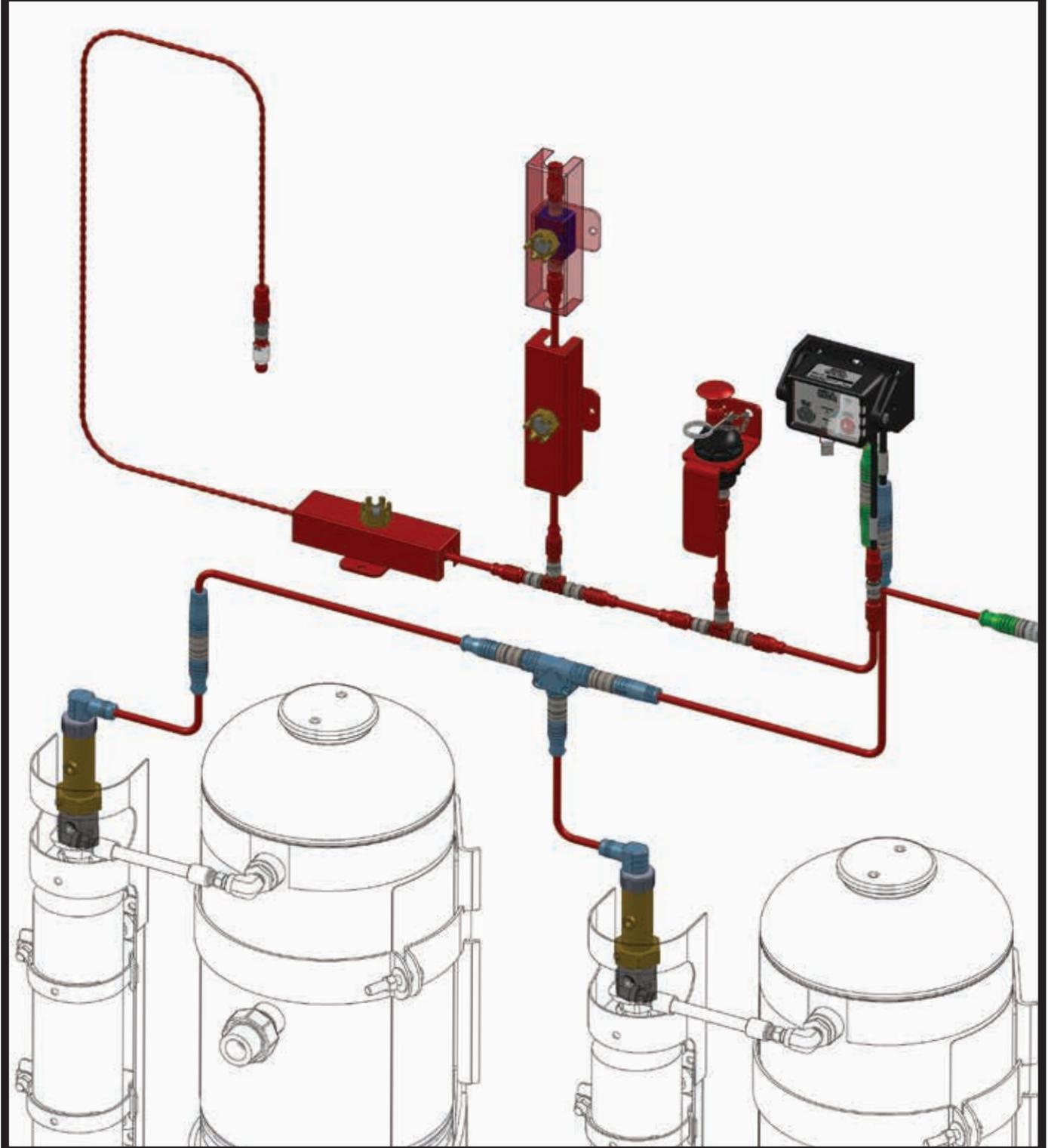


CHECKFIRE 110 DETECTION AND ACTUATION SYSTEM



PLANNING, INSTALLATION, OPERATION, AND MAINTENANCE MANUAL



This manual is intended for use with the ANSUL® CHECKFIRE 110 Detection and Actuation System. This system is specifically engineered for monitoring and release of vehicle fire suppression systems. Planning, installation, recharge, and maintenance of the system must conform to the limitations detailed in this manual. Installation and maintenance shall be performed by an individual holding current ANSUL Certification from an ANSUL CHECKFIRE 110 Training Program with training to plan, install, recharge, and maintain the CHECKFIRE 110 System(s). Individuals must also hold current ANSUL Certification from an ANSUL A-101 or LVS training program.

Those who plan, install, operate, reset, program, inspect, or maintain these systems should read this entire manual. Specific sections will be of particular interest depending upon one's responsibilities.

As with all electro-mechanical-pneumatic equipment, the system needs periodic care to provide maximum assurance that it will operate effectively and safely. Inspection frequency shall be performed consistently, depending on operating and/or environmental conditions. Maintenance shall be performed semi-annually, or more frequently, depending on operating and/or environmental conditions.

The application and use of the CHECKFIRE 110 System is limited to the applications and uses described in this manual. For other applications, contact your Authorized ANSUL Distributor, Territory Manager, or Tyco Fire Protection Products – Technical Services Department, Marinette, Wisconsin 54143-2542, USA.

Note: The converted metric values in this manual are provided for dimensional reference only and do not reflect an actual measurement.

- ▶ Part Number: 440391-03
- ▶ Date: 2014-AUG-28

ANSUL, CHECKFIRE, and the product names listed in this material are marks and/or registered marks. Unauthorized use is strictly prohibited.



DANGER

Indicates a hazardous situation in which a person **will experience serious personal injury or death** if the situation is not avoided.



WARNING

Indicates a hazardous situation in which a person **could experience serious personal injury or death** if the situation is not avoided.



CAUTION

Indicates a hazardous situation in which a person **could experience minor or moderate personal injury** if the situation is not avoided.

CAUTION

Addresses practices not related to personal injury, such as a system part malfunctioning, property damage, or system failure.

NOTICE

Addresses general practices or observations related to system function that are *not* related to personal injury.

DATE	PAGE	REV. NO.	DATE	PAGE	REV. NO.
2014-MAY-01	2-4	01	2014-MAY-08	10-1	02
2014-MAY-01	2-5	01	2014-AUG-28	FOREWORD	03
2014-MAY-01	2-7	01	2014-AUG-28	1-1	02
2014-MAY-01	3-2	01	2014-AUG-28	4-7	02
2014-MAY-01	4-3	01			
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LEGEND FOR MANUAL PAGE REVISION INDICATORS:
 ▶ Indicates revised information.
 ■ Indicates no change to text – change in page sequence only.

REVISION RECORD

PAGE 2 REV. 0 2014-MAY-01

CHECKFIRE 110
Detection and Actuation System

NOTES:

SYSTEM DESCRIPTION

The CHECKFIRE 110 Detection and Actuation System is typically used with an ANSUL A-101 or LVS Vehicle Fire Suppression System for 24-hour protection of equipment. The system is designed for vehicles in extreme environmental and physical conditions.

Industries Where Vehicles Use CHECKFIRE 110 Systems:

- Forestry
- Agriculture
- Construction
- Public transportation
- Public utilities
- Land fills
- Waste disposal
- Mining

The automatic detection and actuation system provides monitored input/output circuits to activate an ANSUL fire suppression system. On detecting a fire condition, the control module activates the release circuit resulting in the discharge of an expellant gas cartridge initiating fire suppression system operation. Optional pneumatic actuation is available.

CHECKFIRE 110 Features

- Supervised power, detection, and release circuits
- External primary power with an internal reserve power source
- Selectable release time delay
- Electric “DELAY/Reset/Silence” button
- “PUSH To Activate / Alarm When Lit” electric manual activation button
- Color-coded “Plug and Play” connections
- 85 dB Internal Sounder
- System isolate feature
- Dust and water tight (IP67 rated)

CHECKFIRE 110 Specifications

CONTROL MODULE POWER (24 HOUR OPERATION)

- 12/24 VDC vehicle primary power source
- Internal 72 hour reserve power source

SYSTEM CURRENT DRAW

- Nominal < 6 mA @ 10.2 – 28 VDC
- Maximum < 100 mA @ 10.2 – 28 VDC

OPERATING TEMPERATURE LIMITS

- 40 °F to 140 °F (– 40 °C to 60 °C)

APPROVALS

- FM Approved and CE Marked

CHECKFIRE 110 Connectivity

The modular cable harness system includes four color-coded leads for Detection, Release, External Power, and Alarm Output. See Figure 1-1.

DETECTION INITIATING / MANUAL ACTIVATION CIRCUIT

Detection circuit lead - 33 in. (838 mm) with **Red** color-coded connector

Connects to:

- Detection Circuit Cable
 - Electric Manual Actuator
 - Linear Detector
 - Spot Thermal Detector

RELEASE CIRCUIT

Release circuit lead – 27 in. (686 mm) with **Blue** color-coded connector

Connects to:

- Release Circuit Cable
 - Release Circuit Drop Cable

EXTERNAL POWER CIRCUIT

Power circuit lead – 21 in. (533 mm) with **Green** color-coded connector

Connects to:

- Power Circuit Cable
 - Fused Power Circuit Cable

ALARM OUTPUT CIRCUIT (Optional)

Alarm circuit lead – 16 in. (406 mm) with **Yellow** color-coded plug

Connects to:

- Vehicle electronics (digital 3.3 VDC output)

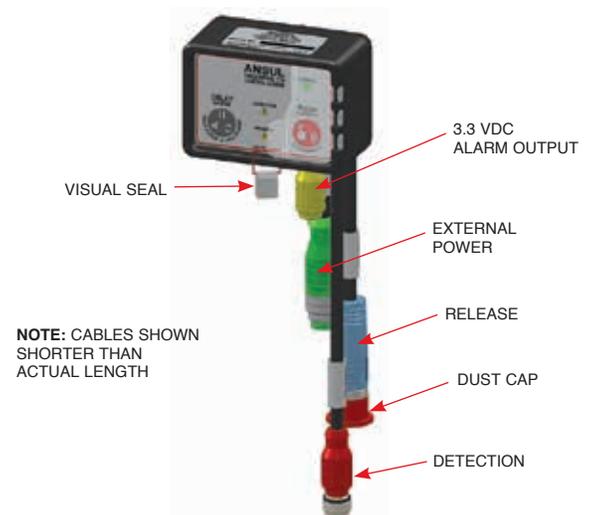


FIGURE 1-1
CHECKFIRE 110 CONTROL MODULE LEADS

TYPICAL SYSTEM CONNECTIONS

Four leads with corresponding color-coded connectors provide easy CHECKFIRE 110 System installation, see Figure 1-2.

Detection Circuit Lead: Permits multiple-detection options using Detection Circuit Cable and Tees for the main detection trunk and branch lines.

- Electric Manual Actuators (EMA)
- Linear Detectors
- Spot Thermal Detectors

Release Circuit Lead: Connects to a maximum of 2 Electric-Pneumatic Actuators installed on agent tank expellant gas cartridges using Release Circuit Cable(s), Tee (needed on second tank), and Release Circuit Drop Cable(s).

External Power Circuit Lead: Provides a direct connection to the vehicle power source using Power Circuit Cable(s) and a single Fused Power Circuit Cable.

Alarm Output Lead: Connects to vehicle electronics (by others) as needed (connection line not shown).

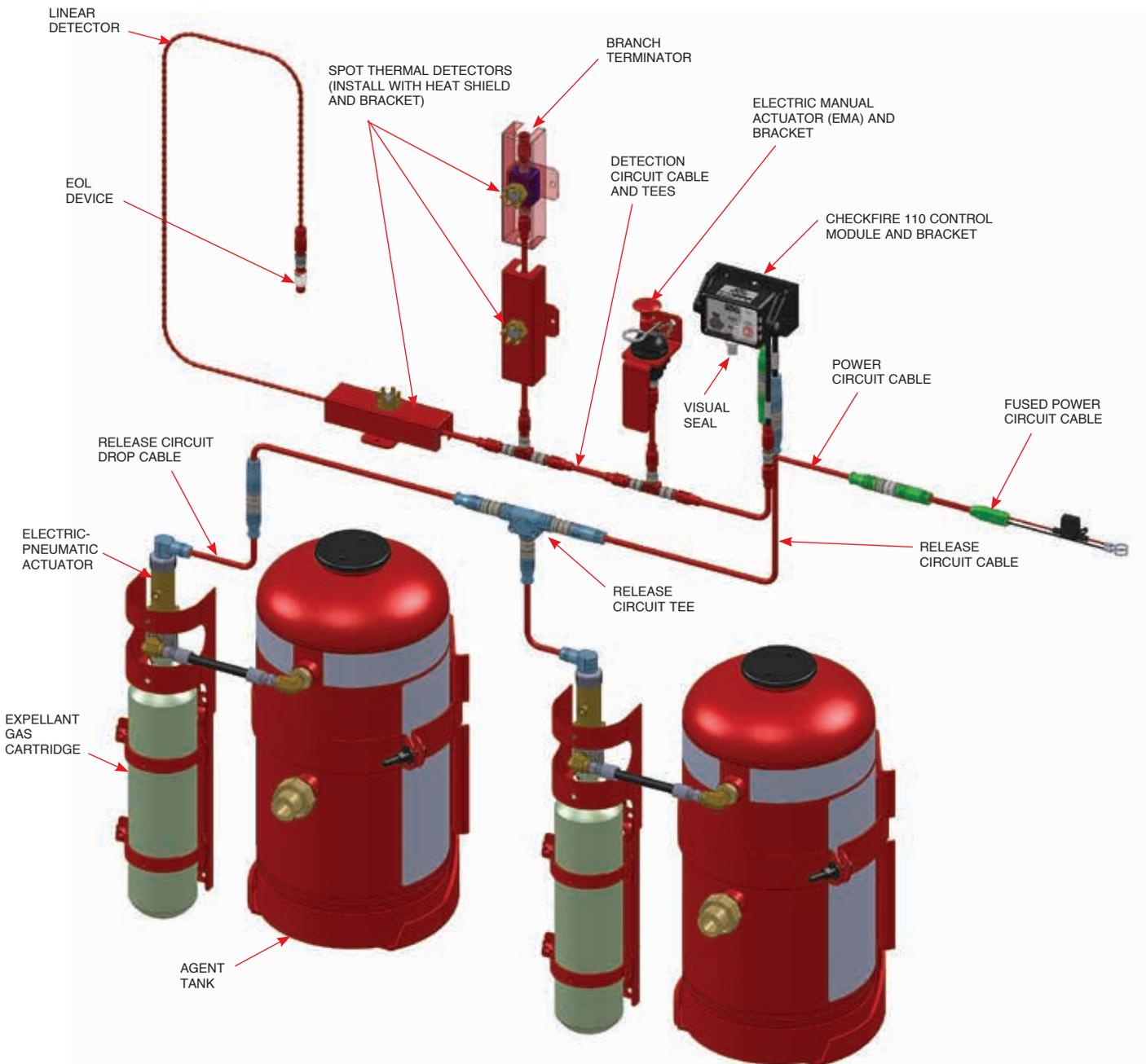


FIGURE 1-2
SYSTEM CONNECTIONS

CHECKFIRE 110 CONTROL MODULE
Part No. 439559

Provides communication and control of input/output components. See Figure 2-1.

