TCM-4

Time Control Module

ICB

MODULE TYPE	RELEASE CONTROLS
LAMPS	GREEN = ENABLE
SWITCH	GREEN FLASHING = DELAY TIMER ACTIVE YELLOW = TROUBLE

MODULE TYPE	RELEASE CONTROLS
LAMPS	GREEN = ENABLE
SWITCH	GREEN FLASHING = SOAK TIMER ACTIVE YELLOW = TROUBLE

CIRCUIT 1 ENABLE A

CIRCUIT 1 ENABLE B

CIRCUIT 2 ENABLE A

CIRCUIT 2 ENABLE B

CIRCUIT 3 ENABLE A

CIRCUIT 3 ENABLE B

CIRCUIT 4 ENABLE A

CIRCUIT 4 ENABLE B

Installation Precautions

Adherence to the following will aid in problem-free installation with long-term reliability:

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

CAUTION - *System Reacceptance Test after Software Changes:* To ensure proper system operation, this product must be tested in accordance with NFPA 72-1993 Chapter 7 after any programming operation or change in site-specific software. Reacceptance testing is required after any change, addition or deletion of system components, or after any modification, repair or adjustment to system hardware or wiring.

All components, circuits, system operations, or software functions 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, must be tested and proper system operation verified.

This system meets NFPA requirements for operation at 0-49° C/32-120° F and at a relative humidity of 85% RH (non-condensing) at 30° C/86° F. However, the useful life of the system's standby batteries and the electronic components may be adversely affected by extreme temperature ranges and humidity. Therefore, it is recommended that this system and its peripherals be installed in an environment with a nominal room temperature of 15-27° C/60-80° F.

Verify that wire sizes are adequate for all initiating and indicating device loops. Most devices cannot tolerate more than a 10% I.R. drop from the specified device voltage.

Like all solid state electronic devices, this system may operate erratically or can be damaged when subjected to lightning induced transients. Although no system is completely immune from lightning transients and interferences, proper grounding will reduce susceptibility. *Overhead or outside aerial wiring is not recommended, due to an increased susceptibility to nearby lightning strikes.* Consult with the Technical Services Department if any problems are anticipated or encountered.

Disconnect AC power and batteries prior to removing or inserting circuit boards. Failure to do so can damage circuits.

Remove all electronic assemblies prior to any drilling, filing, reaming, or punching of the enclosure. When possible, make all cable entries from the sides or rear. Before making modifications, verify that they will not interfere with battery, transformer, and printed circuit board location.

Do not tighten screw terminals more than 9 in-lbs. Over tightening may damage threads, resulting in reduced terminal contact pressure and difficulty with screw terminal removal.

This system contains static-sensitive components. Always ground yourself with a proper wrist strap before handling any circuits so that static charges are removed from the body. Use static suppressive packaging to protect electronic assemblies removed from the unit.

Follow the instructions in the installation, operating, and programming manuals. These instructions must be followed to avoid damage to the control panel and associated equipment. FACP operation and reliability depend upon proper installation.

Fire Alarm System Limitations

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

An automatic fire alarm system - typically made up of smoke detectors, heat detectors, manual pull stations, audible warning devices, and a fire alarm control 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, or 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 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 like smoking in bed, violent explosions, escaping gas, improper storage of flammable materials, overloaded electrical circuits, children playing with matches, or arson.

IMPORTANT! *Smoke detectors must be installed in the same room as the control panel and in rooms used by the system for the connection of alarm transmission wiring, communications, signaling, and/or power.* If detectors are not so located, a developing fire may damage the alarm system, crippling its ability to report a fire.

Audible warning devices such as bells may not alert people if these devices are located on the other side of closed or partly open doors or are located on another floor of a 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 detectors may be subject to reduced sensitivity over time. For this reason, the rate-of-rise feature of each 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. It is essential to use only equipment listed for service with your control panel.

Telephone lines needed to transmit alarm signals from a 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.

Table of Contents

Section One: General Information

Introduction

The TCM-4 is a time control module for the System 5000. It can be operated in one of two modes. The module can be used for multi-hazard release or for two-stage alert/evacuation. Programming of the module is accomplished during programming of the system.

Multi-Hazard Release

When programmed for multi-hazard release, the TCM-4 provides four independent release circuits. The functions of the module can be expanded by using an ICE-4 Indicating Circuit Expander or a CRE-4 Control Relay Expander.

Key features when used as a multi-hazard release module include:
- Cross or Single Zone Release capability
- Optional Delay Timer
- Optional Soak Timer
- Manual Release
- Warning Bell Circuits (when used with ICE-4)

Note: Factory Mutual requires Style D (Class A) wiring on all Initiating Device Circuits in Pre-Action or Deluge systems.

Two-Stage Alert/Evacuation

When programmed for two-stage alert/evacuate the TCM-4 provides four independent Notification Appliance Circuits. Each of these circuits has an alert select and evacuation select. If alert is selected, the notification circuit pulses at 20 PPM. If evacuate is selected, the notification circuit pulses at 120 PPM. The functions of the module can be expanded by using an ICE-4 or CRE-4.

