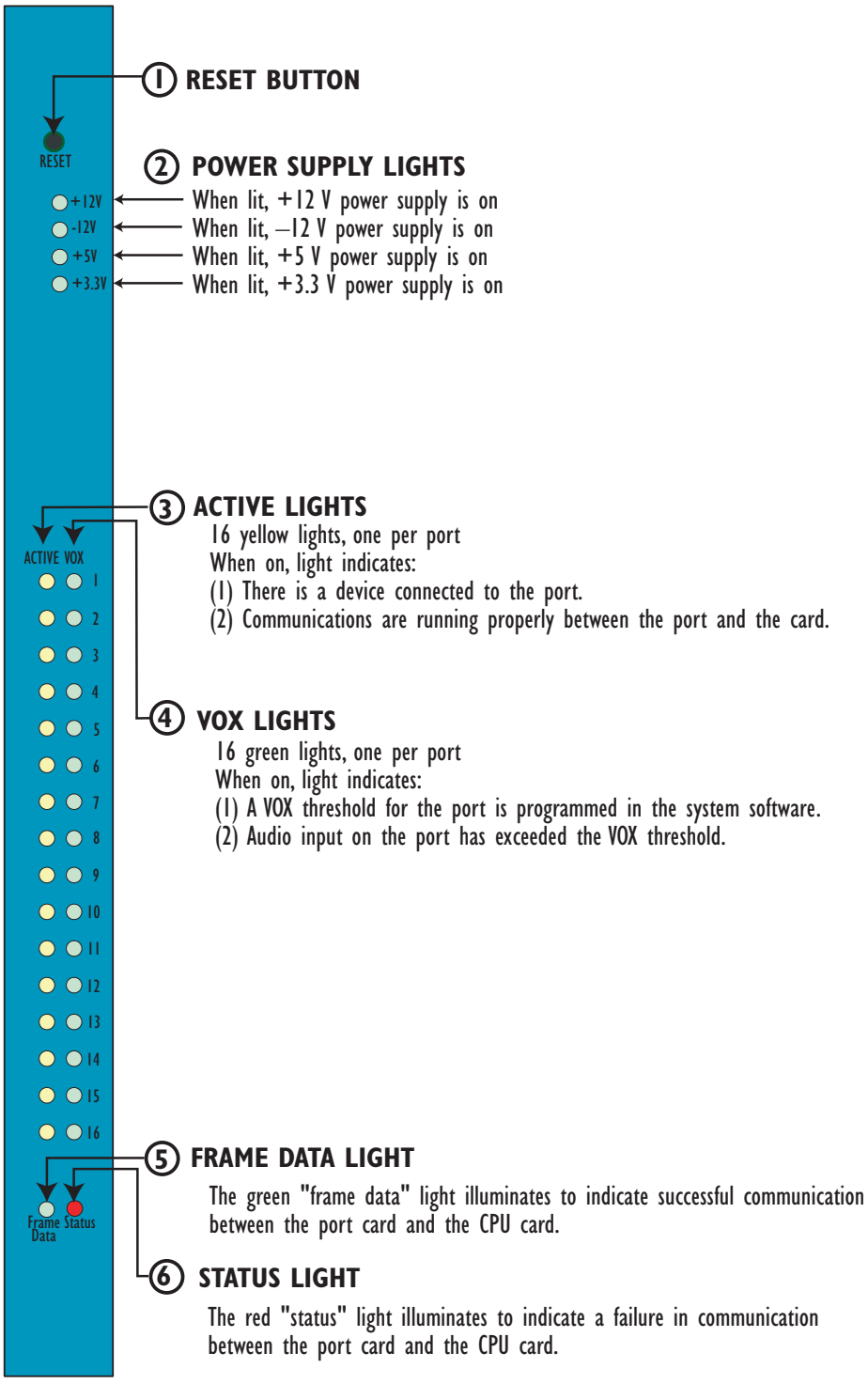


Figure 2-3: Analog Port Card Lights and Controls

③ Active Lights

When lit, an “active” light indicates successful communication between the port card and a connected remote device such as an intercom panel or interface.

Each of the port card’s 16 yellow “active” lights corresponds to one of 16 rear-panel connectors or “ports” to which remote audio devices can be connected.

④ VOX Lights

When lit a “VOX” light indicates that the audio level on a connected remote device, such as an intercom panel or interface, has exceeded a preset threshold. The threshold audio level is set through the ECS configuration software.

Each of the port card’s 16 green “VOX” lights corresponds to one of 16 rear-panel connectors or “ports” to which audio devices (intercom panels or interfaces) can be connected.

⑤ Frame Data Light

The green “frame data” light illuminates to indicate successful communication between the port card and the CPU card.

⑥ Status Light

The red “status” light illuminates to indicate a failure in communication between the port card and the CPU card.

INTERFACE CARD DESCRIPTION

The following interfaces can be installed in the Median:

- **FOR-22**. A two-channel, universal 4-wire interface with transformer isolation, opto-isolation for logic input, and relay contacts for relay out.
- **CCI-22**. A two-channel, isolated translator of 4-wire audio from the matrix to two-wire intercom circuits, such as Clear-Com party line products.
- **TEL-14**. Allows two standard 2-wire POTS telephone lines to connect to matrix ports.
- **RLY-6**. Provides six relays that can be wired for general purpose use and controlled directly from the matrix.
- **GPI-6**. Provides a method to read external switch closures and control voltages and translate them to operations in the matrix.

- **AES-6.** Provides an interface for third party devices and digital panels.

Each of these interfaces has its own individual manual in the Eclipse set of manuals. Refer to an interface's individual manual for more information on operating, installing, or maintaining it.

Note: Unlike interfaces installed in a separate interface frame, the interfaces installed in the Median are powered by the same onboard power supply that also powers the CPU card and port cards.

POWER SUPPLY DESCRIPTION

Eclipse Median has two Euro Cassette power supply units can be easily installed or removed as needed. One power supply unit can power an entire matrix; the second unit provides a backup in case of an equipment failure.

In addition, the two supplies have separate IEC connectors to AC mains power, and are designed for completely automatic and transparent changeover between supplies in the event of an outage on one of the AC mains circuits. For this feature to work, each power supply should be connected to a different AC mains branch.

If the temperature inside the Eclipse matrix exceeds a threshold, both an audible alarm and a warning light switch on, allowing the system operator to diagnose and correct power anomalies while the system remains in operation.

Each cassette has two status lights located on the power supply unit in the upper left corner. The green light stays on continuously to indicate that the unit is receiving appropriate power. The amber light goes on when a DC output or AC input falls too low.

DIAGNOSING POWER SUPPLY PROBLEMS

Figure 2-4 illustrates the front panel alarm lights, power supply lights, and reset button. An alarm source triggers the main alarm light and also one of the additional six red alarm lights, allowing the system operator to identify or correct alarm conditions before they affect the operation of the matrix.

Each of the four green power supply lights stays on continuously to show that the power supplies are receiving sufficient AC current. When one of these lights switches off, the power supplies need to be replaced or repaired.

Under normal operating conditions, the red front-panel alarm lights stay off, while the green power supply lights stay on continuously.

The power supplies may need to be adjusted if E-QUE, E-FIB or IVC-32 interfaces are installed. For details of the adjustments please refer to the system upgrade manual (part 810377Z).

Figure 2-4: Power supply module's front door

CONDITIONS THAT CAUSE AN ALARM

The following conditions trigger an alarm:

- If any of the voltages produced by the first power supply unit fall below normal levels.
- If any of the voltages produced by the second power supply unit fall below normal levels.
- If an internal matrix alarm condition activates a matrix relay to turn on an external alarm.
- If the active CPU card exceeds a temperature threshold.
- If either of the CPU cards is removed from the matrix.
- If either of the matrix's two cooling fans stop operating.
- If the temperature inside the Eclipse matrix exceeds a set threshold.

MAIN ALARM LIGHT

An alarm condition triggers the following events:

- The red main alarm light flashes.
- The matrix's internal alarm buzzer sounds.
- Any installed alarm relay outputs switch to active (the normally open contact closes and the normally closed contact opens). When the alarm relay activates, it can cause an externally connected device like a light or buzzer to switch on.
- One of the six auxiliary red alarm lights may go on to more precisely indicate the source of the alarm condition. These lights are discussed in further detail later in this section.

ALARM RESET BUTTON

When you press the alarm reset button, the following events take place, even if the alarm condition has not been corrected:

- The internal audible alarm buzzer stops buzzing.
- Any wired relay contacts return to their inactive state. If these relays are connected to external alarm lights or alarm buzzers, those lights or buzzers shut off.

If the original alarm condition still exists, the red main alarm light on the matrix's front panel continues to flash. The red main alarm light only stops flashing when all original sources triggering the alarm are corrected.

If a new alarm condition or conditions occur before the original alarm conditions are corrected, the internal buzzer and relay contacts will not reactivate. They will only reactivate after all original alarm conditions are corrected.

AUXILIARY ALARM LIGHTS

When an alarm condition occurs, any of the six auxiliary alarm lights may switch on, in addition to the main alarm light, to help diagnose the alarm condition. The following sections describe the six auxiliary alarm lights.

External Alarm ("Ext Alarm")

The "external" alarm (labelled "EXT ALARM") light switches on to indicate that an alarm condition has triggered the built-in relay outputs to turn on any externally installed alarms such as lights or bells. You connect the external alarm to the matrix through the 9-pin D-type connector on the matrix's rear panel labeled "Alarm I/O".

Temp Alarm

The red “temp” alarm light switches on to indicate one or both of the following:

- The active CPU card has detected a temperature in the matrix above a threshold.
- One of two CPU cards has been removed from the matrix.
  Note that this feature only operates if there are two CPU cards installed in the matrix. If there is only one CPU card, the Temp alarm light does not switch on if the card is removed.

Fan-Fail Alarm

The red fan-fail alarm light illuminates when either fan in the power-supply module stops rotating correctly.

PSU1 Fail

When the first power supply unit is operating correctly, the red PSU1 light stays off, while the four green power supply lights (+12V, +5V, +3.3V, -12V) stay on continuously.

If a DC output or AC input to the first power supply drops too low, the red PSU1 light switches on. The amber light on the power supply unit itself also switches on to indicate the same condition. One of the green power supply lights may then switch off to help indicate the source of the trouble.

Note that the PSU1 fail light only works if the first power supply is plugged into the matrix’s midplane from inside the matrix.

Note: A temperature sensor inside the power supply senses if the power supply overheats, and switches on the second matrix cooling fan. The red “Temp” light switches on to indicate that the active CPU card, not a power supply, has overheated.

PSU2 Fail

When the second power supply unit is operating correctly, the red PSU2 light is off, while the four green power supply lights (+12V, +5V, +3.3V, -12V) are on continuously.

When a DC output or AC input to the second power supply drops too low, the red PSU2 light switches on. The amber light on the power supply unit itself also switches on to indicate the same condition. One of the green power supply lights may then switch off to help indicate the source of the trouble.

Note that the PSU2 fail light only works if the second power supply is plugged into the matrix’s midplane from inside the matrix.

Note: A temperature sensor inside the power supply senses if the power supply overheats, and switches on the second matrix cooling fan. The red "Temp" light switches on to indicate that the active CPU card, not a power supply, has overheated.

Fan-On Indicator

Two fans deliver forced air cooling to the matrix's power supplies. The primary fan runs continuously. If a temperature exceeding a threshold is detected in a power supply and extra cooling is required, a second fan switches on to increase the air flow. The "fan-on" alarm light illuminates red to indicate that the second fan is on.

POWER SUPPLY LIGHTS

The green power-supply lights illuminate to indicate that the power supplies are receiving +12 V, –12 V, +5 V, and 3.3 V power.

CONNECTING THE MATRIX

You can precisely locate a port with its row and column numbers as shown in Figure 2-7.

The Eclipse Median connects to devices such as the configuration computer, panels, interfaces, and other matrices through its rear-panel hardware connectors, often called “ports”. These connectors are housed in modular removable panels. Each panel is associated with a corresponding front-panel circuit card.

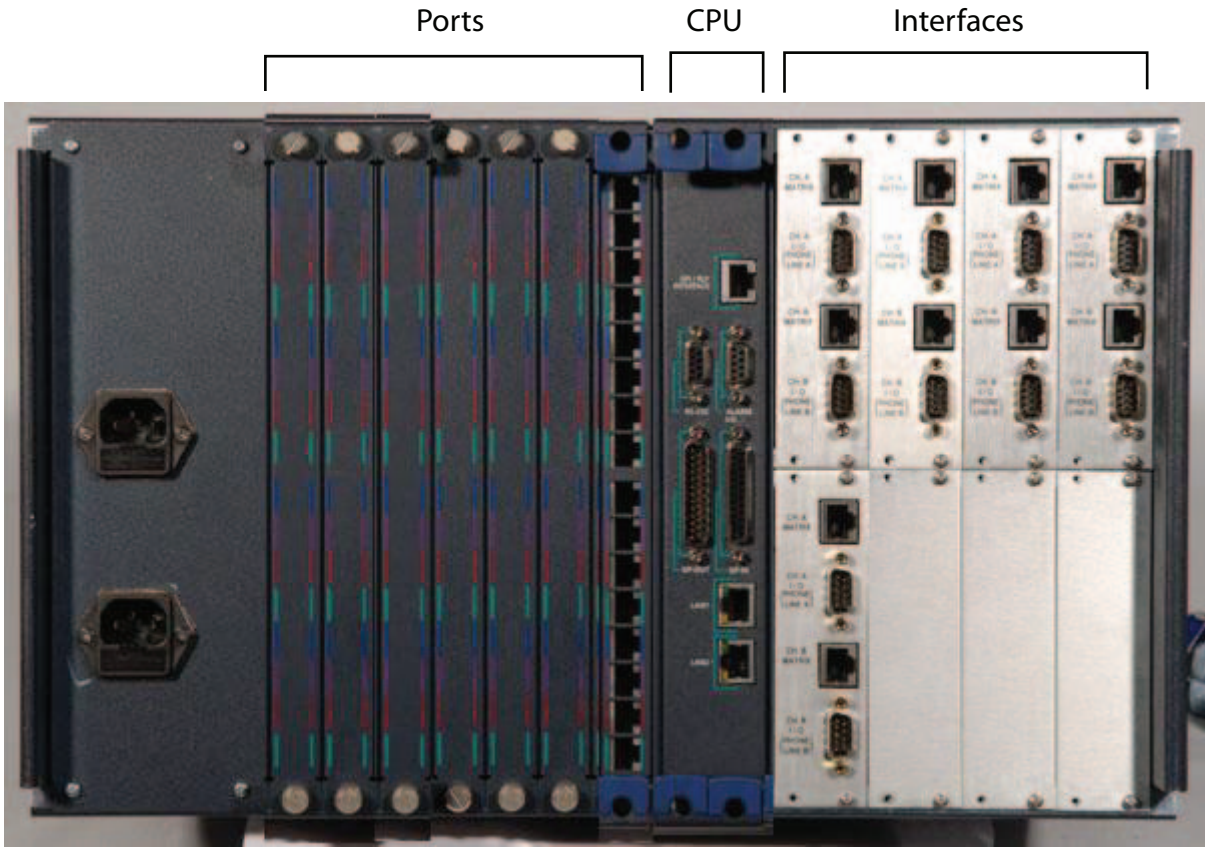


Figure 2-5: Eclipse Median Rear Connector panels

There are six types of rear-connector panels:

- The CPU-card rear panel holds the various connectors associated with the CPU card, such as the RS-232 connector for the configuration computer. The CPU-card rear connectors are discussed in the next section, “Connecting the CPU Card”.
- An analog port-card rear panel holds the sixteen RJ-45 connectors associated with its corresponding front-panel port card. Remote intercom panels and interfaces connect to the matrix through this rear-connector panel.
- A E-FIB fiber card provides two ports to connect fiber network cables.

- An E-QUE card provides eight RJ-45 ports for connection to wireless equipment and three RJ-45 ports for DECT sync and LAN connections.
- An IVC-32 card provides a RJ-45 port for connection to an IP network. No other ports are used.
- Blank panels covers unused slots in the matrix.

CONNECTING THE CPU CARD

The rear-connector panel associated with the CPU card holds seven connectors, as illustrated in Figure 2-6. The following sections describe each connector. The Installation Chapter of this manual gives pin assignments for each connector.

Note: A matrix only requires one rear-panel CPU card, because whichever of the two front-installed CPU cards is acting as master will work in conjunction with this card. All other cards, however, require their own rear-connector panel.

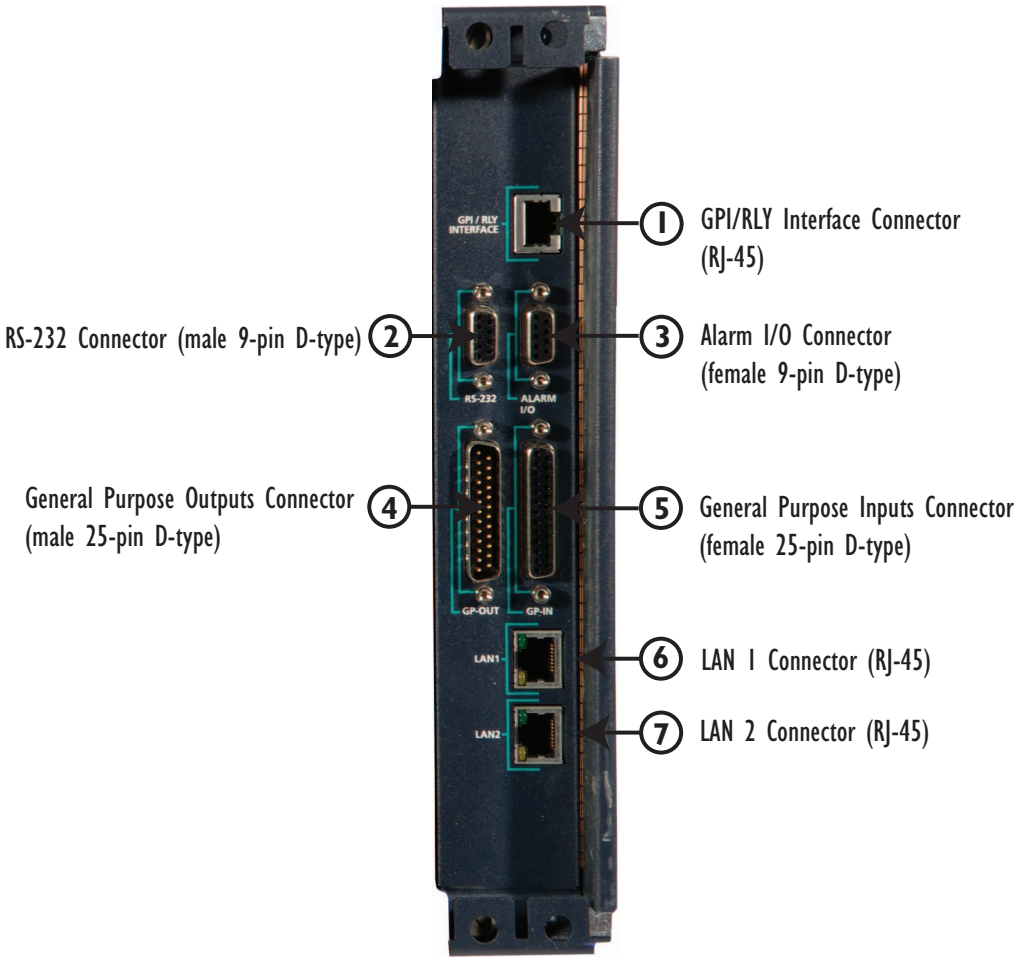


Figure 2-6: CPU Card's Rear-Connector Panel

① CONNECTING TO A GPI-RLY INTERFACE

The RJ-45 socket labeled “GPI/RLY Interface” connects the CPU card to a GPI-6 or RLY-6 card. The GPI-6 provides six general-purpose opto-isolated logic inputs. The RLY-6 card provides six single-pole, double-throw relay outputs.

Both card types mount in either an IMF-3 interface frame or an IMF-102 interface frame. You can operate up to ten GPI-6 or RLY-6 cards at one time from the matrix by daisy-chaining the cards together. Each card has an IN and an OUT connector for this purpose.

The RLY-6 and GPI-6 cards connect to the GPI/RLY interface connector using shielded category-5 cable. For more information about the GPI-6 and RLY-6 cards, consult their respective manuals in the Eclipse Median manual set.

Note: If you use this port, you must add a ferrite to the socket end of each cable. A suitable ferrite is Würth Electronik part: 74271132.

② RS-232 CONNECTOR

The female 9-pin D-type socket labeled “RS-232” connects the CPU card to an external computer.

Note: A shielded cable should be used.

③ ALARM I/O CONNECTOR

The female 9-pin D-type socket labeled “Alarm I/O” connects the Eclipse matrix to an external alarm indicator, such as a light or buzzer and/or to an external alarm source.

Note: A shielded cable should be used.

④ CONNECTING TO GENERAL-PURPOSE OUTPUTS (“GP OUT”)

The male 25-pin D-type socket labeled “GP OUT” connects the CPU card to eight general purpose outputs (GPOs). General-purpose outputs are single-pole double-throw relays with contact ratings of 30 VDC (volts direct current) at 1 ampere.

A general purpose output or “relay” is a switch that is controlled remotely. The relay is programmed in ECS to close a contact whenever an intercom panel key is pressed. When the contact is closed, it completes an electronic circuit’s signal path so that a remote device, such as a light, is powered.

A GPO can be programmed to mute a speaker, to turn on an applause light, to turn on a door lock, or to perform a variety of other functions.

For example, to get the attention of a panel operator working in a high-noise environment such as a control booth, a relay can be prgrammed to switch on a light at operator panel each time an incoming call is received, to ensure that the call is not missed.

Note: If the GP-OUT port is used the following filter must be fitted between the PROC-RCC socket and the cable:

CINCH FA-25PS/1-LF 25W D-type in-line 1000pF filter (UK supplier: Farnell 111-4108)

Note: A shielded cable should be used.

⑤ GENERAL-PURPOSE INPUTS (“GP IN”)

The female 25-pin D-type socket labeled “GP IN” connects the Eclipse Median CPU card to eight general purpose inputs (GPIs).

An external device such as an external foot switch, a panel-mounted switch, or the logic output of some other device can be connected to the “GP IN” connector. When the external logic device is activated, it sends a control signal into the matrix to perform one of several preset functions, such as turning an intercom panel’s microphone on or off, muting a microphone’s output, or turning a panel’s speaker off. The function to perform and the panel upon which it is performed is configured using ECS.

Note: A shielded cable should be used.

⑥ LOCAL AREA NETWORK 1 PORT (“LAN 1”)

The RJ-45 socket labeled “LAN 1” connects a local area network (LAN) to the CPU card through a standard Ethernet connection. The green LED indicates the port is connected and the amber LED indicates activity.

Note: If this port is used a ferrite must be added to the socket end of each cable. A suitable ferrite is Würth Electronik part: 74271132.

Note: A shielded CAT-5 cable should be used.

⑦ LOCAL AREA NETWORK 2 PORT (“LAN 2”)

The RJ-45 socket labeled “LAN 2” connects a second local area network (LAN) to the CPU card through a standard Ethernet connection. The green LED indicates the port is connected and the amber LED indicates activity.

Note: If this port is used a ferrite must be added to the socket end of each cable. A suitable ferrite is Würth Electronik part: 74271132.

Note: A shielded CAT-5 cable should be used.

CONNECTING PORT CARDS

Each rear-connector panel associated with an MVX-A16 interface holds the sixteen RJ-45 connectors that connect the matrix to intercom panels and interfaces. Each front-installed MVX-A16 port card requires a corresponding rear-connector panel. Blank panels cover unused slots.

Each port on the matrix can be located and identified by using the rear-panel numbering grid.

- Port rows are numbered 1 through 16.
- Ports columns are numbered 1 through 7.
- CPU card columns are numbered P1 and P2. (One rear panel operates with either of the currently active CPU cards).

A port can be identified precisely by identifying its card number and port number on the card. For example, the ports on the first card are designated 1-1, 1-2, 1-3, 1-4, and so on; the ports on the second card are designated 2-1, 2-2, 2-3, 2-4, and so on.
Each rear-connector panel associated with a fiber interface holds two fiber connection ports. Each front-installed E-FIB card requires a corresponding rear-connector panel.

