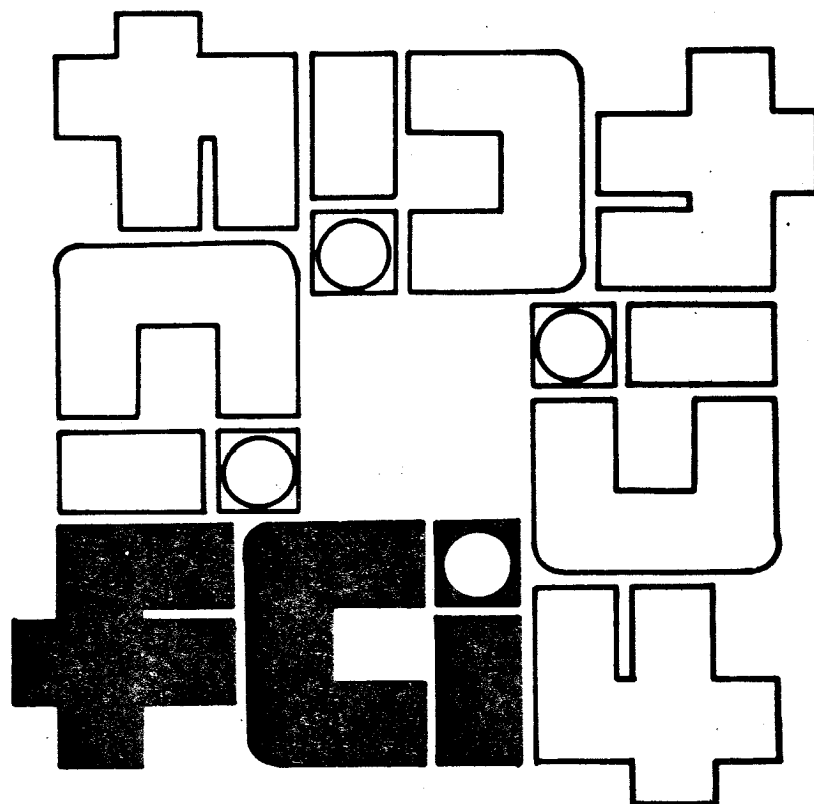




**Fire
Control
instruments, inc.**
269 Grove Street,
Newton, MA 02166

**90000007
INSTRUCTION MANUAL**

7/84



FC-72 SERIES FIRE ALARM CONTROL

MODEL NO. FC-72-05 BEM

SERIAL NO. 38082

CH12

TABLE OF CONTENTS

PARAGRAPH		PAGE
I.	FUNCTIONAL SWITCHES	1
II.	GROUND FAULT DETECTION	1
III.	SHORT CIRCUIT DETECTION	1
IV.	JUMPERS AND JUMPER MATRIX	1
1.	MUNICIPAL BOX CONNECTION	2
2.	AUXILIARY ALARM OUTPUTS	2
2.1	PRE-SIGNAL FEATURE	3
3.	SIGNALLING CIRCUITS	3
3.1	WIRING	3
3.2	SIGNAL CIRCUIT WIRING ESTIMATOR	4
4.	COMMON ALARM DRY CONTACTS	5
5.	REMOTE TROUBLE INDICATOR CONNECTION	5
6.	TROUBLE DRY CONTACTS	5
7.	EARTH GROUND	5
8.	POLARITY REVERSAL FEATURE	6
9.	AUXILIARY POWER OUTPUT	6
10.	SMOKE DETECTOR OUTPUT	6
11.	ZONE ALARM DRY CONTACTS	6
12.	INITIATING CIRCUITS	7
12.1	INITIATING WITH ZONE DETECTOR MODULE	7
12.2	INITIATING CIRCUITS WITH SPRINKLER SUPERVISORY MODULE	8
13.	REMOTE ZONE ANNUNCIATOR	9
14.	ACCESSORY ZONE OUTPUT	9
15.	STAND-BY BATTERY CONNECTIONS	9
16.	POWER SUPPLY	11
17.	FUSES	11
18.	LOCATING A TROUBLE	11
19.	FCI APPROVED, U.L. LISTED (MULTIPLE LISTED), TWO WIRE PHOTOELECTRIC AND IONIZATION SMOKE DETECTORS	12

I. FUNCTIONAL SWITCHES

Trouble Silence Switch (Fig. 1A)

This switch, when operated, will silence the System Trouble Audible when a System Trouble occurs. Upon correction of the trouble condition, the audible will sound again to indicate that the switch be returned to the normal position.

Battery Bell Test Switch (Fig. 1A)

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 signalling devices from the stand-by batteries. OPERATING THIS SWITCH WILL NOT REVERSE TELEPHONE LINES OR ACTIVATE THE MASTER BOX OUTPUT.

Lamp Test Switch (Fig. 1A)

This switch will light all RED LED alarm indicators, all YELLOW LED trouble indicators on ZDM's, and all Remote Zone Annunciators (RZA's). All alarm indicators are supervised.

Reset Switch (Fig. 1A)

This switch 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. 1B)

This switch will disable the City Box Output and/or Polarity Reversal Output (JRR must be cut for Polarity Reversal disable). 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 on until the master box and the control are reset.

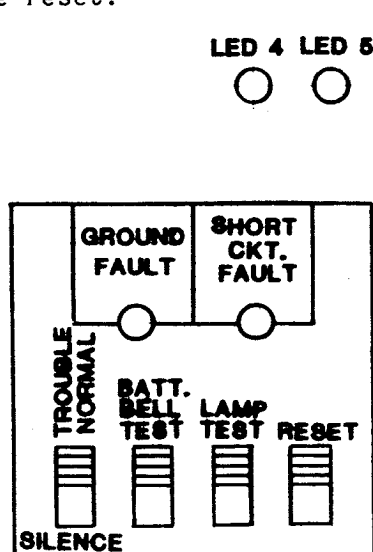


FIGURE 1A

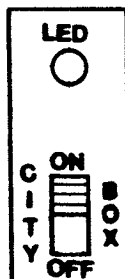


FIGURE 1B

Zone Signal Silence Switch (Fig. 11)

Each zone has a SIGNAL SILENCE SWITCH. When an alarm is initiated from a zone, the signals may be silenced by operating its Zone Silence Switch. This will also cause both a System and a Zone Trouble. Subsequent alarm signals from other zones are not interfered with by the operation of any one zone silence switch. NOTE: THIS SWITCH WILL NOT AFFECT THE ZONE ALARM DRY CONTACTS.

II. GROUND FAULT DETECTION (Fig. 1A)

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.

To locate the source of the ground fault, individually remove each external wire from the FC-72, then use an OHM meter on the Rx100 scale to measure the resistance from each wire to ground. The meter should read an open circuit, if not, check the field wiring.

NOTE: TERMINAL 24 OF THE FC-72 MUST BE CONNECTED TO AN EARTH GROUND PER ARTICLE 760 OF N.E.C. (CONDUIT GROUND IS NOT ACCEPTABLE) FAILURE TO MAKE THIS CONNECTION WILL RESULT IN THE LOSS OF GROUND FAULT SUPERVISION AND THE REDUCTION IN LIGHTNING PROTECTION.

III. SHORT CIRCUIT DETECTION (Fig. 1A)

The signal circuit wiring terminals (6-13) are supervised for short circuits across either signal circuit. When a short circuit is present the YELLOW SHORT CIRCUIT LED will light, and a System Trouble will occur. See para. 3

IV. JUMPERS AND JUMPER MATRIX (Fig. 2)

JUMPER	FUNCTION
J-11	Cut if a BMC-6 or CCM-6 is used
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-9 & J-10	Cut the jumper to the left of each zone card installed (SSM or ZDM)
J-L	Cut when coded initiating devices are used, -- jumper located on zone card

J-R Cut this jumper on each zone that an RZA (Remote Zone Annunciator) is used

JRR Cut if the City Box Switch is required to disable the Polarity Reversal Output in alarm

J-RTI Cut if RTI is used--jumper located next to Terminals 17-19

JT Cut to transmit System Trouble to Remote Station via telephone lines (term.'s 25 & 26)

JS3 Cut for supervision of Terminals 3 & 4

JS5 Cut for supervision of Terminals 4 & 5

2. DO NOT connect this resistor to the master box or transmitter. Leave it in the bottom of the control cabinet for troubleshooting purposes. Connect master box wiring to terminals 1(+) and 2(-). Field wiring must not exceed 35 OHMS. Check with a meter before making final connections.

