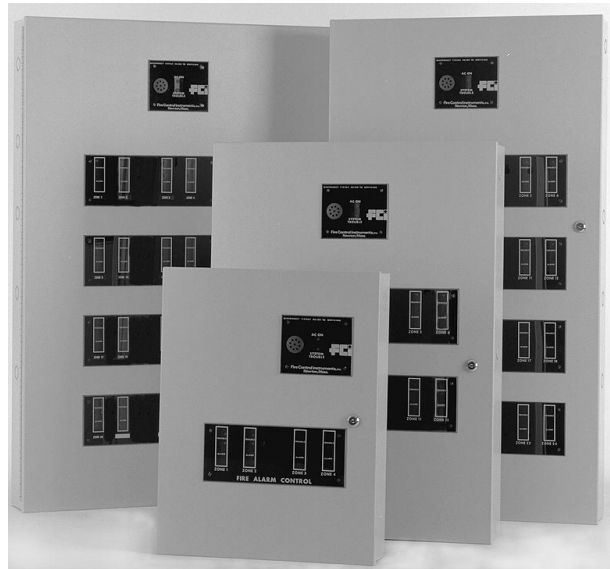


FC-72 SERIES FIRE ALARM SYSTEM

INSTRUCTION/OPERATING MANUAL



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Part Number: 9000-0007
Version 5.1



Serial Number _____

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IMPORTANT INFORMATION

READ THE FOLLOWING INFORMATION BEFORE INSTALLING:

The contents of this manual are important, and the manual must be kept with the fire alarm control panel at all times. If building ownership is changed, this manual, including any testing and maintenance information, must be passed along to the new owner(s).

The fire alarm control panel is part of a system. Manuals and instructions for other devices forming part of the system should be kept together. Purchasers who install this system for use by others must leave the instructions with the user. A copy of these instructions is included with each product and is available from the manufacturer.

This equipment is Listed by various listing agencies for use in fire alarm systems. Use only components which are compatible with the FCI system. The installation **MUST** be in accordance with the instructions in this manual.

THEREFORE:

- **DO NOT** deviate from the procedures described in this manual.
- **DO NOT** assume any details not shown in the instructions.
- **DO NOT** modify any electrical or mechanical features.
- **DO** comply with all codes and standards set forth by the authority having jurisdiction.

The term "Authority Having Jurisdiction" has become a standard term in the fire alarm industry. An acceptable definition of "Authority Having Jurisdiction" is:

Systems installed in the USA fall under the jurisdiction of some authority. In some areas this may be a local fire department; in other areas it may be a building inspector, insurance firm, etc. Different authorities may have their own local requirements for the way the fire alarm system is installed and used. Most local authorities base their requirements on the NFPA codes, but there may be important differences. You must install this system in the way in which the authority having jurisdiction requires. If you do not know which authority has jurisdiction in your area, contact your local fire department or building inspector for guidance.

It is important that you tell users to be aware of any requirements defined by the Authority Having Jurisdiction.

The installation **MUST** be in accordance with the following standards:

- National Fire Alarm Code (NFPA 72)
- National Electrical Code (NFPA 70)
- Life Safety Code (NFPA 101)

Touching components that are improperly installed, applied or operated could be hazardous and possibly fatal. Short circuits could cause arcing that could result in molten metal injuries. Therefore, only qualified technicians familiar with electrical hazards should perform checkout procedures. Safety glasses should be worn, and test equipment used for voltage measurements should be designed for this purpose and should be in good working order.

WARNING - Improper installation, application, or operation can result in death or serious injury.

ENVIRONMENTAL CONSIDERATIONS:

It is important that this equipment be operated within its specifications:

Recommended operating temperature range:	60 to 80° F (15 to 27° C)
Absolute maximum operating temperature range:	32 to 120° F (0 to 49° C)
Operating humidity:	not to exceed 85%, non-condensing at 90° F (32° C)

Operating this equipment within the recommended temperature range will extend the useful life of the system standby batteries.

INSTALLATION CONSIDERATIONS:

Check that you have all the equipment you need to make the installation. Follow the field wiring diagrams and installation notes in this manual.

Install the equipment in a clean, dry environment (minimal dust). Avoid installing equipment where vibrations will occur.

Remove all electronic assemblies prior to drilling, filing, reaming, or punching the enclosure. When possible, make all cable entries from the sides, being careful to separate the power limited conductors from the non-power limited conductors. Before making modifications, verify that they will not interfere with battery, transformer and printed circuit board location.

Do not over-tighten screw terminals. Over-tightening may damage threads, resulting in reduced terminal contact pressure and difficulty with screw terminal removal.

Disconnect all sources of power before servicing, removing, or inserting any circuit boards. Control unit and associated equipment may be damaged by removing and/or inserting cards, modules, or interconnecting cables while the unit is energized.

WIRING CONSIDERATIONS:

This fire alarm control panel contains power limited circuits. You cannot connect external sources of power to these circuits without invalidating their approval.

Verify that wire sizes are adequate for all initiating device and notification appliance circuits. Most devices cannot tolerate more than a 10% drop from the specified device voltage.

The installer must make sure that the wiring and devices installed in the system meet the current National Electrical Code, NFPA 70, and all applicable state and local building code requirements.

Use the conductor size and type required by local codes. (see NFPA 70, Article 760). Wiring resistance must not be more than that shown on the field wiring diagrams.

To reduce errors and help in servicing the system, all conductors should be tagged or otherwise coded and logged at installation to identify circuit assignment and polarity. If the conductors are logged with a code, keep the log that explains the code with the manual, so that it is available to other people working on the panel.

Like all solid state electronic devices, this system may operate erratically or be damaged when subjected to lightning induced transients. Although no system is completely immune to lightning transients and interference, proper grounding will reduce susceptibility. We do not recommend the use of overhead or outside aerial wiring due to the increased susceptibility to nearby lightning strikes. Consult with the FCI Technical Support Department if any problems are anticipated or encountered.

To prevent the spread of fire, use proper patching materials to areas where system wiring passes through fire-rated walls or floors.

DO NOT RUN LINE VOLTAGE IN THE SAME RACEWAYS AS FIRE ALARM CONDUCTORS.

WARNING - Several different sources of power can be connected to this fire alarm control panel. Disconnect all sources of power before servicing. The control panel and associated equipment may be damaged by removing and/or inserting cards, modules, or interconnecting cables while the panel is energized. Failure to do so can damage circuits. Do not attempt to install, service, or operate this control panel until this manual is read and understood.

WHEN APPLYING POWER TO THIS FIRE ALARM CONTROL PANEL, CONNECT THE AC LINE VOLTAGE FIRST, THEN CONNECT THE BATTERIES.

OTHER CONSIDERATIONS:

The equipment was tested according to EC directive 89/336/EEC for Class A equipment and was verified to the limits and methods of EN 55022.

CAUTION - System Reacceptance Test: To ensure proper system operation, this product must be tested in accordance with NFPA 1996, Chapter 7 after any change, addition or deletion of product components, or after any repair to system wiring. All components, circuits, or system operations known to be affected by a change must be 100% tested. In addition, to ensure that other operations are not inadvertently affected, at least 10% of initiating devices that are not directly affected by the change, up to a maximum of 50 devices, should also be tested and proper system operation verified.

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

If these instructions are not clear, or if additional information or clarification is needed, please consult your local authorized Fire Control Instruments, Inc. distributor.

Because of design changes and product improvements, the information in this manual is subject to change without notice. FCI reserves the right to change hardware and/or software design, which may subsequently affect the contents of this manual. FCI assumes no responsibility for any errors that may appear in this manual.

Neither this manual nor any part of it may be reproduced without the advance written permission of Fire Control Instruments, Inc.

FIRE ALARM SYSTEM LIMITATIONS

An automatic fire alarm system - Typically made up of smoke detectors, heat detectors, manual pull stations, audible/visual warning devices, and a fire alarm control panel with remote notification capability - can provide early warning of a developing fire. Such a system, however, does not assure protection against property damage or loss of life resulting from a fire.

Any fire alarm system may fail for a variety of reasons:

Smoke detectors may not sense fire where smoke cannot reach the detectors such as in chimneys, in walls, on roofs, or on the other side of closed doors. Smoke detectors also may not sense a fire on another level or floor of a building. A second floor smoke detector, for example, may not sense a first floor or basement fire. Furthermore, all types of smoke detectors - both ionization and photoelectric types - have sensing limitations. No type of smoke detector can sense every kind of fire caused by carelessness and safety hazards such as smoking in bed, violent explosions, escaping gas, improper storage of flammable materials, overloaded electrical circuits, children playing with matches, or arson.

Audible/visual warning devices such as horns, bells or strobes, may not alert people if these devices are located on the other side of closed or partly closed doors or are located on another floor of the building.

A fire alarm system will not operate without any electrical power. If AC power fails, the system will operate from standby batteries only for a specified time.

Rate-of-rise heat type detectors may be subject to reduced sensitivity over time. For this reason, the rate-of-rise feature of each heat detector should be tested at least once per year by a qualified fire protection specialist.

Equipment used in the system may not be technically compatible with the control panel. It is essential to use only equipment listed for service with this control panel.

Telephone lines required to transmit alarm signals from the premise to a central monitoring station may be out of service or temporarily disabled.

The most common cause of fire alarm malfunctions, however, is inadequate maintenance. All devices and system wiring should be tested and maintained by professional fire alarm installers following written procedures supplied with each device. System inspection and testing should be scheduled monthly or as required by National and/or local fire codes. Adequate written records of all inspections should be kept.

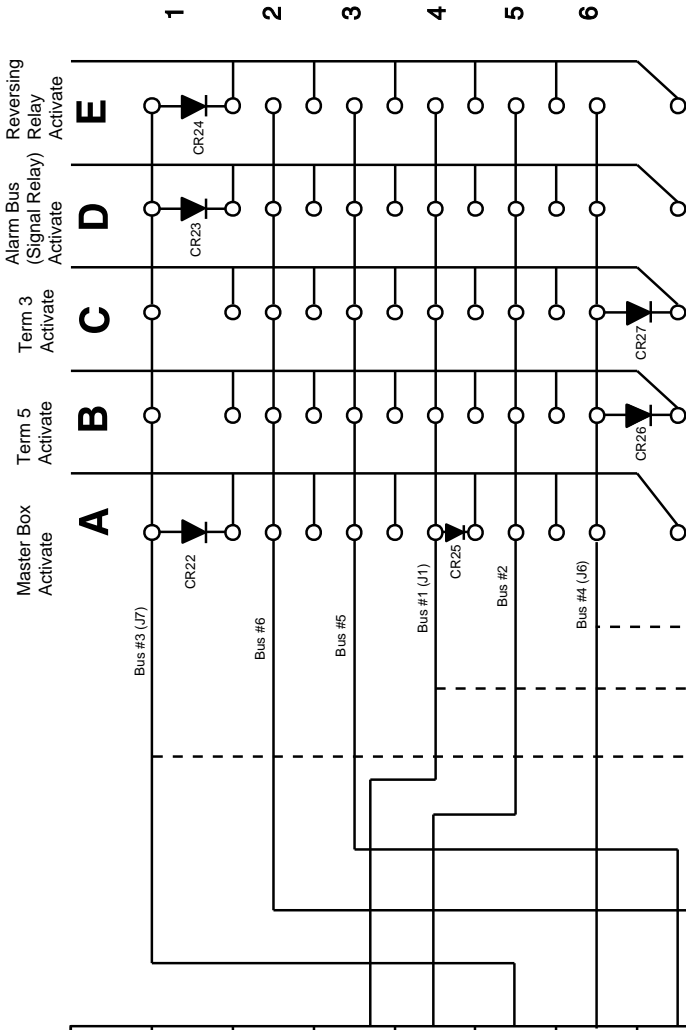
While installing a fire alarm system may make lower insurance rates possible, it is not a substitute for fire insurance!

CAUTION

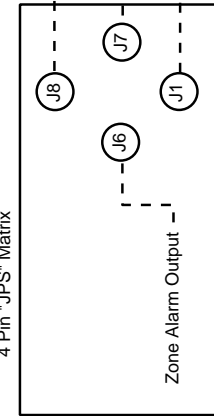
To keep your fire alarm system in excellent working order, ongoing maintenance is required per the manufacturer's recommendations and UL and NFPA Standards. At a minimum, the requirements of Chapter 7 of NFPA 72, The National Fire Alarm Code, shall be followed. A preventive maintenance agreement should be arranged through the manufacturer's local representative. Though smoke detectors are designed for long life, they may fail at any time. Any smoke detector, fire alarm system or any component of that system which fails shall be repaired or replaced immediately.

