Cautions, warnings, and regulatory information

READ AND SAVE THESE INSTRUCTIONS Follow the instructions in this installation manual. These instructions must be followed to avoid damage to this product and associated equipment. Product operation and reliability depend upon proper installation.



DO NOT INSTALL ANY SIMPLEX™ PRODUCT THAT APPEARS DAMAGED Upon unpacking your Simplex product, inspect the contents of the carton for shipping damage. If damage is apparent, immediately file a claim with the carrier and notify an authorized Simplex product supplier.



ELECTRICAL HAZARD Disconnect electrical field power when making any internal adjustments or repairs. All repairs should be performed by a representative or an authorized agent of your local Simplex product supplier.



STATIC HAZARD Static electricity can damage components. Handle as follows:

- Ground yourself before opening or installing components.
- Prior to installation, keep components wrapped in anti-static material at all times.



EYE SAFETY HAZARD Under certain fibreoptic application conditions, the optical output of this device may exceed eye safety limits. Do not use magnification (such as a microscope or other focusing equipment) when viewing the output of this device.

FCC RULES AND REGULATIONS – PART 15. 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.

SYSTEM REACCEPTANCE TEST AFTER SOFTWARE CHANGES To ensure proper system operation, this product must be tested in accordance with NFPA72 after any programming operation or change in site-specific software. Reacceptance testing is required after any change, addition or deletion of system components, or after any modification, repair or adjustment to system hardware or wiring.

All components, circuits, system operations, or software functions known to be affected by a change must be 100% tested. In addition, to ensure that other operations are not inadvertently affected, at least 10% of initiating devices that are not directly affected by the change, up to a maximum of 50 devices, must also be tested and proper system operation verified.

NFPA 72® is a registered trademark of the National Fire Protection Association.

Introduction to the ES Net Digital Audio Controller

The 4100-1411 ES Net ES Net Digital Audio Controller Card is compatible with 4100U and 4100ES Fire Alarm Control Units (FACU).

Important: Verify FACU System Programmer, Executive, and Slave Software compatibility when installing, or replacing system components. Refer to the Technical Support Information and Downloads website for compatibility information.

The 4100-1411 ES Net Digital Audio Controller and option cards make up the audio controller subsystem of the Fire Alarm System. The controller is the head end of the audio system, and is seen by the system CPU as a single slave. Only the audio card is visible, while any option cards appear logically as memory-mapped locations on the audio controller.

The main function of the audio controller card is to control system audio inputs and to recreate stored audio messages for distribution throughout the system. Analog audio inputs to the system include local and remote microphones, and fire fighter phone communications. You can also expand analog audio inputs using the 4100-1240 Audio Input Option Card.

The ES Net DAC card provides the same functionality as the 4100-1311 Digital Audio Controller Card. In addition, inter-panel audio notification and voice messages can be carried over the ES Net network along the fire alarm data. Therefore, the complexity and installation cost of fire alarm systems that require support of audio notification or 2-way fire fighter phone communications are reduced because all communication types can be carried over a single IP based network using a single set of wires for all communications.

Note: Audio between Nodes and Miniplexes remain unchanged and still uses RS-485-based digital communication for audio distribution to Miniplexes.

Audio over the ES Net network requires that all network links be either Ethernet, Single-Mode Fiber, or Multi-mode Fiber. Audio over the ES Net network is not supported if the network contains DSL links. Additional audio controller functionality includes supervision of its inputs and distribution channels (risers), and communication with the system CPU.

Option cards are compatible with either type of Audio Controller Card as are message files and download software.

To make the 4100-1411 Digital Audio Controller Card fully backward compatible with previous digital audio systems, you can select digital audio controller mode. In this mode, the card cannot send audio messages and fire fighter phone communications to remote nodes over the ES Net network.

Table 1: Reference documents

Document number	Document
574-848	*4100ES Fire Alarm System Installation Guide*
574-849	*ES Panel Programmer's Manual*
579-160	*Audio Option Card Installation Instructions*

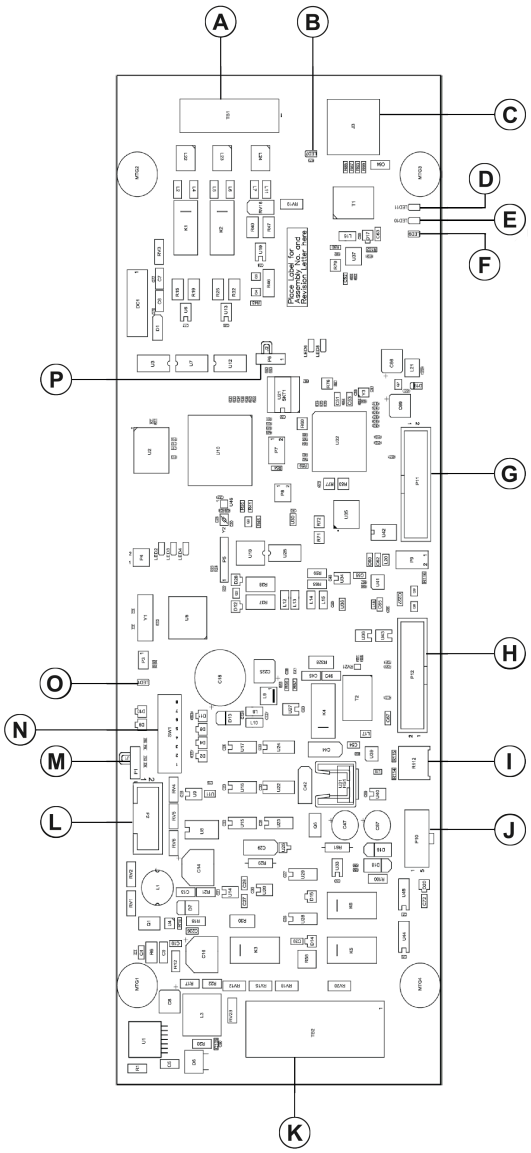
Table 1: Reference documents

Document number	Document
579-226	*Fire Fighter Phone System Installation Instructions*
579-1256	*ES Net Network Interface Card Installation Instructions*

ES Net Digital Audio Controller illustration

Figure 1 shows the ES Net Digital Audio Controller.

Figure 1: The 4100-1411 ES Net Digital Audio Controller



Callout	Description	Callout	Description
A	Digital Audio Riser terminal block (TB1)	I	Local speaker volume (R112)
B	Ethernet status LED (LED7)	J	Local speaker/mic port (P10)
C	Ethernet port (J3)	K	Remote mic terminal block (TB2)
D	DAR source (LED10)	L	Message download port (P2)
E	PDI direction (LED11)	M	Download speed selection jumper (P1)
F	Secondary enable LED (LED9)	N	Address switch (SW1)
G	Input option card port 1 (P11)	O	Comm loss LED (LED1)
H	Input option card port 2 (P12)	P	Constant supervision jumper (P6)

ES Net Audio Controller Card specifications

The ES Net Digital Audio Controller uses 24 V card power for riser amps and for microphone supervision. All card logic and low-level analog circuitry is powered by the on-board buck regulator.

The following specifications apply to the ES Net Digital Audio Controller Card:

- Minimum input voltage: 19 VDC
- Maximum input voltage: 33 VDC
- Maximum ripple: 1 VRMS at 120 Hz

Table 2: Digital current draw

Specification	At 24 VDC	Maximum over range
Current draw (quiescent of PCA, no conditions below)	125 mA	140 mA
Additional current draw factors (add to above number for total card current draw)		
Local speaker on - silence	40 mA	40 mA
Local speaker on - min volume (horn tone, 500 Hz square wave)	60 mA	60 mA
Local speaker on - half volume (horn tone, 500 Hz square wave)	160 mA	160 mA
Local speaker on - full volume (horn tone, 500 Hz square wave)	250 mA	250 mA
Local microphone enabled	10 mA	12 mA
Remote microphone enabled	20 mA	25 mA
Fire fighter phone on	0 mA	0 mA

Note:

- The equipment operates normally with ambient temperatures outside the cabinet from 32°F to 120°F (0°C to 49°C), inclusive.
- The equipment operates normally under non-condensing humidity conditions up to 93% relative humidity at 90°F (32°C).

LED functions

For ES Net Digital Audio Controller LED functions, see Table 3.

Table 3: ES Net Digital Audio Controller LEDs

LED	Name	Description
LED1	COMM_LOSS	• When ON steadily, indicates the audio controller is not communicating with the master, or is missing its slave exec code. • When OFF, indicates that the controller is communicating with the master. • When FLASHING, indicates the audio controller is downloading data from the message download port.
LED2, LED3, LED4	SLAVE DIAG 0, 1, 2	Reserved for R&D use
LED9	SECONDARY ENABLE	• When ON, indicates the DAR is in degraded mode (Class A is enabled). • When OFF, indicates the DAR is not in degraded mode (Class A is disabled).
LED7	Ethernet Port Status	• When OFF, indicates there is no connection with the ES Net NIC card. • When ON steadily, indicates there is a connection with the ES Net NIC card but no activity. • When FLASHING, indicates there is a connection with activity.
LED10	DAR source	• When ON, indicates that the DAR riser's source is the DAR that comes from the PDI. • When OFF, indicates the DAR riser's source is this audio card's DAR.
LED11	PDI direction	• When ON, indicates that this card is receiving the DAR from the PDI. • When OFF, indicates that this card is driving its DAR onto the PDI.
Note: LEDs 5, 6, and 8 not in use.		

