Matrix Plus II System

Volume I

Operation Manual

Clear-Com Part #810182, Rev F

Matrix Plus II System Operation Manual
August 1995

Clear-Com Systems
945 Camelia Street
Berkeley, California 94710-1484
U.S.A.

Congratulations on your purchase of a Matrix Plus II Intercom System. The Matrix Plus II System includes sophisticated hardware and software components that can be configured in many different ways. The three-volume set of the Matrix Plus II System Manual will guide you through installation, operation, and troubleshooting/maintenance of your system.

THREE-VOLUME SET DESCRIPTION

This is **Volume I — Operation Manual** — This manual describes the use of the Matrix Plus II System. In the Operation Manual, intercom station operators and other Matrix Plus II System users will find detailed instructions on the use of the Matrix Plus II System components, including the PGM-12 Configuration Program.

Volume II — Installation Manual describes how to install a Matrix Plus II System and includes the specifications of each Matrix Plus II System component. Technical Personnel will use the Installation Manual when installing the Matrix Plus II System.

Volume III — Maintenance Manual includes troubleshooting and maintenance information on the Matrix Plus II System. The Maintenance Manual also provides schematics and bills of materials for each Matrix Plus II System hardware component. Technical Personnel will use the Maintenance Manual for locating solutions to common problems encountered in using the Matrix Plus II System.

All of these manuals are written for beginning users of Matrix Plus II Systems, however some experience with basic intercom systems is assumed. To use the PGM-12 Configuration Program, you must have some familiarity with your IBM-PC or compatible computer and the MS-DOS Operating System. External devices which are not supplied with your Matrix Plus II System are not covered in this manual. External devices include external party-line intercom systems, audio devices, and other hardware connected to the matrix through 4-wire connections or Matrix Plus II System Interface Modules.

HOW EACH MANUAL IS DIVIDED

Each of the three manual volumes is divided into chapters and sections. Chapters are marked by divider tabs labeled with the name of the chapter. The Chapter titles are Contents, Overview, Stations, Configuration, Matrix Cards, Interfaces, Frames, and Index. With the exception of the Contents, Overview, Frames and Index Chapters (these do not contain Sections), the page following the Chapter divider lists the Sections that are contained in each Chapter. These Sections are marked by numbered dividers. The titles for each Section within a Chapter are printed on the page immediately following the Section's numbered divider.

Page numbering begins at page "1" for each Chapter. With the exception of the Contents and Index Chapter (which use Roman numerals), each page is referred to by its Chapter letter, Section number, and page number. For example, the first page of the Section on the ICS-2002 Intercom Station is found on page "S1-1". "S1-1" stands for Station Chapter, Section 1, page 1".

To locate this page, turn to the Chapter divider tab labeled "Stations", and then turn to the next divider tab labeled "1".

CUSTOMER SERVICE DEPARTMENT

The Matrix Plus Customer Service Department is available to answer questions not covered in this manual.

Clear-Com Customer Service Department
Clear-Com Intercom Systems
945 Camelia Street
Berkeley, California 94710-1484
Telephone: (510) 527-6666
Telefax: (510) 527-6699

WARRANTY AND REPAIRS

CLEAR-COM LIMITED WARRANTY

Clear-Com products are warranted to be free from defects in materials and workmanship for a period of one year from the date of sale.

Clear-Com's sole obligation during the warranty period is to provide, without charge, the parts and labor necessary to remedy covered defects appearing in products returned prepaid to Clear-Com, 945 Camelia St., Berkeley, Ca. 94710-1484, U.S.A.

This warranty does not cover any defect, malfunction or failure caused beyond the control of Clear-Com, including unreasonable or negligent operation, abuse, accident, failure to follow instructions in the Manual, defective or improper associated equipment, attempts at modification and repair not authorized by Clear-Com, and shipping damage. Products with their serial numbers removed or defaced are not covered by this warranty.

To obtain warranty service, follow the procedures described below in the sections "Repairs" and "Shipping Instructions".

This warranty is the sole and exclusive express warranty given with respect to Clear-Com products. It is the responsibility of the user to determine before purchase that this product is suitable for the user's intended purpose.

Any and all implied warranties, including the implied warranty of merchantability are limited to the duration of this express limited warranty.

Neither Clear-Com nor the dealer who sells Clear-Com products is liable for incidental or consequential damages of any kind.

REPAIRS

Through your Dealer — If repair of Matrix Plus System hardware products is necessary, contact the dealer where the unit was purchased.

Through the Factory — If repair through the dealer is not possible, contact the Clear-Com Customer Service Department at the address listed (refer to **CUSTOMER SERVICE DEPARTMENT** on the previous page).

Be prepared to provide your company's name, address, phone number, name of person to contact regarding the repair, type and quantity of the equipment, description of the defect, and the equipment serial number(s).

If return of the product to the factory is authorized, the Clear-Com Customer Service Department will issue you a Return Authorization ("RA") Number. Do not return any equipment to the factory without first obtaining a Return Authorization Number.

WARRANTY REPAIR EXCHANGE PROGRAM

All warranty repair of Matrix Plus II System is covered by the following exchange program. This exchange program is limited to major parts of the system. Major parts are defined as one of the following:

- Crosspoint Cards
- CPU Controller Cards
- Intercom Station
- Interface Module
- Power Supply Module
- Matrix Card Frame
- Power Supply

After issuing an RA number, Clear-Com will immediately ship a replacement part(s). The customer will be billed for the exchange item and credited when the defective part is returned, in repairable condition, to Clear-Com with the proper RA number. Clear-Com will pay freight charges on equipment we send out. The customer will pay freight on all return items.

All warranty work is to be performed at the Clear-Com factory. All service at the customer's facility will be charged at the current quoted rate plus expenses and transportation.

SHIPPING INSTRUCTIONS

All shipments of Clear-Com equipment must be prepaid via United Parcel Service or the best available shipper. The equipment should be shipped in the original packing container. If the original container is not available, use a suitable container that is rigid and of adequate size. If a substitute container is used, the equipment should be wrapped in paper and surrounded with at least four inches of excelsior or similar shock-absorbing material. All shipments should be directed to the attention of the Customer Service Department and must include the Return Authorization Number.

Upon completion of repairs, equipment will be returned collect via United Parcel Service or other specified shipper.

SOFTWARE LICENSE AGREEMENT

Clear-Com Systems ("Clear-Com") provides this software program and firmware for the Matrix Plus System and licenses its use. You assume responsibility for the selection of the program and firmware to achieve your intended results, and for the installation and use of, and results obtained from, the program.

"Program" in this agreement refers to the PGM-12 Configuration Program computer software ("MXPLUS"). "Firmware" in this agreement refers to the operating software stored in ROMs throughout the Matrix Plus System.

License The computer program and firmware contains confidential information pertaining to Clear-Com. You may not modify, reverse compile, rent, lease, or distribute the computer program or firmware, or any copy, in whole or in part.

You may use the program only on a single machine. You may copy the program into any machine-readable form for backup purposes in support of your use of the program on the single machine.

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Termination The license is effective until terminated. You may terminate it at any time by destroying the program, together with all copies. You also will terminate upon conditions set forth elsewhere in this agreement or if you fail to comply with any of the terms or conditions of this agreement. You agree upon such termination to destroy the program together with all copies.

Limited Warranty Clear-Com warrants that the Matrix Plus II software, firmware and the accompanying media will perform substantially in accordance with the specifications set forth in the accompanying documentation. Clear-Com does not warrant that the functions contained in the program will meet your requirements or that the operation of the program will be uninterrupted or error-free.

Limited Remedies If the Clear-Com software, firmware, or media fails to perform as warranted, Clear-Com will replace it within the warranty period. Clear-Com will at it's sole descression also endeavor to fix any software/firmware problems as stated in the **Limited Warranty**. In no event will Clear-Com be liable to you for any lost profits, lost savings or other incidental or consequential damages arising from use of, or inability to use, any program, even if Clear-Com or an authorized Clear-Com representative has been advised of the possibility of such damages, or for any claim by any other party.

Some States and Provinces do not allow the limitation or exclusion of liability for incidental or consequential damages, so the above limitation or exclusion may not apply to you.

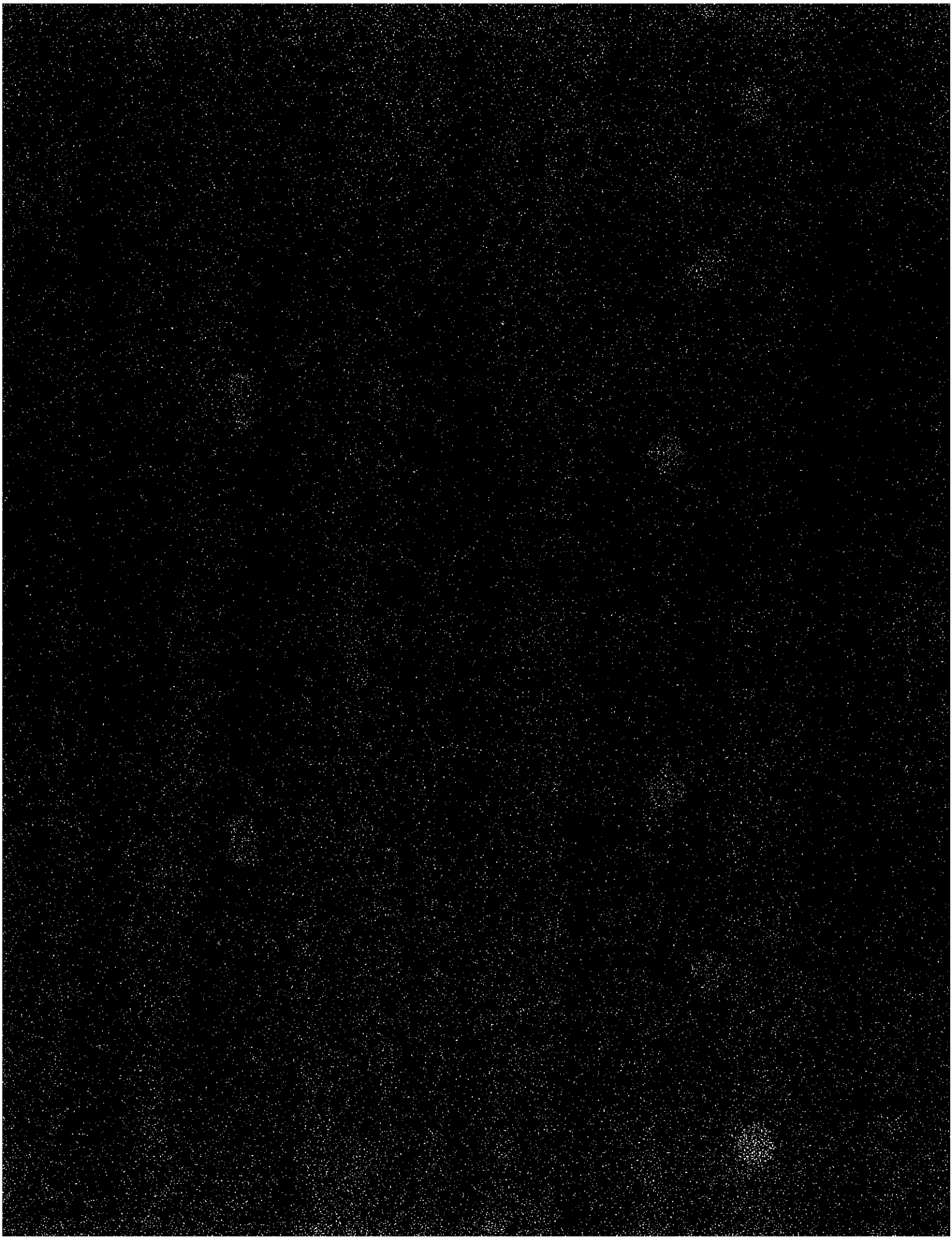
Clear-Com's liability to you for actual damages for any cause whatsoever, and regardless of the form of the action, will be limited to the money paid for the program and firmware that caused the damages or that is the subject matter of, or is directly related to, the cause of the action.

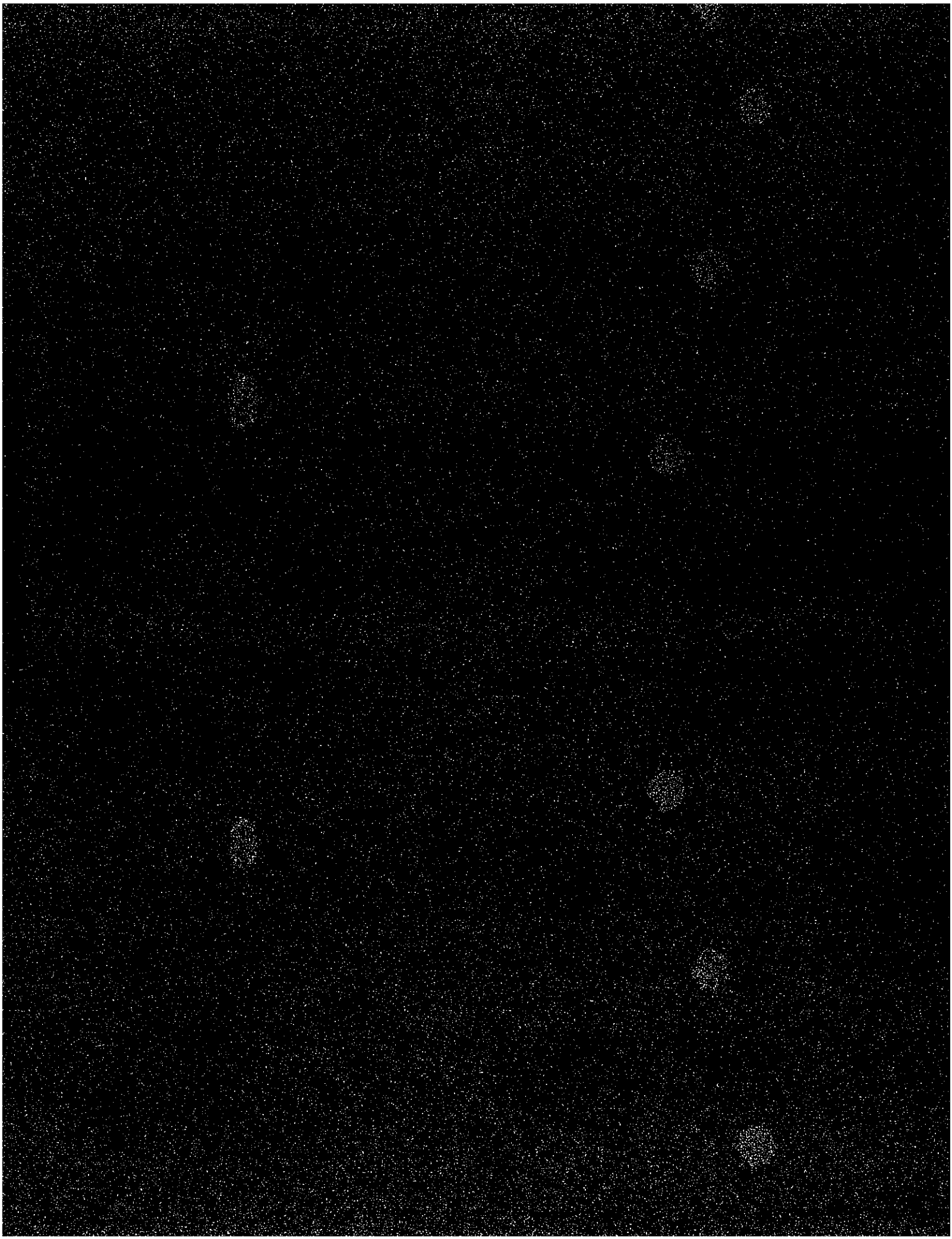
General Any attempt to rent, lease, or sublicense the program, or (except as expressly provided in this agreement) to transfer any of the rights, duties or obligations under this agreement is void.

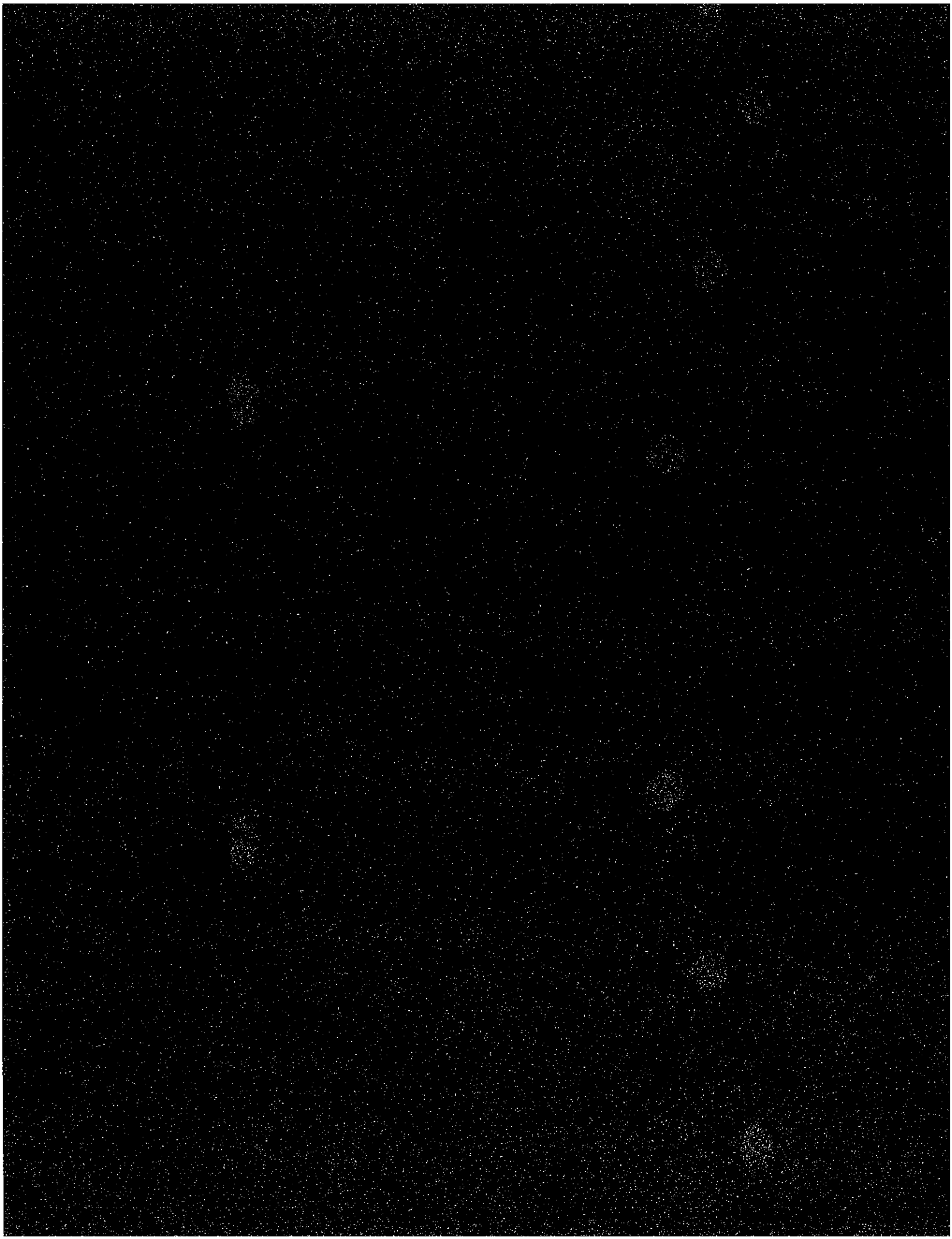
The agreement will be construed under the laws of the State of California, except for that body of laws dealing with the conflict of laws. If any provision of this agreement shall be held by a court of competent jurisdiction to be contrary to law, that provision will be enforced to the maximum extent permissible, and the remaining provisions of the agreement shall remain in full force and effect.

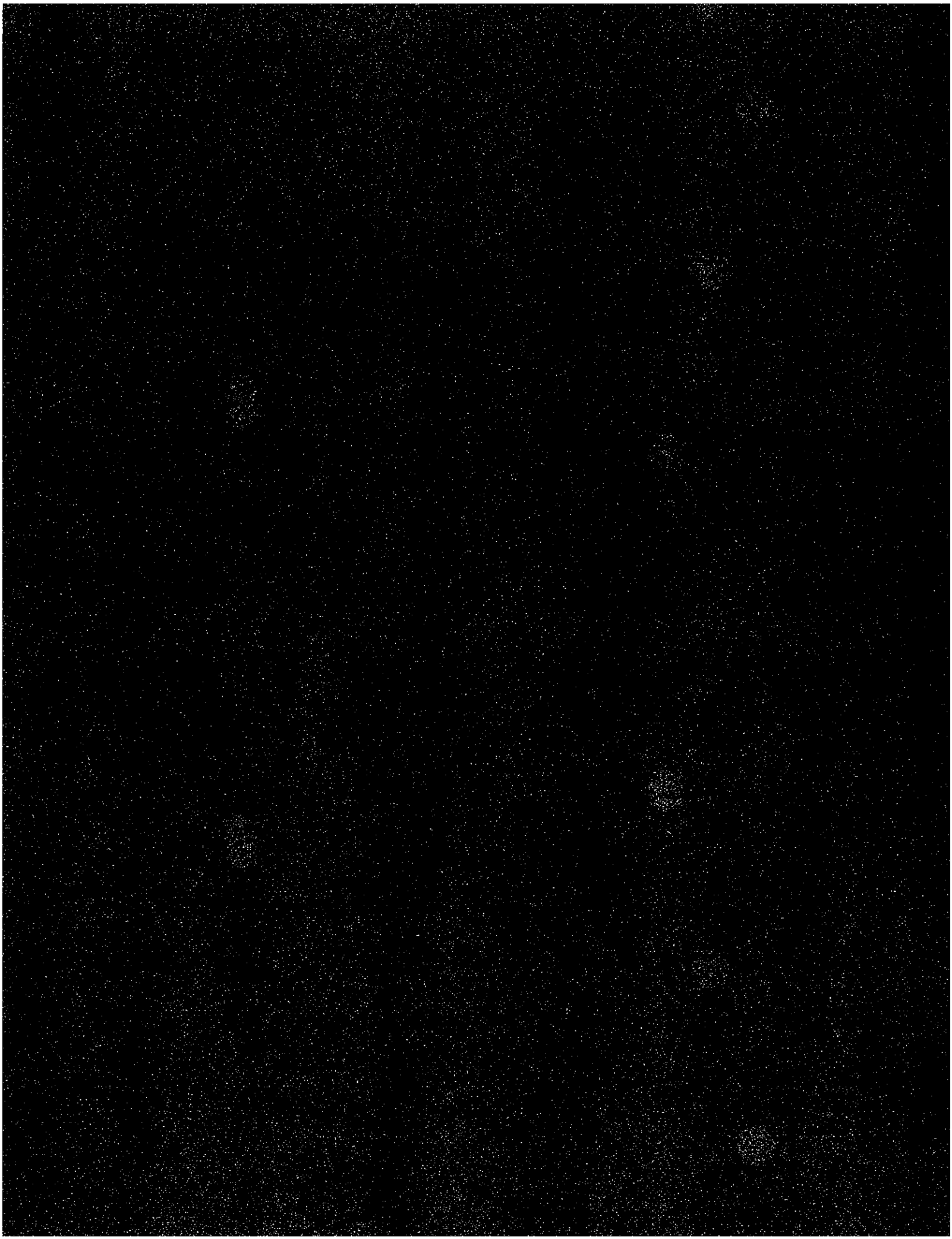
NOTICE REGARDING SPECIFICATIONS

Performance specifications included in this Installation Manual are "design-center specifications" and are included for customer guidance and to facilitate system installation. Actual operating performance may vary.









Overview of the Matrix Plus II System

The Clear-Com Matrix Plus II is an exceptionally reliable modular intercom system which provides a vast range of communication services for broadcast, performing arts, industrial, and aerospace applications. It provides up to 100 audio channels which can be interconnected in almost any configuration, and includes a broad range of intercom stations and interfaces to external audio sources. Matrix Plus II intercom station installation is very versatile with a variety of different transmission systems available.

The Matrix Plus II is an "off-the-shelf" system that is completely microprocessor controlled, providing the best of both point-to-point and party-line communications. It supports paging, call signaling, IFB, ISO, groups, automatic DTMF dialing, linking multiple systems, routing and many other sophisticated communication features. Each intercom station is individually programmable even while the system is in use. To change your operating configuration, you can use the Matrix Plus II Configuration Program, a menu driven program which runs on an IBM-PC (or compatible) computer which you connect to the Matrix Plus II System via a serial port. You can store multiple system configurations to disk, allowing you to instantly re-configure your system as often as you require.

A variety of intercom stations are available for the Matrix Plus II System ranging from the ICS-62 to the ICS-2002. The ICS-62 is compact and inexpensive, providing a microphone, speaker and 6 programmable selector keys, each assignable to any combination of destinations in the system. The ICS-2002 provides 12 user programmable selector keys and an 8 X 80 character LCD display. Using its built-in menu-driven software, you can re-configure virtually all of the ICS-2002's local parameters. Using an ICS-2002, you can also reconfigure many global parameters, including reassigning the selector keys on other intercom stations. Up to sixty additional selector keys may be added to any station by adding expansion key panels.

The Matrix Plus II System includes modular, plug-in interfaces to virtually any other communication system or device including telephone lines, two-way radios, cameras, wireless beltpacks, "2-wire" and "4-wire" audio circuits including fiber optic and satellite links, and standard Clear-Com and RTS party-line intercom systems.

Three types of wiring schemes are available. 3-pair or 4-pair station-to-station wiring is standard, with a 10,000 foot operating range. 4-pair operation allows use of repeaters and enables "long-line" operation. Optional fully digital operation over a single pair also with a 10,000 foot operating range requires minimal wiring and provides for secure digitized communications.

The Matrix Plus II System is exceptionally reliable. Any intercom station, interface module or circuit card may be unplugged and replaced while the system is running. Dual power supplies allow the Matrix Plus II System to be connected to two separate 115/220 volt AC power sources so that in the event that one source fails, the other can run the system. All matrix configuration information is stored in the matrix frame in battery-backed memory, allowing the system to restore itself immediately and automatically after a power failure or other error condition.

The Clear-Com Matrix Plus II is a modular, microprocessor controlled intercom system that is configurable to satisfy a wide range of communication requirements.

Matrix Plus II Terms and Concepts

This section will introduce terms and concepts that are fundamental to the understanding the Matrix Plus II System.

Many of these terms and concepts were developed for the television industry, but also find use in other operating environments. The following terms are discussed in alphabetical order:

- Answer Back
- Auto-Listen
- Call Signals
- Controls (DTMF Sequences, Relays, and Routes)
- Crosspoints
- DTMF Sequences
- Fixed Groups
- Forced Crosspoints
- IFB (Interrupt Foldback)
- Interfaces
- ISO (Station Isolate)
- Labels
- Page Override
- Party-Line
- Point-to-Point
- Ports
- Priorities
- Relays
- Routes
- Talk and Listen
- Trunks

Answer Back

Each Matrix Plus II System intercom station has a key labeled "Answer Back". This key allows you to respond to calls from stations or interfaces which are not currently assigned to a selector key on your station. The "answer back stack" feature also allows more than one station to call your station at the same time without any of them getting a "busy signal".

If another station operator tries to call you but you are already talking to some other caller, the second caller does not get a "busy" signal (as on a telephone line). Instead, you immediately hear their incoming communication and their station's label is placed in an incoming call list, referred to as your station's "answer back stack".

When you complete your current conversation and are ready to respond to them, you press your station's Answer Back key and talk to them. If several calls arrive while you are in conversation, they are placed in the answer back stack in the order received, and can be answered in turn.

The ICS-2002 Intercom Station shows the answer back stack in its display window and allows you to respond to the calls in any order you choose. The other Matrix Plus II System intercom stations have a "Call Waiting" LED to indicate that one or more calls are present in their answer back stack.

In an ICS-2002 Intercom Station you can also use the Answer Back key to call a station that is not assigned to a selector key on your station. To do this you use the Select Station keypad button to place any available label in your station's answer back stack, then press the Answer Back key. The "Select Station" function may be inhibited at an individual station

Auto-Listen

"Auto-listen" is a Matrix Plus II System feature that causes a source to automatically set both a talk and a listen to a destination simply by activating a talk. In this way, the source receives audio from the destination without the destination having to specifically activate a talk back to the source. Enabling or disabling auto-listen is a part of the Configuration Software setup for each station, interface and party-line.

Call Signals

A "call signal" is an electronic signal that can be sent from one station or interface to another. Call signals can be used to get the attention of a station operator, or to control a device such as a relay or a radio transmitter or activating the "call lights" on an external Clear-Com Party-Line system.

The term "call signal" is distinct from the phrase "to call", for example "to call a station". "Calling a station" means pressing a selector key on an intercom station in order to originate a talk to the destination station. "Sending a call signal" means manually or automatically sending an audible or visual call signal to the destination.

Call signals can be sent manually from an intercom station by pressing the call signal button, followed by the selector key labeled with the name of the destination. Receiving a call signal at an intercom station results in an announce tone of four beeps, and the sender's label appearing in the answer back stack.

Call signals can be sent automatically by using the "auto-call" feature. Enabling "auto-call" for a station or interface causes any station that calls them to automatically accompany the call with a call signal for the duration of the call. An example would be to activate the speaker of a KB-112 Clear-Com party-line speaker station.

Call signals can also be received from an interface. A received call signal can activate an audible call signal at a station or it can activate a control function.

The Matrix Plus II System also uses call signals for various internal purposes. For example the call signal mechanism is used to cause a TEL-12 Telephone Interface to go off hook whenever it receives a call from a station. Also, a 2-way radio interface uses the call mechanism to control the "push-to-talk" transmit function on the radio. In these cases the call signal for that port is not manually available for use by intercom station operators.

Controls (DTMF Sequences, Relays, and Routes)

DTMF Sequences, Relays, and Routes are referred to in the Matrix Plus II System as "Controls". A control is activated by "assigning" it to a label. When the label is "activated" (by setting a talk or listen to that label, for example by preassigning a selector key with that label assigned to it) the associated control is activated. Relays can be configured to activate on talk, listen or both.

When you desire a control function to happen simultaneous with audio path activation, you can assign the control to any label. For example, you can assign a DTMF sequence to a label that picks up a telephone line, creating an auto dialing sequence.

When you desire a control function activation not connected with a listen or talk label, you can assign the control to a "control label" which is a type of label that has no other function than to activate the controls assigned to it.

Crosspoints

Functionally, a "crosspoint" is a one-way audio path from one port to another port in the Matrix Plus II System. Physically, crosspoints consist of electronic contacts on the crosspoint cards in the matrix card frame.

Crosspoints exist between every pair of ports in the system. They are connected ("closed") or disconnected ("opened") by the Matrix Plus II System as needed to provide one-way or two-way communication paths between the ports in the system.

DTMF Sequences

A DTMF sequence is an assignable control consisting of a 20-character name and a sequence of up to 20 DTMF tones. When the sequence is activated, it causes the string of tones to be sent to the destination of the label that the sequence is assigned to. DTMF tone generation is done by the MTX-100 card with the DTMF-1 option installed.

Fixed Groups

A "Fixed Group" is a label representing a list of port labels, including stations, interfaces and controls. When a Fixed Group label is assigned to a selector key, pressing that selector key allows you to access all members of the list simultaneously, as though each were assigned a separate selector key and you pressed all of them at once. Unlike a party-line, the other members of the Fixed Group cannot talk or listen to each other. A Fixed Group is said to be "fixed" because its members are set using the configuration program and do not change dynamically as do Party-Lines.

When you call a fixed group, each group member's answer back stack will contain your station's label, and their response (if any) will be heard at your station only.

To create fixed group labels, use the "Setup - Labels" screen in the Configuration Program. To assign members to the fixed group, use the "group lists" menu item.

Forced Crosspoints

A "Forced Crosspoint" is a crosspoint that is always closed to establish an audio path. Forced crosspoints are set from within the configuration program, or from an ICS-2002. You can set as many forced crosspoints as you wish, and any port may be a source or destination for as many fixed crosspoints as there are ports in the system.

Forced crosspoints can only be interrupted by a higher priority call or an IFB or ISO interruption.

For example, a forced crosspoint can be used to continuously route an audio program (fed into the matrix through an audio interface) to two particular IFB outputs. That fixed crosspoint can be assigned the lowest priority so that it will be interrupted by any calls coming from other stations.

IFB (Interrupt Foldback)

"Interrupt Foldback" (also referred to as "IFB" or "Program Interrupt") is a broadcast industry term referring to the situation where the "talent" (for example a newscaster) is listening to an audio program (an "on-the-air" feed, for example), that must be interrupted from time to time (for example, for instructions from the Director). Because a destination can be configured as an IFB destination of only certain sources, the term "called in IFB mode" is used to differentiate an IFB interruption rather than a normal prioritized call to the destination.

When a station or interface is configured as an IFB destination, the IFB mode caller interrupts the current program at the destination for the duration of his call. The IFB mode caller talks to the destination, but the destination is never required to reply, thus no listen path is set from the IFB destination to the caller.

The Matrix Plus II System distinguishes four types of IFB: global IFB, local IFB, external IFB control, and station IFB transfer.

Configuring a station or interface as a "global IFB destination" causes the destination's program to be interrupted as a result of any call from any station or interface in the Matrix Plus II System.

Configuring a station or interface as a "local IFB destination" of a specific source causes the destination's program to be interrupted only by a call from the source.

In "External IFB Control" a FOR-22 4-Wire Audio Interface port can be used to send an IFB feed to an external IFB system. The external IFB system can request that an IFB path be activated to it from a predefined source. The external IFB system does this by sending a call signal into the matrix through the FOR-22 port's Call Signal input.

"Station IFB transfer" uses an external Clear-Com PIC-4000 IFB Controller in conjunction with one or more Matrix Plus II intercom stations. When external IFB is in use, the intercom station's microphone audio is rerouted directly out the back of the station to the external IFB hardware.

Interfaces

A Matrix Plus II System Interface Module ("interface") plugs into a IMF-1 Interface Module Frame or a MFC-10 Mini-Matrix Frame with interface slots, and adapts a port to allow it to connect to a specific kind of external device. For example a TEL-12 Telephone Interface allows a standard "wet/dial-up" telephone line to be connected to a Matrix Plus II System port.

There are three Matrix Plus II System Interfaces available, the TEL-12, the FOR-22, and the CCI-22, each of which is described in a separate section below.

The IP-50 is an interface panel for the purpose of directly using the extra 50 outputs of a MCF-100 frame that nromally connect to a SCF-101 frame for expansion beyond 50 ports. With the IP-50 these 50 outputs can be used as outputs only for such uses as IFB feeds and paging systems.

In the Matrix Plus II System Configuration Program, the term "interface" means "a port connected to a Matrix Plus II Interface Module". The term "interface" also means "a port connected directly to an external device via the 4-wire audio connections of the port's 15-pin connector". All ports that are connected to Matrix Plus II System intercom stations are configured using the screens under the "Main Menu" heading "Station", and all ports that are not connected to intercom stations are configured using the screens under the "Main Menu" heading "Interface".

ISO (Station Isolate)

"ISO", short for "station ISOlation", is related to IFB (as described above), but the communication between caller and destination can be two-way. The "ISO mode" caller can interrupt any other audio paths at the destination station to initiate a private conversation between them. As in IFB, when the interruption is finished, the called station's audio is restored to whatever was present before the interruption.

A typical application of ISO is in a television studio, where the camera operators are normally talking on a common party-line but each camera can be interrupted individually by the technical director or video operator.

The Matrix Plus II System distinguishes two types of ISO: global and local.

Configuring a station or interface as a "global ISO destination" causes the destination's program to be interrupted as a result of any call from any station or interface in the Matrix Plus II System.

Configuring a station or interface as a "local ISO destination" of a specific source causes the destination's program to be interrupted only by a call from the source.

Labels

The Matrix Plus II System allows you to assign each selector key on each intercom station in the system one "listen label" and up to four (4) "talk labels". Each selector key's labels name the destination(s) that will be accessed when that key is used to activate a talk or listen (or both). Each label can represent the talk or listen path of an intercom station or interface, a fixed group or party-line, or a control. All labels are created using the "labels" menu in the configuration program. Each label can contain up to five characters consisting of numbers, capital letters, and all punctuation marks except for the underscore ("_"). The five character label is unique, and duplicate labels is not permitted.

Linking

Intelligent System Linking allows ports in one Matrix Plus II System to communicate with ports in remote Matrix Plus II Systems. From the intercom station user's standpoint, this means that any user in the system can press a key on their station and talk to any destination in a remote system in exactly the same way that they talk to a local destination. The label assigned to the key they press to access the remote system is called a Link label.

Page Override

"Page Override" allows you to talk to one or more destination stations at once over the destination's speaker, regardless of the settings of their Intercom volume control and Speaker ON/OFF control. Page Override is available on all Matrix Plus II intercom stations.

Party-Line

A "party-line" intercom system is one in which more than two people are talking and listening to each other at the same time on a single audio path (as on a telephone line).

You can create this type of communication in the Matrix Plus II System by creating a name ("label") for a party-line using the "Setup - Labels" screen in the Configuration Program. Once a party-line label is defined, anyone that assigns that label to a selector key on their intercom station can "join" that party-line by pressing the selector key. Interfaces can be connected ("preset") to any party-line from the "group lists" menu in the configuration program.

Party-Lines in the Matrix Plus II System are said to be "dynamic" because the "members" of the party-line can change according to who happens to be accessing that party-line label at any one time.

Point-to-Point

A "point-to-point" intercom system is one in which one station can talk directly to any other station in the system without the receiver having to operate any controls, and without affecting any other station. For example, you press a selector key labeled DIR (for DIRector) on your station. This causes the light above the selector key marked with your label to light at the director's station, and he can hear you when you speak. If he wishes to reply to you, he presses the selector key marked with your label and talks to you. The Matrix Plus II System incorporates all of the benefits of a point-to-point system, and adds many additional features.

Ports

Each "Port" in the Matrix Plus II System provides a two-way audio path (both talk and listen) between an external device and the Matrix Plus II Card Frame. The external device may be an intercom station, an interface, or any other device that is wired to a port's 15-pin connector. Each "crosspoint card" which is installed in the matrix card frame adds two ports to the system. The Matrix Plus II System can include a total of up to one hundred (100) ports (50 crosspoint cards). Any type of external device can be connected to a port provided by an MTX-100 Station Crosspoint Card. The MTX-200 crosspoint card only supports stations.

Each Port in the system must be assigned a "port function" from within the Matrix Plus II System Configuration Program. The port function specifies what kind of external device the port is connected to, for example an intercom station, telephone interface, or 4-wire audio device. Once a Port has been assigned a port function, all configuration parameters that affect that port (and any external device that may be connected to it) are set from the "Stations" or "Interfaces" screen in the Configuration Program.

Priorities

The Matrix Plus II System provides ten levels of priority for audio paths, ranging from 0 (lowest priority) to 9 (highest priority). Higher priority callers will interrupt lower priority callers, temporarily disconnecting all lower priority talk and listen paths in and out of the destination station.

To set priorities for each station or interface in the system, use the "Global Advanced" screen in the Configuration Program.

Relays

There is one independent relay in each intercom station in the system, and one in each FOR-22 interface port in the system. (The relay in each FOR-22 interface port is available for assignment unless that port is assigned the port function Telephone or Two-Way Radio. This is because the Matrix Plus II System uses the FOR-22 relays internally for those port functions). There are 8 independent relays for each RLY-8 Programmable Relay Control Interface installed in the system.

To define when a relay is activated use the "Global - Controls" screen in the Configuration Program.

Routes

A "Route" is an assignable control consisting of a 20-character name, a source label and destination label. When the Route is activated, it causes a talk to be activated from the source port to the destination label. The source can be any of the (up to 100) ports in the system, and the destination can be any label in the system (except for control labels).

Talk and Listen

The terms "Talk path" and "Listen path" are often shortened to simply "Talk" and "Listen". The term "activate" a Talk or Listen is used to refer to any of the several ways that an intercom station or interface can open a Talk or Listen path, for example by pressing a selector key on an intercom station down (to Talk) or up (to Listen).

A "Talk" is a one-way communication path from the "source" (the station or interface activating the talk) to the "destination" (the receiving station(s) or interfaces(s)). A "Listen" is a one-way communication path (activated by the source) from the destination to the source.

In the Matrix Plus II System, Talk paths and Listen paths are independent of each other. Each station and interface has a separate "Talk label" and "Listen label" associated with it, allowing talk and listen paths to be specified independently of each other when required.

Trunks

Trunks (audio trunk lines) are audio signal paths (typically two pairs of wires) connecting linked Matrix Plus systems together. Trunks are dedicated exclusively to communications between systems. For example if two systems, each with 100 ports, are connected together by three trunk lines, then there can be three simultaneous independent conversations between the two systems.

Hardware Components

The principal components used in a Matrix Plus II System include the matrix card frames, frame cards, power supply, interfaces, and intercom stations and their options.

Matrix Frames and Power Supplies

The matrix card frame, any necessary interface frames, and power supplies are the central point to which all Matrix Plus II System intercom stations and interfaces must be connected. There are a variety of card frames available in the Matrix Plus II System to accommodate the various sizes of systems needed.

MCF-100 Master Card Frame

The MCF-100 Master Card Frame is the housing for the central switching part of the Matrix Plus II System. The MCF-100 is the first of two card frames that are needed to build a 100 X 100 matrix system, (the SCF-101 is the second). It is intended that the two frames will be connected together to form a 100 X 100 system however, the MCF-100 will operate alone as a 50 X 50 system. A SCF-101 could be added at a later date when expansion is needed beyond the 50 X 50 original installation. Or, with an IP-50 a 50 X 100 rectangular matrix can be constructed.

The MCF-100 frame provides a housing for the CPU-100 Master CPU Controller Card, up to 25 each matrix crosspoint cards (MTX-100 or MTX-200), and up to 25 STX-101 Expansion Crosspoint Cards.

SCF-101 Expansion Card Frame

The SCF-101 Expansion Card Frame is the second frame in a 100 X 100 system. The SCF-101 frame houses the CPU-150 Slave CPU Controller Card, up 25 matrix crosspoint cards (MTX-100 or MTX-200), and up to 25 STX-101 Expansion Crosspoint Cards.

The circuitry necessary to interface the SCF-101 to the MCF-100 is built in. Simply connecting the four ribbon cables between the two frames is all that is needed to expand the 50 X 50 MCF-100 to a 100 X 100 system.

MCF-50 Master Card Frame

The MCF-50 Master Card Frame is the housing for the central switching part of the Matrix Plus II System. The MCF-50 is intended for systems of up to 50 ports with no plans for expansion.

The MCF-50 frame provides a housing for the CPU-100 Master CPU Controller Card and up to 25 matrix crosspoint cards (MTX-100 or MTX-200). The MCF-50 cannot be expanded to increase beyond 50 ports.

MCF-25 Master Card Frame

The MCF-25 is identical to the MCF-50 except that it has slots for 13 matrix cards instead of 25. The MCF-25 cannot be expanded to increase beyond 26 ports.

MCF-10 Mini-Matrix Card Frame

The MCF-10 Mini-Matrix Card Frame is the housing for a complete matrix system including five interface modules and built-in power supplies. The MCF-10 is intended for systems of up to 26 ports with no plans for expansion.

The MCF-10 frame provides a housing for the CPU-100 Master CPU Controller Card, up to 13 matrix crosspoint cards (MTX-100 or MTX-200) providing 26 ports, up to 5 Interface modules, and power supplies.

IMF-1 Interface Module Frame

The IMF-1 Interface Module Frame is a 3RU high frame intended to house up to 11 Matrix Plus II interfaces.

PSU-102 Power Supply

Each PSU-102 is sufficient to power one complete Matrix Frame or one IMF-1 Interface Module frame. Each PSU-102 has three separate 9 VDC power supplies. One of the supplies powers the digital circuitry of the frame cards. The other two supplies are the plus and minus analog supplies for the audio circuitry on the Matrix Cards and interfaces.

Frame Cards

Frame cards are the printed circuit cards that plug into matrix card frames. There are five types of frame cards; CPU-100, CPU-150, MTX-100, MTX-200, STX-101.

CPU-100 Master Frame Controller Card

The CPU-100 is the master controller card in the Matrix Plus II system. The CPU-100 manages the communication between matrix cards, stores system configurations, communicates with an external PC Computer to receive configurations from the Configuration Program, manages LINKING between multiple systems, and controls RLY-8 relay modules directly.

CPU-150 Slave Frame Controller Card

The CPU-150 is the controller card for the second frame in a two frame Matrix Plus II system. The CPU-150 only gathers communication requests from matrix cards in the second frame and passes them on to the CPU-100 in the first frame.

MTX-100 Station/Interface Crosspoint Card (RS-422)

The MTX-100 is a 2 X 50 Matrix Switching Card used to connect to stations and interfaces. The card contains a microprocessor to manage the communication to intercom stations and control the on-board matrix "Talk" switches. The MTX-100 supports all Matrix Plus II intercom stations with 3 or 4 pair wiring to the stations. The MTX-100 communicates to the station via 1 or 2 pair RS-422 data and 2 pairs of 4-wire analog audio. The MTX-100 can also be used to connect to Matrix Plus II interfaces or directly connect to outside applications. An option (DTMF-1) allows the MTX-100 to send and decode standard DTMF tones on the 4-wire audio lines.

MTX-200 Station Crosspoint Card (2-wire Digital)

The MTX-200 is a 2 X 50 Matrix Switching Card for connection to only "Digital 2-Wire" type intercom stations (stations with the "D" suffix). The card contains a microprocessor to manage the communication to intercom stations and control the on-board matrix switches. The MTX-200 supports all Matrix Plus II intercom stations configured with the digital option with a single pair of wires that contains data and audio. The MTX-200 cannot be used to connect to Matrix Plus II interfaces or to directly connect to external devices.

STX-101 Expansion Crosspoint Card

The STX-101 is a card containing crosspoint switches to expand a MTX-100 or MTX-200 from a 2 X 50 to a 2 X 100 set of switches per slot. The STX-101 has no active logic other than that needed to control the CMOS switches. The STX-101 is controlled by its companion MTX card directly above it in the frame.

Interface Modules

An "interface module" connects the Matrix Plus II System to many other forms of communication and control. Interface modules are available for connecting to a telephone line, two-way radio, party-line style intercom, other external audio inputs and outputs, and providing relay contacts for control of external devices.

Interface modules plug into the IMF-1 Interface Module Frame or the MCF-10 Mini Matrix Frame. Each module is 3 RU (5 inches) high and 1-3/8 inch wide.

Each interface provides transformer isolation of the audio signals and opto-coupling of control signal circuits between the Matrix Plus II frame and the external device connected to it.

The Matrix Plus II System provides the following interface modules, which are described in the sections below:

- FOR-22 Dual 4-Wire Interface
- CCI-22 Dual Party-Line Interface
- TEL-12 Telephone Interface
- RLY-8 Relay Interface
- IP-50 Output Interface Panel

The IP-50 is an interface panel for the purpose of directly using the extra 50 outputs of a MCF-100 frame that nromally connect to a SCF-101 frame for expansion beyond 50 ports. With the IP-50 these 50 outputs can be used as outputs only for such uses as IFB feeds and paging systems.

FOR-22 Dual 4-Wire Interface

The FOR-22 interface provides transformer isolation for external "4-wire" audio devices connected to ports in the matrix frame and opto-isolated control signals between the matrix frame and the external device. A "4-wire" audio device uses four wires to connect to the interface: two wires to transmit audio to the matrix and an additional two wires to receive audio from the matrix.

The FOR-22 is a "dual channel" module, allowing two independent 4-wire devices to be connected to two separate ports in the matrix.

The FOR-22 front panel includes gain controls for "send" and "receive". The "send" level is indicated by a two-color LED.

The FOR-22 also provides a set of relay contacts for each port which can control an external device, for example a two-way radio transmitter. The relay can be programmed from the configuration program to close when a call signal is sent to the port, or under a number of other circumstances.

The FOR-22 also provides an external call signal input for each port.

Common 4-wire devices include:

- Audio program feeds
- Two-way radios
- IFB systems
- 4-Wire camera interfaces
- 4-Wire telephone line feeds

CCI-22 Dual Channel Party-Line Interface

A "party-line interface" connects an external, 2-wire, full-duplex "party-line" intercom channel to the matrix frame. The CCI-22 is a "dual channel" party-line interface module, allowing two independent channels of party-line to be connected to two separate ports in the matrix. A variety of party-line formats are supported, including Clear-Com and RTS. (Call signals are only supported in Clear-Com format.)

Both party-line input channels are transformer isolated, protecting them against noise induced by ground loops. Optically isolated call signal paths are provided for call signals to and from external Clear-Com party-lines.

The CCI-22 interface is powered by the external party-line system and not by the matrix. This is to prevent ground loops in the party-line system and if the interface is disconnected it will simply become non-functional and not cause an oscillation in the system because it does not have a termination.

TEL-12 Telephone Interface

The TEL-12 telephone interface allows a standard "wet/dial-up" telephone line to be connected to a port in the matrix.

The TEL-12 provides full auto-answer capability including ring detect and auto-disconnect. When calling out of the matrix on a TEL-12 line, activating a talk to the line automatically seizes the phone line, and deactivating the talk releases the line.

The TEL-12 includes an automatic "hybrid null" test tone and a set of manual null adjustments to allow for optimum cancellation of extraneous "echo/sidetone" signals.

When used with an MTX-100 with the DTMF-1 option, the TEL-12 can provide "direct inward access" ("DIA"). DIA allows the caller to activate preprogrammed talk and listen paths within the system. In DIA, the caller's telephone emulates a Matrix Plus II intercom station, using pre-defined DTMF tone codes as "selector keys". These "selector codes" are assigned from the configuration program.

RLY-8 Relay Module

The RLY-8 provides eight (8) independent relays that are directly controlled by the CPU-100 Master Controller Card in a matrix frame. Up to eight RLY-8 modules can be daisy-chained together to provide up to 64 relays for general purpose use.

Intercom Stations

There are eight intercom stations available for the Matrix Plus II System: the ICS-2002, ICS-1802, ICS-2102, ICS-1502, ICS-102, ICS-92, ICS-62, and ICS-52. Each station must be connected to the matrix card frame. All stations can communicate with the matrix frame using 6-Wire/3-Pair or 8-Wire/4-Pair except for "D" series stations which uses a single pair for connection to the frame.

In the 6-Wire/3-Pair system, one pair is used for two-way data transmission, one pair for audio to the matrix frame from the intercom station, and one pair for audio from the matrix frame to the intercom station. This provides full range audio bandwidth (up to 15KHz) and standard analog audio signals that can be patched and switched with standard audio equipment.

For applications requiring line repeaters, the stations can be wired using 8-Wire/4-Pair. This allows communication between any master station and the matrix frame to be transmitted over four pairs of wires. In the 8-Wire/4-Pair system, two pairs are used for two-way data transmission, one pair for audio to the matrix frame from the master station, and one pair for audio from the matrix frame to the intercom station.

Any intercom station model number that ends in the letter "D" (ICS-2002D, ICS-1502D, etc.) is equipped for 2-wire digital only. A single pair of wires is all that is needed to connect the station to the frame. The 2-wire digital wiring configuration is immune to crosstalk, so the pairs can be routed in large multiple-pair cables.

All Matrix Plus II stations have the following features:

- Built-in speaker and optional plug-in panel microphone
- Front panel headset connector
- Answer-Back Key
- Local program input
- Programmable relay
- Mute relay
- Logic inputs for external control of selected station functions.
- Support for Page Override

These stations are described in the following pages.

ICS-2002 Display/Control Intercom Station

The ICS-2002 Display/Control Intercom Station is the only station which allows you to reprogram its own 12 selector keys and those of other stations in the system. Its 8 x 80 character LCD display provides interactive configuration screens, and displays labels for all currently assigned selector key functions and the answer back stack. The ICS-2002's 16 button keypad is used for station and configuration functions, and can also be used to send DTMF tone codes for dialing a telephone line or a "direct inward access" line to another Matrix Plus II System.

The ICS-2002 Display/Control Intercom Station is built in a 2 RU (3-1/2 inch) high chassis and includes the following unique features:

- Back-lit 8 x 80 character LCD display
- Self-configuration menus and functions
- Station System Programming menus and functions
- Visible, assignable Answer Back stack
- Swap window (provides additional 12 selector key assignments)

ICS-2102 24 Pushbutton Intercom Station

The ICS-2102 has 24 illuminated pushbutton keys in a 2RU (3-1/2 inch) high chassis. Each of the 24 pushbuttons can be individually programmed for talk and/or listen activation. The ICS-2102 has 4 preset pushbuttons, each of which can be programmed to activate any combination of other buttons on the station. A 2x8 character LCD display allows programming of station features and facilitates the Answer Back function.

ICS-1802 12 Key Intercom Station

The ICS-1802 is identical to the ICS-2002 except that only four of the sixteen buttons in the keypad are present. The programming functions, telephone dialing, and swap window are not available.

ICS-1502 24 Key Intercom Station

The ICS-1502 has 24 selector keys in a 2RU (3-1/2 inch) high chassis

ICS-102 10 Key Compact Intercom Station

The ICS-102 has 10 selector keys, and is mounted in a small 1 RU high (1-3/4 inch) chassis.

ICS-92 9 Key Compact Intercom Station with Electronic Labels

The ICS-92 has 9 selector keys, and is mounted in a small 1 RU high (1-3/4 inch) chassis. It features a five-character, alphanumeric LED display above each key (including the Answer Back key).

ICS-62 6 Key Compact Intercom Station

The ICS-62 is identical to the ICS-102 except that it has 6 selector keys.

ICS-52 5 Key Compact Intercom Station with Electronic Labels

The ICS-52 is identical to the ICS-92 except that it has 5 selector keys.

Options for Intercom Stations

Matrix Plus II stations can be equipped with the OPT-100 Auxilliary I/O option, and with several options for expansion keys as described below.

OPT-100 Auxilliary Audio Input/Output Option

The OPT-100 provides three auxiliary audio outputs:

- Stage Announce ("SA") output with relay contacts
- Hot Mic output
- Auxiliary Audio line level output

XP-12 and XP-22 Expansion Panels

Any Matrix Plus II System intercom station may be expanded with up to 60 additional selector keys by adding additional key panels. The XP-12 provides 10 additional selector keys, the XP-12 provides 20. These key panels use paper label strips for the selector keys. You can print these strips automatically on any Postscript printer directly from the PGM configuration program. Both the XP-12 and XP-22 are 1 RU (1-3/4 inch) high and 19 inch wide rack mount panels.

XPL-12 and XPL-22 Expansion Panels with Electronic Labels

The XPL-12 and XPL-22 are similar to the XP-12 and XP-22, but they feature five-character, alphanumeric LED displays above each key. These panels are only available for ICS-2102, ICS-1802, ICS-92, and ICS-52 stations. Up to 60 XPL keys can be added to a station. XPL keys cannot be mixed with XP keys on a given station.

AP-22 Assignment Panel

The AP-22 panel allows you to conveniently assign program feeds to destinations with the push of a button. It features the same five-character, alphanumeric LED displays above each key as the XPL panels, but with 20 pushbuttons instead of lever switches. The AP buttons can also be set up for use as simple talk or listen buttons. Up to 80 AP buttons can be added to a station. AP panels are only available for ICS-2102, ICS-1802, ICS-92, and ICS-52 stations.

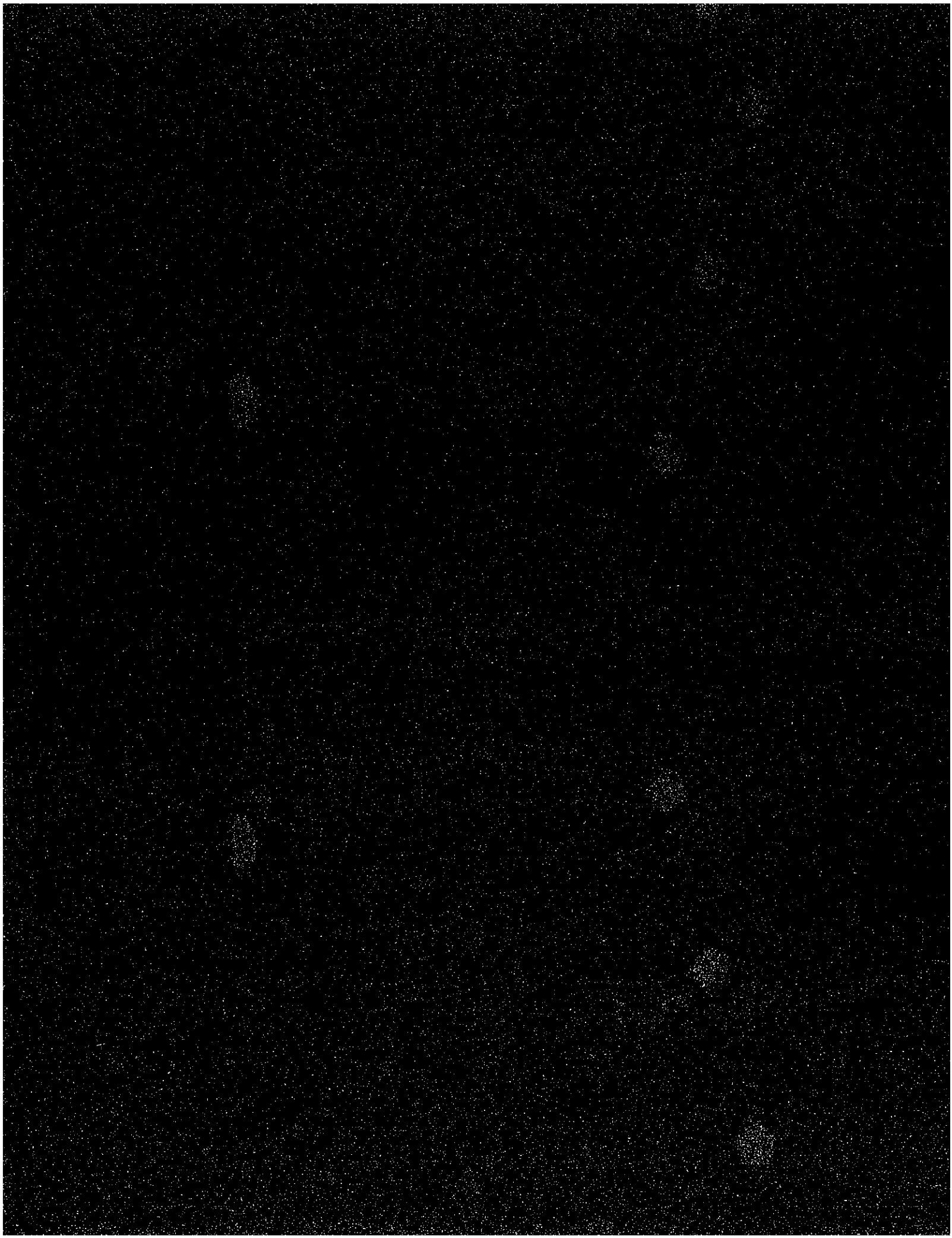
PGM-12 Configuration Program for the IBM-PC

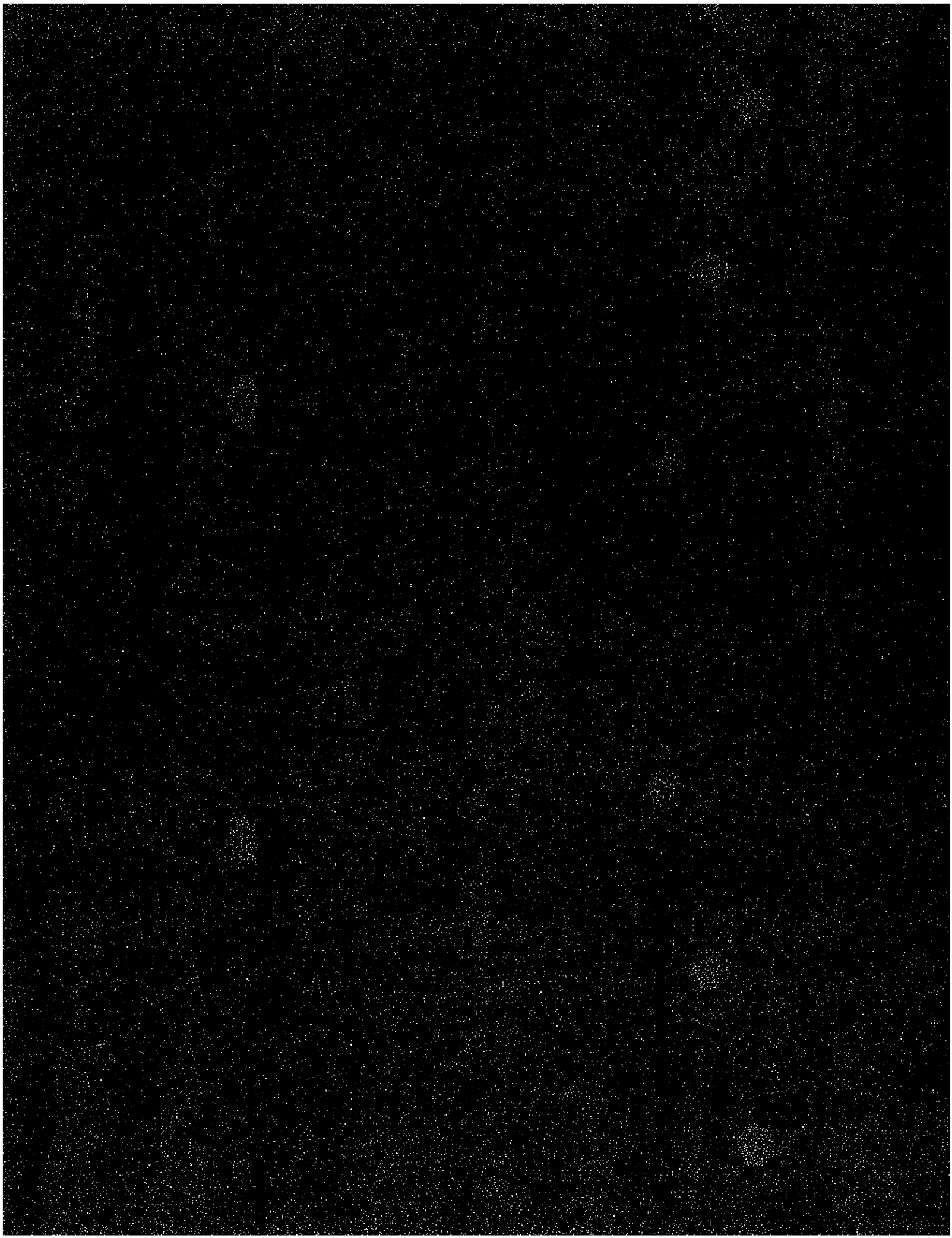
The Matrix Plus II System is completely microprocessor controlled, with dozens of parameters and labels affecting individual stations and the system as a whole. These are referred to collectively as a "configuration". A default configuration (which you specify) can be programmed for your Matrix Plus II System when it leaves the factory.

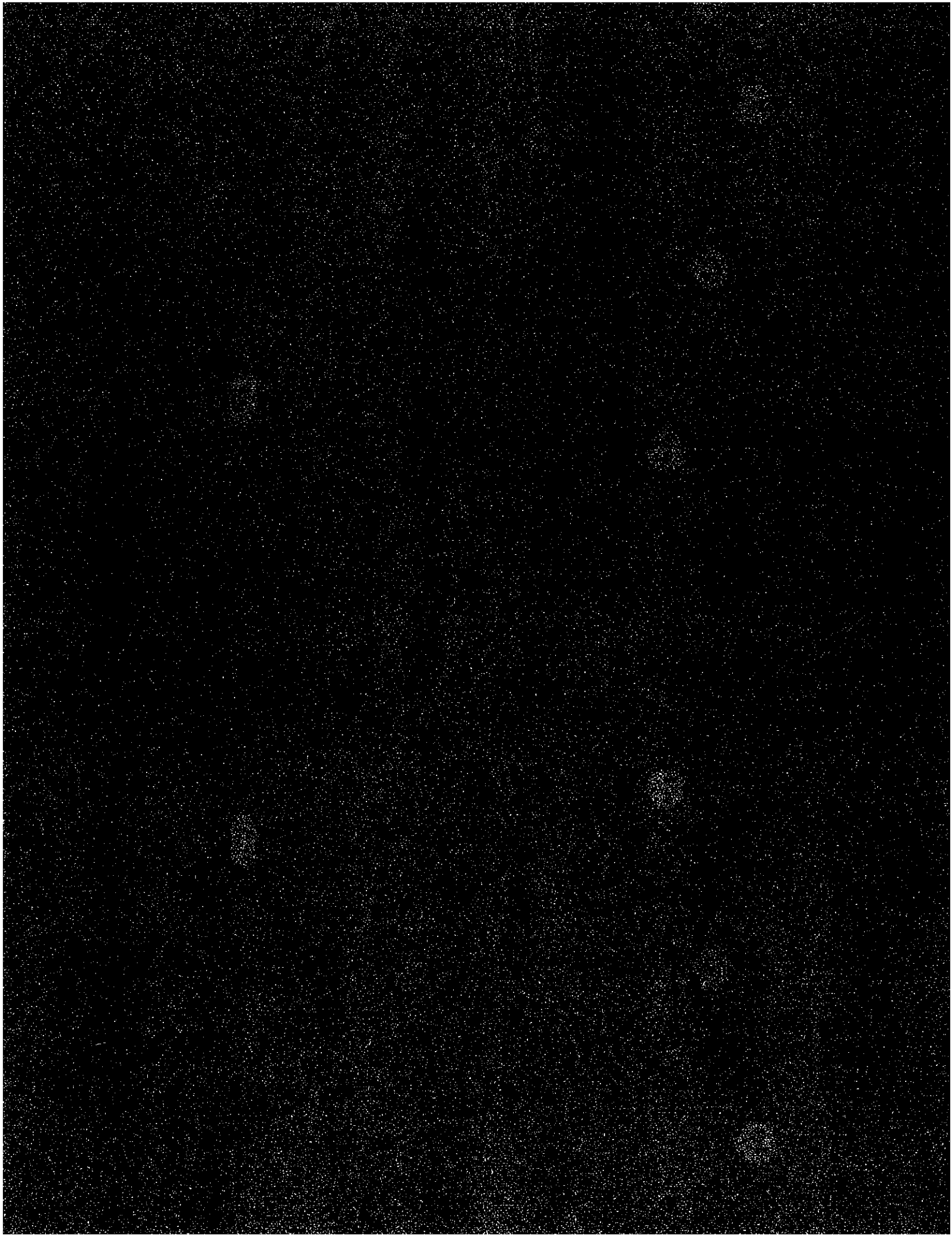
You can modify your configuration by running the PGM-12 Configuration Program on an IBM-PC (or compatible) computer. The Configuration Program allows you to individually configure each intercom station and interface in the system. It also allows you to set a large number of configuration parameters common to the entire Matrix Plus II System.

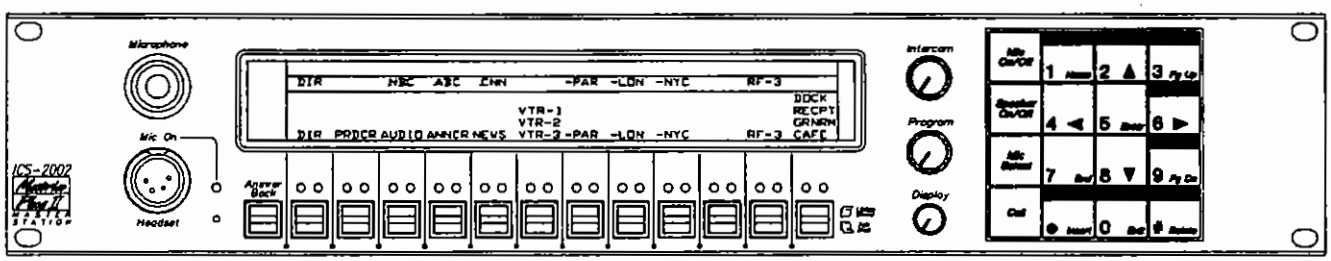
You can modify the Matrix Plus II System's configuration while the system is running ("on-line configuration"). Alternatively, you can create and edit "configuration files" and save them on the computer's disk drive. You can send a configuration file to the matrix card frame ("download" it) at a time when the system is not in use ("off-line configuration").

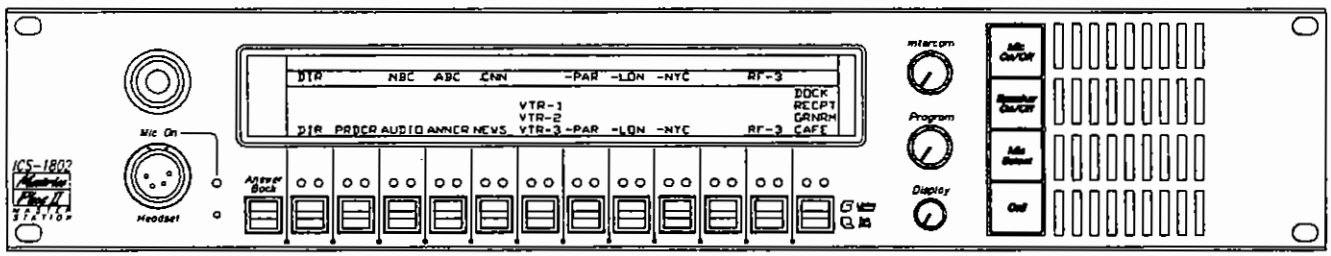
The configuration program runs on an external IBM-PC (or compatible) computer connected to the matrix card frame via a standard RS-232 serial port. The program will support a black and white or color monitor and mouse. For best results, use a VGA color monitor and mouse.











Matrix Plus II System ICS-2002/ICS-1802
MASTER STATION INTERCOM STATION

Introduction

This chapter describes how to use the ICS-2002 and the ICS-1802 Master Intercom Station. Station operators can use this manual once the Matrix Plus II System has been correctly installed and configured. For information on installing the ICS-2002/ICS-1802 see the Matrix Plus II Installation Manual. For information on troubleshooting and maintenance see the Matrix Plus II Maintenance Manual.

The following sections describe the ICS-2002/ICS-1802 and the use of its front panel controls and indicators, menus, and rear panel controls and connectors.

Description

The ICS-2002 Intercom Station has 12 selector keys, is constructed on a 2RU 19 inch rack panel and includes the following features:

- Back-lit 8 x 80 character LCD display
- Self-configuration menus and functions
- Station System Programming menus and functions
- Visible, assignable Answer Back stack
- Swap window (provides additional 12 selector key assignments)
- Built-in speaker and optional plug-in panel microphone
- Front panel headset connector
- Send Call Signals
- Answer-Back Key
- Local program input
- Programmable relay
- Mute relay
- Logic inputs for external control of selected station functions.
- Support for Page Override
- Parallel Stations

The ICS-1802 is a simplified version of the ICS-2002. The keys associated with programming and telephone dialing are not available.

The ICS-2002 and ICS-1802 can be equipped with the following options:

- OPT-100 Auxiliary Audio Output Option
- XP-12/22 and XPL-12/22 Expansion Key Panels
- AP-22 IFB Assignment Panels

Front Panel Controls and Indicators

The following section describes the front panel controls and indicators. These include the display screen, communication error indications, display contrast control, intercom and program level controls, selector keys, answer back key, and keypad buttons.

Figure S1-1 illustrates the ICS-1802 front panel controls and indicators. Figure S1-2 illustrates the ICS-2002 front panel controls and indicators.

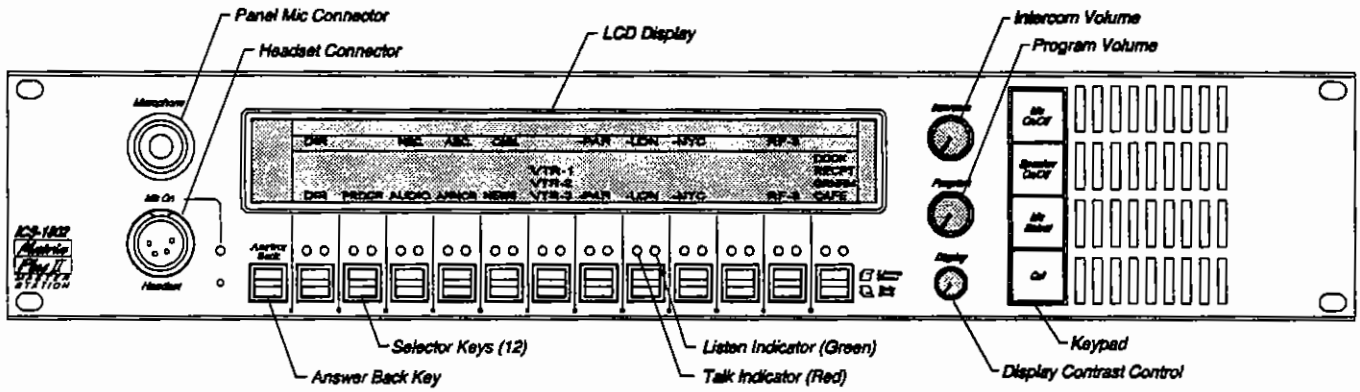


FIGURE S1-1. ICS-1802 Front Panel Controls and Indicators

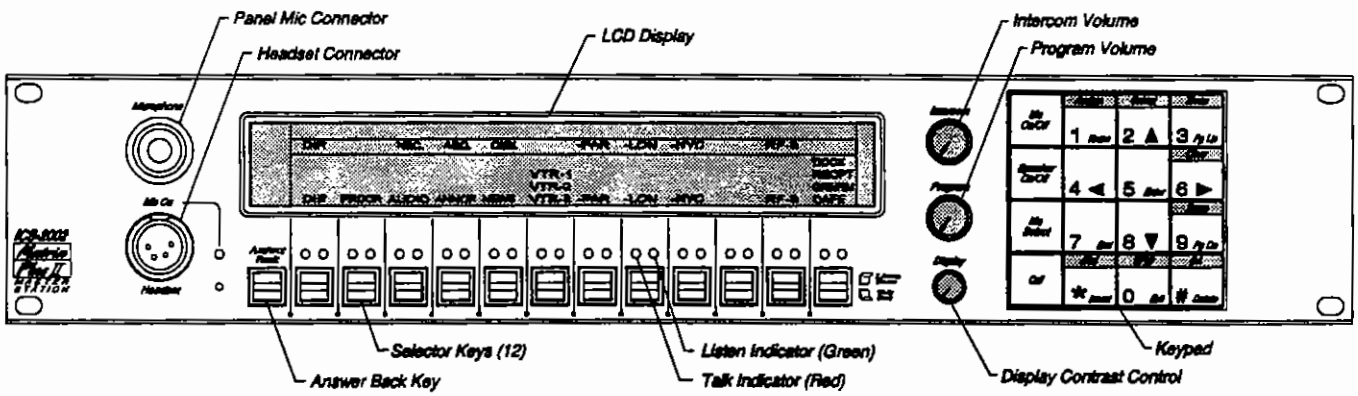
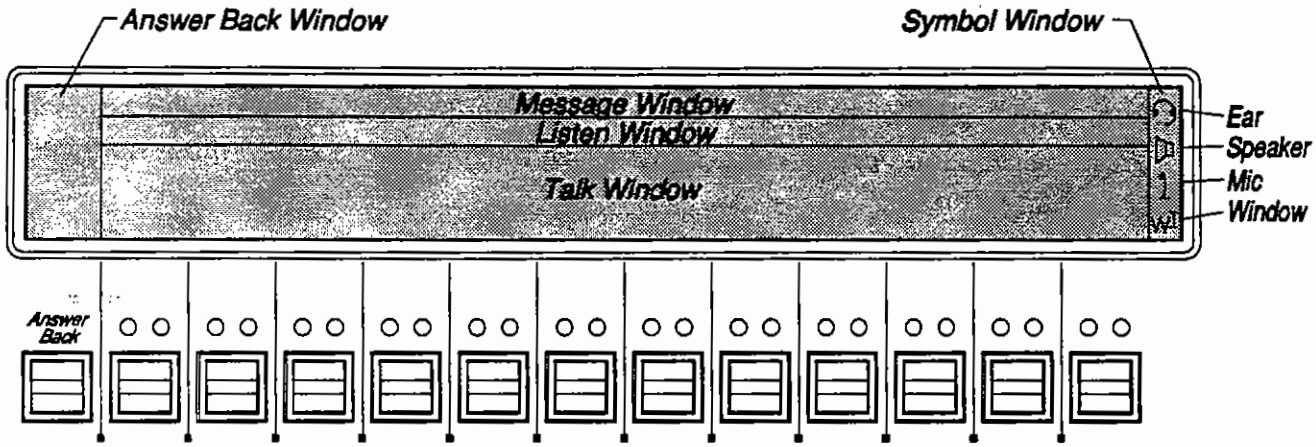


FIGURE S1-2. ICS-2002 Front Panel Controls and Indicators

Display Screen

The display screen of the ICS-2002 Intercom Station is divided into five areas, or "windows". These include the talk window, listen window, answer back window, message window and symbol window



Talk Window

The talk window is located directly above the 12 selector keys, and shows the labels that are currently assigned to be accessed when the selector key is pressed (or latched) in the talk position. Each key can be assigned up to four labels. Each label can represent a talk path to a station, interface, fixed group or party-line, or can activate a programmable control function.

Listen Window

The listen window is located directly above the talk window. It contains one listen label per key. These labels refer to the listen paths that are established when the selector key is pressed upward.

Answer Back Window

The answer back window is located on the left side of the display screen, above the Answer Back key. It displays a list of up to 8 calls coming into the station or selected with the keypad "Select" button. This list is called the answer back stack.

Message Window

The message window displays status and error messages.

Symbol Window

The symbol window has four areas to display graphic symbols. The function of the four areas are as follows:

Ear Symbol The first area contains the symbol of an Ear when someone is listening to ("monitoring") your station.

ICS-2002

Speaker Symbol The second area displays a speaker symbol whenever the station's speaker is active.

Headset or Panel Microphone Symbol The third area displays either a headset or panel microphone symbol indicating which microphone is selected but not necessarily turned on.

