



The MC-IP-Series is a group of audio products designed to provide very high audio quality over ethernet using Internet Protocol. Audio quality is consistent and predictable due to the implementation of Streaming VoIP with our tried-and-true audio designs and industry standard interfaces. The MC-IP provides Master to Remote communication and Master to Master Communication up to 32 Operators and 512 Remotes with a single HOST. When using MC-IP-SERVERS, 32 systems can be interconnected for a total system of $32 \times 32 = 1024$ Operators and $32 \times 32 \times 16 = 16,384$ remote stations.

By using a dedicated IP network with dedicated switch, operator console, field device interface, and HOST, the MC-IP maintains quality audio with no IT setup. By plugging the units in they automatically assign IP addresses and propagate configurations based on ID settings on each device. This allows the system programmer to program the system the way it needs to be, for a specific facility, without worrying about the IT settings for proper operation. Maintenance personal, without IT skills, can swap a box and just set the box ID. As soon as it is attached to a system, the Host sets the IT parameters and downloads the unique characteristic that unit was assigned during the original system programming.

System Station hardware offers a call confirmation light and privacy alert tone for those areas that require ADA and Right to Privacy Act compliance.

The System has an API Interface, for users who would prefer to use their own Integrated Controller, for Doors, Cameras, and Communications, from a single touch screen control console.

The MC-IP Products use Standard 25-Volt Speakers, and Internet wiring.

MC-IP-Series

Modular Communication Internet Protocol Audio Intercommunication

BENEFITS

- Audio and Control over a Single Internet Protocol Connection
- Rugged Design
- High Quality Audio
- Self-contained electronics eliminates the need for wiring separate Modules together
- Designed Specifically for Security, Corrections and Industrial applications
- Industry Standard 25-Volt remote speakers

Associated Equipment:

MC-IP-ODC-POE	Operator Desk Console w/Power Over Ethernet
MC-IP-ODC-TS	Touch Screen Console
MC-IP-ODC-8/16	Push Button Operator Console
MC-IP-HOST	Network Administrator
MC-IP-SERVER	Network Administrator/Router
MC-IP-116	16-Channel Intercom Control Module
MC-IP-116-L	16-Channel Intercom Module w/Remote Station Light Output
MC-IP-116-NC2	16-Channel Intercom Module w/Nurse Call Features
MC-IP-MSI-11	Microphone/Speaker Interface
MC-IP-SW-16	16 port TCP/IP Switch Rack Mount
MC-IP-SW-16-POE	16 port TCP/IP Switch 8 w/POE, Rack Mount
PA-402	Paging Amplifier
PS-2437B	Power Supply
VPSS-L	Vandal-proof Speaker Station w/ Lighted Call Button

Design Information:

Power	24V DC Power Supply (Sold Separately)
Frequency Response	350 – 5000Hz



Tech Works®

"Making Specialized Communication Easy"

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System Overview

Tech Works MC-IP, Modular Communication over Internet Protocol, is a group of components designed to give the highest quality audio and control while utilizing the flexibility of the Ethernet for intercom communication.

The MC-IP provides Master to Remote communication and Master to Master Communication up to 32 Operators and 512 Remotes with a simple HOST. When using MC-IP-SERVERS, 32 systems can be interconnected for a total system of $32 \times 32 = 1024$ Operators and $32 \times 32 \times 16 = 16,384$ remote stations.

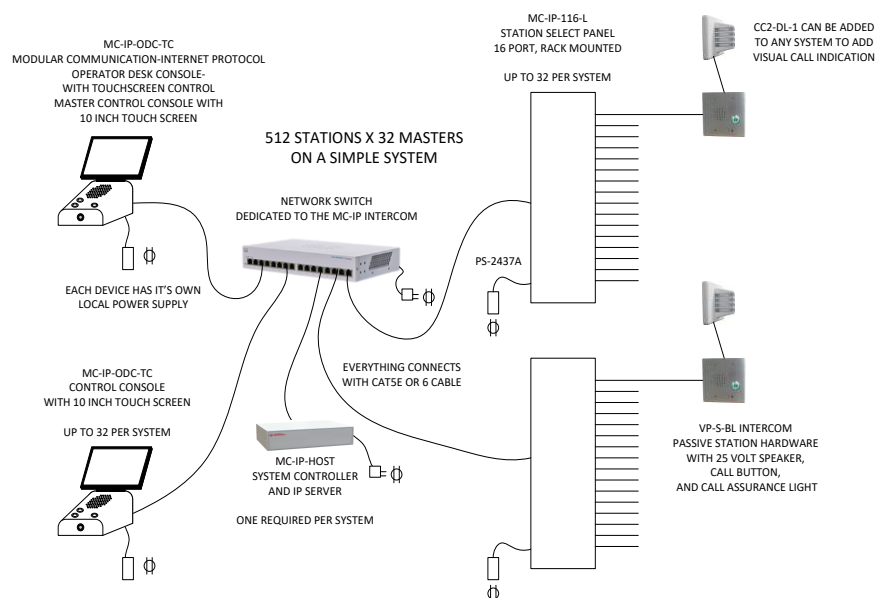
The basic components are the MC-IP-ODC-POE, Operator Desk Console Powered Over Ethernet, the MC-IP-ODC-TS Operator Desk Console with Touch Screen, the MC-IP-116 Station Control Module, the MC-IP-116-L Station Control Module with remote station Light output, and the MC-IP-HOST/SERVER. Using bi-directional streaming audio, the MC-IP connects to a dedicated switch that handles all of the communication without interruption or delays. A router is only used if there is a need to connect out of the MC network to someone else's network.

The MC-IP-HOST or SERVER stores all component profiles so when a new device is added to the system, the MC-IP-HOST/SERVER identifies the device and downloads the system profile for that component. This allows the system programmer to program the system the way it needs to be for a specific facility without worrying about the IP settings for proper operation. This also makes maintaining the system easy by allowing the installer to set up the system one time and if they ever need to swap a component there is no time lost reprogramming. This also means that the systems engineer can do all the configuration in the shop and just send the MC-IP Host out to the field pre-programmed. When components are installed in the field they are automatically added and configured without expensive personnel having to make additional visits for programming.

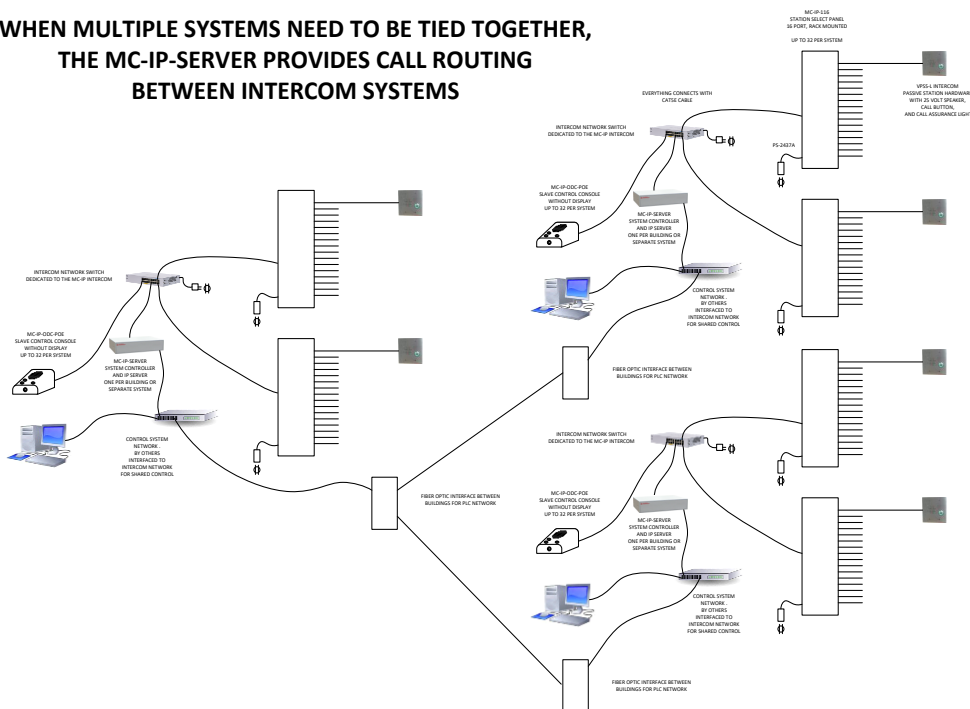
The MC-IP-SERVER has 2 TCP/IP connectors; one for the local Host functions connected to the local network and second to connect a local system to other systems on a second network. Each Server has a local Host port that supports 32×512 . The second port allows this system to be identified and accessed from the WAN. One of the Servers is set up as the Server Host. When a call is to be connected between systems a request goes to the Server Host which goes to the WAN and finds the other Server and checks to see if the station is available, if it is, the call is connected between Station A on Server A and Station B on Server B. All station characteristics are stored on each local Host.

The MC-IP can be a complete solution including it's own touch screen and other user interface devices or it can be controlled by some other system, like a door or camera control system, using API commands. The API commands and communication settings are described in the "*External control system API*" Section of this manual. MC-IP-HOST is designed for two points of access (Ports) from the control system to the MC-IP-HOST, NOT for multiple touchscreens all accessing control to the HOST separately (i.e., multiple touch screen IP addresses). If multiple IP access to the MC-IP is a requirement of your system design, we can offer the MC-IP-SERVER. Where the HOST can support 2 "ports" for external touch screen computers from control systems, each SERVER can support 32 ports and 32 SERVERS can be interconnected. The SERVER also acts as a router for communication between multiple MC-IP systems.

Once the system is complete, the MC-IP-HOST/SERVER sits on the network waiting for command requests such as connections of a console to a remote. The MC-IP-HOST/SERVER processes the request and then gets out of the way to allow the communication to proceed.



**WHEN MULTIPLE SYSTEMS NEED TO BE TIED TOGETHER,
THE MC-IP-SERVER PROVIDES CALL ROUTING
BETWEEN INTERCOM SYSTEMS**



System Components

MC-IP Components are microprocessor-based units containing their own microcontroller, memory and control logic. **During installation, Static protection such as static bracelets MUST be used at all times when any of the products are opened and vulnerable to electrostatic discharge.**

Four versions of the MC-IP-ODC are made available.



The MC-IP-ODC-TS is a self-contained Internet Protocol Master audio console with **built in Touch Screen** for system control.



The MC-IP-ODC-POE is a self-contained Internet Protocol audio console with POE for use in conjunction with touch screen control systems.

The console includes a powder coated metal base with a stainless-steel Faceplate, hidden condenser Microphone, a 3" Speaker, and 3 Vandal Resistant Push Button Switches specifically designed for the Corrections industry. Inside each console are all of the electronics for connection to the network and control of local audio plus remote gain up/down buttons to allow the operator to listen closely to what is said on the remote Station. The Faceplate is Laser Engraved to prevent wear and destruction of labeling. The 3 buttons are "Talk" (Push To Talk), "Listen" (Remote Up), and "Listen" (Remote Down). Remote Listen Level "UP", and Remote Listen Level "DOWN", not a Volume Control, Sets the microphone sensitivity at the Remote Station



The MC-IP-ODC-8 and the MC-IP-ODC-16 are "Direct Station Select" button boxes for applications like Clean Rooms and Operating Rooms where the Operator needs a simple Call Tone and Lighted Station button without a lot of functionality and customization.

The console microphone is mechanically shock resistant mounted on the front of the unit. Frequency selective circuitry shapes the omni-directional microphone for high voice band sensitivity. Tech Works Automatic Level Control makes every voice sound the same and every word as articulate as possible.

The integral 3" loudspeaker is moisture resistant and includes vandal resistant metal barriers to protect it from abuse.



The MC-IP-116 is an audio Intercom Station Control Module that communicates over Internet Protocol and includes all audio amplification, control and support for up to 16 remote intercom Stations. Intended for use in facilities such as Correctional Institutions, Security Applications, and Industrial Applications, the MC-IP-116 has 20 watts of built in power output to industry standard 25-volt speaker Stations or paging Speakers. The MC-IP-116 provides high quality audio communication with complete flexible control. The unit has connections for 16 remote intercom Stations, with Speakers, Call-in Switches, and Call Confirmation Lights. A Tech Works PA-Buss connector allows the addition of our 40-Watt paging amplifier where more power is required for large areas such as Day Rooms, Exercise Yards, and Playgrounds.





The MC-IP-116-L has a Status Indicator associated with each remote station connector. A 6 pin 0.1" (2.54mm) Spring Cage Barrier Strip provides separate connection for Speaker +/-, Call-In +/- and Light +/-.



The MC-IP-116-NC2 has 16 RJ45 connectors, one for each remote station. All NC2 devices communicate over standard CAT cable and provide 2 lights, 2 Call Buttons and 1 Voice Path per station connector.

For convenience, all the MC-IP-116 terminations are connectorized. Remote Stations connect via 4 pin 0.1" (2.54mm) Spring Cage Barrier Strips. Connection for Power, is a barrel connector or Screw Terminal. Paging Amplifier uses a RJ-45 Connector addition is as easy as plugging in our PA-Buss Cat 6 cable.

Associated with each Station is a Status Indicator. The Station Indicators shows the Technician which relay or relays are active. When an Indicator is Off there is no activity with that Station. When an Indicator is On, that Station is selected for Communication.