- Dust and water tight (IP67 rated)
- Durable high-strength glass-filled nylon material
- UL94 Flame rating
- Surface or bracket mounted
- Two index pins on back for secure mounting
- Ambient temperature range: -40 °F to 140 °F (-40 °C to 60 °C)
- LED indicators provide notification of system status (Internal Sounder matches LED pulse rate)
- “PUSH To Activate / Alarm When Lit” manual-activation Button and LED
 - o Provides manual operation (immediate release)
 - o Indicates Alarm Condition
- Guard door with visual seal to protect manual-activation button
- “DELAY/Reset/Silence” Button
 - o Restarts Time DELAY sequence when initiated before release function activates
 - o Resets control module
 - o Silences audible notifications during fault conditions

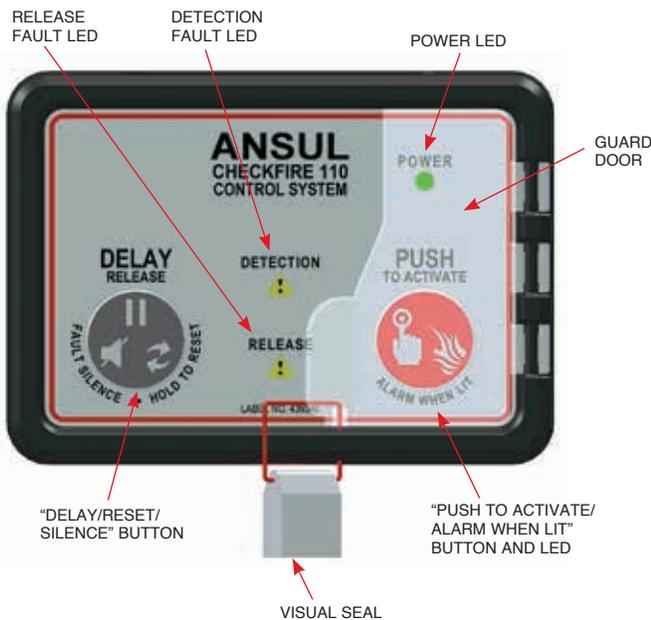


FIGURE 2-1
CHECKFIRE 110 CONTROL MODULE
009151

CHECKFIRE 110/210 MOUNTING BRACKET
Part No. 439564

Provides flexible bracket mounting of Control Module at various viewing angles. See Figure 2-2.

- Constructed with same high-strength glass-filled nylon material as the Control Module
- Multi-position bracket for securing module in a variety of configurations; use 1/4 in. fasteners of appropriate length with lock washers to secure bracket base to mounting surface
- Dimensions for bracket base, see Figure 2-3

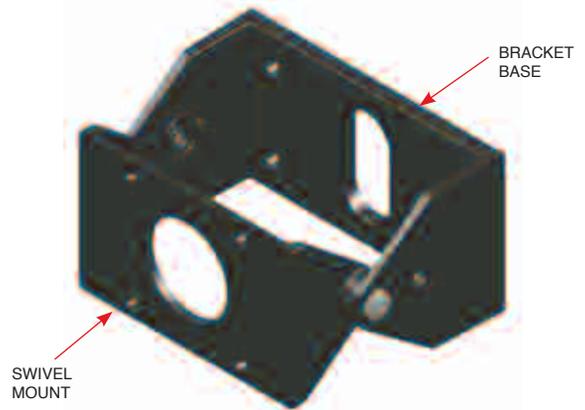


FIGURE 2-2
MOUNTING BRACKET
009152

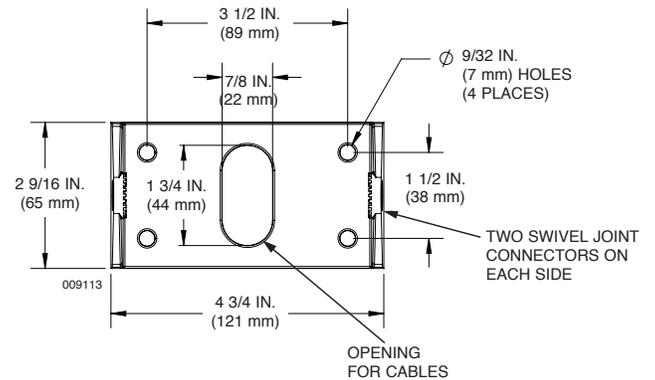


FIGURE 2-3
BRACKET BASE FRONT VIEW
009113

ELECTRIC MANUAL ACTUATOR (EMA)
Part No. 439400

Provides electrical activation of the fire suppression system; typically accessible from ground level and/or in a path of egress. See Figure 2-4.

- Electronic signal sent to Control Module immediately activates fire suppression system
- Temperature range: – 40 °F to 185 °F (– 40 °C to 85 °C)



FIGURE 2-4
ELECTRIC MANUAL ACTUATOR (EMA)
009153

OPTIONAL PNEUMATIC MANUAL ACTUATOR
Part No. See system manuals

Provides pneumatic actuation of the fire suppression system from a remote location typically accessible from ground level and/or in a path of egress.

Note: If plans include an optional pneumatic manual actuator in the operator's compartment, refer to detailed components, planning, design and installation guidelines, in the appropriate fire suppression system manual (latest edition).

System Manuals:

LT-A-101-10/20/30 Manual	(Part No. 24327)
LT-A-101-50/125/250 Manual	(Part No. 427865)
LVS Manual	(Part No. 427109)

ELECTRIC MANUAL ACTUATOR BRACKET
Part No. 440537

Constructed of 3/16 in. (4.8 mm) painted steel. Weld or bolt with appropriate fasteners. See Figure 2-5.



FIGURE 2-5
ELECTRIC MANUAL ACTUATOR BRACKET
009154

► **SPOT THERMAL DETECTOR**

Part No. See Temperature Selections Table

Provides spot thermal detection in the protected area(s). See Figure 2-6.

- Color-coded fixed-temperature design
- Temperature rating stamped on detector
- Includes retaining nut to secure detector in bracket and heat shield

Temperature Selections

Rated Operating Temperature		Maximum Continuous Temperature		Color	Spot Thermal Detector Part No.
°F	(°C)	°F	(°C)		
250	(121)	210	(99)	Blue	438280
350	(177)	256	(125)	Red	438281

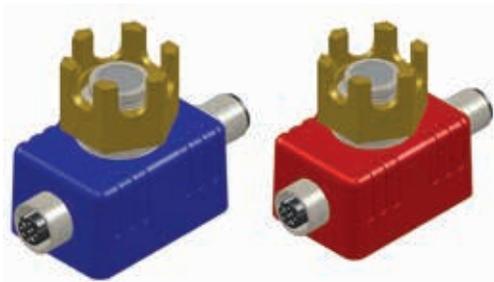


FIGURE 2-6
SPOT THERMAL DETECTORS
009280

► **LINEAR DETECTOR**

Part No. See table

Provides fire detection in the protected area; connects to the CHECKFIRE 110 Control Module via the Detection Circuit Cable. See Figure 2-8.

- Red color-coded connectors
- Two twisted spring steel conductors separated by a heat-sensitive insulator
- Activation temperature rating of 356 °F (180 °C)
- Minimum bend radius, 2 1/2 in. (64 mm)
- Maximum installed continuous operating temperature: 250 °F (121 °C)

Linear Detector Part Number	Length	
	ft	(m)
439406	2	(0.61)
439478	5	(1.53)
439480	10	(3.05)
439408	20	(6.10)
439410	30	(9.15)
440765	50	(15.24)



FIGURE 2-8
LINEAR DETECTOR
009157

SPOT THERMAL DETECTOR BRACKET AND HEAT SHIELD

► **SHIELD**

Part No. 440905

Supports and protects Spot Thermal Detector. See Figure 2-7

- Detector bracket provides secure mounting
- Heat shield provides additional protection for detector body and detection circuit connectors
- Retrofittable to existing style detector bracket (Part No. 416221)

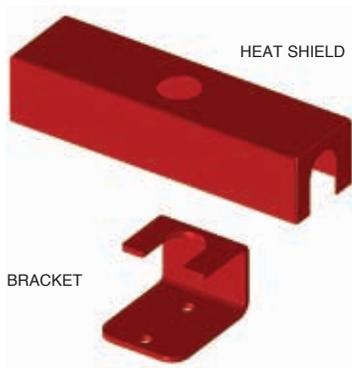


FIGURE 2-7
DETECTOR BRACKET AND HEAT SHIELD
009156

DETECTION CIRCUIT CABLE

Part No. See table

Connects to CHECKFIRE 110 Control Module, Electric Manual Actuator(s) (EMA), and detection input components. See Figure 2-9.

- IP67 connectors
- Red color-coded, anti-vibration connectors
- Temperature rating: 302 °F (150 °C)
- Integral connectors on each end of cable
- Multiple lengths for versatility
- ▶ • Maximum main trunk length: 50 ft (15.24 m)
- Minimum bend radius: 2 1/2 in. (64 mm)

Detection Circuit Cable Part Number	Length	
	ft	(m)
439384	2	(0.61)
439386	5	(1.53)
439388	10	(3.05)
439390	20	(6.10)
440759	30	(9.15)
440762	50	(15.24)



**FIGURE 2-9
DETECTION CIRCUIT CABLE**
009158

DETECTION CIRCUIT BULKHEAD CONNECTOR

Part No. 439404

Provides feedthrough protection and support for detection circuit cable. See Figure 2-10.

- ▶ • IP67 connectors
- Nickel plated brass construction
- Dimensions: see chart in Appendix
- ▶ • Plastic isolators for each side of hole



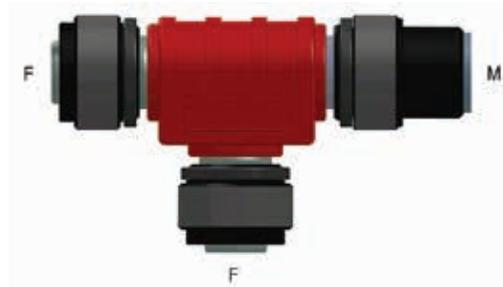
**FIGURE 2-10
DETECTION CIRCUIT BULKHEAD CONNECTOR**
009159

DETECTION CIRCUIT TEE

Part No. 439394

Connects individual Electric Manual Actuator(s) or Spot Thermal Detector(s) to main detection circuit trunk. See Figure 2-11.

- Red color-coded connectors
- Connector temperature rating: 221 °F (105 °C)



**FIGURE 2-11
DETECTION CIRCUIT TEE**
009160

DETECTION CIRCUIT EOL (End-of-Line) DEVICE

Part No. 439396

Provides circuit supervision and termination point for main detection circuit. See Figure 2-12.

- Red color-coded connector
- Connector temperature rating: 221 °F (105 °C)



**FIGURE 2-12
DETECTION CIRCUIT EOL**
009161

DETECTION CIRCUIT BRANCH TERMINATOR

Part No. 439398

Identifies branch termination point in the detection circuit. See Figure 2-13.



**FIGURE 2-13
DETECTION BRANCH TERMINATOR**
009162

RELEASE CIRCUIT CABLE

Part No. See table

Connects to CHECKFIRE 110 Control Module, Release Circuit Tee, and/or Release Circuit Drop Cable(s). See Figure 2-14.

- IP67 connectors
- Blue color-coded, anti-vibration connectors
- Temperature rating: 302 °F (150 °C)
- Multiple lengths for versatility
- Maximum circuit length: 50 ft (15.24 m)
- Minimum bend radius: 2 1/2 in. (64 mm)

Release Circuit Cable Part Number	Length	
	ft	(m)
439418	2	(0.61)
439420	5	(1.53)
439422	10	(3.05)
439424	20	(6.10)
439426	30	(9.15)
439428	50	(15.24)



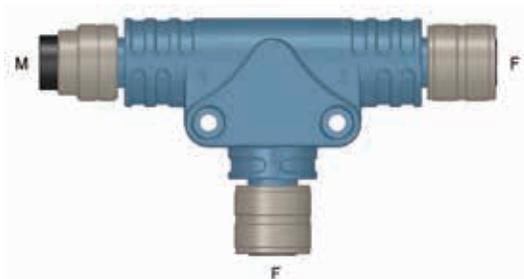
**FIGURE 2-14
RELEASE CIRCUIT CABLE**
009163

RELEASE CIRCUIT TEE

Part No. 439434

Connects to Release Circuit Cable and Release Circuit Drop Cable. See Figure 2-15.

- Blue color-coded connectors
- Connector temperature rating: 221 °F (105 °C)



**FIGURE 2-15
RELEASE CIRCUIT TEE**
009164

RELEASE CIRCUIT DROP CABLE

Part No. See table

Provides connectivity between Release Circuit Cable and Electric-Pneumatic Actuator. See Figure 2-16.

- IP67 connectors
- Blue color-coded, anti-vibration connectors
- Temperature rating: 302 °F (150 °C)
- Two lengths for versatility
- Minimum bend radius: 2 1/2 in. (64 mm)

Release Circuit Drop Cable Part Number	Length	
	in.	(m)
439430	30	(0.76)
439432	38	(0.97)



**FIGURE 2-16
RELEASE CIRCUIT DROP CABLE**
009165

RELEASE AND POWER CIRCUITS BULKHEAD CONNECTOR

Part No. 439405

Provides feedthrough protection and support for either release or power circuit cable. See Figure 2-17.

- IP67 connectors
- Nickel plated brass construction
- Dimensions: see chart in Appendix



**FIGURE 2-17
RELEASE CIRCUIT BULKHEAD CONNECTOR**
009166

RELEASE CIRCUIT TERMINATOR

Part No. 439436

- Identifies termination point in the release circuit. See Figure 2-18.



**FIGURE 2-18
RELEASE CIRCUIT TERMINATOR**
009167

ELECTRIC-PNEUMATIC ACTUATOR

Part No. 439569 (normally supplied with agent tanks or expellant gas cartridge/bracket assemblies)

Attaches to agent tank expellant gas cartridge and provides release of gas into agent tank. See Figure 2-19.

For electrical actuation install Release Circuit Drop Cable (with PAD), see Figure 2-22. On system activation, Electric-Pneumatic Actuator punctures a seal in the expellant gas cartridge allowing expellant gas to flow into the agent tank.

The actuator includes a Preventor to reduce the possibility of installing actuator with the puncture pin not completely retracted. **Note:** Do not bend or remove the Preventor; it is required for correct operation of the actuator.

The actuator includes optional pneumatic actuation hose ports.

Temperature range:

- Electrically with PAD – 40 °F to 185 °F
 (– 40 °C to 85 °C)
- Pneumatic only – 65 °F to 221 °F
 (– 54 °C to 105 °C)

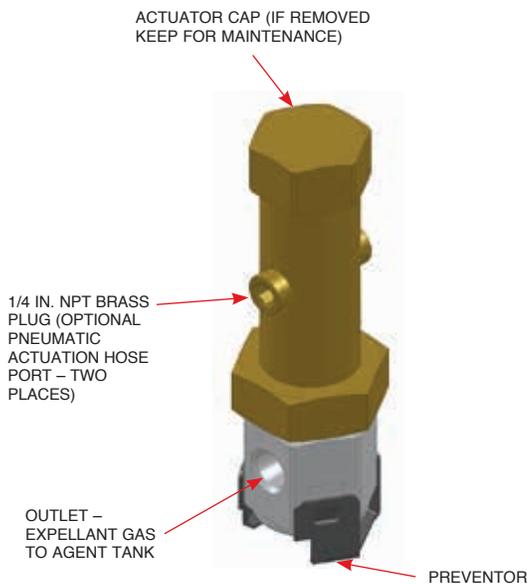


FIGURE 2-19
ELECTRIC-PNEUMATIC ACTUATOR
 009168

PROTRACTING ACTUATION DEVICE (PAD) (Continued)

- Generates force to drive the Electric-Pneumatic Actuator puncture pin through an expellant gas cartridge seal, allowing the expellant gas to flow into agent tank.
- Integral spade connectors easily field-install into the Release Circuit Drop Cable. See Figure 2-20.

