INSTALLATION INSTRUCTIONS

MicroComm DXL

DCC and DCE Installation Instructions

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DCC and DCE Installation Instructions

1. Intent & Scope

This document describes the installation procedures for the MicroComm DXL digital intercom system. This document describes only the wiring and physical interconnections between components. Details on how to set up the software configuration are described in the manual:

Administrator Software – This is used to configure how the system is to operate

2. Description

The MicroComm DXL is a digital intercom system that is constructed in a building block fashion by connecting modules together to form larger systems. A key building block of the system is the Digital Communications Controller (DCC), which incorporates the processor, master station interface, intercom station interface, audio interface, paging interface and power supply functions in one unit. Up to four Digital Communications Expanders (DCEs) and/or Talkback Expanders (TBE) can be connected to one DCC to expand the system. A DCC and its associated DCEs and TBEs are referred to as an Exchange.

Further expansion is possible by connecting DCCs together to form larger systems. Up to 80 DCCs (i.e. 80 Exchanges) can be connected together. Exchanges can be connected together using two different methods. The DCCs can be connected together by an Inter-Exchange Network (Ethernet) and a Digital Audio Trunk Network capable of transmitting 20 simultaneous audio channels and 6 music or program distribution channels. A second method of connecting exchanges together is to use the Inter-Exchange Network (Ethernet) to transmit both data and voice. In this case audio is transmitted between exchanges using voice over internet protocol (VoIP). Each DCC in the system must include a VoIP accelerator card. The Inter-Exchange Network is then capable of transmitting 39 simultaneous audio channels. The MicroComm DXL intercom system uses the same intercom stations, and point monitor and control devices that are used with the MicroComm DXI, except the keyboard/display master stations are different if VoIP is used instead of an Exchange Data Networks (LonWorks) and a Digital Audio Trunk.

A key feature of the MicroComm DXL is a Windows based user interface for system configuration and diagnostics. With its easy to follow tree structure, simple to understand entry boxes, configuration diagnostic aids, and help functions, the MicroComm DXL is a system that a user can easily and quickly program on their own.

Integration to touch screen terminals, graphic control panels and host port computer systems is available through a variety of dedicated interfaces. Simple command messaging allows full external control of virtually all MicroComm DXL functions without having to filter out extraneous communications.

The DCC has connectors that can interface with:

- Two intercom master stations, or two telephone master stations, or one of each.
- Thirty two (32) half-duplex intercom stations or 16 full-duplex intercom stations
- PCI card for Exchange Data Network (LonWorks) connection or a VoIP accelerator card to implement voice over internet protocol.
- Digital Audio Trunk port (either copper or fiber optics).

- Ethernet port
- 4 two terminal status inputs (up to two switches per input)
- 4 two terminal status outputs (normally open relay contact closures)
- 2 line level audio input ports (for audio distribution or amplified microphone signals for paging)
- 2 line level audio output ports (to drive paging amplifiers, recorders, etc.)
- 2 USB type A connectors (for connection to DCEs)
- telephone type modular connector for modem connection
- two serial ports for debugging or connection to an external peripheral.

The DCC or DCE can be ordered with three station configuration options, Station Control Cards SCC-300, SCC-400 or SCC-401. The SCC-300 connects an audio pair to a 25-volt, 1-watt generic intercom station with separate cable pair for switch inputs. The SCC-400 connects 400 series intercom stations (with active amplifiers at the station to minimize cross-talk and external electrical interference) and switch outputs multiplexed with the audio pair. The SCC-401 connects a single audio pair to 401 series intercom stations, similar to 400 series stations but with feedback to a status LED at the station.

The DCE has connectors that can interface with:

- Two intercom master stations, or two telephone master stations, or one of each.
- Thirty two (32) half-duplex intercom stations or 16 full-duplex intercom stations
- 4 two terminal status inputs (up to two switches per input)
- 4 two terminal contact status outputs (normally open relay contact closures)
- 2 line level audio input ports (for audio distribution or amplified microphone signals for paging)
- 2 line level audio output ports (to drive paging amplifiers, recorders, etc.)
- 1 USB type B connector (for connection to DCC)
- 2 USB type A connectors (for connection to other DCEs, TBEs or PZEs)

The DCC and the DCE are designed to mount in a standard 19-inch rack. Each unit requires 3U (5.25 inches) of rack space. Specialized cables are used to bring DCC and DCE connections to terminal blocks.

Each DCC and each DCE requires up to 2.75 Amps from a 117 VAC 60 Hz voltage supply. (Note the input supply voltage can vary from 100-240 Vac at a frequency of either 50 or 60 Hz. The power supply will automatically adjust for either North American or European standard supply voltages.)

3. DCC Backup Battery

The DCC requires a 1.5 volt Alkaline AA battery to maintain the nonvolatile memory and real time clock during unit power down. The battery life is 1 year with DCC unpower and 4 years with the DCC powered.

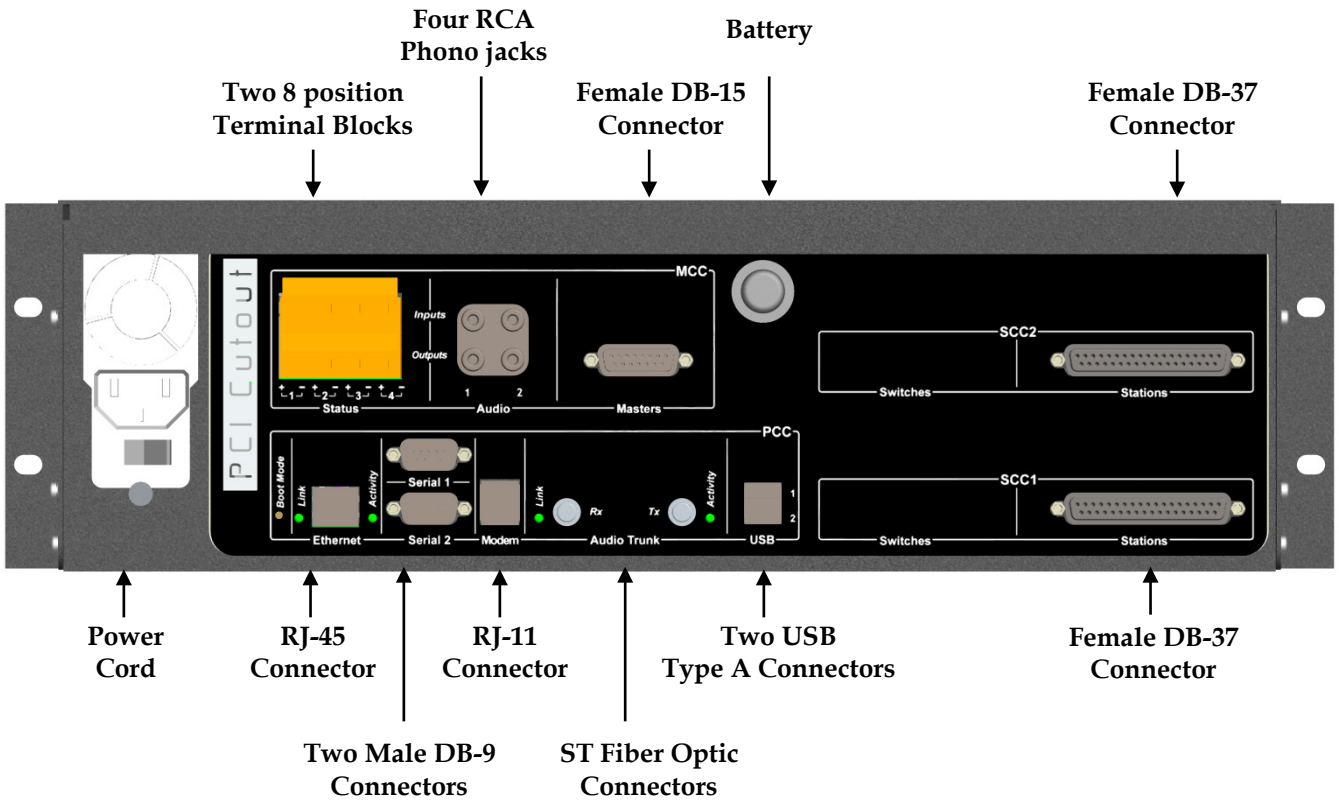
The battery can be replaced with the DCC powered or unpowered. In the unpowered state the DCC will allow up to 15 minutes to replace the battery. The battery voltage is displayed on the DCC front panel on the Status -> DCC Status -> Temperatures screen. If a low voltage alarm has been generated (which can be viewed on the Faults screen) then the battery should be replaced.

The battery should be inserted with the + polarity marked terminal connected to the holder cap (there is a small + marking on one leg of the battery holder cap). Battery replacement should be performed as part of a regular maintenance schedule.