Configuring the ES Net Audio Controller Card

Configuring the download speed

Use jumper P1 on the ES Net Digital Audio Controller to select the download speed from the FACU programmer as follows:

- Position **1-2** for download speed 56 K.
- Position **2-3** for download speed 115 K (default).

Configuring the supervision mode for communication to Miniplexes

Use jumper **P6** to set the compatibility mode as follows:

- Position **1-2** for silence supervision. Set this for backward compatibility when the card is a retrofit or replacement in systems having Digital Audio Riser Interface Cards (566-243).
- Position **2-3**: Constant Supervision (default). Set this in current systems or systems being retrofitted for constant supervision where all 566-243 Digital Audio Riser Interface Cards [DARICs] are being replaced with later versions 566-407 and 566-1000.

Setting the Address

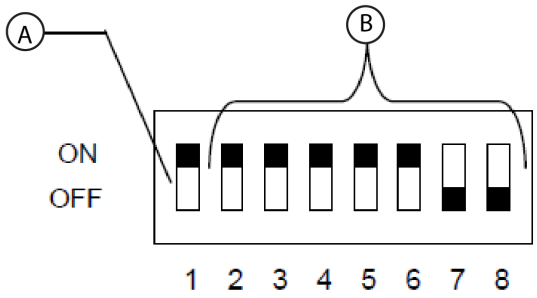
The device address is set using DIP switch **SW1**, which is a bank of eight switches. From left to right, as shown in Figure 2, these switches are designated as **SW1-1** through **SW1-8**. The function of these switches is as follows:

- **SW1-1:** This switch sets the baud rate for the internal 4100 communications line running between the card and the CPU. Set this switch to **ON**.
- **SW1-2 through SW1-8:** These switches set the card's address within the FACU. See Figure 3 for a complete list of the switch settings for all of the possible card addresses.

Note:

- You must set these switches to the value assigned to the card by the Programmer.
- The **SW1** setting applies to audio controller slaves, including audio input cards.

Figure 2: DIP Switch SW1



Callout	Description
A	4100 Comm. Baud Rate
B	DIP Switches SW1-2 through SW1-8 set the Card Address

Note: Switch (SW1-1) must be set to **ON**.

Figure 3: Card Addresses

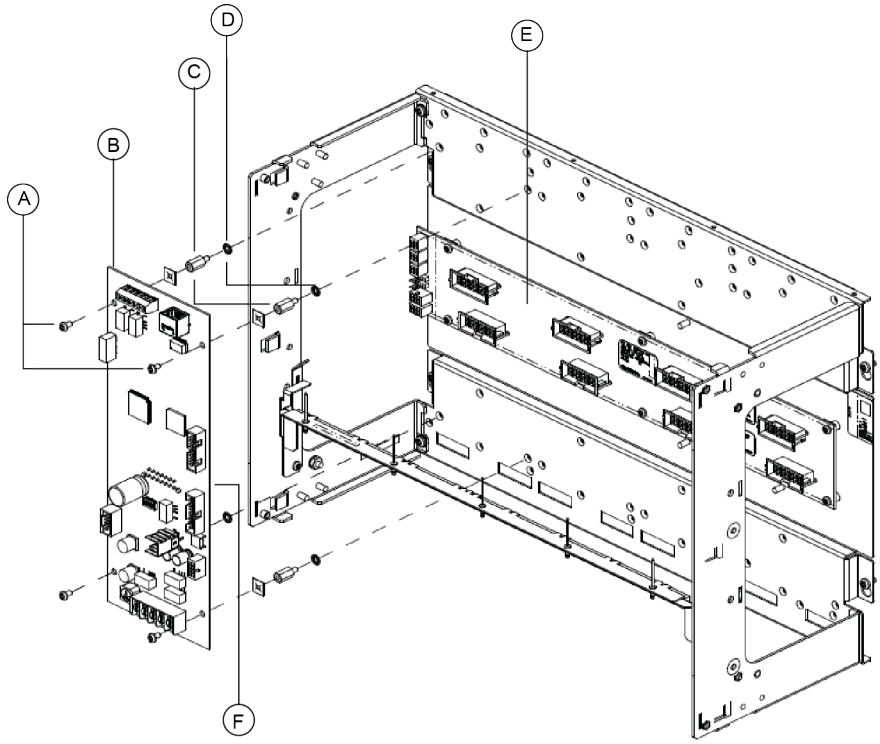
Address	SW 1-2	SW 1-3	SW 1-4	SW 1-5	SW 1-6	SW 1-7	SW 1-8	Address	SW 1-2	SW 1-3	SW 1-4	SW 1-5	SW 1-6	SW 1-7	SW 1-8
1	ON	ON	ON	ON	ON	ON	OFF	61	ON	OFF	OFF	OFF	OFF	ON	OFF
2	ON	ON	ON	ON	ON	OFF	ON	62	ON	OFF	OFF	OFF	OFF	OFF	ON
3	ON	ON	ON	ON	ON	OFF	OFF	63	ON	OFF	OFF	OFF	OFF	OFF	OFF
4	ON	ON	ON	ON	OFF	ON	ON	64	OFF	ON	ON	ON	ON	ON	ON
5	ON	ON	ON	ON	OFF	ON	OFF	65	OFF	ON	ON	ON	ON	ON	OFF
6	ON	ON	ON	ON	OFF	OFF	ON	66	OFF	ON	ON	ON	ON	OFF	ON
7	ON	ON	ON	ON	OFF	OFF	OFF	67	OFF	ON	ON	ON	ON	OFF	OFF
8	ON	ON	ON	OFF	ON	ON	ON	68	OFF	ON	ON	ON	OFF	ON	ON
9	ON	ON	ON	OFF	ON	ON	OFF	69	OFF	ON	ON	ON	OFF	ON	OFF
10	ON	ON	ON	OFF	ON	OFF	ON	70	OFF	ON	ON	ON	OFF	OFF	ON
11	ON	ON	ON	OFF	ON	OFF	OFF	71	OFF	ON	ON	ON	OFF	OFF	OFF
12	ON	ON	ON	OFF	OFF	ON	ON	72	OFF	ON	ON	OFF	ON	ON	ON
13	ON	ON	ON	OFF	OFF	ON	OFF	73	OFF	ON	ON	OFF	ON	ON	OFF
14	ON	ON	ON	OFF	OFF	OFF	ON	74	OFF	ON	ON	OFF	ON	OFF	ON
15	ON	ON	ON	OFF	OFF	OFF	OFF	75	OFF	ON	ON	OFF	ON	OFF	OFF
16	ON	ON	OFF	ON	ON	ON	ON	76	OFF	ON	ON	OFF	OFF	ON	ON
17	ON	ON	OFF	ON	ON	ON	OFF	77	OFF	ON	ON	OFF	OFF	ON	OFF
18	ON	ON	OFF	ON	ON	OFF	ON	78	OFF	ON	ON	OFF	OFF	OFF	ON
19	ON	ON	OFF	ON	ON	OFF	OFF	79	OFF	ON	ON	OFF	OFF	OFF	OFF
20	ON	ON	OFF	ON	OFF	ON	ON	80	OFF	ON	OFF	ON	ON	ON	ON
21	ON	ON	OFF	ON	OFF	ON	OFF	81	OFF	ON	OFF	ON	ON	ON	OFF
22	ON	ON	OFF	ON	OFF	OFF	ON	82	OFF	ON	OFF	ON	ON	OFF	ON
23	ON	ON	OFF	ON	OFF	OFF	OFF	83	OFF	ON	OFF	ON	ON	OFF	OFF
24	ON	ON	OFF	OFF	ON	ON	ON	84	OFF	ON	OFF	ON	OFF	ON	ON
25	ON	ON	OFF	OFF	ON	ON	OFF	85	OFF	ON	OFF	ON	OFF	ON	OFF
26	ON	ON	OFF	OFF	ON	OFF	ON	86	OFF	ON	OFF	ON	OFF	OFF	ON
27	ON	ON	OFF	OFF	ON	OFF	OFF	87	OFF	ON	OFF	ON	OFF	OFF	OFF
28	ON	ON	OFF	OFF	OFF	ON	ON	88	OFF	ON	OFF	OFF	ON	ON	ON
29	ON	ON	OFF	OFF	OFF	ON	OFF	89	OFF	ON	OFF	OFF	ON	ON	OFF
30	ON	ON	OFF	OFF	OFF	OFF	ON	90	OFF	ON	OFF	OFF	ON	OFF	ON
31	ON	ON	OFF	OFF	OFF	OFF	OFF	91	OFF	ON	OFF	OFF	ON	OFF	OFF
32	ON	OFF	ON	ON	ON	ON	ON	92	OFF	ON	OFF	OFF	OFF	ON	ON
33	ON	OFF	ON	ON	ON	ON	OFF	93	OFF	ON	OFF	OFF	OFF	ON	OFF
34	ON	OFF	ON	ON	ON	OFF	ON	94	OFF	ON	OFF	OFF	OFF	OFF	ON
35	ON	OFF	ON	ON	ON	OFF	OFF	95	OFF	ON	OFF	OFF	OFF	OFF	OFF
36	ON	OFF	ON	ON	OFF	ON	ON	96	OFF	OFF	ON	ON	ON	ON	ON
37	ON	OFF	ON	ON	OFF	ON	OFF	97	OFF	OFF	ON	ON	ON	ON	OFF
38	ON	OFF	ON	ON	OFF	OFF	ON	98	OFF	OFF	ON	ON	ON	OFF	ON
39	ON	OFF	ON	ON	OFF	OFF	OFF	99	OFF	OFF	ON	ON	ON	OFF	OFF
40	ON	OFF	ON	OFF	ON	ON	ON	100	OFF	OFF	ON	ON	OFF	ON	ON
41	ON	OFF	ON	OFF	ON	ON	OFF	101	OFF	OFF	ON	ON	OFF	ON	OFF
42	ON	OFF	ON	OFF	ON	OFF	ON	102	OFF	OFF	ON	ON	OFF	OFF	ON
43	ON	OFF	ON	OFF	ON	OFF	OFF	103	OFF	OFF	ON	ON	OFF	OFF	OFF
44	ON	OFF	ON	OFF	OFF	ON	ON	104	OFF	OFF	ON	OFF	ON	ON	ON
45	ON	OFF	ON	OFF	OFF	ON	OFF	105	OFF	OFF	ON	OFF	ON	ON	OFF
46	ON	OFF	ON	OFF	OFF	OFF	ON	106	OFF	OFF	ON	OFF	ON	OFF	ON
47	ON	OFF	ON	OFF	OFF	OFF	OFF	107	OFF	OFF	ON	OFF	ON	OFF	OFF
48	ON	OFF	OFF	ON	ON	ON	ON	108	OFF	OFF	ON	OFF	OFF	ON	ON
49	ON	OFF	OFF	ON	ON	ON	OFF	109	OFF	OFF	ON	OFF	OFF	ON	OFF
50	ON	OFF	OFF	ON	ON	OFF	ON	110	OFF	OFF	ON	OFF	OFF	OFF	ON
51	ON	OFF	OFF	ON	ON	OFF	OFF	111	OFF	OFF	ON	OFF	OFF	OFF	OFF
52	ON	OFF	OFF	ON	OFF	ON	ON	112	OFF	OFF	OFF	ON	ON	ON	ON
53	ON	OFF	OFF	ON	OFF	ON	OFF	113	OFF	OFF	OFF	ON	ON	ON	OFF
54	ON	OFF	OFF	ON	OFF	OFF	ON	114	OFF	OFF	OFF	ON	ON	OFF	ON
55	ON	OFF	OFF	ON	OFF	OFF	OFF	115	OFF	OFF	OFF	ON	ON	OFF	OFF
56	ON	OFF	OFF	OFF	ON	ON	ON	116	OFF	OFF	OFF	ON	OFF	ON	ON
57	ON	OFF	OFF	OFF	ON	ON	OFF	117	OFF	OFF	OFF	ON	OFF	ON	OFF
58	ON	OFF	OFF	OFF	ON	OFF	ON	118	OFF	OFF	OFF	ON	OFF	OFF	ON
59	ON	OFF	OFF	OFF	ON	OFF	OFF	119	OFF	OFF	OFF	ON	OFF	OFF	OFF
60	ON	OFF	OFF	OFF	OFF	ON	ON								

