

## MicroComm DXL

### Digital Intercom System



## System Planning Guide

### Table of Contents

<b>General Description</b>	<b>2</b>	<b>Graphic Control Master Stations</b>	<b>13</b>
<b>Digital Communications Controllers (DCC)</b>	<b>3</b>	<b>Telephone Set Master Stations</b>	<b>14</b>
<b>Digital Communications Expanders (DCE)</b>	<b>3</b>	<b>Intercom Stations</b>	<b>15</b>
<b>Talkback Expander (TBE-310)</b>	<b>3</b>	400 and 401 Series Intercom Stations	15
<b>Page Zone Expander (PZE-110)</b>	<b>4</b>	300 Series and Generic Intercom Stations	16
<b>DCC and DCE Modules</b>	<b>4</b>	<b>Full Duplex Handset Stations</b>	<b>17</b>
Master Control Cards (MCC)	4	<b>Call Operating Devices</b>	<b>17</b>
Station Control Cards (SCC)	4	<b>Discrete I/O Modules</b>	<b>18</b>
Process Control Cards (PCC)	5	100 Series DIO Module	18
Power Supplies	5	300 Series DIO Module	18
<b>DXL Administrator Software</b>	<b>6</b>	<b>Auxilliary Power Supplies</b>	<b>19</b>
<b>System Architecture</b>	<b>7</b>	<b>Field Interface Cables</b>	<b>19</b>
DXL Exchange	7	Quick Connect Boards	19
DXL Local USB Network	7	Device Wiring	19
Exchange LonWorks Network	8		
DXL System with Multiple Exchanges	9		
System Audio Trunk Network	11		
Inter-Exchange Network	11		
<b>Master Stations</b>	<b>12</b>		
Intercom Master Stations	12		



### General Description

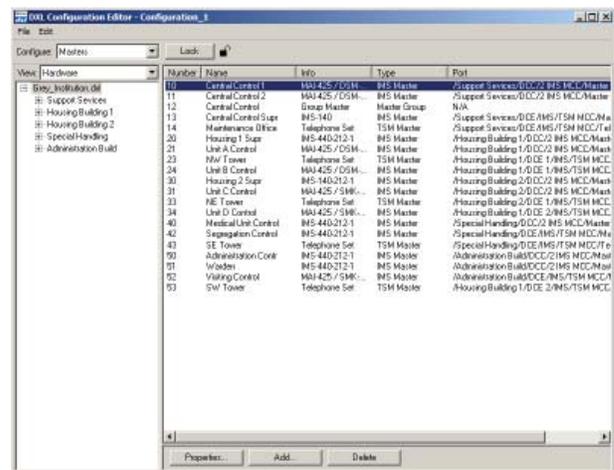
The MicroComm DXL digital intercom system is designed to meet the needs of smaller facilities and facilities with widely distributed architectures. It is also ideally suited for adding functionality and flexibility when retrofitting relay switched intercom systems. A comprehensive feature set gives the MicroComm DXL the power to handle projects with the most demanding requirements, and like all MicroComm family members, it incorporates digital audio technology and provides a high performance, rugged, and reliable communication solution.



Two basic building blocks form the backbone of the system. Digital Communications Controllers (DCCs) are the master component of each exchange and can be interconnected to form larger systems. They incorporate the exchange processor, control software, configuration data, and network ports as well as the intercom station, master station, and audio interface boards. Digital Communication Expanders (DCEs) are used to increase the capacity of each exchange. Up to four DCE expander units can be connected to each DCC to increase the size of the exchange.

The MicroComm DXL is compatible with the same set of intercom stations, master stations, and call devices as the rest of the MicroComm family. The wide and growing variety of standard stations and specialty stations is therefore available for your use.

A key feature of the MicroComm DXL is its Administrator Software. This Windows Explorer style user interface runs on a standard PC and provides system configuration, logging, and diagnostic functions. With its easy to follow tree structure, simple to understand data entry dialogs, copy and paste device creation feature, and built-in device libraries, a MicroComm DXL is easy and quick to program.



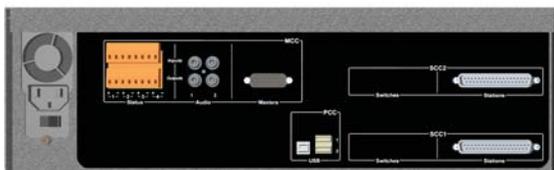
## Digital Communications Controllers (DCC)

DCC's are the heart of the MicroComm DXL system. Each DCC contains all processing, control software and configuration data to operate independently as a stand-alone exchange. Exchange networking, host port control, programming, diagnostics, and maintenance are all performed through the DCCs.

Each DCC also supports two intercom or telephone master stations and up to 32 intercom stations. Two line-level audio inputs and two line-level audio outputs with control and status allow connection of microphones, program sources, paging amplifiers, and logging recorders. The front panel keypad and display are used for basic system set up and diagnostics.



## Digital Communications Expanders (DCE)

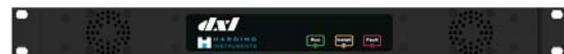


DCEs are used to increase the capacity of an exchange. Up to four DCEs can be connected to each Digital Communication Controller through a “plug and play” Universal Serial Bus (USB) port. The USB carries all the audio and data communications between the units.