The Tech Works MC-IP-MSI-11 is a Modular Communication over Internet Protocol, Microphone, Speaker, audio Interface designed to take a variety of audio communication products and let them talk to each other over the Tech Works MC-IP Network. The MC-IP-MSI-11 consists of four functional modules; The local Microphone/Line Input; a 25 Volt Speaker Output, the CI-BUSS Interface, and an Ethernet port for MC-IP network connection.



The MC-IP-HOST is an Internet Protocol Control Module that does several functions including monitor what devices are connected to the network, who wants to talk to whom, who is talking to who, as well as programmed properties and functional programming of each system device. If a device fails or is removed from the system, the MC-IP-HOST puts that device out of service until a new device with the same credential is installed. When a new device appears the MC-IP-HOST automatically transfers all stored settings to the new device to assure that it functions just like the unit that was replaced. This makes field maintenance or repair a simple "swap of the box" for service. The MC-IP-HOST uses a standard SD card to store system programming and configurations. This information can be copied and stored for backup and security. If a MC-IP-HOST is being replaced, the SD card can be moved to the new MC-IP-HOST without the need to be reprogrammed.

The system handles Call Routing, and Busy signaling. When a Connection is established, the Operator is in full control of the Conversation.



The MC-IP-SERVER is an Internet Protocol Control Module like the MC-IP-HOST but it does a lot more. Where the HOST can support 2 "ports" for external touch screen computers from control systems, each SERVER can support 32 ports and 32 SERVERS can be interconnected. The SERVER also acts as a router for communication between multiple MC-IP systems. The MC-IP-SERVER has 2 TCP/IP connectors; one for the local Host functions connected to the local network and second to connect a local system to other systems on a second network. This allows 32 systems to seamlessly connect to each other for a total of $32 \times 32 = 1024$ Operators and $32 \times 32 \times 16 = 16,384$ remote stations



Each MC-IP system requires an ethernet network switch to connect all of the MC-IP system components. The Tech Works MC-IP-SW-16-RM and MC-IP-SW-16-POE-RM are Gigabit Ethernet LAN switches with 16 LAN ports. The MC-IP is a dedicated network used only for Tech Works MC-IP system communication. The MC-IP is connected to other IP products and networks by router WAN ports to insure the best possible performance of all audio communication. All of the MC-IP Switches are rack mountable



The Tech Works VPSS-L is a two-gang correctional/industrial grade Passive Intercom Speaker Station designed for the most demanding environments. The speaker/microphone is moisture resistant, includes a 25 Volt matching transformer, and employs three steel barriers to protect it from tampering and vandalism. The integral "Call-In" switch is hermetically sealed and utilizes a limited travel actuator to protect from excessive force or moisture. An ultra-bright LED call confirmation light built into the button lets the caller know that their call has been placed. The 12-gauge stainless steel faceplate and tamperproof mounting hardware makes the VPSS-L almost indestructible.



We've selected the best and most popular 25V speakers to pair with the products we build. The **CRS-WM** is a Wall Mount Clean Room Speaker complete with wall mounting steel enclosure.



The **CRS-RC** is a Round Ceiling mount Clean Room Speaker which includes a backbox and all required mounting hardware. This unit is designed to be cut into existing hard lid ceilings and has a 25V speaker.



The Tech Works **CAT6-*** ("*" specify Length) is an EIA 568B standard computer network Patch Cable designed to connect our Tech Works products together. These units are designed for the systems integrator to make installation Plug and Play.



The Tech Works **PS-2437B** is a regulated computer grade power supply capable of providing 3.75 Amps of power at 24-Volts DC to any of our products. A 6-foot removable power cord with a North American standard Edison connector is included along with a metal mounting bracket to allow the unit to be screwed to the wall or under a counter.



The Tech Works **PC-*** ("*" specify Length) is a Power Patch Cable designed to connect our Tech Works Collaborative Intercom (CI-Buss) and PA-Buss products together. These units are designed for the systems integrator to make installation Plug and Play. **18-gauge** power cord is made with 5.5 mm barrel connectors on each end for connecting 24 VDC power from one unit to the next.

Static protection such as static bracelets MUST be used at all times when any of the products are opened and vulnerable to electrostatic discharge.

System Wiring and Connections

Network Configuration and Setup

The Tech Works MC-IP is utilizing a dedicated standard Ethernet network for its inner communications as well as external control through API commands. Standard Ethernet cabling such as Cat 5e/6 can be used. Each node of the MC-IP product line sends TCP and UDP messages using a 100Mbps network link. All switches/routers used in the network should be no less than 100Mbps. It is recommended that 1,000Mbps (1Gbps) routers/switches be used.

When designing a network for the MC-IP system, measures should be taken as to make sure that network bottlenecks are avoided. Bottlenecks can happen when there are many calls happening simultaneously over the same network link. Though switches/routers can help to create the most efficient path, poor network design can have an effect.

For example:

If all the ODC's are on Switch 1 and all the 116's are on Switch 2, any call from an ODC to a 116 must cross the Switch 1 to Switch 2 link. If there are many simultaneous calls, this could create a network bottleneck and could cause problems in the MC-IP system. A better design would be to put ODC's and 116's often used together on the same switch. If multiple switches are required, then planning should be done to put the most amount of traffic for ODC-X to 116-X on the same switch. This would limit the number of calls that need to cross the Switch 1 to Switch 2 link. When possible, it is recommended that all nodes of the MC-IP system be on the same switch. If multiple switches are required, the link between switches should always be at 1GBps or faster speeds.

If external control is to be used, it is highly recommended that a router be used to isolate the MC-IP network from any other network. Only the necessary ports and traffic should be allowed to pass through the router as needed. If a router is used, it should NOT be configured as a DHCP server. The LAN IP settings of the router should be the following:

IP: 172.30.100.1
MASK: 255:255:255:0

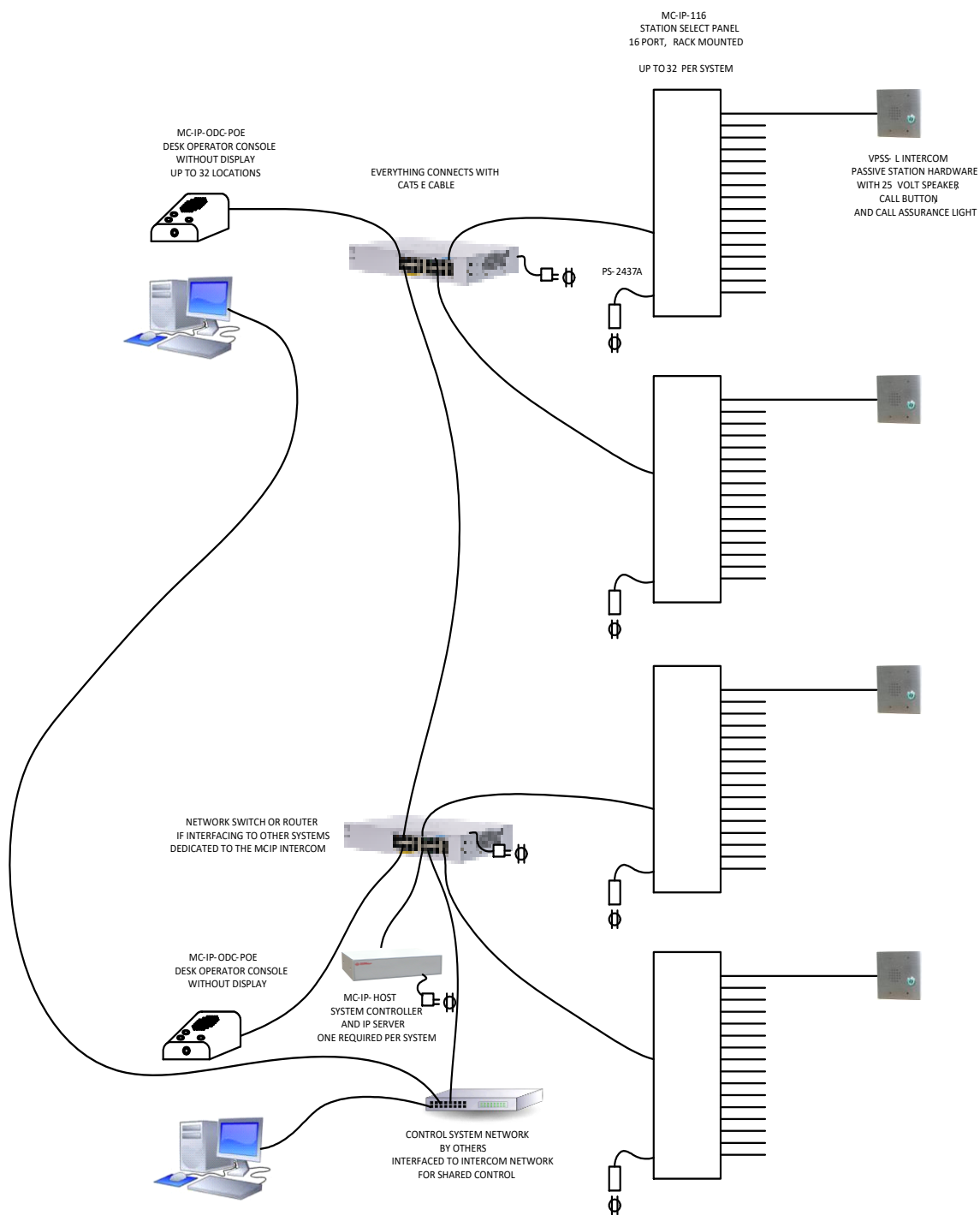
Each node on the MC-IP network has a static IP address. Products such as the MC-ODC and MC-116 have a 16-position rotary switch and a jumper to determine its Network Identity including its IP address. These IP addresses are preset and cannot be changed

The following are the IP Addresses assigned by the HOST:

MC-IP-HOST and MC-IP-SERVER: 172.30.100.2
MC-IP-ODC #0-15: 172.30.100.20 – 35
MC-IP-ODC #16-31: 172.30.100.36 – 51
Reserved for future: 172.30.100.52-83
MC-IP-116 #0-15: 172.30.100.84 – 99
MC-IP-116 #16-31: 172.30.100.100 – 115
MC-IP-MSI-11: 172.30.100.116-147

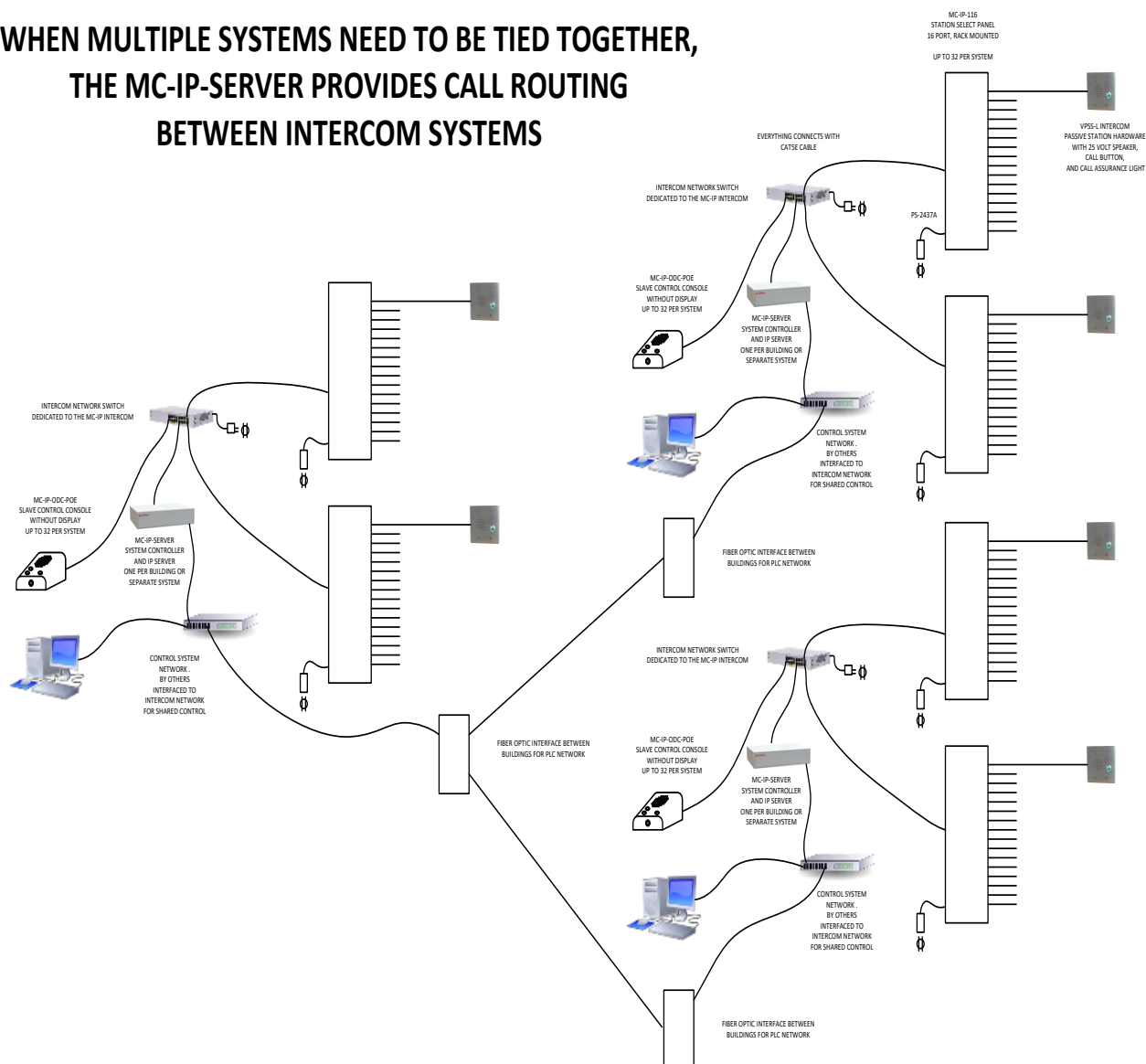
Always keep the MC-IP-ODC on the same network switch as the MC-IP-116s that it needs to communicate with for best performance.

