Split Audio Application to Satisfy the National Building Code of Canada 2015 Division B, Part 3.2.4.18

Application Guide

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1.0 Limitations and Notes

- **Each fire zone must have one bus, which must be class B.**
- **This application is only for use with audio circuits.**
- **This application is not for use with polarized signal circuits.**
- **The maximum current draw of the monitor module is 6.5 mA when the LED is on. If the LEDs must flash during an alarm condition, take their current draw into account for maximum current limitations for addressable circuits.**
- **The minimum versions of the amplifiers that work with this application are:**
  - **QAA-5415-70 Rev F**
  - **QAA-5415-25 Rev G**
  - **QAA-5230S-70/25 Rev G**
  - **QAA-5230-70/25 Rev H**
  - **QAA-5160-70/25 Rev H**
- **This application works with firmware and Configurator software version 11.9.0 or higher.**

Note: In this document, **monitor module** refers to any of the following:

- **MIX-M500SAP(A)**
- **MIX-M500S(A)**
- **MRI-M500SAP(A)**
- **MRI-M500S(A)**

2.0 Overview

Split audio is a feature in the MGC Configurator version 11.9.0 and above. It lets installers satisfy the requirements of Division B, Part 3.2.4.18 of the National Building Code of Canada 2015 for residential buildings while using half the number of amplifiers as before.

The National Building Code of Canada requires that speakers in the suites of residential buildings be wired on separate circuits from the speakers in other areas, e.g. corridors. Previously this was done with 2 amplifiers for each zone: 1 amplifier for the suites, and 1 amplifier for the other areas in the zone.

This application satisfies the Code by using one *bus* serving multiple *supporting field devices* in one fire zone. *Field devices* in suites retain redundancy from an open by using a class A *circuit*. *Field devices* in other areas must be serviced by a separate *supporting field device*.

Definitions from CAN/ULC-S524

- CIRCUIT - Conductors connected directly to *field devices* which provide a *control unit* and/or *transponder* with *field device* status information, alarm signalling or other functions.
- FIELD DEVICE - A device located remotely from, but connected electrically to a control unit and/or *transponder* to transmit or receive status change information (e.g. fire alarm detection or signalling).
- ACTIVE FIELD DEVICE - A *field device* that can be uniquely identified by a *control unit* and/or *transponder* to determine its presence and operating status, and which may be commanded to operate or to change its operating parameters independently of other *field devices* that share a common *circuit*.
- SUPPORTING FIELD DEVICE - An *active field device* that monitors and/or controls other *field devices* on a separate *circuit* and reports the status of the separate *circuit* to a *control unit* and/or *transponder*.

Definition from the Canadian Electrical Code

- BUS - A conductor that serves as a common connection for the corresponding conductors of two or more circuits.

Excerpt from the National Building Code of Canada 2015 Division B, Part 3.2.4.18

8) Audible signal devices within a *dwelling unit* or a *suite* of *residential* or *care occupancy* shall be connected to the fire alarm system

a) in a manner such that a single open circuit at one device will not impair the operation of other audible signal devices on that same circuit that serve the other *dwelling units* or *suites* of *residential* or *care occupancy*, or

b) on separate signal circuits that are not connected to the devices in any other *dwelling unit*, *public corridor* or *suite* of *residential* or *care occupancy*.

(See Note A-3.2.4.18.(8) and (9).)

9) In a *building* or part of thereof classified as a *residential* or *care occupancy*,

a) separate circuits shall be provided for audible signal devices on each *floor area*, and

b) audible signal devices within *dwelling units* or *suites* of *residential* or *care occupancy* shall be wired on separate signal circuits from those not within *dwelling units* or *suites* of *residential* or *care occupancy*.

(See Note A-3.2.4.18.(8) and (9).)

A-3.2.4.18.(8) and (9) Signal Circuits. Clause 3.2.4.18.(8)(a) permits Class A wiring, or Class B wiring with signal circuit isolators located outside of the suites, to serve audible signal devices within residential suites.

Clause 3.2.4.18.(8)(b) permits a separate signal circuit to serve each suite without the need for signal circuit isolators or Class A wiring.

Open circuits and Class A and Class B wiring circuits are terms defined in CAN/ULC-S524, “Installation of Fire Alarm Systems.”

Note: For more information, consult the National Building Code of Canada 2015. Please review the full text of the code and consult with professional advisors for the implications of the code.

3.0 Wiring

3.1 Remove the Jumper on MIX-M500SAP(A) or MRI-M500SAP(A)

If you are using the Advanced Protocol MIX-M500SAP(A) or MRI-M500SAP(A) for speaker applications with the Mircom QX series of amplifiers, follow these instructions to remove jumper J1. The jumper location is shown in Figure 1.

1. Insert a small flat screwdriver into the hole at the top of the unit.
2. Use the screwdriver to push the jumper out through the slot shown in Figure 1. You do not need to open the cover.
3. Discard the jumper.

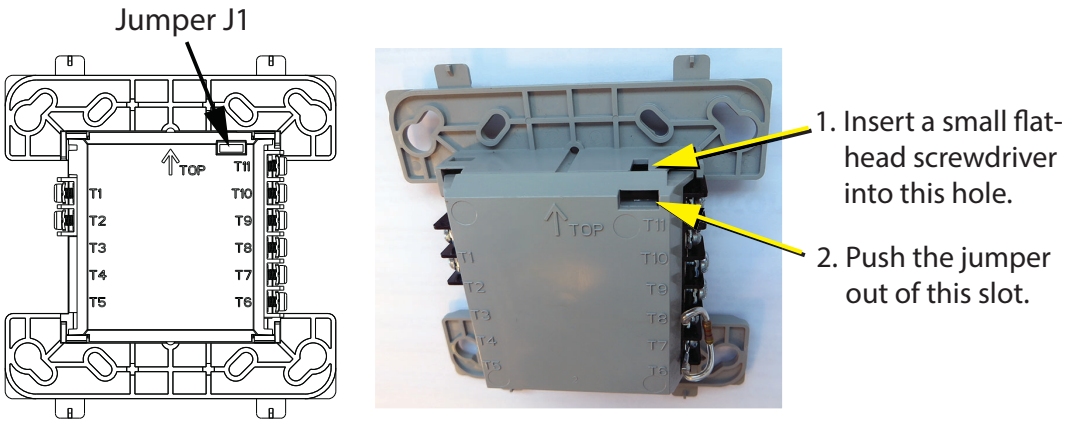


Figure 1 Remove and discard jumper on MIX-M500SAP(A) and MRI-M500SAP(A)

3.2 Typical Wiring

Figure 2 shows the wiring for a typical installation with split audio. Each physical zone is divided into two logical zones: a zone for the other areas, and a zone for the suites. The circuits for the other areas are class B, and the circuits for the suites are class A. The audio bus must be class B.