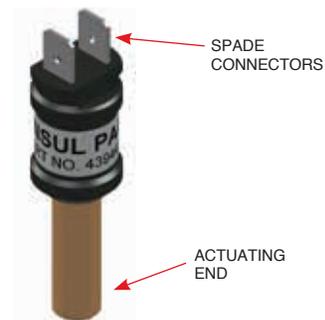


FIGURE 2-20
PAD
 009169



FIGURE 2-21
PAD FIELD INSTALLED IN
RELEASE CIRCUIT DROP CABLE
 009170

PROTRACTING ACTUATION DEVICE (PAD)

Part No. 439448

Provides electrical activation of the fire suppression system. See Figure 2-20 and 2-21.

⚠ CAUTION

When handling the PAD, always point actuating end away from yourself and others. On electrical initiation, PAD operates very quickly and a small brass disk forcefully separates from actuating end. Physical injury may occur from contact with the actuating pin and/or the detaching disk.

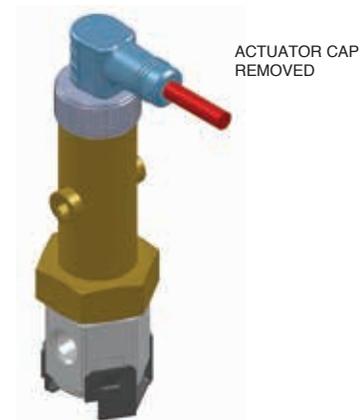


FIGURE 2-22
ELECTRICAL ACTUATION FOR
ELECTRIC-PNEUMATIC ACTUATOR
 009171

POWER CIRCUIT CABLE

Part No. See table

Connects CHECKFIRE 110 Control Module to Fused Power Circuit Cable. See Figure 2-23.

- IP67 connectors
- Green color-coded, anti-vibration connectors
- Temperature rating: 302 °F (150 °C)
- Multiple lengths for versatility
- ▶ • Maximum circuit length: 50 ft. (15.24 m); Excludes 3 ft (0.9 m) Fused Power Circuit Cable
- Minimum bend radius: 2 1/2 in. (64 mm)

Power Circuit Cable Part Number	Length	
	ft	(m)
439438	2	(0.61)
439440	5	(1.53)
439442	10	(3.05)
439444	20	(6.10)
439446	30	(9.15)
440187	50	(15.24)



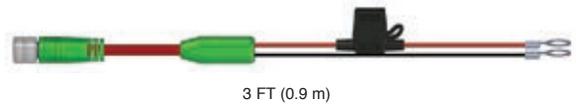
**FIGURE 2-23
 POWER CIRCUIT CABLE**
009172

FUSED POWER CIRCUIT CABLE

Part No. 439492

Connects Power Circuit Cable to the 12/24 VDC vehicle power source. See Figure 2-24.

- IP67 connector
- Green color-coded, anti-vibration connector
- Minimum bend radius: 2 1/2 in. (64 mm)
- 3 amp inline ATO/ATC blade style automotive fuse
- 1/2 in. ring terminals for power source connection



3 FT (0.9 m)

**FIGURE 2-24
 FUSED POWER CIRCUIT CABLE**
009173

RELEASE AND POWER CIRCUITS BULKHEAD CONNECTOR

Part No. 439405

Provides feedthrough protection and support for either release or power circuit cable. See Figure 2-25.

- ▶ • IP67 connectors
- Nickel plated brass construction
- ▶ • Dimensions: see chart in Appendix



**FIGURE 2-25
 POWER CIRCUIT BULKHEAD CONNECTOR**
009166

LABEL PACKAGE

Part No. 440798

Provides instructions for vehicle operators and service personnel on system operation and protection.

Attach appropriate labels as needed in the specified locations. See Figures 2-26 thru 2-29.

If automatic vehicle shutdown is part of the CHECKFIRE System, install Label No. 440799 near the operator's line of vision. Cut out the correct time delay value from Label No. 440800, remove backing to expose adhesive, and attach to Label 440799 in the space provided. See Figure 2-26.



FIGURE 2-26
LABEL FOR ENGINE SHUTDOWN AND TIME DELAY
 009174

If automatic vehicle shutdown is NOT part of the CHECKFIRE System, install Label No. 440801 near the operator's line of vision. See Figure 2-27.

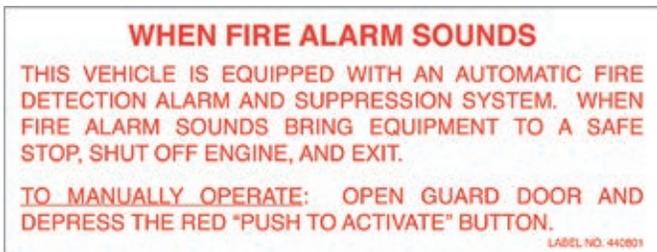


FIGURE 2-27
LABEL TO STOP VEHICLE AND EXIT
 009175

As a reminder to service and maintenance personnel, install this CAUTION (Label No. 71455) in the area protected by the Linear Detector. See Figure 2-28.



FIGURE 2-28
LABEL FOR PROTECTING LINEAR DETECTOR
 009325

Install this label next to every Electric Manual Actuator (EMA). See Figure 2-29.



FIGURE 2-29
INSTRUCTION LABEL FOR EMA
 009324

► VEHICLE SYSTEM PRESSURE SWITCH

Part No. 440090

Provides auxiliary functions (i.e., equipment shutdown, turning on notification appliances, or providing “Pressure Switch Feedback” to a vehicle control panel). See Figure 2-30.

- One integral cable, sealed to switch housing
- Manually resettable 3-conductor (NO/C/NC) SPDT switch
- Rated for 6A with 12/36 VDC nominal
- Includes Pressure Switch Connector Kit (Part No. 440086) to ensure adequate weatherproofing of all electrical connections
- Includes 1/4 in. brass tee and nipple

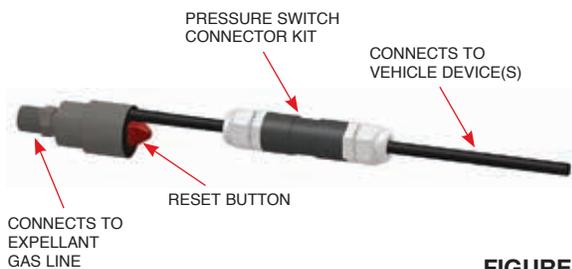


FIGURE 2-30
PRESSURE SWITCH CONNECTIONS
009178

Install switch in expellant gas actuation line using a 1/4 in. tee at the inlet port on the agent tank. Make certain to protect switch and connections from potential damage. See Figure 2-31.

CAUTION

The location of the Discharge Pressure Switch must be at the expellant gas inlet port of the agent tank. Failure to comply may result in damage to the switch and cause the switch to not function properly.

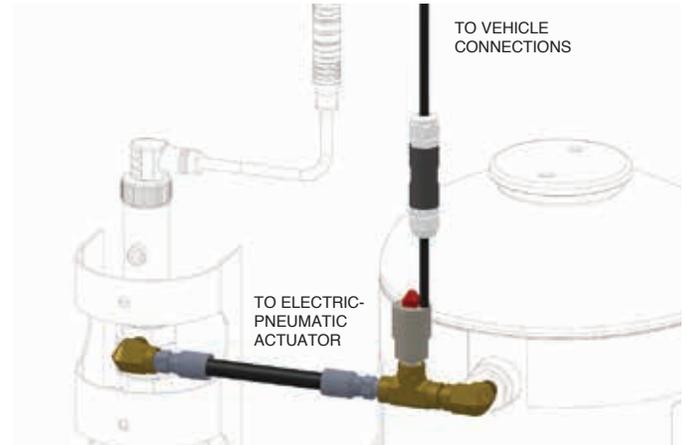


FIGURE 2-31
PRESSURE SWITCH INSTALLATION
009179

Planner/Installer must verify contact ratings of devices intended for pressure switch connection. Connections to vehicle device(s) to be made by others, or with vehicle manufacturer’s direct instruction and approval.

Note: Pressure switch activates on expellant gas release. CHECKFIRE 110 Control Module is unable to monitor or verify pressure switch operation.

DETECTION CIRCUIT TESTER

Part No. 440097

Simulates normal, fault, and alarm conditions for testing the CHECKFIRE 110 Control Module performance. See Figure 2-32.

Switch settings:

- Normal
- Fault
- Alarm

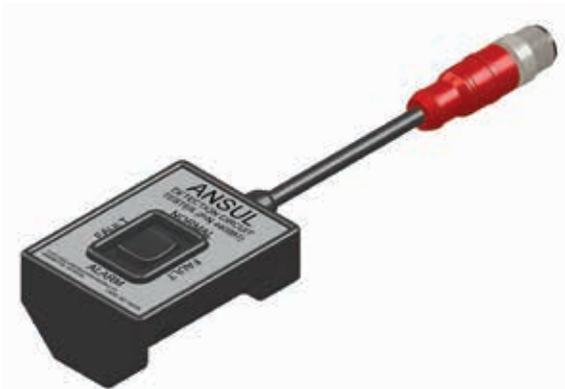


FIGURE 2-32
DETECTION CIRCUIT TESTER

009287

RELEASE CIRCUIT TESTER

Part No. 441021

Indicates a successful release energy pulse to fire the PAD (pass or fail). See Figure 2-33.



FIGURE 2-33
RELEASE CIRCUIT TESTER

009288

RELEASE CIRCUIT TEST PLUG

Part No. 440912

Replaces a PAD for testing the CHECKFIRE 110 Control System. See Figure 2-34.



FIGURE 2-34
RELEASE CIRCUIT TEST PLUG

009289

USER INTERFACE

This section provides the user with overall information on features and operation of the CHECKFIRE 110 Control Module.

FIELD CONNECTIVITY – Cables and Devices

The CHECKFIRE 110 Control Module communicates to devices through cable assemblies incorporating IP67 circular threaded connectors with color-coded overmolding. See Figure 3-1.

IP67 is an environmental ingress protection rating. The first number indicates protection from solid objects (0 is no special protection, 6 is protection from dust). The second number is protection against liquids (0 is no protection, 7 is protection against the effect of immersion in water).

Detection Circuit Lead

- 33 in. (838 mm) Cable
- Red color-coded IP67 anti-vibration connector (Female)

Release Circuit Lead

- 27 in. (686 mm) Cable
- Blue color-coded IP67 anti-vibration connector (Female)

External Power Circuit Lead (12/24 VDC)

- 21 in. (533 mm) Cable
- Green color-coded IP67 anti-vibration connector (Male)

Alarm Circuit Lead (Auxiliary Devices)

- 3.3 VDC digital output
- 16 in. (406 mm) Cable
- Yellow color-coded IP67 plug

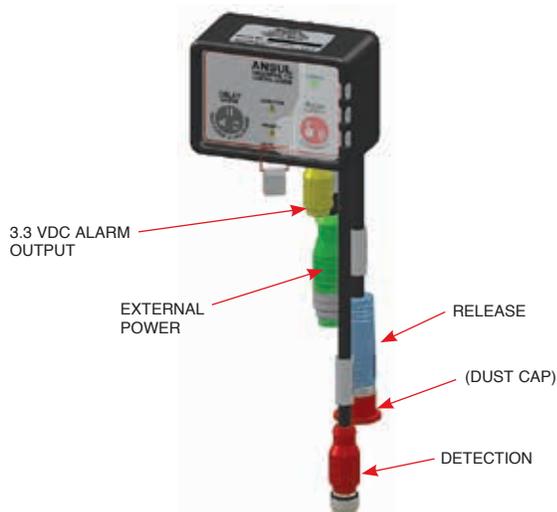


FIGURE 3-1
CONTROL MODULE LEADS

009150

CONTROL MODULE FRONT PANEL BUTTONS

“DELAY/Reset/Silence” Button

Manage fault and/or detection conditions by pressing the “DELAY/Reset/Silence” button (See Figure 3-2) for the following results:

- **Audible Fault Silence**
 - o Silence an audible notification during a fault condition for two hours. Fault LED indicator(s) continue pulsing until the fault condition has been cleared. If a subsequent fault condition occurs, the audible notification will resume until the “DELAY/Reset/Silence” button is pressed again or the fault has cleared.
 - o During a post-discharge condition the button will silence the sounder.
 - o Any new Detection or Fault conditions will reactivate the audible notification.
 - o The audible notification for either a post-discharge or fault condition will resume after being silenced for two hours.
- **Restart Time Delay Sequence**
Restart the time delay cycle during a Detection condition (must be initiated before release circuit activation occurs).
- **Control Module Reset**
Reset the control module after initiating devices have been restored and/or reset.
- **Select Time Delay Period**
Two options available: 5 seconds or 15 seconds

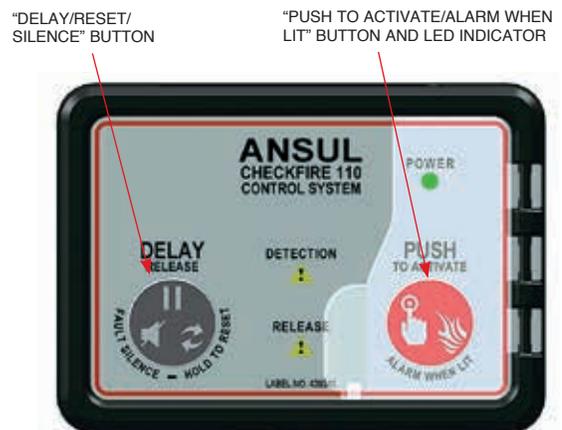


FIGURE 3-2
CONTROL MODULE FRONT PANEL

009180

CONTROL MODULE FRONT PANEL BUTTONS (Continued)

Red “PUSH To Activate / Alarm When Lit” Button and LED Indicator (See Figure 3-2)

- Combination button and LED indicator
- MANUAL ACTIVATION - Pressing the red “PUSH To Activate / Alarm When Lit” Button immediately triggers the release circuit and illuminates the red LED for 10 seconds.

Note: No time delay occurs when red “PUSH To Activate / Alarm When Lit” Button is pressed.

After 10 seconds, the control module enters post-discharge mode, and the red “PUSH To Activate / Alarm When Lit” LED will pulse at a rate of 1 x 10 seconds.

- DETECTOR ACTIVATION - When a detection device sends a detection signal, the “PUSH To Activate / Alarm When Lit” LED indicator displays the following sequence (see Table 3-1):

1. Pulses RED, 2 x 1 second until the time delay period has 5 seconds remaining (sounder matches pulse rate).

2. Pulses RED, 4 x 1 second in the final 5 seconds until time delay has expired (sounder matches pulse rate).
3. Illuminates RED and remains steady-on for 10 seconds (release circuit active) (sounder remains steady-on).
4. Pulses 1 x 10 seconds indicating post-discharge mode (sounder matches pulse rate).

Internal Sounder (Audible Notification)

- Audible notification for all detection and fault conditions
- Pulses at same rate as a corresponding LED indicator(s) (see Table 3-1)
- Minimum 85 dB at 3.3 ft (1 m)

TABLE 3-1: SUMMARY DETECTION CONDITION INDICATORS

	“PUSH To Activate / Alarm When Lit” LED and Sounder Indications			
	2 x 1 sec. for 10 sec.	4 x 1 sec. for 5 sec.	Steady-on for 10 sec.	1 x 10 sec. until reset*
Manual Action (Release Circuit Activation)				
Push the “PUSH to Activate / Alarm When Lit” button Or: Pull ring pin and push an EMA (Immediate release for either action)				
Post discharge				
Detection Circuit Input				
15-Second Time Delay (1st 10 seconds)				
5-Second Time Delay And 5 Seconds to release for 15 Second Time Delay				
Release Circuit Activation (Time Delay Expired)				
Post discharge				

- ▶ *Release Fault Indicator also pulses at this rate during post discharge. When release circuit test device is installed,
- ▶ Release Fault Indicator does not pulse.

