ECLIPSE MATRIX INSTALLATION

Instruction Manual

Eclipse Matrix Installation Instruction Manual

Part Number 810298Z Rev. 7

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IMPORTANT SAFETY INSTRUCTIONS

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

Please read and follow these instructions before operating an Eclipse 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 installation directions 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.

Please familiarize yourself with the safety symbols in Figure 1. When you see these symbols on an Eclipse 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

INSTALLATION OVERVIEW

INTRODUCTION

The Eclipse Matrix Installation Instruction Manual describes the steps required to install an Eclipse matrix system and customize it. The manual provides information about placing, powering, and wiring components of the Eclipse system.

This manual describes how to install an Eclipse matrix system.

It is highly recommended that the instruction manual for the matrix to be installed is read before attempting an installation. That manual describes the specific Eclipse system hardware and defines many of the concepts used in the system. An overall understanding of the system is necessary to make maximum use of its vast capabilities.

Caution: *Servicing instructions are for use by qualified personnel only. To reduce the risk of electric shock, do not perform any servicing other than that contained in the operating instructions unless qualified to do so. Refer all servicing to qualified service personnel.*

Each product manual in the Eclipse set gives additional installation information.

The information in this manual is presented as follows:

Chapter 1. Installation Overview: Step-By-Step Installation Information

The first chapter provides a step-by-step installation guide for the components of the Eclipse matrix system as received from the factory.

Chapter 2. Placing System Components

The second chapter describes the Eclipse matrix system's component location requirements, including a summary of component sizes.

Chapter 3. Powering System Components

The third chapter provides guidelines for providing AC power to the system and for planning the powering of interface frames.

Chapter 4. Wiring System Components

The fourth chapter gives an overview of the various wiring systems for connecting panels and interfaces to the matrix. This chapter contains reference information necessary to wire all connectors in the Eclipse system. However, many of the components have internal jumpers and adjustments. Information on internal jumpers, adjustments, and device specifications can be found in the individual manuals for each component.

Chapter 5. Connecting Matrices

The fifth chapter provides information on linking matrices.

STEP-BY-STEP INSTALLATION

To install an Eclipse matrix system:

1. Verify the shipment.
2. Select locations for the components.
3. Determine the wiring requirements.
4. Install components in rack.
5. Install cables.
6. Connect cable and auxiliary wiring.
7. Connect to mains AC Power.
8. Configure the system with the Eclipse Configuration System (ECS) software.
9. Verify the operation of the system.

1. Verify the Shipment

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

Check the packing list and verify that every item on the list has been received. Pay special attention to options that have been installed in intercom panels. Panel options are printed on each panel's rear cover.

Save all packing materials (boxes, Styrofoam filler, etc.), since they will be needed if any item must be returned because it was shipped by mistake, because of malfunction, or for warranty service.

2. Select Locations for the Components

Select locations for the central matrix, intercom panels, interface modules, computer, and any other system components. For additional information on limitations imposed on location by the Eclipse matrix system see Chapter 2, "Placing System Components."

3. Determine the Wiring Requirements

Eclipse requires shielded category-5 (CAT5) cable with RJ-45 connectors on either end; however, there are various methods available to deliver these cables from one place to another. For more information on RJ-45 connectors and their installation, refer to Chapter 4, "Wiring System Components."

All Eclipse panels have built-in RJ-45 connectors. Shielded CAT5 cables are available with RJ-45 terminations already installed. Bulk RJ-45 connectors can be bought and installed on custom length cables.

4. Install Components in Rack

Install the matrix in a standard Electronics Industry Association 19-inch wide (48.26 cm) equipment rack. The matrix requires adequate ventilation. Leave at least 2 inches (50.8 mm) of clearance on all sides of the matrix to ensure proper airflow. Do not block ventilation vents.

Check the position of circuit cards, power supplies, and rear-connector panels. Refer to the appropriate manual in the Eclipse set of manuals for detailed information on installing a particular frame in the rack.

- For matrices, refer to the *Eclipse Omega Matrix Instruction Manual (part 810290Z),* the *Eclipse Median Matrix Instruction Manual (part 810347Z)*, the *Eclipse Pico Matrix Instruction Manual (part 810348Z)* or the *Eclipse-32 Matrix Instruction Manual (part 810315Z)* as appropriate for complete installation requirements.
- For interface frames, refer to the appropriate instruction manual for either the IMF-3, IMF-102, or DIF-102 interface frame (part 810313Z).

5. Install Cables

Install the wiring between the Eclipse matrix and the system components. Usually the connectors are wired to the cables after the cables are routed. For further information refer to Chapter 4, “Wiring System Components.”

Install the DC power cables that connect the power supply or supplies to the IMF-3 interface frame. Connect the mains AC power cables for the matrix frame and each panel. For further information refer to Chapter 3, “Powering System Components.”

6. Connect Cables and Auxiliary Wiring

There are several different types of wiring necessary to connect an Eclipse system. The following is a summary of the subjects.

Analog Panel Wiring - Connect the intercom panels to the matrix using shielded CAT5 4-twisted pair cables with RJ-45 connectors. At each panel there may be other connector wiring necessary depending on the options and accessories installed.

Digital Panel Wiring - The DIF-102 interface frame holds two DIG-2 interface modules. Each DIG-2 interface module connects two digital intercom panels to the matrix. Connect the intercom panels to the DIG-2 interface using double shielded (braid and foil) 24 AWG conductor CAT-6 enhanced STP cable (CAT-6E) with RJ-45 connectors. At each panel there may be other connector wiring necessary depending on the options and accessories installed.

Interface Wiring - Connect the interface modules to the matrix using shielded CAT5 4-twisted pair cables with RJ-45 connectors. Each interface type requires particular wiring schemes on the DB-9

connectors on the rear of the associated IMF-3 frame per the actual application. Special interfaces such as the RLY-6 and GPI-6 are connected directly via an RJ-45 connector on the rear of the matrix to the appropriate interface input connector on an IMF-3 frame.

External Computer - To connect the computer to the Eclipse matrix, use the supplied DB-9 cable or a commercially available shielded RS-232 cable. If an RS-232 cable is used, be sure it provides the connections described in "Wiring for Serial Connection" in Chapter 4.

Note: If the ECS computer does not have a serial port, but only offers USB, adapters are available from computer parts suppliers.

The matrix can be connected to an Ethernet network through the two standard RJ-45 Ethernet connectors labeled LAN 1 and LAN 2 on the Eclipse matrix. Ethernet connection allows one or more matrices to be controlled from one or more computers on a network. See Chapter 4 for more information.

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

Note: Shielded CAT-5 cable should be used.

External Alarm Connection - Eclipse matrices have built-in fault alarm systems. If it is desirable to repeat this alarm with some remote alarm, relay contacts are available on the matrix frame's rear panel. If some external alarm condition needs to be added to the frame's alarm system, the same connector on the rear panel ALARM I/O will allow an external contact closure to be connected to the frame's alarm system.

Note: Shielded cables should be used.

7. Connect to Mains AC Power

Each component of the Eclipse system requires AC power except for the IMF-3 and some expansion panels. The IMF-3 requires an external power supply. The XP-type expansion panels receive power from the panels to which they are connected.

Matrices

Eclipse matrices have two separate AC power connectors for two separate power supplies in the system. Either power supply will completely power a system, providing 100% power redundancy. If the two power supplies are connected to different AC power sources and one of the power supplies loses power, the other will continue to operate the system.

AC voltage for the matrices and the PSU-101 can be 100 to 240 VAC without any switching or fuse changes.

Panels

V-Series Panels

Each V-Series panel (V12LD, V12PD, V24LD, V24PD, V12LDD, V12PDD, V12LDE, V12PDE) has an external power supply. AC voltage for these panels can be 100 to 240 VAC without any switching or fuse changes.

4000 Series II Panels

Each 4000 Series II panel (4212, 4215, 4222, 4224, 4226, 4294, 4203, 4206, 4230, 4230V) has an external power supply. AC voltage for these panels can be 100 to 240 VAC without any switching or fuse changes.

ICS Panels and i-Stations

Each ICS-2003 and ICS-1016 panel has an external power supply. A bracket has been provided to mount this external supply if necessary. AC voltage for these panels can be 90 to 260 VAC without any switching or fuse changes.

The ICS-102/92/62/52 panels have wall-mounted transformers for 110 VAC and in-line transformers for 220 VAC. Confirm that the correct ones have been supplied for the installation.

The i-Stations have internal power supplies, with removable AC power cords. The power supplies are “universal,” operating over a voltage range of 90 to 245 VAC and 50 to 60 Hz. The maximum dissipation is 40 W.

Each panel will need to be plugged into an AC source at its location.

8. Configure the System

The Eclipse Configuration System (ECS) programming software allows the system to be configured for the operating environment. With this software a system administrator can assign port or panel names, declare interface port functions, assign “labels” to keys on panels, and perform many other functions. Refer to the Eclipse Configuration System Manual for instructions on using the software.

9. Verify the Operation of the System

Once the system is configured, a detailed check of each panel, interface connection, control function, and other features should be performed. Each audio path, relay output, and control input needs to be exercised to verify proper operation. Each software function, such as Party Lines, ISO, and IFB must be verified. Each installation is different, so it is beyond the scope of this manual to outline in detail this phase.

Matrix Indicators to Verify

Eclipse Omega

There are many lights on the front of the matrix that indicate its operational status. Proper operation of the matrix is indicated by the following:

1. The two power supply lights, labeled “+5V” and “+3.3V” illuminate green steadily to indicate that the power supplies are present.
2. The dot-matrix array of lights displays a number to indicate which of the four stored configurations in the CPU card’s memory is currently operating. The configuration number displays for a short time after power up or upon configuration selection.
3. The “OK” light flashes to indicate that the CPU card software is running.
4. The “master” light illuminates steadily on the currently active CPU card, indicating that the CPU card is properly installed and operating correctly.

Eclipse Median

There are many lights on the front of the matrix that indicate its operational status. Proper operation of the matrix is indicated by the following:

1. The two power supply lights, labeled “+5V” and “+3.3V” illuminate green steadily to indicate that the power supplies are present.
2. The dot-matrix array of lights displays a number to indicate which of the four stored configurations in the CPU card’s memory is currently operating. The configuration number displays for a short time after power up or upon configuration selection.
3. The “OK” light flashes to indicate that the CPU card software is running.
4. The “master” light illuminates steadily on the currently active CPU card, indicating that the CPU card is properly installed and operating correctly.

Eclipse Pico

The following front-panel indicators indicate a properly operating Eclipse Pico matrix:

1. The two PSU alarm lights, labeled “1” and “2” do not illuminate under normal operating conditions.
2. One of the four green configuration lights illuminates steadily to identify the currently active configuration.
3. The “OK” light flashes to indicate that the Eclipse-32 is running successfully.
4. If the matrix is connected to a local area network, the green LAN UP light illuminates steadily. The yellow RX light flashes when data is being received.

Eclipse-32

The following front-panel indicators indicate a properly operating Eclipse-32 matrix:

1. The two PSU alarm lights, labeled “1” and “2” do not illuminate under normal operating conditions.
2. One of the four green configuration lights illuminates steadily to identify the currently active configuration.
3. The “OK” light flashes to indicate that the Eclipse-32 is running successfully.
4. If the matrix is connected to a local area network, the green LAN UP light illuminates steadily. The yellow RX light flashes when data is being received.
5. An illuminated port status light indicates that communications are running properly between the matrix and the device connected to that port.

2 PLACING SYSTEM COMPONENTS

COMPONENT LOCATION REQUIREMENTS

This chapter provides guidelines for placing and arranging the main components of an Eclipse system, including:

- Eclipse matrices
- Interface frame(s) and power supplies
- Intercom panels and accessory panels
- External computer

ECLIPSE MATRICES

The Eclipse matrix is the central connecting point of the system. All panels, interfaces, and external devices must be connected directly to the Eclipse matrix, so it should be centrally located. The system matrix may be an Eclipse Omega, Eclipse Median, Eclipse Pico or an Eclipse-32, depending on site requirements.

A matrix should be placed in the center portion of a standard Electronics Industry Association 19-inch wide (48.26 cm) rack, allowing easy access to the matrix's port connectors. Some planning is also necessary for the dressing of cables in the rack because of the large number of cables.

Note: A "rack unit" refers to a standardized unit of space in an Electronics Industry Association equipment rack. One rack unit is 1.75 inches high and 19 inches wide (or 482.6 mm by 44.45 mm). Each increasing "rack unit" adds 1.75 inches to the area vertically, while staying at 19 inches horizontally.

Eclipse Omega Matrix

The Eclipse Omega matrix requires six vertical rack units (10.5 inches or 267 mm) in a standard Electronics Industry Association 19-inch wide (48.26 cm) rack. There are two power supplies in each matrix. A modular removable alarm module fitted beneath the two power supplies has two fans that deliver forced air cooling. The primary fan runs continuously. If the temperature in the matrix exceeds a set threshold and extra cooling is required, a secondary fan switches on to increase the air flow in the matrix.

The "fan-on" alarm light on the front of the alarm module illuminates red to indicate that the secondary fan is on. The red "fan-fail" alarm light illuminates when either fan stops rotating correctly. These alarm

lights allow the system operator to identify and correct the alarm conditions. See the *Eclipse Omega Matrix Instruction Manual* (part 810290Z) for more details.

Caution: *It is mandatory that the air flow through an Eclipse Omega matrix from the bottom to the top is unimpeded. If other equipment is mounted above and below the matrix that impedes the air flow through the matrix, it will be necessary to leave 1 RU of empty space above and below the Eclipse Omega matrix as over-heating will occur if this is not done. If the matrix is mounted in a portable case this air flow must not be impeded.*

Eclipse Median Matrix

The Eclipse Median matrix requires six vertical rack units (10.5 inches or 267 mm) in a standard Electronics Industry Association 19-inch wide (48.26 cm) rack. There are two power supplies in each matrix. A modular removable alarm module fitted beneath the two power supplies has two fans that deliver forced air cooling. The primary fan runs continuously. If the temperature in the matrix exceeds a set threshold and extra cooling is required, a secondary fan switches on to increase the air flow in the matrix.