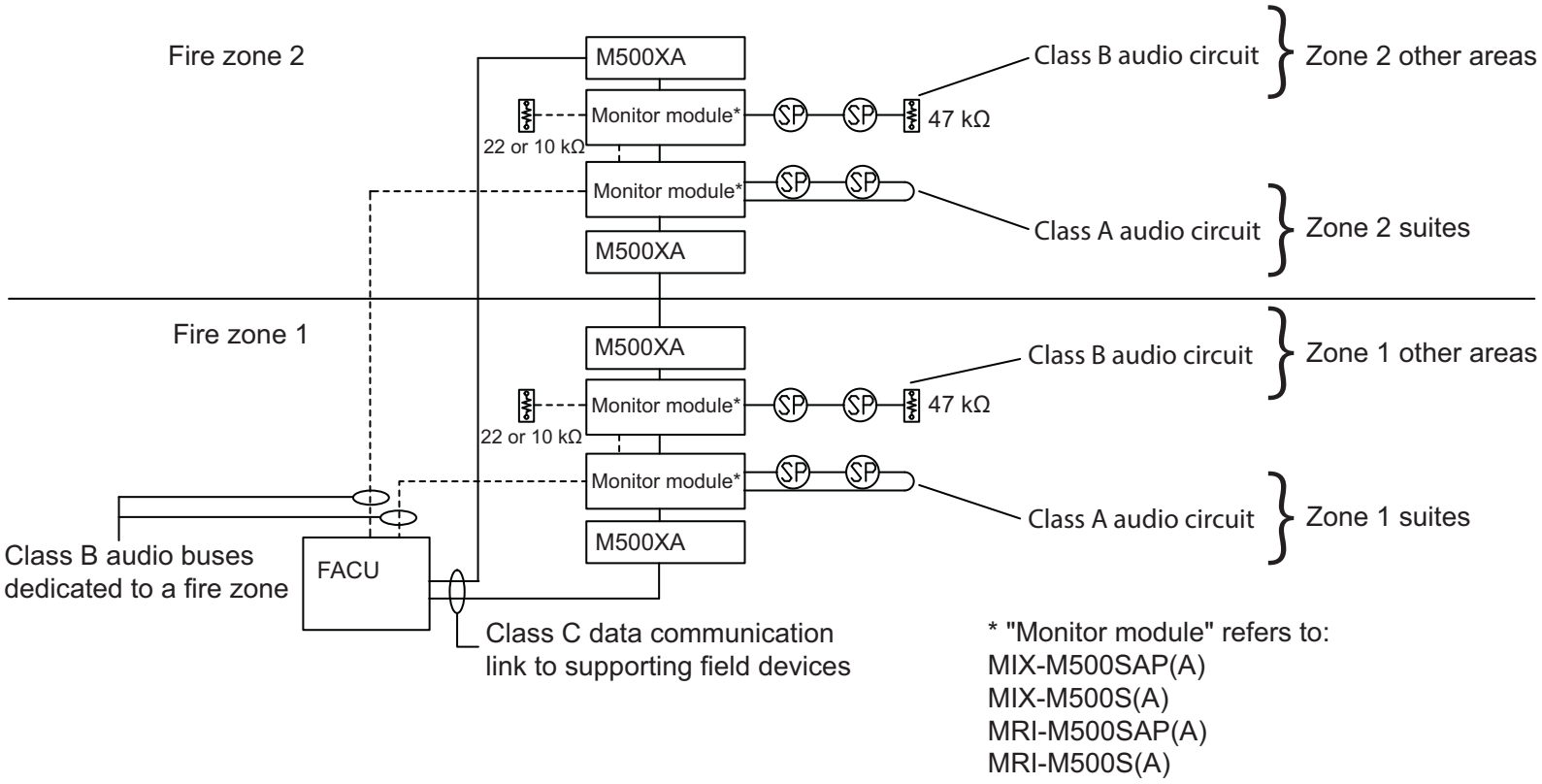


Figure 2 A typical installation with split audio

Note: The last monitor module in each bus must have an EOL resistor for supervision: 22 kΩ for a 15 W circuit and 10 kΩ for a 30 W or 60 W circuit.

3.3 Typical Wiring with Existing Devices

Figure 3 shows the wiring for a typical installation with split audio and existing devices. Each physical zone is divided into two logical zones: a zone for the other areas, and a zone for the suites. The circuits for the other areas are class B, and the circuits for the suites are class A. The audio bus must be class B.

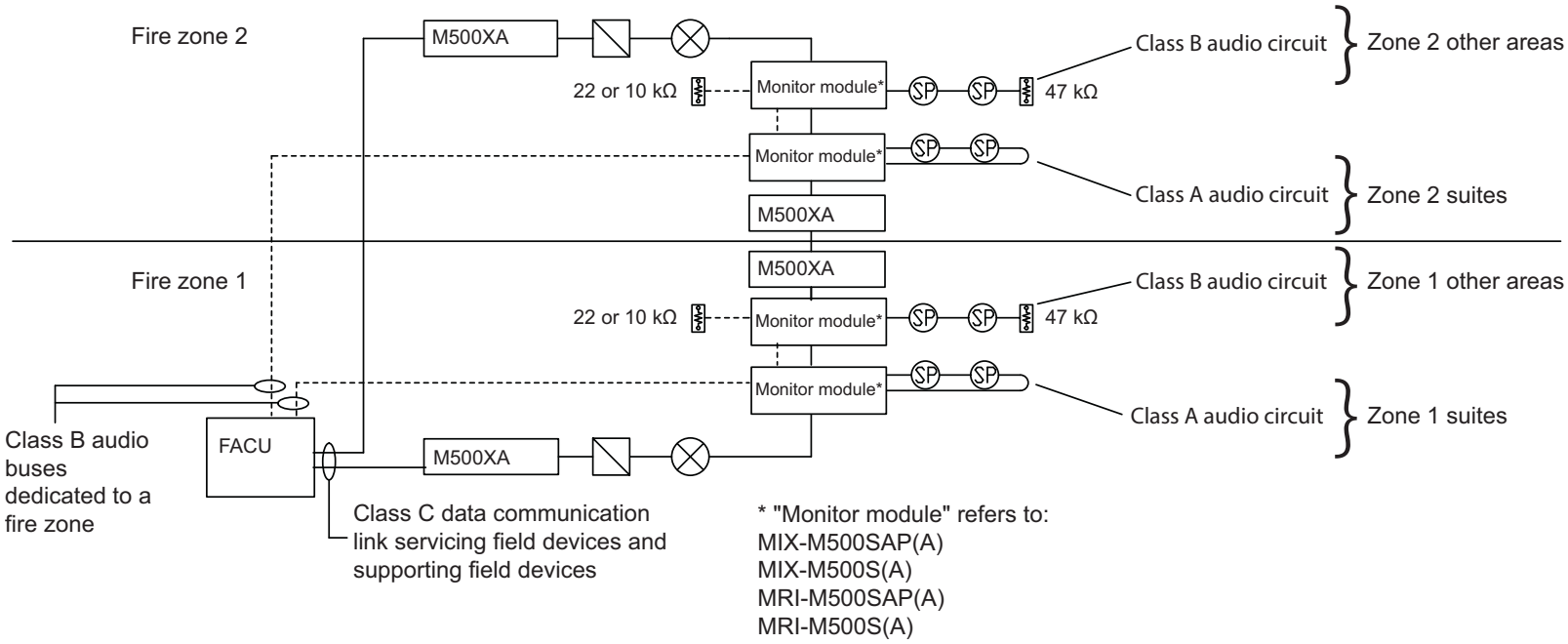


Figure 3 A typical installation with split audio and existing devices

Note: The last monitor module in each bus must have an EOL resistor for supervision: 22 kΩ for a 15 W circuit and 10 kΩ for a 30 W or 60 W circuit.

3.4 Wiring the Monitor Modules

Wiring for:
MIX-M500SAP(A)
MIX-M500S(A)
MRI-M500SAP(A)
MRI-M500S(A)