Like the DCC, each Digital Communication Expander supports two intercom or telephone master stations, up to 32 intercom stations, and two line-level audio inputs and two line-level audio outputs including control and status.

## Talkback Expander (TBE-310)

The TBE-310 offers a flexible solution for driving high power speakers with talkback capability. The Talkback Expander has eight 25 Vrms audio output channels that can be used to drive paging speakers with each channel delivering 5 watts. Adjacent channels can be bridged to form groups that can provide higher output power. In talkback mode the speaker functions as both a speaker and microphone. The TBE connects to a DCC via a USB port and up to 4 TBEs and/or DCEs can be connect to each DCC.



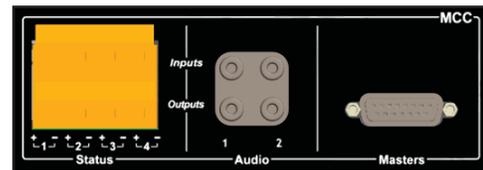
## Page Zone Expander (PZE-110)

The PZE-110 Page Zone Expander offers a flexible solution for adding multiple page zones to a DXL system. The unit has 3 page inputs with each input having 6 selectable relay controlled page outputs. The PZE connects to a DCC via a USB port.



## DCC and DCE Modules Master Control Cards (MCC)

The Master Control Card (MCC) provides the interface for two master stations as well as the two line level audio inputs and two line level audio outputs. Each audio input and output includes an associated status monitor and control point.



The master station ports can be ordered with either Intercom Master Stations (IMS/MAI) or Telephone

The Master Control Card (MCC) provides the interface for two master stations as well as the two line level audio inputs and two line level audio outputs. Each audio input and output includes an associated status monitor and control point.

The master station ports can be ordered with either Intercom Master Stations (IMS/MAI) or Telephone Set Master stations (TSM). DCCs and DCEs can be ordered so both master channels are either the same type, or of different types.

Audio inputs and outputs are through standard RCA phono jacks and are typically used for:

- background music sources
- paging microphones
- two-way radio system interfaces
- monitoring or recording equipment
- paging signals to external amplifiers

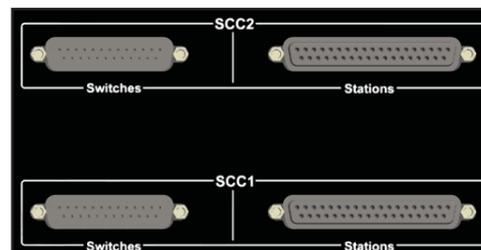
Independent software adjusted volume level controls are also provided for each channel.

The contact closure control inputs are provided for each audio input and output to permit disabling of the signals by external equipment for press-to-talk functions. Status signal outputs are also provided for each channel for external signaling.

## Station Control Cards (SCC)

Station Control Cards (SCC) are used to connect intercom stations to a DXL Exchange. Each DCC or DCE includes two station control cards. The SCC-300, SCC-400 and SCC-401 are used to connect respectively to 300, 400 or 401 series intercom stations.

Each SCC includes 16 half-duplex intercom ports, each with its own device amplifier. Intercom stations are connected to the half duplex ports and full duplex



handset stations are connected to two adjacent ports. Station Control Cards (SCC) are used to connect intercom stations to a DXL Exchange. Each DCC or DCE includes two station control cards. The SCC-300, SCC-400 and SCC-401 are used to connect respectively to 300, 400 or 401 series intercom stations.

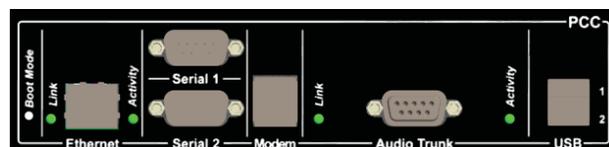
Each SCC includes 16 half-duplex intercom ports, each with its own device amplifier. Intercom stations are connected to the half duplex ports and full duplex handset stations are connected to two adjacent ports. Each intercom station must be connected to its own SCC port. Any attempt to parallel stations will upset the supervisory and audio networks.

Station Control Cards include all the circuitry to interface the intercom station switch contacts as well as supply power to the station amplifiers. A single twisted shielded pair cable is required to connect each 400 or 401 series intercom station to an SCC.

Two field interface connectors are provided on each SCC-300, one for the audio channel and one for the switch connections. Separate field interface cables for each function are also required. A twisted shielded pair cable is required to connect each station's loudspeaker. A separate unshielded twisted pair cable is also required to connect each call switch. The SAB-300 also supports two switches per input with supervising resistors.

## Process Control Cards (PCC)

A Process Control Card (PCC) in each DCC and DCE controls the functions of each unit. They also provide the ports for system networking and control. The DCE card only requires the exchange network USB ports for communication with the DCC.

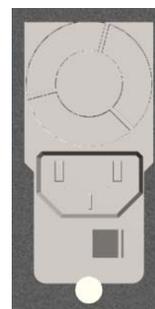


In addition to the USB ports, the DCCs also include:

- a 10/100BT Ethernet port for the system data network.
- two serial ports for setup, maintenance, host port and CCTV interfaces.
- an internal modem port for on-line system support from the factory or a remote service center.
- system audio trunk ports for either copper or fiber optic networks.