ZMC-6 AND/OR BMFC-6

MINI JUMPER MATRIX (NEW)		Function
Diode Jumper Position		
Zone B 3,5, Etc.	Zone A 3,5, Etc.	
J1A	J1B	ALARM WILL ACTIVATE MASTER BOX OUTPUT ONLY
J2A	J2A	ALARM WILL ACTIVATE BUS 2
J3A	J3B	ALARM WILL ACTIVATE A/V SIGNAL CIRCUITS, REVERSING RELAY AND MASTER BOX OUTPUT
J4A	J4B	ALARM WILL ACTIVATE AUXILIARY ALARM OUTPUT ONLY (TERM. 3-5)
J5A	J5B	ALARM WILL ACTIVATE BUS 5
J6A	J6B	ALARM WILL ACTIVATE BUS 6



4 Pin "JPS" Matrix



Diodes Shown in Standard Configuration

BMFC-6 Diode Matrix

BMFC-6 TEST POINTS

(For location of a specific trouble)

INSTRUCTIONS:

Place negative (-) lead of DC voltmeter on Terminal **30** and positive (+) meter lead on indicated test point.

BMFC-6 Test Points			
TEST POINT	CIRCUIT	SATISFACTORY VOLTAGE READINGS	UNSATISFACTORY READINGS
TP-1	Zone 1	Zero VDC	1.2 to 24 VDC
TP-2	Zone 2	Zero VDC	1.2 to 24 VDC
TP-3	Transfer relay	Zero VDC	1.2 to 24 VDC
TP-4	Card supervision	Zero VDC	1.2 to 24 VDC
TP-5	Short circuit	Zero VDC	1.2 to 24 VDC
LED 4	Positive Ground Fault	LED OFF	LED lit
LED 5	Negative Ground Fault	LED OFF	LED lit
TP-8	RTI supervision	Zero VDC	1.2 to 24 VDC
TP-11	Master Box	Zero VDC	1.2 to 24 VDC
TP-12	Ground Fault	Zero VDC	1.2 to 24 VDC
TP-13	Pwr Supply Fault	Zero VDC	1.2 to 24 VDC
TP-14	Gen. Syst. Trbl	Zero VDC	1.2 to 24 VDC
TP-15	Supv. of K4 relay contacts	Zero VDC	1.2 to 24 VDC
<p>NOTE: All the above voltages are approximate and it is entirely possible to have a trouble condition with readings other than shown. If your voltage readings differ and you cannot solve your trouble condition by consulting this manual, please contact your local authorized FCI Distributor.</p>			

1.0 FUNCTIONAL SWITCHES

1.1 BMFC Switches

Operational switches located on the BMFC basic fire card are as follows:

- **Trouble Silence Switch** (Fig. 1) This switch, when operated, will silence the System Trouble audible sounder. Upon correction of the trouble condition, the audible will sound again to indicate that the switch should be returned to the normal position.
- **Battery/Bell Test Switch** (Fig. 1) This switch, when operated, de-energizes the Transfer Relay disconnecting the power supply from the panel circuitry. It also energizes the alarm relay operating all local notification appliances from the stand-by batteries. Operating this switch will not reverse telephone lines or activate the city box output.
- **Lamp Test Switch** (Fig. 1) This switch, when operated, will light all red LED alarm indicators, all yellow LED trouble indicators on zone modules, and all Remote Zone Annunciators (RZAs). All alarm indicators are supervised.
- **Reset Switch** (Fig. 1) This switch, when operated, resets all zones from the alarm condition, as well as interrupting the Smoke Detector Power Output to reset the detectors. It will also cause all the yellow LED zone trouble indicators to light.
- **City Box Disconnect Switch** (Fig. 1) This switch, when operated, will disable the City Box Output and/or Polarity Reversal Output (**JRR** must be cut for Polarity Reversal disabling). The yellow LED above the switch will light, and a System Trouble will occur when the switch is in the **OFF** position, or when the control is in the alarm mode. The yellow LED will remain lit until the master box and the control are reset.

1.2 Zone Module Switches

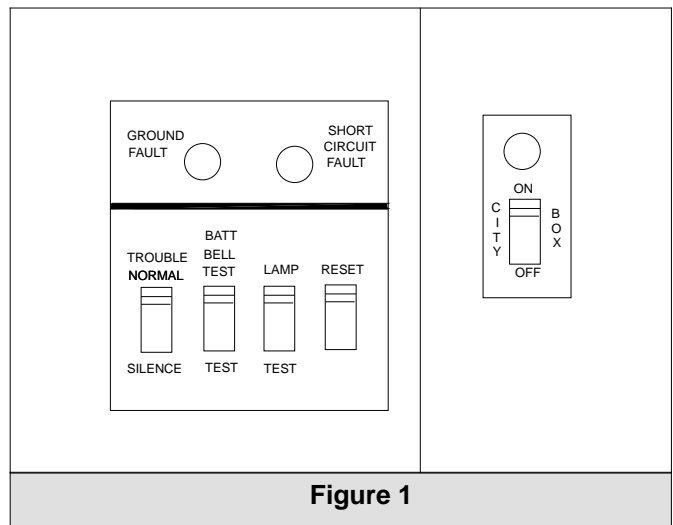
Operational switches mounted on the zone modules are as follows:

- **Zone Maintenance Switch** - Each zone has a maintenance switch. Operation of this switch will disconnect the zone alarm output. This will also cause both a System and a Zone Trouble. Other zones are not affected by the operation of any one zone maintenance switch.

2.0 GROUND FAULT DETECTION

External wiring leaving the FC-72 is supervised for ground faults. When a ground is present on the external wiring the yellow "GROUND FAULT" LED will light and a System Trouble will occur. Separate positive (LED 4) and negative (LED 5) indicators are provided to determine the type of ground fault present. This will help when trouble shooting. To locate the source of the ground fault, remove each external wire from the FC-72 one at a time, then connect a voltmeter to Terminals **24** and **30**. Normal voltage should be from 5.5 to 6.5 VDC. If not, check the field wiring.

NOTE: Terminal **24** of the FC-72 must be connected to an earth ground per Article 760 of the National Electrical Code. Conduit ground is not acceptable. Failure to make this connection will result in a reduction in lightning protection.



3.0 SHORT CIRCUIT DETECTION

The notification appliance circuit wiring Terminals (**6-13**) are supervised for short circuits across either notification appliance circuit. When a short circuit is present the yellow "SHORT CIRCUIT" LED will light, and a System Trouble will occur. See Section 7.

4.0 JUMPERS AND JUMPER MATRIX

The jumpers and jumper matrix for the BMFC are shown in Table 1.

Table 1		
JUMPER		FUNCTION
J-11		Cut if TCM-6, BMC-6 or CCM-6 module is installed.
J-12		Cut when Reversing Relay is being used to transmit an alarm via telephone lines.
J-13		Cut if RTI (Remote Trouble Indicator) is NOT used.
J-10A,B		Install to the right of the last zone in system unless followed by an auxiliary module (ADAM, SRB, etc.)
J-RA,B		Remove this jumper on each zone where an RZA (Remote Zone Annunciator) is used or when a ZDM-D is used.
JRR		Cut if the City Box Switch is required to disable the Polarity Rev. Output in alarm.
J-RTI		Cut if RTI is used—jumper located next to Terminals 17-19 .
JT		Cut to transmit a system trouble to Remote Station via telephone lines. (Terms. 25 & 26).
JS3		Cut for supervision of Terminals 3 & 4 .
JL		Cut if K2 Reversing relay is to be non-latching
J20		Cut for remote reset function.
J5		Factory use only
J22		Cut if Alarm Bus 6 is being used.
JS5		Cut for supervision of Terminals 4 & 5 .
J31-34		Install when using a ZDM-D module.
DIODE JUMPER POSITION		FUNCTION
ZONES 1, 3, 5 etc.	ZONES 2, 4, 6 etc.	
J1A	J1B	Alarm activates master box output only.
J2A	J2B	Alarm activates bus 2.
J3A	J3B	Alarm activates notification appliance circuits, reversing relay and city box circuit.
J4A	J4B	Alarm activates aux. alarm output only. (Terminals 3 - 5)
J5A	J5B	Alarm activates Bus 5.
J6A	J6B	Alarm activates Bus 6.
NOTE: If Alarm Busses 2 or 5 are used: Cut CR71 and CR72 on BMFC, Cut CR5 and CR22 on ZMC		

5.0 MUNICIPAL BOX CONNECTION

BMFC Terminals **1** and **2** are for the supervised connection of a local energy city box or solenoid. The alarm output on these terminals is 20 VDC for municipal box, and 24 VDC for solenoid. A "CITY BOX DISCONNECT" Switch is provided for use when testing and servicing the control. When the switch is in the OFF position, operation of the master box/solenoid is inhibited, the yellow LED above the switch will light, and a System Trouble will occur.

When a solenoid is connected, the switch will inhibit the alarm dry contacts from transferring on alarm if Jumper **JRR DISC.** is cut.

NOTE: This output is fused at 4 amps. Do not exceed 3 amps. The output voltage depends on which device is connected to the circuit. A minimum battery voltage of 23.3 VDC is required to operate the solenoid circuit.

To connect the master box or solenoid, remove the 220 ohm, 5 watt resistor from Terminals **1** and **2**. DO NOT connect this resistor to the master box or transmitter. Leave it in the bottom of the control cabinet for trouble shooting purposes. Connect master box or solenoid wiring to Terminals **1(+)** and **2 (-)**. For solenoid, verify that **R24** is replaced by a fuse, 4 amps @ 24 VDC. For master box, verify that field wiring does not exceed 35 ohms. For solenoid field wiring, refer to the table. Check with a meter before making final connections. To disable the city box switch, consult the factory.

FM Approved, UL Listed solenoids are as follows:

Approved/ Listed	Solenoid Model	Current @ 24 VDC	Max. Line Res.
FM, UL	LV2LBX25	0.458 A	2.0 ohms
FM	T8210A107	0.70 A	0.7 ohms
FM	R8210A107	0.70 A	0.7 ohms
FM	8210A107	0.70 A	0.7 ohms

NOTE: Wiring to a municipal city master box must comply with NFPA 72 “Auxiliary Fire Alarm Systems.”

NOTE: Factory Mutual approves only Class A, Style D initiating circuits when using a solenoid for Deluge/Preaction Service

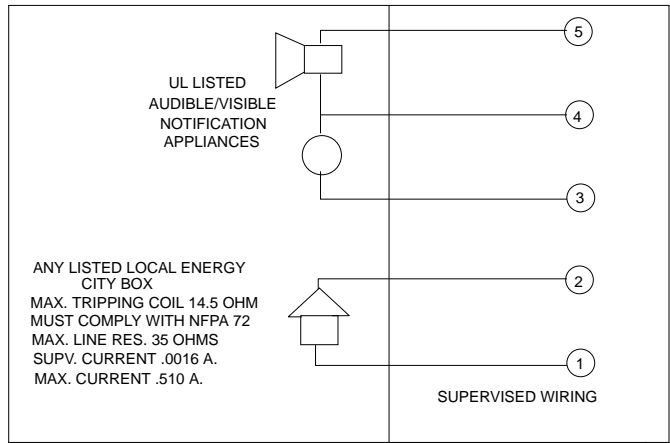


Figure 2

5.1 Troubleshooting the City Box Circuit

PROBLEM	CAUSE	ACTION TO BE TAKEN
“CITY BOX” LED Lit.	Control in alarm.	Reset Control.
	Switch in the ON position.	Return the switch to the OFF position.
	Master Box not reset.	Reset the master box.
	Open in master box coil wiring	Replace EOL resistor of master box. If the LED restores, check for coil opens.

6.0 AUXILIARY ALARM OUTPUTS

BMFC Terminals 3, 4, and 5 comprise two auxiliary alarm outputs. These outputs are a function of the jumper matrix; the most common use is with presignaling systems. These outputs may be configured for either supervised or non-supervised operation.

Terminal 4 is negative (-) and Terminals 3 and 5 are positive (+). Connect only the notification appliances listed in FCI Addendum, P/N 9000-0427 to these terminals per Figure 2:

To make any zone activate the Auxiliary Notification Appliance Outputs, Install a **J4A, J4B** diode jumper to the right of each zone used for this output.

To supervise these outputs, cut Jumper **JS3** on the BMFC for the supervision between Terminals 3 & 4 and/or cut Jumper **JS5** on the BMFC for supervision between Terminals 4 & 5.