Installing the Audio Controller onto the power distribution interface (PDI)

The audio controller assembly is designed to be mounted on the power distribution interface (PDI) in an FACU expansion bay. The card should be mounted onto the leftmost side of the PDI.

Use the connector on the back side of the audio controller card to connect to the left side of the bay as shown in Figure 4.

Figure 4: Mounting onto the PDI

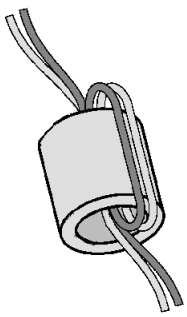


Callout	Description
A	#6 screws
B	Controller card
C	Standoffs
D	Washers
E	PDI
F	PDI connector on the reverse side

Audio controller field wiring

Use supplied ferrite beads with ES Net Digital Audio Controllers. Loop wires once through the supplied ferrite beads as shown in Figure 5. Add ferrite beads on all field wiring cables: primary and secondary DAR, the remote microphone white and green wires, and the remote microphone PTT and return wires.

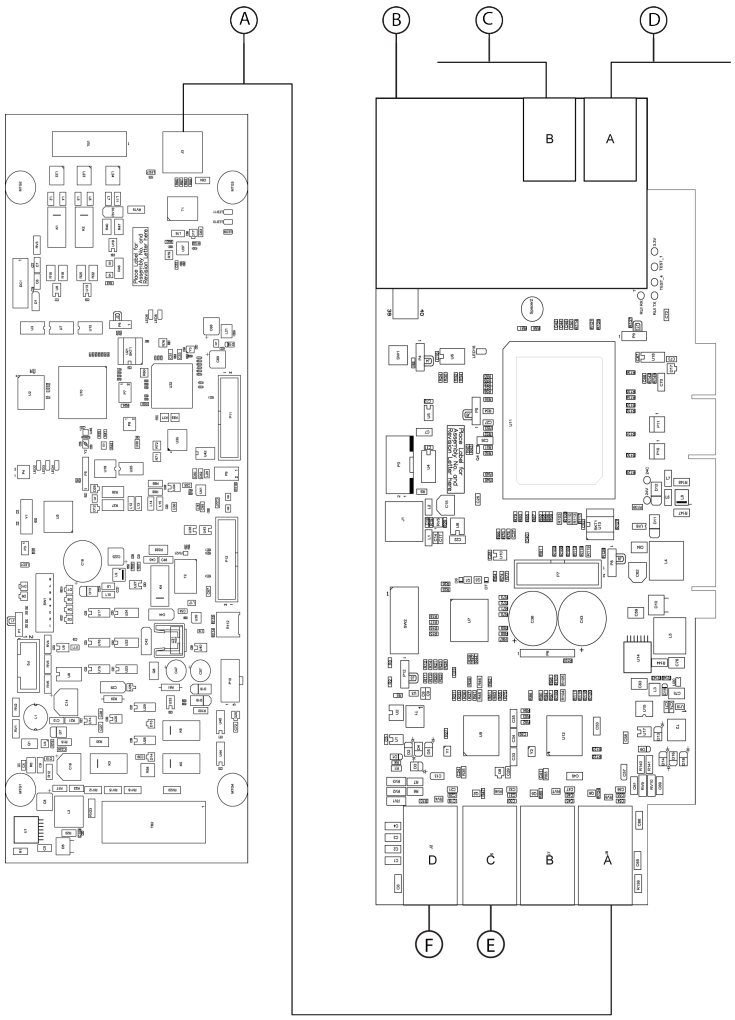
Figure 5: Loop wires as shown



ES Net NIC interconnections

Note: When you set the card to digital audio controller mode, the Ethernet port is unused and must remain unconnected.