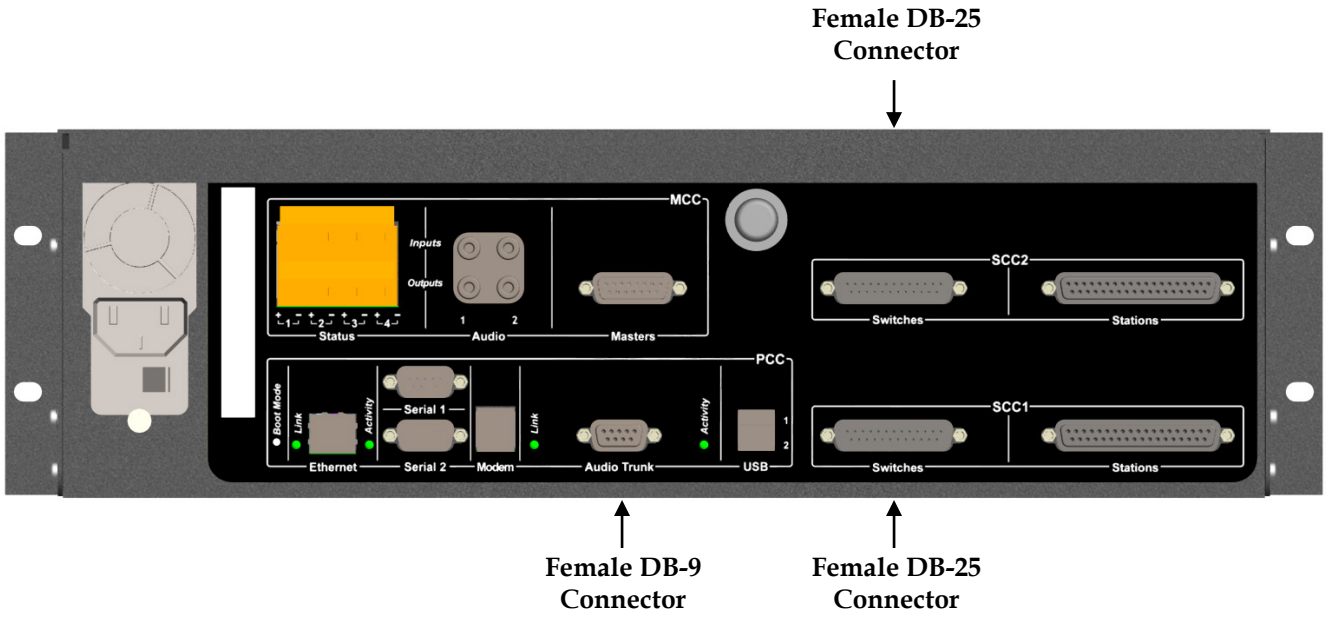
4. Field Connections to the DCC

All field connections to the DCC are made at the rear of the module. Field connections are made via connectors and specialized cables to terminal blocks. The AC socket outlet shall be installed near the equipment and shall be easily accessible..The following figure gives the location and description of all the connectors on the rear of the DCC that has a fiber optic digital audio trunk. If a copper digital audio trunk is specified a female DB-9 connector is used rather than the two fiber optic connectors. The connectors associated with the Ethernet, Serial A, Serial B, Modem and Audio Trunk are associated with the processor control card (PCC) located in the DCC.

If the DCC is used with SCC-300 Station Control Cards rather than the SCC-400 or SCC-401 a DB-25 connector will be located in the areas marked Switches. This equipment relies upon building installation overcurrent protection.



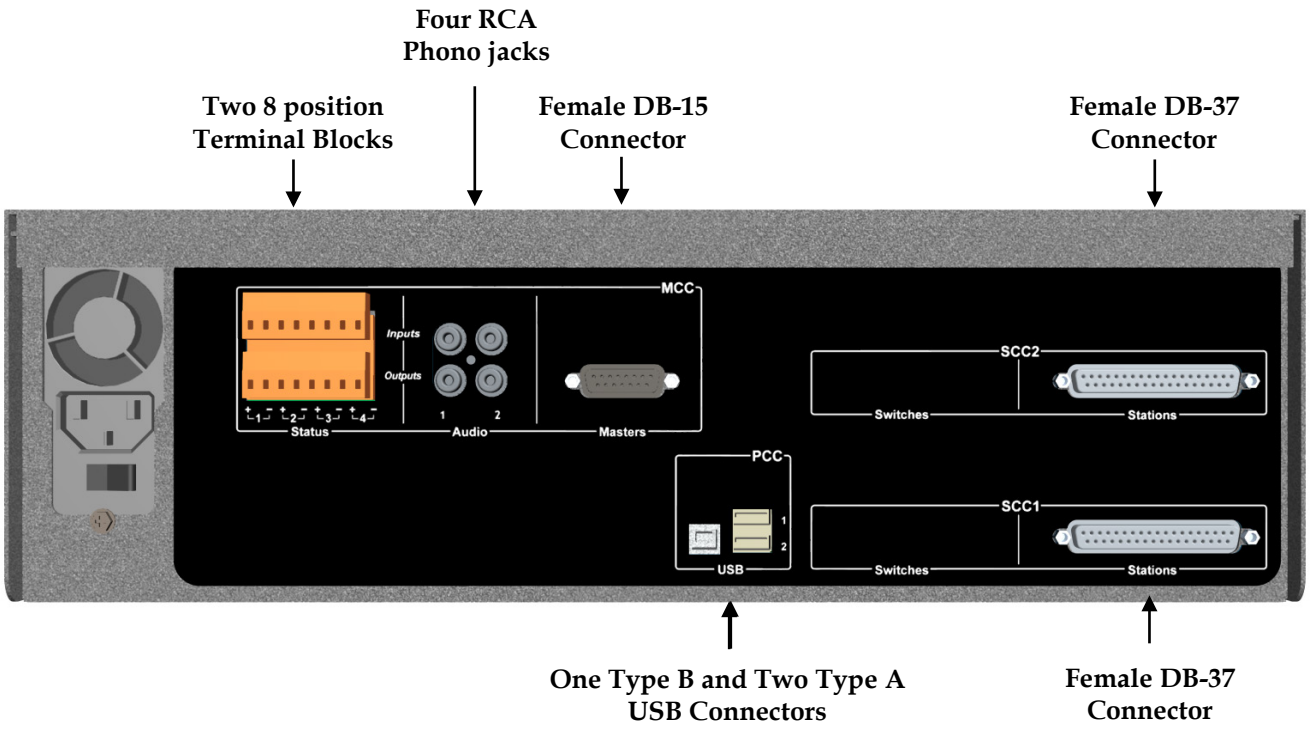
Rear View of DCC with SCC-400 Cards and Fiber Optic Digital Audio Trunk



Rear View of DCC with SCC-300 Cards and Copper Digital Audio Trunk

5. Field Connections to the DCE

All field connections to the DCE are made at the rear of the module. Field connections are made via connectors and specialized cables to terminal blocks. The AC socket outlet shall be installed near the equipment and shall be easily accessible. This equipment relies upon building installation overcurrent protection. The following figure gives the location and description of all the connectors on the rear of the DCE.



Rear View of DCE-400 with SCC-400 Cards

6. DXL Administrator Software Connection

DXL Administrator Software is used to program the system configuration, provide logging, and diagnostic functions for a DXL system. The software configuration is downloaded from a desktop or laptop PC into any one of the DCCs in the system. The software configuration is then transferred to the other DCCs in the system through the Ethernet network. Once the system has the appropriate DXL configuration it will run independently from the PC.

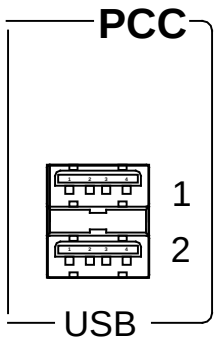
The configuration can be downloaded into the PC via either one of the two serial ports, an Ethernet connection, or the modem input. The serial port connector pin outs are given in Section 9 and the Ethernet network is discussed in Section 8.

7. Connecting DCEs, TBEs and PZEs to a DCC to form an Exchange

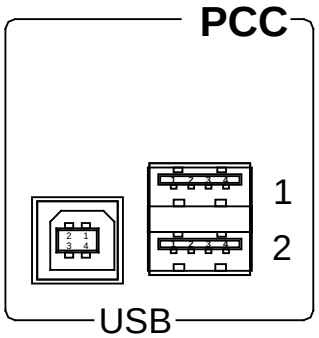
DCEs, Talkback Expanders (TBEs) and Page Zone Expanders (PZEs) are connected to a DCC via a Local USB Network to form an exchange. Up to four DCEs and/or TBEs can be connected to a DCC. Up to 13 PZEs can be connected to a single exchange.

7.1 Connecting DCEs to a DCC

Up to 4 DCEs can be connected with a DCC to form an exchange that allows for a maximum of 160 half-duplex stations and 10 master stations. The units are connected together via USB ports to form the Local USB Network, with a cable connecting a type A USB connector to a type B connector. The DCC has two type A connectors while the DCE contains a hub that has one type B and two type A USB connectors. The DCC and DCEs should be connected so as to best utilize the bandwidth capabilities of the USB networks. If an exchange has one DCC and one DCE then the DCE can be connected to either one of the type A connectors on the DCC, however if the exchange has two DCEs then one of the DCEs should be connected to one of the type A connectors and the other DCE connected to the other type A connector. If a third DCE is installed it can be connected to either one of the existing DCEs, but if a system has 4 DCEs the fourth DCE should be connected so that the system is balanced i.e. each type A connector on the DCC communicates with 2 DCEs.