## Power Supplies

DCCs and DCEs are equipped with an internal power supply that automatically adjusts to a variety of sources ranging from 100-240 VAC at 50 or 60 Hz. Maximum current draw is 2.75 amperes at 115 VAC and 2.0 amperes at 240 VAC. A NEMA 5-15 standard power cord is supplied with each unit.



### DXL Administrator Software

The DXL Administrator Software operates on either a stand-alone desktop or laptop PC with a minimum configuration consisting of a Windows XP Operating System, a Pentium processor, 256M of RAM and a 1G hard drive. This menu driven software package is used to define the software configuration of the system. It is also used for diagnostics, troubleshooting and uploading log information for viewing. The computer must be connected to any DCC in the system to download the software configuration, or when either logging or diagnostic functions are being run, but need not be connected to the system at other times. Once a software configuration is downloaded to a DCC it is distributed to the other DCC's in the system through an Ethernet network.

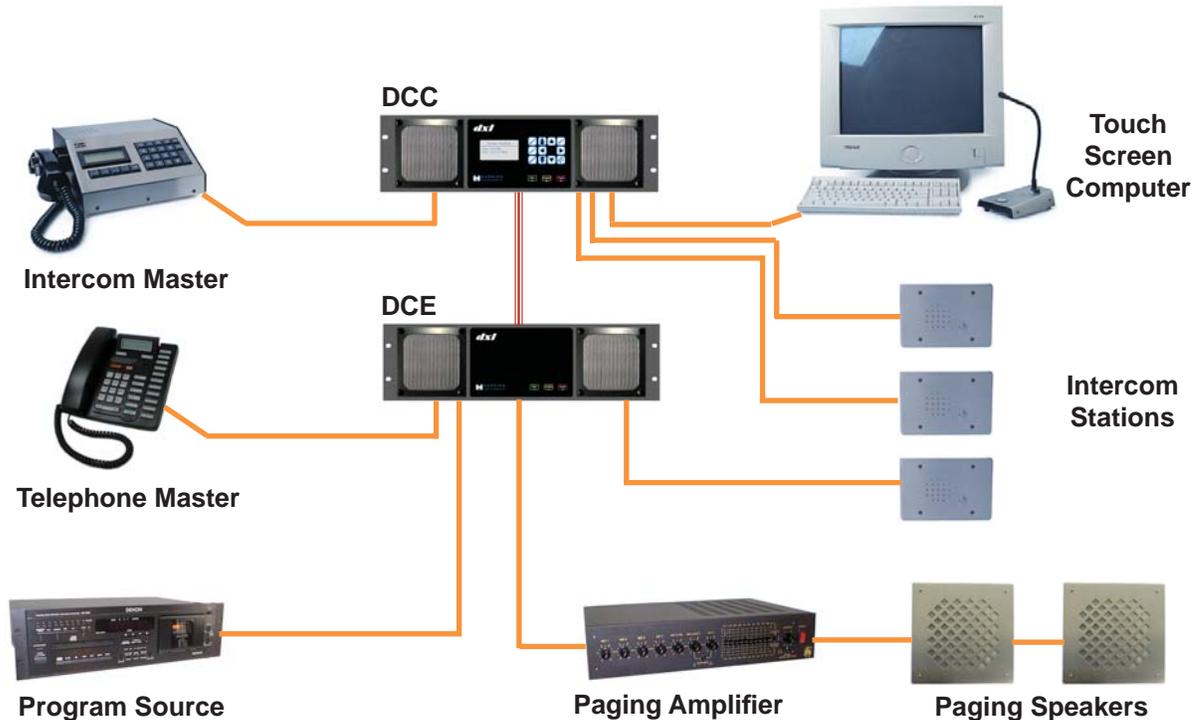
The DXL Administrator computer can be connected to a DCC through either an RS-232 serial port or an Ethernet network port.



## System Architecture DXL Exchange

A MicroComm DXL exchange consists of a DCC controller with up to four DCE and or TBE expander units which are all interconnected with a “plug and play” intra-exchange USB network. Audio signals, control messages, and configuration information are transmitted over the USB network between the DCC and the DCE’s or TBEs.

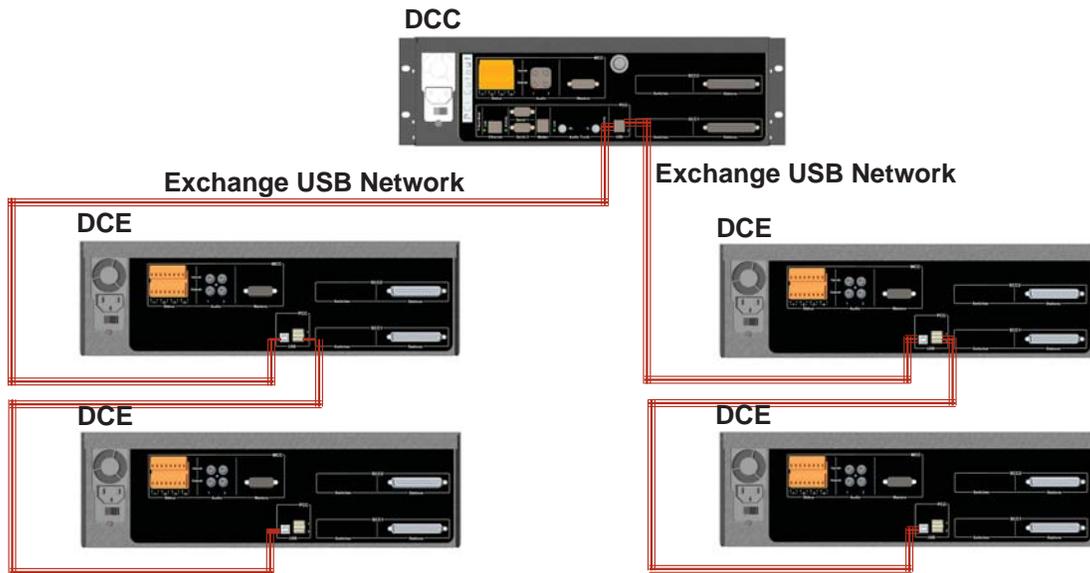
The following diagram depicts typical devices connected to a DXL exchange