CONTROL MODULE FRONT PANEL INDICATORS

**Power Status (Dual-Color Power LED – GREEN / AMBER)
 (See Figure 3-3)**

- Normal status - Power LED is GREEN and remains steady-on indicating power is normal from the external power source
- Fault status - Power LED pulses AMBER 1 x 30 seconds indicating power from external source dropped below acceptable level causing a fault condition. **Note: sounder matches pulse rate for 10 minutes, then auto-silences to conserve energy**
- Fault condition will continue pulsing (AMBER) for up to 72 hours as long as fault exists or until control module powers down
- Once external power source is restored, the (AMBER) power fault LED returns to normal status (steady-on GREEN) and sounder will cease (may take up to 30 seconds)



**FIGURE 3-3
 CONTROL MODULE FRONT PANEL**

009180

Detection Circuit Fault (AMBER) (See Figure 3-3)

- Pulses (AMBER) 1 x 10 seconds (sounder matches pulse rate) during a fault condition
- Returns to normal (no indication) when fault is cleared

Release Circuit Fault (AMBER) (See Figure3-3)

- Pulses (AMBER) 1 x 10 seconds (sounder matches pulse rate) during a fault condition
- Returns to normal (no indication) when fault is cleared

POWER

External Power (Primary)

The CHECKFIRE 110 Control Module utilizes vehicle power for the primary external power source. The input power circuit requires 12 to 24 VDC nominal and is supervised for low power conditions such as open circuits, and/or ground faults.

Internal Reserve Power

In the event primary power source is low or disconnected the CHECKFIRE 110 Control Module has an internal reserve power source providing up to 72 hours of reserve power. A low or lost power condition causes the AMBER Power Fault LED and sounder to pulse 1 x 30 seconds. The sounder will auto-silence after a period of 10 minutes. Restoring the external power source will clear the fault and automatically regenerate the internal power source.

CONTROL MODULE MOUNTING

Two types of mounting options are available.

- SURFACE MOUNT – Control Module includes integral index pins, foam gasket, rubber washer and securing nut to fasten the control module in place without a bracket. The foam gasket minimizes moisture and dust ingress through the opening.
- BRACKET MOUNT - The optional Mounting Bracket (Part No. 439564) is constructed of durable high-strength glass-filled nylon material. The pivot and secure feature accommodates easy operator visual identification and access to the CHECKFIRE 110 Control Module for status indications and manual operation. See Figure 3-4.

Note: The Control Module should never be mounted in an area subject to pressure washing or steam cleaning.



**FIGURE 3-4
 CONTROL MODULE BRACKET**

009181

NOTES:

HAZARD IDENTIFICATION BASIC PLANNING

Individuals responsible for planning (or designing) a CHECK-FIRE 110 Detection and Actuation System must hold current ANSUL Certification from an ANSUL A-101 and/or LVS training program. In addition to the certification, planners must research:

- Known fire hazards in equipment to be protected
- Federal and local fire protection codes/standards

For easier planning obtain a general model drawing of the vehicle with accurate dimensions.

Identify hazard areas needing protection. Agent nozzles in existing fire suppression systems may point out hazard areas. For existing or new fire suppression/detection systems review and apply the following vital information to determine proper placement of discharge nozzles and detection devices.

Fire Hazard Locations

A fire hazard is any area where an ignition source (heat, high temperature or sparks) and fuel (flammable materials) may be found in close proximity. A solid or liquid combustible or flammable material can cause fire when in contact with an ignition (heat) source. Fire hazard areas may also exist in locations where fire can propagate due to dripping or running flammable liquids.

Examples of ignition (heat) sources:

- Engines
- Exhaust manifolds and piping
- Turbochargers
- Power source compartments
- Electrical system equipment
- Torque converters
- Transmissions
- Hydraulic pumps
- Parking brakes (engaged while moving)
- Bearings, clutches or gears
- Malfunctioning components
- Friction from debris packed around parts

Examples of fuel or flammable materials (may cause rapid buildup or spreading of fire):

CLASS B MATERIALS

- Leaking fuel (gasoline, diesel, engine oil, hydraulic oil, glycol, steering fluid, etc.)
- Broken fuel lines/fittings
- Slow leaks – fuel or hydraulic fluid
- Broken hydraulic lines or pumps
- High pressure hoses
- Belly pan (fuel and debris accumulation)
- Ruptured fuel or hydraulic tank
- Greases

CLASS A MATERIALS

- Electric wiring insulation
- Plastic parts
- Rubber
- Debris (wood chips, coal dust, landfill material, etc.)

Identify every foreseeable hazard. Include the occasional danger of malfunctioning components.

Other Considerations

The propagation of fire from one area to another may cause a hazard to be larger than originally determined. Liquid fuel may flow, spray, or splash causing the fire to spread further than anticipated. Radiation, sparks, or conduction through metal can carry heat to an area where the danger of fire would not normally exist. Hand portable fire extinguishers should be accessible to suppress residual fires or to help with providing an escape route.

Research the fire history of the equipment or of similar equipment. This information may be available through company records or vehicle operators who may have first-hand experience enabling them to identify locations of previous fires as well as specific hazards such as frequent component wear, fuel leak points, or ruptures of certain hydraulic fittings or hoses.

Normal operating temperatures in excess of the detector ratings will cause the detection system to activate.

Each identified hazard must include both fire suppression system fixed nozzles and linear detectors or spot thermal detectors for automatic detection and system activation.

Equipment Shutdown

Plan for the shutdown of components that could add to the intensity of the fire, re-ignite the fire, or negatively impact the discharge of fire suppression agent such as:

- Fuel pumps
- Hydraulic pumps
- Engine
- Power source
- Electrical system
- Fans

Automatic pressure bleed-down and/or fuel and hydraulic tank shutoff valves should also be considered to mitigate fire propagation and/or re-flash.

Electrical interface to shutdown functions requires the pneumatic Pressure Switch (Part No. 440090) (the CHECKFIRE 110 Control Module does not include a shutdown function). The switch connects to shutdown devices to initiate properly sequenced engine shutdown simultaneously with fire suppression system operation. Consult the vehicle manufacturer for details. Refer to Section 2 - Components, page 2-9, for electrical rating of switch contacts.

Alarm Application – Operator Safety

Most vehicles are very noisy, and parts of the vehicle are not visible; often the operator is not aware a fire exists. A high decibel alarm and flashing strobe may help warn the operator the CHECKFIRE 110 Control Module is actuating the fire suppression system. Use the Pressure Switch (Part No. 440090) for connections to remote alarming devices (provided by others). For safety, evacuate the vehicle at the earliest possible moment.

The control module pulsing LEDs and 85 dB sounder are intended to alert the operator when the unit receives a fault signal or detection input from a detection device (before actuating the fire suppression system).

The Alarm Circuit 3.3 VDC digital output from the control module connects to compatible vehicle electronics (i.e. computer) for notification of an Alarm or Fire condition.

SPECIFIC PLANNING INFORMATION

Review the following information to plan the CHECKFIRE 110 System layout. Create a drawing of the proposed plan showing locations of components and cable on the vehicle. This will help avoid unforeseen installation problems. Once an acceptable layout is complete; record and keep it for future reference.

Control Module Location

1. Mount control module in full view, easily accessible, and within reach of the operator. Select a flat surface that will properly support the control module during all vehicle operating and environmental conditions (e.g., shock and vibration). **Note:** The control module should never be mounted in an area subject to pressure washing or steam cleaning.
2. Confirm the operator has access to the “PUSH To Activate / Alarm When Lit” and the “DELAY/Reset/Silence” buttons.
3. Select a location suitable for surface mounting (3/16 in. (4.7 mm) maximum thickness), or bracket mounting. For bracket mounting, use the optional CHECKFIRE 110/210 Mounting Bracket (Part No. 439564) and secure with screws or bolts. The mounting surface must be flat to avoid strain on the mounting bracket.
4. Confirm access for proper wiring connections, periodic inspection, and maintenance. If surface mounted, access to the underside or rear of the mounting surface is necessary. Review the surrounding area to confirm the location will not interfere with normal vehicle equipment maintenance or operation.

NOTICE

The ambient temperature for the control module location must not fall below –40 °F nor exceed 140 °F (–40 °C to 60 °C).

Note: If plans include an optional pneumatic manual actuator in the operator’s compartment, confirm the operator has access to the red strike button on the actuator. For detailed planning/installation guidelines, refer to the appropriate system manual (latest edition):

- LT-A-101-10/20/30 Manual (Part No. 24327)
- LT-A-101-50/125/250 Manual (Part No. 427865)
- LVS Manual (Part No. 427109)

CHECKFIRE 110 Circuit Cable Leads and Cable Assemblies

Plan on routing circuit cable assemblies in accessible locations, protected from undue wear, damage, and heat. Cable connectors should not be installed in areas where temperature will exceed 221 °F (105 °C).

NOTICE

All circuit cable must be supported within 1 ft (305 mm) of each component connection and a maximum of 3 ft (914 mm) between supports with rubber-coated 5/16 in. (8 mm) P-Clamps or double-loop cable ties.

When cables pass through a partition, use a bulkhead connector designed for the appropriate cables. Cables must never be routed through a hole or near sharp edges without being properly protected.

Bulkhead Connectors

Part No.	Maximum Pass-through Thickness	Cable Type
439404	3/8 in. (9.5 mm)	Detection Circuit
439405	1 in. (25 mm)	Release Circuit Power Circuit

Detection Circuit Cable (Red Connectors)

Connects input devices to the CHECKFIRE 110 Control Module such as:

- Electric Manual Actuators (EMA)
- Linear Detectors
- Spot Thermal Detectors

1. Determine appropriate detection method (linear detectors or spot thermal detectors) and placement for specific cable end points. **Review specific requirements for each at the end of this section.**

2. Choose a path providing protection for the cable, keep the cables as far away as possible from vehicle electric cables, particularly power cables to and from generators and electric motors; also avoid:

- Antennas and associated cables
- Fire hazard areas
- Areas exposed to mechanical damage
- Proximity to moving parts
- Areas subject to debris accumulation
- Areas exposed to high temperatures (turbo chargers, exhaust equipment, etc.)
- Areas requiring access by vehicle service and maintenance personnel

3. Plan route for the cable from the control module to the detection component end points (note end points for cable lengths) using the following rules (see Figure 4-1):

- No Double Branching
- No EOL Devices on end of branch
- Branch must end with Detection Circuit Branch Terminator or EMA
- ▶ • If used, EMAs must be first component(s) on circuit
- Each EMA must be on a single use branch
- ▶ • Linear Detector may be used anywhere in the main trunk after the EMA (if installed)
- Main detection trunk must be terminated with EOL Device

4. Select appropriate cable lengths for area of installation. Total main detection trunk length must not exceed 50 ft (15.24 m). See Section 2 - Components page 2-4, for available sizes. Maximum length for individual branch lines is

- ▶ 25 ft (7.6 m) (length not included with main trunk limit)

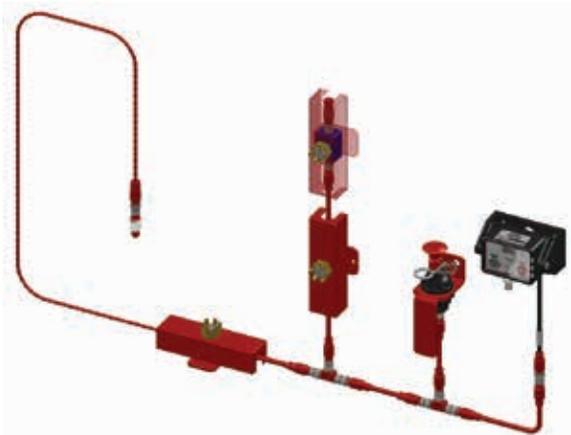


FIGURE 4-1
CORRECT DETECTION CIRCUIT INSTALLATION
009192

ELECTRIC MANUAL ACTUATOR (EMA)

▶ If used, connect the EMA to the main detection circuit using a Detection Circuit Tee (Part No. 439394) and appropriate length of Detection Circuit Cable to the EMA. Surface mount (1/4 in. (6.3 mm) maximum thickness) or bracket mount on a flat surface that will properly support the EMA for vehicle use and conditions. EMA Bracket (Part No. 440537).

- ▶ 1. When planning the detection circuit layout, the EMA(s), if used, **MUST** be installed before any other device on the detection circuit. See Figure 4-2.
- 2. Locate EMA where accessible; preferably in path of egress accessible from ground level. If intended for vehicle operator manual actuation, locate in operator's compartment easily accessible to operator.
- 3. Each EMA must be branched off the main detection trunk utilizing a detection circuit tee and is the only component allowed on the branch.



FIGURE 4-2
CORRECT EMA INSTALLATION
009193

Detection Circuit Cable (Red Connectors) (Continued)

LINEAR DETECTOR

Linear Detector (red connectors and twisted cable) connects directly to the main Detection Circuit Cable.

- Only install in main detection trunk
 - ▶ • If used, must install after the EMA
 - Cannot be branched from main detection trunk
 - ▶ • If last device, must include EOL Device (Part No. 439396) for circuit supervision
1. Where possible, install Linear Detector above the hazard area or around the perimeter of a hazard compartment, preferably within normal airflow, for quick response. Do not allow struts, frame members, or other obstacles to act as heat shields between the hazard area and the detection cable. Attach to vehicle with rubber-coated 5/16 in. (8 mm) P-Clamps or double-loop cable ties.
 2. Do **NOT** install Linear Detector within 12 in. (305 mm) of any area that will become extremely hot during operation, such as:
 - Engine blocks
 - Exhaust manifolds
 - Exhaust tube(s) Mufflers
 - Turbochargers

Note: Maximum installed ambient temperature at the Linear Detector location is 250 °F (121 °C).
 3. Make certain to use an adequate length of Linear Detector to effectively detect a fire. To reduce possibility of damage, only use as much Linear Detector as necessary to cover the hazard area(s).
 4. The minimum bend radius for Linear Detector must not be less than 2 1/2 in. (64 mm). See Figure 4-3.
 - ▶ 5. May be installed anywhere on main trunk after the EMA (if used). See Figure 4-3.
 - ▶ 6. If last device, install an EOL Device (Part No. 439396) on the end of the Main Detection Circuit. See Figure 4-3.
 7. After reviewing the above instructions, select the appropriate length Linear Detector to cover the hazard area(s). See Components, page 2-3, for available sizes.
 8. Whenever possible make end point connections outside the hazard area(s).
 9. Keep the detector as far away as possible from vehicle electric cables, particularly power cables to and from generators and electric motors.

