

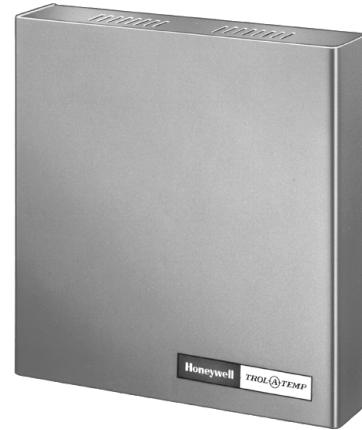
# MABS XX Zone Panel

## MABS XX-A Add-A-Zone Panel

## MHP Multistage/Heat Pump

### Panel

*The MABS XX Light Commercial Forced Air Zone Control System provides automatic zone changeover control in constant volume heating-cooling systems.*



#### Zone System Panels

- The MABS XX Panel controls two or three zones in single stage heating-cooling systems with conventional, single-stage heat pump or central electric heat and single compressor cooling.
- When the MHP Panel is added, MABS XX can be used with:
  - heat pumps with an auxiliary heat stage.
  - two stages of heat and cool.
- Recommended for single-duct systems using residential or small packaged commercial equipment where some zones may require cooling while others require heating.
- Up to nine MABS XX-A Add-A-Zone Panels can be added to the system to control up to 27 additional zones.
- Each zone can have up to two dampers, without additional equipment.
- Panels operate on 24 Vac.
- Highly flexible design allows system operation to be tailored to meet almost any zoning requirement.

#### Thermostats

- Variety of Honeywell Trol-A-Temp thermostats available.
- Auto changeover thermostats are recommended for most zones.

#### Dampers

- Motorized two-position dampers control the flow of air into each zone.
- Models available to mount from the side, bottom or inside of rectangular ducts, or to insert into round ducts.
- Rectangular sizes range from 8 in. wide by 4 in. high to 36 in. wide by 24 in. high (increasing in 2-inch width and height increments).
- Round sizes range from 6 to 24 in. diameter (increasing in 2-inch increments).
- A nonmotorized static pressure regulating damper or motorized modulating damper and differential pressure switch controls airflow into a bypass zone.

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# Specifications

**IMPORTANT:** *The specifications given in this publication do not include normal manufacturing tolerances. Therefore, an individual unit may not exactly match the listed specifications. Also, this product is tested and calibrated under closely controlled conditions, and some minor differences in performance can be expected if those conditions are changed.*

## SYSTEM OVERVIEW

The MABS XX Zone Control System enables single stage heating and cooling systems to provide any zone with heating or cooling on demand. It provides automatic switching between the heat and cool modes with a time delay for purging the system between the end of any call and the start of the next, as well as after a power failure or on a system startup. The fan runs during the time delay.

Single stage equipment includes gas, oil and electric heat systems, water source heat pumps or any heat pump without auxiliary heat equipment. Hydronic valves for either baseboards or water coils in the duct can also be controlled without auxiliary relays.

With the addition of a MHP Multistage/Heat Pump Panel, the system can also control two stage equipment or a heat pump with auxiliary heating equipment.

Each MABS XX Panel can control up to three zones. Additional zones, to a maximum of approximately 30, are controlled by adding one or more MABS XX-A Add-A-Zone Panels. The MABS XX-A panel is like the MABS XX, but it does not include the Master Control Module (MCM). Up to ten panels can be interconnected. Each panel requires its own transformer, and each is isolated from the equipment transformer(s). Transformers must be properly phased when multiple panels are used.

Each zone requires a thermostat, which can be a single set point thermostat with a switching subbase, or

a dual set point thermostat with an AUTO position on the subbase, or a thermostat with no switching subbase (and therefore no independent fan control).

Any zone thermostat with a fan switch can call for FAN ON override. The system can also turn on a fan in heat pump, hydronic and electric heat systems that do not have a plenum switch.

Also, the MABS XX Panel can be set to provide ventilation air to selected zones when the heating and cooling equipment is idle.

## System Components

A MABS XX Zone Control System provides automatic changeover control of up to 30 zones in a constant volume heating and cooling system. System components, which must be ordered separately, include:

- MABS XX Zone Panel for up to three zones.
- MABS XX-A Add-A-Zone Panel for up to three additional zones.,
- MHP Multistage/Heat Pump Panel for use with multistage heat pumps, two stage conventional heat and two-stage cooling equipment.
- Thermostat with system and fan switching for each zone.
- One or two motorized dampers for each zone without additional equipment.
- One 40 VA system transformer for each MABS XX and MABS XX-A Panel.
- Static pressure regulating damper as required. See Planning the Installation section for details.
- If more than two dampers are required per zone, use an SDCR Slave Damper Control Relay. See Accessories.

Review Planning the Installation section before selecting system components.

## ZONE PANELS

The zone panels operate the heating or cooling system and zone dampers in response to the zone thermostats. Switching between heating and cooling can be automatic, depending on the thermostat and subbase used. See Table 1 and specifications on page 3.

# Ordering Information

When purchasing replacement and modernization products, refer to the Honeywell Trol-A-Temp price sheet for complete ordering number

If you have additional questions, need further information, or would like to comment on our products or services, please write or phone:

Honeywell Trol-A-Temp, 57 Bushes Lane, Elmwood Park, NJ 07407-3204. Telephone: 201-794-8004. 800-TAT-TEMP. Fax: 201-794-1359.

TABLE 1—ZONE CONTROL PANELS.

Order Number	Description	Max. No. of Zones	Application	Comments
MABS XX-2	Masterrol Automatic Changeover Zone Panel.	2	Single stage gas, oil or electric heat, compressor cooling; one required per system	
MABS XX-3		3		
MHP	Multistage/Heat Pump Panel.	N/A	Use with MABS XX for heat pump with auxiliary heat, two-stage conventional heating, and two stage cooling	Use one per system.
MABS XX-A1	Masterrol Add-A-Zone Panel.	1	Expands MABS XX to additional zones; less MCM board for system connections	Use with MABS XX-2 or MABS XX-3.
MABS XX-A2		2		
MABS XX-A3		3		

ELECTRICAL RATING: 24 Vac, 60 Hz.

WIRING CONNECTIONS: Screw pressure terminals for thermostat gauge wire connections.

MOUNTING: Panels mount with relays toward top with two screws through mounting holes in cabinet back.

PANEL DIMENSIONS:

MABS XX and MABS XX-A: 11-1/16 in. high x 10-15/16 in. wide x 2-5/16 in. deep [281 mm high x 278 mm wide x 59 mm deep].

MHP: 4 in. high x 6 in. wide x 1-1/2 in. deep [102 mm high x 152 mm wide x 39 mm deep].

### THERMOSTATS AND SUBBASES

These thermostats, with the appropriate subbase, signal the zone control panel to control the zone damper and to operate the heating or cooling equipment as needed. Different zones can use different thermostat types, as long as the thermostats are appropriate for the heating and cooling equipment.

Each zone may include system and fan switching. An AUTO system position is not required, but eliminates the need to manually switch between heating and cooling as the zone demand changes. In some thermostats, system and fan switching is on the thermostat; in others, a separate switching subbase is required. See Table 2 to select the desired thermostats and subbases.

TABLE 2—THERMOSTAT AND SUBBASE MODELS.

Order Number	Honeywell OS Number	Type	Application	Stages		Color	Switching		No. of Wires
				Heat	Cool		System	Fan	
<b>SINGLE STAGE MODELS</b>									
TRT/MCRS <sup>a</sup>	T87F3715/ Q539A1436 <sup>a</sup>	Electro-mechanical	Conventional heat/cool	1	1	Gold	COOL-OFF-HEAT	ON-AUTO	4
TRT-W/MCRS-W <sup>a</sup>	T87F3707/ Q539A1428 <sup>a</sup>	Electro-mechanical	Conventional heat/cool	1	1	White	COOL-OFF-HEAT	ON-AUTO	4
MCHC-A <sup>b</sup>	T874A1465/ Q674E1379	Electro-mechanical	Conventional heat/cool	1	1	White	HEAT-OFF-COOL- AUTO	AUTO-ON	4
HCT <sup>b</sup>	T874A1465/ Q674D1123	Electro-mechanical	Conventional heat/cool	1	1	White	None	None	3
MCHC <sup>b</sup>	T874A1465/ Q674B1471	Electro-mechanical	Conventional heat/cool	1	1	White	HEAT-OFF-COOL	AUTO-ON	4
T8601C1054	T8601C1054	Energy saving electronic	Conventional heat/cool; system powered	1	1	White with gray base	HEAT-OFF-COOL	ON-AUTO	5
T8601C1062	T8601C1062					Beige			
T8601D1045	T8601D1045	Energy saving electronic	Conventional heat/cool; system powered	1	1	White with gray base	HEAT-OFF-COOL- AUTO	ON-AUTO	5
T8602C1061	T8602C1061	Energy saving electronic	Conventional heat/cool; battery powered	1	1	White with gray base	HEAT-OFF-COOL	ON-AUTO	4

<sup>a</sup> Order subbase separately. Subbase required when TRT is used with MABS XX.