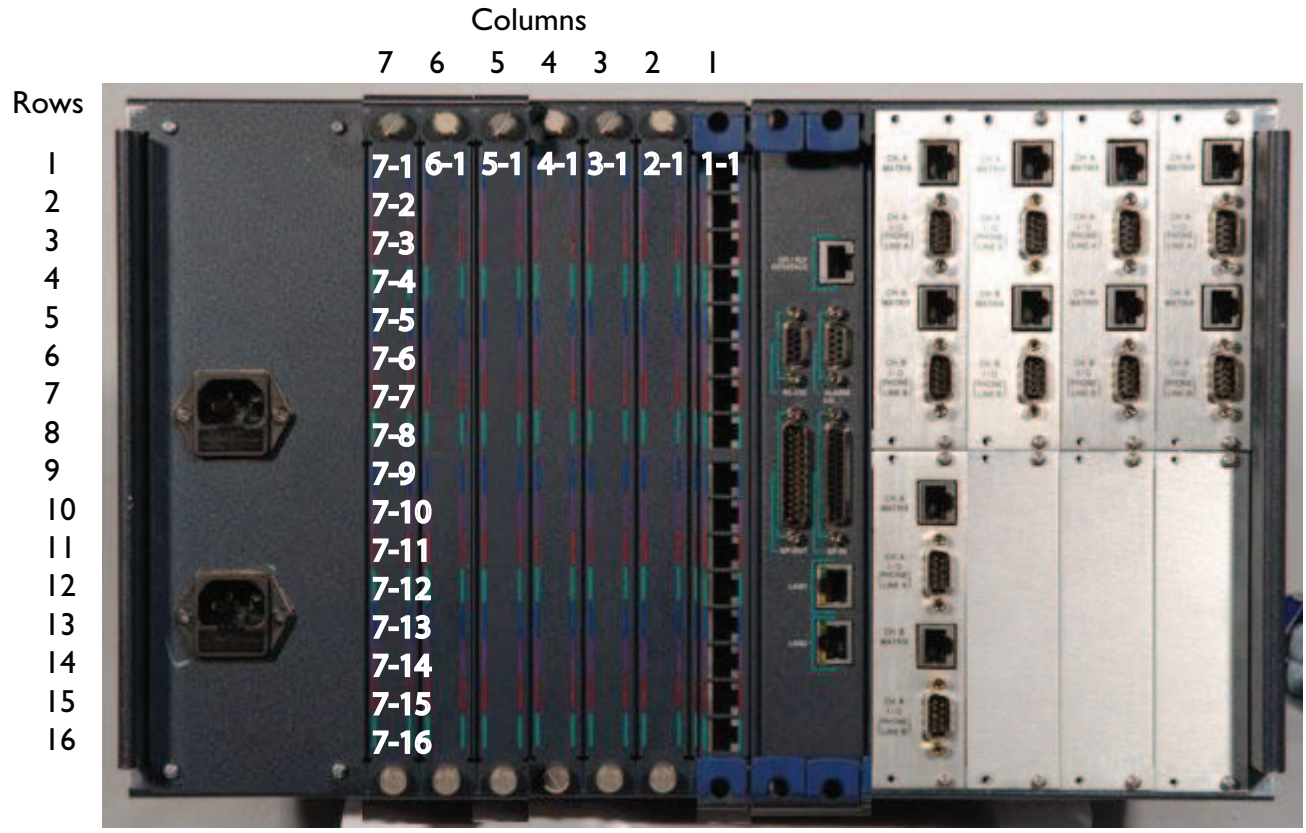


Figure 2-7: Eclipse Median Rear-Panel Port Numbering Grid

Each rear connector panel associated with an E-QUE interface holds eleven RJ-45 ports:

- Eight ports for connection to wireless equipment.
- Two ports for DECT sync.
- One port for LAN interface.

Each rear connector panel associated with an IVC-32 interface holds eleven RJ-45 ports:

- Eight ports for connection to E1/T1 equipment (not used).
- Two ports for DECT sync (not used).
- One port for LAN interface.

Each rear connector panel associated with an E-FIB interface holds two fiber ports (TXVRA and TXVRB).

3 ECLIPSE FIBER LINKING

FIBER INTERFACE DESCRIPTION

E-FIB fiber interfaces connect Eclipse matrices together to provide a high speed, dual redundant link to transfer audio samples and data between systems. These connections can be configured in various ways to provide protection against the loss of a link or a node.

Each fiber interface consists of a front card with various status indicators and a rear card with two Duplex LC Terminated fiber optic connectors (TXVRA and TXVRB). The fiber interfaces use 9/125µ Single Mode fiber optic cables. The standard maximum node length is 10km but other distances are available to special order. For further details please refer to the Technical Specifications in this manual.

Each fiber optic front card has a reset button, status LEDs for power, processor function, card status, link status and link activity. The link status and activity LEDs indicate whether there is activity on a link, whether the card is transmitting on a link and the error state of a link.

Normally fiber interfaces should be fitted in slots 6 and/or 7 of an Median matrix. If fiber interfaces are fitted to any matrix in a linked system all the linked matrices must be reset to ensure that all matrices correctly recognize the new hardware.

E-FIB FRONT-PANEL LIGHTS AND CONTROLS

ⓘ Reset Button

Pressing the reset button causes the card and all links to momentarily stop their current activity and to restart. The card's "frame data" light goes off when the reset starts and comes back on when the reset is complete.

During the reset, configuration information downloads to the card and its connected matrices from the CPU card. If the entire system is operating except for one fiber card press the reset button for that card only.

Note: The reset button is slightly recessed from the front panel to prevent it from being accidentally pressed. A tool such as a bent paper clip is needed to press this button.

② Power Supply & Status Lights

+3.3-Volt Power Supply LED

The matrix's +3.3-volt power supply provides electric current to this green light. When lit, the light indicates that the +3.3-volt supply is present and supplying electric current to the card.

Processor LED

When lit the LED indicates that the fiber card on-board processor is running

Front Card LED

When lit indicates that the front card in functioning normally.

Rear Card LED

When lit indicates that the rear card is functioning normally.

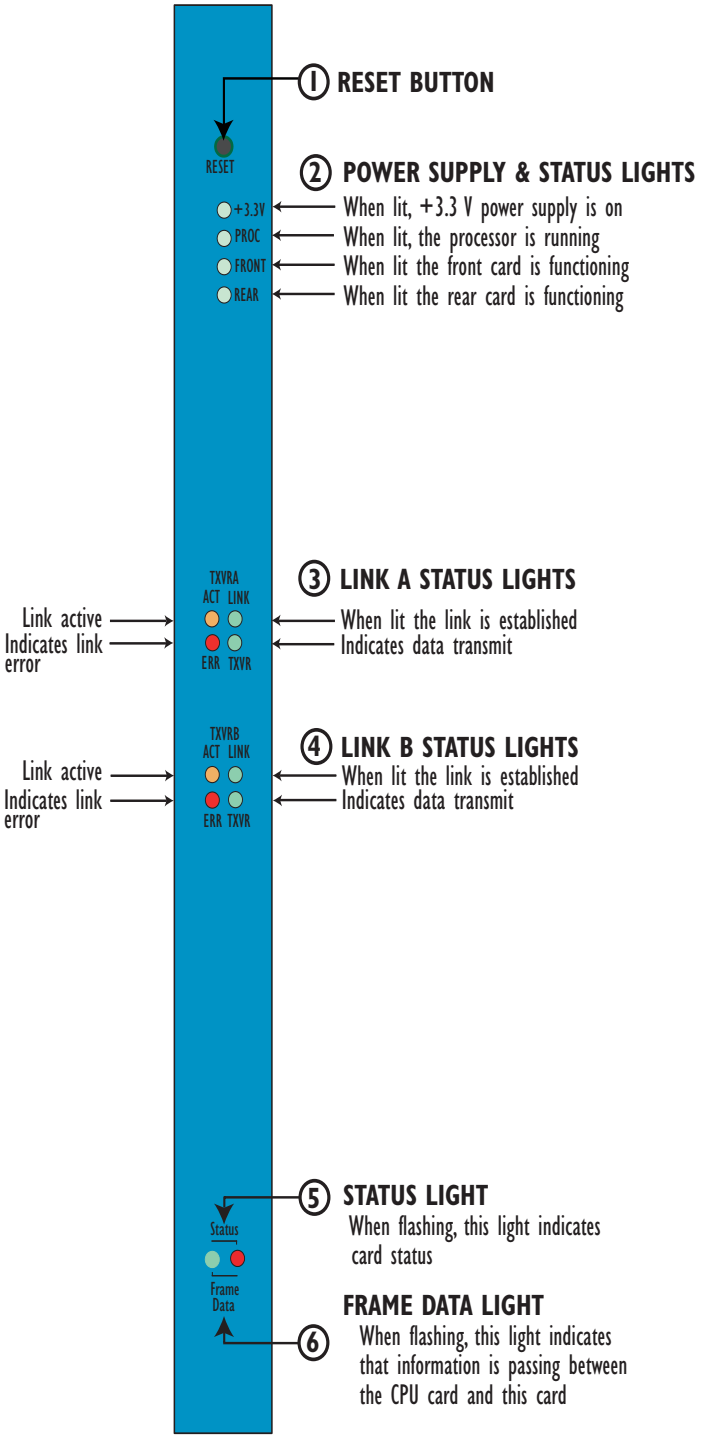


Figure 3-1: Front Fiber Card

③ Primary Link Status LEDs

These LEDs indicate the status and functioning of the primary (A) fiber optic link.

Link LED

This LED indicates whether a link has been established on the primary fiber optic circuit (transceiver A). When illuminated a link is present.

TXVR LED

This LED indicates when data is being transmitted on the primary circuit. It is illuminated when data is present on the circuit.

ACT LED

This LED is lit if the primary fiber optic circuit is active.

ERR LED

This LED will be illuminated if an error condition is detected on the primary fiber optic circuit.

④ Secondary Link Status LEDs

These LEDs indicate the status and functioning of the secondary (B) fiber optic link.

Link LED

This LED indicates whether a link has been established on the secondary fiber optic circuit (transceiver B). When illuminated a link is present.

TXVR LED

This LED indicates when data is being transmitted on the secondary circuit. It is illuminated when data is present on the circuit.

ACT LED

This LED is lit if the secondary fiber optic circuit is active.

ERR LED

This LED will be illuminated if an error condition is detected on the secondary fiber optic circuit.

⑤ Status LED

The green “frame data” LED illuminates to indicate successful communication between the fiber master card and the CPU card.

⑥ Frame Data LED

The red “status” light illuminates to indicate a failure in communication between the fiber card and the CPU card.

FIBER CARD REAR PANEL LIGHTS AND CONNECTIONS

The fiber card rear card contains a single power supply indicator LED and two fiber connectors.

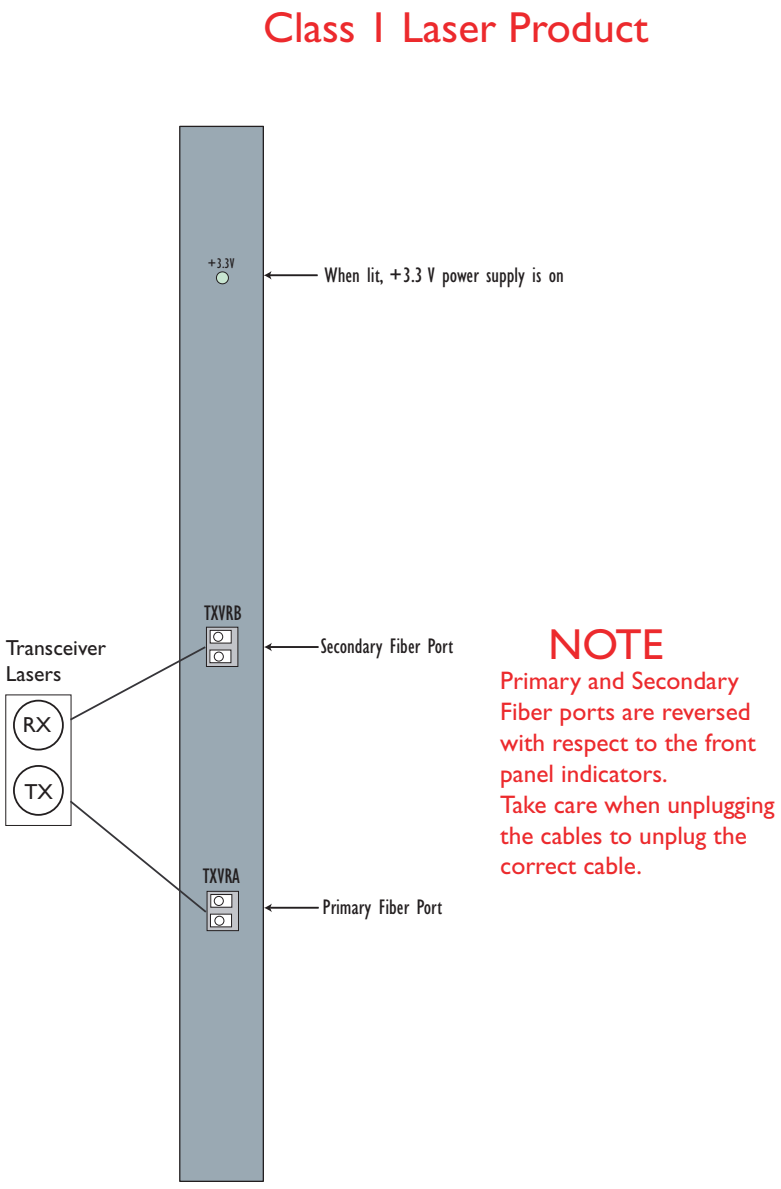


Figure 3-2: Rear Fiber Card

Each fiber card has two fiber transceivers with Duplex LC type connectors. The TX1/RX1 connector is used for the main ring and the TX2/RX2 connector is used for the secondary ring. Single mode 9/125µ fiber optic cable should be used for connections and the matrices should be wired up with the system with the lowest I/P address being system 1.

The fiber optic cable for the primary and secondary circuits are plugged into the appropriate ports. An example showing three systems configured with a primary and secondary ring is shown in Figure 3-6.

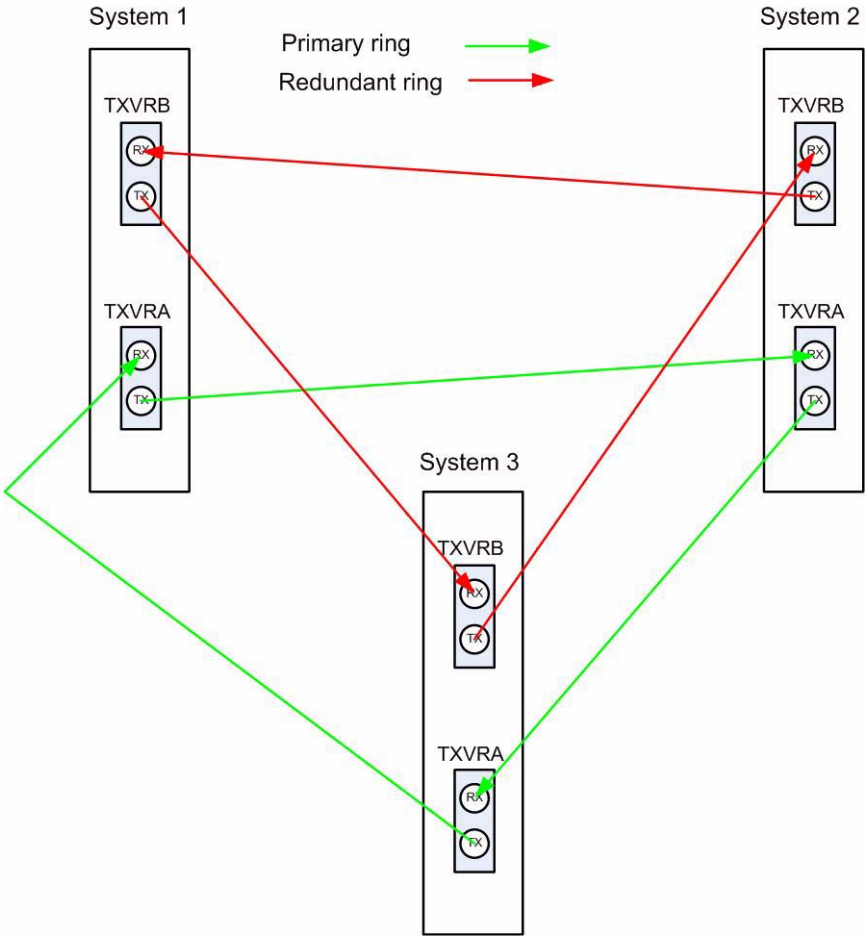


Figure 3-3: Example Fiber Ring Setup

Eye Safety

This laser based single mode transceiver is a Class 1 product. It complies with IEC 60825-1/A2:2001 and FDA performance standards for laser products (21 CFR 1040.10 and 1040.11) except for deviations pursuant to Laser Notice 50, dated July 26, 2001.

Note: The order of the fiber optic cable connections is reversed between the front and rear panels. On the front panel the

primary connection is the upper set of indicators but on the rear panel it is the lower connector. Similarly the secondary connection is the lower set of indicators on the front panel but the upper connector on the rear panel. Care should be taken when connecting or disconnecting the cables to ensure that they are connected correctly and not reversed.

Note: Normally a protective plug is fitted to the fiber connector sockets to protect them from damage or the entry of foreign materials. These should only be removed in order to fit the fiber optic cable and replaced if the cable is unplugged.

CONFIGURING A FIBER OPTIC CONNECTION

There are a number of ways that optical connections can be made between systems depending on the level of redundancy required.

When a break occurs in the fiber ring, a solid red status light will be shown at the fiber card downstream from the break and the link status LEDs may show amber. Other fiber cards will intermittently show red, as the ring attempts to recover. If the system layout is displayed by ECS the faulty links are shown in red.

In order to diagnose faults or switch between primary and secondary rings or between primary and backup fiber linking cards the My Systems in ECS must be used. Ensure that the current configuration is open and click on 'Live Status' in the My Systems toolbar to display the current system state.

This will allow the operator to intervene to alter the system configuration as required. For details of ECS please refer to the ECS instruction manual (part number 810299).

SIMPLEX FIBER CABLING

Single Card Set Redundancy

In this case each Matrix Frame contains one fiber-optic Linking card set . This is shown as in Figure 3-4. This approach still affords fiber connection redundancy since each rear card houses two fiber-optic transceivers.

In the absence of an Uninterrupted Power Supply (UPS) this configuration will not protect against loss of the node or Matrix Frame itself.

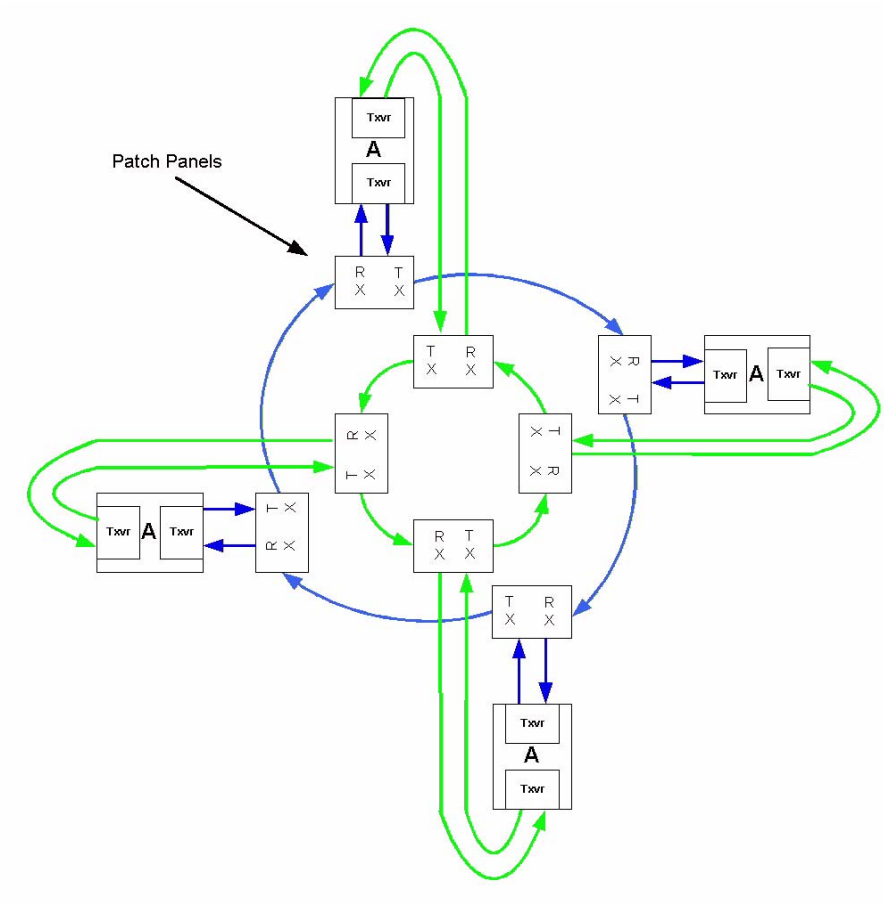


Figure 3-4: Ring Topology Single Card Set Redundancy

Loss of Single Fiber Connection

If a single fiber connection is lost on one ring and the other ring is intact then the active ring always attempts to heal itself by reversing the direction of data flow to bypass the failed connection. If the extent of the failure is such that the active ring is unable to heal itself then the system will switch to the secondary ring.

The self healing mechanism is performed automatically by the Fiber Linking Card whereas the switch-over between redundant cards and rings requires software or operator intervention. Switching to the secondary ring will cause audio breaks or disturbances and temporary loss of crosspoint data.

If a single fiber connection is lost on both rings the nodes adjacent to the failures will loop-back their connections to the failed cables healing the rings and the most intact ring will be used.

The Eclipse Configuration Software (ECS) will report any failures in the fiber connection system.

Loss of a Single Node

If a node is lost on the ring the nodes adjacent to the failed node will loop-back their connections to the failed node healing the ring using the working remains of the ring. The configuration software (ECS) will report the failure.

This applies to the situation where the fiber card itself has failed rather than the matrix.

Loss of Two Fiber Connections

If two adjacent fiber connections are lost on the ring this will be handled as for the loss of a single node where the nodes adjacent to the failed node will loop-back their connections to the failed node healing the ring. The configuration software will report the failure correctly as two failed cables . If two non-adjacent fiber connections are lost on the ring the nodes adjacent to the failures will loop-back their connections to the failed cables healing the ring into 2 separate smaller rings. The configuration software will report the failure.

Note that in this instance the two sub-rings will be dependent on their Ethernet connections for configuration and data transmission but there will be no audio path between them.

Loss of Two Nodes

If two adjacent nodes are lost on the ring this will be handled as for the loss of a single node where the nodes adjacent to the failed node will loop-back their connections to the failed nodes healing the ring. The configuration software will report the failure correctly as two failed nodes . If two non-adjacent nodes are lost on the ring the nodes adjacent to the failures will loop-back their connections to the failed nodes healing the ring into 2 separate smaller rings. The configuration software will report the failure. Note that in this instance the two sub-rings will be dependent on their Ethernet connections for configuration and data transmission but there will be no audio path between them.

DUAL CARD SET REDUNDANCY

This is shown as in Figure 3-5 with both "Card set A" and "Card set B" fitted in each node of the ring. In this case each Matrix Frame contains two Fiber-optic Linking card sets. This approach affords full redundancy, offering protection against component failure within a single Fiber-optic Linking Card Set. Again in the absence of an Uninterrupted Power Supply this configuration will not protect against loss of the node or Matrix Frame itself.

Loss of Single Fiber Connection

If a single fiber connection is lost on one ring and the other ring is intact then the active ring always attempts to heal itself by reversing the direction of data flow to bypass the failed connection. The self healing mechanism is performed autonomously by the fiber linking card.

If the extent of the failure is such that the active ring is unable to heal itself the system will switch to the secondary ring. Switching to the secondary ring will cause audio breaks or disturbances and temporary loss of crosspoint data.

The self healing mechanism is performed automatically by the fiber linking card whereas the switch-over between redundant cards and rings requires software or operator intervention.