(This output is only supervised to the first appliance—DO NOT exceed one appliance per output)

The output parameters of the Auxiliary Notification Appliance Output are as follows:

Voltage	24 VDC (nominal)
Max. ripple voltage	.071 VAC (max.)
Standby current	.002 amp.
Alarm current	0.5 amp. (max.)
Power Limited	

6.1 Presignal Feature

To configure the FC-72 for presignaling, install the **J3A, J3B** diode jumper for general alarm, as described in Table 1. Install **J4A, J4B** diode jumper to the right of all presignaling zones. (See Table 1). Then connect general alarm notification appliances to the common alarm output, Terminals 6 through 13. Connect the presignal appliance to Terminals 3, 4, and 5 using the directions above. *Do not exceed 0.5 amp. per output.* If more than one device is used, the additional device(s) will not be supervised.

NOTE: A presignaling notification appliance and its wiring must be installed within the same room as the control. Also, the notification appliance circuit conductors must be installed in conduit or have equivalent protection against mechanical injury and tampering.

7.0 NOTIFICATION APPLIANCE CIRCUITS

The voltage on these circuits is 24 VDC (nominal). Connect only the UL Listed notification appliances shown in FCI Addendum, P/N 9000-0427 to these circuits. Follow the installation instructions furnished with each appliance.

The BMFC contains two notification appliance circuits, each rated at 1.75 amps, which operate only in unison. Terminals **6, 7, 8, and 9** are for Circuit 1, and Terminals **10, 11, 12, and 13** are for Circuit 2. Each circuit is individually protected and supervised for opens, grounds and shorts.

The output of these circuits is controlled through a notification appliance circuit module. There are four standard modules that can be used with the FC-72 notification appliance circuits.

- **BCM-6, Bell Card Module** - Provides a continuous, non-coded output on the notification appliance circuits.
- **TCM-6, Temporal Coder Module** - Provides a Temporal Pattern Emergency Evacuation Signal per ANSI S3.41
- **BMC-6, Master Coder Module** - Provides an adjustable on-off duty cycle (march time pattern).
- **CCM-6, Common Coder Module** - Provides a variety of common coded signals, programmable in the field.

The output parameters of the notification appliance circuits are as follows:

Voltage	24 VDC (nom.)
Max. ripple voltage	.071 VAC (RMS)
Supervisory current	.0017 amp.
Alarm Current	1.75 amp.
Power Limited Supervised	

Each notification appliance circuit module has a yellow LED which indicates the following trouble conditions:

- An open in the notification appliance circuit wiring.
- An open in the Signal Relay (K3) coil.
- An open overload device in either notification appliance circuit.

7.1 Wiring

Class A, Style Z Wiring

Notification Appliance Circuit 1 - Remove the 3.9K ohm, 1/2 watt, resistor from Terminals **6 (-)** and **9 (+)**. Connect resistor to Terminals **7** and **8**. Connect field wiring to terminals per Figure 3.

NOTE: J-11 Must be cut when using coder modules TCM-6, BMC-6 OR CCM-6) on the BMFC.

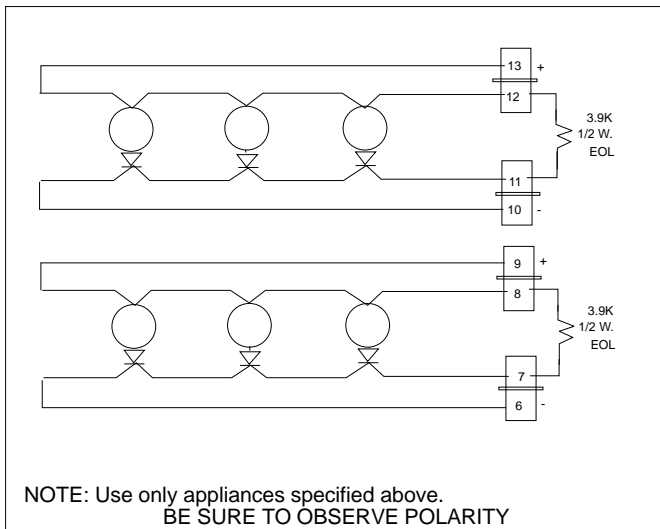


Figure 3

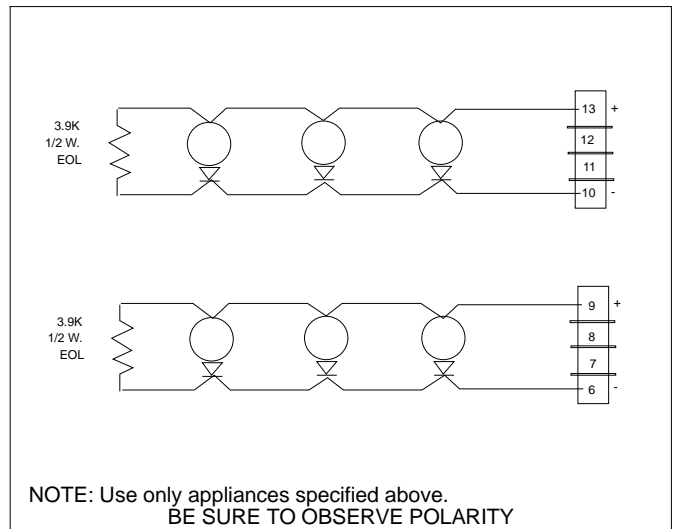


Figure 4

Notification Appliance Circuit 2 - Remove the 3.9K ohm, 1/2 watt, resistor from Terminals **10 (-)** and **13 (+)**, and connect resistor to Terminals **11** and **12**. Connect field wiring to terminals per Figure 3.

Class B, Style Y Wiring

Notification Appliance Circuit 1 - Remove the 3.9K ohm, 1/2 watt, resistor from Terminals **6 (-)** and **9 (+)**, then connect it in parallel within the last device on the circuit. Connect field wiring to these terminals per Figure 4. Be sure to observe polarity, and check all wiring prior to connection.

Notification Appliance Circuit 2 - Follow the same procedure as above, except Terminal **10** is negative **(-)**, and Terminal **13** is positive **(+)**.

NOTE: Divide the load evenly between both notification appliance circuits. Be sure to observe polarity, and check all wiring prior to connection.

7.2 Troubleshooting the Notification Appliance Circuit

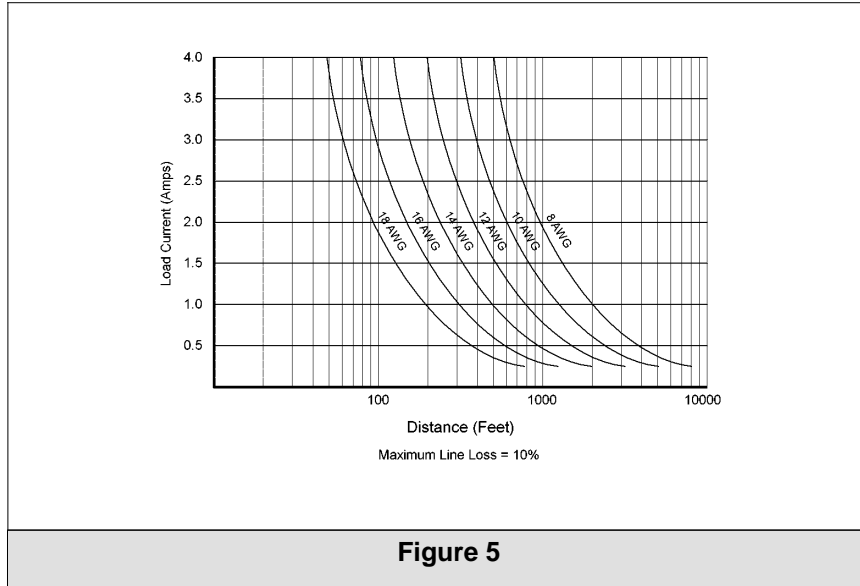
PROBLEM	CAUSE	ACTION TO BE TAKEN
Yellow LED on TCM/BCM is lit	1. Open in ckt. wiring. 2. PTC open. 3. Relay coil defective	Remove the wiring and check for opens. Hold the System Reset switch down for five (5) seconds. Check the coil for 700 ohms resistance. Replace if necessary.
“SHORT CIRCUIT” LED lit.	1. Short circuit in the field wiring 2. Non-polarized appliances used.	Check notification appliance circuits for shorts. (See section on “SHORT CIRCUIT” LED) Use only approved appliances.
Notification appliances will not operate	1. Reversed polarity on appliance. 2. PTC open. 3. Signal relay	Correct polarity of notification appliances Hold the System Reset switch down for five (5) seconds

7.3 Notification Appliance Circuit Wiring Estimator

Use the chart (Figure 5) to determine the required wire size for each notification appliance circuit.

- 1) Compute the required current. (Number of appliances multiplied by appliance current = amperes)
- 2) Compute the distance in feet from panel to the last appliance.
- 3) Locate the total appliance load (amperes) on the vertical axis of the chart. Locate the wire length (feet) on the horizontal axis of the chart. Find where they intersect.
- 4) Read the wire size in AWG on the curved line to the right of the point of intersection.

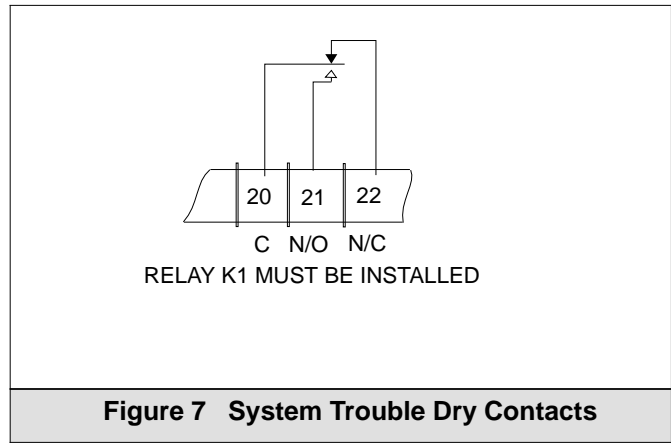
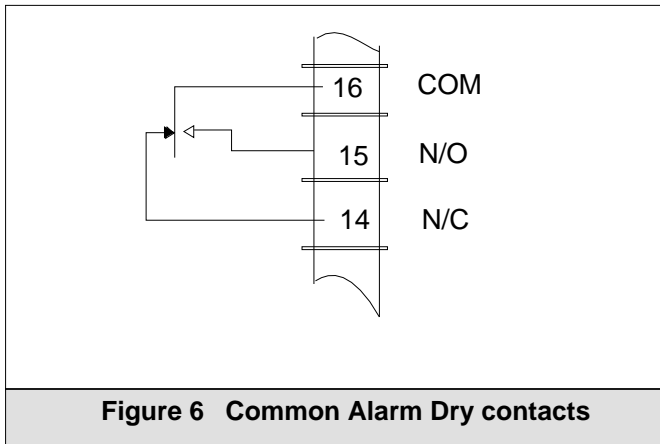
For wire lengths less than 100 feet, use 18 AWG minimum.



8.0 COMMON ALARM DRY CONTACTS

These contacts transfer and latch whenever the reversing relay is energized. Terminal **16** is common, **15** is normally open and **14** is normally closed. See Figure 6. Reversing relay K2 (P/N 4500-0024) must be installed in the socket provided.

These contacts are rated 5 amps @ 26 VDC (resistive). Intended for connection to circuits powered from a Listed power limited source of supply.



9.0 COMMON TROUBLE DRY CONTACTS

Whenever a System Trouble occurs, the trouble dry contacts will transfer. Terminal **20** is common, **21** is normally open, and **22** is normally closed. See Figure 7. the contacts are rated 5 amps @ 26 VDC (resistive). Trouble relay K1 (P/N 26592) must be installed in the socket provided. Intended for connection to circuits powered from a Listed power limited source of supply.

10.0 REMOTE TROUBLE INDICATOR CONNECTION

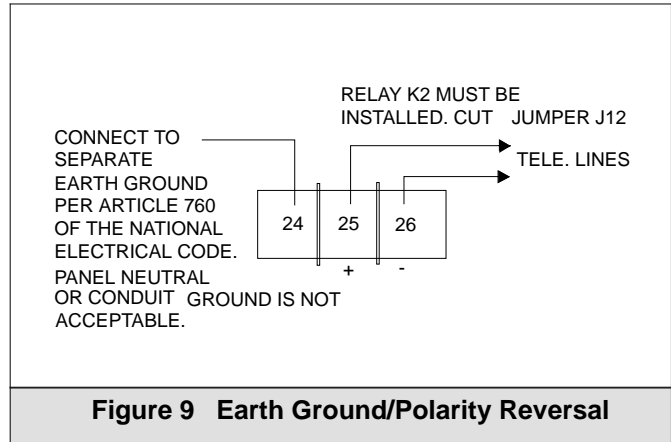
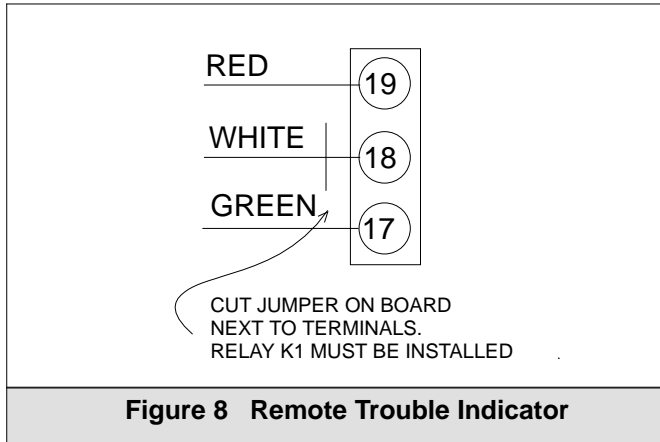
Terminals **17**, **18** and **19** are for the connection of the optional 3-wire remote trouble indicator (RTI). The RTI is supervised for grounds and opens. Should an open occur, the system will indicate trouble.

