

SAFEPATH

Operation and Installation Manual

Models:
SAPE-1AB
SAPE-1AR
SAPE-2AB
SAPE-2AR

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Part Number A83361 Revision C


P83331

Thank you for using our products. Use this product according to this instruction manual. Please keep this instruction manual for future reference.

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Conventions Used in This Manual

This manual uses the following conventions for notes, cautions, and warnings.

NOTE: All **CAUTIONS** and **WARNINGS** are identified by the symbol . All warnings are printed in bold capital letters.



CAUTION: Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It may also be used to alert against unsafe practices.



WARNING: INDICATES A POTENTIALLY HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, COULD RESULT IN PROPERTY DAMAGE AND SERIOUS PERSONAL INJURY OR DEATH TO YOU AND OR OTHERS.

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P83331
SAFEPATH Manual
Rev. C April 1999


Preface

The SAFEPATH panel can provide playback only or record and playback capability, depending upon how the panel is configured. Panels configured with a DX-100 digital voice module have playback only capability. Panels configured with a DX-200 digital voice module have record and playback capability.

The SAFEPATH panel does not sense an emergency condition or hazardous fires; it is only a part of a system that does sense such conditions. The SAFEPATH panel, when activated by a control panel, provides a pre-recorded tone and/or voice message(s) to notification appliances. When used as part of a protective signaling system, the SAFEPATH panel must be properly connected to a compatible control panel that has been approved by a nationally recognized testing laboratory ("LISTED") and to LISTED compatible notification appliances for proper operation.

PERSONNEL PROPERLY QUALIFIED IN THE APPLICATION AND USE OF LIFE SAFETY EQUIPMENT ("QUALIFIED PERSONNEL") MUST READ THIS MANUAL CAREFULLY BEFORE PERFORMING ACTIONS TO SPECIFY, APPLY, INSTALL, MAINTAIN AND OPERATIONALLY TEST SAFEPATH PRODUCTS IN ACCORDANCE WITH THE INSTRUCTIONS IN THIS MANUAL.


The SAFEPATH panel has been Listed by UL as a four circuit panel. Each message must be recorded on each output channel and then selected to play through each output circuit when required.

 **WARNING: IF SAFETY PRECAUTIONS, INSTALLATION AND TESTING INSTRUCTIONS ARE NOT PERFORMED PROPERLY, THE SAFEPATH PANEL MAY NOT OPERATE IN AN EMERGENCY SITUATION WHICH COULD RESULT IN PROPERTY DAMAGE AND SERIOUS INJURY OR DEATH TO YOU AND/OR OTHERS.**

- **DO NOT** assume any installation, operation and testing details not shown in this manual.
- The SAFEPATH panel should only be operated with **covers** properly **in place**.
- **KEEP THIS MANUAL WITH THE SAFEPATH PANEL FOR FUTURE REFERENCE** for the life of the system and make it available to all qualified personnel who operate, test, maintain, or service SAFEPATH products. We strongly recommend that such personnel read and understand the entire manual.

The SAFEPATH panel WILL NOT WORK WITHOUT POWER. The SAFEPATH panel is powered by 120VAC. Back-up power is provided by 24VDC batteries. If both sources of power are cut off for any reason, the SAFEPATH panel will not provide the desired tone and/or voice warning.

WHEELOCK EXPRESSLY DISCLAIMS ALL LIABILITY FOR THE CONTENT, CLARITY AND LANGUAGES OF, AND OUTPUT CHANNEL AND PRIORITY LEVEL ASSIGNED TO, ANY AND ALL MESSAGES. IT IS ESSENTIAL THAT YOU HAVE MESSAGE CONTENT AND LANGUAGE, SEQUENCE, OUTPUT CHANNEL AND PRIORITY ASSIGNMENTS REVIEWED AND APPROVED BY QUALIFIED LEGAL AND SAFETY ADVISORS, QUALIFIED REPRESENTATIVE(S) OF OWNER(S) AND USER(S), AND AUTHORITIES HAVING JURISDICTION.

 **CAUTION:** The SAFEPATH printed circuit boards are sensitive to static electricity and have delicate components mounted on them. Before handling either a board or any component on a board, discharge any static electricity from your body by touching a grounded object such as a metal screw which is connected to earth ground. Handle the board by its edges, and be careful not to twist or flex it. The SAFEPATH panel is to be installed in a static free area and the user is to properly attach grounded wrist straps before touching any static sensitive areas. After handling SAFEPATH printed circuit boards, the SAFEPATH panel should be tested in accordance with the "System Checkout" section of this "Installation" section of this manual to verify that the printed circuit boards are undamaged and functioning properly.

COMPLY WITH ALL OF THE LATEST APPLICABLE CODES, REGULATIONS, LAWS, STANDARDS, GUIDELINES.

For emergency, hazardous, security, life safety and fire protective signaling system applications, the SAFEPATH products must be used within their published specifications and only with a LISTED compatible control panel in accordance with sound engineering judgment and the instructions of the manufacturer and in accordance with local, state and federal codes, regulations and laws. The SAFEPATH products must be PROPERLY specified, applied, installed, operated, maintained and operationally tested in accordance with these instructions at the time of installation and at least twice a year or more often as required by local, state and federal codes, regulations and laws. Installation, testing and maintenance must be performed by qualified personnel for proper operation in accordance with all of the latest National Fire Protection Association (NFPA), Underwriters' Laboratories (UL), National Electrical Code (NEC), Occupational Safety and Health Administration (OSHA), local, state, county, province, district, federal and other applicable building and fire standards, guidelines, regulations, laws and codes including, but not limited to, all appendices and amendments and the requirements of the local authority having jurisdiction (AHJ).

 **WARNING: IF THE PROTECTIVE SIGNALING SYSTEM SOUNDS AND/OR FLASHES, IT IS A WARNING OF A POSSIBLY SERIOUS SITUATION AND REQUIRES YOUR IMMEDIATE ATTENTION.**

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

For the SAFEPATH panel to properly operate, it must be properly connected to a listed compatible and properly operating control panel that controls its activation. The operation and electrical ratings of such control panel must be compatible with the SAFEPATH panel, and all equipment must be properly interconnected and operating. The installer must check compatibility before installation; otherwise, the SAFEPATH panel and/or the control panel may be damaged and/or fail to operate in an emergency situation.

Each manufacturer's fire alarm control panel, and notification appliance operates differently and has different features. Before specifying, installing, operating, testing, maintaining or servicing a system, carefully read the installation, operation and testing manual for each piece of equipment and applicable codes.

Request that the local authority having jurisdiction inspect the proposed placement of the notification appliances and receive their approval.

The output of the audio system may not be heard in all cases. Sound can be blocked or reduced by walls, doors, carpeting, wall covering, furniture, insulation, bed coverings, and other obstacles that may temporarily or permanently impede the output of the audio system. Sound is also reduced by distance and masked by background noise. The output of the audio system may not be sufficient to alert all occupants, especially those who are asleep, those who are hearing-impaired, those who are wearing devices that plug or cover the ears, and those who have recently used drugs or alcohol. The output of the audio system may not be heard by an alert person if the output device is placed in an area which is isolated by a closed door, or is located on a different floor from the person in a hazardous situation or is placed too far away to be heard over ambient noise such as, but not limited to, running water, traffic, air conditioners, machinery or musical appliances.

 **WARNING: AUDIBLE SIGNALS MAY MASK MEDICAL EQUIPMENT MONITORING ALARMS. WHERE MEDICAL EQUIPMENT MONITORING ALARMS ARE IN USE, DO NOT USE AUDIBLE SIGNALS; PROVIDE VISUAL NOTIFICATION APPLIANCES IN HIGHLY VISIBLE LOCATIONS.**

If audible tones and/or voice messages cannot be readily heard and understood clearly within the protected areas as intended, it is necessary to increase the number and/or sound output intensity of speakers within those areas so that they are heard and understood clearly when activated.

Notification equipment cannot last forever. Even though SAFEPATH is expected to last up to ten years, any of its parts or components could fail before then. Therefore testing of the entire protective signaling system, including the SAFEPATH panel, all notification equipment, as well as all messages and their output channel, and priority assignment, must be conducted at least twice each year, or more often as required by local, state and federal codes, regulations and laws, by qualified personnel. If the notification equipment is not working properly, immediately contact the installer and have all/any problems corrected immediately. Malfunctioning components should be replaced immediately. Do not attempt to repair malfunctioning components. Malfunctioning components should be returned for factory repair or replacement. In the event you cannot contact the installer, contact the manufacturer.



WARNING: CERTAIN HARDWARE FUNCTIONS ON THE SAFEPATH PANEL ARE NOT SUPERVISED. IF ANY SUCH HARDWARE FUNCTIONS FAIL, THE SAFEPATH PANEL MAY NOT PROVIDE THE INTENDED WARNING AND/OR NOT INDICATE A TROUBLE CONDITION.

THE FOLLOWING HARDWARE FAILURES WOULD PREVENT THE SAFEPATH PANEL FROM PROVIDING THE INTENDED WARNING:

- 1. THE "SHORT CIRCUIT" DETECTION CIRCUITRY FOR ANY ONE OR ALL OF THE EIGHT CONTACT INPUTS.**
- 2. THE SERIAL PORT RECEIVER.**
- 3. THE PLAY CONTACT FOR EACH OF THE FOUR OUTPUT CHANNELS.**

THE FOLLOWING HARDWARE FAILURES WOULD PREVENT THE SAFEPATH PANEL FROM INDICATING A TROUBLE CONDITION.

- 1. THE "OPEN CIRCUIT" DETECTION CIRCUITRY FOR ANY ONE OR ALL OF THE EIGHT CONTACT INPUTS.**
- 2. THE AUDIO SUPERVISION CIRCUITRY FOR EACH OF THE FOUR OUTPUT CHANNELS.**
- 3. THE STATUS CONTACT.**

THESE HARDWARE FUNCTIONS MUST BE PERIODICALLY CHECKED FOR PROPER OPERATION.

Additional copies of this manual may be obtained from the manufacturer.

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Introduction

SAFEPATH is a stand alone voice evacuation/emergency message panel capable of providing up to four zones of audible and visual signals. Figure 1 illustrates the basic capabilities of the SAFEPATH panel.

The SAFEPATH panel can play back recorded voice, tones, and other sounds when instructed to do so by contact closure or an instruction over a serial link from other equipment. SAFEPATH panels configured with a DX-100 are playback only panels. SAFEPATH panels configured with a DX-200 can also record the messages.

This manual describes the SAFEPATH panel, which features:

- A multitone generator with 8 field selectable sounds for the primary evacuation signal.
- Up to 8 minutes of audio storage in DX-100 configured panels.
- Up to 16 minutes of audio storage in DX-200 configured panels.
- Selective activation of up to 8 message files using contact closures (expandable to 256 message files using optional Digital Voice Expansion Modules (DV-EM's).
- Selective activation of up to 999 message files through the serial port (RS-232 or RS-485).
- Field upgradable.
- Up to 5 levels of message priority assignments with the two least significant priority levels being acknowledgeable.
- Up to four audio and strobe circuits, zone selectable.
- Supervision of input and output lines and many internal operations with trouble diagnosis and notification.
- Serial communication supervision and optional verification of serial commands with a trouble indication if an error is detected.
- Manual override of automatically playing files with live announcements.
- An optional telephone interface.
- An RS-232 interface and an optional RS-485 interface.
- An optional Remote Microphone (RMS-1).

THE SAFEPATH PANEL MUST BE PROPERLY INSTALLED, PROGRAMMED AND CONNECTED TO A COMPATIBLE CONTROL PANEL TO FUNCTION IN A VOICE EVACUATION SYSTEM.

The control panel which activates the SAFEPATH panel can range from simple push-buttons or detectors that provide contact closures to activate SAFEPATH files to a sophisticated, computer-based control panel that activates SAFEPATH files through a serial port.



WARNING: THE OPTIONAL TELEPHONE INTERFACE SHALL NOT BE USED FOR PRIMARY NOTIFICATION OF AN EMERGENCY SITUATION, EVENT, ACTION OR CAUSE.

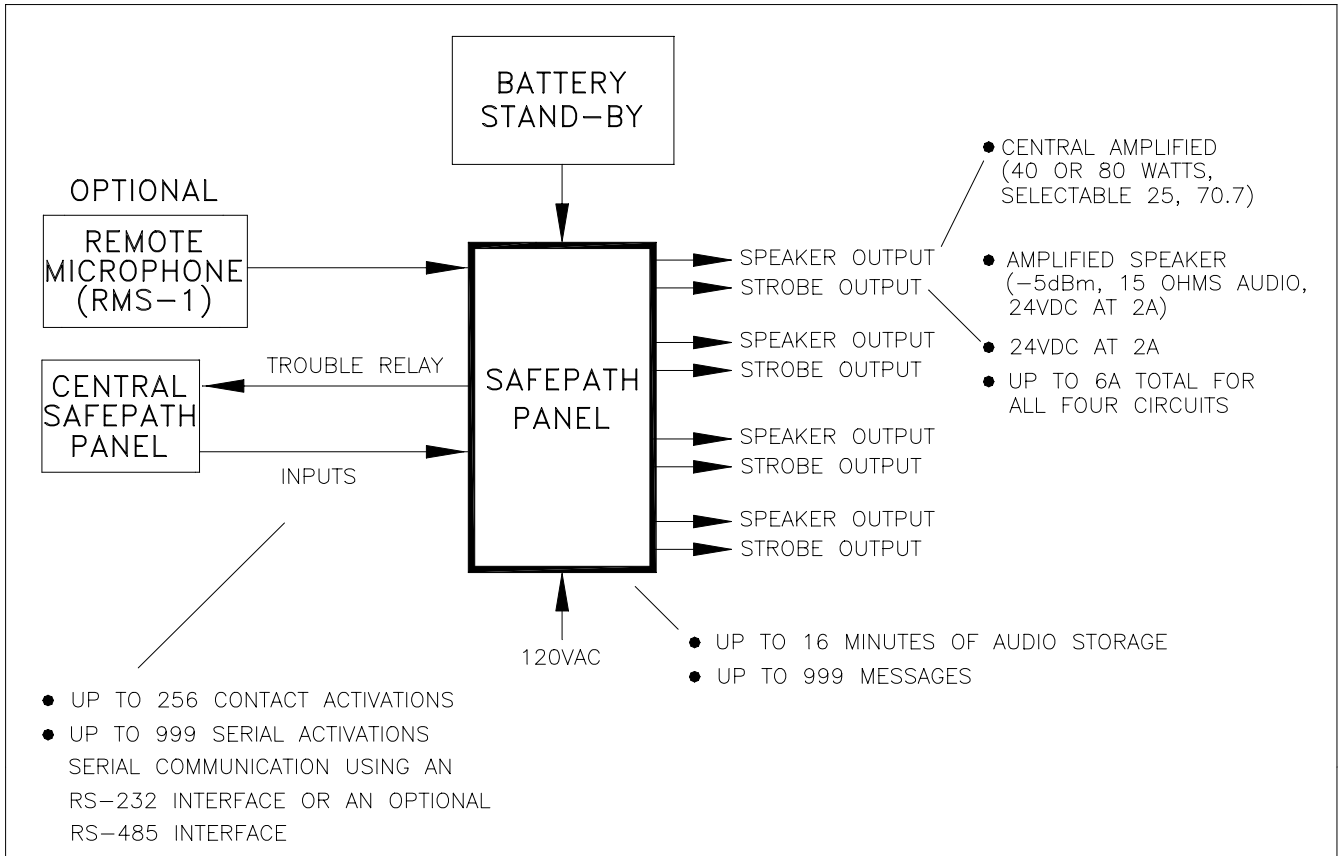


Figure 1.
Basic Capabilities of the SAFEPATH Panel

OPERATION

This chapter describes the operating characteristics of the SAFEPATH panel. Included is information about the following SAFEPATH panel features:

- Operator's Console
- Message Memory
- Input and Output Options
- Message Files
- Output Channels
- File Priority
- Playing Files
- System Pause
- Supervision
- Back-up Battery Requirements
- Password Protection
- Memory Retention Battery

Operator's Console

An operator's console, which allows for manual override of the automatic message playing, is provided. The operator's console includes a microphone, an "ACKNOWLEDGE" push-button, "RESET" push-button, a "MANUAL/AUTOMATIC" switch, "ALL-CALL" switch, four zone disarrangement switches, and "NORMAL" and "TROUBLE" indicators. The operator's console is accessed by opening the enclosure door. See Figure 3.

DX-100 Message Memory

The DX-100 has the ability to store up to eight minutes of audio. The audio is stored digitally on up to eight memory integrated circuit ("I.C.") chips. Each memory I.C. can store up to one minute of audio messages. See Figure 5 for the socket locations S63 and S70 on the DX-100 printed circuit board into which the eight memory I.C.'s U63 thru U70 are inserted.

The eight memory I.C.'s which store audio data are U63 thru U70. These memory I.C.'s are commonly referred to as erasable programmable read only memories ("EPROM's", see EPROM definition in glossary). The number of memory I.C.'s in the DX-100 will vary between one and eight, depending on the number and length of audio messages recorded.

EPROM's are erased by exposure to ultraviolet ("UV") light. UV light is present in light sources such as sunlight and fluorescent lamps. An EPROM must be protected against accidental or premature erasure by covering its window (see Figure 2) with a UV opaque label.

Each EPROM supplied with this module has its window covered with a UV opaque label. An EPROM's UV opaque label is to be removed only when erasing the EPROM. After an EPROM has been erased, its window must be recovered with a new UV opaque label.

⚠ WARNING: EACH EPROM MUST HAVE A UV OPAQUE LABEL PLACED IN PROPER POSITION AS SHOWN IN FIGURE 2. IF THE LABEL IS WORN, TORN, OR OTHERWISE DAMAGED IN ANY WAY THAT WOULD ALLOW UV LIGHT TO PASS THROUGH, STORED MESSAGES CAN BE ERASED. IF STORED MESSAGES ARE ERASED, THEY WILL NOT BE DELIVERED WHEN AND WHERE REQUIRED, AND COULD RESULT IN PROPERTY DAMAGE AND SERIOUS INJURY OR DEATH TO YOU AND/OR OTHERS.

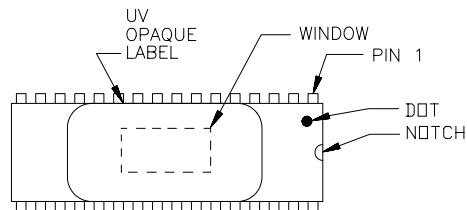



Figure 2.
Top View of Message Memory EPROM

DX-200 Message Memory

The DX-200 has the ability to store up to sixteen minutes of audio. The audio is stored digitally on up to eight memory I.C.'s. Each memory I.C. can store up to two minutes of audio messages. See Figure 6 for the socket locations S63 thru S70 on the DX-200 printed circuit board into which the eight memory I.C.'s, U63 thru U70, are inserted.

These memory I.C.'s are commonly referred to as pseudo static random access memories ("PSRAM's", see PSRAM definition in glossary). If the input power is disconnected and the memory retention battery is or has been disconnected or discharged, the PSRAM I.C.'s will be erased.

 **WARNING: IF BOTH THE INPUT POWER AND THE BATTERY BACK-UP POWER ARE DISCONNECTED AND THE MEMORY RETENTION BATTERY IS OR HAS BEEN DISCONNECTED OR DISCHARGED, ALL MESSAGES IN THE PSRAM I.C.'S WILL BE ERASED. IF STORED MESSAGES ARE ERASED, THEY WILL NOT BE DELIVERED WHEN INPUT POWER IS RESTORED. THIS COULD RESULT IN PROPERTY DAMAGE AND SERIOUS INJURY OR DEATH TO YOU AND/OR OTHERS.**

Input and Output Options

Each SAFEPATH panel model includes 8 inputs that can be used to activate file numbers 1 through 8 with a contact closure or a transistor switch across the corresponding input terminals. The optional digital voice expansion modules ("DV-EM") can provide 32 inputs. When a DV-EM is used, the 8 inputs in the SAFEPATH panel cannot be used. Up to 8 DV-EM's can be connected to a SAFEPATH panel for a total of 256 inputs.


Make sure that SAFEPATH audio outputs are connected to properly operating, listed compatible notification appliances so that message files assigned to that channel can be played.

The SAFEPATH panel is provided with a serial port, through which up to 999 files can be activated with digital commands. The contact inputs in the SAFEPATH panel or DV-EM's can be used along with the serial port. A command is required to start a message, and a second command is required to stop the message. The operation is similar to closing an input contact (start) and then reopening the contact (stop).

Up to four audio output channels are available with the SAFEPATH panel. The output from each audio channel may be either a 15 Ohm line level output or a 25V or 70.7V amplifier output. The 15 Ohm line level output can drive up to forty 600 Ohm line level input appliances. The 25V or 70.7V amplifier can drive up to 40 Watts of speaker notification appliances.

Message Files

All messages are stored in files within the digital voice module's message memory. Up to 999 message files can be stored. There is no limit on the length of a message file (except for the limit imposed by total memory in the unit). There are two types of message files: voice files and string files. Voice files are created by storing audio directly into the selected file number. String files are created by storing file numbers of other message files into the selected file number. (See "file" and "string" definitions in glossary.) Each message file must be assigned a priority level from 1 to 5 (1 is highest, 5 is lowest) and an output channel from 1 to 4. See "Output Channels", "File Priority", and "Playing Files" sections for additional information.

 **WARNING: EACH MESSAGE MUST BE ASSIGNED ITS INTENDED OUTPUT CHANNEL AND PRIORITY LEVEL DURING PROGRAMMING OR THE MESSAGE WILL NOT BE PLAYED WHEN AND WHERE REQUIRED. THIS COULD RESULT IN PROPERTY DAMAGE AND SERIOUS INJURY OR DEATH TO YOU AND/OR OTHERS.**

String files reduce the message memory requirements by allowing many different message files to be created with a relatively small library of voice files that contain custom words or phrases and using one or more of the six string file commands. The string file commands are ADD, PAUSE, COMMON REPEAT, FILE REPEAT, TELEPHONE, and END. ADD is used to add a previously created message file to the string. PAUSE is used to add a period of silence to the string. COMMON REPEAT is used to play the next entered file number multiple times. FILE REPEAT is used to play the entire file again a specified number of times after the file has been de-activated. TELEPHONE is used to add telephone numbers to a string file. END is used to finalize the string.

The following is an example of creating string files from a small library of voice files using the ADD command.

The following voice messages are recorded into the indicated file numbers:

"There is a fire on the"	into file number 100
"First"	into file number 101
"Second"	into file number 102
"Third"	into file number 103
"Floor"	into file number 104

Create three string files as indicated:

File 1:	ADD 100, ADD 101, ADD 104, END
File 2:	ADD 100, ADD 102, ADD 104, END
File 3:	ADD 100, ADD 103, ADD 104, END

When file number 1 is selected to play, "There is a fire on the first floor" will be played. When file number 2 is selected to play, "There is a fire on the second floor" will be played. When file number 3 is selected to play, "There is a fire on the third floor" will be played.

The following is an example of creating string files using the ADD command and the PAUSE command.

The following voice messages are recorded into the indicated file numbers:

“Welcome to Herbie’s” into file number 100
“Our fish are the freshest in town” into file number 101

Create a string file as follows:

File 1: ADD 100, PAUSE 10 seconds, ADD 101, END

When file number 1 is selected to play, “Welcome to Herbie’s”.....(10 seconds of silence).....“Our fish are the freshest in town” will be played.

The following is an example of creating string files using the ADD command and the COMMON REPEAT command.

The following voice messages are recorded into the indicated file numbers:

“Run” into file number 100
“to the nearest salesman” into file number 101

Create a string file as follows:

File 1: COMMON REPEAT 3 times, file number 100, ADD 101, END

When file number 1 is selected to play, “Run, Run, Run to the nearest salesman” will be played.

The following is an example of creating string files using the ADD command and the FILE REPEAT command.

The following voice message is recorded into the indicated file number:

“Thank you for buying Wheelock voice products” into file number 100

Create a string file as follows:

File 1: ADD 100, FILE REPEAT 3 times

When file number 1 is selected to play, “Thank you for buying Wheelock voice products” will be played. The file will play continuously as long as the file is activated. After the file is de-activated, the file will play three additional times. A momentary activation will play the message four times. The FILE REPEAT command must be the last item in the string.

The following is an example of creating string files using the ADD command and the TELEPHONE command.

The following voice message is recorded into the indicated file number:

“A fire has been detected at 101 Main Street” into file number 100

Create a string file as follows:

File 1: TELEPHONE 555-0100, TELEPHONE 555-1212
TELEPHONE 555-4949, ADD 100, END

When file number 1 is selected to play, the phone number 555-0100 is called. If the line is busy or the call is unanswered, the phone number will be tried two more times. After the third attempt, the next number in the string file is called. If three attempts to that number fail, the next number in the string file is called, and so on. If the last phone number in the string file also fails three times, the process starts over with the first phone number.

If at any point the called phone number is answered, the message “A fire has been detected at 101 Main Street” is played. Within 30 seconds of the end of the message, the digital voice module expects to hear an acknowledge code from the person receiving the message. If the acknowledge code is not received, the digital voice module treats the call the same as a line busy or an unanswered call. The acknowledge code expected is a “1-2-3” dialed from a touch-tone phone. When the acknowledge code is received, the digital voice terminates the file, and no other calls are made.

The TELEPHONE command is only available to use in string files programmed for channel 1 with no secondary channels. TELEPHONE commands must be the first commands entered into the string. Once any other command has been selected when creating a string file, the TELEPHONE command is prohibited from being used.

Output Channels

The SAFEPATH panel may be configured with between one and four output channels. Installed output channels are labeled consecutively 1 to 4, as necessary. Message files may be programmed to play out any combination of the four output channels. When a message file is programmed to play out multiple output channels, the message will not necessarily play simultaneously on all selected output channels.

File Priority

The priority of a file playing on one channel will not affect the priority of files playing on any other channel. Priority levels are 1 thru 5, 1 being highest, 5 being lowest.

Priority 1 and Priority 2 files WILL interrupt any file with a lower priority that is playing through the same output channel. Priority 3 and Priority 4 files will NOT interrupt lower priority files but will begin playing immediately upon completion of any lower priority file. Any file that is interrupted by a higher priority file before it has completed playing will remain on the channel queue until it is allowed to replay completely.

If two files or more of equal priority are activated, the files will play sequentially as long as the files are activated.

Priority 4 and Priority 5 files may be acknowledged. Files are acknowledged by the reception of an acknowledge command on the serial port or activation of the acknowledge input. Acknowledged files will play one more time and then be removed from the queue. Dry contact activated files must have their input released and then reactivated to play again. Serial command activated files must have another serial start command transmitted to play again.

Files of all priority levels may be reset. Files are reset by the reception of a reset command on the serial port or activation of the reset input. Reset files will stop immediately and are removed from the queue. Dry contact activated files must have their input released and then reactivated to play again. Serial command activated files must have another serial start command transmitted to play again.

Note: In the United States the latest NFPA guidelines and standards provide that life safety/fire notification alarm tone(s) and voice message(s) are the only alarm tone(s) and message(s) that shall be assigned priority 1 for all SAFEPATH panel output channel(s) assigned to either a dedicated life safety/fire alarm protective signaling system or the life safety/fire alarm system portion of an integrated multi-function system.

Acknowledge Playing Files

All priority 4 and priority 5 files may be acknowledged. Files activated by a dry contact input may be acknowledged by activating the acknowledge dry contact input. Files activated by a serial command may be acknowledged by the serial acknowledge command. Files which have been acknowledged will play one more time and then be removed from the queue. String files which have been programmed with a file repeat will play the number of times selected by the file repeat option and then be removed from the queue. Dry contact activated files which have been acknowledged must have their input released and then reactivated to play again. Serial command activated files which have been acknowledged must have another serial start command transmitted to play again.