## DXL Local USB Network

The Local USB Network employs industry standard USB “plug and play” technology to route audio signals and command messages between the DCC and DCEs. It is recommended that the DCEs be equally distributed among the two DCC USB ports for maximum system performance. Each DCE is shipped complete with a 10 foot USB cable.

The following diagram depicts the recommended exchange network connections when four Digital Communications Expanders are employed in an exchange.



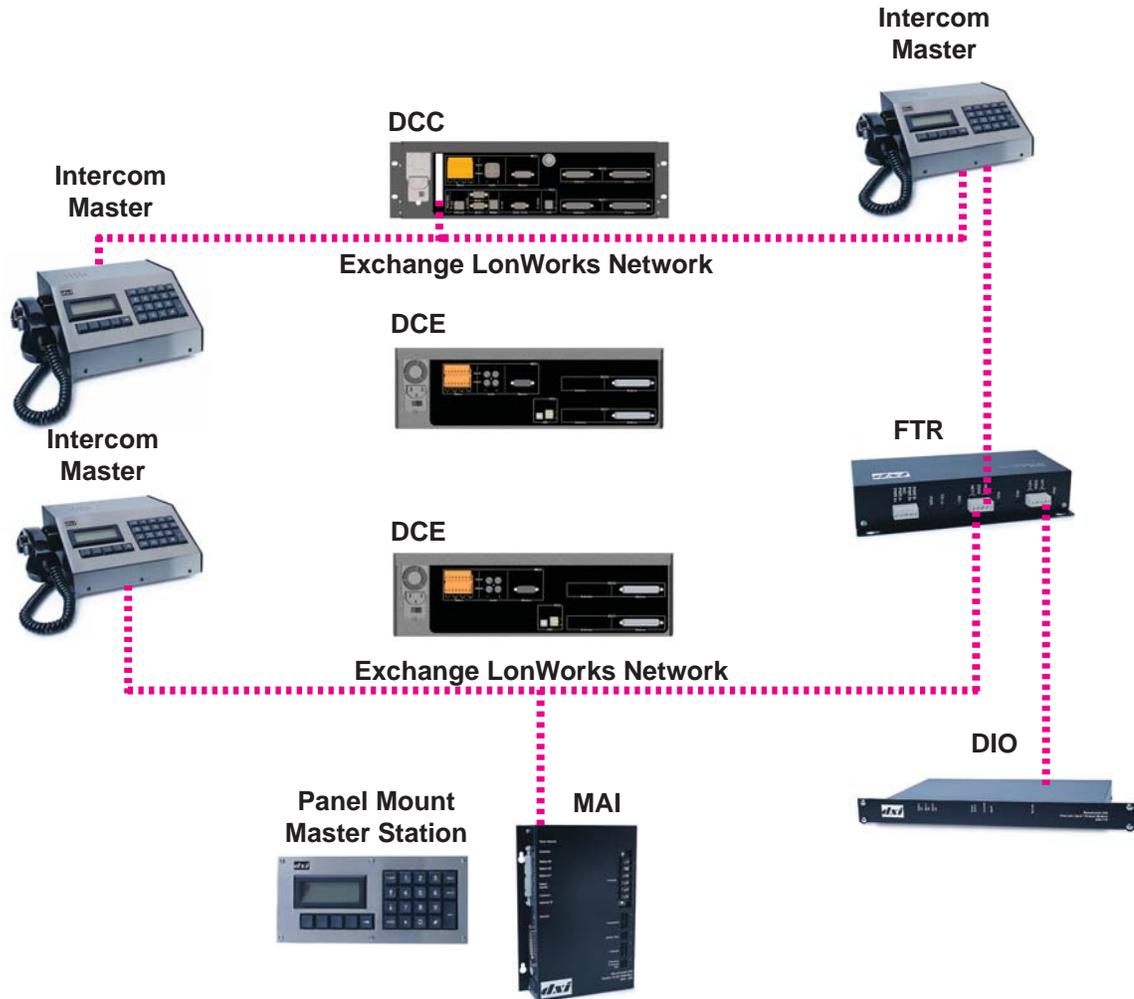
## Exchange LonWorks Network

A DCC may have a card in its PCI slot that has a port to communicate to keypad/display master stations or discrete input/output modules over an Exchange LonWorks free topology data network. LonWorks is a widely used industry standard network that employs a single twisted pair cable wired in a free topology configuration. That is, networks can be configured with a mix of serial and parallel connections. LonWorks cable specifications and listings are available on Echelon's website at [www.echelon.com](http://www.echelon.com).