The “fan-on” alarm light on the front of the alarm module illuminates red to indicate that the secondary fan is on. The red “fan-fail” alarm light illuminates when either fan stops rotating correctly. These alarm lights allow the system operator to identify and correct the alarm conditions. See the *Eclipse Median Matrix Instruction Manual (part 810347Z)* for more details.

Caution: *It is mandatory that the air flow through an Eclipse Median matrix from the bottom to the top is unimpeded. If other equipment is mounted above and below the matrix that impedes the air flow through the matrix, it will be necessary to leave 1 RU of empty space above and below the Eclipse Median matrix as over-heating will occur if this is not done. If the matrix is mounted in a portable case this air flow must not be impeded.*

Eclipse Pico Matrix

The Eclipse Pico matrix requires one vertical rack unit (1.75 in. or 44.45 mm) in a standard Electronics Industry Association 19-inch (48.26 cm) rack. A temperature-controlled fan cools the Eclipse Pico and forces air through the unit horizontally. An alarm light on the front panel of the Eclipse Pico alerts the system operator when the temperature-controlled fan activates.

Caution: *It is mandatory that the air flow across an Eclipse Pico matrix is unimpeded. The air flow in a standard 19-inch (48.26 cm) rack should be sufficient. If the matrix is mounted in a portable case, be sure the air flow is not impeded.*

Eclipse-32 Matrix

The Eclipse-32 matrix requires one vertical rack unit (1.75 in. or 44.45 mm) in a standard Electronics Industry Association 19-inch (48.26 cm) rack. A temperature-controlled fan cools the Eclipse-32 and forces air through the unit horizontally. An alarm light on the front panel of the Eclipse-32 alerts the system operator when the temperature-controlled fan activates.

Caution: *It is mandatory that the air flow across an Eclipse-32 matrix is unimpeded. The air flow in a standard 19-inch (48.26 cm) rack should be sufficient. If the matrix is mounted in a portable case, be sure the air flow is not impeded.*

INTERFACE FRAME(S) AND POWER SUPPLIES

Interface modules convert the 4-wire signals of a central matrix port to some other form of communication, such as for 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 connects to both the central matrix and to the non-4-wire device through cable attached to hardware connectors on the rear of the interface module. To house these interface modules, Clear-Com offers three types of interface frames, which are described in the following sections.

IMF-3 Interface Module Frame

The IMF-3 interface frame holds up to 11 interface modules in three rack units (3 RU) of a standard Electronics Industry Association 19-inch wide (48.26 cm) rack. The frame holds a modular, rear-mounted connector panel for each interface, containing two RJ-45 connectors for connecting cable to matrix ports, and two DB-9 connectors for connecting cable to non-4-wire devices. Figure 2-1illustrates the rear panel of an IMF-3 interface frame, with 11 rear-panel assemblies installed.

The frame uses an external PSU-101 rack-mounted power supply to supply power to the interface modules. A second PSU-101 can be attached for redundancy.

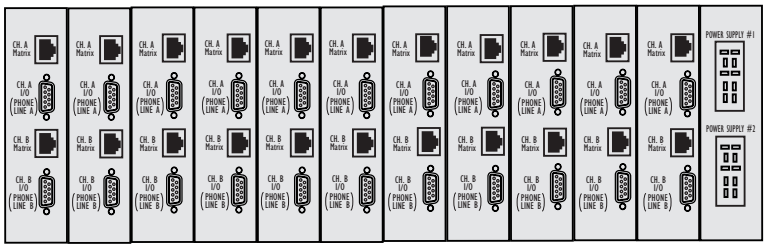


Figure 2-1: IMF-3 Interface Frame Rear Panel

Note: The IMF-3 frame has an individual rear panel for each interface. All interfaces use the same rear panel; however the use of the rear-panel connectors will vary with the type of interface.

Each interface features indicators and controls that must be accessible to system operators, so put the interface module frame(s) in a convenient location. Usually interface module frames are located near the matrix frame, but they can be located farther away. The maximum distance between the matrix frame and the interface frame is 500 feet (150 meters).

Each Eclipse frame contains its own power supplies and does not supply any power for interfaces. A separate power supply (PSU-101) is only necessary for interfaces mounted in IMF-3 frames. If redundant power supply pairs are used for interfaces, mount them together. For detailed information on power supply requirements, refer to Chapter 3, “Powering System Components”.

It is required that an extra rack unit (1.75 in. or 44.45 mm) is left above and below each external power supply unit. This allows for needed cooling for larger system loads.

IMF-102 Interface Module Frame

The IMF-102 interface frame has slots for two interface modules in one rack unit (1 RU) of a standard Electronics Industry Association 19-inch wide (48.26 cm) rack.

It has an internal power supply and a connector for a redundant power supply. Its rear input/output connector panel has two RJ-45 connectors and DB-9 connectors for each of the two interface modules. Figure 2-2 illustrates the rear panel of an IMF-102 interface frame, with two installed rear-panel assemblies.

Figure 2-2: IMF-102 Interface Frame Rear Panel

DIF-102 Interface Module Frame

The DIF-102 interface frame has slots for two digital DIG-2 interface modules in one rack unit (1 RU) of a standard Electronics Industry Association 19-inch (48.26 cm) rack. DIG-2 interface modules allow the matrix to connect to digital versions of Clear-Com intercom panels.

The DIF-102 frame is powered by one or two (for redundancy) external AC mains to 24 VDC power supplies via locking DIN connectors on the DIF-102 rear panel. All other voltages are derived directly or indirectly from the 24 VDC on the DIG-2 front and rear cards.

The DIF-102 should be located in the same building as the Eclipse frame. It can be located up to 3000 feet (1000 meters) from an Eclipse frame.

INTERCOM PANELS AND EXPANSION PANELS

Locate all intercom panels at comfortable heights for operation. Leave at least 2 inches (50.8 mm) of clearance behind the panel chassis to allow for cable connectors. In some low-light conditions, the front-panel display for the ICS-2003 may be too bright. Refer to the ICS-2003 manual for “display brightness adjustment” (part 810303Z).

Accessory panels such as the XPL, AP, or EXP that are intended to expand or enhance the operation of panels are usually mounted just above or below the panel with which they are associated. They can be located up to 25 ft. (7.62 m) away from the panel. A 6-ft. (1.8 m) cable is supplied to connect them.

Expansion panels such as the V12LDE, V12PDE, PD4203, PD4206, PD4230 and PD4230V may be mounted as required.

Panels should not be more than 3,000 ft. (1000 m) from the Eclipse matrix frame to which they are connected.

EXTERNAL COMPUTER

The Eclipse Configuration System (ECS) runs on an external computer that connects to the matrix frame via a standard PC serial port to a DB-9 RS-232 connector. The maximum recommended length of the cable is approximately 10 feet (3.04 meters).

Note: If the ECS computer does not have a serial port, but only offers USB, adapters are available from computer parts suppliers.

ECS can also use an Ethernet network connected to the frame through the two standard RJ-45 Ethernet connectors labeled LAN 1 and LAN 2. Ethernet connection allows single or multiple PCs on the network to control, configure, monitor, and diagnose single or multiple matrices.

3 POWERING SYSTEM COMPONENTS

POWER REQUIREMENTS

Each matrix is equipped with two power supplies that can be connected to separate branches of AC mains, providing redundancy for the power supplies and the power sources.

Power requirements differ for each component of an Eclipse system. This chapter gives guidelines for providing power to the following components:

- Matrices
- V-Series panels
- 4000 Series II panels
- i-Series intercom panels
- ICS-2003 intercom panels
- ICS-1008/ICS-1016 intercom panels
- ICS-52/62/92/102 intercom panels
- XPL-12/22 display expansion panels and AP-22 assignment panels
- Interface frames

MATRICES

Electrical power for an Eclipse Omega, Median or Pico matrix or for an Eclipse-32 matrix originates from AC mains line current, which in turn provides power to the matrix's internal DC power supplies. Each matrix is equipped with two power supplies that can be connected to separate branches of AC mains, providing redundancy for the power supplies and the power sources.

If an AC power source shuts off for any reason, a matrix can continue to operate from the second AC power source. If one power supply fails, a matrix can continue to operate from the second supply.

If one of the two DC power supplies fails, an "alarm" failure condition will activate to provide the system operator with an opportunity to repair or replace the supply while the second supply powers the system.

Eclipse Omega Matrix

The Eclipse Omega matrix has two internal, Euro Cassette, plug-in power supplies. 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 two power supplies already installed. When the matrix is received, connect each of the power supplies to a dedicated branch of AC mains power using the IEC power connectors on the Eclipse Omega frame's rear panel.

A fully equipped Eclipse Omega frame requires 100 to 240 VAC at 50 to 60 Hz with a maximum dissipation of 300 W.

Eclipse Median Matrix

The Eclipse Median matrix has two internal, Euro Cassette, plug-in power supplies. 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 two power supplies already installed. When the matrix is received, connect each of the power supplies to a dedicated branch of AC mains power using the IEC power connectors on the Eclipse Median frame's rear panel.

A fully equipped Eclipse Median frame requires 100 to 240 VAC at 50 to 60 Hz with a maximum dissipation of 300 W.

Eclipse Pico Matrix

The Eclipse Pico matrix has two internal 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 an outage on one of the AC mains circuits.

The power supplies are "universal", operating over a voltage range of 100 to 240 VAC at 50 to 60 Hz.

An Eclipse Pico matrix requires 100 to 240 VAC at 50 to 60 Hz with a maximum dissipation of 40 W.

Eclipse-32 Matrix

The Eclipse-32 matrix has two internal 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 an outage on one of the AC mains circuits.

The power supplies are "universal," operating over a voltage range of 100 to 240 VAC at 50 to 60 Hz

An Eclipse-32 matrix requires 100 to 240 VAC at 50 to 60 Hz with a maximum dissipation of 40W.

INTERCOM PANELS

V-Series Panels and Expansion Panels

Each V-Series panel or expansion panel has a separate external DC power supply. The power supply is “universal”, operating over a voltage range of 100 to 240 VAC at 50 to 60 Hz. The maximum dissipation is 50W.

4000 Series II Panels and Expansion Panels

Each 4000 Series II panel or expansion panel has a separate external DC power supply. The power supply is “universal”, operating over a voltage range of 100 to 240 VAC at 50 to 60 Hz. The maximum dissipation is 30W.

i-Series Intercom Panels

Each i-Station has an internal power supply, with a removable AC power cord. The power supply is “universal”, operating over a voltage range of 90 to 245 VAC and 50 to 60 Hz. The maximum dissipation is 40W.

ICS-2003 Intercom Panels

Each ICS-2003 intercom panel has a separate external DC power supply. The power supply is “universal,” operating over a voltage range of 90 to 260 VAC at 45 to 65 Hz. The maximum dissipation is 30W.

ICS-1008/ICS-1016 Intercom Panels

Each ICS-1008/ICS-1016 intercom panel has a separate external DC power supply. The power supply is “universal”, operating over a voltage range of 90 to 260 VAC at 45 to 65 Hz. The maximum dissipation is 30W.

ICS-52/62/92/102 Intercom Panels

Each ICS-52/62/92/102 intercom panel is powered by a transformer that runs off of AC mains power: the 120-V transformer requires a two-conductor wall outlet, and is housed in a 2 x 2 x 3 in. (5 x 5 x 7.6 cm) direct plug-in module; the 240-V transformer requires a three-conductor wall outlet, and is housed in a 2 x 3 x 5 in. (5 x 7.6 x 12.7 cm) box located in the middle of its cable’s length. Each transformer connects to each compact panel with the 2.1 mm coaxial power connector on the rear of the panel.

An ICS-102/92/62/52 intercom panel requires 90 to 125 or 210 to 250 VAC at 45 to 65 Hz with a maximum dissipation of 40W.

XPL-12/22 Display Expansion Panels and AP-22 Assignment Panels

XPL-12/22 display expansion panels and AP-type assignment panels require an external transformer identical to those used with the 1 RU panels (90 to 125 or 210 to 250 VAC at 45 to 65 Hz with a maximum dissipation of 40W).

INTERFACE MODULE FRAME POWER SUPPLY REQUIREMENTS

IMF-3 Interface Module Frame

As a rule-of-thumb, one PSU-101 power supply unit is required for every two IMF-3 frames. There are two exceptions to this rule. The first exception occurs when the frames have a large number of CCI-22 party-line interfaces which require no DC power from the IMF-3 frame. However, an IMF-3 with only CCI-22 interfaces still needs to be connected to a PSU-101 as the IMF frame itself needs some DC power for the circuitry on its rear panel.

The second exception occurs when using multiple TEL-14 telephone interfaces. An IMF-3 interface frame will only power eight TEL-14 interfaces. If more TEL-14 interfaces are required, they must be installed in a second IMF-3 frame with a second power supply.

A PSU-101 requires 90 to 260 VAC at 45 to 65 Hz with a maximum dissipation of 80 W. A PSU-101 connected for redundancy requires very little AC current unless it is used.

An audible alarm is included in the PSU-101, and an additional set of alarm-relay contacts are provided on the supply. Clear-Com recommends that these contacts be connected to the external alarm input of the matrix frames. If any of the power supplies in the PSU-101 fails, it would cause a system alarm. LEDs on the front of the PSU-101s will indicate the failure.

For more information on interface frames, refer to the Interface Frames Instruction Manual.

Installing two PSU-101 power supplies per application provides redundancy because either of the two PSU-101 power supplies can power a complete system. If one fails, it can be removed without interruption of the entire system. Rear panel connectors provide easy parallel connection to the IMF-3 Interface Module Frame.