The key features of the TCM-4 used as an alert/evacuate module include:
- Alert Timer
- Alert Hold
- Evacuation Relays (when used with CRE-4)
- Separate Evacuation Outputs (when used with ICE-4)

Note: Factory Mutual systems require 90 hours of standby power.

Installation and Programming

For power calculations and information on installing the TCM-4, please refer to the System 5000 Installation Manual, Document 15583. General information about programming can be found in the System 5000 Programming Manual, Document 15584.

Refer to the marking label on the System 5000 cabinet door for the current revision of the System 5000 Installation Manual.

Inventory

The following equipment is included with a TCM-4.
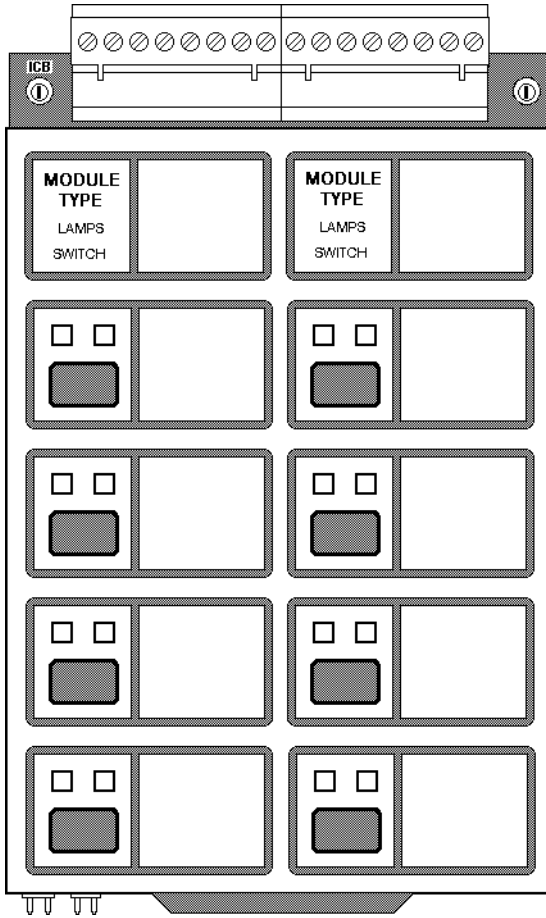
TCM-4 Module

4.7 K 1/2-watt End of Line Resistors (71252)

Quantity 4

4.7 K 1/2-watt Dummy Load Resistor (71245)

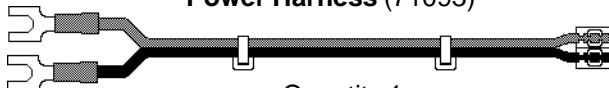Quantity 4

1K 1-watt Dummy Load Resistor (27040)

Quantity 4
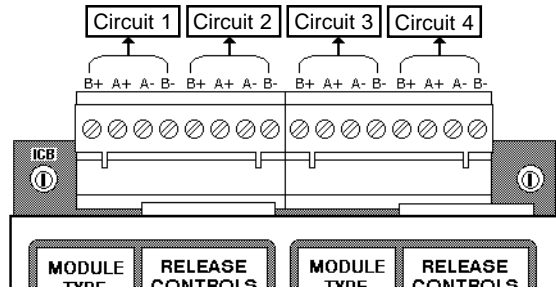
Power Harness (71091)

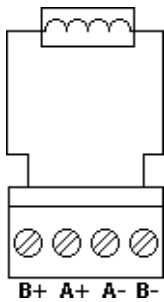Quantity 1

Power Harness (71093)

Quantity 1

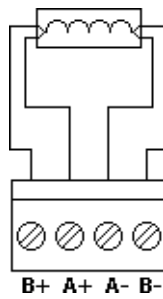## Section Two: Using Multi-Hazard Release

Release Circuits

The TCM-4 has four supervised independent release circuits. Unused circuits must be terminated with a 1K, 1-watt dummy load resistor. These circuits are used to power U.L. listed 24VDC releasing solenoids.
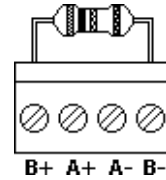

Typical Supervised Releasing Circuits

NFPA Style Y Release Circuit

NFPA Style Z Release Circuit

1K 1-watt Dummy Load Resistor (27040)

Unused Circuits

Deluge/Pre-Action Release

When using this configuration for Deluge and/or Pre-Action Services, wiring must be configured to maintain a minimum voltage of 20.4VDC on release circuits. Calculation of maximum allowable resistance:

$$R_{MAX} = \frac{20.6V - 20.4V}{I_s}$$

where: R_{MAX} = maximum allowable resistance of wiring
I_s = solenoid current

* Factory Mutual requires 90 hours of standby power and Style D (Class A) wiring on all Initiating Device Circuits. *****Do not program an abort switch for this application. ***** For NFPA 13 and 15 applications, the soak timer must be disabled. ***** For NFPA 16 applications, the soak timer may be set to 10 or 15 minutes. ***** For UL Listed and FM approved Solenoid Release Valves, see Document 15378, Device Compatibility Document.