Any dry contact input may be selected to be the acknowledge input. An input selected to be the acknowledge input may not be used to activate files to play. The acknowledge input feature may be disabled by selecting input 0 to be the acknowledge input. In SAFEPATH panels configured with a DX-200 the acknowledge input selection is located in the SETUP procedure from the main menu on the DX-200. In SAFEPATH panels configured with a DX-100, the acknowledge input is selected by first selecting the required input on a Series DV-200 and then transferring the Series DV-200's configuration.

Reset Playing Files

Files of all priority levels may be reset. Files activated by a dry contact input may be reset by activating the reset dry contact input. Files activated by a serial command may be reset by the serial reset command. Files which have been reset will stop playing immediately and be removed from the queue. Dry contact activated files which have been reset must have their input released and then reactivated to play again. Serial command activated files which have been reset must have another serial start command transmitted to play again.

Any dry contact input may be selected to be the reset input. An input selected to be the reset input may not be used to activate files to play or to be the acknowledge input. The reset input feature may be disabled by selecting input 0 to be the reset input. In SAFEPATH panels configured with a DX-200, the reset input selection is located in the SETUP procedure from the main menu on the DX-200. In the SAFEPATH panels configured with a DX-100, the reset input is selected by first selecting the required input on a Series DV-200 and then transferring the Series DV-200's configuration.

Note: The reset switch must be located within a locked enclosure.

Playing Files

The digital voice module stores message file activations in a separate queue (see "queue" definition in glossary) for each output channel. Files can be added to the queue by a contact activation or a serial port start command. Files in each queue are played in the order of file priority. Equal priority files are played in the order of activation.

When a contact activation is detected, the programmed message file is placed on the programmed queue. The contact input is then not checked for activation again until the message file completes playing. Therefore, a momentary contact closure will only play a message file once and a maintained contact closure will continuously repeat a message file as long as its input is held activated (unless it is interrupted by a higher priority file, played alternately with other equal priority files, acknowledged, or reset). (See "acknowledge" definition in Glossary.)

When a valid serial port start command is received, the programmed message file is placed on the programmed queue. Each time the file completes playing, the digital voice module checks to see if a valid serial port stop command has been received. If one has been received, the message file is removed from the queue. As long as the file is on the queue, it will repeat continuously (unless it is interrupted by a higher priority file, played alternately with other equal priority files, acknowledged, or reset).


System Pause


The ability to have a pause between messages is provided. Having a pause between all playing messages prevents messages from "running together" and then being misunderstood. The system pause may be any value from 1 to 999 seconds. The system pause is programmed directly into SAFEPATH panels configured with a DX-200. In SAFEPATH panels configured with a DX-100, the system pause is programmed by first setting the required value on a Series DV-200 and then transferring the Series DV-200's configuration.

Supervision

A trouble condition indicates that the supervision functions have detected a malfunction in the SAFEPATH panel. When a trouble condition is detected, the SAFEPATH panel may not be able to receive and/or remember message requests from the control panel. The installer and/or user must make sure that any message requests to the SAFEPATH panel during a trouble condition are reactivated if necessary, when the SAFEPATH panel returns to normal.

If a trouble condition is detected by any of the supervision functions, the SAFEPATH panel Form C status relay (normally energized) will change state, the green system normal LED will turn off, and the amber trouble LED will turn on. The status relay contact closure must be properly connected to and used by the control panel to indicate a system trouble. At the same time an amber trouble location LED will identify the location of the trouble condition. If a trouble condition is indicated, follow the procedures in the "Troubleshooting and Servicing" section.

 **WARNING: DO NOT LEAVE THE SAFEPATH PANEL IN A TROUBLE CONDITION AS, IT MAY NOT PLAY WARNING MESSAGES WHICH COULD RESULT IN PROPERTY DAMAGE AND SERIOUS INJURY OR DEATH TO YOU AND/OR OTHERS. IF SAFEPATH INDICATES A TROUBLE CONDITION: (1) PROVIDE UL REQUIRED ALTERNATIVE SIGNALING AND (2) HAVE QUALIFIED SERVICE PERSONS IMMEDIATELY REPLACE UNIT(S) THAT HAVE MALFUNCTIONED.**

 **WARNING: MESSAGES REQUESTED BEFORE AND DURING A TROUBLE CONDITION MAY NOT BE HEARD, WHICH COULD RESULT IN PROPERTY DAMAGE AND SERIOUS INJURY OR DEATH TO YOU AND/OR OTHERS. IF MESSAGES REQUESTED BEFORE AND DURING A TROUBLE CONDITION ARE STILL NECESSARY, THEY SHOULD BE REPEATED WHEN THE SAFEPATH PANEL IS RETURNED TO NORMAL.**

Input Voltage Supervision

Input voltage is supervised, and if the input voltage drops below the operating minimum voltage, the SAFEPATH panel will transfer to battery back-up power and indicate a trouble condition.

Program Memory Supervision

The digital voice module's program memory is supervised using a sumcheck technique to detect any changes in the stored data. If a change is detected, the digital voice module will stop operating and the SAFEPATH panel will indicate a trouble condition.

Message Memory Supervision

The digital voice module's message memory is supervised using a sumcheck technique to detect any changes in the stored data. If a change is detected, the digital voice module will stop operating and the SAFEPATH panel will indicate a trouble condition.

Microprocessor Supervision

Each microprocessor within the SAFEPATH panel has a watchdog circuit that supervises the processor and resets it (if necessary) or maintains a trouble condition if the microprocessor cannot be restarted. Each watchdog circuit constantly monitors the functioning of its microprocessor and, if the microprocessor fails to function properly, will attempt to reset and restart the microprocessor.

Expansion Module Supervision

If there are any DV-EM's connected to the SAFEPATH panel, the SAFEPATH panel will automatically detect their presence. It will then monitor these expansion modules. Thereafter, if any expansion module is disconnected, the SAFEPATH panel will indicate a trouble condition.

Input Line Supervision

All input lines (for contact closure or transistor activation) are supervised for open circuits and ground faults. Input line supervision requires a LISTED 10K end-of-line resistor to be installed on each input including all unused and unsupervised inputs. Internal digital voice module circuitry is also supervised.

To comply with NFPA requirements for interconnection of fire alarm control equipment, the SAFEPATH panel must be located in the same room as, and within 20 feet of, a listed compatible fire alarm control panel with the wiring enclosed in conduit and properly connected to such panel.

 **WARNING: THE INPUT LINE SUPERVISION DETECTS ONLY OPEN CIRCUITS AND GROUND FAULTS. IF THE INPUT LINE SUPERVISION IS NOT INSTALLED AS INDICATED, THE SAFEPATH PANEL WILL BE UNABLE TO DETECT OPEN CIRCUITS AND GROUND FAULTS ON THE INPUT LINE WHICH COULD RESULT IN PROPERTY DAMAGE AND SERIOUS INJURY OR DEATH TO YOU AND/OR OTHERS.**

Visual Notification Appliance Output Line Supervision

All visual notification appliance output lines are supervised. The lines are supervised for open circuits, short circuits, and ground faults when the output is de-energized; and ground faults only when the output is energized. Output line supervision requires a LISTED 10K end-of-line resistor to be installed on each output circuit and across the terminals of unused output circuits.

Audio Notification Appliance Output Line Supervision

All audio notification appliance output lines are supervised. The lines are supervised for open circuits, short circuits, and ground faults when the output is de-energized. The lines are unsupervised when the output is energized. Output line supervision requires a LISTED 10K end-of-line resistor to be installed on each output circuit and across the terminals of unused output circuits.

Amplified Speaker Notification Appliance Power Output Line Supervision

All amplified speaker notification appliance power output lines are supervised. The lines are supervised for open circuits, short circuits, and ground faults when the output is de-energized, and ground faults only when the output is energized. Output line supervision requires a LISTED 10K end-of-line resistor to be installed on each output circuit and across the terminals of unused output circuits.

Digital Voice Module Audio Supervision

The audio circuitry of each digital voice module output channel is supervised up to the secondary coil of the output transformer. When a message is playing, a trouble condition is indicated if an audio signal is not detected for more than 3 seconds or a low impedance load (less than 600 ohm) is connected to the line output. An audio signal not detected or low impedance load detected trouble condition will clear automatically as soon as audio is detected or the low impedance load is no longer detected, respectively. When no messages are playing, the circuitry is continuously supervised for functionality. If a circuitry failed condition is detected, the SAFEPATH panel will indicate a trouble condition.

Serial Port Supervision

The SAFEPATH panel can receive commands over a serial port. The standard protocol used on the serial port is described in Appendix A. If a second, optional protocol is provided on the serial port, it is described in Appendix B.

The serial port is supervised for communication errors and ground faults. A trouble condition will be indicated if a communication error is detected, the SAFEPATH panel does not select a file, or the received command is not understood. The trouble condition will return to normal with the next valid command received. See Appendix A (and B, if applicable) for additional serial port information.

The SAFEPATH panel also provides a response for each command received through the serial port. If so programmed, the control panel can supervise the serial port by receiving and comparing the response of each transmitted command. The control panel can both verify the integrity of the physical connection of the serial communication line and the integrity of the commands received by the SAFEPATH panel.



CAUTION: External wiring to/from the serial port of the SAFEPATH panel is **not** supervised by the SAFEPATH panel. Wheelock strongly recommends that the control panel be programmed to use the SAFEPATH panel's serial response capability (described in Appendix A or B, if applicable) to verify the integrity of the serial communications link and to record any communication errors for corrective action.

Ground Fault Supervision

The SAFEPATH panel has the ability to supervise for ground fault conditions on field wiring that is not electrically isolated. The supervised wiring includes contact inputs and serial port wiring. All other wiring is electrically isolated. Ground fault supervision may be enabled and disabled by placing the "GROUND FAULT ENABLE/DISABLE" jumper (JP2) on the digital voice module in the desired position. See Figures 5 and 6, respectively, for the location of the jumper (JP2) on the DX-100 and DX-200 printed circuit board within the SAFEPATH panel.

Memory Retention Battery Supervision

The DX-200's digital voice module's memory retention battery is supervised for correct placement and functionality. The battery is not supervised for level of charge. The battery is checked by the circuitry once every 5 minutes.

Battery Back-Up Line Supervision

The battery back-up lines are supervised for open circuits, short circuits and ground faults.

Back-Up Battery Supervision

The back-up battery is supervised for low voltage conditions.

Telephone Line Supervision

When a telephone string file is selected to play out channel 1 of the digital voice module (DX-100 or DX-200), channel 1's line out is supervised for connection to a telephone line. The telephone line is supervised by monitoring the telephone line's DC voltage and by detecting the proper call progress tones. If either of these two parameters are not correct, the SAFEPATH panel will indicate a trouble condition.

Telephone string files are also supervised for correct reception by the intended party. If three consecutive call attempts to the same phone number go unanswered and/or unacknowledged, the SAFEPATH panel will indicate a trouble condition.

When channel 1 of the digital voice module is connected to a telephone line, it may not be used to play messages through an amplifier module.

Remote Microphone Supervision

The optional remote microphone is supervised for proper operation and for open circuits, short circuits and ground faults.

Back-Up Battery Requirements

Table 1 below shows the amp-hour of battery Back-Up required for various system configurations.

BACK-UP BATTERY REQUIREMENTS			
NUMBER OF AMPLIFIER MODULES INSTALLED	CAPACITY OF BACK-UP BATTERY REQUIRED (IN AMP HOURS)		
	4 HOURS STANDBY	24 HOURS STANDBY 15 MINUTES ALARM	60 HOURS STANDBY 15 MINUTES ALARM
1	24AH	48AH	(Future)
2	24AH	48AH	(Future)
3	24AH	72AH	(Future)
4	24AH	72AH	(Future)

Table 1.

Password Protection

The SAFEPATH panel configured with a DX-200 incorporates password protection to prevent unauthorized use of the keypad on the DX-200. Passwords may be any number from 0 to 999. The password must be entered correctly to access any system functions.

The initial password is 111. It is strongly recommended that this password be changed. Instructions for changing passwords are given in the "Setup" section of Appendix C.

Once the password is entered correctly, the user has access to all system functions. If at any time the user has accessed a system function, but failed to utilize it for at least five minutes, the accessed system function will cease and the enter password screen will be displayed. The password then must be re-entered and the system function reaccessed.

Note: The password should only be given to authorized and properly trained personnel who are responsible for the operation, testing, and maintenance of the SAFEPATH panel.


Memory Retention Battery

SAFEPATH panels configured with a DX-200 contain a memory retention battery to power the DX-200 PSRAM message memory during periods when both input power and battery back-up power have been disconnected from the SAFEPATH panel. The battery's only function is to prevent the message files stored in the PSRAM I.C.'s from being lost. The memory retention battery powers no other circuitry.

The DX-200 contains battery charging circuitry to maintain the battery at full charge. The charging circuitry has two charging rates, fast charge and trickle charge. The fast charge cycle is initiated whenever input power is first connected to the digital voice module and lasts for 24 hours. After 24 hours the fast charge cycle is terminated and the trickle charge cycle is initiated and will remain on as long as input power or battery back-up power remain connected to the SAFEPATH panel.


The memory retention battery duration times for new fully charged batteries during periods of power loss, is shown in Table 2 below.

Note: The memory retention battery in the SAFEPATH panel is shipped in a completely discharged state.

 **CAUTION:** As batteries age, they lose their ability to charge completely. The memory retention battery should be replaced at least once per year to ensure optimum battery performance.

MEMORY RETENTION BATTERY BACKUP DURATION FOR NEW FULLY CHARGED BATTERIES DURING PERIODS OF POWER LOSS		
NUMBER OF MEMORY I.C.'S	MINIMUM (HRS)	TYPICAL (HRS)
1	3000	6000
2	1500	3000
3	1000	2000
4	750	1500
5	600	1200
6	500	1000
7	428	857
8	375	750

Table 2.

 **WARNING:** IF THE INPUT POWER AND THE BATTERY BACK-UP POWER ARE DISCONNECTED AND THE MEMORY RETENTION BATTERY IS OR HAS BEEN DISCONNECTED OR DISCHARGED, ALL MESSAGES IN THE PSRAM I.C.'S WILL BE ERASED. IF STORED MESSAGES ARE ERASED, THEY WILL NOT BE DELIVERED WHEN INPUT POWER IS RESTORED. THIS COULD RESULT IN PROPERTY DAMAGE AND SERIOUS INJURY OR DEATH TO YOU AND/OR OTHERS.

If for any reason the input power and the battery back-up power are disconnected and the memory retention battery is or has been disconnected or discharged and all messages in the PSRAM I.C.'s are erased, all messages will have to be reprogrammed into the SAFEPATH panel once the input power or the battery back-up power is reconnected.

Operator Instructions

The SAFEPATH panel provides an operator console for manually activating the panel. The operator console includes a microphone, a green "NORMAL" indicator, a yellow "TROUBLE" indicator, an "ACKNOWLEDGE" push-button switch, a "RESET" push-button, a "MANUAL/AUTOMATIC" switch, an "ALL-CALL" switch and four "ZONE SELECT" switches. The operator interface allows the operator to manually override automatically playing pre-recorded messages with live announcements or an evacuation tone, to silence internal and external trouble audibles, and to ascertain if the panel has detected a trouble condition. The operator interface is shown in Figure 3.

The "TROUBLE" and "NORMAL" indicators are visible through a window on the panel door, when door is closed. All other operator controls are only accessible by opening the panel door.

The "SELECT" LED's indicate the zones selected for live announcements.

The "ALARM" LED's indicate the zones actively in alarm.

The two indicators identify to the operator when the SAFEPATH panel has detected a trouble condition. The yellow "TROUBLE" indicator will be illuminated whenever there is a trouble detected by the SAFEPATH panel. If no troubles are detected, the green "NORMAL" indicator will be illuminated.

The "ACKNOWLEDGE" push-button allows the operator to silence the trouble audibles, both internal and external. When a trouble condition is detected, both the internal and external trouble audibles are sounded. When the "ACKNOWLEDGE" push-button is depressed, the internal and external trouble audibles will be silenced. The trouble audibles will resound for subsequent trouble conditions. The Form C trouble output contact will remain in the trouble condition and the "TROUBLE" indicator will remain illuminated until all trouble conditions have been corrected.

The "RESET" push-button resets the strobe circuits after all initiating circuits are reset.

The "MANUAL/AUTOMATIC" switch has two positions, manual (down) and automatic (up). When the "MANUAL/AUTOMATIC" toggle switch is in the automatic position, pre-recorded messages may be selected to play in individual circuits via dry contact inputs and/or a serial communication interface. When the "MANUAL/AUTOMATIC" switch is in the manual position, pre-recorded messages will not play, and the visual notification appliances are energized and the evacuation tone sounds in all circuits.

The "ALL-CALL" switch overrides any zone selection and allows audible signals to be heard regardless of the position of the four zone select switches.

The four "ZONE SELECT" switches are numbered 1 through 4. They are used to silence any audible signal and turn off visual signals in the respective zones, for live announcements only.

Operation Instructions

To make a live announcement:

1. Select specific zones or use "ALL-CALL" as necessary.
2. Remove microphone from its holder.
3. Hold down microphone's push-to-talk button and talk into microphone.

To manually sound evacuation tone:

1. Move "MANUAL/AUTOMATIC" switch to the manual position.

The evacuation tone will sound in all circuits.

To silence trouble audibles:

1. Depress the "ACKNOWLEDGE" push-button.

To reset strobes:

1. All initiating circuits must be reset.
2. Momentarily depress the "RESET" push-button.

When the GREEN "NORMAL" LED is ON the system is functioning properly.

When the YELLOW "TROUBLE" LED is ON there is a FAULT in the system which MUST BE CORRECTED.

WARNING

IF THE YELLOW "TROUBLE" LIGHT IS ON, THIS UNIT MAY NOT BE ABLE TO PROVIDE EMERGENCY ANNOUNCEMENT CAPABILITIES AND COULD RESULT IN PROPERTY DAMAGE, SERIOUS INJURY OR DEATH TO YOU AND/OR OTHERS. IN THE EVENT THE "TROUBLE" LIGHT IS ON, YOU SHOULD CONTACT YOUR SERVICE REPRESENTATIVE IMMEDIATELY.

ACKNOWLEDGEMENT

To Acknowledge a Trouble Condition:

1. Momentarily depress TROUBLE ACKNOWLEDGE button.

This will only silence the internal sounder and any external trouble signaling devices. The system will remain in the trouble condition with the yellow "TROUBLE" LED on and the system trouble contact will remain in the trouble position until all trouble conditions have been corrected.

MANUAL OPERATION

To Sound Evacuation Tone:

1. Slide the AUTOMATIC/MANUAL switch DOWN to the MANUAL position.

MICROPHONE OPERATION

1. Hold the microphone within 2 inches of mouth and press push-to-talk switch on microphone.
2. Deliver message. Activation of the microphone will deliver the message to all circuits.

ZONE SELECTION

To select zones individually for live announcements, set each desired zone switch to the ON position. to select all zones at once, set the ALL-CALL switch to the ON position.

Each zone's "SELECT" LED indicates that zone has been selected for announcements

Each zone's "ALARM" LED indicates that zone is active.

RESET

To Turn OFF Strobes:

1. All initiating circuits must be reset.
2. Momentarily depress the RESET button.

WARNING

ANY ZONE SWITCH SET IN THE "OFF" POSITION WILL SILENCE IT'S RESPECTIVE ZONE.

FOR ADDITIONAL INFORMATION:

REFER TO OPERATION AND INSTALLATION MANUAL.

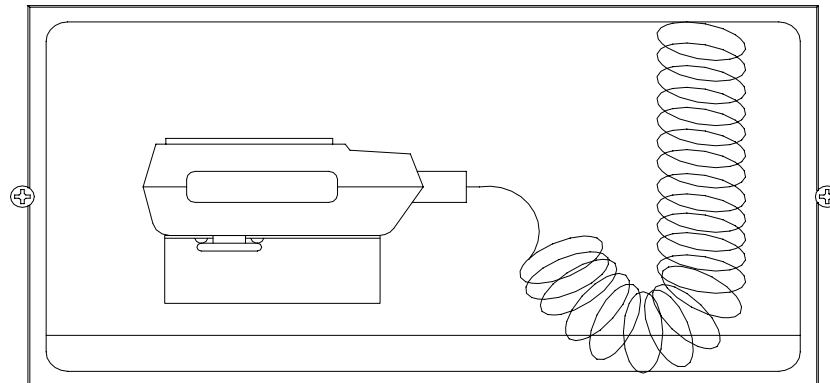
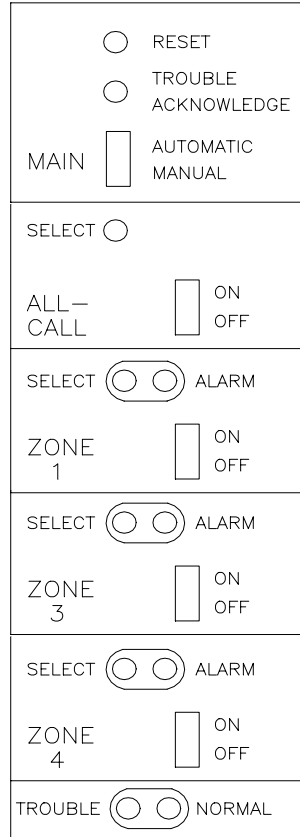


Figure 3.
Operator's Console

Message Recording



WARNING: PROVIDE ALTERNATIVE SIGNALING MEANS WHILE REPROGRAMMING MESSAGES TO ASSURE ADEQUATE PROTECTION OF PEOPLE AND PROPERTY. FAILURE TO PROVIDE ALTERNATIVE SIGNALING MAY CAUSE PEOPLE TO NOT BE WARNED OF AN EMERGENCY CONDITION, WHICH COULD RESULT IN PROPERTY DAMAGE AND SERIOUS INJURY OR DEATH TO YOU AND/OR OTHERS.

WHELOCK EXPRESSLY DISCLAIMS ALL LIABILITY FOR THE CONTENT, CLARITY AND LANGUAGES OF, AND OUTPUT CHANNEL AND PRIORITY LEVEL ASSIGNED TO, ANY AND ALL MESSAGES. IT IS ESSENTIAL THAT YOU HAVE MESSAGE CONTENT AND LANGUAGE, SEQUENCE, OUTPUT CHANNEL AND PRIORITY ASSIGNMENTS REVIEWED AND APPROVED BY QUALIFIED LEGAL AND SAFETY ADVISORS, QUALIFIED REPRESENTATIVE(S) OF OWNER(S) AND USER(S), AND AUTHORITIES HAVING JURISDICTION.

To aid qualified personnel in performing necessary operational testing procedures, a script, listing all messages programmed in the SAFEPATH panel, must be kept with the SAFEPATH panel.

This chapter describes the message recording procedures for the SAFEPATH panel when configured with a DX-200. SAFEPATH panels configured with a DX-100 do not have message recording capabilities. Included is information about the following SAFEPATH panel capabilities:

- Setting Volume Controls
- Recording a Voice File
- Creating a String File
- Transferring Data

Performing the following procedures requires a knowledge of the display and keypad operation. Operation of the display and keypad is explained in Appendix C. Appendix C must be read and understood before proceeding.

Setting Volume Controls

The DX-200's record circuit has one microphone input volume control. The DX-200's playback circuit has four volume controls, one for each output channel. The locations of the five volume controls on the DX-200 within the SAFEPATH panel are shown in Figure 6.

The microphone input volume control determines the record level of messages. If the microphone input volume control is set too high the analog-to-digital converter circuit will be overdriven and/or the input preamps will have clipped outputs. Either of these two conditions will cause distortion. If the microphone input volume control is set too low the analog-to-digital converter circuit will be underdriven. This will cause distortion and louder than normal background noise.

The four output channel volume controls determine the playback level of messages on each of the output channels. If the output channel volume controls are set too high, the output channel amplifiers will have clipped outputs causing distortion. If the output channel volume controls are set too low, the SAFEPATH panel may not detect the audio level properly. See Figure 6 for output channel volume control locations.

Before recording messages the input volume controls and the output channel volume controls should be set according to the procedures set forth below.

Input Volume Control Adjustment Procedure

1. Set output channel volume control to minimum.
2. Set input volume control to maximum.
3. Record a message.
4. Play message. If message sounds distorted, decrease the input volume control. Repeat from step 3.

Output Channel Volume Control Adjustment Procedure

1. Set output channel volume control to minimum.
2. Play a message. If message volume is too low, or if an output channel error is detected, increase the output volume control. Repeat from step 2.

Recording a Voice File



WARNING: IF THE USER EXCEEDS THE AMOUNT OF AVAILABLE MESSAGE MEMORY WHILE RECORDING A VOICE FILE, PART OR ALL OF THE VOICE FILE WILL NOT BE RECORDED. IF PART OR ALL OF THE VOICE FILE IS NOT RECORDED, THE INTENDED MESSAGE WILL NOT BE PLAYED WHEN AND WHERE REQUIRED. THIS COULD RESULT IN PROPERTY DAMAGE AND SERIOUS INJURY OR DEATH TO YOU AND/OR OTHERS.

The following instructions will enable the user to record a voice, tone, or other sound message, play the message back to verify its content, clarity, and output channel assignment, and view file data to verify priority.

1. Select "PROGRAM FILE" from the main menu.
2. Select "RECORD" from the program file menu.
3. Enter file number.
4. Enter priority level. If no priority level is entered, the DX-200 will default to the lowest priority level (5).
5. Enter primary channel number. If no channel number is entered, the DX-200 will default to the last selected primary channel number.
6. If the file is to play out multiple channels when activated, select "YES" at the first secondary channel menu. If the file is to play out only a single channel when activated, select "NO" at the first secondary channel menu.
7. Enter secondary channel numbers, if necessary.
8. Record message. Press "1" to start recording. Press "1" a second time to stop recording. While recording, a countdown timer appears on the display indicating the remaining available memory.
9. Select "PLAY FILE" from the main menu.
10. Enter file number.
11. Listen to the message as it is being played to verify message content, clarity, and output channel assignment. If the message clarity is unacceptable or the message content or output channel assignment is incorrect, the message must be re-recorded.
12. Observe the trouble LED's while the message is being played. If an output channel error is indicated, the channel's volume control must be adjusted higher and/or the message re-recorded at a higher level.

NOTE: A voice file must not contain 3 or more consecutive seconds of silence. The SAFEPATH panel will indicate a trouble condition whenever audio is not detected for 3 or more seconds while a voice file is playing. If silence is required as part of a message, the silence should be the result of a pause command in a string file to prevent indication of a trouble condition.

13. Select "DIAGNOSTICS" from the main menu.
14. Select "VIEW FILE DATA" from the diagnostics menu.
15. Enter file number.
16. Check priority level.

Creating a String File

The following instructions will enable the user to create a non-telephone string file, play the file back to verify its content, clarity, and output channel assignment, and view file data to verify priority.

1. Select "PROGRAM FILE" from the main menu.
2. Select "STRING" from the program file menu.
3. Enter file number.
4. Enter priority level. If no priority level is entered, the DX-200 will default to the lowest priority level (5).
5. Enter primary channel number. If no channel number is entered, the DX-200 will default to the last selected primary channel number.
6. If the file is to play out multiple channels when activated, select "YES" at the first secondary channel menu. If the file is to play out only a single channel when activated, select "NO" at the first secondary channel menu.
7. Enter secondary channel numbers, if necessary.
8. Files (voice and non-telephone string), pauses and repeats may be added to string file from string file menu.
9. Select "PLAY FILE" from the main menu.
10. Enter file number.
11. Listen to the message as it is being played to verify message content, clarity, and output channel assignment. If the message clarity is unacceptable or the message content or output channel assignment is incorrect, the message must be re-recorded.
12. Observe the trouble LED's while the message is being played. If an output channel error is indicated, the channel's volume control must be adjusted higher and/or the problem voice file(s) re-recorded at a higher level.