Systems with API control interface from an external Touch Screen control system



Expanded systems using SERVERs to interconnect multiple MC-IP systems

**WHEN MULTIPLE SYSTEMS NEED TO BE TIED TOGETHER,
THE MC-IP-SERVER PROVIDES CALL ROUTING
BETWEEN INTERCOM SYSTEMS**



MC-IP-HOST Connections



Because the MC-IP-HOST assigns IP addresses and loads the configuration to all other system devices, the HOST should always be connected first. All other components can be connected and disconnected with the system live but the HOST should always be connected and powered on before the network switch is even powered on.

Power is 24 Volts DC and is connected using Tech Works standard 5mm barrel connector

The Network connection is a standard CAT6, 568B wiring jack and should be connected directly to the Tech Works Network Switch.

When the unit is powered on a green indicator between the 2 power connectors will light up indicating that the unit has power.

If the running correctly the “Processor Running” light will flash very fast.

There are 2 lights on the TCP/IP Connector that when properly connected to a working ethernet switch or router will flash very fast to indicate that there is a good connection.

All other adjustments and configuration with the MC-IP-HOST are done through software.

SD Card

The MC-IP HOST includes an SD Card for storage of the system configuration. The SD card can only be accessed by removing the lid of the MC-IP-HOST. The SD Card is where the system configuration for this HOST is stored. The reason for this is if there is ever a HOST failure, the SD Card can be removed and installed in a new HOST and the new HOST will read the SD Card on boot strap and will set the system up exactly as it was before.

Using the Tech Works MC-IP Configurator Program, create the system configuration you want to use and save it. You have 2 ways to load the Configuration into the HOST SD Card. You can use the “Uploader” function built into the MC Configuration software if the computer running the Configurator software is connected to the MC-IP-HOST network. Or the file can be copied to a new SD Card and installed in a HOST and the configuration will be read on boot strap (startup).

The file will have the name you saved it under followed by “.mccfg”. If you manually copy the file to the SD Card, you must copy and rename the file to “mc_host.mccfg” before you install it in the MC-IP-HOST or it will not read it. Simply copy this file to a formatted SD card and swap the one in MC-IP-HOST in the field. In this way, changes can be made by sending a technician out to the field without a computer.

The SD Card must be formatted to File System FAT32 for proper operation.

MC-IP-SERVER Connections:



The MC-IP-SERVER acts as the local HOST and assigns IP addresses and loads the configuration to all other system devices, the SERVER should always be connected first. All other components can be connected and disconnected with the system live but the SERVER should always be connected and powered on before the network switch is even powered on.

Power is 24 Volts DC and is connected using Tech Works standard 5mm barrel connector

The Network connections are both standard CAT6, 568B wiring jacks. The MC-IP-HOST connector should be connected directly to the local Tech Works Network Switch. The "LAN/WAN" Ethernet Connector is for connection to the Wide Area Network or a system with more than 2 touch screen control stations. This does not apply to the MC-IP-ODC-TS which has its own touch screen and does not require a SERVER for 32 Operator stations.

When the unit is powered on a green indicator between the 2 power connectors will light up indicating that the unit has power.

There are 2 lights on the TCP/IP Connector that when properly connected to a working ethernet switch or router will flash very fast to indicate that there is a good connection.

All other adjustments and configuration with the MC-IP-HOST are done through software.

SD Card

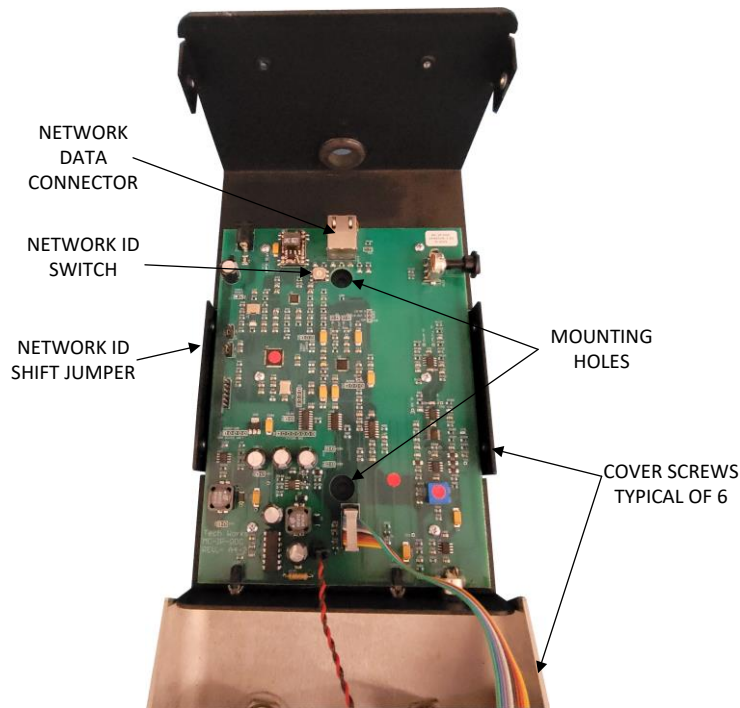
The MC-IP SERVER includes an SD Card for storage of the system configuration. The SD card can only be accessed by removing the lid of the MC-IP-SERVER. The SD Card is where the system configuration for this SERVER is stored. The reason for this is if there is ever a SERVER failure, the SD Card can be removed and installed in a new SERVER and the new SERVER will read the SD Card on boot strap and will set the system up exactly as it was before.

Using the Tech Works MC-IP Configurator Program, create the system configuration you want to use and save it. You have 2 ways to load the Configuration into the SERVER SD Card. You can use the "Uploader" function built into the MC Configuration software if the computer running the Configurator software is connected to the MC-IP- SERVER network. Or the file can be copied to a new SD Card and installed in a HOST and the configuration will be read on boot strap (startup).

The file will have the name you saved it under followed by ".mccfg". If you manually copy the file to the SD Card, you must copy and rename the file to "mc_host.mccfg" before you install it in the MC-IP- SERVER or it will not read it. Simply copy this file to a formatted SD card and swap the one in MC-IP- SERVER in the field. In this way, changes can be made by sending a technician out to the field without a computer.

The SD Card must be formatted to File System FAT32 for proper operation.

MC-IP-ODC Connections



Static protection such as static bracelets MUST be used at all times when any of the products are opened and vulnerable to electrostatic discharge.

All Of the connections for the MC-IP-ODC are inside the console for security purposes. By removing the 6 cover screws on the sides of the ODC the top will easily tip forward. Run the CAT6 cable connector through the grommated opening at the back and plug it into the ODC.

There are 2 mounting holes provided to secure the console to the counter top if desired. It is always best practice to install the counter mounting screw without power applied in case you drop a screw or a tool.

The only user settings inside the ODC are the network ID rotary switch and the address shift jumper P4 labeled "OPT !". The rotary switch selects the address 0-15 and by moving the OPT 1 switch to the "ON" position the rotary switch sets the ID to 16-31.

Replace the cover.

Operation:

Apply power and make sure that the power light on the front of the console comes on.

Whenever an ODC microphone is active the Push To Talk light will light and whenever the speaker is active the Reach lights will light up.

Console conversations are established through the control touchscreen. Once a call is connected the Reach lights should come on to indicate that the speaker is active and you should be hearing the distant remote station. To increase the Listening sensitivity, push the "Reach Up" button repeatedly will make the remote louder. If it is too loud, pressing the "Reach Down" button repeatedly will turn the remote down. Remote Listen Level "UP", and Remote Listen Level "DOWN", is not a Volume Control, it sets the microphone sensitivity at the Remote Station.

Depending on the software configuration of an ODC it can be called by another ODC. When one ODC calls another, the calling ODC will control the direction of the conversation with its Push To Talk button. The Called ODC will have its Push To Talk (PTT) light on to tell the operator that they are being listened to and when the caller pushes their PTT button the called station PTT light will go off and their Reach light will go on.

MC-IP-116 Connections



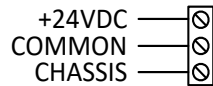
All system components employ RJ45 connectors for a couple of purposes

1. For connection of Tech Works PA-Buss components such as the PA-402
2. For connection of components to the IP Network

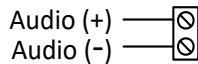
Either application assumes standard off the shelf CAT6 cables wired to EIA/TIA 568B

Power connections are on both the Euro Style Screw Block and the 2.00mm ID (0.079"), 5.50mm OD (0.217") Barrel connector for 24 VDC.

Screw terminal power connections are always:



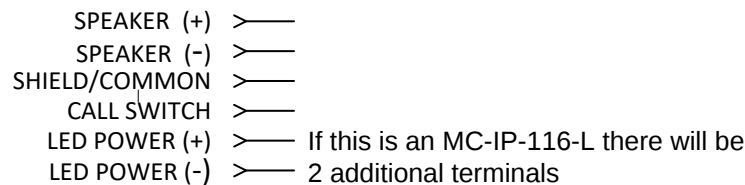
External Paging Amplifier connections are always:



Station field wiring is a 4 or 6-conductor compression clamp connector with 0.1 inch spacing and will connect to 18-24 AWG wire. Wires must be stripped of insulation approximately $\frac{1}{4}$ inch from the end before being inserted in the connector. A slot above each connection allows the insertion of a 2.0 mm tech blade screw driver to release the clamp so that you can remove the wire if necessary.

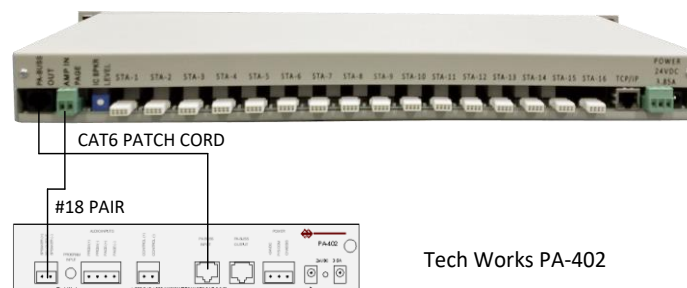


Remote Station connections are:

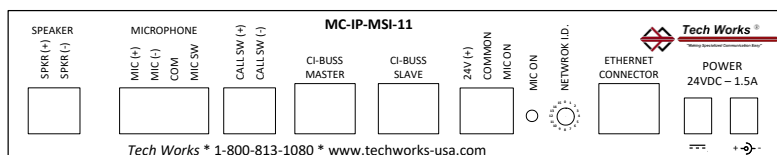


External Paging Amplifier check box in programming is set for each 116 to tell it to either use the built in 20-watt amplifier or an external amplifier connected to the 116. If the External Paging Amplifier is set "On", then each time the 116 is told to page it will automatically activate the built-in page relay and connect the External Amplifier screw terminal inputs to the Station select bus. If this feature is set to "Off" the built-in page relay will not activate and the internal 20-Watt amplifier will be used for paging program amplification.

Connecting an External Paging Amplifier



MC-IP-MSI-11 Connections



Speaker Output:

Two Position Euro-Style Barrier

Strip:

Speaker (+)

Speaker (-)

25-Volts, 10-Watts Maximum

Microphone Input:

Four Position Euro-Style Barrier

Strip:

Universal Microphone/Line Input (+)

Universal Microphone/Line Input (-)

Shield/Switch Common

Talk Switch (N.O.)

Configured for a Microphone Level Input:

2000 Ohms Balanced

-75dBm or -60dBm (Selectable) minimum

input (Balanced) for full rated output

Selectable Equalization - 3 settings

optimized for voice communication

Selectable Phantom Power (22 Volts, Short Circuit Protected)

Call Switch:

Two Position Euro-Style Barrier

Strip:

Call Switch (+), (N.O.)

Call Switch (-)

RJ-45, CI-BUSS, "Master" Connector

RJ-45, CI-BUSS, "Slave" Connector

Microphone ON (someone is listening to you)

Remote Indicator Output:

Three Position Euro-Style Barrier

Strip:

Current Limited 24VDC (+)

Common 24VDC (-)

Mic On – pull to common control

Mic On local Indicator

Network I.D. – Rotary Hex Switch

Sets local unit IP address so that the MC-IP Network Host will recognize it. See jumper settings below for more details. When using the MC-IP-MSI-11 with MC-IP-116, the MSI defaults to the first 32 points in the configuration program. So if you employ both in a single system, set your first MC-IP-116 to Network ID "2" to avoid conflicts.