<sup>b</sup> Subbase shipped with thermostat.

(continued next page)

TABLE 2—THERMOSTAT AND SUBBASE MODELS (continued).

Order Number	Honeywell OS Number	Type	Application	Stages		Color	Switching		No. of Wires
				Heat	Cool		System	Fan	
<b>SINGLE STAGE MODELS (continued)</b>									
T8602C1079	T8602C1079	Energy saving electronic	Conventional heat/cool; battery powered	1	1	Beige	HEAT-OFF-COOL	ON-AUTO	4
T8603D1001	T8603D1001	Energy saving electronic	Conventional heat/cool; battery powered	1	1	White with gray base	None, Auto	None, Auto	5
T8603D1019	T8603D1019	Energy saving electronic	Conventional heat/cool; battery powered	1	1	Beige	None, Auto	None, Auto	5
<b>MULTISTAGE MODELS</b>									
MCTS <sup>b</sup>	T874D1801/Q674B1463 <sup>a</sup>	Electro-mechanical	Multi-stage; conventional heat/cool	2	2	Beige	HEAT-OFF-COOL	AUTO-ON	6
MCTS-W <sup>b</sup>	T874D1827/Q674B1471 <sup>b</sup>	Electro-mechanical	Multi-stage; conventional heat/cool	2	2	White	HEAT-OFF-COOL	AUTO-ON	6
MCTS-A <sup>b</sup>	T874D1827/Q674E1379	Electro-mechanical	Multi-stage; conventional heat/cool	2	2	White	HEAT-OFF-COOL- AUTO	AUTO-ON	6
T8621D7063	T8621D7063	Energy saving electronic	Multi-stage conventional heat/cool	2	2	White with gray base	HEAT-OFF-COOL	ON-AUTO	7
T8621D7071	T8621D7071	Energy saving electronic	Multi-stage conventional heat/cool	2	2	White with gray base	None	None	6
<b>HEAT PUMP MODELS</b>									
MCHPA <sup>b</sup>	Y594G1492	Electro-mechanical	Heat pump	2	1	White	EM HT-HEAT-OFF-COOL-AUTO	AUTO-ON	7
T8611R1125	T8611R1125	Energy saving electronic	Heat pump	2	1	White with gray base	EM HT-HT-OFF-COOL	ON-AUTO	7
T8631R1006	T8631R1006	Energy saving electronic communicating	Heat pump	2	1	White with gray base	EM HT-HT-OFF-COOL	ON-AUTO	7 (Plus H-Bus Wires)

<sup>a</sup> Order subbase separately. Subbase required when TRT is used with MABS XX.

<sup>b</sup> Subbase shipped with thermostat.

**MOUNTING:** All models mount directly on a wall or on a two by four inch horizontal outlet box. To mount the T87 on an outlet box, order the 129044A Adapter Plate Assembly (gold).

**DAMPERS**

These dampers open and close in response to the control panel and control air flow to the zone, providing temperature control. They include a factory mounted actuator motor. Motor assembly is removable for service or replacement without disturbing the damper.

A motorized damper is mounted in the duct takeoff to each zone. The system may require a SPRD Static Pressure Relief Damper to assure correct static pressure and air delivery to each zone. See Planning the Installation section.

**MODELS:**

AOBD Automatic Opposed Blade Damper—Side Mount. Actuator motor side mounted for installa-

tion through side of duct.

AOBD-BM Automatic Opposed Blade Damper—Bottom Mount. Actuator motor mounted on the bottom of the damper to allow installation through bottom of duct.

IOBD Internal Opposed Blade Damper—Actuator motor mounted on the back of the damper to allow installation of the damper and actuator inside the duct.

ARD-PC (D835) Round Damper—Single blade, normally open damper in section of round duct for use in systems with round branch ducts. Actuator mounted on side of housing.

SRTD Square to Round Transition Damper—Automatic Opposed Blade Damper installed in transition fitting with round pipe outlets on each side for round duct applications.

POWER SUPPLY: 24 Vac, 60 Hz via panel.

TIMING: D835 requires 15 sec nominal to open or close; CDO requires 90 sec; other dampers require 30 sec nominal.

**ACCESSORIES:**

MARD Motorized Automatic Round Damper with ML6161 Actuator—single blade damper with spdt 2 position floating control actuator.

ARDPO (D837) Round Damper: Normally closed, used for outdoor air intake, if desired.

DPBT (L6008A) Remote Bulb Controller: Mounts in duct to sense discharge air temperature.

MOBD Modulating Opposed Blade Damper: Requires spdt floating control with center off.

R8800B1026 Relay: Spdt; 24 Vac coil; contacts rated 12A full load, 60A locked rotor, 1/2 hp at 120 Vac.

SDCR SLAVE DAMPER CONTROL RELAY: Wiring panel and 4PDT relay for controlling up to 4 dampers from a single switch or thermostat.

SPRD STATIC PRESSURE REGULATING DAMPER: Nonmotorized damper installs at end of duct run or in bypass zone to relieve excess static pressure.

T6031C AQUASTAT CONTROLLER: Mounts in duct to sense discharge air temperature.

TRANSFORMER: One required for each panel, plus the heating/cooling equipment transformer(s). Do not use equipment transformers.

PMT-50N (AT87A1478): 120/240 Vac primary, 24 Vac secondary, 48 VA.

PMT-40 (AT140D1046): 120/240 Vac primary, 24 Vac secondary, 40 VA.

## Planning The Installation

### MABS XX APPLICATIONS

MABS XX is a stand-alone system that controls two-position zone dampers and heating/cooling equipment based on signals from individual zone thermostats. Each zone is programmed independently at the zone thermostat. Switch settings at the zone panel determine damper position when the thermostat is not calling. When used with auto changeover thermostats, the occupant of each zone can set the system and fan switches to AUTO and from then on be concerned only with the temperature setting.

The MABS XX is designed for applications where one or more zones may require heating while others may require cooling. Although any thermostat can call for either heating or cooling operation at any time, MABS XX panel logic assures that heating and cooling equipment will never operate simultaneously. MABS XX should be integrated with a Honeywell Trol-A-Temp economizer for free cooling. Contact Honeywell Trol-A-Temp for more information.

The system is used in constant volume systems with residential or light commercial heating and cooling equipment. Static pressure control is provided by a nonmotorized static pressure relief damper or by a motorized modulating damper with static pressure control switch that opens and closes with pressure changes in the duct. Either damper is usually installed in a duct leading to an uncontrolled space such as a hallway or foyer.

Some applications that are well-suited to the MABS XX include:

- Large homes with unusual temperature control requirements such as greenhouses or indoor pools.
- Small office buildings.
- Strip shopping malls.
- Schools.
- Buildings with heavy sun, computer equipment, interior/exterior or occupant loads in some zones. These zones will often require cooling, even in the winter.
- Buildings with zones that require maintenance of a particular temperature year round.
- Residences where auto changeover is desired for convenience.

### ZONE PANEL SELECTION

Zone panel selection is based on the type of heating/cooling equipment and on the number of zones. See Table 1. Note that heat pumps with auxiliary heat and two stage equipment require a MHP panel in addition to the MABS XX.

If the building has more than one heating/cooling system, use separate zone control panels for each system. The systems should be wired completely independently.