Window Indication Symbol (only the ICS-2002) The bottom area contains a W for window and a roman numeral I or II to indicate which talk/listen window is active, as toggled by the Swap Button. Refer to the section on Swap Button later in this chapter for more information.

Communication Error Indication

When the ICS-2002/1802 does not have "data" communications with the matrix frame for some reason, it displays the message "WAITING FOR SYSTEM CONNECTION" in the center of the screen and all of the red LEDs will flash slowly. The following functions are still operational: SA, program input, and hot mic output. When "data" communication is restored, the station automatically returns to normal operation.

Display Contrast Control

To adjust the LCD display for different viewing angles and lighting conditions, adjust the knob labeled Display.

Speaker/Headset Level Control

To adjust the volume of the speaker or headset, use the Intercom and Program volume controls as described below. The volume of the speaker is also affected by two internal software controlled functions: Page Override and Mute Level.

Intercom Volume

The Intercom volume control sets the level of all signals coming from the matrix frame. The only exception is in "page" mode in which the volume is controlled by an internal software function. For details of the Page Override, see section below.

Program Volume

The Program volume control adjusts the volume of the signal coming into the station through the auxiliary input on the Miscellaneous connector on the rear panel of the station.

Page Override

Page Override is an internal function in the station whereby the Intercom Volume is set to a preset value when commanded to by the central matrix. Any Fixed Group can be assigned the Page Override function by the Configuration Program.

The preset value is determined by the Configuration Program for each station. If the preset value is lower than the setting of the front panel volume control, the volume will be controlled by the front panel control.

Mute Level

The speaker level is turned down "X" number of dB when any "Talk" is active at the station. This amount of muting is set by the Configuration Program for each individual station. This function helps prevent a possible feedback situation. The maximum amount of muting is 15 dB below full volume on the front panel control. If the front panel control is set below that level, then muting will have no effect.

Headset Connector

The Headset Connector provides front panel connection of a headset. Plugging in a headset initially causes the station to switch to Headset Mic Operation and turn the speaker off. Unplugging the headset causes the station to switch to Panel Mic operation and turn the speaker on.

Selector Keys and Indicators

The following section describes the operation of the selector keys and their associated indicators.

Selector Key Operation

The twelve selector keys operate as both talk and listen keys. Pressing a key down accesses a talk label. Pushing the key up accesses a listen label. If you press and hold a talk key down, the talk path will remain active only for as long as you hold it down. If you press the talk key only briefly, the key will "latch", and the talk path will be active until it is pressed again. The listen key is latching only.

You can prevent the selector key from latching in the talk position on a given station ("local latch disable"), or you can prevent any station from latching a talk to a given station or interface ("global latch disable") from the configuration program.

Talk Indication

Whenever a talk path is active, the red LED above the key is lit continuously.

Listen Indication

When a listen path is active, the green LED above the key is lit continuously and the label in the listen window above the key is underlined.

Monitoring/Eavesdropping Indication

When any other station begins listening ("monitoring") to your station, a beep will sound at your station. The ear symbol appears in the symbol area and a message to that effect appears in your station's message window, including the listening station's label.

Call Waiting LED Indication

When another station calls your station, the red LED above the selector key on your station with their label assigned to it flashes rapidly. This flashing is sometimes referred to as a "call waiting tally". The label of the calling station will also appear in your station's answer back window.

To answer the incoming call press either the associated selector key or the Answer Back key. The call waiting tally will be cleared by answering the call or after the designated answer back auto-clear time. The auto-clear time is set from your station's configuration menu or from the configuration program.

In-Use Tally Indication

If a selector key on your station is assigned to a label, and another station is currently accessing that label, the LED above that key double-flashes once per second to warn you that the label is in use. This tally must be specifically enabled from the configuration software, so it may or may not be in effect on your station.

Priority Conflict Error Indication

A "priority conflict" error occurs if you attempt to call a station or interface which is currently accessed by another caller assigned higher priority. Your station's speaker beeps twice and the key's LED flashes rapidly for as long as you hold it down.

This same error indication happens when an an IFB or ISO conflict occurs. An IFB or ISO conversation can only be joined by another station with a selector key assigned to that destination in IFB or ISO mode. If you attempt to interrupt an IFB or ISO communication path that is in use by pressing a key assigned to that destination (but not in IFB or ISO mode), your station's speaker beeps twice and the key's LED flashes rapidly for as long as you hold it down.

Telephone Off-Hook Tally Indication

When a telephone interface is assigned to a selector key, the LED above that key will flash once per second whenever that telephone is off-hook. This tally must be enabled from the configuration program.

Radio Receiver Active Tally Indication

When a two-way radio interface port is assigned to a selector key, the LED above that key will flash once per second whenever that radio's receiver is active. This tally is only in effect if it has been enabled from the configuration program.

Station Connected Tally Indication

When a station label (call that station's label REMOT) is assigned to a selector key on another station (call that station LOCAL), the LED above the REMOT key on LOCAL will flash once per second whenever REMOT is on-line and available for LOCAL to talk to. The primary use of this tally is the case in which a station (REMOT in this example) is connected to the frame via a long-line link (for example an ISDN or T1 link) that might only be active at certain times. This tally is only in effect if it has been enabled from the configuration program.

Expansion Key Panel Operation

The optional XP-12, XP-22, XPL-12 and XPL-22 Expansion Panels provide additional selector keys that operate in exactly the same way as the selector keys on the station, including talk, listen, tally, and error indication. The XP panels have paper label strips to identify the keys, whereas the XPL panels have electronic label displays.

Assignment Key Panel Operation

The optional AP-22 Assignment Panel ("AP") allows you to conveniently assign program feeds to destinations, equivalent to setting forced crosspoints from the Station System Programming menu of a display intercom station or the configuration software. This mode is referred to as "IFB Assignment" mode. The AP can also function as a simple expansion panel with electronic labels, but with pushbuttons instead of lever switches. This mode is referred to as "Communication" mode.

The currently selected mode is displayed as "IFB" or "COM" above the rightmost button of the last installed AP on the station. Pressing that button will toggle between modes. The AP will always power up in COM mode, and will revert back to COM mode if left in IFB mode for more than 20 seconds with no buttons pressed. IFB Assignment mode can be disabled as part of the station's configuration; if it is disabled the AP always remains in COM mode.

In COM mode each button either talks or listens to the label assigned to it. This allows you to conveniently talk to your destinations and listen to your sources on the AP. Note however that AP button operation is slightly different from station selector key operation in that only a talk or a listen is activated by an AP button. The red LED above each button indicates an active talk to that label, and the green LED indicates an active listen. If the label is configured for auto-listen, the listen path will be activated with the talk as expected.

In IFB mode each button is configured with either a "source" or a "destination" label. "Sources" are audio paths into the matrix, for example program feeds. "Destinations" are paths out of the matrix, for example IFB feeds.

To assign a source to a destination you first select the destination, then the source. The AP prompts you to select a destination by flashing the red LEDs over the available destinations. Once you have pushed one of these buttons, its LED lights solid to indicate it is selected, and the others stop flashing. The AP then prompts you to select a source by flashing the green LEDs over all available sources. Once you have pushed a source button its LED lights solid. The audio path is not actually established until you either exit IFB mode or select another destination.

Usually only one source can be routed to a destination at a time. In that case, pressing a different source button deactivates any previously established path to that destination. However, the system can be configured to allow multiple source assignment from AP panels, and in that case the AP panel will allow you to set more than one path at a time to a destination.

Some of the labels assigned to buttons on the AP may not be available as sources or destinations in IFB mode. For example, a fixed group label can be assigned to a button for use in COM mode, but it will not be available in IFB mode because only port labels can be sources or destinations. Another reason that even a port label might not be available as a source is that it has been configured with a "forced off crosspoint" to the selected destination. This prevents a talk from ever being activated between it and the selected destination, and results in the label not being available as a source for that destination.

Answer Back Key

The Answer Back key on the ICS-2002/1802 is used to answer calls to your station from other stations or interfaces that are not assigned a selector key on your station. It can also be used on the ICS-2002 to call a destination that is not assigned to any selector key on your station.

The following sections describe the use of the ICS-2002's answer back facility.

Answer Back Window

The Answer Back window is located on the left side of the display screen, above the Answer Back key. It displays a list of up to eight calls coming into the station. The first caller's label is closest to the Answer Back key and is highlighted, and subsequent calls are placed above it in the window. This list is called the answer back stack.

Using the Answer Back Key

To answer the incoming call from the station whose label is highlighted in the answer back stack, press the Answer Back key. This key cannot be latched. It is a momentary only function. Alternately, if that station is assigned to a selector key, the LED above that key will flash and pressing that key will also answer the call.

Answer Back Label Selection

If there is more than one label in the answer back stack, you can select which one you want to respond to by pressing UP on the Answer Back key to move the highlight up to the desired label. (After the highlight reaches the top label it

wraps around to the bottom of the list). To answer the highlighted caller, press DOWN on the Answer Back key.

Removing Labels From the Answer Back Stack

To manually remove a label from the answer back stack on the ICS-2002 only, move the highlight to that label and press the Clear button on the keypad.

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Each label will be automatically removed from the stack if not accessed within a time period set by the answer back auto-clear time in the station's configuration menu.

Select Station Button

On an ICS-2002, if you need to talk to a destination whose label is not assigned to any of your selector keys, you can place the destination's label in the answer back stack. Once in the answer back stack, you can use the Answer Back key to talk to that destination.

To place a label in the answer back stack, press the Select button on the keypad. The display screen displays a list of all available talk labels. Highlight the desired label (using the cursor buttons) and press the Enter button. The label is highlighted in the answer back stack. To talk to that destination, press down on the Answer Back key.

Keypad

The 16-button keypad, located on the right side of ICS-2002's front panel, provides various functions. The ICS-1802 only provides the four left most buttons. The functions available are as follows:

ICS-2002 and ICS-1802:

- **Mic On/Off**
- **Speaker On/Off**
- **Mic Select**
- **Call** Signal

ICS-2002 only:

- **SA** (Studio/Stage Announce)
- Cursor Control
- **Clear** Answer Back
- **Select** Station
- **Swap** Window

- **Assign** Keys
- **Dial** Phone
- **Menu**
- **UPIC**

The words in bold above are the actual text on the buttons. Several of these buttons provide two or three different functions. The legend on the upper portion of each button is active during normal station operation. The legend in the lower right portion of each button are cursor movement directions which are active in the assign keys, select station, and menu modes. The numbers in the lower left portions are active in the dial phone mode.

Mic On/Off Button

To toggle the microphone On or Off, press the Mic On/Off button. The green "Mic On" LED located next to the headset connector indicates when the microphone is On. If the microphone is off, and you activate a Talk, the mic turns On. If the talk is momentary, the microphone will turn off at the end of the call. If the talk is latched, the microphone will remain On after the call.

Speaker On/Off Button

To toggle the speaker On and Off press the Speaker On/Off button. A speaker symbol appears in the symbol window when the speaker is On. This button works only when a headset is plugged into the station.

Mic Select Button

To switch between the panel mic and the headset mic (if a headset is plugged into the station), press the Mic Select button. Plugging in a headset initially causes the station to switch to headset operation. Unplugging the headset causes the station to switch to panel mic operation. This button works only when a headset is plugged into the station.

Call Signal Button

To send a call signal, press the call signal button on your station. The message window will prompt you for a destination. Press the selector key labeled with the name of the destination. The call signal will be sent each time you press the destination key (until the message in the message window times out, which takes about 5 seconds).

You can issue a call signal to any destination assigned to a selector key on your station. If more than one label is assigned to that key, all labels will receive the signal. If a label is a fixed group, the entire group will receive the call signal. If

the label is a party-line, then every station listening on the party-line will receive the call signal.

Remote Telephone Line Release

To hang up a telephone interface that has been left off-hook (and deactivate any audio paths set to that interface from anywhere in the system), press and hold the call signal button on your station, then press the selector key assigned to that telephone, then release the call signal button. This function must be specifically enabled from the configuration program, so it might or might not be active on your station.

SA (Studio/Stage Announce) Button

To direct the station's active microphone output to the station's local studio announce output, press the SA button. While the SA button is pressed, all talk paths from the station to the matrix frame are turned off and the microphone output is sent only to the studio announce output on the Auxiliary Audio I/O connector on the rear panel of the station. This function requires that the station be equipped with the OPT-100 Auxiliary Audio Input/Output option.

Cursor Buttons

Cursor movement in assign keys, select station, or menu mode is provided by twelve of the keypad buttons as follows:

- **Home** moves the cursor to the upper left corner of the screen.
- **Up Arrow** moves the cursor up one line.
- **Pg Up** moves the cursor up one screen-full if more than one screen-full of information is available.
- **Left Arrow** moves the cursor left.
- **Enter** selects the highlighted label or function.
- **Right Arrow** moves the cursor right.
- **End** moves the cursor to the lower right corner of the screen
- **Down Arrow** moves the cursor down one line.
- **Pg Dn** if more than one screen full of information is available the cursor will move down one page.
- **Insert** allows you to move all talk/listen label assignments of the selector key below the highlight (the "current" selector key) one selector key position to the right. The talk and listen label positions for the current key will then be available for assignment. This moves the talk/listen label assignments of all selector keys to the right of the current key one position to the right. The rightmost selector key's labels

are "pushed off the end", but the last one pushed off is saved for as long as you are in the current assign keys screen. Use the Delete key to reverse the last key pushed off.

- **Delete** removes the highlighted label from its current assignment, creating an empty location for a new label. If the highlight is located above a selector key that has no labels assigned to it, pressing the Delete key will move all selector key assignments to the right of the current key over one position to the left. This fills in the current key's label area with the label set of the selector key that was to its immediate right. The Delete key can be used to reverse the effect of an insert. If an insert was previously performed, the rightmost selector key will be assigned the labels that were "pushed off the end" by the insert.
- **Exit** exits the current function or menu.

Select Station Button

If you need to talk to a destination whose label is not assigned to any of your selector keys, you can place the destination's label in the answer back stack. Once in the answer back stack, you can use the Answer Back key to talk to that destination.

To place a label in the answer back stack, press the Select button on the keypad. The display screen displays a list of all available talk labels. Highlight the desired label (using the cursor) and press the Enter button. The label is highlighted in the answer back stack. To talk to that destination, press down on the Answer Back key.

Clear Answer Back Button

To manually remove a label from the answer back stack, move the highlight to that label and press the Clear button on the keypad. Each label will be automatically removed from the stack if not accessed within a time period set by the answer back auto-clear time in the station's configuration menu or configuration program.

Swap Window Button

The ICS-2002 provides two sets of talk and listen label assignments for the twelve selector keys on the station. The Swap Window button alternates between the two sets, and the talk/listen windows display the labels for each. This effectively provides twenty four selector keys, however only twelve can be active at one time.

If talk/listen paths are latched on when you swap windows, the paths are temporarily disconnected. When the windows are swapped back, the previously latched

paths will be re-established. Should the label appear in both windows, not necessarily in the same position, the path will remain latched through the swap.

Assign Keys Button

You can assign different labels to the selector keys on your station by using the assign keys button. Access to this menu may be disabled from the configuration menu in your station or from the configuration program. To assign keys on your station perform the following steps:

1. Select the talk/listen window set to be modified by pressing the NEXT key if necessary.
2. Activate the assign keys mode by pushing and holding the Assign Keys button for one second. Upon releasing the key and a delay of about another second, the message window indicates that the station is in assign keys mode.
3. A cursor (highlighted bar) indicates the currently selected label location to be reassigned.
4. Highlight the location to be assigned by using the cursor keys, then press the Enter button.
5. The display screen will list all labels available for assignment to your station. Highlight the desired label and press the Enter button. If the screen is full and the desired label does not appear on it, page through the screen to display more labels using the Page Up and Page Down buttons. If the desired label does not appear on this list, it may be because your station's access to that label has been inhibited (blocked) from the configuration program.
6. To exit assign keys mode, press the Exit button.
7. An exit menu will appear allowing you to Abort without saving the changes or Exit saving the changes.

If another station calls while you are in these menus, that station's label will be added to your answer back stack, and you can hear them when they speak. To respond, exit the menu and press your Answer Back key.

Dial Phone Button

The Dial Phone button turns the keypad into a touch-tone phone keypad, allowing you to generate DTMF tones ("touch-tones") for dialing on a telephone line. Access to this menu may be disabled from the configuration menu in your station or from the configuration program.

To place a telephone call, press a selector key that is assigned to a telephone interface. When you hear the dial tone, push the Dial Phone button on the keypad. A prompt for the telephone number appears in the message window. Enter the number using the buttons on the keypad (0-9, "#" and "*"). The numbers you dial

appear in the message window. The station automatically exits dial tone mode after five seconds of keypad inactivity.

While your call is in progress you can enter dial phone mode to send DTMF tones to the destination.

UPIC Button

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The UPIC button (short for YOU PICK) is a "hot key" that can be programmed for quick direct access to many of the functions that are available with the Menu button. For example, the button could be programmed to directly bring up the Change Party Line Assignment Menu. The following menu items are available for programming to the UPIC button:

- System Programming Menu
- Change Party Line Assignments
- Change Party Line Ass'ts for Cameras
- Change Fixed Group Assignments
- Change Forced Xpoints
- Change Forced Xpoints for PGM Sources
- Program Station Key Assignments
- View Party Lines
- View Monitoring List
- Change Input Level Gains

To program the UPIC button use the Station - Local Setup screen of the Configuration Program

Menu Button

The Menu button on the keypad accesses the system information menu and the hidden menus as described in the following sections.

Menus

The Menu button on the keypad accesses the system information menu and the hidden menus, including the configuration menu, maintenance menu, and system programming menu.

Pressing the Menu button will also display the Port number and the label of that station.

To access the system information menu, press the menu button. Access to this menu may be disabled from the configuration menu in your station or from the configuration program.

The other three menus are referred to as "hidden menus". To access the hidden menus press and release the Menu button once to access the information menu, then press and hold the Menu button for one second (while the system information menu is displayed). Access to these menus may be disabled or password protected for any or all stations from the configuration program. If these menus are password protected, a password request screen will appear.

If another station calls while you are in these menus, that station's label will be added to your answer back stack, and you can hear them when they speak. To respond, exit the menu and press your Answer Back key.

System Information Menu

The System Information menu allows you to view (not modify) the following station parameters as described in the following sections.

- Auto Listens
- Fixed Group
- Party-Lines Lists
- Forced Crosspoints
- Assignment Inhibits
- IFB Labels
- ISO Labels
- Monitoring List
- Nearby Station List

Auto Listens

This function lists all ports which have auto-listens enabled.

Fixed Group Lists

This function displays all available fixed group labels. Availability of a fixed group label is determined from the configuration program. To display the list of stations and interfaces in each fixed group, press the selector key associated with that group.

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If a fixed group list is set for page override, the message "(page override)" is shown.

Party-Lines

This function displays all available party-line labels. To display the list of interfaces preset to a party-line, use the cursor key to select that party-line.

If a party-line list is set for auto-listen, the message "(auto-listen)" is shown.

Forced Crosspoints

Selecting Forced Crosspoints causes a sub-menu to appear allowing the choice of viewing Destinations or Sources.

Viewing destinations displays all destinations to which your talk path is always connected.

Viewing sources displays all talk crosspoints that are always set to your station.

Assignment Inhibits

This function lists labels that cannot be assigned to a selector key from your station. Assignment inhibits can only be set from the Configuration Program.

Inhibited labels are grouped as "port inhibits", "talk only inhibits", and "listen only inhibits". "Port inhibits" lists destinations that cannot be assigned for either talks or listens. "Talk only inhibits" lists destinations that cannot be assigned for talks, and "listen only inhibits" lists destinations that cannot be assigned for listens.

IFB Labels

This function displays a list of all IFB destinations of this station.

ISO Labels

This function displays a list of all ISO destinations of this station.

Monitoring List

This function displays a list of all other stations that are monitoring your station. An "ear" symbol in the symbol window indicates that someone is monitoring your station.

Nearby Station List

This function displays a list of the stations that are named as "nearby stations" for your station. Nearby stations are assigned for each station as part of its local configuration from the Configuration Program.

Configuration Menu

The configuration menu is one of the hidden menus. If access to the hidden menus has been inhibited from the configuration program, this menu will not appear and the word "inhibited" appears in the message window. Selecting the configuration menu produces the following choices, described in the following sections.

- Change Answer Back Auto-Clear
- Change Panel Light Auto-Shutoff
- Toggle Panel Light On/Off
- Inhibit Station Features
- Station Eavesdropping

Change Answer Back Auto-Clear

This function allows you to increase, decrease or disable the time period that a caller's label will remain in the Answer Back window. The time period is adjustable from 5 to 60 seconds in 5 second increments. The default timeout period is ten seconds.

Change Panel Light Auto-Shutoff

This function allows you to increase, decrease or disable the period of time after which the display screen's electro-luminescent backlit panel will shut off if there is no activity at the station. The default is set to ten minutes. Turning the panel off when not in use increases its lifespan.

Toggle Panel Light On/Off

This function allows you to turn On or Off the display's electro-luminescent backlit panel. In some lighting conditions, for example bright sunlight, the display is easier to read with the backlighting turned Off.

Inhibit Station Features

This function allows you to disable or enable the following station features.

Assign Keys When the assign keys is inhibited, the user is prevented from changing the labels assigned to the selector keys using the assign button.

Station Selection When station selection is inhibited, the user is prevented from assigning labels to the answer back stack.

Dial Phone When dial phone is inhibited the keypad buttons cannot be used to produce touch-tone dial tones.

Swap Window When swap window is inhibited the user is restricted to the current talk/listen window set.

Monitoring Alert Tone When monitoring tones are inhibited, the eavesdropping/monitoring tones will be blocked from the station's speaker. These tones are still present in the headset.

Information Menu When the information menu is inhibited, the user is prevented from accessing the system information menu.

Station Eavesdropping

You are "eavesdropping" when you listen to another station even though that station has no talk keys pressed. Eavesdropping can be useful when communicating with an operator whose hands are occupied and cannot press a key to respond to you.

To prevent other stations from eavesdropping on your station, set station eavesdropping to "disabled". When eavesdropping is disabled, you must have at least one talk key pressed for any station to listen to you. The default is eavesdropping disabled.

Whether eavesdropping is disabled or not, you must have your Mic On/Off button On for anyone to listen to you.

Maintenance Menu

The maintenance menu is one of the hidden menus. The maintenance menu provides functions used by technical personnel. For information on the use of these functions, see the ICS-2002 section of the Matrix Plus II System Maintenance Manual.

System Programming Menu

The system programming menu is one of the hidden menus. The system programming menu can be inhibited for this station from the configuration program.

The system programming menu allows an ICS-2002 operator to set some of the Matrix Plus II System configuration parameters that can otherwise only be set from the configuration program.

The following functions are available:

- Change Party Line Assignments
- Change Fixed Group Assignments
- Change Forced Crosspoints
- Program Station Key Assignments
- Change Input Level Gains
- Monitor Port Outputs

Change Party Line Assignments:

To preset (or remove) an interface from a party-line, perform the following steps.

1. Select CHANGE PARTY-LINE ASSIGNMENTS.
2. The ICS-2002 displays a list of interface categories: all, cameras, program input / IFB outputs, 2-way radios or telephones, and other interfaces. Each interface label in the system is assigned to one of these categories.
3. Select the category that the interface label you wish to assign belongs to, using the corresponding selector key.
4. Select the interface label using the Cursor and Enter buttons. The ICS-2002 will display a list of the party-lines to which the interface is currently preset.
5. Add to or delete from this list by using the selector keys labeled Add or Del, or move the label from its current assignment to a new assignment by using the selector key labeled Move. The Add and Del functions are only presented when there are labels available for them to operate on. The move function is only presented if the interface is preset to only one party-line. To select a label when more than one label is displayed, use the Cursor and Enter buttons. To back up one screen while making selections, use the selector key marked Exit.
6. To exit "change party-line assignments", press the selector key marked Exit repeatedly until the message "select 'exit' to save changes, 'abort' to abandon changes" appears. Press Exit to save your changes or press Abort to exit without saving your changes.

Change Fixed Group Assignments

To add or remove stations or interfaces from fixed groups, perform the following steps.

1. Select CHANGE FIXED GROUP ASSIGNMENTS.
2. The ICS-2002 will display a list of port categories: all, cameras, program input / IFB outputs, 2-way radios or telephones, other interfaces, and ICS stations. Each station or interface label in the system is assigned to one of these categories.
3. Select the category that the label you wish to assign belongs to, using the corresponding selector key.
4. Select the label using the Cursor and Enter buttons. The ICS-2002 will display a list of the fixed groups to which the label is currently assigned.
5. Add to or delete from this list by using the selector keys labeled Add or Del, or move the label from its current assignment to a new assignment by using the selector key labeled Move. The Add and Del functions are only presented when there are labels available for them to operate on. The move function is only presented if the label is assigned to only one fixed group.To select a label when more than one label is displayed, use the Cursor and Enter buttons. To back up one screen while making selections, use the selector key marked Exit.
6. To exit "Change Fixed Group Assignments", press the selector key marked Exit repeatedly until the message "select 'exit' to save changes, 'abort' to abandon changes" appears. Press Exit to save your changes or press Abort to exit without saving your changes.

Change Forced Crosspoint

To add or remove forced crosspoints, perform the following steps.

1. Select CHANGE FORCED CROSSPOINTS.
2. The ICS-2002 will present a choice of two forced crosspoint assignment methods. The "select source -> assign destinations" method allows you to choose a single source and assign it to one or more destinations. The "select destination -> assign sources" method allows you to choose a destination and assign one or more sources to it. Select one of these methods using the selector keys.
3. The ICS-2002 will display a list of port categories: all, cameras, program input / IFB outputs, 2-way radios or telephones, other interfaces and ICS stations. Each port label in the system is assigned to one of these categories. Select the category that the audio source (or destination) belongs to, using the corresponding selector key.
4. Select the source (or destination) label using the Cursor and Enter buttons. The ICS-2002 will display a list of possible destinations (or sources).
5. Add to or delete from this list by using the Selector keys labeled Add or Del, or move the label from its current assignment to a new assignment by using the selector key labeled Move. The Add and Del functions are only presented when there are labels available for them to operate on. The Move function is only presented if the label is assigned to only one destination (or source). To select a label when more than one label is displayed, use the Cursor and Enter buttons. To back up one screen while making selections, use the selector key marked Exit.
6. To exit the change forced crosspoints function, press the selector key marked Exit repeatedly until the message "select 'exit' to save changes, 'abort' to abandon changes" appears. Press Exit to save your changes or press Abort to exit without saving your changes.

Program Station Key Assignments

The "program station key assignments" function allows you to change the talk and listen selector key labels on any station in the system including the keys on expansion key panels.

WARNING All station key reassignments take place immediately upon exiting this function. Active talk and listen paths will be disconnected if you remove their labels. For this reason, use care when modifying key assignments on stations that are in use.

To reassign the selector keys on a station, perform the following steps.

1. Select PROGRAM STATION KEY ASSIGNMENTS.
2. The display screen will list all of the stations in the system. Highlight a station and press the Enter button.
3. The ICS-2002 will display a talk and listen window for the station to be programmed. A cursor (highlighted bar) indicates the currently selected label location to be reassigned. To move around in the talk and listen windows, use the cursor control buttons on the keypad. Select the location to be assigned by pressing the Enter key.
4. The ICS-2002 will display a list of all labels available for assignment to that station. To select a label, use the cursor buttons to move the highlighted bar to the desired label, and press the Enter button. If the screen is full and the desired label does not appear on it, scroll the screen using the cursor control buttons to display more labels. If the desired label does not appear on this list, it may be because that station's access to that label has been inhibited (hidden) from the configuration program.
5. To access additional windows or expansion key panels on that station press the selector key labeled Next.
6. To exit the program station key assignments function, press the Exit button on the keypad. The ICS-2002 will display the message "select 'exit' to save changes, 'abort' to abandon changes". Press Exit to save your changes or press Abort to exit without saving your changes.

Change Input Level Gains

Each input port has a gain control that is controlled by the system software. There are two methods for adjusting port input gains; using this menu item or the Configuration Software.

NOTE: This function is intended to only be used to trim the gain of a particular port to accomidate excessively high or low levels on that port only. This function should not be used to elevate the output operating level of a MTX card above the nominal 0 dB operating level. Excessive output level at the output of a MTX card reduces the headroom of the system, increases distortion, and increases system crosstalk

To set the input gain of a port:

1. Select CHANGE INPUT LEVEL GAINS.
2. The ICS-2002 will display a list of port label categories available for Input Level Change. Select a label category using the selector keys. A screen will appear that will contain a list of labels in the selected category, a report line in the top right corner of the display shows the gain setting in dB for the selected port, and a menu is presented above the selector keys.
3. Select the desired port label using the Cursor .
4. The input gain of the selected port can now be adjusted by pressing the UP or DOWN selector keys. The gain steps 3 dB each time the key is pressed. The speaker and headphone of your station is listening to the selected port so you can hear the effects of the change. Pressing the selector key marked TALK will allow you to talk to that station or interface to request that the person at that station talk to you so you can hear the effect of the gain change.
5. To exit the change input level gain function, press the Exit button repeatedly until you are out of the Menus.

Monitor Port Outputs

The purpose of this function is to individually monitor port outputs. It is not possible to actually monitor a port output but it is possible to copy all of the closed crosspoints to a given port to your station and thereby listen to whatever that port is listening to also. This function is very usefull in debugging configurations.

To monitor a particular port:

1 Select MONITOR PORT OUTPUTS.

2 The ICS-2002 will display a list of port label categories available for monitoring. Select a label category using the selector keys. A screen will appear that will contain a list of labels in the selected category.

3 Select the desired port label using the Cursor . You should now hear on your speaker and earphone whatever is heard at that port.

4 To select another port, use the selector keys.

5 To exit the monitor port outputs function, press the Exit button repeatedly until you are out of the Menus.

Rear Panel Connectors

This section describes only those rear panel functions that directly affect normal operation of the station. These include the functions that are available through the Miscellaneous connector and the functions added by the use of the OPT-100 Auxiliary Audio. The actual functions that these inputs and outputs perform depend on the installation of the individual station. This section only describes the general use of these functions. For a complete description see the ICS-2002 chapter of the Installation Manual.

Miscellaneous Connector

The miscellaneous connector includes the following functions: Logic Input #1, Logic Input #2, the programmable relay, and mute relay.

Logic Input #1 and #2

This section describes the functions of logic inputs. Each of these two inputs can control one of several functions. You determine which function each will control by using the Configuration Program. Typically, these inputs are connected to an external foot switch, a panel mounted switch, or the logic output of some other device.

The following functions are available:

- **Mic On/Off (Toggle)** Activating this function toggles the station's microphone on and off.
- **Mute Mic Output To Frame** Activating this function turns off the audio from the station to the frame. It does not turn off the "Hot Mic" output (described in the OPT-100 Auxiliary Audio I/O Option section of the Installation manual). For an example of the use of this option, see the example in the ICS-2002 section of the Installation manual showing connection of an external IFB feed to the station.

- **Mic Off (Momentary)** Activating this function momentarily turns OFF the station's microphone.
- **Answerback Talk/Clear** This function performs the same functions as the station's Answer Back key. It functions as follows. Holding down the switch activates a talk to that label. If there is a label in the station's Answer Back Stack, pressing and releasing the switch quickly clears the label.
- **Studio Announce** Activating this option sends the output of the station's selected microphone (panel or headset) to the station's Studio Announce ("SA") audio output, and activates the SA relay. The microphone output is not sent to the frame. The SA output and relay are only present if the station has the OPT-100 Auxiliary Audio I/O Option installed. (The SA options are described in the OPT-100 section of the ICS-2002 chapter of the Installation manual).
- **Speaker OFF** Activating this function turns off the station speaker, disabling all audible output from the station.
- **Activate Talks (Push To Talk)** When this function is in the active state, the station behaves normally. When this function is deactivated, it disables activation of all talk labels, implementing a "Push To Talk" function for the station. Any controls (relays, etc.) assigned to the labels are activated or deactivated along with the label they are assigned to. The LED indicators associated with the active labels behave normally regardless of the state of this input. Both momentary and latched talks are controlled by this input.
- **Activate Talk Switch #1** Activating this function is equivalent to pressing the first (leftmost) talk selector key on the station. This is a momentary activation only.
- **Activate Talk Switch #2** Activating this function is equivalent to pressing the second talk selector key on the station. This is a momentary activation only.
- **Activate Listen Labels Button** Activating this function is equivalent to pressing the Listen Labels button on an ICS-52/92 station. All of the modes of the Listen Labels button are supported. See the ICS-52/92 section of the Operations manual for details.

Programmable Relay

The SPDT programmable relay can be used for speaker muting, applause lights, door locks, and other functions that can be controlled by a switch closure. Each programmable relay has a label that is available anywhere in the system, subject to the same inhibits as any other label. Any programmable relay in the system can be activated from any station in the system, including a direct inward access caller.

To activate the programmable relay in a given station, press a selector key on any station in the system that has a label with that particular stations relay assigned to it. Assigning a relay to a label is done in the Global - Controls screen of the Configuration Program.

Mute Relay

The mute relay is activated whenever any talk selector key is activated at the station. The mute relay is commonly wired such that whenever it is activated, the volume of the monitor speaker in that room is decreased (muted).

OPT-100 Auxiliary Audio Option

The OPT-100 Auxiliary Audio option provides the following features:

- SA Audio and Relay Outputs
- Hot Mic Output
- Line Output

SA Audio and Relay Outputs

The SA Announce 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 station's front panel is pressed or when activated by Logic Input #1 or #2 configured for the Local Studio Announce Function. The SA relay is also activated and the contacts are available on the rear panel.

Hot Mic Output

The "Hot Mic" output is a balanced line-level transformer-isolated feed of the signal from the currently selected microphone. The currently selected microphone is either the panel microphone or the headset microphone. The Hot Mic output is active regardless of whether the station has talk paths set, and regardless of the settings of the front panel controls on the station.

Line Output

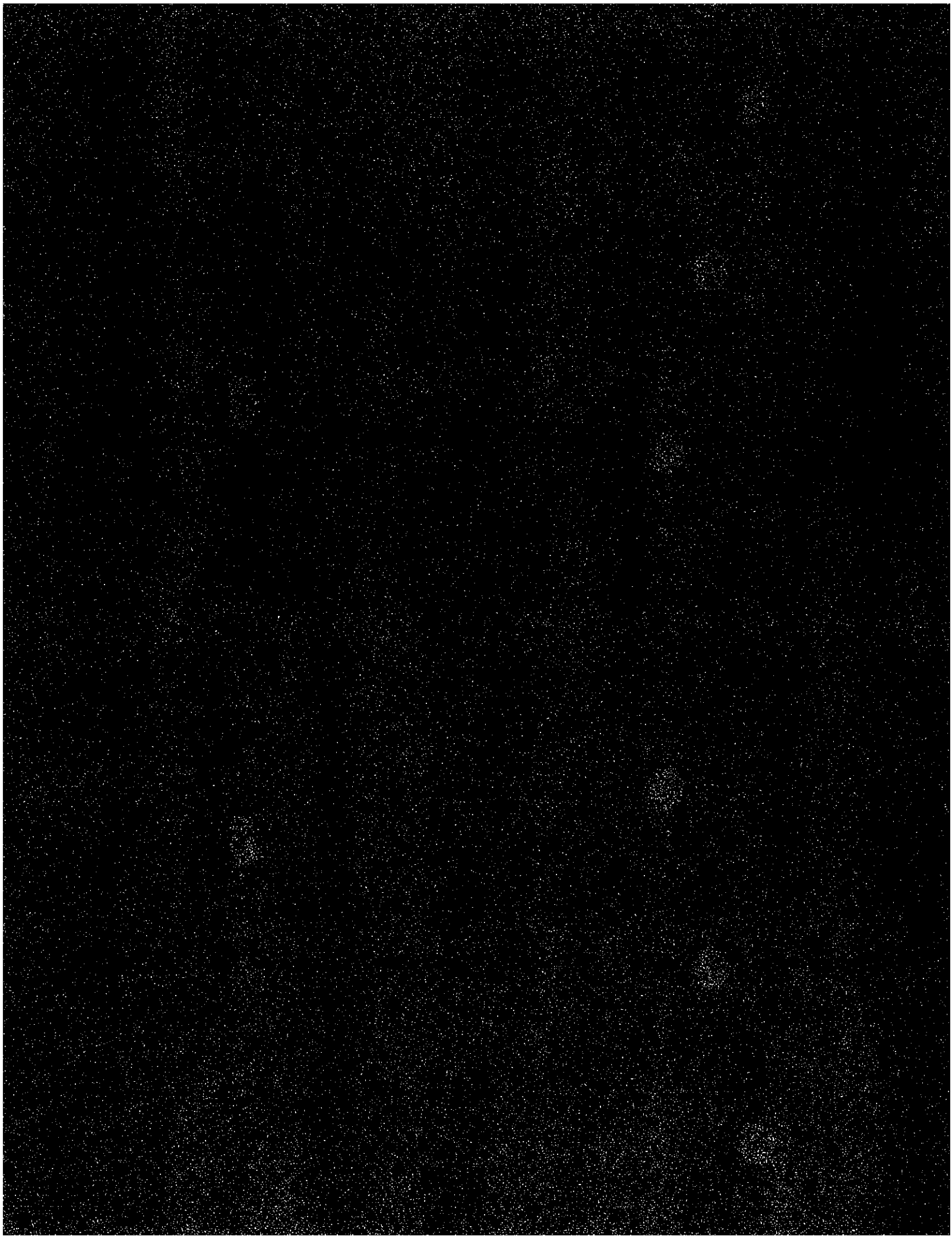
The Auxiliary Audio Line Level output is a balanced line-level transformer-isolated feed of the same audio signal that is sent to the station's internal speaker. For example, this output could be used to feed an external amplifier connected to a set of ceiling loudspeakers.

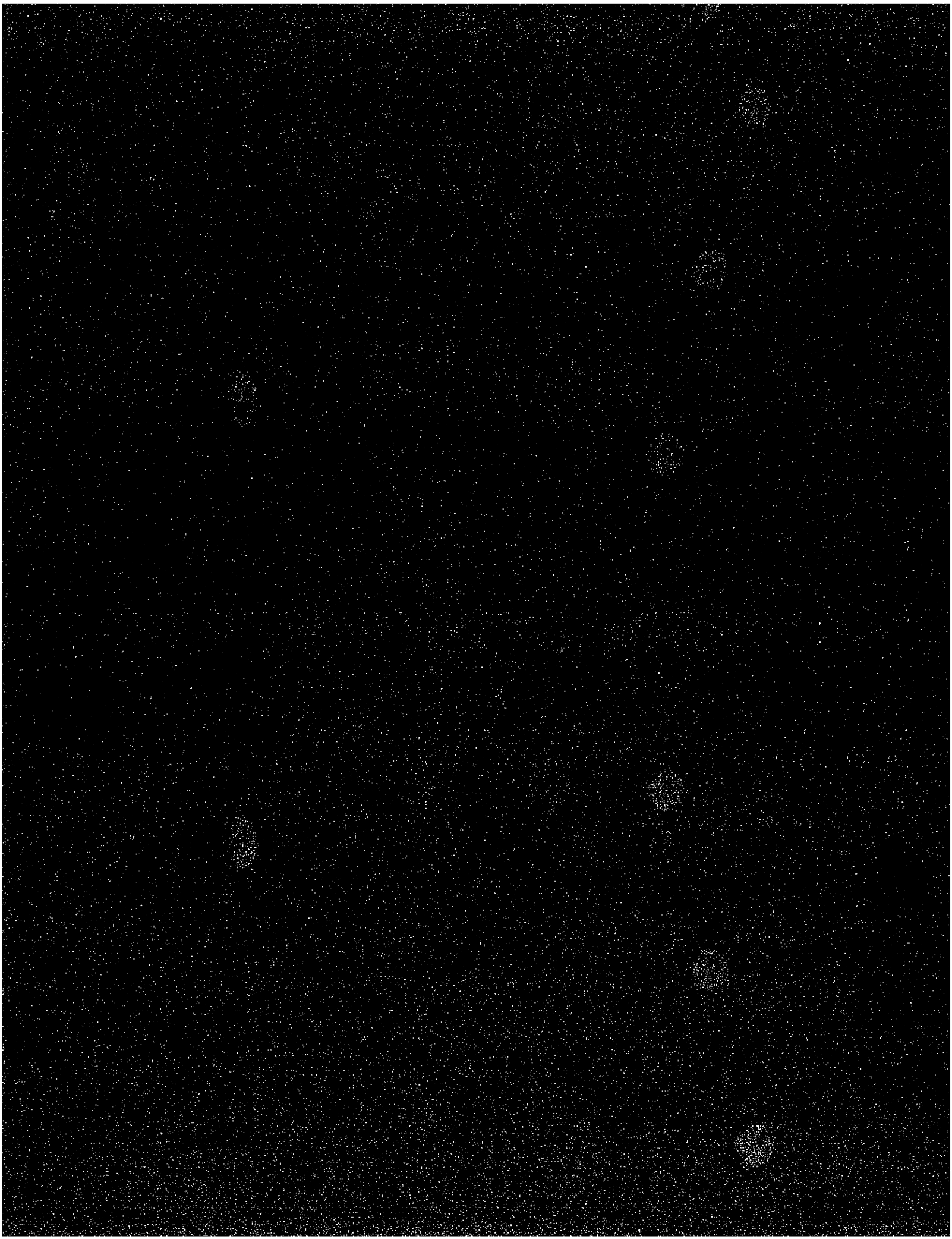
Parallel Stations

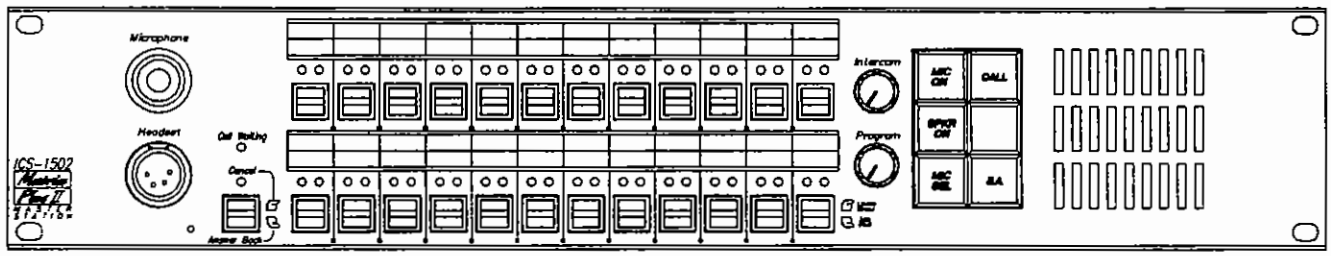
All Matrix Plus II stations support "parallel stations". Up to four of any type stations wired for 3 pair or 4 pair operation can be parallel wired together to a single port. This mode of operation is intended for a large room with a single operator where it might be impractical for an operator to be close to a single station.

All normal station functions are operational including programming functions. For information on the installation of parallel stations refer to the Installation Manual.

Activating a Talk on one station turns the microphone on at that station and turns the mics off at the other stations. A second or third mic can be turned on at given stations by using their Mic On keys.







Matrix Plus II System ICS-1502

MASTER STATION INTERCOM STATION

Introduction

This chapter describes how to use the ICS-1502 24-Key Intercom Station. Station operators can follow these instructions once the Matrix Plus II System has been correctly installed and configured. For information on installing the ICS-1502 see the Matrix Plus II Installation Manual. For information on troubleshooting and maintenance see the Matrix Plus II Maintenance Manual.

The following sections describe the ICS-1502 and the use of its front panel controls, indicators, rear panel controls, and connectors.

Description

The ICS-1502 Intercom Station has 24 selector keys and includes the following basic features:

- 2 RU (3-1/2 inch) high chassis
- Built-in speaker and optional plug-in panel microphone
- Front panel headset connector
- Local program input
- Programmable relay
- Mute relay
- Two logic inputs for external control
- Parallel Stations

The ICS-1502 can be equipped with the following options:

- OPT-100 Auxiliary Audio Output Option
- XP-12 and XP-22 Expansion Key Panels

Front Panel Controls and Indicators

The front panel controls and indicators include communication error indication, speaker level controls, selector keys, Answer Back key, and function buttons.

Communication Error Indication

When the ICS-1502 does not have data communications with the matrix frame for some reason, all of the red LEDs above the selector keys will flash slowly. The following functions are still operational: SA, program input, and hot mic output. When data communication is restored, the station automatically returns to normal operation.

Speaker/Headset Level Controls

To adjust the volume of the speaker or headset, use the Intercom and Program volume controls. The volume of the speaker is also affected by two internal software controlled functions: Page Override and Mute Level.

Intercom Level

The Intercom level control sets the level of all signals coming from the matrix frame. The only exception is in "Page Override" mode in which the volume is controlled by an internal software function. For details of the Page Override, see section below.

Program Level

The Program level control adjusts the volume of the signal coming into the station through the auxiliary input on the Miscellaneous connector on the rear panel of the station.

Page Override

Page Override is an internal function in the station whereby the Intercom Volume is set to a preset value when commanded to by the central matrix. Any Fixed Group can be assigned the Page Override function by the Configuration Program.

The preset value is determined by the Configuration Program for each station. If the preset value is lower than the setting of the front panel volume control, the volume will be controlled by the front panel control.

Mute Level

The speaker level is turned down "X" number of dB when any "Talk" is active at the station. This amount of muting is set by the Configuration Program for each individual station. This function helps prevent a possible feedback situation. The maximum amount of muting is 15 dB below full volume on the front panel control. If the front panel control is set below that level, then muting will have no effect.

Headset Connector

The Headset Connector provides front panel connection of a headset. Plugging in a headset initially causes the station to switch to Headset Mic Operation and turn the Speaker off. Unpluging the headset causes the station to switch to Panel Mic operation and turn the Speaker on.

Selector Keys and Indicators

The following section describes the operation of the selector keys and their associated indicators.

Selector Key Operation

The twenty-four selector keys operate as both talk and listen keys. Pressing a key down activates a talk to the talk destination label assigned to that key. Pushing the key up activates a listen to the listen destination label assigned to that key. If you press and hold a talk key down, the talk path will remain active only for as long as you hold it down. If you press the talk key only briefly, the key will "latch", and the talk path will be active until it is pressed again. The listen key is latching only.

Labels can only be assigned to selector keys from the configuration program, or from an ICS-2002 station. Your ICS-1502 station is supplied with a designator strip on which you can write the current label assignments for each selector key. You can prevent the selector key on your station from latching in the talk position ("local latch disable"), or you can prevent any station from latching a talk to your station ("global latch disable") from the configuration program.

Talk Indication

Whenever a talk path is active, the red LED above the key is lit continuously.

Listen Indication

When a listen path is active, the green LED above the key is lit continuously. Whenever another operator activates a listen to your station, your station will issue a beep to let you know that someone is listening to you.

Call Waiting Indication

When another station calls your station, the red LED above the selector key on your station with their label assigned to it flashes rapidly. This flashing is referred to as a "call waiting tally".

To answer the incoming call press the associated selector key. The call waiting tally is cleared when you answer the call. If you do not answer the call, it will be cleared after the designated answerback auto-clear time. The auto-clear time is set from the configuration program.

In-Use Tally Indication

If a selector key on your station is assigned to a destination in IFB or ISO mode, and another station is currently accessing that destination in IFB or ISO mode, the LED above that key flashes slowly to warn you that the IFB/ISO destination is in use. If you wish to join the conversation, you can press your selector key down.

IN-Use Tally & Priority Conflict Error Indication

An IFB or ISO conversation can only be joined by another station with a selector key assigned to that destination in IFB or ISO mode. If you attempt to interrupt an IFB or ISO communication path that is in use by pressing a key assigned to that destination (but not in IFB or ISO mode), you receive an IFB/ISO Error indication, and your talk path is not connected.

The station beeps four times and the LED above the key flashes rapidly for as long as you hold the selector key down.

A "priority conflict" error occurs if you attempt to call a station or interface which is currently accessed by another caller assigned higher priority. Your station's speaker beeps four times and the key's LED flashes rapidly for as long as you hold it down.

Priority Conflict Error Indication

A "priority conflict" error occurs if you attempt to call a station or interface which is currently accessed by another caller assigned higher priority. Your station's speaker beeps four times and the key's red LED flashes rapidly for as long as you hold the selector key down.

Expansion Key Panel Operation

The XP-12 and XP-22 Expansion Key Panels provide additional selector keys. The XP-12 adds 10 keys and the XP-22 adds 20 keys. More than one panel can be used, in any combination, for a total of up to 60 additional selector keys.

The red LEDs on the expansion panels provide the same functions as the red LEDs on the station including talk, call waiting tallys, in use, and error indication. The green LEDs on the expansion panels indicate an active listen equivalent to the green LEDs on the ICS-1502.

Answer Back Key

The Answer Back Key is used to answer calls to your station from other stations or interfaces that are not assigned to a selector key on your station.

An incoming call from a station that is not assigned to a selector key on your station will cause the red Call Waiting LED above the Answer Back key to flash, and the calling station's label to be temporarily assigned to your station's Answer Back key. The Call Waiting LED will flash and the caller's label will remain assigned to the Answer Back key until you answer the call, or until the answer back timeout period elapses and the caller's label is automatically removed from the Answer Back key.

To answer the incoming call, press the Answer Back key down. The green Answer Back LED will light, indicating that you have an active talk path to the caller. The talk path is active for as long as you hold the key down (it does not latch).

To remove the caller's label from the Answer Back key manually, press up on the Answer Back key. The label assignment will be automatically removed after the answer back timeout period elapses. The timeout period is reset each time you press the Answer Back key, so the label assignment is only removed until one timeout period starting at your last key press.

If another call (or calls) comes in while you are answering a call using the Answer Back key, the Call Waiting LED will flash, and the calling station's label will be placed in your station's answer back stack. To answer the next caller, press up on the Answer Back key to remove the current caller's label from the Answer Back key, then press down on the Answer Back key to speak to the next caller in the answer back stack.

Function Keys

The six buttons located on the right side of the station perform the following functions, each of which is described in the following paragraphs.

- Mic Sel (Panel or Headset Microphone Select)
- Mic On (Microphone On/Off)
- Spkr On (Speaker On/Off)
- Call (Call Signal)
- S.A. (Studio/Stage Announce)
- Unmarked (No Function)

Mic Sel (Panel or Headset Microphone Select)

To switch between the panel mic and the headset mic (if a headset is plugged into the station), press the Mic Sel button. The button will be lit when the panel microphone is active. Plugging in a headset initially causes the station to switch to headset operation. Unplugging the headset causes the station to switch to panel mic operation. The Mic Sel button has no effect if a headset is not plugged into the station.

Mic On (Microphone On/Off)

To toggle the active microphone On or Off, press the Mic On button. The button will be lit when the microphone is On. If the microphone is Off and you activate a talk, the microphone will be turned On automatically. If the talk is momentary, the microphone will turn Off at the end of the call. If the talk is latched, the microphone will remain On after the call.

Spkr On (Speaker On/Off)

To toggle the speaker On and Off press the Spkr On button. The button will be lit when the speaker is On. This button is only effective when a headset is plugged into the station.

Call (Call Signal)

To send a call signal, press the call signal button on your station. The button will illuminate. Press the selector key labeled with the name of the destination. The call signal will be sent each time you press the destination key or until the function times out, which takes about 5 seconds.

You can issue a call signal to any destination assigned to a selector key on your station. If more than one label is assigned to that key, all labels will receive the signal. If a label is a fixed group, the entire group will receive the call signal. If the label is a party-line, then every station listening on the party-line will receive the call signal.

S.A. (Studio Announce)

To direct the station's active microphone output to the station's local studio announce output, press the S.A. button. While the S.A. button is pressed, all talk paths from the station to the matrix frame are turned off and the microphone output is sent only to the studio announce output on the Auxiliary Audio I/O connector on the rear panel of the station. This function requires that the station be equipped with the OPT-100 Auxiliary Audio Output Option.

Rear Panel Connections

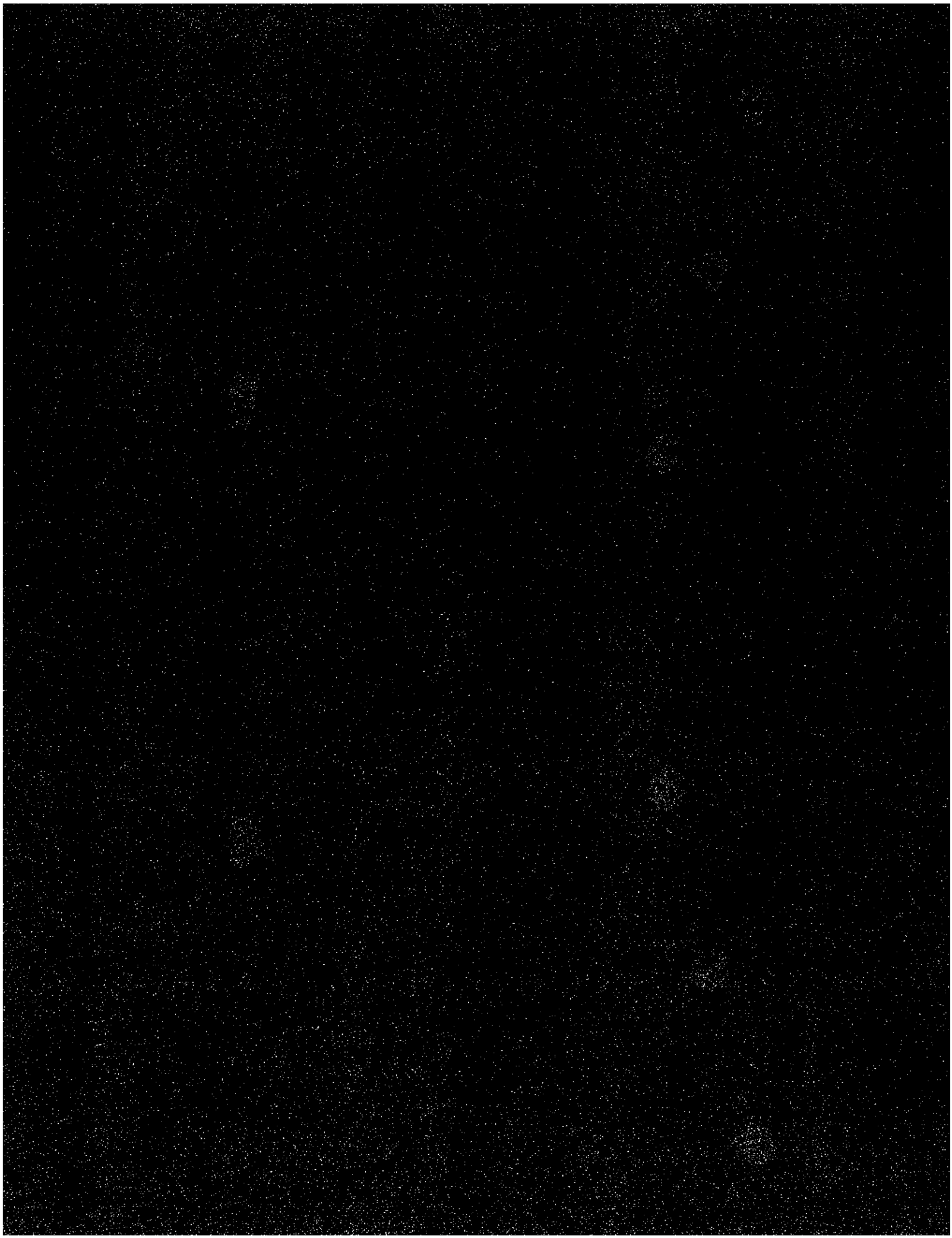
All functions supported by the rear panel connectors on the ICS-1502 are identical to those on the ICS-2002. Refer to the ICS-2002 section of this Operation Manual.

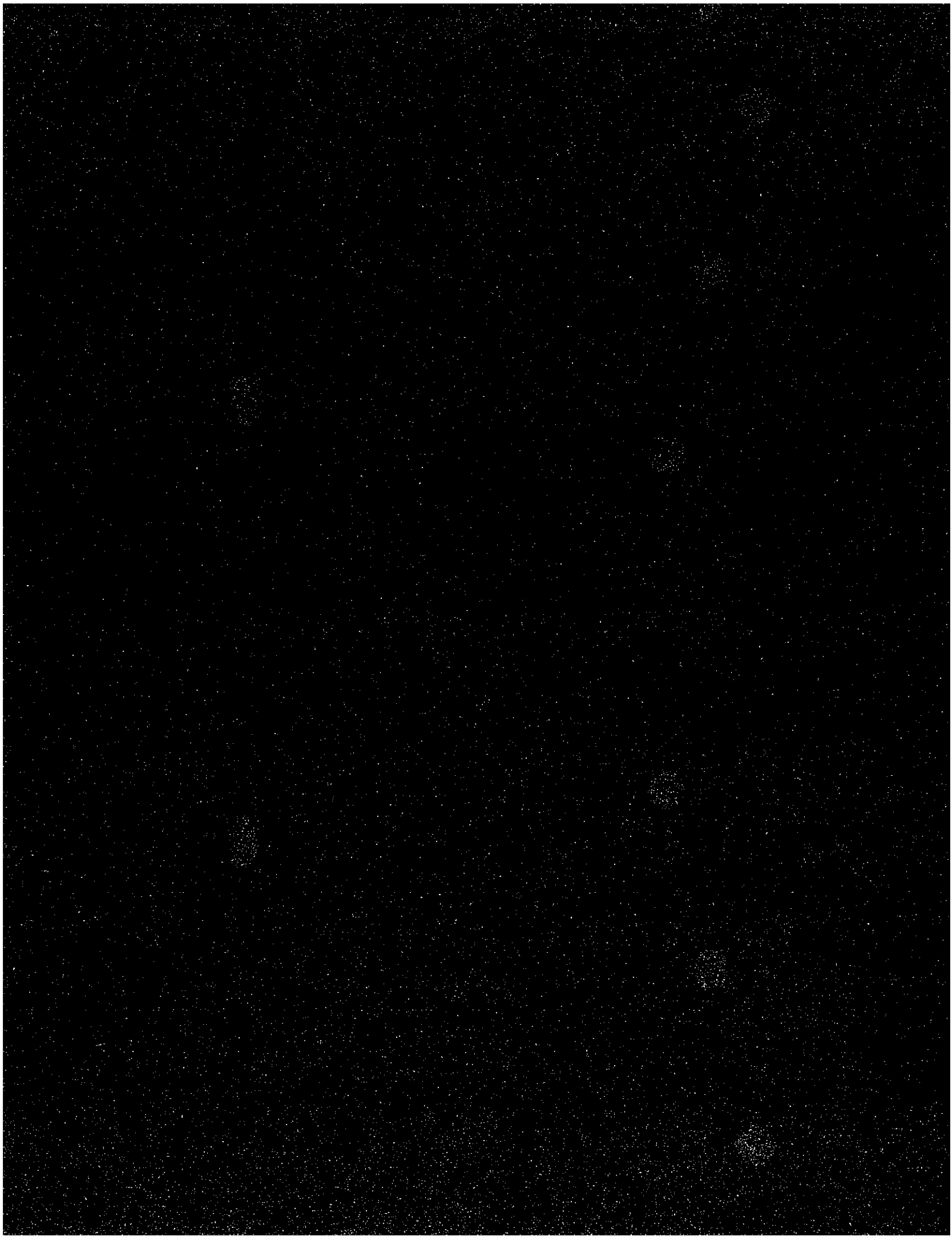
Parallel Stations

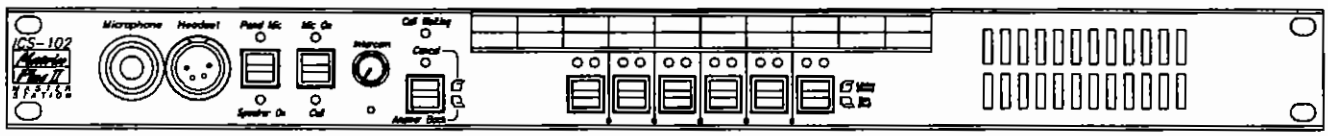
All Matrix Plus II stations support "parallel stations". Up to four of any type stations wired for 3 pair or 4 pair operation can be parallel wired together to a single port. This mode of operation is intended for a large room with a single operator where it might be impractical for an operator to be close to a single station.

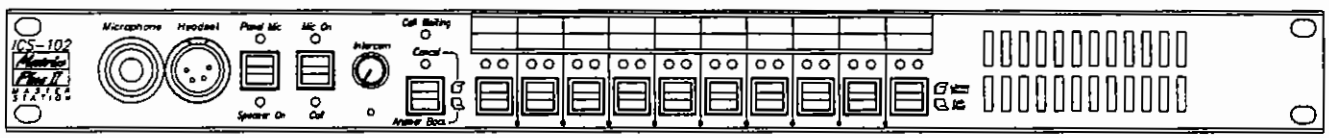
All normal station functions are operational including programming functions. For information on the installation of parallel stations refer to the Installation Manual.

Activating a Talk on one station turns the microphone on at that station and turns the mics off at the other stations. A second or third mic can be turned on at given stations by using their Mic On keys.









Matrix Plus II System ICS-62/ICS-102
MASTER STATION INTERCOM STATION

Introduction

This chapter describes how to use the ICS-102 and ICS-62 Intercom Stations. Station operators can use this manual once the Matrix Plus System has been correctly installed and configured. For information on installing the ICS-102 and ICS-62 see the Matrix Plus Installation Manual. For information on trouble-shooting and maintenance see the Matrix Plus Maintenance Manual.

The following sections describe the ICS-62 and ICS-102 intercom stations, and the use of their front panel controls, indicators, and rear panel connectors. The ICS-62 and ICS-102 are identical except the ICS-102 has ten talk/listen selector keys whereas the ICS-62 has six.

Description

The ICS-102 Compact Intercom Station has 10 selector keys, and is mounted in a small 1 RU high (1-3/4 inch) chassis. The ICS-62 Intercom Station has 6 selector keys and includes the same features and options as the ICS-102.

The ICS-102 and ICS-62 intercom stations include the following features:

- 1 RU (1-3/4 inch) high chassis
- Built-in speaker and optional plug-in panel microphone
- Front panel headset connector
- Local program input
- Programmable relay
- Mute relay
- Two logic inputs for external control
- Parallel Stations

The ICS-102 and ICS-62 can be equipped with the following options:

- XP-12 and XP-22 Expansion Key Panels
- OPT-100 Auxiliary Audio Output Option

Front Panel Controls and Indicators

The front panel controls and indicators include communication error indication, speaker level controls, selector keys, Answer Back Key, and function keys.

Communication Error Indication

When the ICS-62 or ICS-102 does not have data communications with the matrix frame for some reason, all of the red LEDs will flash slowly. The following functions are still operational: SA, program input, and hot mic output. When data communication is restored, the station automatically returns to normal operation.

Speaker/Headset Level Control

To adjust the volume of the speaker or headset, use the Intercom as described below. The volume of the speaker is also affected by two internal software controlled functions; Page Override and Mute Level.

Intercom Volume

The Intercom volume control sets the level of all signals coming from the matrix frame. The only exception is in "page override" mode in which the volume is controlled by an internal software function. For details of the Page Override, see section below.

Page Override

Page Override is an internal function in the station whereby the Intercom Volume is set to a preset value when commanded to by the central matrix. Any Fixed Group can be assigned the Page Override function by the Configuration Program.

The preset value is determined by the Configuration Program for each station. If the preset value is lower than the setting of the front panel volume control, the volume will be controlled by the front panel control.

Mute Level

The speaker level is turned down "X" number of dB when any "Talk" is active at the station. This amount of muting is set by the Configuration Program for each individual station. This function helps prevent a possible feedback situation. The maximum amount of muting is 15 dB below full volume on the front panel control. If the front panel control is set below that level, then muting will have no effect.

Selector Keys and Indicators

The following section describes the operation of the selector keys and their associated indicators.

Selector Key Operation

The six selector keys (ten for ICS-102) operate as both talk and listen keys. Pressing a key down accesses a talk label. Pushing the key up accesses a listen label. If you press and hold a talk key down, the talk path will remain active only for as long as you hold it down. If you press the talk key only briefly, the key will "latch", and the talk path will be active until it is pressed again. The listen key is latching only.

Labels can only be assigned to selector keys from the Configuration Program or an ICS-2002 station. Your station is supplied with a designator strip on which you can write the current label assignments for each selector key.

You can prevent the selector key from latching in the talk position on a given station ("local latch disable"), or you can prevent any station from latching a talk to a given station ("global latch disable") from the configuration program.

Talk Indication

Whenever a talk path is active, the red LED above the key is lit continuously.

Listen Indication

When a listen path is active, the green LED above the key is lit continuously. Whenever another operator activates a listen to your station, your station will issue a beep to let you know that someone is listening to you.

Call Waiting Indication

When another station calls your station, the red LED above the selector key on your station with their label assigned to it flashes rapidly. This flashing is sometimes referred to as a "call waiting tally".

To answer the incoming call press the associated selector key. The call waiting tally will be cleared by answering the call or after the designated answer back auto-clear time. The auto-clear time is set from the configuration program.

In-Use Tally Indication

If a selector key on your station is assigned to a destination in IFB or ISO mode, and another station is currently accessing that destination in IFB or ISO mode, the LED above that key flashes slowly to warn you that the IFB/ISO destination is in use. If you wish to join the conversation, you can press your selector key down.

IN-Use Tally & Priority Conflict Error Indication

An IFB or ISO conversation can only be joined by another station with a selector key assigned to that destination in IFB or ISO mode. If you attempt to interrupt an IFB or ISO communication path that is in use by pressing a key assigned to that destination (but not in IFB or ISO mode), you receive an IFB/ISO Error indication, and your talk path is not connected.

The station beeps four times and the LED above the key flashes rapidly for as long as you hold the selector key down.

Priority Conflict Error Indication

A "priority conflict" error occurs if you attempt to call a station or interface which is currently accessed by another caller assigned higher priority. Your station's speaker beeps four times and the key's LED flashes rapidly for as long as you hold it down.

Expansion Key Panel Operation

The XP-12 and XP-22 Expansion Key Panels provide additional selector keys. The XP-12 adds 10 keys and the XP-22 adds 20 keys. More than one panel can be used, in any combination, for a total of up to 60 additional selector keys.

The red LEDs on the expansion panels provide the same functions as the red LED on the station including talk, call waiting, IFB/ISO, and error indication. The green LEDs on the expansion panels indicate an active listen equivalent to the green LEDs on the ICS-62 or ICS-102.

Answer Back Key

The Answer Back key is used to answer calls to your station from other stations or interfaces that are not assigned to a selector key on your station.

An incoming call from a station that is not assigned to a selector key on your station will cause the red Call Waiting LED above the Answer Back key to flash, and the calling station's label to be temporarily assigned to your station's Answer Back key. The Call Waiting LED will flash and the caller's label will remain assigned to the Answer Back key until you answer the call, or until the answer back timeout period elapses and the caller's label is automatically removed from the Answer Back key.

To answer the incoming call, press the Answer Back key down. The green Answer Back LED will light, indicating that you have an active talk path to the caller. The talk path is active for as long as you hold the key down (it does not latch).

To remove the caller's label from the Answer Back key manually, press up on the Answer Back key. The label assignment will be automatically removed after the answer back timeout period elapses. The timeout counter is reset each time you press the Answer Back key, so the label assignment is only removed until one timeout period starting at your last key press.

If another call (or calls) comes in while you are answering a call using the Answer Back key, the Call Waiting LED will flash, and the calling station's label will be placed in your station's answer back stack. To answer the next caller, press up on the Answer Back key to remove the current caller's label from the Answer Back key, then press down on the Answer Back key to speak to the next caller in the answer back stack.

Function Keys

Two keys located on the left side of the station next to the headset connector provide four basic station control functions. These keys have both up and down positions and LEDs associated with each position indicating the status of the function. Panel Mic select and Speaker On/Off is controlled by one key. The other key controls the Mic On/Off function and the sending of Call Signals. The following sections describe the use of these controls.

Panel Mic Function

To switch between the panel mic and the headset mic (if a headset is plugged into the station), press up on the Panel Mic key. The LED above the key will illuminate when the panel microphone is On. Plugging in a headset initially causes the station to switch to headset operation. Unplugging the headset causes the station to switch to panel mic operation. The up function of the key works only when a headset is plugged into the station.

Speaker On Function

To toggle the speaker On and Off press the Speaker On/Off key down. The LED below the key will illuminate when the speaker is on. The down function of the key works only when a headset is plugged into the station.

Mic On/Off Function

To toggle the microphone On or Off, press the Mic On/Off key up. The LED above the key indicates when the microphone is On. If the microphone is Off and you activate a talk, the microphone will be turned on automatically. If the talk is momentary, the microphone will turn Off at the end of the call. If the talk is latched, the microphone will remain On after the call.

Call Signal Function

To send a call signal, press the call signal button on your station. The led will illuminate. Press the selector key labeled with the name of the destination. The call signal will be sent each time you press the destination key or until the function times out, which takes about 5 seconds.

You can issue a call signal to any destination assigned to a selector key on your station. If more than one label is assigned to that key, all labels will receive the signal. If a label is a fixed group, the entire group will receive the call signal. If the label is a party-line, then every station listening on the party-line will receive the call signal.

Rear Panel Connections

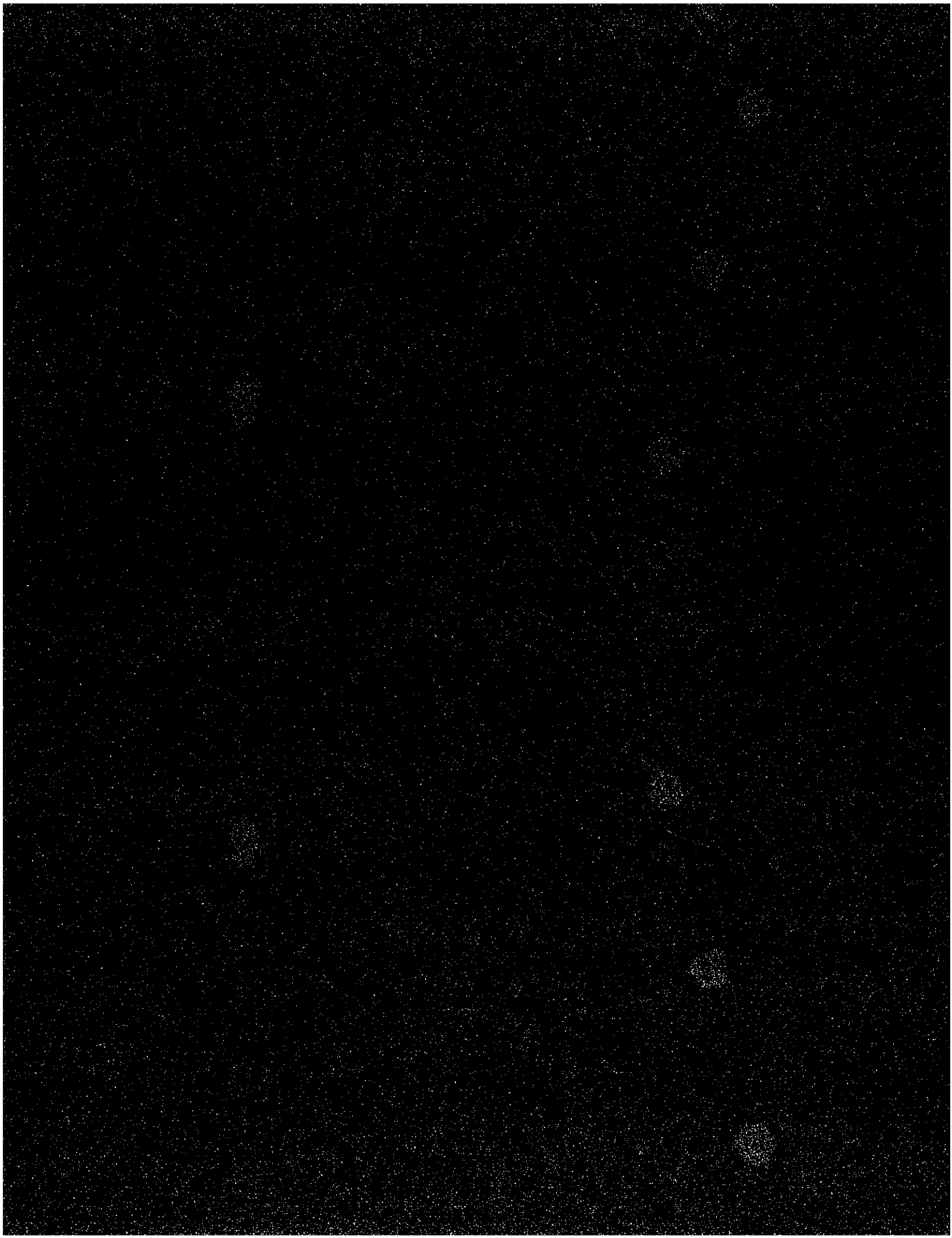
All functions supported by the rear panel connectors on the ICS-102/ICS-62 are identical to those on the ICS-2002. Refer to the ICS-2002 section of this Operation Manual.

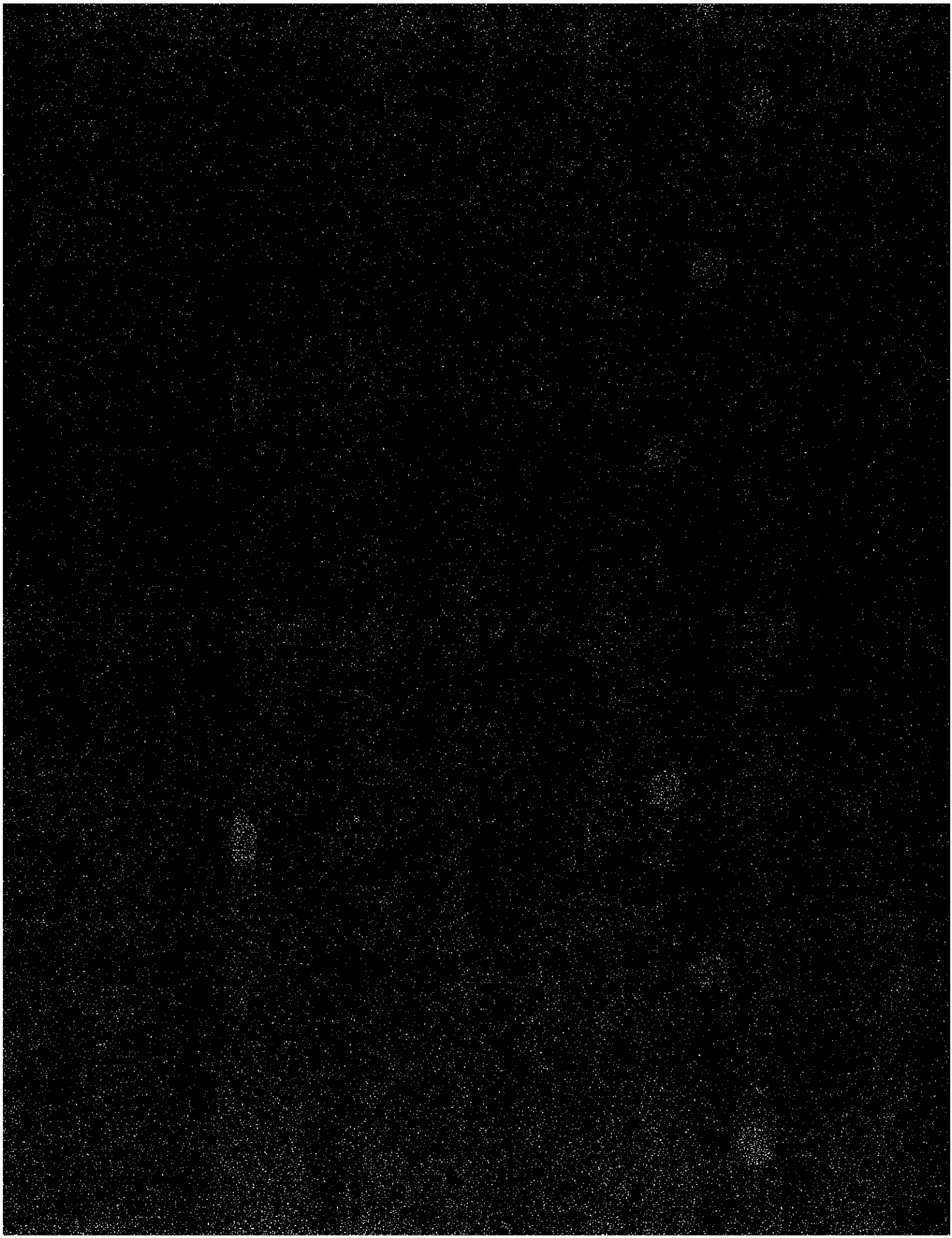
Parallel Stations

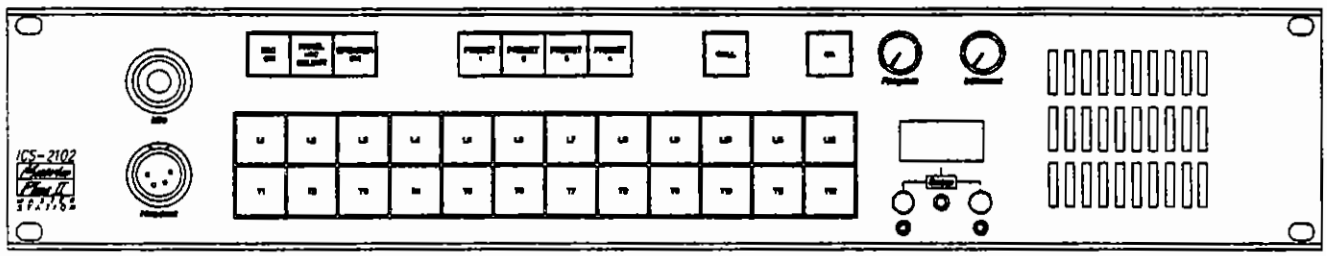
All Matrix Plus II stations support "parallel stations". Up to four of any type stations wired for 3 pair or 4 pair operation can be parallel wired together to a single port. This mode of operation is intended for a large room with a single operator where it might be impractical for an operator to be close to a single station.

