



**FEDERAL SIGNAL CORPORATION**

Electrical Products

# **MODELS AR2000-M, AR2000-P AND AR2000-Z AUDIO ROUTER DEVICES**

## **INSTALLATION AND SERVICE INSTRUCTIONS**

**INSTALLATION AND SERVICE INSTRUCTIONS  
FOR  
MODELS AR2000-M, AR2000-P AND AR2000-Z, AUDIO ROUTER DEVICES**

**SAFETY MESSAGE TO INSTALLERS**

People's safety depends on your safe installation of our products. It is important to read, understand and follow all instructions shipped with this product.

Selection of mounting location for this device, its controls and routing of wiring should be made by the Facilities Engineer and the Safety Engineer. Listed below are other important safety instructions and precautions you should follow.

- This unit must be installed and maintained by a qualified electrician in accordance with the National Electrical Code (NFPA 70) or other national or local codes, under the direction of the local authority having jurisdiction.
- Do not connect this unit to system wiring when circuits are energized.
- For optimum sound distribution do not overload the output lines.
- All audio devices produce loud sounds which, in certain circumstances, may cause permanent hearing loss. Take appropriate precautions such as wearing hearing protection. Recommendations in OSHA Sound Level Standard (29 CFR 1910) should not be exceeded.
- After installation and completion of initial system test, provide a copy of this instruction sheet to all personnel responsible for operation, periodic testing and maintenance of this equipment.

**I. GENERAL.**

**1-1. GENERAL DESCRIPTION.**

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

The Model AR2000-M (see figure 1-1) Audio Router, is a UL listed and cUL certified central control device that is capable of routing a selected audio input to specific zones. It can control signals to speakers designed for 25Vrms line operation or 70Vrms line operation. It can also control 1Vrms signals intended to be amplified with a separate amplification device. The AR2000-M has a public address (PA) function so voice messages or instructions can be announced over the Audio Router system through an optional Model MSB-1 or MNC-1 Micro-

phone. The unit can also be used to play background music generated from an external source over the Audio Router system.

The Model AR2000-M is an audio multiplexing device. It is capable of handling two inputs from any of three different selected source voltages of 1, 25 or 70 volts. The unit has 8 selectable zones which either the A or the B source is routed to. There is an all call button that selects all zones. There are also 8 programmable presets on the unit. The presets are initiated by the front panel buttons or by remote contacts wired to the back panel. The front panel also has a monitor speaker jack. A microphone jack is also available for use with a MSB-1. The microphone has priority over the two user supplied sources. The telephone feature is protected by an 8 key password. Options available allow changing the password and recording a message for broadcasting. Commands entered via the telephone key pad allow the user to send a message to specified zones. The microphone and the telephone interface have the same priority. If the microphone is in use, the telephone interface is disabled. If the phone message system is in use, the microphone is disabled.

If more than eight zones or eight presets are needed by the user, a separate AR2000-Z (See Figure 1-2), zone unit, or AR2000-P (See Figure 1-3), preset unit is available. Each AR2000-Z or AR2000-P unit will add an additional eight zone or preset controls respectively. Up to seven additional Preset or Zone units may be added for a total of 64 zones and 64 presets.

The Model MNC-1 microphone is a hand held, noise canceling microphone that is ideal for use as a local microphone. The Model MSB-1 microphone (See Figure 1-4) is a base station type microphone designed for desktop operation.

The Model AR2000-M may be installed in indoor installations only as a rack mounted device.

The Model AR2000-M is a rack mount unit that will fit any standard 19" rack mount cabinet. The Model AR2000-M can be used for a variety of prioritized signaling purposes, such as playing background music, paging, start and dismissal, phone messaging and other communication applications. Additional advantages of the Model AR2000-M include economical system expansion and long term system flexibility.

The Model AR2000-M routes audio signals and applies them through zone outputs to the devices in the system. The AR2000-M connects easily with

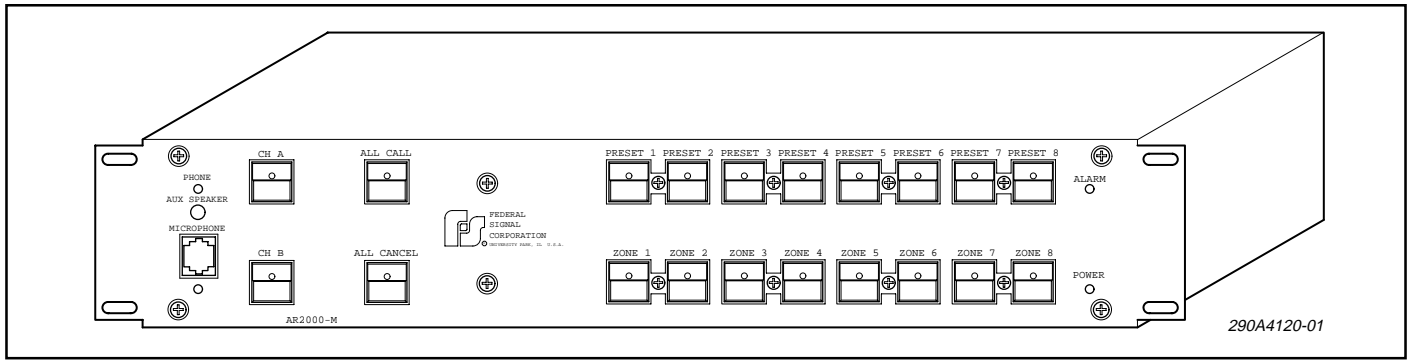


Figure 1-1.

Selectone amplified speakers. A Model AM25CK or AM70CK Connector Kit is required in each Selectone device to connect it to the signal line. The Audio Router device supplies 15W at either 25Vrms or 70Vrms. An additional amplifier must be supplied to obtain higher wattage levels. Care must be taken to ensure that the total line impedance of all the connected devices does not cause the line voltage to drop.

Each preset can be manually activated locally with its associated push button switch on the front panel or with a contact closure at the associated preset control input on the back panel. Whenever a preset is activated, either locally or remotely, its associated front panel push button LED illuminates to indicate that the preset has been activated. The LED remains lit until the preset is deactivated or the remote contact closure is removed. As an added feature, when a preset is remotely activated, the associated LED illuminates and flashes until the remote contact closure is removed. All AR2000-M controls are located on the front panel except gain adjustments which are made on the back panel during installation.

### Operation (normal mode)

Pressing the Channel A or Channel B button will immediately switch the input to that channel; the speaker indicator lights will indicate what speakers are connected. Pushing a speaker button will turn that speaker on or off; pushing a preset button will select speakers per that preset, and may also select Channel A or B (if that preset was configured for a specific channel). Keying the microphone while in this mode will cause the microphone signal

to be sent to the selected speakers; releasing the microphone will allow Channel A or B operation to resume.

Keying the Microphone button will allow the user to direct audio to specific zones (default is All-Call). The user may select zones using either individual speaker or preset buttons; Channel A or B operation will not be interrupted until the microphone is actually keyed. Releasing the microphone will allow Channel A or B to resume operation on its selected speakers.

Pressing the All Call button (whether the unit is in Microphone mode or Channel A/B mode) will cause all zones to be selected. Pressing any individual zone when All Call is lit, however, will cancel all the zones except that one.

Pressing All Call will perform the following function:

If all of the zones are not selected, "All Call" will select all 64 zones. Otherwise, pressing "All Call" will cancel all of the zones.

### Telephone operation

When the line attached to the Router is called, the router will answer with the Message "ENTER PASSWORD". The caller is required to enter their 8 digit password. The caller is given 2 chances to enter the correct password.

If the correct password is not entered, the caller hears the message "GOODBYE" and the system hangs up the phone line.