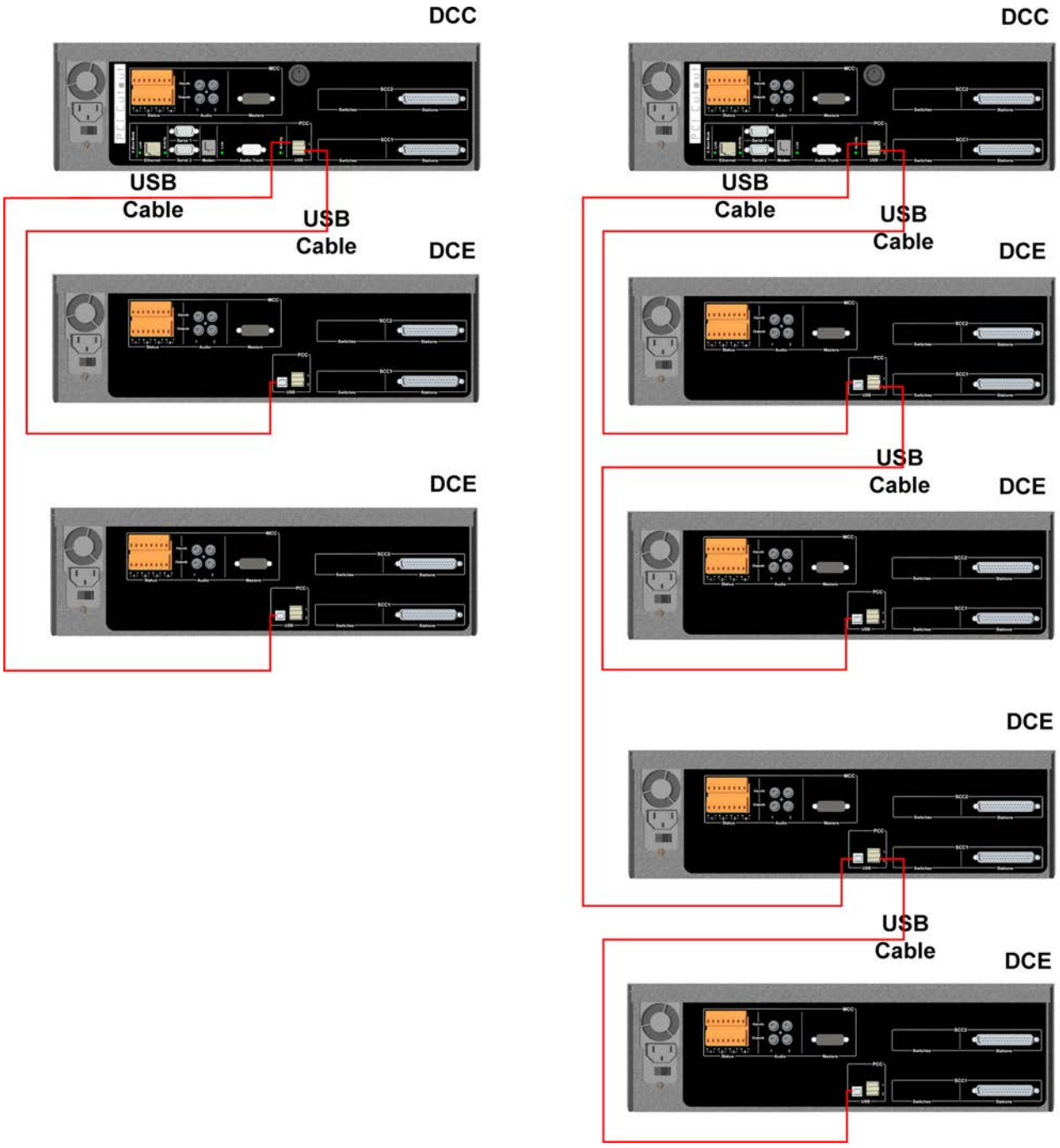


Dual USB Type A Connector on DCC



Dual USB Type A Connector and USB Type B Connector on DCE

Two of the four possible USB connection schemes for an exchange are shown below. The connection distance of a standard USB cable is limited to 16.5 feet (5 m), normally the DCC and its associated DCEs would reside in the same 19-inch equipment rack so distance between units should not be a concern.

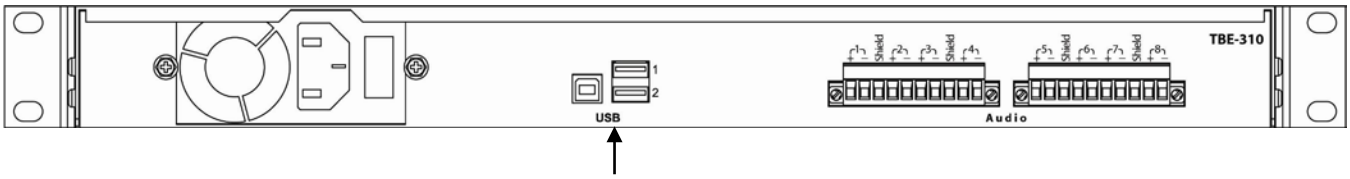


USB Connections for 2 DCEs and 4 DCEs

USB connections should be made using the USB A to B cable supplied with the DCE. Only certified USB A to B cables of 10 feet (3 meters) or less should be used with the system.

7.2 Connecting a TBE to a DCC

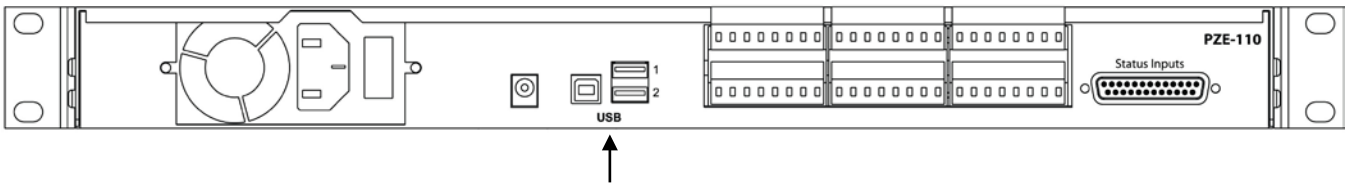
A TBE offers a flexible means for driving high power speakers with talkback capability. The TBE can drive 25 Vrms speaker lines. Each unit has 8 amplifier outputs with each channel delivering 5.0 watts. Adjacent channels can be bridged to form groups that can provide higher output power. The TBE connects to a DCC via the Local USB Network.



One Type B and Two Type A USB Connectors

7.3 Connecting a PZE to a DCC

A PZE provides 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. Each input has a separate relay (controlled by the DXL) to key the amplifier. The PZE connects to a DCC via the Local USB Network.



One Type B and Two Type A USB Connectors

7.4 Rack Mounting of DCC, DCEs, TBEs and PZEs

DCCs, DCEs, TBEs and PZEs are designed to fit into a standard 19 inch equipment rack. These basic units which are connected together to make up an exchange can be stacked in the equipment rack without additional vertical spacing between them. If units are not located in the same equipment rack the maximum separation between units is governed by the USB Data Exchange Network with USB connections limited to 6 feet.

8. Connecting DCCs together

Multiple exchanges (up to 32) can be connected together to form a DXL system. Normally a DXL system will include master stations with displays that provide an operator with information on the state of the system i.e. pending call requests. In order to display information the DXL system must be capable of sending data to the master station. Two methods can be implemented:

i) A Digital Data Network (LonWorks) connects all keyboard/display master stations to a DXL exchanges. Each DCC must contain a PCI card in order to realize a LonWorks network. A separate Digital Audio Trunk is required to transmit audio between the exchanges, while an Ethernet network is used to transmit data between exchanges over the Inter-Exchange Network.

ii) Data can be sent to a keyboard/display master station via an Ethernet network. In this case digitized audio can also be transmitted over the Inter-Exchange Network and each DCC must contain a VoIP accelerator card.

Two different types of keyboard/display master stations are required

i) Keyboard/display master stations that contain a Neuron that decodes data sent via the Digital Data Network (LonWorks).
ii) Keyboard/display master stations that receive/transmit both audio and data over the Inter-Exchange Network (Ethernet).

Note that the two approaches are mutually exclusive i.e. a DCC can have either a PCI card or a VoIP accelerator card but not both.

8.1 System with Local Data Exchange Network (LonWorks)

A DXL system that uses a Local Data Exchange Networks (each exchange can have it's own LonWorks network) must also have a Digital Audio Trunk to transmit audio between exchanges and an Inter-Exchange Network (Ethernet) to transmit data.

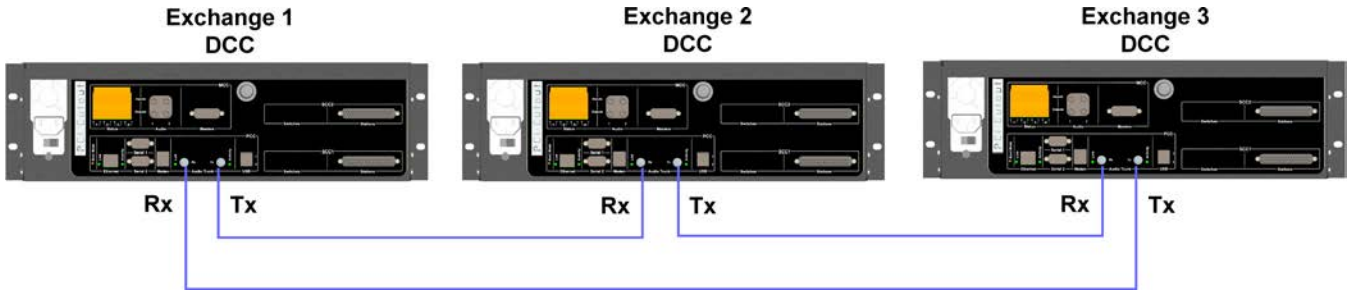
8.1.1 Audio Trunk Network

The copper Digital Audio Trunk Network loop is made via a DB-9 female connector. The connections from the DCC to the field terminal block can be made using a CBL-ATN-A cable. The pin connections and wire colors for the cable are as follows:

DB-9 Pin Number	Signal	Wire Color	Terminal Block Pin Number
1	RTIP1	White/Blue Stripe	
6	RRING1	Solid Blue	
2	TTIP1	White/Orange Stripe	
7	TRING1	Solid Orange	
3	N/C		
8	N/C	White/Green Stripe	
4	N/C	Solid Green	
9	N/C	Solid Brown	
5	N/C	White/Brown Stripe	

DB-9 Cable for Copper Digital Audio Trunk Network

A Digital Audio Trunk connection for 3 DCCs using fiber optic connections is shown below. If more than 3 DCCs are required in the system then the loop is extended to include all the DCCs.



