

Features

The ZT-MNS-100-BAS panel contains:

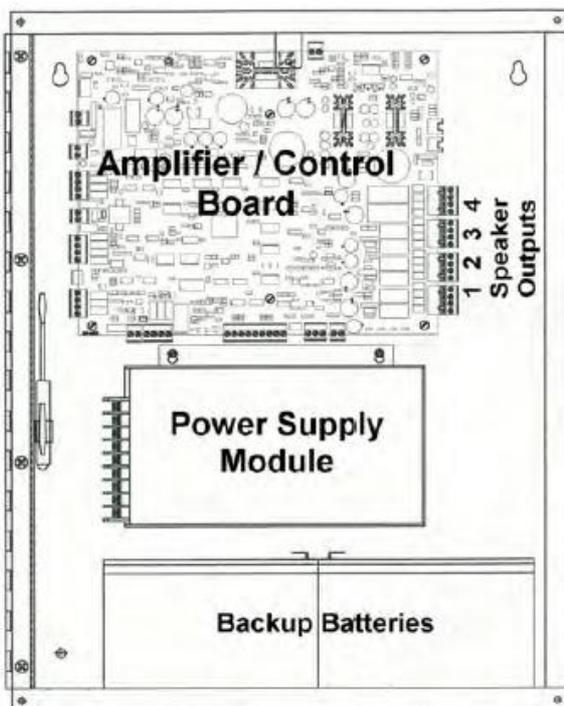
- A 100Watt , efficient Class D, Audio Amplifier
- 4 Selectable power- limited Speaker circuits
 - 3 x 25 Watt circuits
 - 1 x 60 Watt circuit
 - Continuous supervision of speaker circuits, even while activated
 - Class A or Class B wiring without the loss of Speaker circuits
 - Removable headers that accept up to 12AWG
- 2 Standard Messages
- Activation and Supervision by a single NAC or Addressable Control Module from a Fire Panel
- Contact closure activation of secondary messages
- Power supply and backup battery charging and switch -over internal
- Local and Remote Microphone inputs
- Auxiliary Audio input for paging, or background music

System Configurations

The MNS-100 system fits between standard 16" OC studs.

The Basic System VDOT-MNS-100BAS (shown below)

Contains the Amp/Controller Board – 100Watts and Zones, with the power supply and backup batteries.



System Installation

The cabinets can be surface or semi-flush mounted. All can fit between standard 16" on center (OC) studs, with mounting holes in the corners that accept up to #8 utility or wood screws.

There are numerous knockouts that provide a pathway for the field wiring into the cabinets.

- For semi-flush mount installations, the rough openings are 14-3/16"W x 31-5/8"H and 4" deep, for the large cabinet and 18-5/8"H for the small cabinet. On both there is about a 1" reveal that will protrude into the occupied area.
- If surface mounting is required, there are 2 Key-holes at the top that accept #8 utility screws to help hang the cabinet, with 2 holes near the bottom to secure the cabinet to a solid surface such as 2x4 studding, backboard, rails or a dry cement block / brick wall.

It is intended for indoor, dry locations only, with an environment of 32 to 120 degrees F, and 90% humidity non-condensing maximum. Care must be taken to avoid water infiltration or condensation. Do not mount directly on an exterior wall that could enhance condensation, use of a back board or rails is recommended.

Power Supply Connections

All high voltage and low voltage wiring must be completed in accordance with NFPA, NEC, local code standards and requirements, and others as directed by your AHJ.

Non-Power-Limited wiring (AC input, battery connections, and external P.L. wires) must be separated from Power-Limited wiring by at least 1/4", and run in separate conduits and through separate knockouts.

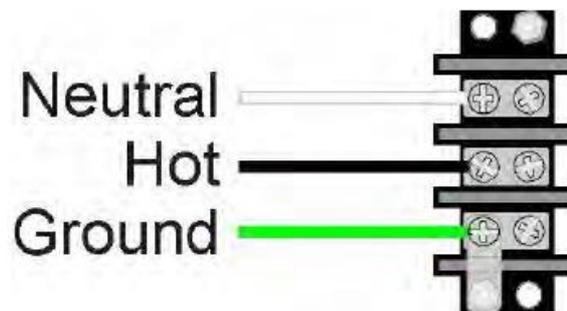
The primary (AC) power must be from a dedicated branch circuit, labelled to indicate that is part of the Fire Alarm or Emergency Communication System.

Use 14AWG minimum to connect the 120V/240V, 50/60Hz, 600W service to the panel, onto the terminal strip provided on the lower left side of the cabinet.