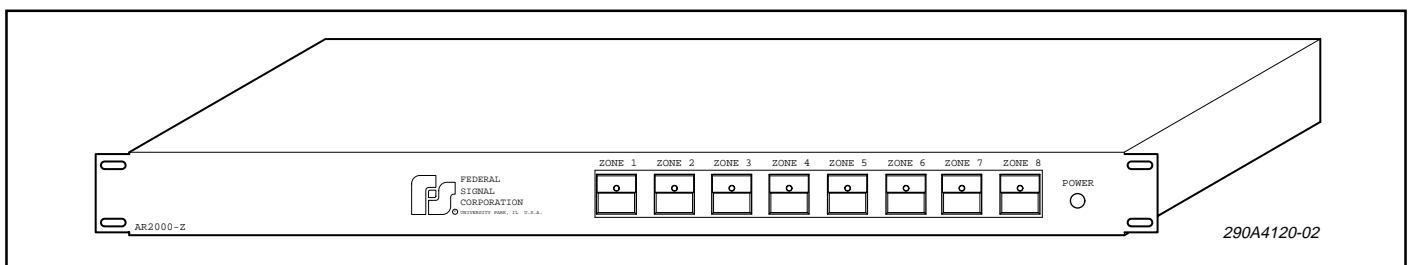


Figure 1-2.

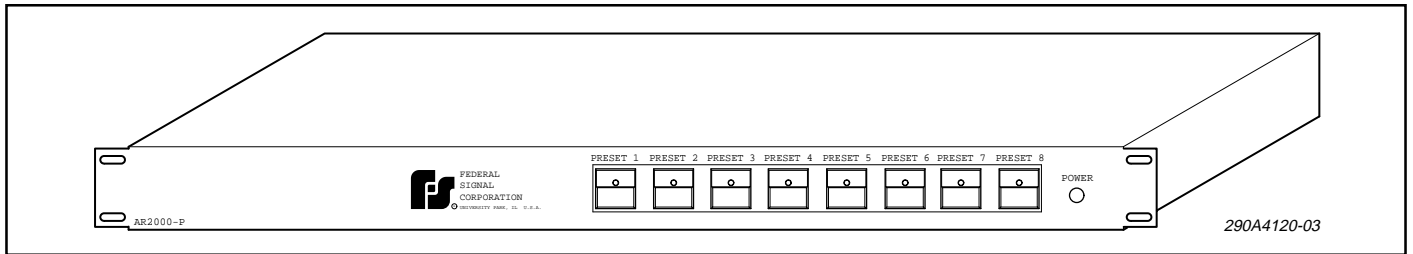


Figure 1-3.

If the correct password is entered the caller will hear the message “PRESS 9 KEY TO CHANGE THE PASSWORD OR 6 KEY TO RECORD A MESSAGE”.

If the caller presses the 9 key, the message “ENTER NEW PASSWORD” will inform the caller to enter a new password. The same new password must be entered twice. Otherwise, the caller will hear the message “PASSWORD NOT CHANGED” then the message “GOODBYE” and the system hangs up the phone line. If the new password is successfully entered twice, the caller will hear the message “PASSWORD CHANGED” then the message “GOODBYE” and the system hangs up the phone line.

If the caller presses the 6 key, the message “RECORD MESSAGE, PRESS # KEY TO BROADCAST YOUR MESSAGE” prompts the caller to start speaking. The message can be up to 90 seconds long. If the user exceeds 90 second duration, the message will not play back.

At any time during the call, the caller can enter the # key or hang-up the phone to exit. Also, when a key input is necessary, the caller has 5 seconds to enter a key or the system hangs up automatically.

The password can be returned to the default “12345678” by opening the cover of the Router and setting switch SW1 position #4 to the “ON” position for 5 seconds with the power “ON”.

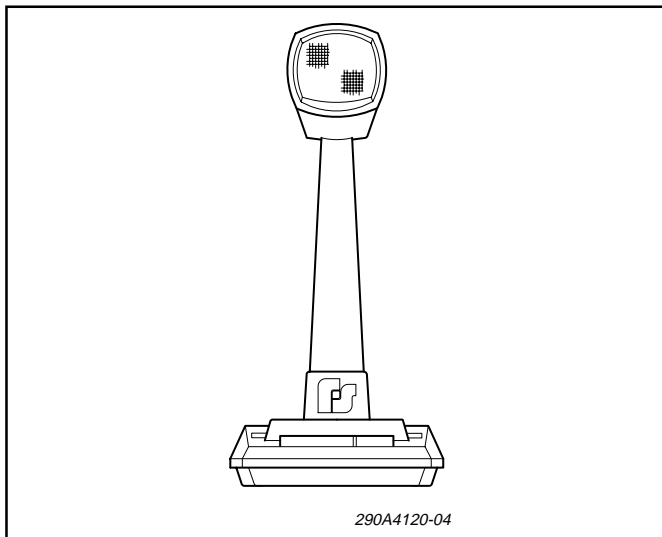


Figure 1-4.

Default is to all zones. Phone receiving is disabled during message playback; therefore, subsequent calls must wait for the current message to be completed before another recording will take place.

### Preset operation

The preset optos are a combination of edge and level-tripped. If the system sees an active edge on an opto, it will set the input and output relays for the corresponding preset. The relays will remain set until the input goes away.

Setting a Preset:

To set a preset, select the zones desired for the preset by pressing and releasing the appropriate zone button. The LED corresponding to that zone will illuminate. Select the input source (Channel A or Channel B) for that preset. Press and hold the appropriate preset button until it begins to flash. The preset is now set.

To recall a preset simply select the preset by pressing and releasing the associated preset button.

### 1-2. CHASSIS DESCRIPTION.

The Model AR2000-M is assembled in a black, sprayed aluminum 3-piece housing approximately 17.5" wide by 14.25" deep by 3.5" high. It is intended to be rack mounted in a standard 19" rack mount cabinet.

The housing is held together with eighteen screws, eight on the front panel, six on the rear panel and four securing the top to the sides.

The main printed circuit board is attached to the lower housing with seven screws. Separate wiring harnesses connect the front and rear boards to the main printed circuit board. The front panel switches are designated as CH A, CH B, ALL CALL, CANCEL ZONE 1 through ZONE 8 and PRESET 1 through PRESET 8.

The Model AR2000-P is assembled in a black, sprayed aluminum 3-piece housing approximately 17.5" wide by 10.125" deep by 1.75" high. It is intended to be rack mounted in a standard 19" rack mount cabinet. The housing is held together with

twelve screws, four on the front panel, four on the rear panel and four securing the top to the sides. The front panel switches are designated as PRESET 1 through PRESET 8.

The Model AR2000-Z is assembled in a black, sprayed aluminum 3-piece housing approximately 17.5" wide by 10.125" deep by 1.75" high. It is intended to be rack mounted in a standard 19" rack mount cabinet. The housing is held together with twelve screws, four on the front panel, four on the rear panel and four securing the top to the sides. The front panel switches are designated as ZONE 1 through ZONE 8.

### **1-3. CONTROL CIRCUITRY.**

#### *A. Control Circuitry.*

The control circuitry in the AR2000-M has a built-in priority level feature. The local microphone has the highest priority level when activated. If a preset is initiated by contact closure, the AR2000-M will grant that preset priority. The Audio Router will store the current selection first, then activate the preset. Once the contact closure is removed, the AR2000-M will return the system to the previous condition. Pressing cancel will deactivate any currently active selections.

#### *B. All CALL Pushbutton.*

The ALL CALL pushbutton switch selects and connects all zones to the currently selected input source. Pressing the ALL CALL again returns the system to the previous condition.

#### *C. CANCEL Pushbutton.*

The CANCEL pushbutton when pressed will reset all the manually activated signaling functions of the AR2000-M.

#### *D. MONITOR SPKR.*

A monitor speaker may be connected to the unit at this output. Audio to this output will exist during all conditions except when the microphone is in use. This prevents any feedback from the microphone.

#### *E. ADDITIONAL ZONES.*

An AR2000-Z may be connected to add on additional 8 zones of control. If desired, up to seven (7) total AR2000-Z units may be added to provide a total of 64 zones.

#### *F. ADDITIONAL PRESETS.*

An AR2000-P may be connected to add on additional 8 presets of control. If desired, up to seven (7) total AR2000-P units may be added to provide a total of 64 presets.

### **1-4. POWER.**

#### **WARNING**

In order to prevent power to the AR2000-M from being accidentally turned off, the unit has a power switch located on the back of the unit. Before performing any installation or maintenance, ensure that power is disconnected.

The front panel has a green LED to indicate the presence of primary power. It also has a red LED to indicate the presence of secondary power in use. The AR2000-M can be operated from either a 120VAC, 240VAC or a 24VDC power source. The AC power is connected via the power cord, which requires manual switching in order to operate. 24VDC Backup connects via the rear terminals directly underneath the 4-Amp, Bussman-type GMT indicating fuse.