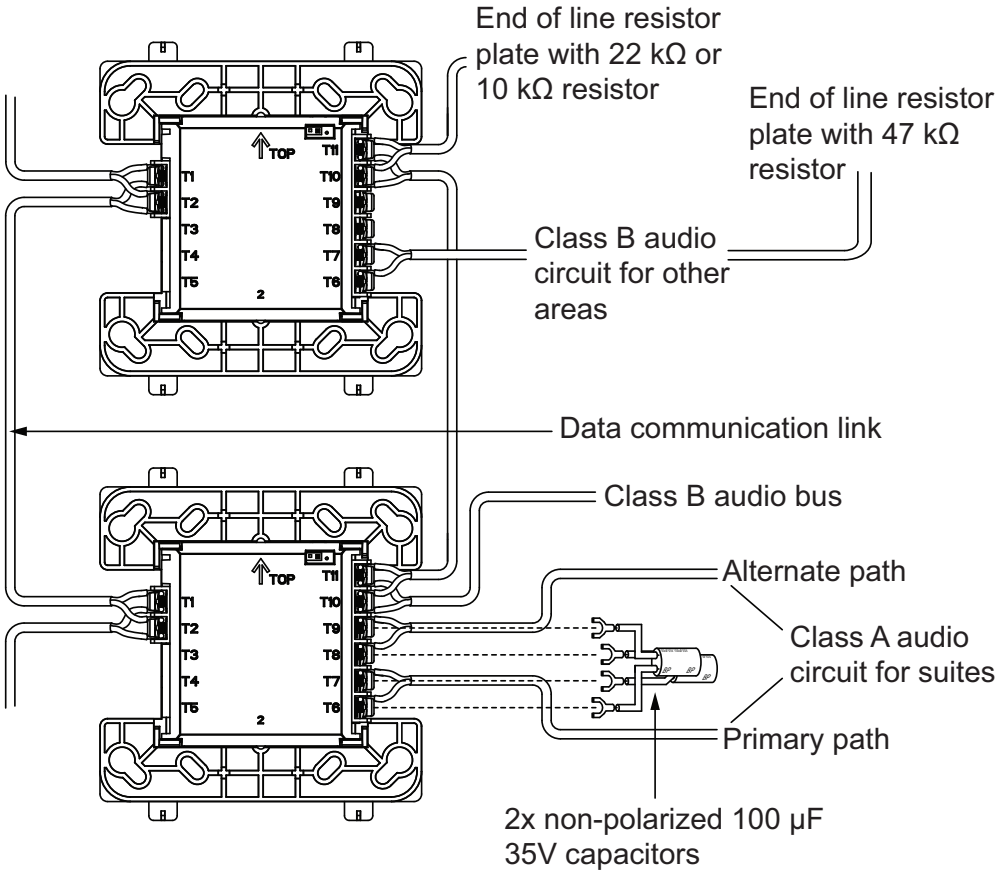
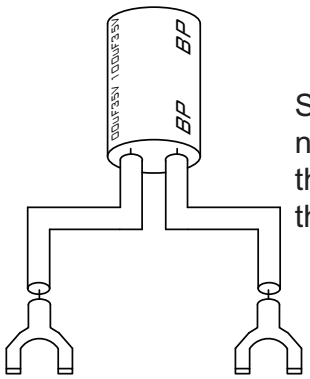


Figure 4 Wiring the monitor modules

3.5 Wiring the Capacitors



SPLIT-AMP-CAP-KIT comes with 20 non-polarized 100 µF 35V capacitors that have been modified to eliminate issues in the field.

Figure 5 SPLIT-AMP-CAP-KIT

The class A audio circuit for suites requires 2 SPLIT-AMP-CAP-KIT capacitors for every monitor module. The class B circuits do not require capacitors.

1. Wire one capacitor to terminals T6 and T9.
2. Wire the other capacitor to terminals T7 and T8.

3.6 Wiring the M500XA Isolators

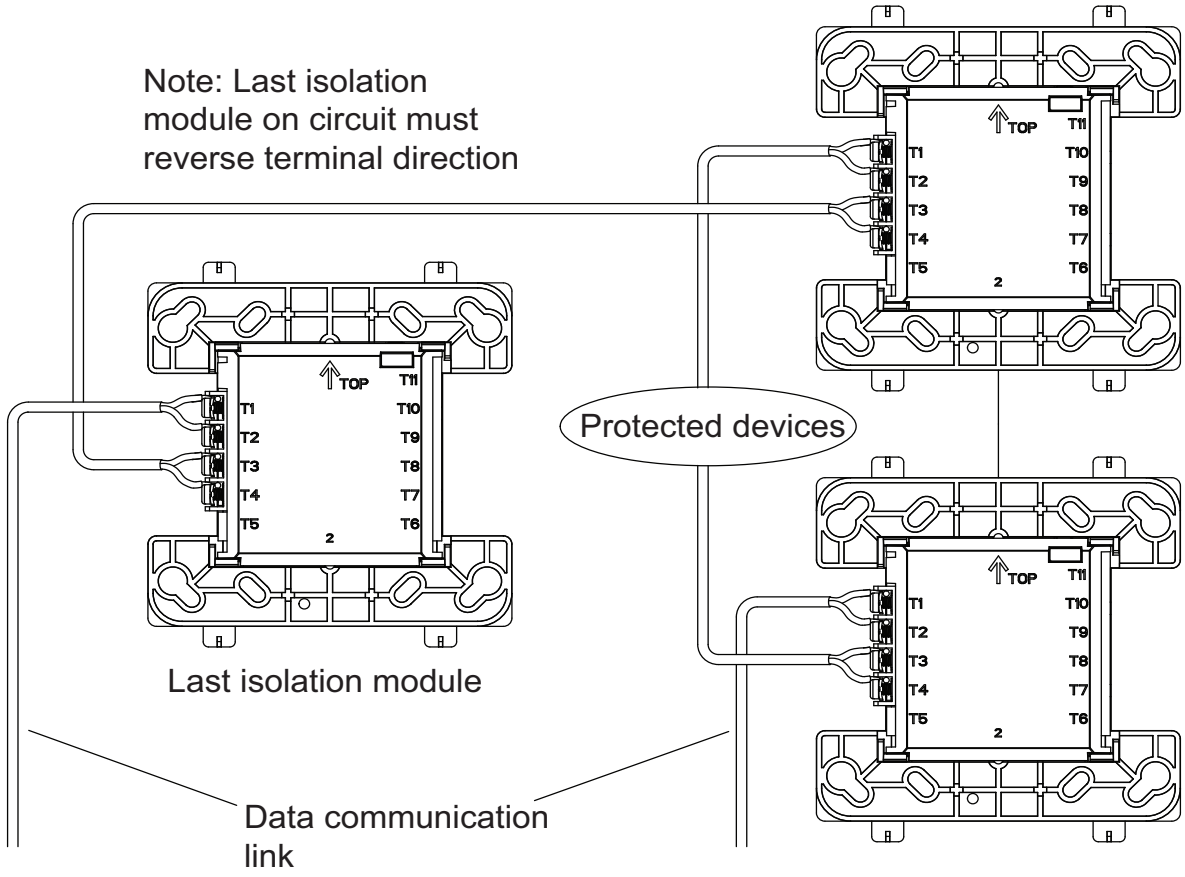
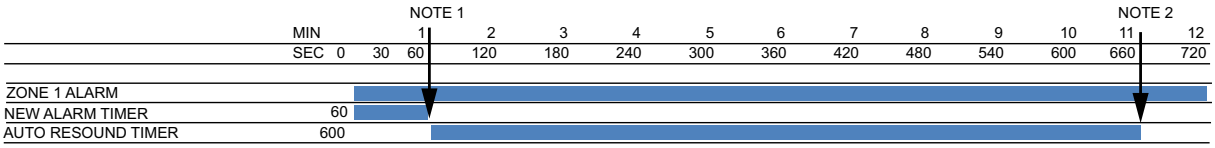


Figure 6 Wiring the M500XA isolators

4.0 Sequence of Events



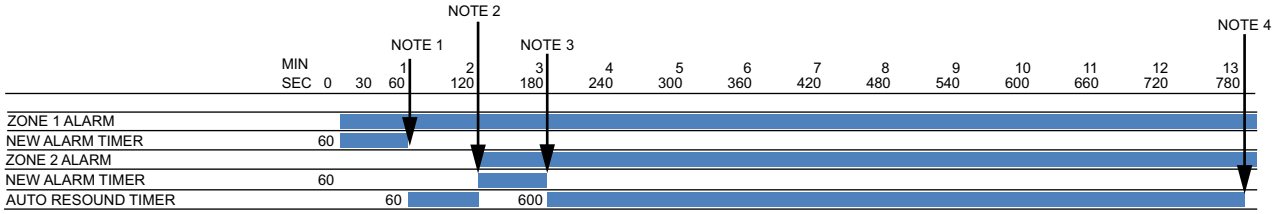
NOTE 1:
NEW ALARM TIMER EXPIRES
AUTO RESOUND TIMER ACTIVATES

NOTE 2:
AUTO RESOUND TIMER EXPIRES
ALL SIGNALS REACTIVATE

NEW ALARM TIMER ACTIVE:
ALL SPEAKERS SOUND UNTIL TIMER EXPIRES

AUTO RESOUND TIMER ACTIVE:
SUITE SPEAKERS ARE SILENCED (CORRIDOR REMAINS ACTIVE) IN ALL ZONES EXCEPT FOR ZONE OF ALARM UNTIL AUTO RESOUND TIMER EXPIRES OR SUBSEQUENT ALARM