Audio Trunk Network Loop

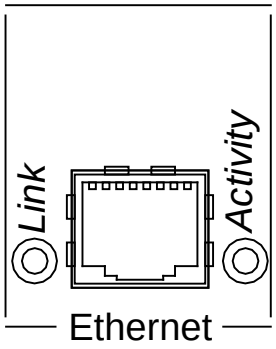
8.1.2 Audio Trunk Network Connection Distances

Copper audio trunk networks employ the E1 standard with 22 gauge unshielded twisted pair telecommunications data cable with a characteristic impedance of 120 ohms. The maximum segment distance is 8,200 feet (2,500 meters).

Fiber optic audio trunk networks use a 62.5/125 micron multimode fiber optic cable employing an 820 nanometer wavelength signal. The DCC fiber optic Digital Audio Trunk uses ST type fiber connectors. The maximum distance for fiber optic cable is determined by a power budget of 10 dB. Each connector typically results in a 0.3 dB loss, while a 62.5/125 micron multimode fiber cable has a loss of 5.15 dB/mile (3.2 dB/Km). If there is only one pair of connectors, then a maximum distance between two DCC's could be up to 9,170 feet (2900 m). Extra margin should be allowed for field grade connections.

8.1.3 Inter-Exchange Network

All the DCCs in a DXL system are connected by means of an Inter-Exchange Network (Ethernet). The network can be used at 10baseT or 100baseT speed. The Ethernet port connection on a DCC is made via EIA/TIA568B (Ethernet standard) 8-pin RJ-45 connector.



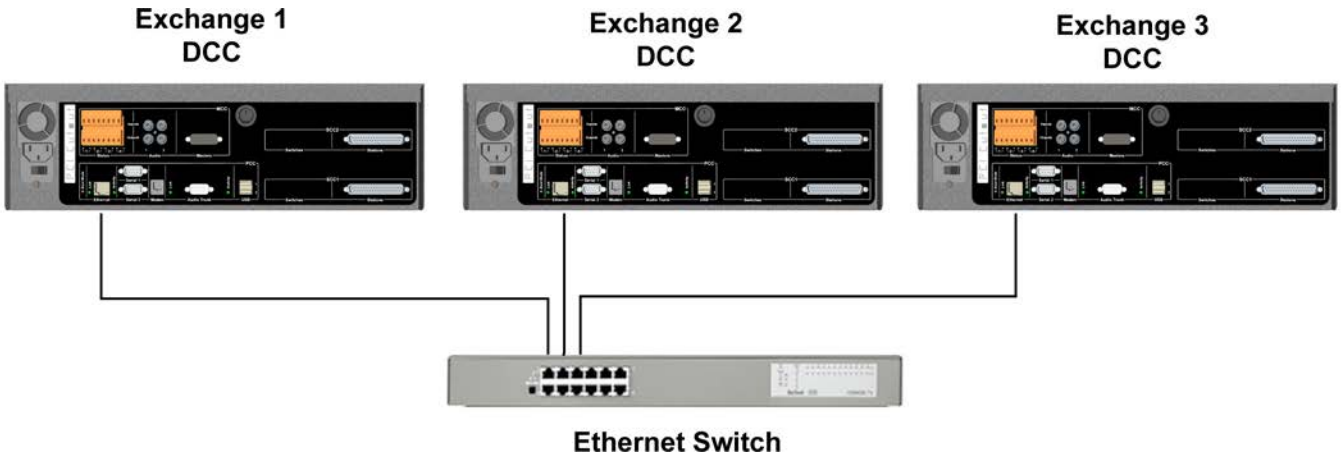
Ethernet RJ-45 Connector

The pin assignments for this connector and the wire colors for the T568A standard are as follows:

RJ45 Pin	Function	Wire Color
1	Tx +	White/Green
2	Tx -	Green
3	Rx +	White/Orange
4	N/C	Blue
5	N/C	White/Blue
6	Rx -	Orange
7	N/C	White/Brown
8	N/C	Brown

Ethernet RJ-45 Pin Allocations

A typical Ethernet network for a system with 3 DCCs is shown below:



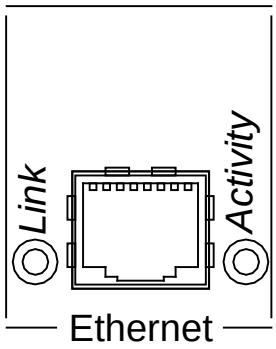
Inter-Exchange Network (Ethernet)

8.2 System with VoIP Capability

A DXL system that uses VoIP keyboard/display master stations requires an Inter-Exchange Network (Ethernet) that connects all DCCs and VoIP display master stations.

8.2.1 Inter-Exchange Network (Ethernet)

All the DCCs, VoIP keyboard/display master stations and VoIP stations in a DXL system are connected by means of an Inter-Exchange Network (Ethernet). The network can be used at 10baseT or 100baseT speed. The Ethernet port connection on a DCC is made via EIA/TIA568B (Ethernet standard) 8-pin RJ-45 connector.



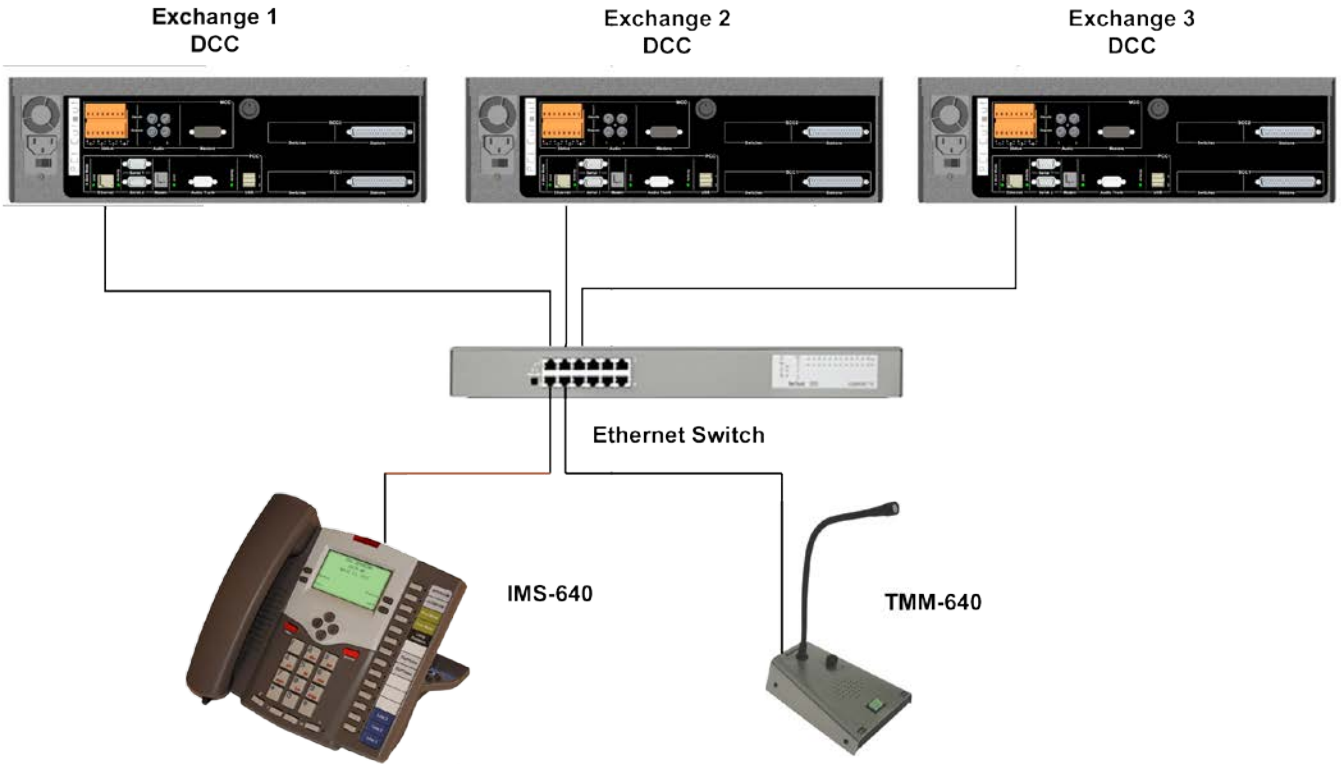
Ethernet RJ-45 Connector

The pin assignments for this connector and the wire colors for the T568A standard are as follows:

RJ45 Pin	Function	Wire Color
1	Tx +	White/Green
2	Tx -	Green
3	Rx +	White/Orange
4	N/C	Blue
5	N/C	White/Blue
6	Rx -	Orange
7	N/C	White/Brown
8	N/C	Brown

Ethernet RJ-45 Pin Allocations

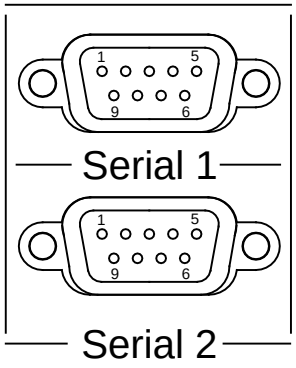
A typical Ethernet network for a system with 3 DCCs is shown below:



Inter- Exchange Network (Ethernet)

9. Serial Port Connections to the DCC

Each DCC includes two asynchronous serial ports that use DB-9 male connectors.