Figure 6: ES Net NIC interconnections



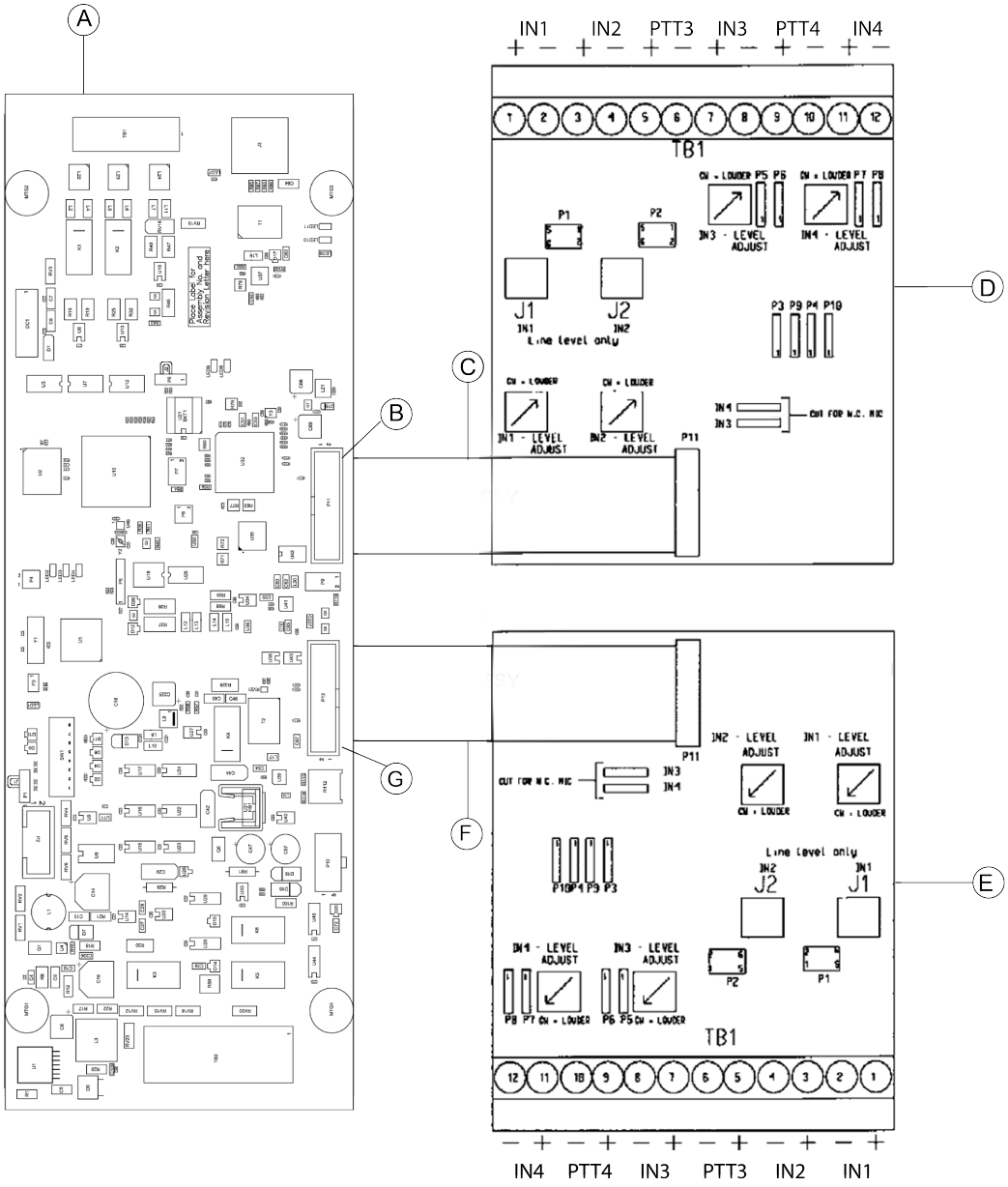
Callout	Description
A	Ethernet cable
B	Ethernet or Fiber media card
C	ES Net Network
D	ES Net Network
E	To Master CPU
F	To Service Port

Note:

- Figure 6 shows a typical connection of the ES Net DAC to the ES Net NIC card.
- The ES Net DAC Ethernet port should connect to the NIC on either on-board Ethernet ports A or B using the provided two-foot cable. For the connection of the NIC to the ES Net network, use an Ethernet Media Card (4100-6306), Single-Mode Fiber Media Card (4100-6308) or a Multi-Mode Fiber Media card (4100-6309).
- The ES Net NIC Ethernet port to which the ES Net DAC card connects must be configured as an audio port in the ES Programmer. Refer to *574-849* for configuration information.

Audio Input Card interconnections

Figure 7: Audio Input Card interconnections

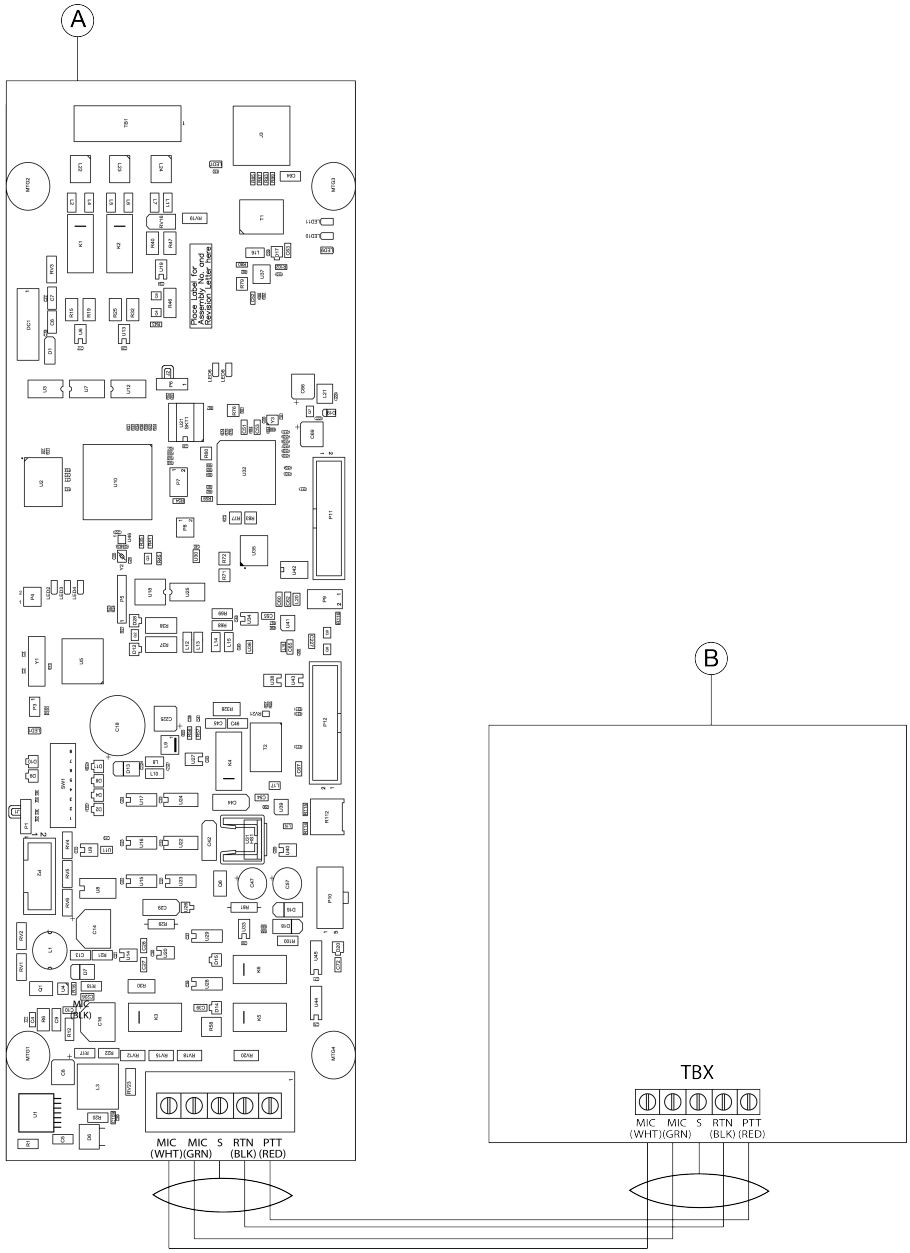


Callout	Description
A	4100-1411 ES Net Digital Audio Controller Card
B	Input option 1 (P11)
C	734-048 Harness assy
D	637-063 Audio Input Option card, optional
E	637-063 Audio Input Option card, optional
F	734-048 Harness assy
G	Input option 2 (P12)

Note: Refer to the *Fire Alarm System Audio Input Card Installation Instructions 579-160* for information on the audio input card.