- Remove the plastic protective cover from the terminal block
- Connect the Neutral, Hot (line), and Ground from the AC circuit to the terminal block
- Replace the cover over the terminal block

A knockout at the bottom and lower left side of the cabinet are provided for running the AC power wiring. If the AC power is wired through the bottom knockout, metallic conduit must be used.

The AC power must be run separate from low voltage wiring by at least 1/4".



AC supply, Non-Power-Limited wiring

Must be separated from Power-Limited wiring by 1/4" and wired using separate knockout.

Connect AC supply with over current protection using 14AWG (min) wire rated for 600V.

Connect the Ground terminal to a good earth ground.

Basic Connections

Input Connections

J4 NAC Activation Input: The primary activation input connection for the MNS-100 inputs is the Reverse-Polarity supervising Notification Appliance Circuit (NAC) input.

This input needs to be 10-30VDC, steady, non-coded, without synch-pulses.

The 4-pin connector J4 is the NAC input. The left connections pins 1 and 2 are attached to the FACP NAC output. This connection activates and supervises the MNS-100. The End-Of-Line Resistor (EOLR) is placed on the right terminals 3 and 4. The NAC side is polarity sensitive with pin 1 being positive (+) in the Alarm mode. The internal MNS-100 Trouble Relay will open the connection to the EOLR if the MNS-100 system detects any fault within the panel, or with any of the supervised field wiring, such as Speaker Circuits, remote microphones or other supervised connections.

The NAC input is shown with a 2-wire Class-B connection. For a Class-A connection the connections 3 and 4 can be wired back to the FACP with pin 4 being the positive (+) return connection.

It should be noted that the AC Fail supervision with corresponding switch-over to back up batteries, will cause the MNS-100 to indicate a Fault but this will not open the EOLR on the NAC connection until a period of time, (typically 6 hours) has lapsed while in battery backup operation. This allows time for the AC to restore, preventing nuisance troubles during short power interruptions.

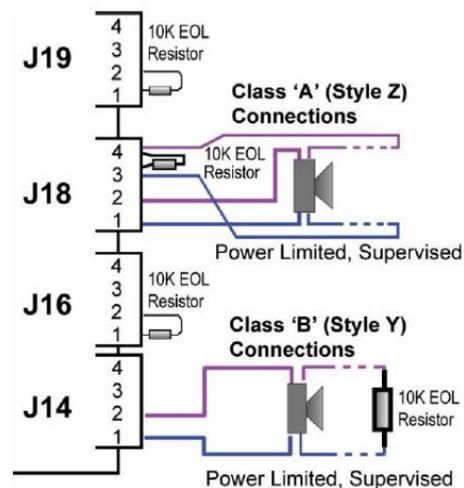
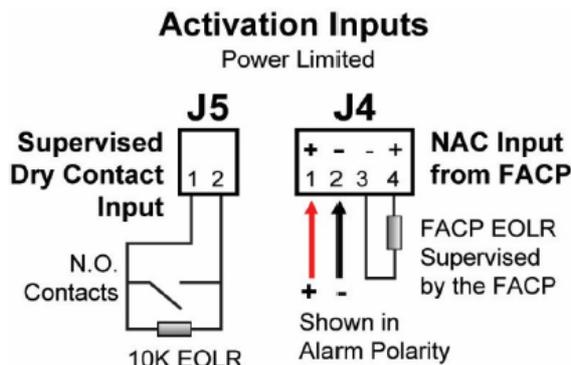
Output Connections

Whether there is one or multiple speaker circuits connected to the MNS-100, all connect the same way. The Speaker outputs can be connected either Class-B or Class-A, without loss of any zones or circuits.

There are four Speaker Circuits (Zones) on the main board of the MNS-100. Output circuits 1, 2, 3, and 4 correspond to J14, 16, 18 and 19 respectively on the lower-right side of the board.

On all the connections, the pin 1 is the positive (+) output. There is an approximate 10 to 13VDC between pins 1 and 2 at all times, with the 10K EOLR attached. This is the supervision voltage, and is present during standby, supervisory mode or in alarm activated. During Alarm-Active condition, this DC voltage may be difficult for some Digital Multi-Meters (DMM) to read with the audio AC at the same time.

For Class-A connections, the return pins are 3 and 4, with 3 being the positive (+) connection. The 10K EOLR must be placed in the connector with the return wires.