TO DISABLE THE MASTER BOX SWITCH CONSULT THE FACTORY.

TROUBLESHOOTING THE MASTER BOX CIRCUIT

PROBLEM:

1) City Box LED Lit

CAUSE

Open in wiring or trip coil

Switch in the OFF position

Control in alarm

Master Box not reset

ACTION TO BE TAKEN

Replace resistor -- if LED restores, check for opens with a meter

Return switch to the ON position

Reset Control

Reset Master box

2. AUXILIARY ALARM OUTPUTS (Fig. 3)

TERMINALS 3, 4, AND 5

Terminals 3, 4, and 5, comprise two 24 VDC auxiliary alarm outputs. These outputs are a function of the jumper matrix; the most common use is with the Sprinkler Supervisory Module (SSM) and Pre-Signaling Systems. These outputs may be configured for either supervised or non-supervised operation.

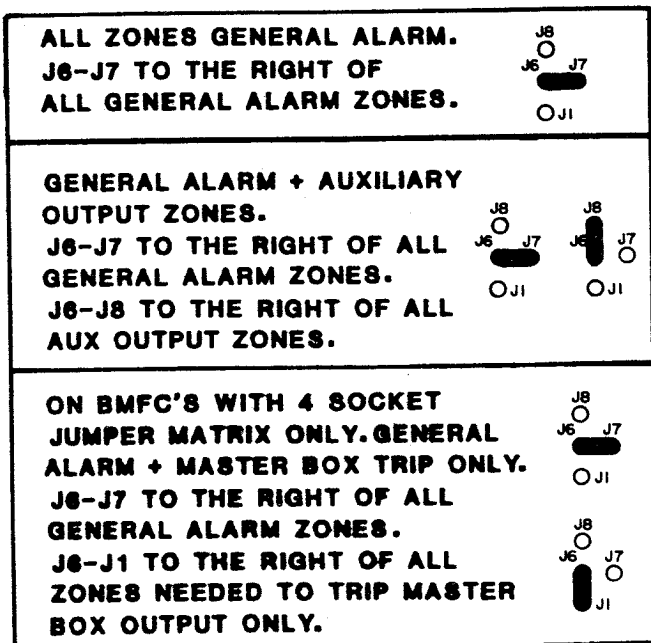


FIGURE 2

1. MUNICIPAL BOX CONNECTION (Fig. 3)

NOTE: WIRING TO A MUNICIPAL MASTER BOX MUST COMPLY WITH NFPA AUXILIARY PROTECTIVE SIGNALLING SYSTEMS.

TERMINALS 1 & 2

Terminals 1 and 2 are for the supervised connection of a local energy master box. There is a 24 VDC output on these terminals in the alarm mode. 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 is inhibited, the YELLOW LED above the switch will light, and a System Trouble will occur. NOTE: THIS OUTPUT IS CURRENT LIMITED THE OUTPUT VOLTAGE DEPENDS ON CIRCUIT CONNECTED.

To connect the master box remove the 220 OHM, 5 WATT resistor from terminals 1 and

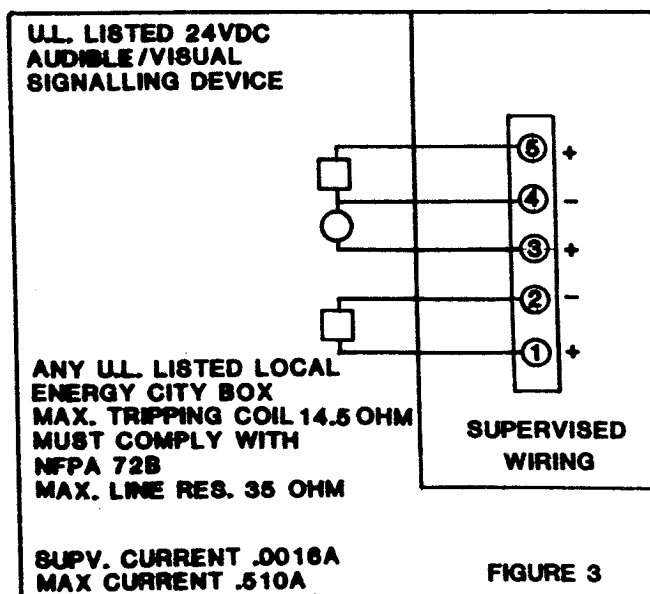


FIGURE 3

Terminal 4 is negative (-) and terminals 3 and 5 are positive(+). Connect any of the following compatible devices to the terminals per Figure 3.

HP-24	VIBRATING HORN
BP-24	VIBRATING BELL
FSL	FLASHING STROBE
FSL/HP-24	FLASHING STROBE W/VIBRATING BELL

To make any zone activate the Auxiliary Outputs, arrange jumpers as follows:

Install a J6 to J8 jumper to the right of each zone used for this output.

To supervise these outputs, arrange and cut the jumpers as follows:

(this output is only supervised to the first device--DO NOT exceed one device per output)

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.

The Output Parameters of the Auxiliary Alarm Output are as Follows:

VOLTAGES

24 VDC NOMINAL
.071 VAC (RMS) MAX. RIPPLE VOLTAGE

CURRENTS

.500 AMP -- MAX. ALARM
.002 AMP -- NORMAL STANDBY

2.1 PRE-SIGNAL FEATURE (Fig. 3)

NOTE: THE WIRING TO A PRE-SIGNAL ALARM BELL AND THE ALARM BELL ITSELF MUST BE INSTALLED WITHIN THE SAME ROOM AS THE CONTROL. ALSO, THE BELL-CIRCUIT CONDUCTORS MUST BE INSTALLED IN CONDUIT OR HAVE EQUIVALENT PROTECTION AGAINST MECHANICAL INJURY AND TAMPERING.

To configure the FC-72 for pre-signaling install the J6 and J7 jumpers for general alarm, as described above. Install J6 to J8 jumpers to the right of all pre-signal zones. (See Fig. 2) Then connect general alarm signals to the common alarm output, terminals 6 through 13. Connect

pre-signal device to terminals 3, 4, and 5 using the directions above. DO NOT EXCEED .500 AMPS PER OUTPUT.

3. SIGNALLING CIRCUITS (Fig. 4A & 4B)

NOTE: USE ONLY 24VDC POLARIZED DEVICES.

TERMINALS 6-13

There are two signalling circuits on the BMFC, each rated at 1.75 AMPS, which operate in unison. Terminals 6,7,8, and 9, are circuit #1, and terminals 10,11,12, and 13 are circuit #2. Each circuit is individually fused and supervised for opens, grounds and shorts.

The output of these circuits is controlled through a signal circuit module. There are three standard modules which can be used with the FC-72 signal circuits.

- 1) BCM-6 Bell Card Module, provides a continuous, non-coded output on the signal circuits.
- 2) BMC-6 Master Coder Module, provides an adjustable on-off duty cycle (march time pattern).
- 3) CCM-6 Common Coder Module, provides a variety of common coded signals, programmable in the field.

NOTE: J-11 must be cut when using either coder module (BMC-6 or CCM-6) on the BMFC.