### ZONE THERMOSTAT SELECTION

The choice of thermostat for the MABS XX Zone System is fairly flexible. Some considerations are:

- A fuel saver thermostat offers the best combination of economy and comfort.
- A mixture of fuel saver and standard thermostats may be appropriate. Use fuel savers in zones where different control points are required at different times of day; use standard thermostats in zones where a constant control point is desired or that are used only occasionally.
- A system with multistage heating or cooling equipment or a heat pump requires a multistage or heat pump thermostat, respectively, in *each* zone.
- Each zone thermostat can have system and fan switching. An AUTO position on the system switch is not required, but it is particularly useful in zones that may require both heating and cooling at different times during the day. Electronic thermostats are available with system and fan switches built in; electromechanical thermostats use a separate subbase. See Table 2 to determine whether an additional subbase is required.

### DAMPER SELECTION

Motorized damper selection hinges on two factors—actuator accessibility and duct size. Install motorized dampers where the actuator is accessible for service. Models are available for side or bottom insertion into existing rectangular ducts, for internal mounting as the ductwork is assembled, and for use with round takeoff

ducts. The dampers can be mounted in any position, except side and internal mount models used in horizontal ducts must be mounted with the actuator towards the top of the duct to reduce operating friction and minimize dirt accumulation on the linkage.

For most applications, choose a damper the same nominal size as the duct. The dampers are sized 3/8 in. smaller than the duct so they will slip in easily and be less likely to bind. *Never* force a damper into an undersized duct, because the resulting pressure will cause the

blades to bind. If necessary, two dampers can be installed back-to-back, or the width of the damper can be smaller than the width of the duct to allow some air to bypass the damper and flow into the zone even when the damper is closed.

If you use an internally mounted damper, install it just upstream of a register, or install the damper just ahead of a right angle to allow access for motor service. Generally, however, motorized dampers are installed close to the heating and cooling equipment. They can be installed in a divided plenum on a two-zone system.

## Installation

### WHEN INSTALLING THIS SYSTEM...

1. Read these instructions carefully. Failure to follow them could damage the components or cause a hazardous condition.
2. Check the ratings given in the instructions and on the components to make sure they are suitable for your application.
3. Installer must be a trained, experienced service technician.
4. After installation is complete, check out component operation as provided in these instructions.

### LOCATION AND MOUNTING

#### Zone Panel or Add-A-Zone Panel

The zone panel and Add-A-Zone Panel(s) are mounted near the heating and air conditioning equipment. Although they can be mounted in any position, vertical mounting is recommended. Ambient temperatures at the selected location remain within minus 40° to 140° F [-40° to 46° C] and relative humidity must remain below 95 percent noncondensing.

Before mounting, make sure the black strain relief bushings are installed in the wiring knockouts in the bottom of the case. Remove the relay board by popping it off the snap-on standoffs in the corners. See Fig. 1. Position the cabinet with the wiring knockouts on the bottom.

Surface-mount on a wall or panel with two No. 8 screws (obtained locally) through the mounting holes in the back of the cabinet. See Fig. 2. Use the cabinet as a template to mark the mounting holes. Mount with screw anchors (obtained locally) if mounting on plasterboard.

After mounting the cabinet, install the wiring board. With the relays at the top, line up the holes in the board with the pins in the cabinet and press down on the corners of the board until it pops into place. After installing the wiring board, make sure the relays are firmly seated on the board.

### THERMOSTAT AND SUBBASE OR WALLPLATE

Refer to installation instructions packed with the product. All Trol-A-Temp by Honeywell thermostat heat anticipator settings are factory set. There is no need to change the setting.

### ZONE DAMPERS

Refer to installation instructions packed with the product.

### WIRING

All wiring must comply with local codes and ordinances. Use 18 gauge, color-coded thermostat cable for all 24 Vac wiring. System wiring need not be in conduit unless required by local codes, but avoid running control wires close to other wires carrying heavy current loads.

### TWO DAMPERS IN A ZONE

Where two dampers are used in one zone, connect one damper to the appropriate zone damper terminals on the Zone Panel or the Add-A-Zone Panel. Connect the second damper in tandem to the first one. See Figs. 4 through 7. For more than two dampers per zone, use an SDCR Slave Damper Control Relay. See Accessories section.

### FAN WIRING CONNECTIONS

In heat pump and some electric heat systems, the heating fan must come on with the heating equipment. In other systems, the heating fan operates with a plenum fan control. The G terminal provides fan operation during the time delay and ventilation modes and on cooling. The GH terminal provides fan operation on heating in systems without a plenum fan control.

- Gas or oil heat: Wire the low speed (heating) fan through the plenum fan control. Connect the high speed (cooling) fan to the G terminal on the MABS XX Panel.
- Heat pumps and central electric heat: Connect the low speed (heating) fan to the GH terminal and the high speed (cooling) fan to the G terminal. Connect a single speed fan to GH and jumper GH to G.

Figs. 8 through 11 show typical wiring connections. However, for heating/cooling equipment connections, follow the appliance manufacturer instructions if available. In a multistage system or a heat pump with auxiliary heat, use the MCM as the thermostat equivalent.

Fig. 1—Remove the wiring board by gently lifting up each corner.