Figure 7 Sequence of events with 1 alarm



NOTE 1:
NEW ALARM TIMER EXPIRES
AUTO RESOUND TIMER ACTIVATES

NOTE 2:
ZONE 4 ALARM ACTIVATES (SUBSEQUENT ALARM)
NEW ALARM TIMER ACTIVATES
AUTO RESOUND TIMER EXPIRES

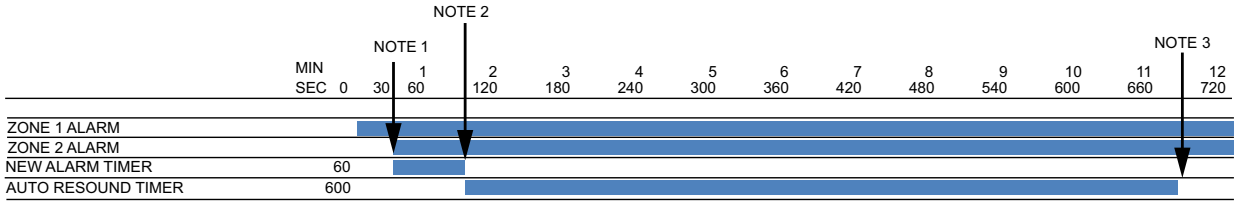
NOTE 3:
NEW ALARM TIMER EXPIRES
AUTO RESOUND TIMER ACTIVATES

NOTE 4:
AUTO RESOUND TIMER EXPIRES
ALL SIGNALS REACTIVATE

NEW ALARM TIMER ACTIVE:
ALL SPEAKERS SOUND UNTIL TIMER EXPIRES

AUTO RESOUND TIMER ACTIVE:
SUITE SPEAKERS ARE SILENCED (CORRIDOR REMAINS ACTIVE) IN ALL ZONES EXCEPT FOR ZONE OF ALARM UNTIL AUTO RESOUND TIMER EXPIRES OR SUBSEQUENT ALARM

Figure 8 Sequence of events with 2 alarms 2 minutes apart



NOTE 1:
ZONE 4 ALARM ACTIVATES (SUBSEQUENT ALARM)
NEW ALARM TIMER ACTIVATES

NOTE 2:
NEW ALARM TIMER EXPIRES
AUTO RESOUND TIMER ACTIVATES

NOTE 3:
AUTO RESOUND TIMER EXPIRES
ALL SIGNALS REACTIVATE

NEW ALARM TIMER ACTIVE:
ALL SPEAKERS SOUND UNTIL TIMER EXPIRES

AUTO RESOUND TIMER ACTIVE:
SUITE SPEAKERS ARE SILENCED (CORRIDOR REMAINS ACTIVE) IN ALL ZONES EXCEPT FOR ZONE OF ALARM UNTIL AUTO RESOUND TIMER EXPIRES OR SUBSEQUENT ALARM

Figure 9 Sequence of events with 2 alarms 30 seconds apart

5.0 Split Audio in the Configurator

This example shows how to set up split audio and suite silence for a residential building.

In this example, there are 2 physical zones as defined by the National Building Code of Canada. Each physical zone is divided into two logical zones: a zone for the suites, and a zone for the other areas.

To set up split audio you must:

- Add and Tag Input Devices
- Add and Tag Input Zones
- Add a Common Alarm input zone
- Add the monitor modules
- Add Amplifier Cards
- Tag and Correlate Audio Zones
- Correlate the Input Zones with Devices
- Correlate the Common Alarm Input Zone
- Set up Timers
- Correlate the System Statuses

Follow the instructions below to complete these steps.

5.1 Add and Tag Input Devices

1. Add input devices.
2. Double-click in the **Tag** field and tag each input circuit appropriately. For instance, tag the first input circuit **Zone 1**.

Addr	Device	Type	SubType	F1	F3	Tag (Line1)
0.0	Supv Opt Ckt	Signal	None			Base Signal
0.1	Supv Opt Ckt	Signal	None			Base Signal
0.2	Supv Opt Ckt	Signal	None			Base Signal
0.3	Supv Opt Ckt	Signal	None			Base Signal
1.0	Input Ckt	Alarm Input	None			Zone 1
1.1	Input Ckt	Alarm Input	None			Zone 2
1.2	Input Ckt	Alarm Input	None			
1.3	Input Ckt	Alarm Input	None			
1.4	Input Ckt	Alarm Input	None			
1.5	Input Ckt	Alarm Input	None			
1.6	Input Ckt	Alarm Input	None			
1.7	Input Ckt	Alarm Input	None			

Figure 10 Input circuits

5.2 Add and Tag Input Zones

1. Add input zones to correspond with the physical zones as defined by the National Building Code.
2. Double-click in the **Tag** field and tag each zone appropriately. For instance, tag the first zone **Zone 1**.

5.3 Add a Common Alarm input zone

1. Select **Base I/O**, then select **Input Zones**.
2. Click **Insert** -> **Add Zone**.
3. Click **Add**, and then click **Close**.
4. Double-click in the **Tag** field for the new zone and type **Common Alarm**.

Addr	Device	Type	SubType	Priority	F1	F3	Tag (Line1)
1	Input Zone	Alarm	None	Normal		ND	zone 1
2	Input Zone	Alarm	None	Normal		ND	zone 2
3	Input Zone	Alarm	None	Normal		ND	common alarm

Figure 11 Common alarm input zone

5. Select the Common Alarm input zone.
6. Click the **Advanced Logic** tab, and then click **Edit**.

   The **Advanced Logic Editor** appears.

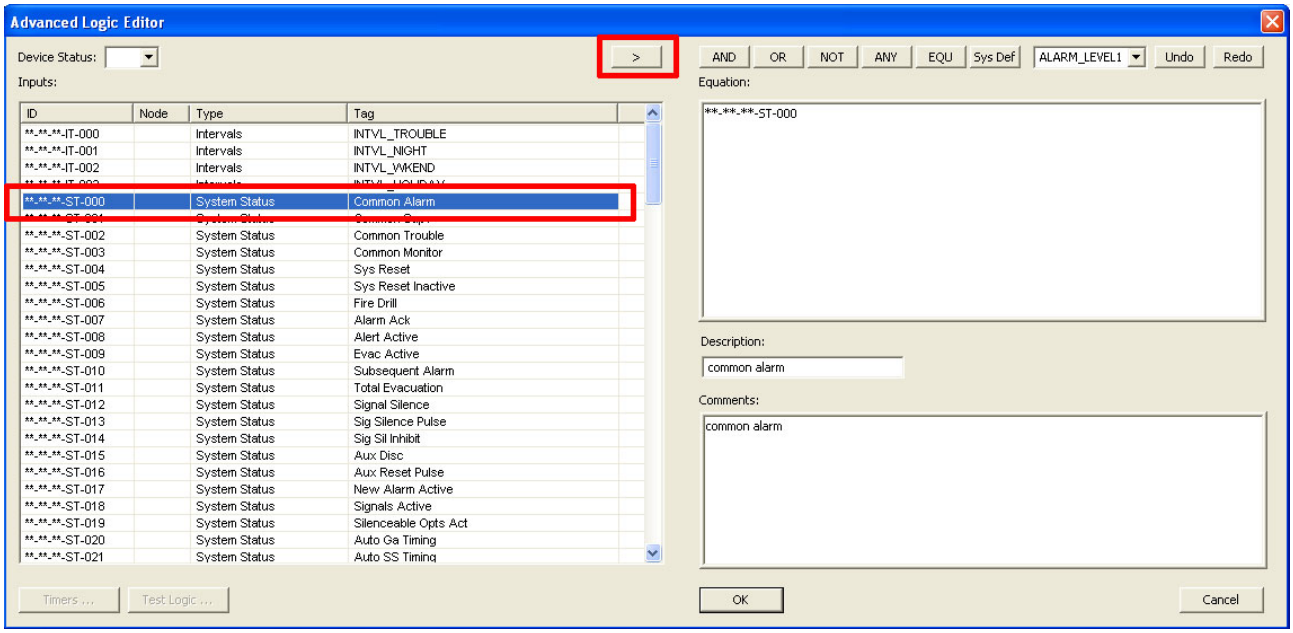


Figure 12 Advanced logic editor

7. Select the Common Alarm System Status (****-**-**-ST-000**) from the list of inputs.
8. Click the arrow button at the top.
9. Type **Common Alarm** for the **Description** and **Comments**.