All normal station functions are operational including programming functions. For information on the installation of parallel stations refer to the Installation Manual.

Activating a Talk on one station turns the microphone on at that station and turns the mics off at the other stations. A second or third mic can be turned on at given stations by using their Mic On keys.







Matrix Plus II System ICS-2102
MASTER STATION INTERCOM STATION

Introduction

This chapter describes how to use the ICS-2102 24-Key Intercom Station. Station operators can follow these instructions once the Matrix Plus II System has been correctly installed and configured. For information on installing the ICS-2102 see the Matrix Plus II Installation Manual. For information on troubleshooting and maintenance see the Matrix Plus II Maintenance Manual.

The following sections describe the ICS-2102 and the use of its front panel controls, indicators, rear panel controls, and connectors.

Description

The ICS-2102 Intercom Station includes the following basic features:

Front Panel Features

- 24 Programmable Talk/Listen buttons
- 4 Locally Programmed Preset Push-buttons
- 2 RU (3-1/2 inch) high chassis
- Built-in speaker and optional plug-in panel microphone
- Front panel headset connector

Rear Panel Features

- Local program input
- Programmable relay
- Mute relay
- Two logic inputs for external control
- Parallel Stations

Options

- OPT-100 Auxiliary Audio Output Option
- XP-12 and XP-22 Expansion Key Panels

Front Panel Controls and Indicators

The front panel controls and indicators include communication error indication, speaker level controls, push-button selector keys, Preset push-buttons, Answer Back key, function buttons, and the LCD display with its SETUP buttons.

Communication Error Indication

When the ICS-2102 does not have data communications with the matrix frame for some reason, all of the 24 selector push-button lamps will flash slowly. The following functions are still operational: Program input, and hot mic output. When data communication is restored, the station automatically returns to normal operation.

Speaker/Headset Level Controls

To adjust the volume of the speaker or headset, use the Intercom and Program volume controls. The volume of the speaker is also affected by two internal software controlled functions: Page Override and Mute Level.

Intercom Level

The Intercom level control sets the level of all signals coming from the matrix frame. The only exception is in "Page Override" mode in which the volume is controlled by an internal software function. For details of the Page Override, see section below.

Program Level

The Program level control adjusts the volume of the signal coming into the station through the auxiliary input on the Miscellaneous connector on the rear panel of the station.

Page Override

Page Override is an internal function in the station whereby the Intercom Volume is set to a preset value when commanded to by the central matrix. Any Fixed Group can be assigned the Page Override function by the Configuration Program.

The preset value is determined by the Configuration Program for each station. If the preset value is lower than the setting of the front panel volume control, the volume will be controlled by the front panel control.

Mute Level

The speaker level is turned down "X" number of dB when any "Talk" is active at the station. This amount of muting is set by the Configuration Program for each individual station. This function helps prevent a possible feedback situation. The maximum amount of muting is 15 dB below full volume on the front panel control. If the front panel control is set below that level, then muting will have no effect.

Headset Connector

The Headset Connector provides front panel connection of a headset. Plugging in a headset initially causes the station to switch to Headset Mic Operation and turn the Speaker off. Unplugging the headset causes the station to switch to Panel Mic operation and turn the Speaker on.

Push-button Selector Keys and Indicators

The following section describes the operation of the selector keys and their associated indicators.

Selector Key Operation

The twenty-four pushbutton keys, by default, operate as a standard 12 key station (ICS-2002) with the bottom row being 12 talk keys and the top row being 12 listen keys. Optionally from the Station-Local screen in the Configuration Computer, the station keys can be selected to 'Reverse Talk/Listen Rows' or 'Enable 24 Key Operation'. When 'Reverse Talk/Listen Rows' is selected, the bottom row becomes 12 listen keys and the top row becomes 12 talk keys. When 'Enable 24 Key Operation' is enabled each button becomes both a Talk and Listen key. In this mode to activate only a Talk assign only a Talk Label to that key, to activate only a Listen assign only a Listen Label to that key.

Pressing a key down activates a talk to or listen from the label assigned to that key. If you press and hold a talk button down, the talk or listen path will remain active only for as long as you hold it down. If you press the push-button only briefly, the key will "latch", and the path will be active until it is pressed again.

Labels can only be assigned to selector keys from the configuration program, or from an ICS-2002 station. Your ICS-2102 station is supplied with push-buttons that the user can place their own designations in each push-button cap. You can prevent a push-button from latching in the ("local latch disable"), or you can prevent any station from latching a talk to your station ("global latch disable") from the configuration program.

Talk and Listen Indication

Whenever a function programmed to a push-button is active, the button will illuminate brightly. The OFF condition for these push-buttons is a dimly lit button.

Call Waiting Indication

When another station calls your station, the lamp in the button on your station with their label assigned to it flashes rapidly. This flashing is referred to as a "call waiting tally".

To answer the incoming call press the associated selector key. The call waiting tally is cleared when you answer the call. If you do not answer the call, it will be cleared after the designated answerback auto-clear time. The auto-clear time is set from the configuration program.

In-Use Tally Indication

If a selector key on your station is assigned to a destination with in 'use tally' set, and another station is currently accessing that destination, that pushbutton's lamp flashes slowly to warn you that the destination is in use. If you wish to join the conversation, you can press your selector push-button.

Priority Conflict Error Indication

A "priority conflict" error occurs if you attempt to call a station or interface which is currently accessed by another caller assigned higher priority. Your station's speaker beeps four times and the button's lamp flashes rapidly for as long as you hold the selector key down.

An IFB or ISO conversation can only be joined by another station with a selector key assigned to that destination in IFB or ISO mode. If you attempt to interrupt an IFB or ISO communication path that is in use by pressing a key assigned to that destination (but not in IFB or ISO mode), you receive an Priority Conflict Error Indication, and your talk path is not connected.

Expansion Key Panel Operation

The XP-12 and XP-22 Expansion Key Panels provide additional selector keys. The XP-12 adds 10 keys and the XP-22 adds 20 keys. More than one panel can be used, in any combination, for a total of up to 60 additional selector keys.

The red LEDs on the expansion panels provide the same functions as the red LEDs on other ICS stations including talk, call waiting tallys, in use, and error indication. The green LEDs on the expansion panels indicate an active listen.

Preset Pushbuttons

The ICS-2102 has 4 Preset Pushbuttons that can be programmed by the station operator to activate any or all of the 24 talk/listen push-buttons. Programming of the Preset buttons is a local only function. The Preset programming is saved in the system configuration in the CPU-100 Master Controller Card in the matrix frame. To program the preset buttons see the section on the LCD display later in this manual.

Once programmed, pressing a preset key activates all talk/listen push-buttons that were programmed to it. Each preset push-button is normally latching/momentary like talk buttons but each can be programmed to be momentary only. If nothing is programmed to a preset button it will not activate.

Answer Back Button

The Answer Back Key is used to answer calls to your station from other stations or interfaces that are not assigned to a selector push-button on your station.

An incoming call from a station that is not assigned to a push-button on your station will cause the lamp in the Answer Back push-button to flash, and the calling station's label to be temporarily assigned to your station's Answer Back key. The label of the calling station will appear in the LCD display. The Answer Back push-button will flash and the caller's label will remain assigned to the Answer Back key until you answer the call, or until the answer back time-out period elapses and the caller's label is automatically removed from the Answer Back key.

To answer the incoming call, press the Answer Back button. The button will light brightly, indicating that you have an active talk path to the caller. The talk path is active for as long as you hold the button down (it does not latch).

The label assignment will be automatically removed after the answer back time-out period elapses. The time-out period is reset each time you press the Answer Back key, so the label assignment is only removed until one time-out period starting at your last key press. To remove the caller's label from the Answer Back key manually, momentarily press the Answer Back button.

If another call (or calls) comes in while you are answering a call using the Answer Back key, the calling station's label will be placed in your station's answer back stack. The LCD display will show the next callers label. The active label is marked as <LABEL>. To answer the next caller, momentarily press the Answer Back button to remove the current caller's label from the Answer Back button, then press down on the Answer Back button to speak to the next caller in the answer back stack.

The LCD display can only show 2 labels. If more than two come in they will appear as the first ones are removed from the stack.

Function Keys

The three six buttons located on the left side of the front panel and the CALL button perform the following functions, each of which is described in the following paragraphs.

- Mic On (Microphone On/Off)
- Speaker On (Speaker On/Off)
- Panel Mic (Panel or Headset Microphone Select)
- Call (Call Signal)

Mic On (Microphone On/Off)

To toggle the active microphone On or Off, press the Mic On button. The button will be lit when the microphone is On. If the microphone is Off and you activate a talk, the microphone will be turned On automatically. If the talk is momentary, the microphone will turn Off at the end of the call. If the talk is latched, the microphone will remain On after the call.

Speaker On (Speaker On/Off)

To toggle the speaker On and Off press the Speaker On button. The button will be lit when the speaker is On. This button is only effective when a headset is plugged into the station.

Panel Mic (Panel or Headset Microphone Select)

To switch between the panel mic and the headset mic (if a headset is plugged into the station), press the Panel Mic button. The button will be lit when the panel microphone is active. Plugging in a headset initially causes the station to switch to headset operation. Unplugging the headset causes the station to switch to panel mic operation. The Panel Mic On button has no effect if a headset is not plugged into the station.

Call (Call Signal)

To send a call signal, press the call signal button on your station. The button will illuminate. Press the selector button labeled with the name of the destination. The call signal will be sent each time you press the destination key or until the function times out, which takes about 5 seconds.

You can issue a call signal to any destination assigned to a selector key on your station. If more than one label is assigned to that key, all labels will receive the signal. If a label is a fixed group, the entire group will receive the call signal. If the label is a party-line, then every station listening on the party-line will receive the call signal.

LCD Display and Its SETUP Buttons

The LCD display has the following functions:

- Display labels in the Answer Back Stack.
- View the button assignments
- Program the Preset Buttons
- Set the Preset Buttons for Latch Disable
- Identify this station.

Viewing the Answer Back Stack is the function of the display during normal operation. All other functions are available only in the Programming Mode.

To enter the Programming Mode press and hold both SETUP buttons for one second until the display shows '--Menu--'. Releasing the SETUP buttons will place you in the BUTTON CHECK function. To exit the Programming Mode at any time, press both SETUP buttons momentarily. To move from one menu item to the other press the button DOWN to advance to the next and UP to move backward in the order.

The Programming Mode has the following functions:

- BUTTON CHECK
- ASSIGN PRESETS
- LATCH DISABLE
- STATION I. D.

BUTTON CHECK

The 24 talk/listen buttons will flash indicating that they are available to be viewed for their assignments. Pressing one of the flashing buttons will cause whatever labels assigned to it to appear in the LCD display.

ASSIGN PRESETS

The four preset buttons will flash indicating that they are available for programming. Press the button to be programmed and its lamp will be on solid indicating that it is now ready for programming. The 24 talk/listen buttons will be on bright or flashing. A flashing button indicates it is available for programming. A button that is on solid is programmed to the selected preset button.

To add or remove a talk/listen button from a preset button, press the desired button.

To program another preset button, press the desired button and follow the above procedure.

LATCH DISABLE

Any of the Preset Buttons can set for Latch Disable. When entering this mode any button that is not latch disabled will flash and any button that is set for latch disable will be on solid.

To change the latch disable state of a preset button, press it.

STATION I. D.

This function allows the operator to view the label and port number assigned to his or her particular station.

Upon entering this mode the display will read STATION I. D. and the Answer Back button will flash. Pressing the Answer Back button will cause the LCD display to show the label assigned to the station on the first line and the port number on the second line.

Rear Panel Connections

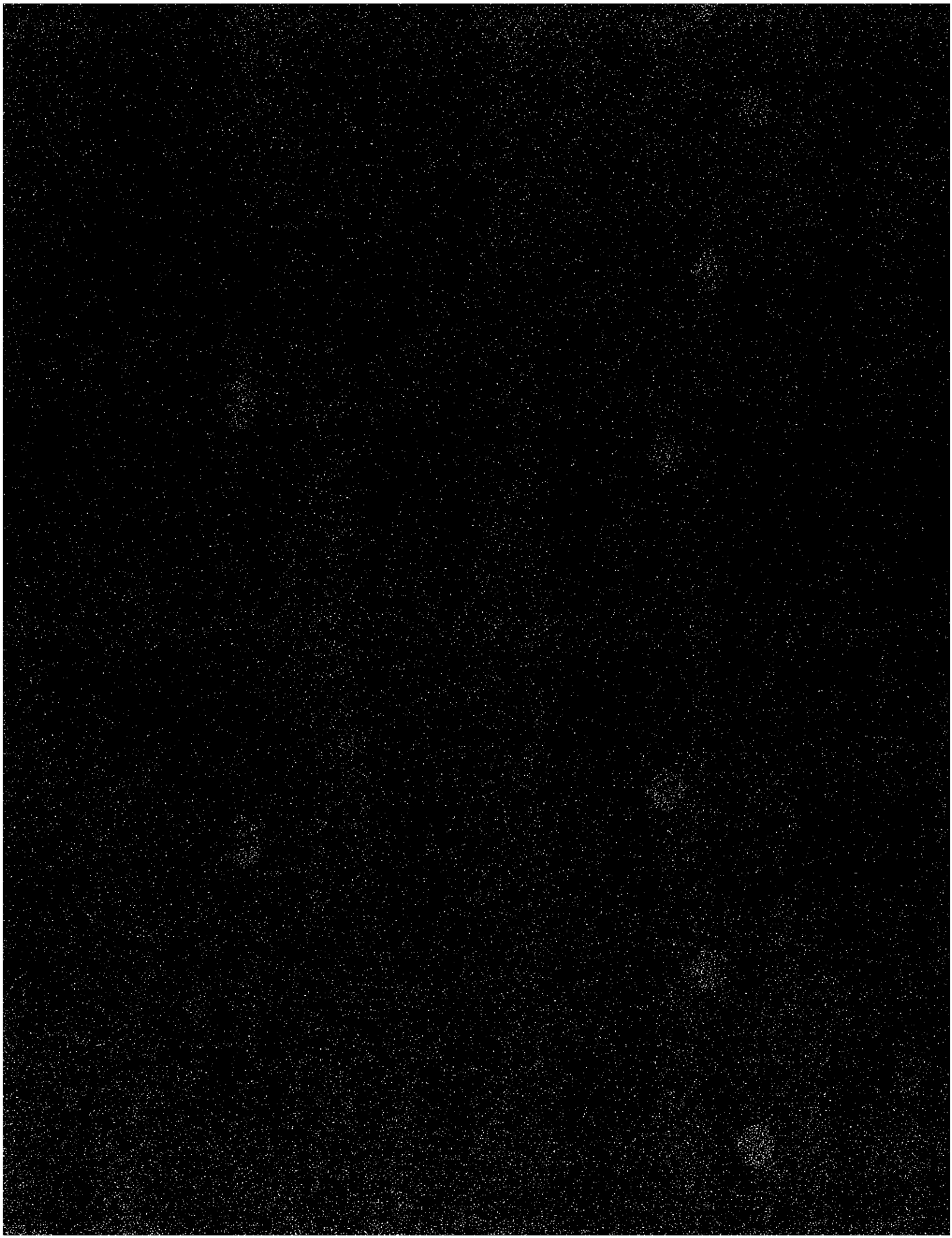
All functions supported by the rear panel connectors on the ICS-2102 are identical to those on the ICS-2002. Refer to the ICS-2002 section of this Operation Manual.

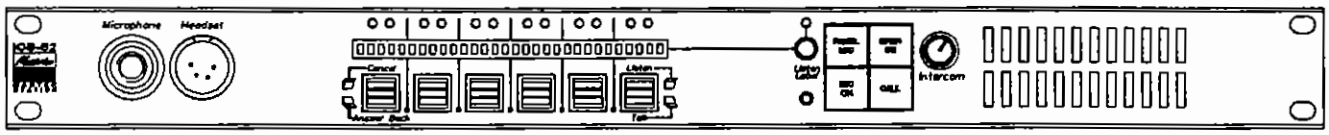
Parallel Stations

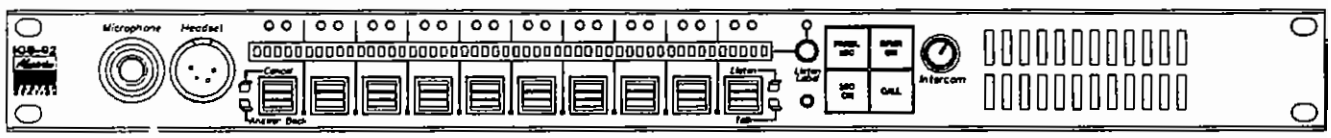
All Matrix Plus II stations support "parallel stations". Up to four of any type stations wired for 3 pair or 4 pair operation can be parallel wired together to a single port. This mode of operation is intended for a large room with a single operator where it might be impractical for an operator to be close to a single station.

All normal station functions are operational including programming functions. For information on the installation of parallel stations refer to the Installation Manual.

Activating a Talk on one station turns the microphone on at that station and turns the mics off at the other stations. A second or third mic can be turned on at given stations by using their Mic On keys.







Matrix Plus II System ICS-92/ICS-52
MASTER STATION INTERCOM STATION

Introduction

This chapter describes how to use the ICS-92 and ICS-52 Intercom Stations. Station operators can use this manual once the Matrix Plus System has been correctly installed and configured. For information on installing the ICS-92 and ICS-52 see the Matrix Plus Installation Manual. For information on trouble-shooting and maintenance see the Matrix Plus Maintenance Manual.

The following sections describe the ICS-52 and ICS-92 intercom stations, and the use of their front panel controls, indicators, and rear panel connectors. The ICS-52 and ICS-92 are identical except the ICS-92 has nine talk/listen selector keys whereas the ICS-52 has five.

Description

The ICS-92 Compact Intercom Station has 9 selector keys, and is mounted in a small 1 RU high (1-3/4 inch) chassis. The ICS-52 Intercom Station has 5 selector keys and includes the same features and options as the ICS-92.

The ICS-92 and ICS-52 intercom stations include the following features:

- 1 RU (1-3/4 inch) high chassis
- A five character LED display above each selector key
- Built-in speaker and optional plug-in panel microphone
- Front panel headset connector
- Local program input
- Programmable relay
- Mute relay
- Two logic inputs for external control
- Parallel Stations

The ICS-92 and ICS-52 can be equipped with the following options:

- XP-12 and XP-22 (Non-display) Expansion Key Panels
- XP-12L and XP-22L (Display) Expansion Key Panels
- OPT-100 Auxiliary Audio Output Option

Front Panel Controls and Indicators

The front panel controls and indicators include communication error indication, speaker level controls, selector keys, selector key display, Answer Back Key, and function keys.

Communication Error Indication

When the ICS-52 or ICS-92 does not have data communications with the matrix frame for some reason, all of the red LEDs will flash slowly. The following functions are still operational: SA, program input, and hot mic output. When data communication is restored, the station automatically returns to normal operation.

Speaker/Headset Level Control

To adjust the volume of the speaker or headset, use the Intercom as described below. The volume of the speaker is also affected by two internal software controlled functions; Page Override and Mute Level.

Intercom Volume

The Intercom volume control sets the level of all signals coming from the matrix frame. The only exception is in "page override" mode in which the volume is controlled by an internal software function. For details of the Page Override, see section below.

Page Override

Page Override is an internal function in the station whereby the Intercom Volume is set to a preset value when commanded to by the central matrix. Any Fixed Group can be assigned the Page Override function by the Configuration Program.

The preset value is determined by the Configuration Program for each station. If the preset value is lower than the setting of the front panel volume control, the volume will be controlled by the front panel control.

Mute Level

The speaker level is turned down "X" number of dB when any "Talk" is active at the station. This amount of muting is set by the Configuration Program for each individual station. This function helps prevent a possible feedback situation. The maximum amount of muting is 15 dB below full volume on the front panel control. If the front panel control is set below that level, then muting will have no effect.

Selector Keys and Indicators

The following section describes the operation of the selector keys, the one-line diaplay above the keys and the keys associated status indicators.

Selector Key Operation

The selector keys operate as both talk and listen keys. Pressing a key down accesses a talk label. Pushing the key up accesses a listen label. If you press and hold a talk key down, the talk path will remain active only for as long as you hold it down. If you press the talk key only briefly, the key will "latch", and the talk path will be active until it is pressed again. The listen key is also momentary and latching in function.

Labels can only be assigned to selector keys from the Configuration Program or an ICS-2002 station.

You can prevent the selector key from latching in the talk position on a given station ("local latch disable"), or you can prevent any station from latching a talk to a given station ("global latch disable") from the configuration program.

Selector Key Display

Each selector key has a five character LED display above it for indication of the Talk or Listen label assigned to that key. If more than one Talk label is assigned to a key then only the first one will be displayed.

Pressing the Listen Label enable button will toggle the display between displaying the Talk and Listen labels. The green led next to the Listen Label enable button will illuminate when the listen labels are displayed.

Talk Indication

Whenever a talk path is active, the red LED above the key is lit continuously.

Listen Indication

When a listen path is active, the green LED above the key is lit continuously. Whenever another operator activates a listen to your station, your station will issue a beep to let you know that someone is listening to you.

Call Waiting Indication

When another station calls your station, the red LED above the selector key on your station with their label assigned to it flashes rapidly. This flashing is sometimes referred to as a "call waiting tally".

To answer the incoming call press the associated selector key. The call waiting tally will be cleared by answering the call or after the designated answer back auto-clear time. The auto-clear time is set from the configuration program.

In-Use Tally Indication

If a selector key on your station is assigned to a destination in IFB or ISO mode, and another station is currently accessing that destination in IFB or ISO mode, the LED above that key flashes slowly to warn you that the IFB/ISO destination is in use. If you wish to join the conversation, you can press your selector key down.

IN-Use Tally & Priority Conflict Error Indication

An IFB or ISO conversation can only be joined by another station with a selector key assigned to that destination in IFB or ISO mode. If you attempt to interrupt an IFB or ISO communication path that is in use by pressing a key assigned to that destination (but not in IFB or ISO mode), you receive an IFB/ISO Error indication, and your talk path is not connected.

The station beeps four times and the LED above the key flashes rapidly for as long as you hold the selector key down.

Priority Conflict Error Indication

A "priority conflict" error occurs if you attempt to call a station or interface which is currently accessed by another caller assigned higher priority. Your station's speaker beeps four times and the key's LED flashes rapidly for as long as you hold it down.

Expansion Key Panel Operation

The XP-12, XP-22, XP-12L, and XP-22L Expansion Key Panels provide additional selector keys. The XP-12 and XP-12L adds 10 keys and the XP-22 and XP-22L adds 20 keys. The XPL-12 and XPL-22 both have five character LED displays above each key similar to the ICS-92/52 stations whereas the XP-12 and XP-22 panels do not.

More than one panel can be used, in any combination, for a total of up to 60 additional selector keys. However, the XP and XPL (non-display and display) expansion panel types cannot be mixed at the same station. If one XP-12 is installed at a particular station only XP-12 or XP-22s can be added to the existing XP-12. The same is true for XPL (display) panels.

The red LEDs on the expansion panels provide the same functions as the red LED on the station including talk, call waiting, IFB/ISO, and error indication. The green LEDs on the expansion panels indicate an active listen equivalent to the green LEDs on the ICS-52 or ICS-92.

The five character display above each key on the XPL (display) expansion panels normally displays the first TALK label assigned to that key. If the LISTEN label function is selected at the station then the display will show the LISTEN label assigned to that key.

Answer Back Key

The Answer Back key is used to answer calls to your station from other stations or interfaces that are not assigned to a selector key on your station.

An incoming call from a station will cause the red Call Waiting LED above the Answer Back key to flash, and the calling station's label to be temporarily assigned to your station's Answer Back key and displayed in the five character display above the key. The Call Waiting LED will flash and the caller's label will remain assigned to the Answer Back key until you answer the call, or until the answer back timeout period elapses and the caller's label is automatically removed from the Answer Back key.

To answer the incoming call, press the Answer Back key down. The green Answer Back LED will light, indicating that you have an active talk path to the caller. The talk path is active for as long as you hold the key down (it does not latch).

To remove the caller's label from the Answer Back key manually, press up on the Answer Back key. The label assignment will be automatically removed

after the answer back timeout period elapses. The timeout counter is reset each time you press the Answer Back key, so the label assignment is only removed until one timeout period starting at your last key press.

If another call (or calls) comes in while you are answering a call using the Answer Back key, the Call Waiting LED will flash, and the calling station's label will be placed in your station's answer back stack. To answer the next caller, press up on the Answer Back key to remove the current caller's label from the Answer Back key, then press down on the Answer Back key to speak to the next caller in the answer back stack.

Function Keys

Five push-buttons on the right side of the station next to the speaker provide five basic station control functions. Four of these buttons have internal illumination that indicates the status of the function whereas one has an led above it. The following functions as controlled by these buttons:

- **PANEL MIC Select**
- **SPEAKER ON**
- **MIC ON/OFF**
- **CALL SIGNAL**
- **LISTEN LABEL Enable**

PANEL MIC Select

To switch between the panel mic and the headset mic (if a headset is plugged into the station), press up on the Panel Mic button. The button will illuminate when the panel microphone is On. Plugging in a headset initially causes the station to switch to headset operation. Unplugging the headset causes the station to switch to panel mic operation. This function operates only when a headset is plugged into the station.

SPEAKER ON

To toggle the speaker On and Off press the Speaker On/Off button. The button will illuminate when the speaker is on. This function operates only when a headset is plugged into the station.

MIC ON/OFF

To toggle the microphone On or Off, press the Mic On/Off button. The button will illuminate when the microphone is On. If the microphone is Off and you activate a talk, the microphone will be turned on automatically. If the talk is momentary, the microphone will turn Off at the end of the call. If the talk is latched, the microphone will remain On after the call.

CALL SIGNAL

To send a call signal, press the call signal button on your station. The button will illuminate. Press the selector key labeled with the name of the destination. The call signal will be sent each time you press the destination key or until the function times out, which takes about 5 seconds.

You can issue a call signal to any destination assigned to a selector key on your station. If more than one label is assigned to that key, all labels will receive the signal. If a label is a fixed group, the entire group will receive the call signal. If the label is a party-line, then every station listening on the party-line will receive the call signal.

LISTEN LABELS

The label display fields on the station normally show talk labels. To show the listen labels instead, push the Listen Labels button. The green LED above the Listen Labels button will be lit whenever listen labels are displayed.

The Listen Labels button also affects the displays of any Display Expansion Key Panels that may be attached to the station. Label display is always the same for all keys, so you will never see the listen label of one key and the talk label of another at the same time.

Pushing the Listen Labels button once causes the display to show listen labels. The display will revert back to talk labels after 10 seconds.

Pushing the button twice within a 1/2 second period causes the display to show listen labels and latch them there without the 10 second timeout.

To restore talk labels, push the Listen Labels button again. Or, press any talk selector key that has split label assignments (that is, the talk and listen labels assigned to the key are different from each other).

If you activate a listen using a selector key with split label assignments, the display will show listen labels. The display will revert back to talk labels after 10 seconds.

To display the port number and label of the station, push and hold the Listen Labels button for 2 seconds.

To display the revision of the station software, push and hold the Listen Labels button for 4 second

Rear Panel Connections

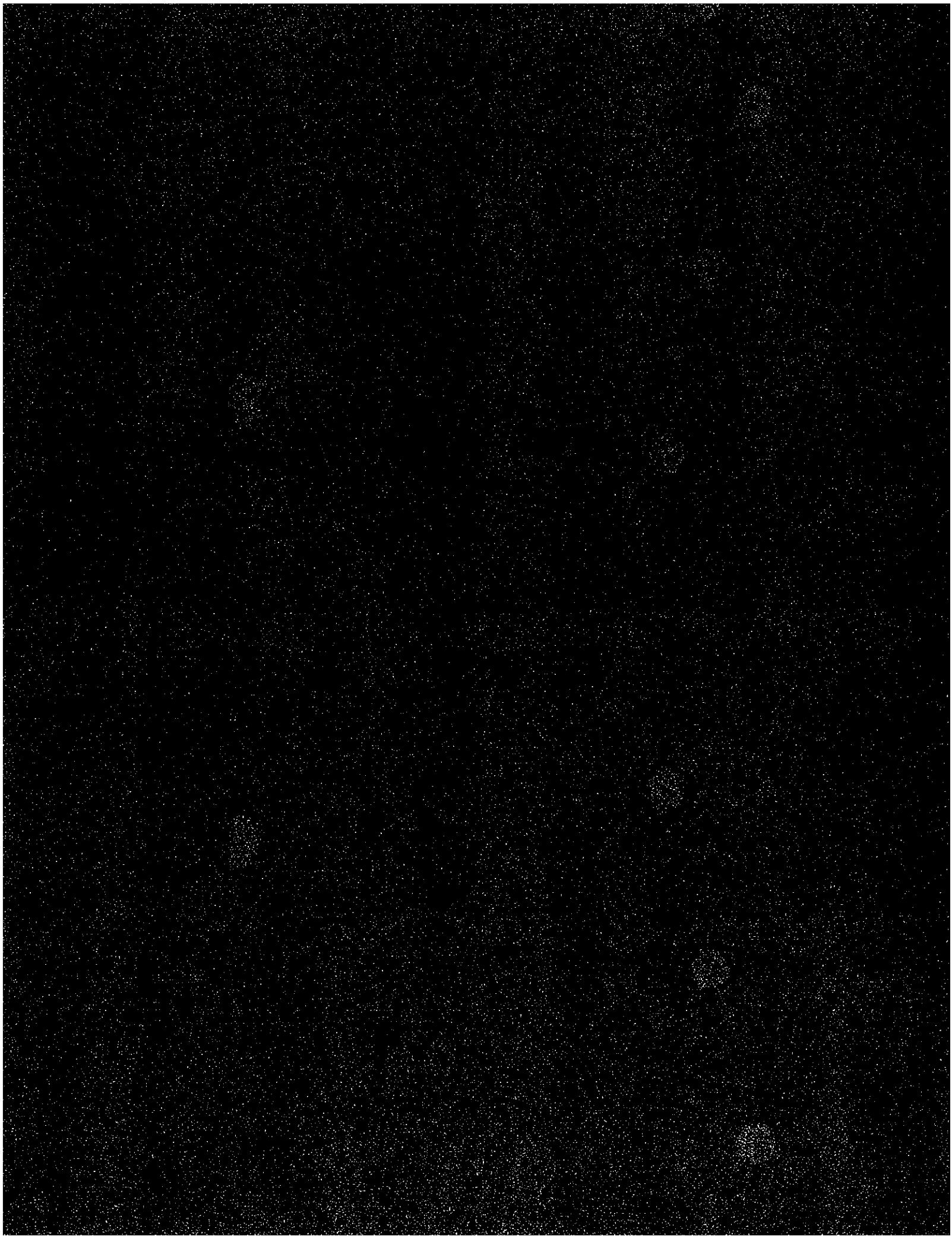
All functions supported by the rear panel connectors on the ICS-92/ICS-52 are identical to those on the ICS-2002. Refer to the ICS-2002 section of this Operation Manual.

Parallel Stations

All Matrix Plus II stations support "parallel stations". Up to four of any type stations wired for 3 pair or 4 pair operation can be parallel wired together to a single port. This mode of operation is intended for a large room with a single operator where it might be impractical for an operator to be close to a single station.

All normal station functions are operational including programming functions. For information on the installation of parallel stations refer to the Installation Manual.

Activating a Talk on one station turns the microphone on at that station and turns the mics off at the other stations. A second or third mic can be turned on at given stations by using their Mic On keys.



Introduction

The Matrix Plus System Configuration Program ("MXPLUS2") runs on an IBM-PC (or compatible) computer connected to your Matrix Plus II System Frame via the computer's serial port. The configuration program is your primary tool for configuring the Matrix Plus System. It provides pulldown menu-driven control over every parameter in the Matrix Plus System including labels, passwords, fixed group and party-line members, selector key assignments on intercom stations, and many more. One set of all of these parameters is referred to collectively as a "configuration" of a Matrix Plus System. MXPLUS2 can also create reports of your configurations and send them to screen, disk or printer.

This chapter describes how to use MXPLUS2 to set each parameter in the Matrix Plus System. The first section describes how to get around within the screens and menus of the configuration program. The remaining sections present in detail the use of each available screen and function. The final section explains how MXPLUS2 can be operated in "Command Line" mode. This allows MXPLUS2 to automatically perform any of several functions without requiring an operator to be present.

The minimum hardware requirements are an IBM PC/AT (or compatible) computer with an 80286 (or faster) CPU and a hard disk. A mouse (or other pointing device) and a color monitor are strongly recommended for ease of operation, but are not required. The program cannot be run from a floppy disk.

Starting MXPLUS2

The default directory for MXPLUS2 is C:\MXPLUS2. To start MXPLUS2 type MXPLUS2 at the DOS command line from that directory, or ensure that that directory is in your path. MXPLUS2 can also be operated in "command line" mode, allowing certain operations to be done without user intervention, for example from a batch file. For details on the syntax of command line options, see the Command Line section of this chapter. If MXPLUS2 encounters unrecognized command line options it will exit to DOS immediately.

MXPLUS2 includes a password protection feature. If no password has been assigned, MXPLUS2 will start immediately. If a password is assigned, you will be prompted to enter the password before entering MXPLUS2. For details see the description of the Password field in the MXPLUS2 - PC Setup section of this chapter.

Keyboard and Mouse

MXPLUS2 can be operated using either the keyboard or a mouse or a combination of the two. Most items are entered either by checking or unchecking "check fields", by selecting an option from a popup menu, or occasionally by entering text.

The keys you will use are the Enter key ("ENTER"), the Escape key ("ESC"), the Arrow keys, the F1 and F4 function keys ("F1","F4") and the alpha and number keys.

- Pressing ENTER in a field activates a popup menu of choices, or checks/unchecks check fields.
- ESC gets you out of whatever screen you are in. In a popup, pressing ESC leaves the choice at whatever it was before the popup was selected.
- The arrow keys move you from field to field, with the following exception: When in a text entry field, the arrow keys are used for moving the cursor within the field, so you will use the TAB (SHIFT-TAB) key to move to the next (previous) field.
- In text entry fields, the ENTER key moves you out of that field into the next field.
- The F1 key provides context sensitive help.
- The F4 key sends your latest changes to frame and file (on-line) or file (off-line).
- The alpha and numeric keys are used for entering text (in the few instances where this is required). Also, when in a list of labels, pressing a letter/number key causes the cursor to move to the next label name starting with that letter/number.
- To select an entry in the menu bar or menus, hold down the ALT key and simultaneously press the letter key corresponding to the letter highlighted in the menu option you wish to select.
- The mouse equivalent of the ESCape key is achieved by clicking on the "cancel button", which is the small box located in the extreme upper left corner of the border of a popup or screen. Alternatively, clicking the mouse outside of a popup or menu cancels the action.

Menus, Screens and Fields

The "menu bar" is the menu that runs across the top of the screen. A "pull-down menu" appears when you select a menu bar item. Selecting an item within a pull-down menu item opens a screen which addresses a particular function or group of functions. To close the screen press ESC or click on the cancel button. Opening a new screen automatically closes a previously opened screen.

Screens include scrollable list boxes when more than one screen-full of information needs to be available. To cause the screen to scroll using the mouse, click or drag in the scroll bar at the right of the screen. From the keyboard you can use the PAGE UP, PAGE DOWN, HOME, ARROW and END keys.

Each screen includes "fields" that contain either modifiable or non-modifiable (informational) data. The fields in the screen are color coded. Fields that contain modifiable data are always in one color (white letters by default), unmodifiable data fields are in another (black letters by default). The cursor will only "enter" a modifiable data field, and will just "float" over unmodifiable fields. To get to fields in a screen that are located below a list box using the keyboard, use the RIGHT arrow key. There are some fields that are between boxes. To access such fields using the keyboard, you may need to move the cursor laterally until you come to a field from where you can enter the desired field. For example in Station - Key Assignments to get from the upper box to the "COPY" button, you need to press the LEFT arrow key to get to the leftmost field in the box, then press the DOWN arrow go to the Swap Box Selector field, then press RIGHT to get to the COPY field.

Info Lines

When you place the cursor in a modifiable data field, MXPLUS2 displays a one line "info line" in the window's border. This info line contains information relating to the currently selected field. If the field is a configuration parameter, the info line provides context sensitive help by briefly stating the function of the field. If the field is a label, the info line displays the label's type, port function if applicable, index, and 20 character name (for example "Port 16 Phone Telco Line #2" or "Group 1 Fix Grp Executives"). If the field is a control, the info line displays information related to the control. For example a DTMF sequence shows the actual sequence assigned to the name in the field: "DTMF Sequence (510) 555-1212" and a relay shows the location of the relay: "Relay Port 2 ICS-2002 Director" or "Relay RLY-8 Module: 1 Relay: 1".

In some screens, there are two info lines present simultaneously, one tracking the row of the field, and one tracking the column. For example in the Global - Advanced screen there is an info line in the box border showing label info, and a second prompt in the screen border (at the bottom of the screen) showing the function of that column.

Look for these info lines, and read them! They will help you a great deal, especially when you are first learning to use MXPLUS2.

On-Line and Off-Line Configuration

You can run MXPLUS2 either "off-line" or "on-line". By default MXPLUS2 starts in off-line mode. You can use off-line mode to create a configuration file, then send the file to the matrix frame at a later time. You can use on-line mode to make changes to the system while it is running. In both modes, any changes you make affect the configuration in PC memory immediately. However, these changes are not saved to file (off-line) or frame (on-line) until you specifically "save changes" either by clicking on the ON-LINE/OFF-LINE field in the lower right hand corner of the screen or by pressing the F4 function key. When you save changes, MXPLUS2 saves all changes made since the last time you saved changes.

Help System

MXPLUS2 includes a comprehensive, context sensitive help system. The text of the help system consists of the entire Operation manual, automatically indexed so that pressing the F1 function key at any time will pop up a screen containing the section of the manual that applies to the current screen. In addition, you can get help on specific topics by looking them up in the alphabetic list in the Help - Index screen, and help on using the keyboard and mouse from the Help - Keyboard and Mouse screen.

Once you have opened a help screen, you can exit at any time by pressing ESC, or by clicking outside the popup with the mouse, or by clicking on the EXIT field. From within a help screen you can scroll by using the PAGE UP, PAGE DOWN, or arrow keys, or by dragging the scroll bar. You can get to the Index section by clicking on the Index button, and you can go to the Keyboard and Mouse section by clicking on the Keyboard and Mouse button. From the Keyboard and Mouse section you can get to the Quick Reference section by clicking on the Quick Reference button. The Quick Reference section summarizes the keyboard and mouse commands in a table.

You can move the help screen around on the screen by positioning the mouse cursor on the title of the help window, then holding down the mouse button

and dragging the window. This is useful for momentarily referring to the current screen (underneath the help screen) without having to exit the help screen. It is not possible to perform this function without a mouse.

The help system keeps a list of which help topics you have viewed during the current visit to the help system, and allows you to go back through the previously viewed screens by clicking on the Previous Screen button.

You can customize the help system text for your installation. For example, you can translate it into a language other than English, or add or replace specific terms or explanations to the help screens to suit your site.

This process requires modifying one of MXPLUS2's system files (MXPLUS2.HLP) and should only be undertaken by personnel equipped with the training and tools required to edit a pure ASCII text file having a very specific format. For example, using a conventional word processor can insert invisible control characters into the file that can corrupt the file.

Failure to perform changes EXACTLY according to the required format can cause MXPLUS2 to behave unpredictably. For this reason, Clear-Com does not provide technical support for MXPLUS2 versions that have modified MXPLUS2.HLP files. You perform any changes to MXPLUS2.HLP entirely at your own risk.

However, no changes made to MXPLUS2.HLP can cause long term damage to MXPLUS2. Make a backup copy of MXPLUS2.HLP before making any changes, and you can always revert back to that original copy at any time and be certain of full functionality. For complete details of the format of the MXPLUS2.HLP file, and instructions for modifying it, see the text at the start of MXPLUS2.HLP.

Configurations and Configuration Files

The complete set of programmable parameters for a given system setup are referred to as a "configuration". The CPU-100 Master Controller Card in the Matrix Frame holds two configurations in its battery-backed memory at any one time: The "Current" configuration and the "Default" configuration. The current configuration is the one that is actively in use by the system. The default configuration can be copied into the Current memory area by pressing the "Load Default" button on the CPU-100 card. From MXPLUS2 you can configurations directly between PC memory, disk file, and the current and default frame configurations in virtually any combination.

MXPLUS2 stores a single complete configuration in each "configuration file". Configuration files have the file extension "*.CFG". However, from within

MXPLUS2 you are never required to enter this extension, it is automatically assumed and you enter only the eight-character base file name.

There is a sample configuration file supplied with MXPLUS2 called "SAMPLE.CFG" which contains the example screens used in this chapter. We encourage you to examine and experiment with this file as you read this manual.

The "Template" Configuration File

MXPLUS2 maintains a configuration file on disk that corresponds closely with the configuration in the frame at any given time. The name of the template file appears in the info line line when the cursor is in the ON-LINE/OFF-LINE field in the lower right corner of the screen. This section describes the relationship between a configuration in the frame and that file, referred to as that configuration's "template" file. The rest of this section is not required reading, because the template file system is essentially transparent to the user. However, because MXPLUS2 may prompt you to provide a "template file name" at one time or another, you should be aware that this is the file that it is referring to.

The MXPLUS2 system includes a 20 character description for each label in the system. These descriptions are for the convenience of the MXPLUS2 user only, and are not sent to (or stored by) the CPU-100 card in the frame. This is because they require too much memory to fit in the CPU-100. The result is that when you upload a configuration from the frame, the description fields in PC memory are not updated. Needless to say you do not want to have to type in those descriptions every time. The same situation holds for control names. They are long, and not used by the CPU, so must be loaded separately from a disk file.

To resolve this, each of the configurations in the frame controller (current and default) store the name of a configuration file from which MXPLUS2 can load the associated label descriptions (et al) for that configuration. This file is referred to as the "Template File" or "Template Configuration" for that frame configuration.

In the case of starting an upload from a system in which no file name is present in the frame's configuration, MXPLUS2 warns you that a template could not be opened, and that you will be prompted to select a template file name at off-line or update time. Whenever there is a transition from ON-LINE to OFF-LINE, the current state of the frame configuration being operated on is stored to its template file automatically. If MXPLUS2 cannot find the specified template file, it will prompt you for a new file name with a popup file selection box, and update the frame configuration with the new file name.

Whenever a configuration file or a configuration in PC memory is sent to the frame, the configuration's template file name is sent with it. The template file name used is the name/path most recently used when either loading the configuration from a disk file or saving it to a disk file.

Your changes are sent to the template file when you click on the ON-LINE/OFF-LINE field, press F4, go offline, or exit (if you answer OK to the confirmation prompt).

The template file corresponds closely with the configuration in the frame at any given time, but it can get out of sync in certain respects For example if you use Station System Programming to change key assignments, MXPLUS2 has no way of tracking this. For the purpose of restoring label and function descriptions, this difference does not pose any problem, and is resolved the next time you go on-line with the frame.

File Selection Box

When you select a function that reads, writes, deletes, or names a disk file, MXPLUS2 displays a popup file selection box.

The file selection box initially displays the configuration files in the current drive and directory (all files with ".CFG" extension). You can change the drive by going to the Directory field and typing the drive letter followed by a colon, then clicking or pressing enter in that field. You can change directories either by typing the full directory name in the Directory field, or by clicking in the Directories box in the upper right hand corner. Clicking on the symbol "..\" in the Directories box causes MXPLUS2 to make the parent directory (if one exists) the current directory.

When you click the OK field, MXPLUS2 uses the file whose name appears in the File field, located in the drive and directory specified in the Directory field. To put a name in the File field, you can either enter it by typing it in, or click on an existing file name in the Files box. Alternatively, you can double-click on the file name and MXPLUS2 will get the file immediately. The file extension ".CFG" is always appended to the file name shown in the File field, so you never need to add an extension. No other extensions are permitted for configuration files.

To create a new directory, you can type the desired path in the Directory field and MXPLUS2 will attempt to create it. Only one directory can be created at a time, and it must be the last one named in the path.

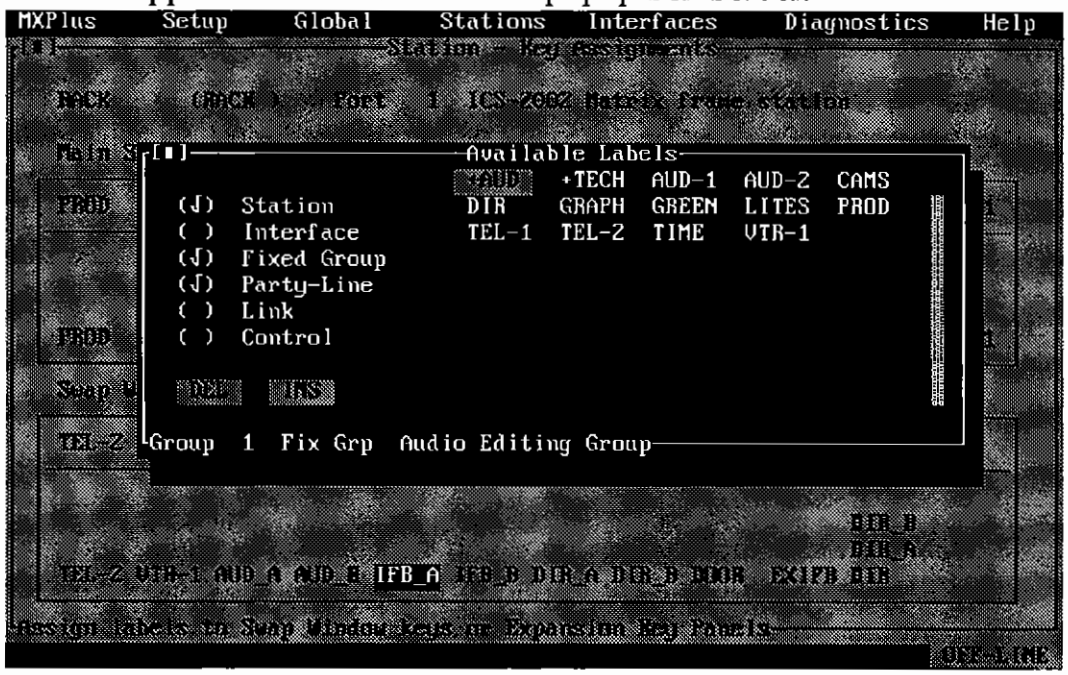
When you are saving a configuration file, you can include a one-line description of the file's content by typing in the Description field. This file description, along with the date of last modification of the file, will then be listed after that file's name when it appears in the Files box. The Description field is only displayed when you are saving a configuration file.

To cancel the file operation, you can press ESC or click on the box in the extreme upper left hand corner of the popup box border.

Label Selection Box

Whenever you need to specify a label in a field in MXPLUS2, selecting the field pops up a label selection box. To select a label from the box, click or press ENTER on the desired label name. Note that when the cursor is highlighting a given label, that label's description and/or other relevant data is displayed on the "info line" in the bottom border of the popup. The check fields at the left of the popup determine which types of labels are listed in the box. To exit without choosing a new label, you can press ESC or click on the box in the

extreme upper left hand corner of the popup box border.



The popup often includes a DEL ("Delete") button. This is used to remove a label or control assignment. When assigning labels to station keys or DTMF codes, an INS ("Insert") button is also present, and both the INS and DEL keys have additional functionality (see the Station - Key Assignments section).

Controls: DTMF Sequences, Relays, and Routes

DTMF Sequences, Relays, and Routes are features of the Matrix Plus II System that are called "Controls". A control is activated by "assigning" it to a label. When the label is "activated" (by setting a talk or listen to that label, for example by pressing a selector key with that label assigned to it) the control is activated. Relays can be configured to activate on talk, listen or either.

When you only want the control to activate when a label is activated (no audio path activation), you can assign the control to a "control label" which is a type of label that has no other function than to activate the controls assigned to it.

When you also want some audio activity to happen, you can assign the control to any label. For example, you can assign a DTMF sequence to a label that picks up a telephone line, creating an auto dialing sequence.

To "set up" each control (for example assigning the actual DTMF sequence to a DTMF sequence control) use the Setup - Relays, Setup - DTMF Sequences, and Setup - Routes screens. To assign the controls to labels, use the Global - Controls screen.

Menu Summary

The menu bar of MXPLUS2 includes the following menus. The following paragraphs very briefly describe the kinds of parameters found in each menu.

- MXPlus
- Setup
- Global
- Stations
- Interfaces
- Diagnostics
- Help

The MXPlus menu includes functions and screens that configure and run MXPLUS2 but do not directly affect a configuration. These include the Go On-Line, Go Off-Line, and file functions, the PC Setup functions, the report generation screen, and the Exit to DOS function.

The Setup menu addresses configuration items that are most likely to be set initially and then left alone in the course of normal use. These include setting port functions and expansion key panels, label names and descriptions, relay names and activation status, route sources and destinations, system-wide configuration parameters, trunk ports, and DTMF sequences.

The Global menu addresses items in the system that affect the interaction of the stations, interfaces, groups, and other elements in the system. These include assigning group members, control assignments, link label assignments, passwords for DTMF access and ICS-2002 menu access. A number of "advanced" features such as Global IFB and Tally are also found here.

The Stations menu includes the configuration items that are specific to each station, including key assignments, local setup items, and "advanced" functions such as local latch disables and forced crosspoints.

The Interfaces menu includes the configuration items that are specific to each interface including DTMF decoding parameters, local setup, and "advanced" functions.

The Diagnostics menu allows access to screens that monitor which talks are set in the system, and what is responsible for each one being set.

The Help Menu provides a summary of the keyboard and mouse conventions, an alphabetical reference to functions, and technical support contact information.

MXPlus Menu

The MXPlus menu includes the following functions and screens, each of which is discussed in detail below.

- On-Line To Matrix
- Go Off-Line
- Get File
- Save File
- Transfers
- Reports
- PC Setup
- Exit

On-Line To Matrix (MXPLUS menu)

When you select On-Line to Matrix, MXPLUS2 gets the current configuration from the CPU-100 Master Controller Card in the frame. It takes between 15 seconds and 4 minutes complete this, depending on the baud rate and system size. If MXPLUS2 displays an error message or the process takes more than a few minutes, something is wrong with your serial connection or your PC Setup settings, and you should check the diagnostic procedures in the Maintenance manual to resolve the issue before proceeding.

If the configuration in the frame does not include the name of a template file, or MXPLUS2 cannot find the template file on your hard disk, MXPLUS2 displays the warning "Cannot read template configuration file. Label descriptions, control names, and trunk system names may not be current. You will be prompted to choose a file name when you update or save this configuration." If this occurs you may want to go back and read the Template Files section of this chapter for details.

Go Off-Line (MXPLUS menu)

Selecting Go Off-Line when you are on-line takes the system off-line, preventing any further changes from being sent to the matrix frame. If changes are pending, you will be prompted to send them before going off-line.

Get File (MXPLUS menu)

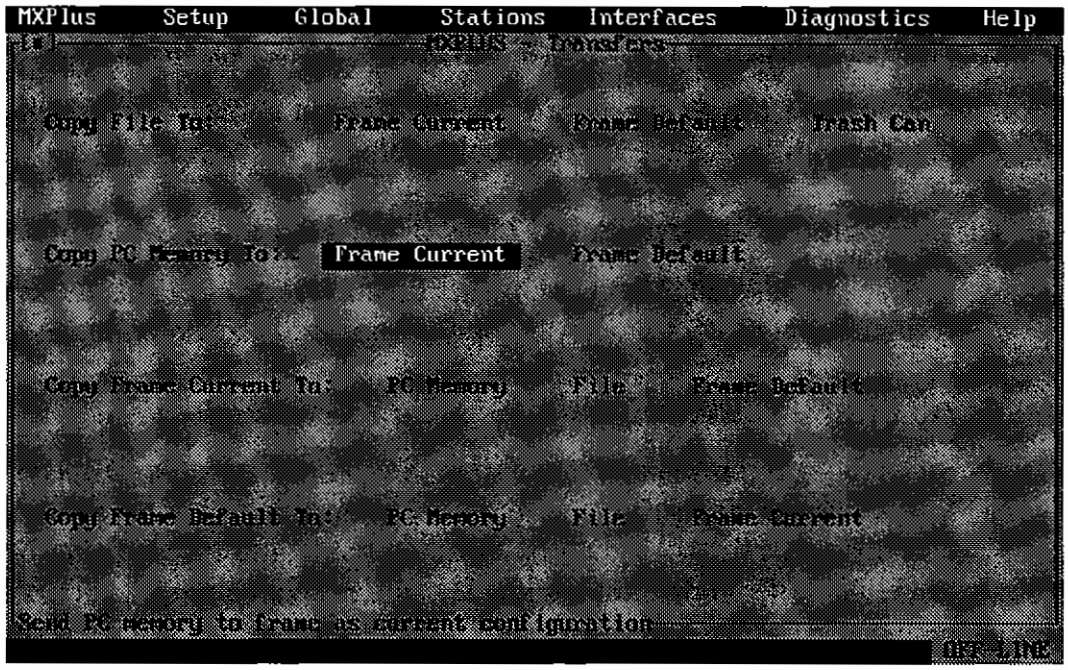
To load a file from disk into PC memory, select Get File. MXPLUS2 will display a popup file selection box.

Save File (MXPLUS menu)

To save a configuration to a file, select Save File. MXPLUS2 will display a popup file selection box. To name the file, either type the new name in the File field, or click on an existing file name in the Files box (to overwrite that file with the new configuration). This new file name then becomes the configuration's template file name, and is the file name written when you click the ON-LINE or OFF-LINE button to save your changes. You can also type a one-line description for the file in the Description field.

Transfers (MXPLUS menu)

Several other configuration options (besides "Get File" and "Save File") are available from this screen, as described below.



The screen above highlights the field you would select to send the configuration in the PC's memory to the frame's current configuration.

Copy File To Frame Current (MXPLUS menu - TRANSFERS)

Select a configuration file from disk to send to the frame as the current configuration.

Copy File To Frame Default (MXPLUS menu - TRANSFERS)

Select a configuration file from disk to send to the frame as the default configuration.

Copy File To Trash Can (MXPLUS menu - TRANSFERS)

Select a configuration file on disk to delete.

Copy PC Memory To Frame Current (MXPLUS menu - TRANSFERS)

Sends the configuration currently in PC memory to the frame as the current configuration. The template file name for that configuration will be the name displayed in the info line when the cursor is in the ON-LINE/OFF-LINE field. That is, the name of the last file loaded into PC memory from disk, or the file

name used when the configuration in PC memory was last saved to disk (whichever was done most recently). To change the template file name for the configuration in PC memory, use MXPlus - Save File to save it to the desired template file name/path before sending it to the frame.

Copy PC Memory To Frame Default (MXPLUS menu - TRANSFERS)

Identical to Copy PC Memory To Frame Current above but sends the configuration to the frame as the default configuration.

Copy Frame Current To PC Memory (MXPLUS menu - TRANSFERS)

Similar to the MXPLUS2 - Go On-Line function in that it loads the current frame configuration to PC Memory, but it does not then remain on-line.

Copy Frame Current To File (MXPLUS menu - TRANSFERS)

Saves the current frame configuration directly to a disk file. Displays a file selection popup for you to enter the file name, path and description. This function first loads the configuration from the frame into PC memory, then saves it to the file, overwriting any previously existing configuration information in PC memory.

Copy Frame Current To Frame Default (MXPLUS menu - TRANSFERS)

Replaces the default frame configuration with the current frame configuration. This is done entirely within the CPU-100 Controller Card's memory so it is a very fast , and does not affect the configuration in PC memory.

Copy Frame Default To PC Memory (MXPLUS menu - TRANSFERS)

Similar to the MXPLUS2 - Go On-Line function, but it loads the default frame configuration to PC Memory, and does not then remain on-line.

Copy Frame Default To File (MXPLUS menu - TRANSFERS)

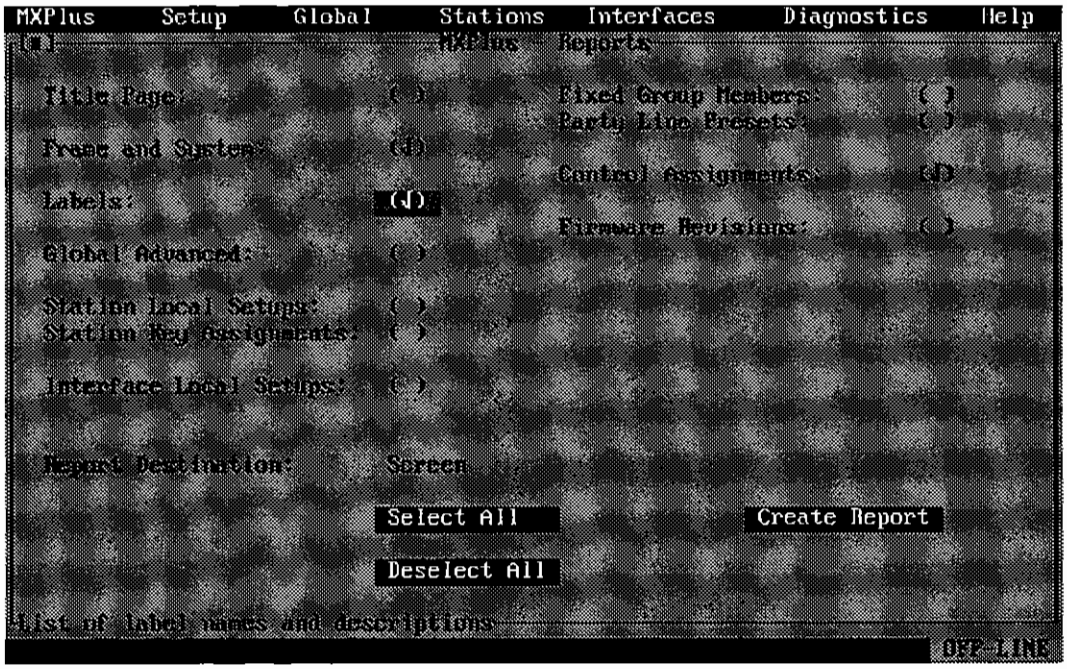
Similar to the Copy Frame Current To File function above, but copies the default configuration from the frame.

Copy Frame Default To Frame Current (MXPLUS menu - TRANSFERS)

Similar to Copy Frame Current To Frame Default above, but reverse, overwriting the current configuration in the frame with the default configuration in the frame. This change affects the matrix immediately, so it should be used with caution.

Reports (MXPLUS menu)

To send a summary of the various groups of configuration parameters to the screen, a file, or one of your PC's printer ports, check the fields corresponding to the information you want included in the report. You can enable all of the report sections with one click by using the Select All button.



In the screen above fields are checked to generate a report of frame and system setup, label names and descriptions, and control assignments.

Using The Screen (MXPLUS menu - REPORTS)

When you select Screen as the destination, the information is displayed in a popup box that shows one page at a time, advancing one page each time a key is pressed. To exit the report display, press ESC a few times.

When you select Printer as the destination, the report is sent to the printer port named in the Report Printer field of the MXPlus - PC Setup screen.

When you select File as the destination, MXPLUS2 prompts you for a file name, and creates the file with the extension ".PRN". The .PRN file is an ASCII file with all the same control codes that would be sent to a generic ASCII printer, so that the file can be sent to the printer directly at a later date if desired.

To set the desired destination, select it from the popup selected by the Report Destination field.

To create the report, select the Create Report button. To create a Firmware Revisions report you do not have to be on-line, however the matrix frame must be connected to the PC. To place checks in all of the fields at once, click the Select All button. To clear all check fields, click the Deselect All button.

Reports Sections (MXPLUS menu - REPORTS)

Title Page:	Opening page with configuration file name and date
Frame and System:	Summary of cards in frame and assigned port functions
Labels:	Label names and descriptions
Global Advanced:	Summary of global advanced functions
Station Local Setups:	Local setup information for each station
Station Key Assignments:	Selector key assignments for each station
Interface Local Setup:	Local setup information for each interface
Fixed Group Members:	Members of each fixed group
Party Line Presets:	Available party-lines and any preset member interfaces
Control Assignments:	List of controls assigned to each label. Controls include relays, DTMF sequences, and routes.
Firmware Revisions:	Reads from the matrix frame the revision level of each EPROM in the system.

If your system includes linking, the following two report sections are also shown:

Trunk Port Setups:	Local trunk port destinations and remote system info
Link Label Assignments:	Available link labels and their destinations

PC Setup (MXPLUS menu)

The PC Setup screen allows you to set parameters that only affect the appearance and operation of MXPLUS2 on your PC, but do not affect frame configuration parameters.

In this screen the program has been configured to communicate with the frame through the PC's COM1 serial port, at the standard baud rate of 19.2K. The password "MYPASSWORD" has been added to prohibit unauthorized access to the configuration program.

Password (MXPLUS menu - PC SETUP)

If this field is blank, no password is required to enter MXPLUS2. If a password is entered here, it must be entered before MXPLUS2 will run. The password is not case sensitive; for example "MyPassword" is the same as "mypassword". The password is not actually saved to the file until you press the ENTER key or click in the field. While MXPLUS2 saves the password it displays the message "Saving Password...".

Display Type (MXPLUS menu - PC SETUP)

MXPLUS2 attempts to correctly determine the type of display adapter on your PC. In some cases it is necessary to force MXPLUS2 to use either the monochrome map or the color map. The monochrome map is predetermined, and is designed for use with "Hercules" (or compatible) monochrome adapters. The color map is determined by the color selection fields in the lower part of this

PC Setup screen. To select a mode, choose Auto-Detect, Color, or Monochrome from the popup selection box selected by this field. Your display type choice is stored and used in future MXPLUS2 sessions.

Report Printer (MXPLUS menu - PC SETUP)

These fields allow you to set the printer type and destination port MXPLUS2 will use when printing reports from the MXPlus - Reports screen. Printer choices are Generic ASCII, PostScript, or HP LaserJet Series II, and port choices are LPT1, LPT2, LPT3. Printing Generic ASCII reports to a disk file is also supported by selecting File as the report destination from the Reports screen.

Label Printer (MXPLUS menu - PC SETUP)

These fields allow you to set the printer type and destination port MXPLUS2 will use when printing selector key designation strips from the Stations - Key Assignments screen. Printer choices are PostScript or HP LaserJet Series II, and port choices are LPT1, LPT2, LPT3, or File.

When File is the destination, the PostScript or HP LaserJet code that creates the the page of designation strips on the printer is saved to a file named <portlabel>.LBL in the current DOS directory. <Portlabel> is the talk label name of the station. ".LBL" stands for "LaBeL strip". You can then send the .LBL files to the printer at your convenience by using the DOS COPY command with the /b (binary) option. For example the following DOS command sends all of your .LBL files to LPT2:

```
COPY /b *.LBL LPT2
```

The PostScript and HP LaserJet printer drivers are designed to be as compatible as possible with the wide variety of laser printers available. However, Clear-Com cannot guarantee that these drivers will work with every printer. If you experience difficulty printing designation strips on your printer, please contact Clear-Com Technical Support.

PC Serial Port (MXPLUS menu - PC SETUP)

To run MXPLUS2 on-line, you must have a serial communication link between your PC and the frame. Most PCs have between 1 and 4 serial communication ports, referred to as COM1, COM2, COM3 and COM4. This field activates a popup that allows you to select which port on your PC is physically wired to the frame. Your serial port choice is stored and used in future MXPLUS2 sessions.

PC Serial Baud Rate (MXPLUS menu - PC SETUP)

MXPLUS2 can run its communication with the CPU-100 Master Frame Controller card in the frame at various "baud rates" (speeds). The standard rate is the fastest rate (19.2KBaud) and is recommend unless you experience difficulties with it. Common reasons for running at the slower speed are very long cables or very slow PCs. For further information on troubleshooting, see the Configuration section of the Maintenance manual. Your serial port baud rate choice is stored and used in future MXPLUS2 sessions.

Display Colors (MXPLUS menu - PC SETUP)

MXPLUS2 lets you set the colors for various categories of screens and data. To set these colors, click on the field in the color display map, and select the desired foreground/background color pair for that category from the color selection popup. Once you select a color pair from the popup, the display map reflects your choices. To cause MXPLUS2 to actually save and use the color set displayed in the display map, click on the Save New Colors button below the map. To restore the default color map, click on the Restore Default Colors button. Your color choices are stored and used in future MXPLUS2 sessions.

Exit (MXPLUS menu - Exit)

To exit the configuration and return to the DOS prompt, click on Exit. If you have any changes pending, you will be prompted to save them if you wish.

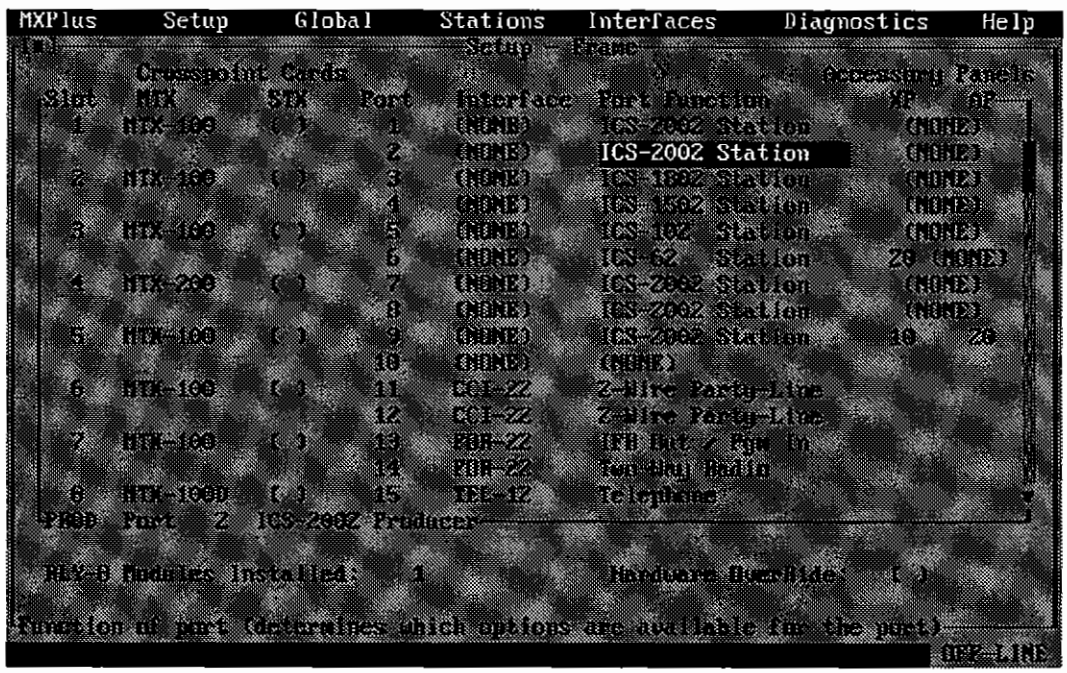
Setup Menu

The Setup menu includes the following functions and screens, each of which is discussed in detail below.

- Frame
- Labels
- Applications
- Relays
- Routes
- System
- Trunk Ports
- DTMF Sequences

Frame (SETUP menu)

The **Setup - Frame** screen shows the hardware installed in your frame. Some hardware components are detected automatically by the Matrix Plus II System, and others require that you enter them manually as described in the sections below.



In the frame setup above, the TEL-12 on port 15 is connected to an MTX-100D port to allow dial up DTMF inward access to the system. The D suffix for the MTX-100 indicates that it has the DTMF-1 Inward / Outward Control Option installed. The XP Accessory Panels field for the ICS-62 states that 20 additional

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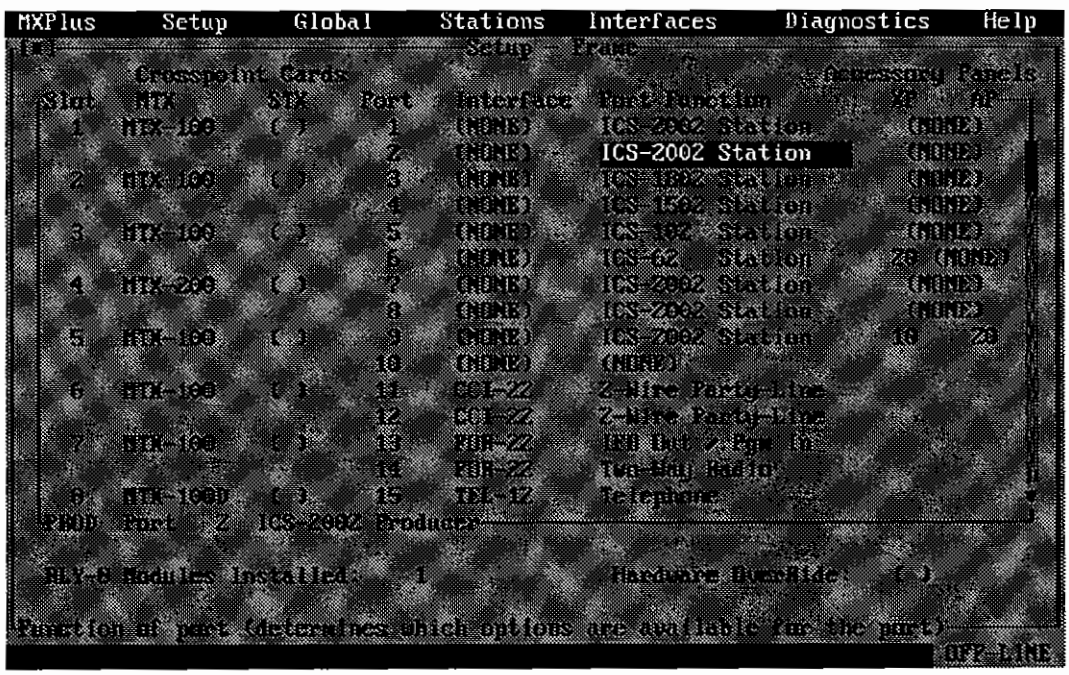

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selector keys, provided by expansion key panels, are connected to the station. The RLY-8 Modules Installed field is set to 1, indicating that one RLY-8 interface is connected to the frame.

Hardware OverRide (SETUP menu - FRAME)

The Crosspoint Cards and Interface columns on the left half of the box are by default non-modifiable data fields. This is because they are automatically set by the Matrix Plus II System, and under normal circumstances do not require modification. However, sometimes it is useful to be able to change them, for example when creating a configuration that includes hardware that is not yet installed.

The Crosspoint Cards - MTX column indicates what type of crosspoint card is in each slot of the frame. Available crosspoint cards include MTX-100, MTX-200, or MTX-100D. An "MTX-100D" indicates an MTX-100 with the DTMF Inward / Outward Control Option installed.

The Crosspoint Cards - STX column is checked if an STX-101 Expansion Crosspoint Card is installed below that slot. STX-101 cards plug into a small slot below each crosspoint card in the frame. The STX card slots are only present in System III or System IV frames (i.e. systems with greater than 50 port capacity).

The "Interface" column indicates what type of interface (FOR-22, CCI-22, or TEL-12) is connected to each port.

To change the hardware specified in the Card and Interface columns, check the Hardware OverRide field in the bottom right corner of the screen. MXPLUS2 then makes those fields modifiable.

Port Function (SETUP menu - FRAME)

Each port in the Matrix Plus System must be assigned a "port function" which specifies what type of station or interface it is connected to (if any) and the intended use of the port. For example if an MTX-100 port is connected to an intercom station, the Matrix Plus System treats it differently than if it is connected to a telephone interface. The Port Function column displays the port functions assigned to each port in the frame associated with the configuration currently in PC memory.

There are port functions that have the same hardware attached to them but perform different functions. For example the Camera and 2-Way Radio port types typically both physically connect to an FOR-22 4-wire interface. As another example, MXPLUS2 must be able to tell the difference between an

ICS-2002 display station and an ICS-62 compact because the configuration options are different for each.

Only port functions that are physically compatible with each individual port are included in the choices for that port. For example since an MTX-200 port can only be connected to a 2-wire digital intercom station, MTX-200 ports include only intercom stations as possible port functions.

It is possible to allow intercom stations from the Matrix Plus I System to be used with the Matrix Plus II System. To use these stations, you must first update the firmware (EPROM chips) in the stations. Then, to cause MXPLUS2 to include these port functions in the popup selection box, you must check the Assign Old Stations field in the Setup - System screen of MXPLUS2. These stations can only be assigned to MTX-200 card ports, because they only can be wired using the Digital 2-Wire wiring system.

When you change a port function to "NONE" or between a station type and an interface type, the entire configuration for that port is automatically cleared to defaults. This includes configuration items that only were required if that port existed, for example its label name is reset to default, and any assignments of that label to station keys are removed. Also, if the port is an interface, any party-line that had only that port preset to it is reset to its default name, and the preset is cleared.

When you change a port function from "NONE" to certain interface types, you will be prompted to "set default parameters" for that port. If you agree by clicking OK on the popup, MXPlus2 will automatically set the configuration parameters usually used with that port function. You can view and edit these parameters at any time from the Setup - Applications screen. For details on the specific parameters set for each interface that has this "auto-setup" feature, see the Setup - Applications screen.

Each port function is listed below, including further explanation as required.

ICS-2002 Station

ICS-1802 Station

ICS-1502 Station

ICS-102 Station

ICS-62 Station

ICS-2000 Station

ICS-1500 Station

ICS-1000 Station

ICS-100 Station

ICS-60 Station

2-Wire Party-Line The 2-Wire Party-Line port function is commonly used when the port is connected to a CCI-22 Party-Line Interface. Call signals are sent to and received from an external Clear-Com party-line in the same way as they are sent between stations within the matrix. It is not necessary that the port be connected to a CCI-22 interface, but the call signals operate using the conventions used by the CCI-22. When connected to an RTS party-line system, call signals are not operative.

Two-Way Radio When the Two-Way Radio port function is selected, the port is configured to operate a push-to-talk two-way radio system. The call signal output activates a relay to key the radio's transmitter.

Telephone When the Telephone port function is selected, the port is configured to operate a TEL-12 Telephone Interface. The call signal output is used as a request from the matrix for the interface to go off hook. A call signal sent from the TEL-12 interface to the matrix indicates that the line is ringing or that the line is off hook.

Telephone IFB The Telephone IFB port function is functionally identical to the Telephone port function above. However, its auto-configuration parameters include settings commonly used when a telephone port is used for dial-in IFB.

Four-Wire The Four-Wire port function is commonly used when the port is wired directly to the external device. In this case, call signals sent to the port from the matrix only have an effect if the Call Signal Output connection on the port's 15-pin connector is wired to that external device.

By default, when a Four-Wire port is connected to an FOR-22 4-Wire Audio Interface, a call signal sent to the port from the matrix activates the FOR-22 channel's relay. Alternatively, this relay can be activated by assigning the relay's control name to a label using the Setup - Relays and Global - Controls screens. Placing a check in the FOR-22 relay's Available field the Setup - Relays screen causes the default (call signal) activation for the relay to be disabled.

External IFB Ctrl The External IFB Ctrl ("Control") ("EIFB") port function is intended for use with a specific type of "external IFB controller". This external IFB controller includes a switch that is wired so that it sends a continuous call signal to the EIFB port for as long as the switch is selected. For the duration of this call signal, the Matrix Plus II System deactivates all talk paths to the EIFB port which are not IFB paths. Even if no IFB talk paths are active at that time, all other talk paths are deactivated. For the duration of the call signal, all stations that have the EIFB port assigned to a selector key receive an IFB tally only if the station is selected for tally (flashing LED above the EIFB selector key). Stations that have the EIFB port assigned as a local IFB destination can talk to the EIFB port, and all others receive an error indication if they attempt to do so.

One application of this setup is the case where a recording crew is located in a different part of a building than the rest of the crew, and the recording crew needs to inform the others when the show is on the air. The recording crew turns on the switch, and the IFB tally informs the rest of the crew that they are on the air. The talk path to the recording crew is reserved for use by stations that have the EIFB port assigned as a local IFB destination.

The EIFB port should not be configured as a global IFB destination. If the external system is connected through an FOR-22 interface, the FOR-22 channel's relay will be activated for the duration of all talks to the port from any other port(s) in the system.

Camera The Camera port function is used to identify a port as a camera interface. The camera port can be connected to a CCI-22 Interface, an FOR-22 Interface, or wired directly to the matrix card's 15 pin connector. A port designated as a camera is grouped with other camera ports in the port selection screens in the Station System Programming menus in the ICS-2002.

IFB Out / Pgm In The IFB Output / Pgm Input port function is intended for use in a television application in which the output connection is used to send an IFB feed from the matrix and the input connection is used to receive an external program feed for distribution within the matrix. A port designated as an IFB Out / Pgm In port can be connected to an FOR-22 interface for transformer isolation or wired directly to the matrix card's 15-pin connector. A port designated as an IFB output is grouped with other IFB output ports in the port selection screens in the Station System Programming menus in the ICS-2002.

Trunk The Trunk port function is only available in systems that include the System Linking option. The Trunk port function is used when linking multiple Matrix Plus II Systems together. A Trunk is a dedicated audio line that is used to carry audio between the two systems. For further details see the Setup - Trunk Ports section of this chapter.

Accessory Panels (SETUP menu - FRAME)

For each port that is assigned an intercom station port function, there is an entry in the XP (Expansion Keys) column indicating the number of XP or XPL expansion keys that are physically attached to the station. You must fill in this number for each station because the Matrix Plus II System cannot detect this automatically. The number of expansion keys can be NONE, 10, 20, 30, 40, 50, or 60. MXPLUS2 does not need to know whether the keys are supplied by XP-12 or XP-22 Expansion Panels, as long as the total number of keys is correct. The Station - Key Assignments screen will only allow you to assign labels to the number of expansion key panel keys named here.