Each Signal Circuit Module has a Yellow Signal Circuit fault LED for indicating the following trouble conditions:

- 1) An open in the signalling circuit wiring
- 2) An open in the signal relay (K3) coil
- 3) An open fuse in either signalling circuit

3.1 WIRING

CLASS A WIRING (Fig. 4A)

SIGNAL CIRCUIT 1, remove the 3.9K OHM, 1/2 WATT, resistor from terminals 6(-) and 9(+), and connect resistor to terminals 7 and 8. Connect field wiring to terminals per Figure 4A.

SIGNAL 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 4A.

NOTE: DIVIDE LOAD EVENLY BETWEEN BOTH SIGNALLING CIRCUITS. BE SURE TO OBSERVE POLARITY.

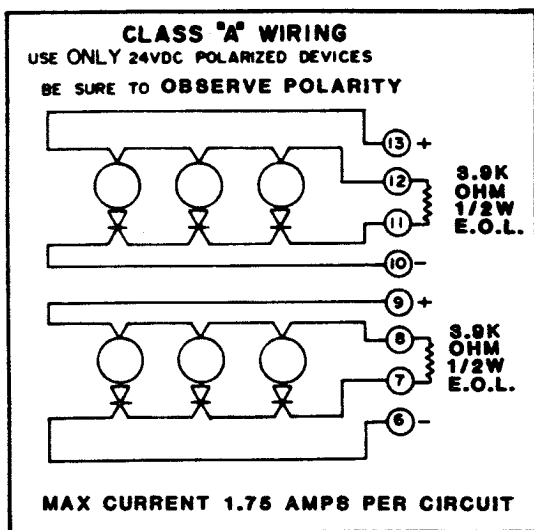


FIGURE 4A

CLASS B WIRING (Fig. 4B)

SIGNAL 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 4B. BE SURE TO OBSERVE POLARITY

SIGNAL CIRCUIT 2, Follow the same procedure as above, except terminal 10 is negative(-), and terminal 13 is positive(+).

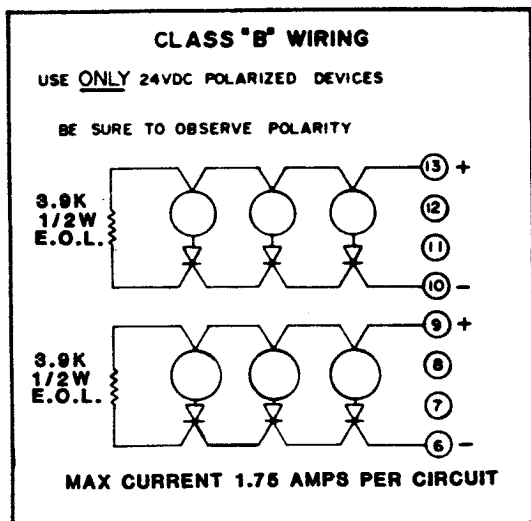


FIGURE 4B

NOTE: DIVIDE LOAD EVENLY BETWEEN BOTH SIGNALLING CIRCUITS. BE SURE TO OBSERVE POLARITY, AND CHECK ALL WIRING PRIOR TO CONNECTION.

TROUBLESHOOTING THE SIGNAL CIRCUIT

PROBLEM:

1) Yellow LED on Signal Circuit Module

CAUSE	ACTION TO BE TAKEN
Open in Signal Ckt. wiring	Remove wiring and check for opens
Fuse open	Replace fuse
Relay coil defective (K3)	Check coil for 700 OHMS replace if necessary

2) Short circuit LED lit

CAUSE	ACTION TO BE TAKEN
Short circuit in field wiring	Check signalling circuits for shorts (See section on short circuit LED)

Non-polarized devices used	Use polarized devices
----------------------------	-----------------------

3) Signals will not operate

CAUSE	ACTION TO BE TAKEN
Reversed polarity on signals	Correct polarity of signalling devices
Fuse open	Replace fuse
Signal relay not operating (K3)	Check relay and replace if necessary

The output parameters for the Signal Circuit are as follows:

VOLTAGES

24 VDC REGULATED
.071 VAC (RMS) MAX. RIPPLE VOLTAGE

CURRENTS

1.75 AMP -- MAX. ALARM
.0017 AMP -- NORMAL STANDBY

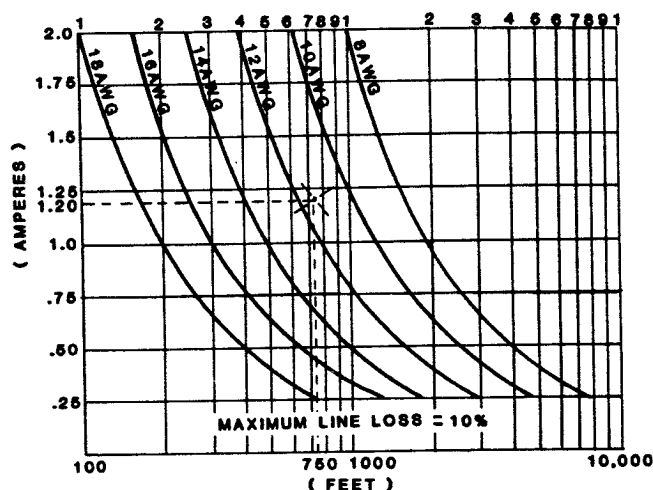
3.2 SIGNAL CIRCUIT WIRING ESTIMATOR

Use the chart to determine the required wire size for each signal circuit.

- 1) Compute required signal current. (Number of bells x bell current AMPS)
- 2) Compute distance in feet from panel to last signalling device.
- 3) Find signal AMPS (amperes) on vertical axis of graph. Find length of signal run on horizontal axis of graph. Find crosspoint.

4) Read wire size in AWG on the curved line to the right of the crosspoint.

5) Example - Find the required wire size for 1.2 AMPS of signal current and a wire run distance of 750 feet.



NOTE: FOR WIRE LENGTHS LESS THAN 100 FEET USE 18 AWG MINIMUM.

4. COMMON ALARM DRY CONTACTS (Fig. 5)

TERMINALS 14, 15, & 16

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

CONTACT RATINGS: 26 VDC
5 AMPS
(RESISTIVE ONLY)

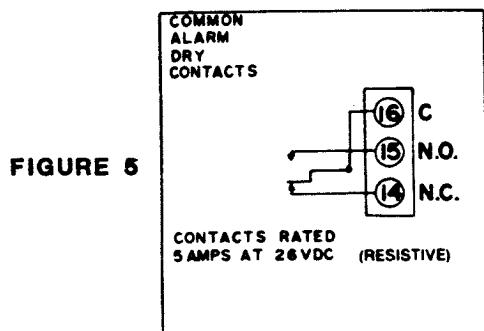


FIGURE 5

5. REMOTE TROUBLE INDICATOR CONNECTION (FIG. 6)

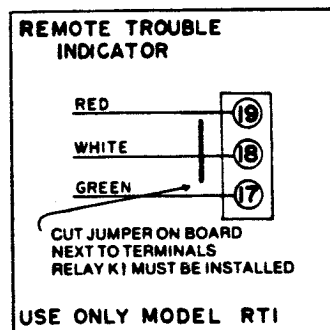
TERMINALS 17, 18, & 19

These terminals 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 show a trouble.

To use the RTI, install trouble relay K1 (FCI 26593). Cut the jumper (JRTI) which is located to the LEFT of terminals 17, 18, and 19. Connect the RTI per Figure 6.

CIRCUIT RATINGS: 24 VDC
.004 AMPS MAX.

FIGURE 6



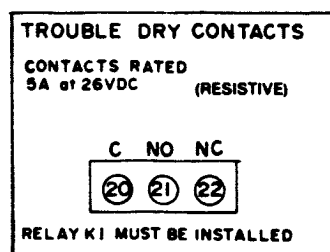
6. TROUBLE DRY CONTACTS (FIG. 7)

TERMINALS 20, 21, & 22

Whenever a System Trouble occurs, the System Trouble Dry Contacts will transfer. Terminal 20 is common, terminal 21 is normally open, and terminal 22 is normally closed. See Figure 7.