#### **WARNING**

If this unit is to be connected to a non-power limited 24 volt dc supply, the National Electrical Code (NFPA 70) requires that those leads be separated from other classes of wiring connected to this unit.

The AR2000-P and the AR2000-Z obtain power directly from the AR2000-M.

### **1-5. AUDIO INPUTS.**

Channel A and Channel B inputs are provided in the back of the unit to couple standard 1 volt audio signal from a background music source such as a radio receiver, CD player or a tape player. The inputs can also be selected to accept a 25Vrms or 70Vrms input source. The Channel A input is selectable from the front panel by depressing the Channel A selection button. To select the Channel B input, depress the Channel B selection button on the front panel. Only Channel A or Channel B may be activated at one time. It is not possible to activate both Channel A and Channel B audio sources simultaneously.

### **1-6. MICROPHONE INPUT OPTION.**

A Federal Signal Model MSB-1 microphone can be connected directly to the AR2000-M via the modular jack provided on the front of the unit (highest priority).

### **1-7. TELEPHONE INPUT OPTION.**

A standard telephone line can be connected directly to the AR2000-M via the modular phone jack provided at the back of the unit. This allows the user to contact the AR2000-M via phone, record a message and deliver it to zones selected by the phone line user.

## 1-8. ELECTRICAL DETAILS.

Termination: Screw terminals for 13 AWG to 23 AWG conductors.

Voltage Range: Selectable 120 VAC or 240 VAC 50/60 Hz.

Battery backup: 24 VDC

Channel A input: Selectable to be 1 Vrms, 25 Vrms, or 70 Vrms

Channel B input: Selectable to be 1 Vrms, 25 Vrms, or 70 Vrms

Onboard Amplifier: 15 Watts maximum

Amplifier  
Output Voltage: Selectable to be 1 Vrms, 25 Vrms, or 70 Vrms

Frequency range: -3dB @ 150 Hz -3dB @ 12 kHz  
(no load) -6dB @ 85 Hz -6dB @ 24.8 kHz

Monitor Speaker  
output: 300mW typical @ 1 kHz, 8 ohm

Maximum switching  
current for each zone: 15 AMPS

## II. SPECIFICATIONS.

### 2-1. AR2000-M POWER INPUT.

Input Voltage	120V,50-60HZ
Standby Current	350 mA
Operating Current	2 A
Power Consumption	240 Watts
Input Voltage	240V, 50-60HZ
Standby Current	160 mA
Operating Current	1 A
Power Consumption	160 Watts

### 2-2. EMERGENCY POWER SOURCE INPUT.

Input Voltage	24 VDC
Standby Current	650 mA
Operating Current	4 A

### 2-3. AUDIO INPUT.

#### A. Local PA (Use optional Model MSB-1 microphone)

Input Impedance	5k Ohms
Input Voltage	16 mVrms (MAX)

#### B. Channel A / Channel B

Input Impedance	28.87 K ohms @ 1 Vrms position 22.67 K ohms @ 25 Vrms position 22.10 K ohms @ 70 Vrms position
Input Voltage	Selectable at 1Vrms, 25Vrms or 70 Vrms

### 2-4. AUDIO OUTPUTS.

#### A. Output Impedance

Balanced Sig. line	27 Ohms
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#### B. Output Voltage Levels no Load

Balanced Signal Line @70Volt position	70Vrms
Balanced Signal Line @25Volt position	25Vrms
Balanced Signal Line @1Volt position	1-20Vrms

### 2-5. REMOTE PRESET ACTIVATION CIRCUIT.

**NOTE:** It is recommended that the installer use shielded, twisted pair wire in order to minimize any false activation due to environmental noise.

Type	Dry Contact Closure
Line Impedance	1 K ohm (MAX)
Circuit Current	20 mA Max (12VDC)

### 2-6. REMOTE MIC. ACTIVATION CIRCUIT (PTT).

Type	Dry Contact Closure
Line Impedance	100 Ohm (MAX)
Circuit Current	10MA Max (12VDC)

## 2-7. RELAY CONTACT CLOSURE OUTPUTS.

Relays	
Type:	Dry Contact Closure
Rating:	15A maximum current per zone

## 2-8. FUSE.

F1	Type GMC 2A, 250V
F2	Bussman-type GMT 4A

## 2-9. PHYSICAL.

A. AR2000-M	
Weight	16 lb 8 oz. (7.5 kg.)
Dimensions (HWD)	3.5" x 17 3/8" x 14.25" 89mm x 442mm x 362mm
Case Material	14GA Aluminum
B. AR2000-P	
Weight 3 lb, 15 oz. (1.8 kg)	
Dimensions (HWD)	1.75" x 17 3/8" x 10.125" 44.5mm x 442mm x 257mm
Case Material	14GA Aluminum
C. AR2000-P	
Weight 3 lb, 15 oz. (1.8 kg)	
Dimensions (HWD)	1.75" x 17 3/8" x 10.125" 44.5mm x 442mm x 257mm
Case Material	14GA Aluminum

## 2-10. AGENCY APPROVALS.

### A. UL AND cUL Certifications.

UL 813, (AZJX) Commercial Audio and Radio Equipment, Systems and accessories  
C22.2 No. 1-98, (AZJX7) Audio, Video, and Similar Electronic Equipment

### B. CSA Certification-Pending

C22.2 No. 1-98, Audio, Video, and Similar Electronic Equipment

### C. FCC.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.



### III. INSTALLATION.

#### SAFETY MESSAGE TO INSTALLERS

Peoples lives depend on proper installation of our products. It is important to follow all instructions shipped with these products. These devices are to be installed by a qualified electrician in accordance with the National Electrical Code (NFPA 70), or other national or local codes, under the direction of the local authority having jurisdiction.

The selection of the mounting location for the device, its controls and routing of the wiring is to be accomplished under the direction of the Facilities Engineer and the Safety Engineer. In addition, listed below are some other important safety instructions and precautions you should follow:

- Read and understand all instructions before installing or operating this equipment.
- Do not connect this unit to the system when power is on.
- Speakers connected to this system can produce loud sounds which may cause, in certain situations, permanent hearing loss. You should take appropriate precautions such as wearing hearing protection.
- After installation, test the Audio Router sound system to ensure proper operation.
- Show these instructions to your Safety Engineer and then file them in a safe place and refer to them when maintaining and/or reinstalling the unit.
- Establish a procedure to routinely check the sound system for proper activation and operation.
- Consult the authority having jurisdiction in your area regarding the proper use and installation of this product.

#### 3-1. UNPACKING.

After unpacking the unit, examine it for damage that may have occurred in transit. If equipment has been damaged, do not attempt to install or operate it. File a claim immediately with the carrier stating the extent of the damage. Carefully check all envelopes, shipping labels and tags before removing or destroying them.

#### 3-2. MOUNTING ARRANGEMENTS.

The AR2000-M provides four (4) holes for mounting in a standard rack. It utilizes a space of 2U.

The AR2000-P provides four (4) holes for mounting in a standard rack. It utilizes a space of 1U.

The AR2000-Z provides four (4) holes for mounting in a standard rack. It utilizes a space of 1U.

#### 3-3. ELECTRICAL CONNECTIONS.

##### DANGER

To avoid electrical shock and damage to the device, do not attempt to connect wires when power is on.

Terminal blocks are supplied on the AR2000-M for field wiring. Strip 1/2" of insulation from the wiring leads. Attach the appropriate wires to the corresponding terminals. Tighten the screws to insure that the wires are firmly held in place. The terminals will accept conductor sizes 23 AWG to 13 AWG.

#### 3-4. SIGNAL LINES.

A. The signal lines transfer the tone signals and verbal messages from the AR2000-M to the selected zones and their devices. In order to reduce the possibility of cross talk, hum and static noise pick-up, the signal lines must be twisted pair, shielded audio cable. Although the majority of systems use AWG 18 shielded twisted pair audio cables, the size of the audio cable should be adjusted to correspond to the level of audio being routed in your application.

##### CAUTION

If too small a wire gauge is used, unacceptable signal voltage drop in the signal line will cause reduced sound output from the remote signal device. Only use a cable having wire gauge greater than 22AWG.