NOTE: A string file must not play voice files in an order which would allow 3 or more consecutive seconds of silence. The SAFEPATH panel will indicate a trouble condition whenever audio is not detected for 3 or more seconds while voice files are playing. If silence is required as part of a message, the silence should be the result of a pause command in the string file to prevent indication of a trouble condition.

13. Select "DIAGNOSTICS" from the main menu.
14. Select "VIEW FILE DATA" from the diagnostics menu.
15. Enter file number.
16. Check priority level.

The following instructions will enable the user to create a telephone string file, play the file back to verify its content, clarity, output channel assignment, and telephone numbers, and view file data to verify priority.

1. Select "PROGRAM FILE" from the main menu.
2. Select "STRING" from the program file menu.
3. Enter file number.
4. Enter priority level. If no priority level is entered, the Series DX-200 will default to the lowest priority level (5).
5. Enter channel number 1.
6. Select "NO" at the first secondary channel menu.
7. Enter all telephone numbers which are to be called from the string file menu. Telephone numbers must be the first items added to the string file. Once a file, pause, or repeat has been added, telephone numbers can not be added.
8. Files (voice and non-telephone string), pauses, and repeats may be added to the string file from the string file menu.
9. Select "PLAY FILE" from the main menu.
10. Enter file number.
11. Verify which telephone numbers are being dialed and then listen to the message as it is being played to verify message content, clarity, and output channel assignment. If the message clarity is unacceptable or the message content or output channel assignment is incorrect, the message must be re-recorded.
12. Observe the trouble LED's while the message is being played. If an output channel error is indicated, the channel's volume control must be adjusted higher and/or the problem voice file(s) re-recorded at a higher level.

NOTE: A string file must not play voice files in an order which would allow 3 or more consecutive seconds of silence. The SAFEPATH panel will indicate an output channel error whenever audio is not detected for 3 or more seconds while voice files are playing. If silence is required as part of a message, the silence should be the result of a pause command in the string file to prevent indication of a trouble condition.

13. Select "DIAGNOSTICS" from the main menu.
14. Select "VIEW FILE DATA" from the diagnostics menu.
15. Enter file number.
16. Check priority level.

Transferring Data

A Series DV-200 is capable of downloading files and system configuration data from itself to a SAFEPATH panel configured with either a DX-100 or DX-200. Files may be either voice files or string files. System configuration data includes system pause information.

The Series DV-200 containing the data to be downloaded is referred to as the source Series DV-200. The digital voice module (DX-100 or DX-200 within the SAFEPATH panel) that is to receive the downloaded data is referred to as the destination digital voice module. To download data, the source Series DV-200 and destination digital voice module must be setup and connected as follows:

1. Connect the J2 (see Figure 4) connectors on both the source Series DV-200 and the destination digital voice module using Wheelock Model Number CAB-P cable (not supplied with either panel, must be ordered separately).
2. Place the communication mode jumpers (JP1) on each of the digital voice panels in position A. See Figures 5 and 6, respectively, for the location of the jumper (JP1) on the destination DX-100 and DX-200. See Figure 8 in the Series DV-200 VoiceLink Operation and Installation Manual for the location of the jumper (JP1) on the source Series DV-200.

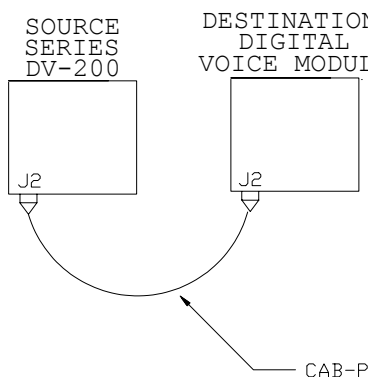


Figure 4.
File Downloading Connection

Single File Download Procedure

1. Select "TRANSFER FILE" from the main menu on the source Series DV-200.
2. Select "MESSAGE/STRING" from the next menu.
3. Select "FILE" from the next menu.
4. Enter file number of the file to be downloaded.
5. Repeat step 3 for all files which need to be downloaded.
6. Test the SAFEPATH panel to ensure that all files (messages, output channel assignments, and priority assignments) were transferred properly by activating all downloaded files.

The length of time required to download each file will vary depending upon the length of the file. String files are typically very short and should be downloaded within several seconds. Voice files are typically very long. When downloading voice files, a good rule of thumb is that downloading will require 30 seconds for every second of recorded time.

If for any reason the downloading sequence is interrupted (due to power loss, a disconnected cable, etc.), disconnect input power to the destination digital voice panel for a minimum of two seconds and then reconnect. If downloading to a DX-200, the partially transmitted file must be re-downloaded, according to the procedures set forth below. If downloading to a DX-100, the partially transmitted file must be either disabled or re-downloaded, according to the procedures set forth below. A disabled file may not be played or re-used without erasing all message memory EPROM's in the DX-100 with an ultraviolet (UV) light source.

All Files Download Procedure

1. Select "TRANSFER FILE" from the main menu on the source Series DV-200.
2. Select "MESSAGE/STRING" from the next menu.
3. Select "ALL" from the next menu.

The length of time required to download each file will vary depending upon the number, types and sizes of the files to be downloaded. A good rule of thumb is that downloading will require 30 seconds for every second of recorded time.

If for any reason the downloading sequence is interrupted (due to power loss, a disconnected cable, etc.), disconnect input power to the destination digital voice panel for a minimum of two seconds and then reconnect. If downloading to a DX-200, the partially transmitted file must be re-downloaded, according to the procedures set forth below. If downloading to a DX-100, the partially transmitted file must be either disabled or re-downloaded, according to the procedures set forth below. A disabled file may not be played or re-used without erasing all message memory EPROM's in the DX-100 with an ultraviolet (UV) light source.



CAUTION: Never disable a file on a DX-200. Disabling a file on a DX-200 will cause the DX-200 to indicate a trouble condition.

File Disable Procedure (DX-100 Only)

1. Select "TRANSFER FILE" from the main menu.
2. Select "REMOVE" from the incomplete file menu.

File Re-Download Procedure

1. Select "TRANSFER FILE" from the main menu.
2. Select "REXMIT" from the incomplete file menu.

If the re-download attempt fails when re-downloading to a DX-100, the file must be disabled.

System Configuration Data Download Procedure

1. Select "TRANSFER FILE" from the main menu on the source Series DV-200.
2. Select "CONFIGURATION" from the next menu.

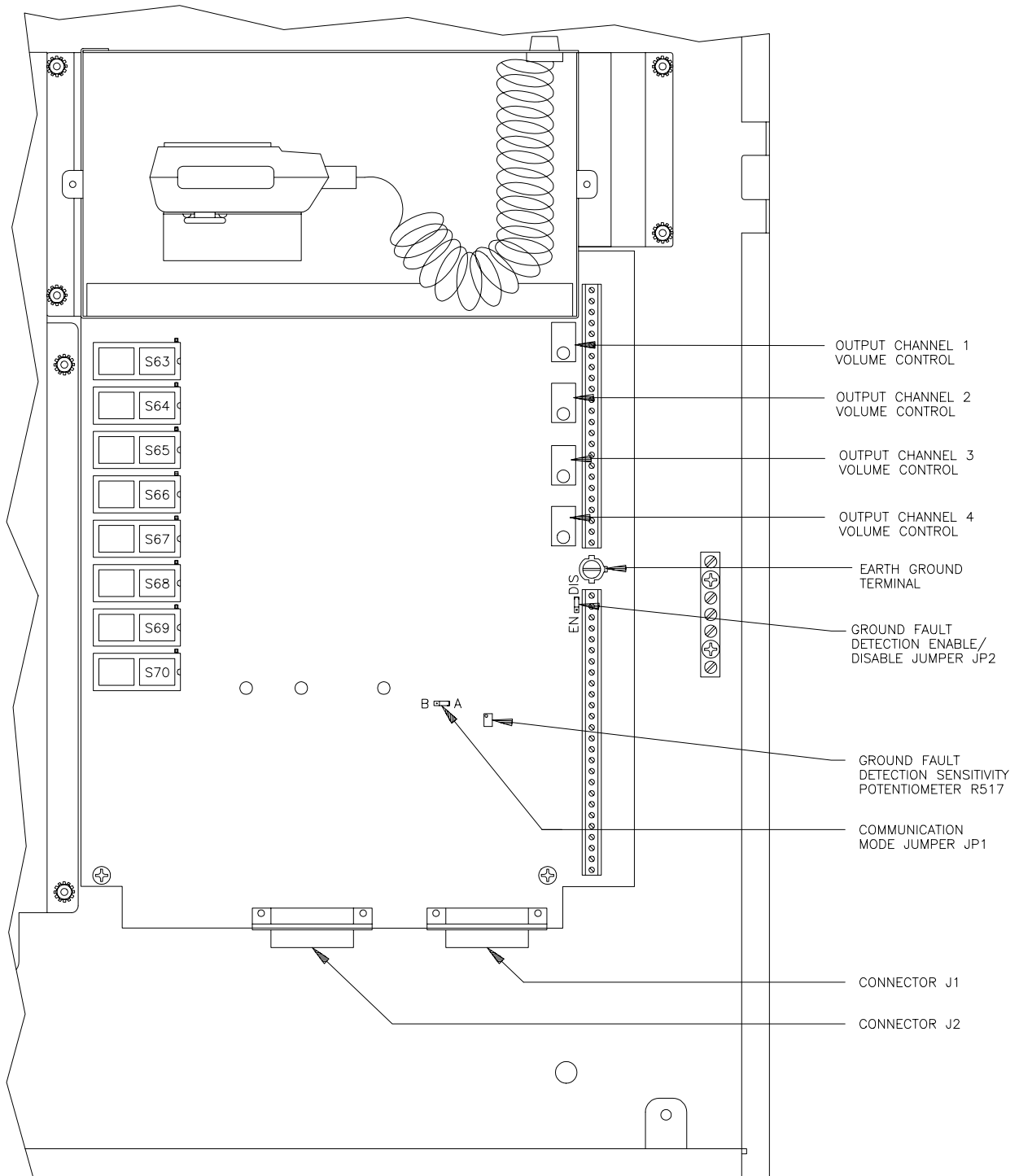


Figure 5.
DX-100 Module Illustration

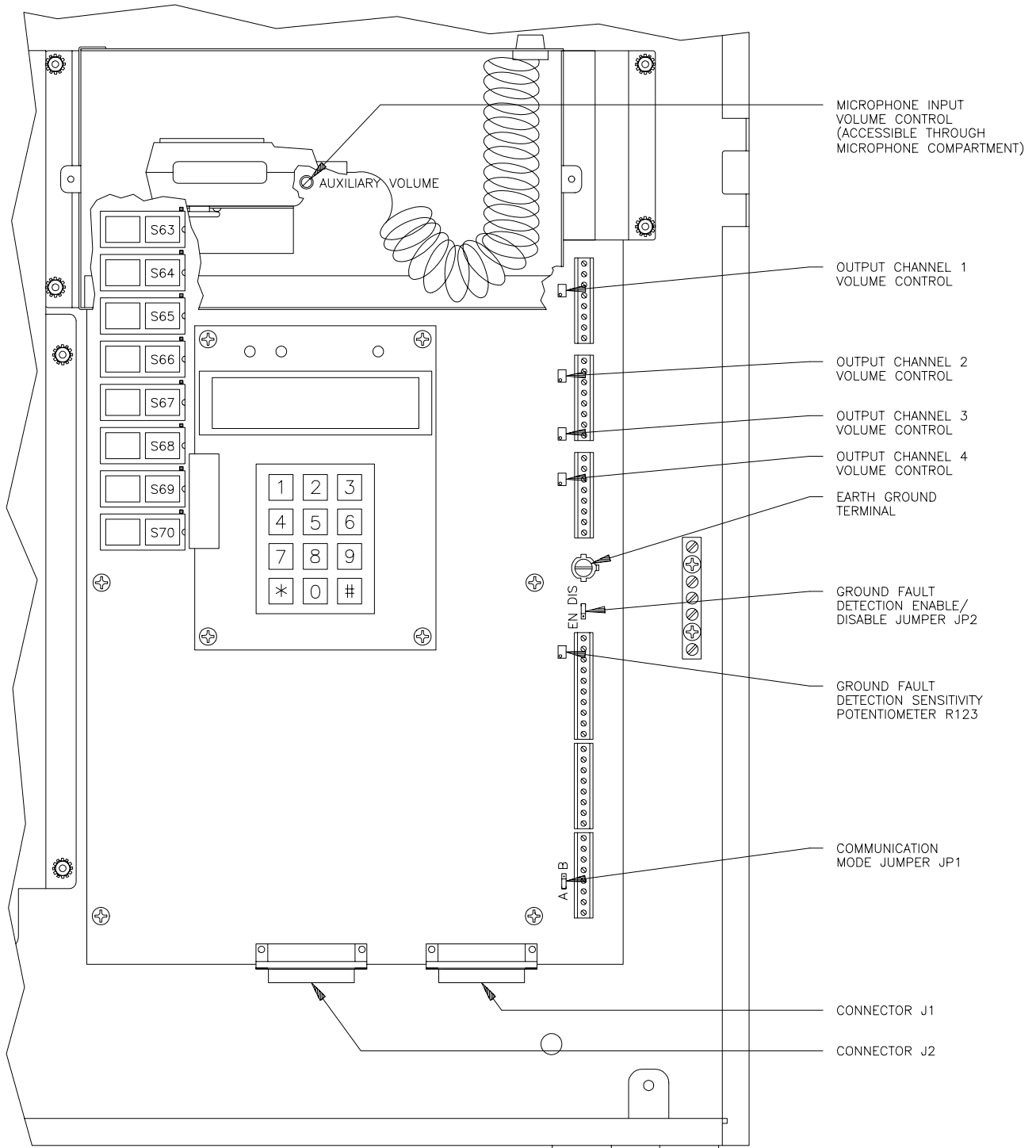


Figure 6.
DX-200 Module Illustration

Installation

The lives of people depend upon your safe installation of the SAFEPATH panel. Please read, understand and carefully follow the specific installation instructions set forth below to avoid damage to the SAFEPATH panel and equipment connected to it. Installation should be conducted only by qualified persons in accordance with the procedures in this manual.



WARNING: SHUT OFF ALL POWER BEFORE STARTING THE INSTALLATION. ELECTRICAL SHOCK CAN CAUSE DEATH OR SERIOUS INJURY.



CAUTION: The SAFEPATH printed circuit boards are sensitive to static electricity and have delicate components mounted on them. Before handling either a board or any component on a board, discharge any static electricity from your body by touching a grounded object such as a metal screw which is connected to earth ground. Handle the board by its edges, and be careful not to twist or flex it. The SAFEPATH panel is to be installed in a static free area and the user is to properly attach grounded wrist straps before touching any static sensitive areas. After handling SAFEPATH printed circuit boards, the SAFEPATH panel should be tested in accordance with the "System Checkout" section of this "Installation" section of this manual to verify that the printed circuit boards are undamaged and functioning properly.



CAUTION: The Authorities Having Jurisdiction (AHJ) should be consulted by the installer prior to installation.

1. Prepare a drawing of the complete system wiring (Keep a copy of the system wiring drawing with the SAFEPATH manual as a permanent record of the system wiring). See the "Wiring Guidelines" and the "Field Wiring" sections to help develop this drawing.
2. Carefully unpack the SAFEPATH panel and make sure each item described on the packing slip is present and undamaged.
3. Mount the SAFEPATH panel (and optional expansion modules) in the desired location as described in the "Mounting" section.
4. Mount any additional wiring boxes or junction boxes needed to interconnect field wiring.
5. Connect conduit fittings or bushings as needed using knockouts provided on the top and bottom of the SAFEPATH panel.
6. Install field wiring in conduit when necessary, following the National Electrical Code and local codes for the type of system being installed. Make all necessary connections at any additional wiring or junction boxes.




CAUTION: Provide proper strain relief for all wiring not in conduit.

7. Connect the SAFEPATH panel to earth ground, following the National Electrical Code and local codes for the type of system being installed, as described in the "Grounding" section.
8. Check the integrity of all field wiring following the directions in the "Field Wiring Checkout" section. Confirm that the specified cable is installed and that there is continuity between required points (no open circuits), with no unwanted connections (shorts) to other conductors, chassis, or earth ground.
9. Connect the wiring to the appropriate terminals of the SAFEPATH modules following the directions in the "Field Wiring" section and the system wiring drawing you created in Step 1.
10. Install the appropriate amplifier modules into slots 1 thru 4 of the mother board.
11. Install the controller module into slot 5 of the mother board.
12. Apply power and perform the operational tests described in the "System Checkout" section.


Wiring Guidelines

Although the SAFEPATH products incorporate signal verification and noise filtering circuitry on their inputs, induced voltages or noise on the input wiring can cause improper operation. Therefore, use shielded twisted pair wire for all dry contact input wiring.

The shield of each cable should be connected only at one end. Each shield of each cable that connects to the SAFEPATH panel is to connect to the grounding points provided near the knockout locations on the chassis (see Figure 7).

 **WARNING:** ALL SAFEPATH DRY CONTACT INPUT WIRING AND AUDIO WIRING SHOULD BE ROUTED AWAY FROM ANY HIGH VOLTAGE OR HIGH CURRENT LINES (SUCH AS AC OR DC POWER LINE, AUDIO POWER LINES, AND MOTOR OR RELAY ACTUATION LINES) AND SHOULD BE INSTALLED IN SEPARATE CONDUIT FROM HIGH VOLTAGE OR HIGH CURRENT LINES. FAILURE TO DO SO MAY CAUSE ELECTRICAL SHOCK RESULTING IN PROPERTY DAMAGE AND SERIOUS INJURY OR DEATH TO YOU AND/OR OTHERS.


The National Electrical Code defines two types of circuits for protective signaling systems: **power limited** circuits and **non-power limited** circuits. The SAFEPATH dry contact input circuits have been designed as **power limited circuits**. All other circuits are **non-power limited**. Power limited and non-power limited wiring within the SAFEPATH panel must have a 1/4" separation. Figure 7 illustrates one possible wire routing which will accomplish the required separation: power supply and battery wiring must be routed through the conduit entrances on the left-hand side of the panel, all digital voice module wiring must be routed through the conduit entrances on the lower right-hand side of the panel, and all output wiring from the motherboard must be routed through the conduit entrances on the upper right-hand side of the panel.

 **CAUTION:** The National Electric Code limits the maximum number of conductors that can be installed in conduit and wiring boxes depending on the size of the conduit, the volume of the boxes, and the gauge of the wire used. Make sure that wiring used for SAFEPATH installation complies with the latest NEC requirements.

See the SAFEPATH "Field Wiring Connection" section for recommended wire sizes and wire type to use for all SAFEPATH input and output circuits.

Mounting

The SAFEPATH panel shall be mounted in a location within the environmental limits specified in the latest UL Standard for indoor control panels. The SAFEPATH panel shall not be located in a hazardous location. Refer to the "Technical Specifications" section.

 **CAUTION:** In order to comply with the latest NFPA and UL requirements for interconnection of fire alarm control equipment, the SAFEPATH must be located in the same room as, and within 20 feet of, a LISTED compatible fire alarm control panel, with the wiring enclosed in conduit and properly connected to such control panel.

Refer to Figure 7 for SAFEPATH panel mounting hole layout. Drill mounting holes for appropriate screws and anchors to ensure secure mounting to the type of surface at the selected location. Keep out dust and dirt during installation, as they can interfere with the operation and reduce the life of the equipment.

Remove the door and mount the SAFEPATH panel at the selected location. **Use care to avoid damage to the module PC boards during installation.** Do not apply excessive pressure to any PC board or its components, including field wiring terminals and connectors.

Refer to Series DV-EM operations and installation manual for Series DV-EM mounting instructions.

Grounding

The SAFEPATH panel should be connected to earth ground in accordance with the National Electrical Code. Connecting the SAFEPATH panel to earth ground will reduce static discharge failures, improve transient protection, and reduce the chance of electrical shock. The SAFEPATH panel should be grounded as follows:

1. Connect a wire between the ground screw on the digital voice module (DX-100 or DX-200) printed circuit board and the adjacent ground terminals on the enclosure. See Figures 5 and 6, respectively, for the location of the ground screw and the adjacent enclosure ground terminals for DX-100 and DX-200 configured panels.
2. Connect a wire between the ground lug (labeled "EARTH GROUND") in Figure 11 and earth ground.

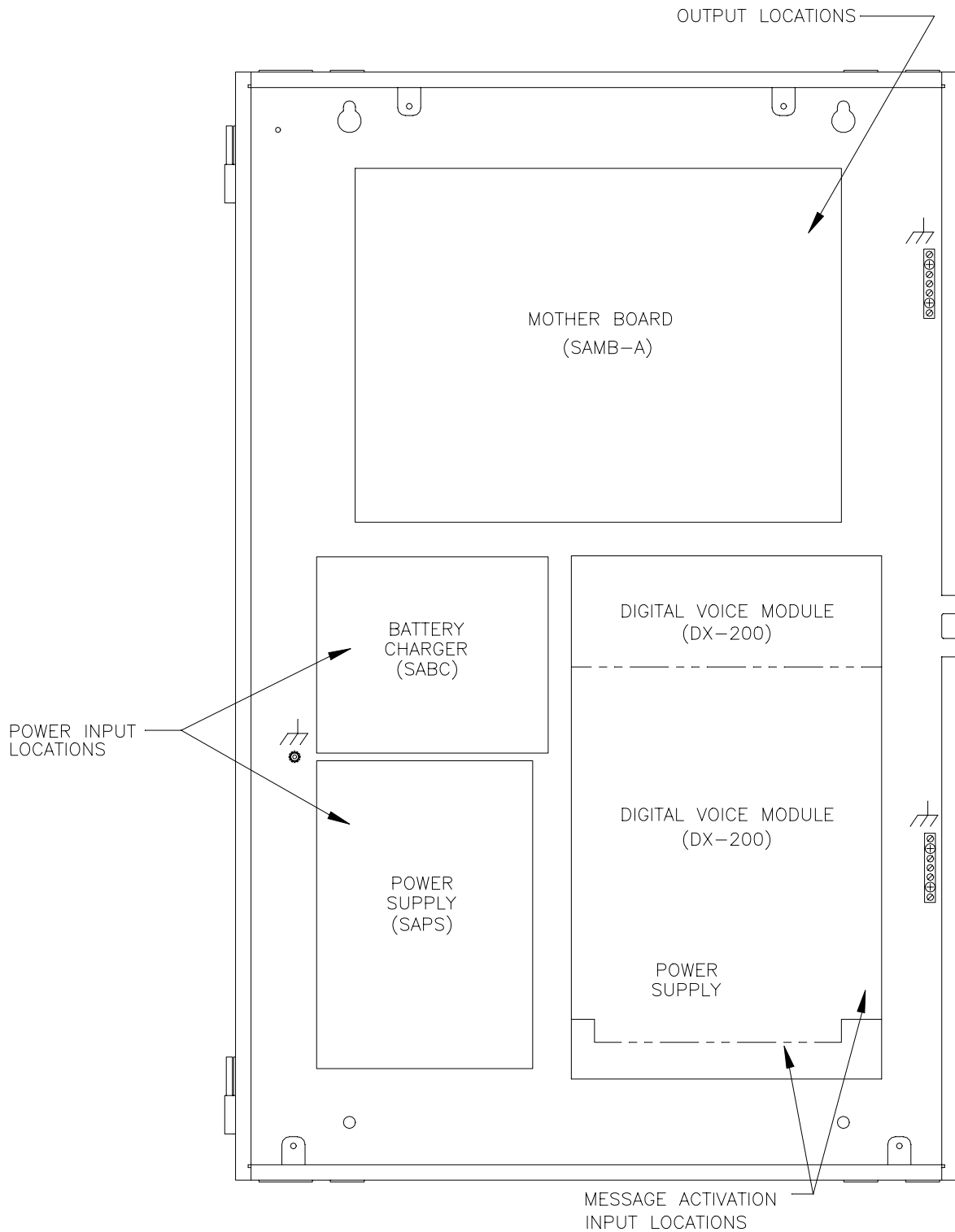


Figure 7.
SAFEPATH Panel Mounting

Field Wiring

Before installation, the system specifier must determine the proper wire gauge for all field wiring. The field wiring is broken down into two categories, inputs and outputs.

NOTE: All field wiring shall conform to applicable codes and standards including NFPA, UL, local, state, county, province, district and federal codes and standards.

SAFEPATH Field Wiring Connection

All SAFEPATH wiring terminals are designed to accept #22 AWG to #12 AWG wiring (one wire per terminal). Connect the field wiring to the SAFEPATH terminals while referring to the following sections.

Install field wiring following the latest National Electrical Code and local codes for the type of system being installed. Make all necessary connections. See Figure 8 for typical system block diagram.

Check the integrity of all field wiring following directions in the "Field Wiring Checkout" section. Confirm that the specified cable is installed and there is continuity between required points (no "open circuits"), with no unwanted connections ("shorts") to other conductors, chassis, or earth ground. **Perform the field wiring checkout before continuing with any connections to the SAFEPATH wiring terminals.**



WARNING: TO REDUCE THE RISK OF ELECTRICAL SHOCK, NEVER CONNECT OR DISCONNECT FIELD WIRING WHEN INPUT VOLTAGE OR BACK-UP BATTERIES ARE CONNECTED TO THE SAFEPATH PANEL.

Input Wiring Descriptions

The SAFEPATH panel has seven types of inputs, the locations of which are shown in Figure 9. Detail of the message activation terminal blocks and connectors is shown in Figure 10. Detail of the power input and ground terminals is shown in Figure 11.

Dry Contact Input Wiring

The dry contact inputs shall be dry contacts or open collector devices. Dry contacts or open collectors from multiple devices may be connected in parallel as shown in Hook-up A in Figure 12. If multiple inputs are located at the same location, the (-) input leg may be commoned to reduce wiring requirements as shown in Hook-up B in Figure 12. Each input circuit must have a LISTED 10K end-of-line resistor across the last input contact. All unused or unsupervised inputs must have a LISTED 10K end-of-line resistor installed across input terminals. The LISTED 10K end-of-line resistors must have a 1/8W minimum power rating and a 5% maximum tolerance.

SAFEPATH dry contact inputs meet the requirements for power limited fire protective signaling circuits as defined in the National Electrical Code. Each input meets Class B, Style B supervision requirements for initiating device circuits.

The gauge of the wire necessary for dry contact input wiring may vary for each dry contact input. The field wiring for each dry contact inputs shall not exceed 100 ohms of resistance or 0.050 microfarads of capacitance.

Series DV-EM Wiring

One Series DV-EM port is provided. This port allows up to eight Series DV-EM's to be connected to the SAFEPATH panel.

Attach the first Series DV-EM (J1, male plug) to the DX-100/DX-200 (J1, female socket) with cable assembly CAB-EM. (See Figure 1 in the Series DV-EM VoiceLink Operation and Installation Manual for the location of connectors on the Series DV-EM.) Connect the cable's male plug to the J1 female socket on the right-side bottom of the DX-100/DX-200. Connect the cable's female socket to the J1 male plug on the left-side of the Series DV-EM. To install additional Series DV-EMs, attach the next Series DV-EM (J1, male plug) to the previous Series DV-EM (J2, female socket). Optionally, the Series DV-EMs can also be interconnected using the CAB-EM cable assembly.

NOTE: When connecting the first Series DV-EM to the DX-100/DX-200, either a rectangular hole capable of passing the connector of cable assembly CAB-EM will have to be punched in the bottom of the SAFEPATH enclosure or the cable assembly CAB-EM will have to be cut four inches from the cable's male plug, passed through a conduit entrance, and spliced back together inside the SAFEPATH panel.

Do not substitute alternate cables for the CAB-EM or connect field wiring to the eight DX-100/DX-200 dry contact inputs when any DV-EM modules are used, as the SAFEPATH panel may fail to operate properly.

RS-232 Port Wiring

One RS-232 port is provided. It is a ten wire interface. The pin out of the RS-232 port is shown in Figure 13. The field wiring required will be a function of the protocol implemented. See Appendix A (and B, if applicable) for protocol information.