9-pin Serial Port Connectors

Serial Port 1 provides both limited RS-232 (without handshaking) and RS-422 interfaces on the same DB-9 connector. The pin allocations for the Serial Port 1 DB-9 connector are as follows:

Pin Number	Function
1	N/C
2	Receive Data (Rx)
3	Transmit Data (Tx)
4	TX + (RS-422)
5	Gnd
6	N/C
7	Tx – (RS-422)
8	Rx + (RS-422)
9	Rx – (RS-422)

Pin Allocations for Serial Port 1

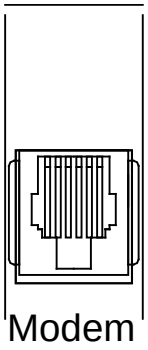
Serial Port 2 provides full RS-232. When the modem is operational, Serial Port 2 is disabled.

Pin Number	Function
1	Data Carrier Detect (DCD)
2	Receive Data (Rx)
3	Transmit Data (Tx)
4	Data Terminal Ready (DTR)
5	Gnd
6	Data Set Ready (DSR)
7	Request to send (RTS)
8	Clear to Send (CTS)
9	Ring Indicator (RI)

Pin Allocations for Serial Port 2

10. Modem Port Connections to the DCC

If the 56K modem is included the modem connection is made via a standard RJ-11 telephone jack.



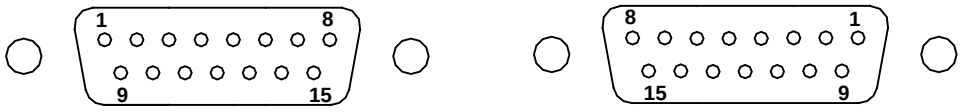
RJ-11 Modem Connector

11. Master Stations

Each DCC and DCE supports two master station audio interfaces by means of a Master Control Board (MCC-400). The two master audio interfaces can be built to interface three possible master station configurations,

- two Intercom Master Stations (IMS),
- two Telephone Set Masters (TSM),
- or one IMS and one TSM.

Audio connections to the master stations are via a CBL-MST-A cable to a female DB-15 connector located on the rear of the DCC or DCE.



Male DB-15 Connector Female DB-15 Connector

DB-15 Connector Pin Outs

11.1 Field Connections from DCC or DCE to IMS Master Station

The MCC cable (CBL-MST-A) provides a male DB-15 connector with screw locks on one end and open wires on the other end to be punched down onto terminal blocks. The DB-15 pins and cable wire colors are given in the following table. The signal pairs labeled Master 1 Mic and Master 1 Spk are used for connecting to an IMS master, while the pair Master 1 Tip and Master 1 Ring is used to connect to a TSM master. Depending on the MCC configuration one or the other of these two sets of connections can be used. The same holds for the signals labeled Master 2. If the unit has been ordered for one IMS master and one TSM master the IMS master is connected to the signals labeled Master 1 and the TSM master is connected to the signals labeled Master 2.

Note: when connecting an IMS master the Spk and Mic connections are polarity sensitive.

DB-15	Signal	CBL-MST Wire Color	Terminal Block Pin Number
1	Master 1 Mic+	Red	
9	Master 1 Mic-	Black	
2	Gnd	Red/BlackShield & White/Black Shield	
10	Master 1 Tip	White	
3	Master 1 Ring	Black	
11	Master 1 Spk+	Green	
4	Master 1 Spk -	Black	
12	Gnd	Green/Black Shield & Blue/Black Shield	
5	Master 2 Spk-	Black	
13	Master 2 Spk+	Blue	
6	Master 2 Ring	Black	
14	Master 2 Tip	Yellow	
7	Gnd	Yellow/Black Shield & Brown/Black Shield	
15	Master 2 Mic-	Black	
8	Master 2 Mic+	Brown	

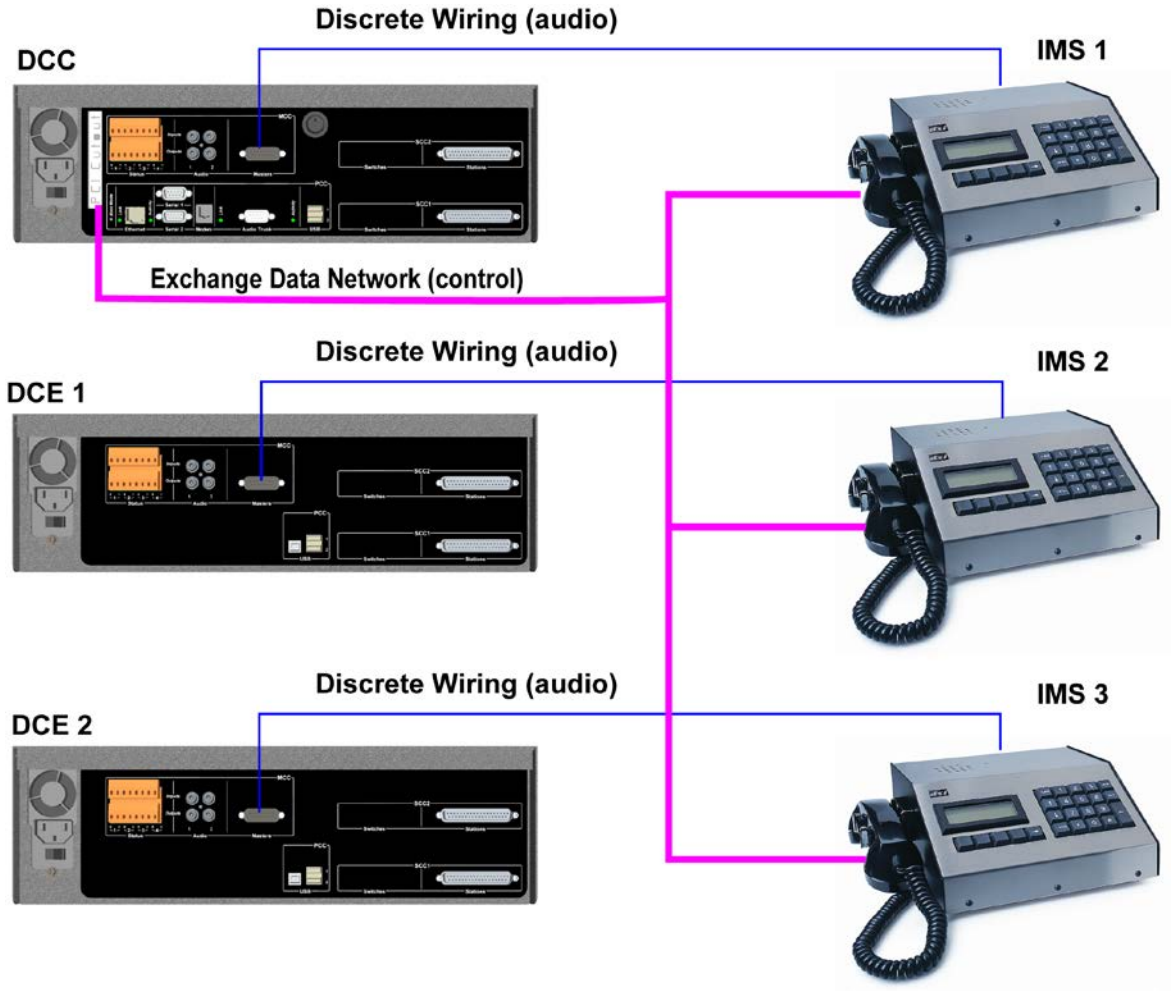
Pin Numbers and Wire Color for CBL-MST-A cable

11.2 Exchange Data Network

All intercom master stations with display in an Exchange require an Exchange Data Network connection from the DCC to each master station connected to that exchange. The Exchange Data Network uses the LonWorks 78KHz Free Topology configuration for transmitting control signals between the DCC and peripheral devices that contain a Neuron (such as the IMS Master Stations). The DCC requires a PCI LonWorks card, which has a depluggable terminal connector.

Information on the type of twisted pair cables, distances and other design considerations for a LonWorks network can be found at the Echelon web site (www.echelon.com). In particular the document Part Number 005-023-01 gives design information on various cables and distances. If distances need to be extended, FTR-120 Free Topology Repeaters can be used. Details on installation procedures are given in the Installation Instructions document IM-FTR-120.

The LonWorks connections for an exchange are shown below where the 3 master stations are each connected to a different DCC or DCE.



Exchange Data Network Connecting DCC-400 to IMS Master Stations

12. Station Interface

The DCC (or DCE) has two 37 pin female connectors; each connector has 16 audio ports (2 pins per port) that are used for half-duplex communications between a station and a master station, or adjacent ports can be used to provide up to eight full-duplex audio channels. If the DCC (or DCE) is supplied with SCC-400 or SCC-401 cards contact closures for up to two supervised switches can be multiplexed onto the audio pair. The 400 or 401 series intercom stations have their audio and signaling functions transmitted over a single shielded, twisted pair cable. Each intercom station must have its own channel; a channel for an intercom station requires one audio port.

If the DCC (or DCE) is supplied with SCC-300 cards, then a second pair of DB-25 female connectors is used to provide switch closure information to the DCC (or DCE). Each audio channel has an associated switch port. With supervised switches up to two switches can be multiplexed over the single pair of unshielded wires.

System planners should be aware that audio signal levels transmitted from the intercom station to the SCC-300 in microphone mode are in the millivolt range, while audio signals levels transmitted from the SCC-300 to the intercom station in loudspeaker mode are in the volts range. Due to the large difference in signal levels, cross-talk can occur in cable runs where microphone signals are transmitted at the same time as loudspeaker signals. System planners should take into account the possible interaction of signals and follow standard practices for separating signals of different levels. The 400 series intercom stations are much less susceptible to cross talk interference as they incorporate amplifiers that bring microphone signals levels up to the range of loudspeaker signal levels for cross-talk immunity.

12.1 Audio Field Interface Cable

The SCC-300, SCC-400 and SCC-401 use a female DB-37 connector to interface to the external audio lines. A CBL-STN-A cable with a male DB-37 connector is used to interface the audio ports to terminal blocks and in turn to the field wiring. The cable incorporates 16 individual shielded pairs.