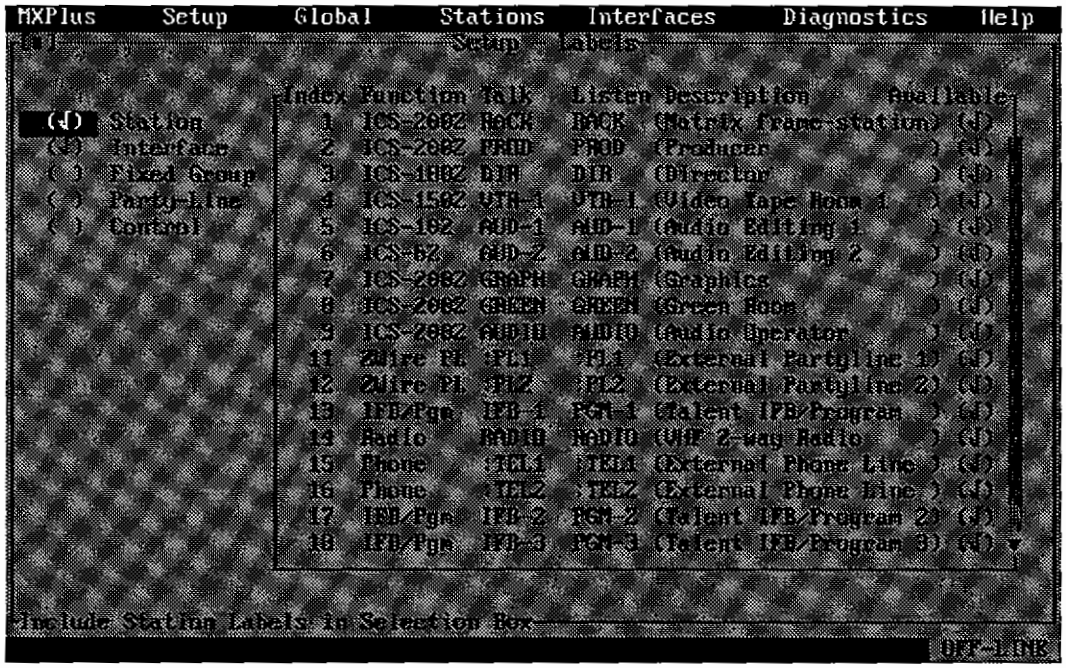
The AP column shows the number of Assignment Panel buttons physically attached to the station. The number of AP buttons that can be installed on a station can be NONE, 20, 40, or 60, depending on the number of expansion panel keys also attached to the station. For example if the station already has 60 XP keys attached, only 20 AP buttons can be attached. The full complement of 60 AP buttons can only be attached if the station has 0 or 10 XP keys attached.

RLY-8 Relay Modules Installed (SETUP menu - FRAME)

Similar to the case with expansion key panels, you must enter the number of RLY-8 Programmable Relay Control Interfaces that are installed in the frame. Up to 8 RLY-8s may be installed. Each RLY-8 module includes 8 individual relays. The Setup - Relays screen will only allow you to set up relays that are accounted for here.

Labels (SETUP menu)

This screen allows you to set the 5-character names for each label, and the 20-character description associated with it. For non-port labels (groups, party-lines, etc.), you also set the "availability" of the label.



In the above screen, the external party-line ports ":PL1" and ":PL2" begin with a colon to indicate that these labels should not be assigned to station keys. Instead, they are preset to party-lines and accessed through the party-line labels. The port labels are usually then configured as globally hidden to prevent direct assignment to station keys. The telephone port labels ":TEL1" and ":TEL2" will be hidden, and access to the telephone lines will be through the party-line labels TEL-1 and TEL-2. For details of configuring telephone ports see the TEL-12 chapter of this Operations manual.

Definitions (SETUP menu - LABELS)

The Matrix Plus II System allows you to assign each selector key on each intercom station in the system one listen label and up to four talk labels. Each selector key's labels name the destination(s) that will be accessed when that key is used to activate a talk or listen (or both). Each label can represent the talk or listen path of an intercom station or interface, a fixed group or party-line, a destination in a remote system, or the activation of a control (relay, DTMF sequence, or route).

A "talk" label refers to the label used when activating a talk to a port. A "listen" label refers to the label used when activating a listen to a port. In most cases, the talk and listen labels will be identical. The common exceptions are ports assigned the Four-Wire or IFB Out / Pgm In port functions, in which the input and output may be used for unrelated purposes.

The Matrix Plus II System provides 32 fixed group labels, 64 party-line labels, 50 Link labels, 50 control labels, and one port label for each port installed in the system, up to 100 ports.

Allowable Names (SETUP menu - LABELS)

Labels can be up to five letters long, using numbers, capital letters, and all punctuation marks. Leading spaces are not allowed in label names. However, the underscore character ("_") will appear as a space when viewed on the LCD screen of an ICS-2002 Display Station. Blank label names are not allowed, and are replaced by MXPLUS2 with the label's default name when you exit the field.

The 5-character label names must be unique. That is, no two labels can have the same name. MXPLUS2 will display an error message and will not let you exit a field that has a duplicate label name. The error message will specify exactly where the duplicate label is used to give you the opportunity to change it.

Only stations and interfaces can have "split labels" (separate talk and listen labels). Split labels are normally only used for interface ports assigned the IFB Out / Program In port function.

Naming Conventions (SETUP menu - LABELS)

There is a set of conventions commonly used for naming labels in Matrix Plus installations. These conventions are presented in the "Matrix Plus System Configuration Package" available from your Matrix Plus Dealer. The three most common naming conventions are as follows.

A colon (":") as the first character in a label indicates that the label is not to be assigned directly to a selector key. The most common use of this is in labels for interface ports that are only accessed through a party-line and never through the interface label directly. For example, a TEL-12 Telephone Interface port is often preset to a party-line, and the party-line label assigned to selector keys on stations that require access to the phone line.

Using the Screen (SETUP menu - Applications)

To select an interface port to configure, click on the label name field in the upper left hand corner and select an interface from the label popup. The box shows the relevant configuration parameters (given that the port selected has a set of auto-configuration parameters defined. If not, the box displays "empty").

The following sections describe the application auto-setup parameters for each port function that is supported by this feature.

2-Wire Party-Line Application Auto-Setup

The most common configuration of this port is as an interface to an external Clear-Com party-line, in conjunction with a CCI-22 Dual Party-Line Interface, as described in the Configuration section of the Interfaces - CCI-22 chapter of this Operation manual. The following auto-setup helps you to configure the port as described in that section.

- The first unused party-line is made available, and the CCI-22 port is configured as its only preset member.
- That party-line label's description is set to "2-Wire PL at port N", where N is the CCI-22 port's port number. The party-line label's name is not changed from the default.
- The talk and listen labels of the CCI-22 port label are globally hidden.
- The party-line label is configured for auto-listen.

For the party-line interface port label the screen shows the Hide Label field. For the party-line label it shows the label name and description, and the Auto-Listen field.

Two-Way Radio Application Auto-Setup

Configuring an FOR-22 port as a two-way radio interface is described in the Configuration section of the Interfaces - FOR-22 chapter of this Operation manual. The following auto-setup helps you configure the port as described in that section.

- The first unused party-line is made available, and the FOR-22 port is configured as its only preset member.
- That party-line label's description is set to "Radio at port N", where N is the FOR-22 port's port number. The party-line label's name is not changed from the default.
- The talk and listen labels of the FOR-22 port label are globally hidden.

- Talk and Listen Activation for the FOR-22 port is set to Always Active.
- The party-line label is configured for global latch disable.

For a two-way radio port, the screen shows the Hide Label field, the Talk and Listen Activation field, and the Radio Receiver Active Tally field. For the party-line it shows the label and description, and the Global Latch Disable field.

Telephone Application Auto-Setup

There are three common configurations of a telephone interface port described in the Configuration section of the Interfaces - TEL-12 chapter of this Operation manual. The following auto-setup is common to two of these, Intercom Station Telephone Access Mode and Manual Call Screening Mode. (The third is covered below as the Telephone IFB Application Auto-Setup).

- The first unused party-line is made available, and the telephone port is configured as its only preset member.
- That party-line label's description is set to "Phone at port N", where N is the telephone port's port number. The party-line label's name is not changed from the default.
- The talk and listen labels of the telephone port label are globally hidden.
- Talk and Listen Activation for the telephone port is set to Always Active.
- The telephone port is set to Enable Telephone Off-Hook Tally.
- The party-line label is configured for In-Use Tally.
- The party-line label is configured for Auto-Listen.

For the telephone port label, the screen shows the Hide Label field, the Talk and Listen Activation field, and the Radio Receiver Active Tally field. For the party-line label it shows the label and description, and the Global Latch Disable field.

Telephone IFB Application Auto-Setup

This auto-setup for a telephone port corresponds to the Self-Service Dial-In Mode described in the Configuration section of the Interfaces - TEL-12 chapter of this Operation manual. The principal difference from the Telephone Application Auto-Setup described above is that in this case the telephone port is accessed directly instead of through a party-line. The following apply to the Telephone IFB port label:

- Port is set as a global IFB destination.
- Port is set to Prevent Stations From Calling Out.
- Port is set for global latch disable.
- Telephone Off-Hook Tally for the port label is enabled.
- In-Use Tally for the port label is enabled.

The screen shows each of these including the Global IFB field, the Prevent Stations From Calling Out field, the Global Latch Disable field, the Off-Hook Tally field, and the In-Use Tally field.

IFB Out / Pgm In Application Auto-Setup

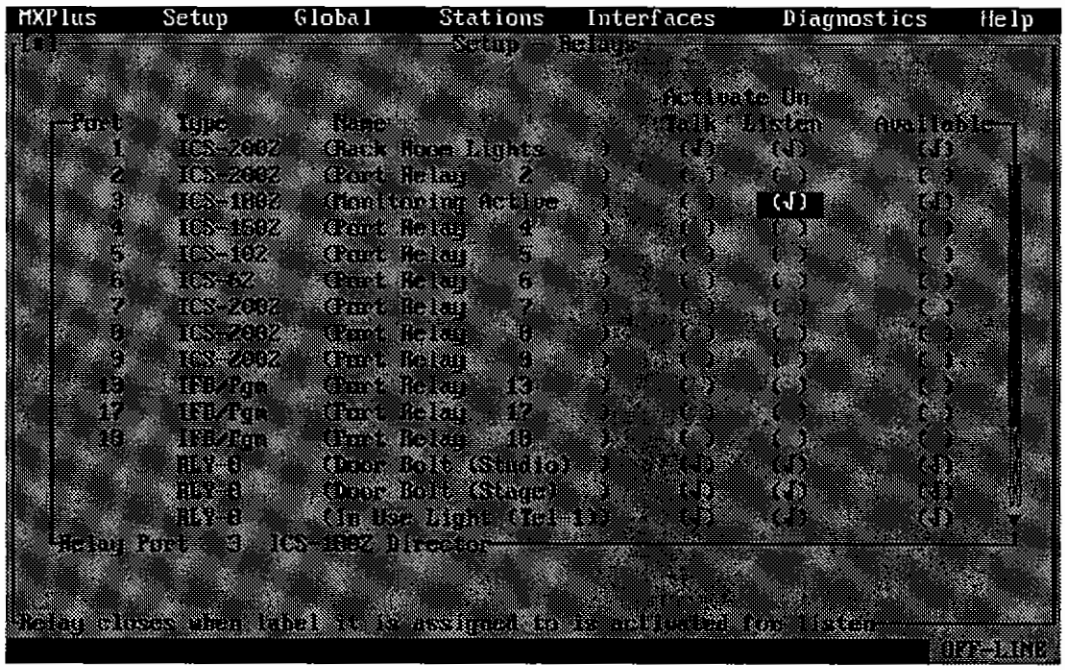
This auto-setup for an IFB Input and Program Output includes the following settings for the port:

- Port is set as a global IFB destination.
- Port is set for global latch disable.
- In-Use Tally for the port label is enabled.

The screen shows each of these including the Global IFB field, the Global Latch Disable field, and the In-Use Tally field.

Relays (SETUP menu)

This screen allows you to assign each relay a 20 character name, and determine whether it is activated by a talk or listen (or either) to the label(s) it is assigned to. You can also set availability for each relay.



In the system shown in the screen above, the relay in the Director's ICS-1802 station on port 3 is used to control an indicator light that lights at that station whenever that station is being monitored. The director prefers this to hearing a beep at the station every time someone listens to him. To set this up, that relay is named appropriately, is set to activate on listen only, and has its Available field checked. Then, from the Global - Controls screen, it will be assigned to activate with the label DIR (Director). Monitoring tones at his station are turned off from the Station - Local Setup screen.

Definitions (SETUP menu - RELAYS)

There is one independent relay in each intercom station in the system, and one in each FOR-22 interface port in the system. (The relay in each FOR-22 interface port is available for assignment unless that port is assigned the port function Telephone or Two-Way Radio. This is because the Matrix Plus II System uses the FOR-22 relays internally for those port functions). There are 8 independent relays for each RLY-8 Programmable Relay Control Interface installed in the system.

Using the Screen (SETUP menu - RELAYS)

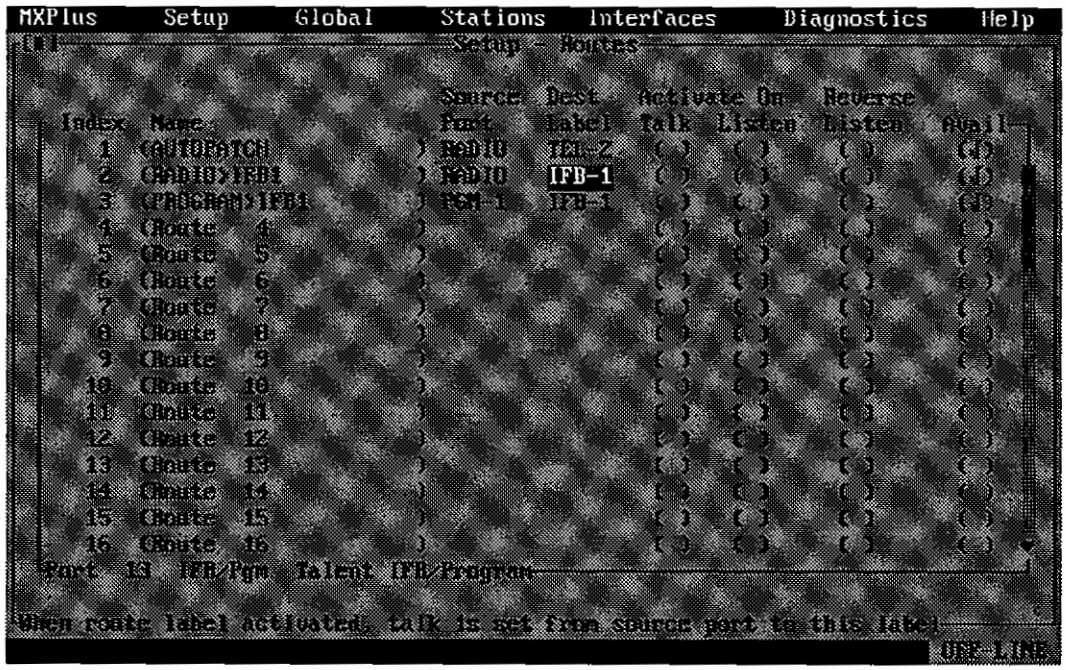
After you enter the relay's name, pressing ENTER in the name field places a check in both the Activate on Talk field and the Available field, and moves you down to the next relay name field.

When you are in the name field, the LEFT and RIGHT arrow keys are used for cursor movement within the field. To move to a field to the right (without performing the functions provided by pressing the ENTER key), press TAB.

Once you have set up the relay and made it available using this screen, you can assign it for activation by a label from the Global - Controls screen. The same information that appears in the info line of this screen when a specific relay is highlighted will appear in the info line of the popup selection box used in the Controls screen.

Routes (SETUP menu)

This screen allows you to define the source port and destination label for each route, and to set availability for the route. You also determine whether the route will be activated when the label it is assigned to is activated for talk and/or listen. You can choose to reverse the direction of the route when the route is activated by a listen.



The screen above shows two routes made available for use. Activating the first will enable a talk path from the two-way radio port RADIO to the four wire interface IFB1. This route is then set to activate with the label EXIFB from the Global - Controls screen. This is designed to allow the Director to dynamically patch a reporter calling in on the radio to the talent on the air.

Definitions (SETUP menu - ROUTES)

A "route" is an assignable control consisting of a 20-character name, a source port and destination label. When the route is activated, it causes a talk to be set from the source port to the destination label.

The route can be activated by activating either a talk and/or a listen to the label the route is assigned to. Activating the route by either a talk or a listen has the same effect: it causes a talk to be set from the source port to the destination label. However, if you check the Reverse Listen field, activating the route by a listen activates a listen from the source to the destination.

The source can be any of the ports in the system, and the destination can be any label in the system, with the following two exceptions:

1 The destination cannot be a control label.

2 The source can be a party-line IF AND ONLY IF the destination is a link label whose destination is a remote party-line. (This exception applies only to systems that included the System Linking option). If your intent is to link a local party-line to a remote party-line, you must set the route destination BEFORE setting the route source, as described in the Linking Party-Lines section of the Global - Links screen description.

Using the Screen (SETUP menu - ROUTES)

After you enter the route's name, press ENTER while in the name field to place a check mark in both the Available and Activate On Talk fields, and move you to the source port field.

Once you have set up the route and made it available using this screen, you can assign it for activation by a label from the Global - Controls screen. When a route is highlighted in the popup selection box in the Controls screen, the source and destination of the route appear in the info line of the popup.

Route Name

The name you assign to the route here is used only when you are assigning the route to a label from the Global - Controls screen. When you are in the name field, the LEFT and RIGHT arrow keys are used for cursor movement within the field. To move to a field to the right (without performing the function provided by pressing the ENTER key), press TAB.

Activate On Talk

When this field is checked, the route will activate whenever anyone sets a talk to the label the route is assigned to.

Activate On Listen

When this field is checked, the route will activate whenever anyone sets a listen to the label the route is assigned to. Note that unless the Reverse Listen field is checked, activating the route by a listen has exactly the same effect as activating it by a talk. That is, the audio path set is a talk from the route's source to its destination.

Reverse Listen

This field is only significant if the Activate On Listen field is checked; otherwise this field is ignored. When both this field and the Activate on Listen field are checked, the route will activate whenever anyone sets a listen to the label the route is assigned to. However, the audio path set is a listen from route source to route destination.

System (SETUP menu)

This screen allows you to set the operation of several global system functions.

This screen shows IFB defined not only to interrupt other audio paths to the IFB destination, but also to disable all other audio paths from the source location. This allows private cueing to IFB destinations. The talk and listen paths have also been set to restore after a station or system power down.

IFB Interrupts Other Talks From Source Station (SETUP menu - SYSTEM)

By default, this field is not checked. In that case, when you activate an IFB path from your station (the IFB source) to a destination port, any talk paths that you currently have set on your station are still active, allowing them to hear what you are saying to your IFB destination. When this field is checked, all other talk paths from your station are interrupted (turned off) for the duration of your IFB talks.

ISO Interrupts All Other Listens (SETUP menu - SYSTEM)

By default, this field is not checked. In that case, when you activate an ISO path between your station (the ISO source) and a destination port, any listen paths that are activated from your station are still active, allowing you to hear them during your ISO conversation. When this field is checked, all listen paths activated from your station are interrupted (turned off) for the duration of your ISO conversation.

Enable Multiple Sources for Assignment Panels (SETUP menu - SYSTEM)

By default, this field is not checked. In that case, Assignment Panels ("APs") will only allow one program source at a time to be routed to a destination. If this field is checked, the AP will allow you to assign any or all of the available sources to the selected destination. For further information on AP operation, see the Assignment Panels section of the ICS-2002 chapter of this Operation manual.

Restore Talk Paths (SETUP menu - SYSTEM)

By default, this field is not checked. In that case, if mains AC power is interrupted to the frame, any talk paths set in the system are shut off, and are not restored when power is restored. If this field is checked, the frame controller will automatically restore any paths that were set before the interruption. This is possible because the CPU-100 Frame Controller card maintains the status of all talk and listen paths in its battery backed memory.

This function also applies to talk paths to and from individual ports that have paths interrupted as a result of having their matrix card in the frame reset or temporarily removed or after a power down.

Restore Listen Paths (SETUP menu - SYSTEM)

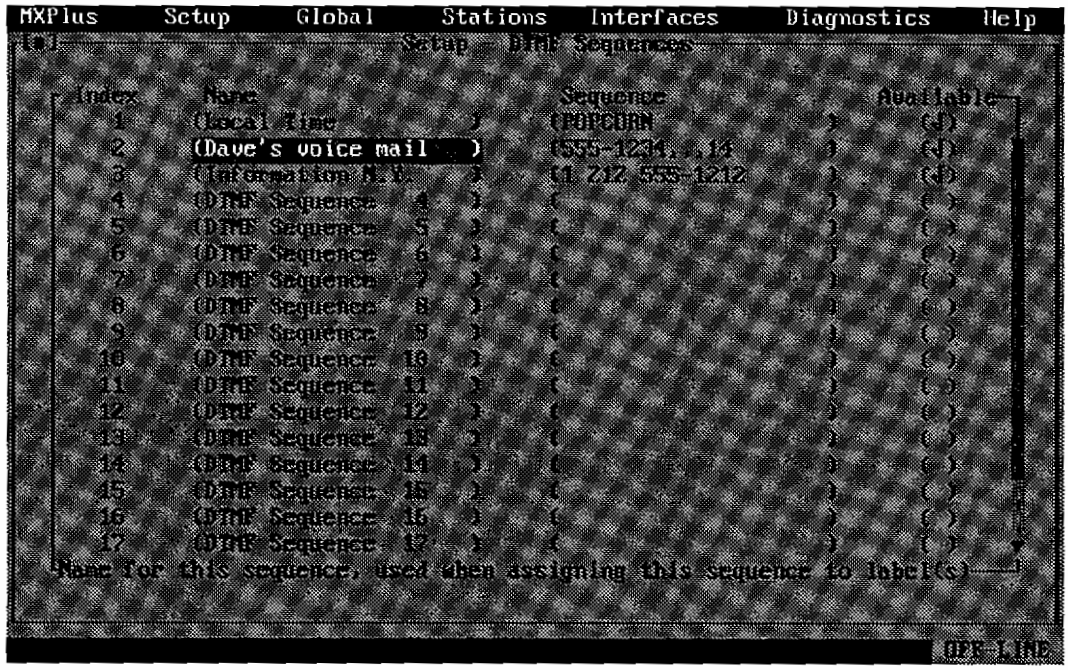
This effect of this field is identical to the Restore Talk Paths field above except that it affects listen paths instead of talk paths.

Assign old stations (SETUP menu - SYSTEM)

By default, this field is not checked. In this case, the only intercom station port functions that are available in the popup list of port functions in the Setup - Frame screen are the Matrix Plus II System intercom stations. When this field is checked, stations from the Matrix Plus (I) System are also included in the list. This is for the benefit of users who are upgrading from an older Matrix Plus system. These stations are the ICS-2000, ICS-1500, ICS-1000, ICS-100, and ICS-60.

DTMF Sequences (SETUP menu)

The MTX-100 matrix card with the DTMF-1 option installed has the ability to generate DTMF tones at its output. This screen allows you to define the name and the sequence of DTMF tones (touch-tone telephone beeps) that make up each DTMF sequence, and to set availability for the sequence.



This screen shows three DTMF sequences made available for use. These are typically assigned to labels such that pressing a talk key to that label activates the audio path and generates the tone sequence at the output port. This "speed dial" is useful for frequently called phone numbers or control applications that recognize DTMF tones. In the sequence Dave's Voice Mail, a pause of 3 seconds is added after dialing to allow the destination to answer, and the DTMF sequence 14 then directs the destination's phone system to accesses Dave's voice mail box. DTMF sequences are assigned to labels in the Global - Controls screen.

Definitions (SETUP menu - DTMF SEQUENCES)

A DTMF sequence is an assignable control consisting of a 20-character name and a sequence of up to 20 DTMF tones. When the sequence is activated, it causes the string of tones to be sent to the destination of the label that the sequence is assigned to. The actual tones are generated within the MTX-100 port. The MTX-100's ability to generate DTMF tones is provided by the DTMF-1 DTMF Inward / Outward Control Option for the MTX-100. Without this option installed in the card, tones cannot be sent.

The Matrix Plus II System is intelligent about the timing of sending the tone sequence. For example, if the sequence is assigned to a telephone port via a party-line label named LINE1, pressing a key with the LINE1 label will first pick up the telephone line and wait for the dial tone, then dial the tone sequence.

Allowable Sequence Characters (SETUP menu - DTMF SEQUENCES)

The sequence field can contain the numbers 0 - 9, and the pound ("#") and star ("*") characters. These characters are interpreted as representing their respective DTMF tones. In addition, you can enter additional upper case alphabet letters, which are interpreted as their corresponding digits as on a telephone touch tone keypad. For example the letters A, B, and C each generate a DTMF tone for digit 1, and POPCORN would dial 767-2676. Only upper case letters are recognized as touch tone digits, so lowercase letters typed in the field are automatically converted to uppercase.

You can add a delay of one second at any time in the sequence by adding a comma (",") between digits. You can create delays of multiples of one second by using more than one comma in a row.

Other characters such as punctuation can be added for readability, but they are ignored for the purpose of generating tone sequences. For example, the parentheses and hyphen are ignored in the following phone number: (510) 555-1212.

Using the Screen (SETUP menu - DTMF SEQUENCES)

After you enter the DTMF sequence's name, pressing ENTER in the name field moves you to the sequence field. After you enter the sequence, pressing ENTER places a check mark in the Available field, and moves you to the next sequence name down.

When you are in the name field, the LEFT and RIGHT arrow keys are used for cursor movement within the field. To move to a field to the right (without performing the function provided by pressing the ENTER key), press TAB.

Once you have set up the sequence and made it available using this screen, you can assign it for activation by a label from the Global - Controls screen. When a DTMF sequence is highlighted in the popup selection screen in the Controls screen, the digits of the DTMF sequence assigned to the sequence appear in the info line of the popup.

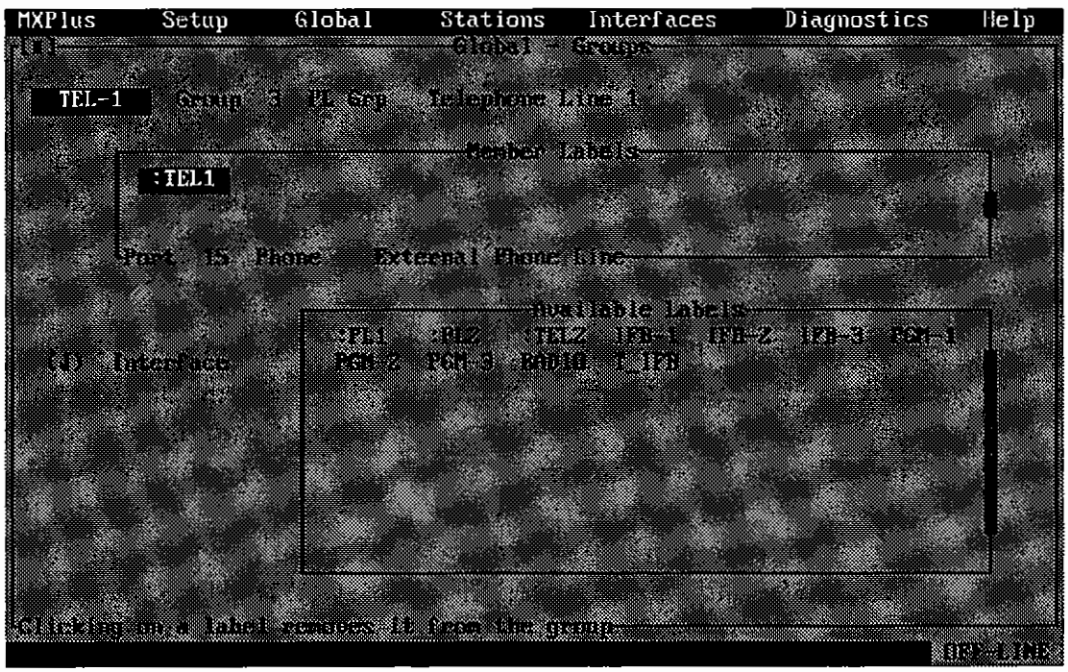
Global Menu

The Global menu includes the following functions and screens, each of which is discussed in detail below.

- Groups
- Controls
- Links
- Passwords
- Advanced Functions

Groups (GLOBAL menu)

The groups screen allows you to add member ports to fixed groups, and to "preset" interfaces to party-lines.



This screen shows the port label :TEL1 preset to the internal party-line label TEL-1. The label TEL-1 will be assigned to station keys while the port label :TEL1 will be hidden. This allows multiple stations to access the phone party-line, and hear each other as well as the person on the other end of the telephone line. External Clear-Com party-lines are typically configured in the same way, and are always accessed via their associated party-line label.

Definitions (GLOBAL menu - GROUPS)

A "fixed group" is a list of port labels represented by a single fixed group label. The fixed group label can be assigned to one or more selector keys on one or more stations. That selector key then simultaneously accesses all members of that fixed group.

A "party-line" (in this context) consists simply of a party-line label. When assigned to selector keys on various stations in the system, that label allows anyone in the system who activates a talk (or listen or both) to that label to talk to anyone else who has the matching listen label activated on their station at the same time.

Devices connected to the matrix via interfaces (such as two-way radios) require "preset" (permanent) assignment to party-lines. This is because they do not have selector keys that would allow them momentary access to party-lines, as do Matrix Plus II System intercom stations.

You can assign the talk and listen connections between each interface and the party-line independently. In most cases where an interface is preset to a party-line, both its talk and listen connections are assigned to the party-line. Independent assignments of talk and listen connections between interfaces and party-lines are most often used when the interface's talk and listen connections are being used for different purposes.

For example, the listen and talk connections of a 4-wire interface may be used separately to send audio to an external IFB system and bring external audio program into the matrix. In that case, you might want the external audio program to be fed into a party-line, but you would not want there to be any connection to the IFB audio. In that case you would preset only the listen connection to the party-line for that device. You choose to preset the listen connection because the connections are viewed from the perspective of the party-line. Therefore, to send program into the matrix, a listen path must be activated.

Using the Screen (GLOBAL menu - GROUPS)

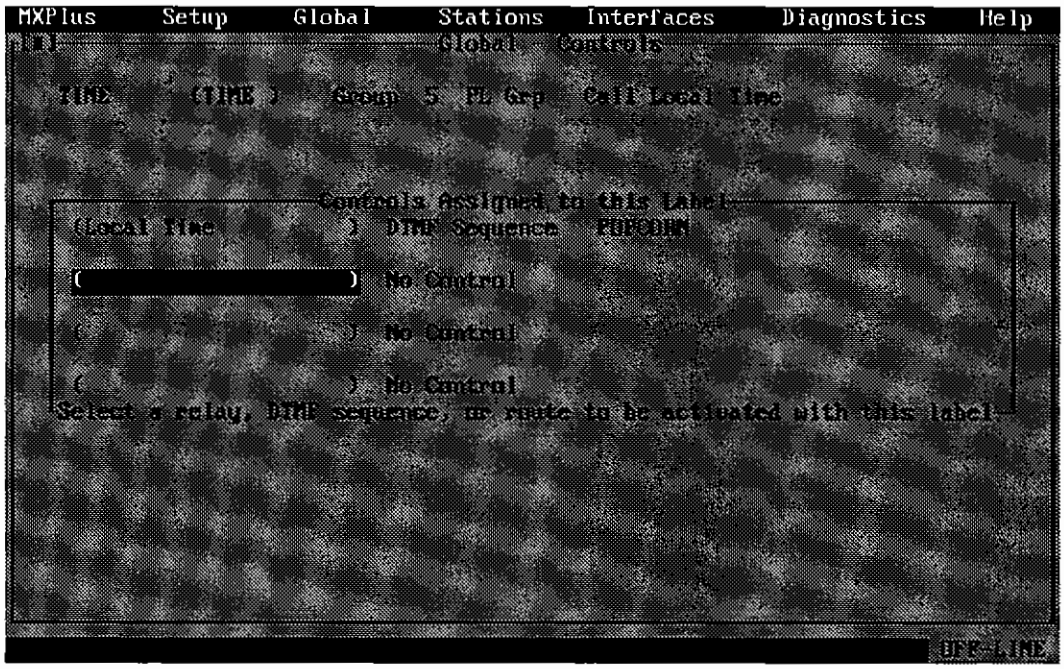
Select the fixed group or party-line that you want to assign members to by selecting a label from the label popup box (selected by pressing ENTER or clicking in the label field in the upper left hand corner of the screen). The Member Labels box shows any port labels that are members of the group (or preset members of the party-line). The Available Labels box shows all other labels in the system that are available for membership in that group.

To add a label to the group, click on the label in the Available Labels box. MXPLUS2 will remove the label from the Available Labels box and add it to the Member Labels box, then resort the labels in both boxes alphabetically. To remove a label from a group, click on that label in the Member Labels box. The label will be removed from the Members box and transferred back to the Available Labels box.

For fixed groups, the Available Labels box shows talk labels only, because both the talk and listen labels are always assigned to the group. For party-lines, the Available Labels box shows both the talk and listen labels for each port that has separate talk and listen labels. This allows separate assignment of talk and listen labels to the party-line.

Controls (GLOBAL menu)

This screen allows you to assign controls to labels. Controls include relays, DTMF sequences, and routes. Each label can have up to four controls assigned to it.



In the screen above, the label TIME has the DTMF sequence named Local Time assigned to it. TIME is a party-line with a telephone preset to it. Activating a talk to TIME will seize the phone line and dial the number to find out what time it is.

Definitions (GLOBAL menu - CONTROLS)

Assigning a control to a label results in that control being activated when a talk or listen is activated to the label. (Relays allow you to specify whether to activate on talk or listen or both). Before you can use this screen to assign a control to a label, you need to assign a name to the control and make it available. To do this use the associated setup screen for the control (Setup - Relays, Setup - DTMF Sequences, or Setup - Routes).

Using The Screen (GLOBAL menu - CONTROLS)

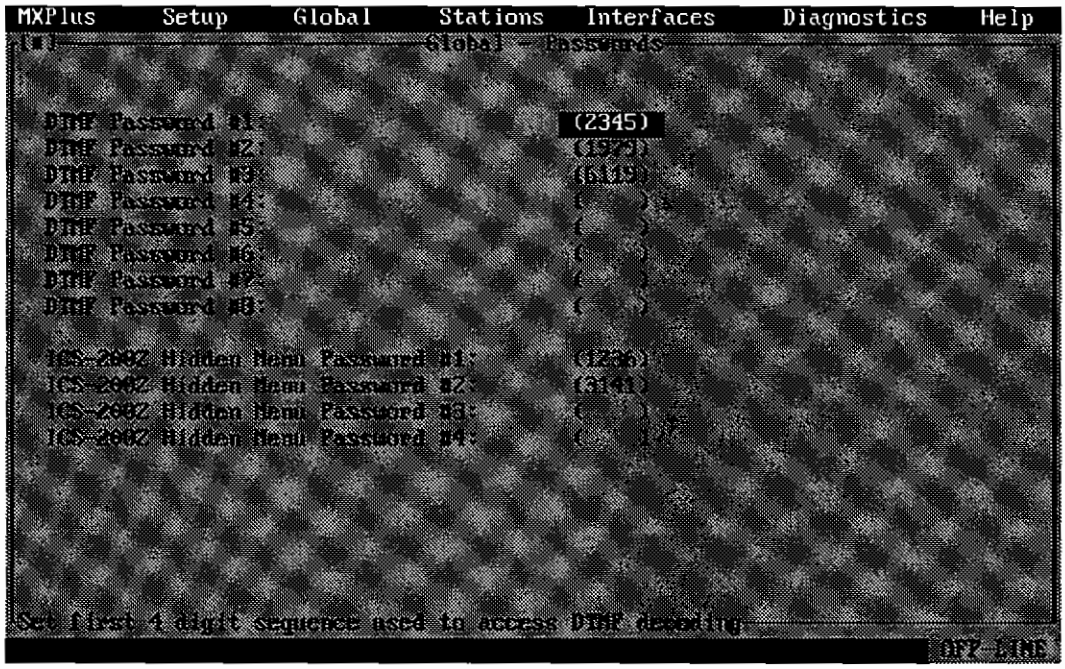
Select the label you want to assign controls to. To do this, press ENTER (or click in) the label field in the upper left hand corner of the screen, then select a label from the popup label selection box.

The Controls Assigned To This Label box shows the assignments of each of the four control assignment fields for that label. To the right of each control name is a summary of the function of that control. Each of the four fields are equivalent to each other, however assignments to these fields are always made starting in the uppermost field and working downward. MXPLUS2 enforces this procedure by only letting you enter the next available control assignment field.

To add an assignment or change an existing assignment in one of the fields, click on the desired field and select one of the available controls from the popup control selection box. Controls that are already assigned to the current label are not displayed in the popup selection box. If the control you want is not listed in the popup, check the setup screen for that control to be sure that it has a check mark in its Available check field.

Passwords (GLOBAL menu)

This function allows you to set the passwords that are global within the Matrix Plus II System. These include the four available passwords required to access the hidden menus in ICS-2002 intercom stations, and the eight available DTMF passwords required to gain access to the Matrix Plus II System from a remote location using DTMF Inward Access.



Each of the DTMF passwords 2345, 1979, or 6119 can be used to gain access to any DTMF decoding port that has that password enabled. Either of the passwords 1236 or 3141 can be entered to gain access to the System Programming menus on any ICS-2002 display stations in the system. Enabling DTMF passwords is done from the Interface - DTMF Parameters screen.

Definitions (GLOBAL menu - PASSWORDS)

There are four ICS-2002 Hidden Menu passwords. If you do not assign a value to any of them, no password is required to access the hidden menus on any ICS-2002 in the system. If you assign a value to one of them, then that is the unique password that must be entered to gain access to hidden menus on every ICS-2002 in the system. If you assign values to more than one of the passwords, any of the values will gain access to the menus.

There are eight DTMF passwords. Assigning a value to one of these makes it available for recognition by every "MTX-100 with DTMF" port in the Matrix Plus II System. An MTX-100 With DTMF port is a port provided by an MTX-100

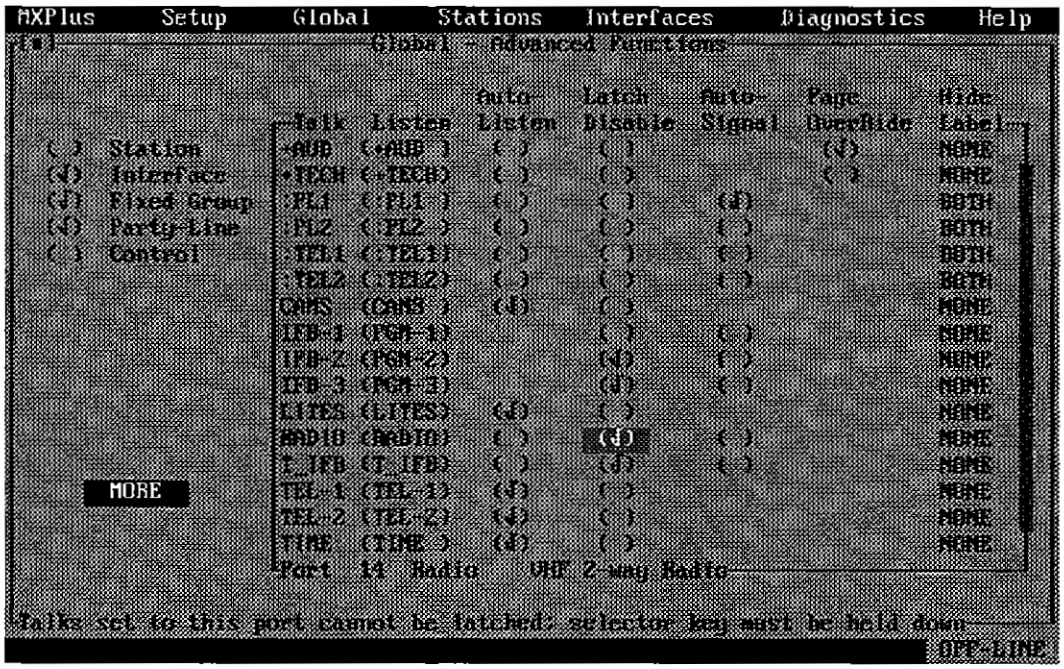
Crosspoint card that is equipped with the DTMF-1 INWARD / OUTWARD Control Option. The local configuration of each MTX-100 With DTMF port includes setting that port to recognize any or all of these DTMF passwords. Any MTX-100 With DTMF port that is configured to recognize one or more of these DTMF passwords will allow access to the system if the caller correctly enters any one of the recognized passwords.

Using The Screen (GLOBAL menu - PASSWORDS)

Passwords can contain only numbers (no alphabetic or punctuation characters). Passwords must contain exactly four digits. MXPLUS2 will not let you leave a password field containing fewer that four characters, and will only let you enter numeric values. To confirm (save) a newly entered password, you must press ENTER from within that password field. If you leave the field without pressing ENTER, any modifications are ignored.

Advanced Functions (GLOBAL menu)

This screen allows you to set a number of global parameters used to customize the system to meet your specialized needs. These include auto-listen, latch disable, auto-signal (automatic call signaling), page override, label hiding, ISO, IFB, priorities, and tally indication.



In the configuration above, the interface RADIO has been configured for global latch disable. This prevents users from latching a talk to the 2-way radio and possibly overheating its transmitter. Page Override is set for the fixed group "+AUD" to guarantee that a call to that group will be heard at each station in the group even if the station has its volume control turned down. The labels beginning with colons ":" and asterisks "*" are hidden to prevent anyone from assigning them to any station keys.

Definitions (GLOBAL menu - ADVANCED FUNCTIONS)

These global (as opposed to "local") parameters affect the way stations and interfaces in the Matrix Plus II System interact with each other. For example, a station's priority is a global parameter, but its selector key assignment is a local parameter. Not every one of these functions is applicable to every type of label in the system Only the applicable check fields appear in the column for each function.

Using The Screen (GLOBAL menu - ADVANCED FUNCTIONS)

Each available label in the system is shown in the box (when the check mark corresponding to the label's type is checked at the left of the screen). The opening screen shows field columns for the first five advanced functions. To access the columns for the remaining functions, click on the MORE button located below the label type check fields at the left of the screen.

Auto-Listens (GLOBAL menu - ADVANCED FUNCTIONS)

This function allows you to configure a label for "auto-listen". When a talk is activated to a destination that is configured for auto-listen, a listen path is also automatically activated for the duration of the call. In this way, the source receives audio from the destination without the destination having to specifically activate a talk back to the source.

Latch Disable (GLOBAL menu - ADVANCED FUNCTIONS)

This function allows you to prevent a latched talk to any label. When a label that has been configured as "latch disabled" is assigned to a selector key, the key can only access the label for as long as the operator physically presses the key. If a port is set for latch disable and that port's label is included in a Fixed Group or Party-line, it will not automatically cause the entire Fixed Group or Party-line to be latch disabled.

Auto-Signal (GLOBAL menu - ADVANCED FUNCTIONS)

Auto-Signal (Automatic Call Signaling) allows you to configure a station or interface for automatic call signaling. Any station or interface that activates a talk path to a destination configured for auto-call signaling will send a call signal to the station or interface for the duration of the talk.

If a port set for auto-call signals joins (or is preset to) a party-line, no call signal is sent to the port when the party-line is talked to.

Auto-call signals are most commonly used with external devices such as other types of intercom stations (not from the Matrix Plus II System) that require a control signal to activate them. The call signal can be used for this purpose.

Auto-call is automatically enabled for Telephone and Two-Way Radio interfaces, so no check field appears in the list for these ports.

Page Override (GLOBAL menu - ADVANCED FUNCTIONS)

Setting "page override" for a fixed group forces the intercom stations in that group to allow a talk to that group to override the setting of the Intercom volume control on the destination stations. A talk to a page override group will be heard on each station's speaker, even if the Intercom volume control is turned down on the station, and even if the speaker is turned off.

Individual stations can be configured to be excepted from this override by unchecking the Page Override field from the Station - Local Setup for that station. Also, the volume level of the page can be set for each individual station from the Page Volume field of the Station - Local Setup screen for that station.

Hide Label (GLOBAL menu - ADVANCED FUNCTIONS)

This function allows you to prevent any label from being assigned to any selector keys. This is achieved by "hiding" the label: removing it from the label selection boxes in the Station - Key Assignments screen, and from the key assignments screens in the Station system Programming menus of all ICS-2002 Display Stations. Talk and listen assignments of each label can be hidden individually by selecting one of NONE, TALK, LISTEN, or BOTH from the popup selection box.

Hiding a label is in force from the time it is done onward, and does not cancel pre-existing assignments of the hidden labels. However, if a pre-existing assignment is removed, it cannot then be reassigned.

ISO (GLOBAL menu - ADVANCED FUNCTIONS)

This function allows you to configure a station or interface as a "global ISO destination". Any station that activates a talk to a global ISO destination creates a private, two-way talk path between that station and the destination. All existing talk paths set from the source are interrupted. All existing talk and listen paths to and from the ISO destination are interrupted, except for other ISO talk paths. If more than one station at a time activates a talk to the global ISO destination, both sources can talk and listen to the destination. When the source terminates the call, their audio paths return to their previous states. When all ISO paths to the destination are deactivated, the destination's audio paths return to their previous states. If you prefer that ISO talks also interrupt listens at the source, check the ISO Interrupts All Other Listens field in the Setup - System screen.

IFB (GLOBAL menu - ADVANCED FUNCTIONS)

This function allows you to configure a station or interface as a "global IFB destination". Any station that activates a talk to a global IFB destination creates a private, one-way talk path to that station or interface. All existing talk and listen paths set to the IFB station or interface are interrupted, except for other IFB talk paths. If more than one station at a time activates a talk to the global IFB destination, both sources can be heard by the destination. When the source terminates the call, their audio paths return to their previous states. When all IFB talks to the destination are deactivated, the destination's audio path return to their previous states. If you prefer that IFB talks also interrupt talks at the source, check the IFB Interrupts All Other Talks From Source Station field in the Setup - System screen.

Priority (GLOBAL menu - ADVANCED FUNCTIONS)

Use this function to change the "priority" of any station or interface in the system. Higher priority calls interrupt lower priority calls. Ten priority levels are available: zero is the lowest, nine is the highest. The default priority is one. Both ISO and IFB calls interrupt priorities of every level.

Priorities are not followed within a party-line. A station can always join a party-line, regardless of the priorities of other stations connected to the party-line.

NOTE: Priorities must be very carefully planned out. It is possible to create situations in which necessary communication paths will be blocked by paths incorrectly set to higher priority.

In-Use Tally (GLOBAL menu - ADVANCED FUNCTIONS)

When this field is checked for a label, the LED above any selector key that this talk label is assigned to will double-flash once per second when that label is in use by any station or interface. When you enable this tally for an interface label that also has Off-Hook Tally enabled, this tally will only flash when the interface is off-hook.

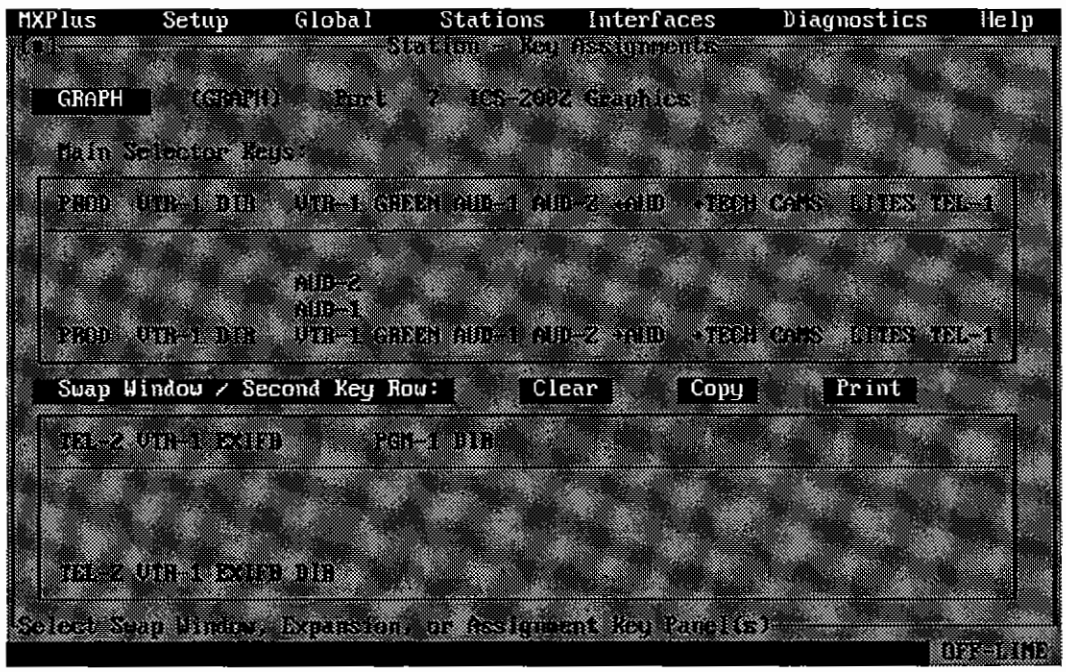
Stations Menu

The Stations menu includes the following screens, each of which is discussed in detail below.

- Key Assignments
- Local Setup
- Advanced Functions

Key Assignments (STATIONS menu)

The Key Assignments screen allows you to assign (or reassign) labels to selector keys on intercom stations, including keys on expansion key panels attached to each station. You can also print out a set of selector key designation strips for the station.



In the screen above, keys have been assigned to the station GRAPH. The swap window shows the station's second set of key assignments. Note that multiple labels may be assigned to each talk key, and that not every key needs to be assigned both talk and listen labels.

Definitions (STATIONS menu - KEY ASSIGNMENT)

Any selector key can be assigned up to four talk labels and one listen label. Selector keys on expansion key panels can be assigned one talk label and one listen label (there are exceptions mentioned below).

Using The Screen (STATIONS menu - KEY ASSIGNMENT)

To change the selected station, click in the label field in the upper left of the screen and select a new station from the popup label selection box.

The top part of the screen displays the main key window, which represents the layout of the front panel selector keys of the intercom station selected.

The lower part of the screen contains the swap window, which can be set to show any additional groups of keys available on the selected station. To set the contents of the swap window, select from the menu of options produced by clicking on the Swap Window button. The text displayed in the Swap Window button changes to reflect the current contents of the swap window.

For an ICS-2002, the swap window initially displays the station's swap window (WINDOW II) keys (accessed by the station's "Swap" button). For an ICS-1502, the swap window initially displays the second row of selector keys on the front panel. For stations with expansion keys installed, the swap window box will also display these keys in groups of ten keys.

To assign a label to a given selector key, highlight the label position associated with the desired key and press ENTER. Select the desired label from the label popup box. The labels that are displayed include all available labels that have not been globally or locally hidden. When you assign a label to a previously unassigned selector key, the key's listen label will automatically default to the same label that you assign to its talk label.

To move all talk/listen label assignments of the selector key below the highlight (the "current" selector key) one selector key position to the right, use the <Insert> key or the INS button in the label popup. The talk and listen label positions for the current key will then be available for assignment. This moves the talk/listen label assignments of all selector keys to the right of the current key one position to the right. The rightmost selector key's labels are "pushed off the end", but the last label pushed off will be saved for as long as you are in the current assign keys screen. This makes it possible to completely reverse the last insert by using the <Delete> key or DEL button as described below.

The <Delete> key (or DEL button in the label popup) removes the highlighted label from its current assignment, creating an empty location for a new label. If the highlight is located above a selector key that has no labels assigned to it, pressing the <Delete> key will move all selector key assignments to the right of the current key over one position to the left. This fills in the current key's label area with the label set of the selector key that was to its immediate right. The <Delete> key can be used to reverse the effect of an insert. If an insert was

previously performed, the rightmost selector key will be assigned the labels that were "pushed off the end" by the insert.

The Clear button allows you to clear all key assignments in either the main or swap window. To do this, click the button and select Main Window or Swap Window from the popup. To highlight this button from the keyboard, first get to the Swap Window button and then press the RIGHT arrow key.

The Copy button allows you to copy all key assignments from the current station to the destination station of your choice. This function copies all key assignments including swap window keys and expansion panel keys. If the destination station does not have some of these keys, it will ignore the other assignments. However, the assignments are still stored, which can be useful for example if an ICS-62 having only 6 selector keys station is removed and replaced with a spare ICS-2002 station having 12 keys, there will be key assignments for the remaining keys. To highlight this button from the keyboard, first get to the Swap Window button and then press the RIGHT arrow key twice. The copy function will not copy a station label to its own station.

The Print button allows you to print out a set of selector key designation strips for the current station. These strips include the names of the listen label and first talk label for each key on the station, including expansion key panel keys. (The "first" key is the one closest to the selector key in the key assignment window). The strips are printed on a single page, with a header stating the name and description of the current station and configuration. The header also includes the configuration file path and the date the print was made. Each strip is preceded by text stating which group of keys it corresponds to. The strips print as white letters on a black background, with the black area sized precisely to fit in the strip holders on the stations. For stations that have 12 selector keys across, the strip is too wide to fit on the page so it is printed in two halves. Display stations do not require designation strips for their main and swap keys, but may require strips for any expansion keys present.

Designation strips can be printed out on either a PostScript or HP LaserJet Series II compatible printer. To set the printer type and destination printer port, use the Label Printer fields in the MXPlus - PC Setup screen. Clear-Com recommends using a 40 to 50 pound paper stock for printing label strips. This results in a sturdy strip that is still thin enough to feed correctly in the printer, and slide easily under the strip holder's protective plastic strip. The exact amount of time it takes to print each strip depends on the speed of your computer system, but it will probably take about half a minute per strip.

Assigning Labels to Expansion Panels

Separate talk and listen labels can be assigned to each expansion panel selector key if there are thirty or fewer expansion keys on the station. If there are forty expansion keys on the station, then only the first twenty are separately assignable. If there are fifty keys, the first ten are separately assignable. If there are sixty, all talk and listen labels for each expansion key must be identical. The screen is smart about this and will not let you assign split labels anywhere that they are not assignable.

Assigning Labels to Assignment Panels

Optional AP-22 Assignment Panels ("APs") allow the station user to conveniently assign program feeds to destinations, equivalent to setting forced crosspoints. This mode is referred to as "IFB Assignment" ("IFB") mode. The AP can also function as a simple expansion panel with electronic labels, but with pushbuttons instead of lever switches. This mode is referred to as "Communication" ("COM") mode. Switching between modes is done by the user at runtime by pressing a button on the AP.

A full description of the operation of APs is presented in the Assignment Panels section in the Stations - ICS-2002 chapter of this Operation manual. The present discussion is limited to the mechanics of assigning labels to the buttons, and assumes that you have read that section and understand how APs operate.

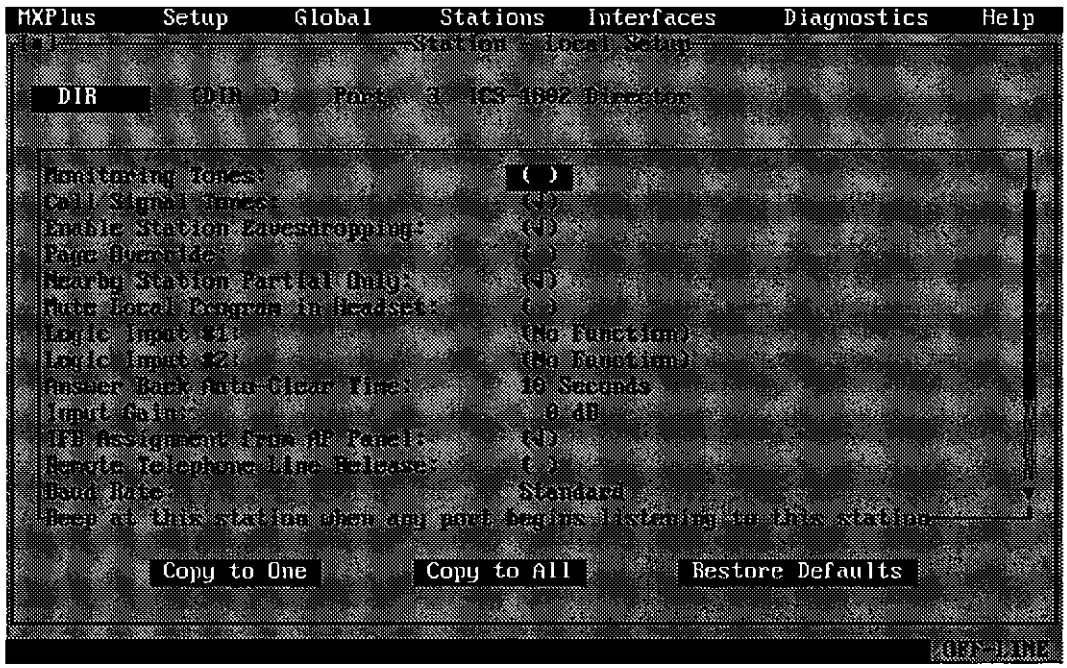
To assign a source to a button, click in that button's "Source" (listen label) area, and pick a station or interface label from the popup. To assign a destination to a button, click in that button's "Destination" (talk label) area, and pick a station or interface label from the popup. Only a source or a destination can be assigned to a button, but not both.

The label popup does not prevent you from selecting other types of labels, for example groups and party-lines. This is because in COM mode, any type of label is valid on a button. However in IFB mode, only station and interface labels are assignable as sources and destinations (other types are ignored).

The rightmost button position of the last AP on each station is reserved for use as the Mode toggle/display, and does not appear on the key assignment screen. However, if the station's IFB Assignment From AP Panel field has been turned off (from the Stations - Local Configuration screen) the AP will always remain in COM mode and that last position will be available for assignment.

Local Setup (STATIONS menu)

Local Setup allows you to tailor each intercom station to the needs and preferences of its operator. In the case of the ICS-2002 station, you can also set some limitations on the operator's ability to reconfigure this and other stations in the system. This section describes all of the possibilities, but not every station includes every one. For example an ICS-62 station does not have parameters relating to the LCD screen since it has no such screen.



The screen above shows the local setup of the station DIR. Monitoring tones have been disabled so that the station does not beep each time anyone listens to it. The monitoring signal function has been replaced by lighting an indicator as described in the example for the Setup - Relays screen. Page Override has been disabled, so that the Director is not interrupted by group pages.

Using The Screen (STATIONS menu - LOCAL SETUP)

To select a station to configure, click on the label name in the upper left hand corner and select a station from the label popup. The box shows the local functions that apply to that station, and provides a modifiable field for each. In addition, the screen provides a Copy to One button, a Copy To All button, and a Restore Defaults button, each of which are described below.

Copy Buttons (STATIONS menu - LOCAL SETUP)

The Copy To One button at the bottom of the screen allows you to copy these setup parameters to a given station.

The Copy To All button allows you to copy these parameters to all stations.

The Restore Defaults button allows you to restore this station to the initial default values. All station local parameters for that port are set to their defaults, including any that are not used by the type of station currently attached to the port.

If the destination of a copy does not support a given parameter, the destination station ignores the parameter. If the destination station supports more parameters than are represented for the source station, whatever default or previously existing parameter assignments that exist for (but are ignored by) the source station are copied. For this reason it is recommend that the source of a copy be a full-featured station, or at least one that was reset to defaults before being configured.

Monitoring Tones (STATIONS menu - LOCAL SETUP)

By default this field is checked, enabling the tone that you hear at the station when another station sets a listen to this station. Removing the check mark disables this tone.

Call Signal Tones (STATIONS menu - LOCAL SETUP)

By default this field is checked, allowing incoming call signal tones to sound at this station. Removing the check mark disables all incoming call signal tones at this station.

Enable Station Eavesdropping (STATIONS menu - LOCAL SETUP)

By default this field is not checked, which prevents any other station from listening to your station unless your station has its microphone turned on AND has a talk set to some other (any other) station in the Matrix Plus II System. When you check this field, other stations can monitor your station as long as your microphone is turned on, even if you have no talks activated.

Page Override (STATIONS menu - LOCAL SETUP)

By default this box is checked, enabling page override for this station. Removing the check disables page override for this station. For a discussion of page override see the Global - Advanced - Page Override section of this chapter.

Nearby Station Partial Only (STATIONS menu - LOCAL SETUP)

By default this field is checked, allowing talks to nearby stations that have headsets plugged into them.

The Nearby Station column in the Stations - Advanced screen allows you to designate any other station as "nearby" to this station, for example one that is located only a few feet from this station in a mobile sound truck. Talk paths from a station to its nearby stations are disabled, preventing possible feedback. However, if the nearby station has a headset plugged into it, feedback could not occur, so you would not want to disable talks to it. This is referred to as "nearby station partial only".

Mute Local Program In Headset (STATIONS menu - LOCAL SETUP)

By default this box is not checked. This allows both the intercom audio and the program audio to be present in the audio feed to the headset for this station. If this field is checked, it removes the program audio from the headset. This function was primarily intended for use when installing binaural headphones on a station. That procedure is described in the Installation Manual.

Logic Input #1 and #2 (STATIONS menu - LOCAL SETUP)

Each of these two external hardware signal inputs to the station can control one of several functions when activated by an external signal, for example a foot switch. See the ICS-2002 section of the Installation manual for details of the kind of signal required to activate these inputs. The popup menu selects which function each will control. The following functions are available:

- **Mic On/Off (Toggle)** Activating this function toggles the station's microphone on and off, equivalent to the front panel "Mic ON/OFF" switch.
- **Mute Mic Output To Frame** Activating this function turns off the audio from the station to the frame. It does not turn off the local "Hot Mic" output (described in the OPT-100 Auxiliary Audio I/O Option section of the Installation manual). For an example of the use of this option, see the example in the ICS-2002 section of the Installation manual showing connection of an external IFB feed to the station.
- **Mic Off (Momentary)** Selecting this function momentarily turns OFF the station's microphone.
- **Answerback Talk/Clear** This function performs the same functions as the station's Answer Back key. It functions as follows. Holding down the switch activates a talk to that label. If there is a

label in the station's Answer Back Stack, pressing and releasing the switch quickly clears the label.

- **Studio Announce** Selecting this option sends the output of the station's selected microphone (panel or headset) to the station's Studio Announce ("SA") audio output, and activates the SA relay. The microphone output is not sent to the frame. The SA output and relay are only present if the station has the OPT-100 Auxiliary Audio I/O Option installed. (The SA options are described in the OPT-100 section of the ICS-2002 chapter of the Installation manual).
- **Speaker Off** Activating this function turns off the station's speaker, disabling all audible output from the station.
- **Activate Talks (Push To Talk)** When this function is in the active state, the station behaves normally. When this function is deactivated, it disables activation of all talk labels, implementing a "Push To Talk" function for the station. Any controls (relays, etc.) assigned to the labels are activated or deactivated along with the label they are assigned to. The LED indicators associated with the active labels behave normally regardless of the state of this input. Both momentary and latched talks are controlled by this input.
- **Activate Talk Switch #1** Activating this function is equivalent to pressing the first (leftmost) talk selector key on the station. This is a momentary activation only.
- **Activate Talk Switch #2** Activating this function is equivalent to pressing the second talk selector key on the station. This is a momentary activation only.
- **Activate Listen Labels Button** Activating this function is equivalent to pressing the Listen Labels button on an ICS-52/92 station. All of the modes of the Listen Labels button are supported. See the ICS-52/92 section of the Operations manual for details.

Answer Back Auto-Clear Time (STATIONS menu - LOCAL SETUP)

This is the number of seconds that an unanswered or completed call will remain in the station's answer back stack before being automatically removed from the stack. The time is variable in increments of 10 seconds up to one minute, or can be disabled. The default is 10 seconds.

Baud Rate (STATIONS menu - LOCAL SETUP)

For stations that use the 3-Pair or 4-Pair wiring system to connect them to the frame, this field sets the baud rate for the RS-422 digital data communications between station and frame. The default is "Standard", the highest available speed (19.2K baud). The slower "Long Line" option can be used if required.

Input Gain (STATIONS menu - LOCAL SETUP)

This field allows you to set the gain of the signal sent to the matrix frame by this station. The gain is set at the input to the matrix card. It can be set in 3 dB increments between -30 dB and +12 dB. The default is 0dB.

The input gain setting parameter is designed to provide flexibility in setting individual port gains. Clear-Com does not recommend attempting to increase overall signal level in the system by increasing the input gain settings for all ports. Doing so will result in decreased headroom and increased crosstalk, and may result in feedback or other undesirable side effects.

Speaker Mute Attenuation (STATIONS menu - LOCAL SETUP)

This field sets the amount of attenuation that will be applied to the speaker audio when any selector key is pressed on this station. The default setting is -6dB. The maximum mute is -15dB. To turn the speaker off entirely whenever a key is pressed, select Speaker Off.

Page Override Volume (STATIONS menu - LOCAL SETUP)

This field sets the volume of a page override to this station. For further information on Page Override, see the discussion of Page Override in the Global - Advanced screen in this chapter.

Station Connected Tally (STATIONS menu - LOCAL SETUP)

Checking this field causes the LED above any key that has this label assigned to it to flash once per second whenever this station is correctly connected to the matrix frame. The primary use of this tally is the case in which this station is connected to the frame via a long-line link (for example an ISDN or T1 link) that might only be active at certain times. By default this tally is disabled, and the box is not checked.

IFB Assignment From AP Panel (STATIONS menu - LOCAL SETUP)

This field enables access to the IFB Assignment mode of any optional AP-22 Assignment Panels connected to the station. By default, access is enabled and the box is checked. For further information on AP panels, see the Assignment Panels section of the Stations - ICS-2002 chapter of this Operation manual.

Remote Telephone Line Release (STATIONS menu - LOCAL SETUP)

This field enables access to the Remote Telephone Line Release function. This function allows the station user to hang up any telephone interface anywhere in the system. By default, access is disabled and the field is not checked. For

further details see the entry for Remote Telephone Line Release in the Stations - ICS-2002 chapter of this Operation manual.

Station System Programming (STATIONS menu - LOCAL SETUP)

This field enables access to the Station System Programming (SSP) menus on an ICS-2002 station. By default, this box is checked. For a complete description of the SSP functions, see the ICS-2002 - Menus section of this Operation Manual.

Assign Keys Mode Access (STATIONS menu - LOCAL SETUP)

Remove the check in this field to prevent any operator of an ICS-2002 station from modifying the selector key assignments at that station. By default, this box is checked.

Select Station Mode Access (STATIONS menu - LOCAL SETUP)

Remove the check in this field to prevent any operator of an ICS-2002 station from talking to, listening to, or sending a call signal to any station whose label is not explicitly assigned to a selector key on the station. By default, this box is checked.

Dial Phone Mode Access (STATIONS menu - LOCAL SETUP)

Remove the check in this column to prevent any operator of an ICS-2002 station from generating "touch-tone" digits from the station using the dial phone mode. By default, this box is checked.

Swap Window Access (STATIONS menu - LOCAL SETUP)

Remove the check in this column to prevent any operator of an ICS-2002 station from accessing the second set of selector key assignments ("swap" window) of that station. By default, this box is checked.

Hidden Menu Access (STATIONS menu - LOCAL SETUP)

Remove the check in this column to prevent any operator of an ICS-2002 station from accessing the "hidden" Configuration, Maintenance, and System Programming menus in the station. By default, this box is checked.

System Information Menu Access (STATIONS menu - LOCAL SETUP)

Remove the check in this column to prevent any operator of an ICS-2002 station from accessing the System Information menu in the station. By default, this box is checked.

Panel Light Auto-Shutoff Time (STATIONS menu - LOCAL SETUP)

This field determines the amount of time that the ICS-2002's back-lit LCD display will stay lit without any activity on the station's front panel. Turning the display off when it is not in use increases its lifespan. When the backlight is off, it will automatically turn on when any front panel control is operated, or any talks or listens are activated to the station from elsewhere in the system. The default is 5 minutes.

Simultaneous Main and Swap (STATIONS menu - LOCAL SETUP)

By default this field is not checked, causing any audio paths set in the main key window to be interrupted whenever the swap window is selected, and vice versa. If you check this field, both sets of audio paths will be active at all times. This has the advantage that paths are not interrupted when you switch windows, but has the disadvantage that it is less obvious (from looking at the station's LEDs) which talk and listen paths are active.

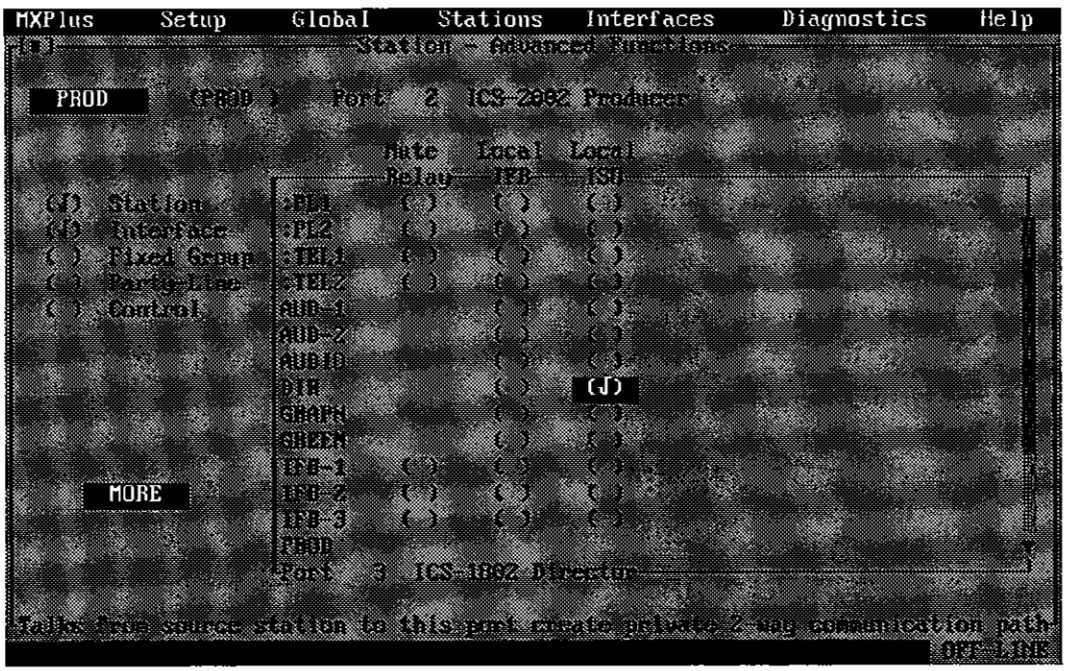
Hot Key Function (STATIONS menu - LOCAL SETUP)

This field produces a popup menu from which you can set the effect of the "UPIC" hot key on the keypad of an ICS-2002 station. The effect of the key is to place you immediately in one of the following ICS-2002 screens with a single keystroke. The available destination screens are as follows. For further information on the function of any of these screens, see the Menus section of the ICS-2002 chapter of this Operation Manual.

- System Programming Menu
- Change Party Line Assignments
- Change Party Line Ass'ts for Cameras
- Change Fixed Group Assignments
- Change Forced Crosspoints
- Change Forced Crosspoints for PGM Sources
- Program Station Key Assignments
- View Party Lines
- View Monitoring List
- Change Input Level Gains

Advanced Functions (STATIONS menu)

This screen allows you to set functions that affect this station's interaction with specific other labels in the system. These functions include local latch disables, nearby stations, forced crosspoints, local IFB and ISO destinations, local label hiding, and mute relay activation.



In this screen, the Producer's station PROD names the Director's station DIR to be a local ISO destination. This allows the Producer to initiate a private conversation with the Director whenever required.

Using The Screen (STATIONS menu - ADVANCED FUNCTIONS)

To select a station to configure, click on the label name in the upper left hand corner and select a station from the label popup. Any of the available labels in the system can appear in the box, with modifiable fields for each of the functions applicable to that label. Because it is useful for diagnostic purposes to set a forced crosspoint from a station to itself, even the currently selected station is included in the list, but with only that one modifiable field.

To acces the Mute Relay, Local IFB and Local ISO columns, click on the MORE button at the lower left of the screen.

Latch Disables (STATIONS menu - ADVANCED FUNCTIONS)

Checking this field prevents a latched talk to this label from this station only. That is, when this label is assigned to a selector key on this station, the key can only access the label for as long as the operator physically presses the key.

Nearby Stations (STATIONS menu - ADVANCED FUNCTIONS)

If one or more intercom stations are situated within hearing distance of the selected (source) station, designate the other stations as "nearby" to the source. Then, the source station is prevented from closing a talk path to those stations if the source's panel microphone and the nearby station's speaker are active. This prevents acoustical feedback, which is inherent in side-by-side station installations.

The action of this function is affected by the Nearby Station Partial Only field in the local setup for the selected station. For further information see the description of that field in the Station - Local Setup section of this chapter.

Forced On Crosspoints (STATIONS menu - ADVANCED FUNCTIONS)

Check this field to set a forced crosspoint from the selected station to any or all other stations and interfaces in the system. Forced crosspoints from a station are audio paths between the station and a destination that are not associated with selector keys. Forced crosspoints are always connected, but can be interrupted by higher priority calls or IFB/ISO calls.

If station eavesdropping is enabled for this station, forced crosspoints set from this station will always be activated. If station eavesdropping is disabled for this station, the forced crosspoint will only be activated when the station has at least one talk path set. Station eavesdropping is set from the local setup screen for this station.

Forced crosspoint audio paths are considered to go from the listen label of the source port to the talk label of the destination port. This is because talks and listens are viewed from the perspective of the frame.

Forced crosspoints can also be conveniently set from any intercom station equipped with AP-22 Assignment Panels. For details see the Assignment Panels section of the Stations - ICS-2002 chapter of this Operation manual.

Forced Off Crosspoints (STATIONS menu - ADVANCED FUNCTIONS)

A "forced off crosspoint" between the selected station and a destination means that under no circumstances will an audio path be set from source to destination. This is primarily used as a safety feature, for example to prevent a program feed from one studio from being accidentally routed to a destination in another studio. This is particularly helpful in reducing the possibility of errors by users of AP-22 Assignment Panels.

Local IFB (STATIONS menu - ADVANCED FUNCTIONS)

This function allows you to configure a station or interface as a "local IFB destination" of this station. When this station activates a talk to one of its local IFB destinations it creates a private, one-way talk path to the destination. All existing talk and listen paths set to the destination are interrupted, except for other IFB talk paths. If more than one station at a time activates an IFB talk to the same destination, both sources can be heard by the destination. When the source terminates the call, their audio paths return to their previous states. When all IFB talks to the destination are deactivated, the destination's audio path return to their previous states. If you prefer that IFB talks also interrupt talks at the source, check the IFB Interrupts All Other Talks From Source Station field in the Setup - System screen.

Local ISO (STATIONS menu - ADVANCED FUNCTIONS)

This function allows you to configure a station or interface as a "local ISO destination" of this station. When this station activates a talk to any of its local ISO destination it creates a private, two-way talk path between this station and the destination. All existing talk paths set from the source are interrupted. All existing talk and listen paths to and from the ISO destination are interrupted, except for other ISO talk paths. If more than one station at a time activates an ISO path to the destination, both sources can talk and listen to the destination. When the source terminates the call, their audio paths return to their previous states. When all ISO paths to the destination are deactivated, the destination's audio paths return to their previous states. If you prefer that ISO talks also interrupt listens at the source, check the ISO Interrupts All Other Listens field in the Setup - System screen.

Hide Label (STATIONS menu - ADVANCED FUNCTIONS)

This function allows you to locally hide a specific label, preventing it from being assigned to a selector key on this intercom station. Talk and listen assignments of each label can be hidden individually by selecting one of NONE, TALK, LISTEN, or BOTH from the popup selection box.

Hidden labels are removed from the list of available labels that are displayed when assigning labels to selector keys on this station from within the configuration program or the ICS-2002 station. Hiding a label does not cancel pre-existing assignments of the hidden labels. However, if a pre-existing assignment of a hidden label is removed, it cannot be reassigned.

Mute Relay (STATIONS menu - ADVANCED FUNCTIONS)

This function allows you to determine which talk keys cause the station's Mute relay to activate. Talks to any label whose field in the Mute Relay column is checked will result in Mute relay activation.

Each Matrix Plus II Intercom Station has a Mute relay. The Mute relays is a general purpose relay with contacts brought out to a connector on the rear of the station. It is commonly used to mute a control room monitor speaker, but many other uses are possible, for example turning on a light or unlocking a door.

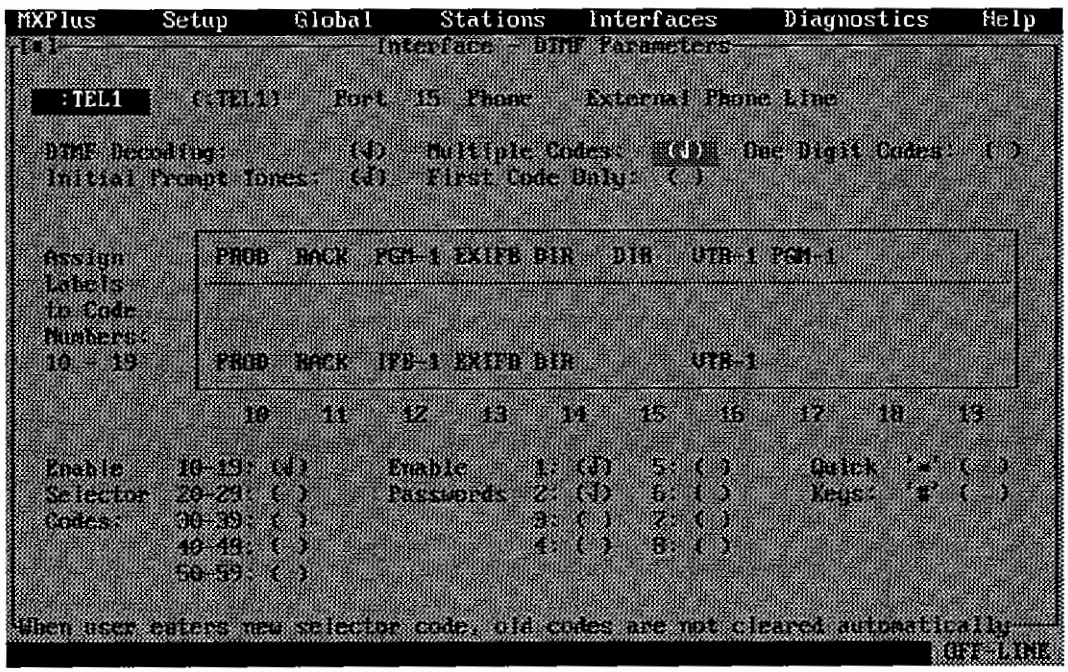
Interfaces Menu

The Interfaces menu includes the following screens, each of which is discussed in detail below.