To use the RTI, install trouble relay K1 (4500-0024). Cut the jumper (**JRTI**) which is located to the LEFT of Terminals **17**, **18** and **19**. Connect the RTI per Figure 8.

Circuit ratings: 24 VDC @ .004 amps max. Power limited.

11.0 EARTH GROUND

The FC-72 control must be connected to (earth) ground, per Article 760 of the National Electrical Code. The connection is made to Terminal **24**. This connection will provide maximum protection in the event of lightning, transients, or electrical disturbance. Failure to connect a ground will result in a reduction in lightning protection. MINIMUM wire size 14 AWG.



12.0 POLARITY REVERSAL OUTPUT

Terminals **25** and **26** are for the connection of a polarity sensitive remote station receiver via leased telephone lines. The output is 24 VDC, current limited to 0.13 amp. Reversing relay K2 (4500-0024) must be installed in the socket provided. Cut Jumper **J12** and connect the telephone lines to Terminals **25 (+)** and **26 (-)**. In the alarm condition the relay will operate, reversing the polarity on the telephone lines (Term. **25** will now be negative and Term. **26** will be positive).

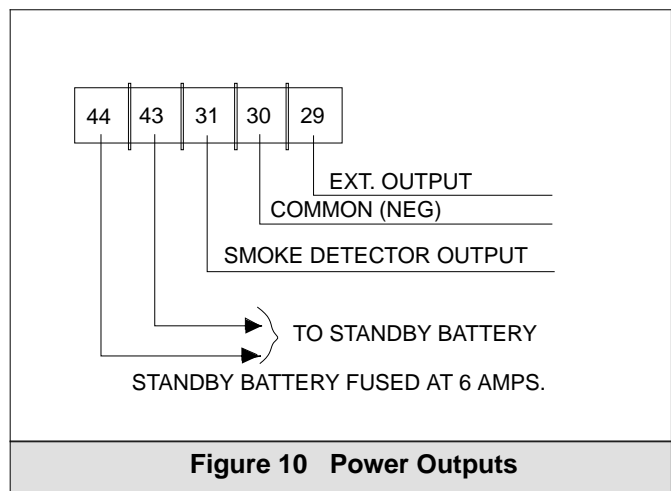
To transmit a trouble signal to the remote station, cut Jumper **JT**, which is located above relay K1. This will remove power from the output in the event of a System Trouble, but will not inhibit an alarm signal. Relay K1 must be installed in order to transmit a trouble. The output parameters for the Polarity Reversal circuit are as follows:

Voltage	19.9 VDC minimum 26.4 VDC maximum
Max. ripple voltage	.071 VAC (RMS)
Standby Current	.010 amp. @ 24 VDC
Alarm Current	.130 amp.
Power limited	
Supervised	

13.0 AUXILIARY POWER OUTPUT

Terminals **29 (+)** and **30 (-)** supply a continuous 24 VDC nominal output for use only with the Model 301DH duct detector remote test station. This output is NOT interrupted by the reset switch. See Figure 10.

Voltage	24 VDC (nominal)
Max. ripple voltage	.071 VAC (RMS)
Current	1.75 amp. max.
Power limited	
Unsupervised	



14.0 SMOKE DETECTOR OUTPUT

Terminals **30 (-)** and **31(+)** are only for the power connection of 4-wire Model SPB-24 projected beam smoke detectors. Operation of the reset switch interrupts this output to reset all detectors. See Figure 10.

Voltage 24 VDC (nominal)
Max. ripple voltage .071 VAC (RMS)
Current 1.75 amp.
Power limited
Unsupervised

Two-wire photoelectric or ionization smoke detectors must not be connected to these terminals. See Section 16.1 on the ZDM.

15.0 ZONE ALARM DRY CONTACTS

A set of Form "C" dry contacts rated 2 amps at 24 VDC (resistive), are provided for each zone when a ZDM or VZM is installed. They are intended for connection to circuits powered from a Listed power limited source of supply. Terminal **35** is common, **34** is normally open, and **33** is normally closed. See Figure 11. These contacts transfer only when there is an alarm on that individual zone, and they will remain in the alarm condition until the control is reset. The position of the zone maintenance switch WILL NOT AFFECT THESE CONTACTS. Jumpers in the matrix are not required to operate these contacts.

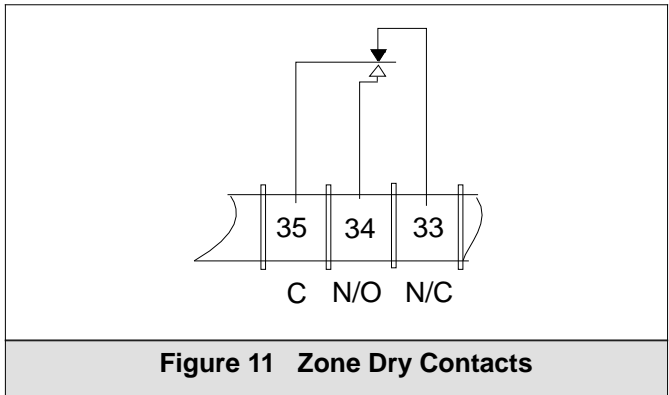


Figure 11 Zone Dry Contacts

16.0 INITIATING CIRCUITS

16.1 Zone Detector Module (ZDM)

Terminals **37** through **40** are provided for each zone, and will accept U.L. Listed normally open initiating devices such as heat detectors, thermostats, and manual stations. See Figures 12 and 13.

FCI approved, U.L. Listed compatible, two-wire photoelectric and ionization smoke detectors that use the supervisory current from the initiating circuit as their power source can be used. Each zone is capable of powering a specified number of FCI approved detectors. See FCI Addendum, P/N 9000-0427 for a list of approved detectors.

One ZDM is required for each active zone and will accept either Class A, Style D or Class B, Style B 4-wire or 2-wire circuits. Each zone module has an individual maintenance switch as well as a supervised red "ALARM" LED and a yellow "TROUBLE" LED.

CAUTION: Fire Control Instruments, Inc. does not warrant the integrity of systems using FCI control panels and two-wire smoke detectors that have not been tested and approved by FCI. See Addendum, P/N 9000-0427

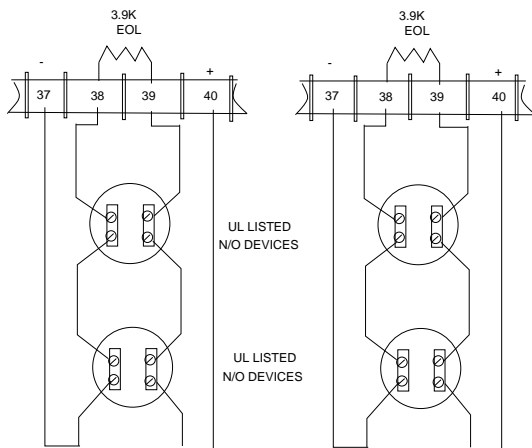


Figure 12

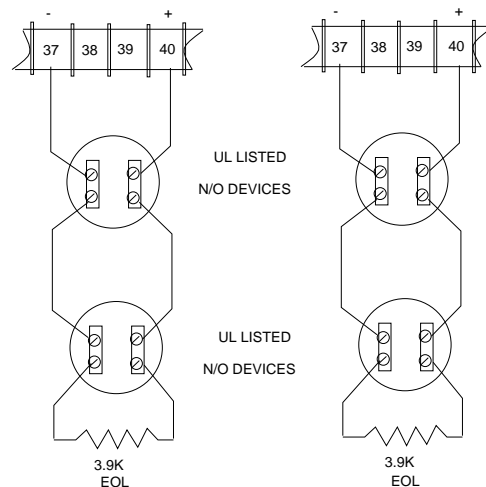


Figure 13

The output parameters for the initiating circuits with ZDM modules are as follows:

Voltage 24 VDC (nominal)
Max. ripple voltage .672 VAC (RMS)
Standby Current .006 amp.
Alarm Current .032 amp.
Zone Alarm 2 amp. (resistive) @ 26 VDC dry contacts. Intended for connection to circuits powered from a Listed power limited source of supply.

A. CODED OPERATION

All ZDM modules are normally configured for the “latching” mode of operation. If coded operation (from coded initiating devices) is desired, cut the latch diode **CR5** on the appropriate ZDM(s). **CR5** is located directly above the relay. (See Fig. 14)

B. WATERFLOW DETECTION

When a zone is to be used for waterflow alarm detection, the zone maintenance switch must be bypassed (per U.L. 864).

Install Mini-jumper **W1** as shown in Figure 14. The notification appliances can only be silenced after the waterflow device has been restored to normal. This circuit may be wired Class A, Style D or Class B, Style B .

C. GENERAL ALARM — ZONE JUMPER CONFIGURATION

The zone jumper matrix and zone supervision jumpers should be configured in the following ways for general alarm zones. (For other configurations see Table 1, Section 4.)

ONE ZONE - When only one zone is used, the **J10A** jumper to the right of the zone (Zone 1) should NOT be removed. A diode jumper (1N4004) should be installed in position **J3A**.

TWO OR MORE ZONES - When two or more zones are used, diode jumpers should be installed in positions **J3A** and **J3B**. The **J10A**, **J10B** jumper to the LEFT of each zone should be removed for supervision.

D. WIRING

U.L. Listed N.O. Detection Devices or 4- wire smoke detectors may be used. For FCI approved, U.L. Listed, and Multiple Listed 2-wire smoke detectors, see FCI Addendum, P/N 9000-0427.

Class A, Style D Operation

Remove the 3.9K ohm, 1/2 watt resistor from Terminals **37** and **40**, and connect it to Terminals **38** and **39**. Then connect field wiring per Figure 12. The maximum allowable resistance in the field wiring is 100 ohms per zone for the ZDM/ZDM-D modules, and 50 ohms per zone for the VZM module.

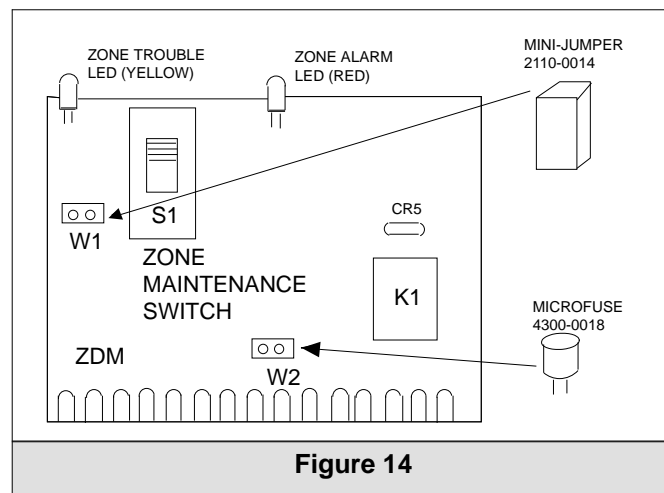
Class B, Style B Operation

Remove the 3.9K ohm, 1/2 watt resistor between Terminals **37** and **40**, and install it in parallel within the last device on the circuit. Then connect wiring to Terminal **37 (-)** and **40 (+)**. See Figure 13.

The maximum allowable resistance in the field wiring is 100/750 ohms per zone for the ZDM, 100 ohms per zone for the ZDM-D and 50 ohms per zone for the VZM. Prior to installing the wires on Terminals **37** and **40**, read the resistance across the circuit. It should be between 3,900 and 4,000 ohms for the ZDM or ZDM-D and 3,900 and 3,950 ohms for the VZM.