Male DB-37 Connector

Female DB-37 Connector

DB-37 Connector Pin Outs

The following table for a generic terminal block gives the pin numbers, wire colors, and a suggested terminal block position for each of the station control card signals when a CBL-STN-A audio cable is used.

The field wiring from the terminal block to the intercom station is shielded, twisted pair cable. The shields should be connected to the terminal block (every third position). The shielded wire is left unconnected at the station end.

Wiring Table for Generic Terminal Block

DB37 Pin Number	Signal	CBL-STN Wire Color	Terminal Block Pin Number
1	Audio 1 +	Black	1
20	Audio 1 -	Red	2
5	Shield 1	Shield	3
2	Audio 2 +	Black	4
21	Audio 2 -	White	5
5	Shield 2	Shield	6
3	Audio 3 +	Black	7
22	Audio 3 -	Green	8
5	Shield 3	Shield	9
4	Audio 4 +	Black	10
23	Audio 4 -	Blue	11
5	Shield 4	Shield	12
6	Audio 5 +	Black	13
25	Audio 5 -	Yellow	14
24	Shield 5	Shield	15
7	Audio 6 +	Black	16
26	Audio 6 -	Brown	17
24	Shield 6	Shield	18
8	Audio 7 +	Black	19
27	Audio 7 -	Orange	20
24	Shield 7	Shield	21
9	Audio 8 +	Red	22
28	Audio 8 -	White	23
24	Shield 8	Shield	24
10	Audio 9 +	Red	25
29	Audio 9 -	Green	26
14	Shield 9	Shield	27
11	Audio 10 +	Red	28
30	Audio 10 -	Blue	29
14	Shield 10	Shield	30
12	Audio 11 +	Red	31
31	Audio 11 -	Yellow	32
14	Shield 11	Shield	33
13	Audio 12 +	Red	34
32	Audio 12 -	Brown	35
14	Shield 12	Shield	36
15	Audio 13 +	Red	37
34	Audio 13 -	Orange	38
33	Shield 13	Shield	39
16	Audio 14 +	Green	40
35	Audio 14 -	White	41
33	Shield 14	Shield	42
17	Audio 15 +	Green	43
36	Audio 15 -	Blue	44
33	Shield 15	Shield	45
18	Audio 16 +	Green	46
37	Audio 16 -	Yellow	47
33	Shield 16	Shield	48

* All wiring is polarity sensitive. Pin 19 is not connected.

12.2 SCC-300 Field Interface Cables for Switches

The SCC-300 Station Control Card is used to connect generic intercom stations to the MicroComm DXL system. Generic intercom stations are stations with a speaker, 25-volt line matching transformer, and a call switch. Each channel has an audio port and a switch input port. Intercom stations have their audio connected by a single shielded twisted pair and their switch inputs, such as call request, over a second pair of unshielded wires.

The SCC-300 requires two cables, a CBL-STN-A cable to interface the audio lines to the terminal blocks and a CBL-SWT-A cable to interface the switch inputs to the terminal blocks.

12.2.1 Switch Connections

A CBL-SWT-A cable is used to connect the switches to the female DB-25 connector. The following table gives a suggested connection scheme showing pin numbers, wire colors, and terminal block positions for the station switches. The scheme shown does not make efficient use of terminal block terminals but is made to have switch port positions correspond to the audio port positions. Note that all the 'Switch – 'terminals are connected to a common digital signal ground.

Male DB-25 Connector Female DB-25 Connector

DB-25 Connector Pin Outs

Switch Wiring Table for SCC-300 to Generic Terminal Block

DB-25 Pin Number	Signal	CBL-SWT Wire Color	Terminal Block Pin Number
1	Switch 1 +	Red	1
2	Switch 1 -	Black	2
14	Switch 2 +	White	4
2	Switch 2 -	Black	5
15	Switch 3 +	Green	7
16	Switch 3 -	Black	8
3	Switch 4 +	Blue	10
16	Switch 4 -	Black	11
4	Switch 5 +	Yellow	13
5	Switch 5 -	Black	14
17	Switch 6 +	Brown	16
5	Switch 6 -	Black	17
18	Switch 7 +	Orange	19
19	Switch 7 -	Black	20
6	Switch 8 +	White	22
19	Switch 8 -	Red	23
7	Switch 9 +	Green	25
8	Switch 9 -	Red	26
20	Switch 10 +	Blue	28
8	Switch 10 -	Red	29
21	Switch 11 +	Yellow	31
22	Switch 11 -	Red	32
9	Switch 12 +	Brown	34
22	Switch 12 - -	Red	35
10	Switch 13 +	Orange	37
11	Switch 13 -	Red	38
23	Switch 14 +	White	40
11	Switch 14 -	Green	41
24	Switch 15 +	Blue	43
25	Switch 15 -	Green	44
12	Switch 16 +	Yellow	46
13	Switch 16-	Green	47

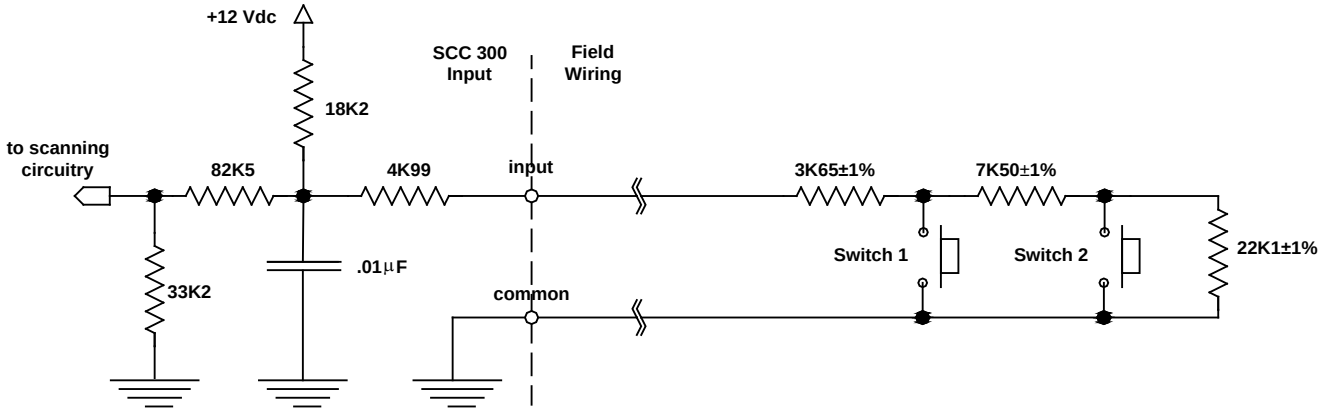
*All Switch – signals are connected to Digital Signal Gnd.

12.2.1.1 Supervised switches

Using a resistor network the SCC-300 is capable of reading the switch closures for one or two switches per input, as well as identifying open or short circuit faults. The following sections give terminating networks for both supervised and unsupervised switches.

12.2.1.2 Supervised 2 Switch Network

The switches may have terminating resistors, which allows the DXL system to detect which one of the two switches is closed, as well it allows the system to monitor for either open or shorted faults. The following schematic shows the necessary switch wiring.



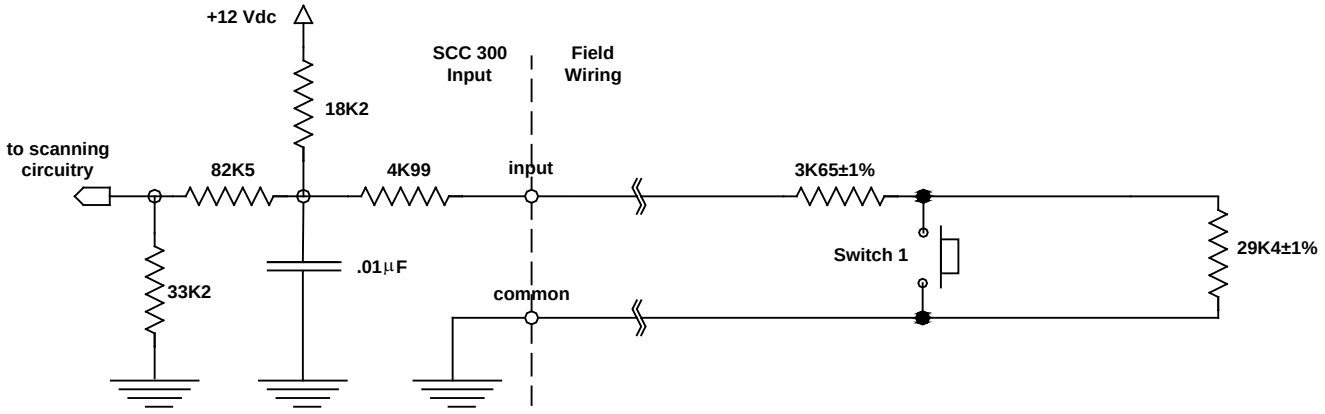
Supervised 2 Switches

Each input can be in one of five states. The voltage at the SCC 300 input terminals determines the states. The actual voltage measured will be slightly different than those given in the table due to component tolerances and the resistance of the field wiring.

Input State	Wiring	Switch 1	Switch 2	Voltage
Open Fault	Open Circuit	N/A	N/A	10.4
Idle	Normal	Not Pushed	Not Pushed	6.4
Switch 2 Pressed	Normal	Not Pushed	Pushed	3.6
Switch 1 Pressed	Normal	Pushed	N/A	1.6
Short Fault	Short Circuit	N/A	N/A	0

12.2.1.3 Supervised 1 Switch Network

A single switch with a terminating resistor network can be used to detect switch closure, as well as monitor open and short faults. Either Switch 1 or Switch 2 can be used with the appropriate terminating resistors.