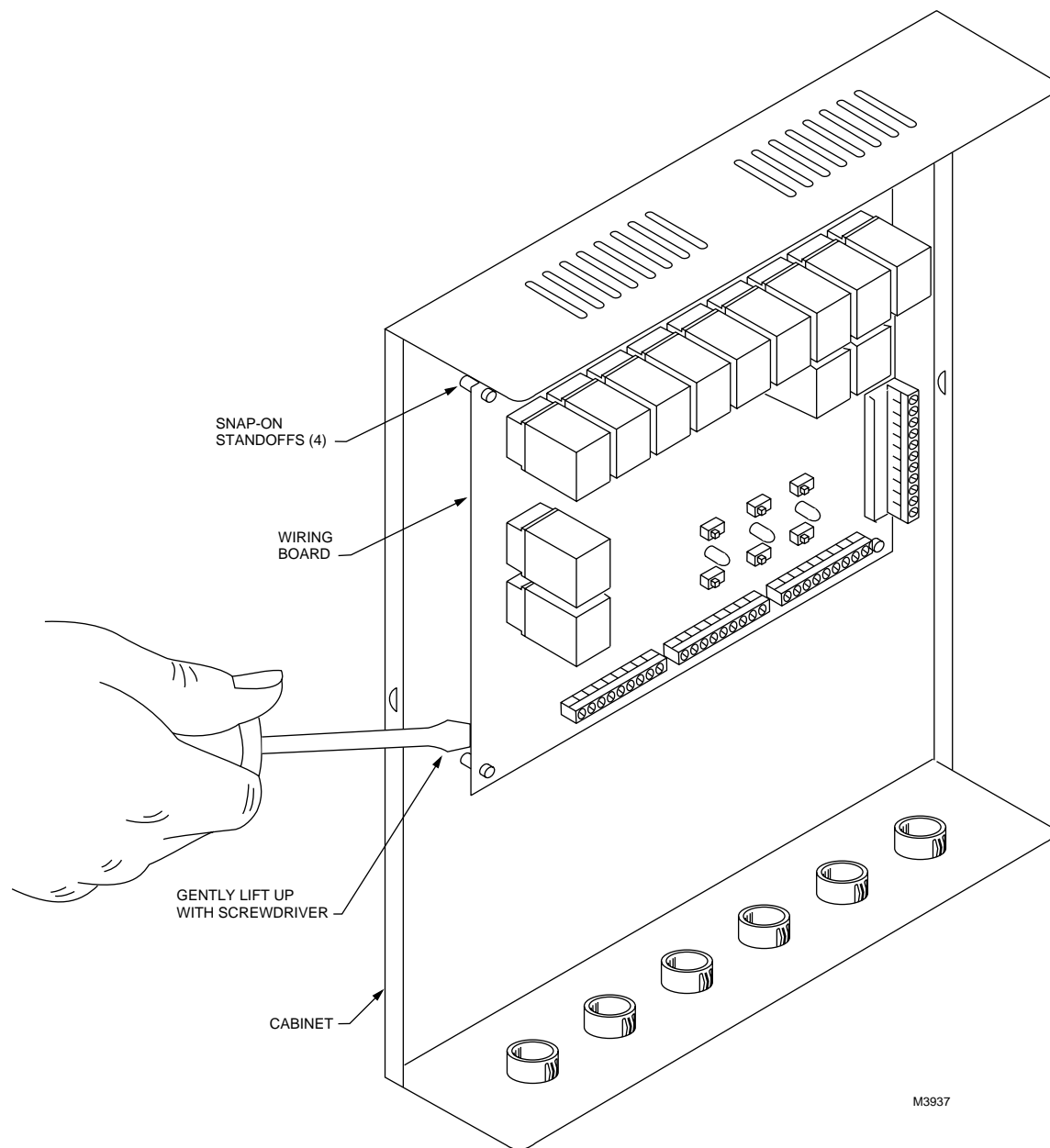
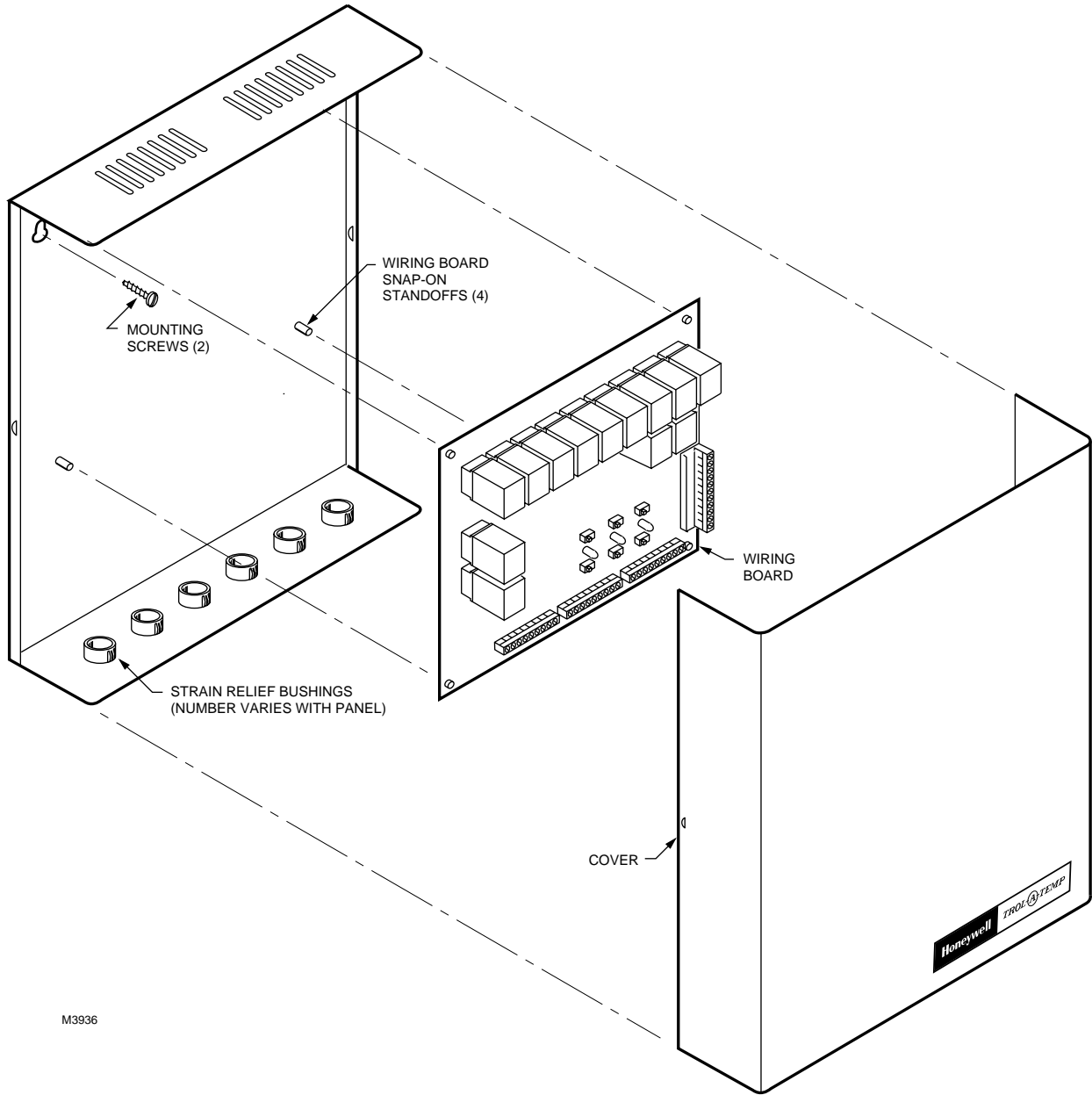


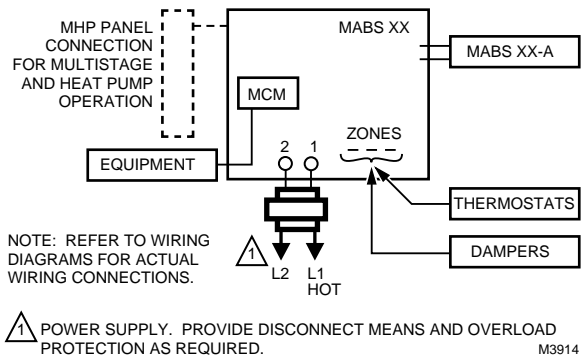
Fig. 2—Internal view of zone panel showing locations of mounting holes.



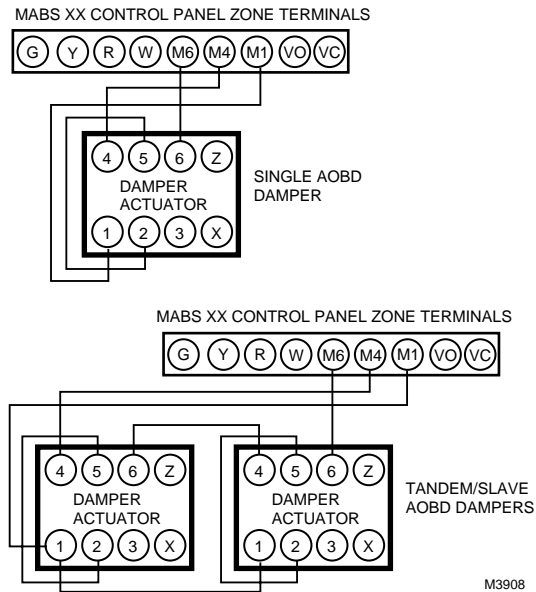
M3936



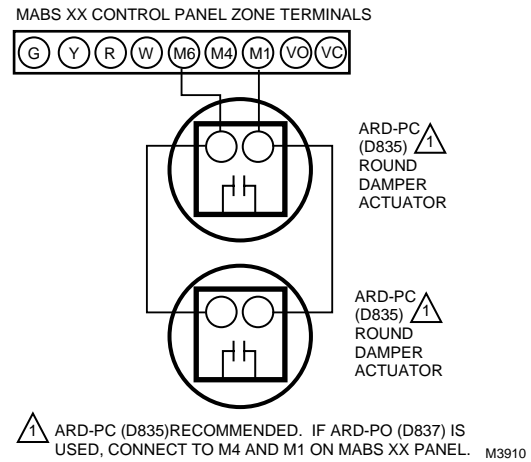
**Fig. 3—System guide block diagram.**



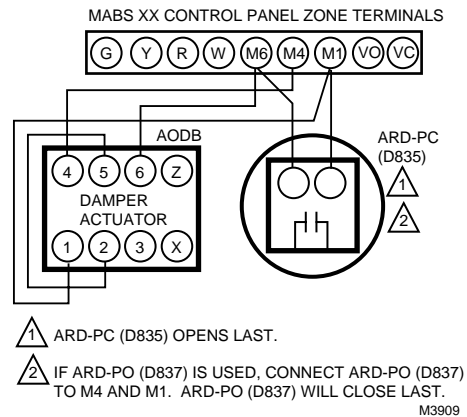
**Fig. 4—Single and tandem slave damper wiring for rectangular dampers.**



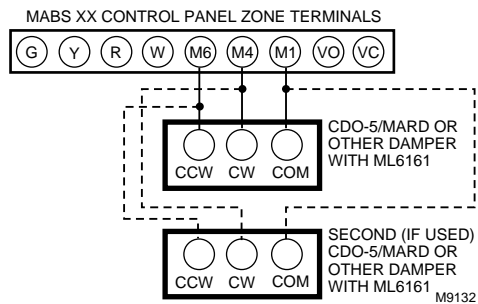
**Fig. 5—Dual damper wiring for an ARD-PC (D835) Round Damper.**



