

## **Base Wide Mass Notification Personnel Alerting System Overview**

### **General Description**

The system is comprised of three main components:

- Central Control Centers (both RF and Land-line configurations)
- Outdoor Giant Voice Base Warning Sirens
- Indoor Building Warning Equipment

Each of these components is COTS equipment provided by Federal Signal Corporation facilitating maintenance and long-term product support.

### **Control Centers**

The system allows for multiple independent Control Centers which can offer both activation and complete system monitoring. A computer-based Graphic User Interface (GUI) is used for control and status monitoring. All system configuration, administration and maintenance software exists in the Control Center. An SS2000D radio modem with pushbutton controls provides the required radio interface and secondary pushbutton activation points. Central Control points do not require PCs, but can include only a SS2000D Encoder/Status Monitor.

Digital voice storage and playback units that are controlled by the SS2000D can be supplied at each Central Control point. The Digital voice modules enable pre-recorded messages to be played over the warning system. Messages are stored in non-volatile memory cards that can be programmed with user provided wav files.

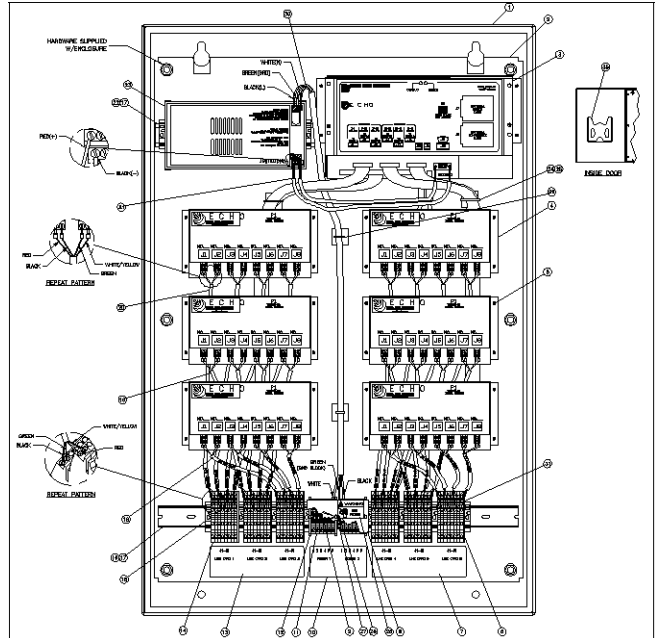
Federal Signal can supply complete base station radio equipment or can interface the SS2000D into existing base station radio systems. All control and status monitoring sites use Federal Signal's MSK radio modems and secure data transmission protocol. Digital and Live Voice announcements are broadcast via the radio channel.

Optionally, Federal Signal can provide a two-way (ISDN) landline operation to each giant voice siren and indoor controller. In this configuration, the SS2000D is connected to the Federal Signal Matrix ISDN Driver that operates as the communication transmission device between the Central Control points and the Central Control Station Bridge. The ISDN driver is connected to the Control Station Bridge via standard telephone line pairs.

### **Optional ISDN Backbone**

The central control for the landline communications network is a central control station "bridge" which connects each central control and status monitoring points with up to 96 RTUs (remote terminal unit) and/or other field stations.

The Federal Signal ISDN line driver matrix enables sirens and controls to communicate over standard telephone wire pairs. Audio is digitized before entering the network, which eliminates interference and cross-talk found in typical wire-line systems. Siren control commands, diagnostic messages, live voice and digitally stored voice messages can be sent over the network. Any node or line fault on the network is instantly detected at the main maintenance unit. The Control Station Bridge should be situated in a protected safe area such as the primary control point. The control station bridge includes a power supply, a motherboard operation controller, and up to six line cards, each with up to 8 unit addresses, for a total of 48 RTU/Station points. The control station can easily be expanded to 96 control points with the addition of a second control station bridge. Ultimately, the system allows more than 4,000 unique stations units to be integrated into the system.