Cross-Zoning

Each of the release circuits has two enable inputs. Both enables must be activated before the release sequence can begin. If cross-zoning is desired, separate initiating circuits should be mapped to A and B. If cross-zoning is not desired, map initiating circuit to both A and B inputs. The green LED will turn on for an enable that has been activated.
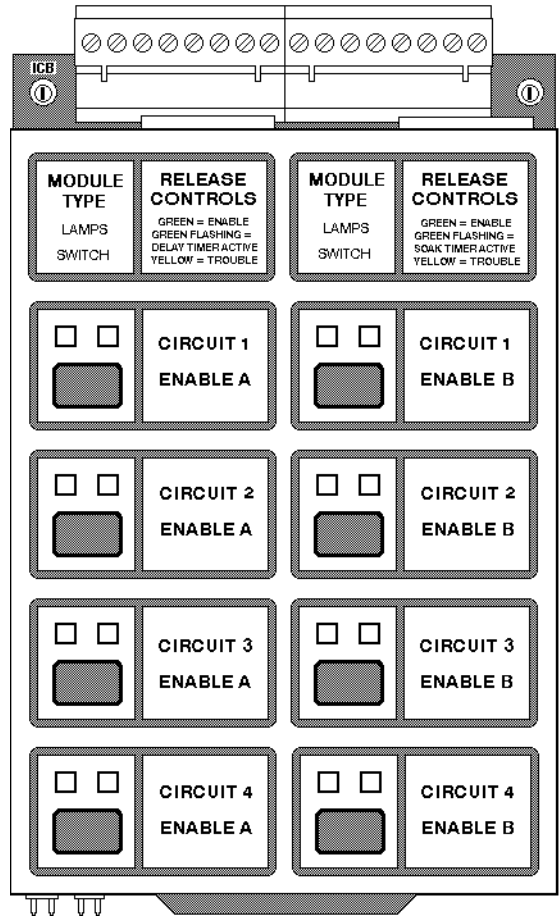
Delay Timer

An optional delay timer may be programmed per circuit. This timer will delay the activation of the release circuit by 15 seconds (non-adjustable). The delay timer will begin after both enables are received. When this timer is activated, the green LED for Enable A will flash.

Soak Timer

An optional soak timer may be programmed per circuit. This timer will automatically turn off the circuit 10 minutes after it has been energized. If another release circuit is activated, the soak timer will be restarted and the soak time for the first release will be increased. When this timer is active, the green LED for Enable B will flash. When this timer has expired, the green LED for Enable B will stay on steady.

Manual Release

Manual release may be achieved by alarming an initiating zone that has been mapped to both Enables A and B. If the delay timer option is selected, the release will occur after timer has expired.

ICB

MODULE TYPE	RELEASE CONTROLS
LAMPS	GREEN = ENABLE
	GREEN FLASHING =
SWITCH	DELAY TIMER ACTIVE
	YELLOW = TROUBLE

MODULE TYPE	RELEASE CONTROLS
LAMPS	GREEN = ENABLE
	GREEN FLASHING =
SWITCH	SOAK TIMER ACTIVE
	YELLOW = TROUBLE

CIRCUIT 1 ENABLE A
CIRCUIT 1 ENABLE B
CIRCUIT 2 ENABLE A
CIRCUIT 2 ENABLE B
CIRCUIT 3 ENABLE A
CIRCUIT 3 ENABLE B
CIRCUIT 4 ENABLE A
CIRCUIT 4 ENABLE B

Warning Bell Circuits

Notification circuits can be added to the TCM-4 by using an ICE-4 Indicating Circuit Expander. This expander module will provide an independent notification circuit for each of the release circuits. This notification circuit will activate when Enables A and B are activated for the corresponding release circuit. These notification circuits will not be delayed even if the delay timer is programmed.

The notification circuits are supervised and power limited. They can be wired as NFPA Style Y or Z. Use polarized UL listed Notification Appliances with a minimum operating voltage range of 18 to 30VDC. Unused notification circuits must be terminated with 4.7K dummy load resistor.