- DTMF Parameters
- Local Setup
- Advanced Functions

DTMF Parameters (INTERFACES menu)

The DTMF Parameters screen allows you to set all of the parameters related to decoding of DTMF tones.



The screen above shows the interface port :TEL1 configured for DTMF inward access. When a caller calls in, he must enter either password number 1 or number 2 (as set from the Global - Passwords screen) to gain access to the system. The Allow Multiple Codes field is checked, allowing the caller to simultaneously set a listen to the on the air feed on PGM-1, and a talk to the Director. To do this the caller presses first 17 then 14.

Definitions (INTERFACES menu - DTMF PARAMETERS)

Each MTX-100 Crosspoint Card equipped with the DTMF-1 DTMF Inward / Outward Control Option provides two "DTMF ports" (ports capable of DTMF

tone encoding and decoding). DTMF decoding is the ability to decode "DTMF codes". DTMF tone encoding is the ability to create DTMF tones.

"DTMF tones" are the sounds produced by a touch-tone telephone when you press the buttons on its numeric keypad.

"DTMF codes" are combinations of DTMF tones that are pre-assigned with specific meanings when decoded by the DTMF port. DTMF decoding allows you to implement "direct inward access". In this section, for simplicity, we refer to DTMF tone encoding/decoding as "DTMF decoding"

"Selector codes" are the two-digit numerical codes that allow you to specify audio paths when accessing the Matrix Plus II System via DTMF inward access.

If the One Digit Codes field is checked, selector codes are limited to the ten single-digit codes 0 - 9.

"Control Codes" are additional codes that perform specific functions. These codes are:

- **00: Clear Last Entry** This code clears the paths established by your last selector code entry. The clear last entry command keeps track of all of your selector code entries, so entering "00" followed by "00" clears the paths activated by the last two selector codes you entered, and so on.
- **91: Send Call Signal** This code causes this port to send a call signal to the matrix as though received from an external device connected to this port.
- **92: Disable DTMF Decoding** This code turns off DTMF decoding. This can be helpful because certain program sources may contain DTMF tones that are not intended to be interpreted as selector codes, and can inadvertently reroute the audio path. For further information see the First Code Only field, described below.
- **99 or 099: Clear All** Either of these codes clears all currently active talk and listen paths.

"Prompt tones" are tone sequences that the MTX-100 sends to the user. The MTX-100 issues four distinct prompt tone sequences: Password Request, Access Granted, Ready, and Error. Each of these sequences, and other reference information, are presented in the Overview of DTMF Operation and Using DTMF Decoding sections of the MTX-100 section of this Operations manual.

Using The Screen (INTERFACES menu - DTMF PARAMETERS)

To change the selected station, click in the label field in the upper left of the screen and select a new DTMF interface port from the popup label selection box.

There are 50 DTMF selector codes available, arranged in 5 groups of 10 codes. To select a set of DTMF selector codes to assign labels to, click on the Assign Labels To Code Numbers button and select one of the groups of ten selector codes from the popup menu. The text of the button displays the currently selected group. The non-modifiable numbers below the DTMF selector code box display the specific selector code numbers for each column in the box.

If the One Digit Codes field is checked, only one group of selector codes (numbered 0 - 9) is available for assignment.

DTMF Decoding (INTERFACES menu - DTMF PARAMETERS)

Placing a check in this field enables DTMF tone encoding/decoding for this port. If the field is not checked, all DTMF tone encoding/decoding is disabled and the port behaves exactly as a non-DTMF port. Even it this field is not checked, all of the other fields in this screen can be set, allowing DTMF encoding/decoding to be left configured but only enabled as needed.

Initial Prompt Tones (INTERFACES menu - DTMF PARAMETERS)

When this field is not checked, DTMF decoding is enabled continuously. In this case, the DTMF port is continually ready to accept selector codes and control codes. No passwords are required to access the system.

When this field is checked, DTMF decoding is only enabled for as long as the port continuously receives a call signal from the interface's external device. If a password has been assigned to the port, the port will prompt for the password at the start of the received call signal. When access is granted to the system, it issues the Access Granted Prompt. At the end of the call signal, all talk and listen paths are deactivated automatically.

For example, this field is usually checked when the port is to be used for DTMF inward access using a TEL-12 Telephone Interface. The TEl-12 sends a call signal to the interface for the duration of an incoming call. The start of this call signal tells the DTMF port that a call has been initiated and that the port should prompt for a password (if one has been set). The end of the call signal tells the port to turn off any remaining paths set by the caller.

Multiple Codes (INTERFACES menu - DTMF PARAMETERS)

When this field is not checked, only one selector code can be active at a time. If you enter a second selector code, audio paths activated by the previous selector code will be deactivated automatically, and the new paths will be activated. For example if you send a code to turn on path 1, then send a second code to turn on path 2, path 1 is turned off before path 2 is turned on.

When this field is checked, any number of selector codes can be active at the same time. To deactivate a selector code, you must either enter the selector code number preceded by a zero, or enter a Clear Last or Clear All control code. For details see the MTX-100 section of this manual.

First Code Only (INTERFACES menu - DTMF PARAMETERS)

When this field is checked, DTMF tone detection is disabled after the first valid code is received. By default it is not checked. DTMF decoding can also be disabled at any time by entering the Disable DTMF Decoding control code, described in the Definitions section above. The following paragraphs explain why disabling DTMF tone detection can be useful.

During normal operation, DTMF tones present in the audio input to the port are decoded at all times. However, certain program sources may contain DTMF tones that are not intended to be interpreted as selector codes, and can inadvertently reroute the audio path. For example, telephone company commercials. On rare occasions, other audio signals contain sounds that fool the DTMF tone detection circuitry into detecting a false DTMF tone, for example certain voices or musical instruments.

These DTMF disabling features allow you to set up your program feed, then disable decoding to ensure that your paths are not accidentally rerouted. To re-enable tone decoding, you must hang up and call back again.

One Digit Codes (INTERFACES menu - DTMF PARAMETERS)

If this field is checked, selector codes are limited to the ten codes 0 - 9, plus the "quick keys" pound ("#") and star ("*"). This makes the codes faster to dial and easier to remember, however it introduces the following limitations:

1. There are only 10 codes available.
2. Control codes are not recognized.
3. The pound and star keys can only be assigned a single digit code.
4. The "0<selector code>" form used to turn off an individual path that has been established is not recognized. This means that if you have Multiple Codes enabled, there is no way to turn off a previously established path.

Selector Code Assignment Box (INTERFACES menu - DTMF PARAMETERS)

This box allows you to assign talk and/or listen labels to selector codes.

The screen displays a window similar to the talk/listen window of an ICS-102 intercom station. The window has ten positions horizontally, representing a group of ten of the fifty available selector codes. Each selector code can be assigned up to three talk labels and one listen label.

To assign a label to a given selector code, click on the label position associated with the desired code and select a label from the label popup selection box, just like assigning station keys. When you assign a label to a previously unassigned selector code, the selector code's listen label will automatically default to the same label that you assign as its talk label.

To move all talk/listen label assignments of the highlighted selector code (the "current" selector code) one selector code position to the right, press the INSert key on the keyboard or click the INS button in the popup. The talk and listen label positions for the current code will then be available for assignment. This moves the talk/listen label assignments of all selector codes to the right of the current code one position to the right. The rightmost selector code's labels are "pushed off the end", but the last label pushed off will be saved for as long as you are in the current assign selector codes screen. This makes it possible to completely reverse the last insert by using the DELete key as described below.

The DELete key removes the highlighted label from its current assignment, creating an empty location for a new label. If the highlight is located in a selector code that has no labels assigned to it, pressing the DELete key will move all selector code assignments to the right of the current selector code over one position to the left. This fills in the current code's label area with the label set of the selector code that was to its immediate right. The DELete key can be used

to reverse the effect of the last insert. If an insert was previously performed, the rightmost selector code position will be assigned the labels that were "pushed off the end" by the insert.

A selector code always activates both the talk and listen label(s) assigned to it. If you require separate listen and/or talk access to a destination, you must assign two separate selector codes, one to activate the talk, and another to activate the listen. To activate both the talk and listen simultaneously, you can either enter both selector codes (when in multiple selector code mode only) or assign a third selector code to be both talk and listen at once.

A summary of all selector codes assigned to a DTMF port is included in the Interface Local Setup report for each DTMF port. To create this report use the MXPLUS - Reports screen.

Enable Selector Codes (INTERFACES menu - DTMF PARAMETERS)

By default, each of these fields is checked, enabling decoding (recognition) of all fifty selector codes by this port. To disable decoding of any of the five groups of codes, remove the check from that field.

When the One Digit Codes field is checked, only the first group of selector code enables (0 - 9) is in effect.

Enable Passwords (INTERFACES menu - DTMF PARAMETERS)

By default, each of these fields is checked, enabling recognition of any of the 8 available passwords by this port. To disable recognition of any of the passwords, remove the check from the associated field. These passwords are 4-digit codes set from the Global - Passwords screen.

Passwords are only prompted for and checked if the Enable Initial Prompt Tones field is checked.

Quick Keys (INTERFACES menu - DTMF PARAMETERS)

These fields let you define the action of the Pound ("#") and Star ("*") keys on the touch-tone keypad. If you enter a 2-digit pair (corresponding to one of the valid selector codes or control codes) in the Pound or Star field, the DTMF port will translate the DTMF tone for Pound or Star into that 2-digit code. for example, if you want the Star key to clear all paths, you can enter 00 in the Star field.

If the One Digit Codes field is checked, the quick keys can only be assigned a single digit code, so control codes cannot be used.

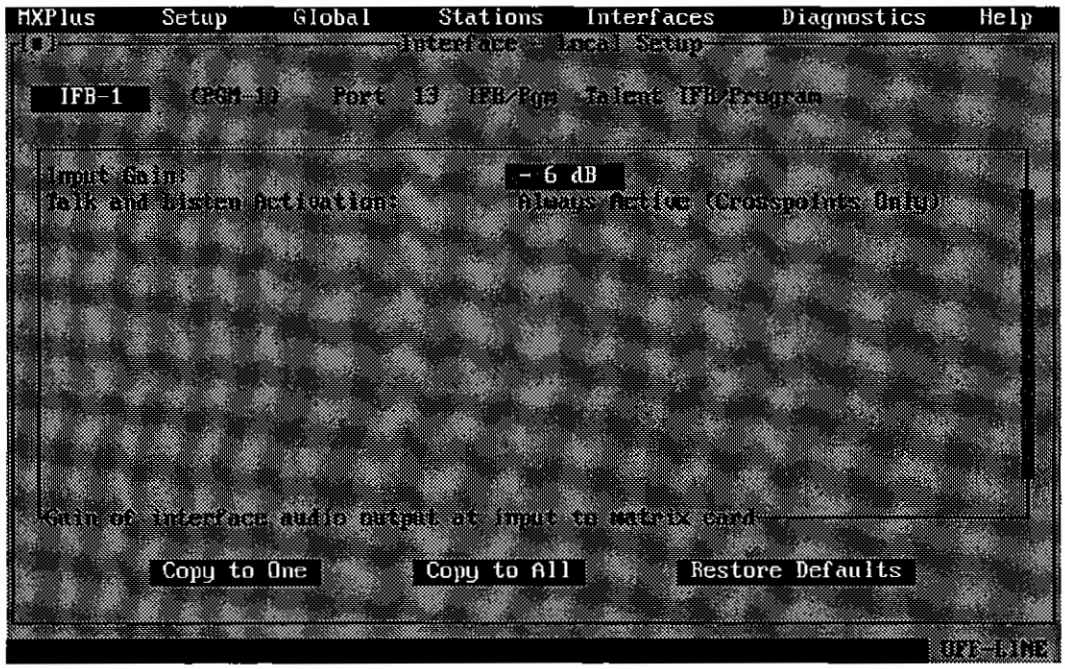
Configuring a Port for Direct Inward Access

To configure an MTX-100 port for direct inward access via a telephone line, attach a TEL-12 Telephone Interface to the port and assign it the port function Telephone from the Setup - Frames section. Set the TEL-12's Auto-Answer switch to On. This causes the TEL-12 to send a call signal to the MTX-100 port whenever it answers a telephone call. Put a check in the Enable Initial Prompt Tones field in this screen. Place a check mark in the Allow Multiple Codes field if desired.

Enable the desired groups of selector codes, and assign labels to these codes. Assign as many or as few passwords as required from the Global Passwords screen. Enable recognition of the passwords from this screen. If no passwords are enabled, the MTX-100 port immediately sends the "access granted" prompt followed by the "ready" prompt.

Local Setup (INTERFACES menu)

Local Setup allows you to set parameters that affect only that interface.



This screen shows the local setup for On The Air Feed PGM-1. The input gain has been set to -6dB to allow it to remain in the background at destination stations, even when the destination station's volume controls are turned up to normal listening levels for other ports.

Using The Screen (INTERFACES menu - LOCAL SETUP)

To select an interface to configure, click on the label name in the upper left hand corner and select an interface from the label popup. The box shows the local functions that apply to that interface, and provides a modifiable field for each. In addition, the screen provides a Copy to One button, a Copy To All button, and a Restore Defaults button, each of which are described below.

Copy Buttons (INTERFACES menu - LOCAL SETUP)

The Copy To One button at the bottom of the screen allows you to copy these setup parameters to a given station.

The Copy To All button allows you to copy these parameters to all interfaces.

The Restore Defaults button allows you to restore the local parameters for this interface to their initial default values.

Input Gain (INTERFACES menu - LOCAL SETUP)

This field allows you to set the gain of the signal sent to the matrix frame by this interface. The gain is set at the input to the matrix card. It can be set in 3 dB increments between -30 dB and +12 dB. The default is 0dB.

The input gain setting parameter is designed to provide flexibility in setting individual port gains. Clear-Com does not recommend attempting to increase overall signal level in the system by increasing the input gain settings for all ports. Doing so will result in decreased headroom and increased crosstalk, and may result in feedback or other undesirable side effects.

Preset Talk and Listen Activation (INTERFACES menu - LOCAL SETUP)

Preset talks and listens are set from this port's Interface - Advanced screen. They are similar to forced crosspoints except that they can be configured to activate only when a call signal is received at this port from an external device such as a radio or telephone. There are three possible options.

The default setting of this option, Always Active (Crosspoints Only), is the correct setting in almost all cases. However, there are certain circumstances in which you would use the other two. All three are described below.

- Always Active (Crosspoints Only) This setting causes any preset talk or listen paths from this interface to be active at all times. (An exception to this is when they are preset to a party-line that has no current listens activated to it. In that case the paths are only activated when listens or talks to the party-line are activated).

  When Always Active is set, an incoming call signal does not have any effect on the preset talk and listen paths. In addition, when the port receives a call signal from an external device, it does not generate any tallies (e.g. In-Use tally) in the system, and does not cause activation of any controls assigned to the interface port label. It does send a call signal to its preset call signal list members,

- Detection of External Device This setting causes the preset talk or listen paths to be activated when a "device detect" signal is received at the port from an external device. A device detect signal consists of a call signal that is active for more than one second.

  Device detect signals are sent by telephone interfaces. This setting allows a telephone to automatically activate a preset audio path whenever it auto-answers an incoming call.

- Push to Talk (Talks with Call Signal) This setting causes the port's preset talk paths to be activated when the port receives a call signal (of any duration) from an external device. In addition, the call signal initiates call signals to members of the port's preset call signal list,

tally indications (such as In-Use tally), and control activations (such as relays). Listen paths are activated as in Always Active mode.

Enable Telephone Off-Hook Tally (INTERFACES menu - LOCAL SETUP)

This option applies only to telephone interface ports, and is disabled by default. When this field is checked, the LED above any selector key with this telephone port assigned to it will flash once per second whenever the telephone interface is off-hook. The tally is active for either the telephone port label or a party-line label with this port preset to it.

Prevent Stations From Calling Out (INTERFACES menu - LOCAL SETUP)

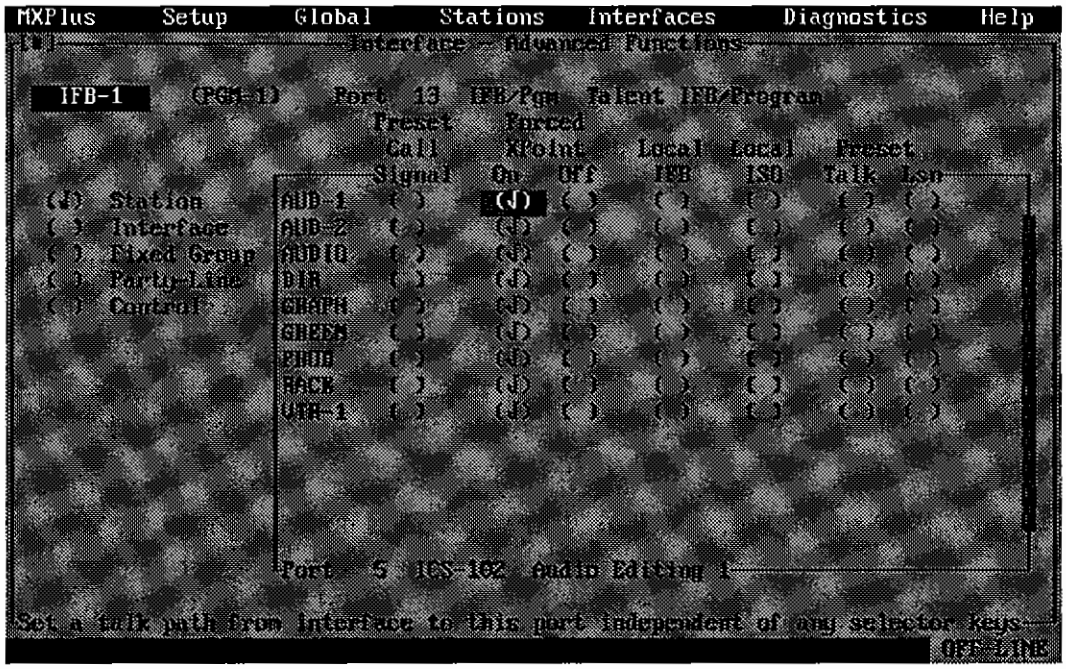
This option applies only to telephone interface ports, and is disabled by default. When this field is checked, all station users are prevented from initiating phone calls from this telephone interface.

Radio Receiver Active Tally (INTERFACES menu - LOCAL SETUP)

This option applies only to interface ports assigned the Two-Way Radio port function, and is disabled by default. When this field is checked, the LED above any selector key with this port assigned to it will flash once per second whenever the radio receiver is active. The tally is active for either the port label or a party-line label with this port preset to it.

Advanced Functions (INTERFACES menu)

This screen allows you to set functions that affect this interface's interaction with specific other labels in the system. These functions include preset call signals, forced crosspoints, local IFB and ISO destinations, and preset talk and listen paths.



The PGM-1 input has been forced to all the stations in the system, allowing a system wide program feed. To keep the PGM-1 feed in the background, we reduced its gain (from the Interface - Local Setup screen) to 6dB lower than the default gain for the other ports in the system.

Using The Screen (INTERFACES menu - ADVANCED FUNCTIONS)

To select an interface to configure, click on the label name in the upper left hand corner and select an interface from the label popup. Any of the available labels in the system can appear in the box, with modifiable fields for each of the functions applicable to that label. Because it is useful for diagnostic purposes to set a forced crosspoint from an interface to itself, even the currently selected interface is included in the list, but with only that one modifiable field.

Preset Call Signal (INTERFACES menu - ADVANCED FUNCTIONS)

Check this field for a given destination label to cause this interface to send a call signal to that destinations whenever the interface receives a call signal from

its external device. The talk or other activation will last for the duration of the incoming call signal.

Forced On Crosspoints (Interfaces menu - ADVANCED FUNCTIONS)

Check this field to set a forced crosspoint from the selected interface to any or all other stations and interfaces in the system. Forced crosspoints are audio paths between the interface and a destination that are always connected, but can be interrupted by higher priority calls or IFB/ISO calls.

Forced crosspoint audio paths are considered to go from the listen label of the source port to the talk label of the destination port. This is because talks and listens are viewed from the perspective of the frame.

Forced crosspoints can also be conveniently set from any intercom station equipped with AP-22 Assignment Panels. For details see the Assignment Panels section of the Stations - ICS-2002 chapter of this Operation manual.

Forced Off Crosspoints (STATIONS menu - ADVANCED FUNCTIONS)

A "forced off crosspoint" between the selected interface and a destination means that under no circumstances will an audio path be set from source to destination. This is primarily used as a safety feature, for example to prevent a program feed from one studio from being accidentally routed to a destination in another studio. This is particularly helpful in reducing the possibility of errors by users of AP-22 Assignment Panels.

Local IFB (INTERFACES menu - ADVANCED FUNCTIONS)

This function allows you to specify stations or interfaces as "local IFB destinations" of this interface. When this interface activates a talk to any of its local IFB destinations, it creates a private, one-way talk path to the destination. All existing talk paths set from this interface are interrupted. All existing talk and listen paths set to the destination are interrupted, except for other IFB talk paths. If more than one interface at a time activates an IFB talk to the destination, both stations can be heard by the destination. When this interface terminates the call, its audio paths return to their previous states. When all IFB talks to the destination are deactivated, the destination's audio paths return to their previous states.

The effect of calling a local IFB destination is in part controlled by the setting of the IFB interrupts other outgoing talks field in the Setup - System screen. For further information see the section on that screen in this chapter.

Local ISO (INTERFACES menu - ADVANCED FUNCTIONS)

This function allows you to specify stations or interfaces as "local ISO destinations" of this interface. When this interface activates a talk to any of its local ISO destinations, it creates a private, two-way communication path between this interface and the destination. All existing talk and listen paths set to and from both this interface and the destination will be interrupted, except for other ISO paths. If more than one source at a time activates an ISO path to the destination, both sources can be heard by the destination. When this interface terminates the call, its audio paths return to their previous states. When all ISO paths to the destination are deactivated, the destination's audio paths return to their previous states.

The effect of calling an ISO destination is in part controlled by the setting of the ISO Interrupts All Other Listens field in the Setup - System screen. For further information see the section on that screen in this chapter.

Preset Talk and Listen Activation (INTERFACES menu - LOCAL SETUP)

This function allows you to set preset talk and listen paths from this port to any other destination in the system. Preset talks and listens are similar to forced crosspoints except that they can be configured to activate only when a call signal is received at this port from an external device such as a radio or telephone. The Talk and Listen Activation field in the Interfaces - Local screen for this port determines whether a call signal is required to activate the preset talks and listens set from here. By default, these paths are active at all times. For further details, see the description of the Talk and Listen Activation field in the Interfaces - Local Setup section of this chapter.

Diagnostics Menu

The Diagnostics menu includes the following functions and screens, each of which is discussed in detail below.

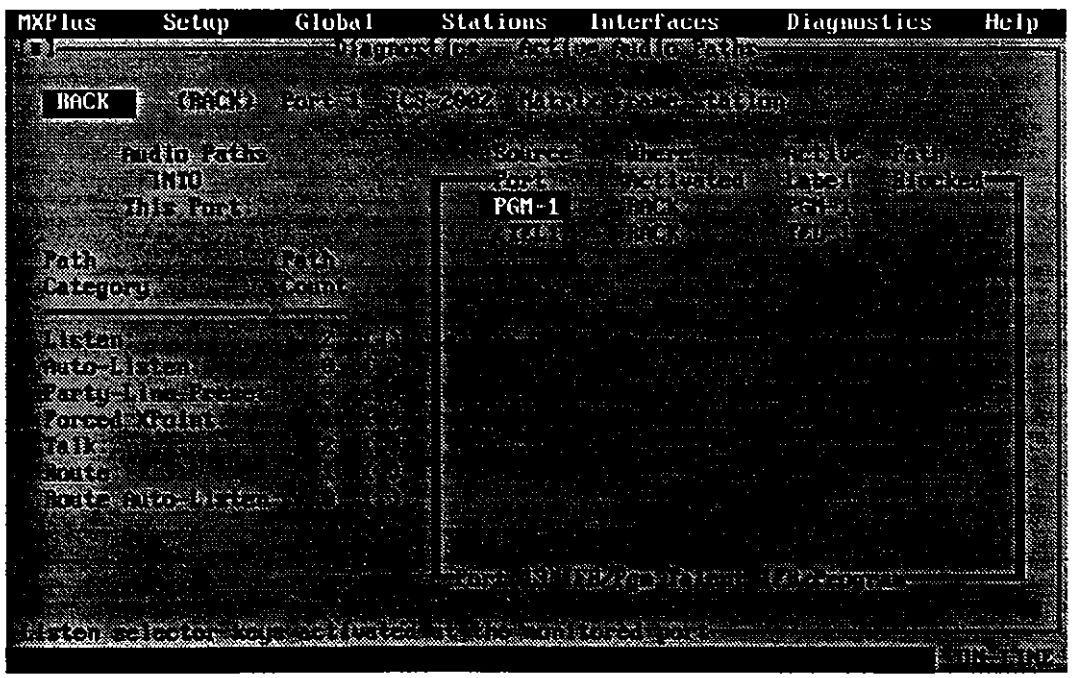
- Active Audio Paths
- Hardware Status

Active Audio Paths (DIAGNOSTICS menu)

The Active Audio Paths screen displays a list of all active labels that result in audio paths into the selected port. Alternatively, you can list all audio paths that are destinations of the selected port. (The lists also include paths that are requested, but do not result in audio paths being set because they do not have high enough priority. This case is discussed below). The selected port is referred to as the "monitored" port.

This screen is updated with the latest path change information from the frame every few seconds. For this reason, you must be on-line with a frame to use this screen. If you are not on-line, MXPLUS2 will display the screen, but no audio path information will be present.

You can also use this screen to clear (turn off) any audio path in the system, or to reset any station (which has the effect of clearing all paths resulting from settings at that station).



In the screen above, we are monitoring audio paths into the station RACK that are a result of listen labels activated by RACK's own selector keys. The Path Count field indicates that 2 paths of this category are currently set, and the relevant information for these two paths is displayed in the Path List. The first path listed is from port 13, IFB-1 (PGM-1). The second path listed is from port 15, :TEL1. This path is set as a result of RACK listening to party-line TEL-1. Each path in the list consists of a single crosspoint being set.

Definitions (DIAGNOSTICS menu - ACTIVE AUDIO PATHS)

In addition to telling you which paths are active, this screen also tells you how and where each path is activated. "How" the path is activated means "what action caused the path to be set". For example the path was set as the result of a forced crosspoint, or a talk selector key being pressed, or as a result of a route. In this screen the paths are listed by cause, so the cause is also referred to as the "path category". "Where" the path is activated means "which port was responsible for initiating the action that caused the path to be set". For example if someone at the DIR station presses a selector key with the label TAPE on it, and you are currently monitoring TAPE, the path was set as a result of an action at the DIR station. Some paths are set by the Matrix Plus II runtime system ("the system"), and are not considered to have been initiated by any particular port. For example a forced crosspoint is considered to be set by the system.

More than one path may be set as a result of a single label being activated. For example, if you activate a listen to a group, a listen will be set from each member of the group to the monitored station. In these cases, each path is given an individual entry in the list.

Using The Screen (DIAGNOSTICS menu - ACTIVE AUDIO PATHS)

Select the port to be monitored from the Port field in the upper left hand corner of the screen. Select whether you want to monitor audio paths into or out of the port by setting the Audio Paths field to "INTO" or "OUT OF".

Select which path category you want to monitor by selecting one of the Path Category check fields at the left of the screen. Only one of the category fields is active at once, ensuring that every path in the list is of the same category. The available path categories depend on whether you have the Audio Paths field set to INTO or OUT OF mode. The available path categories for each mode are described in the next section.

To the left of each check field is a Path Count field. These fields list the number of paths that are currently set for each path category. The Path Count fields are updated along with the path list.

When you highlight a label field with the cursor, the info line shows the description of that label. When you click on a label field, a popup allows you to clear that path (or, if the path is activated from a station, reset that station).

To set the number of seconds between updates from the frame, click on the Update Period field and select a time value (2, 5, or 10 seconds) or select Pause to suspend updates. The default value of 2 seconds works with most systems, however if your computer is not very fast and you have a lot of active paths, you might choose a slower speed.

To reset the station you are monitoring, click on the Reset button at the bottom of the screen. This button has no effect when you are monitoring an interface port.

Audio Path Categories (DIAGNOSTICS menu - ACTIVE AUDIO PATHS)

Paths INTO the port:

- **Listen** A listen selector key is activated at the monitored port
- **Auto-Listen** A talk selector key is activated at the monitored port. The destination label has been set for Auto-Listen
- **Party-Line Preset** The monitored port is preset to a party-line
- **Forced XPoint** A forced crosspoint set to the monitored port
- **Talk** Another port has activated a talk selector key that has a label assigned to it that is (or includes) the monitored port
- **Route** A port has activated a route. The route has a destination label that is (or includes) the monitored port
- **Route Auto-Listen** A port has activated a route. The route's source port is the monitored port. The route's destination label has been set for Auto-Listen

Paths OUT OF the port:

- **Talk** A talk selector key is activated at the monitored port
- **Party-Line Preset** The monitored port is preset to a party-line
- **Forced XPoint** A forced crosspoint set from the monitored port
- **Listen** Another port has activated a listen selector key that has a label assigned to it that is (or includes) the monitored port

- **Auto-Listen** Another port has activated a talk selector key that has a label assigned to it that is (or includes) the monitored port. That label has been set for Auto-Listen
- **Route** Another port has activated a route. The route's source port is the monitored port.
- **Route Auto-Listen** A port has activated a route. The route has a destination label that is (or includes) the monitored port. The route's destination label has been set for Auto-Listen

Audio Path Descriptions (DIAGNOSTICS menu - ACTIVE AUDIO PATHS)

The screen lists the active paths that belong to the current Audio Path Category. For each path there is a column for Source Port, Where Activated, Active Label, and Path Blocked. (The Source Port column changes to Destination Port when in Audio Paths OUT OF mode). When you highlight any label field, that label's description appears in the info line.

The Source (Destination) Port column shows the physical port that is the source (destination) of the path described by that line. The Where Activated column shows which port, if any, has activated the path. The Active Label column shows which label, if any, was activated to set the path.

The Path Blocked column is checked when the path is requested (by whatever cause) but not physically activated. The most common causes for this are IFB or ISO interruptions, and cases where a higher priority request is blocking a lower priority request. For example if there is a forced crosspoint sending a program feed to a port, but there is an active IFB to that port at that moment, the forced crosspoint will be requested but not set, because it is being blocked by the higher priority IFB path. Another possible cause of a path being blocked is a forced off crosspoint (set from the Stations (or Interfaces) - Advanced screen), which prevents that path from ever being set for any reason.

Clearing Paths (DIAGNOSTICS menu - ACTIVE AUDIO PATHS)

To clear a path, click on one of the label name fields in the path you want to clear. From the popup, select "Clear Path". To cancel, click outside the box or press the ESC key.

When you clear a path using this screen, the path is cleared by deactivating the label that resulted in the path being set. For example, say you determine from this screen that you have an unwanted path that is set as a result of a talk key being activated. The active label is a fixed group that has the monitored port as a member. If you clear that path from this screen, all talks resulting from the

activation of that fixed group label will be cleared, just as though whoever had pressed that key had released it.

Resetting Stations (DIAGNOSTICS menu - ACTIVE AUDIO PATHS)

If the path is activated from a station, you have the option of resetting that station. Resetting the station deactivates all selector keys at that station, allowing you to simultaneously clear all paths activated by that station.

This technique may not be effective if your system is set to Restore Talk Paths and/or Restore Listen Paths (from the Setup - System screen). This is because even though all paths activated at that station are cleared by the reset, all talk or listen paths that are set to be restored will be restored by the system when the station restarts.

To reset the station, click on one of the label name fields in the path you want to clear. Then from the popup, select "Reset Station". To cancel, click outside the box or press the ESC key.

After a station is reset, it takes several seconds for the station to restart. The exact amount of time depends on whether the station uses the 2-wire digital wiring system or the RS-422 2- or 3- pair wiring system. The digital stations take about 3 seconds, and the RS-422 stations running at the standard setting of 19.2K baud take about 4 seconds.

Hardware Status (DIAGNOSTICS menu)

When you enter the Hardware Status screen, MXPLUS2 runs a set of on-line consistency checks with the frame and then reports the results. If all hardware checks correctly, the Hardware Status field displays "OK". If there are any discrepancies in these tests, the Hardware Status field displays "Warnings" and displays the relevant information in the Warnings List.

This screen is updated with the latest hardware status information from the frame every few seconds. For this reason, you must be on-line with a frame to use this screen. If you are not on-line, MXPLUS2 will display the screen, but no hardware status information will be present. If you cannot get on-line, see the Configuration Program and CPU-100 sections of the Installation and Maintenance manuals for troubleshooting assistance.

The screen above shows a sampling of possible error conditions that we have intentionally caused for the purpose of demonstrating this screen. First, we unplugged the matrix card for ports 3 and 4 to simulate someone accidentally putting the card in the wrong slot and leaving those ports without a card. Second, we unplugged the power from station GRAPH. Third, we "accidentally" skipped a row of pins when we plugged the 16-pin header on the ribbon cable that connects the FOR-22 interface to the EIF backplane for port 13, IFB-1. Fourth, we removed the MTX-100 card that was in slot 5 (ports 9 and 10) and replaced it with an MTX-200 (which only supports stations).

Using the Screen (DIAGNOSTICS menu - HARDWARE STATUS)

When the Hardware Status field reads "OK", this means that each of the tests described in the Hardware OK Criteria section below have passed sucessfully. When the Hardware Status field reads "Warnings", the screen displays the discrepancies in the Warning List. Each entry in the Warning List includes the port number, the port label, the matrix card provided for the port, the interface connected to the port, and a warning description. The warning descriptions are presented in detail in the Hardware Warning Descriptions section below.

Highlighting the label in the Talk Label column causes the description of that label to appear in the info line.

To determine the port function assigned to any of the ports, recall that a port label description (as shown in the info line) always includes the port function in abbreviated form. For example a port assigned the "IFB Out / Pgm In" port function includes the phrase "IFB/Pgm".

Hardware OK Criteria (DIAGNOSTICS menu - HARDWARE STATUS)

When the Hardware Status field reads "OK", this means that each of the following tests have passed sucessfully:

- All ports that have port functions other than "None" have functional matrix cards installed
- All ports whose port function normally is associated with a certain kind of interface have that interface installed
- All ports assigned a station port function have a functional station connected to them
- All ports that have an interface installed have a matrix card installed that is compatible with that interface type
- All interface ports that have DTMF decoding enabled have matrix cards installed that are equipped with the DTMF-1 DTMF Inward / Outward Control Option.
- If the system has more than 50 ports assigned port functions other than "None", all matrix card slots have STX-101 Expansion Crosspoint Cards installed in their associated STX card slot (located below their slot in their frame)

Hardware Warning List (DIAGNOSTICS menu - HARDWARE STATUS)

When the Hardware Status field reads "Warnings", the screen displays each discrepancy in the Warning List. Each entry in the Warning List includes the port number, the port label, the matrix card provided for the port, the interface

connected to the port, and a warning description. The warning descriptions are presented in detail below.

- **No Matrix Card** A port function has been assigned to the port, but the frame controller could not establish communications with a matrix card in the slot associated with that port.
- **No Interface** The port function for the port is one that usually is associated with an interface. However, the matrix card at the port read the Interface Select pins on its 15-pin To Matrix connector, and did not find them connected in any of the defined Interface Select patterns. These patterns are defined in the Frames - MCF-100 section of the Installation manual.
- **No DTMF Option in Matrix Card** The port has DTMF Decoding enabled (from the Interfaces - DTMF Parameters screen) but the matrix card provided for that port does not have the DTMF-1 DTMF Inward / Outward Control Option installed.
- **Matrix Card Incompatible With Interface** The matrix card for this port only supports stations, and the port is assigned a non-station port function.
- **Interface Incompatible With Port Function** There is an interface present on this port, but the port function assigned is not one usually used with that interface.
- **Station Not Responding** The port's matrix card could not establish communications with a station. The station may be unplugged, miswired, or otherwise disabled.
- **No STX-101 Expansion Crosspoint Card** The system configuration has more than 50 port functions assigned. This indicates to Diagnostics that there are at least 51 ports in the system, and that there is (or should be) an SCF-101 Expansion Card Frame in the system. In order for systems of 51 or more ports to be fully functional, each matrix card slot must have an STX-101 card installed in the small slot below it. Ports that generate this warning do not have STX-101 cards installed in their slots.

Exceptions (DIAGNOSTICS menu - HARDWARE STATUS)

There are certain conditions that generate warnings even in normally functioning (but non-typically configured) systems. These warnings do not not necessarily indicate problems in the system, and can often be safely ignored if you have a specific reason for doing so. Diagnostics warns about all possible mismatch conditions to make it simpler to debug the most typical installations.

If Diagnostics generates such extraneous warnings for your system, it is up to your System Administrator to know that these exceptions are a normal condition in your system, and are not wiring or configuration errors.

The most common of these exceptions are noted here, including "Interface Mismatch" warnings and "No STX card" warnings.

When determining whether a warning generated by this screen is going to create any real problems in your system, note that the interface type reported in this screen (and in the Frame Setup screen) is a "for your information only" field, and its setting does not in any way effect any of the functions that are presented in the other MXPLUS2 screens. In contrast, the type of matrix card in a slot determines which port functions appear in the popup selection box that you use to set its port function. Thus, an "Incompatible Matrix Card" warning can indicate a serious incompatibility whereas an "Incompatible Interface" warning can be safely ignored if you have some specific reason to do so.

- **Interface Mismatch Warnings** It is rather common to have port function / interface mismatches for one reason or another, and such mismatches do not necessarily constitute a real problem in your system. For example, assume that an audio device is connected directly to an interface port without an interface connected, and that the port function is set to "Telephone" (because the call signals are being used for some specific purpose). This will be flagged with a warning even though in your system it is a normal condition.
- **Missing STX Card Warnings** It is also common that certain matrix card slots in a large system may not have STX-101 Expansion Crosspoint Cards installed. For example, you can use the absence of an STX card to limit access of that port to ports in the other card frame.

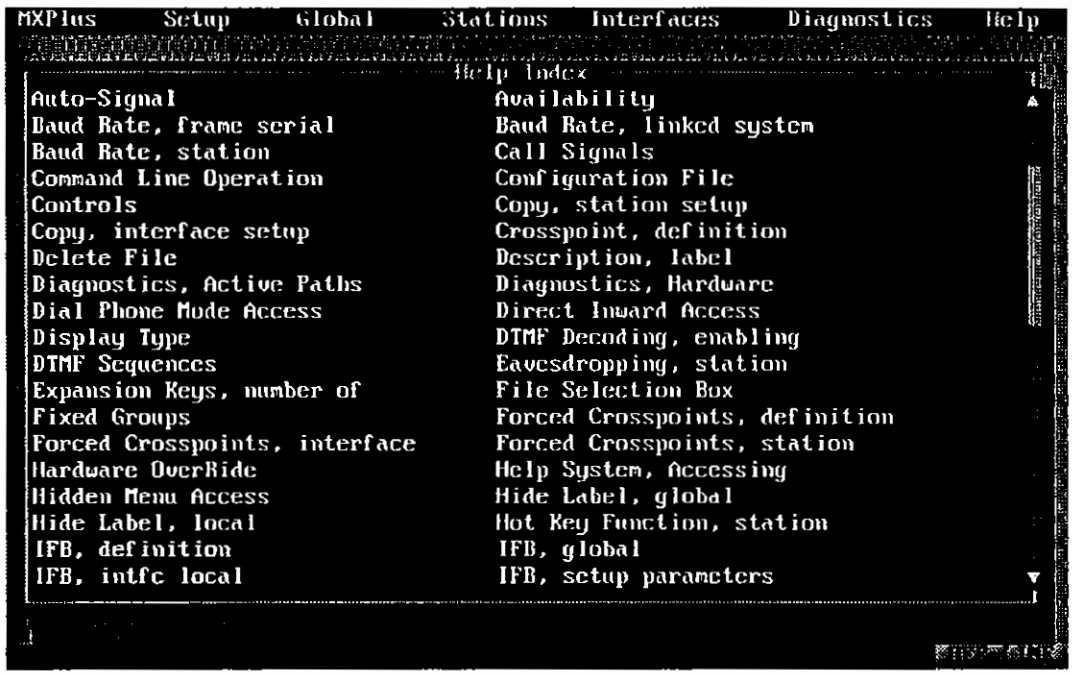
Help Menu

The Help menu includes the following functions and screens, each of which is discussed below.

- Index
- Keyboard and Mouse
- About MXPLUS2

Index (HELP menu)

The Help Index screen provides an alphabetical index to allow you to look up definitions and screen instructions. Clicking on an index entry places you in the help screen for that entry.



Keyboard and Mouse (HELP menu)

This screen provides a summary of the screen movement actions that you will perform from within MXPLUS2, and the mouse and keyboard commands you will use to accomplish them.

About MXPLUS2 (HELP menu)

This screen displays your MXPLUS2 version and serial number, and the information required to contact Clear-Com Matrix Plus Customer Service for technical support.

Command Line Operation

MXPLUS2 can be operated in "Command Line" mode. This allows MXPLUS2 to automatically perform any of several functions without requiring an operator to be present. The functions available in command line mode are the following:

- Send a configuration from a named file to the frame
- Set and Clear any fixed crosspoints from any port or ports
- Set and Clear any party line presets for any interface port(s)

For example, to cause MXPLUS2 to send the file MYCONFIG to the frame, include the following line in a DOS batch file which could be run at some specific time by a DOS scheduling utility (not supplied):

MXPLUS2 /d=MYCONFIG

Command Line Syntax

Any number of options may be entered on a single command line. Each command line option must be separated by at least one space. Each command line option starts with a forward slash ("/") followed immediately by an "action letter" which indicates which action is to be taken. The action letter may be in upper or lower case. The action letter must be immediately followed by an equal sign ("="). Spaces are not allowed within a given option. The action letters and other arguments are described below.

- /d Send a File
- /f Set or clear a fixed crosspoint
- /p Add or remove a party-line preset

Send a Configuration

To send a configuration from a named file to the frame:

MXPLUS2 /D=[drive][path]FILENAME

Example:

MXPLUS2 /D=C:\MYMTX\MYCONFIG

The action letter is D (or d), and the single argument is the name of a configuration file. The name can optionally include a path including drive letter. If drive and path are not supplied, the current DOS path is assumed. The file

name must not include an extension. The extension (".cfg" for configuration files) is automatically appended to the file name given.

Set Or Clear A Fixed Crosspoint

The /f command allows you to set or clear a fixed crosspoint on a port. The parameter sent with the command determines whether it is a set or clear command. The following paragraphs describe how to use the command.

Set a Fixed Crosspoint

To set fixed crosspoints from a given port to a given list of destination ports:

MXPLUS2 /F=SOURCE:DEST1[,dest2,dest3...(up to 50 ports)]

Example: (sets fixed crosspoints from port 3 to ports 1 and 2, and from port 5 to port 17.)

MXPLUS2 /f=3:1,2 /f=5:17

The action letter is F (or f), and the arguments consist of the source port number followed by a colon (":") and a list of destination ports separated by commas (","). No destination can be the same port as the source.

To Clear a Fixed Crosspoint

To clear a fixed crosspoint, use the same syntax used to set a fixed crosspoint, but precede the destination with a minus sign ("-").

Example: (clears fixed crosspoints previously set from port 3 to ports 1 and 2, and from port 5 to port 17.)

MXPLUS2 /f=3:-1,-2 /f=5:-17

To clear all fixed crosspoints from a given port:

MXPLUS2 /F=SOURCE:0

Example (clears all forced crosspoint assignments from port 20, then sets a forced crosspoint from port 20 to port 51):

MXPLUS2 /F=20:0 /F=20:51

Supply the single destination 0. Ports are numbered starting at number one, so zero is never a valid port number.

Add Or Clear Interface Port to a Party-line

The /p command allows you to add or remove a port from a party-line preset. The parameter sent with the command determines whether it is an add or remove command. The following paragraphs describe how to use the command.

Add An Interface Port to a Party-line

To add an interface port to a party-line (PL) group(s)

(also referred to as assigning party-line presets)

MXPLUS2 /P=INTERFACE:PL1[,pl2,pl3...(up to 50 PLs)]

Example: (Adds interface port 7 to party-line 3)

MXPLUS2 /p=7:3

The action letter is P (or p), and the arguments consist of the interface port number followed by a colon (":") and a list of party-line index numbers separated by commas (","). To find the index for a party-line you know the name of, see the Setup - Labels screen in the configuration program.

Clear All Party-line Preset Assignments For A Port

To clear a party-line preset assignment, use the same syntax used to assign a preset, but precede the party-line that you want to unassign the port to with a minus sign ("-").

Example: (Removes interface port 7 from party-line 3)

MXPLUS2 /p=7:-3

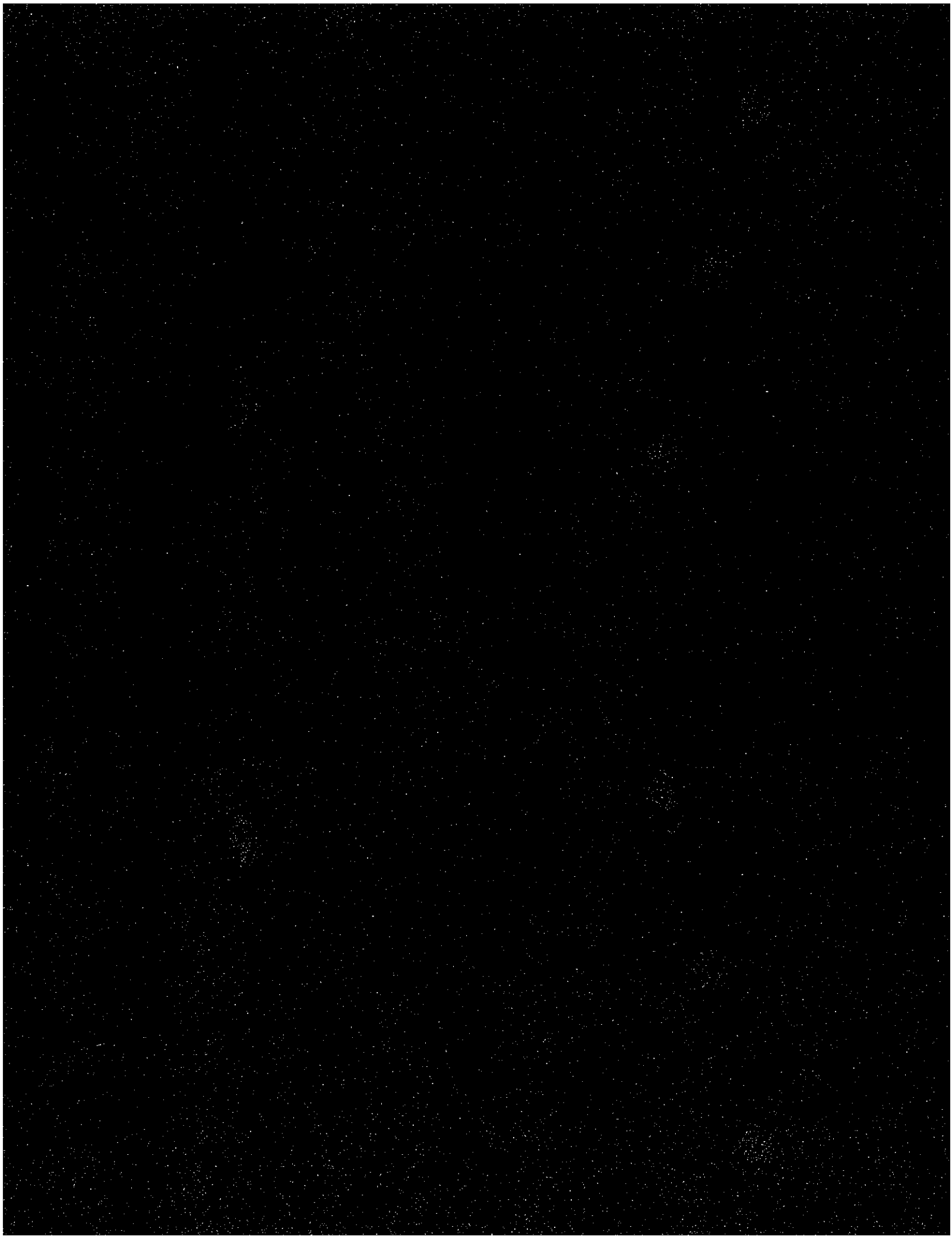
To clear all party-line (PL) preset assignments for a given port:

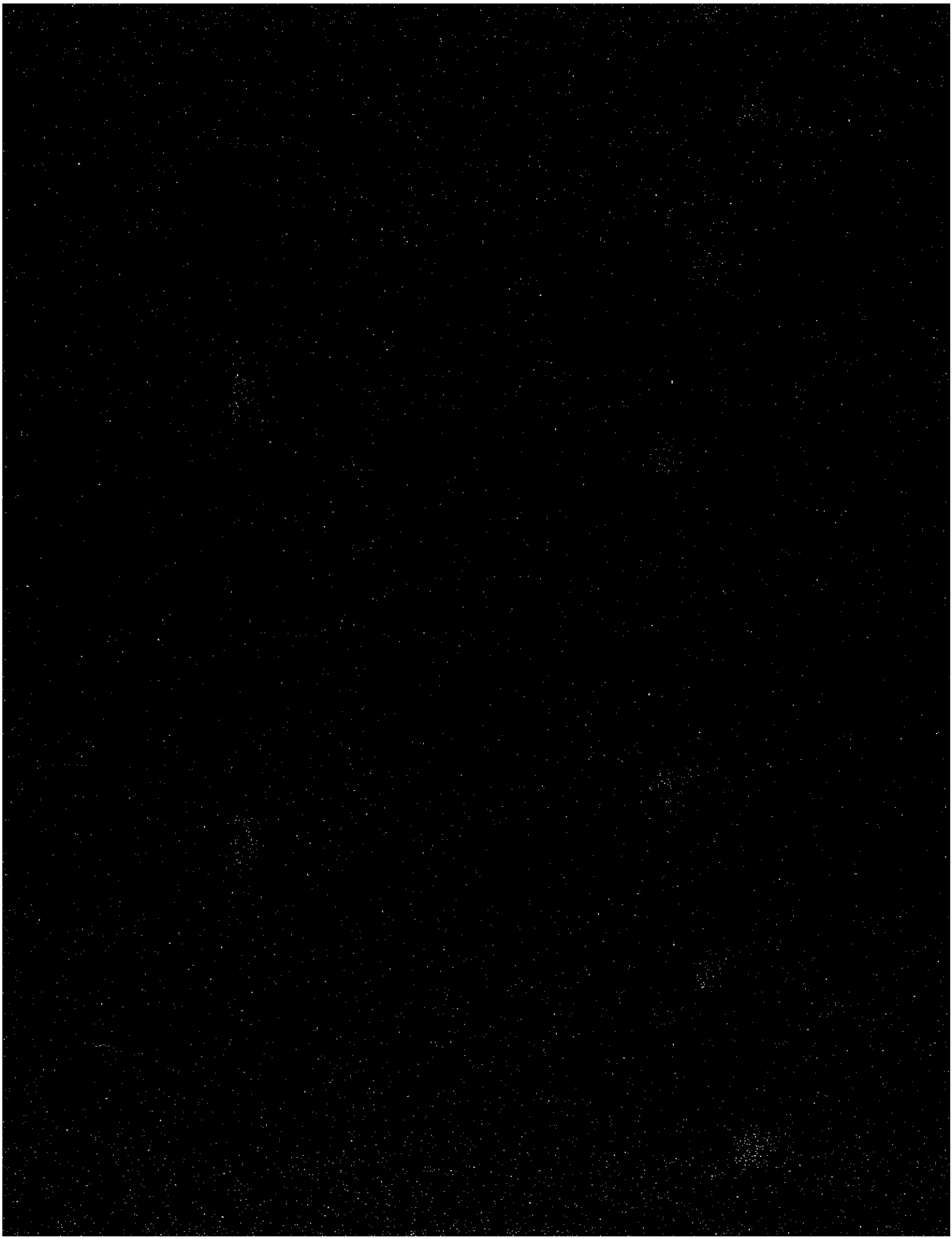
MXPLUS2 /P=INTERFACE:0

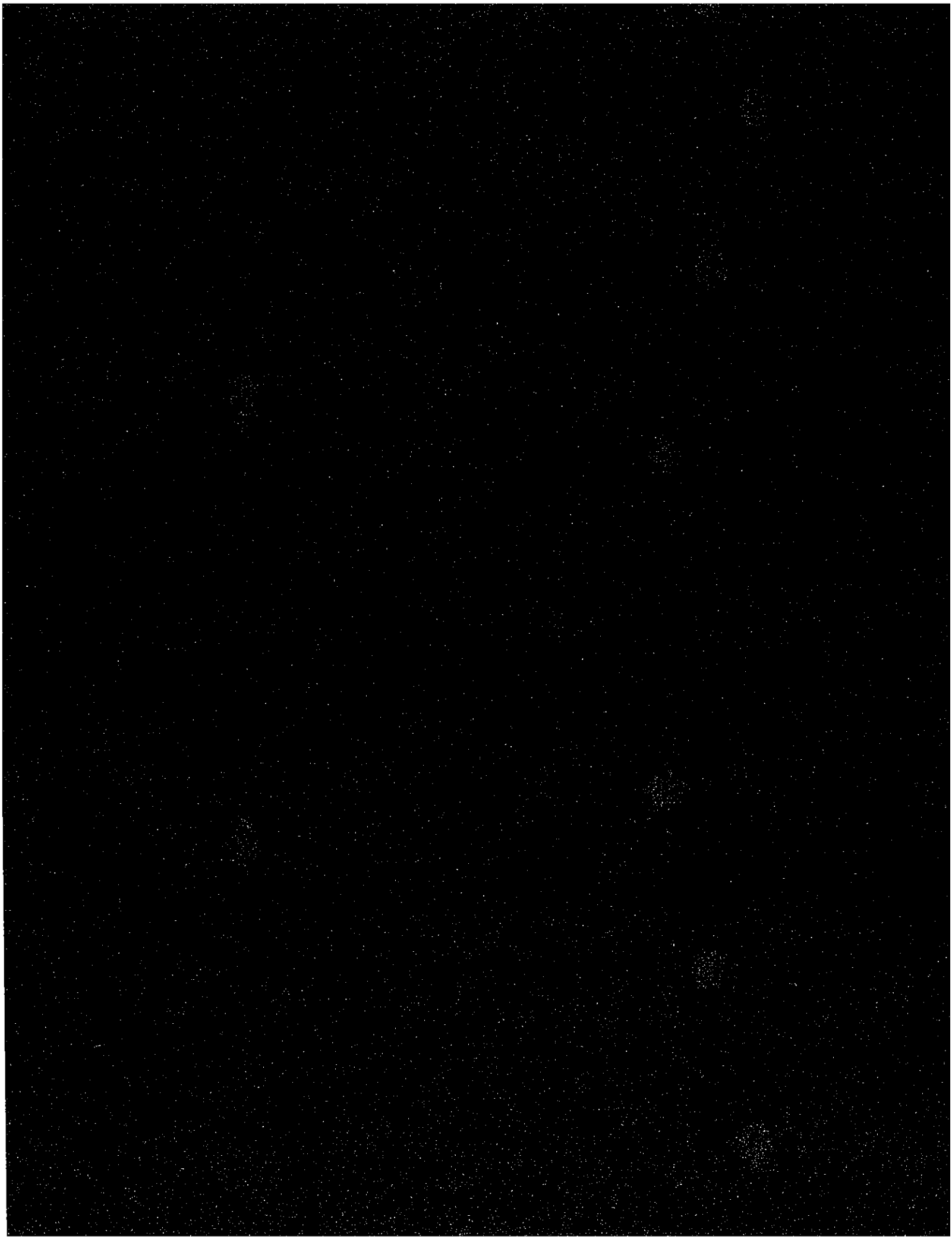
Example (clears all party-line presets from port 33, then assigns port 33 to PL4):

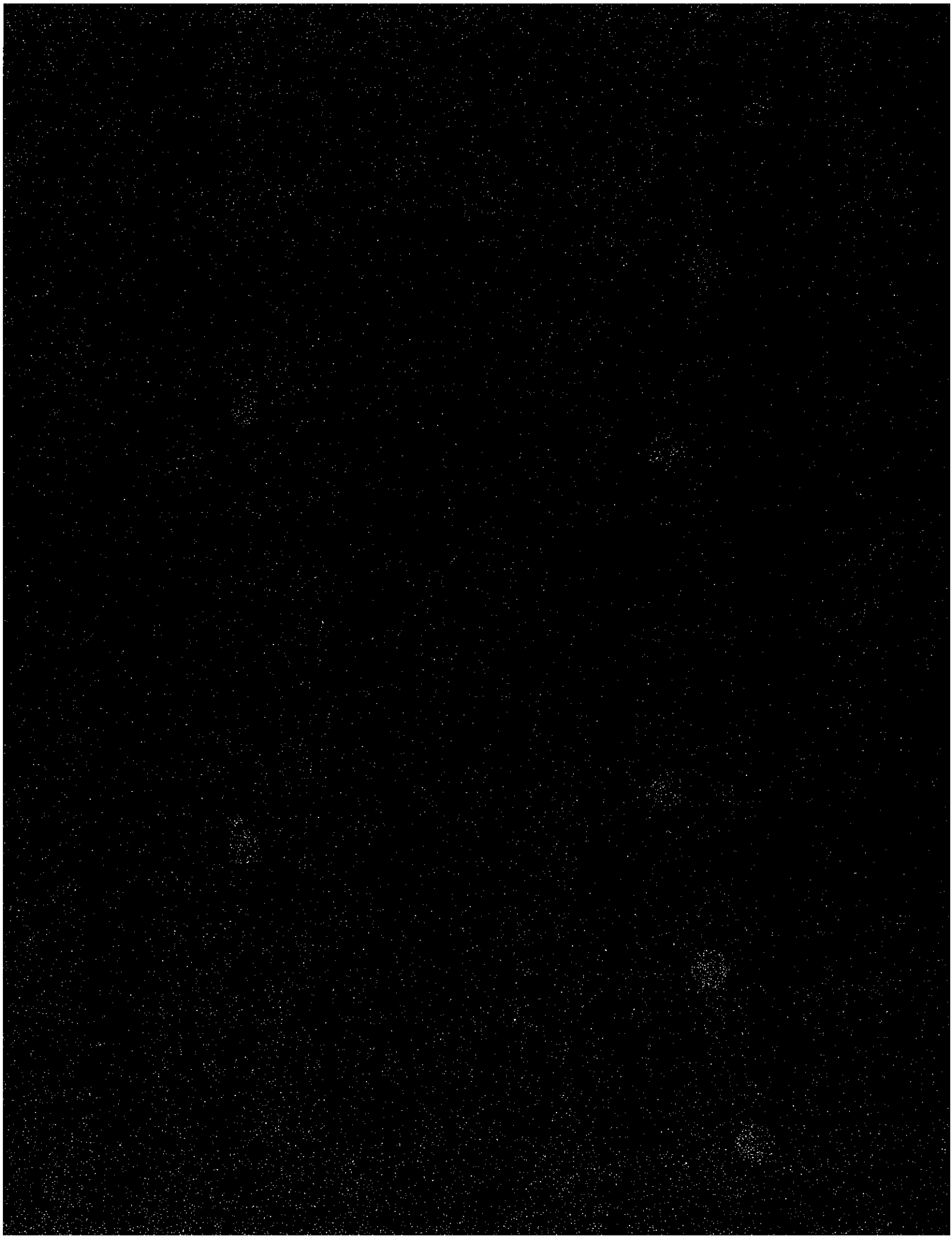
MXPLUS2 /P=33:0 /P=33:4

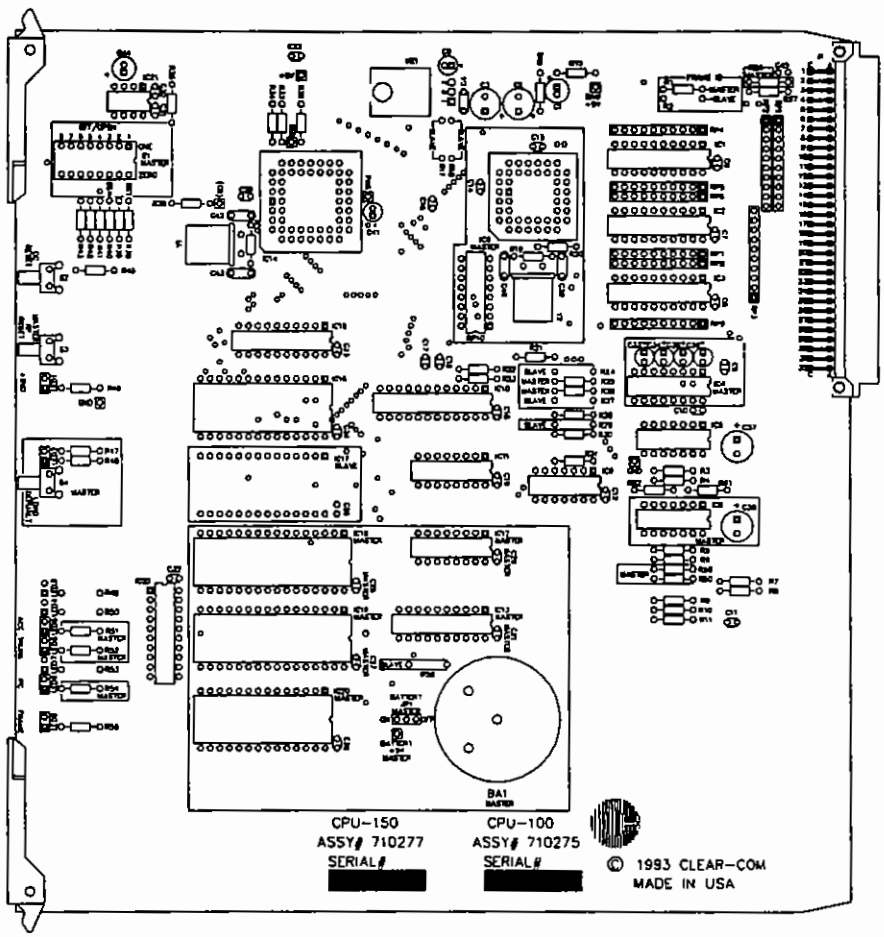
Supply the single PL index 0. Party-line groups are indexed starting at number one, so zero is never a valid party-line index.











Matrix Plus II System CPU-100

MASTER FRAME CONTROLLER CARD

Introduction

This Section provides a description and information on how to operate the CPU-100.

Description

The CPU-100 is the master controller card in the Matrix Plus II system. The CPU-100 manages the communication between matrix cards, stores system configurations, communicates with an external PC Computer to receive configurations from the Configuration Program, manages LINKing between multiple matrixes, and controls certain interfaces directly.

The memory used to store the configuration of the system is battery-backed. There is enough memory available to store a complete second configuration which is called Default Configuration. Refer to the section later in this chapter on how to use the Default Configuration.

Controls and Indicators

The CPU-100 has a Frame Controller Reset pushbutton, a Master Crosspoint Reset pushbutton, a Load Default pushbutton and a series of indicator leds. These controls and indicators are provided for maintenance personnel. During normal operation these controls and indicators should not be used except for the possible use of the Default Configuration pushbutton. The following sections describe these controls and indicators.

Frame Controller Reset

The upper reset pushbutton (labeled "CC Reset Switch" on the CPU-100 card) resets only the CPU-100 Master CPU Controller card. Resetting the CPU controller causes it to discontinue its current activity and restart its internal program as if power were first applied to it using the Current configuration stored in battery-backed RAM. The Matrix Plus II System will then require about half a minute before operation is fully restored.

Crosspoint Card Master Reset

The lower pushbutton (labeled "Master XP Reset" on the CPU-100 card) sends a "reset" command to all of the crosspoint cards in the frame (both frames in a two frame system). This has the effect of pressing each crosspoint card's reset pushbutton. Resetting a crosspoint card also resets any stations connected to it.

Load Default Pushbutton

The Load Default pushbutton is used to move the Default configuration stored in memory to the Current operating configuration. The following discussion is a description of Default Configuration and how to use the Load Default Pushbutton.

The Default configuration is a second configuration saved in memory. The Default configuration portion of memory can only be written to by commands from the Configuration Program. The Configuration computer can perform the following functions on the Default configuration memory:

- Download from the Configuration in PC memory to the Default configuration.
- Upload from the Default configuration to the Configuration in PC memory.
- Load the Default into the Current configuration.
- Load the Current into the Default configuration.
- Copy a disk file to the Default configuration.
- Send the Default configuration to a disk file.

To load the Default into the Current at the CPU card, press and hold the Load Default pushbutton for more than 5 seconds. The red LED above the pushbutton will flash for about 5 seconds then it will turn on solid indicating that the load default command has been accepted and the process has started. The Load Default LED will remain on as long as the Current and Default memory sections are identical. Any change to the Current configuration will cause the led to go off.

If the Load Default Pushbutton is held while the CPU RESET is pressed, the Default configuration will be loaded immediately into the Current configuration. In this case, the Load Default pushbutton is not read until after the internal RAM test is conducted by the CPU board. The end of the RAM test is indicated by all of the leds coming on for a short period. The Load Default pushbutton must be held until the RAM memory test is over.

LED Indicators

A series of six LED indicators on the edge of the CPU-100 Master CPU Controller Card indicate system status as shown in Figure M1-1. The paragraphs following Figure M1-1 describe the function of each LED indicator.

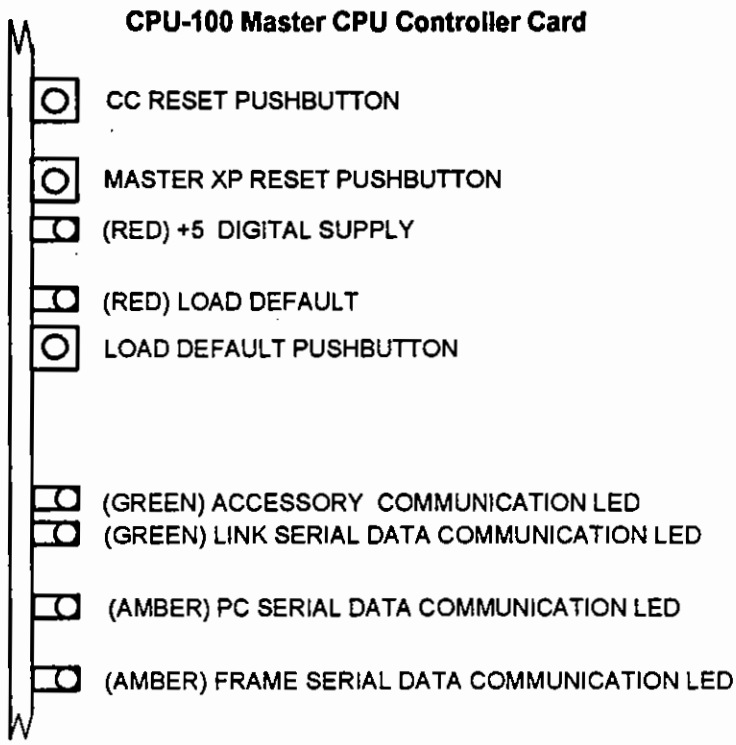
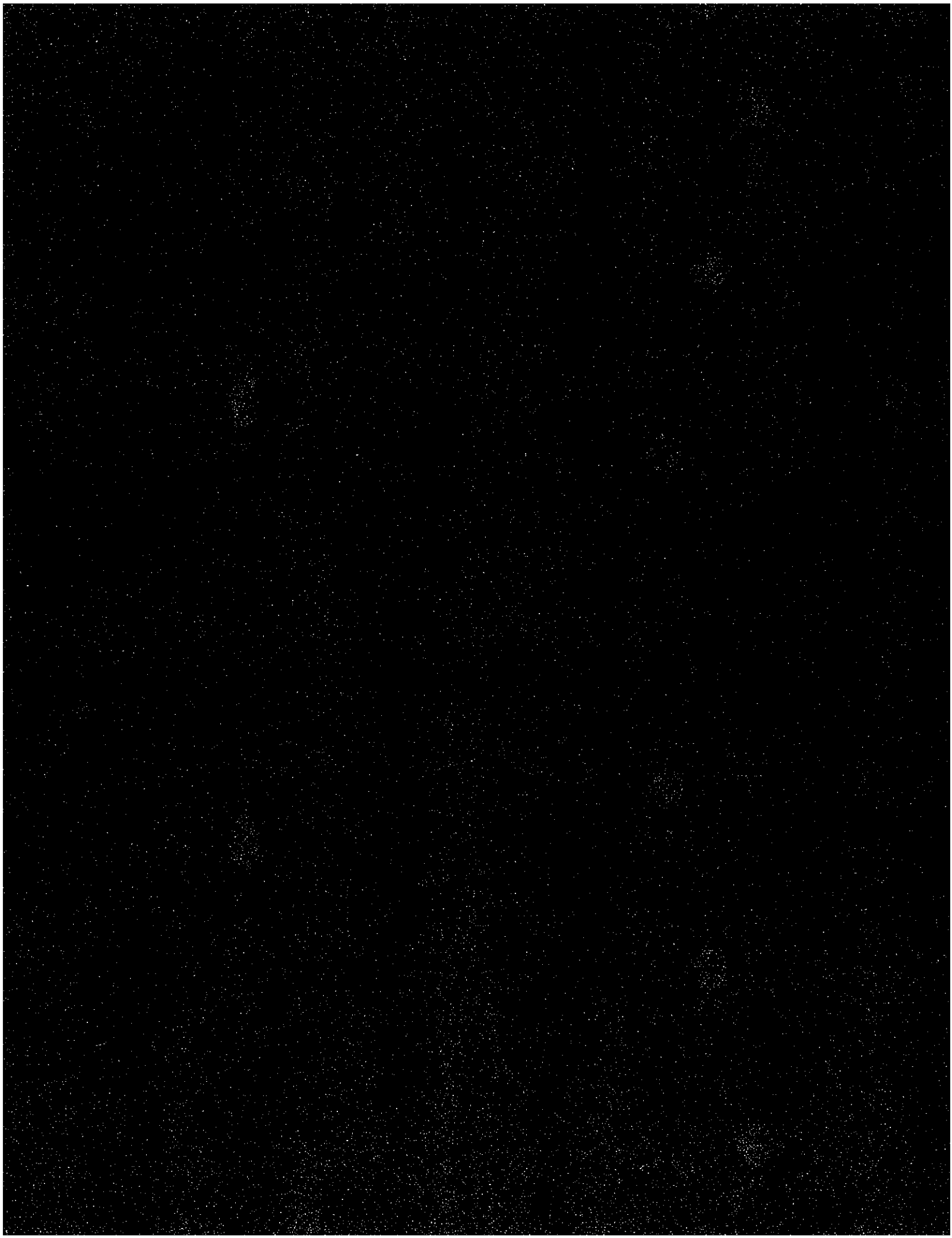
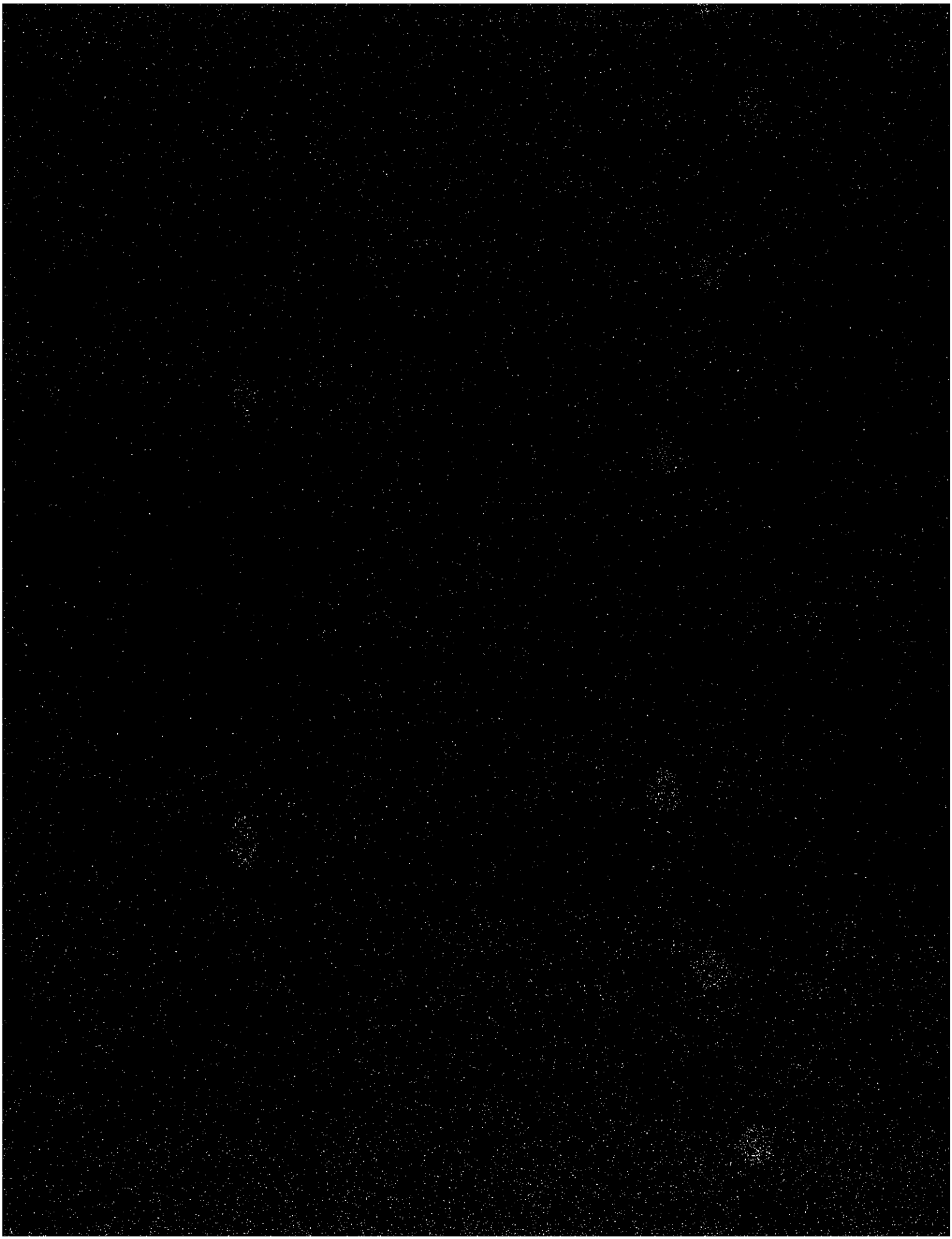
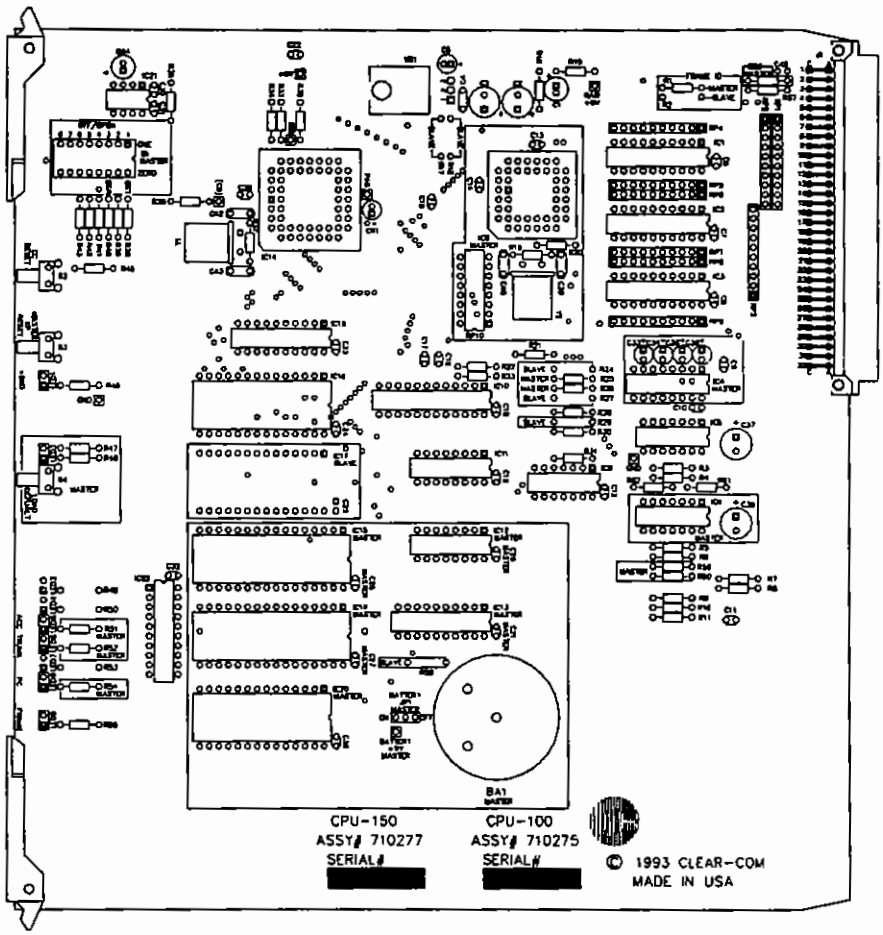


FIGURE M1-1. CPU-100 Master CPU Controller Card LED Indicators

- +5 VDC (red). When lit indicates that +5 Volt DC power is supplied to the CPU-100 Card.
- LOAD DEFAULT (red). Refer to the section in this chapter on the LOAD DEFAULT Pushbutton.
- ACC SERIAL DATA COMMUNICATION (green). When lit indicates that the CPU-100 is in progress of an actual data transmission to the Accessory Port (RLY-8).
- TRUNK SERIAL DATA COMMUNICATION (green). When lit indicates that the CPU-100 is in progress of actual communication to another Matrix frame for LINKING purposes. In actual use this led will illuminate occasionally.
- PC SERIAL DATA COMMUNICATION (amber). When lit indicates the Configuration Program is actively sending/receiving configuration information to/from the matrix frame.
- FRAME SERIAL DATA COMMUNICATION (amber). When lit indicates that communication between the CPU-100 Card and one or all of the Crosspoint Cards is actively in progress. In normal use this LED Indicator flickers at least once every three seconds.