Many other optional communications devices can be added to the network to increase the system's capabilities. Indoor and outdoor handsets with remote speakers and strobes provide low cost methods of warning and communicating with guard shacks and other remote locations. Indoor PA, PBX, and radio system interfaces are also available. The standard configuration is sufficient for addressing each giant voice outdoor warning siren RTU, and still allow for additional Intercommunication handset stations or push-button activation points to be added into the system.

### **Giant Voice Outdoor Base Warning Sirens**

The Modulator Siren Series and the DSA (Directional Speaker Array) with the UltraVoice electronic siren controller has been proposed for the Giant Voice warning system. These outdoor sirens use high power omni-directional speakers for both voice and tone warning.

### **Indoor Building Warning Equipment**

Federal Signal offers three primary indoor configuration options to meet the UFC requirements. These consist of: Buildings with existing public address systems, Building requiring installation of large quantities of loudspeakers, and buildings requiring few loudspeakers.

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Federal Signal Informer Tone-Alert Radios are utilized for indoor warning and interface to existing Public Address systems. The Informer includes two independent relays and a 600-Ohm audio output for easy interface to existing indoor speaker systems. One relay for the Informer can be interfaced into the existing Fire panels to interrupt during the PAS alert and message. A second relay may be used to control an ADA listed strobe, which comes with battery back-up capability. Both the Informer and the Strobe plug into a standard 120V outlet. Furthermore, the Informer 600-Ohm audio output can be interfaced into the existing PA systems in order to distribute the alert tone and message throughout the facility.



In buildings requiring large numbers of distributed speakers, Federal Signal can supply the UltraVoice Electronic Controller and distributed 2-Watt, 15-Watt, or 30-Watt loudspeakers to supply both tone and voice messaging capabilities. Loudspeakers are controlled by an UltraVoice (UV) controller mounted in each facility. The UV can be interfaced to the existing Fire panel and to each loudspeaker. The controller is battery-operated and can provide complete activation and control capability via an installed radio transceiver or ISDN Siren modem. Furthermore, all can operate regardless of AC power availability since the controller supplies all power to the loudspeakers and the controller operates from 24VDC.



In buildings requiring only a few loudspeakers, Federal Signal can provide Informer Tone-Alert Radios or Two-Way Digital Controllers (Model FCTBD). Each Informer or FCTBD controller can be interfaced to a Central Amplifier and loudspeakers.

In all instances, Federal Signal has the ability to interface to existing Fire Alarm Panels as specified in the UFC guideline. In addition, strobe lights can always be interfaced into these systems.

## WARNING SYSTEM COMPONENTS

### FEDERAL COMMANDER™ DIGITAL SYSTEM SOFTWARE

Federal Signal can provide full remote status capability via radio, or optional ISDN landline to "report back" information pertaining to conditions and readiness of each siren. Federal Signal can supply The Federal Commander Digital System software. The Commander was developed by Federal Signal Corporation to be the best system available for automating the management of indoor and outdoor warning systems using a very reliable digital modem technology developed specifically for wireless communications.

This system, when installed in a computer and interfaced with the SS2000D Digital Status Encoder, can provide many capabilities including:



**Reliability** -- The digital modem technology used is designed specifically for wireless communications providing reliable communications under harsh radio conditions.

**Security** -- The digital encoding scheme provides protection from malicious activation. Messages cannot be taped and played back to activate the system. Multiple levels of passwords are available to secure operation and configuration of the system.

**Automation** -- The Software can be setup to automatically test and poll the system for reports at pre-defined intervals.

**Ease of Use** -- The graphical user interface requires very little training. All user-specific information can be easily configured by the administrator/end-user.

**Reporting** -- Detailed status reports can be generated based on pre-defined sorting criteria.

**Programming** -- Siren sites can be programmed from the control center over the radio link. Communications parameters, siren tone type and length, zoning, and reporting options are a few of the remotely programmable features.