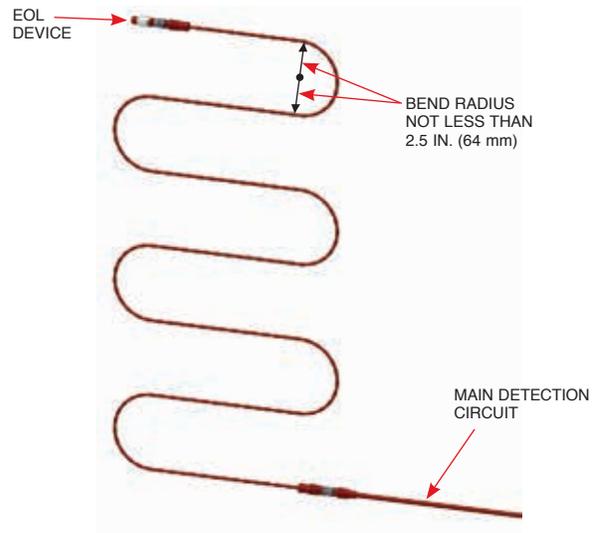


FIGURE 4-3
LINEAR DETECTOR INSTALLATION
 009194

SPOT THERMAL DETECTOR SELECTION AND PLACEMENT

Use spot thermal detectors to meet single-point detection requirements.

Note: When using spot thermal detectors, plan to locate a minimum of two (2) detectors in each hazard area. Large hazard areas will require additional detectors.

1. Select according to temperature range relative to hazard temperature (refer to table).

Rated Operating Temperature		Maximum Hazard Temperature		Detector	
°F	(°C)	°F	(°C)	Color	Part No.
250	(121)	210	(99)	Blue	438280
350	(177)	256	(125)	Red	438281

2. Mount using provided bracket and heat shield on a flat surface that will properly support the detector during all vehicle operating and environmental conditions (e.g. shock and vibration).

Detection Circuit Cable (Red Connectors) (Continued)

SPOT THERMAL DETECTOR SELECTION AND PLACEMENT (Continued)

3. Connect directly to Detection Circuit Cable or connect to Linear Detector assemblies.
4. Spot thermal detectors may be run in a branch from main detection trunk. A branch terminator is required when installed on a branch. See Figure 4-4.

CAUTION

Do not use an EOL Device at the end of a branch. The EOL Device will cause incomplete detection circuit supervision and the system will not function properly.

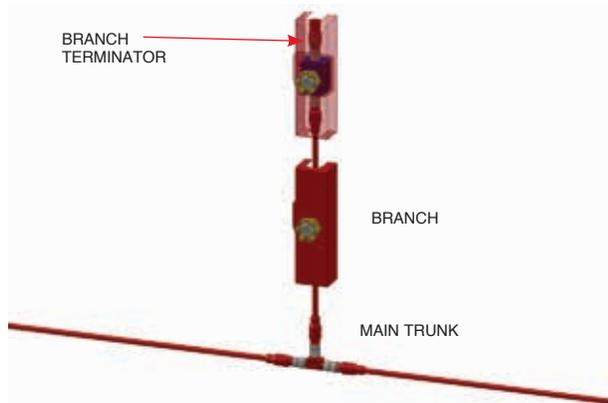


FIGURE 4-4

SPOT THERMAL DETECTOR BRANCH INSTALLATION

009195

5. Install an EOL Device (Part No. 439396) at the end of the main detection trunk. See Figure 4-5.

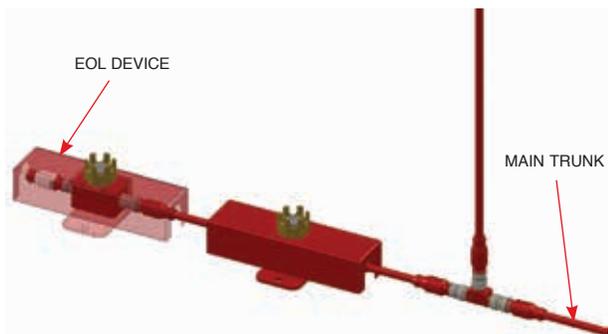


FIGURE 4-5

SPOT THERMAL DETECTOR MAIN TRUNK INSTALLATION

009196

Review complete plan layout for the following **INCORRECT INSTALLATIONS** and adjust as needed.

INCORRECT DESIGN INSTALLATIONS

CAUTION

Do not use an EOL Device on a branch because the complete detection circuit will not be monitored. (See Figure 4-6 and 4-7). Double branching is not allowed. (See Figures 4-6 thru 4-8). Failure to comply may cause the system to not function properly.

NO EOL DEVICE ON BRANCH
 NO DOUBLE BRANCHING



FIGURE 4-6

INCORRECT EMA INSTALLATION

009197

EMA MUST BE ON SINGLE USE BRANCH
 NO EOL DEVICE ON BRANCH
 NO DOUBLE BRANCHING



FIGURE 4-7

INCORRECT INSTALLATION

009202

CAUTION

Only one EMA may be installed from a detection circuit tee on a single branch circuit. If multiple EMAs are to be installed, additional branches on the main trunk will be required (one EMA per branch). Incorrect installations will cause the system to not function properly. See Figure 4-8.

EMA MUST BE ON SINGLE USE BRANCH
 NO DOUBLE BRANCHING



FIGURE 4-8

INCORRECT EMA INSTALLATION

009198

Detection Circuit Cable (Red Connectors) (Continued)
 INCORRECT DESIGN INSTALLATIONS (Continued)

CAUTION

Install EMA(s) as the first component(s) on the Detection Circuit and on a single use branch. Failure to comply may cause the system to not function properly. (See Figure 4-9, and 4-10).

EMA MUST BE FIRST COMPONENT AND ON SINGLE USE BRANCH



FIGURE 4-9
INCORRECT EMA INSTALLATION
 009199

EMA MUST BE FIRST COMPONENT AND ON SINGLE USE BRANCH



FIGURE 4-10
INCORRECT EMA INSTALLATION
 009200

CAUTION

Do not install the Linear Detector on a branch. (See Figure 4-11).

LINEAR DETECTOR MUST BE IN THE MAIN TRUNK; AND END WITH EOL DEVICE IF LAST DEVICE ON MAIN TRUNK



FIGURE 4-11
INCORRECT INSTALLATION
 009201

Release Circuit Cable (Blue Connectors)

Connects Electric-Pneumatic Actuator(s) (for agent tank expellant gas cartridges(s)) to CHECKFIRE 110 Control Module.

- System activates a maximum of 2 Electric-Pneumatic Actuators (one per tank).
- For electrical actuation include a Release Circuit Drop Cable and a Protracting Actuation Device (PAD) (Part No. 439448) for each actuator. Release Circuit Tee (Part No. 439434) required for two actuators.
- For optional pneumatic actuation install a pneumatic manual actuator near the operator and/or in path of egress at a point accessible from ground level. Refer to appropriate system manual list on page 2-2.

1. Determine location of agent tank(s), expellant gas cartridge assembly(s), and actuator(s) for specific cable end points.
2. Plan route for the release circuit cable from the control module to the agent tank expellant gas cartridge end point(s) (note end point(s) for cable lengths). Choose a path in accessible locations providing protection from undue wear, damage, and heat. Keep cables as far away as possible from vehicle electric cables, particularly power cables to and from generators and electric motors; also avoid:

- Antennas and associated cables
- Fire hazard areas
- Areas exposed to mechanical damage
- Proximity to moving parts
- Areas subject to debris accumulation
- Areas exposed to high temperatures (turbo chargers, exhaust equipment, etc.)
- Areas requiring access by vehicle service and maintenance personnel

3. Select appropriate cable lengths for area of installation. See Section 2 - Components, page 2-5, for available sizes. Maximum 50 ft (15.2 m) allowed.

4. If more than one Electric-Pneumatic Actuator is required, add a Release Circuit Tee and appropriate length Release Circuit Cable to interconnect release circuits.

Power Circuit Cables (Green Connectors)

Connects CHECKFIRE 110 Control Module to 12/24 VDC nominal vehicle power source using the Power Circuit Cable and the Fused Power Circuit Cable (connects to vehicle power supply).

1. Determine location of power source that will provide the following current load capabilities:

SYSTEM CURRENT DRAW

- Nominal < 6 mA @ 10.2 – 28 VDC
- Maximum < 100 mA @ 10.2 – 28 VDC

2. Plan route for the Power Circuit Cable from the control module to the end point of the Fused Power Circuit Cable (note end points for both cables). Choose a path in accessible locations providing protection from undue wear, damage, and heat. Keep the cables as far away as possible from vehicle electric cables, particularly power cables to and from generators and electric motors; also avoid:
 - Antennas and associated cables
 - Fire hazard areas
 - Areas exposed to mechanical damage
 - Proximity to moving parts
 - Areas subject to debris accumulation
 - Areas exposed to high temperatures (turbo chargers, exhaust equipment, etc.)
 - Areas requiring access by vehicle service and maintenance personnel
3. Select appropriate cable lengths for area of installation. See Section 2 - Components, page 2-7, for available sizes.

Alarm Output Circuit Lead – Digital 3.3 VDC

The Digital 3.3 VDC Alarm Output Circuit Lead (Yellow plug) on the CHECKFIRE 110 Control Module is an 18 AWG, two conductor polarity sensitive cable assembly. The white conductor is positive and the black conductor is negative.

This circuit is initiated by an alarm condition. The output is not intended to directly operate analog devices such as audible horns, strobes and relays. However, the installer or OEM can use the circuit as a logic input to a vehicle operating system or Programmable Logic Controller to manage engine shutdown, cooling fans, hydraulic pumps, notification devices, relays, etc.

The vehicle operating system, control configuration, and field wiring must be provided and installed by others.

Note: Removal of the yellow plug on the Alarm Output Circuit Lead may compromise the IP67 rating for this circuit.

NOTICE

Do not remove the yellow plug unless circuit is intended for use.

Vehicle System Pressure Switch

The Vehicle System Pressure Switch is a manually resettable 4-conductor SPDT switch, rated for 6A when used with voltages between 12 VDC and 36 VDC nominal. The switch can be used to perform several different tasks on system actuation, including equipment shutdown, turning on notification appliances, or providing “Pressure Switch Feedback” to a vehicle control panel. The switch has one integral cable, sealed to the end of the switch housing with 3-conductors (NO/NO/C/NC) for field connections.

Install switch in expellant gas actuation line using a 1/4 in. tee at the inlet port on the agent tank. Make certain to protect switch and connections from potential damage.

Planner/Installer must verify contact ratings of devices intended for pressure switch connection. Connections to vehicle device(s) to be made by others, or with vehicle manufacturer’s direct instruction and approval.

Note: Pressure switch activates on expellant gas release. CHECKFIRE 110 Control Module is unable to monitor or verify pressure switch operation.

Label Package

Include a Label Package (Part No. 440798) to identify specific procedures of the system to vehicle operators.

System Layout

Once components are selected and locations are determined, complete a final drawing of the system layout. This drawing should at a minimum include the following:

- Hazard area locations
- Component locations (include vehicle power source)
- Routes for all connecting circuits with cable lengths identified.

Indicate areas where cable must pass-through bulkheads. Use circuit bulkhead connectors to support and protect cables. (Confirm acceptable pass-through locations with vehicle manufacturer.) The drawing should be as precise as possible to avoid installation problems later.

Compile a list of components to confirm system includes all required parts (review Components Planning Checklist, page 4-8). The CHECKFIRE System is complete when all necessary components combine to provide automatic fire detection and activation of the fire suppression system for protected areas.

COMPONENTS PLANNING CHECKLIST

- CHECKFIRE 110 Control Module
- Mounting Bracket
- Detection Circuit Cable(s), Tees, EOL Device, and Branch Terminator(s)
- Electric Manual Actuator(s) (EMA) and Bracket(s)
- Linear Detector(s)
- Spot Thermal Detector(s) (include bracket and heat shield), if applicable
- Release Circuit Cable(s) and Tees
- Release Circuit Drop Cable(s)
- PAD(s)
- Electric-Pneumatic Actuator(s) (may be supplied with agent tanks)
- Pneumatic Manual Actuator(s) (optional)
- Power Circuit Cable(s) and Fused Power Circuit Cable
- Pressure Switch(es), if applicable
- Rubber-Coated 5/16 in. (8 mm) P-Clamps (by others)
- Double-Loop Cable Ties
- Bulkhead Feedthrough Connectors (detection, release, and power circuits)
- Alarms or Strobes
- Label Package

Note: For part numbers, see Section 10 – Appendix, Component Index, page 10-1.

INSTALLATION

Before installing the detection and actuation system, Section 4 - System Planning should be studied in its entirety. In addition, a resulting system layout drawing with information on hazard areas, component locations, and routing of connecting circuits, along with all cable lengths identified, should be available. Review this drawing and become familiar with all applicable steps and instructions before installing any component.

NOTICE

For ease of installation, the fire suppression system should be installed before the detection and actuation system.

CHECKFIRE 110 CONTROL MODULE INSTALLATION

The CHECKFIRE 110 Control Module may be surface mounted (3/16 in. (4.7 mm) maximum thickness) or bracket mounted. For bracket mounting, use the CHECKFIRE 110/210 Mounting Bracket (Part No. 439564). Index pins on the control module prevent rotating. **Note:** The Control Module should --never be mounted in an area subject to pressure washing or steam cleaning.

Surface Mounting Instructions

Although recommended, the CHECKFIRE 110 Control Module does not require a bracket when surface mounting in a flat location. The location must properly support the control module during all vehicle environmental and operating conditions (e.g. shock and vibration).

1. Refer to layout drawing for planned location and determine a position within operator's reach with the best viewing angle for control module LEDs and easy access to control module buttons. Verify the location meets approval of the vehicle owner and/or vehicle service manager.
2. Confirm access to underside or rear of mounting surface to enable proper cable connections, periodic inspections, and maintenance. Verify control module location and connections will not interfere with normal vehicle operation, service, and maintenance.
3. Drill three holes matching the correct diameter and layout for surface mounting, see Figure 5-1.
 - a. Use the foam gasket as a template to carefully mark hole locations. The gasket has 4 index holes (for ease of installation) and the control module has 2 index pins. Before drilling, make sure index holes on the gasket line up correctly with the index pins on the control module. See Figure 5-2.

Note: The foam gasket is packaged in a separate bag with the enclosure nut, rubber washer, and visual seal in the CHECKFIRE 110 Shipping Assembly (Part No. 439559).

- b. After drilling holes, remove burrs and sharp edges.

4. Install foam gasket on control module.
 - a. Remove protective backing exposing gasket adhesive.
 - b. Align with index pins on back of control module and press in place, securing to control module surface.

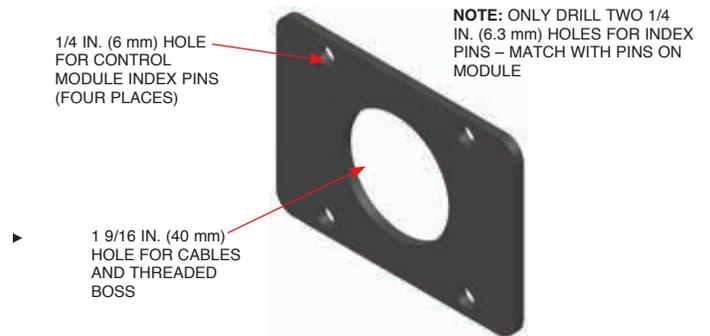


FIGURE 5-1
SURFACE MOUNTING TEMPLATE
(FOAM GASKET)

009203



FIGURE 5-2
INDEX PINS AND THREADED BOSS

009204

5. If possible, hold rubber washer and enclosure nut (packaged in separate bag) on the back side of the mounting surface so it lines up with the 1 9/16 in. (40 mm) drilled hole.
6. Carefully feed cables through drilled hole, rubber washer, and enclosure nut.
7. Fit index pins and threaded boss into the drilled holes.

Surface Mounting Instructions (Continued)

- 8. Hand-tighten enclosure nut on threaded boss, see Figure 5-3.

CAUTION

Only hand-tighten enclosure nut, do not use mechanical force such as a wrench.