10. Click **OK**.

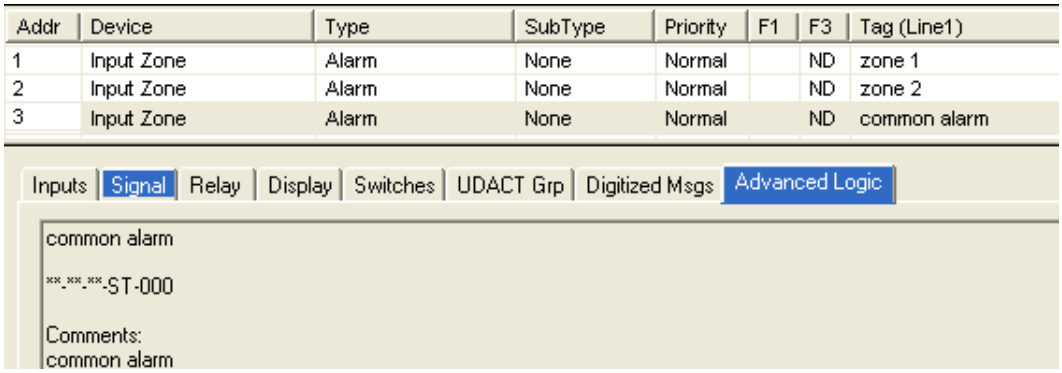


Figure 13 Advanced logic for the common alarm input zone

5.4 Add the monitor modules

1. Select **Base I/O** under the loop adder card.
2. Select the loop that the modules are connected to.
3. Click **Insert** -> **Add Device**.

   The Add Devices window appears.

Figure 14 Add Devices

4. In the Type menu, select **Supv Opt Mod**.
5. In the **Process As** menu, select **Signal**.
6. In the **Number to add** box, type the number of modules that are connected. In this example, there are 2 modules for each physical zone for a total of 4 modules.
7. Click **Add**, and then click **Close**.
8. Double-click in the **Tag** field and tag each module appropriately, for instance **Zone 1 Suites** and **Zone 1 Other Areas**.

In Figure 15, there are 2 modules for each physical zone. One module controls the speakers for the suites, and the other module controls the speakers for the other areas.

Addr	Device	Type	SubType	F1	F3	F4	Sens Lvl Pre	Sens	Sens Lvl 2	Sens Lvl 3	Tag (Line1)
101	Supv Opt Mod	Signal	None								zone 1 suites
102	Supv Opt Mod	Signal	None								zone 1 other areas
103	Supv Opt Mod	Signal	None								zone 2 suites
104	Supv Opt Mod	Signal	None								zone 2 other areas

Figure 15 4 monitor modules

9. To reduce current load, select **NF** (No Flash) in the **F4** column to prevent the module from flashing its LED when it is activated.

Attention: The maximum current draw of the monitor module is 6.5 mA when the LED is on. If the LEDs must flash during an alarm condition, take their current draw into account for maximum current limitations for addressable circuits.

5.5 Add Amplifier Cards

1. Select **Audio Control** in the job tree, and then select the loop that contains the amplifiers.
2. Click **Insert** -> **Add Amplifier**.

   The **Add Amplifier** window appears.

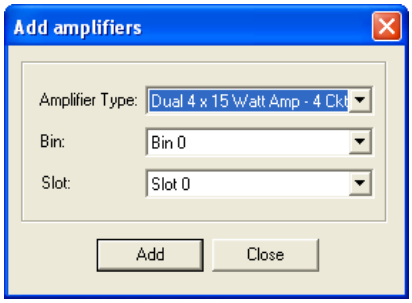


Figure 16 Add Amplifiers

3. In the **Amplifier Type** menu, select the amplifiers that are connected. Choose the items prefaced with **Dual**: **Dual 4 x 15 Watt amp**, **Dual 2 x 30 Watt amp**, or **Dual 60 Watt amp**.
4. Click **Add**, and then click **Close**.
5. Double-click in the **Tag** field and tag each circuit appropriately. For instance, tag the circuit for the first fire zone **Zone 1 audio bus**.

   Figure 17 shows 1 dual 15 watt amplifier, for a total of 4 circuits. Only 2 circuits are used, because there are only 2 audio buses.

Addr	Device	Type	SubType	F1	F3	Tag (Line1)
0.0.0	Dual 15 Watt	Signal	None			Zone 1 audio bus
0.0.1	Dual 15 Watt	Signal	None			Zone 2 audio bus
0.0.2	Dual 15 Watt	Signal	None			
0.0.3	Dual 15 Watt	Signal	None			

Figure 17 1 dual 15 W amplifier

5.6 Tag and Correlate Audio Zones

1. Select **Audio Control** in the job tree, and then select **Audio Zones**.

   By default, each amplifier circuit has 2 audio input zones correlated with it.

2. Click the **Signal** tab for each audio input zone to see the amplifier circuit that it is correlated with.

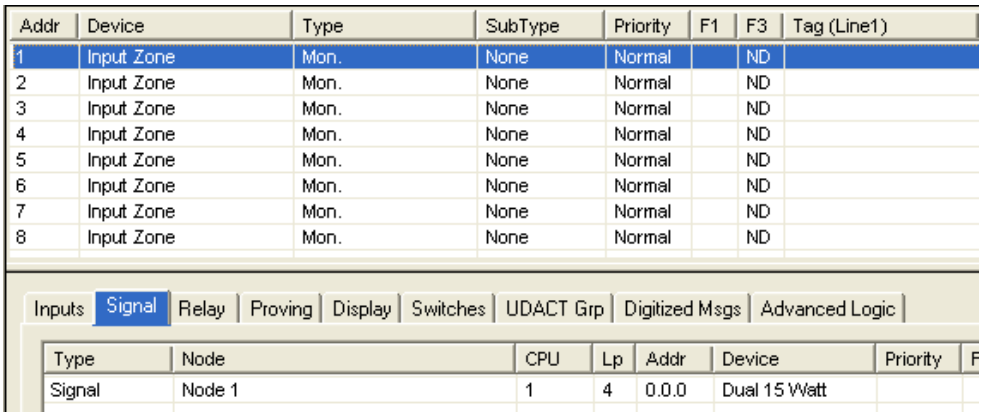


Figure 18 The Signal tab of an audio input zone showing the correlated amplifier circuit

3. Double-click in the **Tag** field and tag each audio zone appropriately. For instance, tag the first audio zone **Zone 1 suites**.

   In Figure 19, 4 zones are used because there are 2 audio buses. The first 2 audio input zones, tagged **Zone 1 suites** and **Zone 1 other areas**, are correlated with the first amplifier circuit, tagged **Zone 1 audio bus**. The next 2 zones, tagged **Zone 2 suites** and **Zone 2 other areas**, are correlated with the second amplifier circuit, tagged **Zone 2 audio bus**.