Matrix Plus II System CPU-150

SLAVE FRAME CONTROLLER CARD

Introduction

This Section provides a description and instruction on how to use the controls and indicators of the CPU-150 Slave CPU Controller Card.

The CPU-150 Slave CPU Controller Card is only required for applications that have 51 or more audio ports (up to the maximum of 100 audio ports) installed in the system.

Description

The CPU-150 is the controller card for the second frame in a two frame Matrix Plus II system. The CPU-150 only gathers communication requests from matrix cards in the second frame and passes those request on to the CPU-100 in the first frame.

Controls and Indicators

The CPU-150 has a Frame Controller Reset pushbutton, a Master Crosspoint Reset pushbutton, and two indicator leds. These controls and indicators are provided for maintenance personnel. During normal operation these controls and indicators should not be used .

Frame Controller Reset

The upper reset pushbutton (labeled "CC Reset Switch" on the CPU-150 card) resets only the CPU-150 Slave CPU Controller card. Resetting the Slave CPU controller has very little effect on system operation.

Crosspoint Card Master Reset

The lower pushbutton (labeled "Master XP Reset" on the CPU-150 card) sends a "reset" command to all of the crosspoint cards in both matrix frames. This has the effect of pressing each crosspoint card's reset pushbutton. Resetting a crosspoint card also resets any stations connected to it.

LED Indicators

The LED indicators on the edge of the CPU-150 Slave CPU Controller Card indicate system status as shown in Figure O2-1. The paragraphs following Figure O2-1 describe the function of each LED indicator.

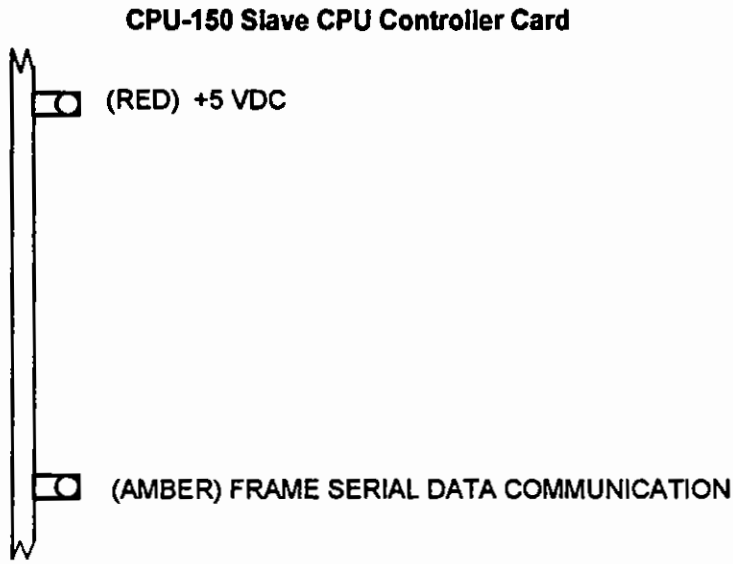
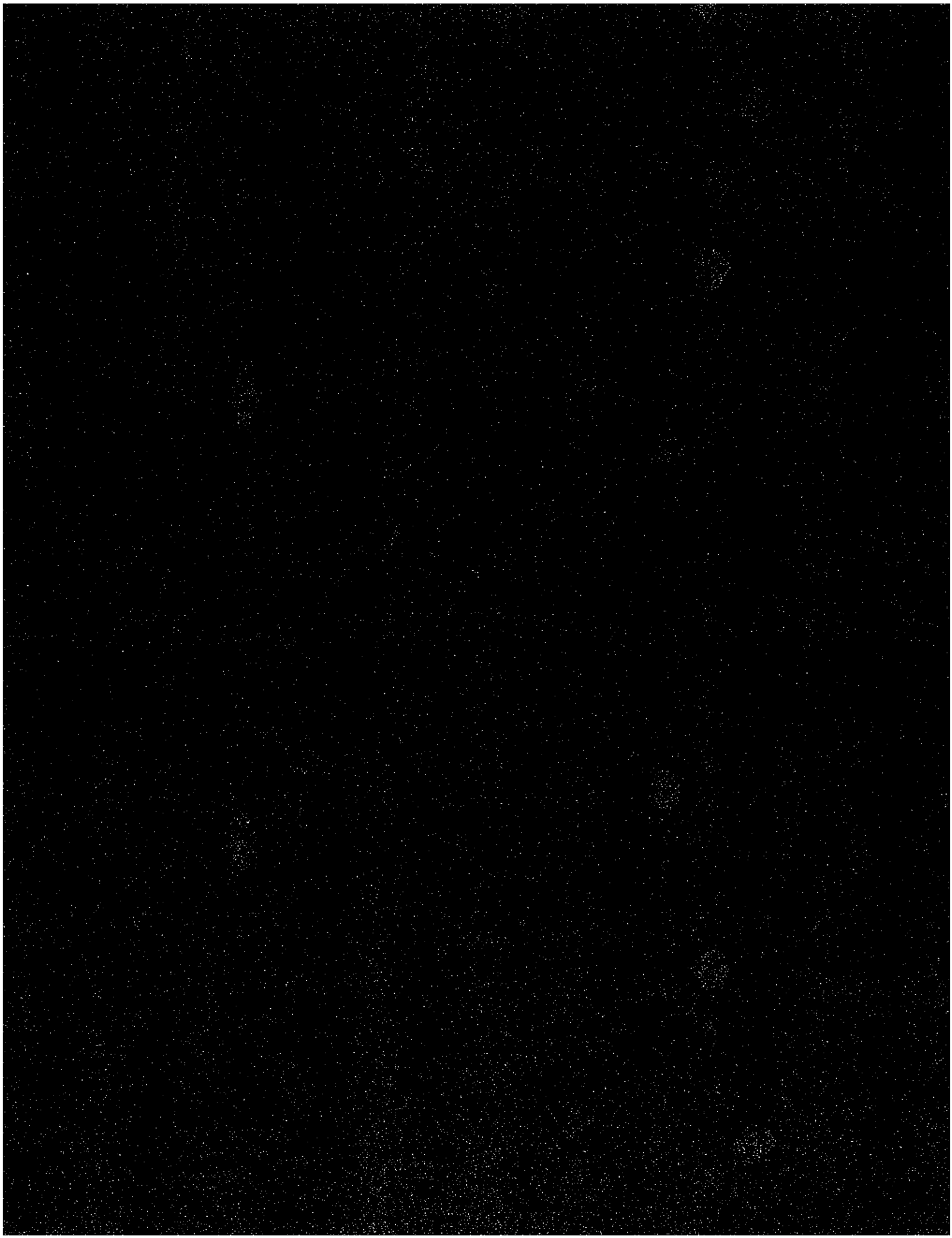
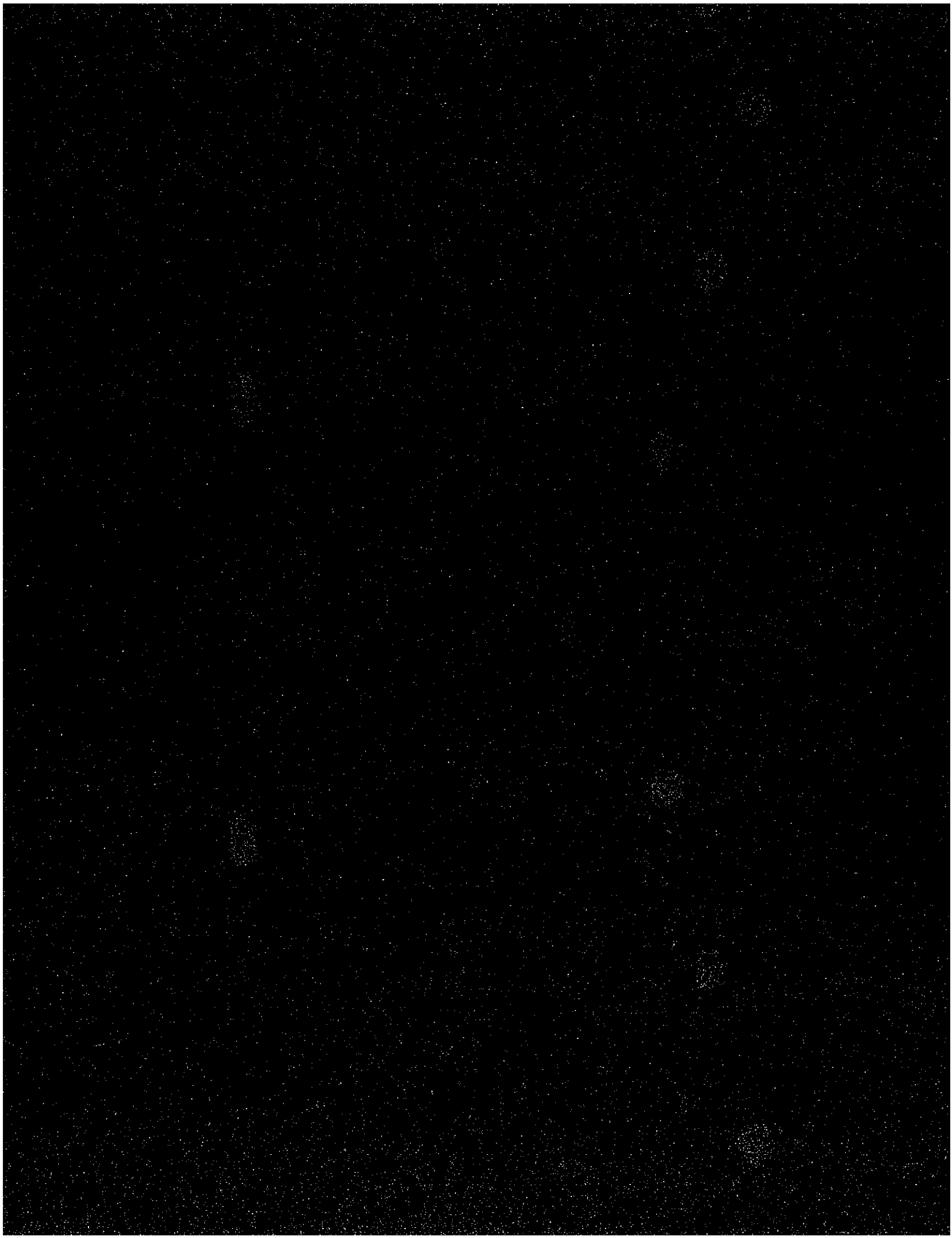
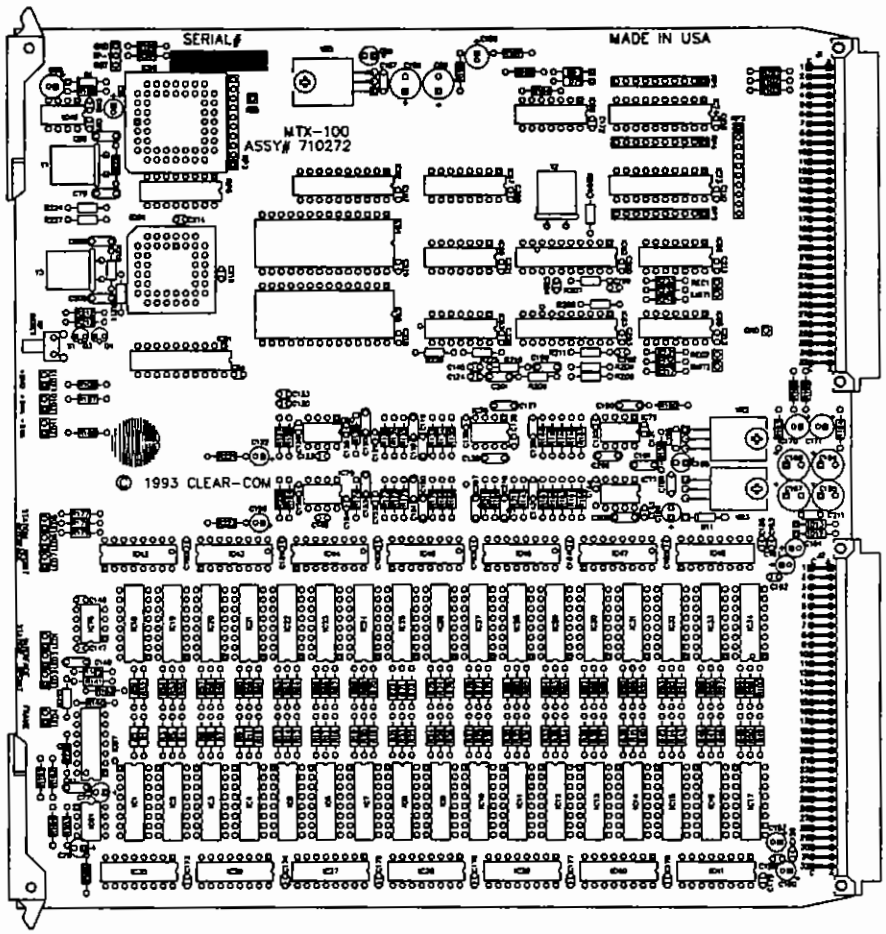


FIGURE O2-1. CPU-150 Slave CPU Controller Card LED Indicators

- +5 VDC (red). When lit indicates that +5 Volt DC power is supplied to the CPU-150 Card.
- FRAME SERIAL DATA COMMUNICATION (amber). When lit indicates that communication between the CPU-150 Card and the CPU-100 Master CPU Controller Card is actively in progress. In normal use this LED Indicator illuminates at least once every three seconds.







Matrix Plus II System MTX-100

STATION CROSSPOINT CARD

Introduction

This chapter describes the MTX-100 Station/Interface Crosspoint Card and its use, including the options provided by the DTMF-1 DTMF Inward / Outward Control option. It is assumed that the MTX-100 card has been correctly installed in a matrix card frame. For information on installing an MTX-100 see the Matrix Plus II Installation Manual. For information on troubleshooting and maintenance see the Matrix Plus II Maintenance Manual.

Once the MTX-100 card is physically installed, each of the two MTX-100 ports on the MTX-100 card must be assigned a port function from the configuration program. Once each port is assigned a port function, no further operator interaction with the MTX-100 card itself is required under normal circumstances. All of the features of the MTX-100 port, including (optional) DTMF decoding, are controlled from the Matrix Plus II System Configuration Program. The only operator accessible control is a Reset switch. The input gain of both ports is adjustable under program control from the Configuration Program or an ICS-2002 intercom station. The MTX-100's LED indicators are used to verify its operation and for troubleshooting purposes.

The first sections of this chapter describe the function of the MTX-100 and its associated 15-pin connectors, and how to assign a port function to the ports provided by the card. The next sections describe the function of its LED indicators and the reset pushbutton on the card. The final sections describe the MTX-100 card's DTMF encoding and decoding capabilities. These sections include an overview of DTMF decoding, and user operation of DTMF decoding. For the steps and specifics of configuring the port for DTMF decoding from the Configuration Program, please see the Interfaces - DTMF Parameters section of the Configuration Program chapter of this manual.

Description

The MTX-100 Station/Interface Crosspoint Card contains a microprocessor and all of the electronic crosspoint switches and communications hardware necessary to add two ports to the matrix. Each of these two ports includes all of the circuitry required to connect either a Matrix Plus II System station, interface module, or any external 4-wire audio device to the Matrix Plus II System.

If the DTMF-1 DTMF Inward / Outward Control option is installed in an MTX-100 card, the ports provided by the card are capable of creating and interpreting "DTMF tones" as described in detail in sections below. Briefly, DTMF decoding allows a "remote" user to call into a Matrix Plus II System and activate talk and listen paths within the system by entering numeric codes on a touch-tone keypad. It also allows the card to generate DTMF tones.

15-Pin Connector

Each MTX-100 Port has a 15-pin connector associated with it, located on the back of the MCF matrix card frames. The 15-pin connector provides connections to an interface module or to an external 4-wire audio device.

Each port and its associated 15-pin connector is numbered sequentially. The left-most crosspoint card slot in the matrix frame contains port numbers 1 and 2, the second card slot contains port numbers 3 and 4, and so on up to ports 49 and 50. In a two frame system port numbers 51 to 100 are located in the second frame. If a card slot is empty, those port numbers are skipped. Note that the extreme left-most card slot is always occupied by the CPU-100 or CPU-150 Frame Controller Card, and does not occupy port numbers.

The 15-pin connector for each port on the MTX-100 card includes a set of four input lines that are used by the Matrix Plus II System for Interface Identification ("Interface ID"). Each interface module has an interface ID code associated with it, and passes that code to the port via the interface ID lines. This allows the Matrix Plus II System to accurately identify which interfaces are connected to which ports in the matrix frame.

Port Functions

Each MTX-100 port must be assigned a port function before it can be recognized by the Matrix Plus II System. The port function informs the Matrix Plus II System and Configuration Program of the type of device that is connected to the port. This is important because the Matrix Plus II System treats each device differently, and the configuration options are different for each device.

Some port functions are specific to one interface module, and some are not. For example a port assigned the "Telephone" port function is intended to be connected to a TEL-12 Telephone Interface Module, whereas a port assigned the "Camera" port function may be connected to a camera via an FOR-22 4-Wire Interface Module, a CCI-22 Party-Line Interface Module, or in some cases be wired directly to the camera via the port's 15-pin connector.

Each MTX-100 port may be assigned any one of the port functions described in the Setup - Frames section in the Configuration chapter of this manual.

LED Indicators

The MTX-100 Station Crosspoint Card has 10 LED indicators on its front edge as shown in Figure M3-1. These LED indicators provide status information about the MTX-100 card's operation. The paragraphs following Figure M3-1 briefly describe the function of each LED indicator.

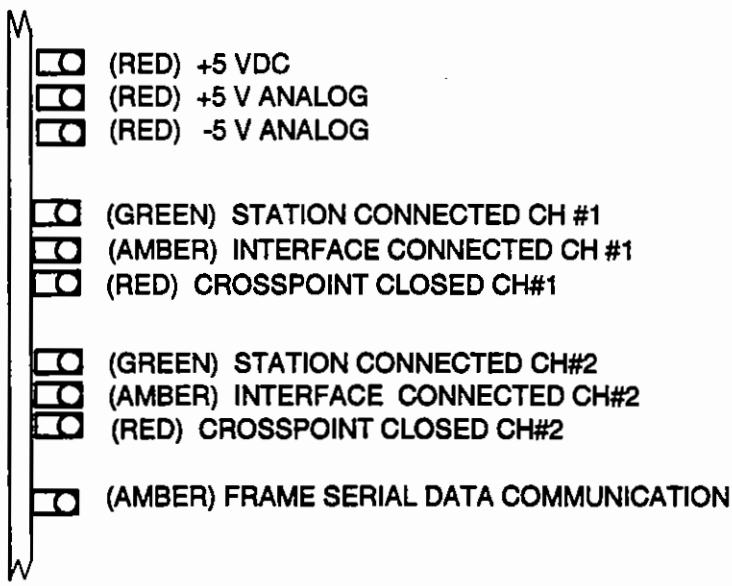


FIGURE M3-1. MTX-100 LED Indicators

- **+5 VDC (RED)** Indicates the presence of 5 volt digital power supply.
- **+5V ANALOG (RED)** Indicated the presence of the +5 volt analog power supply.
- **-5V ANALOG (RED)** Indicates the presence of the -5 volt analog power supply.
- **STATION CONNECTED CH#1 (GREEN)** When lit, indicates that the first port of this card is connected to a Matrix Plus II intercom station and that data communications to and from the station are established. This LED indicator should always be lit when the port is connected to an intercom station.
- **INTERFACE CONNECTED CH#1 (AMBER)** When lit, indicates that the first port of this is connected to a Matrix Plus II interface.
- **CROSSPOINT CLOSED CH#1 (RED)** When lit, indicates that at least one crosspoint switch is closed on the first port of this card.
- **STATION CONNECTED CH#2 (GREEN)** When lit, indicates that the second port of this card is connected to a Matrix Plus II intercom station and that data communications to and from the station are established. This LED indicator should always be lit when the port is connected to an intercom station.
- **INTERFACE CONNECTED CH#2 (AMBER)** When lit, indicates that the second port of this is connected to a Matrix Plus II interface.
- **CROSSPOINT CLOSED CH#2 (RED)** When lit, indicates that at least one crosspoint switch is closed on the second port of this card.
- **FRAME SERIAL DATA COMMUNICATION** (amber). When lit indicates that communication between the CPU-100 Card and one or all of the Crosspoint Cards is actively in progress. In normal use this LED Indicator flickers at least once every three seconds.

Reset Pushbutton

The Reset pushbutton on the front edge of the MTX-100 card causes the microprocessor on the MTX-100 card to stop whatever it is doing and restart from the beginning of its internal program.

Under normal operating conditions, it is never necessary to press the Reset button. Technical personnel might push the Reset button if they believe that the MTX-100 card is behaving incorrectly as a result of corruption of the internal data or instruction sequence of the MTX-100's microprocessor.

Resetting the MTX-100 disconnects all communication paths on both ports of the MTX-100 card and causes any stations connected to be re-initalized. When communication with the CPU-100 Master CPU Controller card is reestablished (which can take several seconds), new talk paths can be activated. Previously existing Talk and Listen paths will be automatically restored if the "Restore Talk Paths" and "Restore Listen Paths" fields are checked in the "Setup - System" screen of the Configuration Program.

Overview of DTMF Operation

Each MTX-100 port which has the DTMF-1 DTMF Inward / Outward Control option installed has DTMF encoding and decoding capability as defined below.

DTMF decoding can be used whether the MTX-100 port has an interface connected to it or not. Whenever enabled, DTMF tone decoding is performed for any audio program entering the matrix through the MTX-100 port, regardless of the port function assigned to the MTX-100 port.

DTMF Encoding

DTMF Encoding is the ability of the card to generate DTMF tones. "DTMF tones" are the sounds produced by a touch-tone telephone when you press the buttons on its numeric keypad. This is required for the MTX-100 card to directly dial a telephone or otherwise send DTMF tones to a destination. An ICS-2002 station has the ability to directly dial by itself with or without the DTMF-1 option being installed on the particular port. The encoding capability of the MTX-100 card is primarily used for automatic dialing of DTMF sequences.

The Configuration Program does not prevent you from assigning DTMF sequences to port labels that do not support DTMF encoding, but activating DTMF sequences from such a port will have no effect.

DTMF Decoding

DTMF decoding is the ability to decode "DTMF tone codes". "DTMF tone codes" are combinations of DTMF tones that are pre-assigned with specific meanings when decoded by the MTX-100 port. The purpose of these codes is to implement "Direct Inward Access" as defined below.

Direct Inward Access

DTMF decoding allows a "remote" user to call into a Matrix Plus II System and specify talk and listen paths within the system. The remote user can be an individual calling into the system from a touch-tone telephone ("direct inward access"). The "remote" user can do the equivalent of pressing the selector keys on a station in the Matrix Plus II System by entering "selector codes" on their telephone. Selector codes are assigned talk and listen labels from the configuration program in the same way that selector keys are assigned labels on intercom stations.

DTMF Passwords

"DTMF passwords" are four-digit numbers that you can use to restrict remote access to the Matrix Plus II System. For example, a caller dials into an MTX-100 port in the matrix from a touch-tone phone via a TEL-12 interface. The TEL-12 answers the call, and then the MTX-100 issues the "password request" prompt. The password request prompt is a specific tone sequence described in the operation section below... The caller enters a four-digit password by pressing keys on his telephone keypad. If the password is valid, the MTX-100 issues the "access granted" prompt followed by the "ready" prompt. The caller may then enter a selector or control code.

There can be up to eight passwords per Matrix Plus II System. Each MTX-100 port can be configured to recognize any number of these codes as part of its local configuration. By default, no passwords are assigned values, and all passwords are enabled. In this default case, no password is required to gain access to the system. Passwords are assigned values from the Global-Passwords screen in the Configuration program.

For example if you have two MTX-100 ports, then each port can have a separate password by assigning values to two of the eight codes, then enabling one of them for one port and the other of them for the other port. Or, both passwords can be enabled for both ports. Or, you could assign no passwords and system access would be unrestricted.

Selector Codes

"Selector Codes" are two-digit numeric codes that can be assigned talk, listen, or control labels in the same way as the selector keys on an intercom station. Selector codes are assigned labels as part of each MTX-100 port's local configuration from the "Interface-DTMF Parameters" screen.

Selector codes can be assigned up to three talk labels and/or one listen label. There are fifty unique selector codes available for each MTX-100 port in the Matrix Plus II System.

The fifty selector codes are numbered from 10 to 59. The selector codes are grouped in five groups of ten keys per group. You can individually enable or disable recognition of any of the five groups from the Interface-DTMF Parameters screen.

If the One Digit Codes option is enabled, selector codes are only one digit long, and there are only 10 of them, numbered 0 - 9.

The "*" and "#" keys on a telephone keypad can be programmed activate any of the selector codes directly. This function is called "Quick Keys".

A selector code always activates both the talk and listen labels assigned to it. If you require separate listen and/or talk access to a destination, you must be sure that two separate selector codes have been configured, one to activate the talk, and another to activate the listen. To activate both the talk and listen simultaneously, assign a third selector code to be both talk and listen at once. Or, if this port has been configured for Multiple Codes (described below) you can enter both selector codes.

For example, assume that the selector code "14" has been assigned as a talk to the "Producer". Then, after receiving a ready prompt from the MTX-100 , pressing "1" and then "4" on your telephone touch tone keypad will activate a talk to the "Producer".

Entering the number zero followed by a two-digit selector code will deactivate any talk/listen path(s) that were activated by pressing the selector code. For example, entering "014" will disconnect the talk path established in the above example.

This method of deactivating previously set paths cannot be used when the One Digit Codes option is enabled.

Control Codes

Control codes are fixed codes that are specified by the Matrix Plus II System. Control codes perform functions the functions Clear Last Entry, Clear All, Send Call Signal, and Disable DTMF Decoding. They are described in detail in the Control Codes section below.

Control codes cannot be used when the One Digit Codes option is enabled.

Multiple Codes

By default, entering a selector code activates the paths assigned to that code, and deactivates any previously activated paths. However, it is also possible to configure a port for Multiple Codes, which allows selector codes to be active until specifically deactivated (by entering a 0 followed by that selector code).

If the One Digit Codes option is enabled in addition to the Multiple Codes option, there is no way to turn off a path once it has been activated.

Prompt Tones

Prompt tones are the audible tone sequences that the MTX-100 sends to you, the user. The MTX-100 issues four distinct prompt tone sequences: Password Request, Access Granted, Ready, and Error. They are described in detail in the Prompt Tones section below.

First Code Only

During normal operation, DTMF tones present in the audio input to the port are decoded at all times. However, certain program sources may contain DTMF tones that are not intended to be interpreted as selector codes, and can inadvertently re-route the audio path. For example, telephone company commercials.

When First Code Only is enabled, DTMF tone detection is disabled after the first valid code is received. Thise feature allows you to set up your program feed, then disable decoding to ensure that your paths are not accidentally rerouted. To re-enable tone decoding, you must hang up and call back again. DTMF decoding can also be disabled at any time by entering the Disable DTMF Decoding control code, described in the Control Code Reference section below.

Using DTMF Decoding

This section describes how to use "direct inward access" ("DIA") to access a Matrix Plus II System once it has been successfully installed and configured. The first section describes the basic sequence of operation of DIA. The following sections provide the specifications of the prompt tones produced by the MTX-100, and the control codes available.

How To Use Direct Inward Access

To use Direct Inward Access (DIA), the MTX-100 card providing the port must have the DTMF-1 option installed, and the port must first be configured as described in the Interfaces - DTMF Parameters section of the Configuration Program chapter of this manual.

To use DIA, you call in over a phone line, and the Matrix Plus II System answers your call. The MTX-100 will then issue an "password request" prompt tone sequence to signal you to enter an password if one has been assigned for this line. The password is a four-digit number sequence that is assigned to the line by your system operator. If you do not enter the password correctly, the MTX-100 will repeat the password request prompt. There is no limit on the number of incorrect password attempts you may make. When you enter a valid password (or if no password was assigned) the MTX-100 will issue the "access granted" prompt,

followed immediately by the "ready" prompt to signal you to enter a selector or control code on your telephone's touch-tone keypad. This sequence is described in the section immediately below. The prompt tone sequences are described in the Prompt Tones section following it.

How To Enter DTMF Tone Codes

To activate talk or listen paths in the Matrix Plus II System, you enter two-digit selector codes. Each selector code has been assigned one or more talk or listen labels. You must obtain the list of selector codes from your system operator.

If the One Digit Codes option is enabled for this port, selector codes consist of only a single digit.

There are also control codes which perform specific functions, for example the code zero-nine-nine deactivates all currently active audio paths. The control codes are listed in in the Control Codes Reference section below.

Control codes cannot be used when the One Digit Codes option is enabled.

Entering a selector code causes the talk/listen paths that have been assigned to that code to be activated (as well as any control functions assigned to the labels). Labels activated by a newly entered selector code will replace any previously activated labels, unless your port has the Multiple Codes option enabled. In that case, entering additional selector codes will activate additional paths, similar to pressing several keys at once on an intercom station.

Entering a selector code always activates both the talk and listen labels assigned to it. If you require separate listen and/or talk access to a destination, you should have two separate selector codes configured: the first to activate the talk, the second to activate the listen. If you need both at once, and Multiple Codes is enabled for your port, you can enter both selector codes. Otherwise, you need to have a third selector code assigned to activate both.

To deactivate a path activated by a selector code, enter the number zero followed immediately by the selector code. (The number zero is reserved and is never used as a leading digit in selector code numbers). For example if the selector code "55" is assigned to talk to the intercom station labeled REM-5, the sequence "55" will activate the talk path and the sequence "055" will deactivate it.

This method of deactivating previously set paths cannot be used when the One Digit Codes option is enabled.

For each code you enter, the MTX-100 will issue the ready prompt to indicate that it has acknowledged the code you have just entered, and that it is ready to receive another code. If you enter a code that is out of range or not assigned any talk or listen labels, the MTX-100 will issue the "error" prompt, and then issue the "ready" prompt again.

If you enter an incomplete code (a single digit or the first two digits of a three-digit code), the MTX-100 will wait five seconds for the rest of the code. If it does not receive another digit(s) within that time, it will throw the digit(s) away and wait for another complete code to be entered. No error prompt is issued.

If you enter a valid code followed by an extraneous digit, the MTX-100 will correctly acknowledge the code, and will throw away the extraneous digit before issuing the next ready prompt.

If First Code Only is enabled for your port, DTMF tone detection is disabled after the first valid selector code is entered.

Control Code Reference

The currently defined control codes are as follows.

Control codes cannot be used when the One Digit Codes option is enabled.

Clear Last Entry

The code zero-zero ("00") clears the paths established by your last selector code entry. The clear last entry command keeps track of all of your selector code entries, so entering "00" followed by "00" clears the paths activated by the last two selector codes you entered, and so on.

Clear All

Either of the codes zero-nine-nine ("099") or nine-nine ("99") clears all currently active talk and listen paths.

Send Call Signal

NOT IMPLEMENTED

The code nine-one ("91") causes this port to send a call signal to the matrix as though received from an external device connected to this port.

Disable DTMF Decoding

The code nine-two ("92") disables further DTMF tone decoding on this port. To re-enable tone decoding, you must hang up and call back again.

Prompt Tone Reference

"Prompt tones" are the tone sequences that the MTX-100 sends to you, the user. The MTX-100 issues four distinct prompt tone sequences, as described below.

Password Request Prompt

The "password request" prompt indicates that the MTX-100 is ready for you to enter your password. If the MTX-100 does not recognize the password you have entered, it will not issue an error prompt, but will repeat the password request prompt. There is no limit on the number of incorrect password entry attempts you can make. The password request prompt consists of a tone pair repeated quickly three times. The tone pair consists of a low tone followed quickly by a higher tone. ("doo-dee-doo-dee-doo-dee").

Access Granted Prompt

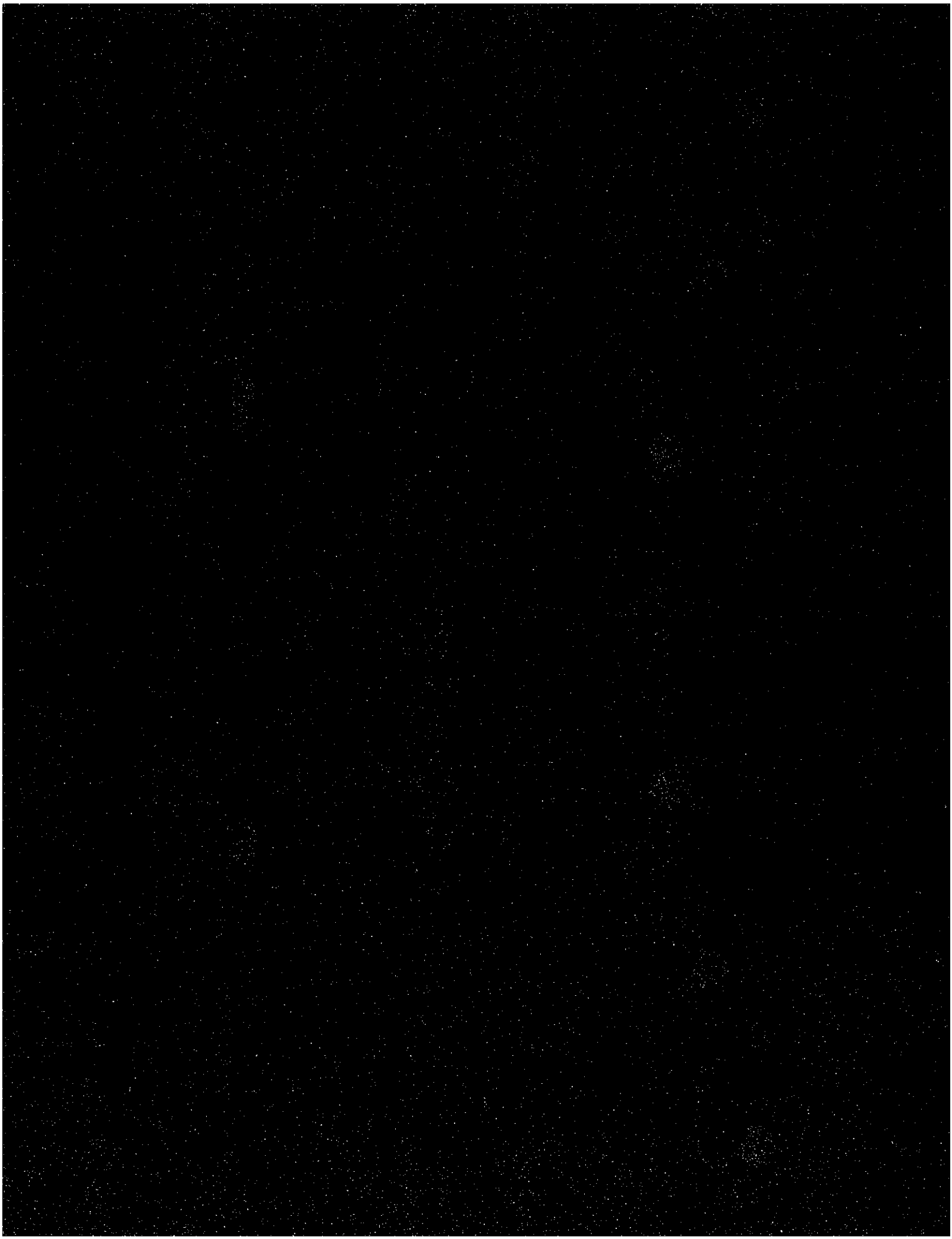
The "access granted" prompt indicates that the MTX-100 has acknowledged your password and that you have been granted access to the Matrix Plus II System. The access granted prompt consists of a series of four ascending tones. ("Doo-doo-doo-deet"). The access granted prompt is always followed immediately by a ready prompt (described below). The complete sequence sounds like ("Doo-doo-doo-deet (short pause) Beep").

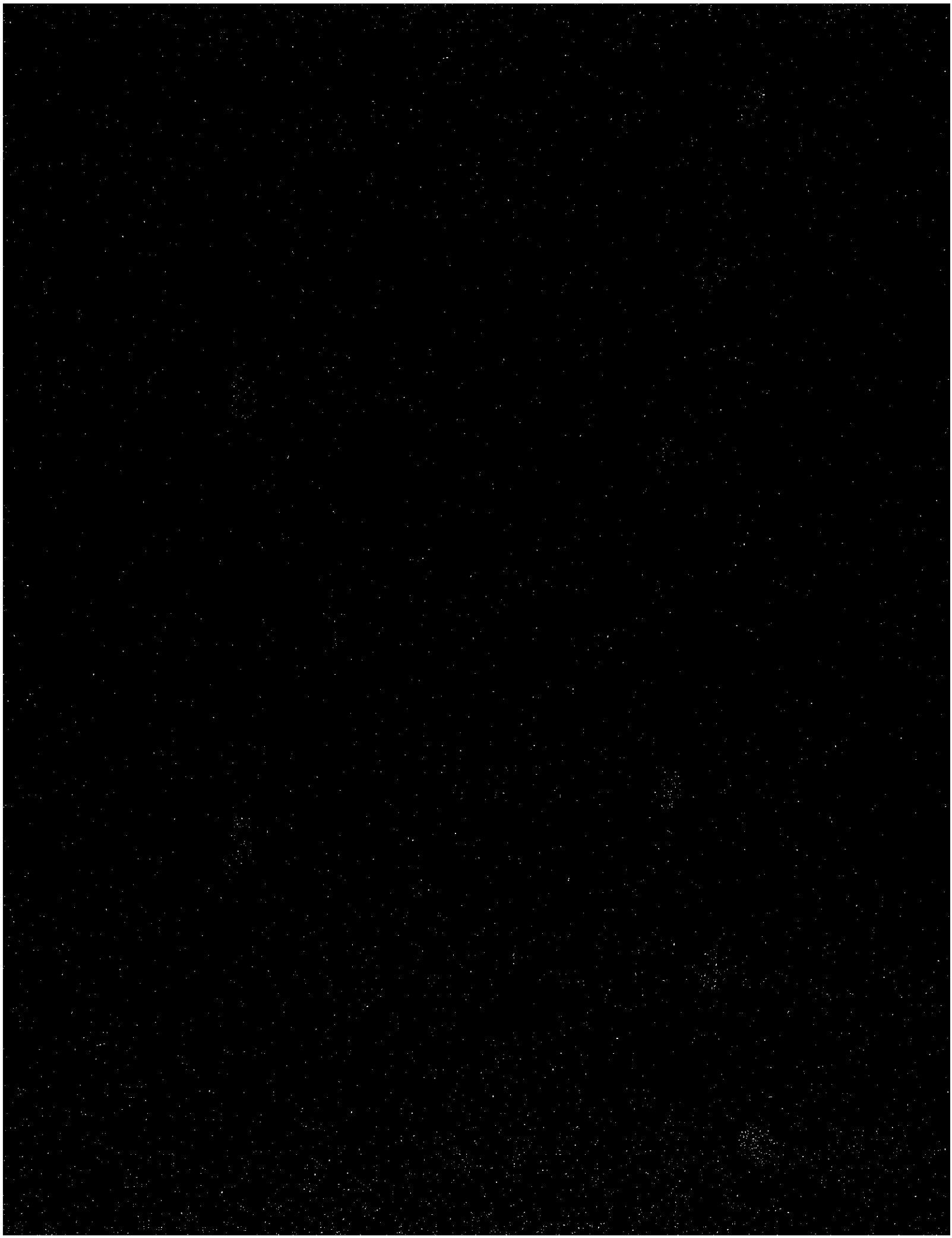
Ready Prompt

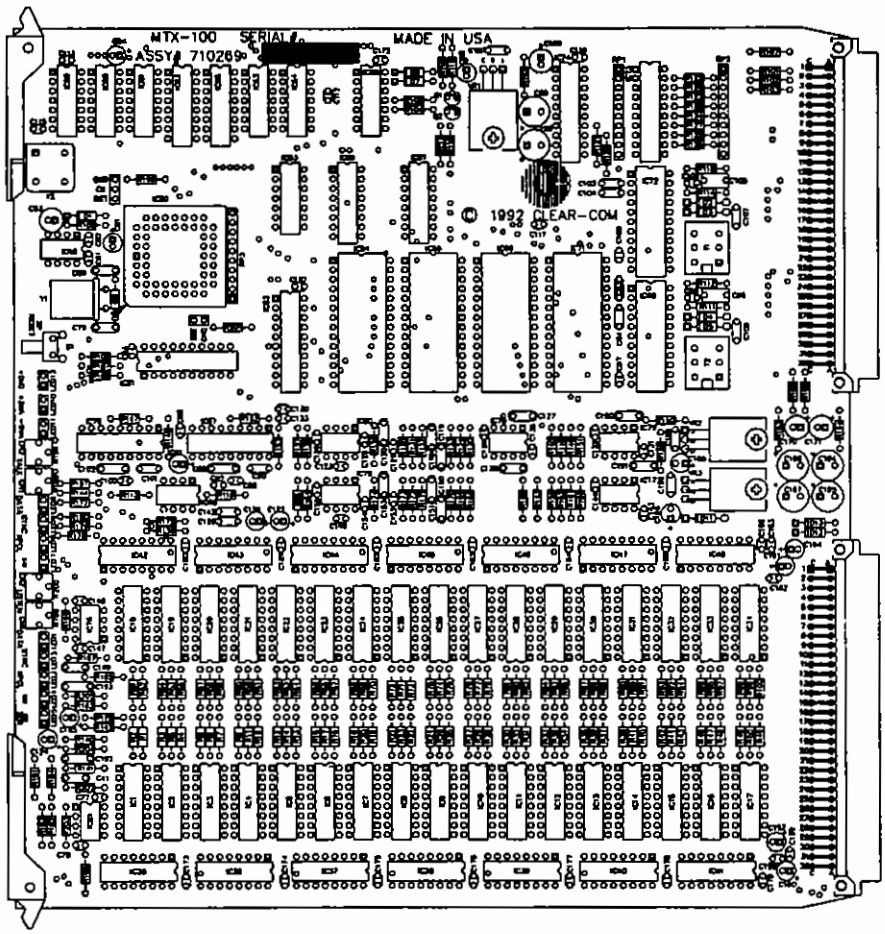
The "ready" prompt indicates that the MTX-100 is ready for you to enter a selector code or control code. It also indicates that it has acknowledged the last selector code or control code that you entered, if there was one. The ready prompt consists of a single high pitched tone. ("Beep").

Error Prompt

The error prompt indicates that you have entered a selector code that is lower than 10 or greater than 59, or that has no talk or listen labels assigned to it. The error prompt is also issued if you enter selector code values in ranges that have been inhibited (selector code access is controlled by your system operator), and for invalid control codes. The error prompt is always followed immediately by a ready prompt. The error prompt consists of a mid-range tone followed by a lower tone. ("uh-oh").







Matrix Plus II System MTX-200

STATION CROSSPOINT CARD

Introduction

This chapter describes the MTX-200 Station Crosspoint Card and its use. It is assumed that the MTX-200 card has been correctly installed in a matrix card frame. For information on installing an MTX-200 see the Matrix Plus II Installation Manual. For information on troubleshooting and maintenance see the Matrix Plus II Maintenance Manual.

Once the MTX-200 card is physically installed, each of the two MTX-200 ports on the MTX-200 card must be assigned a port function from the configuration program. Once each port is assigned a port function, no further operator interaction with the MTX-200 card itself is required under normal circumstances. All of the features of the MTX-200 port are controlled from the Matrix Plus II System Configuration Program. The only operator accessible control is a Reset switch. The input gain of both ports is adjustable under program control from the Configuration Program or an ICS-2002 intercom station. The MTX-200's LED indicators are used to verify its operation and for troubleshooting purposes.

The first two sections of this chapter describe the function of the MTX-200 and its associated 15-pin connectors, and summarize the port functions that may be assigned to each MTX-200 port. The next sections describe the function of its LED indicators and reset pushbutton.

Description

The MTX-200 Station Crosspoint Card option contains a microprocessor and all of the electronic crosspoint switches and communications hardware necessary to add two ports to the matrix. Each of these two ports includes all of the circuitry required to connect a Matrix Plus II System station. The MTX-200 uses a single twisted pair of wires for transmission of digitized audio and data to stations. The MTX-200 is intended to operate only with "D" suffix Matrix Plus II intercom stations which include the following: ICS-2002D, ICS-1802D, ICS-1502D, ICS-102D, and ICS-62D or old stlye stations with a software update: ICS-2000, ICS-1500, ICS-1000, ICS-100, and ICS-60.

IMPORTANT NOTE: The MTX-200 card will not operate interfaces nor will it send or receive 4-wire audio. The 2-wire connection must be made over direct cable (hard copper), no modems, long lines, or repeaters allowed.

15-Pin Connector

Each MTX-200 Port has a 15-pin connector associated with it, located on the back of the MCF Matrix Card Frames. The 15-pin connector provides connections to a station.

Each port and its associated 15-pin connector is numbered sequentially. The left-most crosspoint card slot in the matrix frame contains port numbers 1 and 2, the second card slot contains port numbers 3 and 4, and so on up to ports 49 and 50. In a two frame system port numbers 51 to 100 are located in the second frame. If a card slot is empty, those port numbers are skipped. Note that the extreme left-most card slot is always occupied by the CPU-100 or CPU-150 Frame Controller Card, and does not occupy port numbers.

Port Functions

Each MTX-200 port must be assigned a port function before it can be recognized by the Matrix Plus II System. The port function informs the Matrix Plus II System and configuration program of the type of device that is connected to the port. This is important because the Matrix Plus II System treats each device differently, and the configuration options are different for each device.

For a detailed description of the port functions available for the MTX-200 see the section on Port Functions in the Configuration chapter.

LED Indicators

The MTX-200 Station Crosspoint Card has 8 LED indicators on its front edge as shown in Figure M4-1. These LED indicators provide status information about the MTX-200 card's operation. The paragraphs following Figure M4-1 briefly describe the function of each LED indicator.

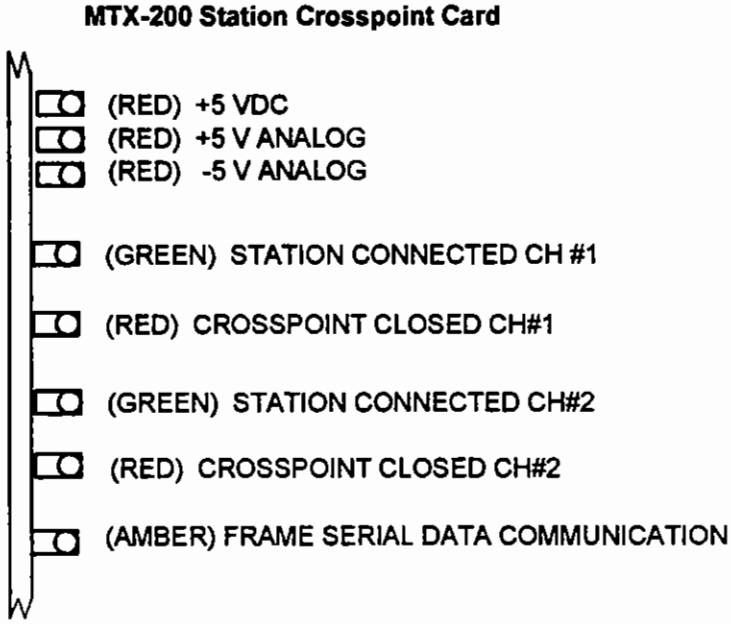


FIGURE M4-1. MTX-200 LED Indicators

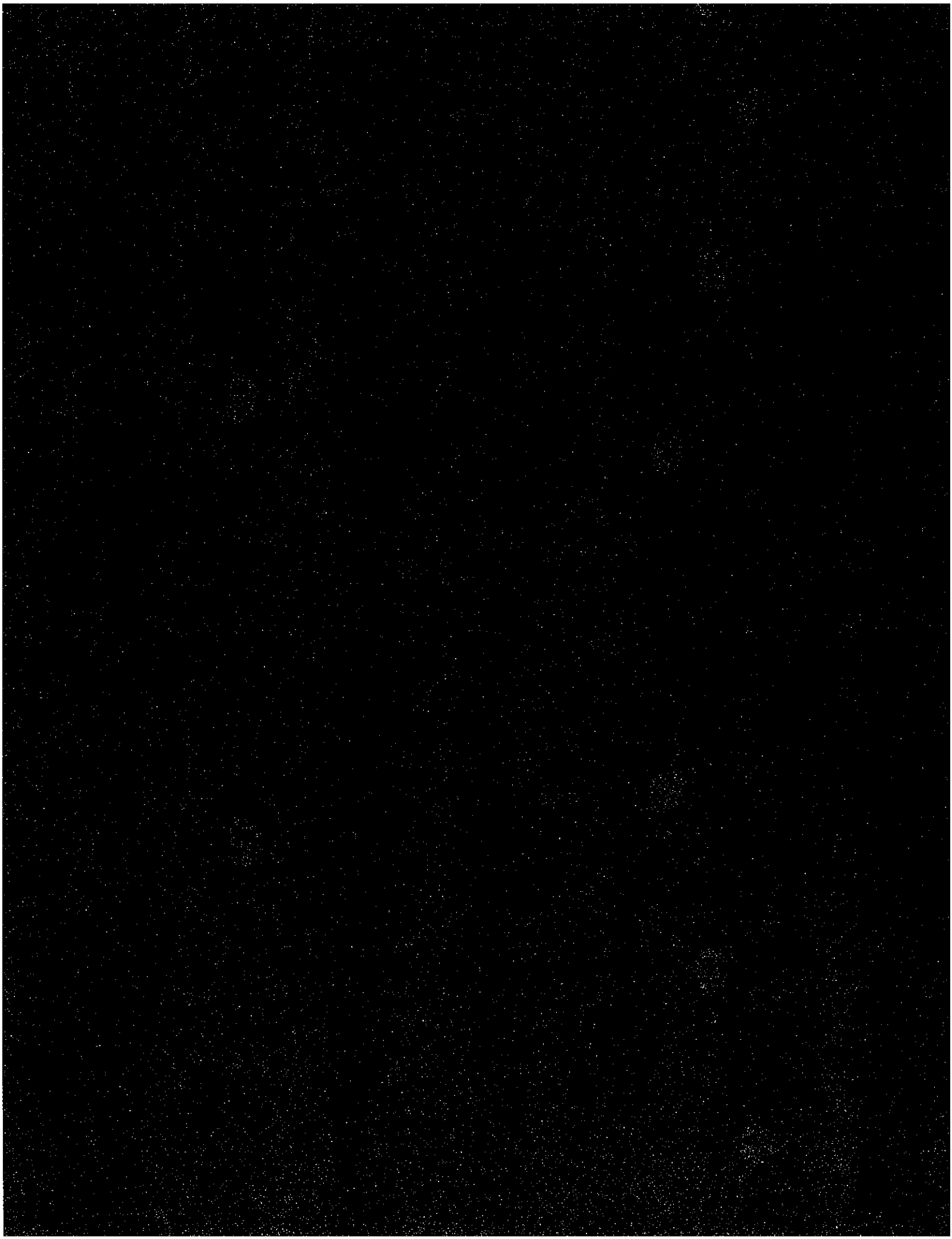
- **+5 VDC (RED)** Indicates the presence of 5 volt digital power supply.
- **+5V ANALOG (RED)** Indicated the presence of the +5 volt analog power supply.
- **-5V ANALOG (RED)** Indicates the presence of the -5 volt analog power supply.
- **STATION CONNECTED CH#1 (GREEN)** When lit, indicates that the first port of this card is connected to a Matrix Plus II intercom station and that data communications to and from the station are established. This LED indicator should always be lit when the port is connected to an intercom station.
- **CROSSPOINT CLOSED CH#1 (RED)** When lit, indicates that at least one crosspoint switch is closed on the first port of this card.
- **STATION CONNECTED CH#2 (GREEN)** When lit, indicates that the second port of this card is connected to a Matrix Plus II intercom station and that data communications to and from the station are established. This LED indicator should always be lit when the port is connected to an intercom station.
- **CROSSPOINT CLOSED CH#2 (RED)** When lit, indicates that at least one crosspoint switch is closed on the second port of this card.
- **FRAME SERIAL DATA COMMUNICATION** (amber). When lit indicates that communication between the CPU-100 Card and one or all of the Crosspoint Cards is actively in progress. In normal use this LED Indicator flickers at least once every three seconds.

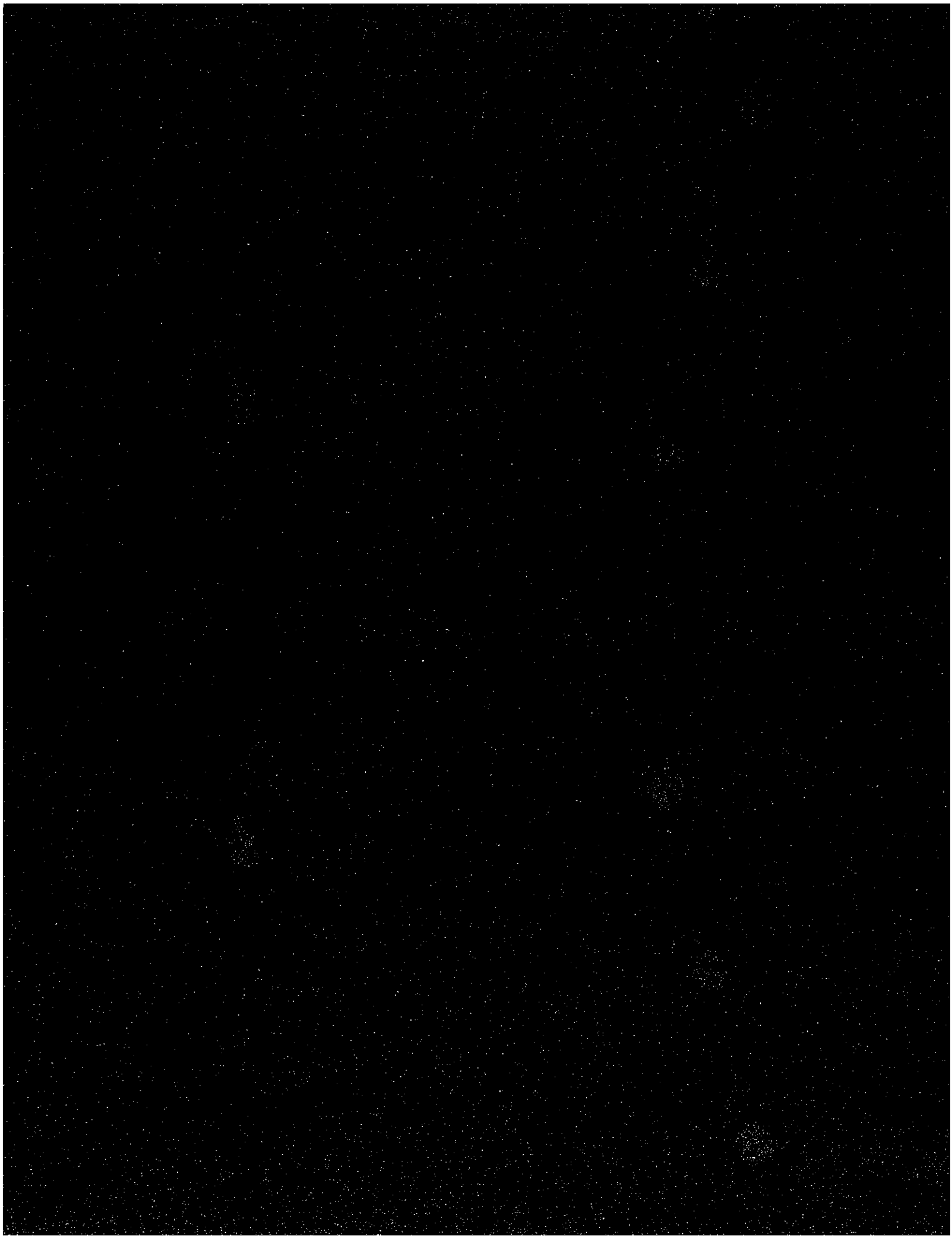
Reset Pushbutton

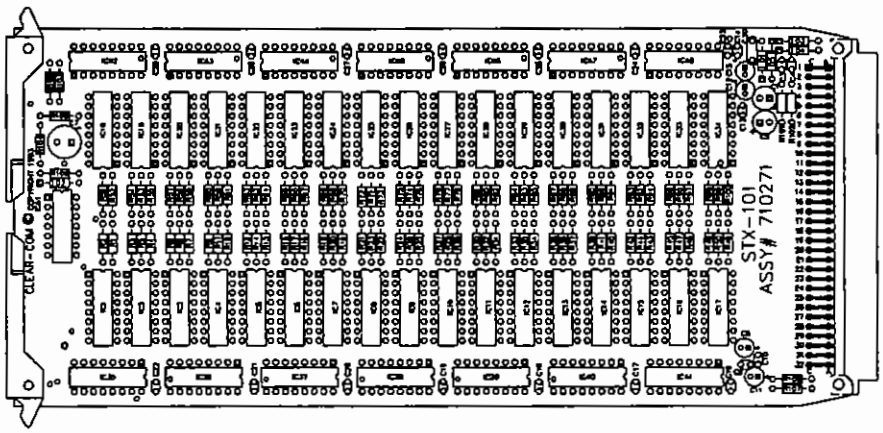
The Reset pushbutton on the front edge of the MTX-200 card causes the microprocessor on the MTX-200 card to stop whatever it is doing and restart from the beginning of its internal program.

Under normal operating conditions, it is never necessary to press the Reset button. Technical personnel might push the Reset button if they believe that the MTX-200 card is behaving incorrectly as a result of corruption of the internal data or instruction sequence of the MTX-200's microprocessor.

Resetting the MTX-200 disconnects all communication paths on both ports of the MTX-200 card and causes any stations connected to be re-initalized. When communication with the CPU-100 Master CPU Controller card is reestablished (which can take several seconds), new talk paths can be activated. Previously existing Talk and Listen paths will be automatically restored if the "Restore Talk Paths" and "Restore Listen Paths" fields are checked in the "Setup - System" screen of the Configuration Program.







Matrix Plus II System STX-101

CROSSPOINT EXPANSION CARD

Introduction

This chapter describes the STX-101 Crosspoint Card and its use. It is assumed that the STX-101 card has been correctly installed in a matrix card frame. For information on installing an STX-101 see the Matrix Plus II Installation Manual. For information on troubleshooting and maintenance see the Matrix Plus II Maintenance Manual.

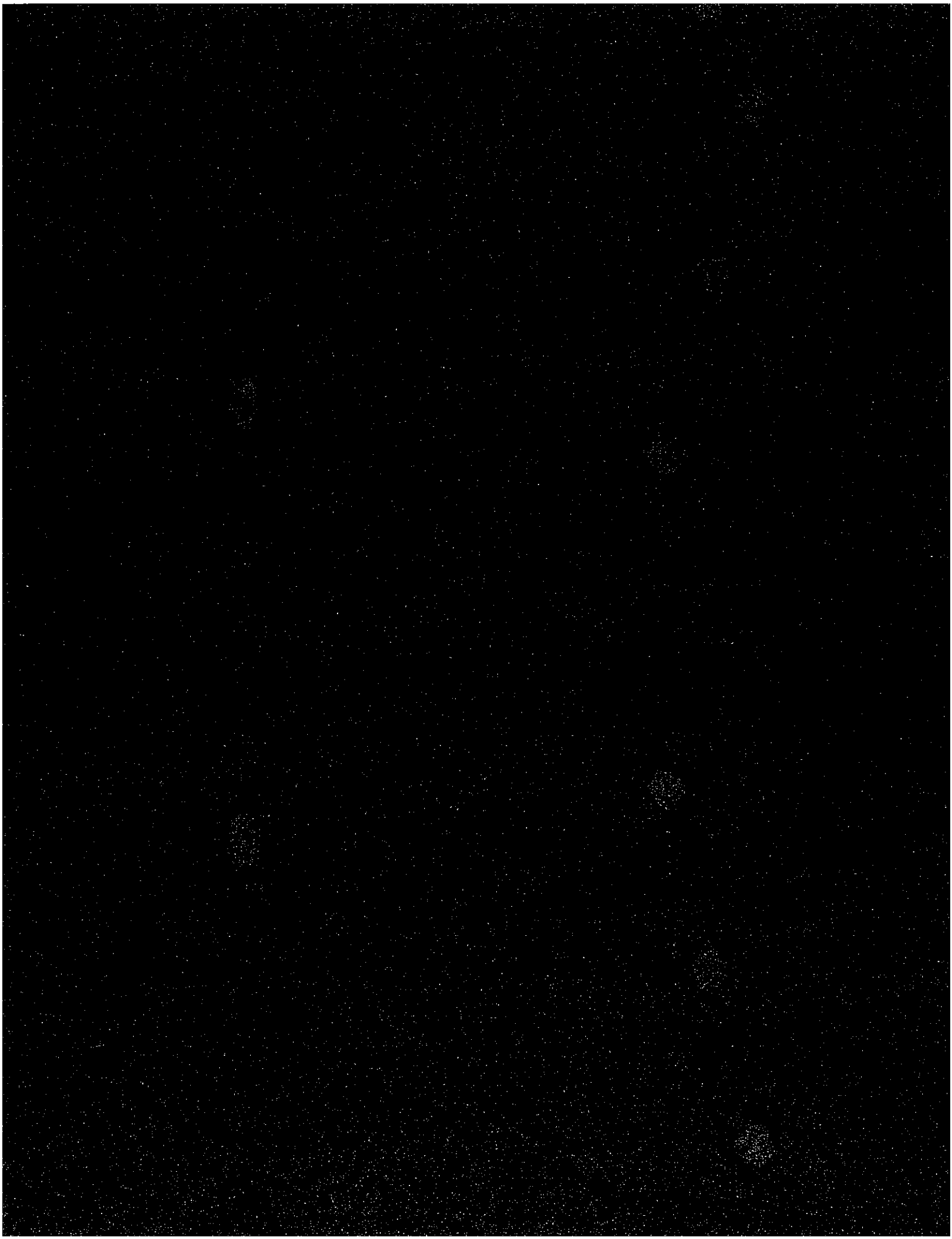
Description

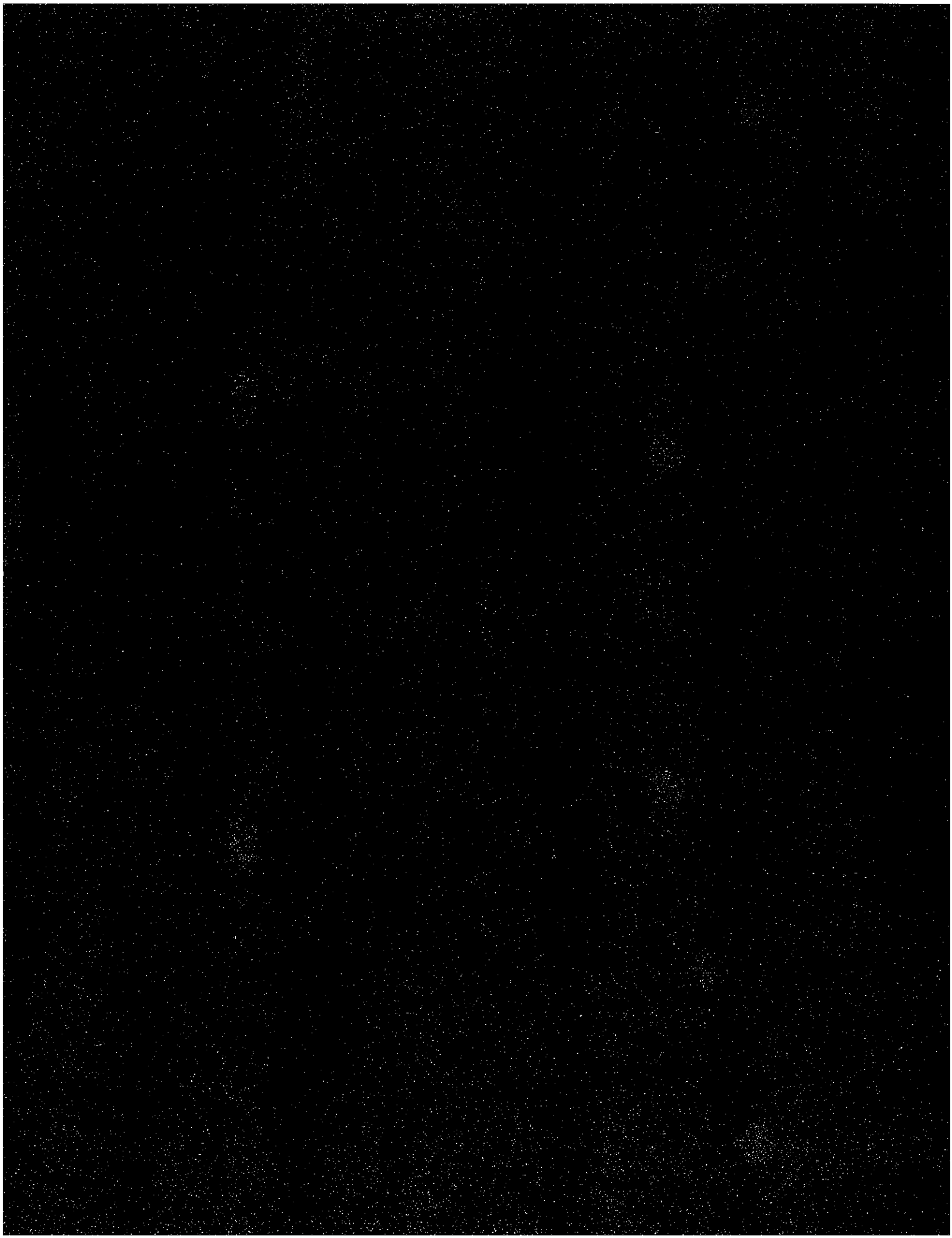
The STX-101 is a card containing crosspoint switches to expand a MTX-100 or MTX-200 from a 2 X 50 to a 2 X 100 set of switches per slot. The STX-101 has no active logic other than that needed to control the CMOS switches. The STX-101 is controlled by its companion MTX card directly above it.

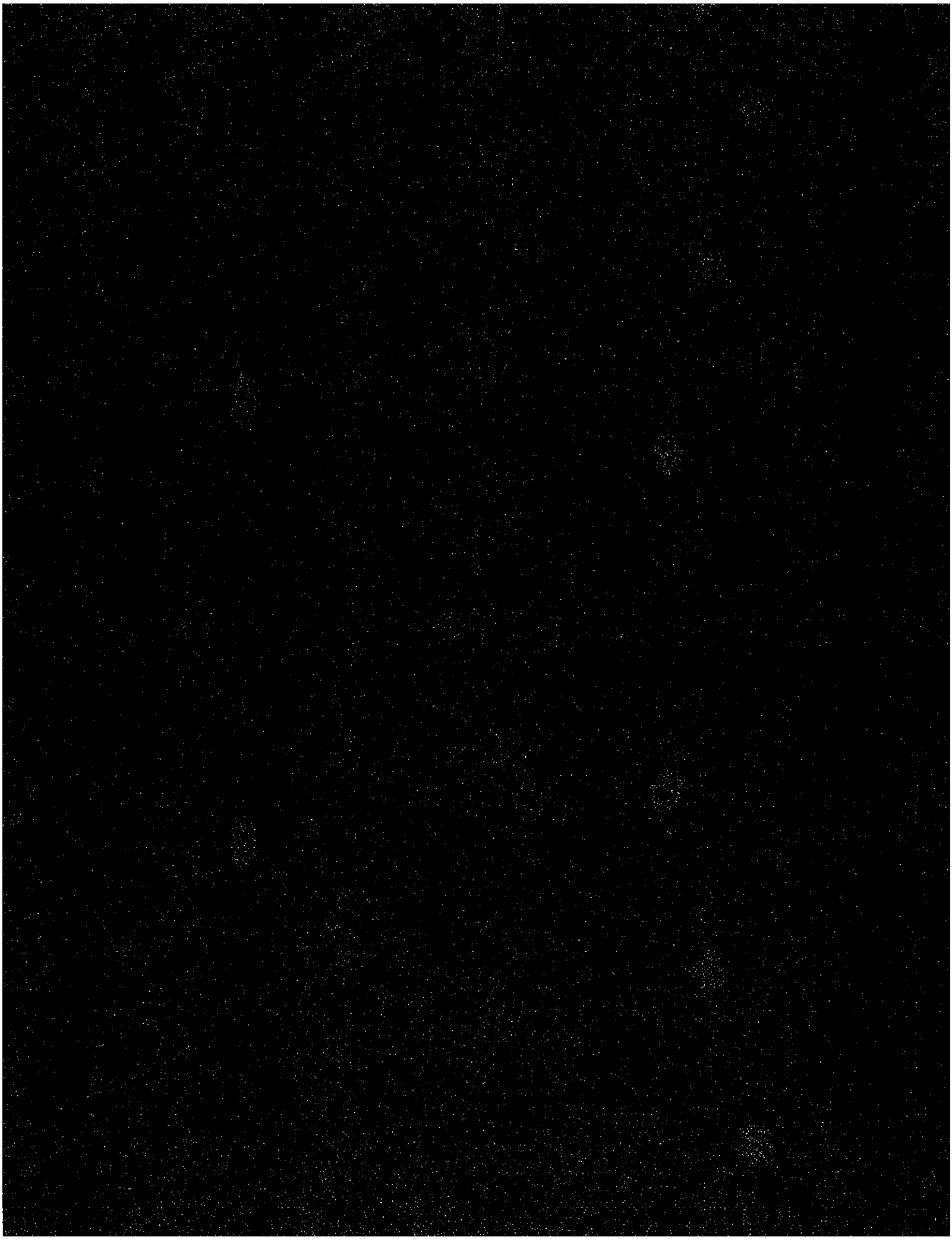
The STX-101 can only be used in the MCF-100 and SCF-101 card frames.

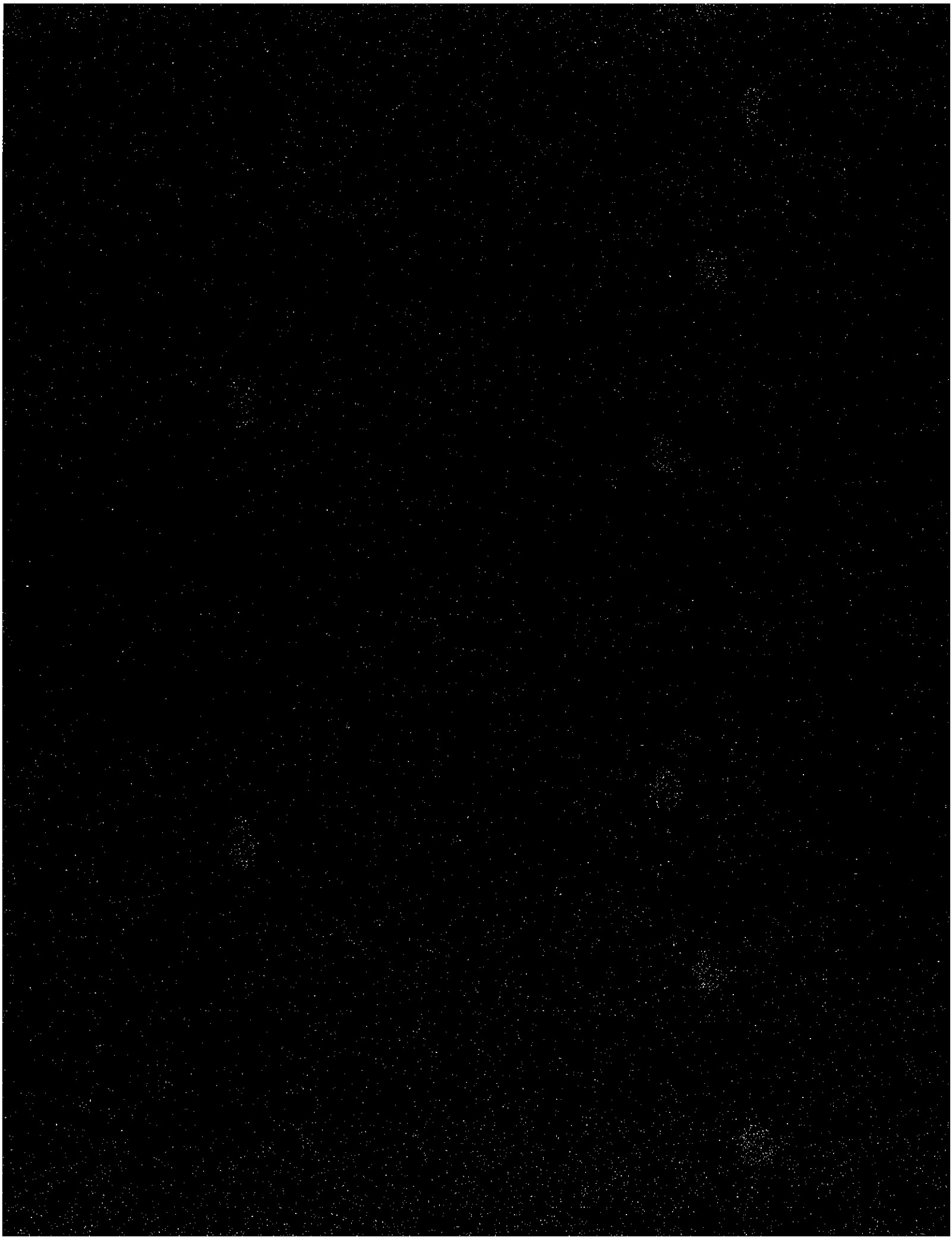
Operation

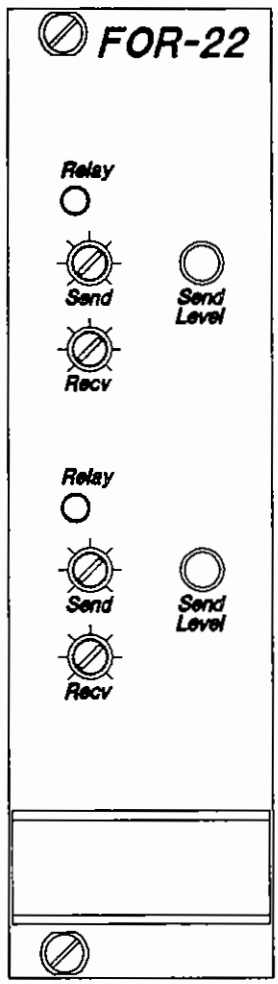
The STX-101 has no indicators or controls on it and there is no system configuration necessary to use it. The card should not require any operator attention.











Matrix Plus II System FOR-22
DUAL 4-WIRE INTERFACE MODULE

Introduction

This section describes how to configure and use the FOR-22 Dual 4-Wire Interface. System operators can use this manual once the Matrix Plus II System has been correctly installed and the FOR-22's internal jumpers have been set. For information on installing the FOR-22 see the Matrix Plus II Installation Manual. For information on troubleshooting and maintenance see the Matrix Plus II Maintenance Manual.

Description

Each of the two channels of the FOR-22 Dual 4-Wire Interface provides the following functions for a port in the Matrix Plus II System.

- Transformer isolation between an external 4-wire audio device or system and the port
- A set of relay contacts which are activated by a call signal from the matrix
- An LED indicator that lights when the relay is active as a result of a call signal from the matrix
- An optically isolated call signal input (from the external device to the matrix)
- Separate "send" (to external device) and "receive" (from external device) level controls on front panel
- Send levels adjustable for line level, IFB feed level, and microphone level (set by internal jumpers)
- A 2-color LED indicates correct signal level to external device

The FOR-22 occupies one slot in the interface section of the IMF-1 Interface Module Frame or the MCF-10 Mini-Matrix Frame. Connections are made to the matrix frame via a 15-pin connector, and to the external device via a 9-pin connector.

Configuration

Each FOR-22 port must be assigned a port function. Depending on the port function and the external device, an FOR-22 channel can be connected to any 4-wire audio device, with several possibilities for call signal handling. The following descriptions cover the general purpose 4-wire connection and three special installations: external telephone interface, 2-way radio, and 4-wire intercom station.

Port Functions

A port with an FOR-22 connected to it can be assigned any port function except for "ICS-xxxx Intercom Station". Selecting a port function that closely describes the use of the port is useful because it informs both the Matrix Plus II System and the station operators of the intended use of the port. The Matrix Plus II System treats call signals differently for some port functions (for further information on the effects of call signals, see the "Setup - Frames" section of the Configuration chapter of this manual). ICS-2002 Station users will find the FOR-22 ports grouped with other interfaces of the same port function in some of the configuration menus.

General Purpose 4-Wire Interface When connecting an external device, you can assign the FOR-22 port the "Four-Wire" port function. In this case the relays on the FOR-22 can be assigned to independent labels, and can be accessed independently of the audio channels of the FOR-22 and call signals still work.

External Telephone Interface You can connect an FOR-22 channel to another manufacturer's telephone interface by assigning it the "Telephone" port function. The Matrix Plus II System then uses the FOR-22 channel's relay to signal the external telephone interface whenever the station operator activates a talk or listen to the FOR-22 port.

A call signal from the FOR-22 to the matrix indicates a ring from the external telephone interface. A steady call signal indicates that the line is in use for "direct inward access".

2-Way Radio Interface You can connect an FOR-22 channel to a 2-way radio. The Matrix Plus II System then uses the FOR-22 channel's relay to key the radio transmitter when the station operator activates a talk to the FOR-22 port.