The current capacities of the power supplies are as follows:

- +9 V analog 3.0 A
- -9 V analog 3.0 A

The following chart provides the current drain of the +/- analog power supplies for all components in the system. Some devices, such as interfaces, have a varying current depending on the operation of features. In applications where it is possible to activate all operating features of all components used, use the maximum current column for planning.

Component	Average Current	Maximum
IMF-3 Frame	0.20 A	0.20 A
CCI-22	0.00 A	0.00 A
FOR-22	0.07 A	0.15 A
TEL-14	0.28 A	0.37 A
RLY-6	0.10 A	0.15 A
GPI-6	0.02 A	0.02 A

Table 3-1: Interface Current Consumption

Figure 3-1 shows the PSU-101 to IMF-3 wiring possibilities.

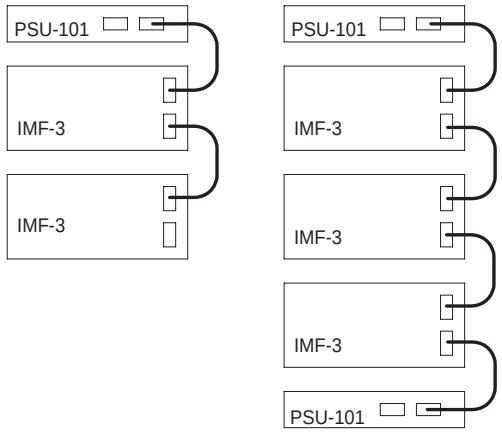


Figure 3-1: PSU-101 to IMF-3 Wiring

IMF-102 Interface Module Frame

The IMF-102 interface frame has an internal power supply and a rear-panel connector to provide redundant power. The IMF-102 requires 90 to 250 VAC with a maximum dissipation of 20 watts.

DIF-102 Interface Module Frame

The DIF-102 interface frame is powered by one or two (for redundancy) external AC mains to 24 VDC power supplies via locking DIN connectors on the DIF-102 rear panel. All other voltages are derived directly or indirectly from the input 24 VDC on the DIG-2 front and rear cards.

The DIF-102 frame has a PSU fail-alarm output provided by Form C relay change-over contacts made available on a 9-way make D connector on the DIF-102 rear panel.

4 WIRING SYSTEM COMPONENTS

SUMMARY OF WIRING SYSTEMS

This chapter describes how to connect an Eclipse matrix to its remote panels and interfaces and to other Eclipse matrices using fiber-optic cable. Most panels and interfaces connect to a matrix via single 4-pair shielded RJ-45 terminated cables.

For more detail about component placement, specifications of individual products, and internal adjustments, refer to the individual manual for each product. To configure panels and interfaces, refer the *Eclipse Configuration System (ECS) Manual* (part 810299Z).

The following wiring topics are discussed:

- Wiring RJ-45 cables.
- Wiring an Eclipse matrix to an external computer, to a local area network, to analog and digital intercom panels, to general-purpose outputs, to general-purpose inputs, to an external alarm, and directly to a 4-wire audio device.
- Using E-FIB cards to connect Eclipse Omega and Median matrices using fiber-optic cable.
- Wiring an Eclipse matrix to the following interfaces: FOR-22 interface, CCI-22 interface, TEL-14 interface, RLY-6 interface, and GPI-6 interface.
- Wiring an ICS panel miscellaneous connector.
- Wiring an OPT-100 auxiliary audio I/O option connector.
- Wiring an ICS panel accessory connector.

Note: Single-pair digital wiring requires double-shielded 24 AWG conductor CAT-6E enhanced STP cable.This wiring is discussed only in general in this manual. For more detailed instructions, refer to the individual manual for each product.

RJ-45 CABLES

The following section discusses the use of RJ-45 connectors for connecting an Eclipse frame to panels and interfaces. It includes the following topics:

- General discussion about RJ-45 connector cables
- Clear-Com kits and recommendation
- Installing RJ-45 connectors.

General Discussion About RJ-45 Connector Cables

The system wiring is with shielded CAT5 twisted cable with RJ-45 connectors on either end; however, there are various methods available to deliver these cables from one place to another.

All Eclipse matrix panels have built-in RJ-45 connectors. Direct 4-pair cable with RJ-45 connectors on either end can connect an Eclipse matrix port to an individual panel.

Shielded CAT5 cables are available with RJ-45 terminations already installed. Bulk RJ-45 connectors can be bought and installed on custom length cables.

The term “category 5” (CAT5) refers to a communications cable standard that calls out transmission characteristics of twisted-pair cables for data communication use. For each increasing “category” (CAT) number the guaranteed bandwidth for data communication purposes is higher.

For the 4-pair wiring scheme between the frame panels, Eclipse uses the AT&T T568B wiring standard for data cables. Cables for use with Ethernet 10-BASE-T are of this type. Cables are available in solid or stranded wire in #24 or #26 AWG.

Clear-Com Kits and Recommendation

There are at least five different wiring standards that use the RJ-45 connector. Although they look identical, many pre-made cables and utility items, like couplers, will not work properly. It is essential to know what wiring standard is used in any accessories.

Note: Long runs with flat cable are not acceptable. The data and audio pairs are not twisted, therefore the crosstalk within the cable is high.

The T568B standard is a mature, well supported standard that allows many advantages. Fast easy termination of cables as well as the availability of a vast array of wiring adapters and patching systems allow great versatility for all applications of intercom wiring. RJ-45 connectors are easy and fast to connect to equipment. T568A cables differ only on the color of the insulation on pairs 2 and 3. If the ends are

not being removed from a pre-made cable this will not be a problem. Be aware that if the ends are removed from a pre-made cable to shorten or to punch onto blocks, pair 2 and 3 colors may be different.

Caution: *Make sure the type of RJ-45 connector matches the wire type. Connectors are available for both stranded and solid wire. Clear-Com intercom panels do not require keyed connectors. Please refer to the following list for connector vendor and port numbers.*

Clear-Com recommends that all cables are thoroughly tested before connecting them.

The following products are recommended as possible sources for cables, connectors and tools:

- Crimper - Siemon PT908 or AMP 2-231652-1 with 853400-1 dies
- Stripper - Siemon CPT
- Tester - Siemon STM-8
- Connector RJ-45 Shielded 26-22 AWG Stranded or Solid RJ-45 - Siemon PS-8-8
- CINCH FA-25PS/1-LF 25W D-type in-line 1000pF filter (UK supplier: Farnell 111-4108)
- Ferrite - Würth Electronik part: 74271132

Installing RJ-45 Connectors

RJ-45 connectors can be a challenge to install correctly unless some of the following techniques are followed. Like most wiring skills, once the “tricks” are known it is fairly easy. It is very strongly suggested that the work is tested with a cable checker.

The technique that will transform this task from tedious to easy is described next. The main hurdle in putting RJ-45 connectors on correctly is the tendency of the wires to slip out of the correct order as the prepared cable end is inserted into the connector. To avoid this problem, try the following:

1. Strip enough jacket off the cable to be able to grasp the wires and pull the jacket back.
2. Untwist the wires and pull them into the correct order and let the jacket slip back to hold them in place.

If this is done correctly, the wires will stay in the correct order. Trim exposed wires to about 9/16 in. (14.28mm) and install into the connector.

The more detailed step-by-step instructions are:

1. Strip off enough of the outside vinyl jacket to be able to grip the wires inside easily (2 in. or 50.8 mm). While holding the four twisted pairs in one hand, slide back the vinyl jacket and clamp it between

your thumb and forefinger. Keep the jacket clamped in this retracted position until the fourth step.

2. Pull the twisted pairs to the one side and untwist them back to the edge of the vinyl jacket. Smooth the kinks out slightly by pulling the conductors through your fingers.
3. In the correct color sequence, pull one wire at a time, straight out, clamping it in place between your thumb and forefinger. If a wire must cross the others, make sure it does it inside the jacket. Make sure your color sequence matches the other side and it does not reverse. If you are rebutting a cable, verify color code. The twisted pairs must be positioned correctly.
4. While holding the wires in the correct order, release your clamped thumb and forefinger enough to allow the retracted jacket to slip back. You still need to maintain enough pressure on your thumb and forefinger to hold the jacket and wires flat but the individual wires should stay in the correct order without holding them with your other hand.
5. Cut the exposed wires to the correct length and slip them into the RJ-45 connector as you release your clamped thumb and forefinger. Crimp and test the cable.
6. Care must be exercised that the shield is not left pulled back inside the wire jacket. We also recommend that the drain wire is soldered to the side of a shielded style connector. Our tests show that a drain wire that is only crimped and not soldered will make an intermittent connection at best.

WIRING THE MATRIX TO A COMPUTER

WIRING FOR SERIAL CONNECTION

The serial connection to a PC is provided by the DB-9F connector labeled “RS-232” on the rear of an Eclipse Omega or Median matrix, or the DB-9F connector labeled “PC” on the front of an Eclipse-32 matrix, or the 3.5mm jack socket labelled “RS-232” on the front of an Eclipse PiCo.

Note: Shielded cable should be used.

The PC runs the Eclipse Configuration System (ECS) program. To configure the serial port, refer to the *Eclipse Configuration System Instruction Manual* (part 810299Z).

To connect a computer to the matrix, run cable from the matrix’s serial connector to the computer’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 4-1 shows the wiring for a 25-pin port. Figure 4-2 shows the wiring for a 9-pin port.

Note: If the ECS computer does not have a serial port, and only offers USB, adaptors are generally available from computer parts suppliers.

Wiring for PC to DB-9F Matrix Connectors

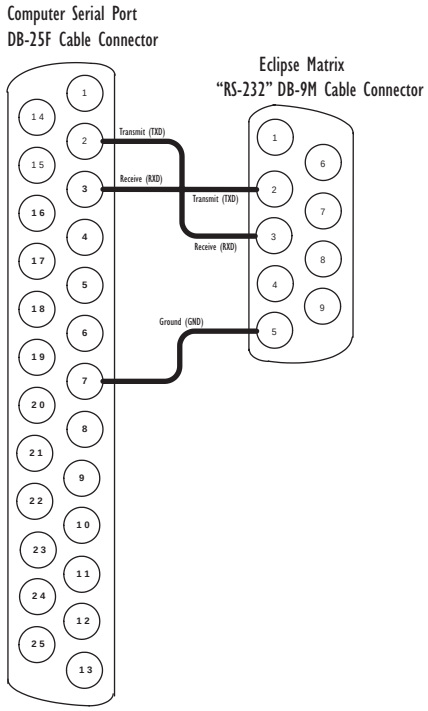


Figure 4-1: Computer DB-25F to Matrix DB-9M RS-232 Cable

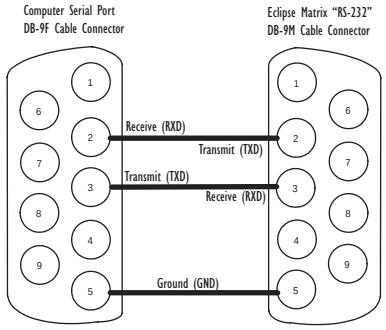


Figure 4-2: Computer DB-9F to Matrix DB-9M RS-232 Cable

Wiring for PC to 3.5mm Jack Matrix Connector

On the PC end, a DB-9F or DB-25F connector is used. Make sure that the data connections of pin 2 to jack plug tip and pin 3 to jack plug ring are followed, and that pin 5 (DB-9F) or pin 7 (DB-25F) goes through to the jack plug screen. The cable will now be ready to use. Table 4-1 gives the connection information for the DB-9F and Table 4-2 gives the connections for the DB-25F.

PC Connection (DB-9F)	Eclipse PiCo (3.5 mm jack)
1	N/C
2	Tip
3	Ring
4	N/C
5	Screen
6	N/C
7	N/C
8	N/C
9	N/C

Table 4-1: Pin Connection for PC DB-9F to Eclipse PiCo Cable

PC Connection (DB-25F)	Eclipse PiCo (3.5 mm jack)
1	N/C
2	Tip
3	Ring
4	N/C
5	N/C
6	N/C
7	Screen
8	N/C
9	N/C
10	N/C
11	N/C
12	N/C
13	N/C
14	N/C
15	N/C
16	N/C

PC Connection (DB-25F)	Eclipse PiCo (3.5 mm jack)
17	N/C
18	N/C
19	N/C
20	N/C
21	N/C
22	N/C
23	N/C
24	N/C
25	N/C

Table 4-2: Pin Connection for PC DB-25F to Eclipse PiCo Cable

WIRING FOR ETHERNET CONNECTION

To connect the matrix to a local-area network (LAN), use the RJ-45 sockets labeled “LAN 1” and “LAN 2” on the rear of the Eclipse Omega and Median matrices, or the RJ-45 socket labeled “LAN” on the rear of the Eclipse Pico and Eclipse-32 matrices. The connectors have standard Ethernet pin assignments, shown in Figure 4-3.

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

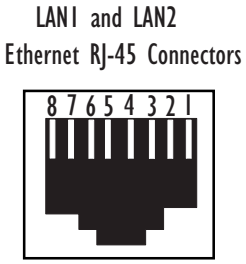


Figure 4-3: Pin Assignments for LAN 1 and LAN 2 Connectors

Note: Shielded CAT-5 cable should be used.

CONNECTING MATRICES WITH FIBER-OPTIC CABLE

Each fiber card link 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 cards use 9/125µ Single Mode fiber optic cables. On the rear card 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 standard maximum node length is 10km but other distances are available to special order.

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.

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.