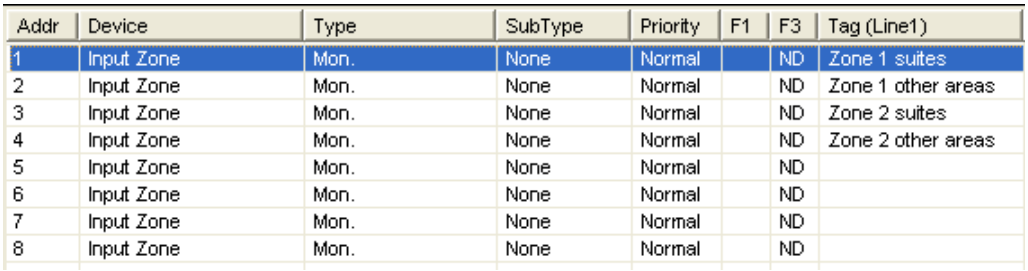


Figure 19 Audio input zones

4. For each pair of zones that are correlated with the same audio bus, correlate the first zone with the **suites** module, and the second zone with the **other areas** module:

   c. Right-click the first zone correlated with the bus, and then select **Add Correlations**.

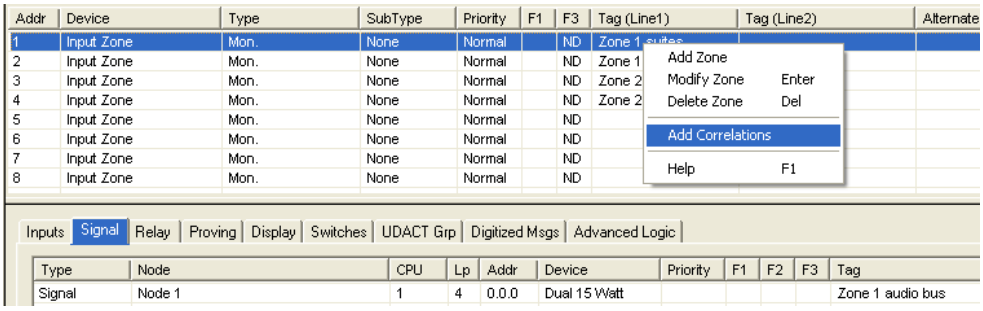


Figure 20 Audio input zone - Add Correlations

   d. In the **Add Correlations** window, select the **Signal** tab, then select the **Zone 1 suites** module, and then click **Add**.

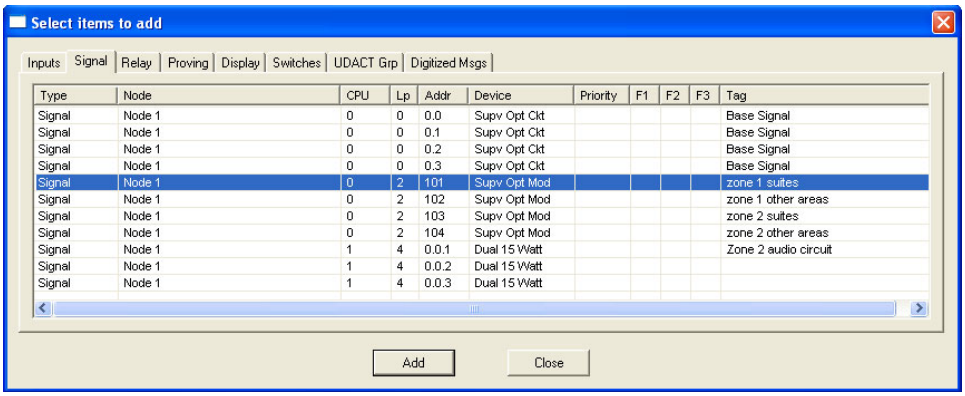


Figure 21 Audio input zone Add Correlations window - Signal tab

   e. Click **Close**.

   f. Right-click the second zone, and then select **Add Correlations**.

   g. In the **Add Correlations** window, select the **Signal** tab, then select the **Zone 1 other areas** module, and then click **Add**.

   h. Click **Close**.

   i. Repeat steps a to f for the next pair of zones correlated with an audio bus, but add the **Zone 2 suites** module to the first zone, and the **Zone 2 other areas** module to the second zone.

In Figure 22, the **Zone 1 suites** audio zone has been correlated with the **Zone 1 suites** module. It is already correlated with the **Zone 1 audio bus** by default.

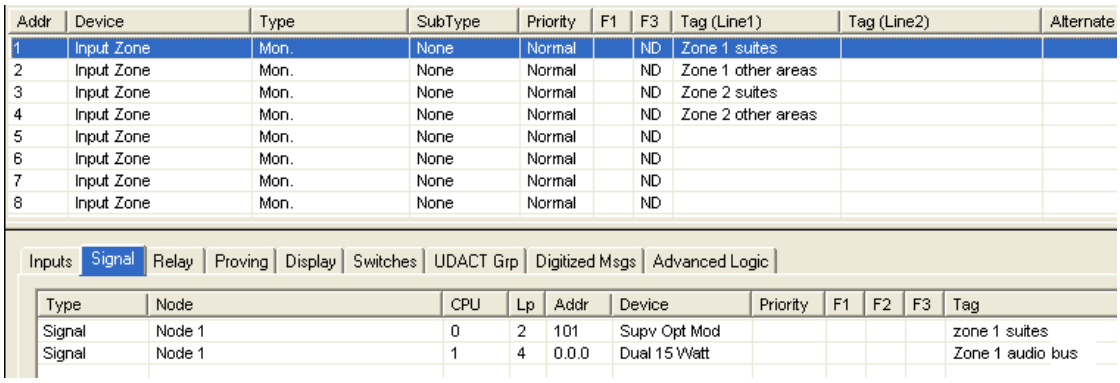


Figure 22 Final audio zone correlations

5.7 Correlate the Input Zones with Devices

1. Correlate each input zone that you created in 5.2 with the modules, amplifier circuits, and input devices that are located in that physical zone:

   a. Right-click the first input zone, and then select **Add Correlations**.

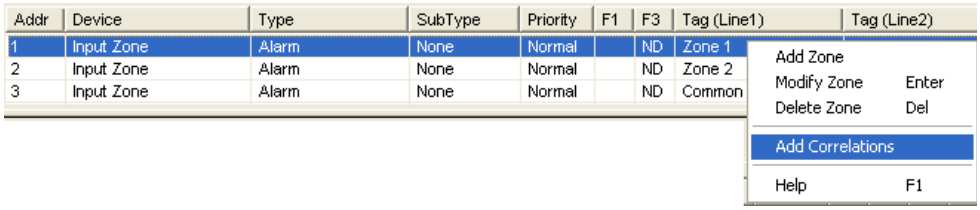


Figure 23 Input zones - Add Correlations

   b. In the **Add Correlations** window, select the **Inputs** tab, then select the **Zone 1** input circuit, and then click **Add**.

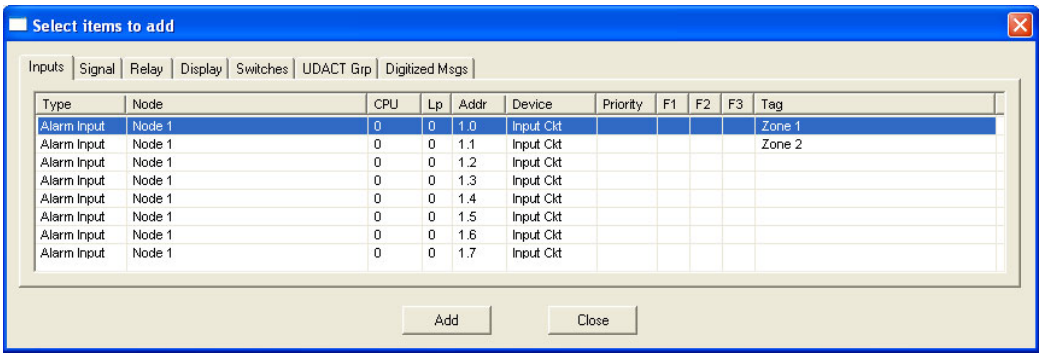


Figure 24 Input zone Add Correlations window - Inputs tab

   c. Select the **Signal** tab.

   d. Hold down the Ctrl key, then select the **Zone 1 suites** module, the **Zone 1 other areas module**, and the **Zone 1 audio bus**.

e. Click **Add**.