B. Federal does not recommend that new or existing telephone lines be used as signal lines in an Audio Router system for the following reasons:

1. Interference from other services or systems, or interference from the system to other services.
2. Cross talk, interference or hum induced by other telephone lines.
3. Extended downtime because of the second party involvement required to service the lines.
4. The additional cost of installation, interfacing devices and monthly charges as opposed to a one-time cost of performing the installation.

### 3-5. MODEL AR2000-M SIGNAL CONNECTIONS.

#### CAUTION

Crosstalk can occur between signal lines and power lines, causing confusing messages, which interfere with the capability of this equipment.

Do not install signal lines in the same conduit with power lines. Avoid routing signal lines on cable trays with high voltage power lines.

To connect the signal lines of the system to the AR2000-M, connect a color-coded shielded twisted pair of audio cables having conductors no smaller than 18 AWG to + and - of each zone output being utilized to the appropriate remote device(s). (See figure 3-1.) Every remote signaling device in the system will be connected in parallel to these lines. When connecting the remote devices in parallel to the signal lines, observe the correct polarity and install wire nuts over the connections.

**NOTE:** If using the supplied amplifier or an external amplifier, the output audio must be connected using appropriate wire from AUDIO OUT to AUDIO IN FROM EXTERNAL AMP. If using the on-board amplifier, directly connect the AUDIO IN FROM EXTERNAL AMP to the AUDIO OUT terminals on the back of the AR2000-M. See section 3-4 for recommended wire sizes.

### 3-6. CONNECTION TO REMOTE DEVICES.

Physically install the remote device(s); follow the installation instructions packed with the device.

#### A. 300GC, 300GCX, 300X, 302GC, 302GCX, 302X, 50GC, and 50GCB.

To connect these models to a 25Vrms or 70Vrms signal line, a Model AM25CK or AM70CK connector card must be used. See figure 3-1 and instructions below for the appropriate signal line voltage.

#### B. 70 Vrms Signal Line Application.

The AR2000-M has provision for connecting 70 Vrms line operated speakers to its output. Connect the 70 Vrms line at the terminals of Zone 1 – Zone 8 terminal block(s). Connect the speakers in parallel to this line using 70 Vrms line tap. This output is selected by setting the switch on the back of the

AR2000-M to the 70 Vrms position. The output audio must be connected using 16GA wire from AUDIO OUT to AUDIO IN FROM EXTERNAL AMP. The Gain may be adjusted using the AUDIO OUT VOLUME control knob.

#### C. 25 Vrms Signal Line Application.

The AR2000-M has provision for connecting 25 Vrms line operated speakers to its output. Connect the 25 Vrms line at the terminals of Zone 1 – Zone 8 terminal block(s). Connect the speakers in parallel to this line using 25 Vrms line tap. This output is selected by setting the switch on the back of the AR2000-M to the 25 Vrms position. The output audio must be connected using 16GA wire from AUDIO OUT to AUDIO IN FROM EXTERNAL AMP. The Gain may be adjusted using the AUDIO OUT VOLUME control knob.

#### D. Low Level Audio Output.

The AR2000-M also has provision for 1 volt audio output that can be switched to each zone for individual external amplification. This low level output is available at the same terminals as in B and C above. This output is selected by setting the switch on the back of the AR2000-M to the 1 Vrms position. The output audio must also be connected using 18-20GA wire from AUDIO OUT to AUDIO IN FROM EXTERNAL AMP. The Gain may be adjusted using the AUDIO OUT VOLUME control knob. It can also be connected to an analog fiber optic transmitter so that audio can be transmitted over a fiber optic link in an electrically noisy environment.

#### E. External Amplifier Connection for Alternate Power Audio Output.

The AR2000-M also has provision to connect an external amplifier, such as the Federal Signal HP440, to be switched to the corresponding zones. Set the Audio Router up as listed in D above. Connect the 1 volt AUDIO OUT to the audio input of another amplifier. The output audio must be connected using appropriate wire gauge for the application to the AUDIO IN FROM EXTERNAL AMP (See figure 3-2.) The Gain may be adjusted using the AUDIO OUT VOLUME control knob.

#### CAUTION

Careful attention should be paid in order to make sure orientation of the signal is not reversed.

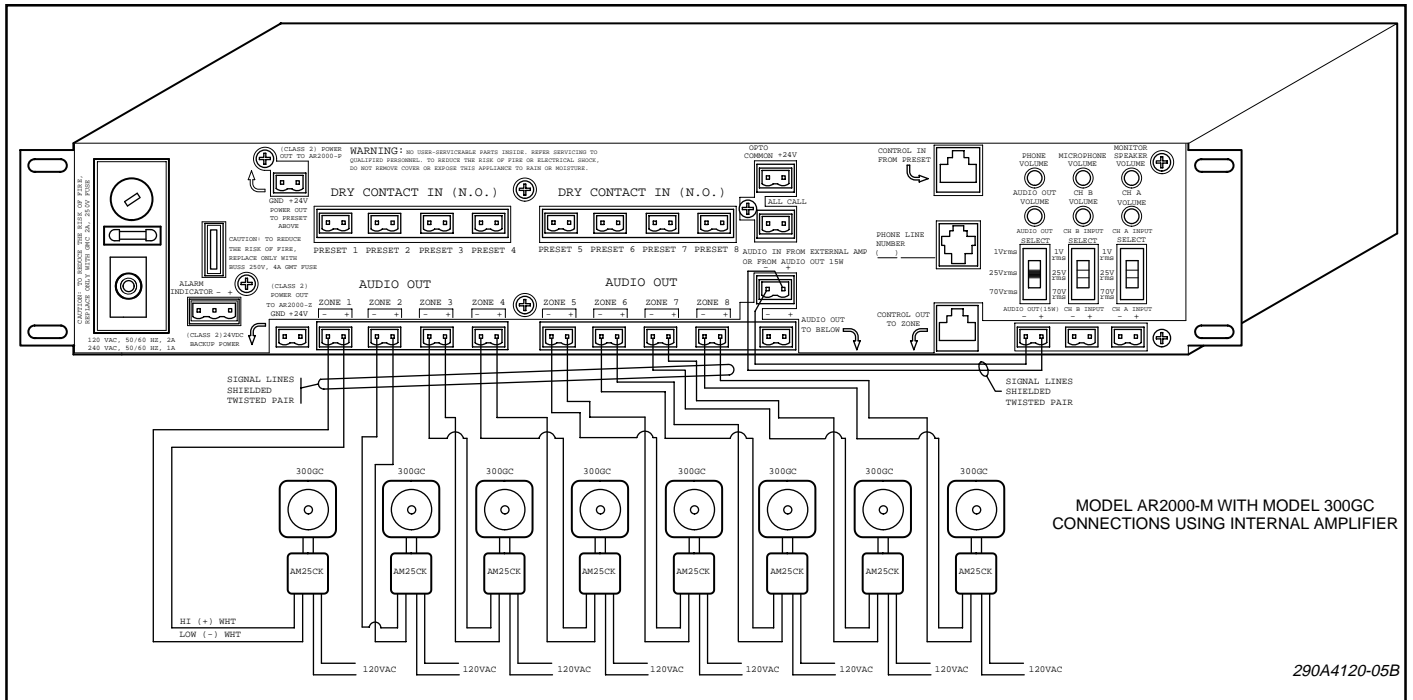


Figure 3-1.

### 3-7. POWER CONNECTIONS.

#### A. Local Power (see figure 3-3).

The two basic methods of supplying power to an Audio Router device are 120VAC 50/60Hz Local Power or 240VAC 50/60Hz Local Power and 24VDC Backup Power. The following paragraphs describe each method along with the advantages and disadvantages of each.

In this system, power is supplied to the AR2000-M device by connecting it to a 120VAC or 240VAC supply in the immediate vicinity of the device. An input selector switch is provided and must be set to the appropriate input voltage prior to turning the device on.