Input Connections

Special Application Inputs Connections

J5 Contact Closure Activation: An alternative to the reverse-polarity NAC activation is a supervised contact closure input. Depending upon the position of the JP1 jumper, this can activate the system exactly the same as the NAC input. Refer to the drawing in section 4.1 to see the wiring connections to J5, the Contact Closure input. This is a Normally Open (N.O.) 'dry contact' input that can be from a switch, or relay with the 10K EOLR across the terminals for the switch etc. If the NAC input cannot be monitored by an NAC or supervisory module, then the optional external relay board can be used as a system supervisory connection. If there is nothing connected to the J4 NAC input, then the internal trouble contact between J4 pins 1 and 4 can be monitored for a Normally Closed (N.C.) connection of a trouble loop that will open the circuit during any MNS-100 fault condition.

Note that during AC interruption and backup battery operation, this contact has a delayed action.

J1, J6 Auxiliary Audio Inputs: To provide for a way to broadcast audio from external sources through the Emergency Communication Speaker System, two Aux-Audio inputs are provided. Both have 1VRMS Audio inputs and contact closure activation. They can be connected to the local telephone system via a 'Line-Card' provided by the phone company, a Weather Radio that will automatically activate upon severe weather alerts or for connection to a wide area Mass Notification system.



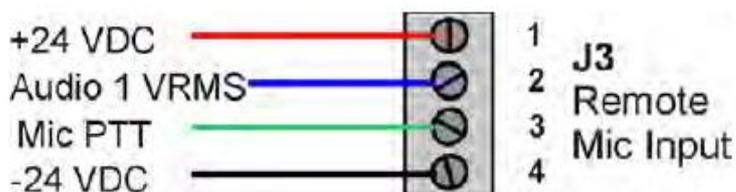
J6 is on the lower left-hand edge of the main board. **J1** is above it on the middle right edge.

On both, pins 1 and 2 are the Audio input, set standard for 1VRMS (0dBm, 2VPP) although other levels are available. To activate these inputs, a dry-contact N.O. switch or relay is closed across pins 3 and 4. This will set the system into Active, and the audio present at the associated input will be broadcast. This is a secondary use of the system, and any other activation NAC, message select, local microphone, or remote microphone will over-ride these inputs. **J1** is a supervised input for use primarily in Mass Notification systems, where these connections need to be maintained at all times. Loss of either EOLR will result in a trouble indication.

J3 Remote Microphone Input: A Remote Microphone may be placed in a convenient location for use by Emergency personnel, such as the front lobby.

The MNS-100 has a supervised input for the remote microphone. As shipped, there are two 'Dummy' EOLRs, one attached between to **J3** pins 1 and 2, and another between 3 and 4. These 'Dummy' EOLRs are removed and stored upon installation of the Remote Microphone wiring.

There are 4-conductors between the MNS-100 and the Remote microphone. These are typically 16 to 22AWG, in a single jacket, with a length up to 200'. The cable doesn't need to be shielded unless it's run in the same conduit as the FACP- SLC, or other data lines.



The connections are pin to pin from connector to connector. Such that pin one of the MNS-100 goes to pin 1 of the Remote mic, 2 to 2, 3 to 3, and 4 to 4. The Remote Microphone Installation Instructions show this and other information in greater detail.

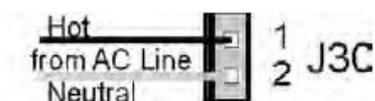
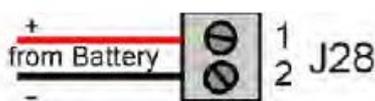
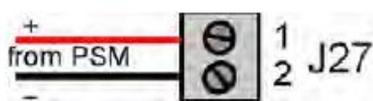


J8 High Level Audio Input: In addition to the low level (1VRMS) inputs of the Aux connectors, a high level (25VRMS or other) input such as a speaker line can be connected to J8. This input is transformer isolated to reduce grounding issues. Activation is via one of the Aux inputs which will vary depending upon the system design.
Standard factory setting will have this input not enabled.

Pre-wired Power Connections

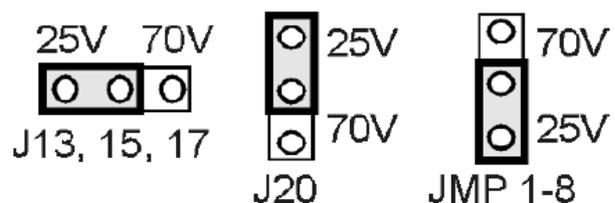
The connections for the power, battery, and AC monitoring are pre-wired to the main board at the factory.

- J27** 24VDC Input: J27 is the 24VDC input from the Power Supply Module.
- J28** Battery Connection: The backup battery pack is attached to the main board via the J28 connector. This provides charging and monitoring, of the battery as well as the backup power input to the system.
- J30** AC Monitoring: Should the AC Main power fail, this connection is monitored and will signal for the switch over from AC provided power to the Battery provided power.