Loss of a Single Node

If a node is lost on one ring due to a single fiber-optic linking card set failure and the fiber-optic linking card set for the other ring is healthy and the other ring is intact then the active ring always attempts to heal itself. The nodes adjacent to the failed node will loop-back their connections to the failed node healing the ring using the working remains of the ring.

If the extent of the failure is such that the active ring is unable to heal itself the system will switch to the secondary ring. Switching to the secondary ring will cause audio breaks or disturbances and temporary loss of crosspoint data.

The self healing mechanism is performed autonomously by the fiber linking card whereas the switch-over between redundant cards and rings requires software or operator intervention.

If a single node is lost on both rings due to multiple fiber-optic linking card set failures etc the nodes adjacent to the failed node(s) will loop-back their connections to the failed node(s) healing the rings and the most intact ring will be used. The configuration software will report the failure.

Loss of Two Fiber Connections

If two adjacent fiber connections are lost on the ring this will be handled as for the loss of a single node where the nodes adjacent to the failed node will loop-back their connections to the failed node healing the ring. The configuration software will report the failure correctly as two failed cables . If two non-adjacent fiber connections are lost on the ring the nodes adjacent to the failures will loop-back their connections to the failed cables healing the ring into 2 separate smaller rings. The configuration software will report the failure.

Note that in this instance the two sub-rings will be dependent on their Ethernet connections for configuration and data transmission but there will be no audio path between them.

Switching to the secondary ring will cause audio breaks or disturbances and temporary loss of crosspoint data. The self healing mechanism is performed autonomously by the fiber Linking Card whereas the switch-over between redundant cards and rings requires software or operator intervention.

If two adjacent fiber connections are lost on one ring and the other ring has a similar failure this will be handled as for the loss of a single node where the nodes adjacent to the failed node will loop-back their connections to the failed node healing the ring. The configuration software will report the failure correctly as two failed cables . If two non-adjacent fiber connections are lost on one ring and the other ring has a similar fault the nodes adjacent to the failures will loop-back their connections to the failed cables healing the ring into 2 separate smaller rings. The configuration software will report the failure.

Note that in this instance the two sub-rings will be dependent on their Ethernet connections for configuration and data transmission but there will be no audio path between them.

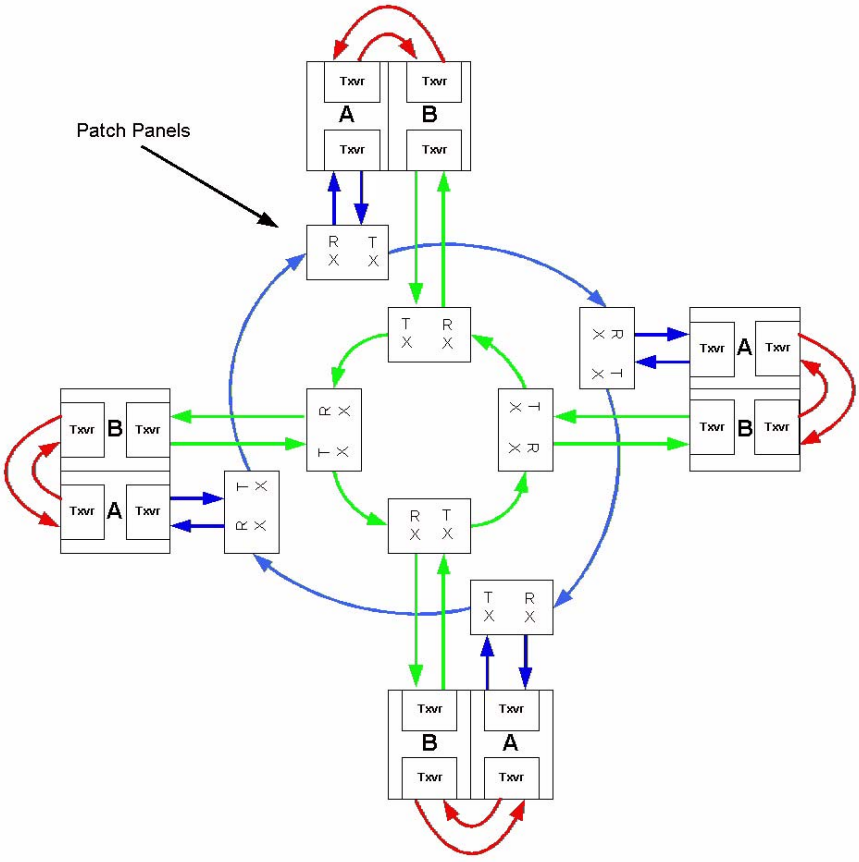


Figure 3-5: Ring Topology Dual Card Set Redundancy

Loss of Two Nodes

If two adjacent nodes are lost on the ring this will be handled as for the loss of a single node where the nodes adjacent to the failed node will loop-back their connections to the failed nodes healing the ring. The configuration software will report the failure correctly as two failed nodes . If two non-adjacent nodes are lost on the ring the nodes adjacent to the failures will loop-back their connections to the failed nodes healing the ring into 2 separate smaller rings. The configuration software will report the failure. Note that in this instance the two sub-rings will be dependent on their Ethernet connections for configuration and data transmission but there will be no audio path between them.

Switching to the secondary ring will cause audio breaks or disturbances and temporary loss of crosspoint data. The self healing mechanism is performed autonomously by the fiber linking card whereas the switch-over between redundant cards and rings requires software or operator intervention.

If two adjacent nodes are lost on one ring and the other ring has a similar fault this will be handled as for the loss of a single node where the nodes adjacent to the failed node will loop-back their connections to the failed nodes healing the ring. The configuration software will report the failure correctly as two failed nodes. If two non-adjacent nodes are lost on one ring and the other ring has a similar fault the nodes adjacent to the failures will loop-back their connections to the failed nodes healing the ring into 2 separate smaller rings. The configuration software will report the failure. Note that in this instance the two sub-rings will be dependent on their Ethernet connections for configuration and data transmission but there will be no audio path between them.

Fiber-Optic Linking Card Failure

This will be handled as for loss of a single node above. The configuration software will report the failure.

FAULT TOLERANCE

Dual Card Set Redundant System - Full Redundancy

In the event of single or multiple cable fault or loss of node conditions occurring on one ring whilst the other ring remains intact the active ring always attempts to heal itself.

Switching to the secondary ring will cause audio breaks or disturbances and temporary loss of crosspoint data. The self healing mechanism is performed autonomously by the fiber linking card whereas the switch-over between redundant cards and rings requires software or operator intervention.

In all fault cases involving recoverable cable faults or loss of nodes on one or both rings the remaining nodes may experience audio breaks or disturbances and temporary loss of crosspoint information or data. Audio and data from a failed node will not be available to the remaining nodes for the duration of the failure. When a ring with non-adjacent failures sub-divides into two sub-rings, audio and data from the failed nodes will not be available to the nodes in either sub-ring, audio and data will continue to be available to nodes within the same sub-ring but data may still be available to all nodes that are still functioning if there is an intact, independent Ethernet connection to those nodes.

If a Matrix frame, connected as a node of the fiber-optic link is reset, powered down or failed this will constitute a lost or failed node on both rings and this node will experience audio breaks or disturbances and loss of crosspoint information or data for up to 5 seconds after the fault condition is cleared or repaired.

Single Card Set Redundant System - Fiber Redundancy

In all fault cases involving cable faults or loss of nodes on the ring the remaining nodes may experience audio breaks or disturbances and loss of crosspoint information or data. When a ring with non-adjacent failures sub-divides into two sub-rings, audio and data from the failed nodes will not be available to the nodes in either sub-ring, audio and data will continue to be available to nodes within the same sub-ring but data may still be available to all nodes that are still functioning if there is an intact, independent Ethernet connection to those nodes.

If a Matrix frame, connected as a node of the fiber-optic link is reset, powered down or failed this will constitute a lost or failed node on the ring and this node will experience audio breaks or disturbances and loss of crosspoint information or data for up to 5 seconds after the fault condition is cleared or repaired.

An example of how a system with multiple matrices would be wired up is shown below in Figure 3-6.

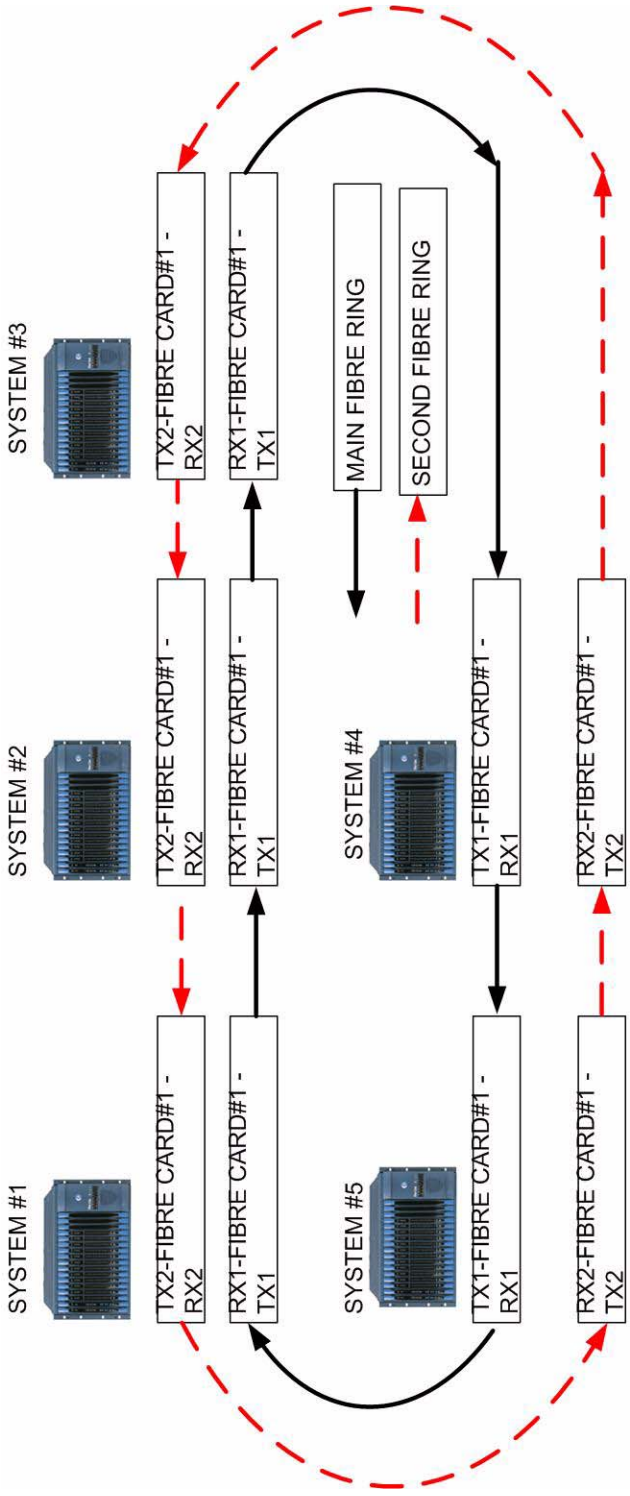


Figure 3-6: Example of Fiber-Optic Connection Setup

4 ECLIPSE E-QUE INTERFACE

E-QUE INTERFACE DESCRIPTION

The E-QUE interface allows the Eclipse matrix connectivity to FreeSpeak/CellCom antennas and FreeSpeak/CellCom antenna splitters, E1 and T1 trunk lines and E1 direct lines. The E-QUE interfaces must be fitted in the rightmost available slots on the Median (furthest from the config cards) and up to four E-QUE interfaces can be fitted on an Eclipse Median matrix.

The FreeSpeak/CellCom connection options supported are:

- Up to 8 x FreeSpeak/CellCom antenna direct connections per E-QUE interface.
- Up to 2 x FreeSpeak/CellCom splitter connections (up to 5 antennas each) per E-QUE interface.

Using all four E-QUE interfaces that can be fitted would allow up to 40 antennas and 200 beltpacks can be connected to a matrix.

The E-QUE interface also provides facilities for Direct and Trunk connections using E1 protocol and Trunk connections over T1 protocol. 30 audio channels on each of 2 connectors (60 channels in total) are available in E1 mode, while 24 audio channels on each of 2 connectors (48 channels per card in total) are available in T1 mode.

Each E-QUE interface consists of a front card with a reset button and various status indicators, and a rear card with eleven RJ45 ports giving eight standard ports, DECT sync in and out and a LAN port.

Each E-QUE front card has status LEDs for power, port activity and LAN status. The port activity LEDs indicate whether there is a device connected to an E1 port and that a connection has been established between this port and the connected device.

Note: It is not necessary to have an ethernet cable connected to the E-QUE card LAN port for the card to function correctly.

E-QUE FRONT-PANEL CARD LIGHTS AND BUTTONS

① Reset Button

Pressing the reset button causes the card and all links to momentarily stop their current activity and to restart.

During the reset, configuration information downloads to the card from the CPU card. If the entire system is operating except for one E-QUE card press the reset button for that card only.

Note: The reset button is slightly recessed from the front panel to prevent it from being accidentally pressed. A tool such as a bent paper clip is required to press this button.

② Power Supply & Status Lights

+3.3-Volt Power Supply Light

The matrix's +3.3-volt power supply provides electric current to this green light. When lit, the light indicates that the +3.3-volt supply is present and supplying power to the card.

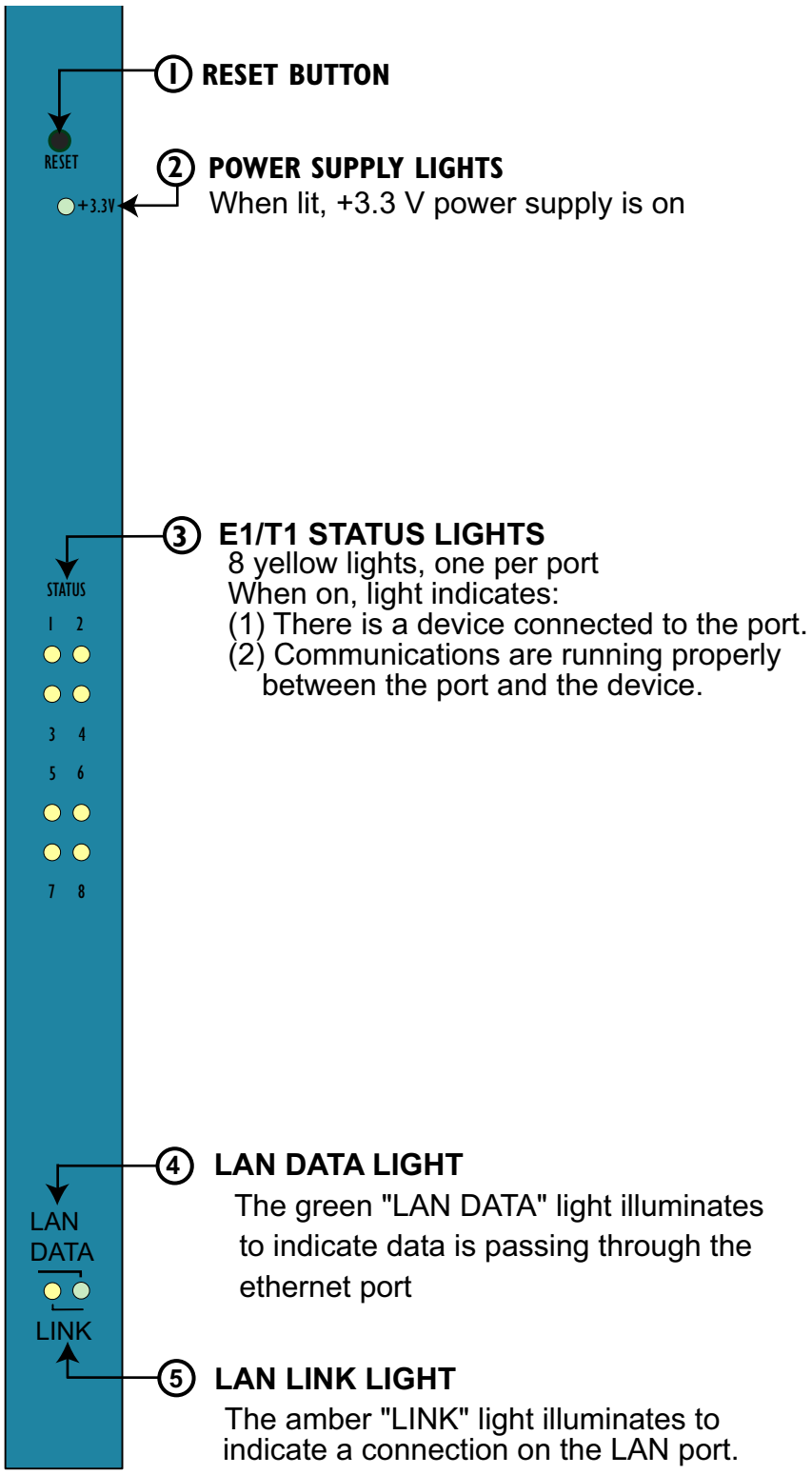


Figure 4-1: Front E-Que Card

③ Status Lights

When lit, a “status” light indicates successful communication between the E-QUE card and a connected device such as an active antenna or splitter.

Each of the E-QUE card’s 8 yellow “status” lights corresponds to one of 8 ports to which devices can be connected.

④ LAN Data Light

The green “LAN DATA” light illuminates to indicate there is data passing through the ethernet port.

⑤ LAN Link Light

The amber “LAN LINK” light illuminates to indicate a connection to the LAN port.

E-QUE CARD REAR CONNECTIONS

The E-QUE rear card contains eleven RJ45 connectors; 8 E1/T1 ports, 2 DECT sync ports and a LAN port.

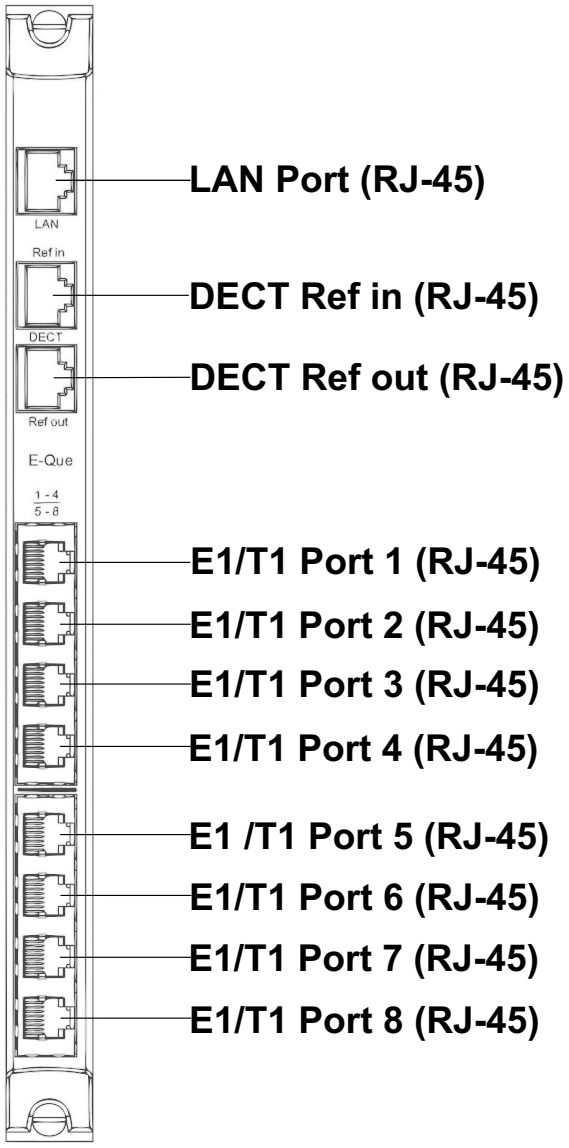


Figure 4-2: E-QUE Card Rear

When multiple E-QUE cards are fitted in a rack, one of the cards generates a clock signal, which all other cards lock to, to ensure that all antennas remain in sync. The system is designed such that the leftmost card (seen from the front) is always the one which generates

this signal. This means that if the leftmost card is removed, or a new card is fitted to the left of existing cards, the antennas will lose lock for a few seconds as the cards re-configure themselves and a new card starts generating the sync signal.

Where multiple connected matrices are used containing E-QUE cards the DECT reference ports are connected as a daisy chain between the matrices to ensure that the DECT signals are synchronized through all the E-QUE cards present in the matrices. Failure to connect the DECT sync signal between matrices will result in poor utilization of the DECT bandwidth, and the system may operate poorly in a congested RF environment.

The LAN port is used for diagnostic purposes.

E-QUE INTERFACE APPLICATIONS

The E-QUE interface may be used to connect FreeSpeak/CellCom antennas and splitters to an Eclipse matrix system or to provide E1 and T1 connections to other systems.

Information on E1 and T1 cable pinouts and cable connections are given in chapter 6.

FREESPEAK/CELLCOM APPLICATION

The E-QUE interfaces can be configured for FreeSpeak/CellCom use in two modes depending on whether antennas or splitters are to be connected.

If the E-QUE interface is configured in ‘Antenna’ mode all eight E1/T1 ports can be used to connect up to eight antennas. If the E-QUE interface is configured to support splitters only two ports are active (ports 1 and 5) allowing a maximum of two splitters to be connected. Each splitter can support up to five antennas.

When the E-QUE interfaces are used in FreeSpeak/CellCom mode they cannot be connected to the antennas via third party equipment or via fiber as the antennas require the DECT sync signal and this will not be converted by third party equipment or fiber interfaces.

Three connections schemes are illustrated below.

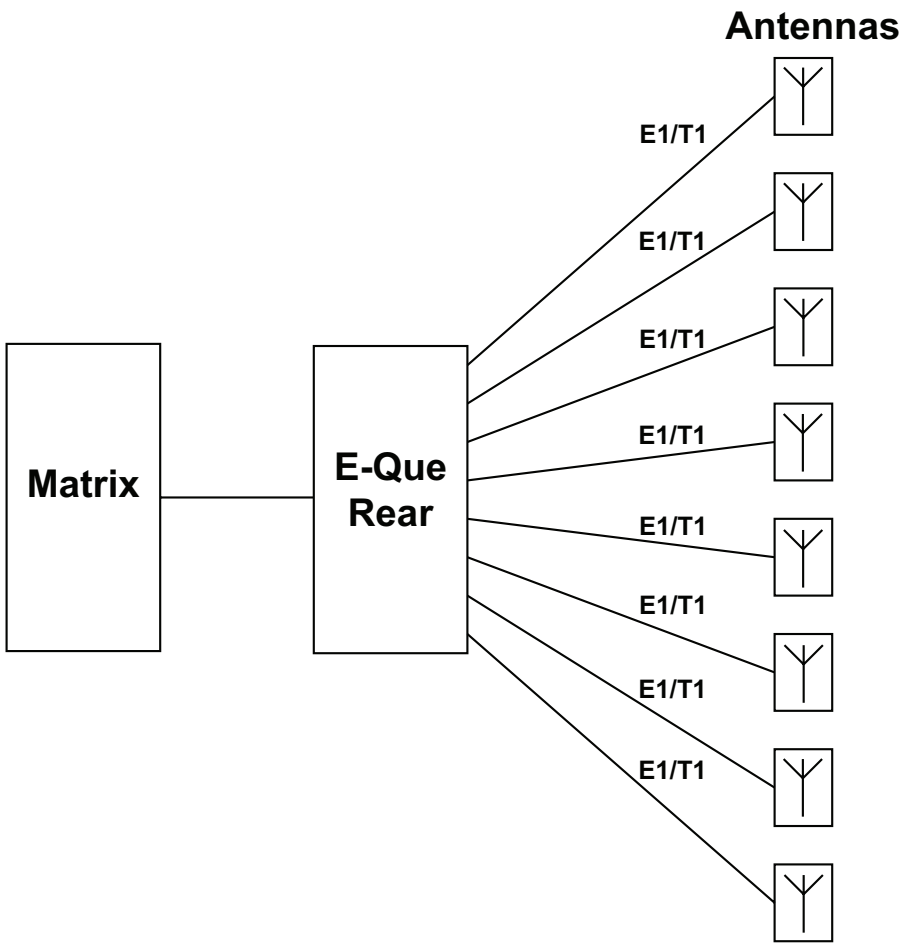


Figure 4-3: E-QUE Card Antenna Connection

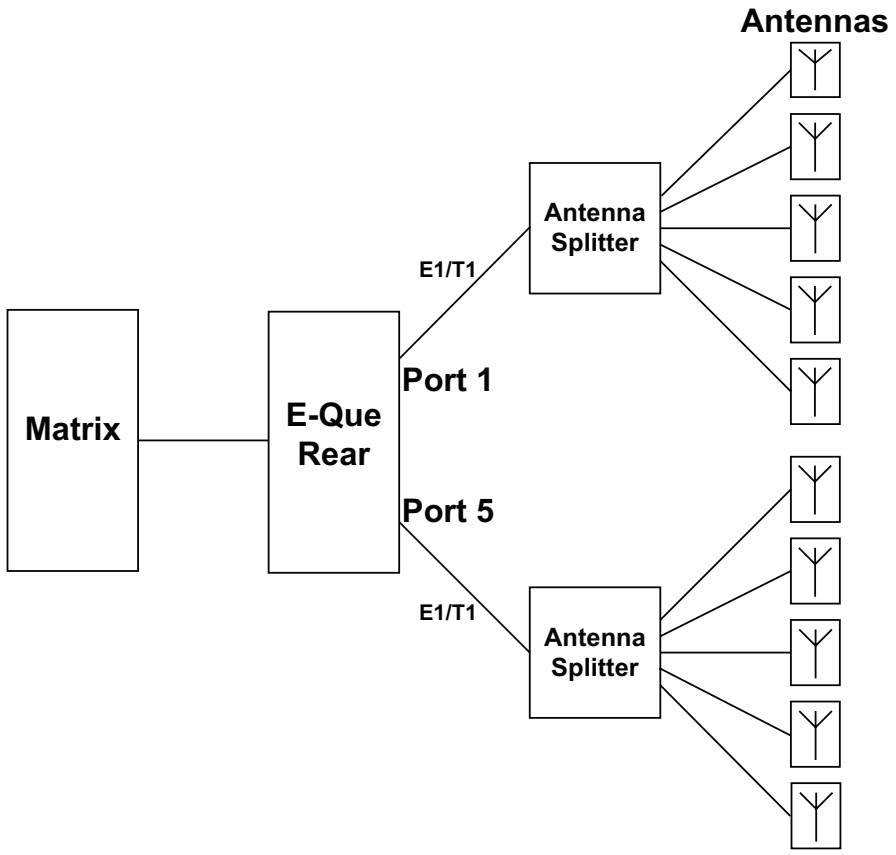


Figure 4-4: E-QUE Card Splitter Connection

Each antenna can handle up to five beltpacks simultaneously and switch service between antennas under control of the matrix as the beltpack user moves around the site.