For information on connection of an ICE-4 to a TCM-4, refer to the System 5000 Installation Manual.
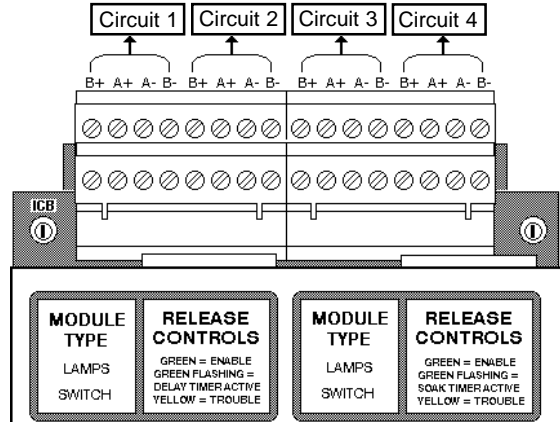
Typical Supervised Notification Circuits

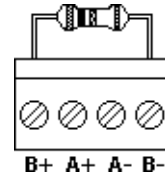ELR 4.7K,
1/2 Watt (71252)
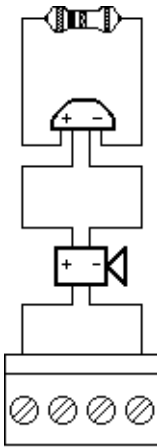
**NFPA Style Y
Notification Circuit**
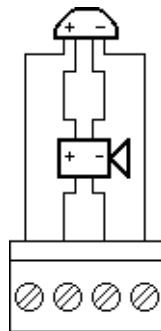
**NFPA Style Z
Notification Circuit**

4.7k 1/2-watt
Dummy Load
Resistor (71245)

**Unused
Circuits**

Relay Activation

A CRE-4 Control Relay Expander module can be used with a TCM-4. This expander module will provide one Form-C contact for each release circuit. The relay will activate when enable A and B are both activated for the corresponding release circuit. They will not be delayed even if the delay timer is programmed. The contacts are rated for 5 amps @ 120VAC or 28VDC (resistive).

For information on connecting a CRE to a TCM-4 refer to the System 5000 Installation Manual.

If using a mix of power-limited and nonpower-limited circuits, maintain a minimum of 0.25" spacing between power-limited and nonpower-limited wiring and exit the enclosure from different knockouts.
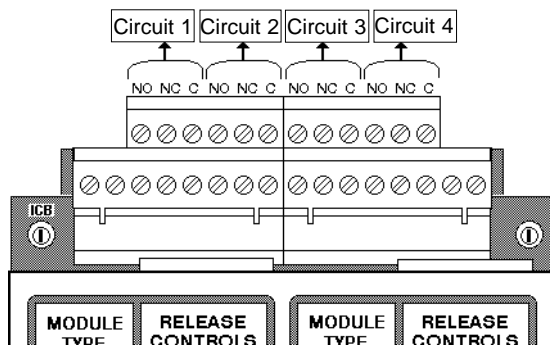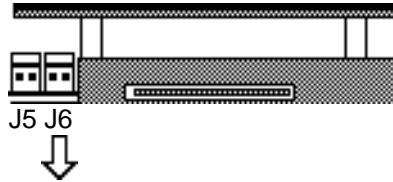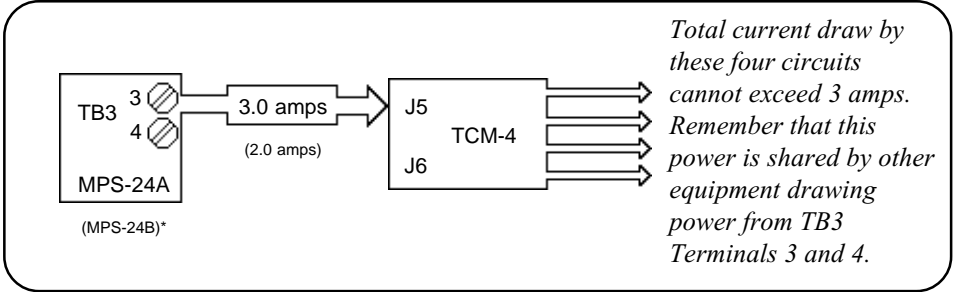