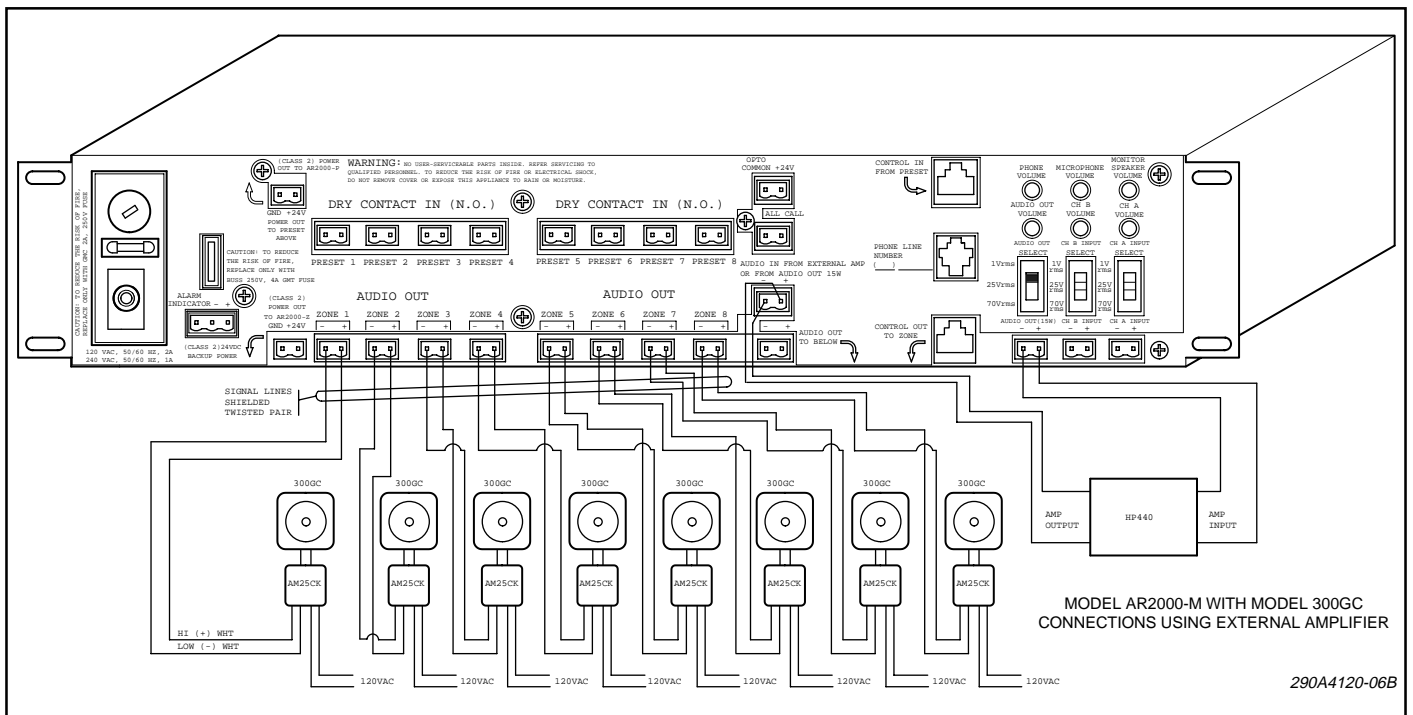


Figure 3-2.

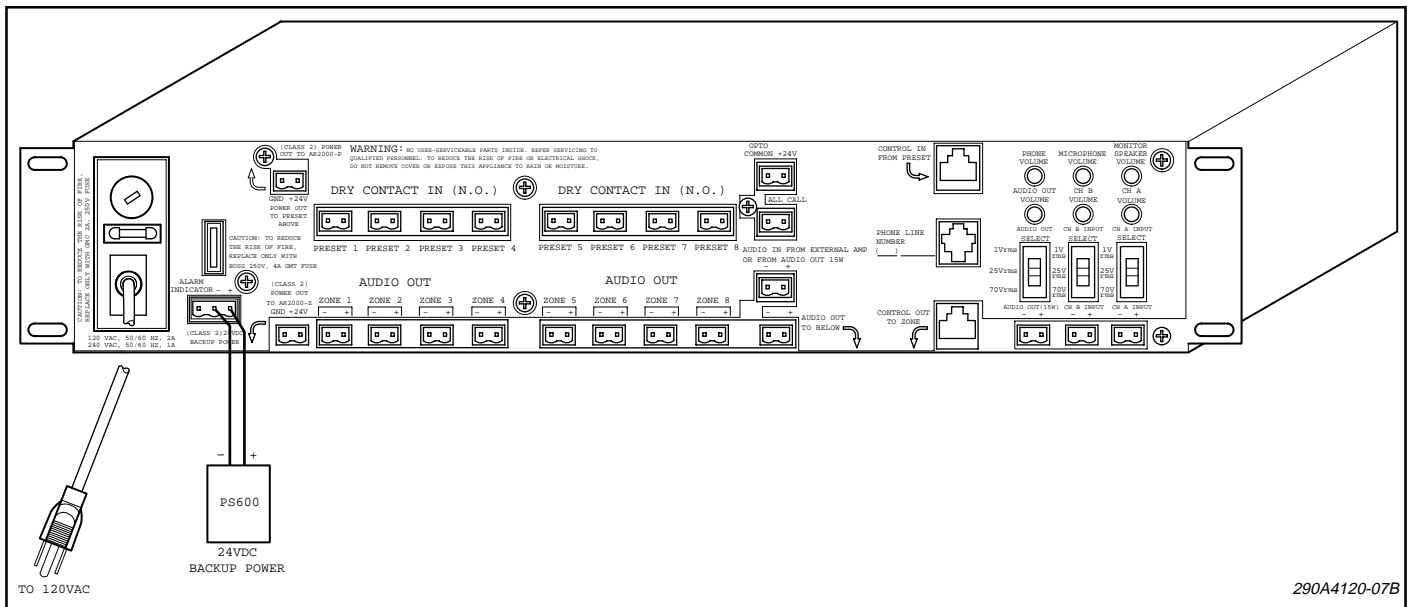


Figure 3-3.

**CAUTION**

Improper installation could render this system inoperable, interfering with the indicating nature of this product. The installation must conform to applicable local and/or National Electrical codes.

If an emergency power source is required, a backup power system described below should be employed.

**WARNING**

If the AR2000-M is to be connected to a non-power limited 24 volt dc supply, the National Electrical Code (NFPA70) requires that those leads be separated from other classes of wiring connected to this unit.

*B. Backup Power (See figure 3-3).*

1. General.

In the backup power system all of the local power lines are connected in parallel to one centrally located power source of 24VDC.

2. Advantages of the Backup Power System.

- a. The entire system may be independent of local line voltage.
- b. The entire system can be switched to an emergency standby power source in the event of a power failure.
- c. The central power system has the added advantage that an auxiliary power supply, such as the Federal Model PS600 can be used to

power the local Audio Router Device. If the PS600 is used, it is not necessary to switch the power source if a power failure occurs.

3. Disadvantages of Backup Power System.

- a. A separate power source for all remote devices is required. Heavy power lines are required from that power source to the remote devices in the system. The size of the power lines is dependent upon the number of amplifiers and the total distance of the power loop in order to minimize the voltage drop while a signal is being routed.
- b. Future expansion is limited by the current capacity of the power source and the power lines that were initially installed.
- c. Central power installations must comply with local electrical codes. Most power circuits are Class I circuits. Therefore, conduit will probably be required. Installation costs are higher than a local power system.

*C. AR2000-M System Power Connections.*

**DANGER**

Installation with the system power on could cause serious injury or death. Do not perform any installation or maintenance on this system when power is on. Ensure that the power is disconnected before proceeding.

**WARNING**

This device is to be installed by a trained electrician who is thoroughly familiar with the national electrical code (NFPA 70) and local codes and will follow the guidelines.

## WARNING

If this unit is to be connected to a non-power limited 24 volt dc supply, the National Electrical Code (NFPA70) requires that those leads be separated from other classes of wiring connected to this unit.

## CAUTION

Cross talk, interference, or hum can be induced in signal lines, causing poor audio output or confusing messages, which interferes with the capability of this equipment. Do not install power lines in the same conduit as signal lines.

Operating power is connected to AR2000-M by merely inserting the plug end of the line cord into any standard 120 volt, 60 Hz outlet. The AR2000-M is factory set for 120VAC 50/60Hz operation. If 240 volt operation is preferred, the input block provides a switch that must be set to this position in order to function at 240 VAC operation.

If it is desired to use 24 VDC either as a primary or auxiliary source of power, connect the “+” terminal of 24 volt DC power supply to the “+” terminal at the 24VDC BACKUP POWER terminal on the AR2000-M and “-” terminal of the 24 VDC power supply to the “-” terminal at the 24VDC BACKUP POWER terminal on the AR2000-M located in the back of the device. (See figure 3-3.)