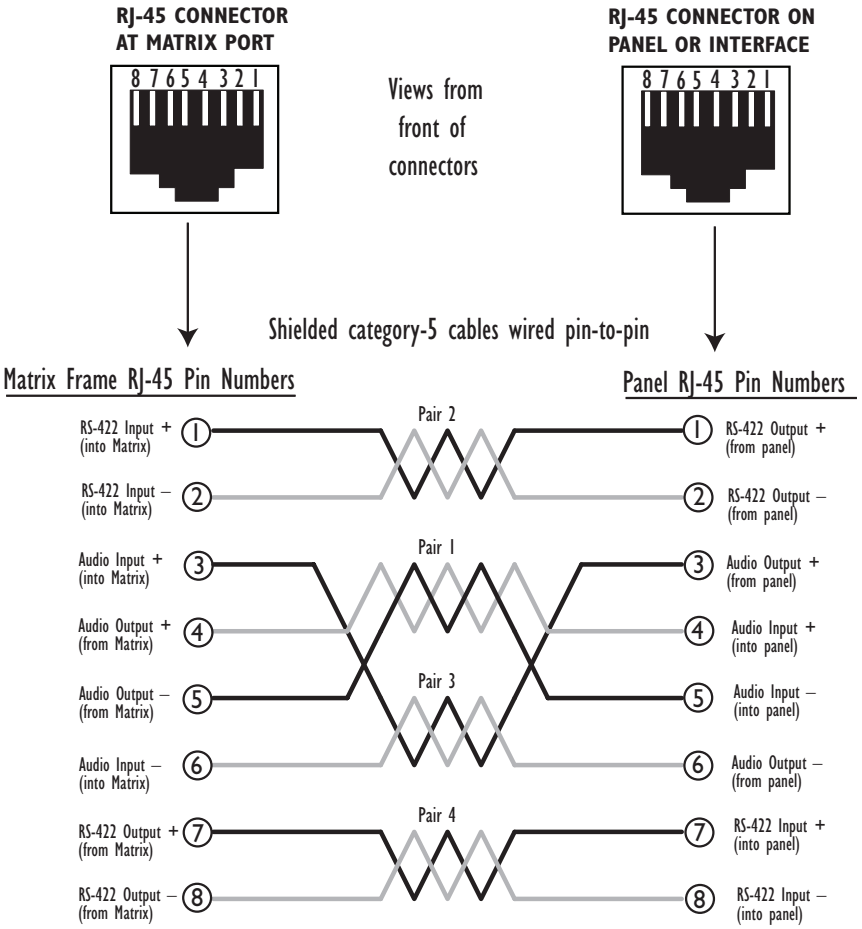
WIRING THE MATRIX TO INTERCOM PANELS

Eclipse uses a 4-pair (analog) or single-pair (digital) wiring scheme between the frame 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 4-4: Wiring Matrix to 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's rear cover is in the correct position for the intended use.

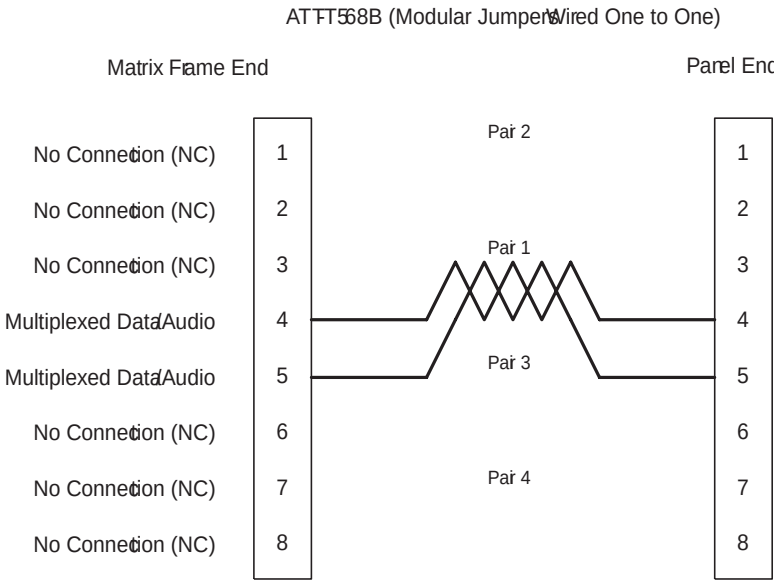


Figure 4-5: Wiring Matrix to Digital Panel Using RJ-45

WIRING THE MATRIX GENERAL-PURPOSE OUTPUTS

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's 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, in order to get the attention of a panel operator working in a high-noise environment, such as a control booth, a relay can be programmed to switch on a light at that panel each time the panel receives an incoming call, to ensure that the panel operator will not miss the call.

The male 25-pin D-type socket labeled "GP OUT" on the rear of the Eclipse matrix connects to eight general-purpose outputs (GPOs). The general purpose outputs are single-pole double-throw relays with contact ratings of 30 VDC (volts direct current) at 1 ampere. Shielded cable should be used to connect GPOs.

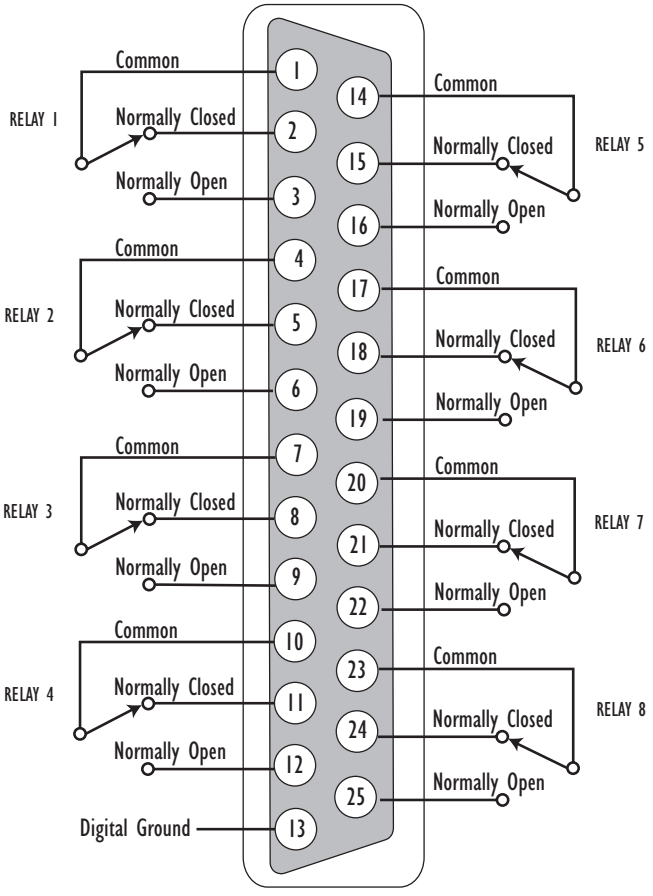
Note: If the GP-OUT port is used the following filter must be fitted between the PROC-RCC socket and the cable: CINCH FA-25PS/1 25W D-type in-line 1000pF filter (UK supplier: Farnell 111-4108).

Each general-purpose output has a relay inside the Eclipse Omega/Median frame. 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.

Figure 4-6 shows the pin configuration of the general-purpose outputs connector.

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 4-6: General-Purpose Outputs Connector Pinout

WIRING THE MATRIX TO GENERAL PURPOSE INPUTS

It is possible to connect an external logic device such as an external foot switch, a panel-mounted switch, or the logic output of some other device to the connector labeled “GP IN” on the rear of the Eclipse matrix. 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 the Eclipse Configuration System (ECS).

The DB-25 connector labeled “GP IN” on the rear of the Eclipse matrix connects to eight local general-purpose inputs. Figure 4-7 shows the pin assignments of the Eclipse general-purpose inputs connector.

Shielded cable should be used to connect General Purpose Inputs.

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-

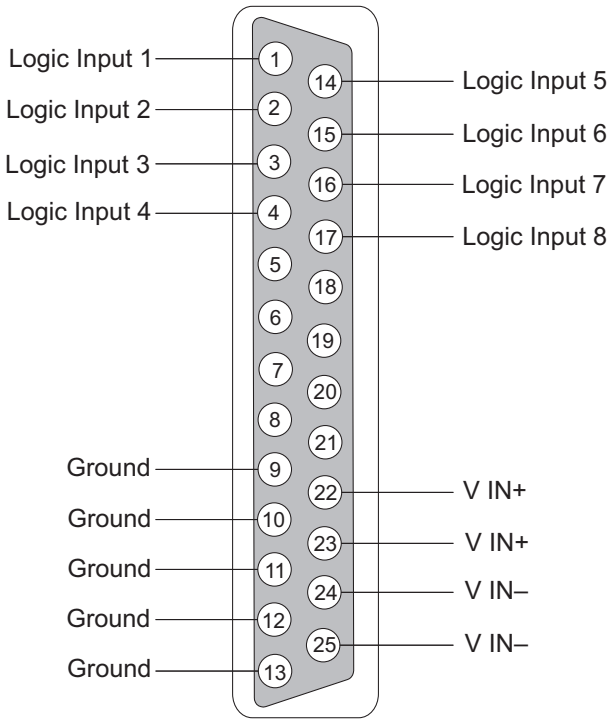


Figure 4-7: General-Purpose Inputs Connector Pinout

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. A voltage output on the GP IN connector supplies the current.

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-frame 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 4-8 shows the opto-isolated connection.

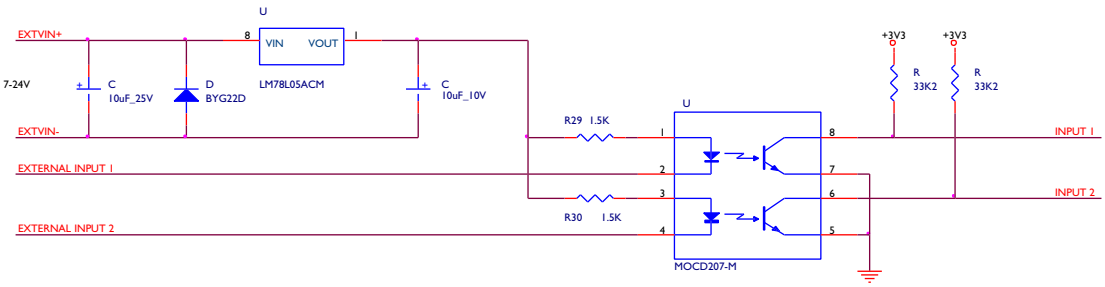


Figure 4-8: Opto-Isolated Connection to Eclipse GPI Connector

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 4-9 shows the non-isolated connection.

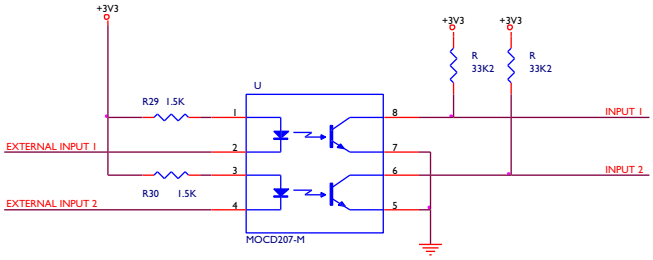


Figure 4-9: Non-Isolated Connection to Eclipse GPI Connector

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 with respect to ground.

WIRING THE MATRIX TO AN EXTERNAL ALARM

With the Alarm I/O DB-9F connector, an external alarm device can be connected to monitor failures in the matrix. Pins are also available for connecting an external alarm source to the matrix's Alarm System. For details on the functions that are monitored by the Alarm System refer to the Eclipse Omega or Eclipse Median Manuals.

A failure will activate the relay contacts connected to pins 4, 5, and 9 of the connector. These contacts are "dry", and are rated at 1 A at 24 VDC. They are **not** recommended 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 matrix. It is connected to the input of a 3.3 volt logic device. A logic high on this input will cause the Eclipse matrix to detect an alarm condition. A logic low or an open circuit will cause the Eclipse matrix to detect no alarm condition.

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

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

Note: Shielded cable should be used.

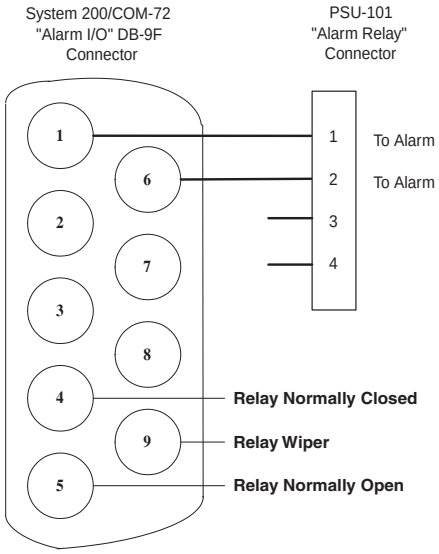


Figure 4-10: Alarm I/O Connector

WIRING THE MATRIX DIRECTLY TO A 4-WIRE AUDIO DEVICE

An external 4-wire audio device can be directly connected to a port connector through the four audio pins, as shown in Figure 4-11. If there is excessive noise on the lines between this device and the matrix, the device may be electronically unbalanced with the rest of the system. The device will need to be isolated with external isolation transformers.

The “CALL SEND” output can be connected to the “CALL REC” input to tell the system software that this is a directly connected port.

The Eclipse Configuration System allows the changing of the audio output reference level between -24, -21, -18, -15, -12, -9, -6, -3, 0, +3, +6, +9, +12, +14 dB. With a +12dB output reference level, it is possible to drive a 200 to 400 Ohm headset directly with a port output for such uses as direct IFB feed.

The Eclipse Configuration System allows the changing of the audio input reference level between -12, -9, -6, -3, 0, +3, +6, +9, +11 dB.

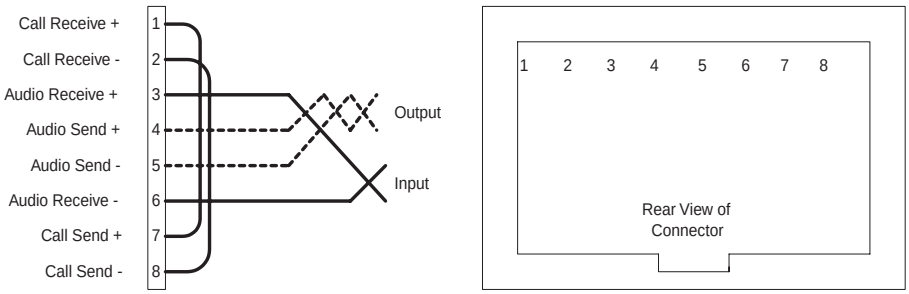


Figure 4-11: Direct Eclipse Matrix Port Connection

Note: Shielded cable should be used.