**Typical Relay
In Standby Position**
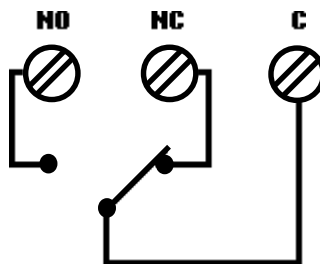
Powering the TCM-4

Regulated power must be used for listed 24VDC release solenoid compatibility. The regulated power available from an MPS-24A is 3 amps. Two amps of RMS regulated power is available from the MPS-24B. Remember that this regulated power may be shared with other devices and modules in the system.
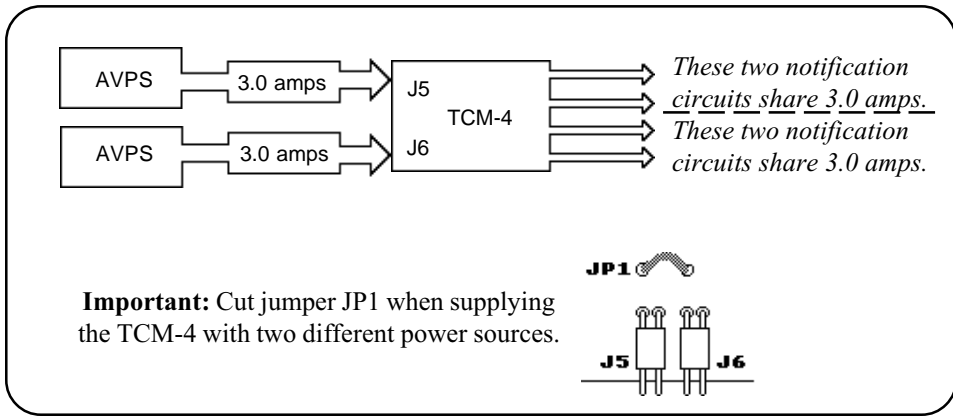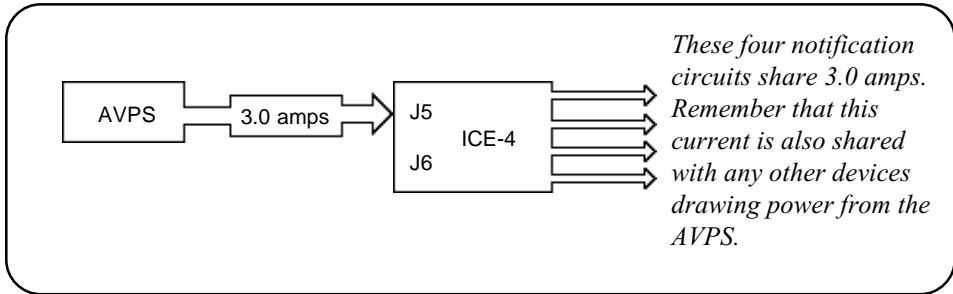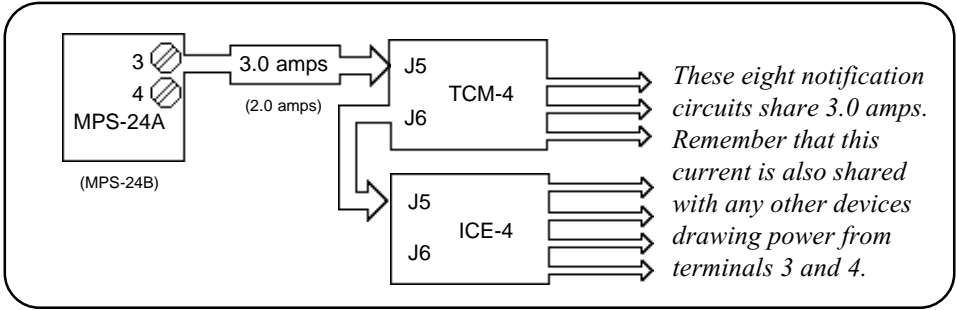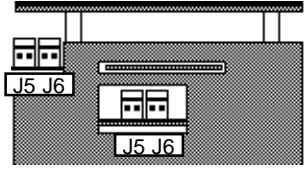
Note: The MPS-24B is designed for small systems with lower power requirements and may not be suitable for more demanding releasing applications. Complete the battery calculations for the system to ensure the suitably of employing this supply.

TB3
3
4
3.0 amps
(2.0 amps)
J5
J6
TCM-4
MPS-24A
(MPS-24B)*

Total current draw by these four circuits cannot exceed 3 amps. Remember that this power is shared by other equipment drawing power from TB3 Terminals 3 and 4.

J5 J6

Power out to next module requiring regulated power

Powering Notification Appliances

Regulated or unregulated power can be used for Notification circuits. Regulated power can be obtained from the MPS-24A, RMS regulated from the MPS-24B, and unregulated power can be obtained from an AVPS.

J5 J6

J5 J6

3
4
MPS-24A

(MPS-24B)

3.0 amps

(2.0 amps)

J5
TCM-4
J6

J5
ICE-4
J6

These eight notification circuits share 3.0 amps. Remember that this current is also shared with any other devices drawing power from terminals 3 and 4.

AVPS

3.0 amps

J5
ICE-4
J6

These four notification circuits share 3.0 amps. Remember that this current is also shared with any other devices drawing power from the AVPS.

AVPS

3.0 amps

AVPS

3.0 amps

J5
TCM-4
J6

These two notification circuits share 3.0 amps.
These two notification circuits share 3.0 amps.

Important: Cut jumper JP1 when supplying the TCM-4 with two different power sources.

JP1

J5   J6

Section Three:
Programming Multi-Hazard Release

Section Three contains programming information specific to the TCM-4. For general information on System 5000 programming, refer to the programming manual.

Reconfigure

The system must be reconfigured any time a new module is installed. After entering the reconfiguration password, all green LEDs on the TCM-4 should light if the module was installed correctly. Press escape to confirm system configuration.

Programming

The following parameters need to be programmed for a TCM-4 to operate properly.

Silenceable Outputs

Select all TCM-4 outputs as non-silenceable.