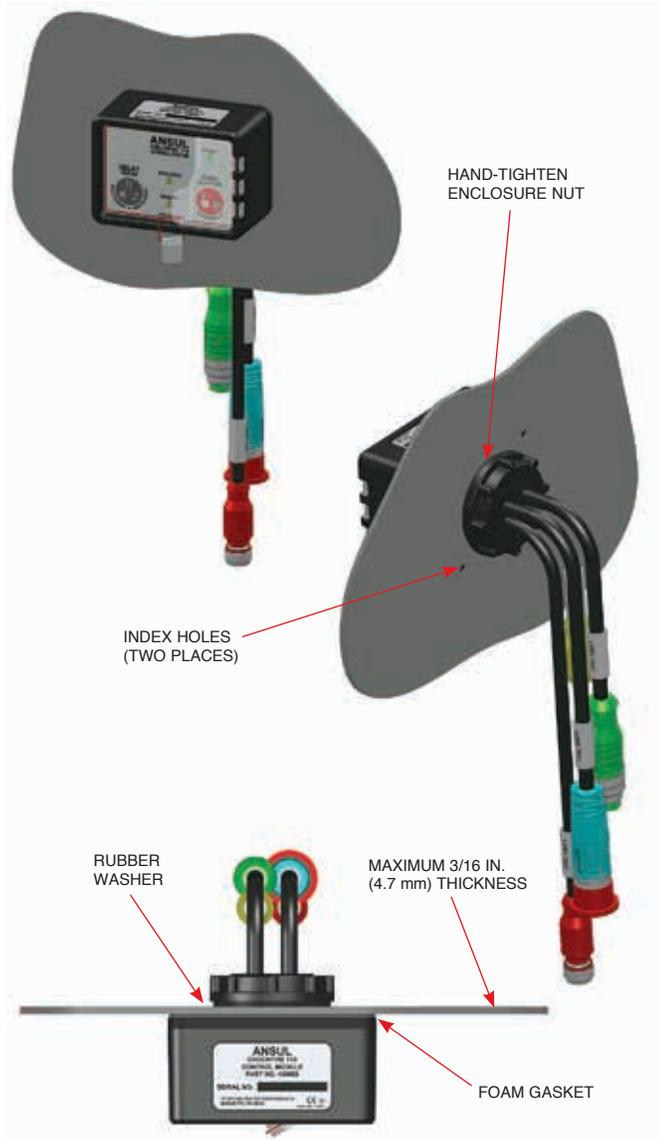


FIGURE 5-3
SURFACE MOUNT 110 CONTROL MODULE
009205

Bracket Mounting Instructions

Bracket mounting requires the CHECKFIRE 110/210 Mounting Bracket (Part No. 439564). The bracket is a two piece, multi-position bracket for securing the control module in a variety of configurations. Mount on a flat surface that will properly support the control module during all vehicle operating and environmental conditions (e.g. shock and vibration).

The bracket includes a Bracket Base, a Swivel Mount and two swivel joint screws, see Figure 5-4. The control module attaches to swivel mount in a horizontal or vertical position on either side of swivel mount.

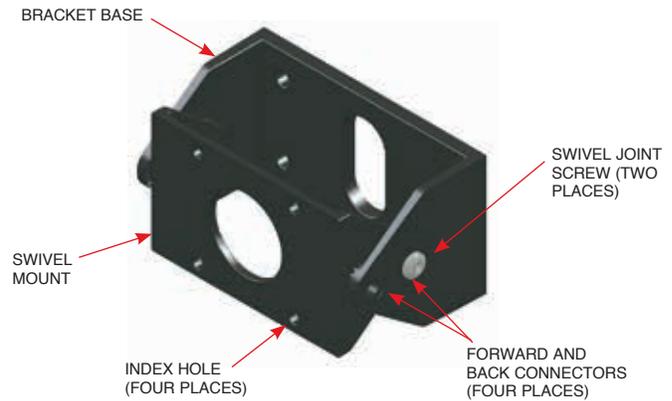
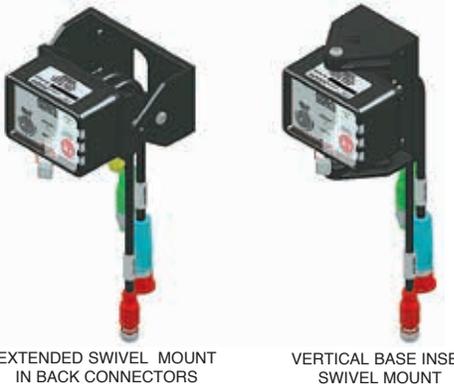
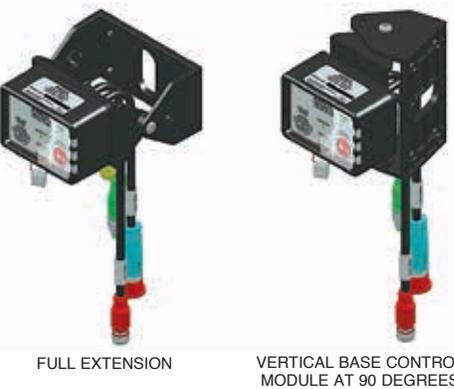


FIGURE 5-4
CHECKFIRE 110/210 MOUNTING BRACKET
009181

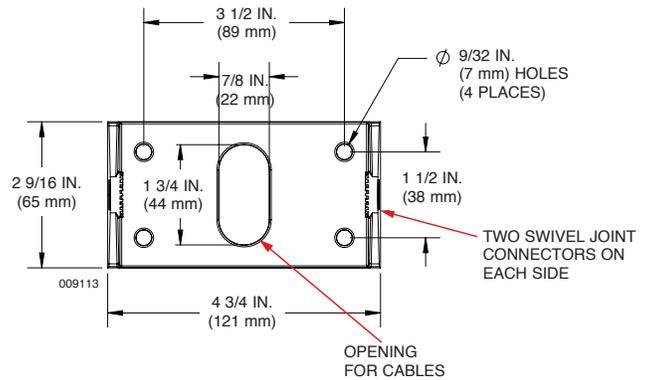
- 1. Refer to layout drawing for planned location and determine a position within the operator's reach with the best viewing angle for control module LEDs and easy access to control module buttons. Verify the location meets approval of the vehicle owner and/or vehicle service manager. See Figure 5-5 for sample mounting options. Note the positions of swivel mount and connectors.

Bracket Mounting Instructions (Continued)



**FIGURE 5-5
SAMPLE MOUNTING OPTIONS**
009233

2. Confirm access to the control module for proper cable connections, periodic inspections, and maintenance. Verify module location and connections will not interfere with vehicle operation, service, and maintenance.
3. Using the bracket base as a template (see Figure 5-6), mark and drill 9/32 in. (7 mm) holes in the flat surface (4 places).
4. If needed, mark a 1 5/8 in. (42 mm) dia. circle in the mounting surface, matching center of the 7/8 in. x 1 3/4 in. (22 mm x 44 mm) opening for cables passing through the mounting surface. Drill the marked hole. See Figure 5-6. Remove burrs and sharp edges; protect cables as needed.



**FIGURE 5-6
BRACKET BASE FRONT VIEW**
009113

5. Secure base to mounting surface using appropriate length fasteners (1/4 in. (6 mm) screws or bolts with lock washers and nuts).
6. Attach control module to swivel mount according to the position determined in Step 1.
 - a. Retrieve enclosure nut and rubber washer for threaded boss from separate bag in the CHECKFIRE 110 Shipping Assembly (Part No. 439559).
 - b. Carefully feed cables through center hole in Swivel Mount, rubber washer, and enclosure nut.
 - c. Insert index pins into index holes and hand-tighten enclosure nut to threaded boss. See Figure 5-7.

Bracket Mounting Instructions (Continued)

CAUTION

The enclosure nut should only be hand-tightened, do not use mechanical force (such as a wrench).

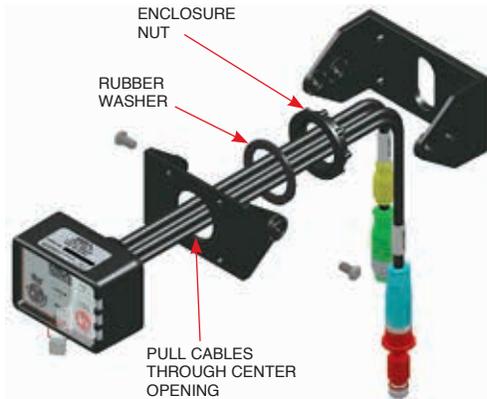


FIGURE 5-7
ENCLOSURE NUT
 009206

- If required, feed cables through opening in bracket base. Reinstall the Swivel Mount to the base according to the position determined in Step 1. Carefully align joint teeth and secure with the swivel joint screws to lock swivel mount in place. Do not over tighten, 20-25 in-lbs (2.26-2.82 N•m) maximum. See Figure 5-8.



FIGURE 5-8
MOUNTING BRACKET WITH
CHECKFIRE 110 CONTROL MODULE
 009207

CABLE CONNECTIVITY / INSTALLATION

The CHECKFIRE 110 System utilizes IP67 circular threaded connectors on all cable and tee components. This modular cable harness reduces installation time and damaged cables can be replaced without replacing the entire cable assembly.

The cable assemblies have a red outer jacket between threaded connectors.

For easy recognition of each cable type, the integral connectors have color-coded overmolding. Specific pin and key designs help ensure proper cable connections.

Note: Refer to the layout drawing for circuit routing and cable/tee assembly.

CIRCUIT CABLE IDENTIFICATION

Circuit	Color	Pins
Detection	RED	4
Release	BLUE	2
External Power	GREEN	2
Alarm Output	YELLOW	N/A

Connector Assembly

Organize cables, tees, and associated connectors for each circuit. Assemble cables by connecting the male and female connectors. The male end has connector pins and a threaded swivel nut. The female end has sockets and a swivel connector, see Figure 5-9.



FIGURE 5-9
CABLE CONNECTORS
 009208

- Align the male end with the female end by positioning keyed slots and pins in the proper orientation, see Figure 5-10.

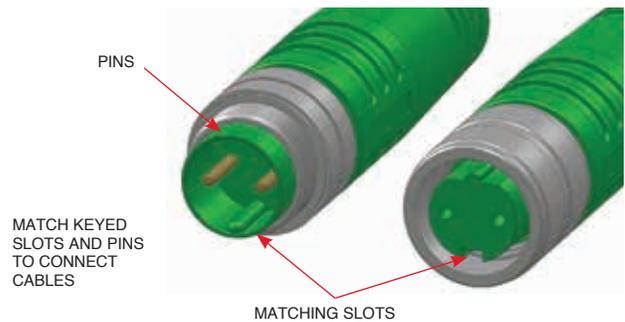


FIGURE 5-10
ALIGN PINS AND KEYS
 009209

Connector Assembly (Continued)

- Lightly press connectors together while rotating until the keys align. Then firmly press connectors together while threading swivel nut; hand-tighten only. If connectors do not go together easily, do not force; recheck keyed slots and pins to ensure proper alignment. **Note:** May need to press connectors together repeatedly and tighten until firmly seated.
- When tight, grasp connectors, push together firmly, then re-tighten swivel fittings.

CAUTION

Do not use mechanical force such as a wrench. The connection has an IP67 rating when hand-tightened and does not require mechanical force.

General Instructions for Cable Installation

All cable assemblies, regardless of type (detection, release or power), must be supported with rubber-coated 5/16 in. (8 mm) P-Clamps or double-loop cable ties (Part No. 440737) attached to the vehicle. The minimum bend radius for all cable assemblies is 2 1/2 in. (64 mm).

When installing cable assemblies, keep the cables as far away as possible from vehicle electric cables, particularly power cables to and from generators and electric motors; also avoid:

- Antennas and associated cables
- Fire hazard areas
- Areas exposed to mechanical damage
- Proximity to moving parts
- Areas subject to debris accumulation
- Areas exposed to high temperatures (turbo chargers, exhaust equipment, etc.)
- Areas requiring access by vehicle service and maintenance personnel

Confirm cables are not subject to damage and will not interfere with vehicle service and maintenance procedures.

- Follow planned route in the layout drawing and install each circuit starting at the control module lead and work outward. Completely install one circuit at a time, finishing with the power circuit. Use correct size P-Clamps to avoid problems, see Figure 5-11. **Note:** Changes to the planned route will likely alter cable lengths needed for installation.

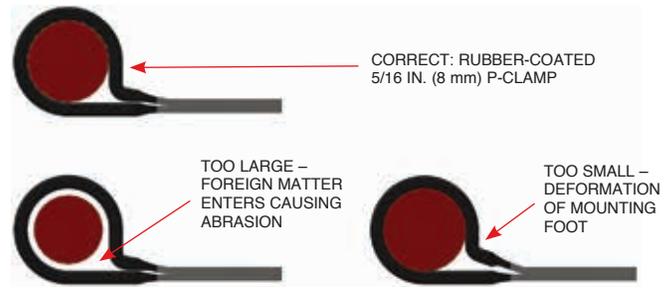


FIGURE 5-11
USE CORRECT SIZE P-CLAMPS
 009210

- If attachment points are not available for P-Clamps, a double-loop cable tie (Part No. 440737) is acceptable for support and separation between cables and the securing point. **Note: Cables should not be supported by hydraulic hoses.** See Figure 5-12.

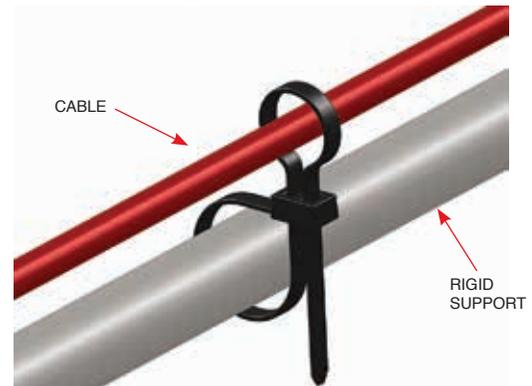


FIGURE 5-12
DOUBLE-LOOP CABLE TIE
 009211

- Secure cables at least every 3 ft (0.9 m) and within 1 ft (0.3 m) on both sides of connectors or connection to a device. See Figure 5-13.

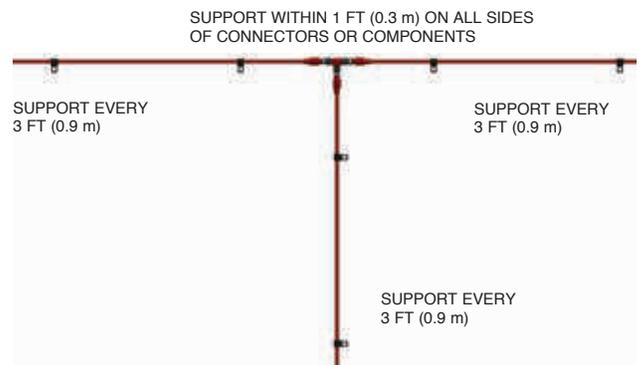


FIGURE 5-13
CABLE SUPPORT REQUIREMENTS
 009212

General Instructions for Cable Installation (Continued)

4. Adjust slack to avoid droops in cable. Allow appropriate slack through areas that are intended to move under normal vehicle operation.
5. When cables pass through a partition, it is recommended to use a bulkhead connector designed for the appropriate cables. **Note: Cables must never be routed through a hole or near sharp edges without being properly protected.** See Figure 5-14.