The DC In power connector is used to locally power the transceiver/antenna with the supplied universal power supply. Use of local power is always required when the transceiver/antenna is connected directly to the E-QUE rear card (rather than via a splitter), and may be required if the antenna is located more than 300 meters (925 feet) from a splitter. It is recommended even when the transceiver/antenna is closer whenever it is available and convenient.

Transceiver/antennas can be located up to 1,000 meters (3,200 feet) using 24 AWG cable or up to 500 meters (1,600 feet) using 26 AWG cable over CAT-5 cable from the base station avoiding expensive RF cable.

Note: It is recommended that shielded CAT-5 cable is used for all wireless installations.

Where multiple matrices are networked together with antennas or splitters connected to E-QUE interfaces on more than one matrix the E-QUE interfaces should have the DECT Sync links between matrices to ensure the correct operation of the FreeSpeak/CellCom system.

Multiple E-QUE interfaces within a single matrix do not need to have external DECT sync cables connected as the signal uses the backplane.

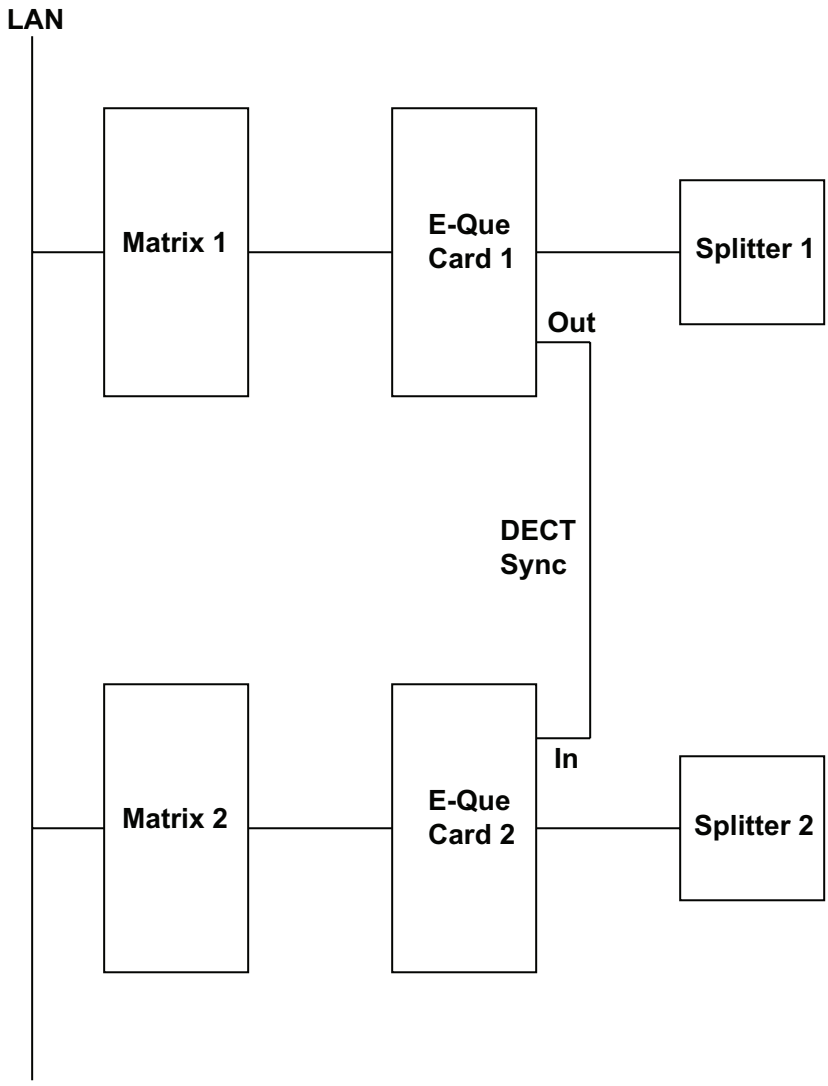


Figure 4-5: Multiple Matrices with DECT Sync Interconnect

All connections are made using CAT5 cable and it is recommended that shielded cable is used.

Note: If an E-QUE interface is fitted in the matrix with antennae or splitters connected and active inserting a second E-QUE interface to the left of the first interface (seen from the front) will cause a temporary loss of audio to beltpacks using the original E-QUE interface (usually for about 10 seconds). The beltpacks do not go offline and signalization is not lost.

E1 TRUNK AND DIRECT MODES

The E-QUE interface can be used for both direct E1 to E1 port connections or to provide trunk linking via a network between systems. The E1 connections can be made between Eclipse systems or between Eclipse systems and compatible third-party equipment. E1 mode provides 30 channels of G.722 encoded audio available on each of ports 1 and 5, giving 60 channels per card.

The E1 specifications are:

- HDB3 Encoding
- Long Haul Receive Signal Level
- E1 120 Ohm Transmit Pulse Amplitude
- Balanced
- 120 Ohm Line Impedance
- No Signalling
- G.722 64 kbit/s Audio Encoding
- Tx Clock locally generated
- Rx Clock Line Recovered

Figure 4-6 shows E1 trunking using a direct connection between the matrices using a CAT5 crossover cable. The E-QUE interface should be set to “E1 Direct” in ECS Matrix Hardware setup.

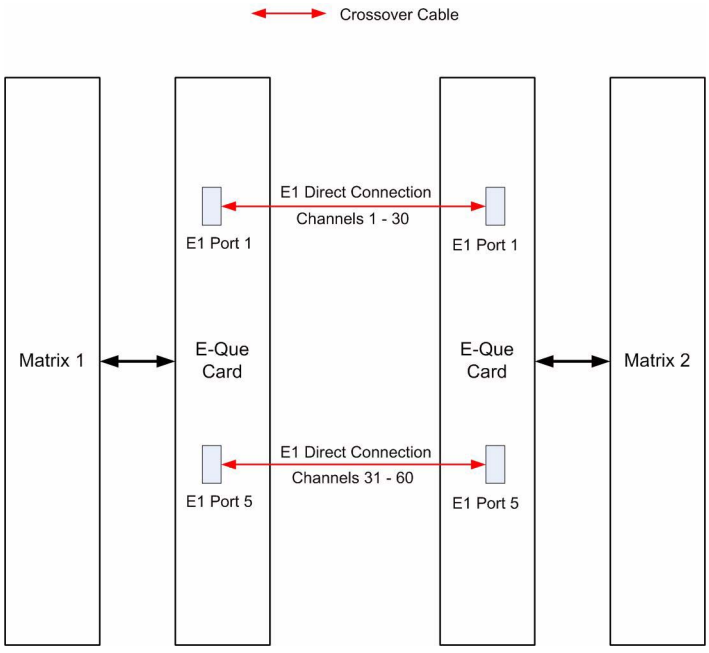


Figure 4-6: Matrix to Matrix Direct E1 Trunking

E1 trunking between matrices can also be achieved over an E1 network as shown in Figure 4-7. In this case E1 ports 1 and 5 of the E-QUE interface are connected using standard straight-through CAT5 cables rather than crossover CAT5 cables.

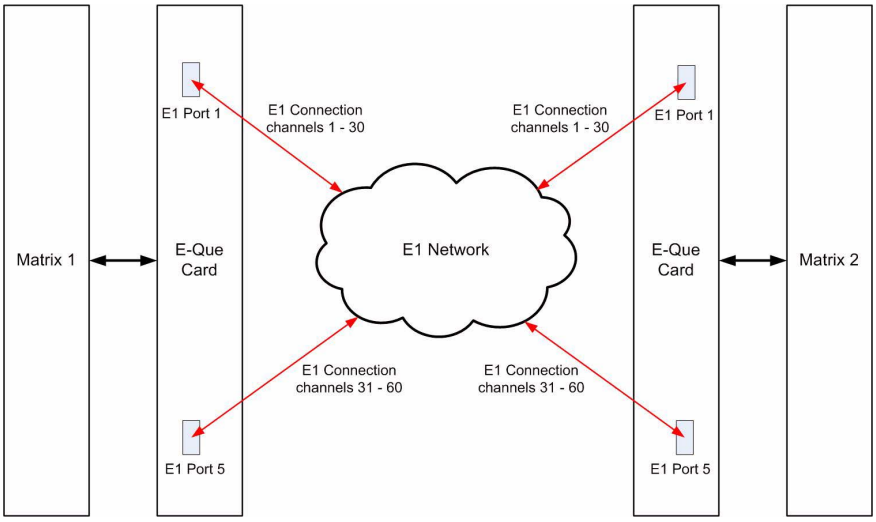


Figure 4-7: E1 Trunking via an E1 Network

The E-QUE interface can also be used to connect the matrix to third party equipment using E1 port 1 or 5.

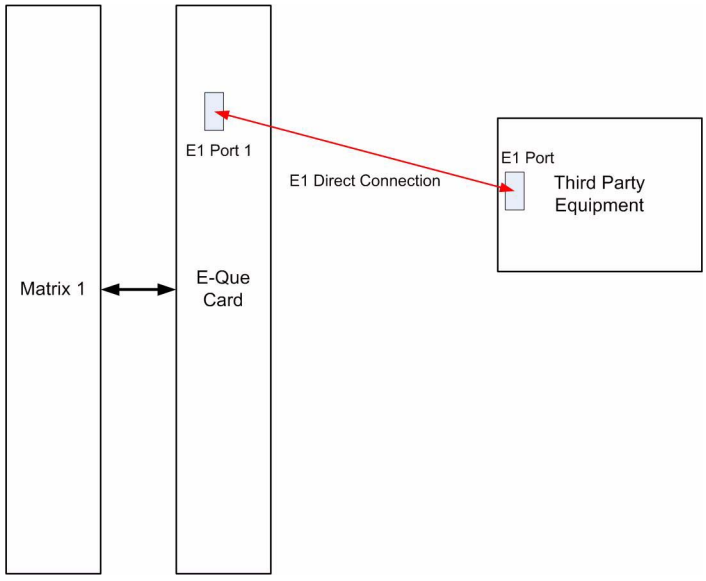


Figure 4-8: Matrix to Third Party Connection Using E1

The CAT5 cable connecting the E1 port on the E-Que rear card may be a crossover cable or a straight-through cable depending on the requirements of the third party equipment. The E-Que interface should be set to “Direct” in ECS.

T1 TRUNKING

The E-QUE interface can provide T1 trunking between Eclipse systems and between Eclipse systems and compatible third-party equipment. T1 mode provides 24 channels of G.722 encoded audio are available on each of ports 1 and 5, giving 48 channels per card.

The T1 trunking specifications are:

- B8ZS Encoding
- Extended Super Frame
- Long Haul Receive Signal Level
- T1 Long Haul (LBO 0 dB) Transmit Pulse Amplitude
- Balanced
- 120 Ohm Line Impedance
- No Signalling
- G.722 64 kbit/s Audio Encoding
- Tx Clock locally generated
- Rx Clock Line Recovered

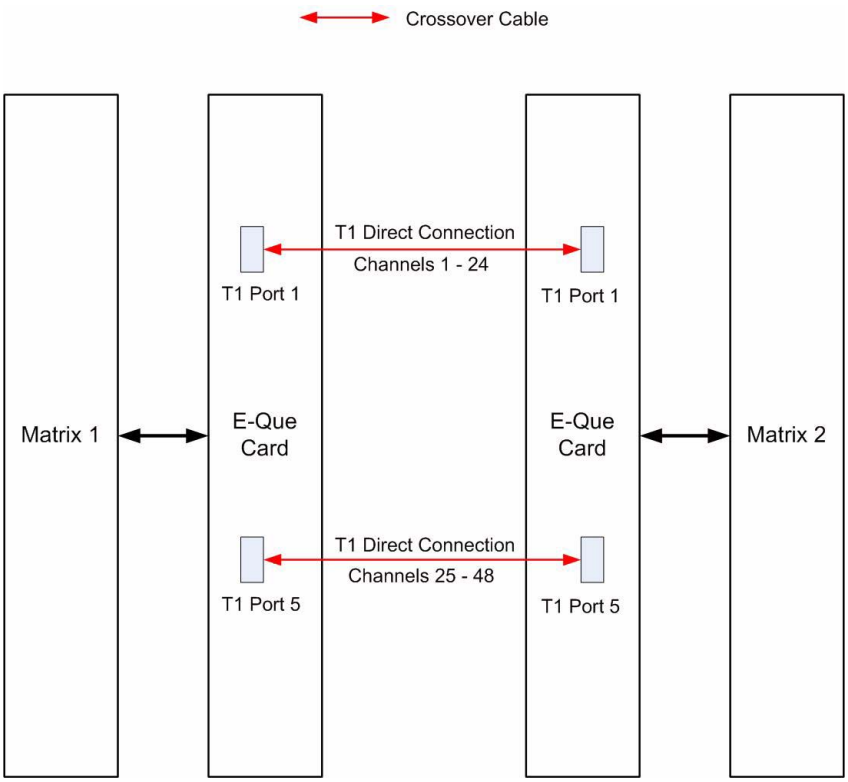


Figure 4-9: Matrix to Matrix T1 Trunking

T1 trunking between matrices can also be achieved over a T1 network as shown in Figure 4-10. In this case T1 ports 1 and 5 of the E-QUE

rear card are connected using standard straight-through CAT5 cables rather than crossover CAT5 cables.

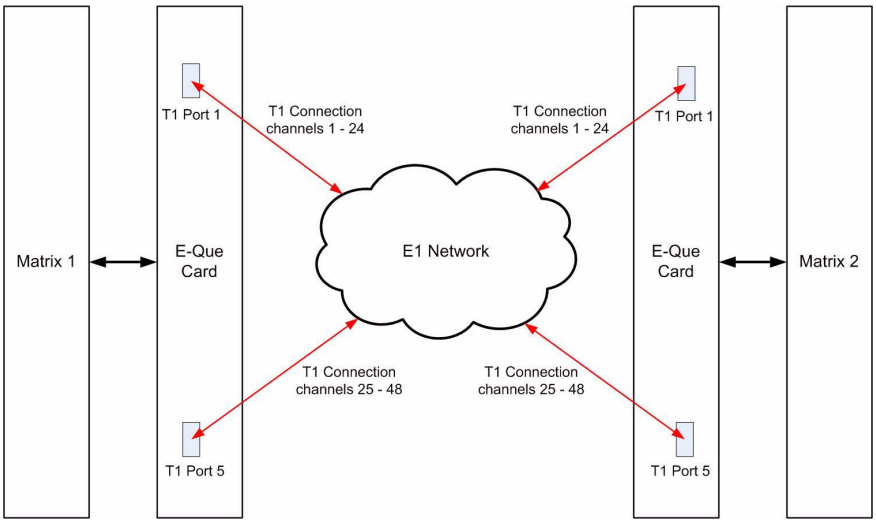


Figure 4-10: T1 Trunking via an T1 Network

TRUNKING FAILOVER

Where the E1/T1 trunking has been configured with redundant trunks audio will be switched from the primary trunk to the backup trunk when a failure is detected. When failover occurs from primary to backup there will be a three second audio break on any route running over the trunk. If the trunk routing is later switched back from the backup trunk to the primary trunk there will be no loss of audio.

5 ECLIPSE IVC-32 INTERFACE

INSTANT VOICE COMMUNICATION INTERFACE DESCRIPTION

The Instant Voice Communication (IVC-32) interface allows the Eclipse matrix connectivity over IP to V-Series IP panels and Concert servers. The IVC-32 interfaces must be fitted in the rightmost available slots on the Median (furthest from the config cards) and up to four IVC-32 interfaces can be fitted on an Eclipse Median matrix.

Using all four IVC-32 interfaces that can be fitted would allow up to 128 IP connections from V-Series IP panels and Concert users to a matrix.

Each IVC-32 interface consists of a front card with a reset button and various status indicators, and a rear card with eleven RJ45 ports giving eight E1/T1 ports (not used), DECT sync in and out (not used) and a LAN port used for the IP connection.

Each IVC-32 front card has status LEDs for power, port activity and LAN status. The port activity LEDs are not active on the IVC-32 front card as the E1/T1 ports are not used.

Note: It is necessary to have an ethernet cable connected to the IVC-32 interface LAN port for the card to function correctly.

IVC-32 CARD FRONT-PANEL LIGHTS AND BUTTONS

① Reset Button

Pressing the reset button causes the card and all links to momentarily stop their current activity and to restart.

During the reset, configuration information downloads to the card from the CPU card. If the entire system is operating except for one IVC-32 interface press the reset button for that card only.

Note: The reset button is slightly recessed from the front panel to prevent it from being accidentally pressed. A tool such as a bent paper clip is required to press this button.

② Power Supply & Status Lights

+3.3-Volt Power Supply Light

The matrix's +3.3-volt power supply provides electric current to this green light. When lit, the light indicates that the +3.3-volt supply is present and supplying power to the card.

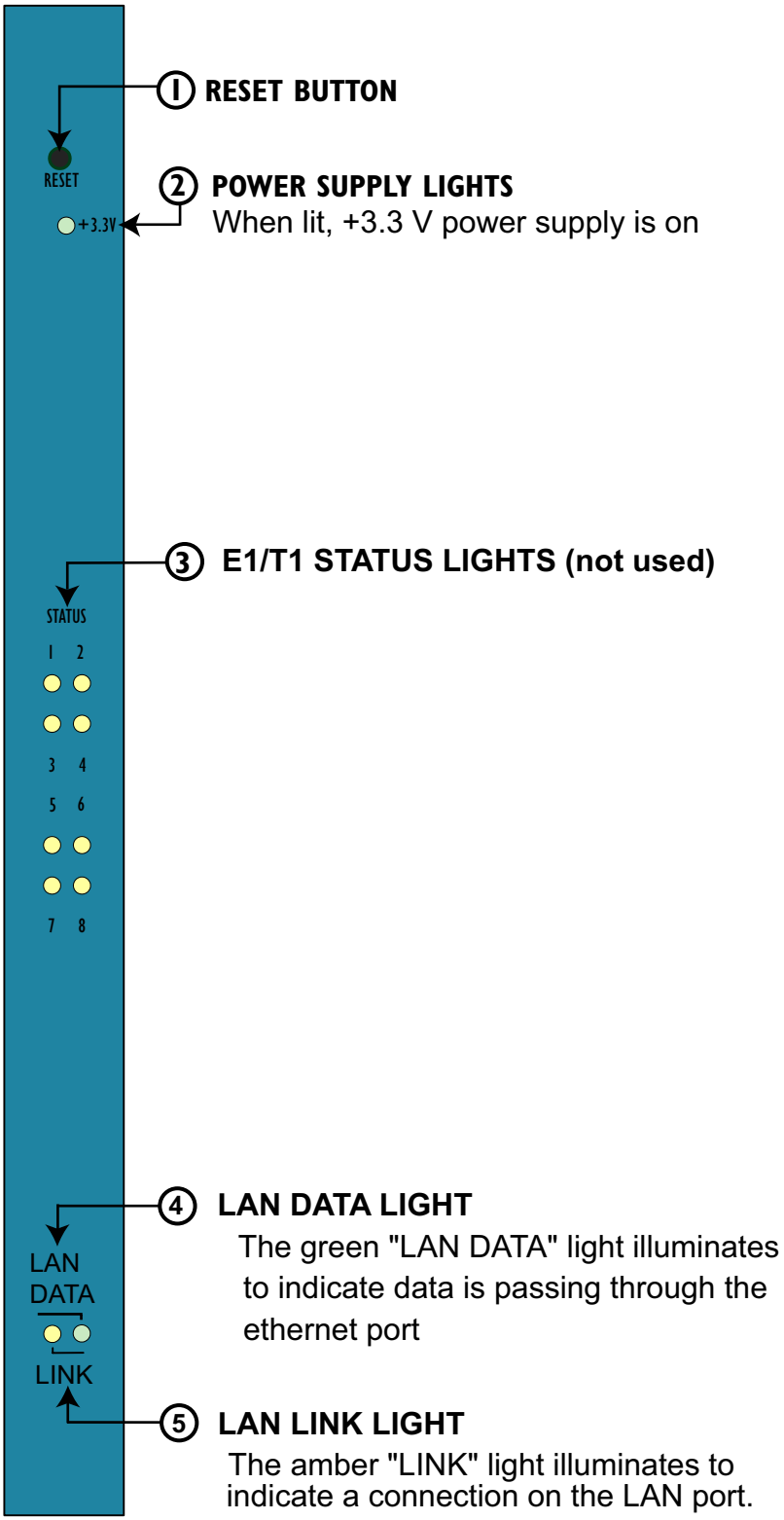


Figure 5-1: IVC-32 Front Card

③ Status Lights

When lit, a “status” light indicates successful communication between an E1/T1 port on the IVC-32 interface and a connected E1/T1 device such as an active antenna or splitter. Normally no E1/T1 devices are connected to an IVC-32 interface and these lights will not be active.

④ LAN Data Light

The green “LAN DATA” light illuminates to indicate there is data passing through the LAN port.

⑤ LAN Link Light

The amber “LAN LINK” light illuminates to indicate a connection to the LAN port. This light must be on for IP connectivity.

IVC-32 INTERFACE REAR CONNECTIONS

The IVC-32 interface rear card contains eleven RJ45 connectors; 8 E1/T1 ports (not used), 2 DECT sync ports (not used) and a LAN port.