		F	SILENCEABLE
	■	S	CODED CIRCUIT
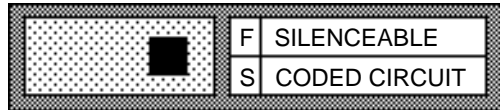
When the Silenceable LED is flashing turn off all LEDs on TCM-4.

Delay Timer

If any circuit is to have a delay timer, select its Enable A as a coded circuit.

		F	SILENCEABLE
	■	S	CODED CIRCUIT
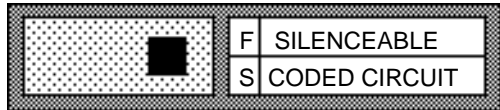
When the Coded Circuit LED is lit, turn the green Enable A LED on for any circuit that requires a delay timer.
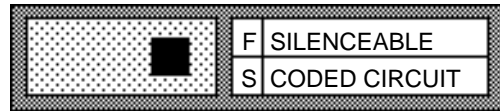
Soak Timer

If any circuit is to have a soak timer, select its Enable B as a coded circuit.

When the Coded Circuit LED is lit, turn the green Enable B LED on for any circuit that requires a soak timer.

		F	SILENCEABLE
	■	S	CODED CIRCUIT

I/O Map

Each of the enables can be mapped to any initiating zones. If you desire cross zone operation, Enables A and B should be mapped to different initiating circuits. If cross zoning is not desired, then map initiating circuits to both A and B.

When the I/O Map LED is flashing each of the initiating circuits can be mapped to outputs. The green enable LEDs on the TCM-4 should be turned on for each of the initiating circuits that are mapped to it.

	F	I/O MAP
■	S	DELAYED CIRCUITS
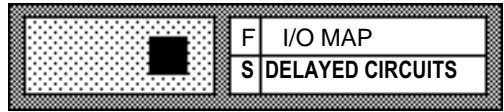
Single Zone Release

When mapping a release circuit for single zone release, map the initiating circuit to both Enables A and B of a releasing circuit.

Note: A releasing circuit can be mapped to more than one initiating circuit.
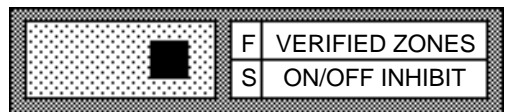
Cross Zone Release

When mapping a release circuit for cross zone release, map Enables A and B to different initiating circuits.

Note: Enable A or B can be mapped to more than one initiating circuit.

Switch Inhibit
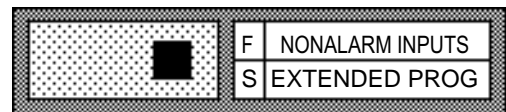
Select all TCM-4 inputs for Switch Inhibit.

When On/Off Inhibit LED is on steady, turn on all green LEDs on the TCM-4.

	F	VERIFIED ZONES
■	S	ON/OFF INHIBIT

Code Options

March Time must be selected in **Code Options.**

When the **EXTENDED PROG** LED is on, set the yellow LED on Notification Circuit 1 to select March Time Code.

	F	NONALARM INPUTS
■	S	EXTENDED PROG

Notification Circuits.

The TCM-4 has four notification circuits that can be wired NFPA Style Y or Z. These circuits are supervised and power limited. Use polarized U.L. listed signaling devices with a minimum voltage range of 18 to 30VDC. Unused notification circuits must be terminated with 4.7K dummy load resistors.

Each notification circuit can operate in the alert or evacuation state. In the alert state, the notification circuit pulses at 20 PPM (20 pulses per minute). When in the evacuation state, the notification circuit pulses at 120 PPM.

Each notification circuit on the TCM-4 has an alert and an evacuation selection input. These inputs can be mapped to any one or any group of initiating zones. If both alert and evacuation are selected, the evacuation takes precedence and the alert LED is turned off.
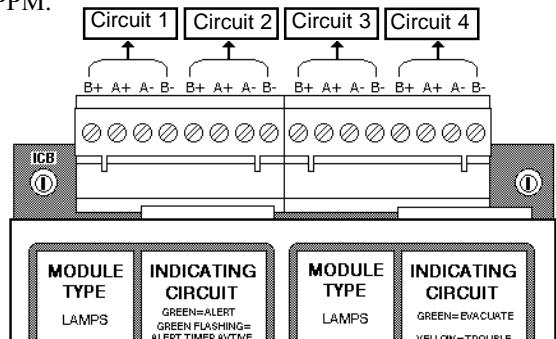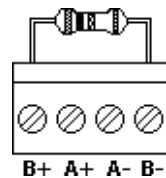

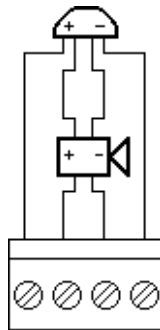*Typical Supervised Notification Circuits*
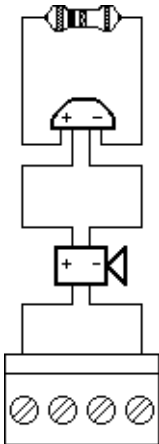
ELR 4.7K,
1/2 Watt (71252)

4.7k 1/2-watt
Dummy Load
Resistor (71245)

B+ A+ A- B-

**Unused
Circuits**

B+ A+ A- B-
**NFPA Style Z
Notification Circuit**

B+ A+ A- B-
**NFPA Style Y
Notification
Circuit**

Alert Timer

When an alert input is activated, a 5-minute alert timer starts. The green LED will flash and the notification circuit will pulse at 20 PPM. This timer is not adjustable.