Remote mic interconnections

Figure 8: Remote mic interconnections



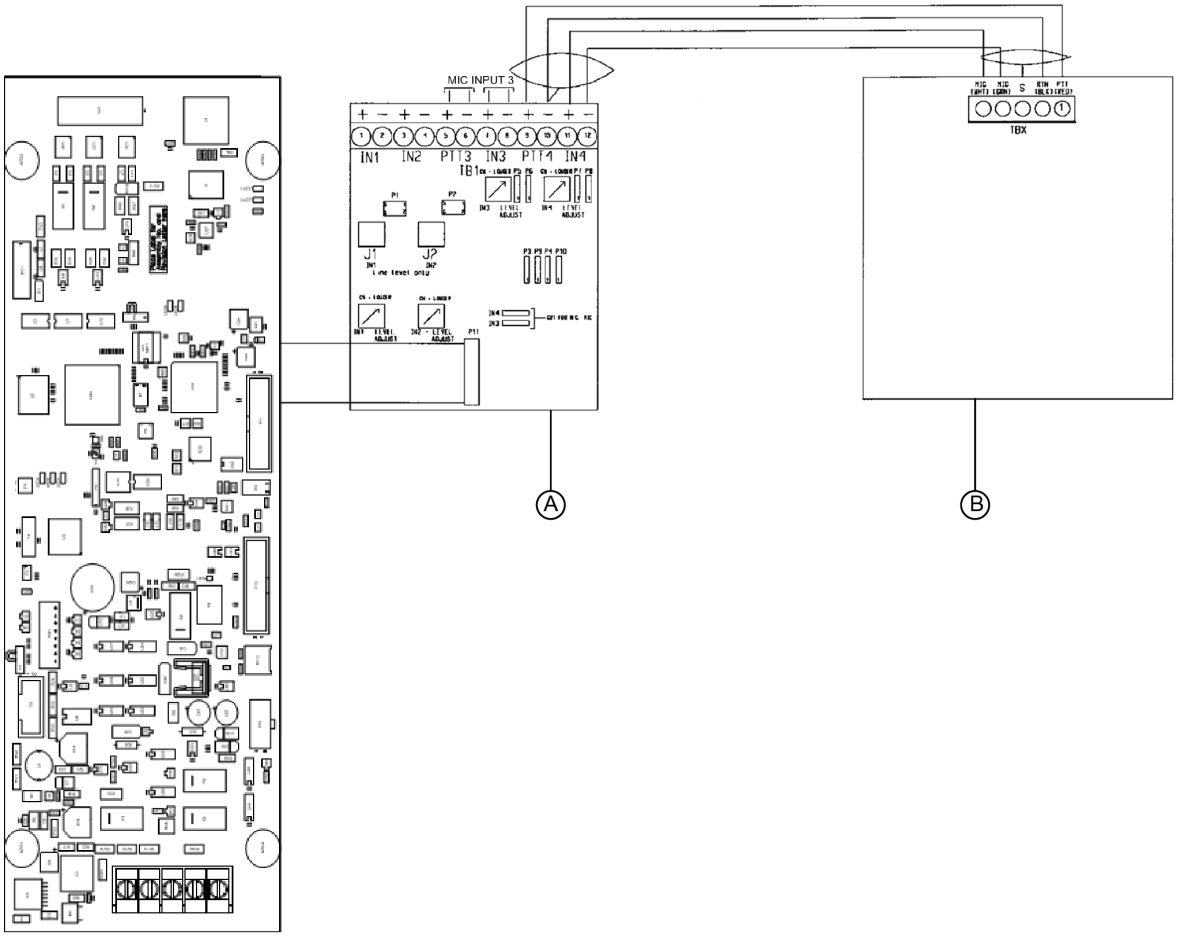
Callout	Description
A	4100-1411 ES Net Digital Audio Controller Card
B	4100-1244 Remote Mic Enclosure

Note:

- Leave the 10 K, 1/2 W resistors (378-030; brown/black/orange) on the + to - terminals of unused remote microphone contacts.
- All wiring is 18 AWG (0.8321 mm^2), twisted-shielded pair.
- Audio wiring is not to be mixed in the same jacket with other wiring, including other audio wiring.
- Supervisory current is 2.4 mA at 24 VDC (nominal).
- Maximum wire distance: 4,000 ft (1,219 m).
- Wiring must be free of all grounds.
- Wiring is supervised and power-limited.
- Terminate the shield as shown. Do not connect the shield to Earth.

Audio Input Card/remote mic interconnections

Figure 9: Audio Input Card with remote mic interconnections



Callout	Description
A	637-063 Audio Option Card
B	4100-1244 Remote Mic Enclosure

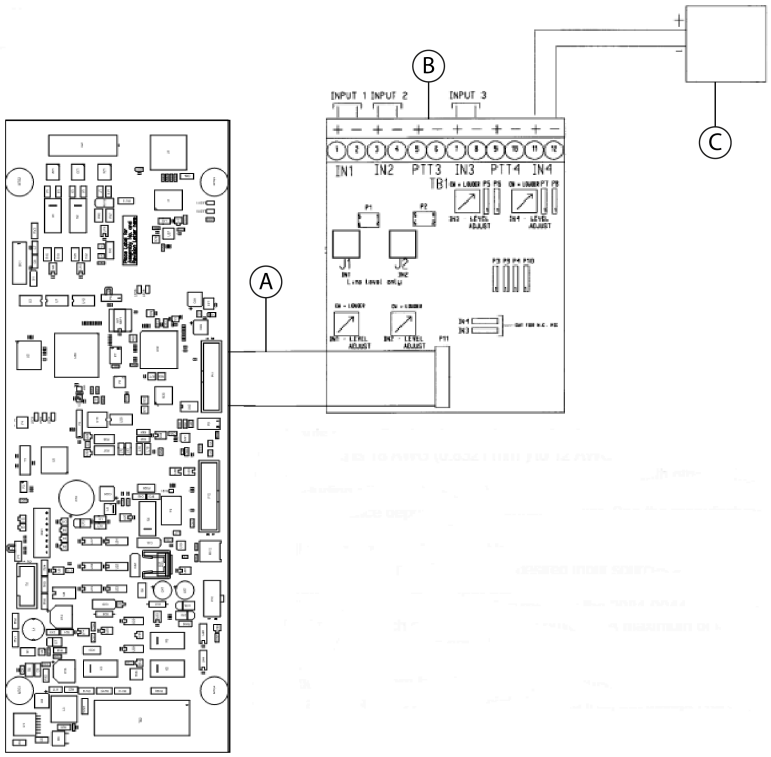
Note:

- Tie shield to PTT on option card side.
- Input level adjust does not adjust microphone input level.
- Leave the 10 K, 1/2 W resistors (378-030; brown/black/orange) on the + to - terminals of unused remote microphone contacts.
- All wiring is 18 AWG (0.8321 mm^2), twisted-shielded pair.
- Audio wiring is not to be mixed in the same jacket with other wiring (including other audio wiring).
- Supervisory current is 2.4 mA at 24 VDC (nominal).
- Maximum wire distance: 4,000 ft (1,219 m).
- Only option card inputs 3 and 4 support remote microphones.
- Set audio input card jumpers for desired input sources as shown in Configuring the ES Net Audio Controller Card.
- Wiring is supervised and power-limited.
- Terminate shield as shown. Do not connect the shield to Earth.

Note: See *Fire Alarm System Audio Input Card Installation Instructions 579-160* for information on the audio input card.

Audio Input Card/line level input interconnections

Figure 10: Line level input interconnections with Audio Input Option Card



Callout	Description
A	734-048 Harness assy
B	637-063 Audio Input Option Card
C	Typical audio source

Note: Use input trimpots to adjust input signals for desired volume.

Installation notes:

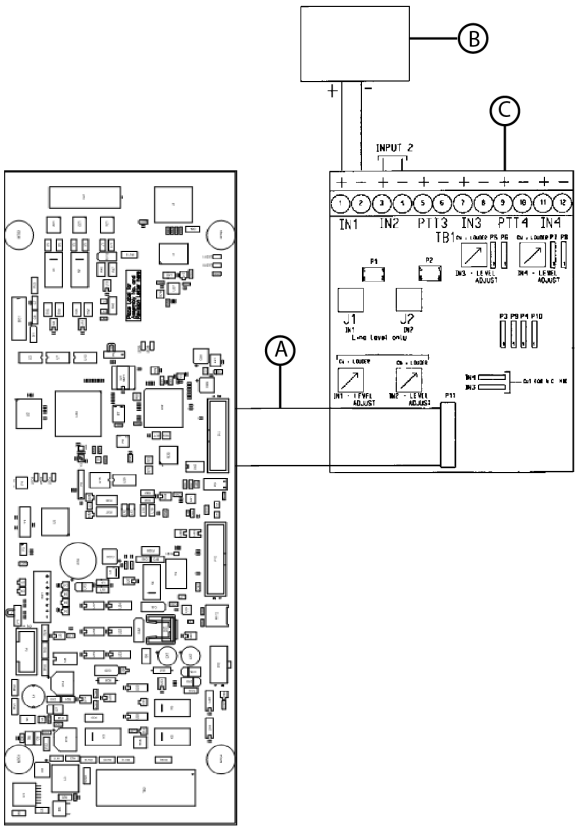
- Inputs set for line level are not supervised.
- All wiring is 18 AWG (0.8321 mm^2) to 12 AWG (3.309 mm^2).
- Audio wiring is not to be mixed in the same jacket with other wiring, including other audio wiring.
- Wire distance depends on the signal supplier. See the manufacturer documentation for requirements.
- All option card inputs support line level signals.
- Set audio input card jumpers for desired input sources as shown in Configuring the ES Net Audio Controller Card.
- All wiring that leaves the building requires the 2081-9044 Overvoltage Protector at each entry or exit to the building. A maximum of four overvoltage protectors are allowed. Each 2081-9044 adds 6 Ohms and 0.006 µF.
- Inputs 1 and 2 are transformer-coupled inputs.
- **J1** and **J2** are the same as points **IN1** and **IN2**, but accept RCA-style connectors (line level only).
- DC input impedance is greater than 900 Ohms.
- Line level is defined as 707 mV RMS, 600 Ohms output impedance.
- If you require a shield, connect the shield according to the signal supplier's instructions. Do not connect the shield to the FACU ground.

Note: Refer to *Fire Alarm System Audio Input Card Installation Instructions 579-160* for information on the audio input card.