CONTACT RATINGS: 26 VDC
5 AMPS
(RESISTIVE ONLY)

FIGURE 7



7. EARTH GROUND (Fig. 8)

NOTE: THE FC-72 MUST BE CONNECTED TO (EARTH) GROUND, PER ARTICLE 760 OF THE NATIONAL ELECTRICAL CODE

TERMINAL 24

The ground 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 the loss of the ground fault supervision and a reduction in lightning protection. MINIMUM WIRE SIZE #14 AWG.

8. POLARITY REVERSAL FEATURE (Fig. 8)**TERMINALS 25 & 26**

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 .130 AMPS. 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 (25 will now be negative and 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 a subsequent alarm signal. Relay K1 must be installed in order to transmit a trouble.

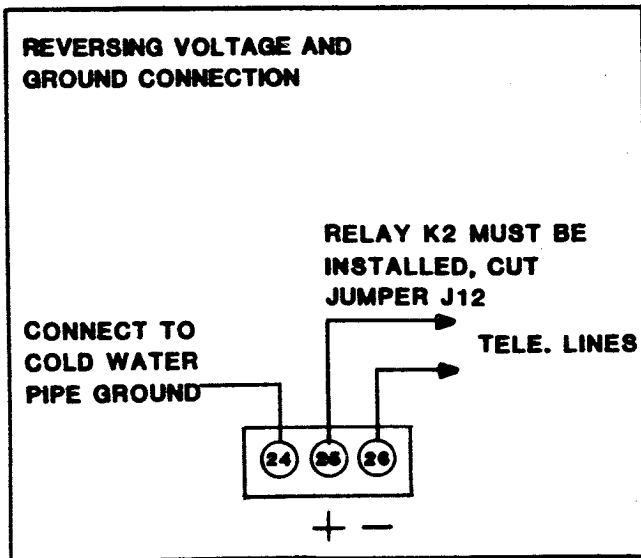
The output parameters for the polarity Reversal Circuit are as follows:

VOLTAGES

17 VDC MINIMUM
24 VDC MAXIMUM
.071 VAC (RMS) MAX. RIPPLE VOLTAGE

CURRENTS

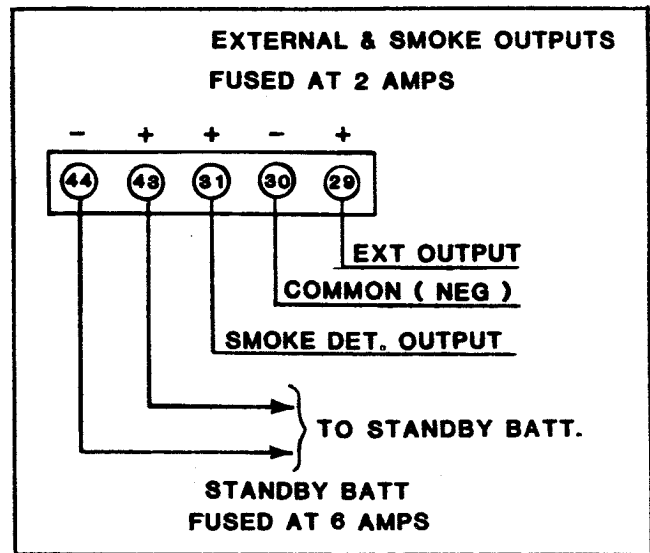
.130 AMP -- MAXIMUM ALARM
.010 AMP @ 24 VDC -- NORMAL STANDBY

**FIGURE 8****9. AUXILIARY POWER OUTPUT (Fig. 9)****TERMINALS 29 & 30**

Terminals 29(+) and 30(-) supply a

continuous 24 VDC output. This output is separately fused at 2 AMPS and is NOT interrupted by the reset switch.

NOTE: DO NOT EXCEED 1.75 AMPS.

**FIGURE 9****10. SMOKE DETECTOR OUTPUT (Fig. 9)****TERMINALS 30 & 31**

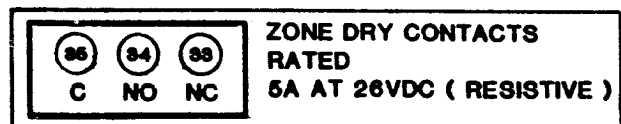
Terminals 30(-) and 31(+) are for the power connection of 4 wire photoelectric and/or ionization smoke detectors. This output is separately fused at 2 AMPS and supplies regulated and filtered 24 VDC. Operation of the reset switch interrupts this output to reset all detectors.

NOTE: DO NOT EXCEED 1.75 AMPS

TWO WIRE PHOTOELECTRIC OR IONIZATION SMOKE DETECTORS MUST NOT BE CONNECTED TO THESE TERMINALS. SEE SECTION ON ZDM--PARA. 12.

11. ZONE ALARM DRY CONTACTS (Fig. 10)**TERMINALS 33, 34 & 35**

A set of Form C dry contacts rated 5 AMPS at 24 VDC (resistive) are provided for each zone that a ZDM is used. Terminal 35 is common, 34 is normally open, and 33 is normally closed. 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 signal silence switch WILL NOT AFFECT THESE CONTACTS. Jumpers in matrix are not required to operate these contacts.

**FIGURE 10**

12. INITIATING CIRCUITS

12.1 INITIATING WITH ZONE DETECTOR MODULE (Fig. 10A & 10B)

TERMINALS 37, 38, 39, AND 40

Terminals 37 through 40 are provided for each zone, and will accept any normally open initiating devices such as heat detectors, thermostats and manual stations.

FCI Approved, U.L. Listed (Multiple Listed), 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 MAXIMUM of 25 detectors.

One ZDM is required for each active zone and will accept either Class A (4 wire) or Class B (2 wire) circuits. Each zone module has an individual silence switch as well as a supervised RED alarm LED and a YELLOW trouble LED.

The output parameters for the Initiating Circuits with ZDM's are as follows:

VOLTAGES

24 VDC REGULATED
.672 VAC (RMS) MAX. RIPPLE VOLTAGE

CURRENTS

.100 AMP -- MAX. ALARM
.006 AMP -- NORMAL STANDBY

A. CODED OPERATION

All ZDM(S) are normally configured in the LATCH mode of operation. If coded operation (from coded initiating devices) is desired, cut the latch jumper located just below the relay on the appropriate ZDM(S).

B. WATERFLOW DETECTION

When using the zone detector module (ZDM) for waterflow alarm detection, the silencing switch must be bypassed, (per U.L. 864). Please consult the factory when using this mode. The audible devices can only be silenced after the waterflow device has been restored to normal, and the control reset switch has been restored. This circuit may be wired Class A or Class B.

C. GENERAL ALARM --ZONE JUMPER CONFIGURATION

The zone jumper plugs and zone supervision jumpers should be configured in the following ways for general alarm zones.

ONE ZONE - When only one zone is used,

the J9-J10 jumper to the right of the zone (zone one) should NOT be cut. The J6-J7 jumper plug should be in place.

TWO OR MORE ZONES - When two or more zones are used the J6-J7 jumper plug should be in place to the right of each zone. The J9-J10 jumper to the LEFT of each zone should be cut for supervision.

D. WIRING

Class A Operation (Fig. 10A)

This configuration is also suitable for Style A, B, or C per NFPA 72D.

Remove the 3.9K OHM, 1/2 WATT resistor from terminals 37 and 40, and connect resistor to terminals 38 and 39. Then connect field wiring per Figure 10A. THE MAXIMUM ALLOWABLE RESISTANCE IN THE FIELD WIRING IS 100 OHMS PER ZONE.

U.L. Listed N.O. Detection Devices or 4 Wire Smoke Detectors may be used. For FCI approved, U.L. Listed (multiple listed) two wire smoke detectors, see para.19.