Optional Connections

To provide proper power limiting on the speaker circuits, different settings are required for the 25 or 70VRMS outputs. There are four 3-pin jumpers on the main board and eight more on the 8 Circuit Expander option board. These are factory set for 25VRMS as shown here: unless the 70V transformer has been pre-installed by the factory then they are already set for 70V.



To change the output limiting for the 70V option, move the jumpers from the 25V pins to the 70V pins.

Indicators

The Amplifier-Controller Board includes 3 LED indicators that are visible through the front panel.

The GREEN LED is a "Power" indicator that shows the presence of the 24VDC power input.

The YELLOW LED is a common "System Fault" indicator that turns on as a result of any fault in the system.

The RED LED serves two purposes.

It is an indication that the system is "Active" when it is on solid,

or it can flash to represent a code for a fault condition.

When the "System Fault" LED is on, the "Active" LED could flash one or more of the codes that are shown in the table below. The code sequence will repeat itself approximately every 6 seconds.

# Flashes	Status
1	AC Fail
2	Low Battery
3	Amplifier Fault
4	Charger Fault
5	Ground or Dry Contact Fault
6	Audio Fault
7	I ² C Fault
8	LOC Fault
9	Message Time Out
10	Input Board Fault
11	Serial Connection Fault

Note: In addition to the "System-FLT" LED, the Controller Board opens the contacts of the System Fault relay which opens the NAC circuit and puts the supervising FACP in a fault condition.

Other Yellow LEDs on the board could light along with the System Fault LED to determine the cause of the fault. These LEDs are:

Amp Fault	This indicates there is a failure in the Amplifier circuit of the board
Spkr4 Limit	Speaker Circuit (Zone) 4 power output limiting has been exceeded
RM Fault	The Remote Microphone circuit has lost supervision
Mic Fault	The Local Microphone is either un-plugged or a wire has broken
Aux2 Fault	The Aux 2 Input has lost either audio or contact supervision
Spkr Faults	There are 4 LEDs associated with a fault on each of the Speaker (Zone) outputs These indicate either a short or open in the speaker circuit wiring

There are 4 Speaker Circuit (Zone) Active Red LEDs that indicate which output is activated. The outputs are controlled by the Zone Select Switches, or by external contact closures.

The output audio level is roughly indicated by a 4-LED bar graph. This is in the upper right corner of the board. Each LED corresponds to approximately 25% audio output level.



Settings

Switches

There are 2 banks of switches, S1 and S2, that set the message and tone options. These are generally acceptable by factory default setting; it is recommended that the system is running properly before making any changes.

The timing, duration, and tones, associated with the messages can be varied by changing the S1 and S2 switch setting according to the following illustration and tables. After any of these are changed, press the Reset button for about 1/2 second to enable the processor to re-read the switch settings.

Switch S1

Option \ Switch		8	7	6	5	4	3	2	1
Initial Tone	7 seconds								Open
	15 seconds								Closed
Between	0 seconds							Open	
	7 seconds							Closed	
Times to Play	0					Open	Open		
	3					Open	Closed		
	6					Open	Closed		
	Continuous					Closed	Closed		

Switch S2 (different tones may have been installed to system requirements)

Option \ Switch		8	7	6	5	4	3	2	1
Msg 1 Tone	Slow Whoop						Open	Open	Open
	HiLo						Open	Open	Closed
	1K Tone						Open	Closed	Open
	Chime						Open	Closed	Closed
	Wail						Closed	Open	Open
<i>Fire Only</i>	Hom						Closed	Open	Closed
	Temporal						Closed	Closed	Open
Msg 2 Tone	1k						Closed	Closed	Closed
	Slow Whoop			Open	Open	Open			
	HiLo			Open	Open	Closed			
	1K Tone			Open	Closed	Open			
	Chime			Open	Closed	Closed			
<i>Fire Only</i>	Wail			Closed	Open	Open			
	Hom			Closed	Open	Closed			
	Temporal			Closed	Closed	Open			
<i>Fire Only</i>	1k			Closed	Closed	Closed			

The Reset Switch SW2 is pressed after any changes are made to the S1 or S2 option switches. The SW1 switch is used in association with external programming, and is not covered in this document.

Jumpers

There are a number of Configuration Jumpers on the Amplifier – Control board that along with the switches, modify the way the unit is used in actual service.

Most are set at the factory to an acceptable initial installation configuration, and it is recommended that the system is running properly before making any changes. Then some of the jumpers may need to be moved to set the exact operation of the unit to the needs of the individual system.