**Digipeating:** -- This feature provides the capability of using siren sites as radio repeaters to reach sirens out of reach from the base station radio. Digipeating can eliminate the need for complex and expensive radio repeater systems under many circumstances. Digipeating cannot be used with live broadcast voice announcements.

**Dynamic Grouping** -- Sirens may be grouped in zones for activation. These zones are easily configured by the user and can be changed without visiting the remote site.

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Alarm Reporting -- The Commander system can be set up to automatically call up to ten phone numbers in case of an alarm at a remote site. Users can also call into the system to retrieve alarm messages. All messages are real voice announcements and are password protected.

On-Screen Mapping -- High resolution graphics depict siren locations on an actual map of the siren system. Siren locations are easily set up by the user and are color coded to indicate the status of the remote site.

Compatibility -- The Commander is downwardly compatible with existing control systems. It can decode any combination of Single Tone, Two-Tone, and DTMF as well as FSK. This makes system integration possible without completely changing all sirens at once.

Fault Tolerance -- The system is very tolerant of adverse radio conditions. It can automatically retry to send messages that are not acknowledged. The system can be completely controlled via the SS2000D in case of a primary computer malfunction.

Remote Access & Support -- Users may dial-in to the system to take control from a remote location. This feature may also be used to enable remote factory support via phone line.

Multiple Base Station Operation -- All system activity is logged at all system bases. This feature enables each base to record activation commands and RTU reports from any source.

Y2K Compliant -- All software used is Y2K compliant.

Internet or Intranet Access -- Special SFCDWARE Client software allows access to your system over the Internet or Local Area Network.

SFCDWARE and Central Computer Unit (CCU) provides the operator interface to the siren system and serves as its command center. It is used to control sirens, command displays and printouts, and to store all incoming alarm messages and status messages for later retrieval and analysis. The software can be used to initiate communications with remote terminal units (RTU) to obtain status data and program sirens remotely.

For permanent records, data can be printed out on any printer, which can reproduce the entire ASCII character set as well as dot addressable graphics.

The CCU is the control station workhorse and serves four major roles: (1) as a control console to activate the RTUs; (2) as a data storage site to collect status and alarm data from all RTUs in the field network; (3) as an action station to alert key support personnel that an alarm has been triggered at an RTU, an RTU has failed to respond to a command, or that an RTU's main power has failed; and (4) as a programming console to configure radio communications parameters and remotely program RTUs.

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The CCU can be configured to automatically poll all the RTUs under its command for status data, on any schedule. Incoming messages to the CCU are stored on the CCU's hard disk, along with complete identification of the originating RTU.

An incoming message that is interpreted as an Alarm, such as Loss of primary power or Local Activation, can be configured to initiate a unique automatic telephone Alarm Call-out system contained in the CCU. This system can dial up to ten pre-assigned telephone numbers and report the alarm conditions to a key support person in an electronically stored human voice. When the call is acknowledged, the CCU discontinues further Call-outs until a new alarm condition occurs. Users may also dial into the CCU to retrieve current Alarm messages over the phone.

The system also supports remote control and maintenance support over a standard phone line. Users may dial into the CCU from a remote computer to control and monitor all portions of the system. Maintenance personnel may dial into the system to provide remote service and support. All dial-in features may be password protected and encrypted.