**Fig. 6—Damper wiring for one rectangular and one ARD-PC (D835) Round Damper.**

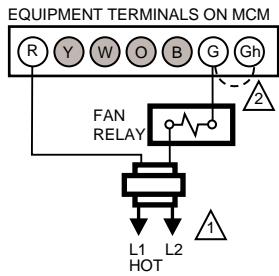


**Fig. 7—Damper wiring for single and tandem CDO-5 or MARD damper with ML6161 sactuator.**

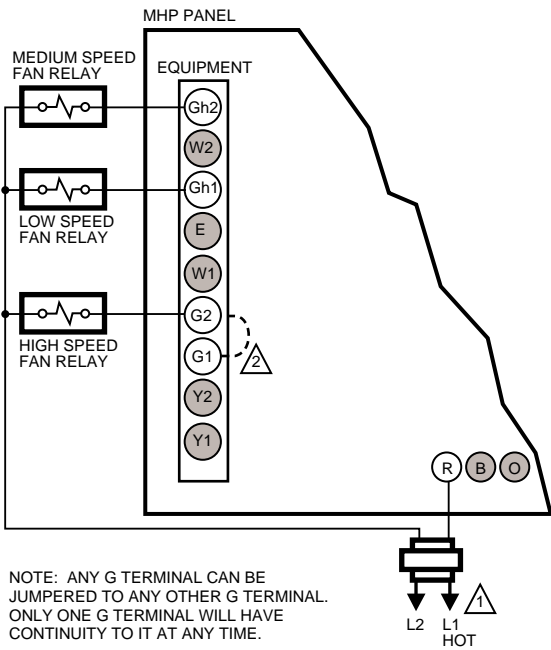


**Fig. 8—Typical connections for single and multispeed fan.**

**SINGLE-STAGE, SINGLE-SPEED FAN**



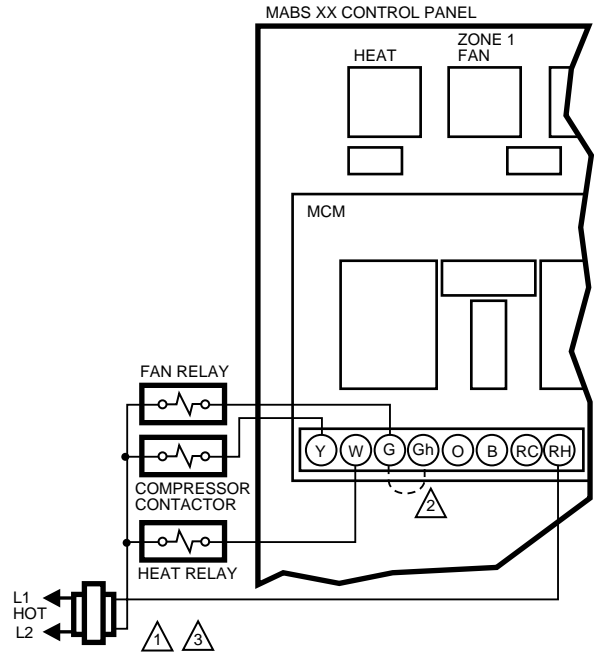
**TWO STAGE, THREE-SPEED FAN  
 EQUIPMENT/POWER TERMINALS ON MHP**



NOTE: ANY G TERMINAL CAN BE JUMPED TO ANY OTHER G TERMINAL. ONLY ONE G TERMINAL WILL HAVE CONTINUITY TO IT AT ANY TIME.

- 1 POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.
- 2 JUMPER G-Gh IF FAN ON WITH HEAT CALL IS REQUIRED. M3913

**Fig. 9—Typical MABS XX connections in a single-stage gas, oil or electric heating/electric cooling system with single equipment transformer.**



- 1 POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.
- 2 JUMPER G TO Gh FOR FAN OPERATION ON CALL FOR HEAT.
- 3 SEPARATE HEAT - COOL TRANSFORMERS MUST BE PROPERLY PHASED, WITH 0 VOLTS BETWEEN W AND G. M3907

Fig. 10—Typical MABS XX connections in a heat pump system with auxiliary heat.

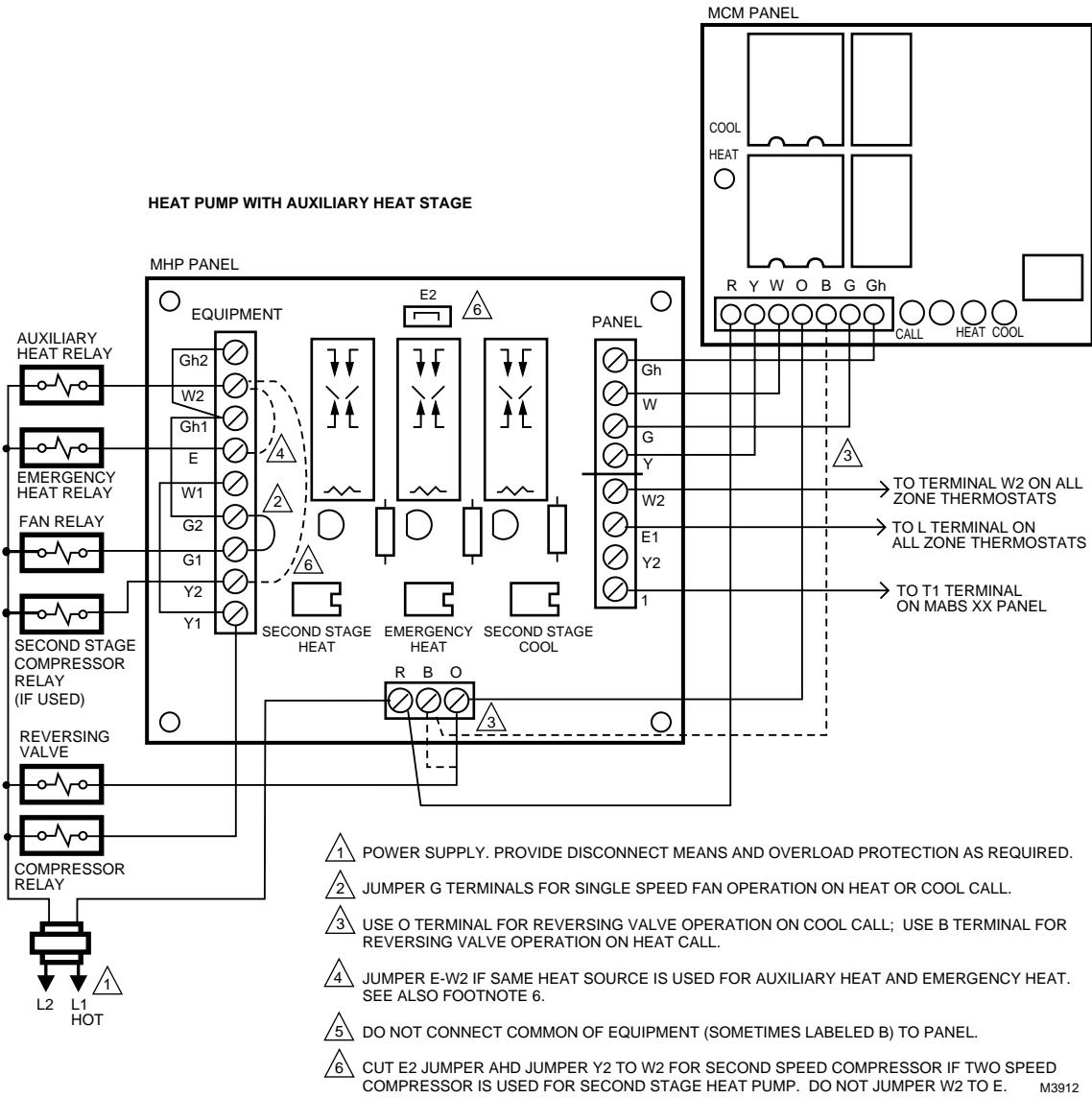
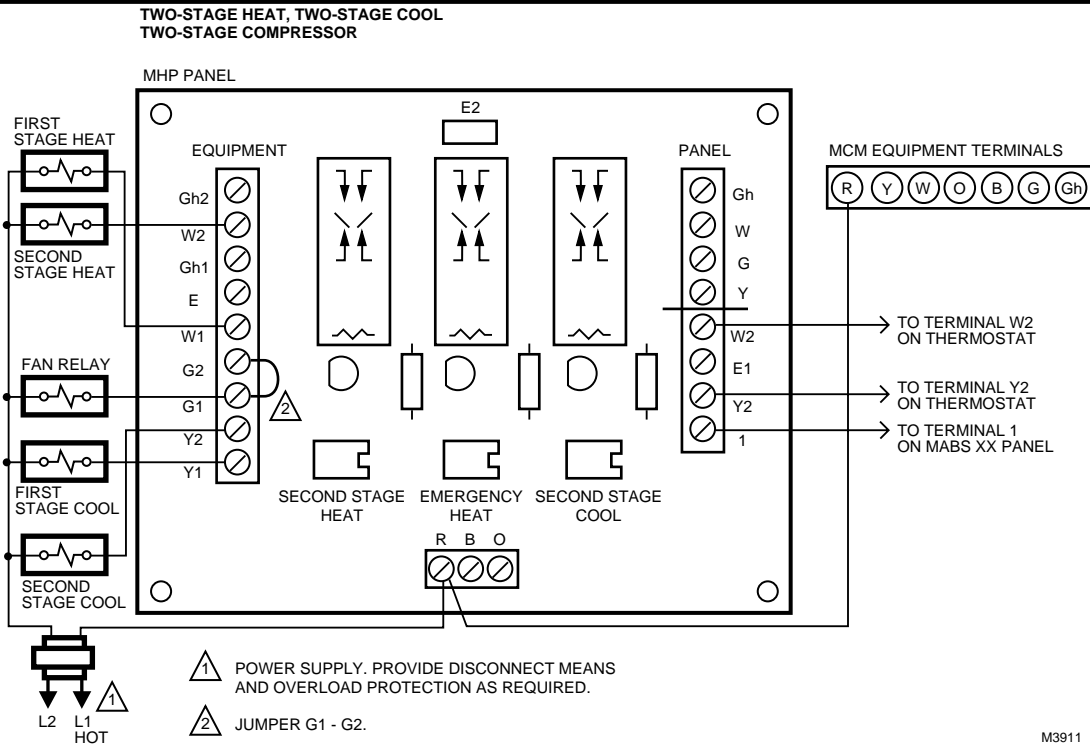