Shielded RJ-45 Ethernet Connector
to MC-IP Network

Power Connectors: (Two)

3.5mm Barrel Connectors

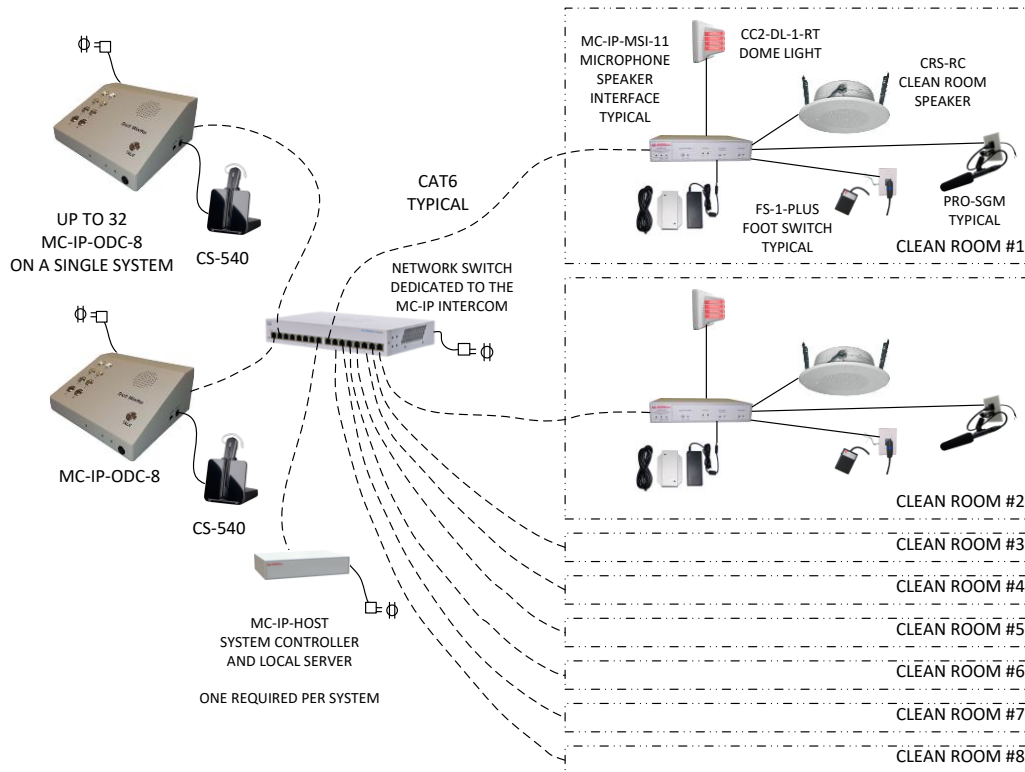
**24Volts, 1.5 Amps Maximum, depending
on Speaker load**

What is an MC-IP-MSI 11 used for?

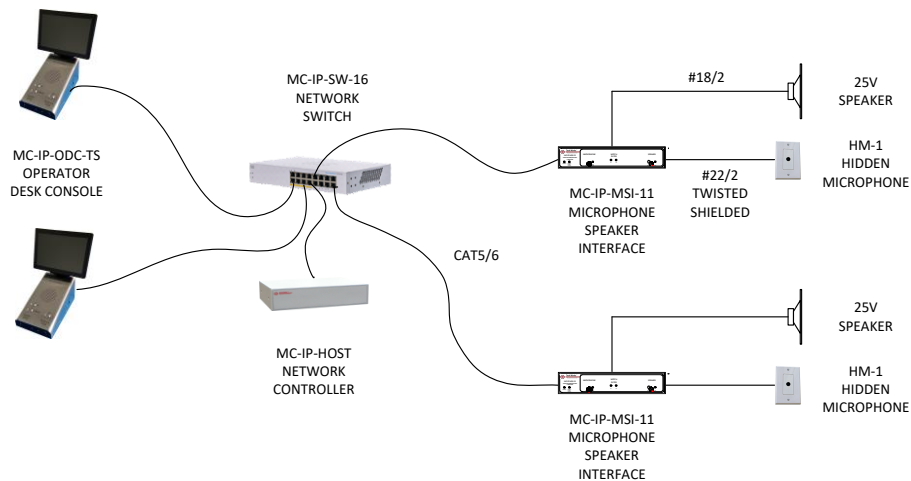
Procedure and Clean Rooms in Healthcare

Whenever 2 or more Operators want to talk to places like clean rooms the MC-IP-ODC-TS and the MC-IP-ODC-8 or the MC-IP-ODC-16 can be connected to select any of up to 32 MC-IP-MSI-11 connected to the network.

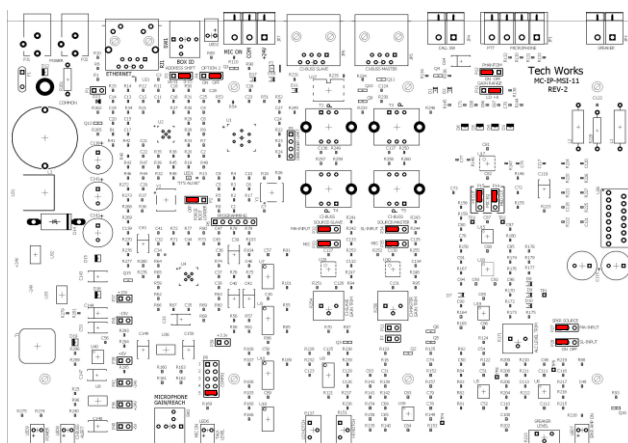
Each MC-IP-MSI-11 is assigned to a space like a clean room or operating room and connects to its local Speakers and Microphone. Adjustments are made in each MSI to meet the acoustic needs of that space. The MSI can also support a light to tell the people in the room when their microphone is on and they are being listened to. Foot switches can also be added to place a call to an Operator or to activate the Microphone so that it is only on when they Push (step) TO Talk.



Observation and Isolation in Detention and Mental Healthcare



MC-IP-MSI-11 Internal Jumpers



The MC-IP-MSI-11 has several internal jumpers to tailor the operation of the unit to the application. All the jumpers are shown in their “Default” positions.

- P3 Address Shift – Used to set the Station ID range of the rotary switch on the back. When set to the Right the address range is 0-15 which will correspond to IP Address 172.30.100.116 - 172.30.100.132. When set to the Left the address range is 16-31 which will correspond to IP Address 172.30.100.133 - 172.30.100.147
- P4 Option 2 – NOT USED
- P2 Force Boot Loader - Only used to restore software in the event of a problem.
- P12 Phantom – 24 VDC Power to a condenser microphone ON/OFF
- P13 Gain Range – Pads the input signal down by 15 dB if it is too loud.
- P14 HI CUT – Shapes the Microphone audio frequency response by rolling off the signal at ~ 3dB/Octave above 4K Hz.
- P15 MID CUT – Takes out the octave around 1K Hz by ~ 10dB which is typically the ringing sound in very hard acoustic environments.

Taking out P13, P14, and P15, the input becomes a line level 0dB

CI Source - Determines what audio signals go to the CI-Buss Connectors and are heard by other CI-Buss devices if installed.

- P32 MA-INPUT – Do you want the audio from the CI Master Connector to go to the CI-Slave Connector?
- P33 MIC – Do you want the audio from this MSI Microphone to go to the CI-Slave Connector?
- P34 SL-INPUT – Do you want the audio from the CI Slave Connector to go to the CI-Master Connector?
- P27 MIC – Do you want the audio from this MSI Microphone to go to the CI-Slave Connector?
- P28 Software Configuration – Position 8, Full Bi-Directional Streaming Audio, No Privacy Tone
- P8 Position 0, Push To Talk Switch activates Microphone.
- Position 1, Privacy Tone ON letting the listener know they are being monitored.

For more information on the CI-Series and the various options of those products visit <https://techworks-usa.com/dealer-ae/data-sheets/#CI>

Features and Programming Options

When any MC-IP-ODC Operator Desk Console selects a Station to have a conversation, either Master to Master (MC-IP-ODC to MC-IP-ODC) or Master to Station (MC-IP-ODC to MC-IP-116), the MC-IP-HOST sees if that Station is available. If not, the requesting Station is sent a "Busy Signal". If the Station is available a connection is established between the two devices and the ODC is in control of the conversation. If a remote Station pushes their call button a message is sent to the HOST requesting and intercom call. Any calling Station can be sent to one or more Operator Desk Consoles (ODCs) at the same time for answering this is known as a "Hunt Group". This is configured for each Station. Call routing and feature options are stored in the MC-IP-HOST (HOST) for call processing.

Call Processing

Calls are typically generated from a Station. When a Station places a call, a message is sent to the HOST for processing. Independent timers are assigned and started for each new call and the call is then put into the Call Queue. Depending on the calling Station configuration and the state of the MC System, the HOST rings the ODC's that were configured for that Station. An ODC will only ring when they are able to take the call, i.e. the ODC and the MC-IP-116 (116) are not busy. An ODC is considered "busy" when it is in a page or on a call. A 116 is considered "busy" when any Station on a 116 is in a call. If any Station on a 116 is in a page, the 116 is not considered "busy". In this case, an ODC will ring and can even connect the call, however, the page will override the call.

Master to Master (ODC to ODC) calling has two options which are configured for each ODC. An ODC can be "Automatic" meaning that if it is not busy, and another ODC wants to talk to it, the voice channel will automatically open as if the calling ODC had called a remote Stations such as a door or a cell. In this case the calling ODC is in control of the Push To Talk function and call ending. If Privacy is turned on, the receiving ODC will hear a beep tone before the calling ODC hears any audio. However, if an ODC is set to "Manual" any ODC calls will be processed as if a remote Station were calling and the receiving ODC will have to answer it. In this case the receiving ODC will ring. To answer the call, the receiving ODC will generate a call to the originating ODC. At this point the "receiving" ODC is now the master and normal ODC to ODC communications are handled as stated above.

Call RELAY (what the Telephone Industry calls "Circular hunting")

Call relaying is a feature which redirects a call to another ODC. In the MC-IP the Call Relay is configured for each Station with up to two RELAY ODC's. The call processing for Call RELAY is determined by the configuration. The configuration is independent for each Station. There are four aspects to Call RELAY, Call Time Out, RELAY 1, RELAY 2, and RELAY Enable. See below for a better definition.

If a Station that is calling my ODC is relayed to You, and you are on a call, the call will still be pending for you, however, your ODC will not ring. Anytime a new CALL comes in an independent Relay timer is started.

If a CALL comes in to an ODC and the ODC is "busy" in a page or on a call, the new call is in the Queue and a message is sent to "their" system visually indicating the Call, but the ODC will not ring.

If a CALL comes in to an ODC and the 116 is "busy" in a call, the new call is in the Queue and a message is sent to "their" system indicating the Call, but the ODC will not ring. ODC's will only ring when they are able to take the call, i.e., the ODC and the 116 are not busy. When any Station on a 116 is in use, all Stations for that 116 are tagged as busy.

Call RELAY Processing

When RELAY Enable has been configured, calls are placed in a hybrid "Circular hunting" loop. Depending on the configuration, a loop consists of up to three steps. The first is the initial Hunt Group of ODC's, the second is the RELAY 1 ODC, and the third is the RELAY 2 ODC. When a new call is placed, one of the timers that were assigned was the Call Time Out. If a call is unanswered for the duration of the timer, the call will advance through the loop and the timer will be reset. Once the end of the loop is reached the process starts over. Typically, during this process, only the active loop ODC(s) will ring, however, there is a configuration option (Ring Local) that will keep ringing the initial Hunt Group until the call is answered.