**The SS2000D Encoder/Status Controller** is interfaced with the transmitter that is to be installed at each of the central control points to operate all sirens in the system. Typically located in the communications center, this encoder/decoder sends the signaling to Controllers installed at each giant voice site and at each indoor

location. The SS2000D along with a conventional computer printer constitutes the head end system for the Federal two-way status control system. Because of the versatility of the SS2000D and its built-in date/time clock, it can be programmed to perform automatic testing of the sirens, weekly and/or monthly report



routines, quiet testing, growl test or a full system test. The programmable function keys enable one-button activation of up to 18 commands. This easy to use activation unit offers 18 pre-sets and a four-line, back-lit LCD display which provides clear instruction to the operator during activation. This is a great feature when alerting specific sirens individually or "zones" of sirens. Activating all sirens in the event of an emergency can be as easy as turning the key lock and pressing one button. After system activation occurs, the system can be programmed to automatically interrogate each site to inform the dispatcher that all of the siren sites received the alert and were sounded. If the dispatcher does not manually cancel the alarm after activation, the Controller will "time out" after a pre-programmed period of time. All post alarm reports are printed via the attached printer for support documentation and future reference.

The unit can be programmed from the keypad, or via a Windows-based software package. The SS2000D also receives the alarms from the siren sites in the event a status change has occurred. All status changes are directed to the printer and time/date stamped. Example: Site One (1) UVTD controller reports an intrusion in the siren control cabinet that houses the electronics and battery, the RTU would transmit the appropriate information back to the SS2000D and it in turn would alarm and printout the alarm condition. After the alarm occurs,

appropriate action can be taken to remedy the alarm condition, assuring all sirens are "armed" and ready to go when needed.

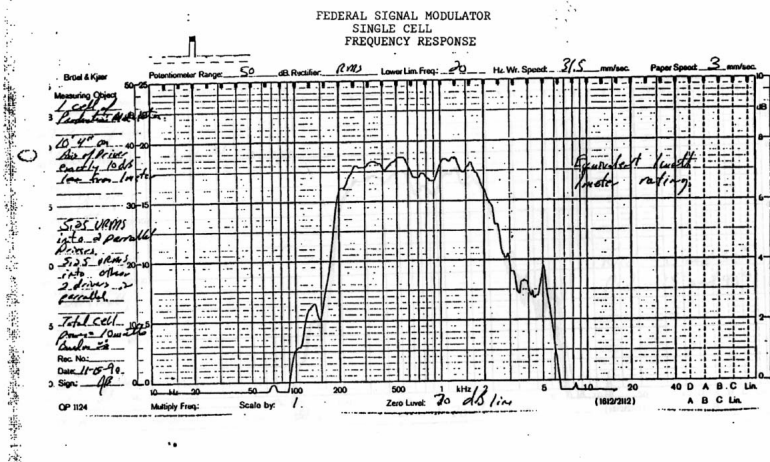
The SS2000D may also be connected to a Digital Storage device, which provides up to 250 messages and 14:20 minutes worth of voice storage. The Digital Storage device is designed for multiple recordings and records messages with the help of a touch-tone telephone. If connected to a phone jack, the messages can even be recorded from remote locations.

### Federal SS2000D System Encoder/Controller Features

- MSK Digital Coding
- Available in small desktop size and 19" rack mount configuration
- Both LCD display and audible alarm
- Programmable "hot" command keys
- In "voice band" signaling
- Secure Communications Protocol
- Built-in Time/Date stamp capability

### MODULATOR ELECTRONIC SIREN

Federal Signal offers the Modulator Electronic Outdoor Siren to provide warning signals and public address to meet Giant Voice System requirements. The modulator siren produces 360°-coverage and the best voice reproduction of any omni-directional siren. Furthermore, the Modulator has the best frequency response of all omni-directional electronic sirens. As the chart indicates, the Modulator siren offers a flat frequency response from 400 to 1500Hz resulting in improved voice reproduction.



The Modulator Siren is available in 7 models ranging from 106 to 125dB output at 100ft (30m). The aluminum center mast and modules of the Modulator provides strength and excellent lightning protection. The basic design of the Modulator allows easy replacement of

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drivers with no disassembly of the unit. These models are used extensively throughout the USA and the world.