Fig. 11—Typical MABS XX connections in a two-stage heating/cooling system..



M3911

## Settings and Adjustments

### MABS XX AND MABS XX-A SWITCHES AND INDICATORS

Set the switches on these panels to provide the desired system operation. Refer to the descriptions below and to the Operation section to determine to correct

switch positions. The MHP Panel has no switches. The MCM Board in the MABS XX has three LEDs that indicate system operation.

TABLE 3—SYSTEM SETUP SWITCHES ON MABS XX (MCM) AND MABS XX-A.

Panel	Switch	Effect On System
MCM	RESET	The reset button bypasses the time delays during checkout.
MABS XX, MABS XX-A	DAMPER OPEN/CLOSE	Sets the zone damper position for the <i>off cycle</i> . <ul style="list-style-type: none"> <li>Set to OPEN to leave the damper open when no zone is calling for heat or cool or for fan operation (default setting).</li> <li>Set to CLOSED to close the damper when no zone is calling for heat or cool. Use this setting for zones that would more often call for cooling during the heating season, or the reverse.</li> </ul>
	FAN SYSTEM/ZONE	For air distribution only; applies only when no zone is calling for heat or cool, and when zone thermostat fan switch is set to ON, turning on system fan. <ul style="list-style-type: none"> <li>Set to SYSTEM to circulate air through all zones with damper OPEN/CLOSE switch set to OPEN (default setting).</li> <li>Set to ZONE to circulate air only to zones with subbase fan switch at ON.</li> </ul>

Fig. 12—MABS XX Panel with cover removed.

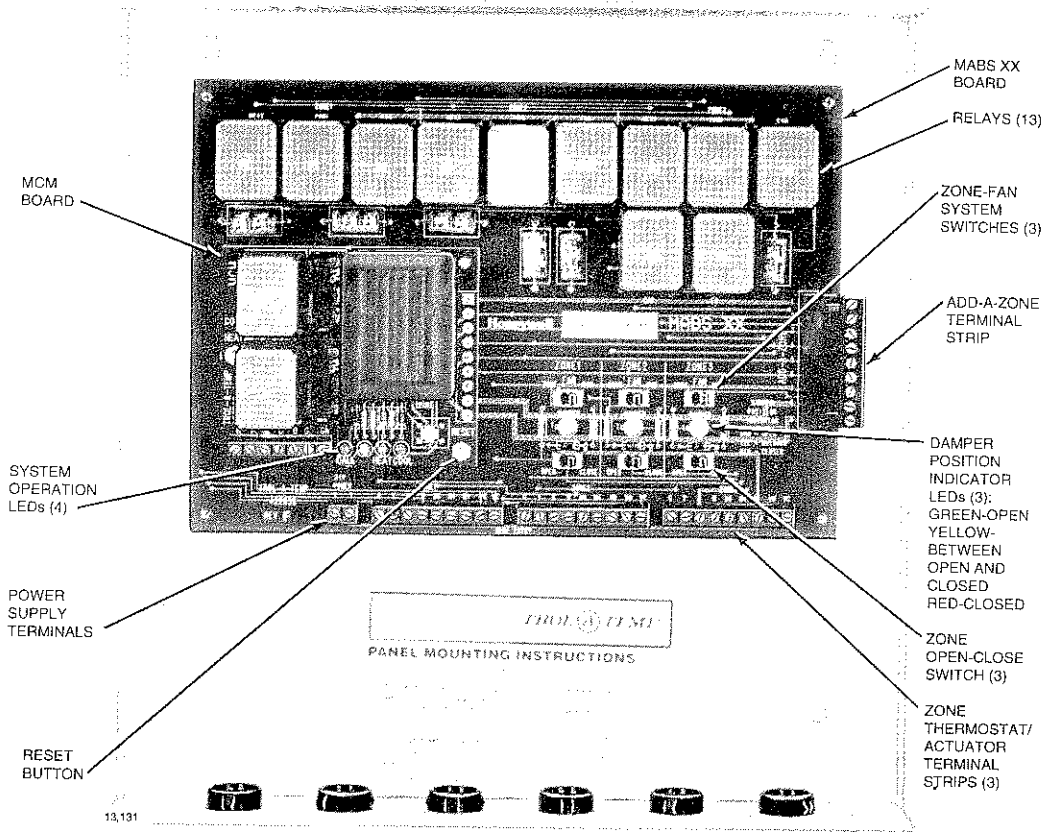
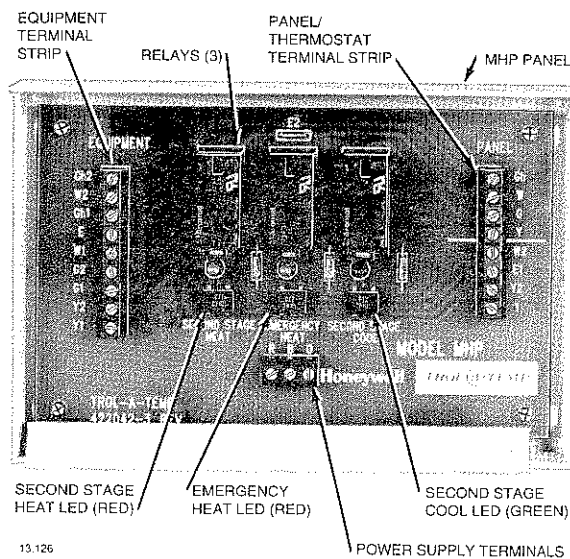


Fig. 13—MHP Panel with cover removed.



**THERMOSTAT**

Select heat or cool system operation at each zone thermostat:

**HEAT:** Thermostat calls for heat in response to temperature drop in the zone.

**COOL:** Thermostat calls for cooling in response to temperature rise in the zone.

**OFF:** Thermostat will not respond to any temperature changes. However, fan will operate the fan switch is set to ON.

**AUTO:** Thermostat automatically switches between heating and cooling as needed.

Select fan operation at each zone thermostat:

**AUTO:** The fan operates with the heating and cooling equipment as follows. If the fan is wired to GH, the fan goes on and off with the heating equipment. If the fan is wired to G, the fan goes on and off with the plenum fan switch in heating and with a call in cooling.