For RS-232 wiring, connect an RS-232 cable (not supplied) from the control panel to the J2 female socket on the left-side bottom of the DX-100/DX-200.

Current RS-232 specifications limit RS-232 communication paths to 50 feet in length. A particular installation may be limited to shorter paths depending on factors such as wire gauge and wire capacitance.

NOTE: When connecting the RS-232 cable to the DX-100/DX-200, either a rectangular hole capable of passing the RS-232 cable connector will have to be punched in the bottom of the SAFEPATH enclosure or the RS-232 cable will have to be cut four inches from the cable's male plug, passed through a conduit entrance, and spliced back together inside the SAFEPATH panel.

RS-485 Port Wiring

One RS-485 port is optional. It is a four wire interface. The pin out of the RS-485 port is shown in Figure 14. The field wiring required will be a function of the protocol implemented. See Appendix B, if applicable, for protocol information.

Current RS-485 specifications limit RS-485 communication paths to 200 feet in length. A particular installation may be limited to shorter paths depending on factors such as wire gauge and wire capacitance.

AC Input Voltage Wiring

Determination of wire gauge for the input voltage wiring should consider all factors, including wire loop length, AC power line voltage, the maximum SAFEPATH AC current consumption, and the AC input voltage range of the SAFEPATH panel.

IT IS IMPORTANT THAT THE WIRING USED FOR INPUT VOLTAGE WIRING IS LARGE ENOUGH TO CARRY THE MAXIMUM CURRENT REQUIRED BY THE SAFEPATH PANEL WITHOUT EXCESSIVE VOLTAGE DROP. IF VOLTAGE DROPS FROM AC POWER LINE LOADING AND WIRING RESISTANCE ARE NOT WITHIN THE SPECIFIED OPERATING VOLTAGE RANGE, THE SAFEPATH PANEL WILL NOT FUNCTION PROPERLY.

A typical AC input voltage wiring diagram is shown in Figure 15. The SAFEPATH panel shall have its own branch circuit on the main power panel. The wiring from the main power panel shall terminate in the SAFEPATH panel on the power supply terminals as shown in Figure 15. Wire jumpers shall then be run from the battery charger terminals to the power supply terminals as shown in Figure 15. The wire jumpers between the battery charger terminals and the power supply terminals shall be the same gauge as the wire between the main power panel and the SAFEPATH panel.

Battery Wiring

Determination of the wire gauge for the battery wiring should consider all factors, including wire loop length and the maximum allowable wire loop resistance. The maximum wire loop resistance is 0.05 ohms. A typical battery wiring diagram is shown in Figure 16.

Earth Ground Wiring

Determination of the wire gauge for the earth ground wiring should consider all factors, including wire length and the maximum allowable wire resistance. A typical earth ground wiring diagram is shown in Figure 17.

Output Wiring Descriptions

The SAFEPATH panel has six types of outputs. The location of the outputs' terminal blocks within the SAFEPATH panel are shown in Figure 9. Detail of the terminal blocks is shown in Figure 18.

Alarm Output Contact Wiring

One alarm output contact is provided. It is Form C and is rated for 0.5A at 24VDC, resistive load. A detail of the alarm output contact terminal connections is shown in Figure 19. The contact in Figure 19 is shown in the non-alarm position. Determination of wire gauge for the alarm output contact wiring should consider all factors, including wire loop length, maximum current capacity, and maximum voltage drop allowable.

System Trouble Output Contact Wiring

One system trouble output contact is provided. It is Form C and is rated for 0.5 amps at 24VDC, resistive load. A detail of the system trouble output contact terminal connections is shown in Figure 20. The contact in Figure 20 is shown in the trouble position. Determination of wire gauge for the system trouble output contact wiring should consider all factors, including wire loop length, maximum current capacity, and maximum voltage drop allowable.

Trouble Audible Output Wiring

One trouble audible output is provided. The output is rated for 24VDC, 0.1 amps maximum. The output is unsupervised. The wiring diagram for the trouble audible output is shown in Figure 21. Determination of wire gauge for the trouble audible output wiring should consider all factors, including wire loop length, maximum current capacity, and maximum voltage drop allowable.

Visual Notification Appliance Output Wiring

Up to four visual notification appliance outputs may be provided. Each output provided is rated for 24VDC, 2.0 amps maximum. All four outputs combined may not exceed 6.0 amps maximum. Each output meets Class B, Style Y supervision requirements for notification appliance circuits.

The wiring diagram for the visual notification appliance output using visual only appliances is shown in Figure 22. The wiring diagram for a notification appliance output using combination audio/visual appliances in central amplified applications is shown in Figure 25. The wiring diagram for a notification appliance output using combination audio/visual appliances in amplified speaker applications is shown in Figure 26.

Each output circuit must have a LISTED 10K end-of-line resistor installed across the last visual notification appliance. All unused outputs must have a LISTED 10K end-of-line resistor across the output terminals. The LISTED 10K end-of-line resistors must have a 1/8W minimum power rating and a 5% maximum tolerance.

The gauge of the wire necessary for the wiring may vary for each visual notification appliance output on the SAFEPATH panel. Determination of wire gauge should consider all factors including wire loop length, the maximum current draw of each appliance, the number of appliances, and the maximum voltage drop allowable.

Audio Notification Appliance Output Wiring

Up to four audio notification appliance outputs may be provided. Each output is either a central amplified output or an amplified speaker output. Central amplified outputs are a 25V or 70.7V audio output, rated for 40W maximum. Amplified speaker outputs are 15 Ohm, -5dBm maximum. Each output meets Class B, Style Y supervision requirements for notification appliance circuits.

The wiring diagram for the audio notification appliance output using audio only appliances in central amplified applications is shown in Figure 23. The wiring diagram for the audio notification appliance output using audio only appliances in amplified speaker applications is shown in Figure 24. The wiring diagram for a notification appliance output using combination audio/visual appliances in central amplified applications is shown in Figure 25. The wiring diagram for a notification appliance output using combination audio/visual appliances in amplified speaker applications is shown in Figure 26.

Each output circuit must have a LISTED 10K end-of-line resistor installed across the last audio notification appliance. All unused outputs must have a LISTED 10K end-of-line resistor across the output terminals. The LISTED 10K end-of-line resistors must have a 1W minimum power rating and a 5% maximum tolerance.

The gauge of the wire necessary for the wiring may vary for each audio notification appliance output on the SAFEPATH panel. When speaker with transformer appliances are used (central amplified outputs), determination of wire gauge should consider all factors including wire loop length, appliance power ratings, the number of appliances, and the maximum voltage drop allowable. When amplified speaker appliances are used, determination of wire gauge should consider all factors including wire loop length, output level, the output resistance, the input resistance of each appliance, the number of appliances, and the appliance input sensitivity.

Amplified Speaker Notification Appliance Power Output Wiring

Up to four amplified speaker notification appliance power outputs may be provided. Each output is rated for 24VDC, 2.0 amps maximum. Each output meets Class B, Style Y supervision requirements for notification appliance circuits. The wiring diagram for the amplified speaker notification appliance power output using audio only appliances is shown in Figure 24. The wiring diagram for the amplified speaker notification appliance power output using combination audio/visual appliances is shown in Figure 26.

Each output circuit must have a LISTED 10K end-of-line resistor installed across the last appliance. All unused outputs must have a LISTED 10K end-of-line resistor across the output terminals. The LISTED 10K end-of-line resistors must have a 1W minimum power rating and a 5% maximum tolerance.

The gauge of the wire necessary for the wiring may vary for each amplified speaker notification appliance power output on the SAFEPATH panel. Determination of wire gauge should consider all factors including wire loop length, the maximum current draw of each appliance, the number of appliances, and the maximum voltage drop allowable.

Remote Microphone Station (RMS-1) Wiring

Use twisted shielded wiring between the remote microphone station and the SAFEPATH panel. Connect shield to the panel ground connection only. The maximum distance between the RMS-1 and the SAFEPATH panel is 1000 Ft. with a minimum wire size of 22 AWG, with a maximum capacitance of 50pF/Ft. or .05uF/Total run.

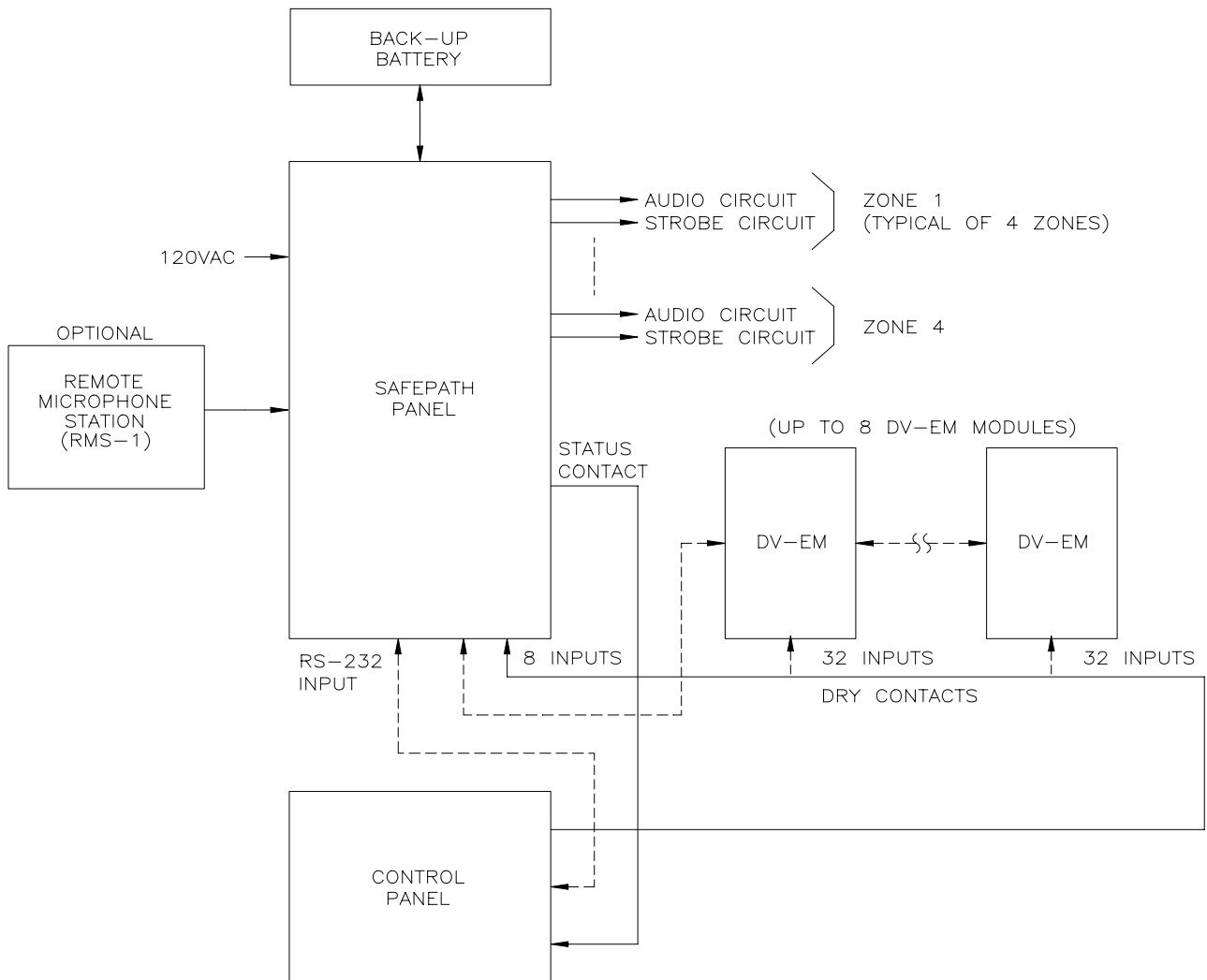


Figure 8.
Typical System Block Diagram

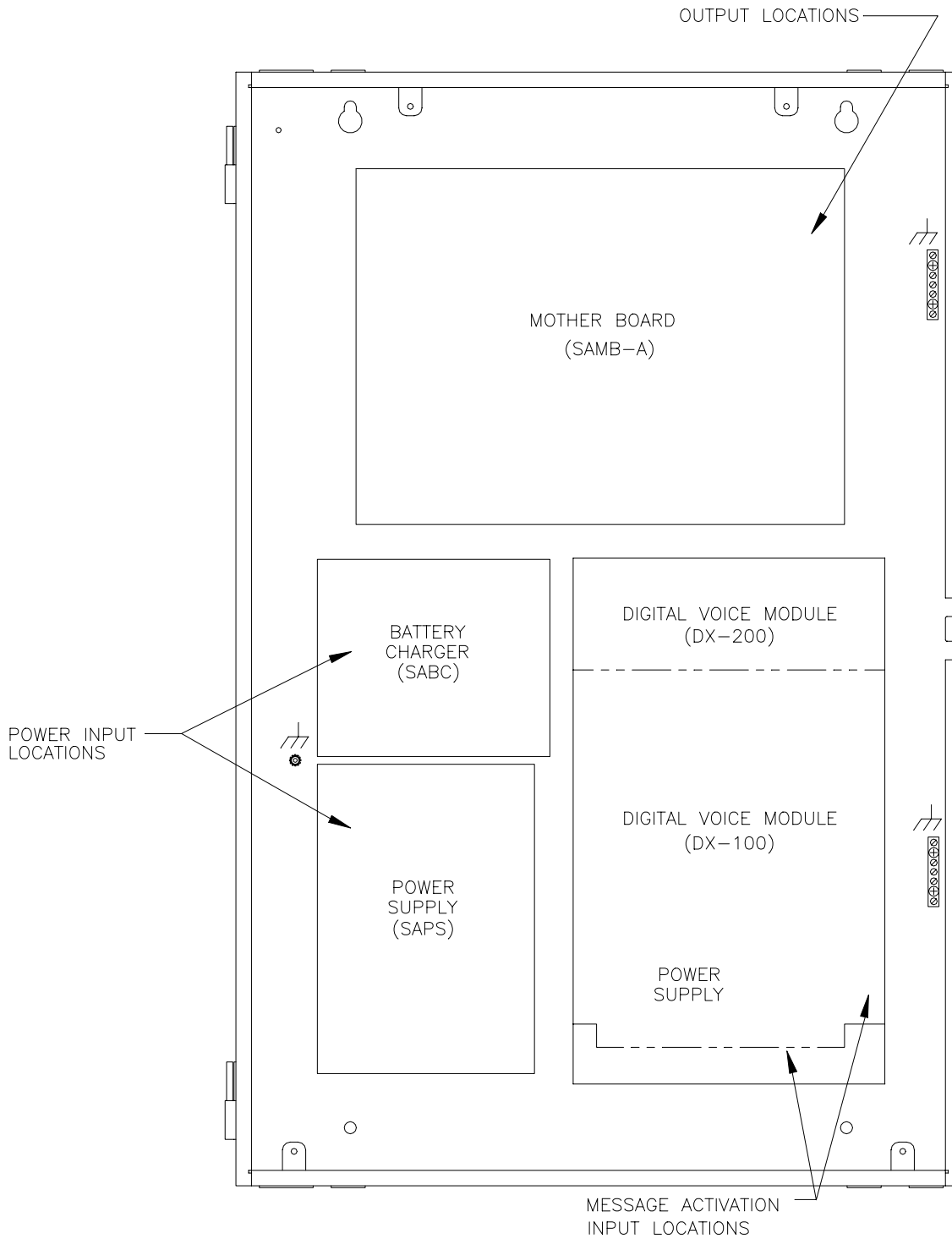


Figure 9.
SAFEPATH Field Wiring
Input/Output Terminal Block Locations

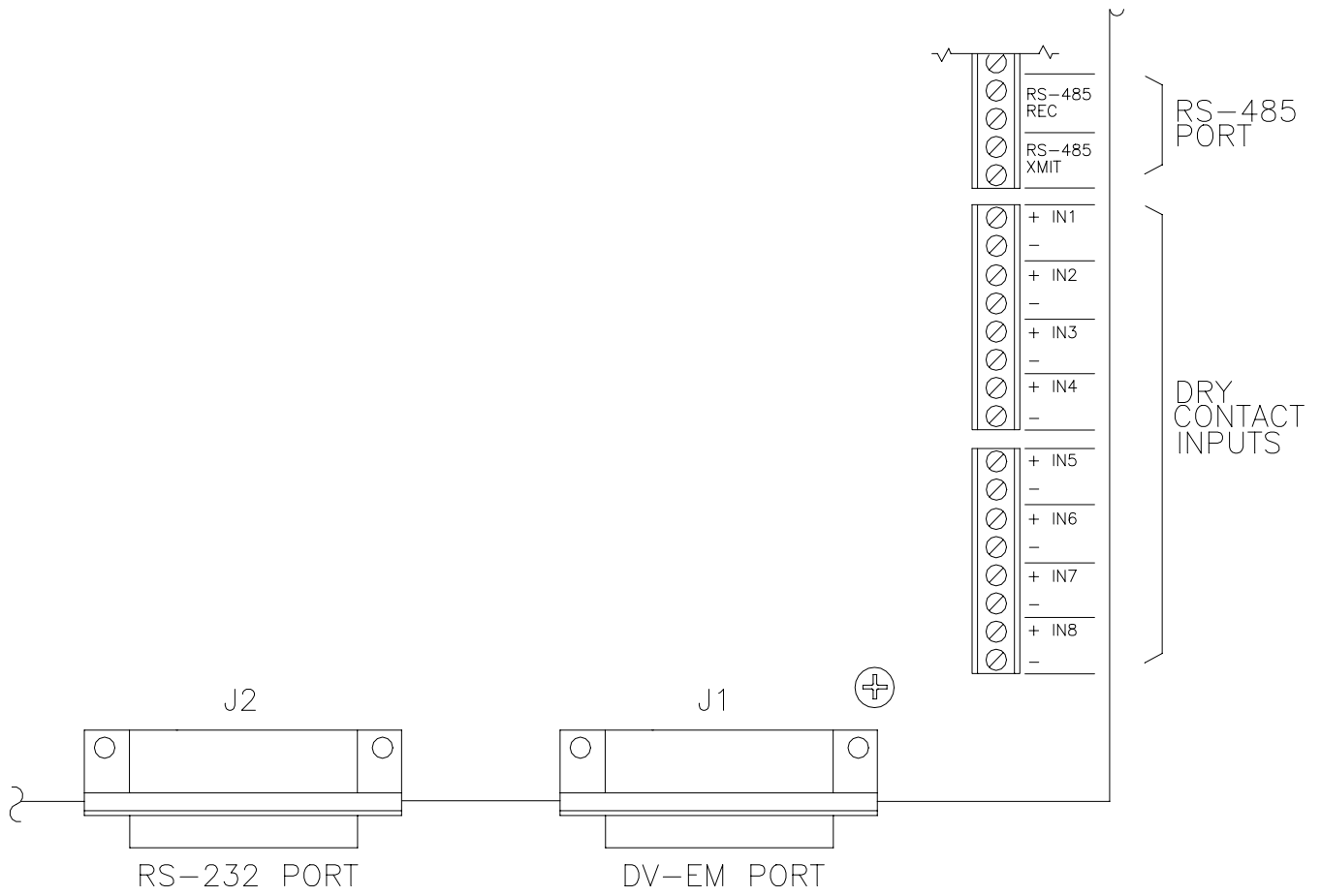


Figure 10.
Terminal Block Layout For SAFEPATH Message Activation Inputs

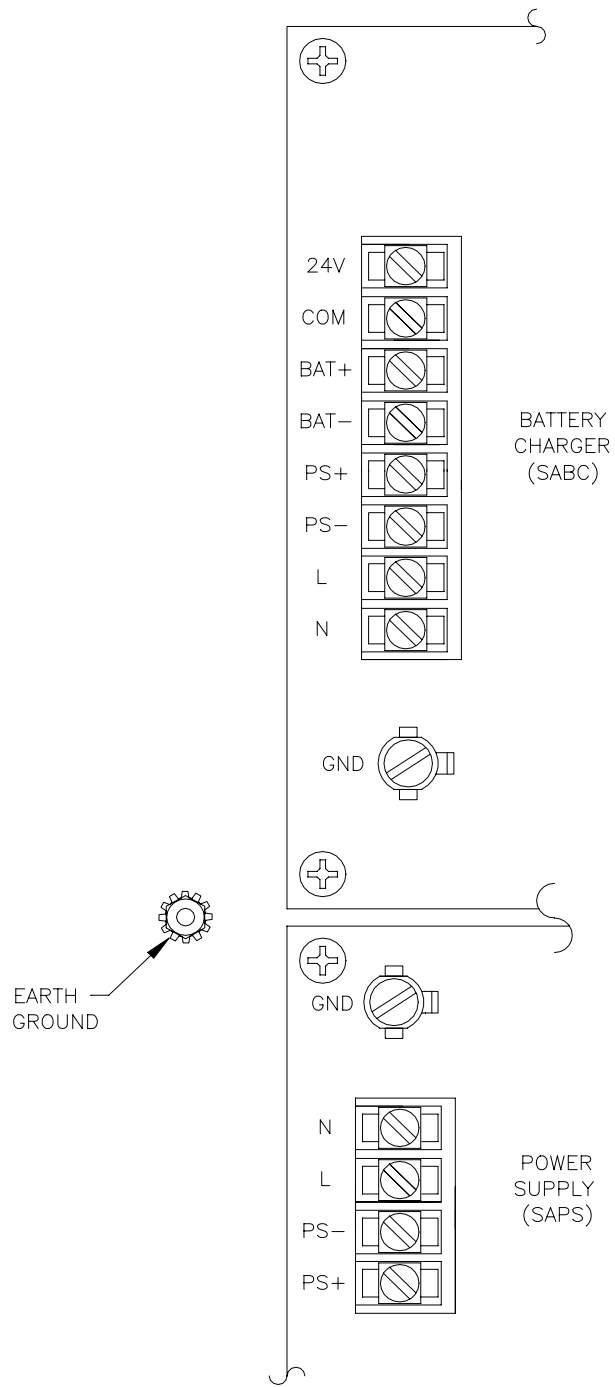
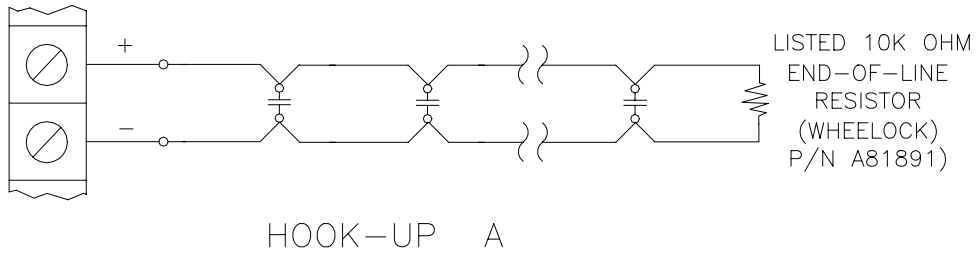
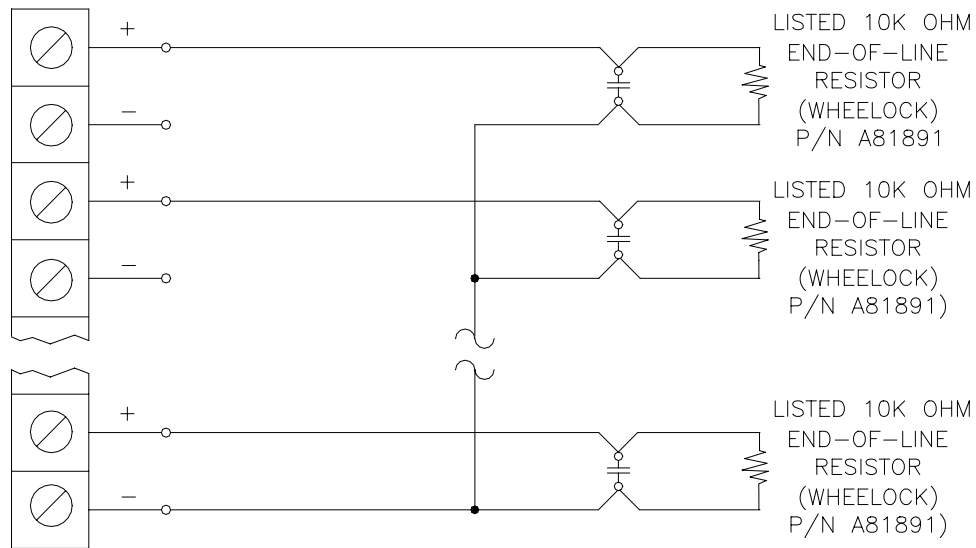


Figure 11.
Power Supply, Battery Charger And Earth Ground Terminal Blocks



HOOK-UP A



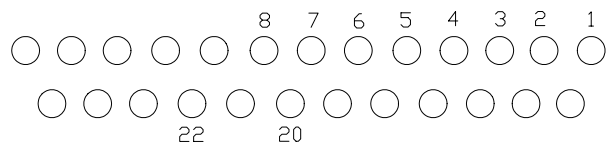
HOOK-UP B

Figure 12.
Dry Contact Input Wiring

- Pin**
- 1 ** Chassis Ground
 - 2 TD (Transmit Data)
 - 3 RD (Receive Data)
 - 4 * RTS (Request To Send)
 - 5 * CTS (Clear To Send)
 - 6 * DSR (Data Set Ready)
 - 7 COM (Signal Ground)
 - 8 * DCD (Data Carrier Detect)
 - 20 * DTR (Data Terminal Ready)
 - 22 * RI (Ring Indicator)

* Optional (Not used with standard protocol)
 ** Not Connected Internally to Signal Ground