Bulkhead Connectors

Part No.	Maximum Pass-through Thickness	Cable Type
439404	3/8 in. (9.5 mm)	Detection Circuit
439405	1 in. (25 mm)	Release Circuit Power Circuit



DETECTION CIRCUIT BULKHEAD CONNECTOR



RELEASE CIRCUIT AND POWER CIRCUIT BULKHEAD CONNECTOR

FIGURE 5-14
BULKHEAD CONNECTORS

009159 / 009166

► LINEAR DETECTOR INSTALLATION

Install Linear Detector throughout the hazard area by connecting directly to the main detection trunk. **Note: Linear Detector should not be supported by hydraulic hoses.**

NOTICE

The minimum bend radius for Linear Detector must not be less than 2 1/2 in. (64 mm) (see Figure 5-16, page 5-7). Adjust slack to avoid droops in cable. Allow appropriate slack through areas that are intended to move under normal vehicle operation.

- Do not try to stretch Linear Detector in any way.
- Do not attach Linear Detector to commonly removed or replaced equipment.

Note: Linear Detector must connect to main Detection Circuit trunk, not the branch of a Detection Circuit Tee.

Keep the following in mind when installing a Linear Detector:

- Make certain Linear Detector routing allows direct exposure to heat resulting from a fire
- Choose routing locations where heat is likely to travel to or through quickly in event of a fire
- Maximum installed ambient temperature at the Linear Detector location is 250 °F (121 °C).
- Support Linear Detector from mounting surfaces such as decks, struts, framework, vehicle component support, or support structures, etc., always keeping system planning guidelines and vehicle maintenance procedures in mind. **Note:** When supporting from the vehicle make certain any support device requiring drilling or welding is approved by owner or vehicle manufacturer.
- Avoid securing Linear Detector too close to extremely hot components
- Route the Linear Detector where it will not be subject to damage and not interfere with vehicle maintenance procedures.
- Keep Linear Detector as far away as possible from vehicle electric cables, particularly power cables to and from generators and electric motors.

1. Make sure detection circuit cable is completely installed from CHECKFIRE 110 Control Module to hazard area end point. Start installation of Linear Detector at end point of detection circuit cable.
2. Install Linear Detector above hazard area or around perimeter of a hazard compartment so it can react to escaping heat. Refer to layout drawing. Do not allow struts, frame members, or other obstacles to act as heat shields between hazard and detector cable.
3. Do **NOT** install Linear Detector within 12 in. (305 mm) of any area that will become extremely hot during operation, such as:
 - Engine blocks
 - Exhaust manifolds
 - Exhaust tubes/Mufflers
 - Turbochargers
4. Secure Linear Detector every 12 in. to 18 in. (305 mm to 454 mm) using appropriately sized (5/16 in. (8 mm)) rubber-lined P-Clamps. Where it is not possible to use rubber-lined P-Clamps, a double-loop cable tie (Part No. 440737) and protective covering (Part No. 56692) is acceptable to provide separation between cable and securing point. Secure more often if necessary

Slice rubber tube length wise to fit around the Linear Detector. This protective covering should also be used at locations where cable would rub against other hard surfaces, rough edges, or sharp corners. See Figure 5-15.

LINEAR DETECTOR INSTALLATION (Continued)

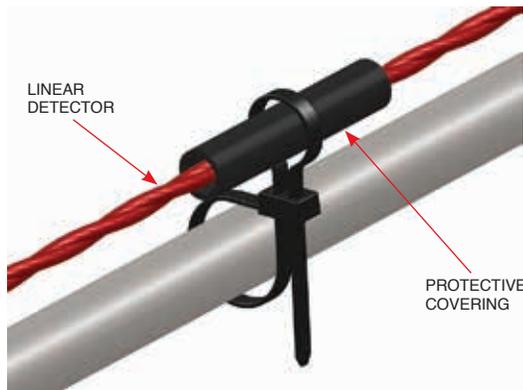


FIGURE 5-15
DOUBLE-LOOP CABLE TIE
009213

- When a Linear Detector must pass-through a partition it is recommended to use a bulkhead fitting designed for the appropriate cable. See Figure 5-14, page 5-6.

Bulkhead Connector

Part No.	Maximum	Cable Type
	Pass-through	
	Thickness	
439404	3/8 in. (9.5 mm)	Detection Circuit

CAUTION

Linear Detector must never be routed through a hole or near sharp edges without being properly protected. Failure to protect the cable from being cut or abraded could cause a fault condition or false alarm condition, potentially leading to a false discharge or detection failure.

- Install an EOL Device (Part No. 439396) at end of the Linear Detector, if last device, to complete the circuit. See Figure 5-16.

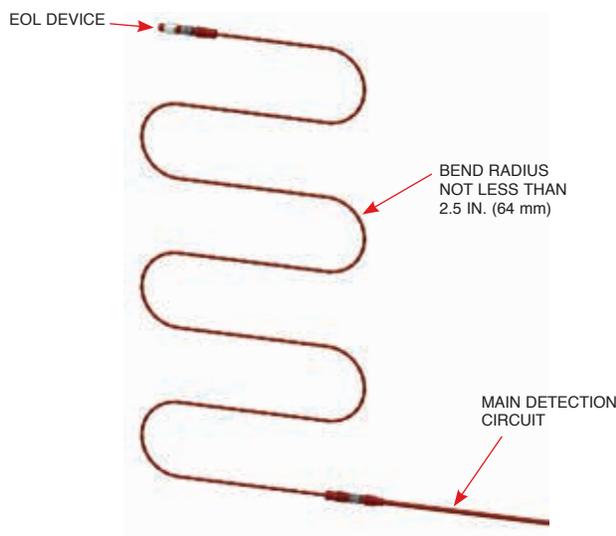


FIGURE 5-16
SAMPLE LINEAR DETECTOR INSTALLATION
009194

SPOT THERMAL DETECTOR INSTALLATION

Mount in a location where detector head points in a downward position with exposure over the hazard area (refer to layout drawing).

- Attach Spot Thermal Detector Bracket securely to mounting surface by welding or bolting with two 1/4 in. bolts of appropriate length (secure with lock washers and nuts). See Figure 5-17. **Note:** When supporting from the vehicle make certain any support device requiring drilling or welding is approved by owner or vehicle manufacturer.
- After securing bracket, remove retaining nut from detector head and slide detector in bracket. Confirm detector has male/female connectors in correct position for connection to detection circuit cable. See Figure 5-18.
- Place Heat Shield over detector head and loosely install retaining nut. See Figure 5-19. **Note:** Remove Heat Shield to connect Detection Circuit Cables.
- During final installation, apply a medium-strength thread-locking compound (e.g. LOCTITE THREADLOCKER BLUE 242) to the base of threaded detector head near the heat shield.
- Tighten retaining nut wrench-tight until the retaining nut is snug. Do not over tighten. Torque not to exceed 25 in-lb (2.82 N•m).

CAUTION

Over tightening of the retaining nut can damage the detector. Do not over tighten. Torque not to exceed 25 in-lb (2.82 N•m).

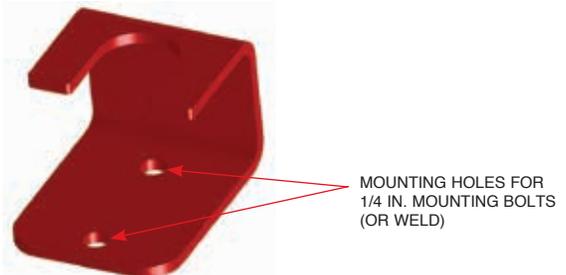


FIGURE 5-17
SPOT THERMAL DETECTOR BRACKET
009234



FIGURE 5-18
SPOT THERMAL DETECTOR
009280

SPOT THERMAL DETECTOR INSTALLATION (Continued)

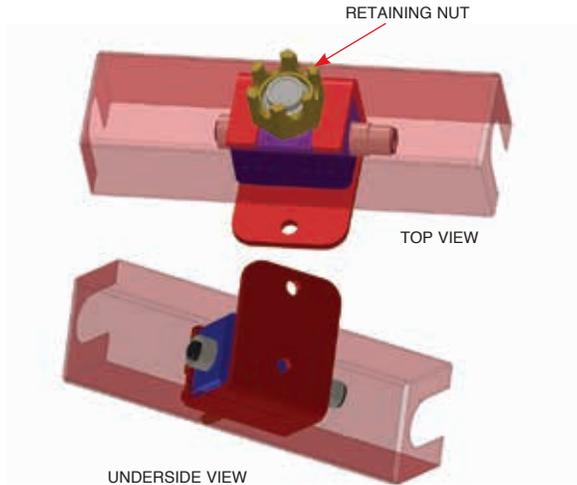


FIGURE 5-19
DETECTOR IN BRACKET WITH HEAT SHIELD
009214

RETRO-FIT INSTALLATION

For a retro-fit installation, install spot thermal detector bracket directly onto existing style detector bracket (Part No. 416221). See Figure 5-20.

1. Remove 1/4-20 x 5/8 in. socket head screws from existing detector bracket and retain. Remove installed spot thermal detector needing replacement and cable clamp on each end.
2. Align replacement Spot Thermal Detector Bracket mounting holes with the holes in the existing bracket and re-install socket head screws.
3. Install replacement Spot Thermal Detector and Heat Shield as in steps 2 – 4 above.

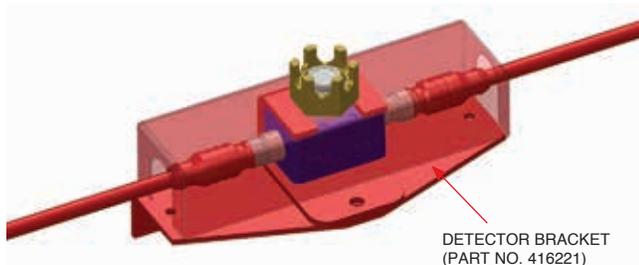


FIGURE 5-20
RETRO-FIT INSTALLATION
009215

ELECTRIC MANUAL ACTUATOR (EMA) INSTALLATION

Refer to layout drawing and install Electric Manual Actuator at location(s) in a path of operator egress and accessible from ground level, when possible. Confirm Detection Circuit Tee for the EMA is prior to any detection device in the main trunk of the detection circuit.

EMA may be surface (1/4 in. (6.3 mm) maximum thickness) or bracket mounted. For bracket mounting use the EMA Bracket (Part No. 440537).

Surface Mounting Instructions

1. Drill a 1 9/16 in. (40 mm) hole in selected surface (always deburr and smooth edges of hole). See Figure 5-21. **Note:** When supporting from the vehicle make certain any support device requiring drilling or welding is approved by owner or vehicle manufacturer.
2. Determine position and add keyway for EMA orientation index nub See Figure 5-21.
3. Remove nut and rubber washer from threaded boss and insert boss through drilled hole fitting index nub into slot. Install rubber washer and hand-tighten nut on threaded boss. See Figure 5-22.

CAUTION

Only hand-tighten nut, do not use mechanical force such as a wrench.

Bracket Mounting Instructions

The bracket has a 1 9/16 in. hole for mounting the EMA.

1. Install the EMA Bracket (Part No. 440537) by either bolting or welding. **Note:** When supporting from the vehicle make certain any support device requiring drilling or welding is approved by owner or vehicle manufacturer.
 - a. **Bolting:** Using bracket base as a template (see Figure 5-23), mark and drill 7/16 in. (11 mm) holes in flat surface (2 places). Secure bracket with 3/8 in. (9 mm) corrosion resistant bolts of the appropriate length with lock washers and nuts.
 - b. **Welding:** Confirm intended surface is approved for welding. To avoid corrosion, paint welded surfaces after welding is complete and surface temperature is normal.
2. Once the EMA bracket is securely mounted, remove nut from threaded boss on EMA. Position EMA in bracket with RED strike button facing in desired direction (fit index nub into desired slot). Install rubber washer and hand-tighten nut on threaded boss. **Note:** Pull pin may need to be removed and inserted in the opposite direction for proper fit. See Figure 5-24.

CAUTION

Only hand-tighten nut, do not use mechanical force such as a wrench.

Note: Install visual seal (supplied by others) when instructed in Section 6 - Test and Place in Service.

Figures for Surface and Bracket Mounting

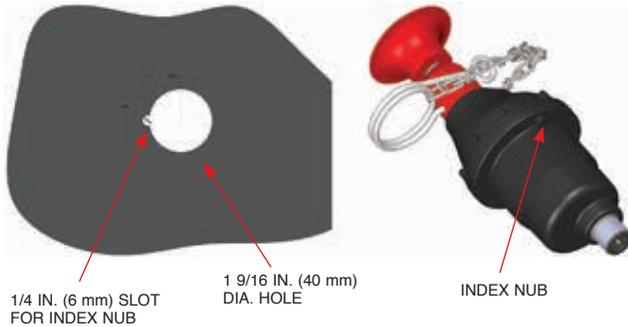


FIGURE 5-21
EMA SURFACE MOUNT DIMENSIONS
 009216

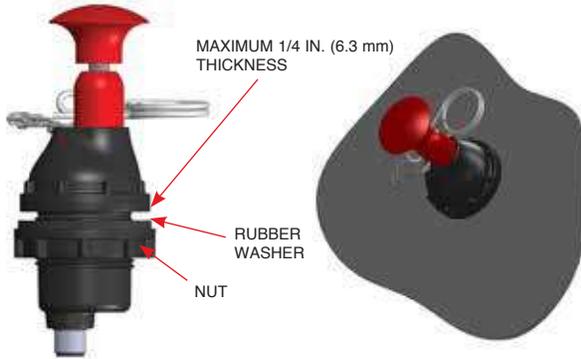


FIGURE 5-22
EMA SURFACE MOUNT INSTALLED
 009217

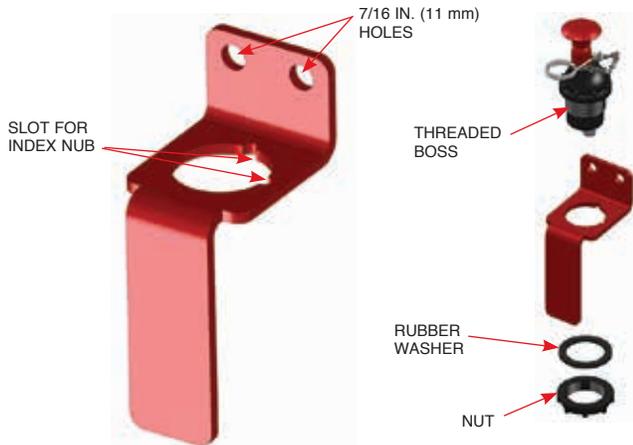


FIGURE 5-23
EMA BRACKET MOUNT
 009154 / 009218

CONFIRM PULL PIN IS ACCESSIBLE

CONNECTS TO: DETECTION CIRCUIT BRANCH



FIGURE 5-24
EMA INSTALLED IN BRACKET
 009219

ELECTRIC-PNEUMATIC ACTUATOR INSTALLATION

The Electric-Pneumatic Actuator (Part No. 439569) installs on an expellant gas cartridge and can be used as an electronic and/or pneumatic actuation device, see Figure 5-25. The actuator includes a Preventor to reduce the possibility of installing actuator with the puncture pin not completely retracted, see Figure 5-26. Do not bend or remove the Preventor; it is required for correct operation of the actuator.

The CHECKFIRE 110 Control Module can actuate a maximum of two Electric-Pneumatic Actuators.