E. OPTIONAL END OF LINE RESISTOR

With the ZDM only, a Class B circuit, when used with 3.3K EOL resistor, may have a maximum DC line resistance of up to 750 ohms. (Not FM Approved)



F. ZDM TROUBLE SHOOTING

PROBLEM	CAUSE	ACTION TO BE TAKEN
"ZONE TROUBLE" led IS LIT.	"MAINTENANCE" switch is in the "OFF" position.	Place the "MAINTENANCE" switch in the normal position.
	Initiating circuit	Check BMFC/ZMC circuit for opens. It should read between 3,900 and 4,000 ohms. (The reading will be between 3,300 and 4,050 ohms if a 3.3K EOL resistor is used)
	Remote alarm indicator defective, field wiring open or Jumper JRA , JRB cut.	Press the LAMP TEST switch on the BMFC while someone observes the remote indicator. If the remote indicator does not light, check the field wiring. If no remote indicator is used, be sure Jumpers JRA , JRB are not removed, or that BMFC/ZMC Terminals 36 and 41 are connected.
	Zone alarm LED defective	Press the "LAMP TEST" Switch; If the red LED does not light, replace the ZDM.

16.2 Verification Zone Detector Module (VZM)

The Verification Zone Module (VZM) may be used to replace the ZDM in applications where verification of alarm is required. Each VZM has an individual zone maintenance switch as well as a red "ZONE ALARM" LED and a yellow "ZONE TROUBLE" LED; placement of these is the same as on the ZDM (see Fig. 14). The VZM will accept FCI approved, U.L. Listed, and Multiple Listed two-wire smoke detectors, four-wire smoke detectors, and normally open contact initiating devices wired either Class A, Style D or Class B, Style B at Terminals **37** through **40** of the BMFC or ZMC. Each zone is capable of powering a specific number of FCI approved two-wire detectors.

The VZM differentiates between two-wire smoke detectors and normally open contact initiating devices, allowing a verification time cycle with the two-wire smoke detectors. However, for normally open contact initiating devices and four-wire smoke detectors, the verification time cycle is automatically bypassed.

The Verification Time Cycle has a fixed time out, totaling 124 seconds. It begins with a 20 second presignaling alarm window, initiated by an active FCI approved, U.L. Listed, and Multiple Listed two-wire smoke detector, (indicated by the flashing yellow trouble LED on the VZM). The presignaling alarm window is followed by a 4 second automatic reset time, (indicated by the constant yellow "TROUBLE" LED), and a 100 second alarm verification window, (indicated by a flashing yellow LED). The alarm verification window holds the circuit in the presignaling alarm state, waiting for the first alarm to be verified. If a subsequent alarm comes in from a smoke detector in the circuit, the VZM will initiate a System Alarm, (indicated by the red LED). If a subsequent alarm is not received within 100 seconds, the VZM will return to its normal supervisory condition.

The output parameters of an initiating circuit with a Verification Zone Module are as follows:

Voltage	24 VDC regulated
Max. ripple voltage	.672 VAC (RMS)
Standby current	.006 amp. (normal standby)
Alarm current	.035 amp. max. (alarm)
Power limited	
Supervised	

Verification Time				
Alarm in (From smoke detector)	20 second Presignal-alarm window	4 sec. Reset	100 sec. alarm Verification window	
Normal Supervisory condition				Normal Supervisory condition

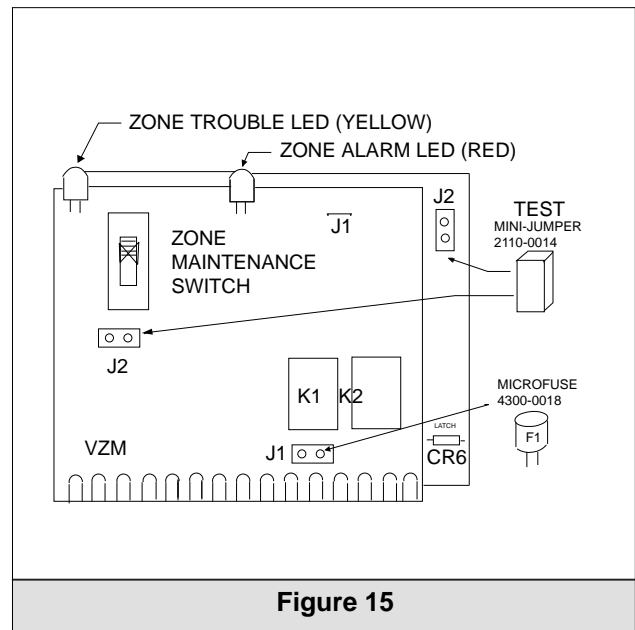


Figure 15

A. CODED OPERATION

All VZMs are normally configured in the “latch” mode of operation. If coded operation (from coded initiating devices) is desired, cut the latch diode **CR6**. See Fig. 15.

When using the Verification Zone Module VZM for waterflow alarm detection, the zone maintenance switch must be bypassed (per U.L. 864).

Install mini-jumper **J2** as shown in Figure 15. The notification appliances can only be silenced after the water-flow device has been restored to normal.

B. GENERAL ALARM — ZONE JUMPER CONFIGURATION

The zone jumper matrix and zone supervision jumpers should be configured per the instructions in Section 16.1.

C. WIRING

The wiring should be configured per the instructions in Section. 16.1.

D. SMOKE DETECTOR TEST

The VZM has an optional two-pin mini-jumper connector **J2**, P/N 2110-0014, which is installed when testing smoke detectors without activating the verification time cycle.

IMPORTANT: Remove the test mini-jumper connector **J2** after completing the test.

16.3 The Double Density Zone Detector Module (ZDM-D)

The Double Density Zone Detector Module (ZDM-D) provides two zones in the space of one. Each zone of the ZDM-D has an individual zone maintenance switch as well as a supervised red “ZONE ALARM” LED and yellow “ZONE TROUBLE” LED. The ZDM-D is not directly interchangeable with the ZDM; some modifications are required on the BMFC and/or ZMC (see Fig. 17). The ZDM-D will accept two-wire smoke detectors, four-wire smoke detectors, and normally open contact initiating devices wired either Class B, Style B in both circuits (Zone A and Zone B) or Class A, Style D in Zone A and Class B, Style B in Zone B at Terminals **36** through **40** of the BMFC or ZMC. **NOTE:** When wiring Zone A for Style D operation, a Model V.E.O.L. must be used (consult factory). Each zone on the ZDM-D is capable of powering a specific number of two-wire smoke detectors.

NOTE: When using two-wire smoke detectors, ONLY FCI Approved, U.L. Listed (Multiple Listed) two-wire smoke detectors should be used. See FCI Addendum, P/N 9000-0427.

The output parameters of the initiating circuits with a ZDM-D module are as follows:

- Voltage (per zone)** 24 VDC nominal
- Max. ripple voltage** .672 VAC (RMS)
- Standby; Current (per zone)** .006 amp.
- Alarm current** .035 amp.
- Power limited**
- Supervised**

When using a ZDM-D module, the jumpers on the BMFC and/or ZMC must be configured as follows (refer also to Fig. 17):

ZDM-D POSITION	JUMPER CONFIGURATION
Zone 1 (BMFC)	Cut: JRA, CR47; Install: J31, J33
Zone 2 (BMFC)	Cut: JRB, CR48; Install: J32, J34
Zone 3, 5, 7, etc. (ZMC)	Cut: JRA, CR20; Install: J11A, J33
Zone 4, 6, 8, etc. (ZMC)	Cut: JRB, CR21; Install: J11B, J34

NOTE: Jumpers **J11A, J11B, J31, J32, J33** and **J34** are wire jumpers, NOT 1N4004 diode jumpers.
IMPORTANT: If the required jumpers are not configured as described above, contact the factory.

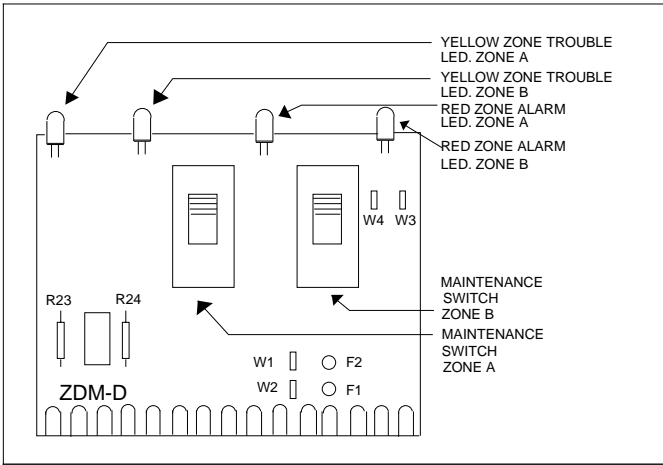


Figure 16

A. CODED OPERATION

All ZDM-D modules are normally configured in the “latching” mode of operation. If coded operation (from coded initiating devices) is desired, cut the latch resistor: **R23** for Zone A and **R24** for Zone B.

B. WATERFLOW DETECTION

When using the ZDM-D module for waterflow alarm detection, the maintenance switch of the appropriate zone must be bypassed (per U.L. 864). For Zone A, install mini-jumper **W3**, for Zone B, install jumper **W4**. The notification appliances can only be silenced after the waterflow device has been restored to normal.

C. GENERAL ALARM — ZONE JUMPER CONFIGURATION

The zone jumper matrix and zone supervision jumpers should be configured per the instructions in Section 16.1C.

D. WIRING

Field wiring is configured (Fig. 16) as:

Zone A — Class A or B, Style D or B

Zone B — Class B, Style B

Using Figure 17 as a guide, connect the field wiring to Terminals **36** through **40**.

NOTE: The maximum allowable resistance in the field wiring is 100 ohms per zone, Class B, Style B, 50 ohms per zone, Class A, Style D.

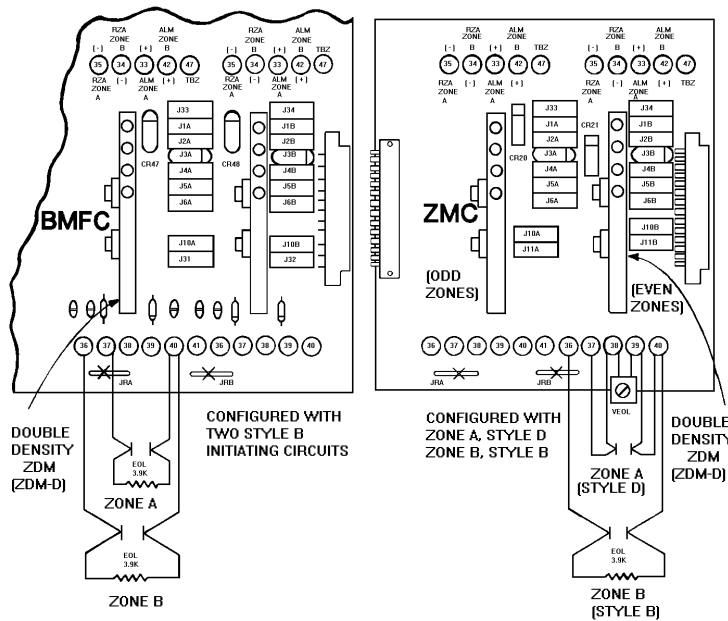


Figure 17

16.4 Sprinkler Supervisory Service

The ZDM module may be used for sprinkler supervisory service by observing the following procedure:

- A. Remove jumper **J3A** (or **J3B**, depending on the zone to be used) if there is to be no municipal notification for supervisory purposes.
- B. Insert jumper **J4A** (or **J4B** depending on the zone to be used).
- C. Connect a notification appliance (such as the HEM mini-horn) to Terminals **3** and **5** on the BMFC-6.
- D. Label the ZDM to indicate it is used for supervisory signaling.

Thus, off-normal positioning of any supervisory switch will cause the notification appliance to activate, but will not cause a alarm condition unless desired.

17.0 REMOTE ZONE ANNUNCIATION

17.1 Remote zone annunciation with Zone Detector Module (ZDM) or Verification Zone Module (VZM)

BMFC Terminals **36** and **41** are provided for connection of a supervised remote zone annunciator with either LED or incandescent lamp. Should an open in the field wiring or annunciator occur, a zone and system trouble will activate. Connect as follows:

- 1) Cut **JRA, JRB** (on BMFC or ZMC) for each zone annunciated.
- 2) If an FCI LED annunciator is used, go to Step 4.
- 3) If an incandescent lamp annunciator is used, ensure that the corresponding zone(s) on the BMFC and/or ZMC is configured as follows:

BMFC - J31 (Zone 1) and/or J32 (Zone 2)	Install a jumper.
ZMC - J11A (Zone 3, 5 etc.) and/or J11B (Zone 4, 6 etc.)	Install a jumper.

IMPORTANT - When an incandescent lamp annunciator is used, only #1820 lamps (28 VDC/0.100 A) or #1829 lamps (28 VDC/0.070 A) are to be used. **F1** microfuse, P/N 4300-0018, **MUST** be installed in socket **W2** of the ZDM or VZM. (Consult factory for assistance).