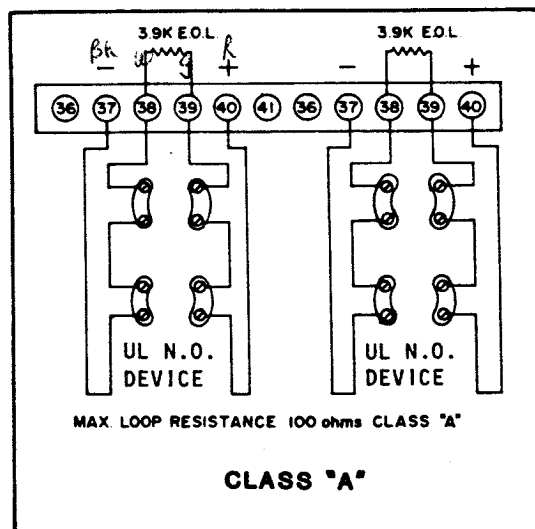


FIGURE 10A

Class B Operation (Fig. 10B)

This configuration is also suitable for Style A or B, per NFPA 72D

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(+). Per Figure 10B.

The maximum allowable resistance in the field wiring is 100 OHMS per zone. Prior to installing the wires on terminal 37 and 40, place your ohm meter on the Rx100 scale and read across the loop. You should read between 3900 and 4000 OHMS.

U.L. Listed N.O. Detection Devices or 4 Wire Smoke Detectors may be used. For FCI approved, U.L. Listed (multiple listed) two wire smoke detectors, see para. 19.

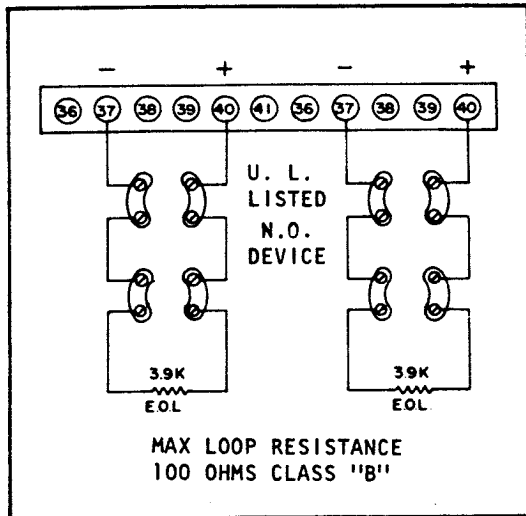


FIGURE 10B

E. ZDM TROUBLESHOOTING (Fig. 11)

PROBLEM:

- 1) Zone trouble LED lit.

CAUSE

Silence switch in off position

Initiating circuit open

Remote alarm indicator defective or field wiring open

Zone alarm LED defective

Zone relay coil open

ACTION TO BE TAKEN

Slide silence switch to normal position

Check circuit (on BMFC/ZMC) for opens—should read between 3900 and 4000 OHMS

Press lamp test switch (on BMFC) while someone observes remote indicator. If remote indicator does not light, check field wiring. If no remote indicator is used, be sure jumper JR is not cut, or that terminals 36 and 41 are connected (on BMFC/ZMC)

Press Lamp Test Switch. If RED LED does not light, replace ZDM

Check relay coil (Should be 185 OHMS) replace if defective

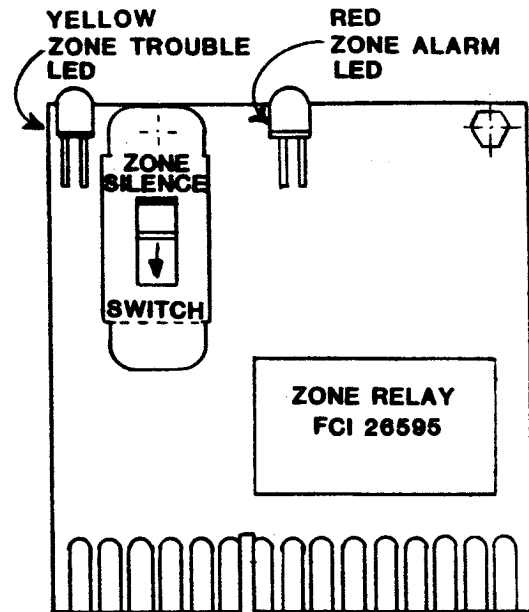


FIGURE 11

12.2 INITIATING CIRCUITS WITH SPRINKLER SUPERVISORY MODULE (SSM) (Fig. 12)

TERMINALS 33, 34, AND 35

The SSM can be used in place of a ZDM. It provides two N.C. zones of detection with separate indication per zone (RED LED). Any number of these modules may be used in a control. It has a number of uses, but its primary function is for monitoring the status of sprinkler supervisory switches, (OSYS-B, PIV-B, etc.).

When an SSM is used, terminal 34 is common with one normally closed circuit between 34 and 35, and the other between 34 and 33. Terminals 36 and 37 become N.O. dry contacts that close when either zone is tripped.

The output parameters of the initiating circuits with sprinkler supervisory modules are as follows:

VOLTAGES

24 VDC REGULATED
.672 VAC (RMS) MAX. RIPPLE VOLTAGE

CURRENTS

XX AMP -- MAX. ALARM
.010 AMP -- NORMAL STANDBY

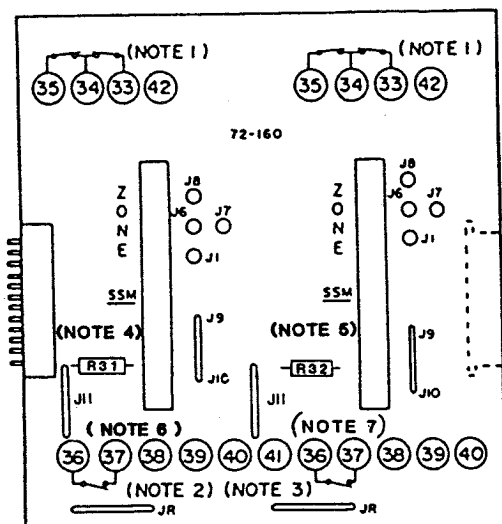
NOTE: When using an SSM module in the FC-72 system and terminals 36 and 37 (normally open dry contacts) are being used, the BMFC and /or the ZMC must be configured in the following way:

- A) The JR Jumper directly below the

B) The jumpers on the BMFC and/or ZMC must be configured as follows:

NOTE: If the required jumpers are not configured as described above, contact the factory. If the dry contacts are not required, it is not necessary to have these jumpers configured as described.

The output of the SSM may be used in the same way as the ZDM to provide general alarm signals, city box trip, and reverse polarity. Its most common use is to provide a separate 24 VDC output on terminals 3 (+), 4 (-), and 5 (+), (See para. 2). These outputs are a function of the jumper matrix. Install a J6 to J8 jumper to the RIGHT of each SSM (See Below). If you wish to supervise this output, see para. 2.

**FIGURE 12**

Notes for use with Figure 12:

- 1) Two normally closed initiating circuits per zone

- 2) JR jumper for odd zones
- 3) JR jumper for even zones
- 4) R31 resistor for zone 1
- 5) R32 resistor for zone 2
- 6) J11 jumper for odd zones
- 7) J11 jumper for even zones

13. REMOTE ZONE ANNUNCIATOR (RZA)

TERMINALS 36 AND 41

Terminals 36 and 41 are provided for each zone in the system. They are for the connection of the supervised remote zone annunciator (RZA). Should a break in the field wiring, or the annunciator occur, a zone and System Trouble will occur. This output is current limited to .040 AMPS.

To connect a model RZA, connect the common from the RZA to terminal 41 between zones 1 and 2. Then connect each of the individual LED wires from the RZA to terminal 36 of the appropriate zone (cut JR for each zone that annunciation is desired).

14. ACCESSORY ZONE SIGNAL OUTPUT

TERMINALS 42 AND 47

- A. Alarm by Zone Output Terminal 42.
This is to be used only with FC-72 series accessories, SRB-2, RB-2, etc. It provides a 24 VDC alarm output per zone.
- 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 24 VDC trouble output per zone.