Call Forward All

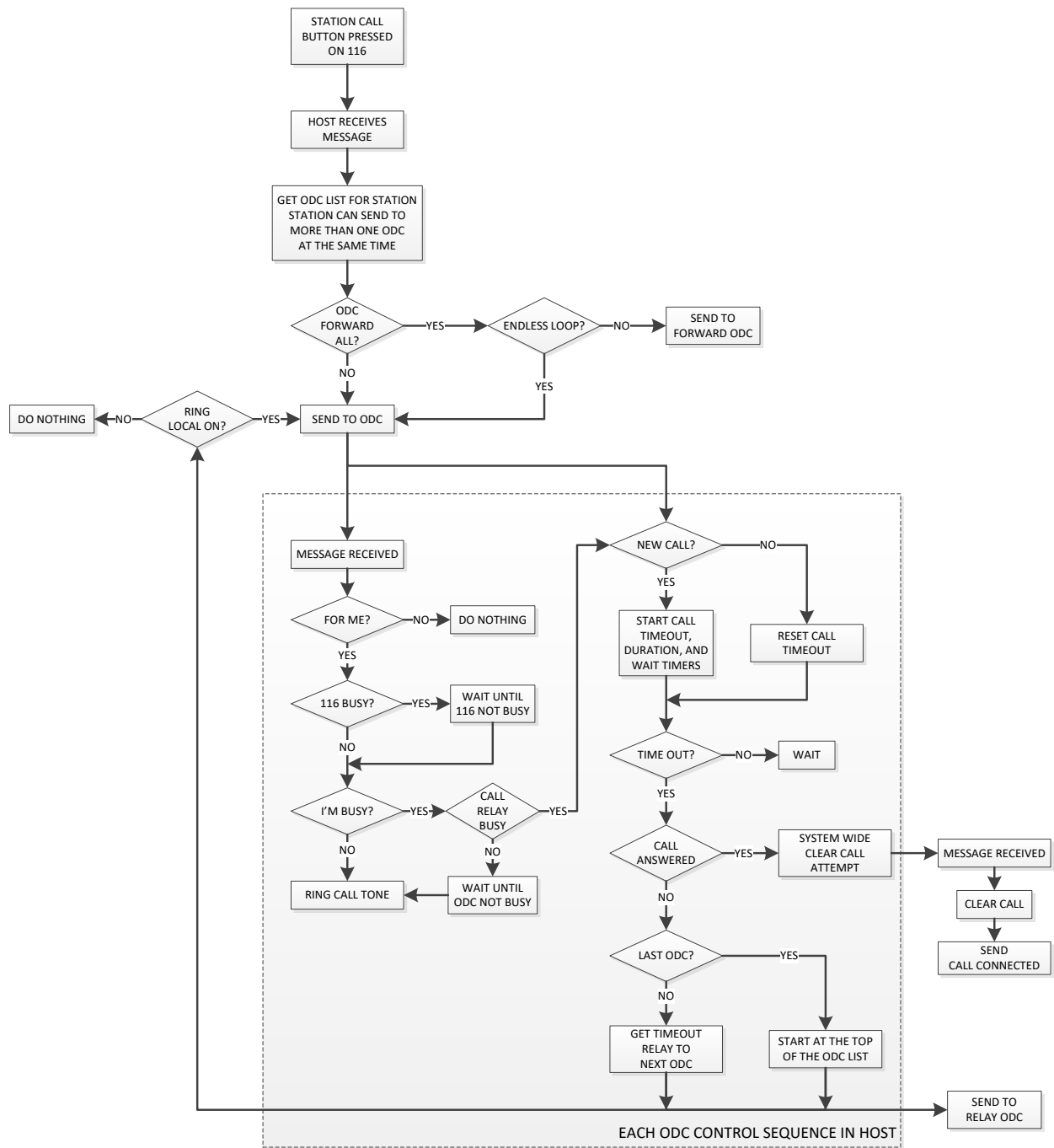
Is where the ODC is out of service for some reason and all calls are to be rerouted to another ODC. This is a system command that is set up in the control system (Touch Screen) so that the Operator can put their console out of service. When a console is out of service it just means that their calls will ring somewhere else. The visual call status is still broadcast to all control screens and can still be displayed as long as the touch screen is still on. It is suggested that the Touch Screen Icon be programmed to reflect that the ODC is in Call Forward All mode.

Call Forward Processing

An ODC can only use forwarding if it has been configured to allow it. When a forward is created, it will only be created if it does not create an endless forward. For example, if ODC-a is forwarded to ODC-b, and ODC-b to ODC-c, and ODC-c to ODC-a, any call to any ODC would be in an endless loop and never ring anywhere. To avoid this, the system will not allow a new forward until a section of the loop is broken. In the example above, the last forward would fail. This means that any forward not needed should be removed before a new one is created. In the example above, the last forward was put in because ODC-a is back from lunch. So ODC-a to ODC-b would be canceled, then ODC-c to ODC-a created.

Console Call Enables (aka Hunt Groups) - Calls can be to a single ODC or to multiple ODCs in a Hunt Group. Hunt Groups on the MC-IP are set up for each Station and are not system wide.

MC-IP Call Processing



MC-IP Configuration Utility

To set up your Modular Communication over Internet Protocol intercom system, a utility program is provided that will create and store your configuration. This program identifies all 32 MC-IP-ODC Operator Desk Consoles and how they will send and receive calls. Each ODC can also have up to 16 unique Paging Zones which are set up and assigned to each ODC in the Configuration Utility. It also Identifies all 32 MC-IP-116 Station Control Modules and all of their 16 Stations and all of their calling attributes.

Console Configuration

Enable	ID	Description	Location	Room	Privacy Tone	Privacy Tone Volume	Call Volume	Display Mode	External Calls	Auto Answer	Forward Enable	Page Group
☐	0				☒	15	15	NORMAL	☐	☐	☐	Edit
☐	1				☒	15	15	NORMAL	☐	☐	☐	Edit
☐	2				☒	15	15	NORMAL	☐	☐	☐	Edit
☐	3				☒	15	15	NORMAL	☐	☐	☐	Edit
☐	4				☒	15	15	NORMAL	☐	☐	☐	Edit
☐	5				☒	15	15	NORMAL	☐	☐	☐	Edit
☐	6				☒	15	15	NORMAL	☐	☐	☐	Edit
☐	7				☒	15	15	NORMAL	☐	☐	☐	Edit
☐	8				☒	15	15	NORMAL	☐	☐	☐	Edit
☐	9				☒	15	15	NORMAL	☐	☐	☐	Edit
☐	10				☒	15	15	NORMAL	☐	☐	☐	Edit
☐	11				☒	15	15	NORMAL	☐	☐	☐	Edit
☐	12				☒	15	15	NORMAL	☐	☐	☐	Edit

Station Configuration: MC-116 ID# 0

MC 116 Select: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 Station Edit

Station Groups External Page Amp

Enable	ID	#	Description	Location	Room	Privacy Tone	Privacy Tone Volume	Timeout	Relay 1	Relay 2	Relay Enable	Ring Local	Can Cancel
☐	0	1				☒	15	0	CON 0	CON 0	DISABLED	☐	☐
☐	1	2				☒	15	0	CON 0	CON 0	DISABLED	☐	☐
☐	2	3				☒	15	0	CON 0	CON 0	DISABLED	☐	☐
☐	3	4				☒	15	0	CON 0	CON 0	DISABLED	☐	☐
☐	4	5				☒	15	0	CON 0	CON 0	DISABLED	☐	☐
☐	5	6				☒	15	0	CON 0	CON 0	DISABLED	☐	☐
☐	6	7				☒	15	0	CON 0	CON 0	DISABLED	☐	☐
☐	7	8				☒	15	0	CON 0	CON 0	DISABLED	☐	☐
☐	8	9				☒	15	0	CON 0	CON 0	DISABLED	☐	☐
☐	9	10				☒	15	0	CON 0	CON 0	DISABLED	☐	☐
☐	10	11				☒	15	0	CON 0	CON 0	DISABLED	☐	☐
☐	11	12				☒	15	0	CON 0	CON 0	DISABLED	☐	☐
☐	12	13				☒	15	0	CON 0	CON 0	DISABLED	☐	☐
☐	13	14				☒	15	0	CON 0	CON 0	DISABLED	☐	☐
☐	14	15				☒	15	0	CON 0	CON 0	DISABLED	☐	☐
☐	15	16				☒	15	0	CON 0	CON 0	DISABLED	☐	☐

System Information

Description:

Location:

Room:

Options:

☒ Enable API

Begin by clicking on “Setup” and installing the “Tech Works MC Configurator. Application”. Once it is installed the above window will appear.

System Information

Description:

Location:

Room:

Options:

☒ Enable API

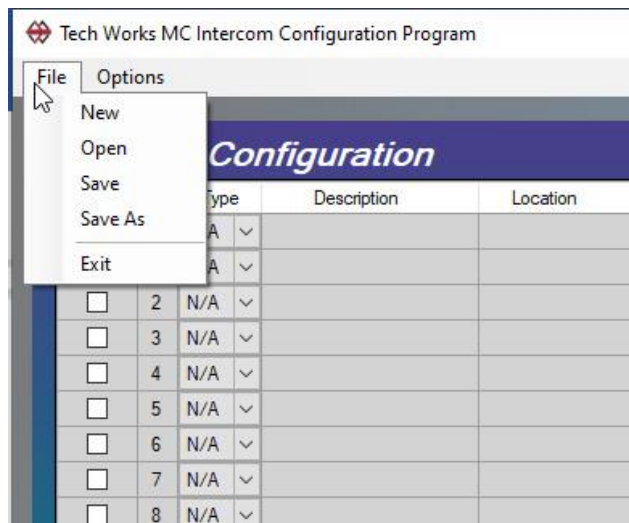
To start a new application, fill out the System Information screen and save your new configuration. When you “Save” your file you will be prompted for a “File” name, so the Description, Location, Room that you fill in is only for your reference and will not affect the file name.

The “Enable API” is a check box to indicate that this configuration will use the API commands to control the system.

File Menu

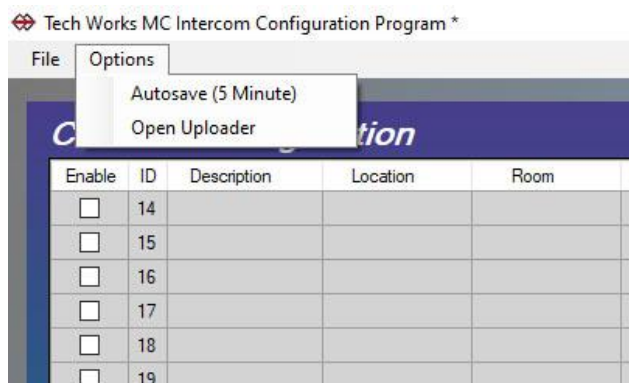
In the upper left-hand corner is a standard Windows File Menu to allow basic file handling functions such as:

- New – Make a new configuration file
- Open – Open an existing configuration file for editing
- Save – To store the existing configuration
- Save As – To make a copy of the existing configuration under a new file name
- Exit – To close the Configurator Program



Options Menu

Also, in the upper left-hand corner is the Options menu. Currently the only option is the Auto Save feature which when checked will automatically save your work every 5 minute.



Common Configuration Elements

Programing Shortcuts

To facilitate faster programming, you can assign all of the Stations on a 116 to a Console by double clicking on the Console # at the top of the column and it will toggle all of the boxes in the vertical column below on or off. Double clicking the All column header will toggle on or off all of the enables for all of the Stations.

Column headers of any cell that is editable can be double clicked to help speed up programming. If a column is a check box, all values in the column will be toggled on or off.

Columns that are text, numbers, or contain drop down boxes, will open a window in which you can set the value for that column.

All is a button to assist in the selection of ODCs to receive call from this Station. By double clicking on the All button, all of the Console enables will toggle on or off for that selected Station. Green means selected.

Privacy Tone Active is an optional feature that inserts a tone every 10-20 seconds when a Station or ODC is being listened to. Privacy Tone (PT) is set for the end point of the call to alert the party being called that they are being listened to. If ODC-a calls ODC-b, a PT is used if ODC-b has it turned on. Same is true in regards to ODC to Station call. The end point, be it a Prison cell, Infirmary, Bathroom, Another Guard, or Teacher, can be individually configured for a PT or not.

The PT is ALWAYS echoed back to the calling ODC. So, if I call you, and you have PT on, when it beeps on your side, I hear it on my side. The PT is generated by the end point. This way there is no way for a Calling ODC to get messed up and NOT send the tone. Essentially, if someone is listening to me in the Bathroom, I will send the beep to them.

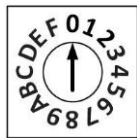
ODC to ODC calling is an option with any ODC. This is determined by how system connections are set up and allowed. An option is available to make sure that a particular ODC is never available to be called. In this way a Systems Integrator cannot inadvertently program a particular ODC to be listened to.

Paging is set in the ODC options. Group or Zone Paging is set for any group of Stations that are commonly paged at the same time. Each ODC can set up to 16 unique page Groups or Zones. Any Group can contain any combination of ODC and Remote Stations. Pages override a connected call. If Intercom Calls are happening between an ODC and Station, the Intercom Calls are muted while the Page happens. When the page is done, any muted call is restored and the PT is played immediately, if it is turned on for that end point. There can also be elevated priority Pages.

One of the 16-page groups can be set as an All-Page group for those Stations associated with a particular ODC.

Interaction between ODC and another ODC or 116 is determined by how each one is programmed to act. The MC-IP-HOST is programmed using the Tech Works Mc Configuration software. The following section describes how to use it. The Station Configuration screen below has 32 tabs across the top, one for each MC-IP-116 or MC-IP-MSI-11. Each 116 connects to up to 16 Stations While each MSI is a single station. Each screen shows the configuration of the 16 Stations connected to that 116 and the options for that Station. The MC-IP-MSI-11 will default to the 16 station configurations associated with the first 2 116 stations. In other words, MSI Network ID 0-15, IP Address 172.30.100.116 - 172.30.100.132, corresponds to MC-IP-116 “0”, station ID 0-15 for programming while MSI Network ID 16-31, IP Address 172.30.100.133 - 172.30.100.148, corresponds to MC-IP-116 “1”, station ID 0-15. So, in a mixed system using both MSIs and 116s you should start your Network IDs for the 116s at “2” to avoid conflicts.

System Default Configuration – All products ship are by default configured so that station addresses 1-32, the first 2 MC-IP-116, and the first 2 MC-IP-ODC are active and configured to call each other. In other words when you open the box, if you simply plug them in and set the ID rotary switch of an MC-IP-116 to “0” or “1” and the MC-IP-ODC to “0” or “1” they will work as a system. ODC 0 and 1 will receive call from stations 1-32 and can call each other.