RS-232D CONNECTOR



VIEWED FROM FRONT OF FEMALE CONNECTOR

Figure 13.
RS-232 Port Pin Out

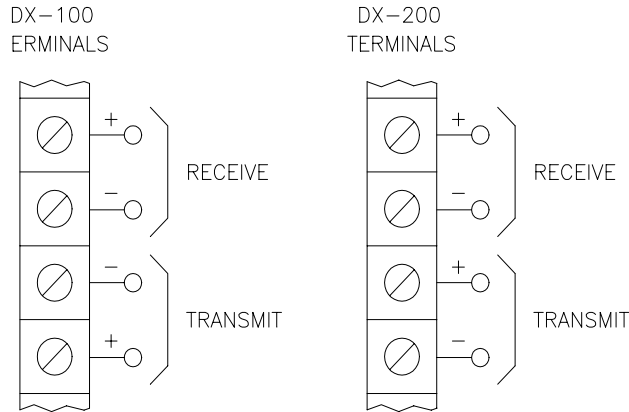


Figure 14.
RS-485 Port Pin Out

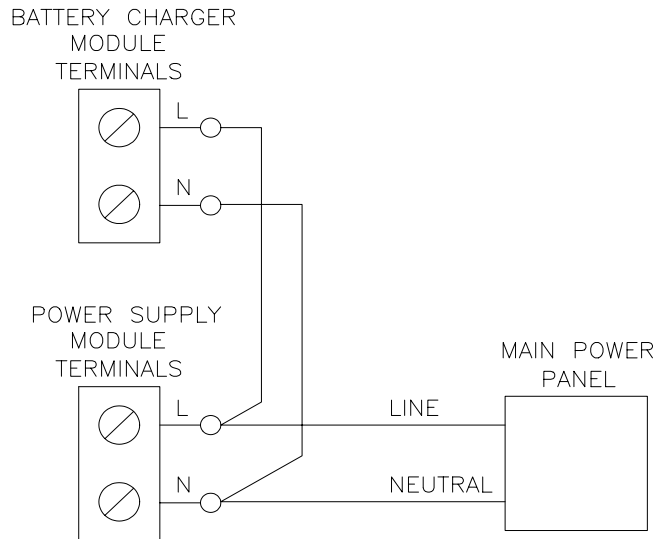


Figure 15.
Typical AC Input Voltage Wiring

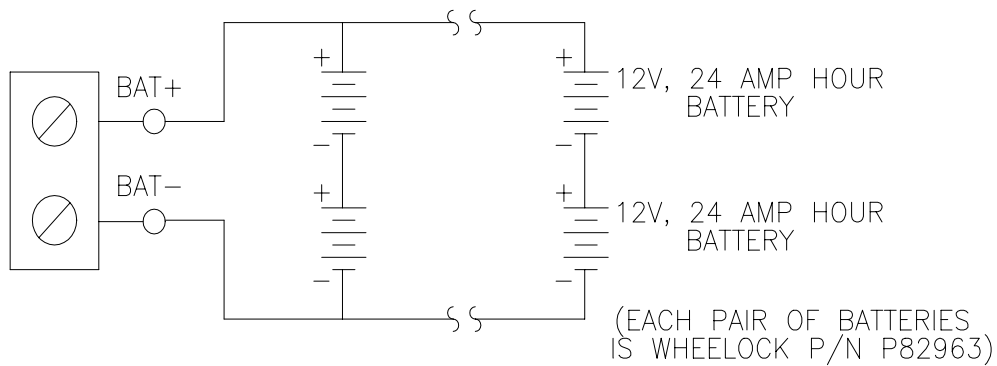


Figure 16.
Typical Battery Wiring

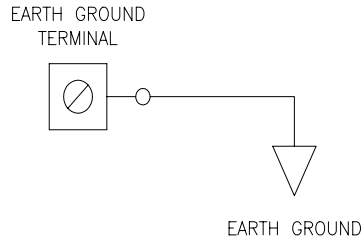


Figure 17.
Typical Earth Ground Wiring

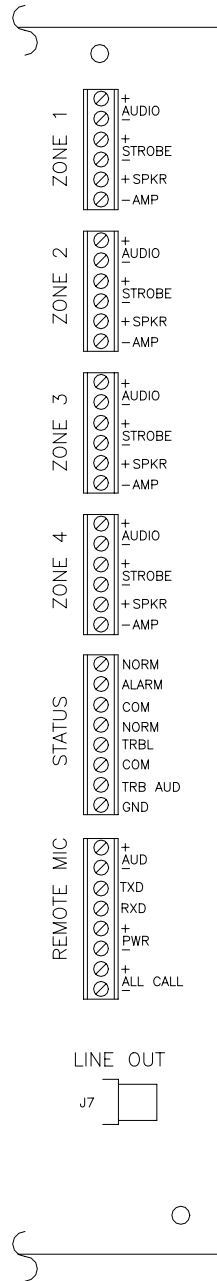


Figure 18.
Output Terminal Block Detail

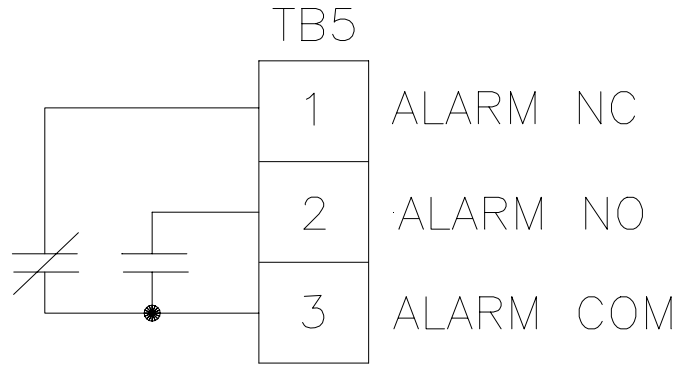


Figure 19.
Alarm Output Contact Connection Diagram

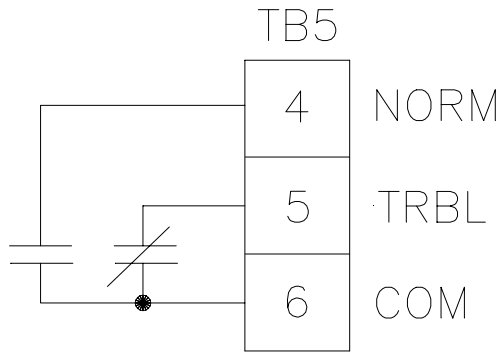


Figure 20.
System Trouble Output Contact Connection Diagram

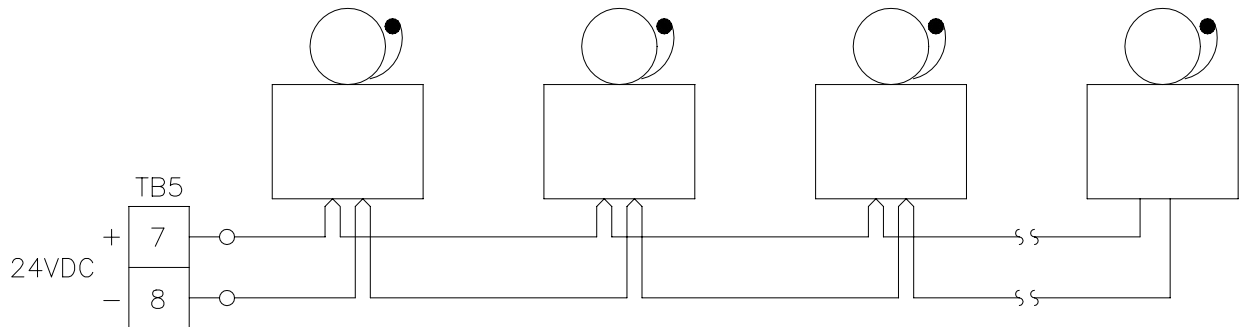


Figure 21.
Trouble Audible Output Wiring Diagram

⚠ CAUTION: Do not loop wire under terminals. Break wire run to provide supervision of connection.

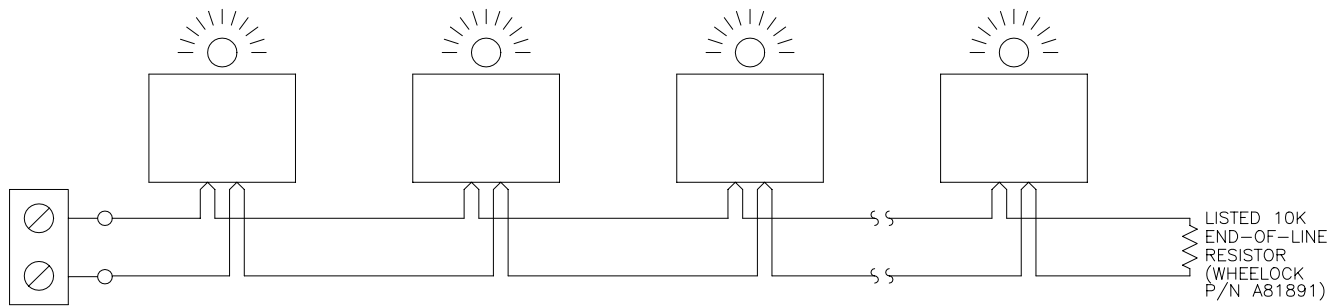


Figure 22.
Visual Notification Appliance Output Wiring Diagram

CAUTION: Do not loop wire under terminals. Break wire run to provide supervision of connection.

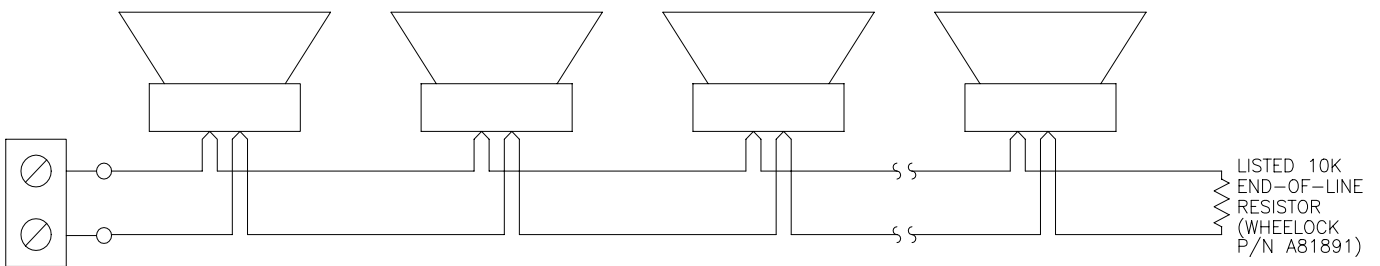


Figure 23.
Audio Notification Appliance Output Wiring Diagram
Using Audio Only Appliances In Central Amplified Applications

CAUTION: Do not loop wire under terminals. Break wire run to provide supervision of connection.

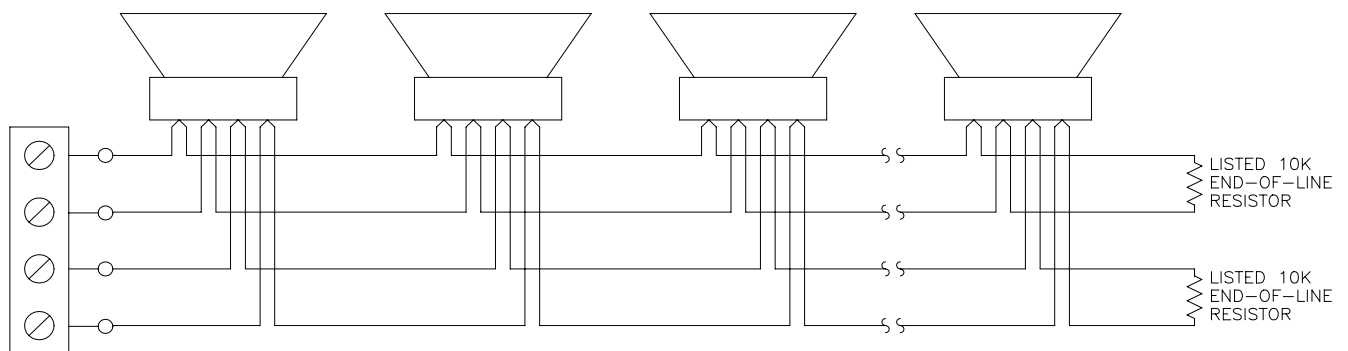


Figure 24.
Audio Notification Appliance Output Wiring Diagram
Using Audio Only Appliances In Amplified Speaker Applications

CAUTION: Do not loop wire under terminals. Break wire run to provide supervision of connection.

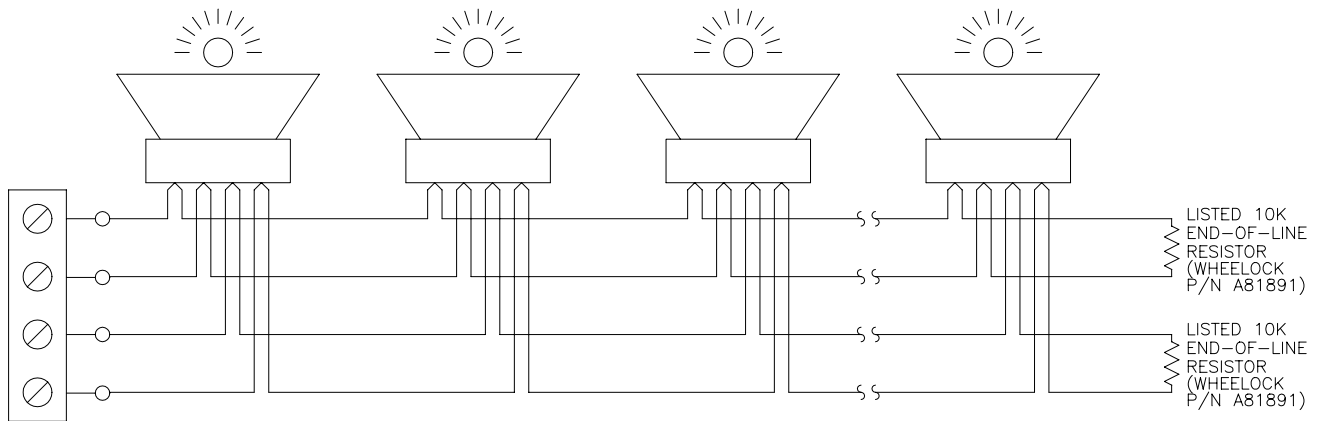


Figure 25.
Notification Appliance Output Wiring Diagram
Using Combination Audio/Visual Appliances In Central Amplified Applications

CAUTION: Do not loop wire under terminals. Break wire run to provide supervision of connection.

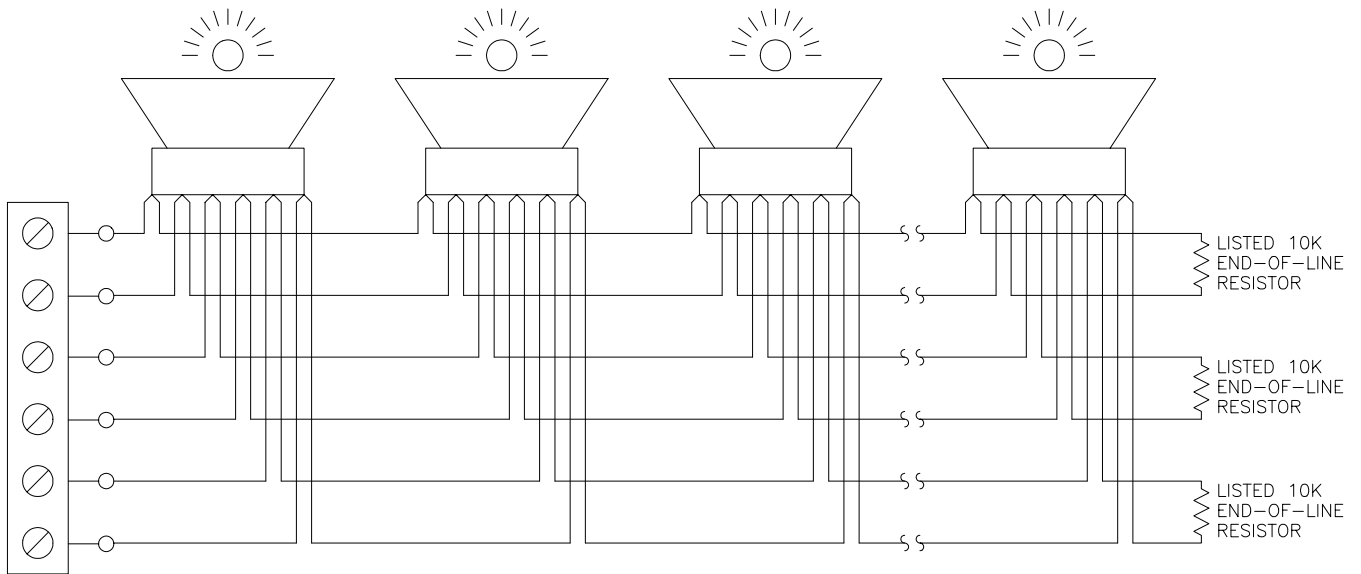


Figure 26.
Notification Appliance Output Wiring Diagram
Using Combination Audio/Visual Appliances In Amplified Speaker Applications

CAUTION: Do not loop wire under terminals. Break wire run to provide supervision of connection.

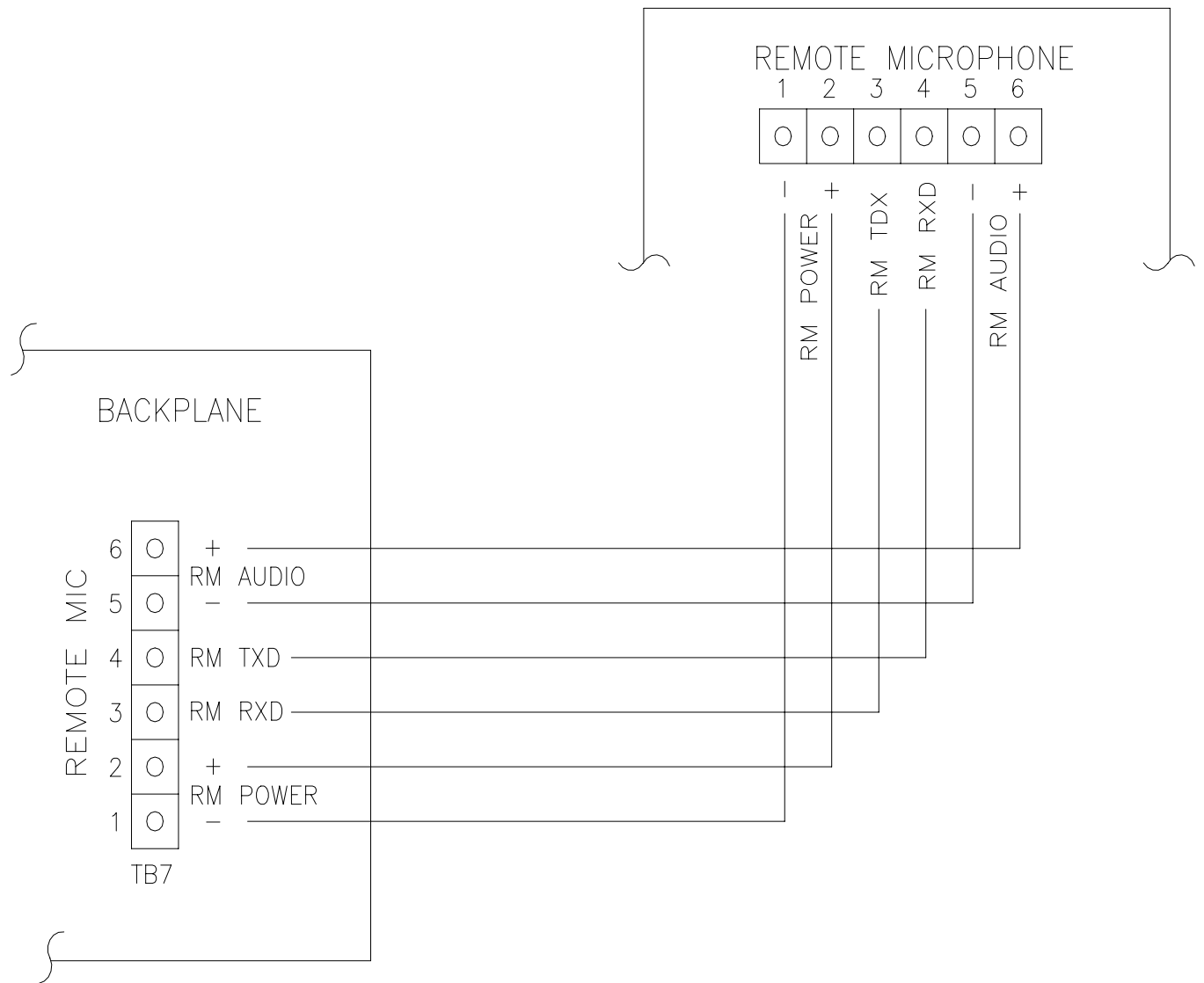


Figure 27.
Optional Remote Microphone Station (RMS-1) Wiring Diagram

Field Wiring Checkout

Refer to NFPA for guidelines on testing signaling system wiring.



CAUTION: Do not connect input voltage to any equipment until the field wiring has been inspected and approved.

Verify that the field wiring is in full agreement with this manual and with the detailed wiring layout prepared for this installation.

Ensure that no unwanted voltages are present on circuit conductors and ground. Test all ungrounded connectors for electrical isolation from ground. Test all wires that are not intentionally connected for electrical isolation from each other. Measure and record the resistance of each circuit pair (this can be done by temporarily short circuiting one end of the circuit).

System Checkout

Refer to NFPA for guidelines on testing signaling systems.

When rated input voltage is applied to the SAFEPATH panel, the unit initializes its program and broadcasts a tone signal through each output channel for several seconds. The green system normal LED indicator should be on to indicate normal operation. If the amber system trouble LED is on, a trouble condition is indicated. Refer to the "Troubleshooting and Servicing" section to diagnose and correct the trouble condition.

The system checkout should include:

1. Testing all inputs and outputs.
2. Testing all connections to equipment that is interconnected with the SAFEPATH panel.
3. Testing all message files for proper audibility, intelligibility, content, and priority.

If a malfunction is discovered during testing, the problem should be corrected immediately before continuing with testing.



WARNING: ALL PROTECTIVE SIGNALING SYSTEMS REQUIRE PERIODIC TESTING. ALL PROTECTIVE SIGNALING SYSTEM EQUIPMENT SHALL BE TESTED BY QUALIFIED PERSONNEL AT LEAST TWICE A YEAR FOR PROPER OPERATION, OR MORE OFTEN IF REQUIRED BY CODES, REGULATIONS AND LAWS. FAILURE TO MAINTAIN AND TEST PROTECTIVE SIGNALING SYSTEM EQUIPMENT CAN RESULT IN NOT DETECTING EQUIPMENT FAILURE THAT CAN CAUSE PROPERTY DAMAGE AND SERIOUS PERSONAL INJURY OR DEATH TO YOU AND/OR OTHERS DURING AN EMERGENCY SITUATION.

Ground Fault Detection Sensitivity Adjustment

The resistance at which a ground fault condition will be indicated is adjustable. The ground fault detection sensitivity can be adjusted between 40K and 500K Ohms. Selecting a high sensitivity (high resistance) will have a fast response to ground fault conditions, but may also cause a high number of false trouble conditions. Selecting a low sensitivity (low resistance) will greatly reduce the susceptibility to false trouble conditions, but will slow the response to ground fault conditions.

Before the following adjustment procedure is performed, all trouble conditions must be corrected (cleared) and the "GROUND FAULT ENABLE ("EN")/DISABLE ("DIS") jumper placed in the enable position.

NOTE: The ground fault detection sensitivity setpoint must be approved by the authorities having jurisdiction.

Adjustment Procedure

1. Disconnect the wire between the earth ground terminal on the digital voice module (see Figure 5 for DX-100 or Figure 6 for DX-200) and earth ground.
2. Rotate the shaft of the Ground Fault Detection Sensitivity potentiometer (R517 on DX-100 or R123 on DX-200) fully counter clockwise (see Figure 5 for DX-100 or Figure 6 for DX-200). The potentiometer is a twelve turn device, so the shaft will probably have to be rotated a number of times. The potentiometer will make a clicking sound when it is rotated past its end point.
3. Place a resistor with the desired setpoint value between the positive side of the input voltage of the digital voice module and the earth ground terminal on the printed circuit board.
4. Slowly rotate the shaft of the Ground Fault Detection Sensitivity potentiometer clockwise. When a ground fault is indicated by the trouble LED's, the sensitivity setpoint is set correctly.
5. Disconnect the resistor used to set the sensitivity level.
6. Reconnect the wire between the earth ground terminal on the printed circuit board and earth ground.

Installation and Care of Sealed Lead Acid Batteries

Sealed lead acid batteries are designed to operate in standby service for approximately five years. This is based upon a normal service condition where there is an ambient of 20 degrees C (68 degrees F) and batteries are completely discharged once every three months. LENGTH OF SERVICE LIFE WILL BE DIRECTLY EFFECTED BY THE NUMBER OF DISCHARGE CYCLES, DEPTH OF DISCHARGE, AND AMBIENT TEMPERATURE.

Use Guidelines:

1. Avoid installation and/or operation in close proximity to heat sources. While the operating temperature range is 0 to 49 degrees C (32-120 degrees F), battery life will be maximized at an ambient of 20 degrees C (68 degrees F).
2. Batteries may generate ignitable gases. Because of this, batteries shall be installed in a well ventilated location, away from spark producing equipment.
3. Batteries shall not be installed in an atmosphere where organic solvents or adhesives may be present. The batteries shall not be cleaned with oils, thinners, or similar substances. The case and cover of the batteries are ABS plastic resin which may suffer damage from these chemicals.
4. Batteries shall not be installed in a heavy vibration or shock location.
5. Batteries shall have a 1/4" minimum separation between cells.
6. Insulated gloves shall always be worn when handling batteries.
7. Batteries shall not be crushed, incinerated, or dismantled. The electrolyte contains sulfuric acid which can cause serious damage to eyes and skin. If contact does occur, flush with water and seek immediate medical attention.
8. Batteries of different capacities, age, or manufacturer shall not be used together.

Battery Storage

Batteries which are to be stored for an extended period of time should be given a supplementary charge monthly. Batteries should never be stored in a discharged condition.

The self-discharge rate of batteries is approximately 3% per month when the storage temperature is maintained at 20 degrees C (68 degrees F). The self-discharge rate will vary depending upon temperature. Cooler temperatures cause the self-discharge rate to decrease. Warmer temperatures cause the self-discharge rate to increase.

Configuration

There are 8 dip switches used to configure the SAFEPATH system:
They are:

- SW8 Position 1, REMOTE MICROPHONE ENABLE (RM). ON configures the system to use an optional Remote Microphone. OFF configures the system to use no Remote Microphone.
- SW8 Position 2, SYNCHRONIZED STROBES ENABLE (SS). ON configures the system to work with Wheelock's synchronized strobes.
- SW8 Position 3, Remote SAFEPATH ENABLE (SL). Future Use, leave in OFF position.
- SW8 Position 4, Future Use (FU). Leave in OFF position.
- SW9 Position 1, LAMP TEST ENABLE (LT). ON lights the panel LED'S for test purposes, leave in OFF position.
- SW9 Position 2, 3, & 4, MULTITONE SELECT (TS1, TS2, & TS3) selects 1 of 8 tones used for the primary evacuation signal. Use chart below to select the tone.

SWITCH SETTINGS FOR AVAILABLE TONE SOUNDS			
STONE SOUND	SW9-2	SW9-3	SW9-4
Horn (Continuous)	ON	ON	ON
Bell (1560Hz Modulated)	ON	OFF	ON
March Time Horn (.25 Sec ON .25 Sec. OFF)	OFF	OFF	ON
Code-3 Horn (ANSI S3.41 Temporal Pattern)	ON	ON	OFF
Code-3 Tone 500Hz (ANSI S3.41 Temporal Pattern)	OFF	ON	ON
Slow Whoop (500-1200Hz Sweep)	OFF	ON	OFF
Siren (600-1200 Hz Sweep)	ON	OFF	OFF
HI/LO (1000/800Hz)	OFF	OFF	OFF

Table 3.

Power Calculations

It is necessary to calculate the current draw for battery back-up requirements. The current requirements depend on the system configuration and the options installed. The total current is the sum of the currents of all the components in the system. There are two different system current ratings:

- Standby Current
- Alarm Current

Standby Current Calculations:

System Controller Board	150mA
Amplifier 1	See Note 1
Amplifier 2	See Note 1
Amplifier 3	See Note 1
Amplifier 4	See Note 1
Digital Voice	See Note 2
Optional RMS-1	40mA (If Installed)
Optional Trouble Audible	See Note 3
Optional SPL	40mA (If Installed)

Total: _____

Note 1: If no amplifier is installed in the slot then the current for that amplifier is zero. If there is an amplifier the standby current depends on the model of the amplifier installed in the slot and the pre-selected 1 of 8 evacuation tones.

Model	Standby Current As per UL full power SIN wave testing	Temporal CODE-3 TONE	Worst case tone HI/LO
SALL-15S	100mA	100mA	100mA
SAA10S/SE Series	240mA	125mA	150mA
SAA40S/SE Series	400mA	300mA	300mA
SAA80S/SE Series	600mA	300mA	400mA

Note 2: The standby current of the DV depends on the model DV installed.

Model	Standby Current
DV-100	200mA
DV-200	250mA

Note 3: Use the rated current for the optional trouble audible attached to the system.

Alarm Current Calculations:

System Controller Board	150mA
Amplifier 1	See Note 4
Amplifier 2	See Note 4
Amplifier 3	See Note 4
Amplifier 4	See Note 4
Digital Voice	See Note 5
Optional RMS-1	75mA (If Installed)
Optional Trouble Audible	See Note 6
Zone 1 Strobes	See Note 7
Zone 2 Strobes	See Note 7
Zone 3 Strobes	See Note 7
Zone 4 Strobes	See Note 7
Optional SPL	190mA (If Installed)

Total: _____

Note 4: If no amplifier is installed in the slot then the current for that amplifier is zero. If there is an amplifier the alarm current depends on the model of the amplifier installed in the slot and the signal used for evacuation.