**ON:** The fan runs continuously, even if the system switch on the thermostat is at OFF. Delivery of

ventilation air to a zone is dependent on the position of the ZONE/SYSTEM switch for this zone and the OPEN/CLOSE switch for each zone.

The fan can be set to run continuously from any zone thermostat that has a fan switch. When one or more zone fan switches are ON, the fan will run continuously until a zone calls for heat. If the fan is connected to G, the fan will go off until it is turned back on by the plenum fan switch. AUTO fan operation requires that *all* zone fan switches be set to AUTO.

**ELECTROMECHANICAL THERMOSTAT ADJUSTMENTS**

**Heat Anticipator**

The heat anticipator pointer should be set at 0.1A. The cooling anticipator is factory-set for three cycles per hour and cannot be changed.

**ELECTRONIC THERMOSTAT ADJUSTMENTS**

Refer to instructions provided with thermostat.

# Checkout

**BEFORE STARTING CHECKOUT**

Make sure the panel switches are set as desired. See Setting and Adjustment section. Before applying power to the panel, check the equipment connections. Make sure there is 24 Vac on the system equipment terminals RC and each wire from the equipment (W1, Y1, G1, etc.). If not, check for a missing wire.

If there is 48 Vac or more between W1 and G1 or any two equipment terminals, reverse the two heating control wires and try again.

Table 4 lists the LEDs provided on the panels and indicates their meaning. These LEDs are used throughout the checkout. Tables 5 through 7 list panel output terminal function. Table 8 summarizes the panel status checks.

Turn on power to the panel; the unit goes into TIMER mode and the fan operates for three minutes. The yellow LED should be on. To bypass the timer mode, press the RESET button.

TABLE 4—INDICATOR LIGHTS ON PANELS.

Panel	Indicator	Meaning
MCM	Yellow LED Red Heat LED Green Cool LED Red Call LED	Timer is in operation. Heat call. Cool call. Any call. <sup>a</sup>
MABS XX, MABS XX-A	Damper position LED: Red Yellow  Green	Damper is closed. Damper is between open and closed. Damper is open.

<sup>a</sup>If the system uses more than one panel, check the CALL LED. If it and the RED LEDs are on and there is no call for heat, the panel transformers are out of phase. Reverse the transformer terminals at one transformer and recheck.

TABLE 5—MCM PANEL OUTPUT TERMINAL FUNCTION.

Terminal	Function
R	Equipment transformer power lead.
O	Closes to R to energize the reversing valve on a heat pump on a cool call.
B	Closes to R to energize the reversing valve on a heat pump on a heat call.
Y	Closes to R to turn on cooling.
W	Closes to R to turn on heating.
G	Closes to R for fan operation when Fan switch is ON or on a cool call.
Gh	Closes to R for low speed fan operation on a heat call.

TABLE 6—MHP PANEL OUTPUT TERMINAL FUNCTION.

Terminal	Function
R	Equipment transformer power lead. Provides tie point to MCM.
O	Tie point for O terminal on MCM.
B	Tie point for B terminal on MCM.
E	Closes to W if E1 control from Emergency Heat switch is on and any zone calls for heat.
Y1	Closes to Y when first stage of cooling calls.
Y2	Closes to Y when any zone calls for cooling and the Y2 control is energized.
W1	Closes to W when first stage of heating calls.
W2	If first stage of heating is calling, closes to W when second stage of heating calls via W2 control.
G1	Closes to G for first speed fan operation when any fan switch is On or when first stage cooling calls.
G2	Closes to G to energize second speed fan when the second stage cool calls. If two stage thermostats are used with a single speed fan, G2 and G1 must be jumpered because G1 breaks when G2 makes.
Gh1	Closes to Gh for low speed fan operation when first stage heating calls. Gh1 breaks when Gh2 makes.
Gh2	Closes to R to energize higher speed fan when second stage heating calls. Gh1 breaks when Gh2 makes.

TABLE 7—MHP PANEL SIDE CONTROL TERMINAL FUNCTIONS.

Terminal	Function
W2	Second-stage heat call control terminal.
E1	Emergency heat mode control terminal. System must be manually switched to emergency heat; it is not energized on a call for heat.
Y2	Second-stage cool call control terminal .
1	System transformer terminal.

TABLE 8—MABS XX PANEL STATUS CHECK SUMMARY.

Check At	Check For 24 Vac Across Terminals:	Status
Each zone on MABS XX	1 and 2	Voltage source to all zones.
	M1 and : R	Voltage to thermostat.
	Y	Cool call. <sup>a</sup>
	G	Fan call. <sup>a</sup>
	W	Heat call. <sup>a</sup>
	M4	Open damper for zone being checked. <sup>b</sup>
	M6	Closed damper for zone being checked. <sup>b</sup>

<sup>a</sup> If the system is responding in the opposite mode, then this voltage indicates a call from another zone rather than just this zone.

<sup>b</sup> Both voltages exist during damper motion.

### CHECK ZONE DAMPER OPERATION

NOTE: Allow 30 seconds for dampers to open or close fully.

#### Check Idle Condition

1. Before setting any zone to call, verify damper wiring by moving the slide switches in each zone between open (O) and close (C). Only that zone should open and close. If two slave dampers chase each other or do not move when they should, they are probably miswired. See Wiring section.

2. Choose a zone with the panel FAN switch in SYSTEM. Set the zone subbase switch to FAN ON. The fan will turn on and the calling zone will open, if it was closed. No other damper will change.

3. Choose a zone with the panel FAN switch in ZONE. Set the zone subbase switch to FAN ON. The fan will turn on and the calling zone will open, if it was closed. All other zone dampers will close, unless their thermostat subbase FAN switch is ON.

#### Check Zone Operation

1. Set all thermostat system switches to HEAT or AUTO and the temperature setting 10° F [6° C] below room temperature. Set all thermostat fan switches to AUTO.

2. Check the SPRD damper, if used, when different numbers of zone dampers are open. With all zone dampers open, the SPRD should be closed. As each zone damper closes, the SPRD should be open slightly. When only one zone damper is open, the SPRD should be almost fully open.

3. Choose a zone with the FAN SYSTEM/ZONE switch at SYSTEM. Set the fan switch to ON. The fan should come on; the zone damper in the zone calling for fan should be open; other zone dampers should not move. Wait 30 seconds for the damper to open, then check it by placing your hand in front of the register.

4. Repeat step 3 at all zones where the FAN SYS-

TEM/ZONE switch is at SYSTEM.

5. Choose a zone with the FAN SYSTEM/ZONE switch at ZONE. Set the fan switch to ON. The fan should come on; the zone dampers in the zones calling for continuous fan should be open; all other dampers should close.

6. Repeat step 5 at all zones where the FAN SYSTEM/ZONE switch is at ZONE.

7. Return all thermostat fan switches to AUTO. Fan should go off and all dampers should return to the position set on the DAMPER OPEN/CLOSE switch.

### CHECK HEATING/COOLING SYSTEM OPERATION USING PANEL LEDS

Call for heat from any zone. The Red HEAT LED will light and the heat will turn on. The fan will delay slightly, then start in response to the plenum switch. The calling zone damper will open, if it was closed, and all other non-heat calling zones will close.

Call for cool from another zone. System operation will not change. Leave the heat and cool calls on and call for heat in another zone. That zone damper will reopen. After all heat calls are satisfied, the Red HEAT LED will turn off and the TIMER mode and Yellow TIMER LED will turn on. The fan will continue to run during the timer period. At the end of the timer period, the fan and the Yellow TIMER LED will go off.

The Green COOL LED will come on and the compressor and fan will start to satisfy the cool call. That zone damper will open, if its slide switch was at Close, and all others will close. Call for heat in another zone. System operation will not change.

Leave the cool and heat calls on and call for cool in another zone. That zone damper will open. When all cool calls are satisfied, the Green COOL LED will turn off, and the TIMER mode and Yellow TIMER LED will operate. At the end of the time delay the fan will turn off and the Yellow TIMER LED will turn off. The heat call will be accepted at this time.



## CHECK HEATING OPERATION FROM ZONE THERMOSTAT



### CAUTION

#### HEAT PUMP INSTALLATIONS:

1. Do not operate heat pump equipment if the outdoor temperature is below the minimum temperature specified by the heat pump manufacturer. Refer to instructions provided with heat pump equipment.
2. Refer to heat pump manufacturer recommendations on time delay requirements when checking each zone thermostat.