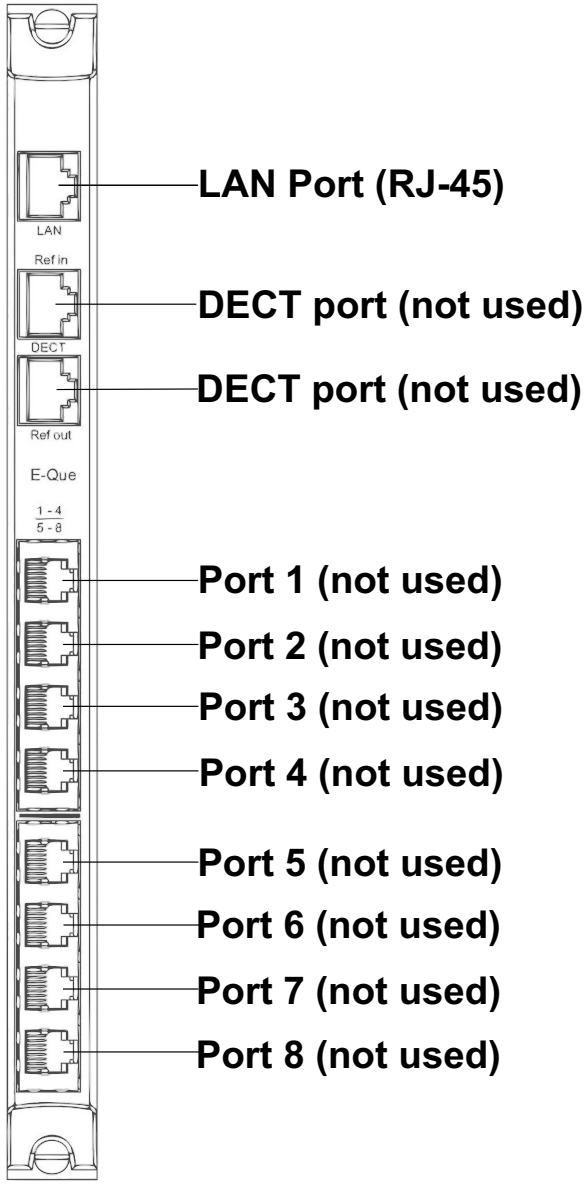


Figure 5-2: IVC-32 Interface Rear Card

The E1/T1 and DECT ports are not used on the IVC-32 interface and should not be connected.

IVC-32 INTERFACE APPLICATIONS

The IVC-32 interface may be used to connect V-Series IP panels to an Eclipse matrix or to provide a link to a Concert Instant Voice Router (IV-R) server.

V-SERIES IP PANELS

V-Series panels with V5.1 or later software may be enabled to communicate with an Eclipse Omega or Median matrix over an IP network via the IVC-32 interface. Both the V-Series panels and the matrix must be enabled for IP communication using a license key purchased from Clear-Com.

The advantage of using IP communication is that it enables remote panels to communicate over an existing local (LAN) or wide area (WAN) network rather than requiring a dedicated link.

CONCERT USERS

The IVC-32 interface will allow Concert users to establish audio links with users on the Eclipse matrix via the Concert IV-R server. This server will provide a link over IP between Concert users and the Eclipse matrix. Concert users cannot connect directly to the IVC-32 interface.

Concert users communicate with Eclipse users via a soft panel rather than the main concert client interface. This soft panel is configured using the Eclipse Configuration System (ECS) software and the configuration information is uploaded to the Concert user's soft panel on connection to the matrix.

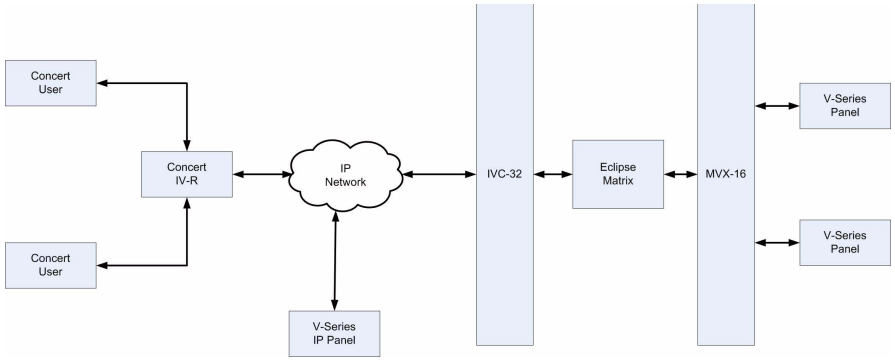


Figure 5-3: IP Communication Via IVC-32 Interface

6 INSTALLATION

RECONNECTING THE CPU CARD'S BACKUP BATTERY

Reconnect the CPU card's backup battery before installing the Median.

***IMPORTANT**: Before the Median is installed the CPU backup battery must be reconnected.*

The matrix CPU card has a lithium backup battery that powers the CPU memory if the AC electricity fails. This backup battery is shipped disconnected to preserve battery life. When the matrix is received the battery must be reconnected.

The matrix will operate if the battery is not reconnected. However, if the matrix is powered down all the configuration information stored in the matrix's CPU card will be lost.

To reconnect the CPU memory's backup battery

1. Please observe anti-static procedures. The CPU card can be damaged by static electricity. Anyone reconnecting the battery should ensure that they ground themselves and all tools before touching cards.
2. Locate CON9 on the centermost upper portion of the CPU card.
   Under the CON9 heading, there are three pins. A jumper plug is placed over pins 2 and 3. This is the OFF position.
3. Lift the jumper plug off the pins, and place it over pins 1 and 2. This is the ON position.
   The battery is now powered.

The Eclipse Median installs in a standard Electronic Industry Association 19-inch (48 cm) equipment rack.

On older Eclipse Median CPU cards the battery is normally a CR2430 3V VARTA 6430-701-501 and would be fitted on shipment. This has a capacity of 280mAh and a life of approximately 73 days. These batteries should only be replaced by qualified service personnel.

Later Eclipse Median CPU cards are fitted with a socketed battery which is normally a Renata CR2477N with a capacity of 950mAh and a life of approximately 247 days. These socketed batteries are easily replaced and this operation does not have to be carried out by service presonnel.

Note: If the matrix is stored for more than three months, or if the AC power to the matrix is regularly turned off (as in Outside Broadcast vans), a qualified service person should be contacted to disconnect the CPU backup battery before storing the matrix. Only a qualified service person should attempt to disconnect the battery. To contact a qualified service person, please see the information in the Warranty chapter.

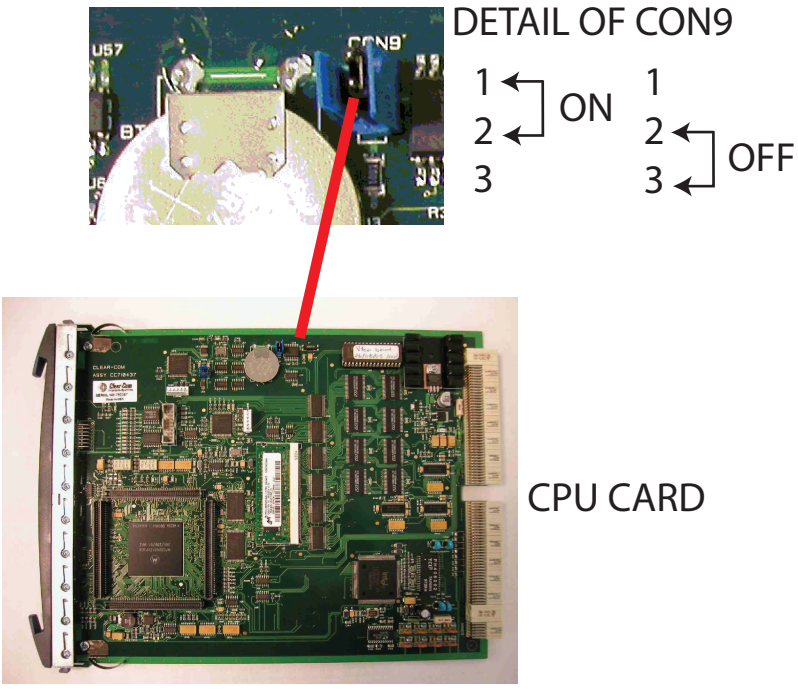


Figure 6-1: CPU card with detail of CON9 jumper plugs

Before performing any service on the CPU card the card's battery must be disconnected. To do so, place the CON9 jumpers in the OFF position as described in the previous procedure.

PIN	STATUS
1	On
2	Common
3	Off

Table 6-1: CON9 Pin Configuration

If the matrix is going to be stored for more than 3 months, or if the power to the matrix is regularly turned off, the CPU backup battery needs to be temporarily deactivated while the matrix is stored. To do so, put the CON9 jumper in the OFF position as described above. In order to power up and start operating the matrix, reconnect the CPU backup battery by placing the CON9 jumper in the ON position, as described above.

If the CPU card is left unpowered for a period of time the batteries for the battery backed up ram may become discharged. This results in the run time information being lost. If this state is detected by the CPU card then the CPU card will provide signalisation on its OK LED in the form of 2 rapid flashes followed by a slow flash of the OK LED. Also if ECS is logging then the following message will appear in the log.

"Non Volatile Data is invalid - Please check Battery Voltage"

If on successive power downs of the Eclipse frame the above state is detected, and the message appears in your logs then it is advisable to check the health of the CPU card on board battery, which should be nominally at least 2.8V. The minimum at which the data may remain intact is around 1.5V but normally the battery should be replaced before the voltage drops to this level.

CAUTION: *Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type.*

Lithium batteries can overheat or explode if they are shorted. When you handle the CPU card or a loose battery, DO NOT touch any external electrical conductors to the battery's terminals or to the circuits that the terminals are connected to.

Whenever you are servicing the battery, make sure that the jumper on CON9 is connecting pin 2 (common) to either pin 1 (on) or to pin 2 (off). If the common is left floating, the CPU may behave unpredictably. For example, the microprocessor may reset itself intermittently.

VERIFYING THE SHIPMENT

When the Eclipse Median system is received, inspect the boxes for shipping damage. Report any shipping damage to the carrier. The Eclipse distributor is not responsible for shipping damage.

Check the packing list and verify that every item on the list has been received. Save all packing materials in the event that any items need to be returned.

UNPACKING THE SYSTEM

When the Eclipse Median system is received the circuit cards, power supplies, and rear-connector panels are pre-installed in the matrix chassis. The user needs to supply:

- A standard 19-inch rack in which to install the matrix.
- A personal computer to run the Eclipse Configuration System (ECS). The Eclipse Configuration System runs on Windows Vista (with restrictions), Windows XP, Windows Server 2003 and Windows 2000.
- Shielded category-5 cables to connect to panels and interfaces.

INSTALLING THE ECLIPSE MEDIAN MATRIX

The following overview gives a summary of the steps required to install an Eclipse Median matrix. More detailed information on each step is provided in the sections that follow.

To install an Eclipse Median matrix

1. Remove the Eclipse Median chassis from its shipping carton.
2. Leave at least 2 inches (51 mm) of clearance on all sides of the matrix chassis to ensure proper airflow. Do not block ventilation vents.
3. Check the position of circuit cards, power supplies, and rear-connector panels. Later sections in this chapter give more information on these items.
4. Apply AC power to the unit. The unit has two separate AC power entry connectors for the two separate power supplies in the system.

INSTALLING POWER SUPPLIES

The Eclipse Median system's DC power supplies run on AC mains power. Two identical Euro Cassette power supplies are provided to ensure that every matrix will have redundant power—that is, to ensure that the matrix will continue to operate even if one supply output fails.

Each of the power supplies must be connected to a dedicated branch of AC mains power. The matrix will continue to operate even if one of the AC power branches fails.

Clear-Com ships each matrix with power supplies already installed. When you receive the matrix, connect the power supplies to AC mains power using the IEC power connectors on the matrix's rear panel.

A fully equipped Eclipse Median (5 port cards, 2 expansion cards, and 8 interface modules) requires 100 to 240 VAC at 40 to 50 Hz with a maximum dissipation of 300W.

INSTALLING THE REAR RJ-45 CONNECTOR PANELS

The matrix's rear panel is constructed of modular, individually-installable connector panels. Each front interface card has a corresponding rear-connector panel; for example each MVX-A16 rear connector panel holds 16 RJ-45 connectors. E-FIB rear cards contain two fiber connectors and E-QUE and IVC-32 rear cards contain 11 RJ-45 connectors.

Clear-Com ships each matrix with the required number of rear-connector panels already installed. Blank rear panels fill unused card slots.

INSTALLING REAR RJ-45 CONNECTOR PANELS IN THE FIELD

Installing or removing a rear panel from the matrix is a simple procedure, allowing the matrix to be easily customized to the operating environment.

To add a rear panel to the matrix

1. Remove the desired blank rear panel by loosening the screws and pulling the panel out. The screws are attached and cannot be removed.
2. Install the new rear panel by sliding the card into the card's guides at the top and bottom of the Eclipse Median chassis.
3. Tighten all of the screws on the rear panel.

To remove a rear panel from the matrix

1. Detach any remote devices connected to the rear panel's connectors.
2. Loosen the screws that hold the rear panel to the matrix. The screws are attached and will not fall off.
3. Remove the rear panel by pulling the panel out.

INSTALLING CPU CARDS

The CPU card's components include CMOS chips which are sensitive to static electricity. Before touching the CPU card touch a grounded metal object, such as any unpainted surface on the matrix, to dissipate static electricity. While handling the CPU card, be careful not to bend any of the card's connector pins or component leads.

Before operating the CPU card the card's battery must be reconnected. The CPU card is shipped with a disconnected battery to preserve battery life. For instructions on reconnecting the battery, see See "Reconnecting the CPU Card's Backup Battery" on page 6-1.

The DIP switches on the CPU card should be checked before installation to ensure they are correctly configured. In particular SW3 switch 2 is only used to put the MVX card into maintenance mode and must be set to OFF for normal operation. The CPU card switch settings for normal operation are shown in Figure 6-2.

Note: If the Maintenance mode switch is set to the ON position system performance may be adversely affected.

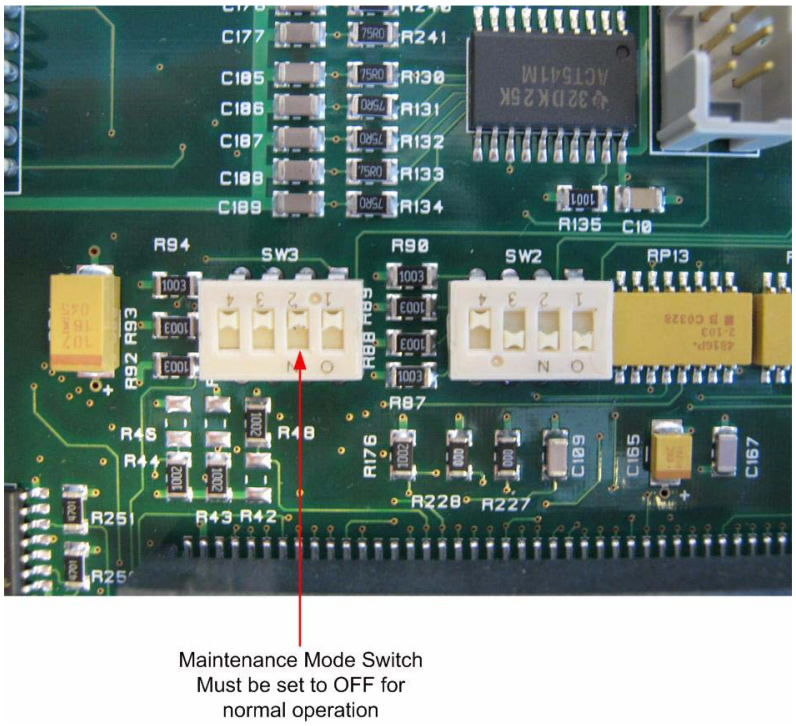


Figure 6-2: CPU Card DIP Switches Set for Normal Operation

If the switch has been left set in the ON position errors will be reported to the matrix error log in ECS. An example of this is shown in Figure 6-3.

11.07.2008 13:34:43		67,FSM (inst 0): state CONFIGURED -> ACTIVE, event ASSERT CONFIG
11.07.2008 13:34:43		68,Fibre RM set (slot 17 addr 1F0400) - Base A 187, total 192
11.07.2008 13:34:44	⚠	70,**********
11.07.2008 13:34:46	⚠	72,Please set this dip switch to off (SW3 dpi 2)
11.07.2008 13:34:47	⚠	75,**********
11.07.2008 13:34:48	⚠	76,Config card in Maintenance Mode (SW3 dpi 2), MVX Port Simulation set
11.07.2008 13:34:49		79,Resyncing MVX 4
11.07.2008 13:34:50	⚠	80,**********
11.07.2008 13:34:51	⚠	82,Please set this dip switch to off (SW3 dpi 2)
11.07.2008 13:34:52	⚠	83,**********
11.07.2008 13:34:53		84,Resyncing MVX 5
11.07.2008 13:34:54	⚠	86,Config card in Maintenance Mode (SW3 dpi 2), MVX Port Simulation set
11.07.2008 13:34:54	⚠	87,Please set this dip switch to off (SW3 dpi 2)
11.07.2008 13:34:55	⚠	88,**********

Figure 6-3: Maintenance Mode Error Log Messages

Store spare CPU cards in unused slots in the matrix or in electrically insulated packaging such as anti-static heavy duty plastic bags.

To insert a CPU card in the matrix

1. Carefully place the card in the appropriate slot. Make sure the card is aligned with the top and bottom precision guides.

2. When the card has almost reached the backplane connectors, open the two ejectors, allowing them to clear the edges of the matrix. Gently insert the card further until it touches the backplane connector guides.
3. Gently close both ejector tabs at the same time, which will propel the card into the backplane connectors.

To remove a CPU card from the matrix

1. Two card ejector tabs, located at the top and bottom of the CPU card, hold the card in place in the matrix. To remove a card, open the two ejector tabs at the same time until the card unseats from its backplane connectors.
2. Pull the card out of the matrix.

HOT PATCHING

The CPU cards are “hot patchable” and “self initializing.” When the matrix is fitted with two CPU cards, a faulty CPU card can be removed and replaced while the system is powered because the second CPU card will automatically begin operating when the first card is removed. Sometimes re-inserting a CPU card can reset the matrix. It is advisable to replace CPU cards during maintenance down times.

***NOTE**: If your computer does not have a serial port, and only offers USB, adapters are generally available from computer parts suppliers.*

VERIFYING THE CPU CARD INSTALLATION

The CPU card's operating status can be checked by looking at the lights on the front of the card. The following lights indicate that the card has been properly installed in the matrix:

- The two power-supply lights, labeled "+5V" and "+3.3V," illuminate green steadily to indicate that the power supplies are present.
- The dot-matrix array of lights displays a number to indicate which of the four stored configurations in the card's memory is currently operating.
- The "OK" light flashes to indicate that the CPU card software is running.
- The "master" light illuminates steadily on the currently active CPU card, indicating that the CPU card is properly installed and operating correctly.

INSTALLING ANALOG PORT AND EXPANSION CARDS

Before installing an interface card, the card's associated rear-connector panel should be installed.

To install an interface card

1. Carefully place the card in the appropriate slot. Make sure the card is aligned with the top and bottom precision guides.
2. Push the card toward the backplane connectors.
3. When the card has almost reached the backplane connectors, open the two ejector tabs, allowing them to clear the edges of the matrix. Gently insert the card further until it touches the backplane connector guides.
4. Gently close both ejector tabs at the same time, which will propel the card into the backplane connectors.

To remove an analog port or expansion card from the matrix

1. The two card ejector tabs, located at the top and bottom of the CPU card, hold the card in place in the matrix. To remove a card, open the two ejector tabs at the same time until the card unseats from its backplane connectors.
2. Pull the card out of the matrix.

STATIC SENSITIVITY

A circuit card's components include CMOS chips that are sensitive to static electricity. Before touching a card first touch a grounded metal object, such as any unpainted surface on the matrix, to dissipate static electricity.When handling a card, be careful not to bend any of the card's connector pins or component leads.

Store spare cards in electrically insulated packaging such as anti-static heavy duty plastic bags or in unused port card slots in the matrix.

HOT PATCHING

Analog port and expansion circuit cards are “hot patchable” and “self initializing”, meaning that a faulty card can be removed and replaced while the system is powered, having no effect on any part of the system operation, except to the analog port card’s assigned sixteen ports.

Communication to a card’s connected remote devices will be interrupted when that card is removed from the matrix. When the card is replaced, communication is restored.

ANALOG PORT NUMBERING

Each MVX-A16 interface has circuitry to support 16 ports. A grid printed on the matrix’s rear panel gives the numbering scheme for the ports, as shown in Figure 6-4.

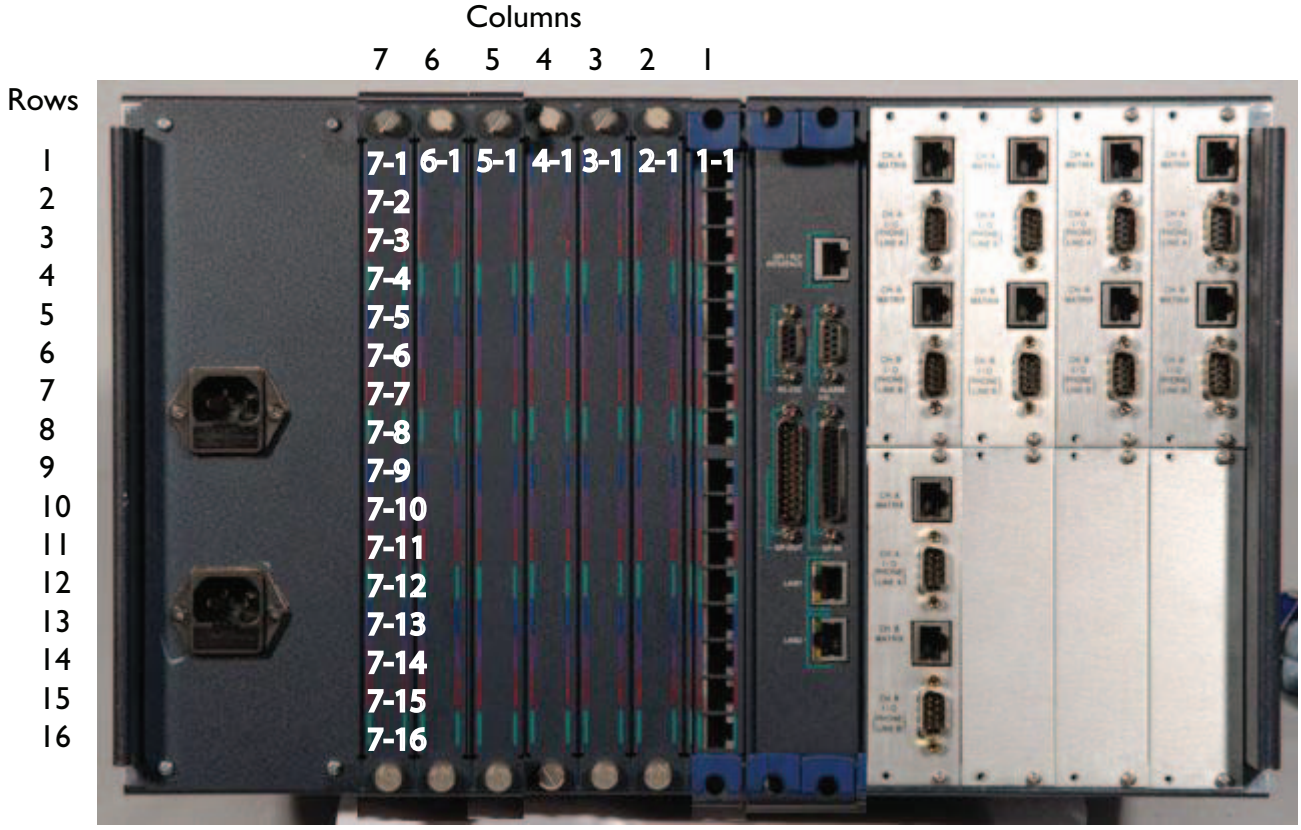


Figure 6-4: Eclipse Median Port Numbering

CONFIGURATION

When an interface is physically installed, its ports must be assigned functions from the Eclipse Configuration System (ECS). Refer to the *Eclipse Configuration System Instruction Manual (part 810299Z)* for more information.