Model	Alarm Current full power SIN wave as per UL testing		
SALL-15S Series	The sum of the currents of the self amplified speakers.		
SAA-10S/SE Series	(total wattage of connected speakers) x 69 + 240mA		
SAA-40S/SE Series	(total wattage of connected speakers) x 55 + 400mA		
SAA-80S/SE Series	(total wattage of connected speakers) x 56 + 600mA		
	Alarm Current for:	Temporal	Worst case
		CODE-3	tone
	Typical Voice	TONE	HI/LO
SAA10S/SE Series	250mA	350mA	750mA
SAA40S/SE Series	600mA	750mA	1600mA
SAA80S/SE Series	1000mA	1050mA	2500mA

Note 5: The alarm current of the DV depends on the model DV installed.

Model	Alarm Current
DV-100	250mA
DV-200	300mA

Note 6: Use the rated current for the optional trouble audible attached to the system.

Note 7: If no strobes are installed in the zone the current is zero. If strobes are installed, the current is the sum of the current ratings of all the strobes attached to the zone.

Battery Capacity Calculations:

The battery capacity depends on two factors; the current being drawn from the battery and the amount of time that the current is being drawn. The battery capacity is measured in amp hours. The total amp hours of batteries needed is (the standby current) x (time in standby) + (the alarm current) x (time in alarm).

Sample Calculation:

The system is equipped with a DV-100, an RMS-1, a remote trouble audible that is rated for 100mA, and three amplifiers. The first amplifier is an SAA-10S Series with 10 watts of speakers attached and 1 amp of strobes attached. The second amplifier is an SAA-80S Series with 60 watts of speakers attached and 2 amps of strobes attached. The third amplifier is an SALL-15S Series with 10, 100mA self amplified speakers attached and no strobes attached. The system is designed for 24 hours of standby and 15 minutes of alarm.

Standby Calculations:

System Controller Board	150mA
Amplifier 1	125mA
Amplifier 2	300mA
Amplifier 3	100mA
Amplifier 4	0mA
Digital Voice	200mA
Optional RMS-1	40mA
Optional Trouble Audible	100mA

Total: $1015\text{mA} = 1.015\text{ amps}$

Alarm Current Calculations:


System Controller Board	150mA
Amplifier 1	350mA
Amplifier 2	1050mA
Amplifier 3	1000mA
Amplifier 4	None
Digital Voice	DV-100
Optional RMS-1	750mA
Optional Trouble Audible	100mA
Zone 1 Strobes	1000mA
Zone 2 Strobes	2000mA
Zone 3 Strobes	0mA
Zone 4 Strobes	0mA

Total: $5975\text{mA} = 5.975\text{ amps}$


Battery Capacity Calculations:


24 hours x 1.015 amps + 1/12 hour (5 minutes) x 5.975 amps = 24.86 amp hours minimum capacity. Any de-rating factor must also be included.

Troubleshooting


 **WARNING:** SOME ELECTRONIC COMPONENTS STORE A HIGH VOLTAGE CHARGE, EVEN THOUGH POWER IS NOT CONNECTED, AND CAN CAUSE A DANGEROUS SHOCK IF TOUCHED. DO NOT TOUCH EXPOSED CIRCUITRY ON THE SAFEPATH PANEL UNLESS THE CIRCUITRY HAS DISCHARGED FOR ONE HOUR AND A SAFE DISCHARGE PROCEDURE IS USED.

 **WARNING:** PROVIDE UL REQUIRED ALTERNATIVE SIGNALING MEANS DURING TROUBLE CONDITIONS AND SERVICING TO ASSURE ADEQUATE PROTECTION OF PEOPLE AND PROPERTY. HAVE QUALIFIED SERVICE PERSONS IMMEDIATELY REPLACE ANY MODULES THAT HAVE MALFUNCTIONED.

 **CAUTION:** Troubleshooting and servicing should be conducted only by qualified persons in accordance with the procedures in this manual. Do not attempt to make other adjustments, modifications, or repairs. Never use water, steam, cleaning liquids or sprays on the SAFEPATH.

 **CAUTION:** User servicing of the SAFEPATH is limited to the following:

- Field wiring changes following the instructions in the "Installation" section of this manual.
- Reprogramming voice messages following the instructions in the "Message Recording" section of this manual (DX-200 configured panels only).
- The procedures set forth in this section.

 **CAUTION:** Do not paint or in any way cover window or LED's.

AFTER ANY TROUBLESHOOTING PROCEDURE IS COMPLETED, PERFORM A COMPLETE SYSTEM CHECKOUT.

The SAFEPATH panel monitors system integrity. Items monitored for integrity are:

1. Strobe circuit field wiring.
2. Speaker circuit field wiring.
3. Amplified speaker audio circuit field wiring.
4. Amplified speaker power circuit field wiring.
5. AC input voltage.
6. Battery voltage level.
7. Battery circuit field wiring.
8. Amplifier functionality.
9. DX-100 and DX-200 functionality.
10. Internal wiring.
11. Internal fuses.
12. Remote microphone functionality and wiring.

System status is indicated to the operator via the NORMAL and TROUBLE indicators. If a trouble condition is detected, the SAFEPATH panel will respond as follows:

1. Turn off the NORMAL indicator.
2. Turn on the TROUBLE indicator.
3. Transfer the Form C trouble contact to the trouble position.
4. Turn on the internal trouble sounder.
5. Turn on the external trouble audible.
6. Turn on a trouble location indicator, if appropriate.

If the acknowledge push-button is pressed, the internal trouble sounder and the external trouble audible will be silenced. All other trouble indicators will still indicate a trouble condition. The internal trouble sounder and the external trouble audible will not resound for subsequent trouble conditions, until all trouble conditions have cleared. If the main power fuse on the controller board is blown, the internal trouble sounder and the external trouble audible will not sound. All other trouble indications occur normally. When there are no trouble conditions detected, the NORMAL indicator will always be on and the TROUBLE indicator will always be off. When a trouble condition is detected, the NORMAL indicator will always be off and the TROUBLE indicator will always be on.

The SAFEPATH panel has trouble location indicators which provide information as to what trouble condition has been detected and on which part of the system the trouble is located. Figure 28 shows the location of all trouble location indicators within the SAFEPATH panel with DX-100. Figure 29 shows the location of all trouble location indicators within the SAFEPATH panel with DX-200. Table 4 cross references the trouble location indicators on the SABC, SACM-4 and SAA modules to the proper troubleshooting procedure. Table 5 cross references the indicators on the digital voice module (DX-100 or DX-200) to the proper troubleshooting procedure.

Trouble Location Indicator/Troubleshooting Procedure Cross Reference					
NORMAL Indicator	TROUBLE Indicator	Module	Indicator	What it Means	Troubleshooting Procedure
On	Off	----	----	Normal	----
Off	Off	----	----	Power Loss	A
On	On	----	----	Faulty Controller Module	B
Off	On	SABC	PWR LOW	Input Power Low	C
			BAT LOW	Battery Voltage Low	D
			BAT OPEN	Battery Trouble	E
		SAA	AMP	Amplifier Trouble	F
			SPK	Audio Output Wiring Trouble	G
			STR	Visual Notification Output Wiring Trouble	H
		SACM-4	AMP	Amplifier Trouble	I
			AUDIO	Audio Output Wiring Trouble	J
			STROBE	Visual Notification Output Wiring Trouble	K
AMP	Amplifier Trouble		I		
Off	On	SADC	D10	See Procedure W	W
			D11		
			D12		

Table 4.

DV Module System Normal LED (Green)	DV Module System Trouble LED (Amber)	DV Module Trouble Indicator LED (Amber)	What it Means	Troubleshooting Procedure
On	Off	Off	Normal	----
Off	Off	Off	Power Loss	M
Off	On	Off	DV Module Inoperative	N
Off	On	Steady-On	DV Module Inoperative	O
Off	On	1 Blink Pattern	Battery Trouble (DX-200 Only)	P
Off	On	2 Blink Pattern	Message Memory PSRAM Error	Q
Off	On	3 Blink Pattern	Input Error	R
Off	On	4 Blink Pattern	Output Channel Error	S
Off	On	5 Blink Pattern	Serial Port Communication Error	T
Off	On	6 Blink Pattern	Ground Fault Detected	U
Off	On	7 Blink Pattern	Telephone Trouble Error	V

Table 5.

SAFEPATH Module Replacement Procedure

Return any modules that are malfunctioning, after all troubleshooting operations have been performed, for factory repair or replacement. If it is necessary to return a SAFEPATH module, replace the malfunctioning modules immediately in the following manner:

1. Disconnect AC input power from the SAFEPATH panel.
2. Disconnect battery back-up power from the SAFEPATH panel.
3. Identify all wiring connections to make sure they will be reconnected identically on the replacement.
4. Disconnect all wiring connections.
5. Remove the malfunctioning module(s) and install the replacement module(s). Perform all checkout procedures described in the "Installation" section of this manual to make sure the replacement module(s) is (are) operating properly.

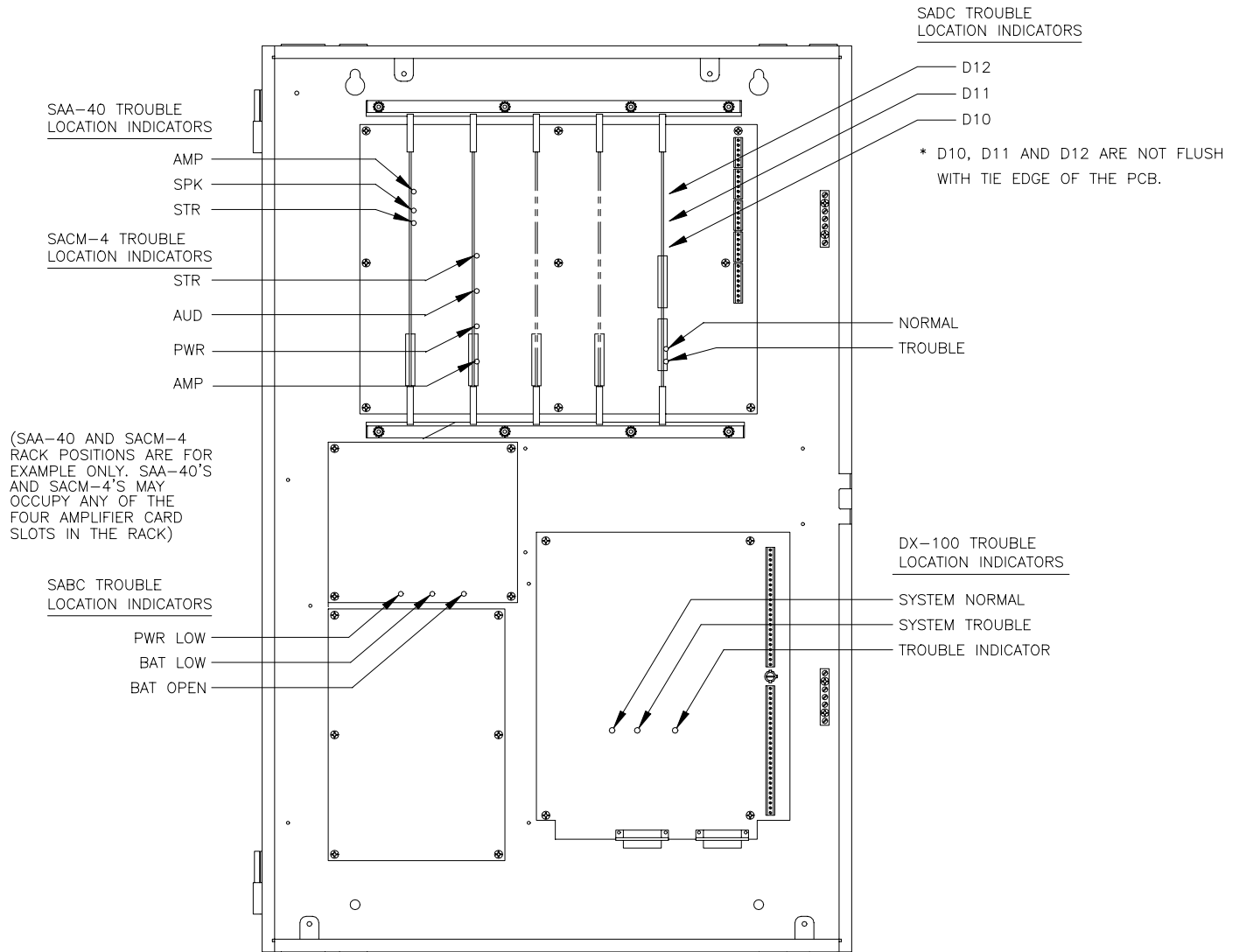


Figure 28.
SAFEPATH With DX-100
Trouble Location Indicator Locations

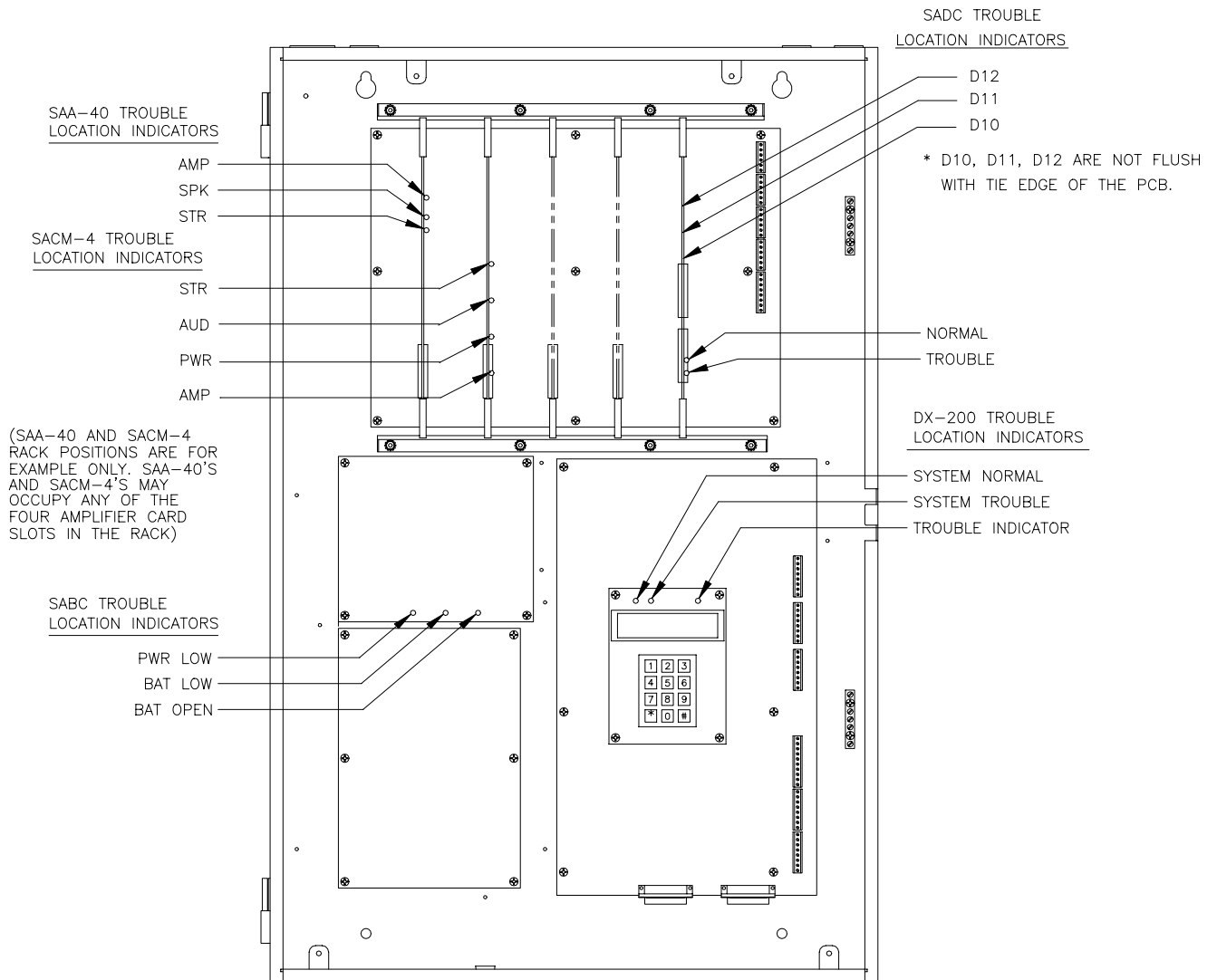


Figure 29.
SAFEPATH With DX-200
Trouble Location Indicator Locations

BEFORE PERFORMING ANY OF THE FOLLOWING TROUBLESHOOTING PROCEDURES, THE PRELIMINARY TROUBLESHOOTING INFORMATION AT THE BEGINNING OF THIS "TROUBLESHOOTING" SECTION MUST BE READ, UNDERSTOOD, AND FOLLOWED.

Procedure A

If the green NORMAL indicator is off, the yellow TROUBLE indicator is off, and no module indicators are on, a power loss condition has occurred. A power loss condition may be caused by:

1. A blown fuse on the SAPS module.
2. A blown fuse on the SADC module
3. Loss of AC input power and battery back-up power.
4. Faulty internal wiring between the SAPS module and the SABC module.
5. Faulty internal wiring between SABC module and the backplane module.
6. Faulty SAPS module.
7. Faulty SABC module.
8. Faulty SADC module.
9. Faulty backplane module.

Perform the following:

1. Verify that all fuses on the SAPS module are intact.
2. Verify that all fuses on the SADC module are intact.
3. Verify that AC input power and battery back-up power are present.
4. Verify that the wiring between the SAPS module and the SABC module is intact.
5. Verify that the wiring between the SABC module and the backplane module is intact.
6. Verify that the output voltage of the SAPS module is within its specification.
7. Verify that the output voltage of the SABC module is within its specification.
8. Swap SADC module with a known good module.
9. Replace the backplane module.

Procedure B

If the green NORMAL indicator is on and the yellow TROUBLE indicator is on, a faulty controller module condition has occurred. A faulty controller module condition may be caused by:

1. A faulty SADC module.

Perform the following:

1. Replace the SADC module.

Procedure C

If the green NORMAL indicator is off, the yellow TROUBLE indicator is on, and the PWR LOW indicator on the SABC is on, an input power low condition has occurred. An input power low condition may be caused by:

1. A fuse on the SABC module is blown.
2. Low AC input power.
3. A faulty SABC module.

Perform the following:

1. Verify that all fuses on the SABC module are intact.
2. Verify that the AC input power is within the correct operating range.
3. Replace the SABC.

Procedure D

If the green NORMAL indicator is off, the yellow TROUBLE indicator is on, and the BAT LOW indicator on the SABC module is on, a battery voltage low condition has occurred. A battery voltage low condition may be caused by:

1. Fully discharged batteries.
2. Faulty batteries.
3. A faulty SABC module.

Perform the following:

1. Charge the batteries for 24 hours.
2. Replace the batteries.
3. Replace the SABC module.

Procedure E

If the green NORMAL indicator is off, the yellow TROUBLE indicator is on, and the BAT OPEN indicator on the SABC module is on, a battery trouble condition has occurred. A battery trouble condition may be caused by:

1. A fuse on the SABC module is blown.
2. Faulty field wiring to batteries.
3. A faulty SABC module.

Perform the following:

1. Verify that all fuses on the SABC module are intact.
2. Verify that the field wiring to the batteries is intact.
3. Replace the SABC module.

Procedure F

If the green NORMAL indicator is off, the yellow TROUBLE indicator is on, and the AMP indicator on the SAA module is on, an amplifier trouble condition has occurred. An amplifier trouble condition may be caused by:

1. Faulty internal wiring between the backplane module and the digital voice module.
2. A faulty SAA module.
3. A faulty SADC module.
4. A faulty backplane module.

Perform the following:

1. Verify that the wiring between the backplane module and the digital voice module is intact.
2. Replace the SAA.
3. Replace the SADC module.
4. Replace the backplane module.

Procedure G

If the green NORMAL indicator is off, the yellow TROUBLE indicator is on, and the SPK indicator on the SAA module is on, an audio output wiring trouble condition has occurred. An audio output wiring trouble condition may be caused by:

1. Missing end-of-line resistor on the audio output.
2. The audio output field wiring is open or shorted.
3. A fuse on the SAA module is blown.
4. A faulty SAA module.
5. A faulty backplane module.

Perform the following:

1. Verify that the end-of-line resistor is properly in place.
2. Verify that the audio output field wiring is intact.
3. Verify that all fuses on the SAA module are intact.
4. Replace the SAA module.
5. Replace the backplane module.

Procedure H

If the green NORMAL indicator is off, the yellow TROUBLE indicator is on, and the STR indicator on the SAA module is on, a visual notification output wiring trouble condition has occurred. A visual notification output wiring trouble condition may be caused by:

1. Missing end-of-line resistor on the visual notification output.
2. The visual notification output field wiring is open or shorted.
3. A fuse on the SAA module is blown.
4. A faulty SAA module.
5. A faulty backplane module.

Perform the following:

1. Verify that the end-of-line resistor is properly in place.
2. Verify that the visual notification output field wiring is intact.
3. Verify that all fuses on the SAA module are intact.
4. Replace the SAA module.
5. Replace the backplane module.

Procedure I

If the green NORMAL indicator is off, the yellow TROUBLE indicator is on, and the AMP indicator on the SACM-4 module is on, an amplifier trouble condition has occurred. An amplifier trouble condition may be caused by:

1. Faulty internal wiring between the backplane module and the digital voice module.
2. A faulty SACM-4 module.
3. A faulty SADC module.
4. A faulty backplane module.

Perform the following:

1. Verify that the wiring between the backplane module and the digital voice module is intact.
2. Replace the SACM-4 module.
3. Replace the SADC module.
4. Replace the backplane module.

Procedure J

If the green NORMAL indicator is off, the yellow TROUBLE indicator is on, and the AUDIO indicator on the SACM-4 module is on, an audio output wiring trouble condition has occurred. An audio output wiring trouble condition may be caused by:

1. Missing end-of-line resistor on the audio output.
2. The audio output field wiring is open or shorted.
3. A fuse on the SACM-4 module is blown.
4. A faulty SACM-4 module.
5. A faulty backplane module.

Perform the following:

1. Verify that the end-of-line resistor is properly in place.
2. Verify that the audio output field wiring is intact.
3. Verify that all fuses on the SACM-4 module are intact.
4. Replace the SACM-4 module.
5. Replace the backplane.

Procedure K

If the green NORMAL indicator is off, the yellow TROUBLE indicator is on, and the STROBE indicator on the SACM-4 module is on, a visual notification output wiring trouble condition has occurred. A visual notification output wiring trouble condition may be caused by:

1. Missing end-of-line resistor on the visual notification output.
2. The visual notification output field wiring is open or shorted.
3. A fuse on the SACM-4 module is blown.
4. A faulty SACM-4 module.
5. A faulty backplane module.

Perform the following:

1. Verify that the end-of-line resistor is properly in place.
2. Verify that the visual notification output field wiring is intact.
3. Verify that all fuses on the SACM-4 module are intact.
4. Replace the SACM-4 module.
5. Replace the backplane module.

Procedure L

If the green NORMAL indicator is off, the yellow TROUBLE indicator is on, and the PWR indicator on the SACM-4 module is on, an amplified speaker power output wiring trouble condition has occurred. An amplified speaker power output wiring trouble condition may be caused by:

1. Missing end-of-line resistor on the amplified speaker power output.
2. The amplified speaker power output field wiring is open or shorted.
3. A fuse on the SACM-4 module is blown.
4. A faulty SACM-4 module.
5. A faulty backplane module.

Perform the following:

1. Verify that the end-of-line resistor is properly in place.
2. Verify that the amplified speaker power output field wiring is intact.
3. Verify that all fuses on the SACM-4 module are intact.
4. Replace the SACM-4 module.
5. Replace the backplane module.

Procedure M

If the digital voice module system normal LED, the digital voice module system trouble LED, and the digital voice module trouble indicator LED are off, the digital voice module may be completely inoperative due to power loss. This condition is caused by:

1. Input voltage is not within proper range or polarity is incorrect.
2. Blown fuse on the digital voice module (F1 on DX-100, F2 on DX-200).
3. One or more LED's are broken.

Perform the following:

1. Verify that input voltage is within proper range and that polarity is correct.
2. Check appropriate fuse on digital voice module.

If, after the above procedure is completed, the trouble condition persists, the trouble condition is caused by broken LED's on the digital voice module. The LED's on the digital voice module are not field replaceable. Digital voice modules with broken LED's shall be replaced immediately, following the "SAFEPATH Module Replacement Procedure", set forth previously in this section.

Procedure N

If the digital voice module system normal LED is off, the digital voice module system trouble LED is on, and the digital voice module trouble indicator LED is off, the digital voice module may be completely inoperative. This condition is caused by:

1. Too low input voltage on the digital voice module.
2. Missing or improperly inserted program memory EPROM.
3. Broken digital voice module trouble indicator LED (digital voice module is operative if this is the cause).
4. Failed circuitry on the digital voice module.

Perform the following:

1. Verify that the input voltage exceeds the minimum operating voltage.
2. Verify that the program memory EPROM is present and inserted into S46 properly.
3. Attempt to play a message file. If the file plays then the digital voice module trouble indicator LED is broken.

If, after the above procedure is completed, the trouble condition persists, the trouble condition is caused by failed circuitry on the digital voice module. There are no field correctable failed circuitry problems on the digital voice module. Digital voice modules with failed circuitry shall be replaced immediately, following the "SAFEPATH Module Replacement Procedure", set forth previously in this section.

Procedure O

If the digital voice module system normal LED is off, the digital voice module system trouble LED is on, and the digital voice module trouble indicator LED is steady on, the digital voice module is partially or completely inoperative. The digital voice module can be rendered inoperative by:

1. Too low input voltage on the digital voice module.
2. Failed audio channel on the digital voice module.
3. Other failed circuitry on the digital voice module.

If the error was either due to the first or third cause, the digital voice module will not play messages. If the error was due to the third cause, the serial port might be functioning properly, depending on what circuitry failed. If the error was due to the second cause, the digital voice module might play messages and the serial port will function properly.

When the digital voice module is rendered inoperative, perform the following:

1. Verify that the input voltage exceeds the minimum operating voltage.
2. Attempt to play messages on all installed audio channels.

If, after the above procedure is completed, the trouble condition persists, the trouble condition is caused by failed circuitry on the digital voice module. There are no field correctable failed circuitry problems on the digital voice module. Digital voice modules with failed circuitry shall be replaced immediately, following the "SAFEPATH Module Replacement Procedure", set forth previously in this section.

Procedure P

If the digital voice module system normal LED is off, the digital voice module system trouble LED is on, and the digital voice module trouble indicator LED flashes a 1-blink pattern, a memory retention battery trouble has been detected. A memory retention battery trouble error may be caused by:

1. Disconnected memory retention battery.
2. Failed memory retention battery.
3. Failed battery charging or supervision circuitry on the digital voice module.

If the error was due to one of the first two causes, the trouble will clear the first time the battery is checked after the cause is corrected. Note that the battery is checked by the circuitry once every five minutes.

When a battery trouble error is indicated, perform the following:

1. Check connection of memory retention battery.
2. Replace memory retention battery.

If after the above procedure is completed, the trouble condition persists, the trouble condition is caused by failed circuitry on the digital voice module. There are no field correctable failed circuitry problems on the digital voice module. Digital voice modules with failed circuitry shall be replaced immediately, following the "SAFEPATH Module Replacement Procedure", set forth previously in this section.