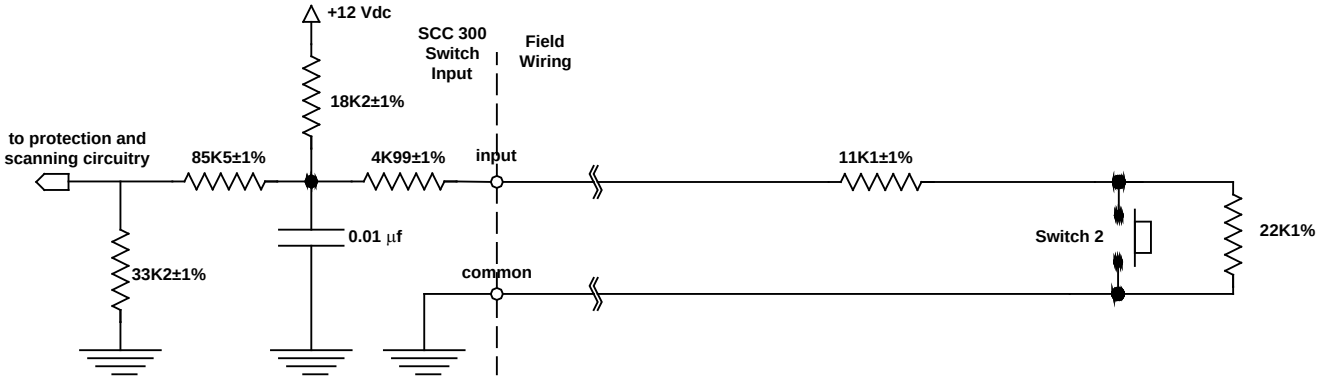


Supervised Single Switch (Switch 1)

With one switch the input can be in one of four states. The states can be determined by the voltage at the input terminals of the SCC 300.

Input State	Wiring	Switch 1	Voltage
Open Fault	Open Circuit	N/A	10.4
Idle	Normal	Not Pushed	6.4
Switch 1 Pressed	Normal	Pushed	1.6
Short Fault	Short Circuit	N/A	0

If Switch 2 is used again the input can be in one of four states. The voltage at the SCC 300 input terminals identifies the state.

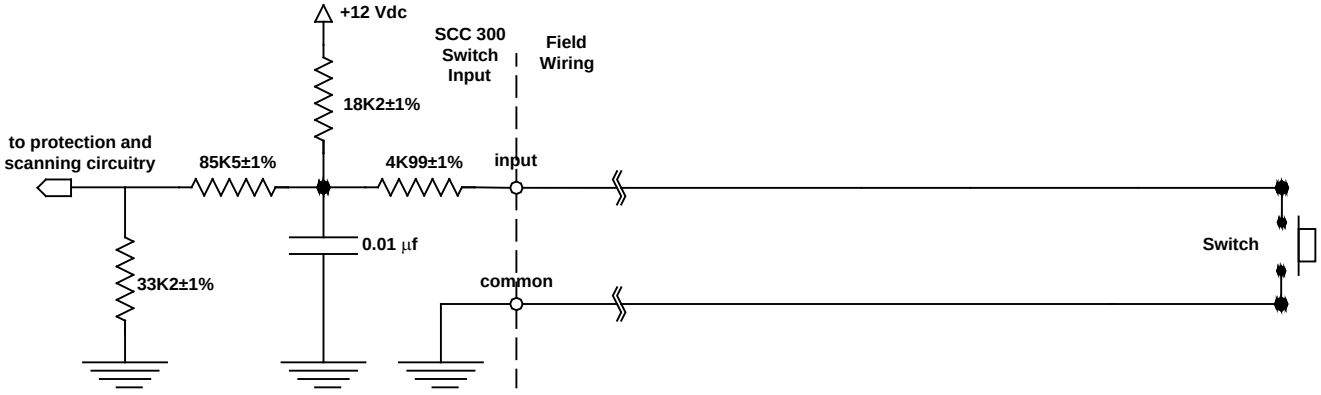


Supervised Single Switch (Switch 2)

Input State	Wiring	Switch 2	Voltage
Open Fault	Open Circuit	N/A	10.4
Idle	Normal	Not Pushed	6.4
Switch 2 Pressed	Normal	Pushed	3.6
Short Fault	Short Circuit	N/A	0

12.2.1.4 Non-Supervised Single Switch

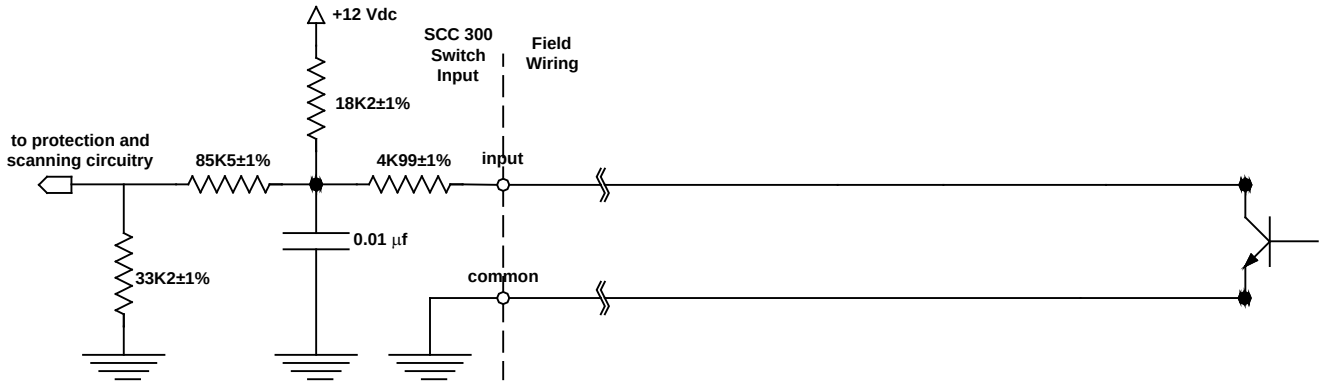
The following switch configuration allows the system to detect a single switch contact closure.



Non-Supervised Single Switch

12.2.1.5 Solid State Switch

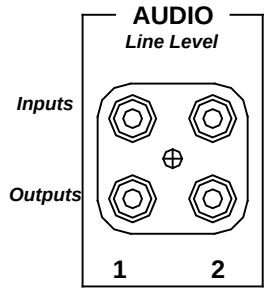
The following schematic shows the connection for an open collector non-supervised switch. The open collector must be capable of sinking 0.6 mA.



Solid State Switch

13. Audio Input and Audio Output Jacks

Both the DCC and DCE (with Master Control Card) provide for two line level audio inputs and two line level audio outputs. The audio inputs can accept program distribution material, or an amplified microphone signal for a paging source. The audio outputs provide line level outputs to drive external paging amplifiers, call recorders, etc. These audio ports use standard RCA phono jacks. The audio inputs connect to the white phono jacks while the outputs are taken from the red phono jacks.



Audio Input and Output Jacks

14. Status Inputs

Both the DCC and DCE (with Master Control Card) have an 8-position depluggable screw terminal block that allows for 4 switch inputs. External supervised wiring permits up to two switches per input port, and provides 'Switch 1' and 'Switch 2' detection. Termination designation on the terminal block is as follows:

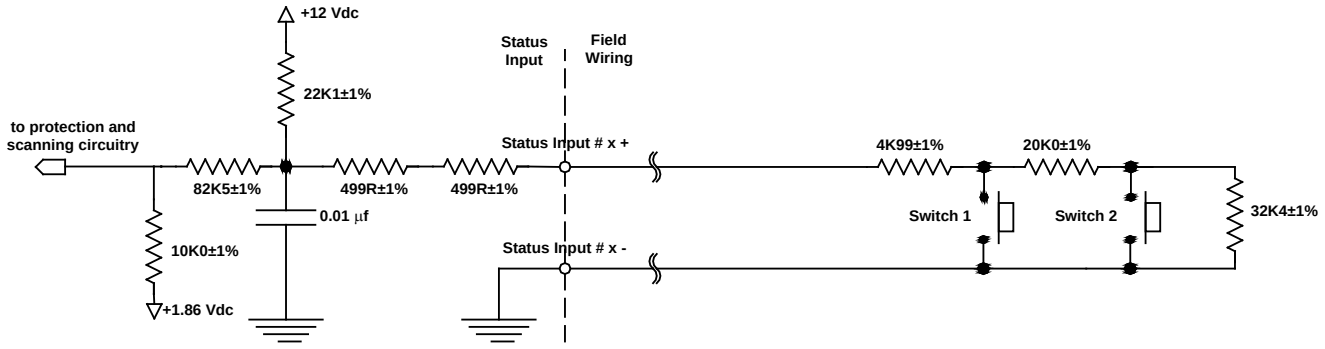
TB Position	Signal
1	Status Input #1 +
2	Status Input #1 -
3	Status Input #2 +
4	Status Input #2 -
5	Status Input #3 +
6	Status Input #3 -
7	Status Input #4 +
8	Status Input #4 -

14.1 Switch Connections

Using a resistor network up to two switch closures can be detected by the DXL. The switches can be supervised and detect open and short circuit wiring faults

14.1.1.1 Supervised 2 Switches Network

The switches may have terminating resistors, which allows the DXL system to detect which one of the two switches is closed, as well it allows the system to monitor for either open or shorted faults. The following schematic shows the necessary switch wiring.