The free topology network can extend up to 1300 feet in length. Network repeaters can extend that limit where required.

Discrete Input/Output (DIO) Modules are added to an exchange to provide a means to monitor switch inputs and outputs

All LonWorks devices in an exchange are connected to the DCC's PCI card, even if the audio connections are made to DCE master ports.



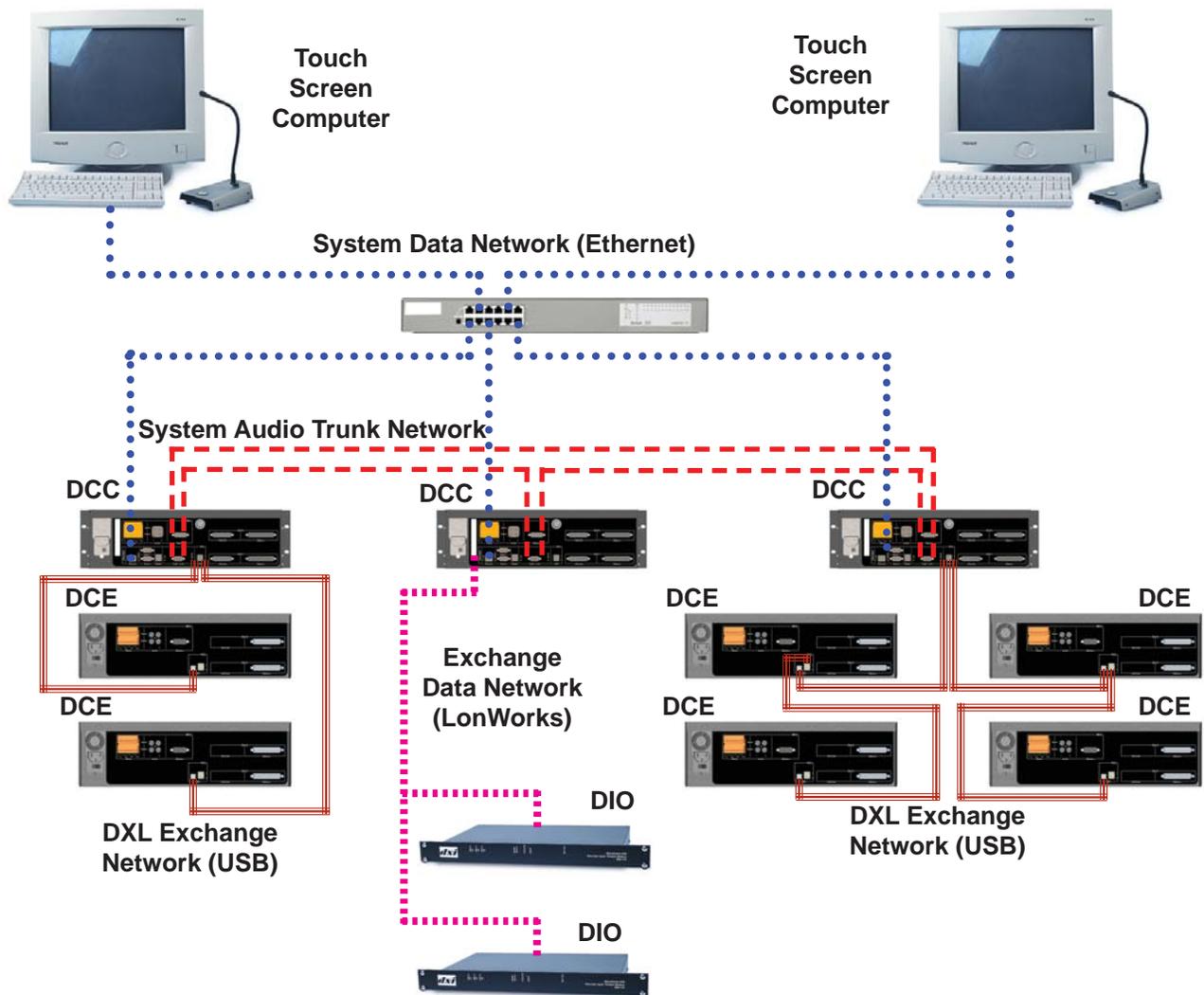
## DXL System with Multiple Exchanges

Multiple DXL exchanges can be networked together to form a system capable of meeting the needs of larger facilities.

**Up to 32 MicroComm DXL Exchange can be interconnected to form larger systems.**

Digital audio trunks and data networks for signals, control messages, and status information are employed between exchanges to form larger systems. The digital audio trunk is connected to form a loop that includes all DCCs, while the data network employs standard Ethernet technology to connect the DCCs and any host port computers. Touch screen operator terminals and door control system PLCs are typical host port computer applications.

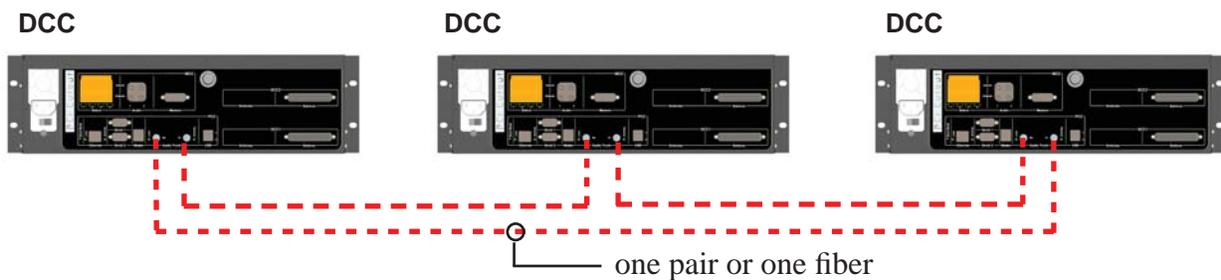
The following diagrams illustrates a system with multiple exchange.