### D. AR2000-P and AR2000-Z Power Connections.

Operating power is connected to AR2000-P and AR2000-Z by merely connecting 24 VDC from the AR2000-M to each unit. A terminal block is provided at the rear-left side of each unit for power connection. Observe and maintain proper polarity when wiring the power to these units. Connect the “+” terminal of the AR2000-M to the “+” terminal of the AR2000-P at the “+” terminal located in the back of device. Connect the “-” terminal of the AR2000-M to the “-” terminal of the AR2000-P at the “-” terminal located in the back of device. An additional 24VDC power outlet is provided on each AR2000-P and AR2000-Z for daisy-chaining the power to each sub-unit. Repeat for each AR2000-P and AR2000-Z.

Setup for the AR2000-P presets is done in the same way as the AR2000-M presets. (See figure 3-4.)

Setup for the AR2000-Z zones is done in the same way as the AR2000-M. An audio input is provided on each unit to be routed to each of the zones it selects. This audio should be connected by wiring a connection from the master audio output to the provided input terminals. (See figure 3-5.) Each additional AR2000-Z should obtain audio in the same manner from the unit above. (See figure 3-5.)

## 3-8. CONNECTIONS TO REMOTE SWITCHES.

The AR2000-M presets can be activated remotely by any normally open low current switch contacts having a current capacity of at least 50 mA inductive. Figure 3-6 illustrates the connection of switch contacts to the AR2000-M. S1, S2, S3 and S4 represents remote switch contacts such as those found in flow switches, program clocks, heat detectors, and smoke detectors. The remotely activated presets function as long as the activating contacts remain closed. A jumper needs to be placed across OPTO COMMON and the provided +24V terminal next to it on the back of the AR2000-M in order for the remotely activated presets to function. A remote switch may be connected to the ALL CALL position if desired. These are all Normally Open contacts that initiate with contact closure and remain active until the contact is opened again.

## 3-9. INPUT SOURCE CONNECTIONS.

### WARNING

Installation or maintenance on AR2000-M when power is on can result in serious injury or death. Do not perform any installation or maintenance to the system when power is on.

Set selector for CH A to the appropriate input voltage, 1Vrms, 25Vrms or 70Vrms. Connect the “+” of the source device to the “+” terminal at the Channel A input. Connect the “-” of the source device to the “-” terminal at the Channel A input. Repeat this process for the Channel B input. CH A and CH B volume controls are available just above each input selector to allow the input gain to be adjusted.

### CAUTION

Be certain to set the input selector switch to the appropriate input voltage to avoid damage to the unit and the device being connected.

## 3-10. COMMUNICATION CONNECTIONS for AR2000-P and AR2000-Z.

### WARNING

It is important that the communication lines be properly connected to their respective communication port. Failure to connect the cables properly will damage the devices and possibly render them inoperable.

The label on the back of each device indicates where the communication cable link should be connected. See figure 3-6 for appropriate placement.

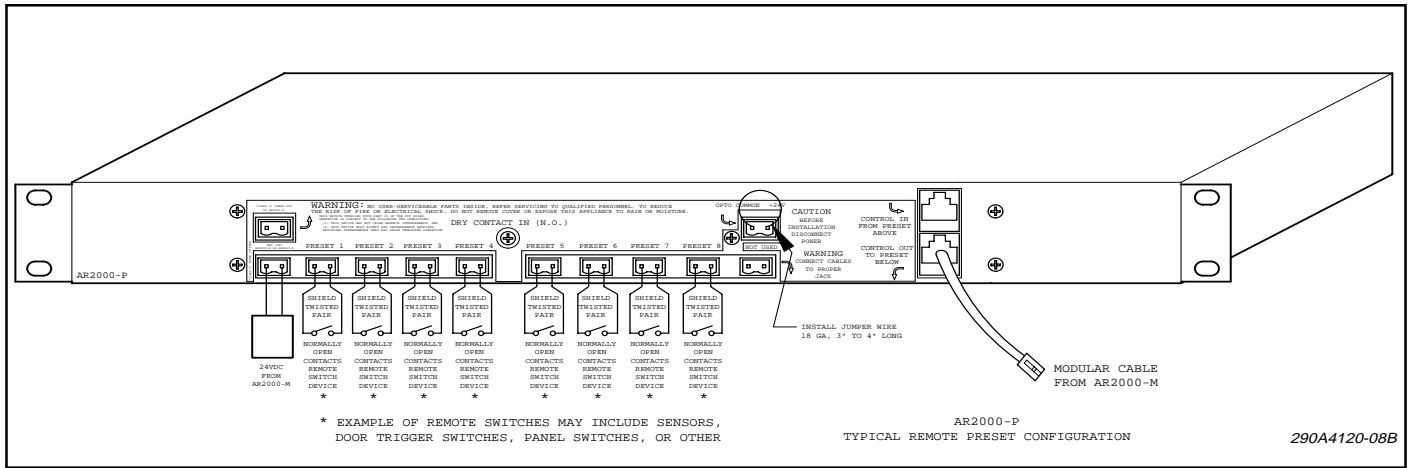


Figure 3-4.

**A. Connecting a Model AR2000-Z.**

Using the provided 8 position modular cable, connect the bottom communication port of the AR2000-M to the top port of the AR2000-Z. (See section 3-7 part D for an explanation of the power connection to this unit.)

**B. Connecting a Model AR2000-P.**

Using the provided 8-position modular cable, connect the top communication port of the AR2000-M to the bottom port of the AR2000-P. (Refer to paragraph 3-7.D. for an explanation of the power connection to this unit.)

**3-11. TYPICAL CONNECTION EXAMPLES**

**A. Connecting a CD Player to the Audio Router.**

Disconnect power from the AR2000-M.

Decide which channel will get the CD player connected to it. Using CH A as an example, set the voltage selector for the Ch A input to the 1 Vrms position. Connect the “+” input of CH A to the “+” output of the CD player. Connect the “-” input of CH A to the “-” output of the CD player. (See figure 3-7.) An input level adjust exists just above the input selector switch for each input channel. Adjust the input level as needed.

**B. Connecting a 300VSC-1044-1 or 300MB to the Audio Router.**

Disconnect power from the AR2000-M. Connect the output of either device to the CH B input in the same manner as detailed for the CD player. Be sure to set the input voltage selector to the appropriate voltage. (See figure 3-7.)