VERIFYING ANALOG PORT CARD INSTALLATION

The operating status of the matrix can be checked by viewing the front-panel status lights. The following lights indicate that an analog port card has been properly installed in the matrix:

- When lit, the four power-supply lights indicate that the associated power supplies are operating properly. The four lights are +12V, -12V, +5V, and +3.3V.
- The column of 16 yellow lights labeled “active” corresponds to the card’s 16 ports. When lit, an “active” light indicates that there is a remote device connected to that port and that communication is running properly between the card and the remote device.
- The column of 16 green lights labeled “VOX” corresponds to the card’s 16 ports. When lit, a “VOX” light indicates the audio level on that port’s connected audio device has exceeded a threshold. The threshold audio level is set for that port’s connected audio device in the ECS configuration software.
- The green “frame data” light illuminates green when information has successfully passed between the CPU card and the port card.
- The red “status” light illuminates when the port card fails to communicate with the CPU card.

INSTALLING INTERFACES IN THE MEDIAN

To install an interface card directly in the Median

1. Remove the blank plates from the front and rear of the interface slot in which an interface card will be installed.
2. Install the front and back interface cards in the slot. Advance the front card along the guides in the front part of the slot until the card connects to the midplane connector. Advance the rear card along the guides in the rear part of the slot, until it connects with the midplane connector.
3. Install the provided screws on the front and rear panels of the interface cards just installed, to secure the interface in place.
4. Repeat steps 1, 2, and 3 for each interface.

Note: One of the Median’s two power supplies will power all CPU, port, and interface cards in the Median. The second power supply provides backup power in case of outages. For more information on installing and wiring a particular interface,

refer to that interface's manual in the Eclipse set of manuals.

WIRING REMOTE DEVICES TO THE MATRIX

The instruction manual *Eclipse Matrix Installation Manual* gives complete details about wiring remote devices to the matrix. The manual also discusses RJ-45 cables and other types of cable required for system installation.

The Eclipse Median system features two IEC mains AC power connectors that provide separate power inputs for redundant power supply combinations. If each AC input is connected to a different mains AC branch, one power supply will continue to operate if the other supply's mains AC branch opens.

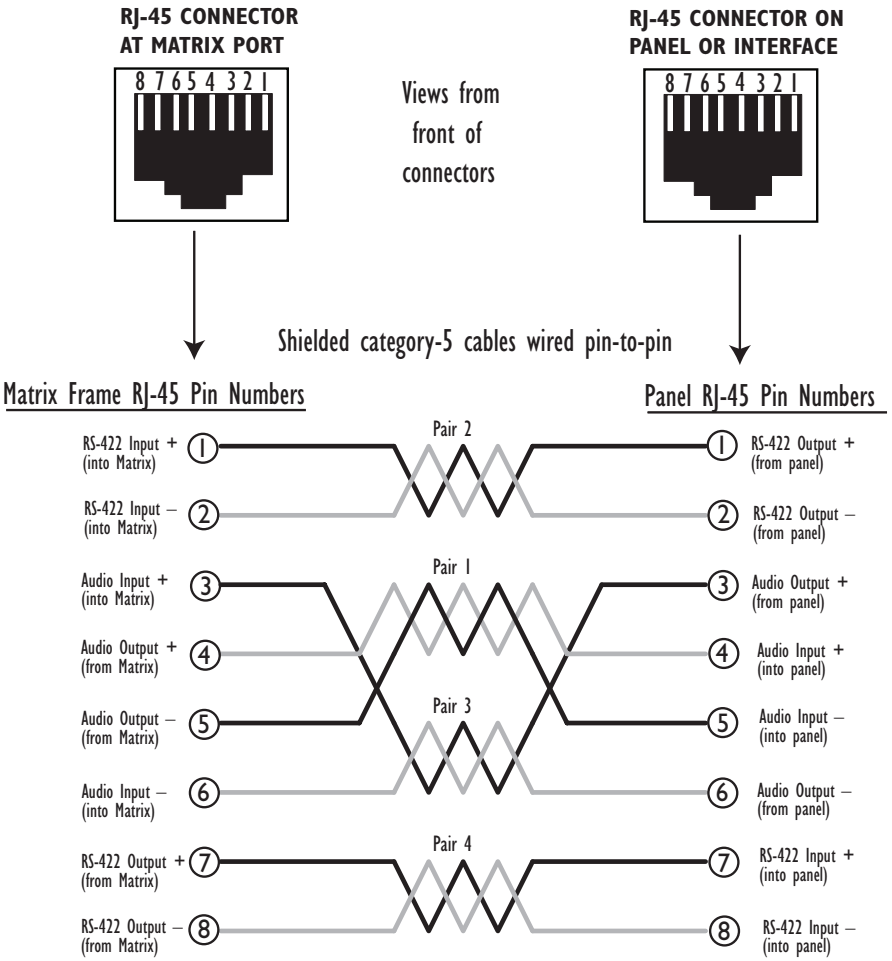
WIRING PANELS TO THE MATRIX

Eclipse uses a 4-pair (analog) or single-pair (digital) wiring scheme between the matrix and panels. All Eclipse panels have built-in RJ-45 connectors.

4-Pair Analog

Four-pair analog wiring is done with shielded CAT5 RJ-45 cable.

- Pair 1 transmits analog audio from the matrix to the panel.
- Pair 2 transmits digital data from the panel back to the matrix.
- Pair 3 transmits audio from the panel to the matrix.
- Pair 4 transmits digital data from the matrix back to the panel



Pair 1 Audio output from Matrix to panel
Pair 2 RS-422 data input from panel to Matrix
Pair 3 Audio input from panel to Matrix
Pair 4 RS-422 data output from Matrix to panel

Figure 6-5: Wiring from the Matrix to an Analog Panel Using RJ-45

Single-Pair Digital

Single-pair digital wiring is accomplished with double-shielded 24 AWG conductor CAT-6E enhanced STP cable. Pair 1 transmits and receives multiplexed digital and analog between the matrix and the panel.

Note: Ensure that the "select" switch on the panel rear is in the correct position for the intended use.

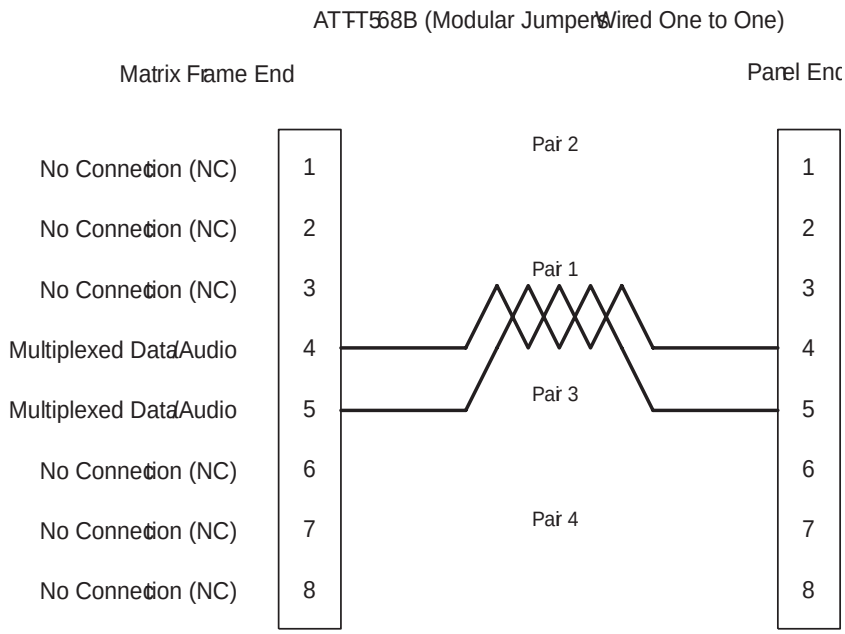


Figure 6-6: Wiring from the Matrix to a Digital Panel Using RJ-45

Note: This wiring diagram refers to the Digi-2 unit only.

WIRING CPU CARD INTERFACES

The central processor unit (CPU) card holds the circuitry for connecting to, and communicating with, the following:

- An external personal computer
- Alarm inputs and outputs
- Eight general purpose inputs (GPIs)
- Eight general purpose outputs (GPOs or relays)
- Two separate local area network (LAN) connections for Ethernet-based communication with a network
- An external GPI/RLY interface

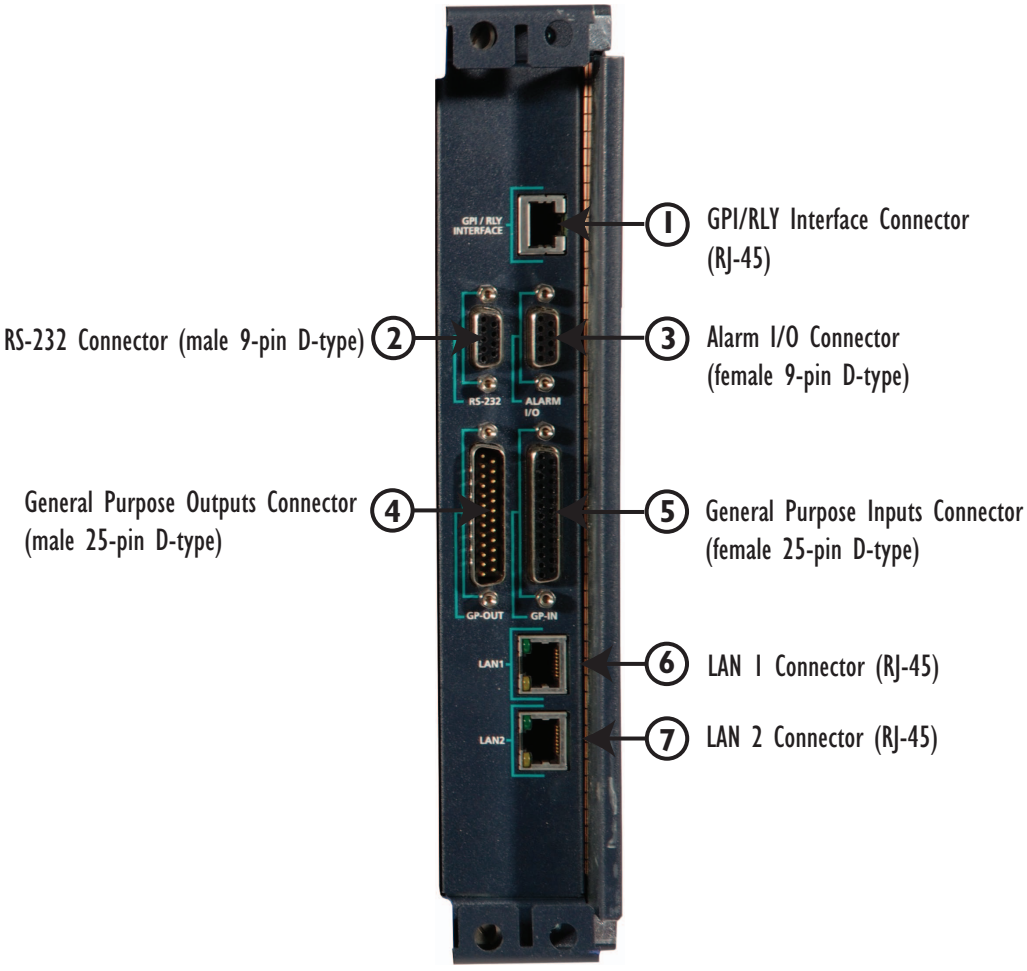


Figure 6-7: CPU Card Interface Connectors

① GPI/RLY INTERFACE CONNECTOR

The GPI-RLY connector provides the opportunity to connect the matrix to an external set of GPI/RLY interfaces. This is in addition to any GPI-RLY interfaces installed on the frame itself.
For wiring pinout information for GPI/RLY interfaces, see the *Relay Interface Module (RLY-6) Instruction Manual* (part 810310Z) and the *General Purpose Inputs (GPI-6) Instruction Manual* (part 810309Z) in the set of manuals supplied with the Eclipse system.

② RS-232 DB-9 CONNECTOR

The DB-9 connector labeled “RS-232” connects the Eclipse matrix to an external computer.

To connect a computer to the matrix, run cable from the matrix’s “RS-232” connector to the PC’s serial port. The maximum recommended length of the cable is approximately 10 feet (3 meters).

A computer has either a 9-pin serial port or a 25-pin serial port. Figure 6-8 shows the wiring for a 9-pin port. Figure 6-9 shows the wiring for a 25-pin port.

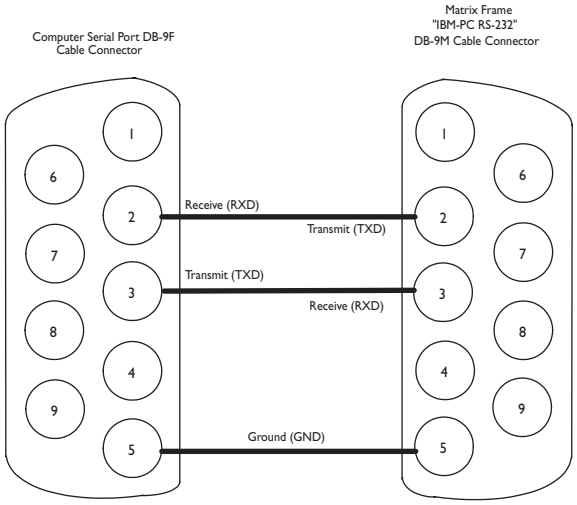


Figure 6-8: Wiring the Matrix DB-9M to a DB-9F Computer Serial Port Connector

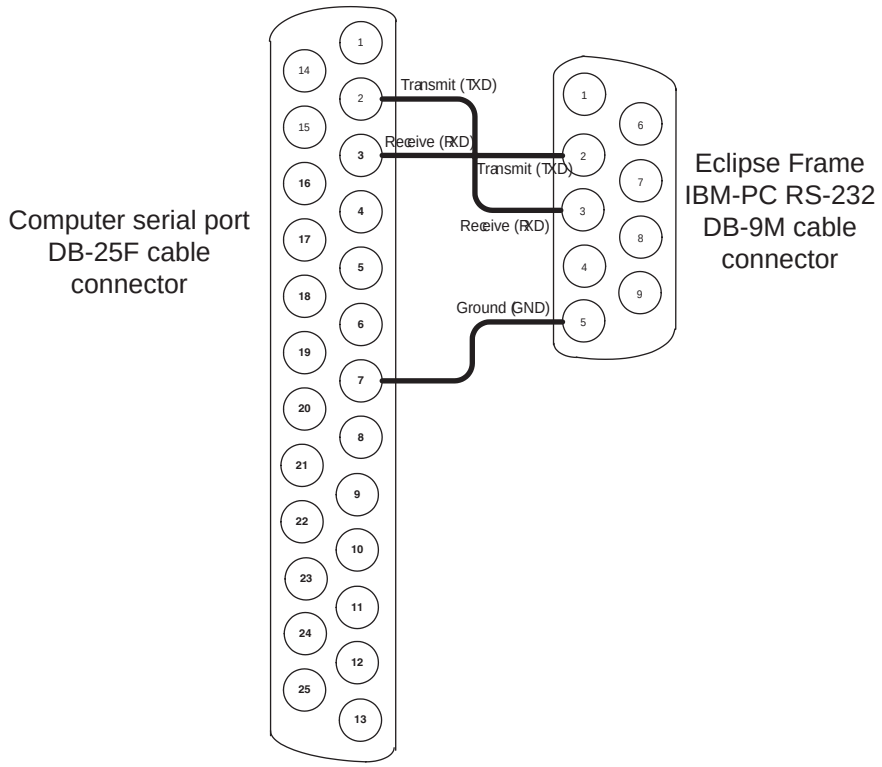


Figure 6-9: Wiring the Matrix DB-9M to a DB-25F Computer Serial Port Connector

③ WIRING TO AN EXTERNAL ALARM

The DB-9F connector labeled “Alarm I/O” connects the matrix to a control circuit for an external alarm, such as a light or bell. The external alarm activates whenever an alarm condition is detected in the matrix.

The following conditions trigger an alarm:

1. If any of the voltages produced by the first power supply unit fall below their normal levels.
2. If any of the voltages produced by the second power supply unit fall below their normal levels.
3. If an external alarm circuit or other logic circuit connected to the power supply is activated.
4. If either of the two power-supply unit fans stop operating.
5. If software on a master CPU card generates an alarm.

An alarm condition activates the relay contacts connected to pins 4, 5, and 9. These contacts are “dry,” (no voltage is supplied to them by the matrix) and are rated at 1 A at 24 VDC. They should not be used for AC mains line current.

Pins are provided for adding an additional alarm source to the matrix’s alarm system. Pin 6 is an alarm input to the Eclipse Median matrix. It is connected to the input of a 3.3 V logic device. A logic high on this input

will cause the Eclipse Median to detect an alarm condition. A logic low or an open circuit will cause the Eclipse Median to detect no alarm condition.

Pin 1 is a voltage source out of the Eclipse Median matrix. It is connected through a 10KOhm pull-up resistor to the +5 V supply rail inside the Eclipse Median matrix.

A contact closure placed across pins 1 and 6 will also cause an alarm condition. The alarm outputs of the PSU-101 power supply could be wired directly to these pins allowing the CPU card to report PSU failures also.

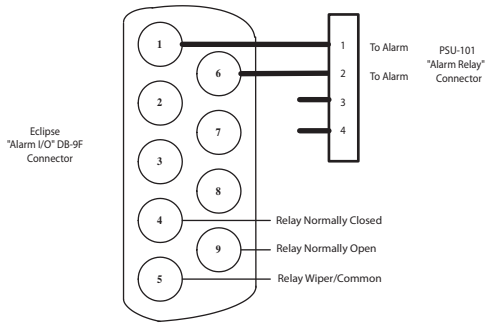


Figure 6-10: Wiring the Alarm I/O Connector to an Alarm Relay Connector

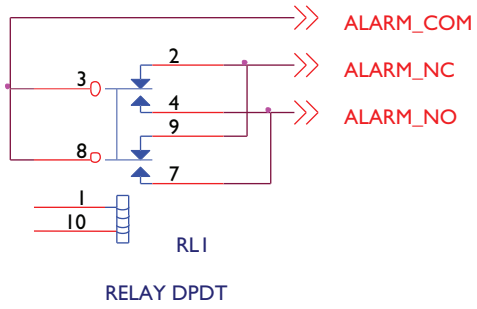


Figure 6-11: Eclipse Median Matrix's Double-Pole Double-Throw Alarm Relay

④ GENERAL-PURPOSE OUTPUTS CONNECTOR (GP OUT)

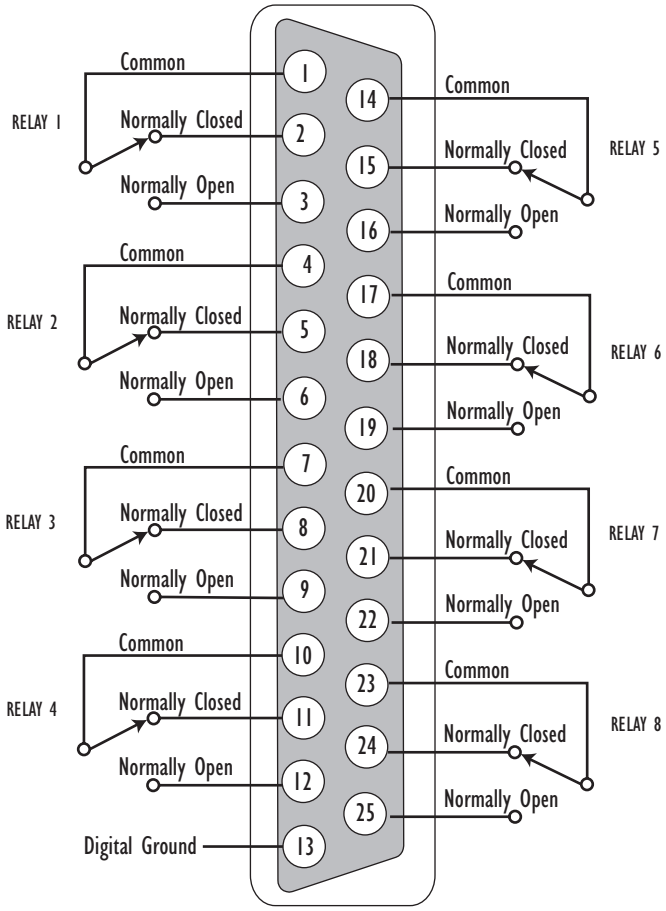
The DB-25 connector labeled "GP OUT" connects the matrix to eight double-pole double-throw (DPDT) relays with contact ratings of 30 VDC at 1A.

Each general-purpose output has a relay inside the Eclipse Median matrix. When a general-purpose output is inactive, the associated

"common" pin on the GP OUT connector will be shorted to the relevant "normally closed" pin. When a general-purpose output becomes active, the short between the "common" pin is broken and a new connection is made between the "common" pin and the "normally open" pin.

DB-25 Male Connector

PIN	DESCRIPTION
1	RELAY 1 Common
2	RELAY 1 Normally Closed
3	RELAY 1 Normally Open
4	RELAY 2 Common
5	RELAY 2 Normally Closed
6	RELAY 2 Normally Open
7	RELAY 3 Common
8	RELAY 3 Normally Closed
9	RELAY 3 Normally Open
10	RELAY 4 Common
11	RELAY 4 Normally Closed
12	RELAY 4 Normally Open
13	GROUND
14	RELAY 5 Common
15	RELAY 5 Normally Closed
16	RELAY 5 Normally Open
17	RELAY 6 Common
18	RELAY 6 Normally Closed
19	RELAY 6 Normally Open
20	RELAY 7 Common
21	RELAY 7 Normally Closed
22	RELAY 7 Normally Open
23	RELAY 8 Common
24	RELAY 8 Normally Closed
25	RELAY 8 Normally Open



30 VDC at 1 Ampere

Figure 6-12: Pin Configuration of the General-Purpose Outputs Connector

⑤ GENERAL-PURPOSE INPUTS CONNECTOR (GP IN)

The DB-25 connector labeled "GP IN" connects the matrix to eight local general-purpose inputs (GPIs).

The general-purpose inputs operate in one of two modes: the “opto-isolated” mode or the unisolated mode. The opto-isolated mode requires the externally connected equipment to provide the current to power the general-purpose input. The non-isolated mode does not require that the externally connected equipment powers the general-purpose input. The current is supplied by a voltage output on the GP IN connector.

To select a mode, move the J1 jumper on the CPU rear card to one of two positions. The J1 jumper is located on the inner-matrix side of the DB-25 connector.

• For opto-isolated mode, fit the J1 jumper across pins 1 and 2.

• For non-isolated mode, fit the J1 jumper across pins 2 and 3.

Note: It is recommended that the connector is set to the fully opto-isolated mode.

Opto-Isolated Mode

Figure 6-13 shows the opto-isolated connection.

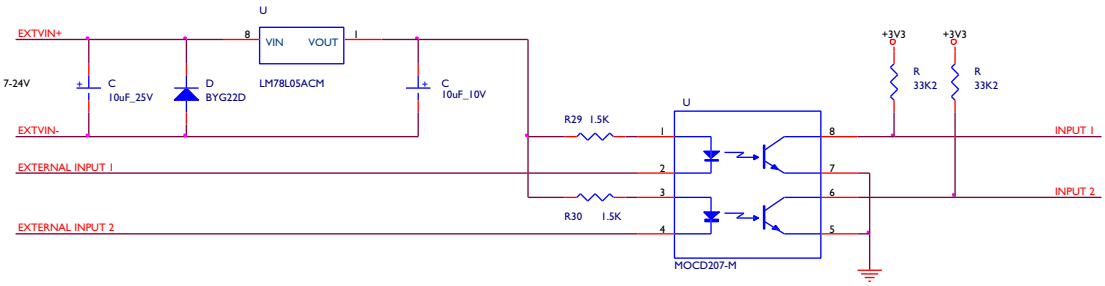


Figure 6-13: Opto-Isolated Connection to Eclipse Median GPI Connector

In this mode, a DC voltage of between 7 and 24 volts is required at the EXTVIN+ pin with relation to the EXTVIN– pin. To cause an input to detect an active signal, current must flow from the relevant input pin.

The external device should draw no current to cause an inactive input and at least 5 mA to cause an active input. The opto-isolator drive line contains a 1.5 kOhm resistor to limit the current through the opto-isolator. Therefore the input pins can be connected directly to the EXTVIN– level to cause an active input.

The voltage level at the external input pin should not be allowed to go below EXTVIN– or above +6 V with respect to EXTVIN–.