To configure the FOR-22 as a radio port, you will need to use the Matrix Plus II Configuration Software to do the following:

- Assign the port the Two-Way Radio port function from the Setup - Frame screen.
- From The Setup - Labels screen give the port label a name. By Matrix Plus II System convention, the label should begin with a colon (":"). The colon indicates that the label represents an interface port that will be accessed via another label (in this case a party-line), and that the label should not be assigned to selector keys directly.
- Preset the port to a party-line label from the Global - Groups screen.
- If the radio's transmitter is not designed to be operated for continuous periods of time without overheating, you may want to prevent stations from latching talks to the radio. To do this, configure the party-line label as globally latch disabled from the "Global - Advanced" screen in the Configuration program.
- Set both the talk and listen port labels to Hidden using the Interface - Advanced screen.
- Usually the Preset Talk and Listen Activation field in the Interfaces - Local setup screen for the port is set to Always Active. However, you may want to set it to Push To Talk to allow the audio paths to be keyed by a call signal received at the FOR-22 port from the radio.
- You may wish to enable the Radio Receiver Active tally for the port label from the Interfaces - Local screen.
- A call signal received from the radio port activates call signals to every destination in the port's preset call signal list. Destinations that have listens activated to the 2-way radio port will receive call signals, whether or not they are included in the radio port's preset call signal list. Ports can be added to the port's call signal list from Interface - Advanced screen.
- Assign the party-line label to selector keys on stations to allow them access to the radio port.

The Auto-Setup feature can do all of this for you when you set the port function to Telephone (except for editing the label name and setting the preset call signal destinations, which cannot be auto-setup).

Operation

In normal use the FOR-22 interface requires no operator interaction. The front panel includes Send and Receive level controls, a "Send Level" LED, and a "Relay Active" LED for each channel.

Send Level Controls

The "Send" controls affect the level of the signals from the matrix to the external devices. This control should be adjusted so that the Send Level LED lights green when signal is present. Occasional red flashes due to peaks in the audio signal are acceptable. The Send controls have a range of +/- 10 dB.

Send Level LEDs

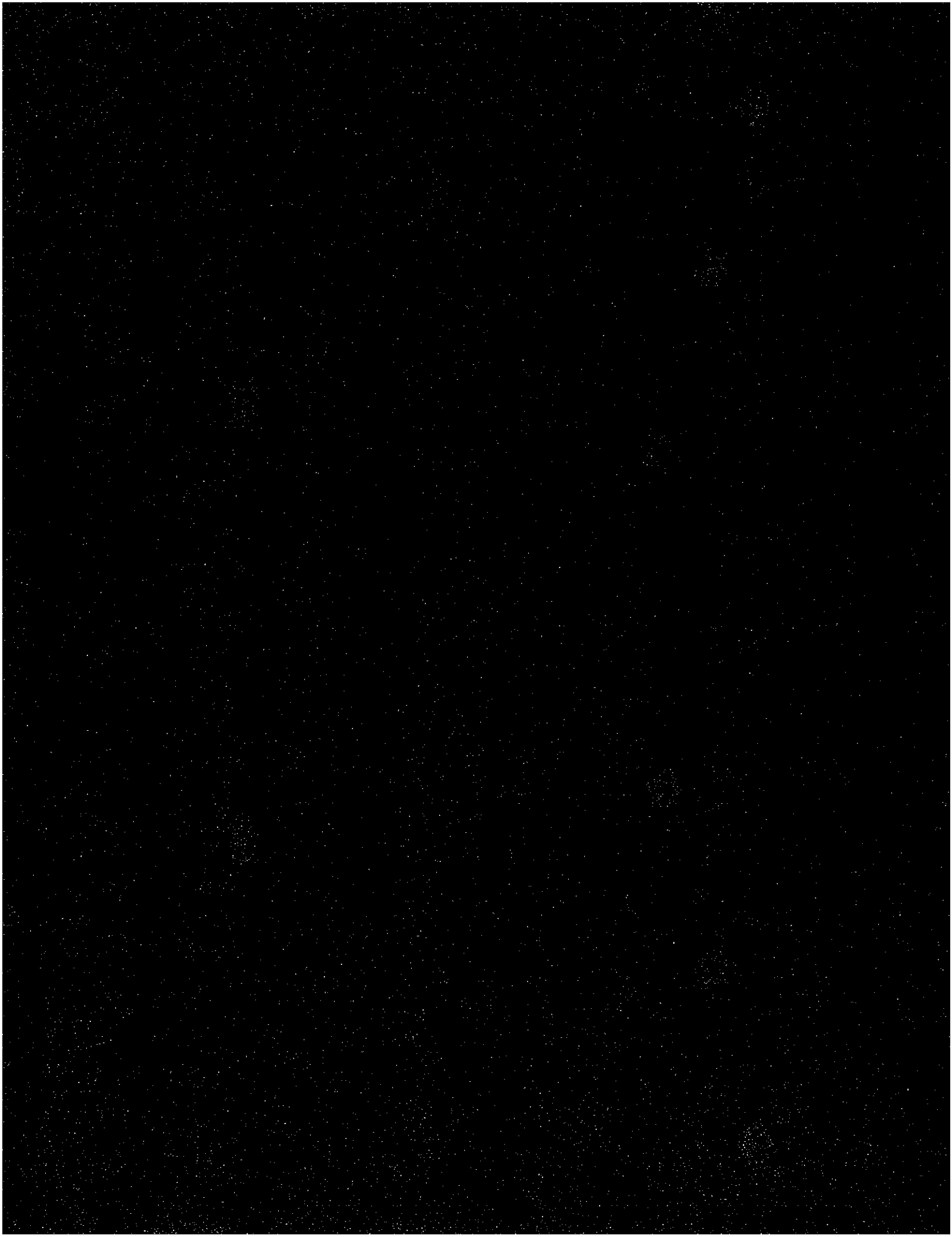
The "Send" 2-color audio level LED lights green when the audio signal being sent to the external device is at a typical acceptable level. The LED lights red when the audio output signal level is too high.

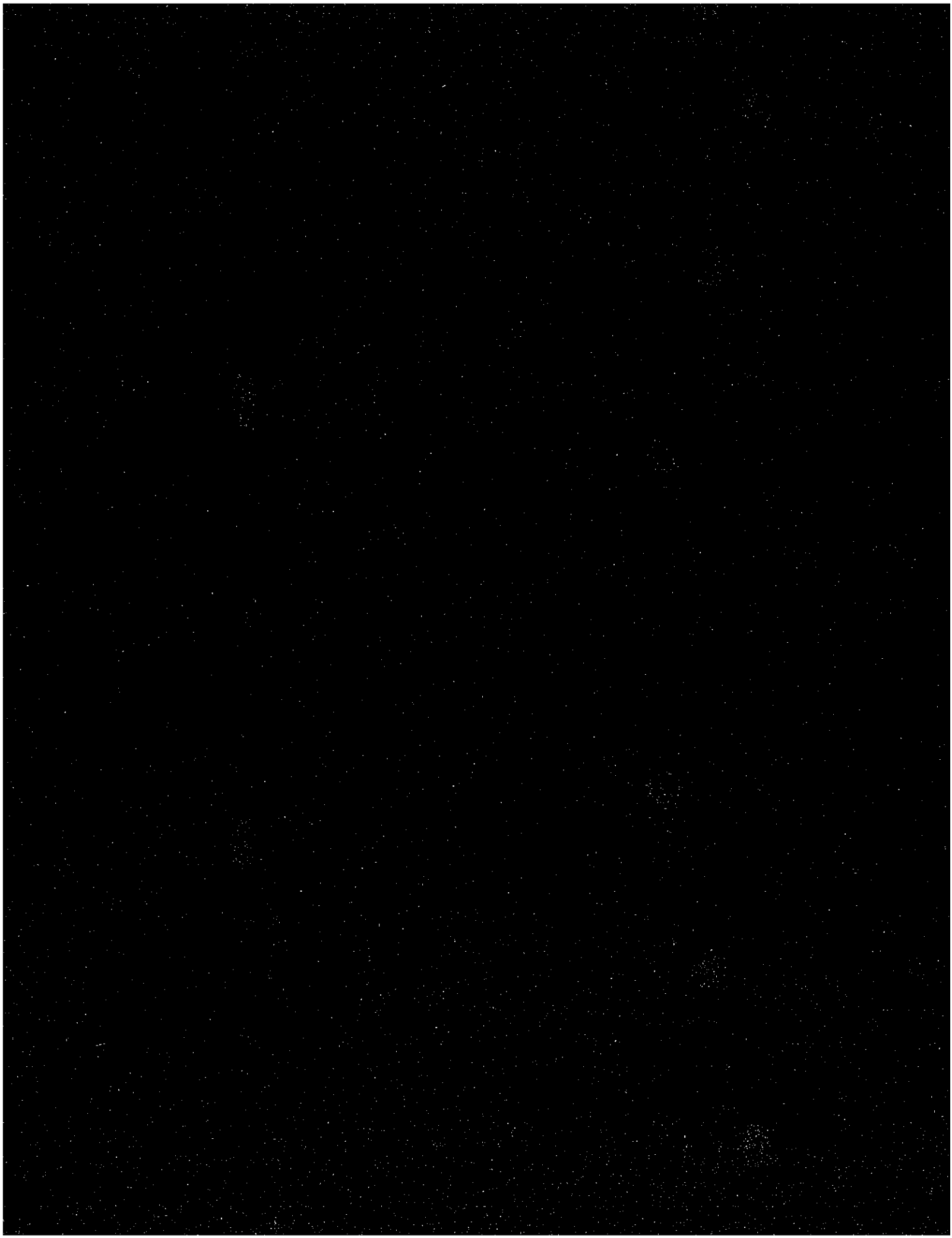
Receive Level Controls

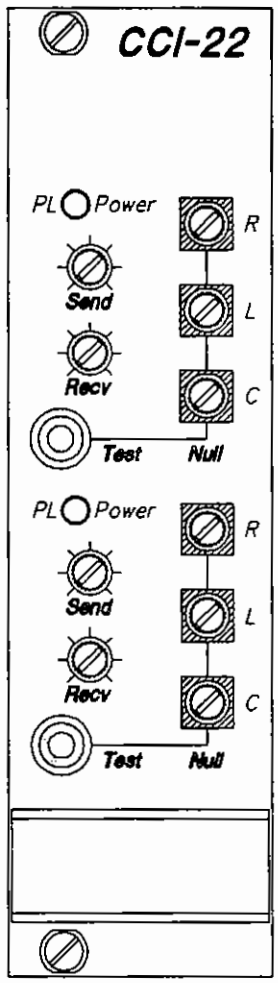
The "Recv" ("Receive") level controls affect the level of the signals sent from the external devices to the matrix. The Recv controls have a range of +/- 10 dB.

Relay Active LED

The "Relay" ("Relay Active") LED lights amber whenever a call signal (from the matrix to the FOR-22 channel) is present, activating that channel's relay.







Matrix Plus II System CCI-22
DUAL PARTY-LINE INTERFACE MODULE

Introduction

This section describes how to configure and use the CCI-22 Dual Party-Line Interface. System operators can use this manual once the Matrix Plus II System has been correctly installed and the CCI-22's internal jumpers have been set. For information on installing the CCI-22 see the Matrix Plus II Installation Manual. For information on troubleshooting and maintenance see the Matrix Plus II Maintenance Manual.

Description

Each CCI-22 Dual Party-Line Interface allows two independent external party-line intercom systems to be connected to the Matrix Plus II System. Clear-Com and most other party-line formats are supported.

Call signals between the party-line and the matrix are fully supported for Clear-Com party-lines only. The call signal paths are optically isolated.

All audio paths are transformer isolated, preventing noise induced by ground-loops in the party-line systems. Send and Receive level controls are included on the front panel.

"Side-tone nulling" circuitry is included.

The CCI-22 occupies one slot in a IMF-1 Interface Module Frame or MCF-10 Mini-Matrix Frame. Connections to the matrix are via 15-pin connectors. Connections to the external party-lines are via 9-pin connectors on the rear panel.

Each channel of the CCI-22 is powered from the Party-Line system it is connected to, not from the Matrix Plus II system.

Two or more CCI-22 interface ports can be preset to a Matrix Plus II System party-line label to create a single unified party-line. In that case, call signals from sources on one of the CCI-22 channels will reach destinations in the other CCI-22 channels in addition to the destination ports within the matrix.

Call signals received from a Clear-Com party-line connected to the CCI-22 interface port are sent to all ports in the matrix which have listens activated to the party-line at the time of the call signal. In addition, call signals are sent to all ports listed in the "preset call signal list" for that port. The preset call signal list consists of all destinations whose labels are checked in the Preset Call Signal column of the Interface - Advanced screen for this port in the configuration program.

Configuration

To configure each CCI-22 port, you will need to use the Matrix Plus II Configuration Software to do the following:

- Assign the port the 2-Wire Party-Line port function from the Setup - Frame screen.
- Preset the port to a party-line label from the Global - Groups screen.
- Set both the talk and listen port labels to Hidden using the Interface - Advanced screen.
- Specify any destinations that should receive a call signal whenever the CCI-22 receives a call signal from the external party-line. This is done from the Preset Call Signal column of the Interface - Advanced screen.
- Assign the party-line label to selector keys on stations to allow access the external party-line.

The Auto-Setup feature can do all of this for you when you set the port function to 2-Wire Party-Line (except preset call signal destinations, which cannot be auto-setup).

Operation

In normal use the CCI-22 interface requires no operator interaction. The front panel includes a set of level controls and a power indicator LED. The front panel also includes a set of 3 "side-tone null" adjustment controls. The "Null" adjustment controls are discussed in the section on the CCI-22 in the Matrix Plus II System Installation Manual.

Level Controls

The "Send" level controls affect the level of the audio signals from the matrix to the external party-line, and the "Recv" ("Receive") control affects the level of the audio from the party-line into the matrix.

The Send and Receive controls have a range of +/- 13 dB. When used with Clear-Com party-line equipment, they are normally set at the center position.

Power LED

The green "Pwr" ("Power") LED when lit indicates that DC power is supplied to the interface. Power for the interface is obtained from the party-line it is connected to.

Side-tone Null Adjustment

"Side-tone" is the portion of the audio signal that the station operator hears in his headset that is his own voice. In interfaces, it is necessary to minimize ("null") the side-tone when an external party-line is placed in the matrix environment. Ideally, there should be no portion of the TALK signal in the LISTEN signal. The side-tone nulling procedure for each channel of the CCI-22 is described here.

The CCI-22 includes sophisticated built-in nulling circuitry, including a test tone generator and an accessory earphone. The earphone plugs into an 1/8 inch phone jack on the front panel. When the earphone is plugged in, it automatically switches on a test tone, and monitors the output of the null circuit.

Separate '**R**' (Resistance), '**L**' (Inductance), and '**C**' (Capacitance) controls compensate for each component of the impedance of the line, providing a superior null.

The null circuit is effective on line lengths between zero and 4000 feet, line impedances between 120 and 350 ohms, and can reduce local audio heard in the received signal by more than 30 dB over the frequency range between 200 and 8K Hz.

To null one channel of the CCI-22, connect the external party-line wiring and devices to the CCI-22 channel. Plug the accessory earphone into the front panel jack labeled "**Test**". Connecting the earphone into the jack disconnects the interface from the matrix and enables a test oscillator. The oscillator produces a squarewave that contains both low and high frequency components allowing you to null all frequencies with a single test signal. The test tone is pulsed in approximately half-second intervals.

Begin the null adjustment described below with the **R**, **L**, and **C** controls set to mid-pot.

To adjust the **R**, **L** and **C** controls, listen to the test tone in the earphone, and adjust first the **R**, then the **L**, then the **C** controls for minimum audible tone in the earphone. Because these controls interact with each other, you will need to go back through this sequence several times. Continue refining the null until the test tone is virtually inaudible.

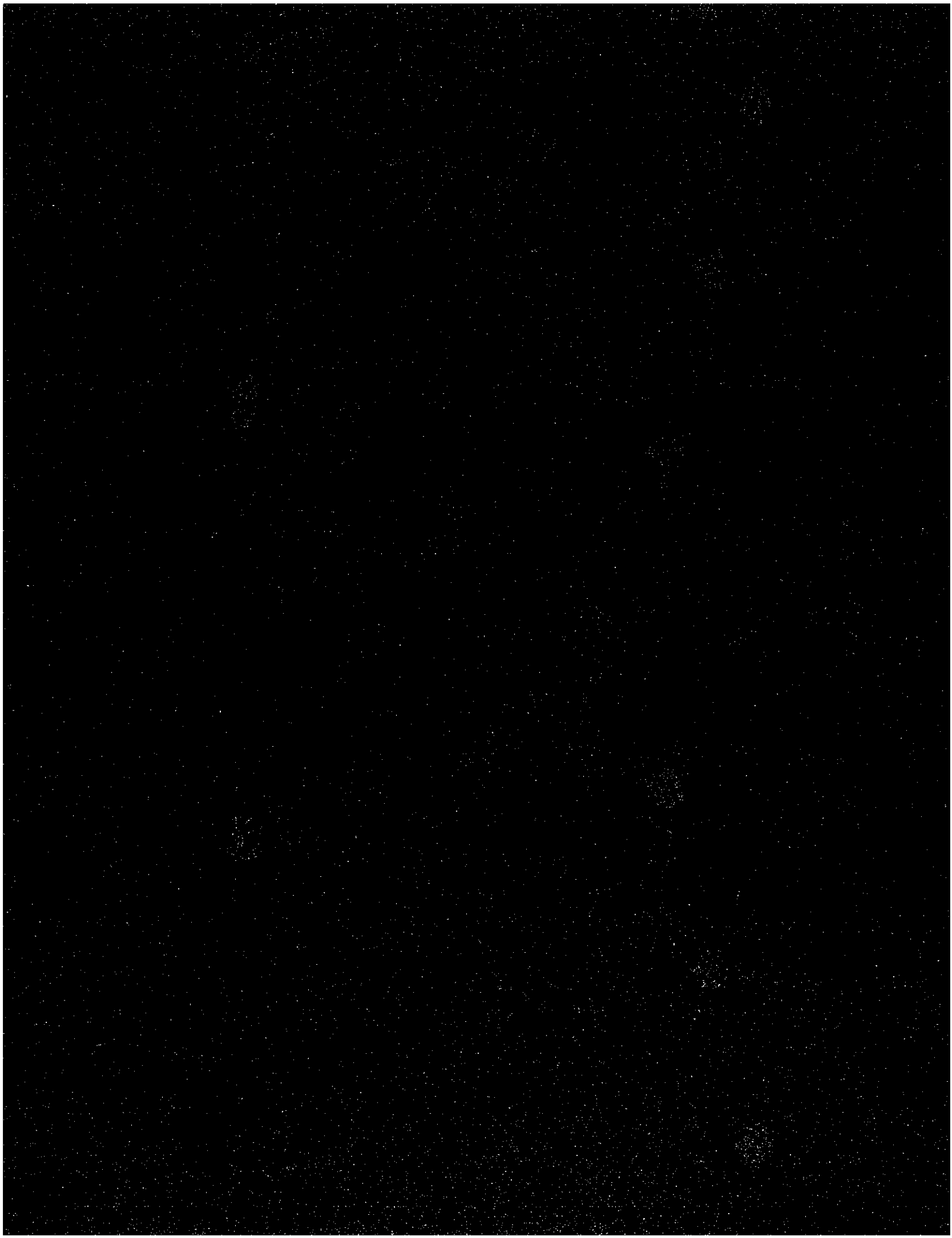
If an almost complete null cannot be obtained, it is likely that something is wrong with the wiring in the external party-line, or with one of the other devices attached to the external party-line. The positions of the **R**, **L**, and **C**

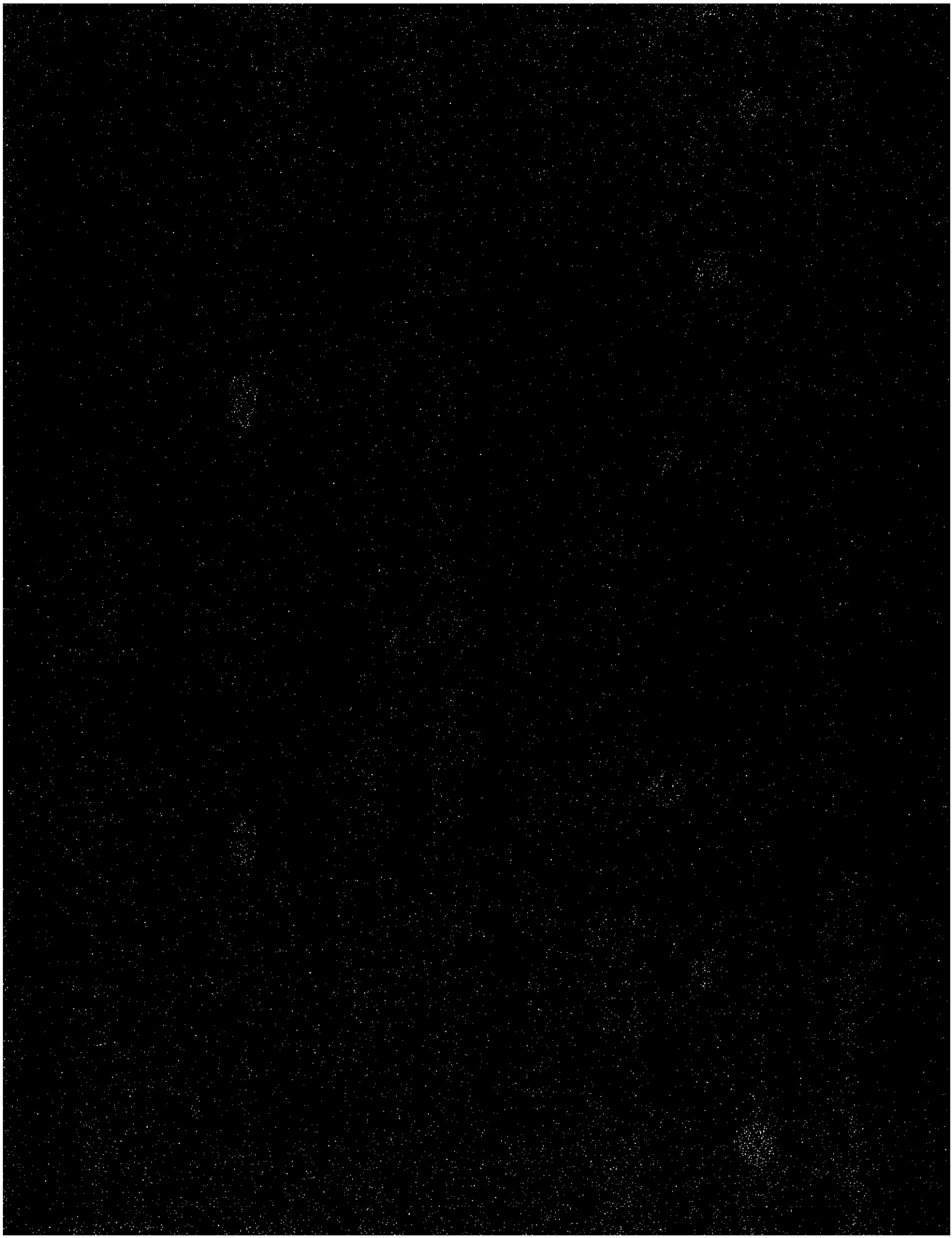
controls when the best possible null has been obtained provide clues as to what the problem might be.

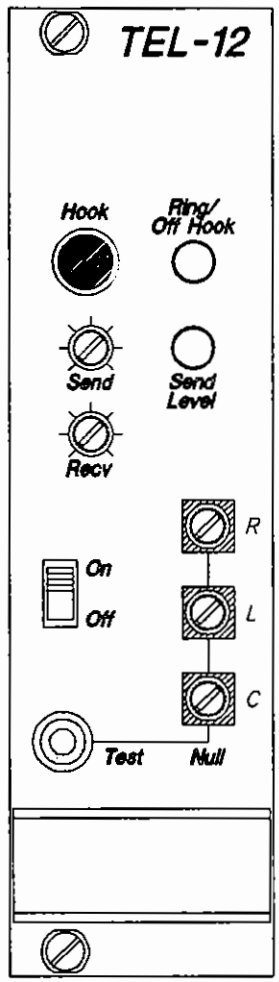
If the **R** control is fully counter-clockwise, the line has more than one termination, or an excessive resistive load on it. If the **R** control is fully clockwise, then the line has no termination.

If the **L** control is fully turned in either direction, it is likely that there is a problem in the external party-line. When a Clear-Com party-line is connected, the **L** control should be just to one side of its mid-pot position. The **L** control corrects for the low-frequency inductive and capacitive elements that the wiring of the external party-line presents to the line.

If the **C** control is fully counter-clockwise, this indicates a very short line (under ten feet). If it is indeed a short line then this is a valid setting. If the **C** control is fully clockwise, this indicates an excessive long line (over 4000 feet). The **C** control compensates for cable capacitance.







Matrix Plus II System TEL-12

TELEPHONE INTERFACE MODULE

Introduction

This section describes how to use the TEL-12 Telephone Interface. It also includes information on the configuration program functions used to configure the TEL-12.

The TEL-12's panel controls and internal switches ("DIP" switches) can select any one of a number of modes of operation for the TEL-12. For this reason, this section describes operation of the TEL-12 in three of the most common modes. These are Intercom Station Telephone Access mode, Self-Service Dial-In mode, and Manual Call Screening mode.

Intercom station operators will normally access a telephone line with the TEL-12 in the Intercom Station Telephone Access mode. However, station operators may need to check with their system operator for further operation instructions if a TEL-12 has been configured in a mode not described here.

Technical personnel configuring the TEL-12 will need to refer to the Matrix Plus II System Installation Manual for details on configuring the TEL-12's internal DIP switches for each of these (and other possible) modes. For information on troubleshooting and maintenance of the TEL-12 see the Matrix Plus II Maintenance Manual.

The first section below describes the basic features of the TEL-12 and its front panel controls and indicators. Subsequent sections cover the configuration parameters of the TEL-12 for each of the three modes of operation described above. Only those configuration parameters that are set via the Configuration Program and the front panel controls are covered here. The DIP switch options for each mode are mentioned, but are covered more thoroughly in the Matrix Plus II System Installation Manual. The final sections cover the use of the TEL-12 in each of the three modes.

Note: In addition to the configurations described here, other configurations are possible. However, certain configurations may result in undesireable crosstalk as a result of the limitations of the TEL-12's analog circuitry. For example, consider a news reporter who calls into the matrix. You would like to provide him with a program feed, and at the same time route his voice in through the matrix to a live broadcast. However, the TEL-12 cannot perfectly isolate his talk from his listen, so some of his outgoing program feed may leak into his incoming voice.

Description

The TEL-12 Telephone Interface allows a standard 2-wire "dial-up/wet" telephone line to be connected to a port in the Matrix Plus II System. The TEL-12 can answer an incoming call automatically ("Auto-Answer") after either 1 or 4 rings, and can be configured to send a call signal whenever it answers a call. The TEL-12 can be configured to be accessible to intercom station operators, or only to outside callers.

The front panel includes a Send level control and Send Level LED, a Receive level control, a Line Seize ("On/Off Hook") pushbutton, an Auto-Answer Enable switch, a Ring/Off Hook LED, and side-tone nulling controls.

The TEL-12 occupies one slot in a IMF-1 Interface Module Frame or MCF-10 Mini-Matrix Frame. The TEL-12 provides transformer isolation between the telephone line and the matrix frame. The TEL-12 includes a "normally open" relay that closes when the line is in use (off hook). Connections to the matrix are via 15-pin connector, and connections to the telephone line and external relay connections are via screw terminals.

Controls and Indicators

The front panel includes a Send Level control and Send Level LED, a Receive level control, a Line Seize ("On/Off Hook") pushbutton, an Auto-Answer Enable switch, a Ring/Off Hook LED, and side-tone nulling controls.

Send Level Control

The Send control sets the level of the signal from the TEL-12 to the telephone line. The Send control has a range of +/- 6 dB. Adjust the Send control such that voice peaks always flash green and occasionally flash red on the Send Level LED.

Send Level LED

The bi-color Send Level LED lights green when the audio signal being sent to the telephone line is at a typical acceptable level. The LED lights red when the audio output signal level is too high.

Receive Level Control

The Receive control sets the level of the signal from the telephone line to the TEL-12. The Receive control has a range of +/- 10 dB. To set the appropriate level, listen to the receive level from the telephone line in normal use. Adjust the Receive control until the telephone receive level is comparable to the volume level of other intercom activity.

Line Seize Pushbutton

The Line Seize pushbutton (also referred to as the "Hook" pushbutton) allows a local user to manually toggle the TEL-12 line from "on-hook" (telephone line not in use) to "off-hook" (line seized) status and vice versa. If a line is seized at the interface by the Line Seize pushbutton that line can be released by pushing the button again, or by auto-disconnect (if the Auto-Disconnect DIP switch is set).

The Remote Telephone Line Release feature allows any intercom station user to hang up a TEL-12 interface from their station, even if it was taken off-hook by the Line Seize pushbutton. Doing so also deactivates any active talk or listen paths to the TEL-12 port.

Auto-Answer Switch

The front-panel Auto-Answer Switch allows the local user to enable or disable the Auto-Answering mode of the TEL-12. The Auto-Answer function, in conjunction with the Auto-Disconnect function, allows a TEL-12 to automatically service incoming calls. An outside caller can automatically be connected to a party-line, IFB program feed, or other Matrix crosspoint connection pre-assigned from the Configuration Program.

Auto-Answer is enabled by putting the Auto-Answer Switch in the UP position. The interface will then automatically answer incoming calls after either 1 or 4 rings (set by the "Auto-Answer Ring Number" DIP switch).

Once a line is seized at the interface by Auto-Answer, the line can be released by Auto-Disconnect or by the Line Seize pushbutton. Auto-Disconnect releases the line when dial tone appears on the line (given that it has not been disabled at the Auto-Disconnect DIP switch on the TEL-12). Deactivating all talk or listen paths from all intercom stations to the TEL-12 port will not release the line. This prevents intercom station operators from disconnecting the telephone line when it is in automatic use by outside callers, or in manual use by an intercom station operator who has access to the Line Seize pushbutton.

The Remote Telephone Line Release feature allows any intercom station user to hang up a TEL-12 interface from their station, even if it was seized by auto-answer. Doing so also deactivates any active talk or listen paths to the TEL-12 port.

Ring/Off Hook LED

The Ring/Off Hook LED flashes red at the tempo of a ring signal when the line is being called from outside. Once the line has been seized and while it is off-hook, the LED lights green. The LED is off when the line is on-hook and is not ringing.

Side-tone Null Adjustment

"Side-tone" is the portion of the audio signal that the station operator hears in his headset that is his own voice. In interfaces, it is necessary to minimize ("null") the side-tone when an external telephone line is placed in the matrix environment. Ideally, there should be no portion of the TALK signal in the LISTEN signal. The side-tone nulling procedure the TEL-12 is described here.

The TEL-12 includes sophisticated built-in nulling circuitry, including a test tone generator and an accessory earphone. The earphone plugs into an 1/8 inch phone jack on the front panel. When the earphone is plugged in, it automatically switches on a test tone, and monitors the output of the null circuit.

Separate '**R**' (Resistance), '**L**' (Inductance), and '**C**' (Capacitance) controls compensate for each component of the impedance of the line, providing a superior null.

To null the TEL-12, connect the telephone line. Establish a telephone call to the interface in some manner. Plug the accessory earphone into the front panel jack labeled "**Test**". Connecting the earphone into the jack disconnects the interface from the matrix and enables a test oscillator. The oscillator produces a squarewave that contains both low and high frequency components allowing you to null all frequencies with a single test signal. The test tone is pulsed in approximately half-second intervals.

Begin the null adjustment described below with the **R**, **L**, and **C** controls set to mid-pot.

To adjust the **R**, **L** and **C** controls, listen to the test tone in the earphone, and adjust first the **R**, then the **L**, then the **C** controls for minimum audible tone in the earphone. Because these controls interact with each other, you will need to go back through this sequence several times. Continue refining the null until the test tone is virtually inaudible.

Configuration

To configure a TEL-12 port, you will select one of the application setup sections below, then set the TEL-12's controls and configuration parameters as described in that section.

The telephone port is commonly accessed through a party-line label. When the TEL-12 line is accessed through a party-line, the stations behave like extensions on a standard telephone line. When you activate a talk to the telephone party-line, you "pick up" your "extension". If someone else is talking on the line, you will hear them.

Intercom Station Telephone Access Mode

In Intercom Station Telephone Access mode, any intercom station with the TEL-12 port (or its associated party-line) label assigned to a selector key can answer a call on the TEL-12 line. ICS-2002 intercom station operators can originate a call by using the ICS-2002's Dial Phone mode. If other station operators need to originate a call, must have a key programmed to activate a DTMF sequence, or they must have access to a touch-tone keypad to dial. One way to arrange this is to have a standard telephone connected in parallel with the TEL-12 line (for further information see the Manual Call Screening Operation section below).

To set the TEL-12's controls for Station Access mode, do the following:

- Set the Auto-Answer switch to Off.
- Ensure that the "Auto-Disconnect" DIP switch is set to On.
- The Matrix Line Off Delay DIP switch can be set to either On or Off. (The effect is described in the Operation section below).

To configure the TEL-12 port, you will need to use the Matrix Plus II Configuration Software to do the following:

- Assign the port the Telephone port function from the Setup - Frame screen.
- From The Setup - Labels screen give the port label a name. By Matrix Plus II System convention, the label should begin with a colon (":"). The colon indicates that the label represents an interface port that will be accessed via another label (in this case a party-line), and that the label should not be assigned to selector keys directly.
- Make sure that the Prevent Stations From Calling Out field in the Interface - Local Setup screen for this port is not checked.
- Preset the port to a party-line label from the Global - Groups screen.

- Set both the talk and listen port labels to Hidden using the Interface - Advanced screen.
- Turn on Auto-Listen for the party-line label from the Global - Advanced screen.
- Be sure that the Preset Talk and Listen Activation field in the Interfaces - Local setup screen for the port is set to Always Active.
- You may wish to enable Telephone Off-Hook tally for the port label from the Interfaces - Local screen.
- You may wish to enable the In-Use tally for the party-line label from the Global - Advanced screen.
- Specify the stations that will answer calls on this phone line from the Preset Call Signal column of the Interface - Advanced screen.
- Assign the party-line label to selector keys on stations to allow them access to the telephone line.

The Auto-Setup feature can do all of this for you when you set the port function to Telephone (except for editing the label name and setting the preset call signal destinations, which cannot be auto-setup).

Self-Service Dial-In Mode

In Self-Service Dial-In mode (also referred to as "Telephone IFB" mode) outside callers dial in and the TEL-12 automatically answers. The caller can be automatically connected to a preset party-line, station, or program feed. Using "direct inward access", the caller can specify paths within the matrix (this requires that the matrix card for the port have the DTMF-1 option installed). Auto-Disconnect will release the line automatically after the caller hangs up.

To set the TEL-12 controls for Self-Service Dial-In mode, do the following:

- Set the Auto-Answer switch to On.
- Ensure that the "Auto-Disconnect" DIP switch is set to On.
- The Matrix Line Off Delay DIP switch can be set to either On or Off. (The effect is described in the Operation section below).

Use the Matrix Plus II Configuration Software to do the following:

- Assign the port the Telephone IFB port function from the Setup - Frame screen.
- From The Setup - Labels screen give the port label a name. This is the label that will be used to access the telephone port.
- Check the Global IFB field for the telephone port in the Global - Advanced screen.

- Be sure that the Preset Talk and Listen Activation field in the Interfaces - Local setup screen for the port is set to Always Active.
- You may wish to enable the Prevent Stations From Calling Out field in the Interface - Local Setup screen for this port. Doing so reserves the port for incoming calls by preventing outgoing calls.
- You may wish to enable the In-Use tally for the party-line label from the Global - Advanced screen.
- You may wish to set Global Latch Disable for the telephone label from the Global - Advanced screen.
- Specify the stations that will receive a call signal when the TEL-12 auto-answers from the Preset Call Signal column of the Interface - Advanced screen.
- Assign the party-line label to selector keys on stations to allow them access to the telephone line.
- Assign program feeds by setting forced crosspoints from each one to the telephone port (IFB destination) from the Interfaces - Advanced screen.

  Assigning program feeds with forced crosspoints can also be done using the AP-22 Assignment Panel. For details see the Assignment Panels section of the Stations - ICS-2002 chapter of this Operations manual.

The Auto-Setup feature can do all of this for you when you set the port function to Telephone (except for editing the label name, setting the preset call signal destinations, and other preferences which cannot be auto-setup).

If the DTMF-1 Option has been installed in the MTX-100 port that the TEL-12 is connected to, the TEL-12 port can be configured so that the caller can select audio paths within the matrix ("direct inward access"). When the TEL-12 answers the call, the MTX card first prompts the caller for a password (if one has been assigned). Then, the MTX card prompts the caller to enter "selector codes" that specify talk and listen paths within the system. The caller has the same options that an intercom station operator has, so it is not necessary to assign the TEL-12 port to a party-line or to assign it fixed crosspoints. For details of direct inward access, see the Matrix Cards - MTX-100 section of this Operations manual.

Manual Call Screening Mode

In Manual Call Screening mode, an intercom station operator with access to the TEL-12's Line Seize pushbutton (the "operator") answers incoming calls on a standard telephone wired in parallel with the TEL-12.

Once the operator determines which destination should receive the incoming telephone call, he presses the Line Seize pushbutton on the TEL-12, which takes the TEL-12 off-hook and makes the incoming telephone call available to the telephone party-line that the TEL-12 port is preset to. Then he sends that destination a call signal from his intercom station and informs them that a call is waiting. The destination then activates a talk to the telephone party-line to access the call. The operator then hangs up the standard telephone.

When the call is complete the destination station operator can inform the operator, and the operator can hang up the TEL-12 using the Line Seize pushbutton. Or, if the "Auto-Disconnect" DIP switch is set, the TEL-12 will automatically hang up shortly after the destination hangs up.

The destination station user can also use the Remote Telephone Line Release feature to hang up the phone.

The operator can also originate outside calls on the standard telephone, and make them available to destinations within the matrix.

To set the TEL-12's controls for Manual Call Screening mode, do the following:

- Set the Auto-Answer switch to Off.
- Set the Matrix Line Off Delay DIP switch to Off. (The effect is described in the Operation section below).
- The "Auto-Disconnect" DIP switch can be set On or Off. This determines whether the operator will be required to manually hang up the line after each call by using the On/Off Hook pushbutton.

To configure the TEL-12 port, you will need to use the Matrix Plus II Configuration Software to do the following:

- Assign the port the Telephone port function from the Setup - Frame screen.
- From The Setup - Labels screen give the port label a name. By Matrix Plus II System convention, the label should begin with a colon (":"). The colon indicates that the label represents an interface port that will be accessed via another label (in this case a party-line), and that the label should not be assigned to selector keys directly.

- Enable the Prevent Stations From Calling Out field in the Interface - Local Setup screen.
- Preset the port to a party-line label from the Global - Groups screen.
- Set both the talk and listen port labels to Hidden using the Interface - Advanced screen.
- Turn on Auto-Listen for the party-line label from the Global - Advanced screen.
- Be sure that the Preset Talk and Listen Activation field in the Interfaces - Local setup screen for the port is set to Always Active.
- You may wish to enable Telephone Off-Hook tally for the port label from the Interfaces - Local screen.
- You may wish to enable the In-Use tally for the party-line label from the Global - Advanced screen.
- Assign the party-line label to selector keys on stations to allow them access to the telephone line.

The Auto-Setup feature can do all of this for you when you set the port function to Telephone (except for editing the label name and other preferences which cannot be auto-setup).

Operation

This section describes the operation of the TEL-12 in each of the following modes: Intercom Station Telephone Access mode, Self-Service Dial-In mode, and Manual Call Screening mode.

Intercom Station Telephone Access Mode

In Intercom Station Telephone Access mode, any intercom station with the TEL-12 port (or appropriate) label assigned to a selector key can answer a call on the TEL-12 line. They can then use the station microphone and speaker (or headset) just like a standard telephone handset. ICS-2002 intercom station operators can originate a call by using the ICS-2002's Dial Phone mode. If other station operators need to originate a call, they must have access to a touch-tone keypad to dial from or must have a key programmed to activate a DTMF sequence. One way to arrange this is to have a standard telephone connected in parallel with the TEL-12 line (see the Manual Call Screening example for further details).

To pick up the phone line from an intercom, activate a talk to the party-line or interface label assigned to the TEL-12 line. To hang up the line, deactivate the talk, and the "auto-disconnect" feature will automatically hang up the TEL-12.

If the Matrix Line Off Delay feature is enabled, there will be a period of 15 seconds between when you deactivate the talk or listen to the TEL-12 port and when the TEL-12 hangs up the line. This allows you time to transfer the call to another station, or to cover an accidental deactivation of the path to the TEL-12 without losing the call.

If your station is on the "preset call signal list" for the TEL-12 port, you will automatically receive a call signal whenever the TEL-12 answers an incoming telephone call. The call signal has the same pattern as a telephone ring, and continues for as long as the line is ringing.

Self-Service Dial-In Mode

In Self-Service Dial-In mode, outside callers dial in and the TEL-12 automatically answers. The caller is connected to a preset party-line, station, or program feed automatically. Auto-Disconnect will release the line automatically after the caller hangs up. This mode can also be used to implement "direct inward access" and "Dial-up IFB".

If you are calling in from an outside line in Self-Service Dial-In mode, the audio paths will be preset and available as soon as your call is answered by the TEL-12. The call will be answered by the TEL-12 after either 1 or 4 rings depending on how your system is configured.

If you are calling in on a "direct inward access" line and no audio paths are preset, you may need to enter passwords, selector codes, and/or control codes to activate audio paths. The section in this manual describing operation of the MTX-100 Crosspoint Card with DTMF describes these codes and how to use them.

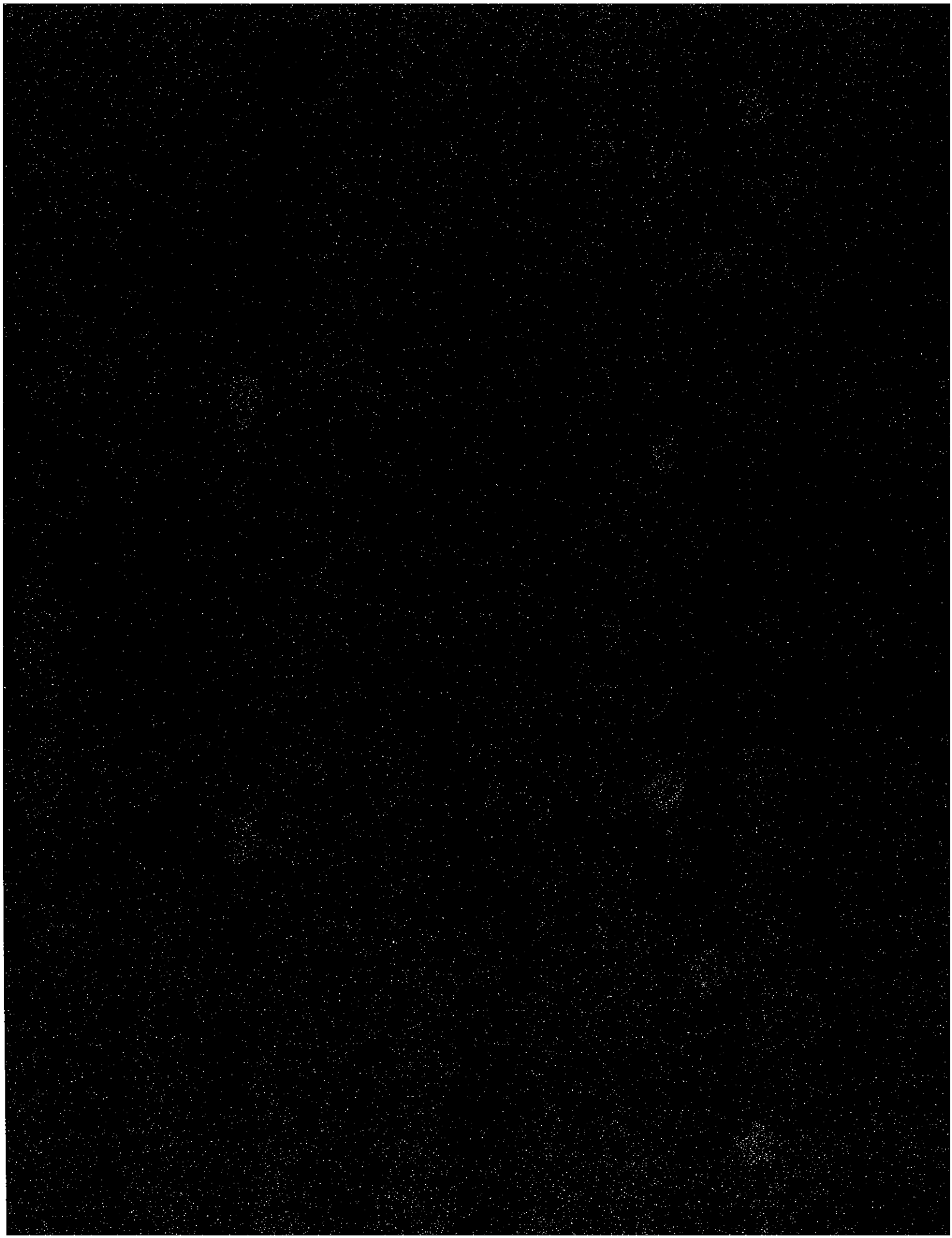
Manual Call Screening Mode

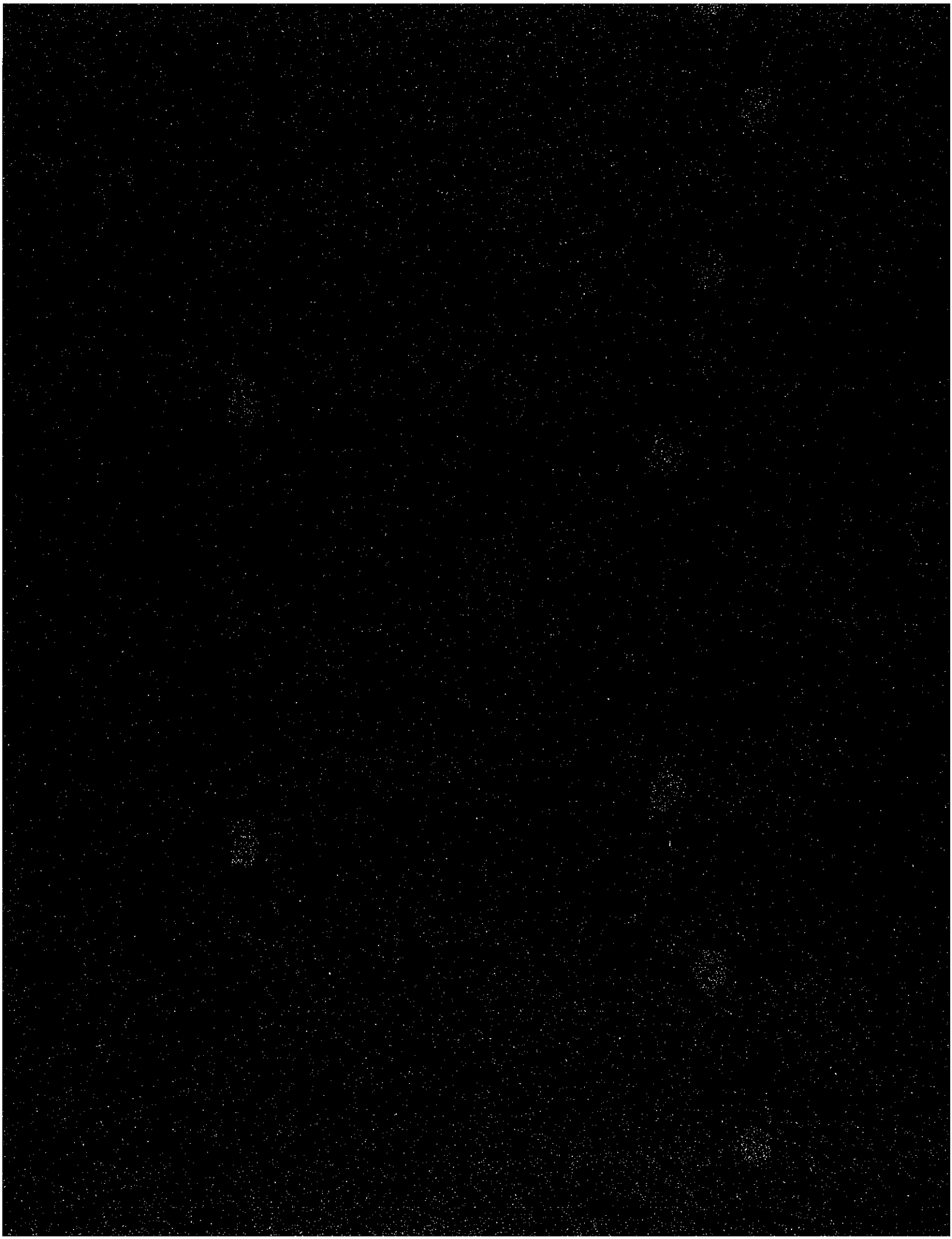
In Manual Call Screening mode, an intercom station operator with access to the TEL-12's Line Seize pushbutton (the "operator") answers incoming calls on a standard telephone wired in parallel with the TEL-12. (When a standard telephone is wired in parallel with the TEL-12, picking up the telephone answers the call without the TEL-12 going off-hook. This is analogous to the way that you can answer an incoming call from any extension on a home telephone line).

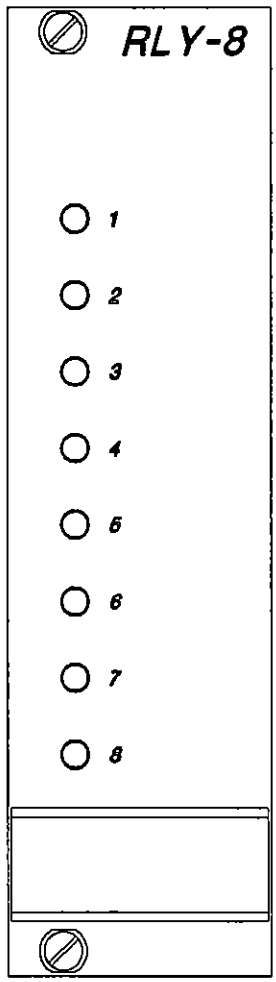
Once the operator determines which destination should receive the incoming telephone call, he sends that destination a call signal and informs them that a call is waiting. The operator then presses the Line Seize pushbutton on the TEL-12, bringing it off-hook and making the incoming telephone call available to the telephone party-line that the TEL-12 port is preset to.

The destination then activates a talk to the telephone party-line to access the call, and the operator hangs up the standard telephone. If the operator keeps the standard telephone off hook while the destination intercom station is talking on the telephone line, the "side-tone null" adjustment on the TEL-12 will not be optimal. (Assuming that the null was adjusted with the standard telephone on-hook).

The operator can also originate outside calls on the standard telephone, and make them available to destinations within the matrix.







Matrix Plus II System RLY-8

RELAY INTERFACE MODULE

Introduction

This section describes how to configure and use the RLY-8 Relay Interface. System operators can use this manual once the Matrix Plus II System has been correctly installed and the relays have been assigned with the Configuration Program. For information on installing the RLY-8 see the Matrix Plus II Installation Manual. For information on troubleshooting and maintenance see the Matrix Plus II Maintenance Manual.

Description

The RLY-8 provides eight independent single pole, double throw (SPDT) relays that are directly controlled by the CPU-100 Master Controller Card in a matrix frame. Up to eight RLY-8 modules can be daisy-chained together to provide up to sixty four relays for general purpose use.

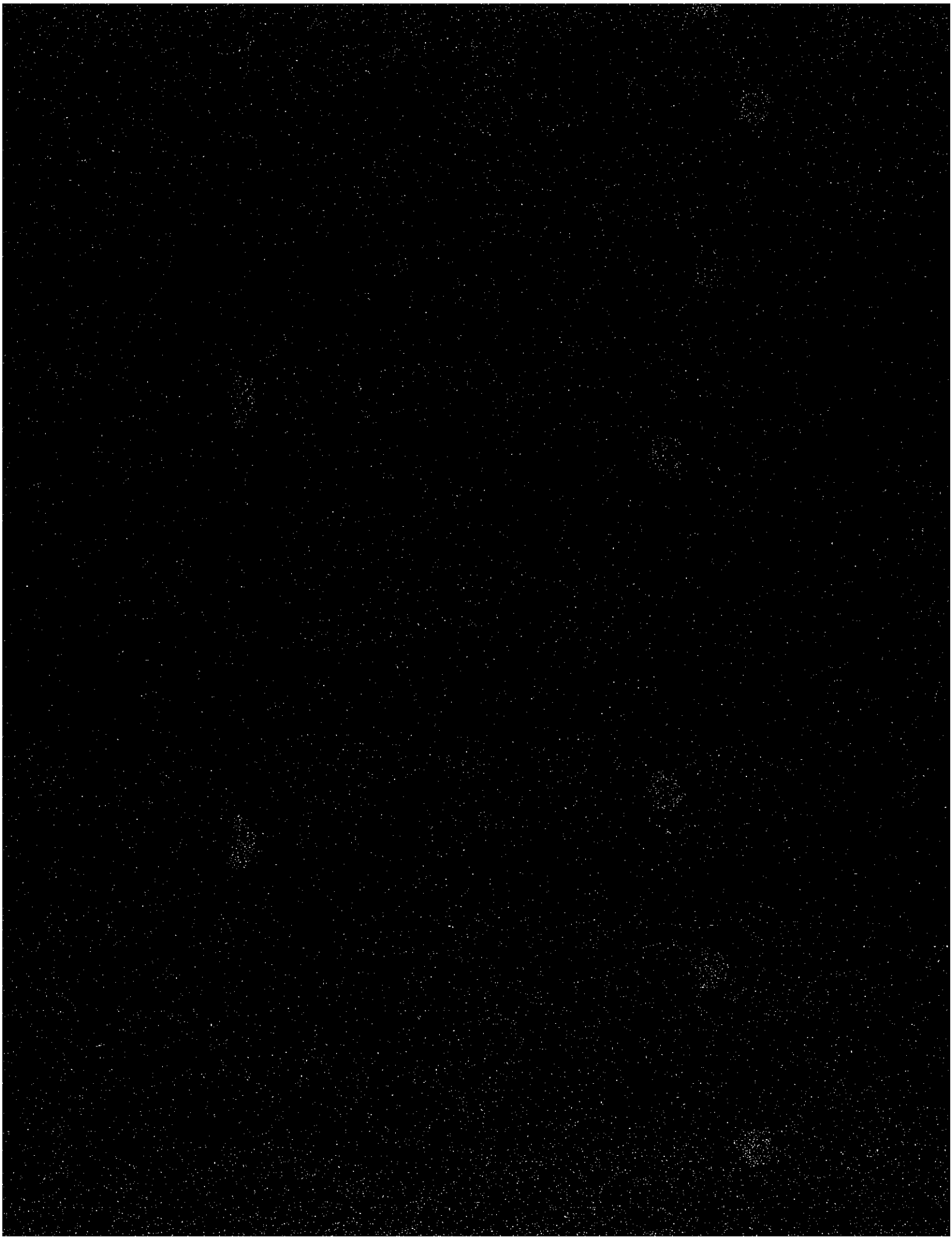
The front panel of the RLY-8 has eight green leds to indicate the operation of each of the relays in the module.

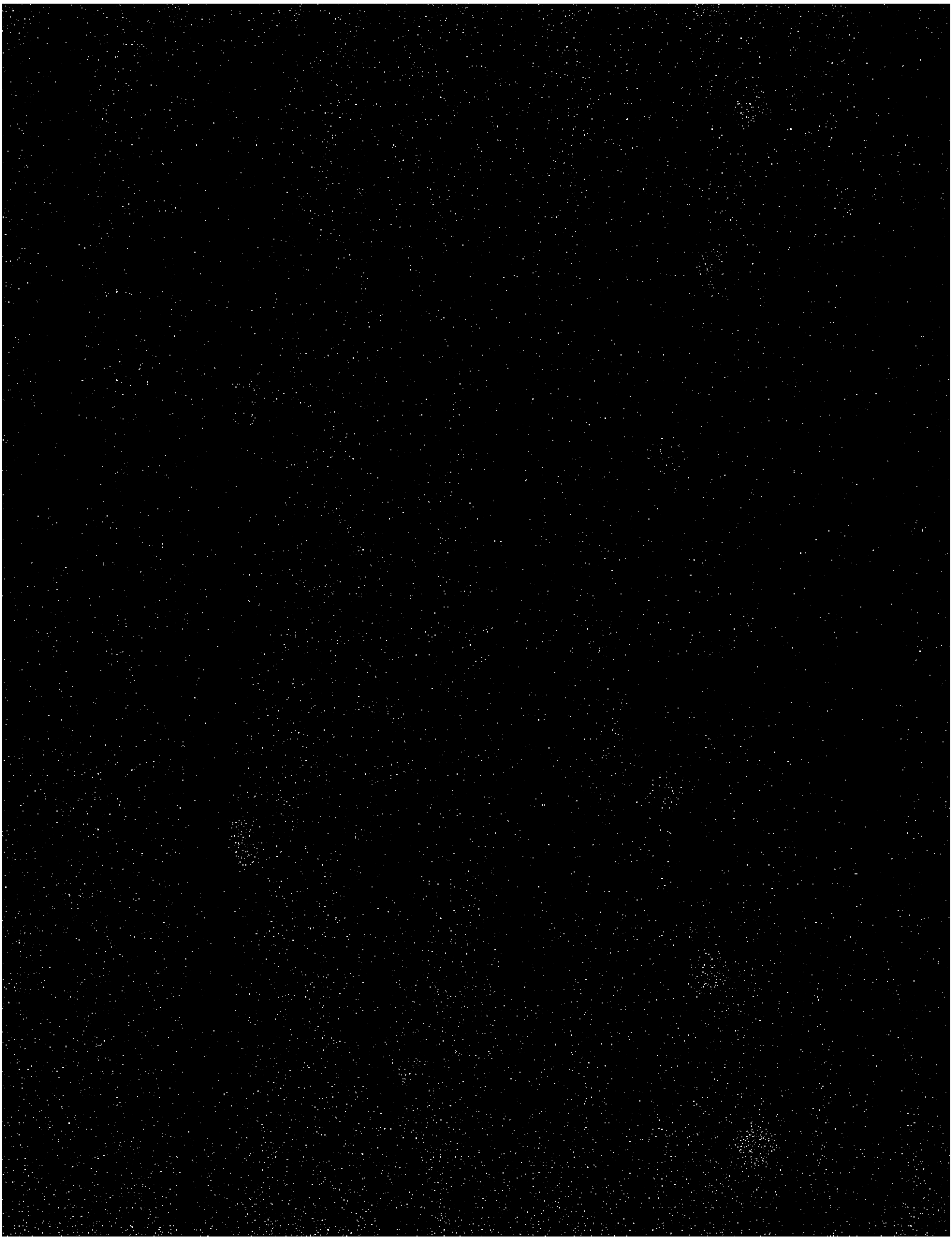
Configuration

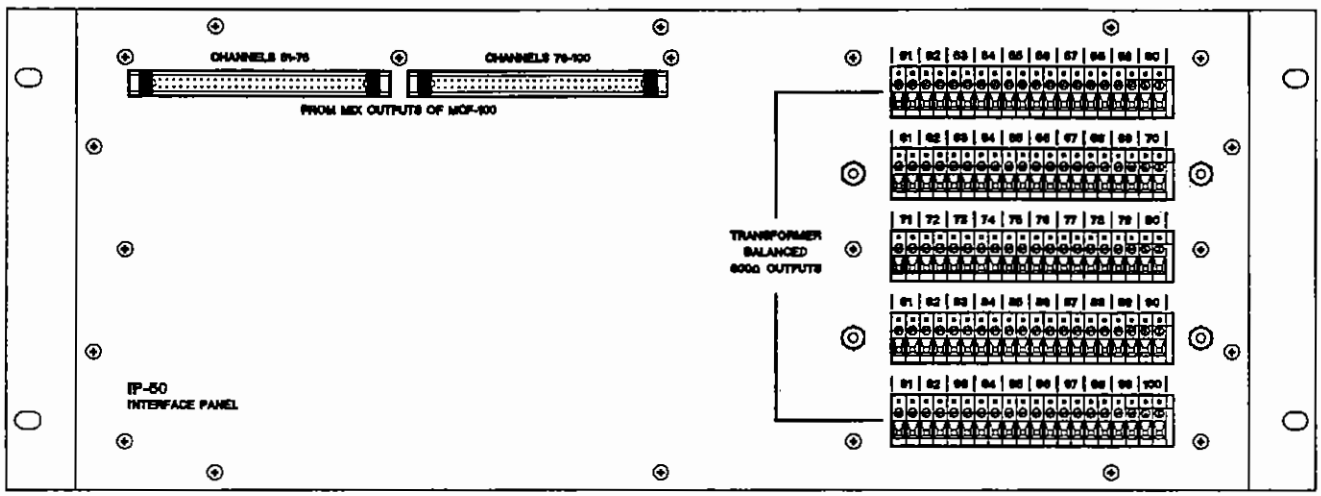
Control of these relays is accomplished by using the "Global - Controls" and "Setup - Relays" screens in the Configuration Program.

Operation

Once the RLY-8 is installed and configured there are no controls for day to day operation. Operation of each individual relay is indicated by leds.







Matrix Plus II System IP-50
INTERFACE PANEL

Introduction

This section describes how to configure and use the IP-50 Frame Interface Panel. System operators can use this manual once the Matrix Plus II System has been correctly installed. For information on installing the IP-50 see the Matrix Plus II Installation Manual. For information on troubleshooting and maintenance see the Matrix Plus II Maintenance Manual.

Description

The IP-50 is an interface panel for the purpose of directly using the extra 50 outputs of a MCF-100 frame that normally connect to a SCF-101 frame for expansion beyond 50 ports. With the IP-50 these 50 outputs can be used as outputs only for such uses as IFB feeds and paging systems.

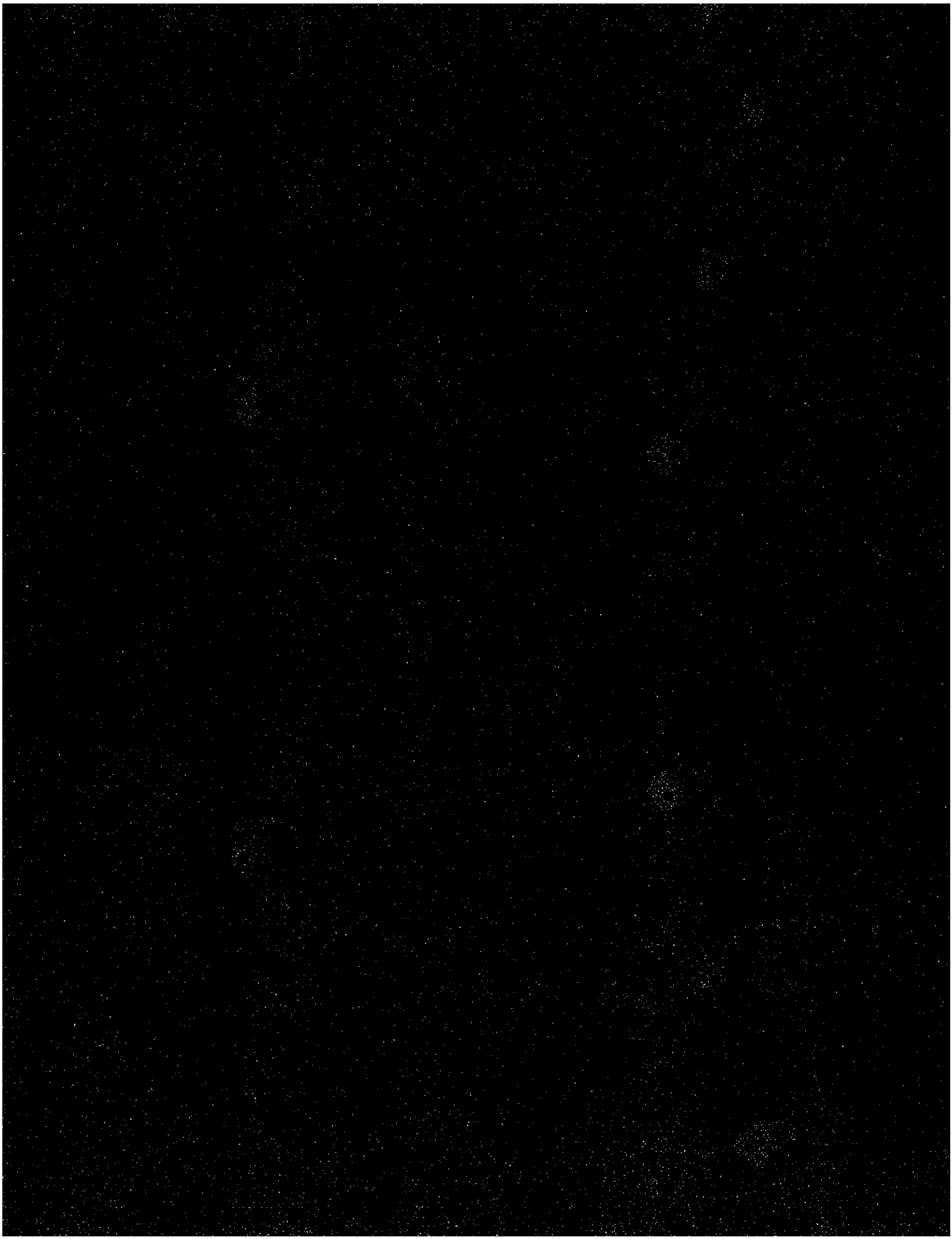
The outputs from STX-101 cards in the MCF-100 that would normally feed to the SCF-101 are now available as outputs for direct connection to the inputs of external devices. Each channel in the MCF-100 frame that needs to have access to these outputs must have a companion STX-101 installed in the slot below its MTX matrix card.

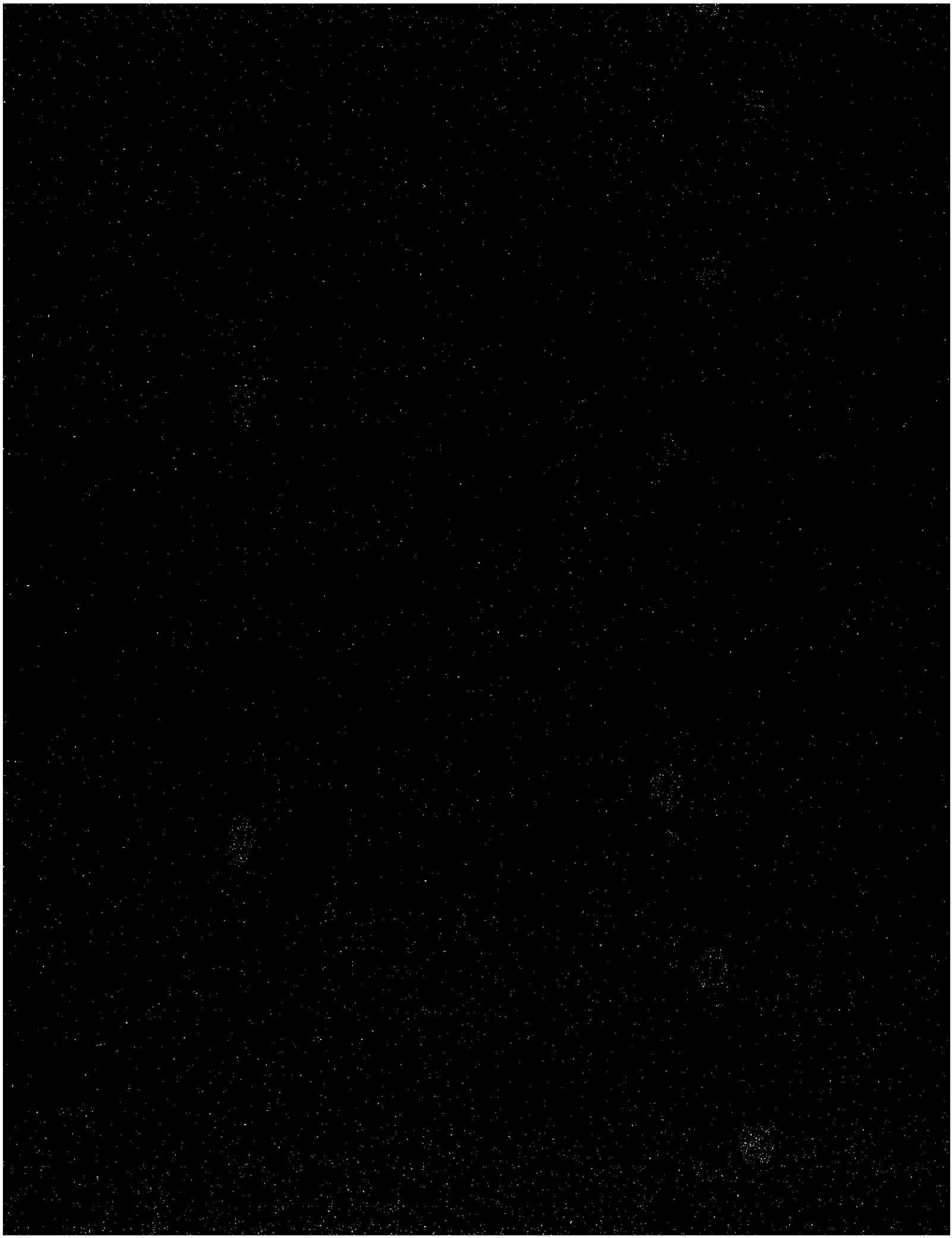
Configuration

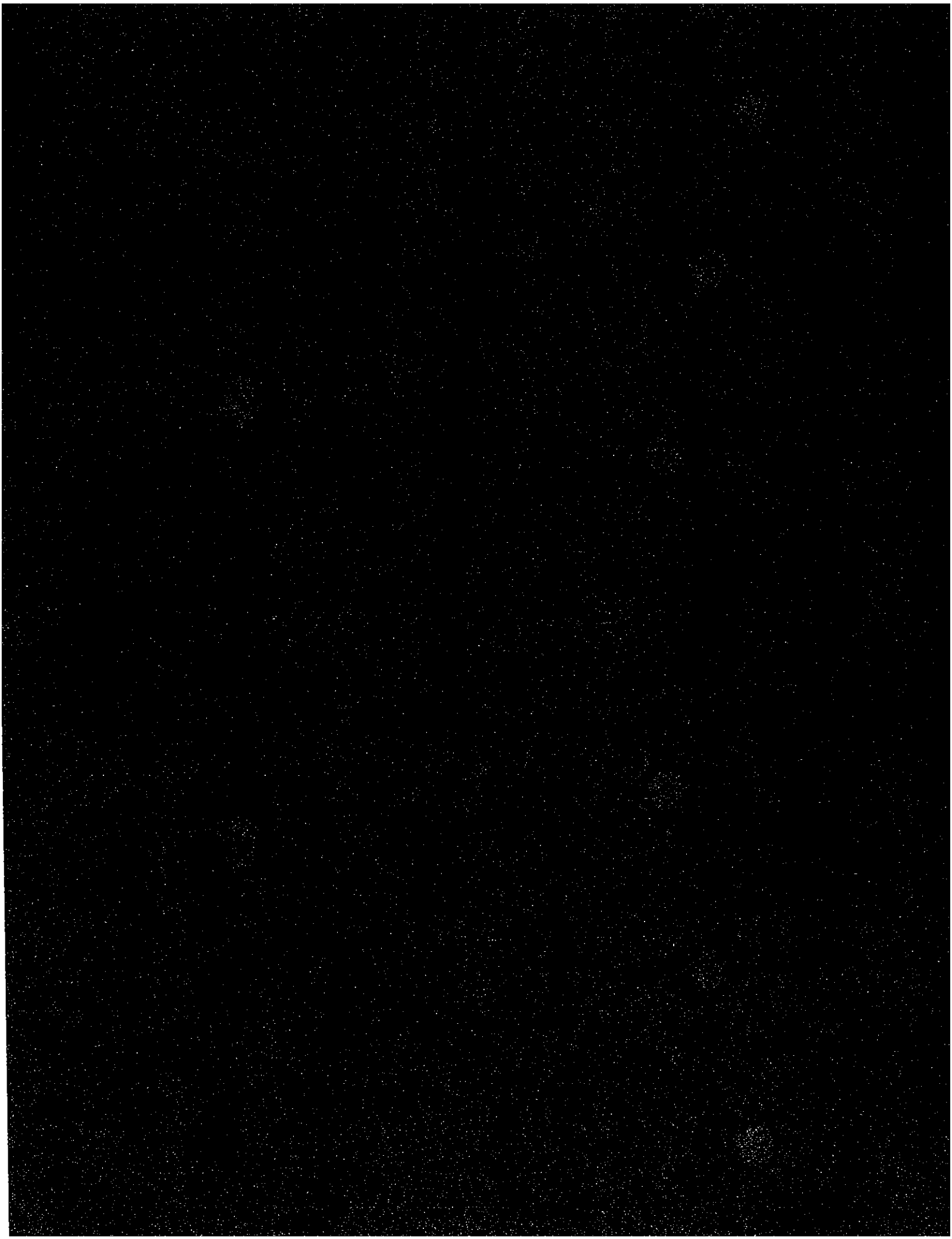
Once configured, the outputs of the IP-50 are available in the system by activating the label assigned for each output of the IP-50. Refer to the Installation manual for details on configuring the IP-50.

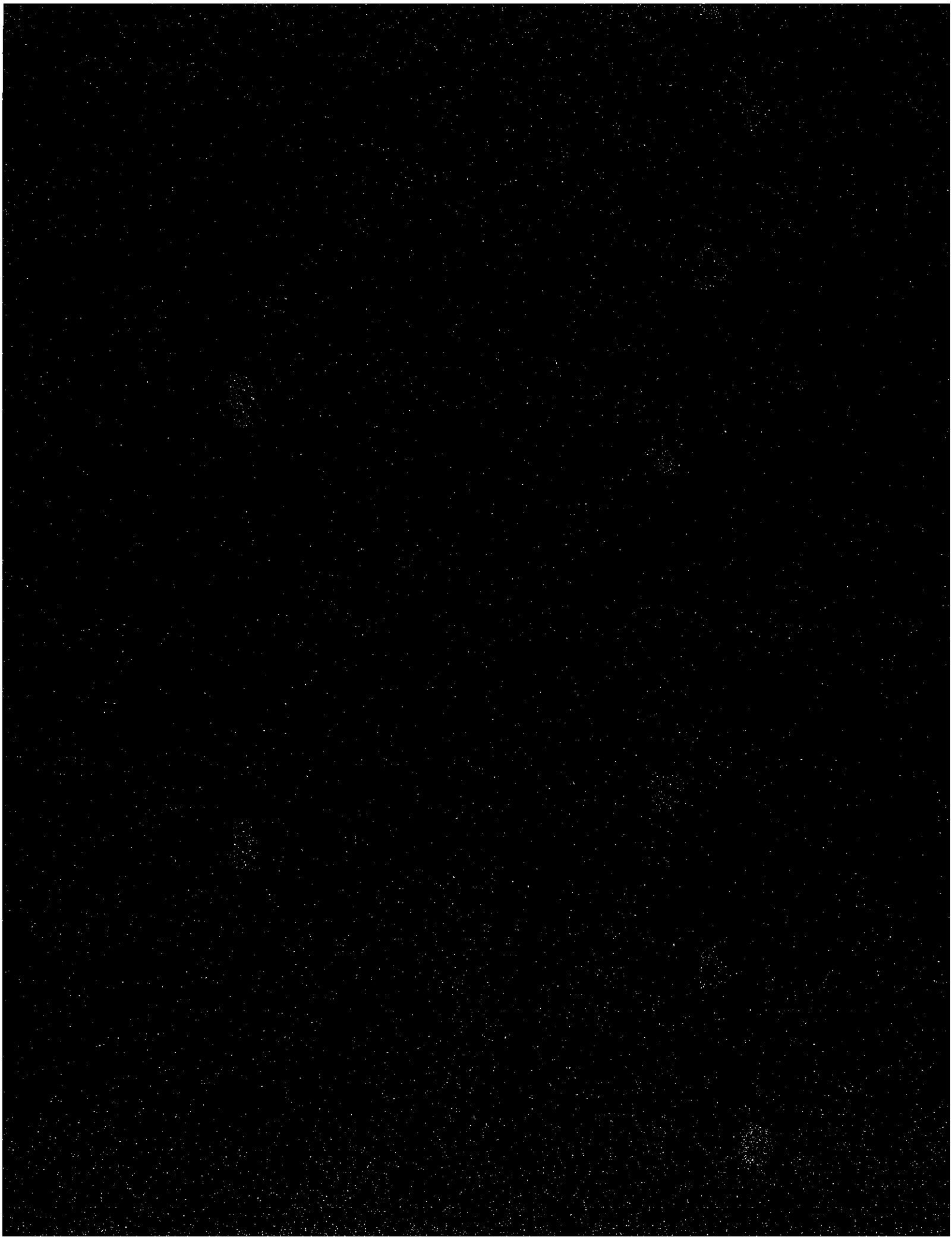
Operation

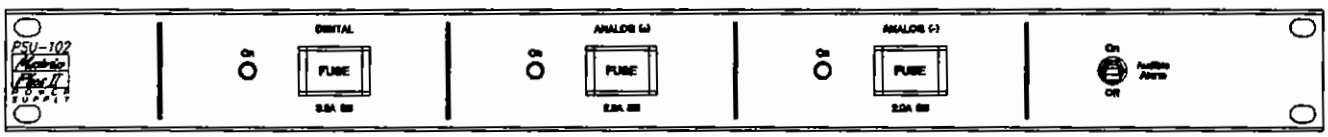
The labels that represent each output on the IP-50 can be used to set fixed crosspoints or for assignment as talk functions on station keys, in fixed groups, party lines, and ect..











Matrix Plus II System PSU-102

P O W E R S U P P L Y M O D U L E

Introduction

This section describes the PSU-102 Power Supply Module and how to operate it.

Description

The PSU-102 is a power supply module intended to power a matrix frame or an interface frame in the Matrix Plus II Intercom system. Two PSU-102s can be paralleled together for redundancy. Once installed , the power supplies should require very little attention.