When the alert timer expires, the notification circuit automatically changes to 120 PPM. At this time the Alert LED is turned off and the Evacuation LED turns on steady.

Note: There is only one alert timer on the TCM-4. If this timer is selected for a notification circuit and an alert for a second notification circuit is selected, the timer is not restarted. The second circuit will change to evacuation in less than 5 minutes.

Evacuation

When an evacuation input is activated the notification circuit rings 120 PPM and the green evacuation LED for that circuit turns on. If the circuit is already in the alert state the evacuation signal takes precedence and the alert LED is turned off.

Manual Alert

To put a circuit that is not in the evacuation state into the alert state, press the alert switch. Manual selection of alert cannot be executed if this switch was inhibited during programming.

Alert Hold Switches

The switch for each of the alert inputs is used for Alert Hold. If a circuit's alert timer is active, pressing its switch will freeze the alert timer. The green alert LED will change from flashing to steady on all circuits in alert. All notification circuits in alert will stay in alert until evacuation is selected or the panel is reset.

Note: CPU Switch Inhibit will not disable this function.

Manual Evacuate

The switch for each of the evacuation inputs can be used for manual evacuation control. Pressing an evacuation switch will put its notification circuit in evacuation (providing the switch was not selected for switch inhibit).
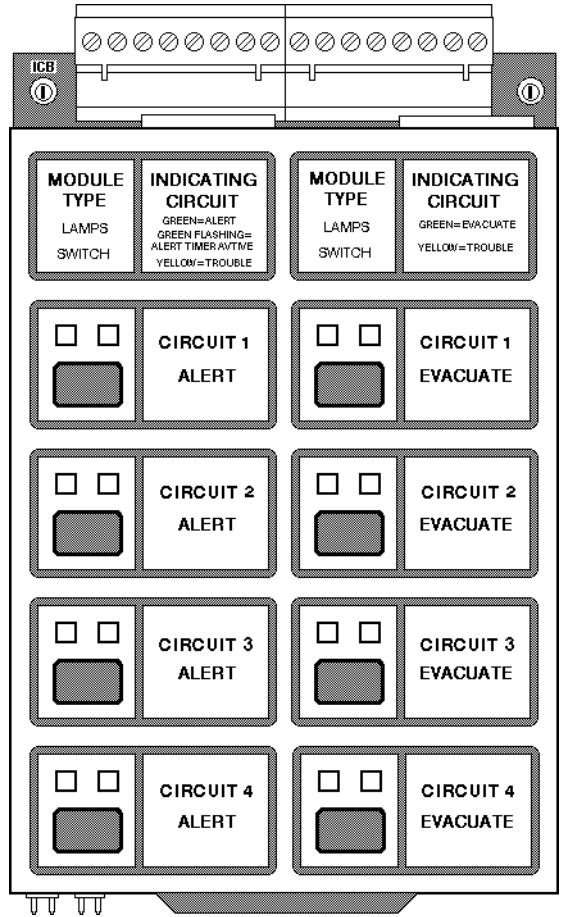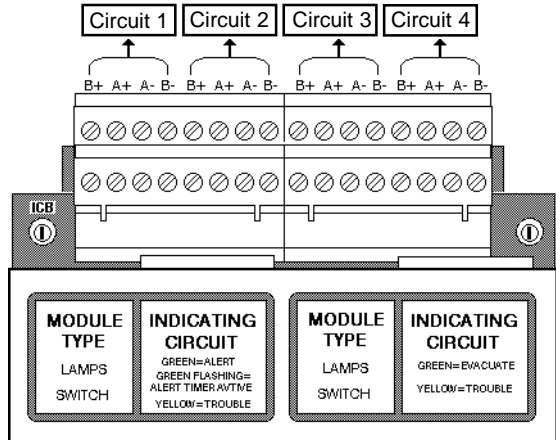
Evacuation Notification Circuits

Notification circuits for evacuation can be added to the TCM-4 by using an ICE-4 Notification Circuit Expander. This expander module will provide an independent notification circuit for each alert evacuation circuit. These notification circuits will activate when the corresponding circuit on the TCM-4 goes into the evacuation state. The ICE-4 circuit does not pulse but stays on steady.

The notification circuits are supervised and power limited. They can be wired as NFPA Style Y or Z. Use polarized U.L. listed signaling devices with a minimum voltage range of 18 to 30VDC. Unused notification circuits must be terminated with a 4.7K dummy load resistor.