- 4) Connect the annunciator common to Terminal **41** between Zones 1 and 2.
- 5) Connect the individual LED/lamp wires to Terminal **36** of each zone annunciated.

17.2 Remote Zone Annunciation With Double Density Zone Detector Module (ZDM-D)

Terminals **34, 35,** and **41** are provided for connection of supervised remote zone annunciators, either LED or incandescent lamp. Should an open in the field wiring of an annunciator occur, a zone (Zone A or Zone B) and system trouble will activate. Connect as follows:

- 1) Cut **W1** for Zone A, or **W2** for Zone B (jumpers are located on ZDM-D).
- 2) Connect the annunciator common to Terminal **41** between Zones 1 and 2.
- 3) Connect the individual LED/lamp wires to Terminal **35** for ZDM-D Zone A, and Terminal **34** for Zone B for each zone annunciated.

IMPORTANT - When an incandescent lamp annunciator is used, only #1820 lamps (28 VDC/0.100 A) or #1829 lamps (28 VDC/0.070 A) are to be used. Microfuse **F1**, P/N 4300-0018, for Zone A, or Microfuse **F2**, for Zone B, on the ZDM-D **MUST** be installed. (Consult factory for assistance).

18.0 ACCESSORY ZONE SIGNAL OUTPUT

A. Alarm by Zone Output - Terminal 42.

This is to be used only with FC-72 series accessories, SRB-6, RB-6, etc. It provides a power limited 24 VDC alarm output per zone.

NOTE: When using ZDM-D module, Terminal **33** is used as alarm output for Zone A and Terminal **42** for Zone B. (See Figure 17)

B. Trouble-By-Zone Output - Terminal 47.

This is to be used only with FC-72 series accessory, trouble by zone board (TBZ/TBZ-U). It provides a power limited 24 VDC trouble output per module.

NOTE: Do not connect any external devices to these terminals.

19.0 STAND-BY BATTERY CONNECTIONS

These (non-power limited) terminals are for the connection of sealed lead calcium (gel type) rechargeable batteries. **BE SURE TO OBSERVE POLARITY.** Terminal **43** is positive (+) and **44** is negative (-). The automatic float charge circuitry is capable of maintaining batteries with capacity ratings between 1.9 and 17 ampere/hours. The maximum charge rate is limited to 0.9 amperes.

If the batteries are connected in reverse, the panel protection circuitry will immediately cause the 6 ampere battery fuse to open.

Stand-by Requirements - To determine the size of standby batteries, you must first determine how much current will be drawn in the standby mode. Refer to the Battery Standby Calculation Chart, Table 2.

20.0 POWER SUPPLY

The output of this power supply is 24 VDC at 4 amperes and complies with U.L. Standard 864.

The transformer secondary is fused at 6 amperes. Connect the power supply to a 120 VAC source. This connection must be to a dedicated branch circuit and mechanically protected. All means of disconnecting the circuit must be clearly marked "FIRE ALARM CIRCUIT CONTROL" and accessible only to authorized personnel. Fusing of this circuit must comply with local codes for over current protection, and/or Article 760 — "Fire Protective Signaling Systems" of the National Electric Code, NFPA 70.

The transfer relay will automatically transfer the system to the stand-by batteries upon reduction to 85% or total loss of AC power.

21.0 FUSES

The standby battery circuit is fused as shown. A 5 amp. permanent fuse (F7) serves as main power limiter in the BMFC and a 6 amp. fuse on the PS-6 protects the power supply.

22.0 LOCATING A TROUBLE

All vital circuits of the FC-72 have an associated yellow "TROUBLE" LED which will identify the circuit in trouble. Refer to the appropriate section of this manual for further instructions.

The following problems will cause a common System Trouble condition, but will not be indicated individually.

PROBLEM	ACTION TO BE TAKEN
Power supply	Check 120 VAC input. Check fuse on PS-6. Check green AC LED. Check all fuses. Check for 24-26 VDC across voltmeter terminals on power supply.
Module unplugged	Replace the missing module or install J10A, J10B after last active zone.
Remote trouble	Connect a jumper between Terminals 17 and 19 . If the trouble clears, check the RTI and associated wiring.
Supervisory signal	Disconnect the wiring on the transmitter or Terminals 3, 4, 5 , and connect a 220 ohm, 5 watt resistors between 3-4, 4-5 . If trouble clears, check the lines for an open circuit.
Transfer relay coil open	Check for open.

TROUBLE CIRCUIT COMPONENTS

If the failure of a component associated with the trouble circuits should occur, and field repairs are not possible, all initiating and notification appliance circuits will continue to function, but *THERE WILL BE NO ELECTRICAL SUPERVISION DURING THIS PERIOD.*

ZONE DETECTOR MODULES

Should a failure occur, a spare module may be used, or if additional zones are in use you may remove the EOL resistor from the faulty zones' wiring and temporarily connect the zone wiring in parallel with a known good zone. Once you have removed the zone module from its connector, a System Trouble will occur.

Connecting **J9, J-10** to the RIGHT of the missing module will clear the trouble but will not supervise any further zones.

NOTIFICATION APPLIANCE CIRCUIT MODULES

Failure of one of these modules will result in loss of supervision on both notification appliance circuits. Both circuits will still operate with the module removed, as will the Polarity Reversal output and the City Box output. If using BMC-6, Jumper **J-11** must be in place.

The Main Power Limiter on BMFC-6 is independently fused by permanent fuse **F7**, 5 amp., Type 2AG.

Table 2 FC-72 System Battery Standby Calculation Chart

Qty	Model	Description	Supv. Current	Alarm Current	Total Supv. Current	Total Alarm Current
1	FC-72-1	1 Zone Control Panel	.063 A	.370 A(*)	.063 A	.370 A
	BMFC-6	Basic Master Fire Card (*)		(*)	—	—
	ADAM-6-1	Aux. DC Actuation Module	.013 A	.073 A		
	ADAM-6-2	Aux. DC Actuation Module	.026 A	.133 A(#)		
	APS-6	Aux. Power Supply	.020 A	—		—
	AVM	Alarm Verification Module	.012 A	.030 A		
	BCM-6	Notification Appl. Circuit Module	(**)	(**)	—	—
	BMC-6	Master Coder Module	(**)	(**)	—	—
	BCM-6	Notification Appl. Circuit Module	(**)	(**)	—	—
	TCM-6	Temporal Pattern Module	(**)	(**)	—	—
	PNIS	PNIS Zone Coder Module	.004 A/zone	.150 A		
	PS-6	Power Supply	—	—	—	—
	RB-6	Aux. Relay Module	—	.070 A (#)		—
	RDF	Releasing Device Interface	.002 A	.047 A		
	RRT	Remote Reset Capability	(##)	(##)		
	RTI	Remote Trouble Indicator	.002 A	.002 A		
	RZA	Remote Zone Annunciator (LED)	—	.002 A	—	
	SRB-6	Supervised Aux. Relay Module	.019 A	.079 A (#)		
	TBZ	Trouble By Zone Module	.003 A	.021A/zone		
	TDS438	Time Delay Switch	—	.001	—	
	VZM	Verification Zone Module	.010 A	.175 A		
	WTM	Walk Test Module	—	.040 A	—	
	ZMC	Zone Mother Card	—	—	—	—
	ZDM	Zone Detector Module	.006 A	.163 A		
	ZDM-D	Zone Det. Module, Dual Density	.018 A	.298 A (#)		
	CPD-7051	Smoke Det., Ionization	.00005 A	⊕		—
	PSD-7155/ PSD-7156	Smoke Det., Photoelectric	.00005 A	⊕		—
	SBS-1101	Smoke Det., Ionization	.00010 A	⊕		—
	SBS-1201	Smoke Det., Photoelectric	.00012 A	⊕		—
	301 Series	Smoke Det.	.00012 A	⊕		—
	4WSD	4 Wire Smoke Det/EOL Relay				

NOTES: (*) FC-72-1 contains BMFC-6, PS-6, one ZDM and one BCM-6, BMC-6, TCM-6, or CCM-6.
(**) Included in BMFC-6 and/or ADAM-6. Power requirements are as above.
(#) With both circuits in alarm.
(##) Consult factory.
⊕ Alarm current is limited by zone module circuitry and is not involved in battery calculation.
Modules DMM, ABM and DBM do not consume current and are not involved in calculations.

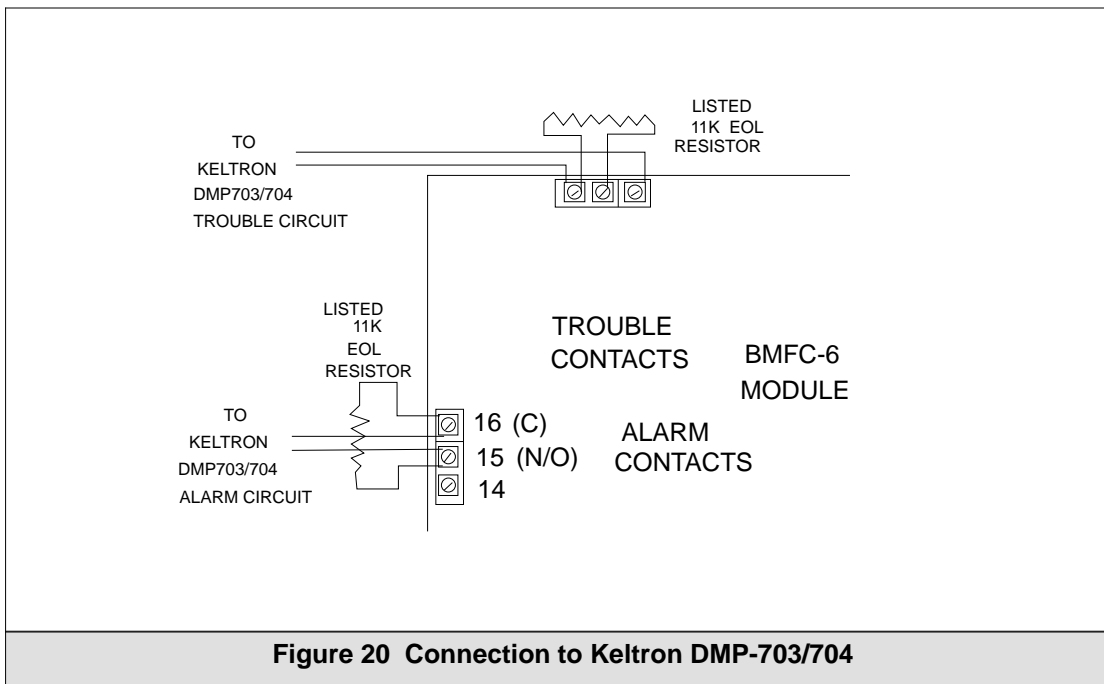
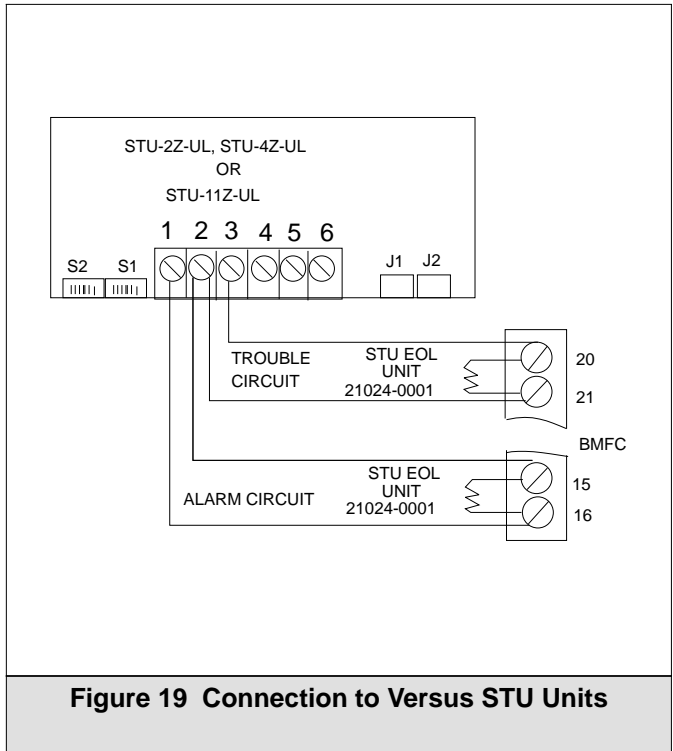
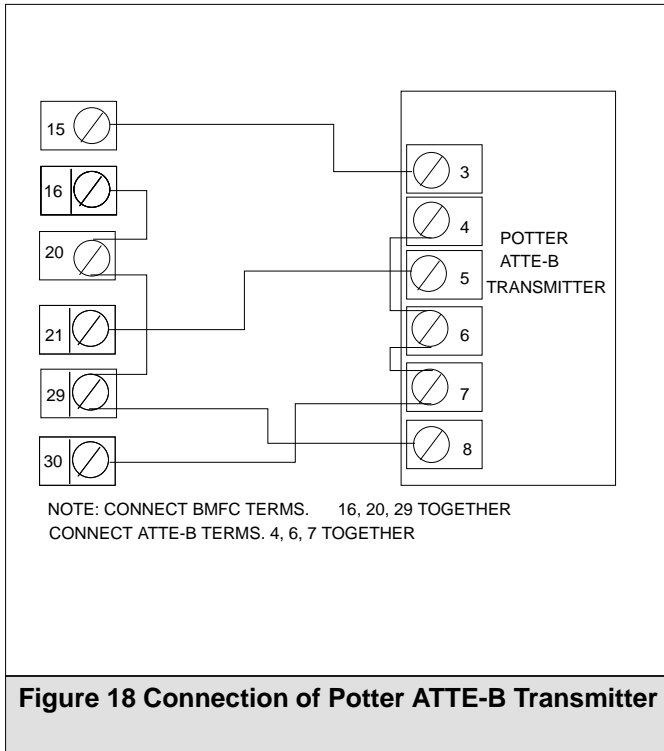
Battery Calculations	
A	Total Supv. Current from above chart
B	Enter number of standby hours (24 hrs for NFPA Local, Proprietary, Central Station, 60 hrs for NFPA Auxiliary, Remote Station, 90 hours for FM Deluge/Preaction)
C	Multiply Line A times hours in Line B—enter
D	Total alarm current from above chart
E	Enter alarm sounding period in hours. (5 minutes = .084 hr.)**
F	Multiply Line D times Line E —enter
G	Total of Lines C&F—enter
H	Multiply Line G by 1.2 — enter (Total ampere/hours required*)
* Use next size battery with capacity greater than required. **5 minute alarm period for NFPA, 10 minute period for FM Deluge/Preaction Service	