Audio Input Card/typical audio interconnections

Figure 11 shows wiring for a 10 VRMS, 25 VRMS or 70.7 VRMS input through an audio input option card.

Figure 11: Audio Input Card with typical audio interconnections



Callout	Description
A	734-048 Harness assy
B	Typical audio source
C	637-063 Audio Input Option Card

Note: For the Audio Input Option Card, use input trimpots to adjust input signals for desired volume.

Installation notes:

- Inputs set for 25 VRMS or 70.7 VRMS audio level are not supervised.
- All wiring is 18 AWG (0.8321 mm^2) to 12 AWG (3.309 mm^2).
- Wire distance depends on the signal supplier. See the manufacturer documentation for requirements.
- Only inputs 1 and 2 support 25 VRMS/70.7 VRMS audio.
- Inputs 1 and 2 are transformer-coupled inputs.
- DC input impedance: 60 Kohms minimum (25 VRMS setting).
- DC input impedance: 170 Kohms minimum (70.7 VRMS setting).
- Set audio input card jumpers for desired input sources.
- If you require a shield, connect the shield per the signal supplier's instructions. Do not connect the shield to the FACU ground.

Note: Refer to *Fire Alarm System Audio Input Card Installation Instructions 579-160* for information on the audio input card.

Fire fighter phone system interconnections

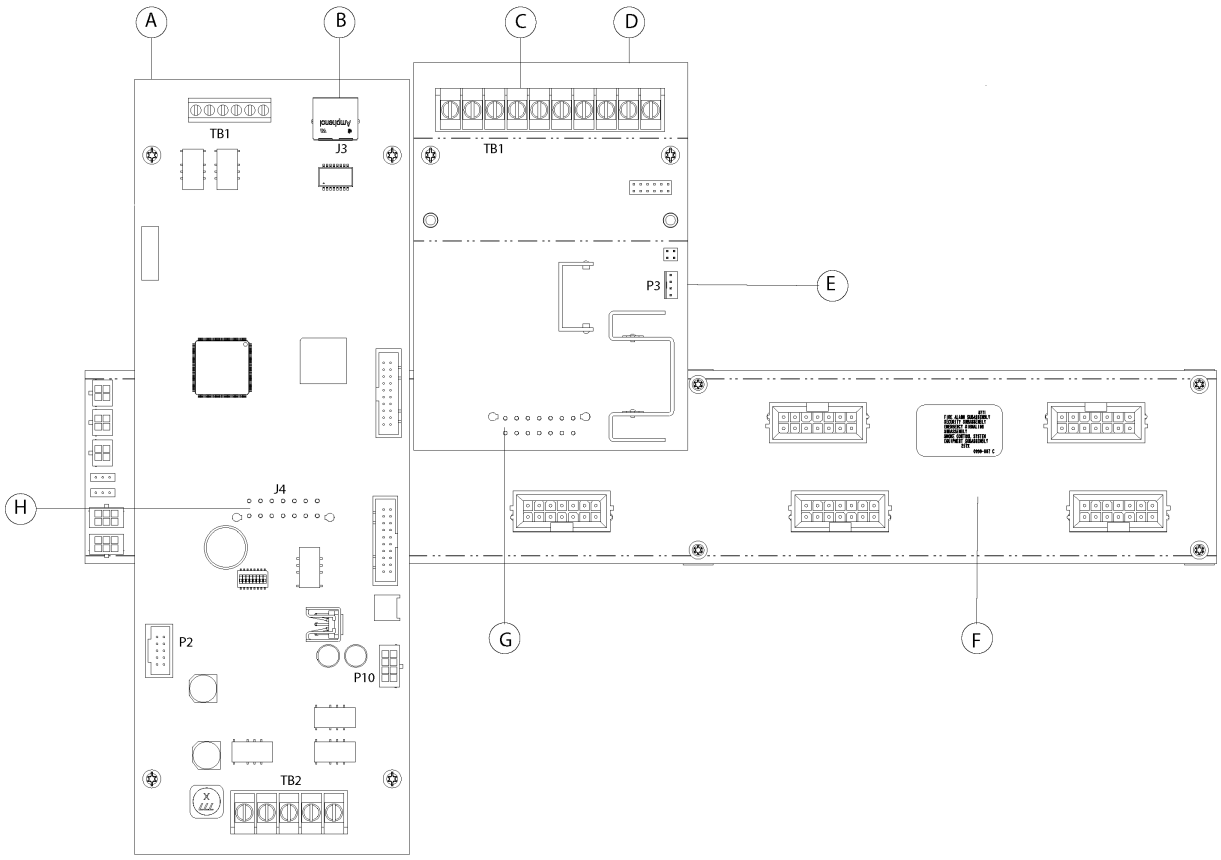
The ES Net Digital Controller Card supports the transmission of 2-way voice communications from Fire Fighter Phones over the ES Net network.

The Fire Fighter Phone Card (4100-1270) is used to interface the Fire Fighter Phone system to the ES Net network through the Digital Audio Controller Card. The talk line is used for the transmission of communications between the ES Net Digital Audio Controller card and the Fire Fighter Phone Card.

Notes:

- Fire fighter phone system interconnections are not supported when you set the card in digital audio controller mode.
- An unlimited number of remote phone assemblies can be connected in a system. However, the maximum number of phones that can be activated at the same time either locally at a node or on the entire ES Net network is 7.

Figure 12: Fire fighter phone assembly



Callout	Description
A	4100-1411 ES Net Digital Audio Controller Card
B	Connection to the ES Net NIC Ethernet port
C	Phone circuits for remote phones and phone jacks
D	4100-1270 Master card with phone card
E	Master phone assembly
F	Power distribution interface card
G	PDI connector (P4) (on reverse side)
H	PDI connector (on reverse side)

Installation notes:

- The ES Net DAC Ethernet port should connect to the NIC on either on-board Ethernet ports A or B using the provided 2 foot cable. For the connection of the NIC to the ES Net network, use an Ethernet Media Card (4100-6306), Single-Mode Fiber Media Card (4100-6308) or a Multi-Mode Fiber Media card (4100-6309).
- The ES Net NIC Ethernet port to which the ES Net DAC card connects must be configured as an Audio port in the ES Programmer. Refer to 574-849 for configuration information.

Note: Refer to *Fire Fighter Phone System Installation Instructions 579-226* for information on the Fire Fighter Phone system.

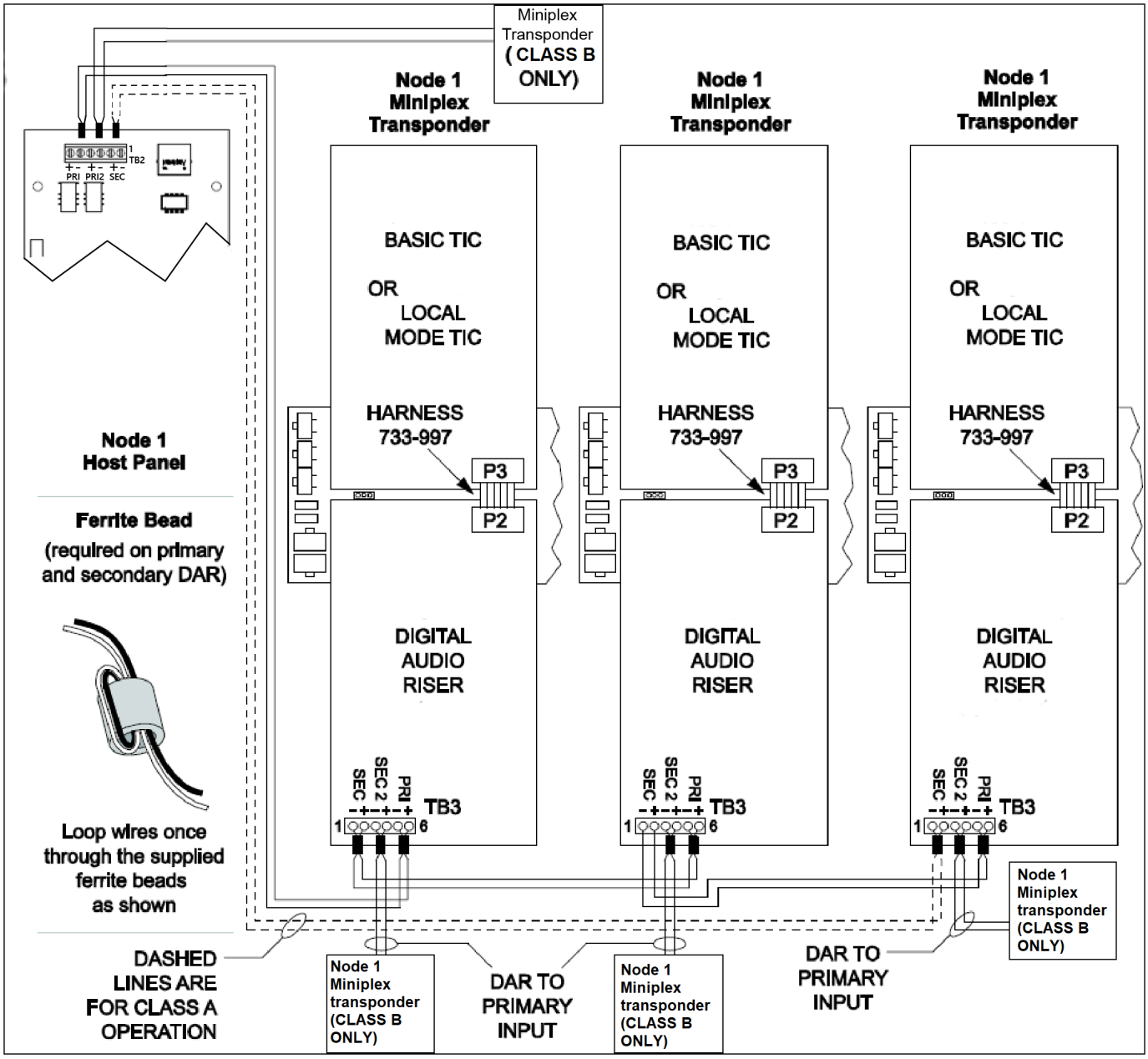
Transponder bay

Use the ES Net DAC to connect to the Digital Audio Riser installed in Miniplex Transponders.