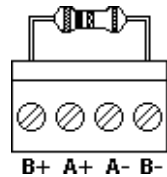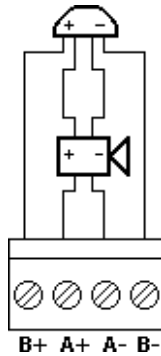For information about mounting an ICE-4 to a TCM-4, refer to the System 5000 Installation Manual.

Typical Supervised Notification Circuits

ELR 4.7K,
1/2 Watt (71252)
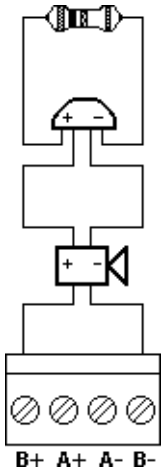
NFPA Style Y Notification Circuit

4.7k 1/2-watt
Dummy Load
Resistor (71245)

Unused Circuits

Section Seven contains programming information specific to the TCM-4. For general information on System 5000 programming, refer to the programming manual.

Reconfigure

The System 5000 must be reconfigured any time a new module is installed. After entering the reconfiguration password, all green LEDs on the TCM-4 should light if the module was installed correctly. Press escape to confirm system configuration.
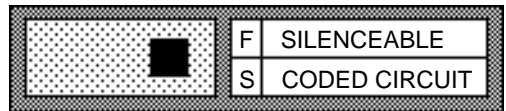
Programming

The following parameters need to be programmed for a TCM-4 to operate properly.

Silenceable Outputs

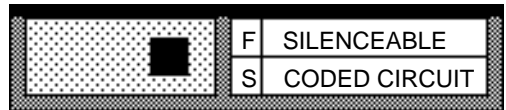If any circuit is to be silenceable, select both alert and evacuation for silenceable.

When the Silenceable LED is flashing, turn the green LED on for both alert and evacuation for all circuits that are to be silenceable.

	F	SILENCEABLE
	S	CODED CIRCUIT

Coded Circuits

Select all alert and evacuation inputs for coded circuits.

When the Coded Circuit LED is on steady, turn on all green LEDs on the TCM-4.

	F	SILENCEABLE
	S	CODED CIRCUIT

I/O Map

The evacuation and alert inputs can be mapped to any initiating circuit.

When the I/O Map LED is flashing, initiating circuits can be mapped for alert and evacuation.

|	F	I/O MAP
	S	DELAYED CIRCUITS
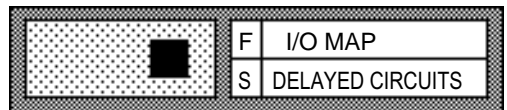
To map an initiating circuit for alert, turn the green alert LED on when the red LED on the initiating circuit is on.

To map an initiating circuit for evacuation, turn the green evacuation LED on when the red LED on the initiating circuit is on.

Manual Evacuation

If manual evacuation is not required, program alert and evacuation for Switch Inhibit.

When the On/Off Inhibit light is on steady, turn the green LED on for both alert and evacuation for all circuits that are <u>not</u> using manual evacuation.

	F	VERIFIED ZONES
■	S	ON/OFF INHIBIT
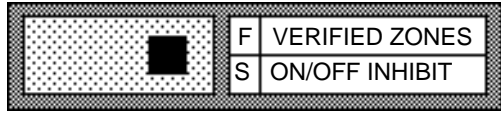
Code Options

Temporal code must be selected in **Code Options.**

When the **EXTENDED PROG** LED is on, set the green LED on Notification Circuit 1 to select Temporal Code.

	F	NONALARM INPUTS
■	S	EXTENDED PROG
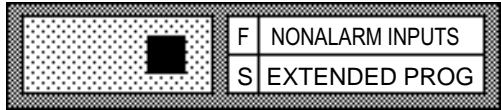
Slide-In Labels

RELEASE A	RELEASE B	ALERT	EVACUATE
(BOTH A & B = RELEASE)	(BOTH A & B = RELEASE)	STAGE 1	STAGE 2
GREEN=ENABLE A GREEN FLASH=DELAY YELLOW=TROUBLE	GREEN=ENABLE B GREEN FLASH=SOAK TIMER YELLOW=TROUBLE	GREEN=SOUND ALERT GREEN FLASH=TIMING MANUAL ALERT TIMER HOLD	GREEN=SOUND EVAC. YELLOW=TROUBLE MANUAL EVACUATE
CIRCUIT 1A	CIRCUIT 1B	CIRCUIT 1 ALERT	CIRCUIT 1 EVAC.
CIRCUIT 2A	CIRCUIT 2B	CIRCUIT 2 ALERT	CIRCUIT 2 EVAC.
CIRCUIT 3A	CIRCUIT 3B	CIRCUIT 3 ALERT	CIRCUIT 3 EVAC.
CIRCUIT 4A	CIRCUIT 4B	CIRCUIT 4 ALERT	CIRCUIT 4 EVAC.

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