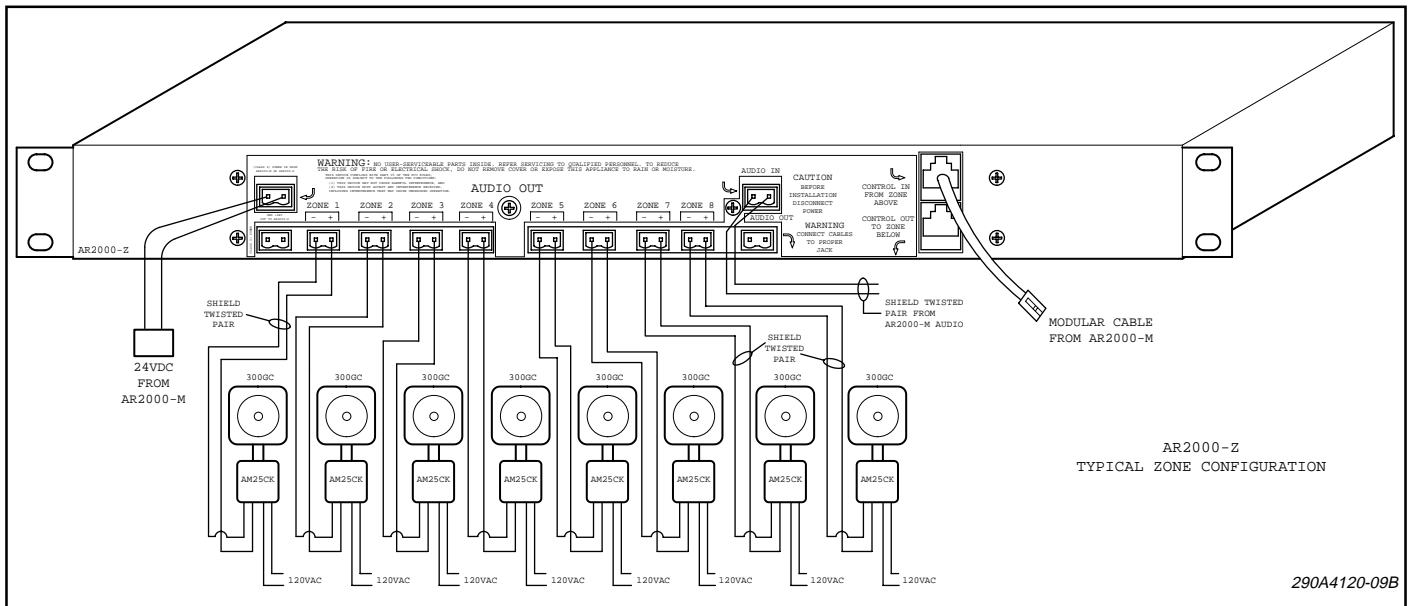
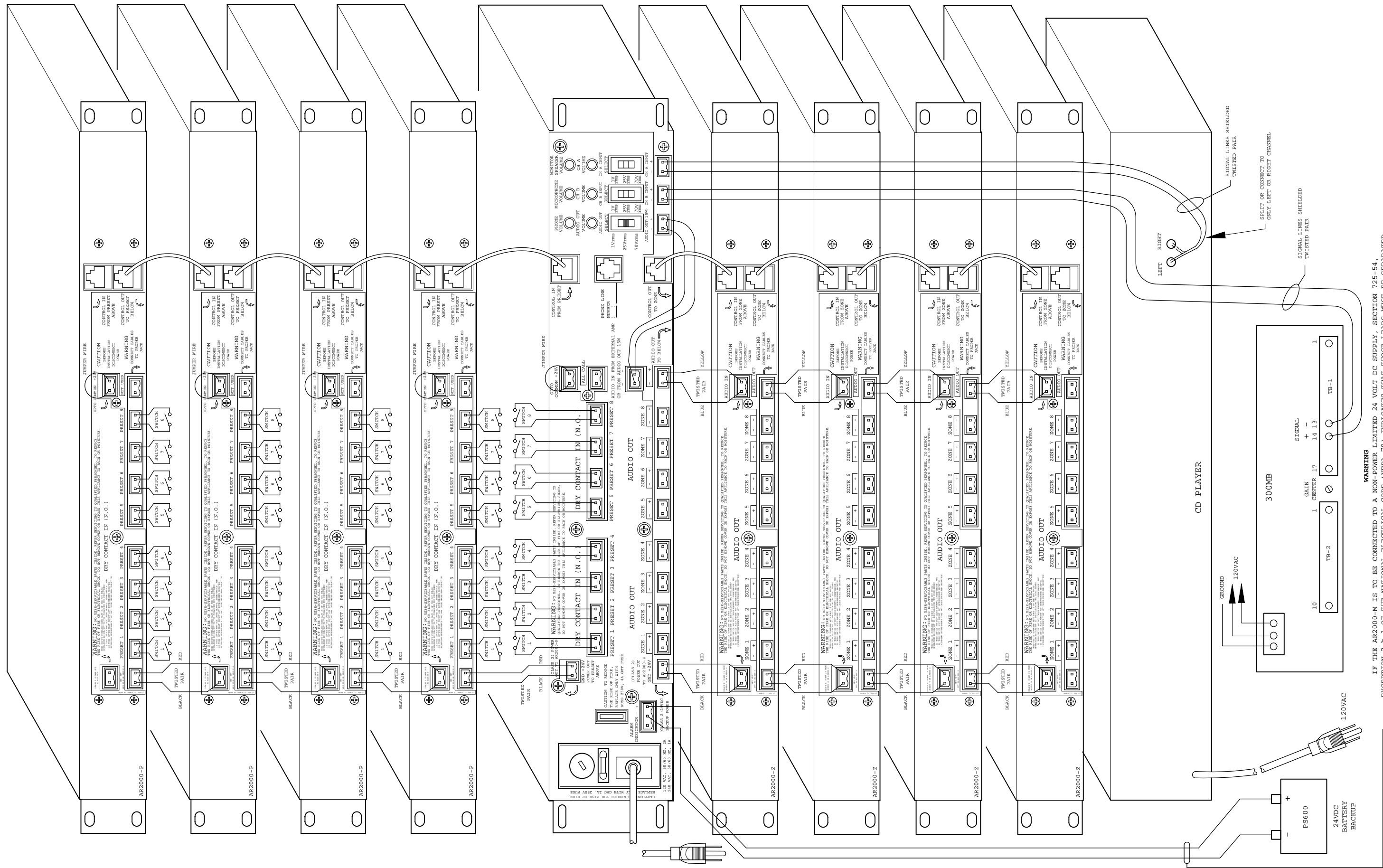


Figure 3-5.



**WARNING**  
 IF THE AR2000-M IS TO BE CONNECTED TO A NON-POWER LIMITED 24 VOLT DC SUPPLY, SECTION 725-54, EXCEPTION 2.D.1 OF THE NATIONAL ELECTRICAL CODE (NFPA 70) INDICATES THAT THOSE LEADS MUST BE SEPARATED BY A MINIMUM OF 0.25 IN. (6.35mm) FROM ALL OTHER CONDUCTORS CONNECTED TO THIS EQUIPMENT.

Figure 3-6.

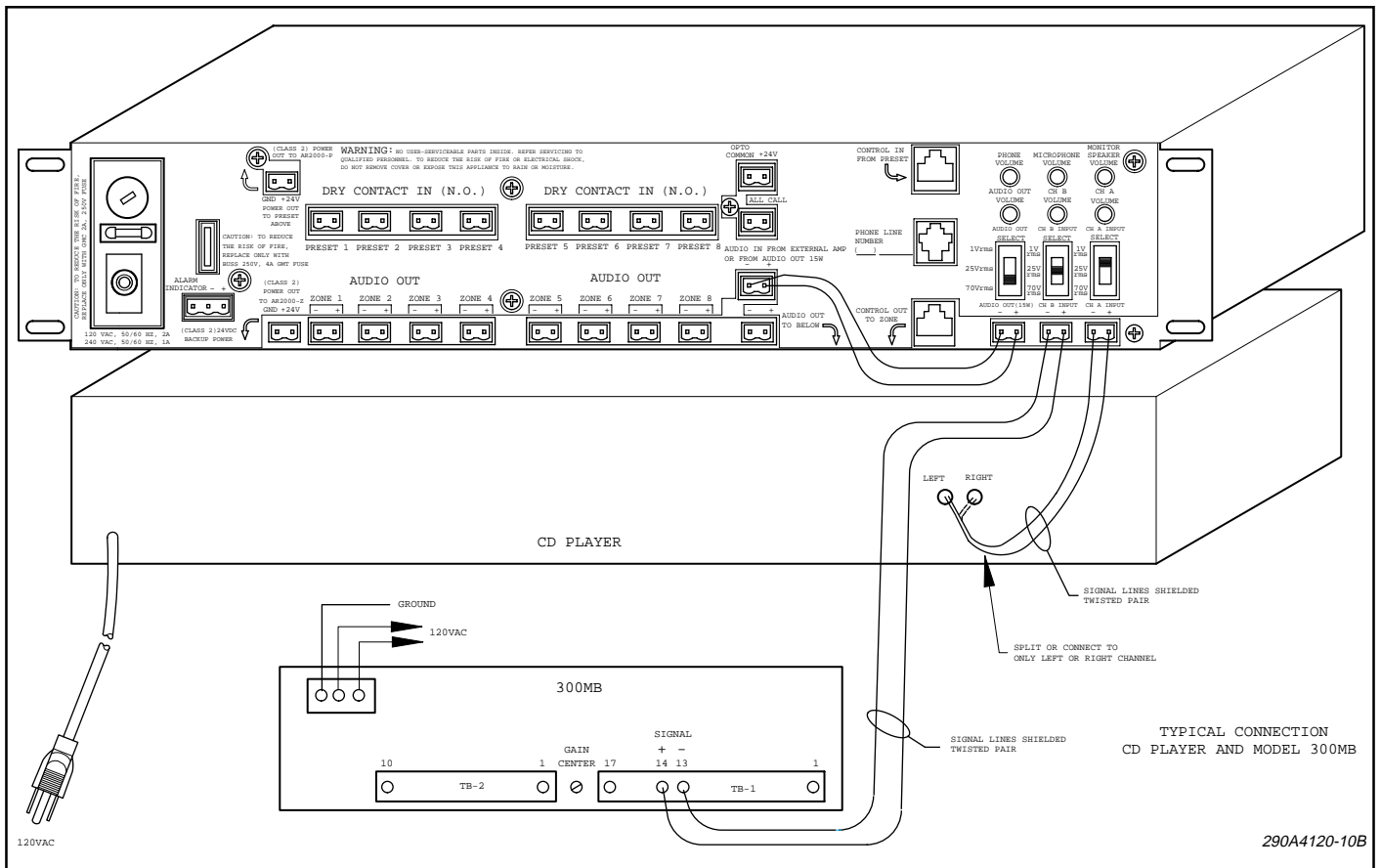


Figure 3-7.