Procedure Q

If the digital voice module system normal LED is off, the digital voice module system trouble LED is on, and the digital voice module trouble indicator LED flashes a 2-blink pattern, a message memory I.C. error has occurred. A message memory I.C. error may be caused by:

1. No messages programmed into message memory I.C.'s.
2. Missing or improperly installed message memory I.C.'s
3. One or more of the messages were not programmed completely.
4. Failed circuitry on the digital voice module.

If the error was due to one of the first three causes, the trouble will clear automatically when the cause is corrected. The first three causes should only occur when power is first turned on to the digital voice module.

When a message memory error is indicated, perform the following:

1. Verify that there is at least one message programmed into the message memory I.C.'s.
2. Verify that all message memory I.C.'s are inserted into their sockets properly.
3. Verify that new blank I.C.'s were installed into the digital voice module in the correct order. Example: An I.C. must be installed in S64 before an I.C. can be installed in S65; I.C.'s must be installed in S64 and S65 before an I.C. can be installed in S66, etc. Note that an I.C. must always be installed in S63.
4. Verify that there are no partially programmed messages on the message memory I.C.'s. This must be done using commands on the serial port.

If, after the above procedure is completed, the trouble condition persists, the trouble condition is caused by failed circuitry on the digital voice module. There are no field correctable failed circuitry problems on the digital voice module. Digital voice modules with failed circuitry shall be replaced immediately, following the "SAFEPATH Module Replacement Procedure", set forth previously in this section.

Procedure R

If the digital voice module system normal LED is off, the digital voice module system trouble LED is on, and the digital voice module trouble indicator LED flashes a 3-blink pattern, an input error has occurred. An input error may be caused by:

1. Open field wiring.
2. No end-of-line resistor on an input line.
3. Inputs on digital voice module are also being used when Series DV-EM's are being used.
4. Previously installed Series DV-EM is no longer detected by digital voice module.
5. Failed circuitry on digital voice module or Series DV-EM.

If the error was due to one of the first four causes, the trouble will clear automatically when the cause is corrected.

When an input error is indicated, perform the following:

1. Check all input wiring for open circuits.
2. Verify that all supervised input wiring has a 10K end-of-line resistor across last input device.
3. Verify that all unsupervised inputs or unused inputs have 10K resistors mounted at terminal blocks. (If Series DV-EM's are used, the eight unused digital voice module inputs shall not have 10K resistors installed. Note that DV-EM's have these 10K resistors mounted on the printed circuit board.)
4. If Series DV-EM's are installed, remove any field wiring from eight digital voice module inputs.
5. A previously installed Series DV-EM is no longer detected. Note that once a Series DV-EM has been installed, the digital voice module will always check for it and give a trouble condition if it doesn't detect it.

If, after the above procedure is completed, the trouble condition persists, the trouble condition is caused by failed circuitry on the digital voice module. There are no field correctable failed circuitry problems on the digital voice module. Digital voice modules with failed circuitry shall be replaced immediately, following the "SAFEPath Module Replacement Procedure", set forth previously in this section.

Procedure S

If the digital voice module system normal LED is off, the digital voice module system trouble LED is on, and the digital voice module trouble indicator LED flashes a 4-blink pattern, an audio channel error has occurred. An audio channel error may be caused by:

1. Too low audio level while playing a message.
2. Pause in message while playing a message.
3. The audio output is loaded down by a low impedance input device.
4. Additional output channel I.C.(s) not installed in sequence.
5. Missing or improperly replaced audio channel.
6. Failed audio channel on the digital voice module.

If the error occurs while playing a file, the error was due to one of the first three possible causes. If the error occurs immediately after turning on power to the digital voice module, the error was due to one of the last three possible causes.

If the error was due to too low of an audio level or a pause while playing a message, the trouble will clear automatically when audio is again detected while a message is playing. If the error was due to the audio output being loaded down, the trouble will clear automatically when the output is no longer loaded down while a message is playing. If the error was due to a missing or improperly replaced output channel I.C., the trouble will clear automatically when the I.C. is correctly in place and input power is cycled off and on.

When an audio channel error is indicated, perform the following:

1. Turn up volume on the digital voice module.
2. Re-record message, shortening duration of the pause.
3. Check impedance of line output wiring and impedance of input device.
4. Verify that output channel I.C.'s were installed in proper sequence. Example: An I.C. must be installed in S21 before an I.C. can be installed in S22, and I.C.'s must be installed in S21 and S22 before an I.C. can be installed in S23.
5. Check for properly inserted output channel I.C.'s (in sockets S21, S22 and S23). Note that once an I.C. has been inserted into a socket, the digital voice module will always check for it and give a trouble condition if it doesn't see it.

If, after the above procedure is completed, the trouble condition persists, the trouble condition is caused by failed circuitry on the digital voice module. There are no field correctable failed circuitry problems on the digital voice module. Digital voice modules with failed circuitry shall be replaced immediately, following the "SAFEPath Module Replacement Procedure", set forth previously in this section.

Procedure T

If the digital voice module system normal LED is off, the digital voice module system trouble LED is on, and the digital voice module trouble indicator LED flashes a 5-blink pattern, a serial port communication error has occurred. A serial port communication error may be part caused by:

1. Invalid command received.
2. Incorrect baud rate.
3. Incorrect data format.
4. Parity error.
5. Framing error.

If the error was due to an invalid command received, the trouble will clear automatically on the next valid command received. If the error was due to an incorrect baud rate or data format, the trouble will clear automatically after first valid data byte is received with correct baud rate and data format. If the error was due to a parity or framing error, the trouble will clear automatically after the next valid data byte is received.

When a serial communication error is indicated, perform the following:

1. Verify that the digital voice module is connected to a system which supports the Wheelock serial port protocol and provides the correct data format.
2. Transmit a valid command to the digital voice module through the serial port.

If, after the above procedure is completed, the trouble condition persists, the trouble condition is caused by failed circuitry on the digital voice module. There are no field correctable failed circuitry problems on the digital voice module. Digital voice modules with failed circuitry shall be replaced immediately, following the "SAFEPTH Module Replacement Procedure", set forth previously in this section.

Procedure U

If the digital voice module system normal LED is off, the digital voice module system trouble LED is on, and the digital voice module trouble indicator LED flashes a 6-blink pattern, a ground fault has been detected. A ground fault detected error may be caused by:

1. Contact input wiring shorted to earth ground.
2. DV-EM cable wiring shorted to earth ground.
3. RS-232 and RS-485 wiring shorted to earth ground.
4. Input power wiring shorted to earth ground.
5. Ground fault detection sensitivity is set too high.
6. Failed ground fault detection circuitry on the digital voice module.

If the error was due to one of the first five causes, the trouble will clear automatically when the cause is corrected.

When a ground fault detected error is indicated, perform the following:

1. Check all contact input wiring for ground faults.
2. Check all DV-EM cabling for ground faults.
3. Check all RS-232 and RS-485 wiring for ground faults.
4. Check all input power wiring for ground faults.
5. Decrease the ground fault detection sensitivity level, following the adjustment procedure set forth in the Ground Fault Detection Sensitivity Adjustment section of this manual.

If, after the above procedure is completed, the trouble condition persists, the trouble condition is caused by failed circuitry on the digital voice module. There are no field correctable failed circuitry problems on the digital voice module. Digital voice modules with failed circuitry shall be replaced immediately, following the "SAFEPTH Module Replacement Procedure", set forth previously in this section.

Procedure V

If the green system normal LED is off, the amber system trouble LED is on, and the amber trouble indicator LED flashes a 7-blink pattern, a telephone trouble has been detected. A telephone trouble error may be caused by:

1. Blown fuse on the digital voice module (F2 on the DX-100, F1 on the DX-200).
2. Incorrect call progress tones on telephone line.
3. Insufficient off hook voltage on telephone line.
4. Disconnect telephone line.
5. Missing or improperly installed Telephone Interface Kit integrated circuits.
6. A telephone message has gone unacknowledged for three consecutive times to one telephone number.
7. Failed circuitry on the digital voice module.

When a telephone trouble error is indicated, perform the following:

1. Check appropriate fuse on digital voice module.
2. Verify that the telephone line is connected properly.
3. Verify that the two Telephone Interface Kit integrated circuits have been installed properly.
4. Verify that all activated telephone messages have been acknowledged and are no longer playing.
5. Verify that there is voltage across the telephone line when a telephone message is selected to play.
6. Verify that the telephone provides a standard dial tone when off hook and a standard ring when dialing.

If after the above procedure is completed, the trouble condition persists, reset the digital voice announcer. Activate one telephone message and verify that it executes correctly. If the telephone message fails to play correctly and there are no problems with the telephone line, the telephone trouble condition is caused by failed circuitry on the digital voice module. There are no field correctable failed circuitry problems on the digital voice module. Digital voice modules with failed circuitry shall be replaced immediately, following the Replacement Procedure, set forth previously in this section.

Procedures W, X and Y are for systems configured with an optional Remote Microphone Station (RMS-1).

Procedure W

	D10	D11	D12	TROUBLE
1.	OFF	ON	OFF	Any DV PLAY EOLR missing
2.	ON	OFF	OFF	Any Amplifier Trouble
3.	OFF	ON	ON	Any Remote Microphone Trouble
4.	ON	OFF	ON	Battery Charger Trouble
5.	OFF	OFF	ON	DV Status Trouble
6.	ON	ON	OFF	Panel Microphone Trouble

Periodic Testing

SAFEPATH periodic testing, including the SAFEPATH panel, all notification equipment and all messages, including their audibility and intelligibility, content and language, sequence, output channel, and priority assignment, must be conducted frequently, at least twice each year, or more often as required by local, state and federal codes, regulations and laws, by qualified personnel to ensure proper operation of all equipment. If the notification equipment is not working properly, immediately contact the installer and have all/any problems corrected immediately. Malfunctioning units should be replaced immediately. Do not attempt to repair malfunctioning units. Malfunctioning units should be returned for factory repair or replacement. In the event you cannot contact the installer, contact the manufacturer.

To aid qualified personnel in performing necessary operational testing procedures, a script, listing all messages programmed in the SAFEPATH panel, must be kept with the SAFEPATH panel.



WARNING: PROVIDE ALTERNATIVE SIGNALING MEANS DURING PERIODIC TESTING TO ASSURE ADEQUATE PROTECTION OF PEOPLE AND PROPERTY. FAILURE TO PROVIDE ALTERNATIVE SIGNALING MAY CAUSE PEOPLE TO NOT BE WARNED OF AN EMERGENCY CONDITION WHICH COULD RESULT IN PROPERTY DAMAGE AND SERIOUS INJURY OR DEATH TO YOU AND/OR OTHERS.

In addition to testing required by relevant fire codes, regulations and laws, several hardware functions should also be tested. The hardware functions that should be tested are as follows:

1. The "short circuit" detection circuitry for any one or all of the eight contact inputs.
2. The serial port receiver.
3. The play contact for each of the four output channels on the digital voice module.
4. The "open circuit" detection circuitry for any one or all of the eight contact inputs.
5. The audio supervision circuitry for each of the four audio channels.
6. The status contact.

These hardware functions may be tested as follows:

1. Activate (short circuit) each contact input and verify that proper message plays.
2. Transmit a serial port command to the SAFEPATH panel and check for a valid acknowledge response.
3. Monitor the play contact for each channel to verify proper operation while alternately playing and not playing files on the output channel.
4. Disconnect (open) each contact input and verify that the proper trouble condition is indicated.
5. Listen to each message and check for audibility of each message.
6. Monitor the status contact while causing the SAFEPATH panel to alternate between trouble and normal states to verify proper operation.

If the SAFEPATH panel fails to perform any of the above tests correctly, immediately replace the malfunctioning SAFEPATH module(s) following the SAFEPATH Module Replacement Procedure given in the "Troubleshooting" section.

Module Description

Introduction

There are fifteen modules in the SAFEPATH product line.

The fifteen modules are:

1. Supervised Audio System Mother Board (SAMB-A)
2. Supervised Audio System Common Control Module (SADC)
3. Supervised Audio System Amplifier/Signal Circuit Module (SAA)
4. Supervised Audio System Amplifier/Signal Circuit Module (SAA-10)
5. Supervised Audio System Amplifier/Signal Circuit Module (SAA-10E)
6. Supervised Audio System Amplifier/Signal Circuit Module (SAA-40A)
7. Supervised Audio System Amplifier/Signal Circuit Module (SAA-40AE)
8. Supervised Audio System Amplifier/Signal Circuit Module (SAA-80)
9. Supervised Audio System Amplifier/Signal Circuit Module (SAA-80E)
10. Self Amplified Speaker Control/Signal Circuit Module (SACM-4)
11. Supervised Audio System Power Supply Module (SAPS)
12. Supervised Audio System Battery Charger Module (SABC)
13. Digital Voice Module with Playback (DX-100)
14. Digital Voice Module with Record and Playback (DX-200)
15. Remote Microphone Station (RMS-1)

Each SAFEPATH panel is configured with:

- One SAMB-A
- One SADC
- Between one and four amplifier modules (any combination of SAA's and SACM-4's)
- One SAPS
- One SABC
- One digital voice module (either a DX-100 or a DX-200)

The interior view of the SAFEPATH panel with the modules in place is shown in Figure 30. The location of the amplifier modules (SAA and SACM-4) is not shown. The amplifier modules may be used in any combination by installing into slots 1 thru 4 in the SAMB-A. A block diagram of the SAFEPATH panel is shown in Figure 31.

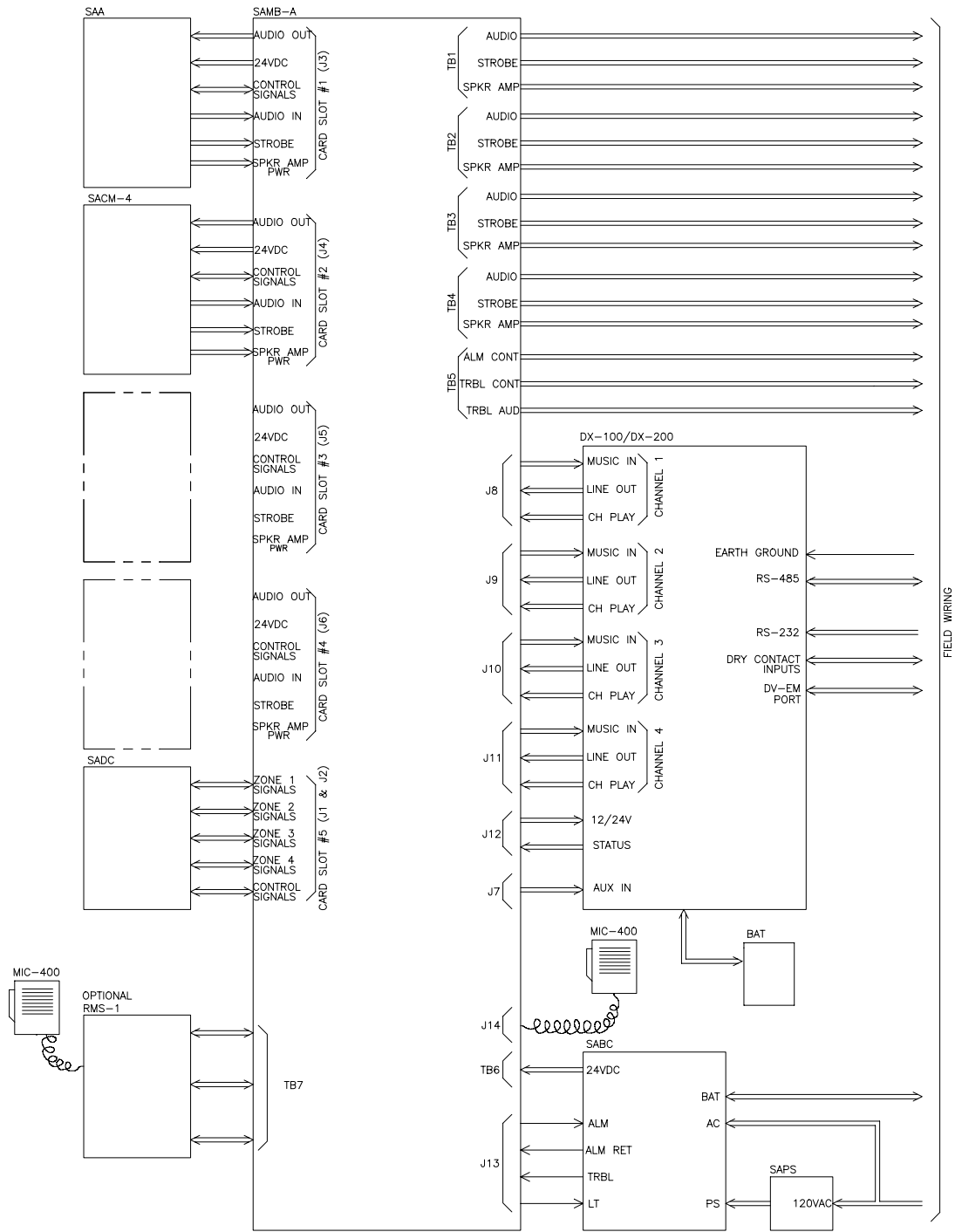


Figure 31.
SAFEPATH Panel Block Diagram

Supervised Audio System Mother Board (SAMB-A)

The supervised audio system mother board (SAMB-A) provides all signal handling capabilities between the SADC and the amplifier modules, terminal blocks for output wiring, and connectors for handling signals between the SADC and the digital voice module and the SABC.

The SAMB-A is illustrated in Figure 32.

Up to four amplifier modules may be connected to the SAMB-A. The amplifier modules may be installed in any order in slots 1 through 4. Installing an amplifier module in slot 1 thru 4 will result in the module's output appearing in the correspondingly numbered terminal block (labeled "Zone 1" thru "Zone 4"). For example, when an amplifier module is installed in slot 1, the amplifier module's output appears at the terminal block labeled "Zone 1".

Only one SADC may be connected to the SAMB-A. The SADC may only be installed in slot 5.

Up to four channels from a digital voice module may be connected to the SAMB-A. The digital voice module channels may be connected in any order to connectors J8 through J11. The digital voice module channel connected to J8 will play through Zone 1; if connected to J9, it will play through Zone 2; if connected to J10, it will play through Zone 3; if connected to J11, it will play through Zone 4.

Connector J14 is the microphone input. J7 is the line out which should be connected to the DX-200's auxiliary input (J7 should be left unconnected in DX-100 configured systems). J12 is used to bring power to the digital voice module and monitor the digital voice module's status contact. J13 is used to monitor the SABC's status.

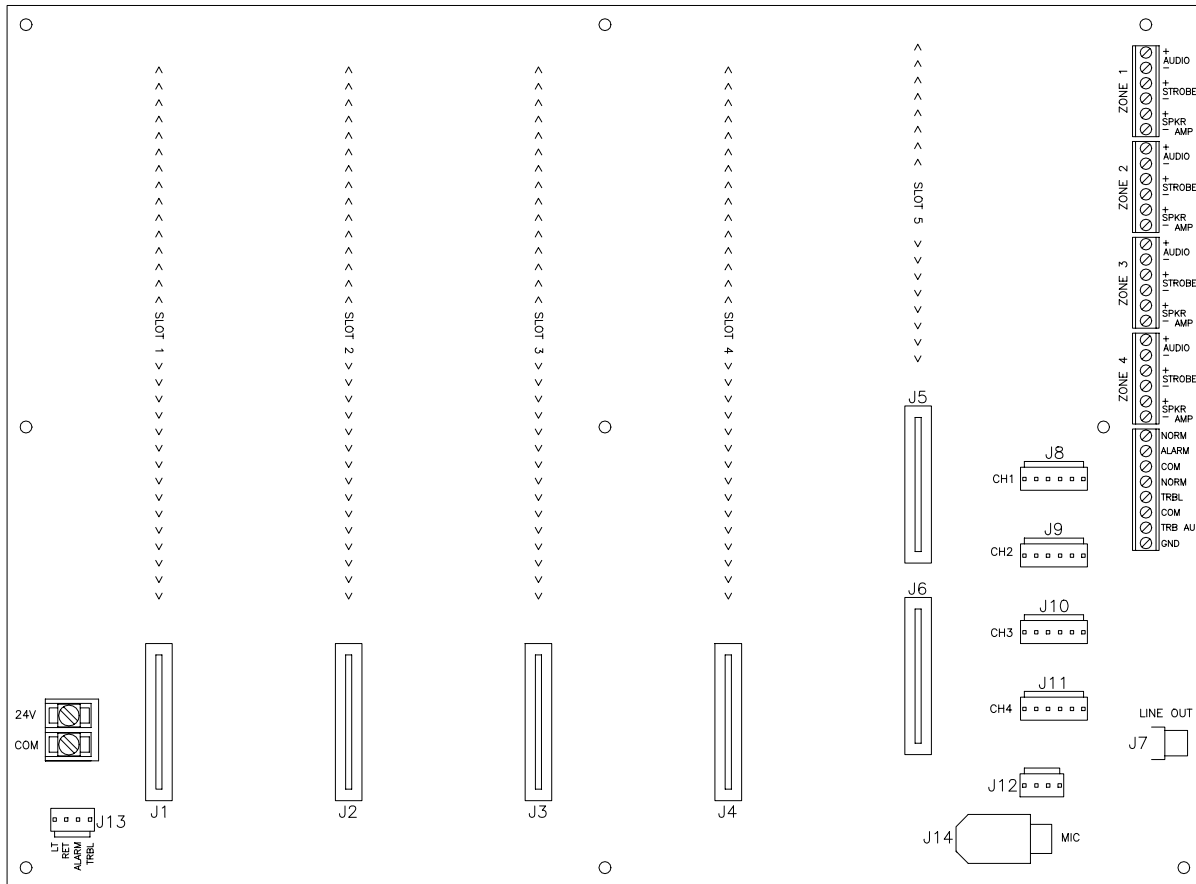


Figure 32.
Supervised Audio System Mother Board

Supervised Audio System Common Control Module (SADC)

The supervised audio system common control module (SADC) provides all of the control capabilities to the SAFEPATH panel. The controller module monitors the digital voice module (DX-100 or DX-200), the battery charger module (SABC), and the amplifier modules (SAA and SACM-4) for proper operation. The microphone is monitored for connection.

The channel playing contacts from the digital voice module (DX-100 or DX-200) are monitored to determine their status, active or inactive. If the channel playing contact is inactive, the control module routes a supervision tone to each of the amplifier circuit modules and monitors the amplifier for functionality. If the channel playing contact is active, the control module routes the audio from that channel's line output from the digital voice module to the respective amplifier circuit module. Wiring used to monitor the channel playing contacts and to route the line outputs from the digital voice module is supervised for open and short circuit conditions.

The battery charger module is monitored for three conditions: low AC input power, battery wiring trouble, and battery voltage low. The wiring between the controller module and the battery charger is supervised for open and short circuit conditions.

The amplifier modules are supervised for two failure conditions: field wiring trouble conditions and amplifier audio output trouble conditions. The controller module only supervises the audio output during standby conditions. When either a message is playing from the digital voice module or a live announcement is being made from the microphone, the field wiring and audio output are not supervised.

If at any time a trouble condition is detected, the controller module will energize the internal and external trouble audibles, transfer the Form C trouble contact to the trouble position, turn off the "NORMAL" indicator, and turn on the "TROUBLE" indicator.

There is one fuse on the printed circuit board, F2. F2 is the fuse for the external trouble audible. See Figure 33 for fuse location.

<u>Fuse</u>	<u>Rating</u>
F2	0.5

Nominal Specifications:

Input Voltage Range	20 to 28VDC
Supply Current (Idle) @ 24VDC	75mA
Supply Current (Full Load) @ 24VDC	130mA
Operating Temperature Range	0 to 49 Degrees C (32-120 Degrees F)
Humidity Range	0 to 85%, Non-condensing

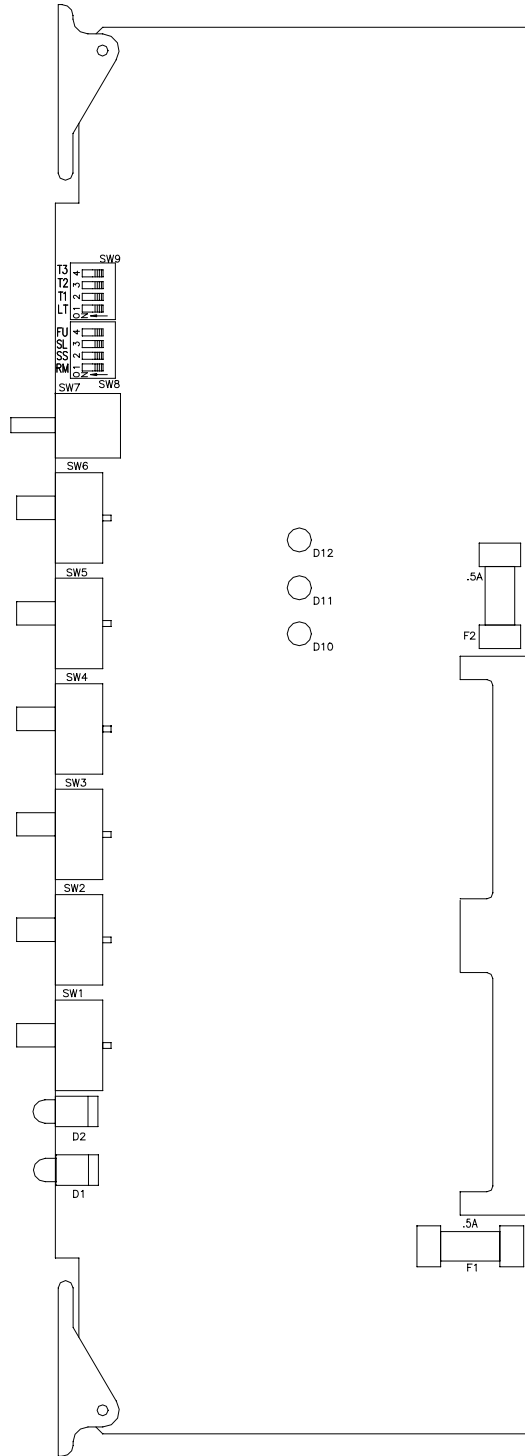


Figure 33.
Supervised Audio System Common Control Module

Supervised Audio System Amplifier/Signal Circuit Module, 40 Watts (SAA)

The supervised audio system amplifier/signal circuit module, 40 watts (SAA) provides audio amplification for the SAFEPATH system. The amplifier can be selected to have either a 25V or a 70.7V audio output. The amplifier contains a switching power supply, a linear amplifier, and supervision circuitry.

The switching power supply is used to provide a constant DC voltage to the amplifier while the input voltage is allowed to fluctuate over its operating range. The amplifier amplifies the low level 600 ohm audio to 40 watts output at either 25V or 70.7V. The supervision circuit monitors field speaker wiring integrity, field strobe wiring integrity, and amplifier functionality.

The board is capable of being field configured for either 25V or 70.7V output. The configuration is done using a two position slide switch (S1) on the printed circuit board. One position (the up position) configures the amplifier to have a 25V output and the other position (the down position) configures the amplifier to have a 70.7V output. See Figure 33 for switch location.

The amplifier supervises both the strobe field wiring and the speaker field wiring with a DC current. The strobe field wiring is supervised with a reverse polarity technique, which applies a DC voltage with one polarity to supervise the wiring and then reverses the polarity to energize the strobes. The speaker field wiring is supervised with a DC current which is removed when audio is being played. Both field wiring circuits are only supervised in the standby state. The amplifier is supervised by monitoring the amplifier output for audio. The state of each of the three supervision features is indicated via three indicators on the printed circuit board. See Figure 33 for indicator locations.

There are two fuses on the printed circuit board, F1 and F2. Fuse F1 is the main fuse for the entire board. F2 is the fuse for the strobe power. See Figure 34 for fuse locations.