### **DSA (DIRECTIONAL SPEAKER ARRAY)**

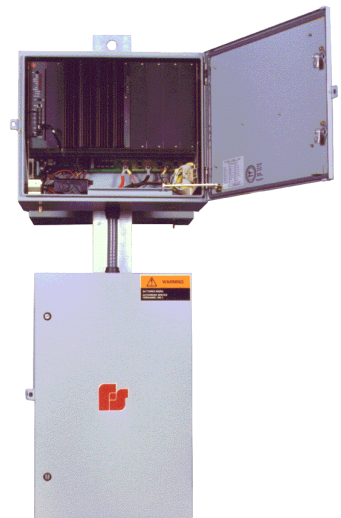


Additionally, Federal Signal offers Directional Speaker Arrays (Model DSA) for pole or wall mounting to meet the coverage requirements where omni-directional speakers are not appropriate. The DSA utilizes re-entrant horns and standard 100-watt high-powered drivers to project sound in a specific direction. By combining horns with stacked arrays, sound pressure is increased. Sound can be projected in multiple directions from one pole location by mounting multiple DSAs. The DSA Speaker Array is a high-powered outdoor warning siren with rated sound output ranging from 111 to 121dBC at 100ft.

### **ULTRAVOICE™ CONTROLLER**

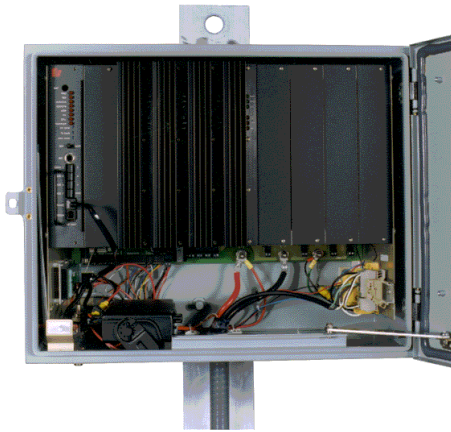
The UltraVoice Control Unit, with digital two-way control and status monitoring, controls the Modulator and DSA sirens. The controller also serves as the indoor control and amplification system for facilities requiring large quantities of distributed loudspeakers. The UltraVoice™ Controller is completely self-contained, single board microprocessor-based monitoring and control unit. It has the capacity to store siren activation functions uploaded from the Central Controller Unit (CCU). It also collects siren status and diagnostic information for report back to the CCU. All programmable parameters are stored in non-volatile memory and are not battery-dependent.

Each RTU can communicate status and alarm data to one or more CCUs. All data is transmitted in a digital format as a stream of characters using Medium Shift Keying (MSK), serially organized and transmitted at a rate of 1200 bits per second. In the system network, the RTU and SS2000D work as a complex data communication pair. Data protection techniques and handshaking is included so that messages do not get corrupted and are received correctly. If an alarm condition is reported by the RTU, the CCU can be programmed to initiate an alarm and even place a series of telephone calls until it reaches and reports to key support personnel. Status alarms from any RTU are handled the same way so that maintenance action can be taken at once. This means that alarms can be set up to report as they happen, enabling action to be taken before extensive downtime occurs. Any RTU in the system may act as a communication repeater, allowing wide area coverage capabilities without the necessity of expensive, high power transmitters or large antenna arrays.



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The UltraVoice RTU's are rack mounted in a common back plane used to interface the UV400 audio amplifiers and mounted in a common polished aluminum NEMA 4 weather proof cabinet with separate NEMA 3 battery compartment. All of the Federal Warning Systems RTU's support and use Motorola CDM750 radios (or customer specified transceiver) to "talk-back" to the Central Controller(s). The antenna system is a high quality 3dB omni-directional ½ wave DC grounded base station antenna with white fiberglass radome and low loss ½" coaxial cable (flooded braid jacket) with weather sealed N Male connectors.