WIRING THE MATRIX TO INTERFACE MODULES

Interface modules convert the 4-wire signals of a central matrix port to some other form of communication, 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.

To house these interface modules, Clear-Com offers three types of interface frames.

- The **IMF-3 interface frame** holds up to 11 interface modules in 3 RU of rack space. Modular rear-mounted connector panels hold two RJ-45 connectors to the matrix ports and two DB-9's attaching the connected devices. The frame uses an external PSU-101 rack-mounted power supply to supply power to the interface modules. A second PSU-101 can be attached for redundancy.

Note: The IMF-3 frame has an individual rear panel for each interface. All interfaces use the same rear panel, however the use of the rear-panel connectors will vary with the type of interface.

- The **IMF-102 interface frame** has slots for two interface modules in 1 RU of rack space. Its rear input/output connector panel has two RJ-45 connectors and DB-9 connectors for each of the two interface modules. It has an internal power supply and a connector for a redundant power supply.
- The **DIF-102 interface frame** has slots for two digital DIG-2 interface modules in 1 RU of rack space. DIG-2 interface modules allow the matrix to connect to digital versions of Clear-Com intercom panels. The DIF-102 frame is powered by one or two (for redundancy) external AC mains to 24 VDC power supplies via locking DIN connectors on the rear panel. All other voltages are derived directly or indirectly from the 24 VDC on a DIG-2 interface module's front and rear cards.

CCI-22 and FOR-22 - The CCI-22 and FOR-22 dual audio interfaces use each of the RJ-45 connectors on its rear panel for connection to the matrix port. The top RJ-45 is for the first channel of the interface. The lower RJ-45 is for the second channel. The DB-9Ms are the interface's audio and control inputs and outputs. Refer to the section on those interfaces later in this chapter for wiring details.

AES-6 - The AES-6 digital interface rear cards provide coax or RJ-45 connectors for wiring to V-Series or 4000 Series II panels and RJ-45 connectors for wiring to the matrix. Refer to the AES-6 manual (part no. 810365Z) for wiring details.

DIG-2—The DIG-2 digital interface rear cards provide RJ-45 connections to ICS digital panels and Eclipse matrices. For wiring details refer to the DIG-2/DIF-102 manual (part. no. 810311Z).

TEL-14—The TEL-14 interface is a two-channel device and uses each of the RJ-45 connectors on its rear panel for connection to the matrix port. The top RJ-45 is for Line A of the interface and the lower RJ-45 is for Line B of the interface. The upper and lower DB-9M connectors are the Line A and Line B connections to the telephone line. Clear-Com provides DB-9F to RJ-11 adapters so that standard phone line RJ-11 plugs and jacks can connect directly to the interface. Refer to the section on this interface later in this chapter for wiring details.

Each audio interface has internal ID circuit jumpers that will identify to the matrix port cards the type of interface it is; as a result the ports and interface modules can be moved without having to change the wiring.

RLY-6 and GPI-6—The RLY-6 and GPI-6 use the same RJ-45s, however their function and connection is different. These interfaces are daisy chained in their direct connection to the matrix frame. RLYs and GPIs do not require connection to a system “port.” The first RLY or GPI interface has its RJ-45 connected to the special RJ-45 on the rear panel of the frame marked GPI/RLY Interface. The top connector of the second RLY or GPI interface connects to the bottom RJ-45 of the first. Each successive interface is connected in this daisy-chained fashion.

Note: For Eclipse systems if both GPI-6 and RLY-6 interfaces are used the GPI-6 interfaces must be placed first in the daisy chain.

This restriction does not apply to Matrix Plus 3 systems where interfaces can be mixed in this 'daisy-chained' scheme.

The maximum combined length of all the RJ-45 cables should not exceed 20 feet (6 meters). Figure 4-12 shows an example of “daisy-chain” wiring.

Figure 4-12 shows the rear panel of a IMF-3 wired for RLY-6s and GPI-6s. The CPU card will read these modules and will call the first RLY-6 relays 1 to 6. The second RLY-6 will be identified as relays 7 to 12.

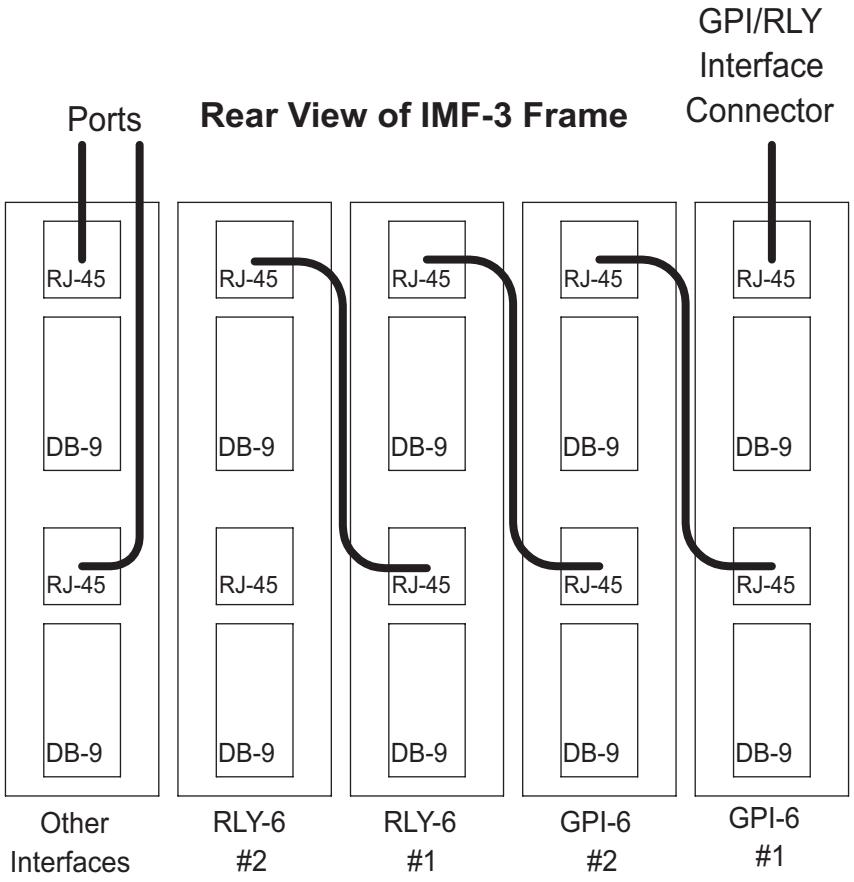


Figure 4-12: RLY-6/GPI-6 Daisy Chain Connection

Figure 4-13 shows the pin assignments of RJ-45 connectors when used to connect to interfaces (IMF-3 frames).

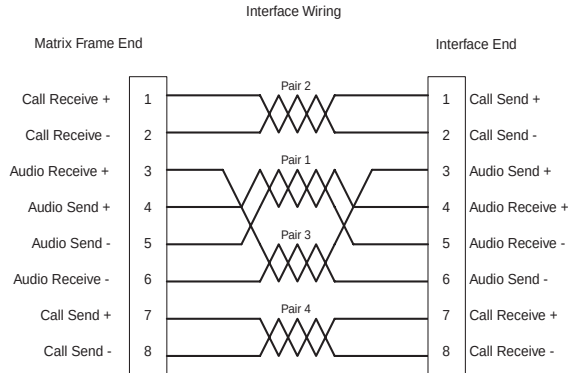


Figure 4-13: Matrix Frame to IMF-3 Interface Connection

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

Note: Shielded cable should be used.

FOR-22 4-WIRE/RADIO INTERFACE WIRING

The FOR-22 4-wire/radio interface connects two external 4-wire circuits to the matrix. Camera intercoms, two-way radios, microwave and satellite links, IFBs, and program audio in and out are candidates for use with the FOR-22.

A FOR-22 interface connects to an Eclipse matrix through the two RJ-45 connectors on the IMF-3 or IMF-102 rear panel assembly to which the FOR-22 is connected. One RJ-45 connector is for the first channel of the interface. The second RJ-45 connector is for the second channel.

The user side of the FOR-22 for each channel appears on a DB-9M connector on the rear of the IMF-3 for IMF-102 frame. Figure 4-14 shows the pinout of either one of these connectors. Each channel is identical.

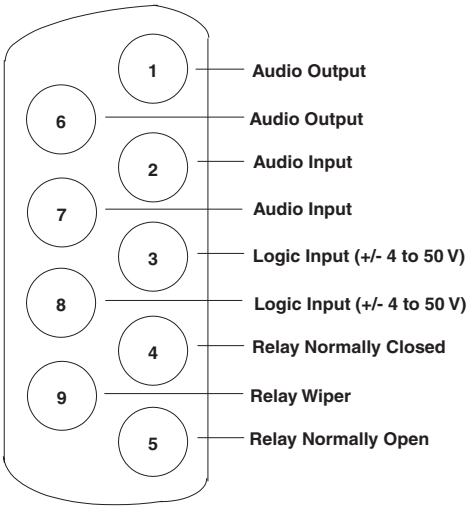


Figure 4-14: Pinout of the DB-9M I/O Connectors for FOR-22s

The following sections describe how to wire for the various type of inputs and outputs available on this connector:

- External audio devices
- Call signal input
- Relay contacts.

Note: Shielded cable should be used.

External Audio Devices

Connect external audio devices to the FOR-22 ports through the two DB-9M connectors labeled “I/O” on the rear panel. Both audio input and output are transformer isolated. For more information on the

various level ranges available on the input and output refer to the FOR-22 manual (part 810306Z).

Call Signal Input

The Call Signal input is used to receive a call/logic input signal from an external device and send it to the matrix. The voltage across the pins required to receive a call signal ranges from 4 to 50V; it can be either positive or negative polarity or AC. The input will draw between 4 and 8 mA.

Relay Contacts

Each FOR-22 interface channel features a relay that is associated with the logical call signal output of a port. A relay's function depends on the function assigned to the FOR-22 port through the Eclipse Configuration System program. A relay can be assigned to operate with any label in the system: when that label is activated (either by a talk, listen, or both, as set from the configuration program), the relay will activate. For details on configuring the use of a relay, see the *Eclipse Configuration System Manual* (part 810299Z).

The relay can be used to activate an external device, such as an applause light in a studio, a cue light, or a security-door lock. The relays feature both "normally open" and "normally closed" contacts. The contacts are rated at 1 A at 24 VDC; they are not designed for switching mains AC line voltage.

CCI-22 PARTY-LINE INTERFACE WIRING

The CCI-22 party-line interface connects two 2-wire full-duplex party-line circuits to the matrix. This interface has its own manual in the Eclipse manual set. The following discussion gives an overview of the wiring of this interface.

The CCI-22 interface uses each of the RJ-45 connectors on its rear panel for connection to the matrix port. One RJ-45 connector is for the first channel of the interface. The second RJ-45 connector is for the second channel.

The user side of the CCI-22 for each channel appears on a pair of DB-9M connectors on the rear of the interface. Figure 4-15 shows the pinout of either one of these connectors. Both DB-9s are paralleled such that both party-line channels are available on each connector. It is possible to wire one DB-9 connector as channel #1 and the second DB-9 as channel #2 or bring both channels out either DB connector together to create a TW-type, party-line connection. Refer to the *CCI-22 Interface Instruction Manual* (part 810307Z) for more information.

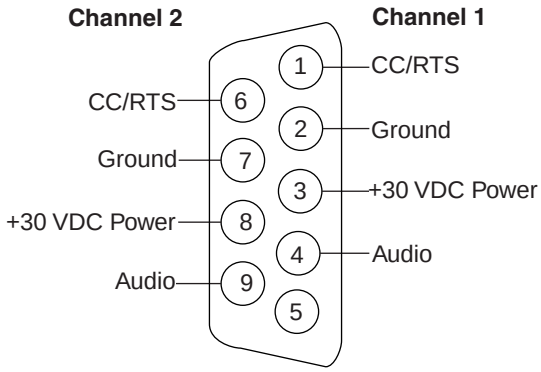


Figure 4-15: Pinout of the DB-9M Interface I/O Connectors for CCI-22

Clear-Com Party Lines General Discussion

Stations on Clear-Com party lines connect to each other with two-conductor shielded microphone cable. One conductor carries the DC power (28 to 30 V) for that channel, while the other conductor carries the duplex two-way intercom audio signal plus DC “Call Light” signaling for that channel. The shield acts as common ground for both power and signal for the channel.

Power to the CCI-22 interface channels must be provided by the external party line. The power connection for each channel is the “+30 VDC Power” pin on the appropriate DB-9M interface I/O connector on the rear-panel assembly. The CCI-22 channel is essentially just another “beltpack” on the party line.

The power pin has DC filtering circuitry that provides a high impedance for the audio such that power can be received from a “powered line or TW line” as is common with RTS systems. For TW operation tie the AUDIO and POWER pins together.

Each party-line channel requires exactly one termination circuit. The termination circuit is usually built into the system component that provides the party line’s power. Connecting more than one termination circuit to a party line will impair the sidetone null and degrade the line’s audio quality.

When a CCI-22 party-line channel is connected to a Clear-Com party line, the Clear-Com/RTS “select” pin must be left floating. Grounding this pin selects the RTS mode, which is incompatible with Clear-Com party lines.

TEL-14 TELEPHONE INTERFACE WIRING

The TEL-14 telephone interface connects two telephone lines to the matrix. The interface can establish IFB connections between the main intercom and remote production trucks, can link intercom communication between remote systems, and can enable telephone

calls directly to or from any intercom panel in an Eclipse or other system. The TEL-14 interface has its own manual in the Eclipse manual set. This following discussion gives an overview of the wiring of this interface.