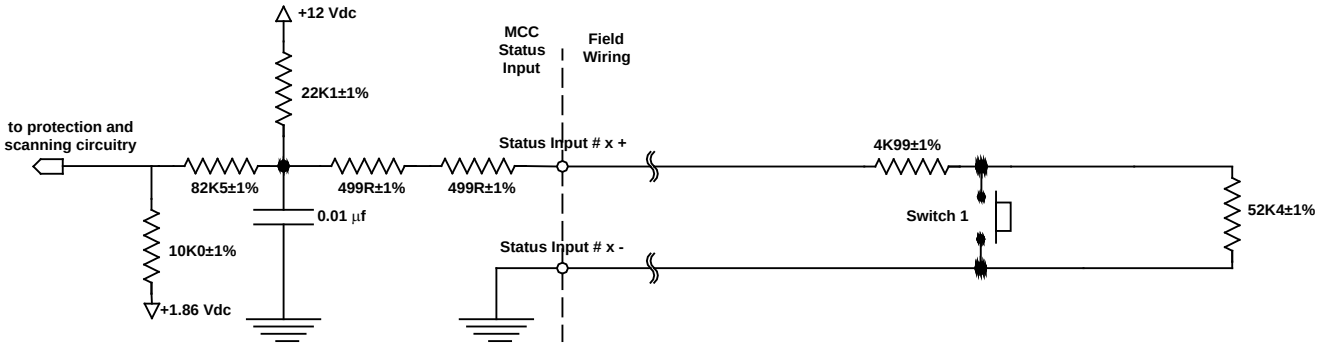
Supervised 2 Switches

Each Output can be in one of five states. The voltage at the MCC input terminals determines the states. The actual voltage measured will be slightly different than those given in the table due to component tolerances and the resistance of the field wiring.

Output State	Wiring	Switch 1	Switch 2	Voltage
Open Fault	Open Circuit	N/A	N/A	10.0
Idle	Normal	Not Pushed	Not Pushed	7.6
Switch 2 Pressed	Normal	Not Pushed	Pushed	5.7
Switch 1 Pressed	Normal	Pushed	N/A	2.1
Short Fault	Short Circuit	N/A	N/A	0

14.1.1.2 Supervised 1 Switch Network

A single switch, with a terminating resistor network can be used to detect switch closure, as well as monitor open and short faults. Either Switch 1 or Switch 2 can be used with the appropriate terminating resistors.

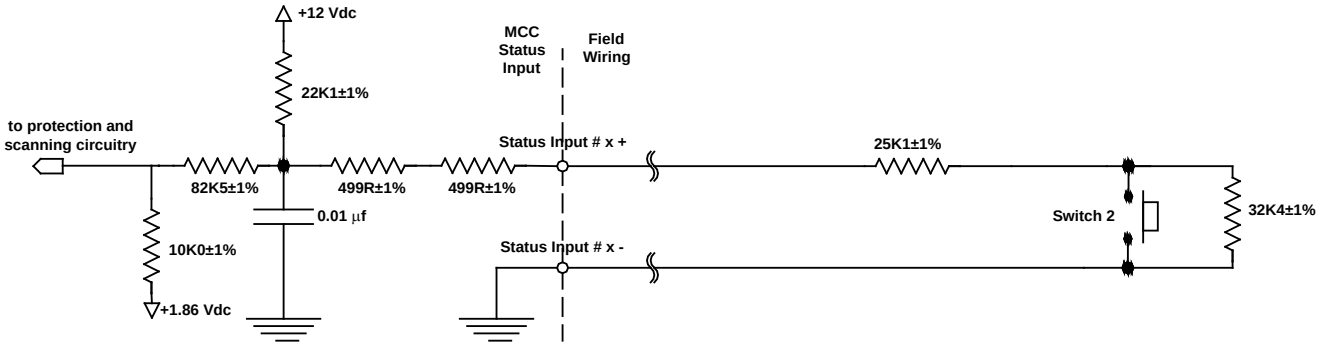


Supervised Single Switch (Switch 1)

Each Output can be in one of four states. The voltage at the MCC-400 input terminal determines the states. The actual voltages will vary slightly due to component tolerances and the resistance of the wiring to the switch.

Output State	Wiring	Switch 1	Voltage
Open Fault	Open Circuit	N/A	10.0
Idle	Normal	Not Pushed	7.6
Switch 1 Pressed	Normal	Pushed	2.1
Short Fault	Short Circuit	N/A	0

If Switch 2 is used again the Output can be in one of four states. The voltage at the MCC input terminals determines the state. (The actual voltages will vary slightly due to component tolerances and the resistance of the wiring to the switch).

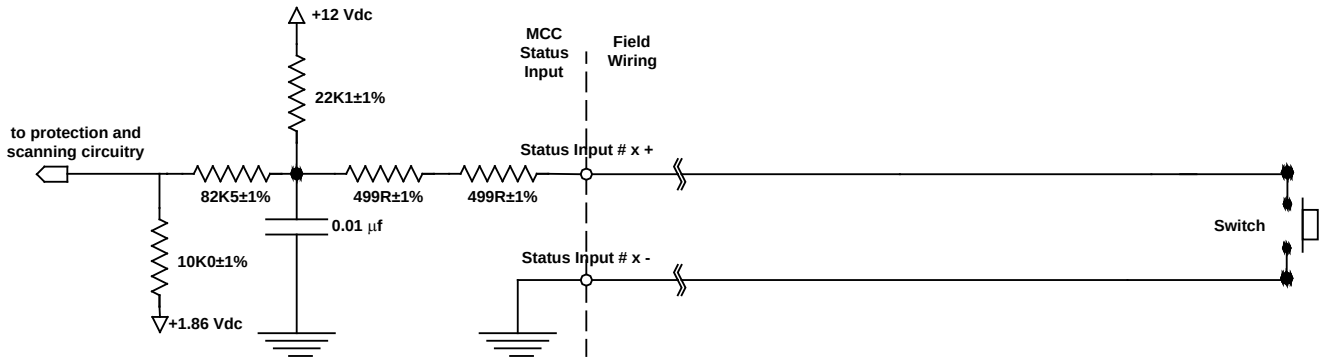


Supervised Single Switch (Switch 2)

Output State	Wiring	Switch 2	Voltage
Open Fault	Open Circuit	N/A	10.0
Idle	Normal	Not Pushed	7.6
Switch B Pressed	Normal	Pushed	5.7
Short Fault	Short Circuit	N/A	0

14.1.1.3 Non-Supervised Switch

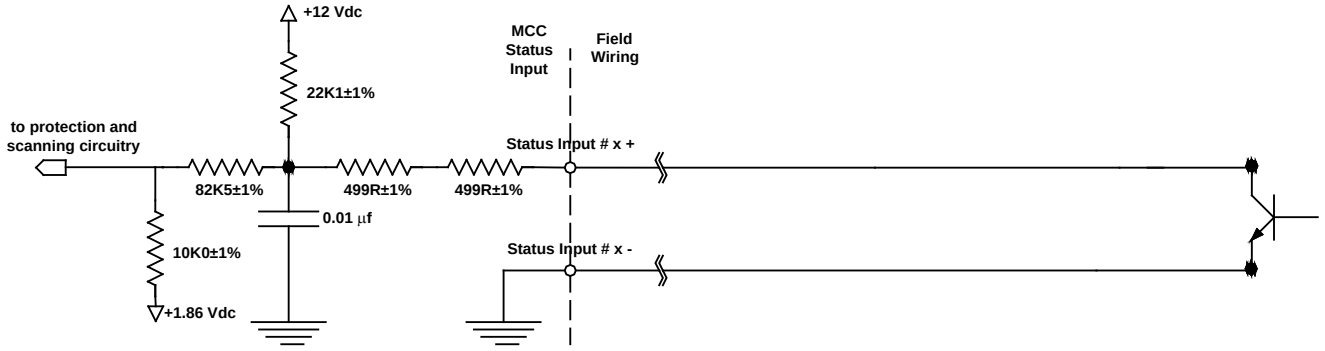
The following switch configuration allows the system to detect a single non-supervised switch contact closure.



Non-Supervised 1 Switch Output

14.1.1.4 Non-Supervised Solid State Switch

The following schematic shows the connection for an open collector non-supervised switch. The open collector must be capable of sinking 0.6 mA.



Solid State Switch Output

15. Status Outputs

Both the DCC and DCE (with Master Control Card) have an 8-position depluggable screw terminal block that allows for 4 status outputs. The outputs are a normally open contact pair that closes when the status output is activated. Pin wiring for the terminal block is as follows:

TB Position	Signal
1	Status Output #1 +
2	Status Output #1 -
3	Status Output #2 +
4	Status Output #2 -
5	Status Output #3 +
6	Status Output #3 -
7	Status Output #4 +
8	Status Output #4 -

Each of the Type A contact switches has a rating of 1 Amp with a maximum voltage of 24 Vac and 30 Vdc.

16. Discrete Input/Output Modules (DIO)

Discrete I/O modules are used to monitor contact inputs and to control outputs. Each input may be used to monitor one unsupervised contact closure or up to two supervised contact closures. Electronic current sinking type switches may also be used as input actuators.

Output control options for Discrete I/O modules include current sinking, voltage source, LED driver and relay contacts. Relay contacts are form C type (common, normally open, normally closed poles for each output). All outputs on a DIO module must be the same type.

16.1 DIO Connections to the Exchange Data Network

Connecting the NET A terminals on the DIO to the Exchange Data Network connects a DIO to the DCC. The types of DIOs that can be used in a MicroComm DXL system include the rack mount DIO-110, wall mount DIO-120, and the wall mount DIO-320. (See Document IM-DIO-100 for detailed description of the installation instructions for the DIO modules)

17. Safety Instructions

Both the DCC and DCE are connected to an electrical socket outlet via a pluggable power cord. The socket-outlet shall be installed near the equipment and shall be easily accessible.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.