NOTE: DO NOT CONNECT ANY EXTERNAL DEVICES
TO THESE TERMINALS.

15. STAND-BY BATTERY CONNECTIONS (Fig. 9)

TERMINALS 43 AND 44

These terminals are for the connection of sealed lead acid (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 charging batteries with capacity ratings between 4.5 and 12 AMP HOURS. The maximum charge rate is limited to .900 AMPS.

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

TO CALCULATE STAND-BY REQUIREMENTS USE THE FOLLOWING STEPS:

1. TOTAL THE REQUIRED SUPERVISORY CURRENT AS DETERMINED BY THE CHART.
2. ADD TO STEP 1, ANY EXTERNAL SUPERVISORY CURRENT REQUIREMENT, (SMOKE DETECTORS, TELEPHONE LINES, ETC.).
3. MULTIPLY STEP 2 TIMES REQUIRED NUMBER OF HOURS IN SUPERVISORY.
4. TOTAL, THE REQUIRED ALARM CURRENT AS DETERMINED BY THE CHART.
5. ADD TO STEP 4 ANY EXTERNAL ALARM CURRENT REQUIREMENTS, (BELLS, HORNS, ETC.).
6. MULTIPLY STEP 5 TIMES REQUIRED NUMBER OF MINUTES IN ALARM
7. MULTIPLY STEP 3 TIMES 1.2
8. MULTIPLY STEP 6 TIMES .034
9. ADD STEP 7 AND 8 TO DETERMINE REQUIRED BATTERY AMPHOUR CAPACITY.

EXAMPLE: AN FC-72/ADAM-6-1 (FOUR ZONE CONTROL WITH AN ADAM-6-1) POWERING 8 SMOKE DETECTORS (.005A

EACH SUPERVISORY) AND 2.5 AMPS OF BELL, FOR 24 HOURS IN SUPERVISORY AND 5 MINUTES IN ALARM.

CALCULATIONS USING THE ABOVE DIRECTIONS STEP BY STEP:

STEP:

- | | | |
|-----|---------|--|
| (1) | .063A | FC-72-1, SUPERVISORY |
| + | .018 | 3 ADD'L ZONES(SUPRV) |
| | .013 | ADAM-6-1, SUPERVISORY |
| | .094 | |
| (2) | .040 | 8 SMOKE DET.'S(SUPRV) |
| | .134 | |
| (3) | x 24 | HOURS IN SUPERVISORY |
| | 3.216 | AMP HOURS |
| (4) | .370 | FC-72-1, ALARM |
| + | .489 | 8 ADD'L ZONES ALARM |
| | .073 | ADAM-6-1, ALARM |
| | .932 | |
| (5) | + 2.500 | 2.5 AMPS-BELLS ALARM |
| | 3.432 | |
| (6) | x 5 | MINUTES IN ALARM |
| | 17.160 | |
| (7) | 3.86 | [3.216 x 1.2] |
| (8) | + .58 | [17.160 x .034] |
| | 4.44 | REQUIRED AMPHOUR CAP-
ACITY FOR BATTERIES |

MODEL	DESCRIPTION	STANDBY POWER REQUIRED	
		SUPERVISORY CURRENT	ALARM CURRENT
FC-72-1	1 Zone Control Panel (1)	.063A	.370A
ADAM-6-1	Auxiliary D.C. Actuation Module	.013	.073A
ADAM-6-2	Dual Aux. D.C. Actuation Module	.026	.133A
APS-6	Auxiliary Power Supply, 24VDC/4A	.020	- - -
BCM-6	Signal Circuit Module	(2)	(2)
BMC-6	Master Coder Module	(2)	(2)
BMFC-6	Basic Master Fire Card	(1)	(1)
CCM-6	Common Coder Module	(2)	(2)
DMM	Diode Matrix Module	- - -	- - -
LBM	Battery Monitor	- - -	- - -
PS-6	Power Supply, 24VDC/4A	- - -	- - -
RB-2	Auxiliary Relay Module	- - -	.070(4)
RRT	Remote Reset Capability	(3)	(3)
RT	Trouble Relay	- - -	- - -
RTI	Remote Trouble Indicator	.002	.002
RZA	Remote Zone Annunciator (LED)	- - -	- - -
SRB-2	Supervised Auxiliary Relay Module	.019	.079(4)
SSM	Sprinkler Supervisory Module	.027	.069(4)
TBZ	Trouble By Zone Module	.003	.021/Zone
TDS438	Time Delay Switch	- - -	.001
ZMC	Zone Mother Card	- - -	- - -
ZMC-A	Zone Mother Card	- - -	- - -
ZMC-B	Zone Mother Card	- - -	- - -
ZDM	Zone Detector Module (ea. additional zone)	.006	.163

NOTES:

- (1) FC-72-1 contains BMFC-6, PS-6, 1 ZDM and 1 BCM-6, BMC-6 or CCM-6.
- (2) Included in BMFC-6 and/or ADAM-6 Power Requirements as above.
- (3) Consult factory.
- (4) With both circuits in alarm

16. POWER SUPPLY

The output of this power supply is filtered and regulated 24 VDC at 4 AMPS. It complies with U.L. STANDARD 864.

The transformer is a 120 VAC to 33 VAC stepdown. The transformer secondary is fused at 6 AMPS.

Connect the power supply to 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 SIGNALLING 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.

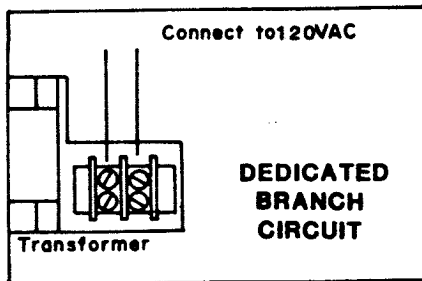


FIGURE 13

17. FUSES

All major circuits on the FC-72 are independently fused as shown. There is also a 6 AMP fuse protecting the power supply.

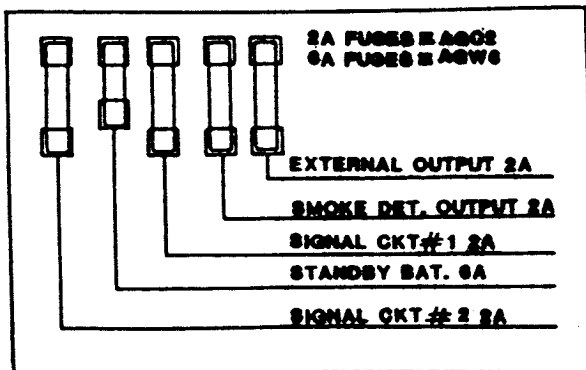


FIGURE 14

18. 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 failure	Check 120 VAC input Check fuse on PS-6 Check green AC LED Check all fuses Check for 24-26 VDC across volt meter terminals on power supply.
Module unplugged	Replace missing module or connect J9-J10 after last active zone.
Remote trouble	Connect Jumper between terminal 17 and 19. If trouble clears check RTI and associated wiring.
Supervisory transmitter or signal failure	Disconnect wiring on terminals 3,4,5, and connect 220 OHM, 5 WATT resistors between 3-4, 4-5. If trouble clears check lines for 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 signalling circuits will continue to function, but THERE WILL BE NO ELECTRICAL SUPERVISION DURING THIS PERIOD.

19. FCI APPROVED, U.L. LISTED (MULTIPLE LISTED), TWO WIRE PHOTOELECTRIC AND IONIZATION SMOKE DETECTORS

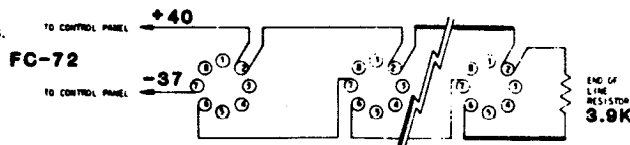
Only FCI approved two wire photoelectric and/or ionization Smoke Detectors, which are U.L. Listed for use with the FC-72 Control Panel, may be used. The

following drawings identify by part number those FCI approved, U.L. Listed (Multiple Listed) models that should be used and the wiring procedure for each model. A maximum of 25 two wire FCI approved Smoke Detectors may be connected to each zone.