The TEL-14 uses each of the RJ-45 connectors on its rear panel for connection to a matrix port. One RJ-45 is for Line A of the interface and the other RJ-45 is for Line B of the interface.

The DB-9M connectors are the Line A and Line B connections to the telephone line. Clear-Com provides DB-9F to RJ-11 adapters so that standard phone line RJ-11 plugs and jacks can connect directly to the interface.

IMF-3 Interface Module Frame Wiring

On the rear of the IMF-3 frame, there is a separate rear-panel assembly for each interface, which contains four connectors for each interface. The following instructions refer to any single rear-panel assembly.

The upper DB-9M connector is used to connect to the first telephone line, A. The upper RJ-45 connector is used to connect telephone line A to the matrix frame. The lower DB-9M connector is used to connect to the second telephone line, B. The lower RJ-45 connector is used to connect telephone line B to the matrix frame. Figure 4-16 illustrates the wiring of one IMF-3 rear-panel assembly to a TEL-14 interface.

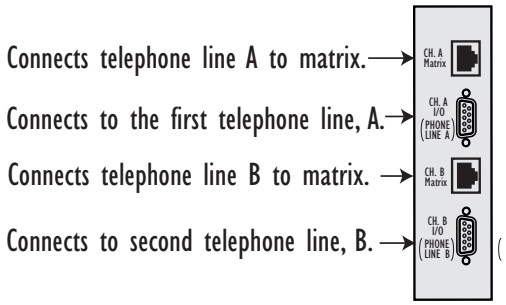


Figure 4-16: Wiring an IMF-3 Rear-Panel Assembly to a TEL-14 Interface

To allow use of a common RJ-11 terminated telephone line, Clear-Com provides two DB-9F to RJ-11 adapters (Clear-Com part 770025).

For internal dip-switch settings and adjustments, refer to the TEL-14 manual (part 810308Z).

IMF-102 Interface Module Frame Wiring

On the rear of the IMF-102 frame, there are two sets of four connectors each, arranged horizontally. The following instructions refer to either one of the two sets.

The leftmost DB-9M connector is used to connect to the first telephone line, A. The leftmost RJ-45 connector is used to connect telephone line A to the matrix frame. The rightmost DB-9M connector is used to connect to the second telephone line, B. The rightmost RJ-45 connector is used to connect the telephone line B to the matrix. Figure 4-17 illustrates the wiring of one IMF-102 rear-panel assembly to a TEL-14 interface.

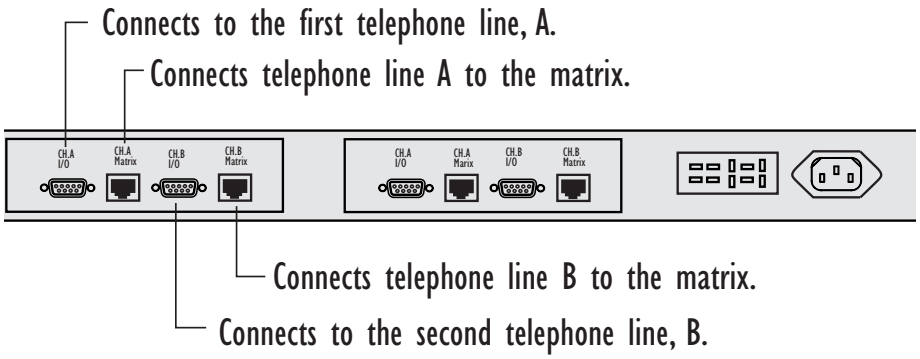


Figure 4-17: Wiring an IMF-102 Rear-Panel Assembly to a TEL-14 Interface

To allow use of a common RJ-11 terminated telephone line, Clear-Com provides two DB-9F to RJ-11 adapters (part 770025).

For internal dip-switch settings and adjustments, refer to the TEL-14 manual (part 810308Z).

Connecting to the Telephone Line

Connecting the telephone line can be accomplished with one of two methods. One method is to use the RJ-11 to DB-9F adapters supplied by Clear-Com with the TEL-14 interface. The second method is to directly wire each telephone line to a DB-9F connector using the pinouts in Figure 4-18, which shows the wiring diagram of the adapter.

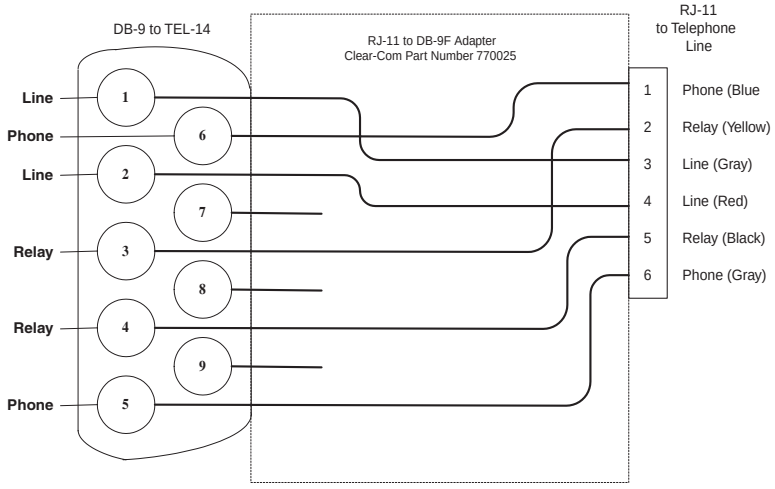


Figure 4-18: RJ-11 to DB-9 Adaptor for TEL-14 Interfaces

Note: The TEL-14 interface works with telephone company central office (CO) lines. Analog panel lines from some in-house PABXs are not compatible.

Telephone Set

Although it is possible to use a parallel-connected telephone set to originate calls, it is preferable to use a series-connected telephone set with the TEL-14. This will prevent the impedance of the telephone set from disturbing the telephone line impedance recognized by the TEL-14. It will also allow the TEL-14 to automatically disconnect the telephone when it comes “off-hook.” A standard telephone may be installed in series with the TEL-14 by connecting it to pins 1 and 6 of the RJ-11 jack. If telephones must be connected in parallel with the telephone line(s) during the TEL-14’s automatic nulling process, all additional standard telephones must be “on-hook”.

Relay Contacts

A pair of relay contacts for each telephone line rated at 2A at 24 VAC is available on the DB-9 or the RJ-11 of the adapter. This pair of contacts is normally open when the line is “on-hook,” and closes when the interface goes “off-hook”. These contacts are not connected to any other circuitry inside the interface, and can be used to energize a line-in-use indicator light on a standard multiline phone set, or for any other low-power application.

RLY-6 INTERFACE WIRING

The RLY-6 relay interface module provides connection of six programmable relays to the matrix so that each relay is directly controlled from the matrix. Multiple RLY-6 interfaces can be daisy chained to provide connection of up to 60 relays to the matrix. RLY-6

and GPI-6 modules can be mixed together up to the total limit of 60 items. Five RLY-6 and five GPI-6 modules would provide 30 relays and 30 inputs for a total of 60 inputs and outputs.

Note: For Eclipse systems if both GPI-6 and RLY-6 interfaces are used the GPI-6 interfaces must be placed first in the daisy chain.

This restriction does not apply to Matrix Plus 3 systems where interfaces can be mixed in this 'daisy-chained' scheme.

The RLY-6 interface has its own manual in the Eclipse manual set (part 810310Z). This discussion gives an overview of the wiring of this interface.

IMF-3 Interface Module Frame Wiring

To Matrix Frame

To connect the RLY-6 to the matrix frame, plug one end of an RJ-45 cable (eight wires with no reversal) into the GPI/RLY INTERFACE connector on the back of the matrix. Plug the other end into the top RJ-45 (CH. A MATRIX) connector for the RLY-6.

To connect an additional RLY-6 interface, plug one end of a short RJ-45 cable into the lower RJ-45 (CH. B MATRIX) for the first RLY-6. Then, plug the other end into the top RJ-45 (CH. A MATRIX) connector for the additional RLY-6. Additional RLY-6 Interfaces are added in the same way, using daisy-chain wiring. If there are multiple RLY-6 modules, the relays in the first will be numbered 1 to 6, second will be 7 to 12, etc. GPI-6 modules can be mixed in this daisy-chained scheme. The maximum combined length of all the RJ-45 cables should not exceed 20 ft. (6 m). Refer to Figure 4-19.

Note: For Eclipse systems if both GPI-6 and RLY-6 interfaces are used the GPI-6 interfaces must be placed first in the daisy chain.

This restriction does not apply to Matrix Plus 3 systems where interfaces can be mixed in this 'daisy-chained' scheme.

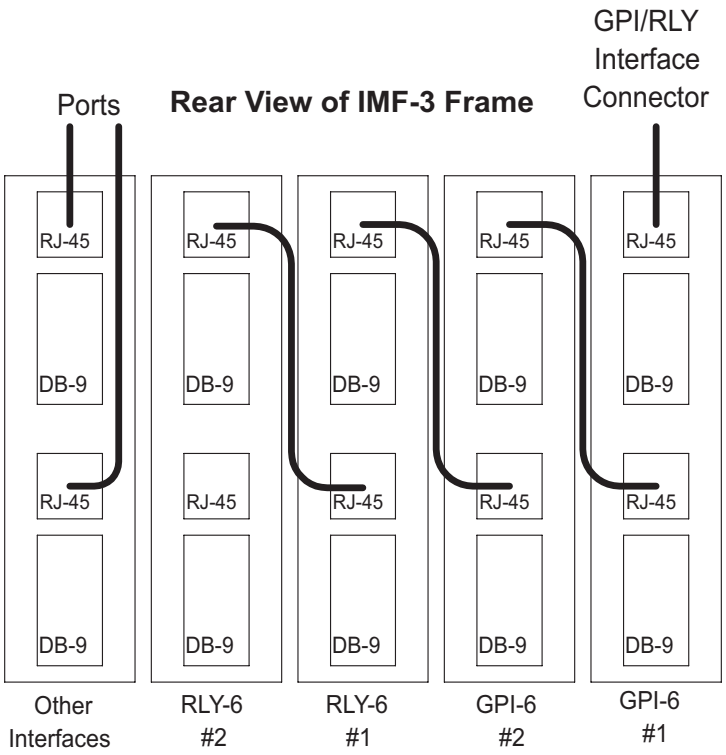


Figure 4-19: Rear View of IMF-3 Frame

To External Device

To connect external devices to an RLY-6 interface, use the two DB-9M connectors on the rear cable assembly panel for the interface. Figure 4-20 shows the pin assignment of these connectors as viewed from the frame side of the connector.

If a DB-9F is plugged into the connector labeled CH. A I/O, relays 1 to 3 are available on that connector. The connector labeled CH. B I/O has the contacts for relays 4 to 6. In Figure 4-20, the labels on the pins apply to either connector. Example: #1/4 COM refers to the wiper of relay 1 if it is connected to CH. A and the wiper of relay 4 if it is connected to CH. B.

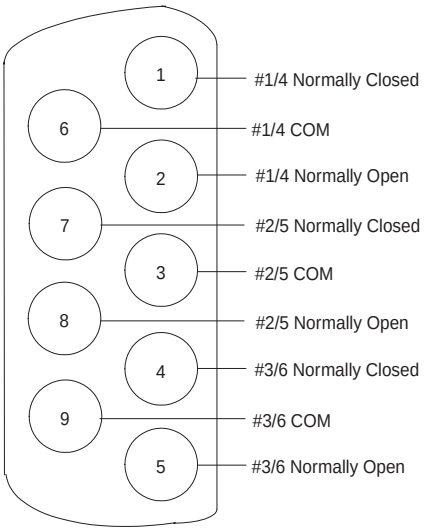


Figure 4-20: RLY-6 Interface DB-9M Connector Pinout

IMF-102 Interface Module Frame Wiring

The wiring of an RLY-6 interface that is placed in an IMF-102 interface frame is the same as the wiring for a RLY-6 interface placed in an IMF-3 interface frame. The only difference is that an IMF-102 interface frame houses only two interfaces, and they are mounted horizontally rather than vertically in the frame. Figure 2-1 and Figure 2-2 in Chapter 2 illustrate the differences between these interface frames.

Refer to the respective manuals for these interfaces and frames in the Eclipse manual set for more information.

Configuration

To associate a relay to a label, use the Eclipse Configuration System, as described in its manual.

GPI-6 INTERFACE WIRING

The GPI-6 input interface module provides connection of six programmable inputs to the matrix so that each input can control a predefined matrix function. Multiple GPI-6 interfaces can be daisy-chained to provide connection of up to 60 inputs to the matrix. RLY-6 and GPI-6 modules can be mixed together up to the total limit of 60 items. Five RLY-6 and five GPI-6 modules would provide 30 relays and 30 inputs for a total of 60 inputs and outputs.

Note: For Eclipse systems if both GPI-6 and RLY-6 interfaces are used the GPI-6 interfaces must be placed first in the daisy chain.

This restriction does not apply to Matrix Plus 3 systems where interfaces can be mixed in this 'daisy-chained' scheme.

IMF-3 Interface Module Frame Wiring

To Matrix Frame

To connect the GPI-6 to the matrix frame, plug one end of an RJ-45 cable (eight wires with no reversal) into the GPI/RLY INTERFACE connector on the back of the frame. Plug the other end into the top RJ-45 (CH. A MATRIX) connector for the GPI-6.

To connect an additional GPI-6 Interface, plug one end of a short RJ-45 cable into the lower RJ-45 (CH. B MATRIX) for the first GPI-6. Then, plug the other end into the top RJ-45 (CH. A MATRIX) connector for the additional GPI-6. Additional GPI-6 Interfaces are added in the same way, using daisy-chain wiring. If there are multiple GPI-6s used, the inputs in the first will be numbered 1 to 6, second will be 7 to 12, etc. RLY-6 modules can be mixed in this daisy-chained scheme. The maximum combined length of all the RJ-45 cables should not exceed 20 ft. (6 m). Refer to Figure 4-19 on page 1-27.