Non-Isolated Mode

Figure 6-14 shows the non-isolated connection.

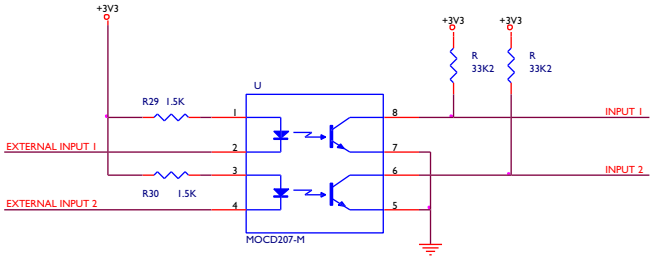


Figure 6-14: Non-Isolated Connection to GPI Connector

To cause an input to detect an active signal, current must flow from the relevant input pin.

The external device should draw no current to cause an inactive input and at least 5 mA to cause an active input. The opto-isolator drive line contains a 1.5 kOhm resistor to limit the current through the opto-isolator. Therefore the input pins can be connected directly to a ground pin to cause an active input.

The voltage level at the external input pin should not be allowed to go below ground or above +6 V with respect to ground.

Pin Assignments for General-Purpose Inputs Connector

DB-25 Female Connector

PIN	DESCRIPTION
1	Logic Input 1
2	Logic Input 2
3	Logic Input 3
4	Logic Input 4
5	N/A
6	N/A
7	N/A
8	N/A
9	Ground
10	Ground
11	Ground
12	Ground
13	Ground
14	Logic Input 5
15	Logic Input 6
16	Logic Input 7
17	Logic Input 8
18	N/A
19	N/A
20	N/A
21	N/A
22	Voltage In+
23	Voltage In+
24	Voltage In-
25	Voltage In-

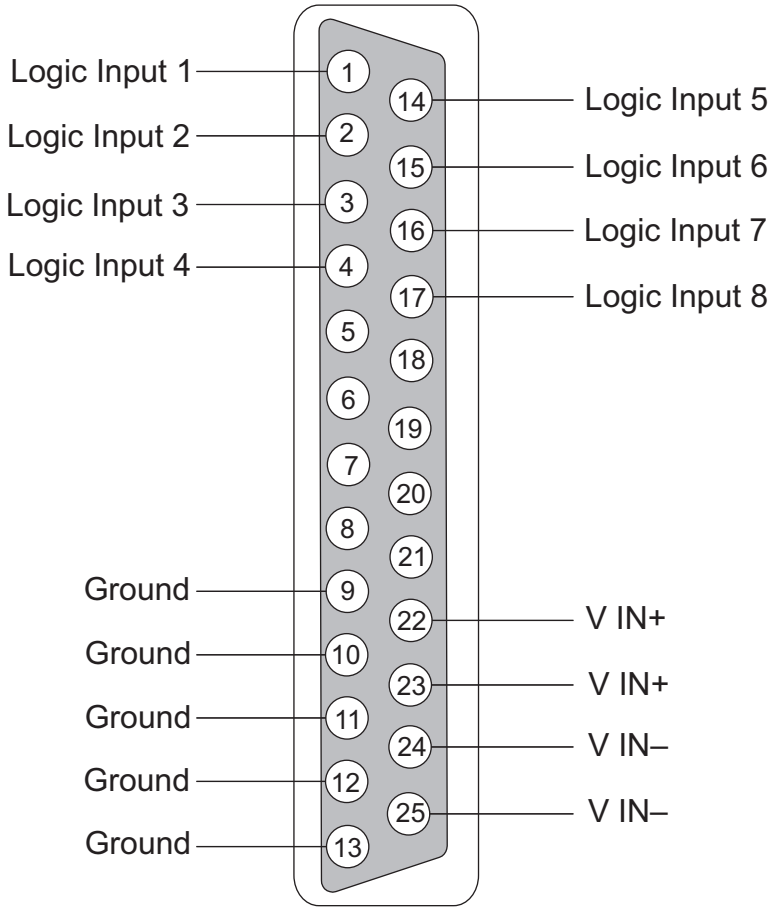
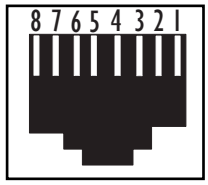


Figure 6-15: Pin Assignments for Eclipse Median General-Purpose Inputs Connector

WIRING TO LOCAL AREA NETWORKS

The “LAN1” and “LAN2” connectors have standard Ethernet pin assignments.

LAN1 and LAN2
Ethernet RJ-45 Connectors



PIN	FUNCTION
1	Transmit data +
2	Transmit data –
3	Receive data +
4	Unused
5	Unused
6	Receive data –
7	Unused
8	Unused

Figure 6-16: Pin Assignments for LAN1 and LAN2 Connectors

E1/T1 MATRIX TO MATRIX CROSSOVER CABLE

For E1 and T1 direct matrix to matrix connections the CAT5 crossover cables should be wired as shown in Table 6-2.

MATRIX 1 PIN		MATRIX 2 PIN
1	to	4
2	to	5
3	not connected	3
4	to	1
5	to	2
6	not connected	6
7	not connected	7
8	not connected	8

Table 6-2: E1/T1 Crossover Cable

E1/T1 STRAIGHT CABLE CONNECTIONS

MATRIX 1 PIN		NETWORK PIN
1	to	1
2	to	2
3	not used	3
4	to	4
5	to	5
6	not used	6
7	not used	7
8	not used	8

Table 6-3: Connections for E1/T1 Straight Cables

E1/T1 straight cables may be used to connect E1 or T1 ports to E1 or T1 networks or thrid party equipment.

E1 TO FREESPEAK/CELLCOM ANTENNA PINOUT

CAT5 cables for connecting an E-Que card to an antenna or splitter are straight through cables. The E1 pinout for connection to an antenna or splitter is shown in Table 6-4. The cable wiring is shown in Table 6-5.

PIN	DESCRIPTION
1	Tx+
2	Tx-
3*	DECTSYNC+
4	Rx+
5	Rx-
6*	DECTSYNC-
7*	GND
8*	12V

Table 6-4: FreeSpeak/CellCom E1 Cable Pinout

MATRIX 1 PIN		ANTENNA PIN
1	to	1
2	to	2
3	to	3
4	to	4
5	to	5
6	to	6
7	to	7
8	to	8

Table 6-5: E1 to Antenna Cable

7 MAINTENANCE

INTRODUCTION

The Eclipse Median system connects a complex network of microprocessor controlled devices. Due to the complexity of the system, field service should be limted to isolating a problem to the specific circuit board that may be causing the problem. Once the circuit board has been identified, it can be either repaired or replaced.

ROUTINE MAINTENANCE RECOMMENDATIONS

MAINTAINING THE MATRIX

Due to the complexity of the system, field service generally should be limited to isolating the specific component with the problem.

Because the matrix has moving air in it, the entire matrix should be cleaned at least once a year. To clean the matrix, shut off AC power, remove all cards, and use compressed air to remove any dust buildup in the matrix itself. Clean all cards with a brush to remove dust buildup.

WARNING: *Care should be taken not to induce a static discharge in the cards. Use of a grounding wrist strap is recommended. If a grounding wrist strap is not available, touch an unpainted metal surface on the matrix chassis periodically to neutralize static electricity.*

RECOMMENDED SPARE PARTS

To facilitate quick repair of the system with minimum downtime, Clear-Com recommends keeping the following spare system components in good working condition at all times:

- One CPU card
- One port card
- One Euro Cassette power supply module
- One of each type of intercom panel in the system
- One of each type of interface in the system

FAIL-SAFE MODES

High reliability is one of the main objectives of the Eclipse Median system design. The following features of the system minimize the effects of a component failure.

DUAL, INDEPENDENT POWER SUPPLIES

The Eclipse Median includes two Euro Cassette power supply units. One power supply unit can power an entire matrix; the second unit provides a backup in case of an equipment failure.

In addition, the two supplies have separate IEC connectors to AC mains power, and are designed for completely automatic and transparent changeover between supplies in the event of a power failure on one of the AC branches.

POWER SUPPLY ALARM OUTPUT

Each power supply contains a sensor that is connected to both an audible alarm and a warning light on the matrix. When a power supply's DC output or AC input drops too low, the sensor activates the matrix's audible alarm and warning light, giving the system operator the necessary forewarning to diagnose and correct any power anomalies while the system remains operational.

The sensor can also activate an external alarm connected to the matrix, such as a light or bell. An alarm can be issued to a remote location to alert operators that part of a power supply has failed.

The failure of a single supply will issue an alarm, but the Eclipse Median system will continue to operate normally, powered by the second supply.

"HOT PATCHABILITY"

All CPU cards, port cards, and all Euro Cassette power supplies are "hot patchable"– that is, they can be plugged in or removed from the matrix while the power is on, and they will be neither damaged, nor will they cause damage to the system. In addition, the system smoothly incorporates a newly added card. Sometimes re-inserting a CPU card can reset the matrix. Replace CPU cards during maintenance down times if possible.

ONBOARD PROCESSORS

If one analog port card malfunctions, the malfunction will normally affect only the panels connected to that analog port interface. The malfunction should not affect any other cards or panels in the system. In all cases, removing a faulty card affects only the devices connected to that card.

FAIL-SAFE COMMUNICATION

In the event of a CPU card failure, the second CPU card takes over operation of the system, while the first card is repaired or replaced.

TROUBLESHOOTING

When attempting to identify the cause of the trouble, it is helpful to begin with the two most basic areas which cause malfunctions:

- The flow of electric current from the power supplies to the cards.
- The flow of data between the program software, the circuit cards, and the attached remote devices.

The following sections discuss troubleshooting these two basic categories of problems.

TROUBLESHOOTING POWER-SUPPLY PROBLEMS

General Principles

Electric current in the matrix starts at the power supplies, travels through the matrix's backplane connectors, and then travels to the circuit cards themselves. When power-supply problems occur, those three areas—the power supplies, the backplane connectors, and the circuit cards—should be explored to identify where the trouble is occurring. Solving power-supply problems starts with identifying the specific component causing the problem.

Note: The matrix's backplane connectors are part of the matrix's infrastructure and are not serviceable by field personnel. If it is determined that a problem is in the matrix's backplane connectors, the matrix must be returned for repair. Backplane connector malfunctions are rare, but should be considered as possibilities. Clear-Com may ship a spare matrix to use while the damaged matrix is being repaired depending on the support status. Please refer to the warranty and support sections in this manual.

If any equipment needs to be returned to Clear-Com, follow the procedure described in the warranty and support sections in this manual for obtaining a return authorization number from the Clear-Com Service Department.

A lit power-supply light on a component indicates that the matrix's electric current has traveled successfully to that component and is powering the component. For example, if the power-supply lights on the CPU card are lit, the electric current has successfully traveled from the matrix's power supplies to the CPU card.

If a power-supply light is not lit on a component, the electric current has not reached that component for some reason. Knowing where the current has stalled helps to identify the component that needs repair.

For example, if all of the power-supply lights on all cards do not light, the electricity supply may have given out either in the power supplies themselves or in the matrix's backplane connectors. A faulty connector

on the backplane, or a crack in the backplane can cause all of the matrix's power-supply lights to go out because the path on which the electric current is traveling has been blocked.

This is a rare problem, but one to consider as a possibility. Repairing the problem in this case would involve determining whether the problem is in the power supplies or the backplane connectors.

When a problem is identified in the power supplies, the backplane connectors, or the circuit cards, the suspect component can be replaced with a properly functioning component to see if the problem is repaired.

Specific Troubleshooting Examples

Troubleshooting more specific problems becomes easier when keeping these general principles in mind. The following examples describe specific problems and suggested solutions.

Problem: All of the power supply lights do not illuminate on one port card

Before repairing or replacing card, try to determine where the problem is occurring. One or both of the following options can be tried:

OPTION 1 Take the bad card out of the matrix, and insert it into a known good slot in the matrix.

- If the power supply lights still do not illuminate, the problem is probably in the card itself. Repair or replace the card.
- If the power supply lights illuminate, the problem may be in the matrix's backplane connectors, which carry electric current from the power supplies to the cards. The matrix can be returned to Clear-Com for investigation or repair. In the meantime another matrix can be substituted for the damaged one. Clear-Com may ship a spare matrix to use while the damaged matrix is being repaired depending on the support status. Please refer to the warranty and support sections in this manual.

OPTION 2 Take a known good card, and insert it into the bad slot.

- If the power supply lights illuminate, the problem is probably in the card. Repair or replace the card.
- If the power-supply lights do not illuminate, the problem may be in the matrix's backplane connectors, which carry electric current from the power supplies to the cards. The matrix can be returned to Clear-Com for investigation or repair. In the meantime another matrix can be substituted for the damaged one. Clear-Com may ship a spare matrix to use while the damaged matrix is being repaired depending on the support status. Please refer to the warranty and support sections in this manual.

Once the problem has been isolated to the card or the backplane, it is easier to take the next step which is to repair or replace the suspect component.

Problem: The power supply lights do not illuminate on all cards in the matrix

In this situation, the most probable problem is that the matrix's power supplies are not sending out any electric current, since none of the cards are receiving power. Although less likely, the problem may be in the matrix's backplane connectors.

The following procedure may help to isolate where the trouble is occurring:

Check the power supplies' alarm lights. If the power alarm lights are indicating a problem with the power supply, swap it out with a new power supply.

- If this repairs the problem, the problem was in the power supply.
- If the problem persists even after the power supply has been replaced, the problem is in the matrix's backplane connectors. Send the matrix back to Clear-Com for repair or replacement. In the meantime another matrix can be substituted for the damaged one. Clear-Com may ship a spare matrix to use while the damaged matrix is being repaired depending on the support status. Please refer to the warranty and support sections in this manual.

Problem: The power supply lights do not illuminate on one of the two CPU cards

When the system is functioning properly, the power-supply lights on both CPU cards illuminate. If the power-supply lights on a CPU card fail to illuminate, the problem may be with the card itself, or with the backplane connectors that carry the electric current from the power supplies to the cards. The backplane connectors are part of the infrastructure of the matrix and are not serviceable by field personnel.

The following procedure may help to isolate where the trouble is occurring:

1. Swap the CPU cards. Put the first card in the second CPU slot and the second card in the first CPU slot. The problem will follow the card or the slot.
   - If the power supply lights do not illuminate on the bad card (the card with the lights out) when it is inserted in the other CPU slot, the problem is probably in the card.
   - If the power-supply lights on the bad card illuminate when the card is inserted in the other CPU slot, the problem is probably not in the card itself. The problem may be with the backplane connectors or power supplies.

2. Check the power supplies' alarm lights. If the alarm lights are indicating a problem with the power supply, swap it out with a new power supply.
   - If this repairs the problem, the problem was in the power supply.
   - If the problem persists even after the power supply has been replaced, the problem is in the backplane. Send the matrix back to Clear-Com for repair or replacement. In the meantime another matrix can be substituted for the damaged one. Clear-Com may ship a spare matrix to use while the damaged matrix is being repaired depending on the support status. Please refer to the warranty and support sections in this manual.

Problem: The power supply lights are out on both CPU cards

The problem may be with power supplies, since both cards appear not to be receiving power. Although less likely, the problem may be in the matrix's backplane connectors.

The following procedure may help to isolate where the trouble is occurring:

Check the power supplies' alarm lights. If the alarm lights are indicating a problem with the power supply, swap it out with a new power supply.

- If this repairs the problem, the problem was in the power supply.
- If the problem persists even after the power supply has been replaced, the problem is in the backplane. Send the matrix back to Clear-Com for repair or replacement. In the meantime another matrix can be substituted for the damaged one. Clear-Com may ship a spare matrix to use while the damaged matrix is being repaired depending on the support status. Please refer to the warranty and support sections in this manual.

TROUBLESHOOTING DATA PROBLEMS

General Principles

The other type of problem that can occur in the system is when data is not flowing properly between the program software, the circuit cards, and the attached panels and interfaces. A troubleshooting sequence in this situation would be to first check cabling, then reset the card or panel, then reset the entire system.

Analog Port Card Reset Button

Resetting the analog port card causes the configuration information for the card and its attached devices to reload to the card from the CPU card's operational memory (located in its microprocessor's RAM), thus clearing up any corruption of data that may have occurred in the analog port card's microprocessor. The interface and all connected

panels and interfaces momentarily stop their current activity and restart. The reset button must be pressed for more than two seconds to take effect.

If the entire system is operating except for one analog port card, or one or more panels connected to the interface, press the reset button for that interface only.

Note: This button is slightly recessed from the front panel to prevent it from being accidentally pressed. A tool such as a bent paper clip is required to press this button.

CPU Card Reset Button

When the CPU card is reset by pressing its reset button, the card's non-volatile RAM reloads all configuration information to the card's microprocessor. Resetting the card clears any corruption of data in the card's microprocessor. The card momentarily stops its current activity and restarts. The same system configuration that was active before the card was reset will be active after the reset.

Note: The reset button is slightly recessed from the front panel to prevent it from being accidentally pressed. A tool such as a bent paper clip is required to press this button.

CPU Card Full Reset Button

Press and hold the full-reset button and simultaneously press the reset button for the system to perform a cold restart. All cards in the matrix reset regardless of any system preferences in the program software and the non-volatile memory is cleared. All audio devices connected to the cards, such as panels and interfaces, reset as well.

When the cards and connected audio devices reset, they momentarily stop their current activity and restart. During this process configuration information is downloaded to the port cards and remote audio devices from the CPU card's microprocessor.

The same system configuration that was active before the card was reset will be active after the reset. The button must be pressed for more than two seconds for the reset to take effect.

Note: Under normal operating conditions it is not necessary to perform a full reset. Technical personnel might perform a full restart if they believe that the CPU card is operating incorrectly as a result of corruption of the microproccessor's internal data or instruction sequence.

Specific Troubleshooting Examples

The following examples describe specific problems and suggested solutions.

Problem: A port light on an analog port card does not illuminate, although there is a panel attached to that port

1. Check the panel and the wiring leading to it.
2. Check the Frame Data light. If there is no indication of matrix communication to this card while the other cards in the matrix are communicating, reset the interface.
3. Replace the interface cards.
4. Replace the panel.

Problem: Audio sounds low or distorted from a panel

1. Check the matrix's currently active CPU card's power lights. If any of the lights are not lit, replace the card.
2. Check the port card's input and output gain settings in the program software.
3. Check the panel's listen-level adjustment settings in the program software.

SYSTEM BLOCK DIAGRAM

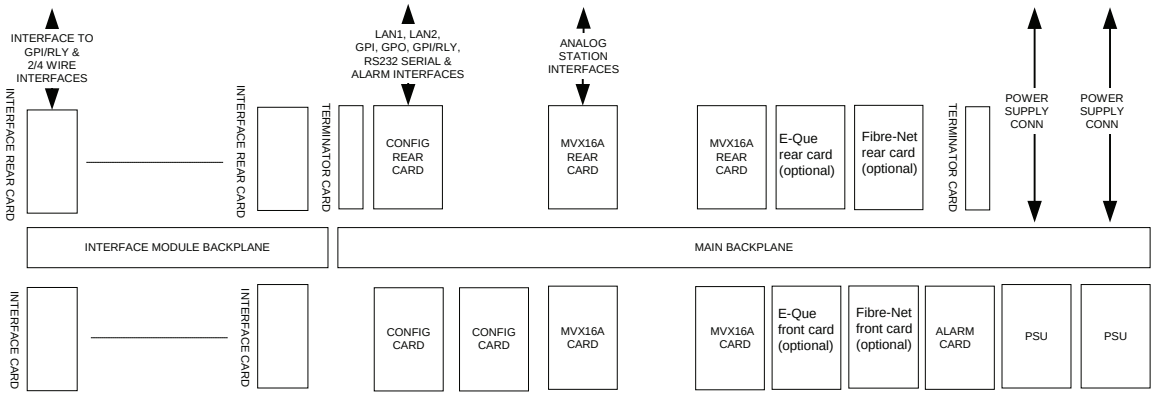


Figure 7-1: System Block Diagram

8 SPECIFICATIONS

MEDIAN MATRIX TECHNICAL SPECIFICATIONS

0 dBu is referenced to 0.775 volts RMS

Matrix Capabilities

Maximum Expansion Cards	7
Ports per MVX Port Card	16
Maximum MVX Port Cards	7
Maximum CPU Cards	2 (included)
Maximum Fibre Expansion Cards	2
Maximum E-QUE Expansion Cards	4
Maximum IVC-32 Expansion Cards	4
Maximum Power Supply Units	2 (included)
Maximum RJ-45 Ports per Matrix	112
Maximum Timeslots	512

Mechanical

Height	10.6 inches (267 mm or 6 RU)
Width	19 inches (482 mm)
Depth	16 inches (410 mm)
Front Card Depth	300 mm
Weight	20 to 35 kg

Environmental

Operating Temperature	0º C to +40º C
Storage Temperature	-55º C to +70º C
Humidity, Maximum	90% non-condensing

Matrix Performance

Sample Rate	48 kHz
Resolution	24 bit
Frequency Response @ 48 kHz sampling	30 Hz – 22 kHz ± 3 dBu
Crosstalk (adjacent channel)	<–70 dBu
Nominal Level	0 dBu
Matrix headroom	+18 dBu
Distortion	<0.05 %, @ 0 dBu, 300 Hz to 10 kHz; <0.1 %, @ 0 dBu, 100 Hz to 20 kHz
Off Noise	<–70 dBu (20 Hz - 22kHz)
On Noise	<–65 dBu (20 Hz - 22 kHz)
Key Response, Intra-System	<40 ms for audio route
Linked Systems	<60 ms for audio between matrices

Fiber Interface Front Card

Height	6RU
Depth	300 mm
Operating Temperature	0º C to +40º C
Storage Temperature	-55º C to +70º C
Humidity	40 - 90% non-condensing
Power	+3.3V

Fiber Interface Rear Card

Height	6RU
Depth	58mm (max)
Operating Temperature	0º C to +40º C
Storage Temperature	-55º C to +70º C
Humidity	40 - 90% non-condensing
Power	+3.3V

Fiber Optic Cable Specification

Cable Type	Single Mode 9/125µ

Fiber Transceiver Specification

Type	SR1 Short Range SFP Transceiver
Minimum Power Budget	8.5dB
Wavelength	1310nm
Connector	Duplex LC
Standard Max Node Length	10km (other distances available to special order)

E-QUE Interface Front Card

Height	6RU
Depth	300 mm
Operating Temperature	0º C to +40º C
Storage Temperature	-55º C to +70º C
Humidity	40 - 90% non-condensing
Power (combined cards)	+3.3V 3.5A +5V 0.7A +12V 0.05A

E-QUE Interface Rear Card

Height	6RU
Depth	58mm (max)
Operating Temperature	0º C to +40º C
Storage Temperature	-55º C to +70º C
Humidity	40 - 90% non-condensing

IVC-32 Interface Front Card

Height	6RU
Depth	300 mm
Operating Temperature	0º C to +40º C
Storage Temperature	-55º C to +70º C
Humidity	40 - 90% non-condensing
Power (combined cards)	+3.3V 3.5A
	+5V 0.7A
	+12V 0.05A

IVC-32 Interface Rear Card

Height	6RU
Depth	58mm (max)
Operating Temperature	0º C to +40º C
Storage Temperature	-55º C to +70º C
Humidity	40 - 90% non-condensing

MVX Analog Port Card

Height	6 RU
Depth	300 mm
Audio Interface	16, bi-directional
Input Format	Balanced
Output Format	Balanced
Isolation	None; expected at User Station
Port Card Outputs	
Level	0 dBu nominal
Impedance	100 Ohms balanced
Frequency Response	30 Hz–22 kHz ± 3 dB
Distortion	<0.05 %, @ 0 dBu, 300 Hz to 10 kHz;
	<0.1 %, @ 0 dBu, 100 Hz to 20 kHz
Port Card Inputs	
Level	0 dBv nominal
Impedance	600 Ohms balanced
Frequency Response	30 Hz–22 kHz ± 3 dB
Distortion	<0.05 %, @ 0 dBu, 300 Hz to 10 kHz;
	<0.1 %, @ 0 dBu, 100 Hz to 20 kHz

Data Interface: 16 bi-directional

Input Format	RS-422 @ 2400 to 19200 kb/s
Output Format	RS-422 @ 2400 to 19200 kb/s
Input Termination	100 ohm ± 10%
Output Termination	None; expected at User Panel
Isolation	None; expected at User Panel

Backplane Connector: FCI/BERG Metral

Port Connector	RJ-45 to Clear-Com standard pinout
Transmission Distance	3000 ft. (1000 m) maximum

System Programming

Group Calls	100
Number of Grouped Ports	4000 maximum
Conferences per Matrix	64
IFB per Matrix	100
Priority Levels	5
Isolates	Any crosspoint
Listen Level Control	0.71 dB steps
Input Level Control	0.355 dB steps
Output Level Control	0.355 dB steps
VOX Input Detection Threshold	0 dB to – 45 dB adjustable

Minimum PC Requirements

Processor	Pentium III 600 MHz
Memory	512 MB RAM
Hard Disk	500 MB free space
Input Devices	3.5-inch Floppy Disk Drive, CD-ROM Drive
Display Resolution	SVGA
User Entry	Keyboard, Mouse
Ports	2 serial ports
Network	IEEE 802.3 Ethernet Card
Operating Systems	Windows 2000 / Windows XP / Windows Server 2003 / Windows Vista (with restrictions)

Power Supply Unit

Format	Euro Cassette
Quantity	2 per matrix
Mounting	Front
Backplane Connectors	Positronics
AC Power Input	IEC (1 per PSU)
Input Voltage	AC 100 V to 240 V, 50/60 Hz
Power Consumption	250 W maximum
Status Indicators	LEDs viewable from front of rack

Notice About Specifications

While Clear-Com makes every attempt to maintain the accuracy of the information contained in its product manuals, that information is subject to change without notice. Performance specifications included in this manual are design-center specifications and are included for customer guidance and to facilitate system installation. Actual operating performance may vary.