**IV. TESTING/OPERATING.**

**WARNING**

Failure to follow all safety precautions and instructions may result in property damage, serious injury, or possible death to you or others.

**WARNING**

Under certain conditions these devices are capable of transferring sound loud enough to cause hearing damage. Adequate hearing protection should be worn if standing within close proximity to the device while testing. Recommendations in OSHA Sound Level Standard (29CFR 1910) should not be exceeded.

**SAFETY MESSAGE TO OPERATORS**

Although your Multiplexing system is operating properly it may not be completely effective. People may not hear or heed your messages. You must recognize this fact and ensure that your messages achieve their intended effect through proper test and training sequences suitable for your specific application(s).

**4-1.** After completion of installation be sure to test the system to verify that each unit operates satisfactorily.

**4-2.** Provide a copy of these instructions for the Safety Engineer(s), System Operators(s) and Maintenance personal.

**4-3. TELEPHONE FUNCTION COMMANDS.**

*A. Changing the Password.*

When the line attached to the Router is called, the Router will answer with the message "ENTER PASSWORD". Enter your 8 digit password.

Then the caller will hear the message "PRESS 9 KEY TO CHANGE THE PASSWORD OR 6 KEY TO RECORD A MESSAGE".

Press the 9 key, the message "ENTER NEW PASSWORD" will inform the caller to enter a new password. The same new password must be entered twice. The caller will hear the message "PASSWORD CHANGED" then the message "GOODBYE" and the system hangs up the phone line.

The password can be returned to the default "12345678" by opening the cover of the Router and



setting switch SW1 to position #4 to the “ON” position for 5 seconds with the power “ON”.

#### B. *Recording a Message for Broadcast.*

When the line attached to the Router is called, the Router will answer with the message “ENTER PASSWORD”. Enter your 8 digit password.

Then the caller will hear the message “PRESS 9 KEY TO CHANGE THE PASSWORD OR 6 KEY TO RECORD A MESSAGE”.

Press the 6 key, the message “RECORD MESSAGE, PRESS # KEY TO BROADCAST YOUR MESSAGE” prompts the caller to start speaking. Say your message into the phone. Press [#] and hang up the phone. Your message will be sent to all zones connected to the Audio Router Device. The message can be up to 90 seconds long. If the user exceeds 90 second duration, the message will not play back. This is the procedure for selecting “All Call”.

#### C. *Abort a Message Without Sending it Anywhere.*

Hang up at any time without pressing [#].

#### D. *Send Your Message to a Specific Selected Zone or Zones.*

After saying the message, press any keys on the telephone keypad from 1-8. These correspond to the eight zones which are connected to the master AR2000-M unit. Pressing [1] will select Zone 1, pressing [5] will select Zone 5 and pressing [8] will select Zone 8.

For example: To send a message to only Zone 3 of the AR2000-M, after recording the message key in [3] and then press the [#] key. The message will be sent only to Zone 3.

For example: To send a message to Zone 3 and Zone 4 of the AR2000-M, after recording the message key in [3], key in [4] and then press the [#] key. The message will be sent to Zone 3 and to Zone 4.

If additional AR2000-Z units are connected, those Zones may also be individually selected. To accomplish this first key in [\*], then key in the bank number which is associated with the additional zones you desire to reference (2 –8) and then key in a Zone for that bank. A maximum of seven (7) additional Zone Banks may be added to the AR2000-M device. The master unit is designated as Bank 1.

For example: Keying in [\*], [1], [2] will select to send your message to zone 2 of Bank 1 (located in the master unit). The [\*] says you are about to select a Bank number and Zone. To send the message to Bank 1 Zones 1, 4, and 6, after recording a message key in [\*], [1], [1], [4], [6], [#] and hang up. The

message will be sent to Zones 1, 4 and 6 of the Master unit (Bank 1).

For example: If there is one AR2000-Z unit connected to the AR2000-M, then it is on Bank 2. To send a message to only Zone 4 of the AR2000-Z in Bank 2, key in the following after recording a message: key in [\*], [2], [4], and then press the [#] key and hang up. The message will be sent only to Zone 4 of Bank 2.

For example: If there are two AR2000-Z units connected to the AR2000-M, then they are on Bank 2 and on Bank 3. To send a message to Zone 4 of the AR2000-Z in Bank 2 and Zone 5 of the AR2000-Z in Bank 3, key in the following after recording a message: key in [\*], [2], [4] and key in [\*], [3], [5] and then press the [#] key and hang up. The message will be sent to Zone 4 of Bank 2 and Zone 5 of Bank 3.

For example: To send a message to Zone 6 from Bank 8 after recording a message, key in [\*], [8], [6] and then press the [#] key and hang up. The message will be sent to Zone 6 of Bank 8.

For example: To select Zones 1,3,5 from Bank 2 and Zones 1, 2 from Bank 3, key in the following after recording a message: key in [\*], [2 ], [1], [3], [5], [\*], [3], [1], [2], [#] and hang up. The message will be sent to Zones 1, 3 and 5 of Bank 2 and Zones 1 and 2 of Bank 3.

#### E. *Send Your Message to a Selected Preset.*

After recording a message, first key in [0 ], then the associated Bank number(1-8) and then the Preset number of that Bank (1-8). The zero indicates you are about to select a preset Bank and preset number. Only one preset may be selected for a message.

If additional AR2000-P units are connected, those Presets may also be individually selected. To accomplish this, first key in [0], then key in the Bank number which is associated with the additional Preset you desire to reference (2 –8) and then key in a Preset for that bank. A maximum of seven (7) additional Preset Banks may be added to the AR2000-M device. The master unit is designated as Bank 1.

To select preset 2 from Bank 2 after recording a message, key in [0], [2], [2] and then press the [#] key and hang up. The message will be sent to Preset 2 of Bank 2.

To select Preset 3 from Bank 8 after recording a message, key in [0], [8], [3] and then press the [#] key and hang up. The message will be sent to Preset 3 of Bank 8.

Telephone operation is essentially independent of other operations except when the device plays its recorded message. Whatever modes were active before phone operation will return when the phone message is complete. In the event that the unit is stuck in playback mode and needs to be disconnected, press and hold the "All call" button for 1 second to force a disconnect.

## **V. MAINTENANCE**

### **SAFETY MESSAGE TO MAINTENANCE PERSONNEL**

Failure to follow all the safety precautions and instructions may result in property damage, serious injury, or death to you or others.

- Read and understand all instructions before performing maintenance on this unit.
- Do not perform maintenance on this unit when the circuit is energized.
- Periodic checks should be made to ensure that effectiveness of this device has not been reduced.
- Any maintenance to this unit **MUST** be performed by a trained electrician in accordance with the National Electrical Code (NFPA 70) or other national or local codes.
- Never alter this unit in any manner. Safety may be jeopardized if alterations are made to this device.
- The nameplates, which may contain cautionary or other information of importance to maintenance personnel, should not be obscured by painting or anything of the like.

### **WARNING**

Unauthorized servicing of this unit may result in diminished performance and/or property damage, serious injury, or death to you or others. If a malfunctioning unit is encountered, do not attempt any field repair or retro fit of parts. Refer to paragraph VI. SERVICE for instructions regarding return/repair of the unit.

## **VI. SERVICE.**

The factory will provide technical assistance with any problem that cannot be handled locally with satisfaction. Please call customer service for assistance (708) 534-3400.

Communication and shipments should be addressed to:

Federal Signal Corporation  
Electrical Products Division  
Service Department  
2645 Federal Signal Drive  
University Park, IL  
60466-3195