<u>Fuse</u>	<u>Rating</u>
F1	10A
F2	3A

Nominal Specifications:

Rated Output @ 1kHz	40 Watts
Input Sensitivity	1Vrms
S/N Ratio	72dB
Frequency Response	275Hz to 4kHz
Input Voltage Range	18 to 30VDC
Supply Current (Standby) @ 24VDC	450mA
Supply Current (Full Load) @ 24VDC	3.8A
Operating Temperature Range	0 to 49 Degrees C (32-120 Degrees F)
Humidity Range	0 to 85%, Non-condensing

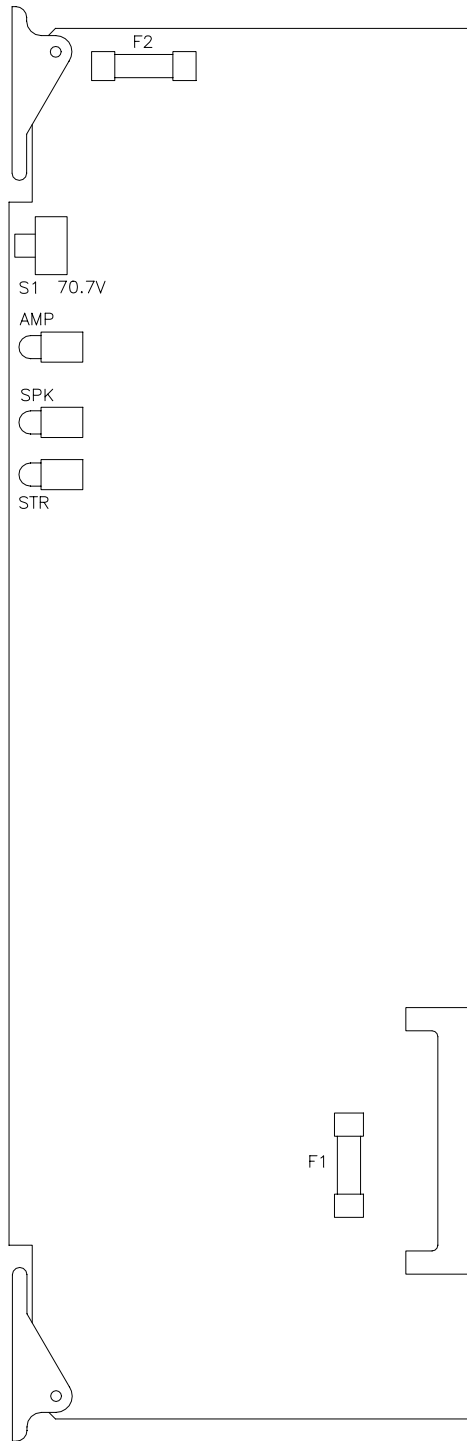


Figure 34.
Supervised Audio System Amplifier/Signal Circuit Module, 40 Watts

Self Amplified Speaker Control/Signal Circuit Module, (SACM-4)

The self amplified speaker control/signal circuit module, (SACM-4) provides audio output for the SAFEPATH system. The circuit module has a -5 dBm, 15 ohm audio output, a 24VDC, 2A speaker amplifier power output, and a 24VDC, 2A strobe output. The circuit module contains a linear amplifier and supervision circuitry.

The circuit module supervises the strobe field wiring, the speaker amplifier audio field wiring, the speaker amplifier power field wiring, and the amplifier. The strobe field wiring and the speaker amplifier power wiring are supervised with a reverse polarity technique, which applies a DC voltage with one polarity to supervise the wiring and then reverses the polarity to energize the strobes. The speaker amplifier audio field wiring is supervised with a DC current which is removed when audio is being played. Both field wiring circuits are only supervised in the standby state. The amplifier is supervised by monitoring the amplifier output for audio. The state of each of the four supervision features is indicated via four indicators on the printed circuit board. See Figure 35 for indicator locations.

There are three fuses on the printed circuit board, F1 and F2, and F3. Fuse F1 is the fuse for the strobe power. F2 is the fuse for the speaker amplifier power. F3 is the main fuse for the entire board. See Figure 35 for fuse locations.

<u>Fuse</u>	<u>Rating</u>
F1	3A
F2	3A
F3	6A

Nominal Specifications:

Rated Output @ 1kHz	500m Vrms, 15 ohm load
Input Sensitivity	1Vrms
S/N Ratio	-75dB
Frequency Response	275Hz to 4kHz
Input Voltage	24VDC
Supply Current (Idle) @ 24VDC	50mA
Supply Current (Full Load) @ 24VDC	135mA
Operating Temperature Range	0 to 49 Degrees C (32-120 Degrees F)
Humidity Range	0 to 85%, Non-condensing

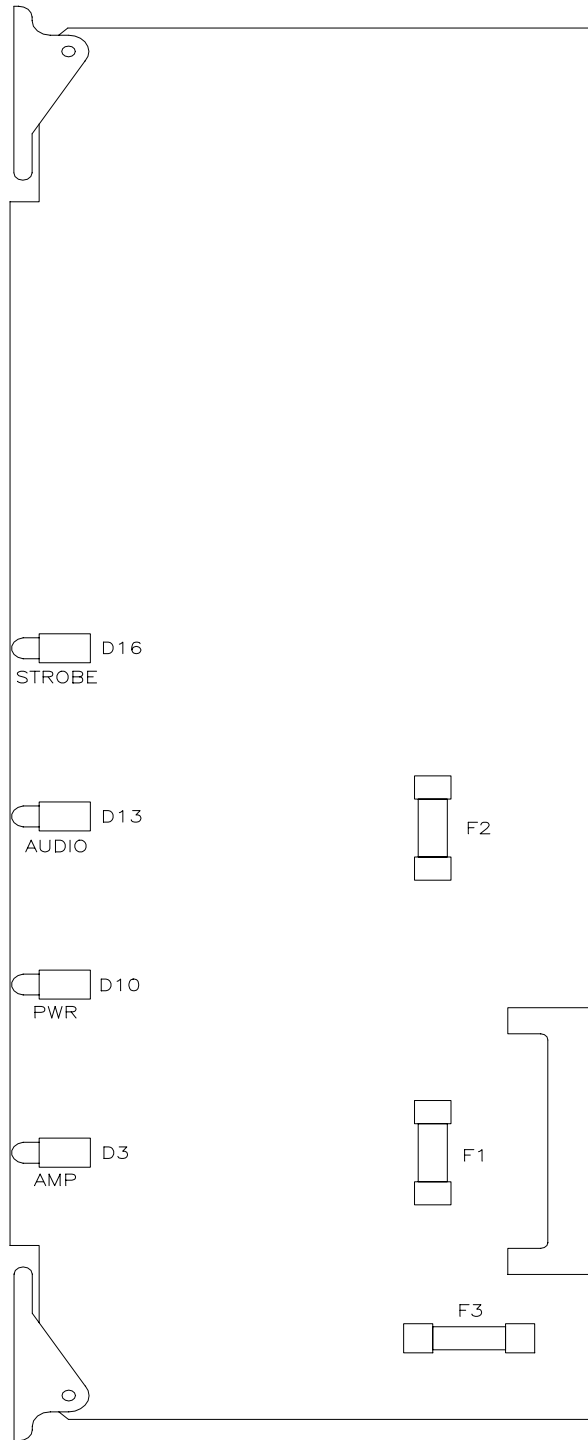


Figure 35.
Self Amplified Speaker Control/Signal Circuit Module

Supervised Audio System Power Supply Module (SAPS)

The supervised audio system power supply module (SAPS) converts 120VAC line voltage to 24VDC output voltage. The power supply module is capable of converting up to 500W and its output is over current protected.

There is one fuse on the printed circuit board, F1. Fuse F1 is the main fuse for the entire board. See Figure 36 for fuse location.

<u>Fuse</u>	<u>Rating</u>
F1	10A

Nominal Specifications:

Rated Output	500W
Input Voltage	120VAC
Supply Current (Full Load) @ 120VAC	6.4A
Efficiency @ 120VAC, Full Load	88%
Operating Temperature Range	0 to 49 Degrees C (32-120 Degrees F)
Humidity Range	0 to 85%, Non-condensing

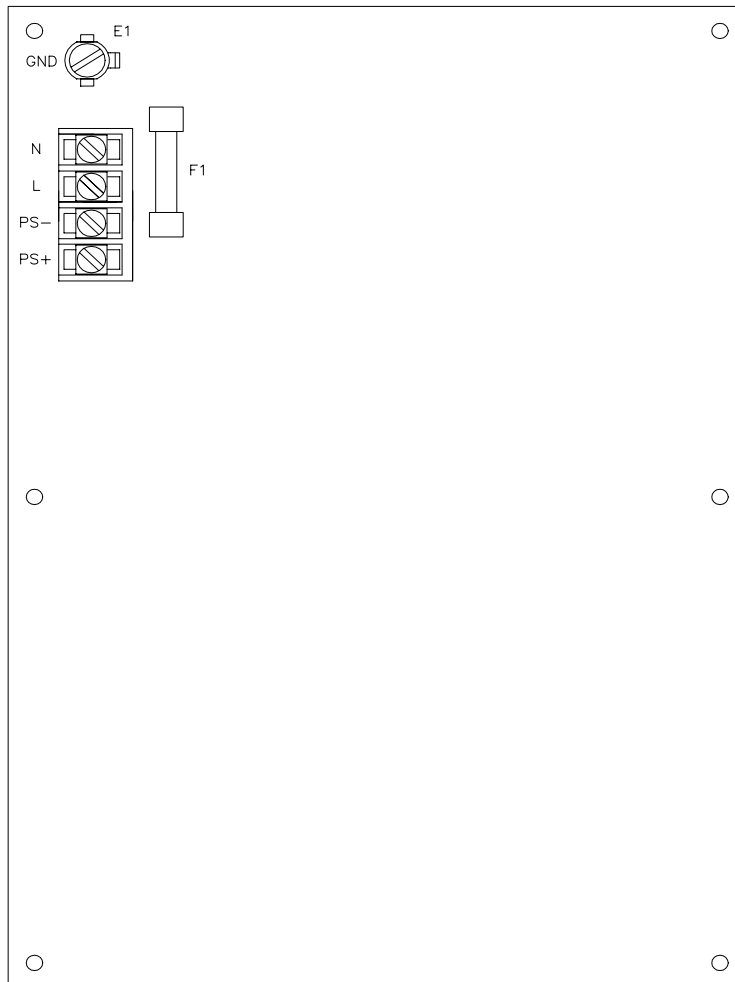


Figure 36.
Supervised Audio System Power Supply Module

Supervised Audio System Battery Charger Module (SABC)

The supervised audio system battery charger module (SABC) provides battery charging and supervision as well as AC power supervision for the SAFEPATH system.

The SABC monitors three parameters: AC input power, battery wiring and battery voltage. When a low AC input power condition is detected, the PWR LOW indicator is illuminated. When a battery wiring open condition is detected, the BAT OPEN indicator is illuminated. When a low battery voltage condition is detected, the BAT LOW indicator is illuminated. See Figure 37 for the indicator locations on the SABC.

The battery charger operates on the dual voltage charging principal, thereby achieving the highest possible level of charge in the shortest amount of time while maintaining battery reliability. The charging circuit is enabled when the AC voltage is within the specified range, the SAFEPATH system is not in alarm, and the battery voltage is above the charge enable threshold level.

When charging begins, the current will be limited to the fast charge rate. As the batteries charge, the terminal voltage increases. The terminal voltage is eventually limited to the overcharge voltage level and the charging current begins to drop. When the charging current drops below the overcharge termination current the float state is entered. At this time the batteries are approximately 90% charged.

There are three fuses on the printed circuit board, F1, F2, and F3. F1 is the fuse for the battery wiring. Fuse F2 is the DC supply fuse which directly powers the charging circuitry. F3 is the fuse for the AC input voltage supervision circuitry. See Figure 37 for fuse locations.

<u>Fuse</u>	<u>Rating</u>
F1	30A
F2	10A
F3	0.5A

Nominal Specifications:

AC Supply Voltage	120VAC
DC Supply Voltage Range	20.4VDC to 26.4VDC
DC Supply Current @ 24VDC, Bulk Charge Rate	3.7A
Fast Charge Rate Current @ Vbat = 26VDC	2.6A
Overcharge Voltage	28.9VDC
Overcharge Termination Current	469mA
Float State Voltage	27.3VDC
Charge Enable Voltage	20VDC
Battery Type	Lead Acid Starved Electrolyte
Nominal Battery Voltage	24VDC
Maximum Battery Capacity	72AH

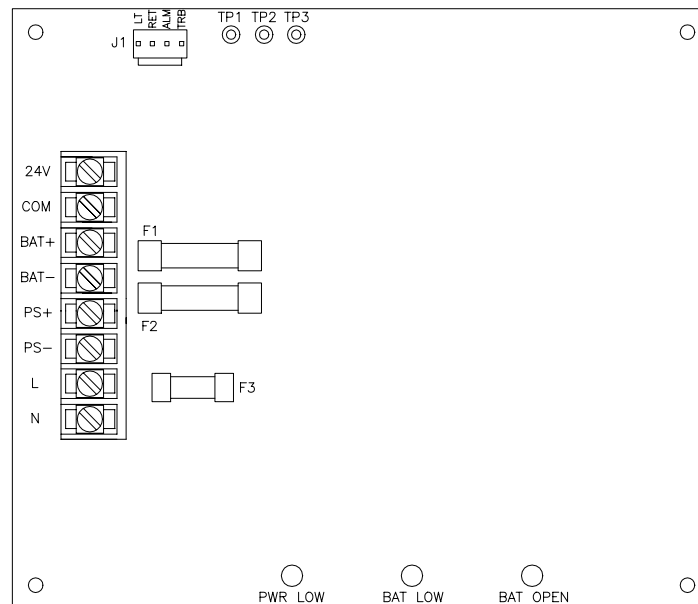


Figure 37.
Supervised Audio System Battery Charger Module

Digital Voice Module with Playback (DX-100)

The digital voice module (DX-100) controls the message playback in the SAFEPATH system. When a dry contact closure or a serial port command initiates a file playing, the DX-100 signals the SADC to switch from the standby condition to an alarm condition for the zone indicated.

The DX-100 can store up to 999 message files. Message files may be any combination of record or string files. Up to 8 minutes of messages may be stored in the DX-100's EPROM message memory.

Messages can be selected to play using a dry contact closure or a command on the serial port. Dry contacts may be connected directly to the DX-100 or to a DV-EM connected to the DX-100, but not both. Up to eight files may be selected using the dry contact inputs on the DX-100, up to 256 files may be selected using the dry contact inputs on up to eight optional DV-EM's, or up to 999 files may be selected using commands on the serial port.

There are two fuses on the printed circuit board, F1 and F2. Fuse F1 is the main fuse for the entire board. F2 is the fuse for output channel 1. See Figure 38 for fuse locations.

Fuse	Rating
F1	0.5A
F2	0.5A

Nominal Specifications:

Input Voltage Range	11 to 29VDC
Supply Current (Idle) @ 24VDC	186mA
Supply Current (Alarm) @ 24VDC	246mA
Operating Temperature Range	0 to 49 Degrees C (32-120 Degrees F)
Humidity Range	0 to 85%, Non-condensing

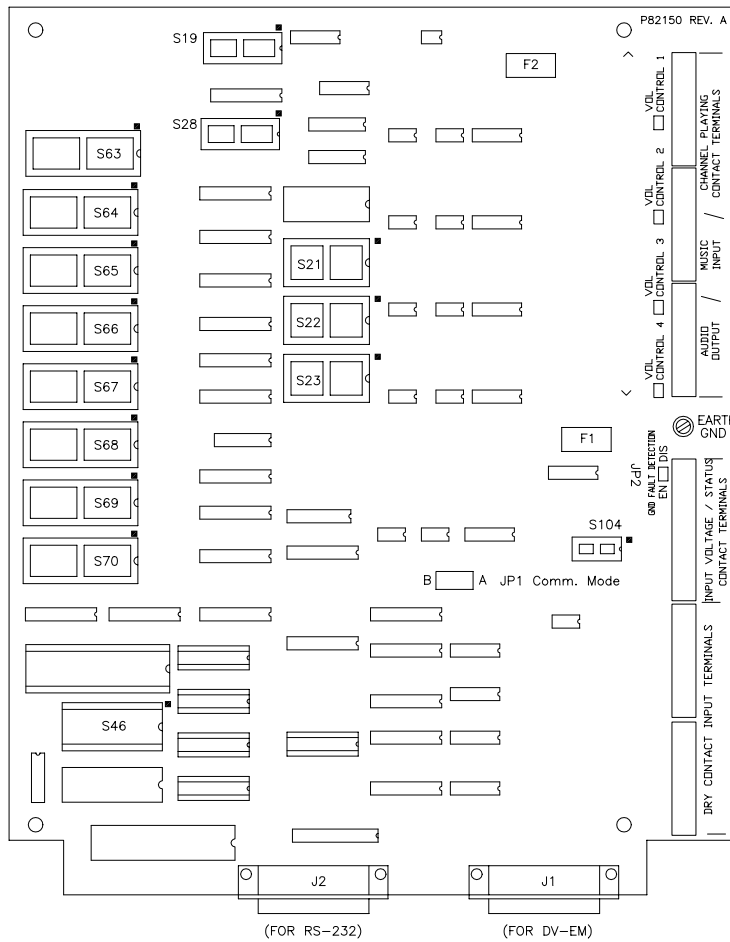


Figure 38.
Digital Voice Module with Playback

Digital Voice Module with Record and Playback (DX-200)

The digital voice module (DX-200) controls the message playback in the SAFEPATH system. When a dry contact closure or a serial port command initiates a file playing, the DX-200 signals the SADC to switch from the standby condition to an alarm condition for the zone indicated. The DX-200 also has the capability of creating record or string files.

The DX-200 can store up to 999 message files. Message files may be any combination of record or string files. Up to 16 minutes of messages may be stored in the DX-200's PSRAM message memory. The DX-200 has a NICAD battery to power the PSRAM message memory I.C.'s during periods of loss input power to the DX-200.

Messages can be selected to play using a dry contact closure or a command on the serial port. Dry contacts may be connected directly to the DX-200 or to a DV-EM connected to the DX-200, but not both. Up to eight files may be selected using the dry contact inputs on the DX-200, up to 256 files may be selected using the dry contact inputs on up to eight optional DV-EM's; or up to 999 files may be selected using commands on the serial port.

There are two fuses on the printed circuit board, F1 and F2. F1 is the fuse for output channel 1. F2 is the main fuse for the entire board. See Figure 38 for fuse locations.

<u>Fuse</u>	<u>Rating</u>
F1	0.5A
F2	0.5A

Nominal Specifications:

Input Voltage Range	11 to 29VAC
Supply Current (Idle) @ 24VDC	233mA
Supply Current (Alarm) @ 24VDC	295mA
Operating Temperature Range	0 to 49 Degrees C (32-120 Degrees F)
Humidity Range	0 to 85%, Non-condensing

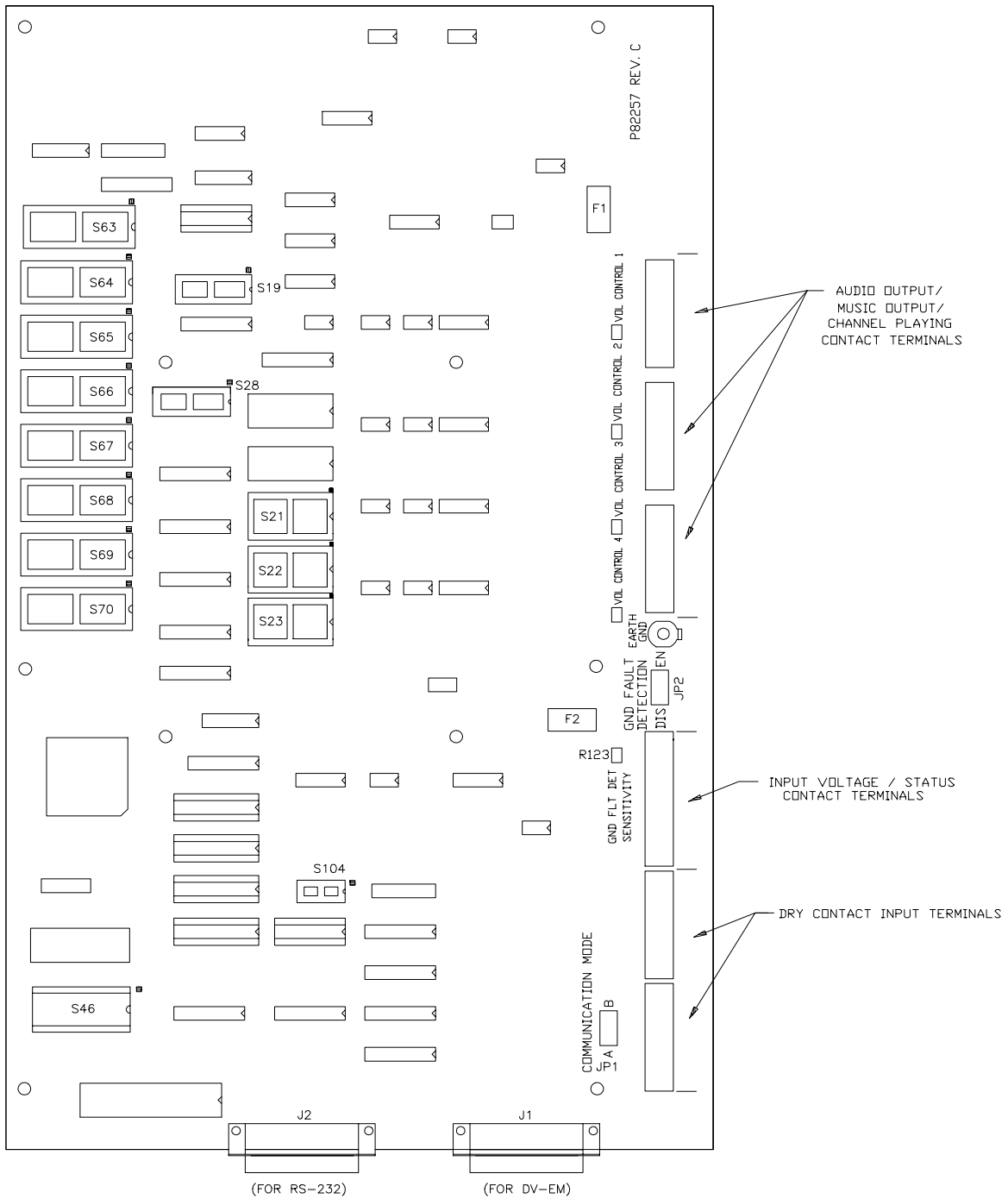


Figure 39.
Digital Voice Module with Record and Playback
(Main Board)

Technical Specifications

Mechanical

Dimensions (H x W x D)	36" by 24" x 6"
Weight	90 pounds
Enclosure	0.050" Steel
Finish	Black
Mounting	Indoor Surface Mount Top and Bottom Wiring Entry

Environmental

(Meets UL requirements)	
Operating Temperature	0° to +49° C (32 to 120 Degrees F)
Storage Temperature	-20° to 70° C (-4 to 158 Degrees F)
Humidity	85±5% @ 30±2° C (86 ± 4 Degrees F) Non-condensing

Playback

Memory Type	PSRAM (DX-200 Configured) EPROM (DX-100 Configured)
Memory Time	2 to 16 Minutes (DX-200 Configured) 1 to 8 Minutes (DX-100 Configured)
Bandwidth	275 Hz to 4000 Hz
Maximum Files	999
Signal to Noise Ratio	51 dB
THD 1 KHz (full scale)	5.5 %

Electrical

Input Voltage

Operating:	120VAC
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Maximum Input Current

Operating:	8.0 at 120VAC
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Message File Activation


Dry Contact Inputs	8 Dry contact inputs are provided on each digital voice module. A 300 millisecond minimum short across input is required to activate files. Input device must sink up to 10mA current with maximum 24VDC drop.
Expansion Terminal	Each DV-EM module has 32 dry contact inputs (same activation as above).
Digital Command	Through serial port, RS-232 or optional RS-485.

Outputs

Visual Notification Appliance Output	1 to 4 output channels optionally provided; each output is rated for 2.0 Amps at 24V. Total of all output channels may not exceed 6.0 Amps.
Central Amplified Output	1 to 4 output channels optionally provided; each programmable for Audio either 25V, 70.7V or 100V output.
Amplified Speaker Audio Output	1 to 4 output channels optionally provided; each through 15 Ohm isolation transformer. Output level is -5 dBm maximum
Amplified Speaker Power Output	1 to 4 output channels optionally provided; each output is rated for 2.0 Amps at 24V.
Trouble Audible Output	Output is rated for 0.100 Amps at 24VDC
Status Contact	Form C contact normally energized. Contacts transfer during trouble. Rated 0.5 Amps at 24VDC max, resistive load.

 **WARNING:** DO NOT EXCEED THE RATINGS OF THE STATUS CONTACT. EXCEEDING THE RATINGS MAY CAUSE THE RELAY TO FAIL AND PREVENT A TROUBLE CONDITION FROM BEING INDICATED.

Alarm Contact	Form C contact normally de-energized. Contact transfers during alarm. Rated 0.5 Amps at 24VDC max, resistive load.
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 **WARNING:** DO NOT EXCEED THE RATINGS OF THE ALARM CONTACT. EXCEEDING THE RATINGS MAY CAUSE THE RELAY TO FAIL AND PREVENT MESSAGES FROM BEING PLAYED.

Wiring Connections

Screw Terminals	Each terminal accepts one conductor from #22 to #12 AWG.
Series DV-EM Port	25 pin D connector (DB25S) on bottom right of digital voice module.
RS-232 Port	25 pin D connector (DB25S) on bottom left of digital voice module.

End-of-Line Resistor

Dry Contact Inputs	10K, 1/8W Minimum, 5%
Visual Notification Appliance Outputs	10K, 1/8W Minimum, 5%
Audio Notification Appliance Outputs	10K, 1W Minimum, 5%
Amplified Speaker Appliance Power Outputs	10K, 1/8W Minimum, 5%

Glossary

A

acknowledge. A serial port command or a dry contact input which will cause a message file of priority level 4 or 5 that is continuously activated to stop repeating after having played at least once.

activation. An input that causes a file to be selected and processed.

C

channel. An audio output path through which the digital voice module transmits message files to the audio system. Each digital voice module can have up to four channels.

D

DX-100. Playback only digital voice module described in this manual.

DX-200. Record/playback digital voice module described in this manual.

DV-EM. Digital Voice Expansion Module, 32 file input selections per module.

E

EPROM. Erasable Programmable Read Only Memory. Non-volatile semiconductor memory used to store messages in the DX-100 and the program in the DX-100 and DX-200.

F

file. Digital voice module files are created either by storing audio directly into a selected file number or by storing the numbers of other files that contain audio into the selected file number. Every file is assigned an output channel and a priority level. Up to 999 files can be created in the digital voice module. A file becomes a message file if it is selected to be played by a contact closure or by a command through the serial port. Some files are never intended to become message files; they merely contain words or phrases that can be strung together to create new files that will become message files. The new files will be assigned channel and priority designations that supersede previous channel and priority designations for the individual files in the new string.

M

message. An audio output generated and played through an assigned channel when a file number is selected by a contact closure or command on the serial port.

P

priority. The order by which files are designated to be played. All files are assigned a priority from 1 to 5, with 1 as the highest priority.

PSRAM. Pseudo Static Random Access Memory. Volatile semiconductor memory used to store DV-200 messages.

Q

queue. A sequence of message files that have been selected to be played through a particular channel. Each file is positioned according to its pre-assigned priority. Equal priority files are positioned in the order they were selected. A file cannot be included in this queue more than once. However, after a file has completed playing, it can be re-added to the queue.

R

reset. A serial port command or a dry contact input which will cause the file presently playing to stop immediately and remove all files from the queue.

S

string. A combination of file numbers (with optional delay or repeat commands) stored in a file and arranged to form a desired message.

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