The jumpers can be divided into three categories:

Normal Configuration Jumpers

These jumpers are the most likely to be needed to be changed. These add field attached options, such as Remote Microphones, or set parameters associated with basic operation.

3-Rel	JP8	Enables the MNS-3-REL option, when jumpered
Ground Fault	J29	Enables the internal Ground Fault Detection when jumpered
	JP7	Not Installed
Spkr Circuits	JP6	Must be Installed

Optional Configuration Jumpers

These jumpers would need to be changed only if a major modification is made to the basic system, such as changing the output voltage from 25 to 70VRMS.

Xform	JP2, JP3	If the optional, external 70VRMS transformer is needed. These jumpers are removed and the transformer is attached to the J9 and J10 connections
25/70	J13, J15 J17, J20, JP9	These jumpers are moved from the 25 to the 70 setting if the 70VRMS transformer is installed
25/70	J7	Not used on the MNS-100BAS
Alm Select	JP1	When installed, this connects the contact closure input J5 to activate

Special Configuration Jumpers

These jumpers would never need to be changed unless instructed to do so by the factory.

Test	JP4	Sets a test tone into the amplifier, used for factory testing only
Audio Select	J11	Selects the audio source into the amplifier. Leave in the factory setting

Message unit

Standard Message and Configuration

The MNS-100 has a two messages and tones pre-loaded into memory. These contain a Fire evacuation message, and a Weather warning message.

The messages are prioritized via importance or urgency of the event. The Fire message is typically set to the highest priority by Fire code requirements. The local and remote microphones are the highest priority in the system, and will over-ride the message and tones. If the local or remote microphones are used during the message cycle, the message will NOT play again after mic un-key but revert to Alert Tone only until the system is reset.

The Bell (NAC) Input J4 activates the first message (#1), the message-1 (primary) Tone and has the top priority.

The messages are activated by contact closure on J31. Do not change these unless instructed to do so. It can affect other parts of the system.

The first message on J31 is also the Emergency Fire message, but its Alert tone is the message-2 (secondary) tone, not the primary. Messages 2 uses the message-2 alert tone and are in numerical priority.

The details of how the message is played are controlled by the S1 and S2 switches. Each of these SIP-Switches has 8 small toggle switches. The individual switches control the type of tone, the timing of the tones, etc. An illustration of the switches and the table of settings are shown in the Switch Setting Section.

Initial Tone	S1-1	Time in seconds that the Alert tone plays before the Message starts This is the pre-Alert Tone
Pause between	S1-2	Time in seconds that the Alert tone plays between Messages repeats The tone is interspersed between the message plays
Times to Play	S1-3-4	The number of times the Message plays (repeats) until the Alert tone only sounds until the system is reset
Msg-1 Tone	S2-1-3	This selects the Alert tone for the First (Primary) Message Typically the Fire Alert tone, Temporal pattern by Code
Msg-2 Tone	S2-4-6	This selects the Alert tone for the Second (Secondary) Message

Backup Battery Requirements

Worksheet

The ZT-MNS-100BAS, with all optional accessories (ZT-MNS-3-REL Relay Card, DVS-RM/B Remote Microphone) requires to following batteries for specified time requirements. The batteries specified can be located in the ZT-MNS-100BAS enclosure

Time Req		Battery Req
Active	Standby	Use:
15 Minutes	24 Hours	2x 12V, 7 AH
30 Minutes	48 Hours	2x 12V, 12 AH

Specifications

A.C. Power with internal Supply:	120/240V AC 50/60Hz, 600W
D.C. Power Supply voltage:	
Built in power supply:	24VDC Regulated
External Power Supply:	24VDC Regulated from Listed for Fire Supply
Current from 24VDC:	5.25A at 100Watts output, Refer to Power Supply Calculation sheet
Output Audio Power:	100Watts from primary cabinet
Frequency Response:	600Hz to 3600Hz
Output Voltage:	25VRMS (70VRMS with optional transformer)
Speaker Circuits:	Class A (Style Z) or Class B (Style Y) 4-standard, (12 with optional expander board) 3 (11) Power Limited 25W, 1-Power Limited 60W 10K EOLR continuously monitored (# A10074) Removable headers that accept 18 to 12AWG
Activation Inputs:	Reverse Polarity (NAC) 9 to 30VDC, 10mA, steady, non-coded Contact closure supervised dry contact closure Contact closure for secondary (non-fire) messages
Remote Microphone:	1VRMS Audio, power limited 24VDC, 100ohms max line resistance Auxiliary
Audio Inputs:	1VRMS Audio, Contact Closure activation 1-Supervised with override priority (control station) 1-Unsupervised low priority (paging)
Ground Fault Impedance:	5k ohms