The UltraVoice siren controllers (RTU) use extremely efficient pulse width modulated (PWM) amplifiers to provide the highest reliability and efficiency in a small modular weatherproof enclosure. Powered from two standard 12VDC marine batteries, the sirens can operate continuously for over 30 minutes in tone and voice. Additional batteries provide additional back-up capability. Each controller can house up to eight (8) 400-watt amplifiers for a total of 3200 watts per RTU. Each amplifier monitors voltage, current, power and speaker load, and is individually controllable to allow for zoning. Amplifiers are rack mounted and hot swappable which eliminates wiring and simplifies maintenance.

The UltraVoice siren controllers can operate completely independent from the communications network enabling local operation in case of an emergency or complete wire-line interruptions. Up to 16 voice messages and seven tones can be stored locally in the siren.

The system allows operators to activate each UltraVoice siren controller independently, in groups or as an entire system. The controllers can be programmed to automatically report changes in status or polled for current status at any time. It is equipped with quiet test diagnostics that allow the system to test all major system components without producing an audible signal. The UltraVoice controllers also allow for multiple activation sequences to be programmed from the central control points or locally at the site using a laptop computer and SFCDWARE software. These sequences can be arranged so that a single encrypted digital coded function can set up a sequence of events such as: Wail; Message 1; Wail; Message 2; Steady; Message 1; etc.) This can be valuable when utilizing voice messages stored within the UltraVoice RTU. In addition, the UltraVoice can be programmed with up to seven different alert tones, which can be customized to meet specific requirements.

The state-of-the-art siren controller uses non-volatile re-programmable FLASH memory for the siren's operating system. User configuration data is stored in non-volatile E<sup>2</sup> memory. Both memory types can be reprogrammed in the field over the built-in serial port without changing any IC chips. All user configuration data can also be updated with over-the-air programming from the Federal Commander Digital System computer.

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With four (4) minutes of digitally stored messaging, complete amplifier monitoring of both voltage and current, and the ability to stack multiple functions under one activation code, UltraVoice is the premier electronic siren controller.

### **Fiberglass Omni-directional VHF Antenna**

#### Features & Benefits

- Collinear Designs - High Performance
- High Density Fiberglass - Very Durable
- Special UV Treated - Stands Up to the Sun
- 100% Tested on a Network Analyzer
- Durable Gold Anodized Sleeve and Cap
- N Female Industry Standard Connector



#### Antenex® Gold Fiberglass Base Station

antennas are collinear designs enclosed in a high density fiberglass, which is covered with a protective ultraviolet inhibiting coating. The radiating elements are made from high efficiency copper and are carefully phased to provide maximum gain in the horizontal plane. The mounting sleeves are tuned to eliminate RF currents from the transmission line resulting in a “cold” sleeve allowing great freedom in mounting. This high quality and well-focused beam provides the highest gain and best efficiency. Every FG fiberglass base antenna is tested on a network analyzer before shipping to assure the best VSWR performance.

### **INFORMER TONE-ALERT RADIO**

Federal Signal can provide the Informer Tone-Alert Radio (TAR) for Indoor Alert and Notification. The Informer is a high-end radio receiver, which can decode Single Tone, Two-Tone Sequential, DTMF and Federal Commander Digital protocols (with optional I-FSK interface PCB). The compact TAR provides four distinct 85dBA at 10ft. alert tones and comes standard with a 6V, 1.2amp hour battery that provides a minimum of 18 hours of operation in stand-by mode and 1½ hours in full alert mode without AC power.



The Informer is UL Listed and includes a UL Listed wall transformer, which can be plugged into a 120V standard wall outlet. The Informer also has a standard BNC antenna connector and comes with a rubber duck antenna that has proven effective for most installations.

Optionally, the Informer can include two independent relays and a 600-ohm audio output (IO models) for controlling remote devices or porting audio from the speaker into external amplified speakers or PA systems.