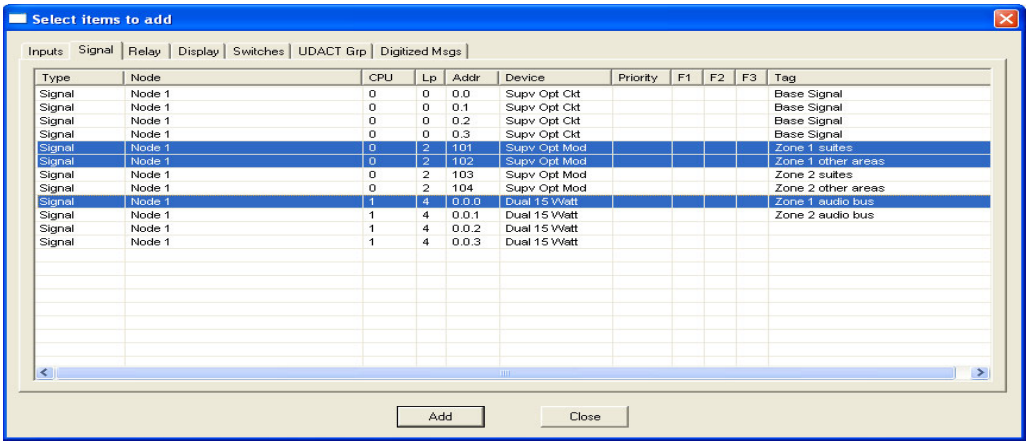


Figure 25 Input zone Add Correlations window - Signal tab

f. Click **Close**.

g. Repeat steps a to f for the second input zone, but add the **Zone 2** input circuit to the **Inputs** tab and add the **Zone 2 suites** module, the **Zone 2 other areas** module, and the **Zone 2 audio bus** to the **Signal** tab.

In Figure 26, the first input zone includes the **Zone 1 suites** module, the **Zone 1 other areas** module, the **Zone 1 audio bus** in the **Signal** tab, and the **Zone 1** input devices in the **Inputs** tab.

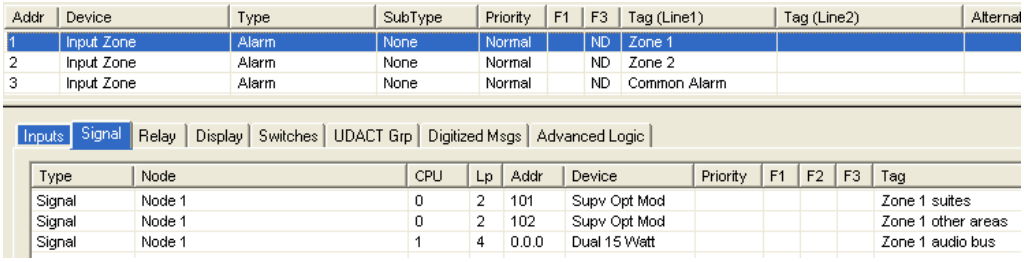


Figure 26 Final input zone correlations - Signal tab

5.8 Correlate the Common Alarm Input Zone

1. Right-click the Common Alarm input zone that you created in step 5.3, and then select **Add Correlations**.

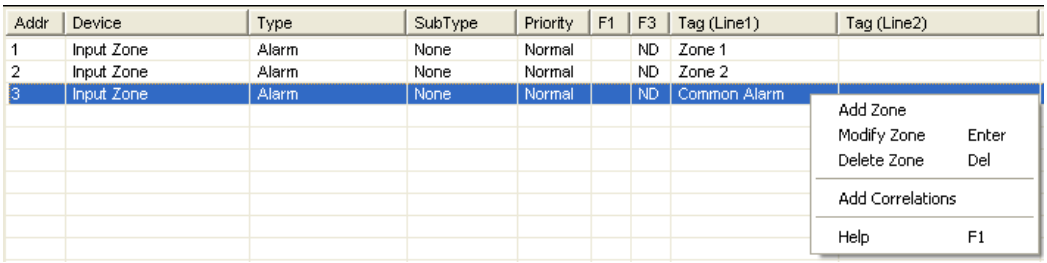


Figure 27 Common Alarm - Add Correlations

2. Click the **Signal** tab and add all the audio buses that you created in step 5.5.

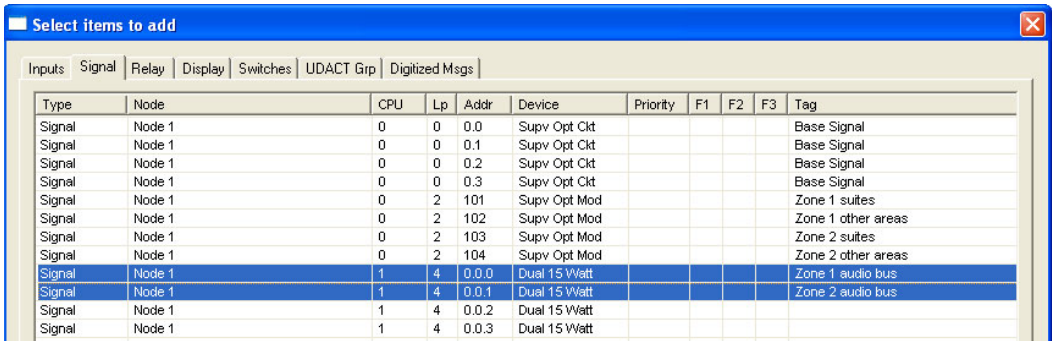


Figure 28 Common Alarm Add Correlations window - Signal tab

5.9 Set up Timers

1. Select **Job Details** in the job tree.
2. Set **New Alarm** to 60 seconds. After 60 seconds, the signals will stop in the correlated zones, except the zone where the alarm was initiated.
3. Set **Auto Resound** to 10 minutes. After 10 minutes, the alarm will sound in all the suites if it has not been acknowledged.
4. Set **Signal Silence Inhibit** to 60 seconds.
5. Set **Auto Signal Silence** to **Disabled**.

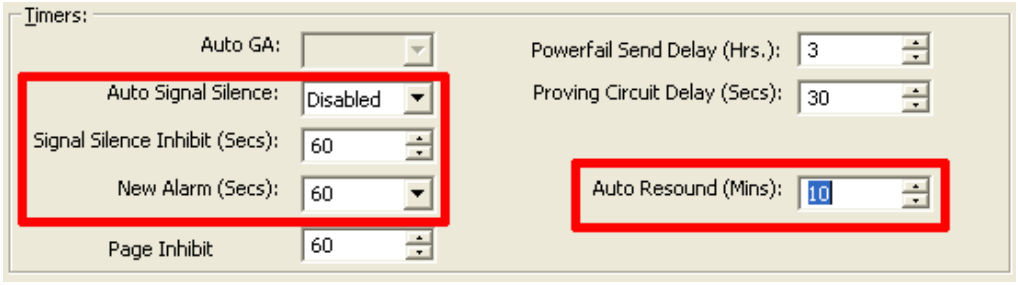


Figure 29 Timers

5.10 Correlate the System Statuses

1. In the job tree, select **Common System Status**.
2. Correlate **New Alarm Active** and **Auto Suite Resound** System Statuses to each monitor module that controls suites:
   a. Right-click **Auto Suite Resound**, and then select **Add Correlations**.