Each MC-IP-116 has a rotary switch which assigns it a system Identification (ID) of 0-F (hex) which is 15. So, A=10, B=11, C=12, D=13, E=14, and F=15. To set the 116 to ID 16-31 you set the ID shift jumper P5 to “ON” and then set the rotary switch to 0=16, 1=17, 2=18, 3=19, 4=20, 5=21, 6=22, 7=23, 8=24, 9=25, A=26, B=27, C=28, D=29, E=30, F=31. The ID shift jumper and address switch are only read on “BOOT” Strap and that is when they receive their individual settings from the HOST. *If you change the address you must, **CYCLE POWER.***

Static protection such as static bracelets MUST be used at all times when any of the products are opened and vulnerable to electrostatic discharge.

The installer sets the rotary switch at the time of installation to tell the system which Station Group it is. Once the 116 is connected to the MC-IP Network, the MC-IP-HOST automatically gets the 116’s ID and sends the configuration to the 116. The 116 is now configured and ready to be used. The configuration for each 116 is set up in the HOST using the following screens.

First select the 116 that you wish to configure by clicking the tab at the top of the screen. The screen below is for setting up MC-IP-116 #0 which is technically the 1st system 116 because the first 116 is #0. You will see that the Station ID for those Stations associated with 116 #2 are 32-47. This is because the Station ID is assigned in sequence of 116 #0 = Station ID 0-15, 116 #1 = Station ID 16-31, 116 #2 = Station ID 32-47 and #3 = 48-63, etc., until MC-IP-116 #15 = Station ID 240-255. There are a total of 512 Stations and 32 ODCs per system. Station IDs are 0-511 and ODC IDs are 0-31.

Any Station can call any ODC or any combination of ODCs. Technically any ODC could call any Station but you would typically not set up a control screen for any Station or Page Zone that is not assigned to call an ODC. However, if a Central Command Control wanted to monitor all system activity, a screen could just as easily be set up to monitor all calls and Call any or all Stations.

Station Configuration

The Station Configuration is split into 2 screens to make programming easier. The button at the top right selects the screen you want to work on.

This is the “Station Edit” screen where you set up each station.

Enable	ID	#	Description	Location	Room	Privacy Tone	Privacy Tone Volume	Timeout	Relay 1	Relay 2	Relay Enable	Ring Local	Can Cancel
☐	0	1				☒	15	0	CON 0	CON 0	DISABLED	☐	☐
☐	1	2				☒	15	0	CON 0	CON 0	DISABLED	☐	☐
☐	2	3				☒	15	0	CON 0	CON 0	DISABLED	☐	☐
☐	3	4				☒	15	0	CON 0	CON 0	DISABLED	☐	☐
☐	4	5				☒	15	0	CON 0	CON 0	DISABLED	☐	☐
☐	5	6				☒	15	0	CON 0	CON 0	DISABLED	☐	☐
☐	6	7				☒	15	0	CON 0	CON 0	DISABLED	☐	☐
☐	7	8				☒	15	0	CON 0	CON 0	DISABLED	☐	☐
☐	8	9				☒	15	0	CON 0	CON 0	DISABLED	☐	☐
☐	9	10				☒	15	0	CON 0	CON 0	DISABLED	☐	☐
☐	10	11				☒	15	0	CON 0	CON 0	DISABLED	☐	☐
☐	11	12				☒	15	0	CON 0	CON 0	DISABLED	☐	☐
☐	12	13				☒	15	0	CON 0	CON 0	DISABLED	☐	☐
☐	13	14				☒	15	0	CON 0	CON 0	DISABLED	☐	☐
☐	14	15				☒	15	0	CON 0	CON 0	DISABLED	☐	☐
☐	15	16				☒	15	0	CON 0	CON 0	DISABLED	☐	☐

Station Edits

External Paging Amplifier check box in programming is set for each 116 to tell it to either use the built in 20-watt amplifier or an external amplifier connected to the 116. If the External Paging Amplifier is set “On”, then each time the 116 is told to page it will automatically activate the built-in page relay and connect the External Amplifier screw terminal inputs to the Station select bus. If this feature is set to “Off” the built-in page relay will not activate and the internal 20-Watt amplifier will be used for paging program amplification.

Enable Tells the system that this Station is to be used.

Station ID is hard coded and set by the position of the rotary switch on the 116 as described above.

Number is the port number 1 of 16 where Stations connect on this 116.

Description is a description of the hardware connected to this port This is limited to 40 characters.

Location is a reference to a general area such as cell block or wing where the Station is located. This is limited to 30 characters.

Room is the actual Room or Cell number where the Station is located. This is limited to 10 characters.

Privacy Tone is a check box to enable the Privacy Tone whenever this Station is called.

Privacy Tone Volume sets the Privacy Tone level that comes out of the speaker into the room or cell where it is located. Level options are 0-15.

Call Time Out is the length of time that the system will wait to relay the call to another ODC.

A Relay is when a call is unanswered and a secondary answering location ODC rings with that call after some designated amount of time. On a Relayed Call the originally intended ODC will continue to ring even while the Relay ODC is ringing. The first ODC to answer will clear the call from the entire system. Relayed Calls are not Forwarded.

Relay 1 is an ODC that calls from this Station should be Relayed to if calls are to be relayed.

Relay 2 is another ODC that calls from this Station should be Relayed to if calls are to be relayed.

Relay Enable is how to route relay calls. There are 4 options:

1. **Relay 1** which means send relayed calls to the OCD designated as Relay 1 only.
2. **Relay 2** which means send relayed calls to the OCD designated as Relay 2 only.
3. **Both** which means send calls to both Relay 1 and Relay 2 as a Circular Hunt group. So, when a call is to be Relayed it will first send the call to Relay 1 and if the timer expires a second time it will then send the call to Relay 2.
4. **DISABLED** means that this Station will not Relay any calls to any other ODC.

Ring Local is a check box to designate if this Station is supposed to continue to ring throughout the relay process.

Can Cancel is the check box to designate if this station can cancel a call at the station by pressing the button a second time or not. When check this station “Can Cancel” it’s Call Ins.

Now let’s take a look at **Station Groups**

The screenshot shows the 'Station Configuration: MC-116 ID# 0' window. At the top, there's a 'Station Edit' button and a 'Station Groups' section with a 'Console Hunt Group Enables' button. Below this is a table with columns: 'Enable', 'ID', '#', 'Description', and 'Console Hunt Group Enables'. The 'Console Hunt Group Enables' column has sub-columns for 'ALL', '0', '1', '2', '3', '4', '5', '6', '7', '8', '9', '10', '11', '12', '13', '14', '15', '16', '17', '18', '19', '20', '21', '22', '23', '24', '25', '26', '27', '28', '29', '30', '31'. The table contains 16 rows of data, each representing a station group configuration.

Console Hunt Group Enables are used to assign what ODC(s) will simultaneously ring when a call is first placed. When an ODC in the group picks up the call, the remaining ODC(s) in the group will have the call canceled for them and stop ringing.

ALL is a short cut that allows the programmer to quickly send this station’s calls to ALL 32 ODCs with the click of a single button.

Console (ODC) Configuration



Each MC-IP-ODC has a rotary switch which assigns it a system Identification (ID) of 0-F (hex) which is 15. So, A=10, B=11, C=12, D=13, E=14, and F=15. To set the ODC to ID 16-31 you set the ID shift jumper P4 to “ON” and then set the rotary switch to 0=16, 1=17, 2=18, 3=19, 4=20, 5=21, 6=22, 7=23, 8=24, 9=25, A=26, B=27, C=28, D=29, E=30, F=31. The ID shift jumper and address switch are only read on “BOOT” Strap and that is when they receive their individual settings from the HOST. *If you change the address you must, **CYCLE POWER**.*

Static protection such as static bracelets MUST be used at all times when any of the products are opened and vulnerable to electrostatic discharge.

The installer sets the rotary switch at the time of installation to tell system which Station Group it is. Once the ODC is connected to the MC-IP Network, the MC-IP-HOST automatically gets the ODC’s ID and sends the configuration to the ODC. The ODC is now configured and ready to be used. The configuration for each ODC is set up in the HOST using the following screens.

Console Configuration												
Enable	ID	Description	Location	Room	Privacy Tone	Privacy Tone Volume	Call Volume	Display Mode	External Calls	Auto Answer	Forward Enable	Page Group
☐	0				☒	15	15	NORMAL	☐	☐	☐	Edit
☐	1				☒	15	15	NORMAL	☐	☐	☐	Edit
☐	2				☒	15	15	NORMAL	☐	☐	☐	Edit
☐	3				☒	15	15	NORMAL	☐	☐	☐	Edit
☐	4				☒	15	15	NORMAL	☐	☐	☐	Edit
☐	5				☒	15	15	NORMAL	☐	☐	☐	Edit
☐	6				☒	15	15	NORMAL	☐	☐	☐	Edit
☐	7				☒	15	15	NORMAL	☐	☐	☐	Edit
☐	8				☒	15	15	NORMAL	☐	☐	☐	Edit
☐	9				☒	15	15	NORMAL	☐	☐	☐	Edit
☐	10				☒	15	15	NORMAL	☐	☐	☐	Edit
☐	11				☒	15	15	NORMAL	☐	☐	☐	Edit
☐	12				☒	15	15	NORMAL	☐	☐	☐	Edit
☐	13				☒	15	15	NORMAL	☐	☐	☐	Edit
☐	14				☒	15	15	NORMAL	☐	☐	☐	Edit
☐	15				☒	15	15	NORMAL	☐	☐	☐	Edit
☐	16				☒	15	15	NORMAL	☐	☐	☐	Edit

Enable is a check box that tells the system that this ODC is to be used.

Station ID is hard coded and set by the position of the rotary switch on the ODC as described above.

Description is the description of the hardware and how it is being used. This is limited to 40 characters.

Location is a reference to a general area such as cell block or wing where the Station is located. This is limited to 30 characters.

Room is the actual Room number where the hardware is located. **This is limited to 10 characters.**

Privacy Tone is a check box to enable the Privacy Tone whenever this Station is called.

Privacy Tone Volume sets the Privacy Tone level that comes out of the speaker into the room or cell where it is located. Level options are 0-15 with 0 being the lowest.

Console Configuration												
Enable	ID	Description	Location	Room	Privacy Tone	Privacy Tone Volume	Call Volume	Display Mode	External Calls	Auto Answer	Forward Enable	Page Group
☐	0				☒	15	15	NORMAL	☐	☐	☐	Edit
☐	1				☒	15	15	NORMAL	☐	☐	☐	Edit
☐	2				☒	15	15	NORMAL	☐	☐	☐	Edit
☐	3				☒	15	15	NORMAL	☐	☐	☐	Edit
☐	4				☒	15	15	NORMAL	☐	☐	☐	Edit
☐	5				☒	15	15	NORMAL	☐	☐	☐	Edit
☐	6				☒	15	15	NORMAL	☐	☐	☐	Edit
☐	7				☒	15	15	NORMAL	☐	☐	☐	Edit
☐	8				☒	15	15	NORMAL	☐	☐	☐	Edit
☐	9				☒	15	15	NORMAL	☐	☐	☐	Edit
☐	10				☒	15	15	NORMAL	☐	☐	☐	Edit
☐	11				☒	15	15	NORMAL	☐	☐	☐	Edit
☐	12				☒	15	15	NORMAL	☐	☐	☐	Edit
☐	13				☒	15	15	NORMAL	☐	☐	☐	Edit
☐	14				☒	15	15	NORMAL	☐	☐	☐	Edit
☐	15				☒	15	15	NORMAL	☐	☐	☐	Edit
☐	16				☒	15	15	NORMAL	☐	☐	☐	Edit

Call Tone Volume determines how loud the Call Ringing tone will be on this ODC. Level options are 0-15 with 0 being the lowest.

Display Mode is a drop-down menu only used with the MC-IP-ODC-TS Touch Screen model. The menu options are "Normal" and "Simple". The "Normal" Mode gives the user access to all system stations assigned to it while the "Simple" Mode gives the user a smaller menu screen for use with smaller systems.

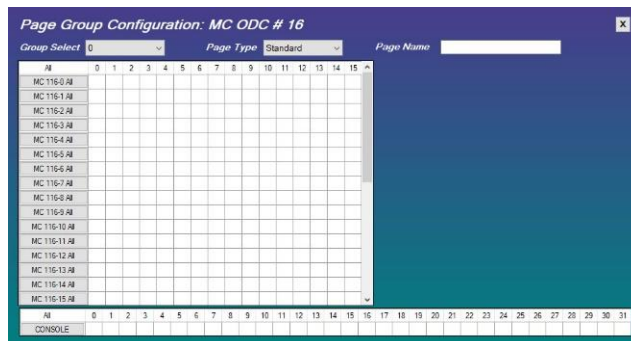
External Calls means this ODC can get a call from another ODC.

Auto Answer means if an ODC calls this ODC, if ON it connects automatically, If OFF it rings and then this ODC "accepts the call".

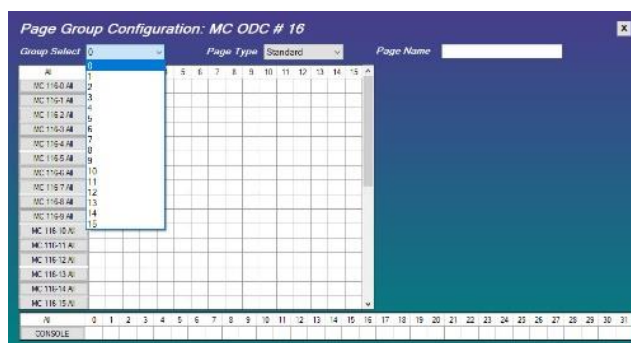
Forward Enable is a check box that determines if this ODC can forward its calls to another ODC. If the box is checked, the systems integrator can add a Call Forward.