9 GLOSSARY

Analog Port Any of the Eclipse matrix's analog input/output RJ-45 connectors that are used to connect cable from the matrix to panels and interfaces. Each "port" connects to a separate audio channel in the matrix intercom system.

Bus A bus is the channel or path between the components in the matrix along which electrical signals flow to carry information from one component to the next. In the Eclipse matrix the bus is located in the etched surface of the midplane.

Call Signal A call signal is an electronic signal sent from one panel or interface to another. A call signal can be audible and/or visual. Typically a call signal is sent to get the attention of a panel operator who may have turned down their intercom speaker's volume or removed their headset. It can also be sent to activate an electronic relay.

Category-5 cable EIA/TIA 568 category specification relating to network cabling. Shielded category-5 cabling is required for Eclipse matrix wiring.

CellCom Digital wireless communications product. Sold under the CellCom name in USA and as FreeSpeak in Europe and Asia.

Central Matrix The term "central matrix" is used to differentiate the central hardware and software of the intercom system from the connected audio devices. The central matrix consists of:

1. The metal housing for the circuit cards and power supplies.
2. The circuit cards.
3. The power supplies.
4. The rear panel connectors which connect the matrix's hardware to panels and interfaces.

Destination A device such as an intercom panel, beltpack, or interface to which audio signals are sent. The device from which audio signals are sent is called a "source".

Duplex All real-time communication between individuals talking face to face is full duplex, meaning that they can both talk and listen simultaneously. The Eclipse matrices provide full-duplex audio.

ECS Eclipse Configuration System. Software program that guides the operation of the central matrix circuit cards and connected panels.

EMS Element Management System. Software program that is used to manage the Concert server system resources.

Ethernet International standard which describes how information is transmitted across a network. Provides for the efficient organization of network components.

Fiber-optic Cable A fiber-optic cable consists of a glass core covered with a reflective material called “cladding” and several layers of buffer coating to protect the cable from the environment. A laser sends light pulses through the glass core to the other end of the cable.

FreeSpeak Digital wireless communications product. Sold under the FreeSpeak name in Europe and Asia and CellCom in USA.

Full Duplex Refers to transmission of signals in two directions simultaneously.

IFB “Interruptible Foldback”. The term “foldback” refers to sending “program” audio, or some other audio mix, back to announcers while they are on the air. Doing so allows announcers to monitor themselves, other announcers, videotapes of commercials, or some mix of sources, while they on the air. This is typically found in television news and live broadcast events.

Announcers typically wear a small ear piece so they can hear the selected foldback audio mix. When a director wants to give directions to an announcer on air, or to announce changes in the program, the director must “interrupt” the foldback. To do this, the director uses a channel specifically set up to interrupt the foldback audio.

Interface Module A piece of electronic hardware designed to convert the 4-wire signals of a central matrix port to some other form of communication, such as 2-wire party line, telephone, etc. The interface module is connected to a central matrix port. The external non-4-wire device is then connected to the interface module.

ISO The ISO function, short for “panel ISOlation”, allows a panel operator to call a destination and interrupt all of that destination’s other audio paths and establish a private conversation. When the call is completed the destination’s audio pathways are restored to their original state before the interruption.

IV-R Instant Voice Router. Software that routes digital audio data between Concert users and between Concert users and Eclipse systems.

Label A label is an alphanumeric name of up to five characters that identifies a source, destination, or control function accessed by an intercom panel. Labels appear in the displays of the intercom panel. Labels can identify panels, ports interfaced to other external equipment, fixed groups, party lines, and special control functions.

Mode A term used to describe a light path through a fiber as in multimode or single mode.

Multimode Fiber-optic Cable The glass core of a multimode fiber is larger than the core of a single mode fiber, which causes the transmitted light beam to disperse as it travels through the core. Single mode fiber, with its smaller core, concentrates the light beam so that it carries signals further. Multimode fiber was the first type of fiber offered

by manufacturers. Single-mode fiber evolved as production methods improved.

Multiplexing The process by which two or more signals are transmitted over a single communications channel. Examples include time division and wavelength division multiplexing.

Nanometer (nm) Common unit of measure for wavelength. One billionth of a meter.

Non-volatile Memory Data stored in the CPU's firmware (ROM) that is not lost when the power is turned off.

Optical Signal A laser at one end of a fiber-optic cable pulses on or off to send a light signal through the glass core of the cable to the other end of the cable. Because the light signals are binary (on or off), the signal is digital.

Panel Also referred to as "station" in some cases (usually older manuals). Any intelligent intercom device connected to the rear-panel analog ports of the central matrix. This term does not refer to devices connected through interface modules.

Port Any of the input/output connections (RJ-45 connectors) on the back panel of the central matrix. These connectors and the attached cables connect the central matrix to remote intercom devices. The term "port" emphasizes that the connection is a "portal" between the central matrix and the remote intercom devices.

Program Any separate audio source that is fed into the intercom channels. In television applications, for example, "program" audio is the audio that is broadcast on air.

Rack Unit or RU Standardized unit of mounting space on a rack panel. Each rack unit is 1.75 inches (44.45 mm) of vertical mounting space. Therefore 1 RU is 1.75 inches (44.45 mm) of vertical mounting space, 2 RU is 3.5 inches (88.9 mm), 3 RU is 5.25 inches (133.35 mm), and so on.

Remote Panel Any intelligent intercom device connected to the back-panel ports of the central matrix. This term does not refer to devices connected through interfaces.

Sidetone The sound of the panel operator's own voice heard in their own earphone as they speak.

Single-mode Fiber-optic Cable The glass core of a single-mode fiber is smaller in diameter than the core of a multimode fiber, so that the light signal transmitted over the core is more concentrated than with multimode fiber, which allows the signal to travel further. Single-mode fiber evolved from multimode fiber as production methods improved.

Source In this manual, the term "source" refers to a device—such as an intercom panel, interface, or beltpack —that sends audio into the matrix. The device to which audio is sent is called a "destination".

VOX In the Eclipse system, when audio at a panel exceeds a threshold, a light switches on at the panel's port card to visually cue the operator. The threshold level is set in the Eclipse Configuration Software.

V-Series Communications panels used with Eclipse systems providing advanced facilities. Available in rack mount and desktop formats.

Wavelength-division Multiplexing (WDM) A method of multiplexing optical signals developed for use on fiber-optic cable. Each signal is assigned a particular wavelength on the light spectrum and therefore many signals can be transmitted simultaneously without interfering with each other.

ECLIPSE MANUALS

The following manuals are available covering Eclipse products and accessories.

SOFTWARE MANUALS

Eclipse Configuration System (ECS) Instruction Manual - 810299Z

Eclipse Logic Maestro Instruction Manual - 810414Z

Eclipse Production Maestro Quick Start Guide - 810409Z

Eclipse Production Maestro Installation and User Guide - 810410Z

Eclipse DECTSync Manual - 810412Z

Eclipse Host Computer Interface (HCI) Manual - 810413Z

HARDWARE MANUALS

Eclipse Omega Matrix Instruction Manual - 810290Z

Eclipse Median Matrix Instruction Manual - 810347Z

Eclipse PiCo Matrix Instruction Manual - 810348Z

Eclipse-32 Matrix Instruction Manual - 810315Z

Eclipse Matrix Installation Manual - 810298Z

Eclipse Upgrade Reference Manual - 810377Z

Eclipse V-Series Panels User Manual - 810365Z

Eclipse FOR-22 4-Wire Interface Instruction Manual - 810306Z

Eclipse CCI-22 Party Line Interface Instruction Manual - 810307Z

Eclipse TEL-14 Telephone Interface Instruction Manual - 810308Z

Eclipse GPI-6 General Purpose Inputs Instruction Manual - 810309Z

Eclipse RLY-6 General Purpose Outputs Instruction Manual - 810310Z

DIG-2 Digital Interface Instruction Manual - 810311Z

IMF-3, IMF-102, DIF-102 Interface Module Frame Instruction Manual - 810313Z

Eclipse AES-6 Digital Interface Instruction Manual - 810383Z

Eclipse BAL-8 Isolation Interface Instruction Manual - 810403Z

Eclipse V-Series AES-3 Option Card Installation Instructions - 810388Z

Eclipse V-Series XLR-7M Upgrade Instructions - 810405Z

Eclipse V-Series T-Adapter Installation Instructions - 810406Z

Eclipse FIM-202D Fiber Interface Instruction Manual - 810385Z

Eclipse FIM-102 Fiber Interface Instruction Manual - 810319Z

Eclipse FIM-108 Fiber Interface Instruction Manual - 810291Z

Eclipse IFB-104 Interface Instruction Manual - 810268Z

Eclipse 4000 Series II Panels Installation Guide - STA0530Z

Eclipse 4000 Series II Panels User Guide - STA0531Z

Eclipse ICS 1008E/1016E Panels Instruction Manual - 810404Z

Eclipse ICS 102/62 Panels Instruction Manual - 810302Z

Eclipse ICS 2003 Panel Instruction Manual 810303Z

Eclipse ICS 92/52 Panels Instruction Manual - 810301Z

Eclipse i-Station Instruction Manual - 810305Z

Eclipse ICS-21 Speaker Panel Instruction Manual - 810263Z

Eclipse ICS-22 Speaker Panel Instruction Manual - 810264Z

Eclipse ICS-24 Headset Panel Instruction Manual - 810265Z

Eclipse Digital Wireless Beltpack Instruction Manual - 810376Z

LIMITED WARRANTY

This document details the Clear-Com Standard Limited Warranty for all new products for sale within all regions with the exception of Military, Aerospace, and Government (MAG).

EXCEPT AS SET FORTH HEREIN ("LIMITED WARRANTY"), CLEAR-COM MAKES NO OTHER WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, NONINFRINGEMENT OF THIRD PARTY RIGHTS, OR FITNESS FOR A PARTICULAR PURPOSE, ALL OF WHICH ARE EXPRESSLY DISCLAIMED.

1. **Standard Limited Warranty.** Clear-Com Communication Systems ("Clear-Com") warrants its products, including supplied accessories, against defects in material or workmanship for the time periods as set forth below provided it was purchased from an authorized Clear-Com dealer or distributor.

   a) Pursuant to this Limited Warranty, Clear-Com will, at its option:

      i) repair the product using new or refurbished parts, or;

      ii) replace the product with a new or refurbished product.

   b) Remedies: In the event of a defect, the rights detailed in 1 (a) are your exclusive remedies. For purposes of this Limited Warranty, "refurbished" means a product or part that has been returned to its original specifications.

   c) Standard Warranty Period (by Product):

      i) All Clear-Com brand systems and products, including belt packs, have a Limited Warranty of two years, with the exception of;

         (1) Cables, accessories, components & consumable items have a Limited Warranty of 90 days.

         (2) Any Clear-Com product that has been classified as obsolete at the time of sale has a Limited Warranty of 90 days from sales and will be replaced with the same product or a sales credit will be issued, at the sole discretion of Clear-Com.

         (3) Headsets, handsets, microphones, and associated spare parts, as well as UHF wireless IFB products, have a Limited Warranty of one year.

         (4) UHF WBS Analog wireless intercom systems have a Limited Warranty of three years.

(5) All software products, including Concert (Client and Server), ECS, Production Maestro and Logic Maestro are warranted for one year and shall substantially conform to published specifications. The media on which the Software is furnished is warranted to be free of defects in material and workmanship (under normal use) for a period of one year.

(6) Any Clear-Com products that are listed within the last time buy period have the same Limited Warranty for their type 1.i 1 - 1.i.5 as above.

d) Any Clear-Com product that is repaired or supplied as a replacement under the terms of this Limited Warranty shall inherit the remaining warranty period from the original product.

e) Standard Warranty Period Start Date

i) Dealer / Distributor Sales: In view of Dealer or Distributor stocking practices, the Standard Warranty Period for products sold through Dealers or Distributors will commence from the Clear-Com invoice date and will include an automatic extension of three months. Any valid warranty claim within the Standard Warranty Period as determined by the Clear-Com invoice date will be covered without further supporting evidence. All warranty claims after this date must be supported by the Customer's proof of purchase that demonstrates the product is still within the Standard Warranty Period (as detailed in Section 1.c.i above, plus the automatic three month extension) from their purchase date.

ii) Direct Sales: The Standard Warranty Period will commence from the date the product was shipped from Clear-Com to the Customer. The Standard Warranty Period start date for contracts that include commissioning will be the date of the Site Acceptance Test (SAT) or one month from conclusion of the commissioning project, whichever is earlier.

f) Invalidation of Warranty

i) This Limited Warranty shall be invalidated if the product's outer case has been opened and internal modifications have been made or damage has occurred, or upon the occurrence of other damage or failure not attributable to normal wear and tear. Authorized modifications with Clear-Com's express written permission will not invalidate the warranty.

g) Software Updates

i) Software Updates are released periodically to correct discovered program bugs. During the Warranty Period, software updates are available to Customers free of charge.

h) Software Upgrades

i) Software Upgrades include new Features and/or Functional Enhancements and are not included as part of the Standard Warranty but may be purchased at the published rates.

ii) Note: In the absence of a Software Update containing a program correction and no available workaround to mitigate the problem, at the discretion of Service, Sales, Engineering, or Product Management, the Customer may be provided a Software Upgrade under warranty.

2. **Exclusions.** Services do not cover damage or failure caused by any occurrence beyond Clear-Com's reasonable control, including without limitation acts of God, fire, flooding, earthquake, lightning, failure of electric power or air conditioning, neglect, misuse, improper operation, war, government regulations, supply shortages, riots, sabotage, terrorism, unauthorized modifications or repair, strikes, labor disputes or any product failure that Clear-Com determines is not a result of failure in the Services provided by Clear-Com. Further Services excluded from this Agreement include: services required due to errors or omissions in Customer purchase orders; installation or maintenance of wiring, circuits, electrical conduits or devices external to the products; replacement or reconditioning of products which, in Clear-Com's opinion cannot be reliably maintained or properly serviced due to excessive wear or deterioration; Customer's failure to maintain the installation site in accordance with the environmental specifications of the products; or service on products removed from the location originally specified by Customer and/or reinstalled without the prior written approval of Clear-Com. Customer will pay Clear-Com's then current published charges to restore such Covered Products to a condition eligible for further service under this Agreement. Clear-Com shall be excused from and shall not be liable for any failure or delay in performance under this Agreement due to the foregoing or any causes beyond its reasonable control.

3. **Limitation of Liability. IN NO EVENT WILL CLEAR-COM BE LIABLE UNDER THIS AGREEMENT FOR ANY INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING WITHOUT LIMITATION LOST PROFITS), REGARDLESS OF THE FORM OF ACTION, EVEN IF ADVISED IN ADVANCE OF THE POSSIBILITY OF SUCH DAMAGES.**

4. **Assignment.** Neither party may assign this Agreement or any portion thereof without the prior written consent of the other, except in the event of a merger, sale of all or substantially all of the assets or other corporate reorganization.

5. **Ownership of replaced parts or product.** All replaced parts or products become the property of Clear-Com.

6. **Entire Agreement.** This Agreement constitutes the entire agreement between the parties with respect to the subject matter hereof, and supersedes all prior or contemporaneous proposals, oral or written, and all other communications between them relating to the subject matter of this Agreement.

TECHNICAL SUPPORT & REPAIR POLICY

NOVEMBER 1, 2008

In order to ensure that your experience with Clear-Com and our World Class products is as beneficial, effective and efficient as possible, we would like to define the policies and share some "best practices" that can accelerate any problem solving processes which we may find necessary and to enhance your customer service experience. Our Technical Support, Return Material Authorization, and Repair Policies are set forth below. These Policies are subject to revision and constantly evolve in order to address our Customers' and the Market's needs. Accordingly these are provided by way of guidance and for information only and may be changed at anytime with or without Notice.

TECHNICAL SUPPORT POLICY

a) Telephone, online, and e-mail technical support will be provided by the Customer Service Center free of charge during the Warranty Period.

b) Technical support will be provided free of charge for all software products under the following conditions:

i) The application, operating, and embedded software is installed on a product covered by Clear-Com's Limited Warranty, and:

(1) The software is at the current release level; or,

(2) The software is one (1) version removed from current.

ii) Older versions of software will receive "best-effort" support, but will not be updated to correct reported bugs or add requested functionality.

c) For Technical Support:

i) North and South America, (inc. Canada, Mexico, and the Caribbean) & US Military:

Hours:	0800 - 1700 Pacific Time
Days:	Monday - Friday
Tel:	+1 510 337 6600
Email:	CustomerServicesUS@vitecgroup.com

ii) Europe, the Middle East and Africa:

Hours:	0800 - midnight Central European Time

Days: Monday - Friday
Tel: +49 40 853 999 700
Email: TechnicalSupportEMEA@vitecgroup.com

iii) Asia-Pacific:
Hours: 0800 - 1700 Pacific Time
Days: Monday - Friday
Tel: +1 510 337 6600
Email: CustomerServicesAPAC@vitecgroup.com

d) Email Technical Support is available for all Clear-Com branded products free of charge for the life of the product, or two years after a product has been classified as obsolete, whichever comes first.

e) Support for Distributor and Dealer Sales

i) Distributors and Dealers may utilize the Customer Service Centers once a system has been installed and commissioned. Clear-Com Systems and Applications Engineers will provide support to the Distributor from the pre-sales stage through to satisfactory installation for new system purchases. Customers will be encouraged to contact their Dealer or Distributor with their installation and technical support enquires rather than using the Customer Service Centers directly.

f) Support for Direct Sales

i) Customers may utilize the Customer Service Centers once a system has been installed and commissioned by Clear-Com Systems and Applications Engineers, or in the case of project installations, once the Project Team has completed the hand-over to the Support Centers.

RETURN MATERIAL AUTHORIZATION POLICY

a) Authorizations: All products returned to Clear-Com or a Clear-Com Authorized Service Partner must be identified by a Return Material Authorization (RMA) number.

b) The Customer will be provided with an RMA number upon contacting Clear-Com Sales Support as instructed below.

c) The RMA number must be obtained from Clear-Com via phone or email prior to returning product to the Service Center. Product received by the Service Center without a proper RMA number is subject to return to the Customer at the Customer's expense.

d) Damaged equipment will be repaired at the Customer's expense.

e) Returns are subject to a 15% restocking fee.

f) Advance Warranty Replacements (AWRs);

i) *During the first 30 days of the Standard Warranty Period:* Once the equipment fault has been verified by Clear-Com or its authorized representative, Clear-Com will ship a new replacement product. The Customer will be provided with an RMA number and be required to return the faulty equipment within 14 days of receipt of the replacement or will be invoiced for the list price of a new product.

ii) *During days 31-90 of the Standard Warranty Period:* Once the equipment fault has been verified by Clear-Com or its authorized representative, Clear-Com will ship a like-new, fully refurbished replacement product. The Customer will be provided with an RMA number and be required to return the faulty equipment within 14 days of receipt of the replacement or will be invoiced for the list price of a new product.

iii) To obtain an RMA number or request an AWR:

(1) North and South America, Asia-Pacific, and US Military:

Hours:	0800 - 1700 Pacific Time
Days:	Monday - Friday
Tel:	+1 510 337 6600
Email:	SalesSupportUS@vitecgroup.com

(2) Europe, the Middle East and Africa:

Hours:	0800 - 1700 GMT + 1
Days:	Monday - Friday
Tel:	+ 44 1223 815000
Email:	SalesSupportEMEA@vitecgroup.com

iv) Note: AWRs are not available for UHF WBS Analog wireless intercom systems. UHF WBS Analog wireless intercom systems out-of-box failures must be returned to Alameda for repair.

v) Note: Out-of-box failures returned after 90 days will be repaired and not replaced unless approved by Clear-Com Management.

vi) Note: AWRs are not available after 90 days of receipt of product unless an AWR Warranty Extension is purchased at the time of product purchase.

vii) Note: Shipping charges, including duties, taxes, and insurance (optional), to Clear-Com's factory is the responsibility of the Customer. Shipping AWRs from Clear-Com is at Clear-Com's expense (normal ground or international economy delivery). Requests for expedited shipping (E.g. "Next-Day Air") and insurance are the responsibility of the Customer.

REPAIR POLICY

a) Repair Authorizations: All products sent to Clear-Com or a Clear-Com Authorized Service Partner for repair must be identified by a Repair Authorization (RA) number (see above).

b) The Customer will be provided with an RA number upon contacting Clear-Com Customer Services as instructed below.

c) The RA number must be obtained from Clear-Com via phone or email prior to returning product to the Service Center. Product received by the Service Center without a proper RA number is subject to return to the Customer at the Customer's expense.

d) Return for Repair

i) Customers are required to ship equipment at their own cost (including transportation, packing, transit, insurance, taxes and duties) to Clear-Com's designated location for repair.

(1) Clear-Com will pay for the equipment to be returned to the Customer when it is repaired under warranty.

(2) Shipping from Clear-Com is normal ground delivery or international economy. Requests for expedited shipping (E.g. "Next-Day Air") and insurance are the responsibility of the Customer.

ii) **Clear-Com does not provide temporary replacement equipment ("loaner") during the period the product is at the factory for repair.** Customers should consider a potential prolonged outage during the repair cycle, and if required for continuous operations purchase minimum spare equipment required or purchase an AWR Warranty Extension.

iii) No individual parts or subassemblies will be provided under warranty, and warranty repairs will be completed only by Clear-Com or its Authorized Service Partners.

iv) Customers requesting a non-warranty repair will be provided an estimate of the total repair cost prior to the return of the equipment. In the event that Clear-Com is unable to estimate

the cost of repair, the Customer may elect to return the product to the factory for an estimate. The Customer is responsible for shipping costs both to and from the factory in the event they choose not to accept the estimate.

v) The Customer must provide either a purchase order for the repair work, or will be required to make an advance payment (as a debit against the Dealer's line of credit, or credit card) prior to the repaired product being returned to the Customer.

vi) For requesting a Repair Authorization number:

(1) North and South America, Asia-Pacific, and US Military:

Hours:	0800 - 1700 Pacific Time
Days:	Monday - Friday
Tel:	+1 510 337 6600
Email:	CustomerServicesUS@vitecgroup.com

(2) Europe, the Middle East and Africa:

Hours:	0800 - midnight Central European Time
Days:	Monday - Friday
Tel:	+49 40 853 999 700
Email:	TechnicalSupportEMEA@vitecgroup.com

vii) Note: Clear-Com's Limited Warranty does not cover normal wear and tear. The Customer will be charged the full cost of the repair if their equipment has been tampered with by non-approved personnel, or has been subject to damage through electrical failure, liquid damage or mishandling. The Customer Service Center will provide the Customer with a cost estimate for any such repairs prior to undertaking the work.