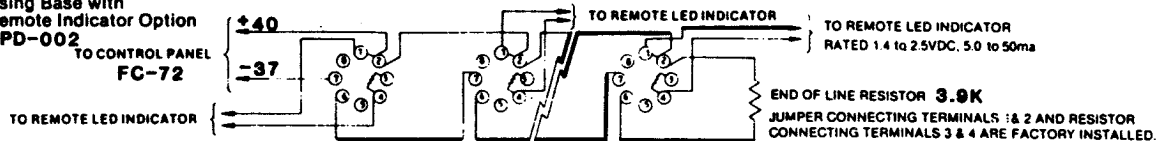
	CPD 7021	PSD 7111,7112	PSD 7121,7122
STANDBY RATINGS			
CURRENT @ 24VDC	60mA	85mA AVERAGE	60mA AVERAGE
OPERATING VOLTAGE RANGE	18-40 VDC	18-40 VDC	12-32 VDC
MAXIMUM RMS RIPPLE	LESS THAN 20% DC INPUT	LESS THAN 20% DC INPUT	LESS THAN 50% DC INPUT
ALARM RATINGS			
CURRENT	10-100 mA		
VOLTAGE	5.5-24 VDC		
AUX. RELAY RATINGS	2A @ 24 VDC, 1A @ 120 VAC ● 2A @ 24VDC, 120 VAC (-101 BASE ONLY) 120 VAC RATINGS NOT APPLICABLE FOR CANADIAN INSTALLATIONS		

WIRING INFORMATION

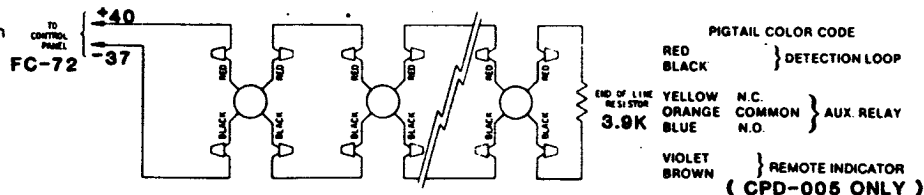
Using Base Less Options.
CPD-001



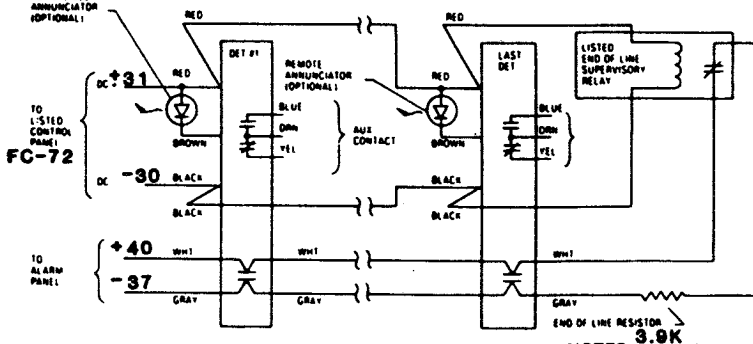
Using Base with Remote Indicator Option
CPD-002



Using Bases with Relay Option
CPD-003, -005



Using 4-wire base,
P/N CPD-101



NOTES:

1. All relays shown in normal position (power ON standby).
2. Alarm current @ 24 VDC = 20 ma 35 ma with remote LED.
3. Aux. contacts rated 2A, 120VAC or 24VDC for U.S. application; 2A, 24VDC for Canadian application.
4. The end of line supervisory relay utilized shall be a listed end of line power supervisory relay rated for the DC supply voltage used.
5. The end of line supervisory device shall be compatible with the control unit used.

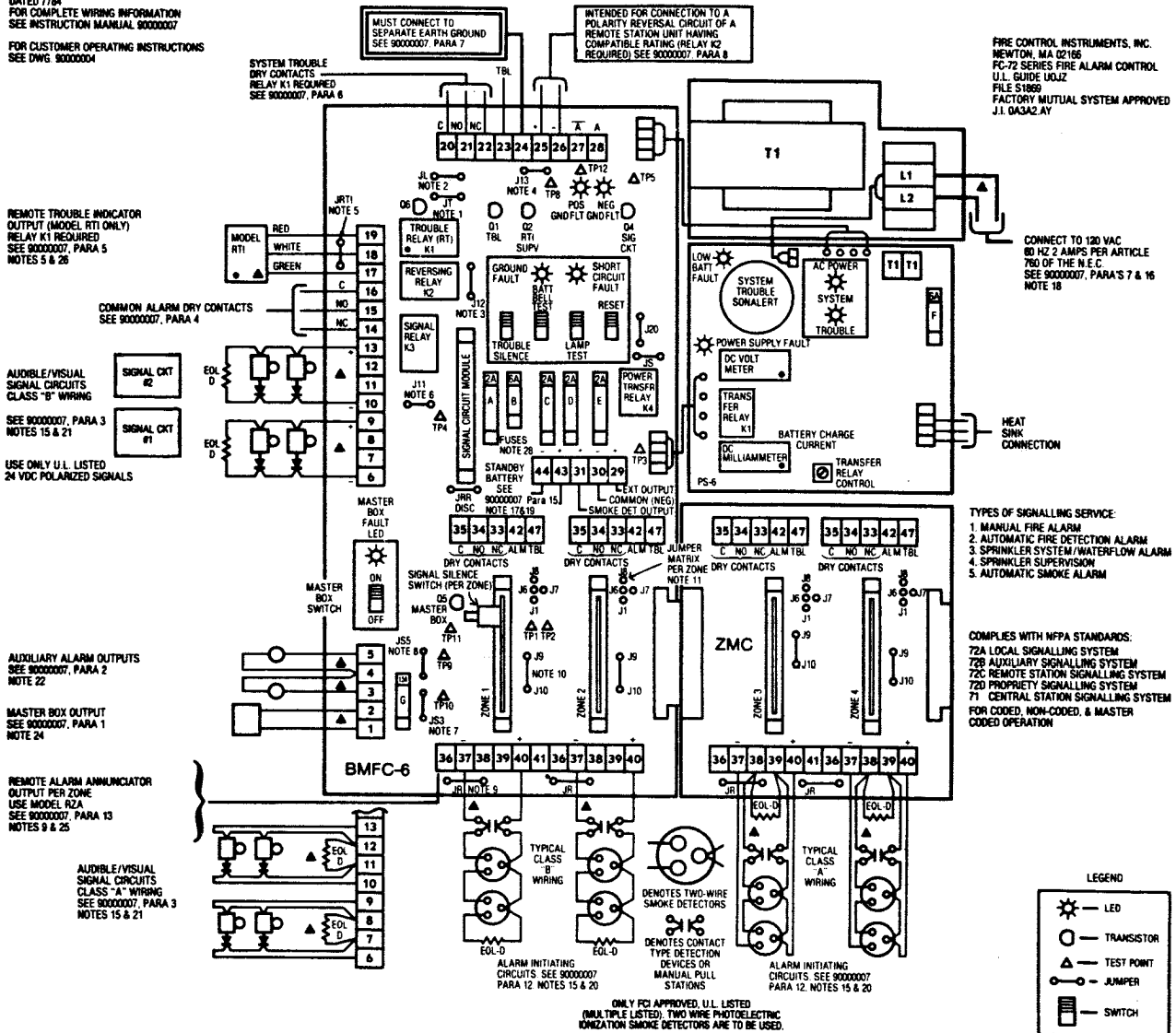
1. To insure proper installation of the detector head to the base be sure wires are properly dressed at installation:
 - a. Position all wires flat against the base.
 - b. Take up all slack in the outlet box.
 - c. Route wires away from connector terminals.
2. If you have installed a jumper between terminals 6 and 7 to test detector loop continuity, be sure to remove the jumper before installing detector head.