Page Group Edit takes the programmer to a separate screen to set up the paging details for each ODC.

Page Group Configuration is a separate screen used to set up a group of Stations that are commonly paged at the same time. Each ODC has the ability to set up 16 (0-15) separate Page Groups/Zones that are unique to that ODC. Most of the time an ODC has Stations that they page that are not tied to any other ODC. However, a central command control location may want to Page multiple ODC areas including ODCs.



Group Select, up at the top left is a drop-down menu which represents the Zone you want to create 0-15.



“Page Type” select:

Override Page will override any other Stations call or page currently in process by putting current calls on hold while Priority page occurs and restoring them when it ends.

Standard Page will override local intercom calls, placing them on hold until the Page ends, but will not override other Page calls.

Page Name For convenience you can give each Page Group a name to identify it.

To select the stations to include in a Group you can individually click on each station box associated with each MC-IP-116. Or to select all station on a particular 116 you can just double click on the 116 buttons at the left.

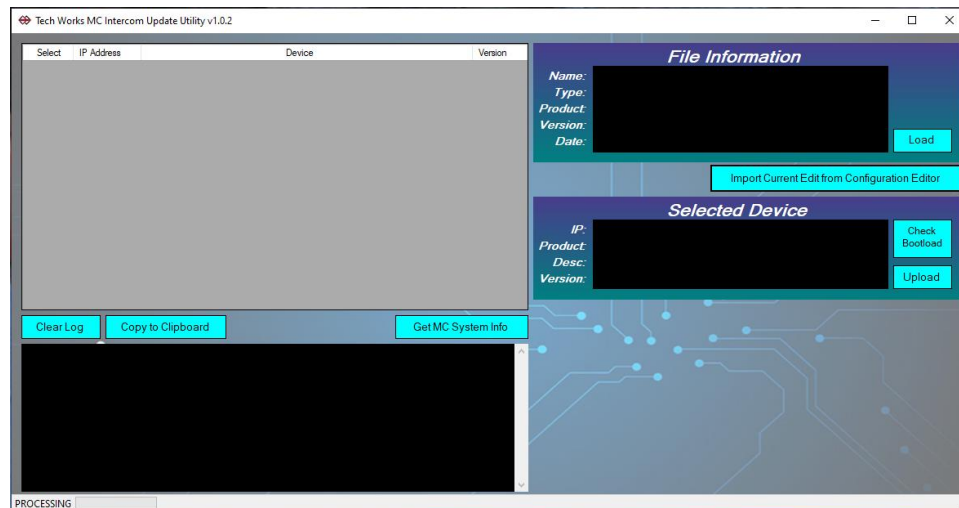
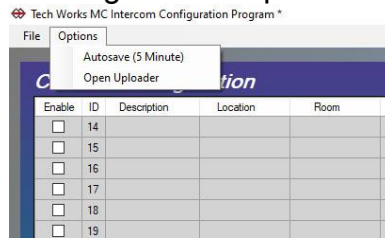
Repeat to create up to 16 Groups/Zones for each ODC.

Typically, Zone “0” is used to set a Zone that represents “All Call” on a particular ODC.

Console allows you to add ODCs to include in this Group by selecting them individually or All by double clicking the Console button.

To Upload the Configuration

1. Install the “Tech Works MC Configurator” application and open it.
2. Create a configuration and save the file.
3. Open the “Uploader” by clicking on the “Options” tab and “Open Uploader”.



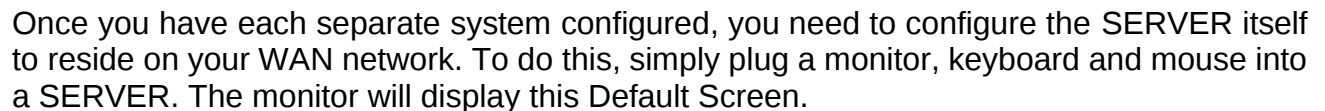
4. Select “GET MC System Info” to see the devices available for Upload.
5. Click “Import Current Edit from Configuration Editor”
6. If the file matches network device it will be hi-lighted in Yellow. Select the HOST from the list of devices and it will appear in the “Selected Device” window.
7. Click the “UPLOAD” button to transfer the file.
8. Once a message “Configuration Transfer Complete” is received, the HOST will push the update out to the ODC’s and 116’s within about a second or two.

To load Firmware Updates

Once the Initial Firmware is loaded, you can upload future updates by doing the same thing as above but selecting a device and the firmware you want to load.

1. Select “GET MC System Info” to see the devices available for Upload.
2. Click “Load File” and select the Firmware file you want to load.
3. If the file matches network device they will be hi-lighted in Yellow. Select the device you want to load and it will appear in the “Selected Device” window.
4. Click the “UPLOAD” button to transfer the file.
5. Once a message “Programming Complete” appears the device will restart to load the new firmware and acquire it’s configuration from the HOST or SERVER.

When you add MC-IP-SERVERs to a system, they reside on both the local network as a HOST and on the WAN as a communication SERVER to connect one local network to another. Each SERVER is configured using the Tech Works MC-Configurator Software just like a HOST as described above.

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WAN NETWORK SETTINGS

The MC-IP-SERVER WAN network settings are totally flexible and follow all network setup standards. You can set the WAN networks to any IP address, Subnet, and Gateway that meets your network needs. The MC-Network settings are fixed to make local network setup easy, while the WAN is totally up to you.

WAN NETWORK SETTINGS

IP: 192 168 1 97

SUBNET: 255 255 255 0

GATEWAY: 192 168 1 1

SERVER ID: 0

SAVE

- Select and assign an IP Address to this SERVER
- Set the Subnet to be compatible with your network
- Set your network Gateway
- Now you need to assign this SERVER so it can find other SERVERS on the WAN and so that it can be found.

SERVER LIST

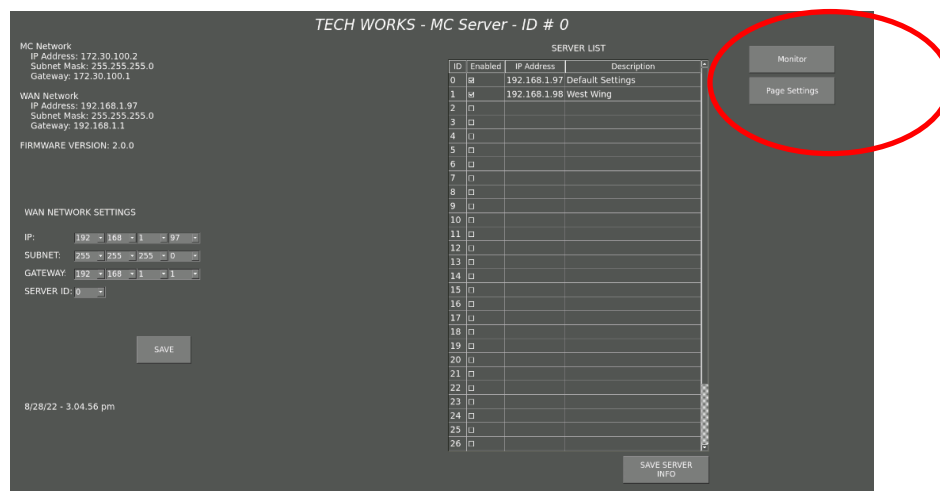
ID	Enabled	IP Address	Description
0	☒	192.168.1.97	Default Settings
1	☒	192.168.1.98	West Wing
2	☐		
3	☐		
4	☐		
5	☐		
6	☐		
7	☐		
8	☐		
9	☐		
10	☐		
11	☐		
12	☐		
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24	☐		
25	☐		
26	☐		

SAVE SERVER INFO

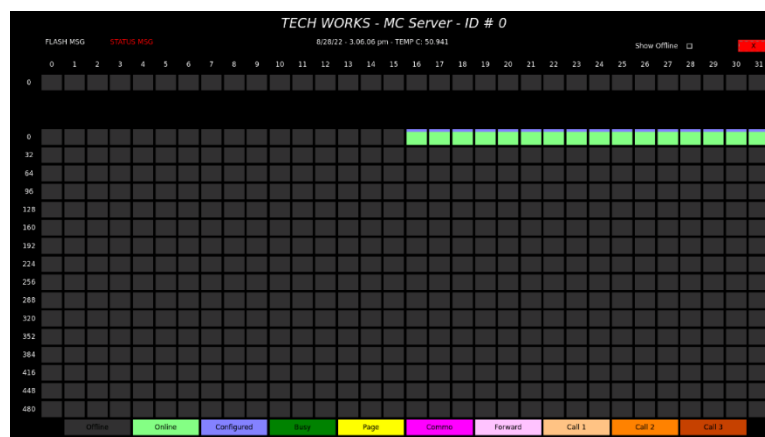
- Check the “ENABLE” box for the SERVERs to exist on this system.
- Set the IP for each SERVER Enabled.
- Add a brief Description to identify each SERVER (Housing Unit A, B, etc.)
- Hit “SAVE SERVER INFO” to store the settings and the SERVER will Reboot with the new settings.

Your done with this SERVER. Repeat for all SERVERs. Your done. It’s that easy.

On the SERVER home screen there are 2 buttons in the upper right-hand corner.



By clicking on the “Monitor” button you will be taken to the following screen

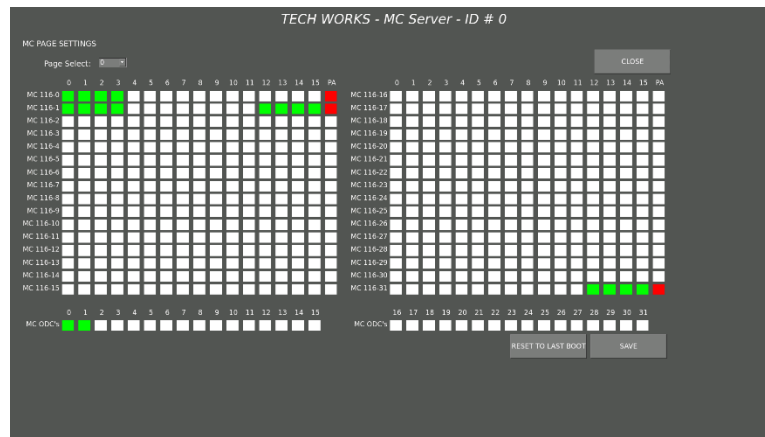


This screen shows you the status of device connected to this SERVER. The icons across the bottom of the screen are simply a legend to identify what the meaning of the colors are of the station information above. This particular SERVER has one MC-IP-116 connected and configured as stations 16-31 which correspond to rotary switch setting “1”. The active boxes being green indicates that all 16 stations are configured and active or “Online”. If a station was busy, it’s box would change to Dark Green. If a station was being Paged it would be Yellow.

This is simply a way to monitor the system for diagnostic purposes only. This takes a lot of systems resources and will kill the SERVER if left active. Do not monitor a SERVER for more than just a few minutes to avoid shut down. This is for DIAGNOSTIC use ONLY!

Global Paging

Paging across SERVERs is done a bit differently than local paging. By clicking on “Page Settings” you will be taken to this screen:



Global Page Group Configuration is a separate screen used to set up a group of Stations that are commonly paged at the same time. Each SERVER has the ability to set up 16 (0-15) separate Page Groups/Zones that are unique to that SERVER. Most of the time a SERVER has Stations that are allowed to be paged that are unique to that building or system such as Exercise Yards or Common areas. However, a central command control location may want to Page multiple areas including ODCs.

In simple Local HOST paging an Operator Console sets up its individual page zones or Groups. When using SERVERS, each SERVER has Page Groups which are accessible from remote SERVERs. So just like you set up ODC Page Groups in the MC-Configuration software, you set up Global Page groups for this SERVER. What you do is create a page group on each server with whatever stations/ODC's that you want to Page. This page group setting is local to each server. Then you send a “Global Page” command at the source server and pass the page group and a mask of what servers are to get the page.

Group Select, up at the top left is a drop-down menu which represents the Zone you want to create 0-15.

To select the stations to include in a Group you can individually click on each station box associated with each MC-IP-116. Or to select all station on a particular 116 you can just double click on the 116 buttons at the left.

Repeat to create up to 16 Groups/Zones for each SERVER.

Typically, Zone “0” is used to set a Zone that represents “All Call” on a particular SERVER.

PA, is the far-right hand box in each row and stands for “Pre-Announce Tone”. By clicking this box a beep tone will be sent before each Global page begins.

Console allows you to add ODCs to include in this Group by selecting them individually or All by double clicking the Console button.

Reset to Last Boot, will set this SERVER to what it was set to before you started.

Save, don't forget to save your settings before continuing.