4100-1411 ES Net Digital Audio Controller with audio riser interconnections to TICs (constant supervision applications)

Figure 13 is an illustration of class A and class B digital wiring from the 4100-1411 ES Net Digital Audio Controller to the digital audio risers connected to TICs.

Figure 13: Digital audio interconnections with the 4100-1411 Digital Audio Controller*



Note: *The following parts are illustrated in Figure 13:

- 4100-1411 ES Net ES Net Digital Audio Controller (566-1291)
- 4100-0620 Basic TIC or 4100-0625 Local Mode TIC
- 4100-0622 Digital Audio Riser (566-407, 566-1000)

Installation notes:

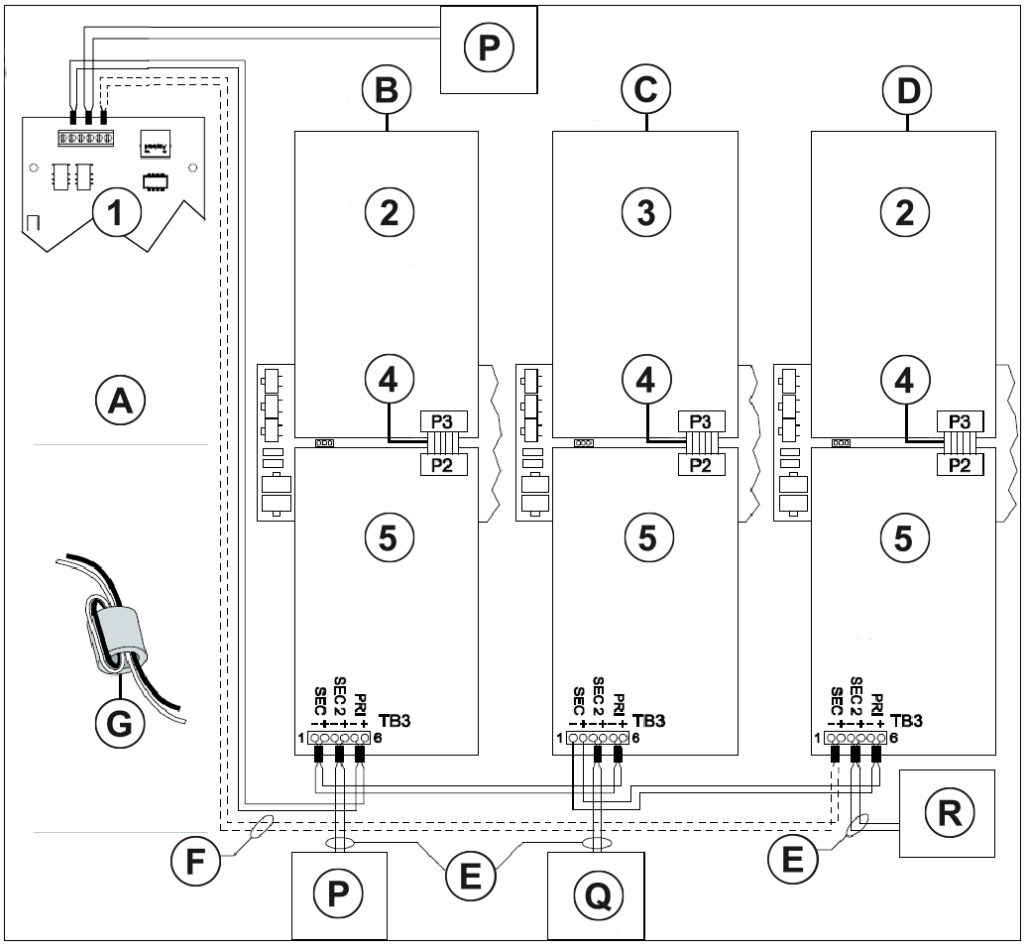
- All wiring is 18 AWG (0.8321 mm^2), unshielded twisted pair.
- Maximum wire distance: 2,500 ft (762 m) from ES Net Digital Audio Controller primary to the first Digital Audio Riser Interface Card (DARIC) primary.
- Maximum distance between subsequent nodes: 2,500 ft (762 m).
- Maximum line distance and capacitance between nodes: 18 AWG (0.8321 mm^2): 40 Ohms maximum, 0.055 µF maximum.
- All wiring that leaves the building requires the 2081-9044 Overvoltage Protector at each entry or exit to the building. A maximum of two overvoltage protectors are allowed for each DAR link. Each 2081-9044 adds 6 Ohms and 0.006 µF. Connect the DAR shield according to the 2081-9044 instructions.
- Wiring must be free of all grounds.
- The maximum number of digital interface cards per digital audio riser is 31.
- All riser wiring is supervised and power-limited.
- Audio wiring is not to be mixed in the same jacket with other wiring including other audio wiring.
- If you use shielded wire indoor installations, leave the shield floating by cutting and taping the shield at both ends.
- For installations outside of these guidelines, contact your sales support channel.

4100-1411 ES Net Digital Audio Controller with audio riser interconnections to TICs or the 4120 network audio riser controller module (constant supervision applications)

Note: To use the following audio riser interconnections with a ES Net DAC you must set the card in Digital Audio Controller mode.

Figure 14 is an illustration of class A and class B digital wiring from the 4100-1411 ES Net Digital Audio Controller to the digital audio risers connected to TICs or the 4120 Network Audio Riser Controller Module.

Figure 14: Digital Audio Interconnections with 4100-1411 Digital Audio Controller



Callout	Description	Callout	Description
1	4100-1411 ES Net Digital Audio Controller (0566-1291)	A	Node 1: Host panel
2	4100-0620 Basic TIC or 4100-0625 Local Mode TIC	B	Node 1: Miniplex transponder
3	4100-0623 Audio Riser Controller Module	C	Node 2: Control panel
4	Harness 733-997	D	Node 2: Miniplex transponder
5	4100-0622 Digital Audio Riser (566-407, 566-1000)	E	DAR to primary input
—	—	F	Dashed lines are for class A operation.
—	—	G	Ferrite bead, required on primary and secondary DAR. Loop wires once through the supplied ferrite beads as shown.
—	—	P	Node P, class B only
—	—	Q	Node Q, class B only
—	—	R	Node R, class B only

Installation notes:

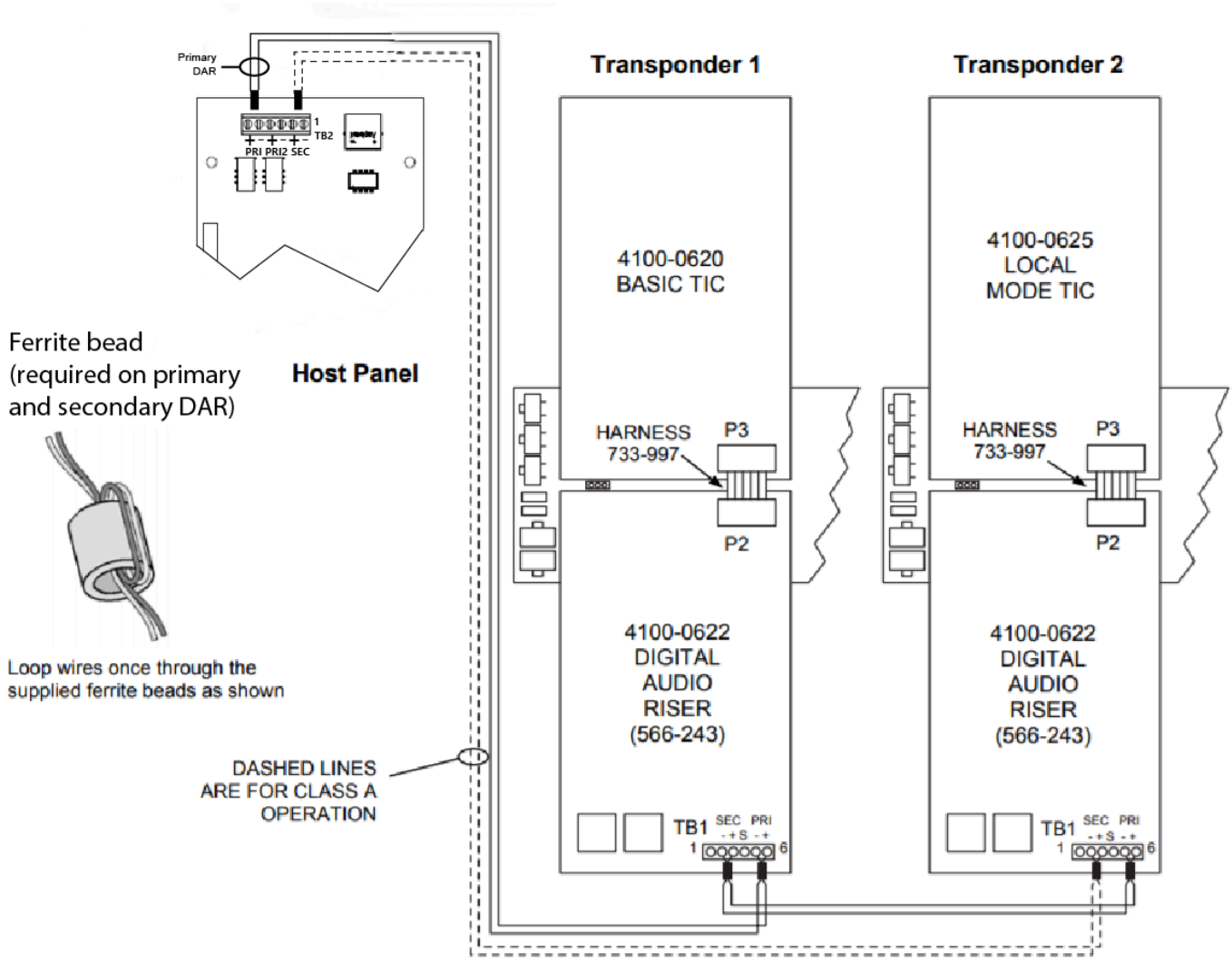
- All wiring is 18 AWG (0.8321 mm^2), unshielded twisted pair.
- Maximum wire distance: 2,500 ft (762 m) from digital audio controller primary to the primary of the first Digital Audio Riser Interface Card (DARIC).
- Maximum distance between subsequent nodes: 2,500 ft (762 m)
- Maximum line distance and capacitance between nodes: 18 AWG (0.8321 mm^2): 40 Ohms maximum, 0.055 µF maximum

- All wiring that leaves the building requires the 2081-9044 Overvoltage Protector at each entry or exit to the building. You can use a maximum of two overvoltage protectors for each DAR link. Each 2081-9044 adds 6 Ohms and 0.006 µF. Connect the DAR shield according to the 2081-9044 instructions.
- Wiring must be free of all grounds.
- The maximum number of digital interface cards for each digital audio riser is 31.
- All riser wiring is supervised and power-limited.
- You must not mix audio wiring in the same jacket with other wiring including other audio wiring.
- If you use shielded wire indoor installations, leave the shield floating by cutting and taping the shield at both ends.
- For installations outside of these guidelines, contact your sales support channel.

4100-1411 ES Net Digital Audio Controller with audio riser interconnections (field replacement only [non-constant supervision])

Figure 15 is an illustration of Class A and Class B wiring from the 4100-1411 ES Net Digital Audio Controller to the digital audio risers that are in turn connected to TICs for Non-Constant Supervision applications.

Figure 15: Digital audio interconnections with the 4100-1411 Digital Audio Controller



Note: The following parts are illustrated in Figure 15

- 4100-1411 ES Net Digital Audio Controller (566-1219)
- 4100-0620 Basic TIC
- 4100-0622 Digital Audio Riser
- 4100-0625 Local Mode TIC

Installation notes:

- All wiring is 24 AWG (0.2047 mm^2) to 18 AWG (0.8321 mm^2), twisted pair.
- Maximum wire distance: 2,500 ft (762 m) from ES Net Digital Audio Controller primary to the last digital audio riser card.
- Maximum total line distance and capacitance: 18 AWG (0.8321 mm^2): 40 Ohms maximum 0.055 µF maximum 24 AWG (0.2047 mm^2): 135 Ohms maximum 0.055 µF maximum.
- All wiring that leaves the building requires the 2081-9044 Overvoltage Protector at each entry or exit to the building. A maximum of four overvoltage protectors are allowed. Each 2081-9044 adds 6 Ohms and 0.006 µF.
- Wiring must be free of all grounds.
- The maximum number of digital interface cards per digital audio riser is 31.
- All riser wiring is supervised and power-limited.
- Audio wiring is not to be mixed in the same jacket with other wiring, including other audio wiring.

Installing the Digital Audio PDI Termination Plug

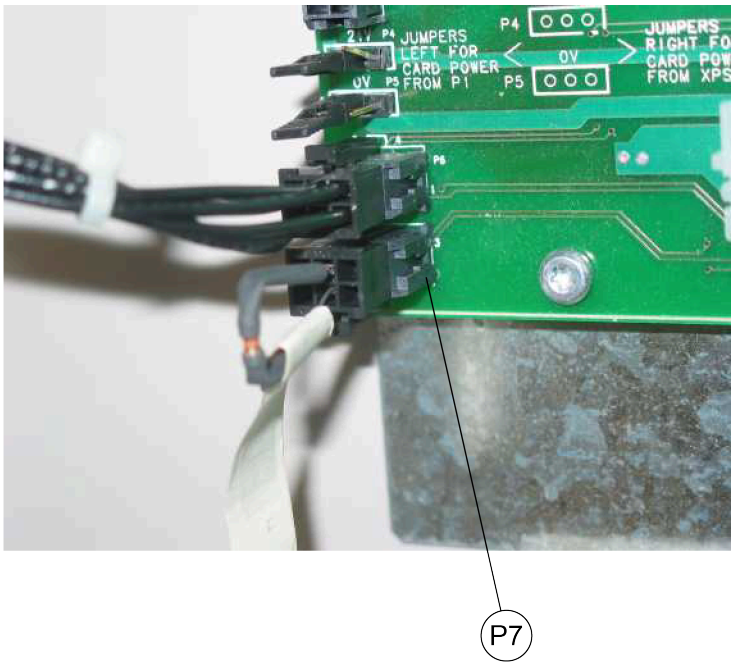
A Digital Audio Riser Termination Plug (734-183) is provided with every ES Net Digital Audio Controller or Digital Audio Riser Module. You must use this termination plug to properly terminate the Digital Audio Signal on the PDI.

Installing the Digital Audio PDI Termination Plug

To properly terminate the Digital Audio Signal on the PDI, you must install the termination plug into **P7** of the last bay that has digital audio. The Digital Audio Controller (or Digital Audio Riser Module) should be the first item and the Digital Audio Termination Plug the last item in the Digital Audio PDI bay-to-bay wiring. See Figure 16.

Place the Digital Audio PDI Termination Plug into **P7** of the last bay with digital audio.

Figure 16: Installing a Digital Audio PDI Termination Plug



Troubleshooting

This section describes the messages that may appear on the FACU display when using the audio controller cards and their option cards.

Card Missing/Failed

The audio controller card is either not installed or is not at the system address specified by the Programmer.

Wrong Card

The wrong card is using the address specified by the Programmer as the audio controller card.

Message Library Mismatch

The audio message library in the audio card does not match the version of the audio message library used by the scripts in the FACU master controller. This can happen when changes are made to the messages and only the audio card message library or the FACU configuration was downloaded.

Message Memory Checksum Failure

Your message memory download was corrupted ***or*** your ES Net Digital Audio Controller is defective. If you receive this message after a download, try downloading again.

Input Option Card Configuration Trouble

An audio input card is missing from either slot 1 or slot 2 next to the audio controller, or is present while slot 1 or 2 was configured not to have an audio input card.

ES Net Audio Playback Receive Trouble

There are multiple possible causes for this trouble:

- The audio controller card's Ethernet port is not connected to the ES Net NIC card port configured as **Audio Network**.
- The ES Net NIC is reporting troubles.
- There is no configured voice command center (VCC) in the jobs. See *900-249* for more details on VCC operations.

ES Net Firefighter Phone Trouble

There are multiple possible causes for this trouble:

- The audio controller card's Ethernet port is not connected to the ES Net NIC card port configured as **Audio Network**.
- The ES Net NIC is reporting troubles.
- There is no ES Net Digital Audio Controller card configured as **Conference Master** connected to the ES Net network.

Additional Troubles

Additional troubles may be annunciated for shorts or opens on any of the following, each of which is supervised:

- Microphone circuit
- DAR riser (communication failure)

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