1. Move heating set point lever (some thermostats use one lever for both heating and cooling) on one zone thermostat 10° F [6° C] above room temperature to call for heat.

2. After 30 seconds, check for warm air at register.

3. Move heating set point lever on zone thermostat 10° F [6° C] below room temperature to end call for heat. Heating equipment will stop; fan will continue to run for three minutes to purge ductwork unless time delay has been bypassed. If time delay has not been bypassed, air flow at the register should stop after 30 seconds if DAMPER OPEN/CLOSE switch on panel is at CLOSE, after three minutes if DAMPER OPEN/CLOSE switch on panel is at OPEN.

4. *Heat pumps only:* Set thermostat system switch to EM. HT. To call for heat, set thermostat heating set point lever 10° F [6° C] above room temperature. Emergency

heat equipment and fan should start. Damper should open. Compressor should remain off.

5. Repeat steps 1 through 4 for each zone thermostat.

## CHECK COOLING OPERATION FROM ZONE THERMOSTAT



### CAUTION

1. Do not operate cooling equipment if outdoor temperature is below 50° F [10° C]. Refer to manufacturer recommendations.
2. Refer to cooling equipment manufacturer recommendations for time delays when checking each zone thermostat.

1. Set all thermostat system switches to COOL or AUTO and fan switches to AUTO.

2. After fan stops, set cooling set point lever (some thermostats use one lever for both heating and cooling) on one zone thermostat 10° F [6° C] below room temperature to call for cooling.

3. After 30 seconds, check for cool air at register.

4. Move cooling set point lever on zone thermostat 10° F [6° C] above room temperature to end call for cooling. Cooling equipment will stop; fan will continue to run for three minutes to purge ductwork unless time delay has been bypassed. If time delay is not bypassed, air flow at register should stop after 30 seconds if DAMPER OPEN/CLOSE switch on panel is at CLOSE; after three minutes if DAMPER OPEN/CLOSE switch on panel is at OPEN.

5. Repeat steps 2 through 4 for each zone thermostat.

## Operation

In the MABS XX System, each zone thermostat independently controls heating or cooling operation for that zone. A switching subbase is recommended for each zone. The MABS XX Panel operates the heating and cooling equipment and the zone dampers based on signals from the zone thermostats. The panel ensures that the furnace and air conditioner never operate simultaneously, and it also provides a time delay between equipment cycles during which the fan operates at high speed to purge conditioned air from the duct.

The MABS XX Panel can control two or three zones heated by a conventional gas, oil or central electric single stage furnace and single stage compressor cooling. To control two stage equipment or heat pumps, a separate MHP panel must be added. In addition, two stage or heat pump, as appropriate, thermostats must be used in all zones.

For more than three zones, up to ten MABS XX-A Panels can be added. Each MABS XX-A Add-A-Zone Panel controls three additional zones. The Add-A-Zone panels are similar to MABS XX Panels, but they do not

have the board that interfaces with the heating and cooling equipment, called the MCM board.

The MCM includes a *reset switch*, which bypasses the built-in 3 minute time delay, and three indicator lights:

*Red Heat LED*—Heating equipment is operating.

*Green Cool LED*—Cooling equipment is operating.

*Yellow*—The timer is operating, as is the high speed fan.

*Red Call LED*—Equipment is operating and provides panel out-of-phase indicator.

Switches on the MABS XX and MABS XX-A Panels set each zone to *SYSTEM* or *ZONE*, which determines damper position when there is no heat or cool call and the zone thermostat fan switch is at ON, and damper OPEN-CLOSE, which determines the damper position when the system is in standby. An indicator light for each zone shows damper positions:

*Red*—Damper is closed.

*Green*—Damper is open.

*Yellow*—Damper is between open and closed.

*Fan operation in heat:* Whether the heating fan is operated through the panel or by a plenum switch is determined by the fan wiring. When the low speed fan is connected to GH, the fan will come on with the heating equipment. When it is connected to a plenum fan control and G on the panel, the fan will come on when the plenum fan control makes. To obtain fan on in heat operation with a single speed fan, the fan must be connected to GH and G-GH must be jumpered.

System operation can be summarized in five levels, as follows:

**Level 0: SYSTEM IDLE.**

Exit: To any level.

No heat or cool call.

Subbase fan switches: All at AUTO.

Equipment: Idle.

Dampers: Open if zone switch is at OPEN, closed if at CLOSE.

**Level 1: SYSTEM VENTILATION.**

Exit: To any level.

No heat or cool call.

Subbase fan switches: A ZONE subbase fan switch is ON with its panel fan switch in SYSTEM.

Equipment: Fan on.

Damper in zone with fan ON: Open.

Dampers in all other zones: Open if zone switch is at OPEN, closed if at CLOSE.

**Level 2: ZONE VENTILATION.**

Exit: To any level.

No heat or cool call.

Subbase fan switches: A SYSTEM subbase fan switch is ON.

Equipment: Fan on.

Damper in zone with fan ON: Open.

Dampers in other zones: Closed, unless the subbase fan switch is ON.

**Level 3: HEAT OR COOL CALL FROM ANY ZONE.**

Exit: Only via timer. Cannot switch to other call without going through timer sequence and initiating one minute bias for other call.

**HEAT CALL** (*maximum time 20 minutes*):

Equipment: Heat on. The Gh terminal can run the fan, if wired, instead of the plenum switch. If Gh is not used and a heat call occurs during a fan call, the fan will turn off until the plenum comes up to temperature.

Damper: Open in zone(s) calling for heat, closed in all others.

**COOL CALL** (*maximum time 20 minutes*):

Equipment: Compressor and fan on.

Damper: Open in zone(s) calling for cooling, closed in all others.

**TIMER:**

Exit: To any level.

Timer mode: Time delay after any Level 3 call is satisfied or at any power restoration. Mode opposite to calling mode prior to exit has priority for one minute.

Equipment: Fan on.

Dampers: Open if zone switch is at OPEN, closed if at CLOSED.

## Troubleshooting

### CHECK EQUIPMENT WIRING TO MCM AND MHP

1. Check for voltage between R and equipment terminals.
  - If there is no voltage, check for loose or broken R wire.
  - If there is voltage only between R and one equipment wire, that equipment wire and the R wire are probably reversed.
2. Check voltage between G and W.
  - If voltage is over 48 Vac, reverse the two furnace connections.
  - If voltage is 24-27 Vac, reverse the heating equipment and primary leads.

### CHECK MABS XX DAMPER WIRING

1. Perform damper checkout if necessary.
2. Check voltage between Trans 1 and Trans 2. If voltage is below 20 Vac, check for a short in a damper wire by disconnecting the M1 of each zone.

3. If dampers do not move, make sure the 2-5 jumper on the AOB D Damper is in place and that tandem slave wiring matches Fig. 4.

4. If dampers chase each other or continue to rotate, check the tandem/slave wiring. See Fig. 4. Make sure AOB Dampers are not wired in parallel. Check for a short between T4 and T6.

### CHECK MCM AND MABS XX CONTROL WIRING IF ADD-A-ZONE IS USED

1. Check for correct phasing if an Add-A-Zone Panel is used.
2. If a heat or cool call is not honored when there is no opposite call:
  - Check with a voltmeter or 24V trouble light to verify voltage on W or Y of zone to M1 of zone. This is the thermostat call.
  - Verify zero volts between M1 and the Add-A-Zone terminal block no. 4 (cool call) or no. 2 (heat call). If voltage is over 3 Vac, the MCM module is not connected, or is shorted or damaged.

- Verify 24V (open circuit, 27 Vac) between R of zone and Add-A-Zone terminal block no. 5 (cool call) or no. 3 (heat call). If no voltage the zone relay for that zone has a bad contact.
3. If more than one zone heat or cool call is not honored when there is no opposite call, check the Mode relay on the MCM as follows:
    - Touch a jumper to the mode point on the Add-A-Zone terminal block (no. 5 for cool, no. 3 for heat)

and no. 1 on the terminal block. If the MODE light goes on but the relay does not click, the MCM is properly set in its socket and the opposite mode relay contact is OK, but the mode relay is damaged. If the MODE light does not light and the relay does not click, either the MCM is not connected properly or the opposite mode relay contact is bad.

4. If the fan runs in Auto mode, but not on either fan override, the MCM board is not seated properly.

**Honeywell**

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