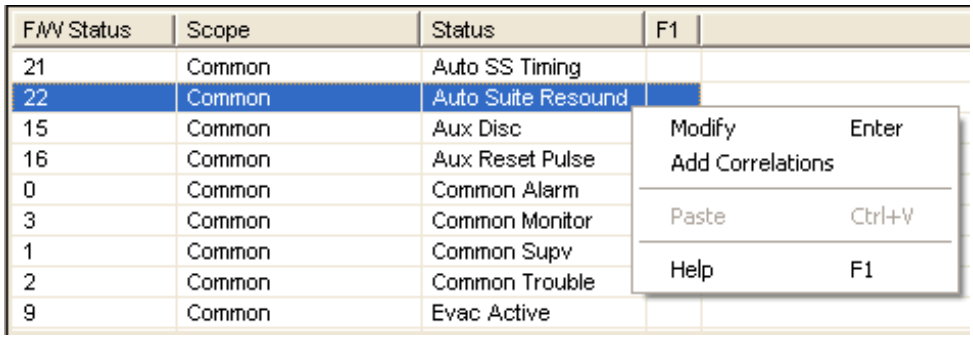


Figure 30 Auto Suite Resound - Add Correlations

   b. Hold down the Ctrl key and select each module that controls suites.

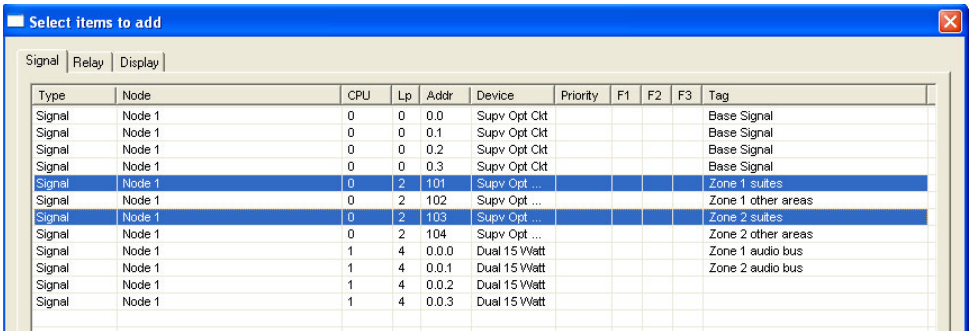


Figure 31 Auto Suite Resound Add Correlations window - Signal tab

   c. Click **Add**.
   d. Click **Close**.
   e. Right-click **New Alarm Active**, and then select **Add Correlations**.

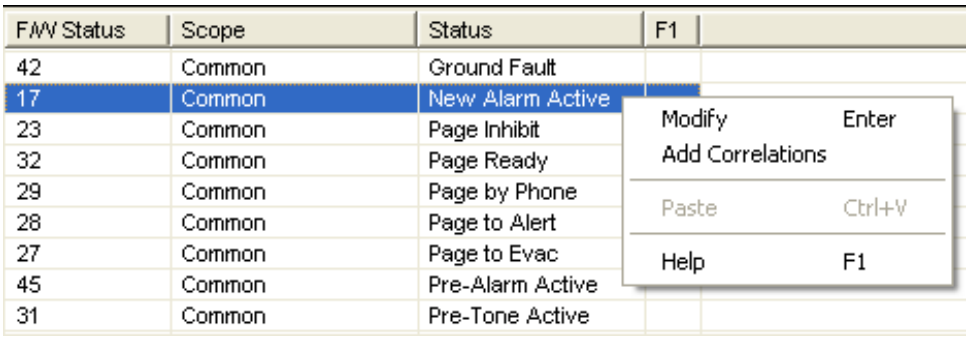


Figure 32 New Alarm Active - Add Correlations

   f. Hold down the Ctrl key and select each module that controls suites.
   g. Click **Add**.
   h. Click **Close**.

3. Correlate the **Common Alarm** System Status with each monitor module that controls other areas:

   a. Right-click **Common Alarm**, and then select **Add Correlations**.

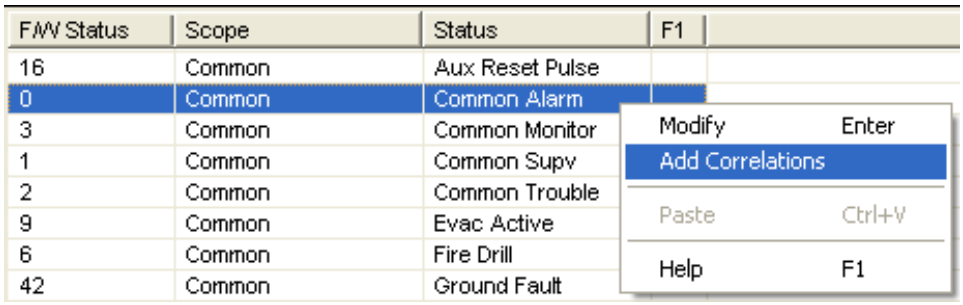


Figure 33 Common Alarm - Add Correlations

   b. Hold down the Ctrl key and select each module that controls other areas.

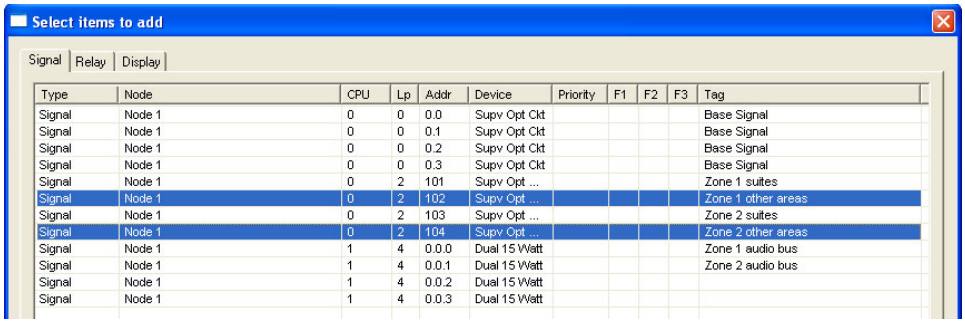


Figure 34 Common Alarm Add Correlations window - Signal tab

   c. Click **Add**.

   d. Click **Close**.

6.0 Troubleshooting

Table 1 Troubleshooting

Message on Display	when you press and hold the INFO button you see...	What it means
ZONE 1 AUDIO CIRCUIT	SPEAKER LINE TROUBLE NODE 1 BIN 0 SLT 0 #1	The bus for the signal modules has an open, short, or the end of line resistor is not installed correctly.
ZONE 1 SUITE	OPEN CIRCUIT TRB ND 1 LOOP2 ADDR 101	The signal module output circuit has an open or the end of line resistor is not installed correctly.
ZONE 1 SUITE	SHORT CIRCUIT TRB ND 1 LOOP2 ADDR 101	The signal module output circuit has a short. Ensure that the capacitors on class A circuits are not shorted.
POS. GROUND FAULT ACTIVE	CODE 1B ND 1 CPU 0 ND 1 LOOP2 ADDR 101	There is a ground fault on the audio circuits. **1B** means a ground fault on the bus or signal module output circuit. When the signal module output circuits have a negative ground fault, the panel displays a positive ground fault.

7.0 Testing

7.1 Testing Automatic Signal Silencing in Suites

1. Activate an alarm condition in one zone.
2. Ensure all speakers sound for 60 seconds.

- After 60 seconds, the suite speakers should silence for 10 minutes except for those in the zone that initiated the alarm.
- 11 minutes after the initial alarm, the silenced speaker resounds.

3. Repeat steps 1 and 2, and then queue the microphone.

- All silenced speakers should broadcast and return to silenced mode after push-to-talk is released.

4. Repeat steps 1 and 2, and then activate a subsequent alarm.

- All speakers should activate for 60 seconds and then return to silenced mode except for the zones that initiated the alarms.

If test 7.1 fails, review the configuration and ensure that the **New Alarm Active** status and **Auto Suite Resound** status are correlated to output modules that are assigned to suite speakers. Also ensure that the timers are adjusted appropriately on the **Job details** page.

7.2 Testing for Sound Distortion in Suites

1. Remove one speaker from the suite on floor level to create an open circuit.
2. Activate an alarm condition in one zone.

The primary and secondary paths of the class A circuit should continue to sound.

If the alternate path sounds distorted, ensure that the capacitors are secure and installed correctly on the output module.

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