## System Audio Trunk Network

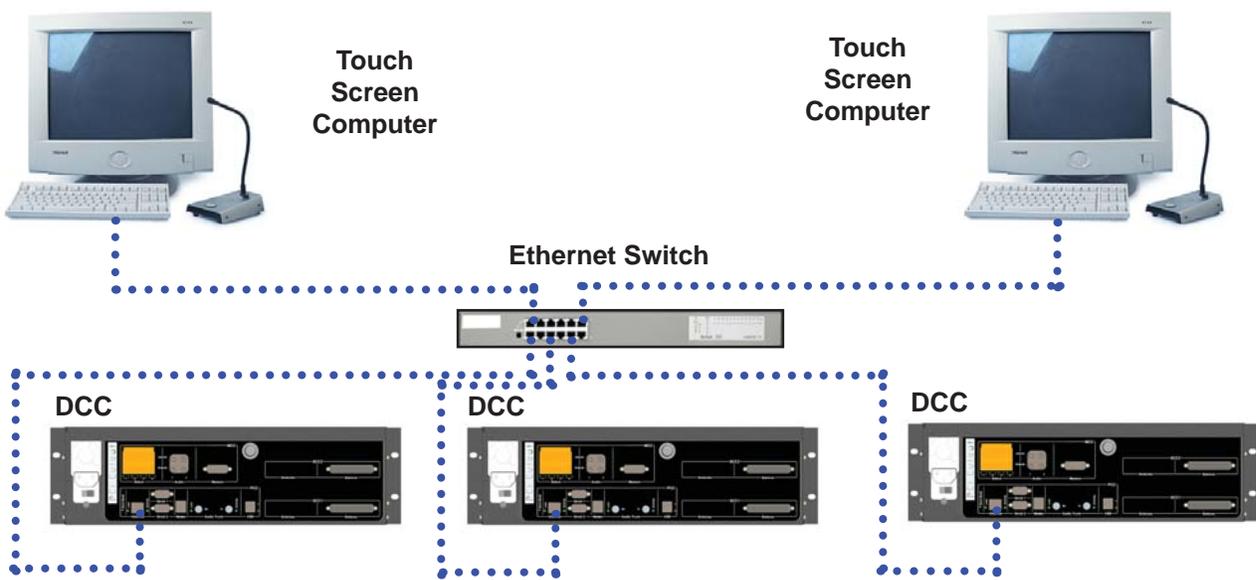
The MicroComm DXL multi-channel System Audio Trunk consists of a single unidirectional loop that links all the DCC's together. For the copper conductor option, the loop consists of one pair of 22 gage twisted cable and can span up to 8200 feet per segment. For the fiber optic network option, the loop consists of one 62.5/125  $\mu$ m multimode fibers and has a 10 dB power budget. For electrical isolation and lightning protection, the fiber optic interface should be used.

Audio Trunk communication networks are unidirectional and **must be looped** around multiple points. When planning the Audio Trunk Network, ensure that all the DCC modules are ordered **with the same format** (copper or fiber optic) interface.



## Inter-Exchange Network

Each DCC is equipped with a 10/100BT Ethernet port with RJ-45 jack for connection to the system data network and host port computers. The network itself may form a portion of a larger network that the system installer constructs with wiring and components he provides. The Inter-Exchange Network provides a link between the DCCs of each exchange and to host port computers. It employs standard Ethernet technology and may also be used to communicate with the Administration Software Computer. The design of the Ethernet network can be achieved with Ethernet switches or repeaters.



## Master Stations

Master Stations with full keypad/display functionality can be provided for desk top, flush panel mount, flush wall mount, or rack mount situations. While these units provide an operator with full control of a stand-alone system, they can also be used to supplement the operation of touch screen terminals and graphic control panels. Audio only masters can be used where all system functions are externally controlled. Telephone set master stations are employed where only administrative or basic functions are required.

### Intercom Master Stations

The IMS-640 is a telephone style keyboard/display intercom master station that uses Voice over Internet Protocol (VoIP). The IMS-640 connects to an exchange via the Inter-Exchange Network (an Ethernet network). The IMS-640 includes a 128x64 pixel graphical display and provides the operator with audio communications as well as alarm and control functions. It permits the operator to place calls, make public address and station group announcements and manage system background music operations. Other features include the ability to acknowledge, cancel, and reset incoming alarms and to monitor, activate and deactivate output points.



The IMS-440 is a desktop standard size keyboard/display master station. The unit is compact, sturdy, and can be permanently fixed to millwork if required. It provides an operator with audio communication, paging, and monitoring functions as well as alarm and control functions. It also permits the operator to receive and place calls, put calls on hold, make public address and station group call announcements, and manage system background music operations. Other features include the ability to acknowledge, cancel, and reset incoming alarms and to monitor, activate and deactivate output points.