Close, will take you back to the main SERVER Home Screen

External Control System API

An API can be used when Systems Integrators want to use a separate touch screen control console that is also used for things like door control, lighting, and cameras. If external control is to be used, it is highly recommended that a router be used to isolate the MC-IP network from any other network. Only the necessary ports and traffic should be allowed to pass through the router as needed. If a router is used, it should NOT be configured as a DHCP server. The LAN IP settings of the router should be the following:

IP: 172.30.100.1
MASK: 255:255:255:0
Subnet: 172.30.100.1

The HOST is able to be controlled through ASCII based commands sent via TCP at IP address 172.30.100.2 on port 60000. Commands are structured in the format of **[command source destination \r\n]**. HOST response commands are structured similar but have a response designation at the start of the message **[response] [original command]**.

Commands received by the HOST will be responded to in the following ways. Any command that is an invalid command will be returned with a **Fail** response. Any command that is a valid command will be returned with an **Ackd** response. The one exception is that a valid command can be sent to the Host and it could return a **Busy** response. This would happen if the command sent is not possible to be acted upon. An example of this, is that if a 116 has a Station in communication and I want to talk to it, I would get back a **Busy** response as the Host is unable to connect the call. These return responses are followed by the original command.

Example:

If a command of **Hello 0 0 \r\n** is sent, the return response would be **Fail Hello 0 0 \r\n**.

If a command of **Ical 0 9 \r\n** is sent, then the return response would be either **Ackd Ical 0 9 \r\n** or **Busy Ical 0 9 \r\n**, depending on the "busy" state of the ODC and the Station.

If a command of **Ical 9 \r\n** is sent, then the return response would be **Fail Ical 9 \r\n**, since the value 2 is missing.

Specific API commands from the MC-IP-HOST will be sent to the control system indicating what is going on with the Intercom. The control system will send specific API commands to tell the MC-IP-HOST what to do. Each command is followed by an ODC-ID (O), Station-ID (S), and/or PageGroup (P) and a carriage return (\r) and line feed (\n). The commands are structured as [Command] space [Source] space [Destination] space [\r\n]

When a station presses a button a **Icrq [ODC] [station]** is sent to all ODC's it has been configured for. When an ODC answers the call by sending a **Ical [ODC] [station]**, a **Ican [ODC] [station]** is sent to all the pending ODC's and a **Icom [ODC] [station]** is sent to indicate who took the call. When the call is done a **Iend [ODC] [station]** is sent.

When you communicate over a system using SERVERs the commands are the same as when using a HOST on a simple system. The difference is the message needs to include a little more information so that the system knows who wants to talk to whom. More on this later.

API Command List

The following is a list of the commands made available for integrators to use to communicate with the MC-IP system. Some command formats are for communication with a HOST and others are for communication with a SERVER.

Command	Value 1	Value 2	Value 3	Value 4	Description	HOST	SERVER
List					Internal Usage	X	X
Time					Use Socket Timer	X	X
Toff					Disable Socket Timer	X	X
Hrst					Hardware Reset	X	
Arst					Reset All Calls	X	X
Firm					Show Firmware	X	X
Asta					Get all ODC and Station Status Bits	X	X
Msta					Get all ODC Status Bits	X	X
Ista					Get all Station Status Bits	X	X
Ilst					List Station Calls	X	X
Plst					List Active Pages	X	X
P3lst					List Active Pages 3 value mode	X	X
MIst					List Console Calls	X	X
F1st					List of Forwards	X	X
Irst					Reset All Station Calls	X	X
Mrst					Reset All Console Calls	X	X
Prst					Reset All Pages	X	X
Info					List versions and last digit of IP	X	X
Ical	CONSOLE	STATION			Call Station	X	
Ical	CON SERVER	CONSOLE	STA SERVER	STATION	Call ODC to Station across servers		X
Iend	CONSOLE	STATION			End Station Call	X	
Iend	CON SERVER	CONSOLE	STA SERVER	STATION	End Call ODC to Station across servers		X
Mcal	SOURCE	DEST			Call Console	X	
Mcal	CON SERVER	CONSOLE	CON SERVER	CONSOLE	Call ODC to ODC across servers		X
Mend	SOURCE	DEST			End Console Call	X	
Mend	CON SERVER	CONSOLE	CON SERVER	CONSOLE	End Call ODC to ODC across servers		X
Pcal	CONSOLE	PAGE NUM			Start Page	X	X
Pcal	CONSOLE	PAGE NUM	MASK 116 PA BUSS		Start Page with PA Buss force	X	X
Pend	CONSOLE	PAGE NUM			End Page	X	X
Pend	CONSOLE	PAGE NUM	MASK 116 PA BUSS		End Page with PA Buss force	X	X
Fset	SOURCE	DEST			Create Forward	X	X
Frst	SOURCE	DEST			Remove Forward	X	X
Mmut	CONSOLE	MUTE			Mute = 1, Mute the Ringing Mute = 0, Turn Mute Off	X	X
GPCal	CONSOLE	PAGE NUM	SERVER MASK		Start Server page with mask indicating what server		X
GPEnd	CONSOLE	PAGE NUM	SERVER MASK		End Server page with mask indicating what servers		X
Temp							X

When a station presses a button a lcrq [ODC] [station] is sent to all ODC's it has been configured for. When an ODC answers the call by sending a lcal [ODC] [station], a lcan [ODC] [station] is sent to all the pending ODC's and a lcom [ODC] [station] is sent to indicate who took the call. When the call is done a lend [ODC] [station] is sent.

When doing ODC to ODC calls, the process is essentially the same. The one difference is in the Mcal and Mcrq because an ODC can be configured to not auto answer. If a Mcal is sent and the destination ODC is not configured to auto answer, a normal Ackd response will be returned and a Mcrq will be generated. And the ODC will ring. A Mcal will then need to be sent from the original destination ODC to connect the call.

Example:

ODC 1 calls ODC 2 and ODC 2 has the auto answer turned off.

Outgoing: Mcal [ODC1] [ODC2]

Incoming: Ackd Mcal [ODC1] [ODC2]

Incoming: Mcrq [ODC1] [ODC2]

ODC 2 would be ringing.

To connect the call;

Outgoing: Mcal [ODC2] [ODC1]

Incoming: Ackd Mcal [ODC2] [ODC1]

Incoming: Mcom [ODC2] [ODC1]

A typical call sequence might be:

1. Station #26 tries to call ODC #2 and a system message is sent from the MC-IP-HOST, "lcrq 02 26\r\n", which makes the Icon on the touch screen labeled Station #26 start to flash and the console to ring.
2. ODC #2 answers the call by pressing the Icon on the touch screen labeled Station #26 which sends the system message to the MC-IP-HOST, "lcal 02 26 \r\n", and changes the touch screen Icon to a different color and on steady, not flashing. This opens the voice channel between the ODC #2 and Station #26 and they have a conversation.
3. The ODC #2 ends the connection by pressing the Icon for Station #26 which sends the system message to the MC-IP-HOST, "lend 02 26 \r\n", and changes the touch screen Icon to its inactive state and color.

API Command Details

"lcal" – Intercom Call - When an ODC wants to talk to a Station.

Command: lcal O S \r\n // Connect comms O to S

Response: Ackd lcal O S, lcom O S (If the call is connected)

Note a lcom O S may also be sent if call was generated by a station and an lcrq is pending"

Example: lcal 02 47\r\n

This would be where Operator ODC #2 tries to connect to Station #47

"lend" – Intercom Call End - When an ODC wants to disconnect or "end" a call to a Station.

Command: lend O S \r\n // End call/comms O to S

Response: Ackd lend O S

Example: lend 02 47\r\n

This would be where Operator #2 ends the connection to Station #47

“lcrq” – Intercom Call Request - When a Station places a call to an ODC.

Command: lcrq O S \r\n // A call from S for O is generated by the MC-IP-116.

Example: lcrq 00 29\r\n

This would be where Station #29 places a call to Operator #0

“lcan” – Intercom Call Canceled - When a Station cancels a call to an ODC.

Command: lcan O S \r\n // A call from S for O

Example: lcan 00 29\r\n

This would be where Station #29 cancels a call to Operator #0

“Mcal” – Master to Master Call – When an ODC wants to call another ODC.

Command: Mcal O O \r\n // Connect comms O to O

Response: Ackd Mcal O O, Mcon O O (If the call is connected)

Example: Mcal 03 12 \r\n

This would be where Operator ODC #3 tries to connect to ODC #12

“Mend” – Master to Master Call End – When an ODC wants to end a currently active call to another Master.

Command: Mend O O \r\n // End call/comms O to O

Response: Ackd Mend O O

Example: Mend 03 12 \r\n

This would be where Operator ODC #3 ends the connection to ODC #12

“Pcal” – Page Call – When an ODC wants to Page a Page Group / Zone.

Command: Pcal O P \r\n // Connect Page O to page group P

Response: Ackd Pcal O P

Example: Pcal 08 15 \r\n

This would be where Operator ODC #8 establishes a Page to Group/Zone #15

“Pend” – Page End – When an ODC wants to end a Page.

Command: Pend O P \r\n // End Page O to group P

Response: Ackd Pend O P

Example: Pend 08 15 \r\n

This would be where Operator ODC #8 ends a Page to Group/Zone #15

“Fset” – Forward All Calls – When an ODC wants to go out of service and Forward All Calls to a different Operator Console.

Command: Fset O O \r\n // Forward O to O

Response: Ackd Fset O O

Example: Fset 04 5 \r\n

This would be where Operator ODC #4 forwards all of its calls to ODC#5

“Frst” – Forward All Reset – When an ODC wants to go back into service and end Call Forward All.

Command: Frst O O \r\n // Cancel Forward O to O

Response: Ackd Frst O O

Example: Frst 04 5 \r\n

This would be where Operator ODC #4 Resets or cancels call forward to ODC#5

A set of “List” commands have been added to show the current active calls and forwards. These commands do not require any additional values to be sent.

“Ilist” - Intercom List - List of all active ODC to Station calls.

Command: Ilist \r\n

Response: Iloa [ODC] [STATION] \r\n

“Mlist” – Master List - List of all active ODC to ODC calls.

Command: Mlist \r\n

Response: Mloa [ODC source] [ODC destination] \r\n

“Flst” – Forward List - List of all active forwards.

Command: Flst \r\n

Response: Floa [ODC source] [ODC destination] \r\n

Responses have been added to help with understanding why a command was not able to be processed. Here are the following responses.

“Npos” – Forward Not Possible - This is sent when a forward is not possible.

If an attempt to create new forward that would create an endless loop were to be sent, a Npos response would be sent indicating that the forward is not possible at this time.

“Ncon” – No Connection Possible - This is sent when an action is not allowed due to the configuration.

If the configuration was set for ODC1 to not accept external calls and someone attempted to call it, a Ncon response would be sent indicating that ODC1 is not configured to allow this action.

SERVER API

When you communicate over a system using SERVERs the commands are the same as when using a HOST on a simple system. All of the previous information in this manual applies to systems using MC-IP-SERVERs. All of the CommandsThe difference is the message needs to include a little more information so that the system knows who wants to talk to whom.

Remember that basic commands are structured as:

[Command] space [Source] (Console) space [Destination] (Station) space [r\n] where "r" is a carriage return and "n" line feed.

The difference when SERVERs are involved is, what SERVER is the [Source] connected to and what SERVER is the [Destination] connected to? So, the message becomes:

Command] space [CON SERVER] space [Source] (Console) space [STA SERVER] space [Destination] (Station)

So, to place a call would look like this:

lcal 00 02 01 15

This would be a call from SERVER 0, Console 2 to SERVER 1 Station 15

In other words, the local HOST message lcal 02 15 would become lcal 00 02 01 15

Global Page API

The command for a global page is:

GPcal [ODC] [SERVER PAGE GROUP] [SERVER MASK]\r\n

Broken down:

GPcal = Global Page call

[ODC] = The local ODC that is the source of the page

[SERVER PAGE GROUP] = the page group that will be used for all servers

[SERVER MASK] = a binary mask for what servers to include.

Here is an example of the bit value for the servers as you can see the mask value doubles at each server ID incrementation.

SERVER ID	Mask Value	Binary	Hex
0	1	00000001	0x01
1	2	00000010	0x02
2	4	00000100	0x04
3	8	00001000	0x08
4	16	00010000	0x10
5	32	00100000	0x20
6	64	01000000	0x40
7	128	10000000	0x80

To give you an idea of the usage I will explain a single “All call” page.

Example:

I will go to page settings on each server, select page 0, and assign all stations/ODC's in use on the server. I would repeat this for all my servers. Now we can think of this as page group 0 as an all page. Assuming we have 4 servers (0,1,2,3) and I want to do an all page from ODC-7 on SERVER-X, and I want to include all servers. I would calculate the mask by adding the Mask Value of each server, so in the case of server 0,1,2,3 I would add 1,2,4,8. So my mask would = 15.

From SERVER-X my command would be:

```
GPcal 7 0 15\r\n;
```

Using the same settings, say I only wanted to send the page to SERVER-0 and SERVER-3. The command would be:

```
GPcal 7 0 9\r\n;
```

Here is the list of Global Page commands:

```
GPcal [ODC] [SERVER PAGE GROUP] [SERVER MASK]\r\n = Global Page Call  
GPend [ODC] [SERVER PAGE GROUP] [SERVER MASK]\r\n = Global Page End
```

Responses:

```
GPend [ODC] [SERVER PAGE GROUP] [SERVER MASK]\r\n = Global Page Ended  
GPcom [ODC] [SERVER PAGE GROUP] [SERVER MASK]\r\n = Global Page  
Connected
```

Notes:

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