In a large system there may be several PSU-102s in the system. Each matrix frame requires its own PSU-102 and if there are a large number of interfaces there may be one or more separate PSU-102s for the interfaces. Additional PSU-102s may be wired in parallel to provide redundancy.

Front Panel Controls and Indicators

The front panel of the PSU-102 contains three leds, three fuses, and an audible alarm enable switch. The following text explains the function of each.

Indicator Leds

There are three green leds to indicate the correct operation of each of the three power supplies in the unit. If a led is out, that power supply is nonfunctional and maintenance personnel should be called. The function of each supply is as follows:

+ Digital

This supplies the power for the digital portion of a matrix frame. Failure of this supply will cause all matrix cards and the CPU-100 to stop operating.

+ Analog

This supplies the positive side of the analog circuits in the matrix frame. Failure of this power supply by itself would cause the audio of the system to be inoperative or distorted.

- Analog

This supplies the negative side of the analog circuits in the matrix frame. Failure of this power supply by itself would cause the audio of the system to be inoperative or distorted.

Fuses

There are three fuses for the three power supplies available on the front panel. These fuses are on the output of the power supplies feeding the matrix frame. If a single Led mentioned above goes out, check its fuse.

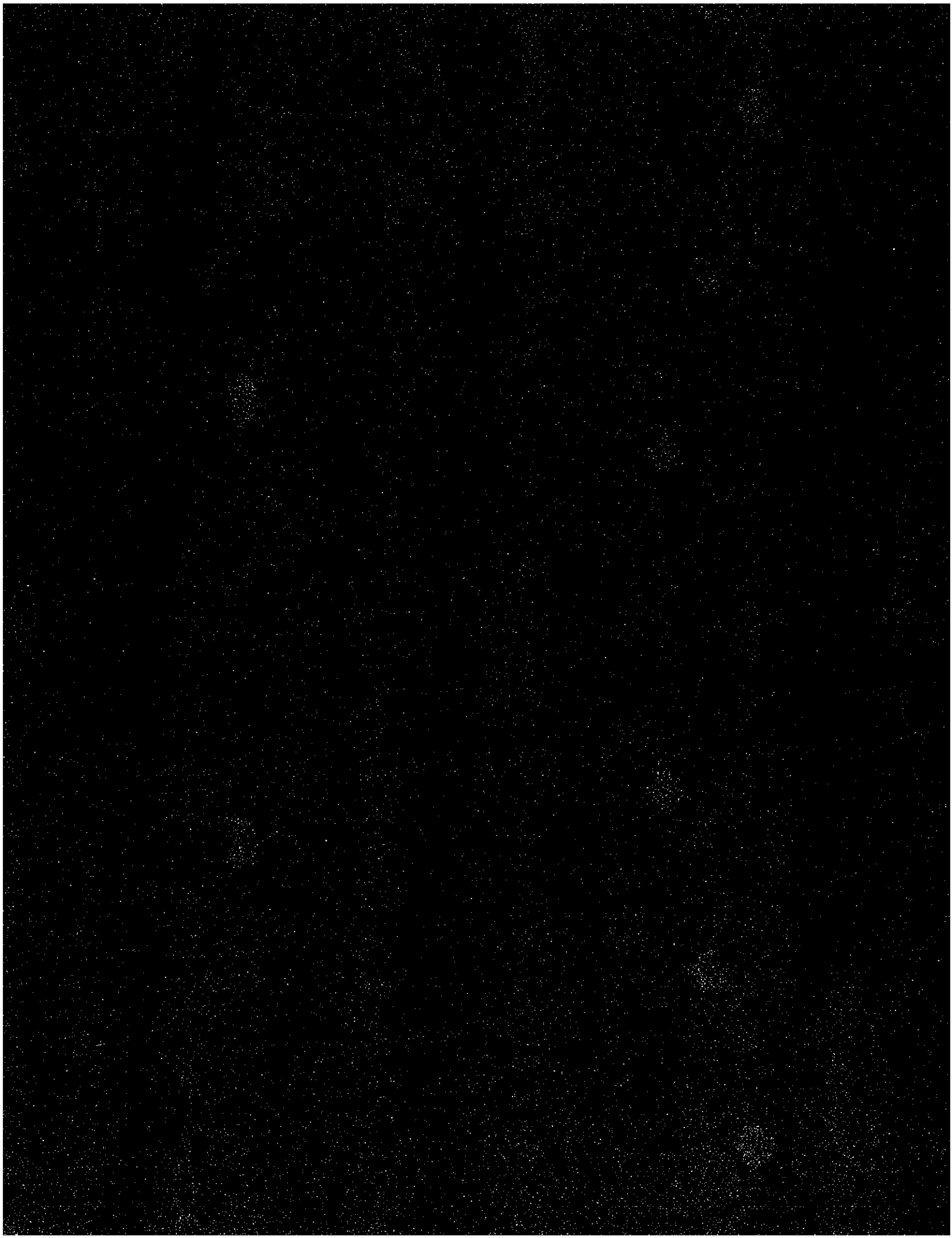
Audible Alarm and Alarm Enable Switch

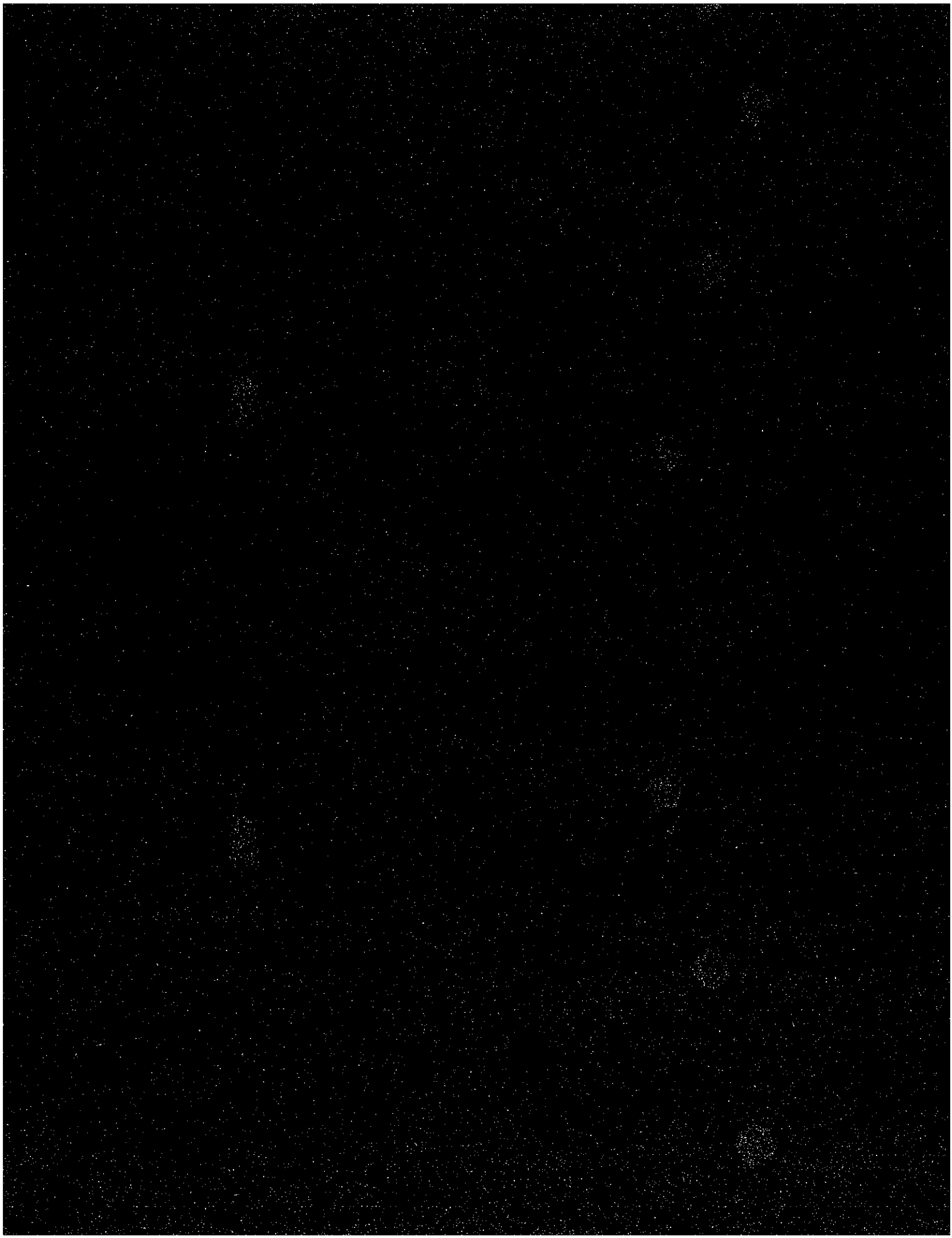
The toggle switch marked Alarm Enable enables an internal audible alarm that will sound if any one of the three power supplies fail. Whether or not the alarm should be enabled depends on your particular installation.

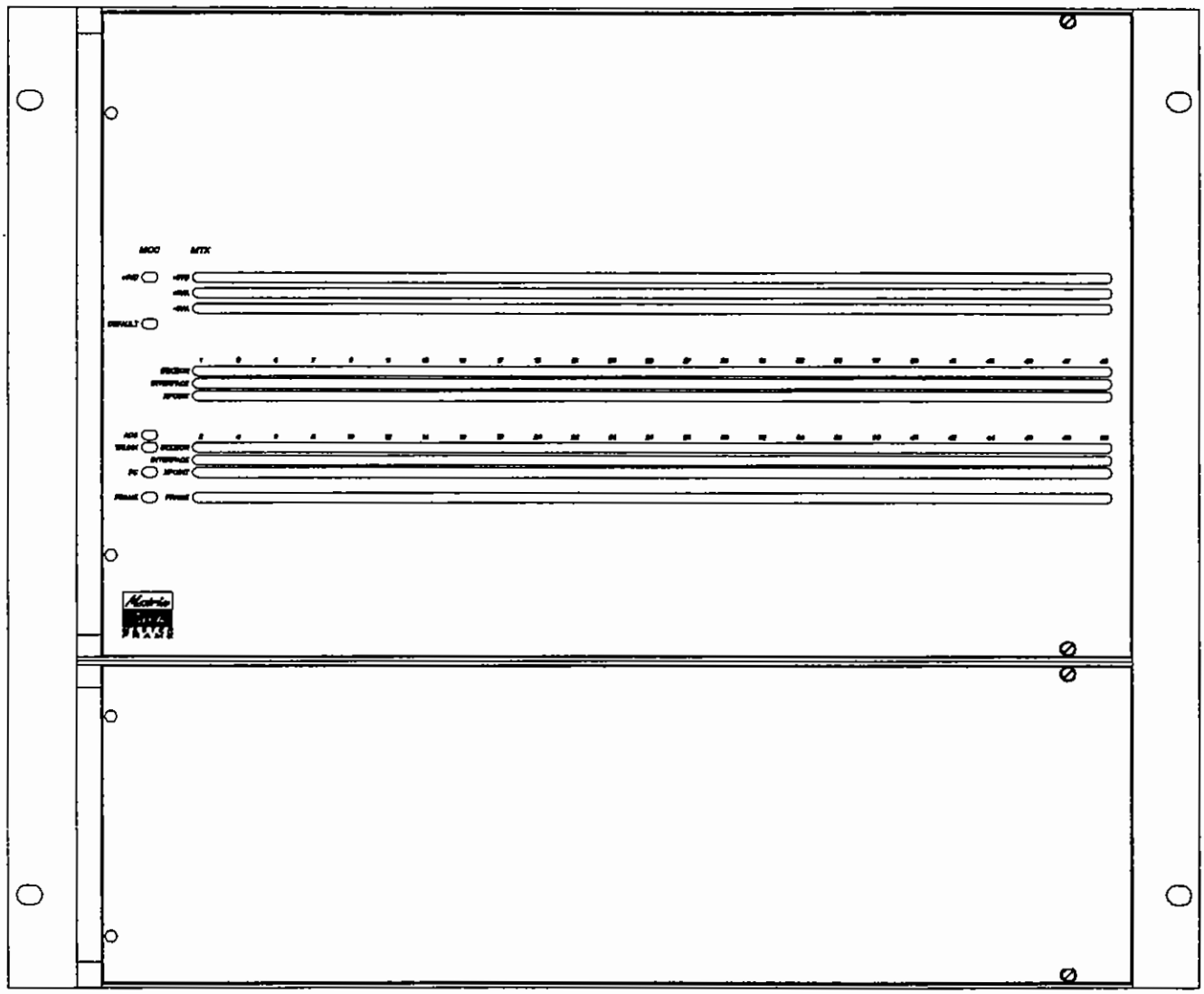
There is also available on the rear panel of the unit, a set of relay contacts that can be wired to an external alarm at some remote location.

Parallel Redundant Operation

If your installation has been wired for parallel redundant operation, a single failure of one or more of the three power supplies in an individual PSU-102 will not cause a system failure. The audible alarm should sound and the remote alarm (if wired) should sound warning that one or more portions of the power supply has failed and needs attention.







Matrix Plus II System MCF-100

MASTER CARD FRAME 50x100 - 25 SLOT

Introduction

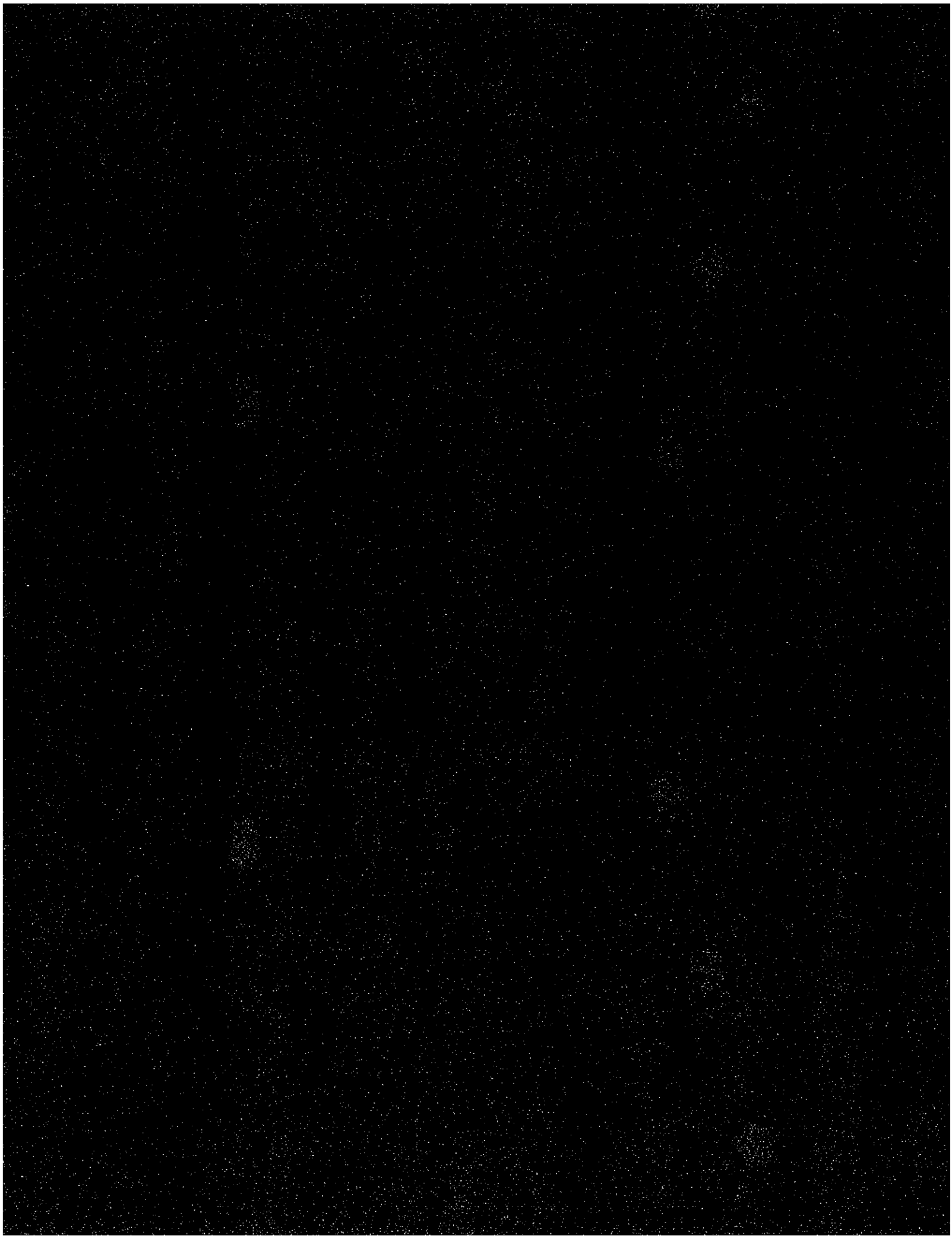
This section describes the MCF-100.

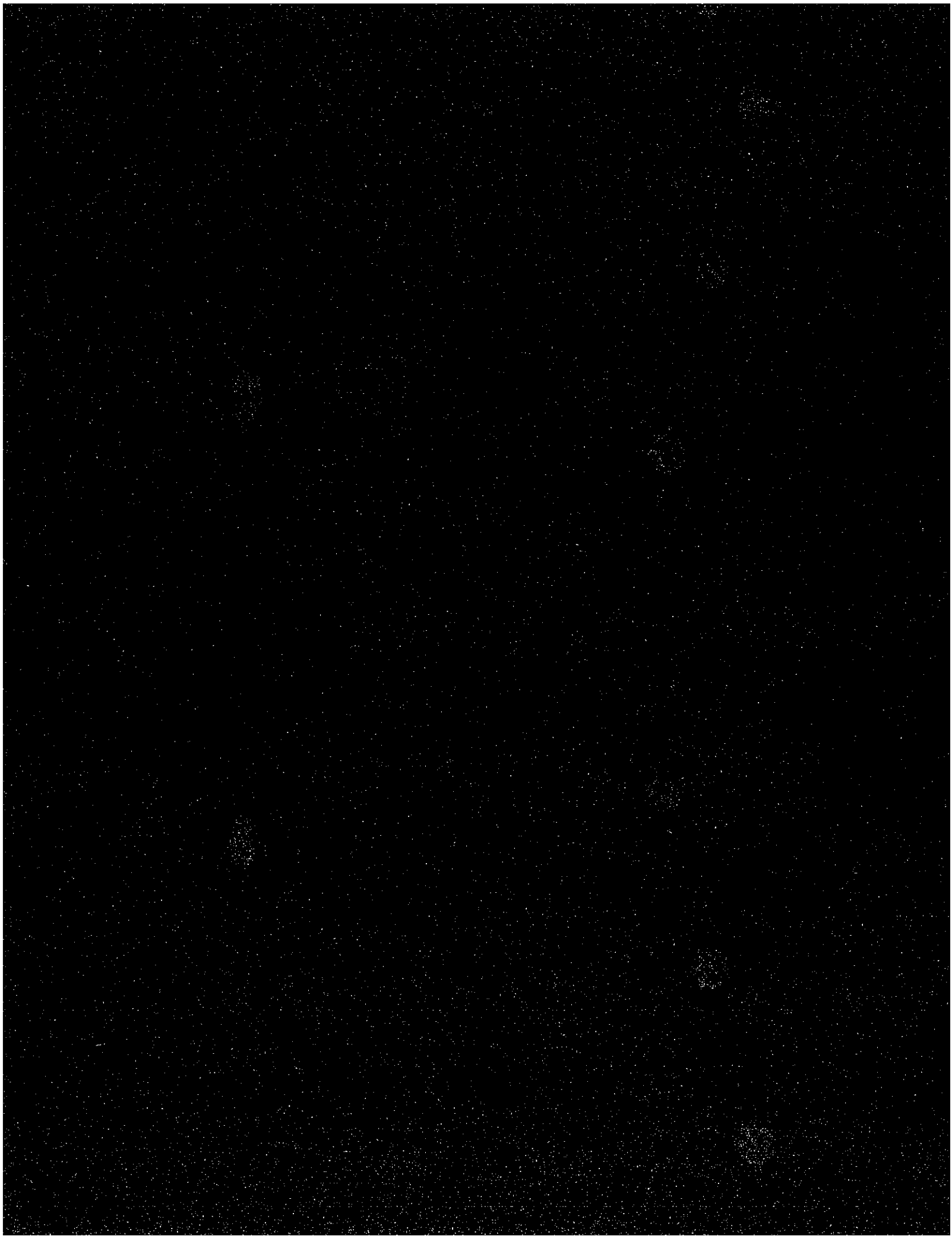
Description

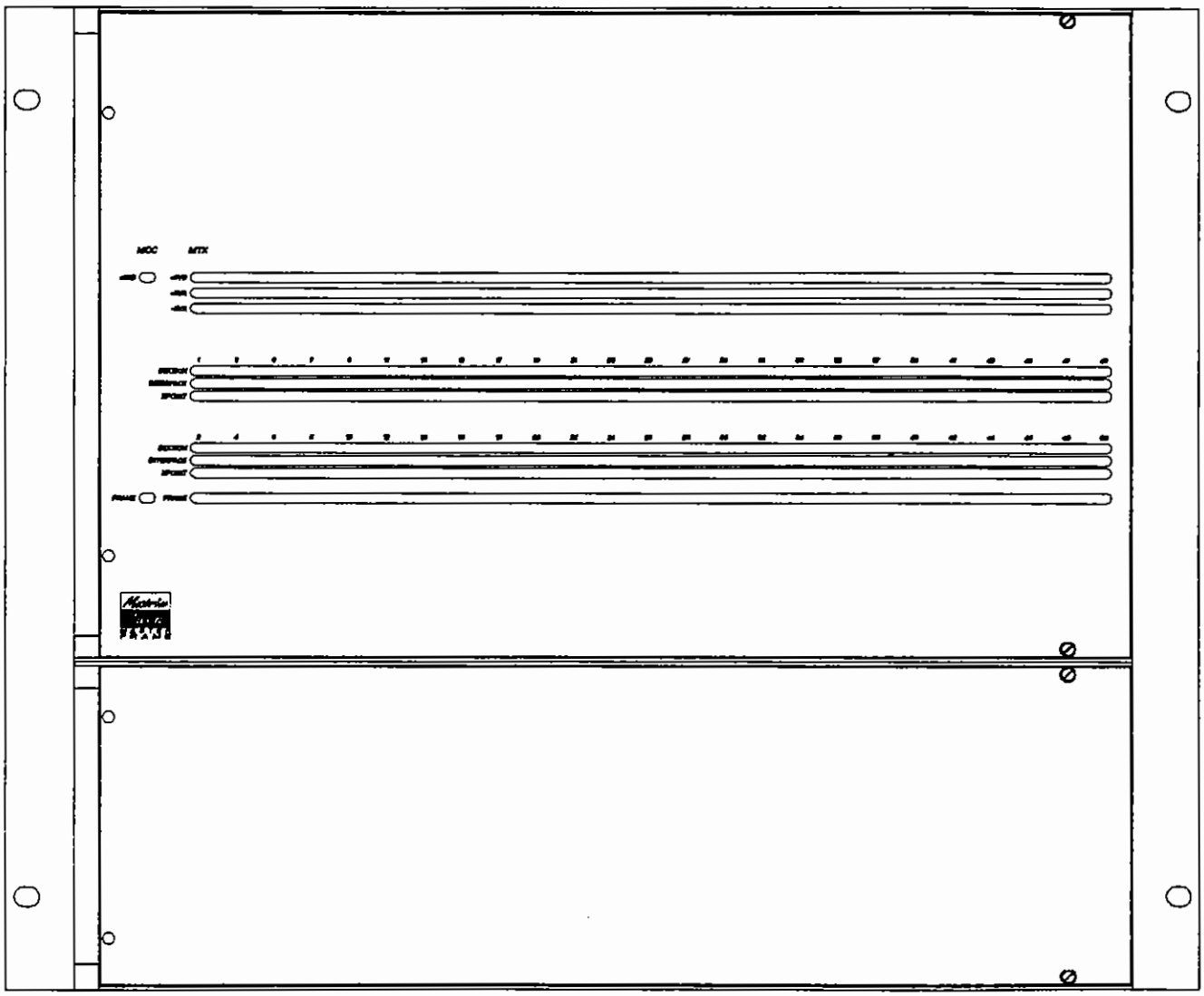
The MCF-100 Card Frame is the first of two frames needed to construct a 100 by 100 matrix system. The MCF-100 has enough card slots to house one CPU-100 System Controller Card, up to 25 MTX-100 or MTX-200 Matrix Cards, and up to 25 STX-101 Crosspoint Expansion Cards. The rear panel contains all the connectors needed to support the possible 50 ports and communication to the external PC, other matrix frames, and Accessory devices.

The frame itself has no controls or indicators. The front of the frame is covered by a door to protect the frame cards. The front door of the frame is transparent in certain areas to expose the indicator leds that are on the cards in the frame. These indicator leds are intended for maintenance personnel. Information on the leds for the individual matrix cards is available in the Matrix Cards section of this manual and the Maintenance Manual.

In normal operation the matrix frame should not need attention.







Matrix Plus II System SCF-101

EXPANSION CARD FRAME 50x100 - 25 SLOT

Introduction

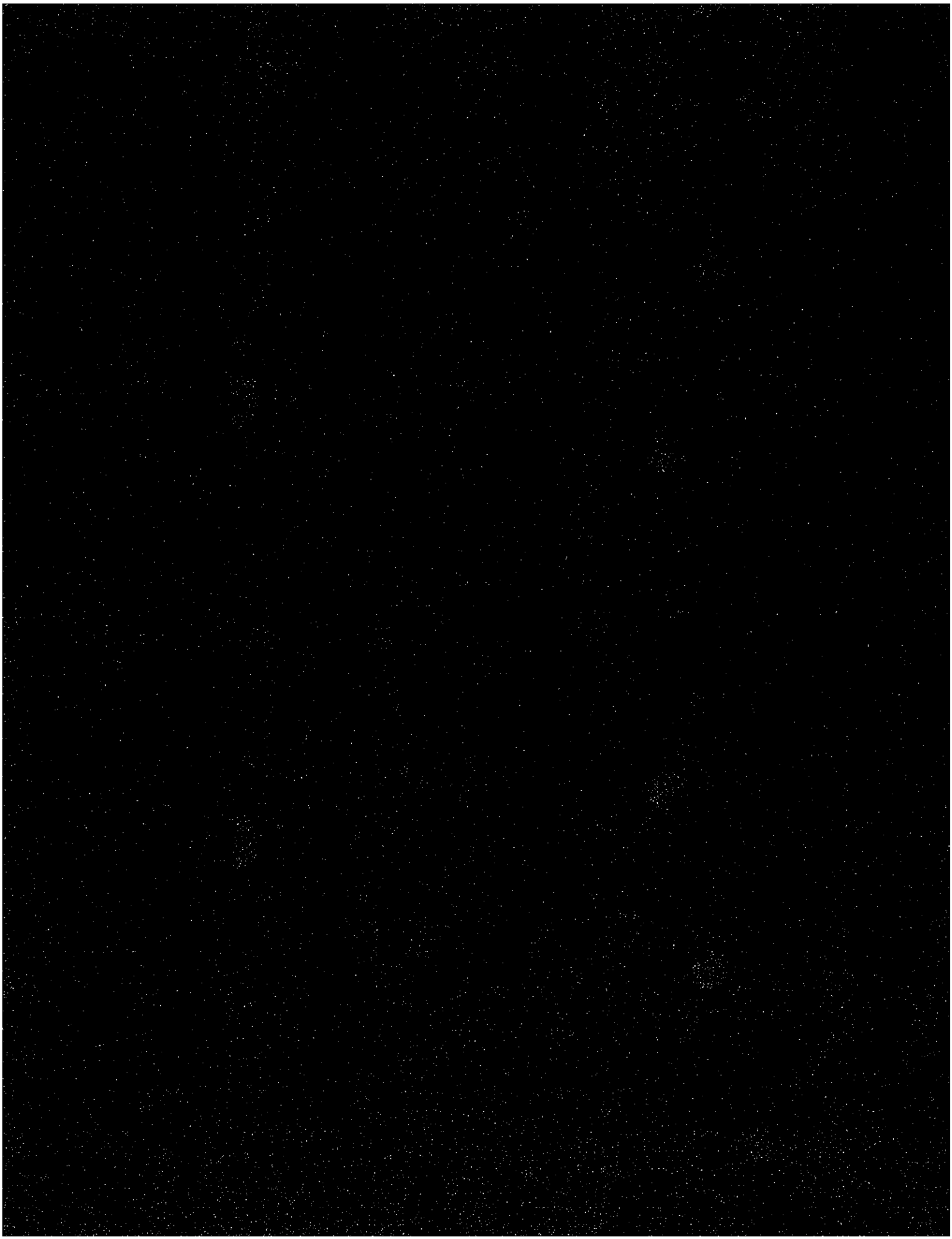
This section describes the SCF-101.

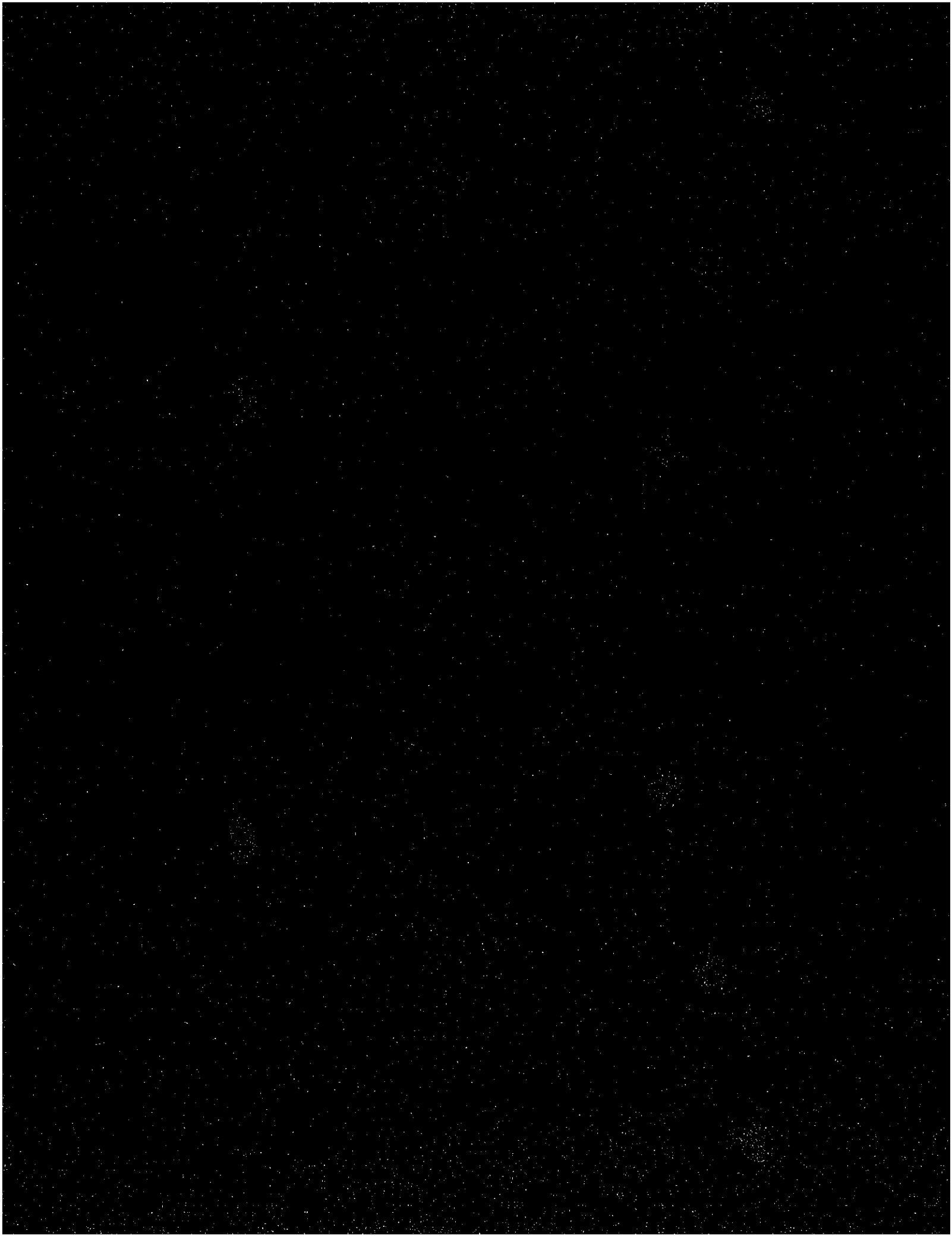
Description

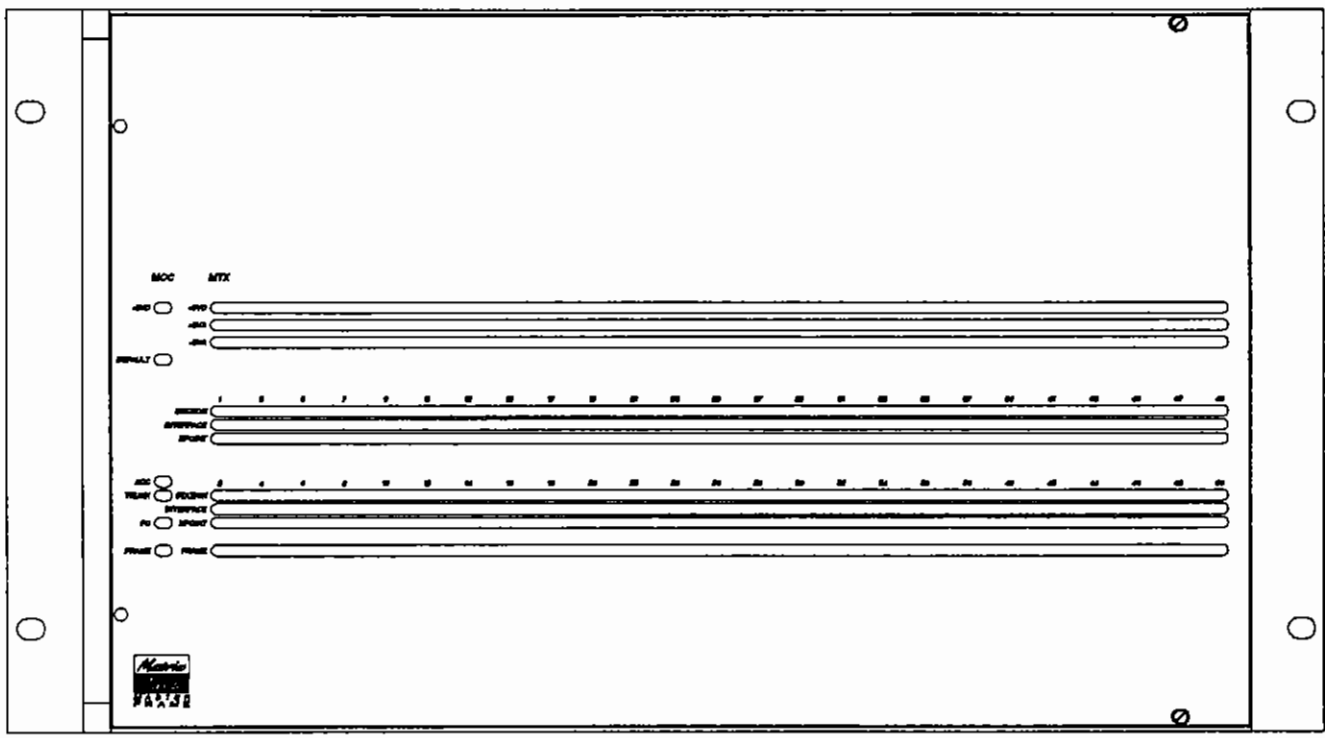
The SCF-101 Card Frame is the second of two frames needed to construct a 100 by 100 matrix system. The SCF-101 has enough card slots to house one CPU-150 Controller Card, up to 25 MTX-100 or MTX-200 Matrix Cards, and up to 25 STX-101 Crosspoint Expansion Cards. The rear panel contains all the connectors needed to support the possible 50 ports and communicate to the Master Frame.

The frame itself has no controls or indicators. The front of the frame is covered by a door to protect the cards. The front door of the frame is transparent in certain areas to expose the indicator leds that are on the cards in the frame. These indicator leds are intended for maintenance personnel. Information on the leds for the individual matrix cards is available in the Matrix Cards section of this manual and the Maintenance Manual.

In normal operation the matrix frame should not need attention.







Matrix Plus II System MCF-50

MASTER CARD FRAME 50x50 - 25 SLOT

Introduction

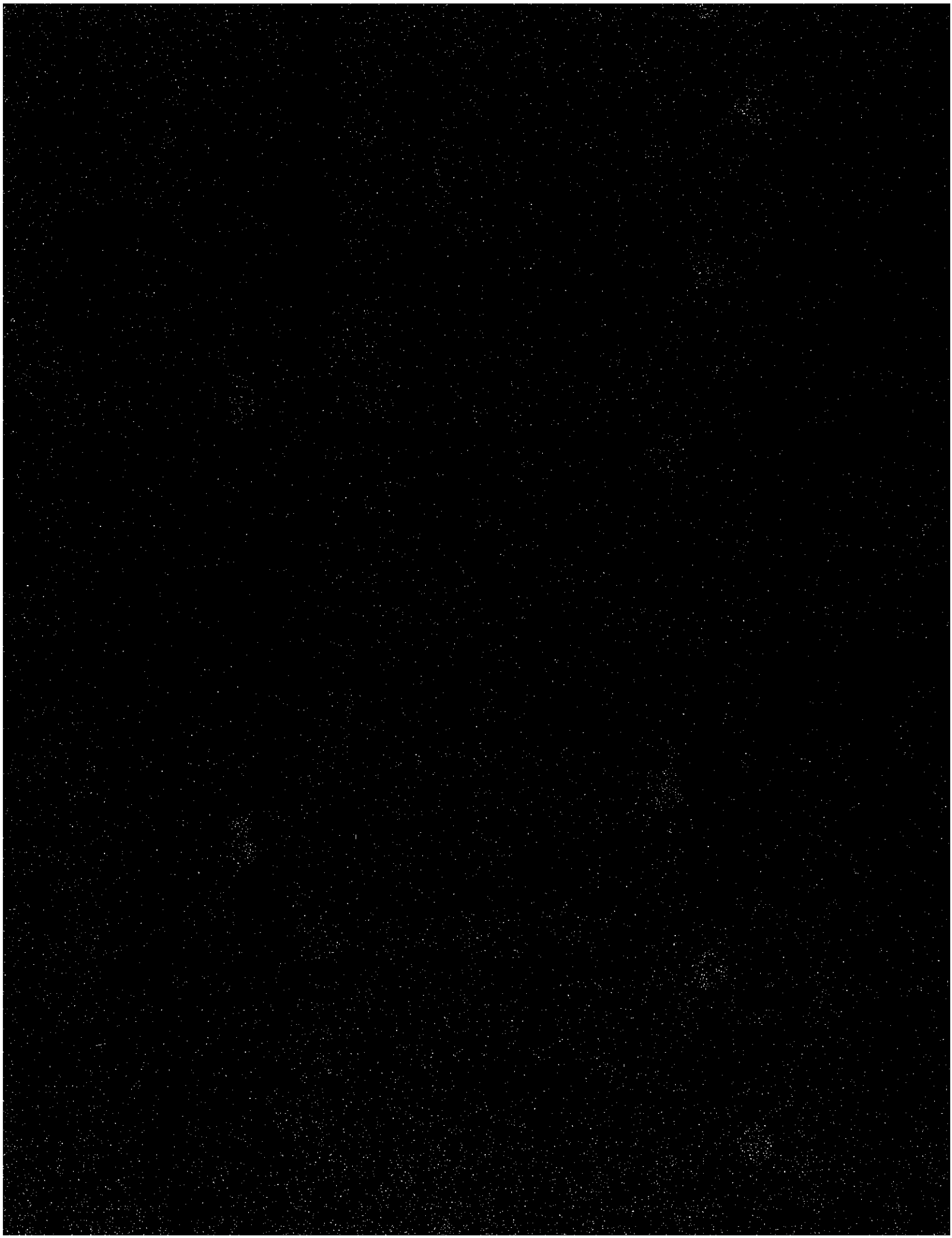
This section describes the MCF-50.

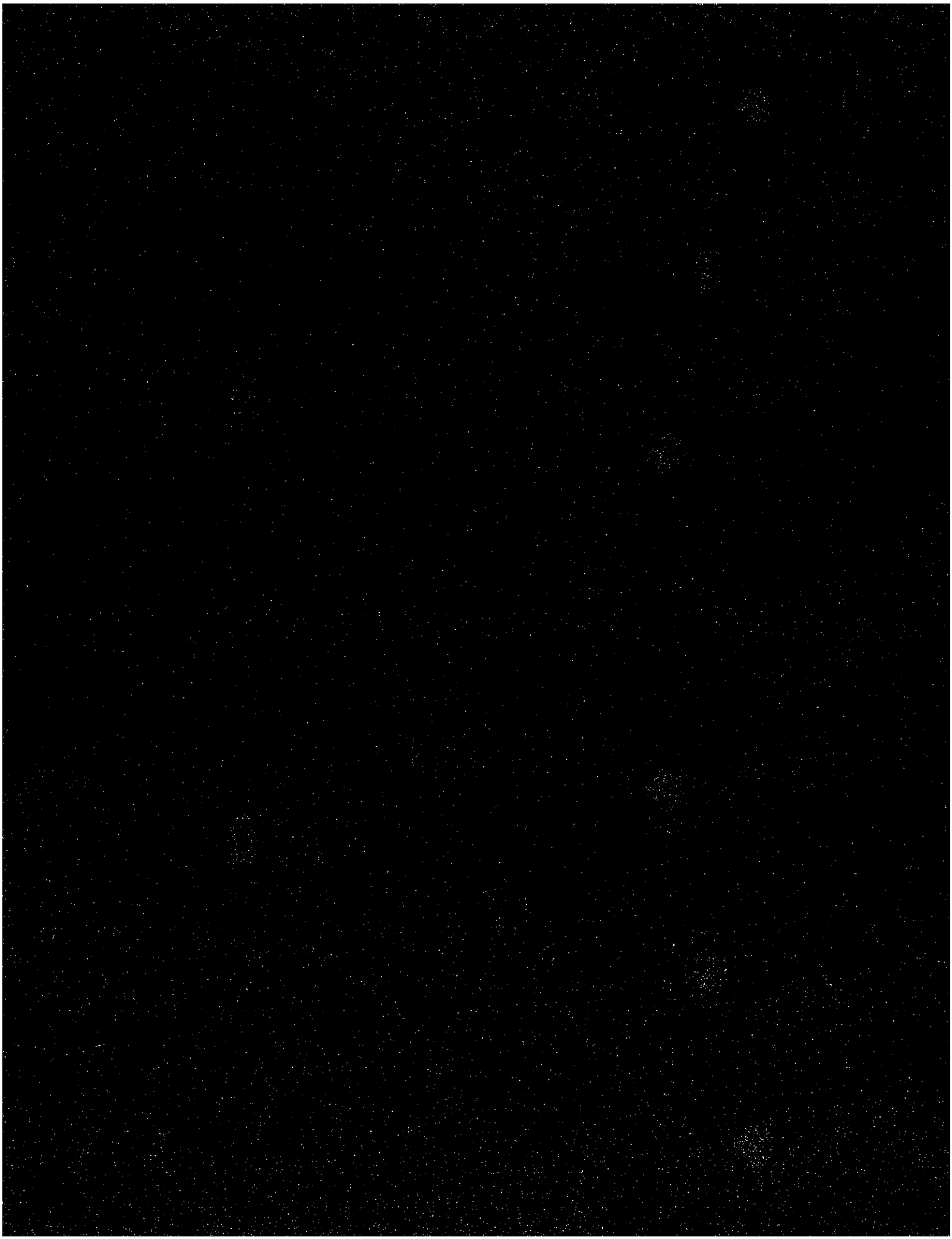
Description

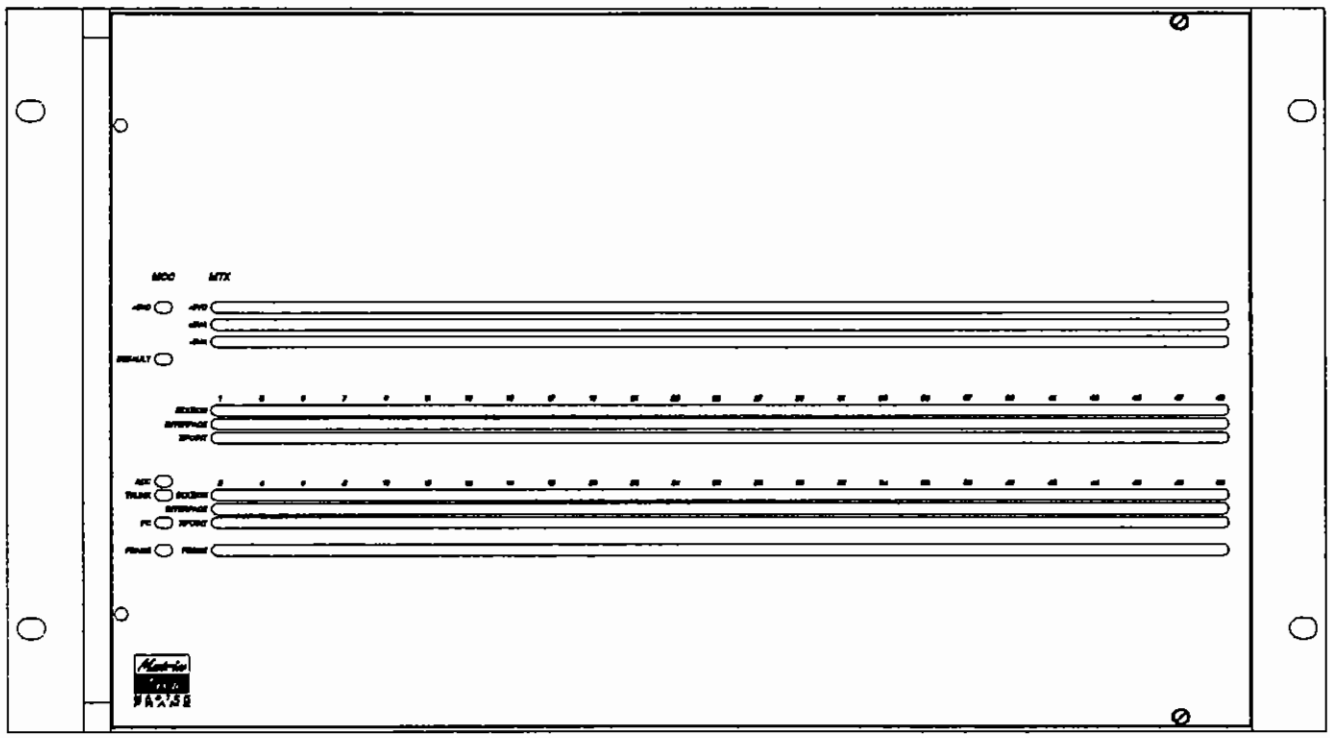
The MCF-50 Card Frame supports up to a 50 by 50 matrix system. The MCF-50 has enough card slots to house one CPU-100 System Controller Card and up to 25 MTX-100 or MTX-200 Matrix Cards. The rear panel contains all the connectors needed to support the 50 ports and communication to the external PC, other matrix frames, and Accessory devices.

The frame itself has no controls or indicators. The front of the frame is covered by a door to protect the frame cards. The front door is transparent in certain areas to expose the indicator leds that are on the cards in the frame. These indicator leds are intended for maintenance personnel. Information on the leds for the individual matrix cards is available in theMatrix Cards section of this manual and the Maintenance Manual.

In normal operation the matrix frame should not need attention.







Matrix Plus II System MCF-25

MASTER CARD FRAME 50x50 - 13 SLOT

Introduction

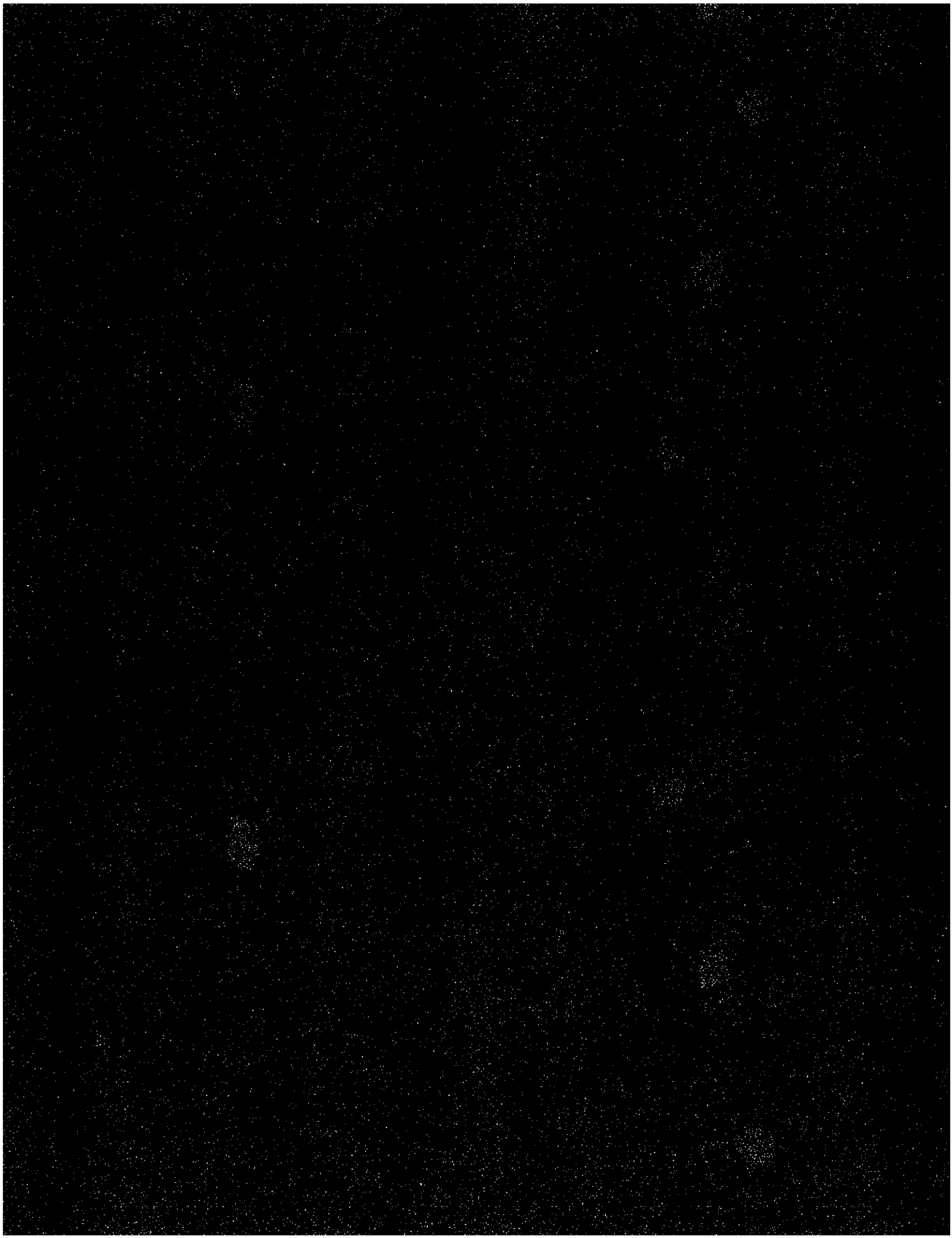
This section describes the MCF-25.

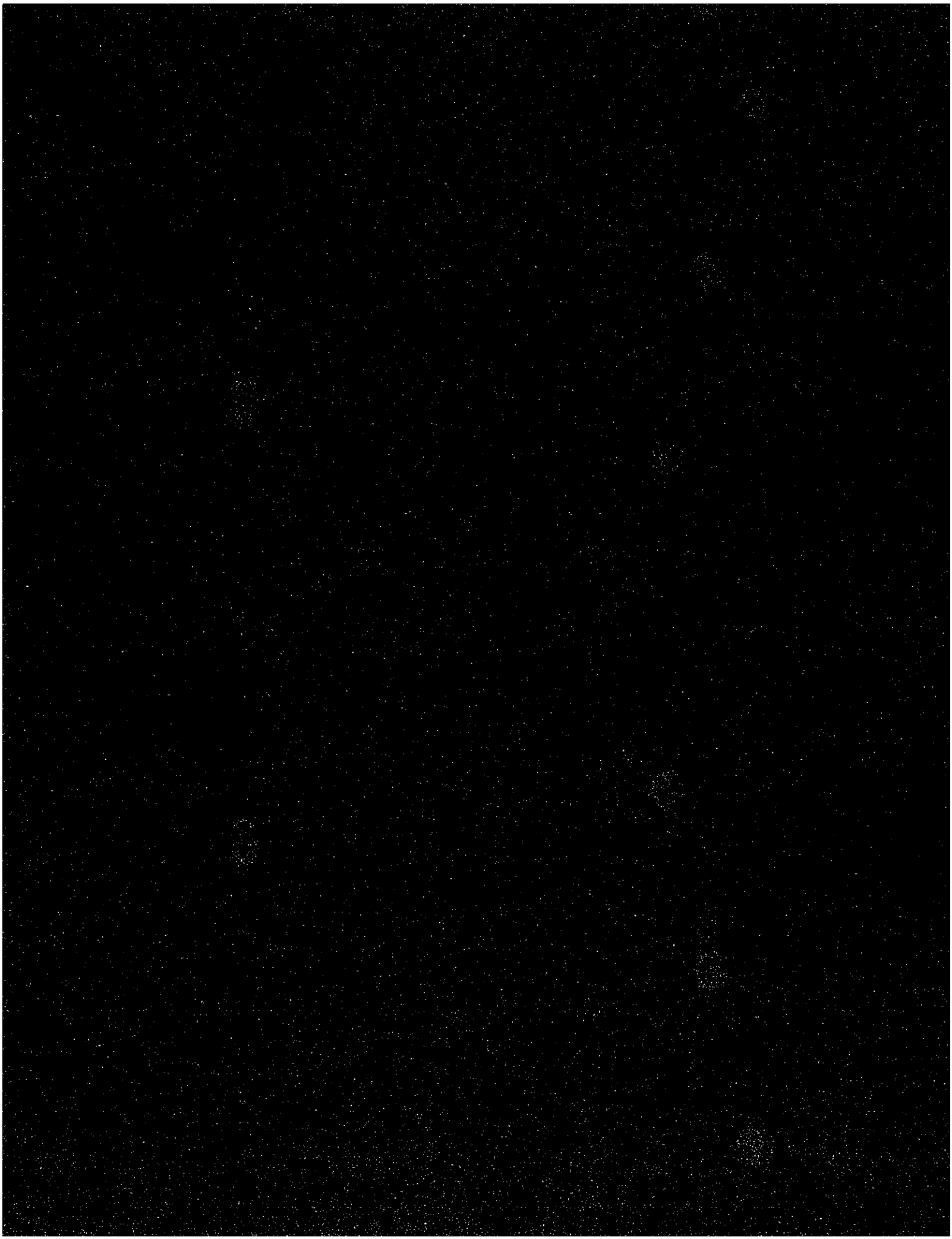
Description

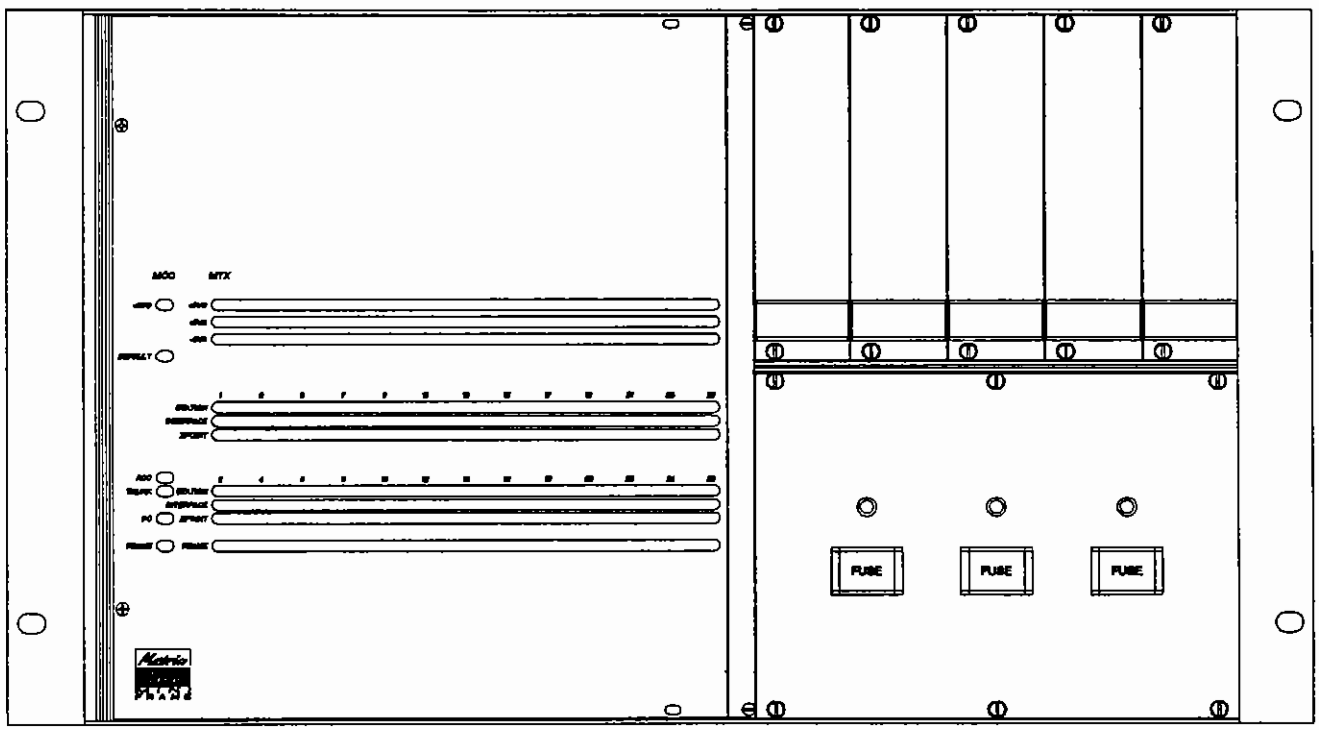
The MCF-25 Card Frame supports a 26 by 26 matrix system. The MCF-25 has enough card slots to house one CPU-100 System Controller Card and up to 13 MTX-100 or MTX-200 Matrix Cards. The rear panel contains all the connectors needed to support the possible 26 ports and communication to the external PC, other matrix frames, and Accessory devices.

The frame itself has no controls or indicators. The front of the frame is covered by a door to protect the frame cards. The front door is transparent in certain areas to expose the indicator leds that are on the cards in the frame. These indicator leds are intended for maintenance personnel. Information on the leds for the individual matrix cards is available Matrix Cards section of this manual and the Maintenance Manual.

In normal operation the matrix frame should not need attention.







Matrix Plus II System MCF-10
MINI MATRIX 26 x 26 - 13 SLOT

Introduction

This section describes the MCF-10 and the use of its controls and indicators.

Description

The MCF-10 Card Frame is a 6RU high Matrix Plus II frame intended as a small stand-alone system containing its own power supplies and interfaces. The MCF-10 provides up to 26 ports, houses up to 5 Matrix Plus II Interface Modules, and built in power supplies. The MCF-10 has enough card slots to house one CPU-100 System Controller Card, up to 13 MTX-100 or MTX-200 Matrix Cards, and up to 5 interface modules. The rear panel contains all of the connectors needed to support 26 ports and communication to the external PC, other matrix frames, and Accessory devices.

Front Panel Sections

The front of the frame is divided into the matrix card section, the interface section and the power supply section. The following text describes each:

Matrix Card Section

The left half of the frame houses the matrix cards. This portion of the frame is covered by a door to protect the frame cards. The front door is transparent in certain areas to expose the indicator leds that are on the cards inside. These indicator leds are intended for maintenance personnel. Information on the leds for the individual matrix cards is available in the Matrix Card section of this manual and the Maintenance Manual.

Interface Section

The upper right hand portion of the frame houses up to five Matrix Plus II interface modules. This section replaces the function of an IMF-1 Interface Module frame. For details on operating any interfaces that are installed in this section, see the appropriate section of this operation manual for that interface.

Power Supply Section

The lower right hand portion of the frame houses the equivalent of one PSU-102 system power supply. This portion of the frame has three leds and three fuses for each of the three internal power supplies. The following sections describes the use of each. An additional external PSU-102 Power Supply can be connected for parallel/redundant operation.

Indicator Leds

There are three green leds to indicate the correct operation of each of the three power supplies in the unit. If a led is out, that power supply is nonfunctional and maintenance personnel should be called. The function of each supply is as follows:

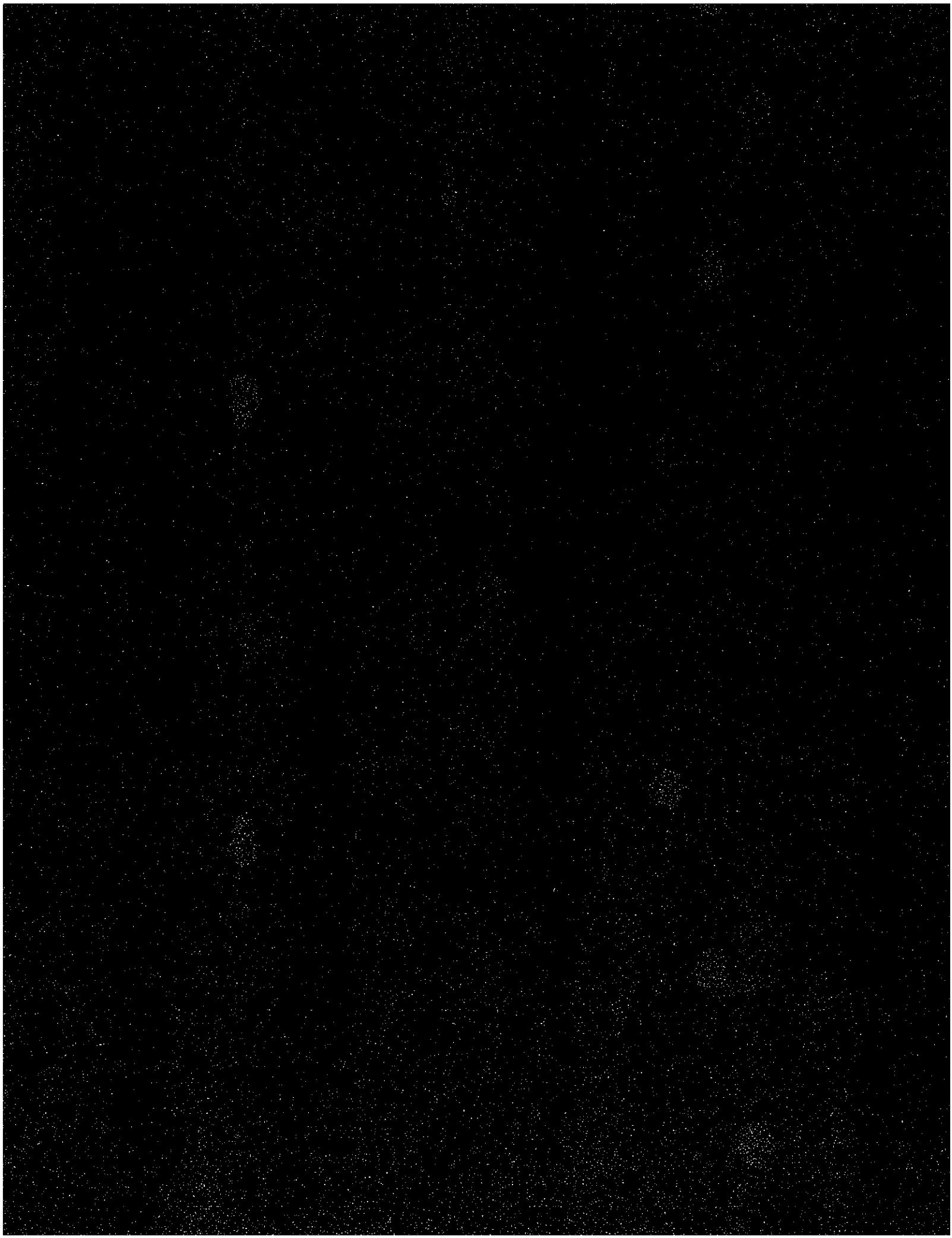
+ Digital This supplies the power for the digital portion of a matrix frame. Failure of this supply will cause all matrix cards and the stop operating.

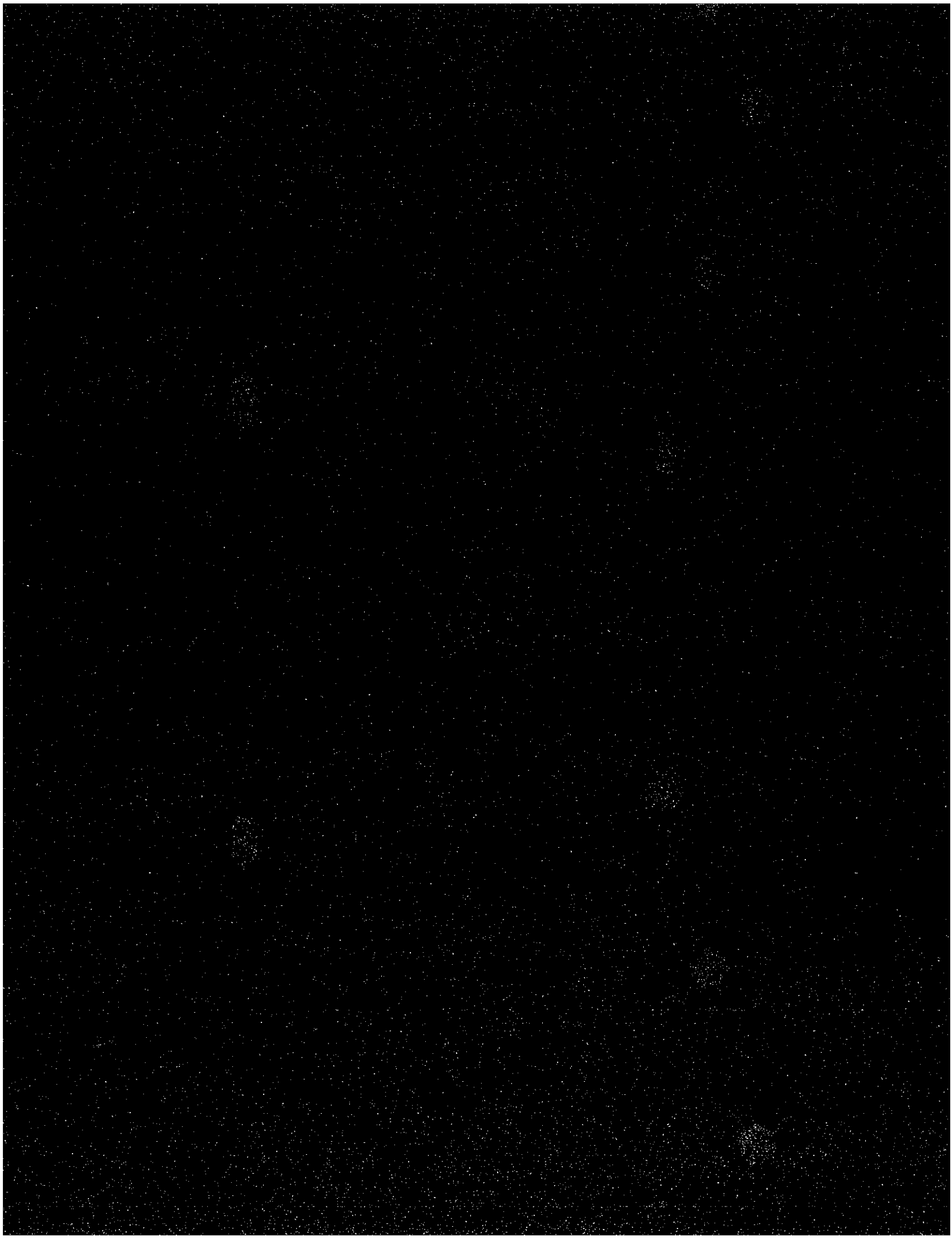
+ Analog This supplies the positive side of the analog circuits in the matrix frame. Failure of this power supply by itself would cause the audio of the system to be inoperative or distorted.

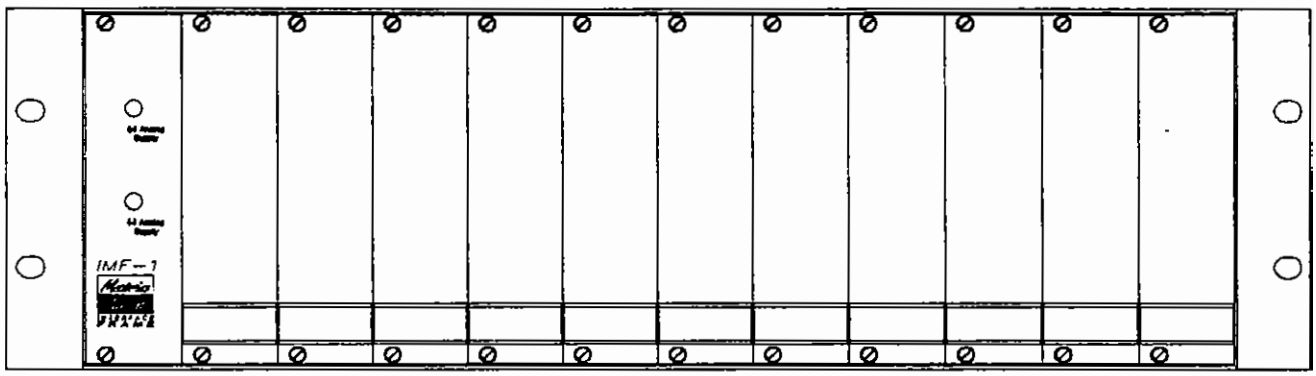
- Analog This supplies the negative side of the analog circuits in the matrix frame. Failure of this power supply by itself would cause the audio of the system to be inoperative or distorted.

Fuses

There are three fuses for the three power supplies available on the front panel. These fuses are on the output of the power supplies feeding the matrix frame. If a single led mentioned above goes out, check its fuse.







Matrix Plus II System IMF-1

INTERFACE MODULE FRAME

Introduction

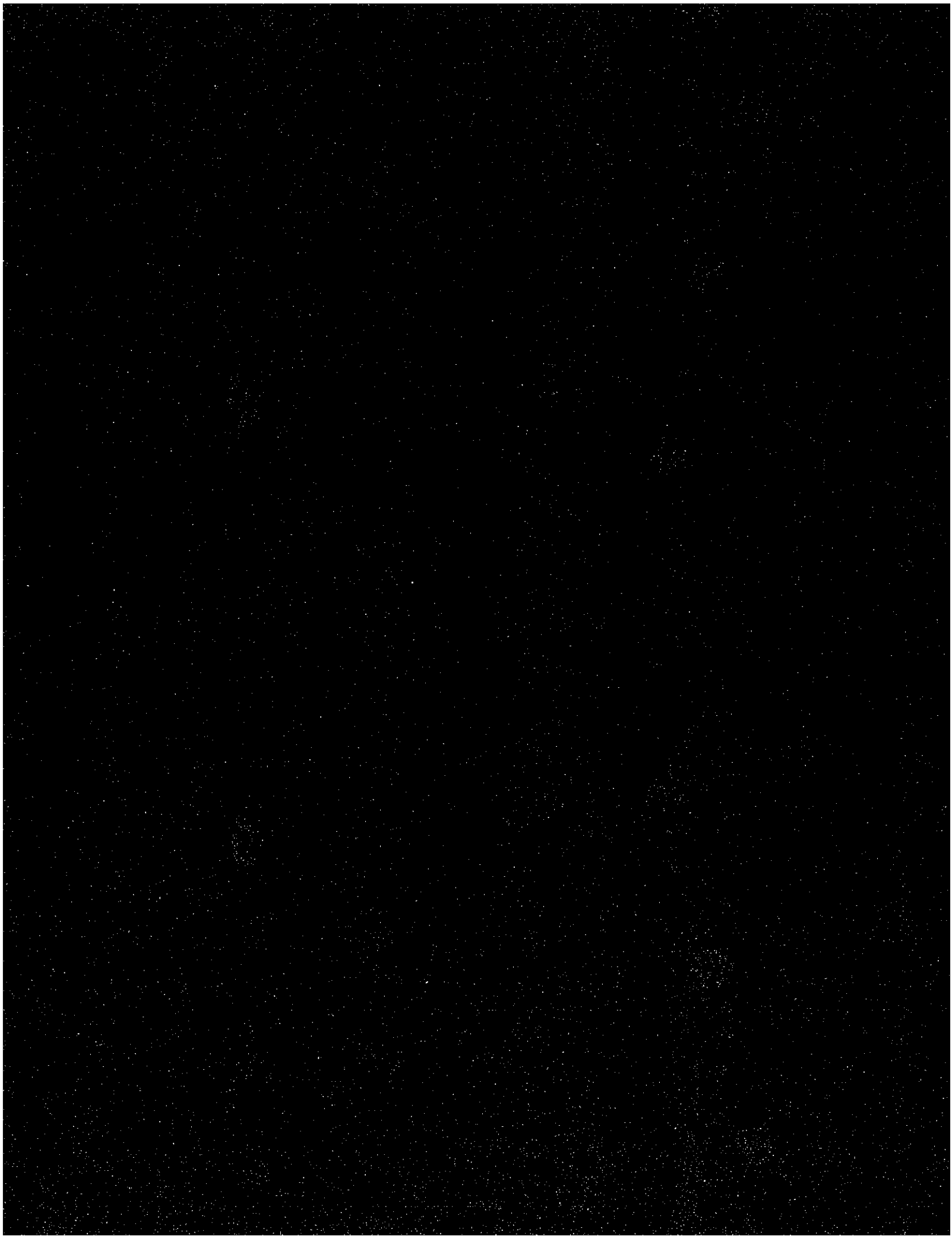
This section describes the IMF-1 Interface Module Frame.

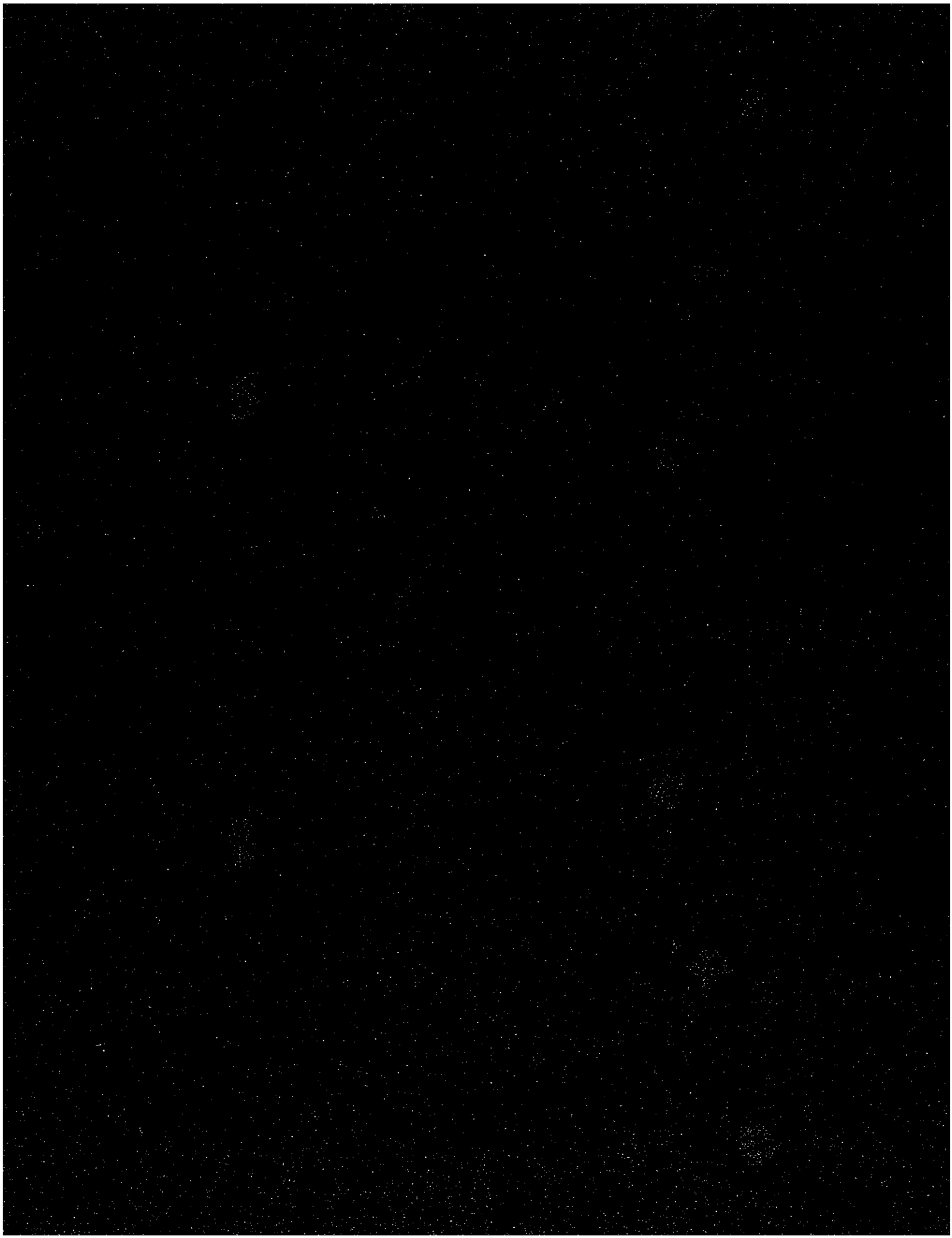
Description

The IMF-1 Interface Module Frame is a 3RU high frame intended to house up to 11 Matrix Plus II interfaces. The left end of the front of the IMF-1 contains a panel with two leds that indicate the presence of DC power in the interface frame.

The two leds represent the plus and minus analog power supplies used by some interfaces.

For operation instructions for the individual interfaces refer to the appropriate chapters in this operation manual on each interface.





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