The IMS-130 is the panel mount, standard size display master station for use with the MAI-420 master audio interface. This unit is suitable for mounting directly into millwork, custom 19" rack mount panels, and other consoles. The IMS-130 in conjunction with the MAI-420 provides the operator with audio communication, paging, and monitoring as well as alarm and control functions. It also permits the operator to receive and place calls, put calls on hold, make public address and station group call announcements, and manage system background music operations. Other features include the ability to acknowledge, cancel, and reset incoming alarms and to monitor, activate and deactivate output points.



The MAI-420 Master Audio Interface provides audio communication circuitry and control between the DXL exchange and a remote location requiring a flush mount master station with an IMS-130 keypad/display module.

Connections are available for interfacing to a loudspeaker, microphone, telephone handset and hook switch, headset, external PTT switch, and phantom powered microphone.

## Graphic Control Master Stations

The TMM-640 Touchscreen Master Module is a small desktop unit for use with a touchscreen terminal. It is a Voice over Internet Protocol (VoIP) device that implements the industry standard Session Initiation Protocol (SIP).

The unit consists of a speaker (c/w volume adjustment), an electret microphone, a push-to-talk (PTT) switch, and a LED status indicator. A front panel 2.5 mm jack also allows a variety of wired headsets to be utilized. The TMM-640 also provides contacts for an external PTT (foot) switch as well as a privacy handset, and also includes a 3.5 mm stereo output jack to provide line-level signalling for external amplified speakers.



The MAI-425 Master Audio Interface provides audio communication circuitry and control between the DXL exchange and a touch screen terminal or graphic control panel without keypad/display functionality.

Connections are available for interfacing to a loudspeaker, microphone, phantom powered microphone, external PTT switch, telephone handset and hook switch, and head set.



The DSM-140 Desktop Speaker Microphone is a compact unit for use with touch screen terminals. The unit consists of a push-to-talk (PTT) switch, speaker and an electret microphone that is either mounted on a 12 inch goose neck or flush mounted. The DSM-140 is connects to an MAI-420 or MAI-425.

## Telephone Set Master Stations

Telephone Set Master Stations provide administrative intercom functions through standard and cordless call display type telephone sets. Intercom communications, zone paging, listen-in monitoring, and output control are all available through telephone set masters. Function keys can be programmed for direct selection of commands and as speed dial numbers.



## Intercom Stations

Intercom stations are designed to mount on standard electrical device outlet boxes. They are offered with a variety of switch types and include handset and call cord options. Specialty intercom stations are also available for a variety of custom back boxes or for mounting on larger electrical boxes.

### 400 and 401 Series Intercom Stations

The ICM-420 and ICM-430 Intercom Stations are for use with the SCC-400 Station Control Cards. The intercom stations are suitable for use in high security areas and are designed for superb audio clarity in reverberant acoustic environments. The 400/401 series ICM's incorporate an integral loudspeaker/microphone, and circuitry for transmission of all station audio, power, and up to two switch closures over a single shielded pair cable for reduced installation costs.



The ICM-421 and ICM-431 Intercom Stations contain a micro-controller to provide feedback information by means of an LED on the station (such as on-hold), and are used with the SCC-401 Station Control Cards. The intercom stations are suitable for use in high security areas and are designed for superb audio clarity in reverberant acoustic environments. The ICM's incorporate an integral loudspeaker/microphone, and circuitry for transmission of all station audio, power, up to two switch closures and LED control signals over a single shielded pair cable for reduced installation costs.

The ICS-4X0 and ICS-4X1 Intercom Specialty Stations are made for applications requiring replacement intercoms for non-standard device boxes, unusual switch combinations, site specific engraving, etc. The ICS-4X0 intercom stations are for use with the SCC-400 Station Control Card. The ICS-4X1 intercom stations are for use with the SCC-401 Station Control Card. The intercom stations incorporate the same performance features of the standard intercom stations and can be ordered to meet the specific requirements of your facility.





The ICB-400 Intercom Boards are used to transform generic 45 ohm intercom stations to obtain full MicroComm quality and performance. They can also integrate ceiling speakers with 25-volt, 5-watt matching transformers and external call switch as intercom stations. Standard mounting holes with 2.51" spacing are used for mounting via nylon standoffs directly to station loudspeakers. Insulated versions with Velcro strips are used for overhead loudspeakers, parking gate pedestals and other similar applications.

## 300 Series and Generic Intercom Stations

Generic intercom stations are stations with a 25 volt, 1 watt speaker. In retrofitting existing systems with this type of intercoms, a 300 Station Control Card (SCC) can be used to interface directly to the existing intercoms.

The ICM-320 and ICM-330 are 25 volt intercoms designed for customers who do not require the enhanced features and cross-talk protection provided by the 400 series intercom stations, or who wish to expand an existing system that has generic intercoms. Generic 300 series intercom stations require a separate pair of wires for the audio and up to two switch closures can be multiplexed over a second pair of wires.



## Full Duplex Handset Stations

Full Duplex Handset Stations allow the user to talk and listen simultaneously with a master station handset or another full duplex handset station. These units are ruggedly constructed and can be ordered with either an armored handset cable with strain relief's on each end or a coiled call cord (required with a press-to-talk switch in the handset). The FDH-420 Full Duplex Handset mounts in a standard two-gang electrical box, and the FDH-440 mounts in a standard four-gang electrical box.