23.0 CENTRAL STATION TRANSMITTER CONNECTIONS

The FC-72 control panel may be used in conjunction with the below listed units to meet the requirements for Central Station protective Signaling Service per NFPA 72. Signals for fire and trouble are transmitted over two (2) separate circuits

- Potter Model ATE-B Alarm and Trouble Transmitter.
- Versus Subscriber Terminal Units STU-2Z-UL, or STU-11Z-UL
- Keltron DMP-703/704 Central Station Alarm receiving unit.

See Figures 18, 19 and 20 for connections to the various units.



24.0 PROPRIETARY SUPERVISING STATION SYSTEM CONNECTIONS

The FC-72 control may be used in conjunction with Keltron Model DMP703 or DMP704 Proprietary alarm receiving units to meet the requirements for Proprietary Alarm Service per NFPA 72. Signals are transmitted for fire, trouble and supervisory functions over three (3) separate circuits.

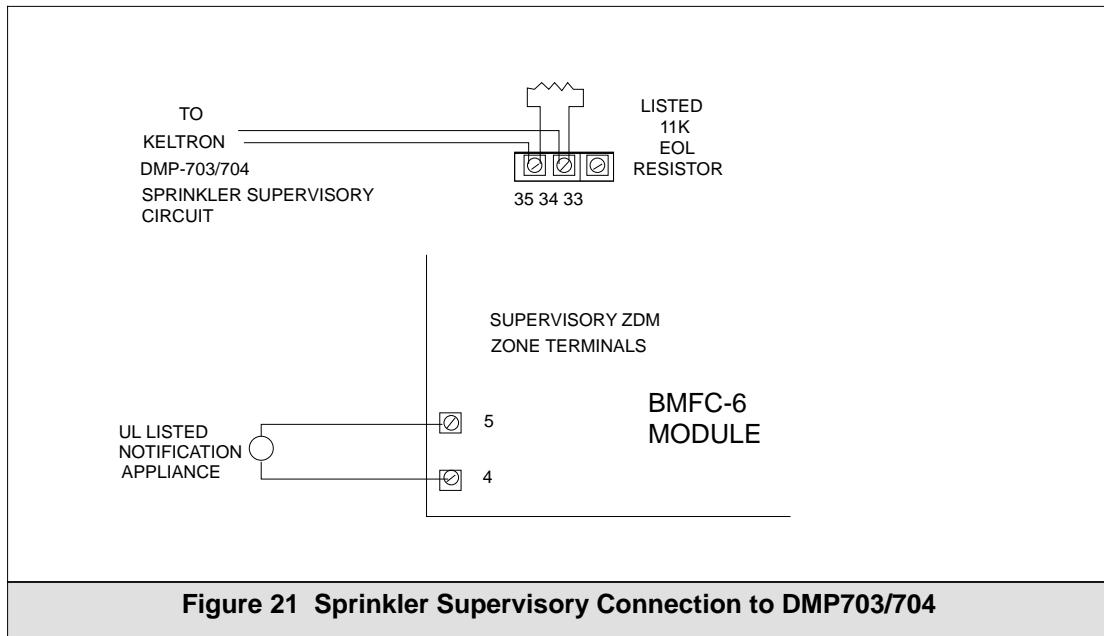
See Figure 23 for connections for fire and trouble transmissions. Figure 21 contains wiring for waterflow and supervisory transmission.

WATERFLOW ALARMS

Remove the associated Zone Module, ZDM, from the mother card and install a jumper across the two waterflow jumper pins on the module. Reinstall the module into the mother card. This will prevent the silencing of notification appliances during a waterflow alarm.

SPRINKLER SUPERVISORY

Remove the associated Zone Module ZDM, from the mother card and cut the 1N4004 diode labeled "latch". On the diode matrix at the right of the Sprinkler Supervisory ZDM module, move the program diode down one position from the factory installed position. Reinstall the module into the mother card. This will cause an output on BMFC Terminals 4 and 5. Connect a UL Listed notification appliance to these terminals and install the appliance inside the control panel if audible, or outside if visual.



25.0 FCI APPROVED, U.L. LISTED, MULTIPLE LISTED, TWO-WIRE PHOTOELECTRIC AND IONIZATION SMOKE DETECTORS

Only FCI approved, compatible two-wire photoelectric and/or ionization smoke detectors, which are U.L. Listed, and Multiple Listed for use with the FC-72 Control may be used. FCI Addendum, P/N 9000-0427 lists those models that should be used, together with the maximum that may be connected to each zone.

Manual stations and heat detectors may be added to the same zone circuit with smoke detectors. Operation of a manual station or heat detector in the same zone as a smoke detector will prevent the operation of smoke detectors on that zone.

All installation wires must be free from grounds, opens or shorts. Test each installation circuit wire with an ohmmeter before connection to the control panel. Ensure that the detectors are wired (spliced) in supervisory position per the wiring diagram.

All wiring must be installed in compliance with the National Electrical Code and local codes. Proper gauge wire should be used. Each conductor should be identifiable to prevent wiring errors. For wiring between detectors, it is recommended that the wire be no smaller than 18 gauge.

Refer to the drawing mounted on the enclosure door for proper terminal connections.

GENERAL NOTES:

To Insure proper installation of the detector head to the base, be sure wires are properly dressed at installation

- Position all wires flat against the base.
- Take up all slack in the outlet box.
- Route wires away from connector terminals.
- For system supervision - Do not use looped wire under the terminals. Break the wire run to provide supervision of connections.

WIRING INFORMATION

Refer to the installation instructions furnished with each detector.

IMPORTANT: Any one initiating circuit should contain the same series smoke detector. We do not recommend mixing 301/SBS series detectors with CPD/PSD series detectors in the same circuit.

25.1 PSD/CPD Series Detectors

Different CPD/PSD detector/base models may be mixed and matched without restrictions.

If you have installed a jumper between Terminals **6** and **7** to test detector circuit continuity, be sure to remove the jumper before installing detector head.

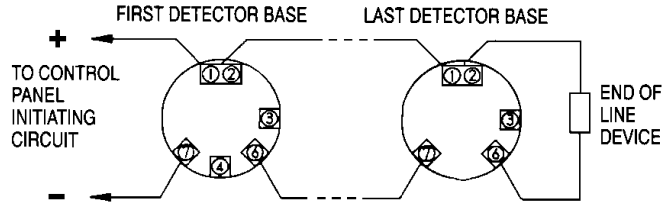
DETECTOR BASE OPTIONS

BASE	IDENTIFIER	
2-WB	FE51A	Connects to a 2-wire detection circuit via screw terminals.
2WRLT	FE52A	Same as above plus provision for remote LED indicator and remote test. Min. alarm current: .019 amp.
2WRB	FE55A	Connects to a 2-wire detection circuit via wire leads. Equipped with SPDT aux. relay. Minimum alarm current: .015 amp. Also has remote indicator and test capability.
4WRB	N/A	Connects to a 4-wire detection circuit via wire leads. Equipped with SPDT supplementary relay. Min. alarm current .035 amp.
2040-24	N/A	End of line supervisory relay, 24 VDC.
MA-001	MAFE	Retrofit adapter. Allows installation of detectors in old CPD series bases, CPD-001 (compatibility identifier FE01A), CPD-002 (Compatibility identifier FE02A) and CPD-003 identifier FE03A).

WARNING: To prevent detector contamination and subsequent warranty cancellation, smoke detectors must remain covered until the area is clean and dust free.