To External Device

To connect external devices to the GPI-6 interface, use the two DB-9M connectors on the rear cable assembly panel for the interface. Figure 4-21 shows the pin assignment of these connectors as viewed from the frame side of the connector.

If a DB-9F is plugged into the connector labeled CH. A I/O, inputs 1 to 3 are available on that connector. The connector labeled CH. B I/O has inputs 4 to 6. In Figure 4-21, the labels on the pins apply to either connector.

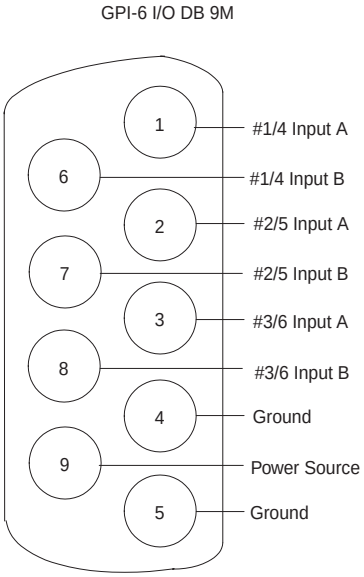


Figure 4-21: GPI-6 Interface DB-9M Connector Pinout

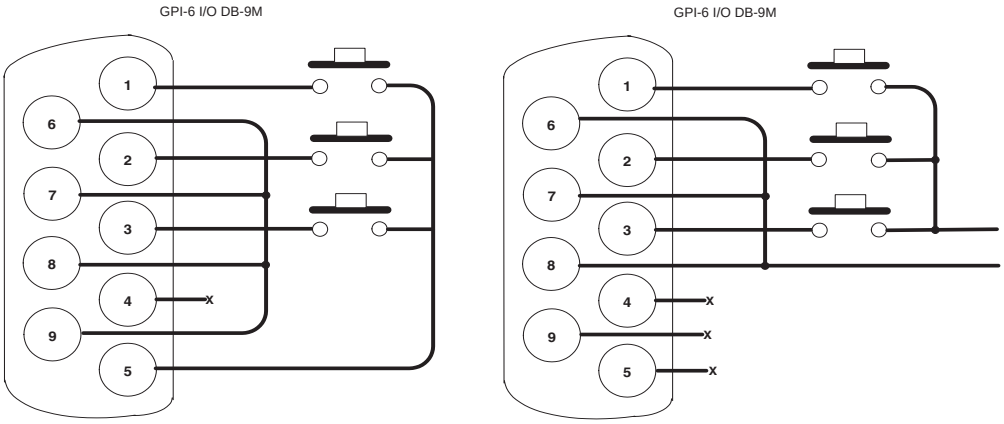


Figure 4-22: GPI-6 Application Examples

Figure 4-21 and Figure 4-22 show how to connect switches or contacts using the power source provided by the GPI-6 module or powering switches from external sources. Each input can be wired to be isolated from each other as a further variation.

IMF-102 Interface Module Frame Wiring

The wiring of a GPI-6 interface that is placed in an IMF-102 interface frame is the same as the wiring for a GPI-6 interface placed in an IMF-3 interface frame. The only difference is that an IMF-102 interface frame houses only two interfaces, and they are mounted horizontally rather than vertically in the frame.

Figure 2-1 and Figure 2-2 in Chapter 2 illustrate the differences between these interface frames.

Refer to the respective manuals for these interfaces and frames in the Eclipse manual set for more information.

Configuration

To define an input function, use the Eclipse Configuration System program, as described in its manual.

WIRING AN ICS PANEL MISCELLANEOUS CONNECTOR

Most local devices connect with a matrix panel via the “miscellaneous” connector.

The following sections discuss how to wire the various functions available on the “miscellaneous” connector.

- External program feed input
- Binaural headset (All Panels Except ICS-2003/2110/1016)
- Logic input #1 and logic input #2
- Mute relay contacts
- Auxiliary relay contacts.

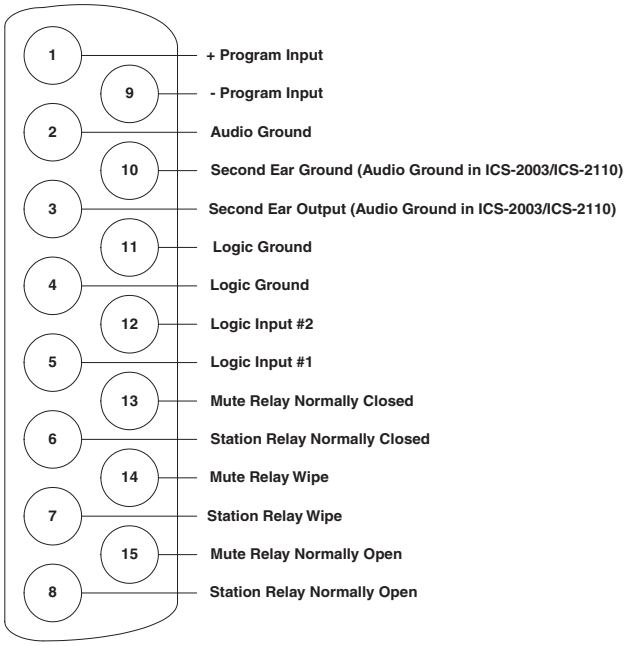


Figure 4-23: Miscellaneous Connector Pin Configuration

EXTERNAL PROGRAM FEED INPUT

The external program feed input allows the panel operator to monitor audio from an external source while simultaneously monitoring the intercom audio.

The input is designed to accept a balanced, line-level audio feed at a maximum level of 0 dB. On some panels there is no “program” volume control. This is just a summing input to the “listen” amplifier.

The program feed input passes through the panel’s “program” volume control before being mixed with the audio at the panel. The “program”

feed (“program audio”) can be heard on the panel’s speaker and headset; it cannot be heard by other panels in the matrix.

To connect an external program feed to the panel, connect the balanced audio pair to pins 1 and 9, and connect a shield or ground connection if available to pin 2 of the connector (refer to Figure 4-23).

BINAURAL HEADSET (ALL PANELS EXCEPT ICS-2003/2110/1016)

The second ear output allows an external binaural headset to be connected to the panel. One side of the binaural headset is connected to the panel’s audio feed from the matrix frame; this is “intercom audio,” and its volume level is controlled by the “intercom” knob on the front panel. The other side of the binaural headset is connected to the panel’s external program feed input; this is “program audio,” and its volume level is controlled by the “program” knob on the front panel.

For more information on implementing this feature, refer to the *Eclipse Configuration System Instruction Manual* (part 810299Z)*.*

ICS-2003 LOGIC INPUT #1 AND LOGIC INPUT #2

This section describes how to connect to the logic inputs of the panel and briefly discusses the functions that can be implemented.

The functions that are available are listed below. For a more detailed description and instructions on how to implement them with the Eclipse Configuration System, refer to the *ICS-2003 Intercom Panel Instruction Manual (part 810303Z).*

- Mic on/off (toggle)
- Mute microphone output to frame
- Microphone off (momentary)
- Answerback talk/clear
- Speaker off
- PTT: activate all talks
- Activate talk switch #1
- Activate talk switch #2
- Activate listen labels button
- Studio announce
- PTT: activate two-way radio talks.

Logic Input #1 supports only active low inputs (0 to 2 VDC with reference to ground), while Logic Input #2 can support either active high (4 to 30 VDC) or active low inputs, depending on whether a jumper has been installed at JP2 (active low is the default with no jumper installed). Refer to the ICS-2003 chapter of this manual for

details on setting this jumper. The ICS-2003 only supports an active low input on both inputs.

Use normally open type switches to activate the logic inputs. Connect the switches as follows (refer to Figure 4-23):

- Logic Input #1—pins 4 to 5 (pin 4 = ground)
- Logic Input #2—Pins 11 to 12 (pin 11 = ground)

Do not apply external voltage to the logic inputs, except in the case of Logic Input #2 being configured for an active high input as described above.

MUTE RELAY CONTACTS

This set of relay contacts will be activated whenever any talk path is activated at the panel. The contacts can be used to activate an external device when a talk path is active, for example, for muting a control room monitor speaker. Refer to Figure 4-23 for wiring details.

Both “normally open” and “normally closed” contacts are provided. They are rated at 1 A at 24 VDC. This relay is not designed for switching mains AC line voltage. To switch an external device that runs on mains AC line voltage, use an external relay (or other switching mechanism) that is activated by this relay.

AUXILIARY RELAY CONTACTS

Each Eclipse system panel includes a relay that is controlled by the system program independent of the local panel function. This relay can be assigned to any label(s) in the system, which will activate whenever a talk or listen is set to that label(s). If activating the relay is the only action desired, assign the relay to a “control” label. For more details refer to the *Eclipse Configuration System Instruction Manual Part 810299Z)*.

The relay can be used to activate an external device, such as an applause light in a studio, a cue light, or a security door lock. Figure 4-23 on page 1-32 shows the wiring of the relay contacts to the “miscellaneous” connector.

Both “normally open” and “normally closed” contacts are provided. They are rated at 1 A at 24 VDC. This relay is not designed for switching mains AC line voltage. To switch an external device that runs on mains AC line voltage, use an external relay (or other switching mechanism) that is activated by this relay.

WIRING A BINAURAL HEADSET (ICS-2003)

The ICS-2003 has a second earphone output, but it functions and is wired differently from all other ICS panels. This output is not available on the “miscellaneous” connector, but on the main board of the panel on a separate header connector. If a six pin headset connector were installed on the front or rear of the panel, this output would be available.

The default configuration of the panel has both earphone outputs being fed with both intercom and program audio. To separate the “program” input to the second ear only, use the Eclipse Configuration System. Refer to the *Eclipse Configuration System Instruction Manual (part 810299Z)* for more information.

Figure 4-24 shows the wiring of a six pin XLR connector for a binaural headset.

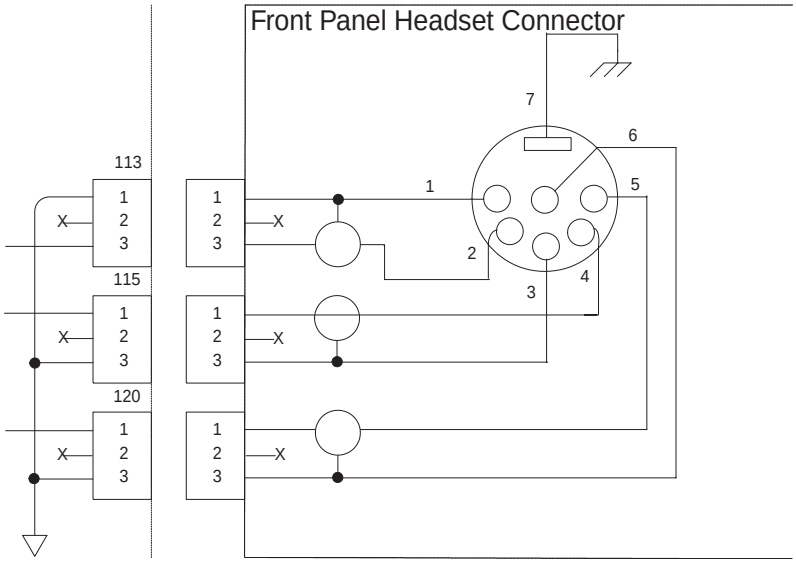


Figure 4-24: Binaural Headset Wiring

WIRING AN ICS PANEL OPT-100 AUXILIARY AUDIO I/O OPTION

Figure 4-25 shows the pinout of the DB-15F “auxiliary audio I/O” connector on the back of the intercom panel. The sections that follow the pinout diagram describe each function and how to wire for it.

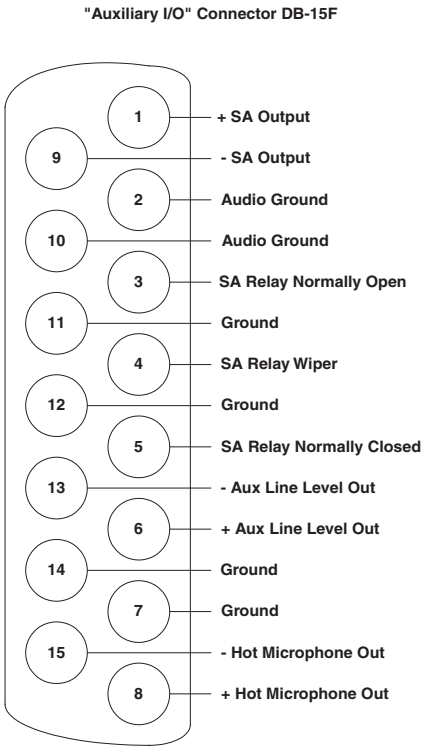


Figure 4-25: Auxiliary I/O Connector

If installed, the OPT-100 Auxiliary Audio I/O Option provides three additional audio output signals, plus a set of relay contacts. The following functions are available:

- Auxiliary audio line level output
- “Hot mic” output
- SA (stage/ studio) announce output
- SA relay

AUXILIARY AUDIO LINE LEVEL OUTPUT

The auxiliary audio line level output is a balanced line-level transformer-isolated feed of the same audio signal that is sent to the panel's internal speaker. For example, this output could be used to feed an external amplifier connected to a set of ceiling loudspeakers.

Connect to pins 6 and 13 for a balanced output. Pin 14 is available as a shield or ground source. Refer to Figure 4-25.

HOT MIC OUTPUT

The "hot mic" output is a balanced line-level transformer-isolated feed of the signal from the currently selected microphone (either the panel microphone or the headset microphone).

The hot mic output is active regardless of whether the panel has talk paths set, and regardless of the settings of the front panel controls on the panel.

Connect to pins 8 and 15 for a balanced output. Pin 7 is available as a shield or ground source. Refer to Figure 4-25.