The Informer is programmed from an easy-to-use software package and can include up to six different activation functions. Each relay can be controlled independently and operate in a separate fashion from the speaker. Furthermore, the Informer can be connected to an

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independent, but complementary ADA approved Strobe device (model IS2) with its own battery back-up option for providing visual alert as part of the Informer activation.

The strobe light option for the Informer series receivers provides a visual extension of the warning signal for the hearing-impaired and in areas for high ambient noise. The strobe light is UL Listed as “Visual Signaling Equipment for Hearing Impaired” (UL1971) and compliant with ADA requirements when properly installed. The unit is completely self-contained and easily wall mounted. Power is supplied by a UL Listed 30VDC wall transformer which runs the strobe and charges the battery back-up system. The batteries provide voltage to run the strobe for more than 1½ hours of operation. The strobe is controlled from a contact closure supplied by the Informer TAR or any other controlling device with a relay output. The flash rate is adjustable from 50 to 80 flashed per minute. (UL rating is based on 60 flashes per minute).

## **INDOOR SPEAKERS**

### **Amplified Loudspeakers**

Federal Signal offers amplified loudspeakers for use with the Informer Tone-Alert Radio. These loudspeakers receive the audio signal from the Informer Tone-Alert Radio via the 600Ohm audio output on the Informer. The Federal Signal GC series operates on its own 120 or 240V power supply. Alternatively, the product can be purchased as a 24VAC/DC model for battery back-up.

The primary model for indoor operation has been the 15-Watt (Model 300GC) offering:

- Built-in gain control
- 86dB to 110dB @ 10' (96dB to 120dB @ 1m)
- Available in 24VAC/VDC, 120VAC and 240VAC
- UL Listed, CSA Certified, CSFM Listed (California State Fire Marshal)
- NEMA 3R, IP54 enclosure

Federal Signal's SelecTone® is a lightweight and compact, solid-state device designed to amplify tone or voice over existing ambient noise.

The rugged speaker cone and projector are constructed of spun aluminum. The internal amplification circuitry, tone module and gain control are contained in a housing constructed of die-cast aluminum. Dust- and moisture-proof gasketing provides protection from the elements. All external surfaces are sealed with gray enamel paint.

The loudspeaker/amplifier is UL (Underwriter's Laboratories) Listed for indoor/outdoor use and meets NEMA 3R requirements.

Federal Signal's Model 300GC provides gain control to overcome ambient noise levels. Typical applications include emergency warning, start and dismissal, general alarm, evacuation and paging.

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### **AM300**

Federal Signal also provides non-amplified loudspeakers such as the AM300 for use with the UltraVoice Electronic Controller. These loudspeakers receive all their power from the UltraVoice (UV400) amplifier. Since the UltraVoice controller is battery-operated, the system is operational even in the event of AC power outage.

- Transformer coupled
- 25 or 70Vrms
- 8 watts or 15 watts, tapable
- Re-entrant horn design
- Wall mount
- UL Fire Listed, CSA Certified, CSFM Listed
- NEMA 3R, IP54 enclosure



The AM300 is a rugged, transformer coupled, re-entrant speaker for use in public address or paging applications. This 15-watt speaker features a durable speaker cone and projector constructed of spun aluminum. The speaker wiring connections are enclosed in a dust- and moisture-proof, die-cast aluminum compartment. All external surfaces are sealed with a gray powder coat paint.

Two screws inserted through the back of the wiring compartment provide for simple wall mount installation. The bottom of the AM300 contains two 1/2-inch conduit openings to accommodate inbound and outbound audio wiring. The unique shape of the AM300 projector provides a 60° sound dispersion.

Power handling for the AM300 is 15 watts with transformer taps of 8 and 15 watts. This unit is designed for use in 25 and 70Vrms distributed systems.

The AM300 is rated for indoor and outdoor use. This speaker is UL Listed for "Fire Protective Signaling Use" and CSFM Listed (California State Fire Marshal). An in-line capacitor (included) provides the isolation necessary for use in supervised systems.