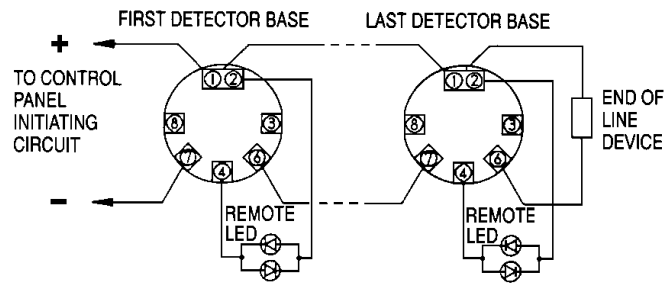
2-WB

Base less options



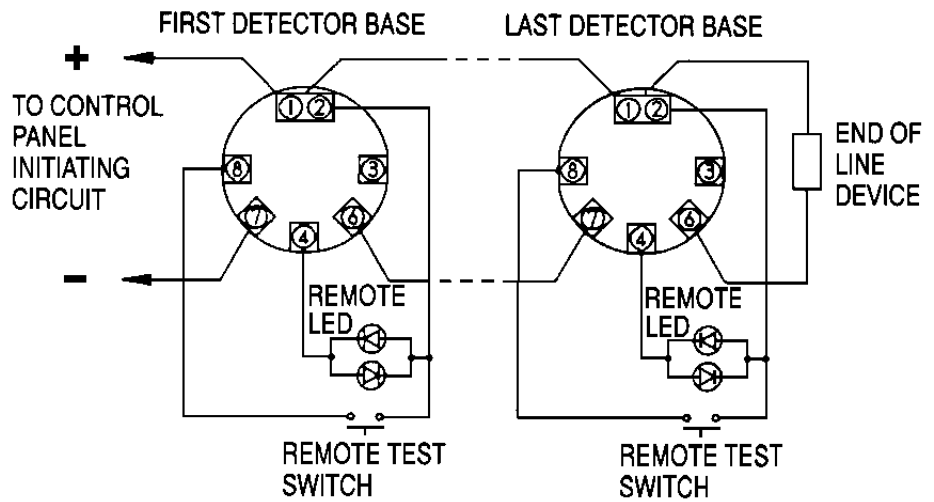
2WRLT

Base with Remote Indicator option



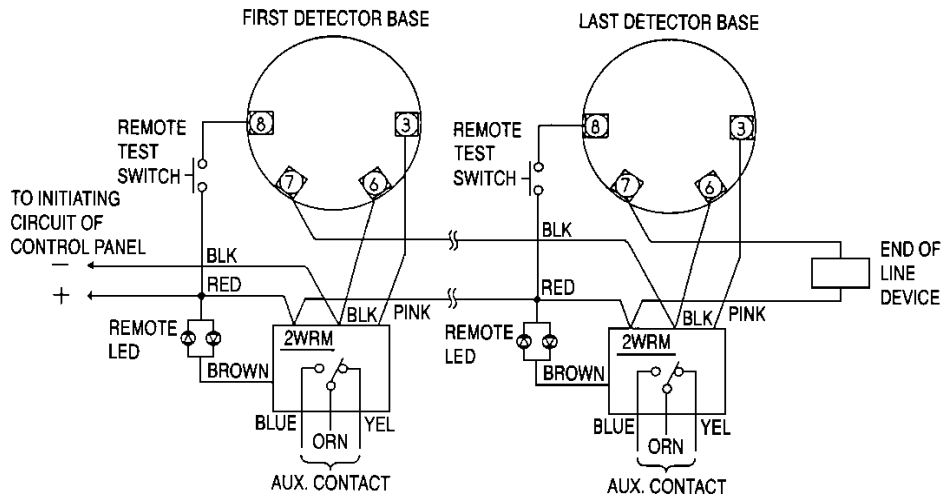
2WRLT

Base with Remote Indicator and Remote Test Switch options



2WRB

Base with relay option



25.2 Model SBS Smoke Detectors

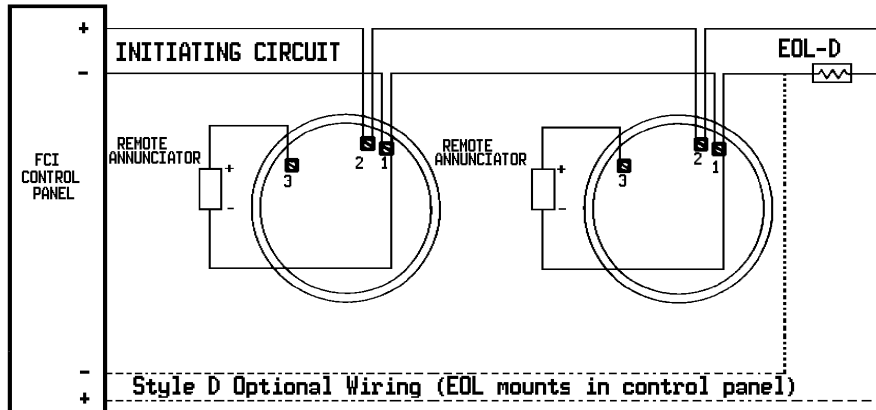


Figure 22 Typical Wiring diagram - Model SBS Detectors

- Installation wiring to detector is NON-POLARIZED unless a remote indicator is used.
- For best system performance, it is recommended that the circuit wires be twisted pair and installed in separate grounded conduit to protect the circuit from extraneous electrical interference.
- Different SBS/301 series detectors may be mixed and matched without restrictions.

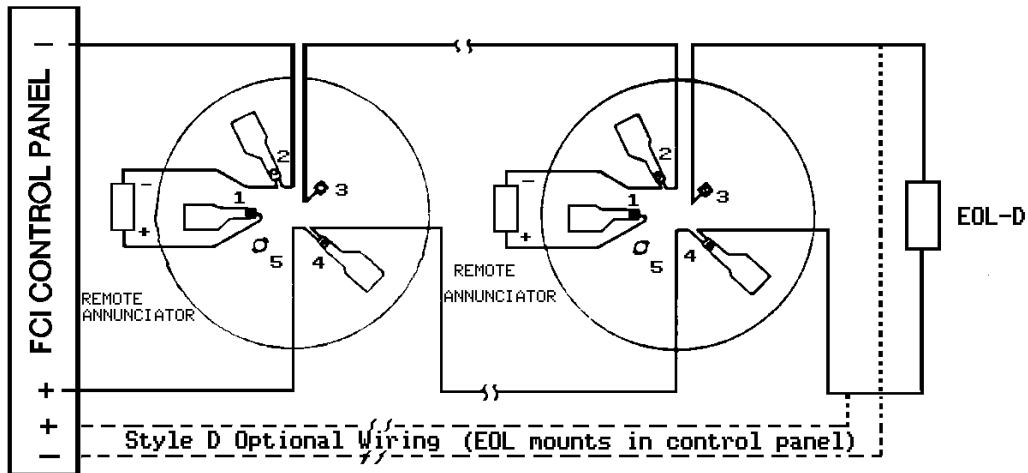


Figure 23 Typical wiring diagram - Model 301 Detectors

25.3 Model 301 Smoke Detectors

- For best system performance, it is recommended that the circuit wires be twisted pair and installed in separate grounded conduit to protect the circuit from extraneous electrical interference.
- Different SBS/301 series detectors may be mixed and matched without restrictions.

NOTE: ALL FIELD WIRING CIRCUITS ARE POWER LIMITED

REMOTE TROUBLE INDICATOR OUTPUT (MODEL RT1 ONLY) SEE 9000-0007 Para. 9 (NOTES 5 & 26)

SYSTEM ALARM DRY CONTACTS SEE 9000-0007 Para. 8

AUDIBLEVISUAL NOTIFICATION APPLIANCE CIRCUITS, CLASS B, STYLE Y WIRING SEE 9000-0007 Para. 7 (NOTES 15 & 21)

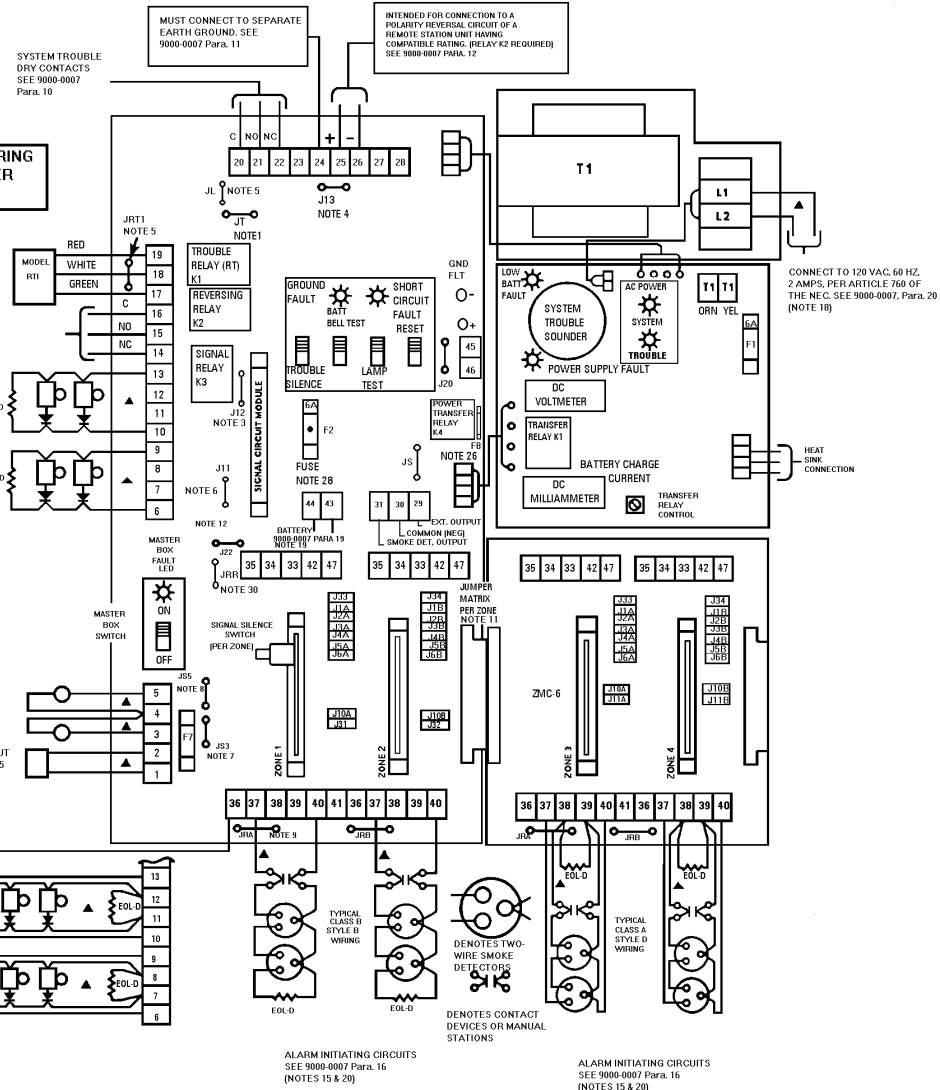
USE ONLY 24 VDC UL LISTED POLARIZED APPLIANCES

AUXILIARY ALARM OUTPUTS SEE 9000-0007 Para. 6

MASTER BOX OUTPUT SEE 9000-0007 Para. 5 (NOTE 24)

REMOTE ALARM ANNUNCIATORS OUTPUT PER ZONE SEE 9000-0007 Para. 17 (NOTES 9 & 25)

AUDIBLEVISUAL NOTIFICATION APPLIANCE CIRCUITS, CLASS A, STYLE D WIRING SEE 9000-0007 Para. 7 (NOTES 15 & 21)



NOTE: To determine the maximum number of FCI approved, UL Listed, (compatible) two-wire photoelectric or ionization detectors, FCI CPD, PSD, 301 and SBS series per circuit, see FCI Addendum, P/N 9000-0427. When configuring the initiating circuits for Class A, Style D, the FCI model VEOL (P/N 1120-0141) may be required.

NOTES

1. JT Cut to transmit system trouble to remote station via telephone line. (Terminals **25 & 26**)
Relay K1 required.
2. JL Cut if reversing relay (K2) latch is NOT desired.
3. J12 Cut when using remote station signal via telephone line. (Terminals **25 & 26**)
4. J13 Cut if RTI Remote Trouble Indicator is NOT used.
5. JRT1 Cut if RTI Remote Trouble Indicator is used.
6. J11 Cut if TCM-6, BMC-6 or CCM-6 is installed.
7. JS3 Cut if supervision of Terminals **3 & 4** is desired.
8. JS5 Cut if supervision of Terminals **4 & 5** is desired.
9. JRA/JRB Cut on each zone where remote zone LED annunciator is used. Cut on each zone where Double Density Zone Detector Module (ZDM-D) is used.
10. J10A/10B Install to the right of the last zone in system unless followed by an auxiliary module (ADAM, SRB, etc.)
11. J22 Cut to disable the Battery Bell Test from activating Bus 6.
12. JRR Cut to enable the city box switch to control the reversing relay.

13. Diode Jumper Position:

(Odd Zones- 1, 3, 5, etc.) (Even Zones- 2, 4, 6, etc.)

		Function
J1A	J1B	Alarm will activate master box/rel. output only.
J2A	J2B	Alarm will activate Bus 2.
J3A	J3B	Alarm will activate notif. appliance circuits, Rev. relay, master box.
J4A	J4B	Alarm will activate aux. notif. appl. output only. (Terms. 3 & 5)
J5A	J5B	Alarm will activate Bus 5.
J6A	J6B	Alarm will activate Bus 6.

14. Δ Denotes supervised wiring.
- Denotes optional or accessory.
- * Except for master box output, A.C. supply circuit and standby battery circuit.

15. Relay	Number	Location	Part No.
Power Transfer Relay	K4	BMFC-6	26592
Rev. & Signal Relay	K2 & K3	BMFC-6	4500-0024
Trouble Relay	K1	BMFC-6	4500-0024
Transfer Relay	K1	PS-6	26592

16. EOL-D = 3.9K 1/2 watt, 5% resistor.
Optional EOL-D = 3.3K 1/2 watt 5% resistor (For use with ZDM module only in Class B, Style B circuits of up to 750 ohms circuit resistance.) (Not FM Approved)
17. When system is supplied in two or more enclosures, mount adjacent with inter-connection cable in metallic raceway.
18. To determine the appropriate standby batteries needed, see Section 19.
19. Main supply circuit input: 120 VAC, 60 Hz @ 2 amp./non-power limited circuit, output 24 VDC nominal @ 4 amp. See Sections 11 & 20.
20. Standby battery circuit: Input 24 VDC nom. non-power limited circuit, output 27.2 VDC, 0.9 amp. max.
21. Initiating circuit output: 24 VDC nom. supervisory, 0.035 amp. max. alarm, power limited circuit. See Section 16.
22. Notification appliance circuits: Output 24 VDC nom., 1.75 amp. max. alarm, power limited circuit. See Section 7.
23. Supplementary notification appliance circuits-auxiliary alarm output: 24 VDC nom., 0.50 amp. max. alarm per output, power limited circuit. See Section 6.
24. Polarity reversal circuit: 24 VDC nom., 0.13 amp. max., power limited circuit. See Section 12.
25. City Master box output: 24 VDC nom., 0.5 amp. max. alarm, non-power limited circuit. See Section 5.
26. Annunciator circuit: 24 VDC nom., 0.5 amp. max. alarm, power limited circuit. Do not connect any load in excess of 0.1 amp.
27. RTI circuit: 24 VDC nom., 0.005 amp. max., power limited circuit. See Section 10.
28. Central Station connection per NFPA 72. See Section 24.
29. Proprietary Supervising Station System connection per NFPA 72, see Section 25.
30. Fuses:
 - F2 - Standby battery
 - F8 - Main Power Limiter, permanent. 5A