3. CAUTION — Do not use looped wire under terminals. Break wire runs to provide supervision of connections.
4. Observe uniform polarity of detector circuit connections when using direct return wire for LED connections.

READ NOTES + INSTRUCTIONS PRIOR TO MAKING CONNECTIONS!

DWG. 25000048
DATED 7/84
FOR COMPLETE WIRING INFORMATION
SEE INSTRUCTION MANUAL 90000007
FOR CUSTOMER OPERATING INSTRUCTIONS
SEE DWG. 90000004

FIRE CONTROL INSTRUMENTS, INC.
NEWTON, MA 02459
FC-72 SERIES FIRE ALARM CONTROL
U.L. GUIDE U0JZ
FILE S1869
FACTORY MUTUAL SYSTEM APPROVED
J.I. 04342 AY



NOTES

- 1.JT Cut to transmit system trouble to remote station via telephone line (term 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 tel. lines (term 25 + 26)
- 4.J13 Cut if Model RT1 is not used
- 5.JRT1 Cut if Model RT1 is used
- 6.J11 Cut if Model BMC-6 or CCM-6 is installed
- 7.JS3 Cut if supervision of term 3 + 4 is desired
- 8.JS5 Cut if supervision of term 4 + 5 is desired
- 9.JR Cut on each zone where remote zone annunciator (Model RZA) is used
- 10.J9-J10 Cut to left of each zone installed except zone 1
- 11.Jumper Matrix: A jumper must be installed to the right of each zone card.
Jumper Position:
J6-J7 — Will cause that zone to trip A/V signal circuits, reversing relay, and master box output.
J6-J8 — Will cause that zone to trip auxiliary alarm output only (Term 3-5)
J6-J1 — Will cause that zone to trip master box output only (Term 1 + 2)
- 12.▲ Denotes supervised wiring
• Denotes optional or accessory
- 14.Relay

Number	Location	P/N
Power Transfer Relay	K4	BMFC-6
Rev & Signal Relay	K2 & K3	BMFC-6
Trouble Relay	K1	BMFC-6
Transfer Relay	K1	PS-6
- 15.EOL-D = 3.9 K OHM, ½ Watt, 5% resistor
- 16.When system is supplied in 2 or more enclosures, mount adjacent with inter-connection cable in metallic raceway.

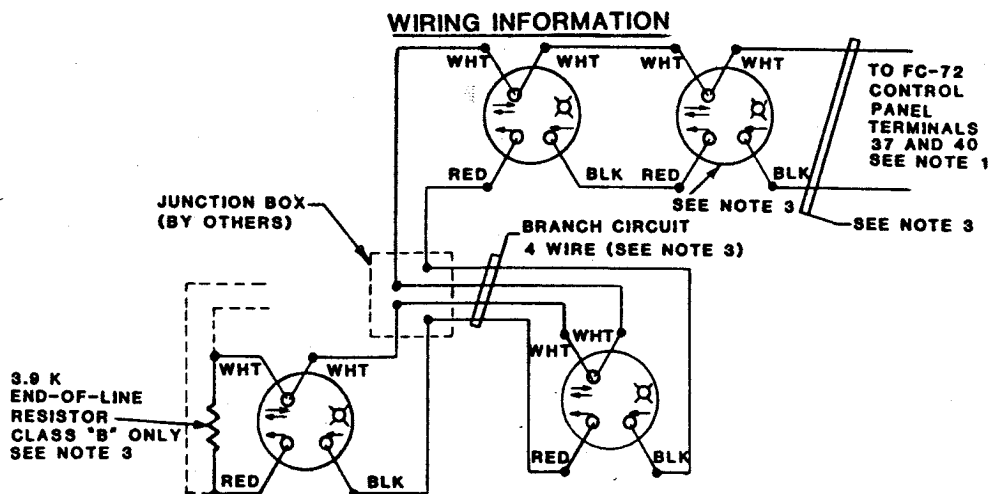
- 17.To determine the appropriate standby batteries needed. See 90000007, Para 15
- 18.Main supply circuit input: 120 VAC, 60 Hz @ 2A/output 24 VDC nominal @ 4A. See 90000007, Para 7 & 16
- 19.Standby battery circuit: input 24 VDC nominal/output 27.2 VDC. 900A Max. Use with 4.5 to 12 A.H. sealed batteries. See 90000007, Para 15.
- 20.Initiating circuit: Supervisory current 24 VDC nominal, .100A Max. Maximum line resistance: Class "A" or Class "B" 100 Ohms. See 90000007, Para 12.
- 21.Audible/visual signalling circuits: output 24 VDC nominal, 1.75A Max. See 90000007, Para 3.
- 22.Supplementary signalling circuits-auxiliary alarm output: 24 VDC nominal, .500A Max. per output See 90000007, Para 2.
- 23.Polarity reversal circuit: 24 VDC nominal, .130A Max. See 90000007, Para 8. Output voltage is dependent on tel. line res. and receiving unit characteristics
- 24.Master box output: 24 VDC nominal, .500A Max. See 90000007, Para 1
- 25.Annunciator circuit: 24 VDC nominal, .100A Max. Do not connect any load in excess of recommended load (not to exceed .040A)
- 26.RT1 circuit: 24 VDC nominal, .005A Max. See 90000007, Para 5.
- 27.Central station connection per NFPA 71. See DWG. 90400038
- 28.FUSES:

A - Signal Circuit #2
B - Standby Battery
C - Signal Circuit #1
D - Smoke Detector Output
E - External Output
F - AC Power
G - Auxiliary Alarm Output/fuse is non-interchangeable

DO NOT RUN 120 VAC IN THE SAME RACEWAY AS FIRE ALARM CIRCUITS

ATTENTION: THE SBS-1000 IS COMPATIBLE WITH THIS MODULE

SBS-1000 ELECTRICAL RATINGS		
STANDBY RATINGS	CURRENT @ 22 VDC	30 mA
	OPERATING VOLTAGE RANGE	19-29 VDC
ALARM RATINGS	CURRENT	30 mA



1) Installation wiring to detector is NON-POLARIZED.

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

3) Wire smoke detectors as shown in drawing. Connect only one wire per pigtail. Detector markings: Arrow pointing to terminal indicates input (→ in, black wire). Arrow pointing away from terminal indicates output (← out, red wire). Arrow pointing in both directions indicates input and output terminations (↔, white wires). No parallel branching of circuits is permitted. Branch circuits require 4

wires. An end of line resistor supplied with the control panel must be installed beyond the last initiating device for each Class "B" circuit zone.

4) 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. Insure that the detectors are wired (spliced) in supervisory position per wiring diagram.

5) To mount detector, first mount metal plate to junction box. Pull wire through box and plate, then connect them to wire leads on the detector using "wire nuts". Align arrow on detector base with arrow on metal plate. Press upward and turn clockwise until detector is locked.

IMPORTANT: ANY ONE INITIATING CIRCUIT WHICH CONTAINS AN SBS-1000 SMOKE DETECTOR SHOULD NOT BE INTERMIXED WITH OTHER MODEL/MAKE SMOKE DETECTORS.

When configuring the initiating circuit for Class "A" use the chart below to determine the maximum number of smoke detectors per zone. (This has no affect on the amount of manual stations and/or heat detectors used within the circuit.)

MAXIMUM SMOKE DETECTORS PER INITIATING CIRCUIT*			
	CLASS "B" WIRING	CLASS "A" WIRING	CLASS "A" W/V.E.O.L.
CPD 7021 PSD 7121 & 7122	25	15	25
PSD 7111 & 7112	25	10	25
SBS-1000	25	25	N/A
* MAXIMUM LINE RESISTANCE 100 OHMS			

ESK 1068