The FDH-440 may be ordered with one or two optional switches that can be used for volume control, press-to-talk, or other functions. The FDH-440 also includes an internal speaker/microphone.

The FDH-420 may be ordered with an optional switch that can be used as a user programmable volume control. The volume switch steps through 8 preset volume levels.

Full Duplex handset stations are powered through the audio lines that are connected to the SCC.



## Call Operating Devices

Call Operating Devices (COD's) are switch units, with a switch button and supervision circuitry. They are used to place call requests, cancel calls, or initiate some other action such as opening a door or triggering an alarm. CODs are connected to the MicroComm DXL system through discrete I/O units, or as remote call switches on intercom stations with that capability.

The COD-210 Call Operating Device consists of a vandal resistant switch on a heavy single gang stainless steel faceplate for mounting on a standard electrical box. It comes with an optional LED, and with a variety of optional switches types.



## Discrete I/O Modules

Discrete Input/Output (DIO) modules are used to monitor switch and contact closures and control auxiliary outputs. DIO modules require a local LonWorks Data Exchange network.

Inputs can be used for functions such as door position monitoring, panic alarms, building alarms, tone signal initiation, etc. They may also be used as a contact interface to an external control system to initiate externally controllable DXI functions.

Outputs are used to control external devices in response to input point activity or manual and automatic system commands. Typical control functions could include release of door locks solenoids, sounding of signaling devices, illuminating external indicating devices, etc.

MicroComm DIO modules are offered in two model series, each with different mounting options.

### 100 Series DIO Module

The DIO-110 is the rack mount version of the Discrete Input/Output Board of the DXI system. It provides interfaces which monitor external switches or drive external outputs. The DIO-120 is the wall mount version of the same module.



The DIOs have an input capacity of 48 contact closure monitor points which may be software configured for either supervised or non-supervised operation. With terminating resistors installed, supervised inputs can detect open circuit and short circuit trouble conditions as well as the independent status of one or two switches per circuit.

Each DIO-110 can also have either 48 solid state output drivers or 16 relay outputs. Solid state drivers are available in voltage source, current sink, and LED types. Each relay output provides both normally open and normally closed contacts.

One field interface cable is required to connect the DIO inputs and one field interface cable is required for output connections.



### 300 Series DIO Module

The DIO-320 is the wall mount version of the Discrete Input/Output Board with relay outputs. It provides interfaces to monitor external switches and to control external devices.

It has an input capacity of 48 contact closure monitor points which may be software configured for either supervised or non-supervised operation. With terminating resistors installed, supervised inputs can detect open circuit and short circuit trouble conditions as well as the independent status of one or two switches per circuit. Each DIO-320 has 48 form C (single pole double throw) relay outputs. Each relay output provides both normally open and normally closed contacts.

Four field interface cables are required to connect all 300 Series DIO module inputs and outputs. One cable is required for the inputs, and one cable is required to connect each group of 16 relay outputs.

## Auxilliary Power Supplies

DC power supplies for remote devices (such as intercom master stations and DIO modules) are available with 1.5 ampere capacities.



## Field Interface Cables

Field Interface Cables are factory manufactured to interface intercom station, master station, and discrete I/O field wiring throughout a facility to the exchange equipment. All field interface connections to the DCC or DCE are made through connectors on the rear of each unit. Factory manufactured cables for the DCC and/or DCE include the following;

- cables for interfacing the master stations (DB-15) connector to terminal blocks
- cables for interfacing intercom stations (DB-37) connectors to terminal blocks

If the units are used with the SCC-300 station control cards and 300 series (or Generic) intercom stations, additional cables are required to interface the station switches to the terminal blocks

- cables for interfacing intercom station switches (DB-25) connectors to terminal blocks

If the DCC is selected with the copper audio trunk network, an additional cable is required

- cables for interfacing copper audio trunks (DB-9) connectors to terminal blocks

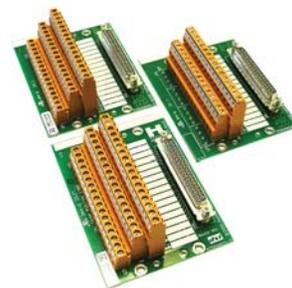
Each cable can be ordered in a variety of standard lengths with custom lengths available upon request. One end of the cable is fitted with a factory-installed connector that plugs into the exchange equipment and the other end is left non-terminated. The end of the cable without the connector is to be terminated on a field wiring interface block provided by the system installer.

Two different styles of cables can be ordered for station audio boards: DB connector at one end of the cable or each end of cable terminated with DB connectors.

## Quick Connect Boards

MicroComm DXL field interface cables are designed with two male DB connectors (one on each end). One end plugs into the station audio board and the other end into a Quick Connect Board. Field wiring is then connected to screw terminals on the Quick Connect Boards.

Alternatively MicroComm DXL field interface cables with a single DB connector are available for termination on multi-pin terminal blocks. These serve to provide a neat and manageable interface between the building's field wiring and the system equipment. This will simplify troubleshooting of field wiring and system additions and modifications.



## Device Wiring

Field wiring information for each MicroComm DXL field device is listed in the data sheets and installation bulletins. The information listed will give the connector type, the type of cable required, including the number of conductors and shielding requirements, and the allowable cable length for the recommended wire gage.