SA (STUDIO/STAGE ANNOUNCE) OUTPUT

The SA output is a balanced line-level transformer-isolated feed of the same signal sent to the hot mic output, except that it is only active when the SA button on the panel's front panel is pressed or when activated by Logic Input #1 or #2 configured for the studio announce function.

Connect to pins 1 and 9 for a balanced output. Pin 2 is available as a shield or ground source (refer to Figure 4-25).

SA RELAY

The SA relay is activated whenever the SA button on the front panel of the panel is pressed or when activated by Logic Input #1 or #2 configured for the Studio Announce Function. Both "normally open" and "normally closed" contacts are provided. They are rated at 1 A at 24 VDC. This relay is not designed for switching mains AC line voltage. To switch an external device that runs on mains AC line voltage, use an external relay (or other switching mechanism) that is activated by this relay.

Refer to Figure 4-25. The following pins are available for the SA relay:

- N.O. (normally open)—Pin 3
- WIPER (common)—Pin 4
- N.C. (normally closed)—Pin 5

WIRING AN ICS PANEL ACCESSORY CONNECTOR

An intercom panel can be connected to an accessory key panel via the accessory panel connector. To connect an accessory panel use the DB-9 connector cable supplied with the Accessory Panel. Connect the cable between the panel and the input connector of the first accessory panel. To connect a second panel use another DB-9 cable and connect it between the output connector of the first panel to the input connector of the second panel. Continue this process for as many accessory panels as needed for each panel.

If a custom length cable is necessary, use a nine-conductor cable of at least 24 AWG are larger wire and wire all pins one-to-one with a male on one end and a female on the other. The distance between the intercom panel and the last accessory panel should be no more than 25 feet (7.62 meters).

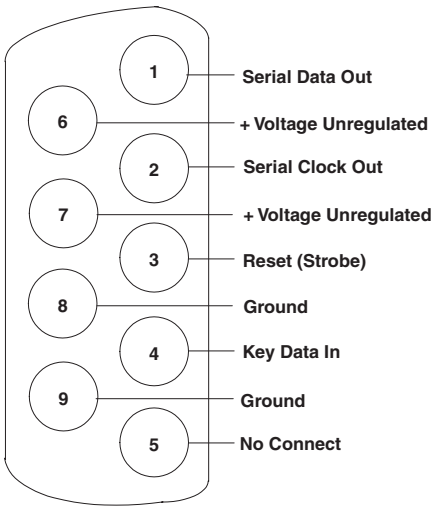


Figure 4-26: Accessory Panel Connector Pinout

5 CONNECTING MATRICES

Eclipse matrices can be connected to expand the geographical range or the port density of a system. With trunk lines and an Ethernet network up to 15 Eclipse matrices can be connected. Eclipse Omega and Eclipse Median matrices can also be connected using fiber-optic cable when fitted with E-FIB fiber-optic interface cards.

Base-loop linking creates non-blocking access to all audio ports of two connected Eclipse Pico/Eclipse-32 matrices.

INTELLIGENT LINKING WITH TRUNK LINES

As many as 15 separate Eclipse Omega, Median, Pico or Eclipse-32 systems can be intelligently linked together with dedicated audio trunk lines and an Ethernet network. Audio travels between the matrices on the dedicated trunk lines, while control data travels on the Ethernet network.

Figure 5-1 illustrates an intelligently linked system on an Ethernet network

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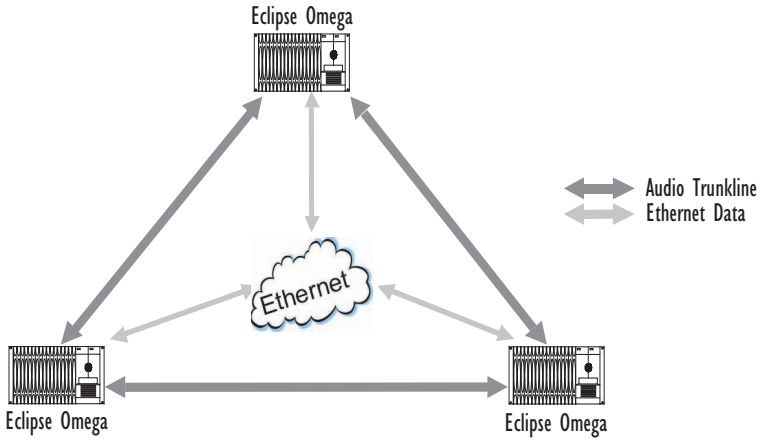

Figure 5-1: A Linked System on an Ethernet Network

A “dedicated audio trunk line” may connect the “receive” lines of an MVX-A16 serial port on one matrix to the appropriate “send” lines of an MVX-A16 serial port on the second matrix, or it may use E-QUE cards or E-FIB cards and fiber optic cables (Omega and Median matrices only).

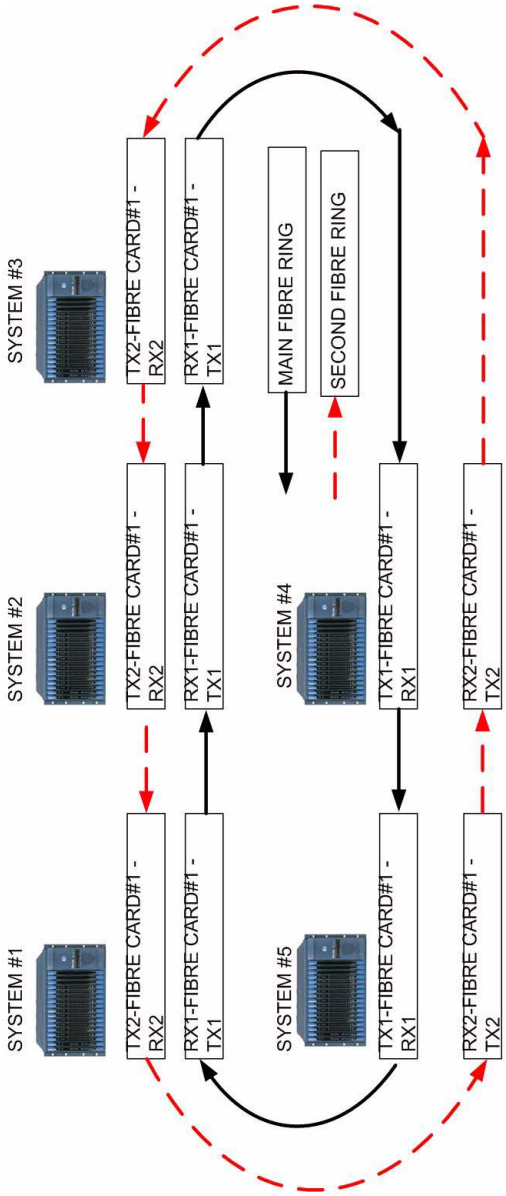

Figure 5-2: Example of Fiber-Optic Connected Matrices

The serial port to serial port wiring is not a typical RJ-45 to RJ-45 jumper cable. It is possible to construct such a cable or use a punch-down block for the crossover wiring. The Seimon cable tester will not test this wiring. Figure 5-3 illustrates dedicated trunk wiring.

The matrix is connected to an Ethernet network with the RJ-45 sockets labeled “LAN 1” and “LAN 2” on the rear of the Eclipse Omega or Median matrix, or the RJ-45 socket labeled “LAN” on the rear of the Eclipse Pico or Eclipse-32 matrix. The connectors have standard Ethernet pin assignments, shown in Figure 5-4.

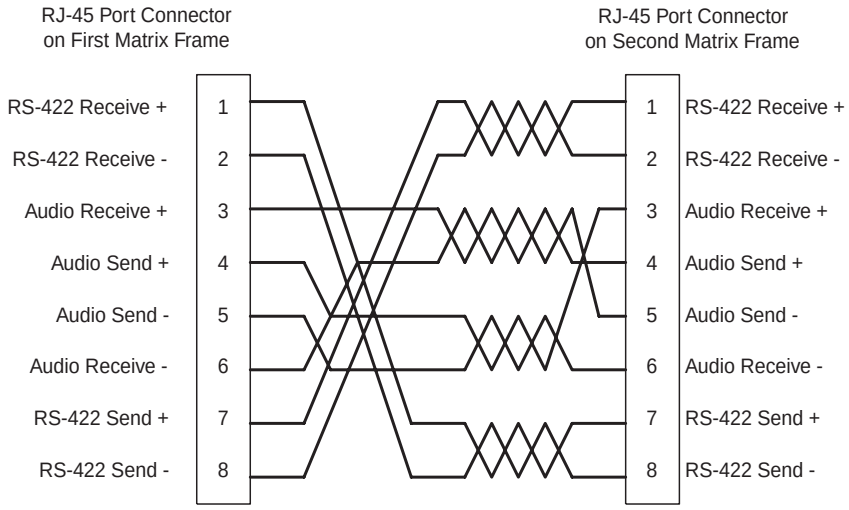

Figure 5-3: Dedicated Serial Port Audio Trunk Wiring

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

LAN1 and LAN2
Ethernet RJ-45 Connectors

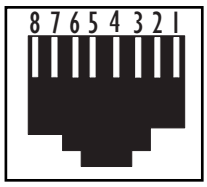

Figure 5-4: Ethernet Wiring

Intelligent linking dynamically allocates the available audio trunks as needed when a “talk” or “listen” to another matrix system is requested. The Ethernet connection between matrices allows control data to route the audio lines so that any panel or interface on one matrix can communicate with panel or interface ports on the other matrices. By doing so, the matrix can transparently handle communication requests so that an intercom panel user cannot distinguish between talking to a control room next door or across the continent.

The Ethernet network extends the system’s programming ability as well, because one computer on a network can control and monitor all matrices on the network.

Figure 5-5 illustrates a system linking matrices across continents.

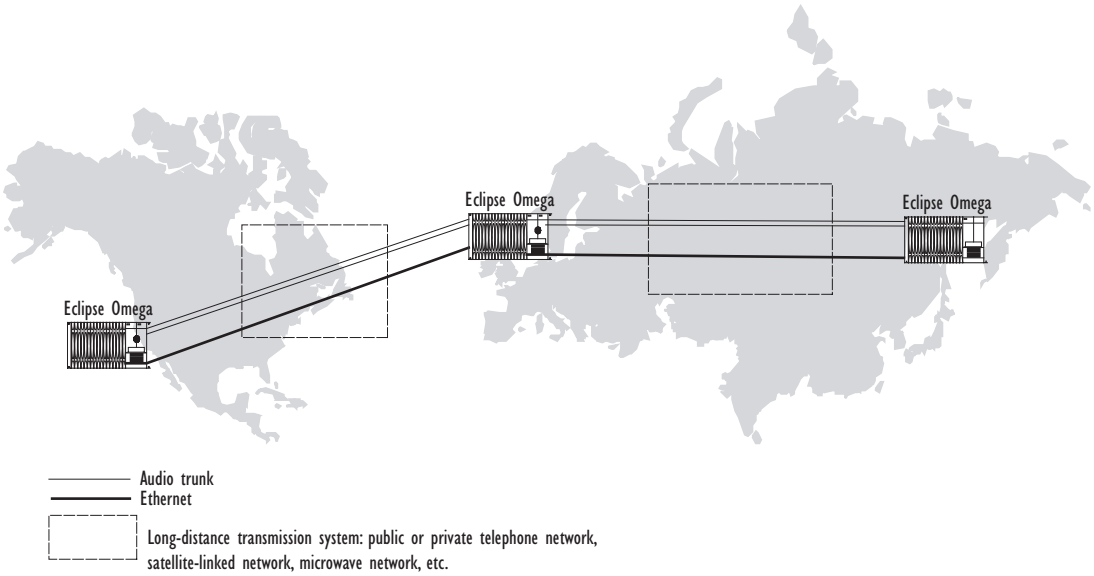

Figure 5-5: Matrices Linked Across Continents

This type of connection uses up available ports on the matrix and so does not provide 100% routing. This type of connection is suitable when only a restricted amount of inter-matrix communications are required, such as between studios. This architecture is also more suited for wide area communications, such as remote systems via public telecommunications networks, where only a small number of trunks are required.

The matrices are configured for linking with the Eclipse Configuration System (ECS) software. For instructions, refer to the *Eclipse Configuration System Instruction Manual* (part 810299Z).

BASE-LOOP LINKING (ECLIPSE PICO/ECLIPSE-32 MATRIX ONLY)

By connecting a single RJ-45 “base loop” connector on one Eclipse Pico/Eclipse-32 matrix to a second RJ-45 “base loop” connector on a second Eclipse Pico/Eclipse-32 matrix, an intelligently linked non-blocking 64-port system in two rack units (2 RU) can be created. This type of connection gives each connected matrix access to all of the audio ports of both matrices, without using up ports for trunk lines.

Specially constructed screened CAT-5 cable of maximum length 1 meter (3.28 feet) is used to connect the matrices. The cable is wired as shown in Table 5-1.

The matrices are configured for linking with the Eclipse Configuration System (ECS) software. For instructions, refer to the *Eclipse Configuration System Instruction Manual* (part 810299Z).

CABLE END 1	WIRE COLOR	CABLE END 2
Pin 1	white/orange	Pin 3
Pin 2	orange	Pin 6
Pin 3	white/green	Pin 1
Pin 4	blue	Pin 4
Pin 5	white/blue	Pin 5
Pin 6	green	Pin 2
Pin 7	white/brown	Pin 7
Pin 8	brown	Pin 8

Table 5-1: Pin Configuration of Eclipse-32 Matrix “Base Loop” Connector

TIE-LINE (AUDIO ONLY) LINKING

Two Eclipse matrices can connect directly through tie-line linking. The tie lines between the matrices are wired as in Figure 5-3.

By configuring each of the linked ports in each system as a “party line,” the two systems can talk and listen to anyone on that party line in either system. Call signals will also pass from one system to the other. However, since no control data passes between the matrices, assignments cannot be dynamically allocated among the ports of a matrix. Only the one party line on the first matrix connects to the party line of the second matrix.

6 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 Omega matrix provides 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 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.