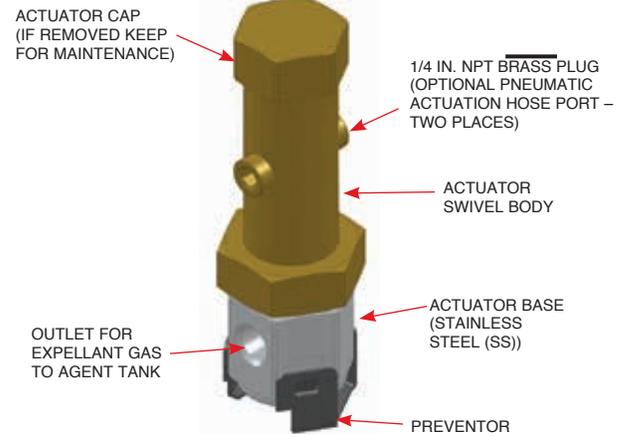


FIGURE 5-25
ELECTRIC-PNEUMATIC ACTUATOR
 009168

**ELECTRIC-PNEUMATIC ACTUATOR INSTALLATION
(Continued)**

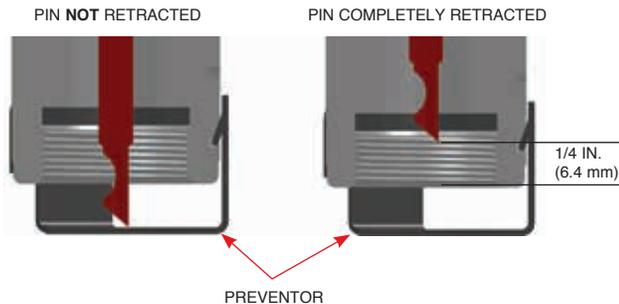
WARNING

Before attaching Electric-Pneumatic Actuator to expellant gas cartridge, verify the cartridge is properly secured and confirm puncture pin is in the completely retracted position. See Figure 5-26. If puncture pin is not completely retracted, the seal can become damaged or pierced, which can result in system actuation or serious personal injury or death.

- Wrench-tighten actuator base (SS) to cartridge. **Note:** Wrench grip is above Preventor. See Figure 5-27.
- Turn cartridge in cartridge bracket (loosen as needed) so expellant gas outlet is in desired orientation, then re-secure cartridge in bracket.
- Position actuator swivel body in desired orientation and wrench-tighten to actuator base until Preventor is held tight in place. See Figure 5-28.

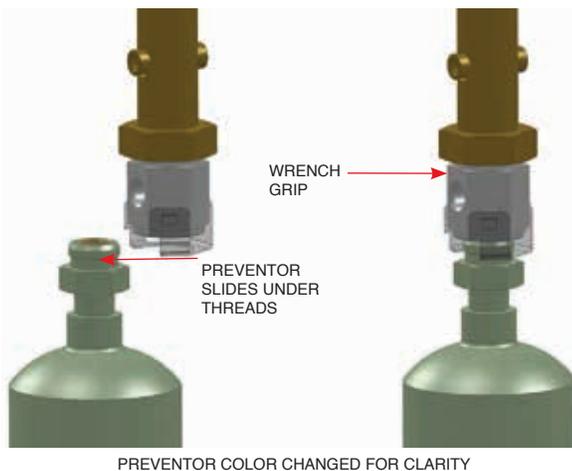
CAUTION

DO NOT ATTACH CABLE TO ELECTRIC-PNEUMATIC ACTUATOR UNTIL TESTING IS COMPLETE.

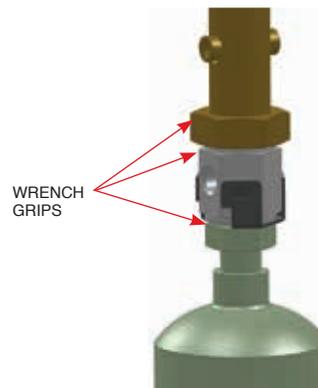


**FIGURE 5-26
RETRACT ACTUATOR PUNCTURE PIN**
009220

- To install the actuator, slide the unit onto the expellant gas cartridge from the side. (Cartridge must be properly secured.) Slide Preventor underneath cartridge threads and thread actuator on cartridge. See Figure 5-27.



**FIGURE 5-27
SLIDE ACTUATOR ONTO CARTRIDGE**
009221



**FIGURE 5-28
ACTUATOR INSTALLED ON CARTRIDGE**
009222

DETECTION CIRCUIT CABLES

The Detection Circuit Lead (red connector) on the CHECK-FIRE 110 Control Module is the starting point for the detection circuit. See Figure 5-29. The Detection Circuit consists of a main trunk and may add branch circuits utilizing Detection Circuit Tees on the main trunk.

Route and secure the Detection Circuit Cable following the installation instructions under Cable Connectivity / Installation, page 5-4.

NOTE: CABLES SHOWN SHORTER THAN ACTUAL LENGTH



**FIGURE 5-29
CHECKFIRE 110 CABLES**
009150

DETECTION CIRCUIT CABLES (Continued)

Verify cable route from the control module to the detection component end points conforms to the following rules (see Figure 5-30):

- No Double Branching
- No EOL Devices on end of branch
- Branch must end with Detection Circuit Branch Terminator or EMA
- ▶ If used, EMAs must be first component(s) on circuit
- Each EMA must be on a single use branch
- ▶ Linear Detector may be anywhere in the main trunk after the
- ▶ EMA
- Main detection trunk must be terminated with EOL Device

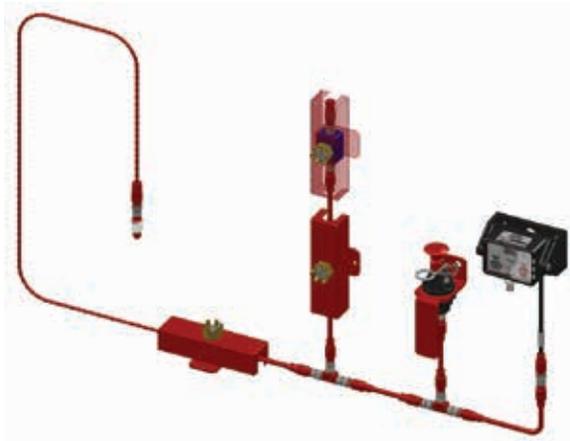


FIGURE 5-30
SAMPLE - CORRECT DETECTION CIRCUIT INSTALLATION
 009192

Install Detection Circuit using the following rules:

- ▶ 1. An Electric Manual Actuator (EMA), if used, must be installed prior to any other detection device. Install a Detection Circuit Tee and required length of Detection Circuit Cable. See Figure 5-31.
- 2. Install each EMA on a separate branch (only one device on a branch). See Figure 5-31.
- 3. Spot Thermal detectors can be installed in main trunk of detection circuit or on a branch circuit using a Detection Circuit Tee and Detection Circuit Cable. If installed on a branch circuit, a Detection Circuit Branch Terminator (Part No. 439398) must be connected to the last detector. See Figure 5-32.

CAUTION

Do not terminate any branch with an EOL Device. Use Branch Terminator only.

- ▶ 4. The Linear Detector may be installed anywhere in the main detection circuit trunk after the EMA. If the last device, the Linear Detector is terminated with an EOL Device. See Figure 5-33.

MUST INSTALL
 ▶ EMA(S) (IF
 USED) PRIOR TO
 OTHER DEVICES



FIGURE 5-31
DETECTION CIRCUIT - EMA
 009193

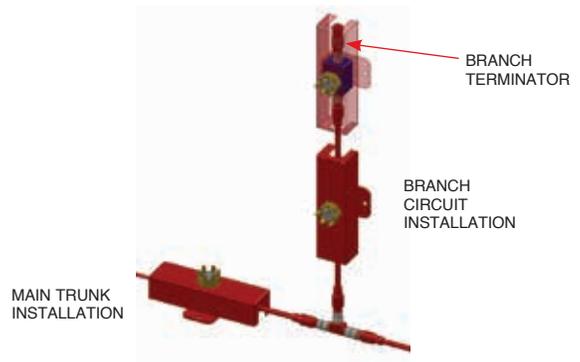


FIGURE 5-32
DETECTION CIRCUIT – SPOT THERMAL DETECTORS
 009192



FIGURE 5-33
DETECTION CIRCUIT - LINEAR DETECTOR
 009224

Review complete installation to verify correctness. If any of the following INCORRECT INSTALLATION examples are found adjust as needed.

DETECTION CIRCUIT CABLES (Continued)
INCORRECT INSTALLATIONS

CAUTION

Do not use an EOL Device on a branch because complete detection circuit will not be monitored. (See Figure 5-34 and 5-35).

Double branching is not allowed. (See Figures 5-34 thru 5-36). Failure to comply may cause the system to not function properly.

NO EOL DEVICE ON BRANCH
 NO DOUBLE BRANCHING



FIGURE 5-34
INCORRECT EMA INSTALLATION
 009197

EMA MUST BE ON SINGLE USE BRANCH
 NO EOL DEVICE ON BRANCH
 NO DOUBLE BRANCHING



FIGURE 5-35
INCORRECT INSTALLATION
 009202

CAUTION

Only one EMA may be installed from a detection circuit tee on a single branch circuit. If multiple EMAs are to be installed, additional branches on the main trunk will be required (one EMA per branch). Incorrect installations will cause the system to not function properly. See Figure 5-36.

EMA MUST BE ON SINGLE USE BRANCH
 NO DOUBLE BRANCHING



FIGURE 5-36
INCORRECT EMA INSTALLATION
 009198

CAUTION

Install EMA(s) as the first component(s) on the Detection Circuit and on a single use branch. Failure to comply may cause the system to not function properly. (See Figure 5-37 and 5-38).

EMA MUST BE FIRST COMPONENT AND ON SINGLE USE BRANCH



FIGURE 5-37
INCORRECT EMA INSTALLATION
 009199

EMA MUST BE FIRST COMPONENT

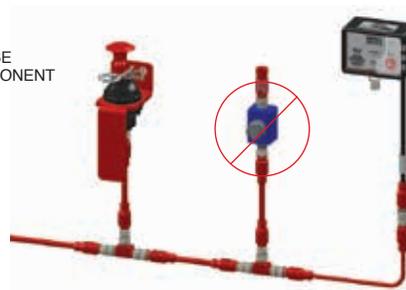


FIGURE 5-38
INCORRECT EMA INSTALLATION
 009200

CAUTION

Do not install the Linear Detector on a branch. (See Figure 5-39).

LINEAR DETECTOR MUST BE IN THE MAIN TRUNK, AND END WITH EOL DEVICE, IF LAST DEVICE ON MAIN TRUNK



FIGURE 5-39
INCORRECT INSTALLATION
 009201

RELEASE CIRCUIT CABLES

The Release Circuit Lead (Blue connector) on the CHECK-FIRE 110 Control Module is the starting point for the release circuit. See Figure 5-40. The Release Circuit consists of a main trunk, Release Circuit Tee (if required), and Release Circuit Drop Cable(s). **Note:** Release Circuit maximum length is 50 ft (15.24 m).



FIGURE 5-40
CHECKFIRE 110 CABLES
009150

Install Release Circuit using the following rules (see Figure 5-41 and 5-42):

1. Maximum two PADs.
2. Maximum 50 ft (15.2 m) of Release Circuit Cable. (Cable dimensions include the connectors.)
3. Use a Release Circuit Tee for second PAD if needed. Additional Release Circuit Cable may be used after the tee if required.
4. Use Release Circuit Drop Cable at end of circuit for connection to the Electric-Pneumatic Actuator.
5. Route and secure Release Circuit Cable following installation instructions under Cable Connectivity / Installation, page 5-4. (Remove and discard dust cap on Release Circuit Lead.)
6. Do not attach Release Circuit Drop Cable to Electric-Pneumatic Actuator at this time. If Release Circuit Drop Cable is connected, the system could be actuated accidentally during installation.

CAUTION

DO NOT ATTACH RELEASE CIRCUIT DROP CABLE TO ELECTRIC-PNEUMATIC ACTUATOR UNTIL TESTING IS COMPLETE.

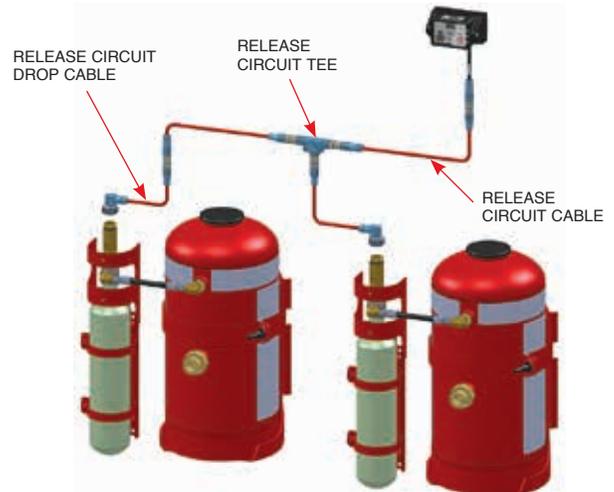


FIGURE 5-41
RELEASE CIRCUIT - TWO TANKS
009225

CAUTION

DO NOT ATTACH RELEASE CIRCUIT DROP CABLE TO ELECTRIC-PNEUMATIC ACTUATOR UNTIL TESTING IS COMPLETE.



FIGURE 5-42
RELEASE CIRCUIT - SINGLE TANK
009226

POWER CIRCUIT CABLES

The Power Circuit Cable Lead (Green connector) on the CHECKFIRE 110 Control Module is the starting point of the power circuit. See Figure 5-43.



FIGURE 5-43
CHECKFIRE 110 CABLES
009150

The power circuit consists of Power Circuit Cable(s) and Fused Power Circuit Cable. See Figure 5-44.

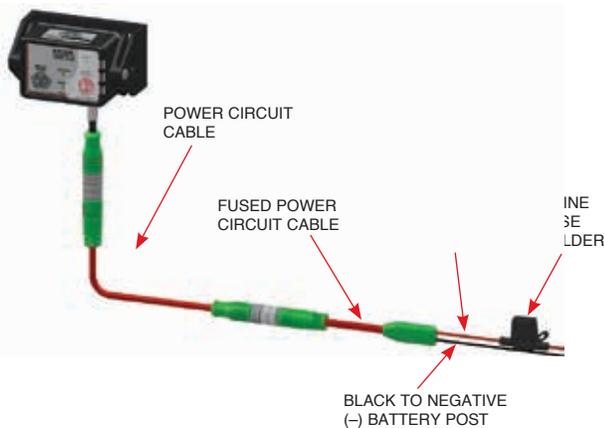


FIGURE 5-44
POWER CIRCUIT
009227

Before installation remove fuse and place in a safe place. Install power circuit using the following rules:

1. It is recommended to install power circuit directly to the 12/24 VDC nominal vehicle battery(s), if possible. This will provide continuous power for 24 hour system protection.
2. Install 1/2 in. (13 mm) ring terminal on **black** jacketed cable, labeled “– VEH BATT” to the negative post on battery or 12/24 VDC nominal power source.

3. Install 1/2 in. (13 mm) ring terminal on red jacketed, 3A fused cable, labeled “+ VEH BATT” to the positive post on the battery or 12/24 VDC nominal power source. **Do not install fuse at this time.**
4. Route and secure the Power Circuit Cable following the installation instructions under Cable Connectivity / Installation, page 5-4.
5. Do not install fuse until entire system is ready for testing (refer to Section 6 – Test and Place in Service). When ready, install fuse following required steps (a – e) to ensure an IP67 connection. See Figure 5-45.
 - a. Insert new fuse.
 - b. Apply entire contents of supplied Dow Corning 4 (dielectric grease) inside inline fuse holder cover.
 - c. Snap cover in place and press firmly together around outer edges to properly seal.
 - d. Wipe off excess grease on outside of inline fuse holder.
 - e. May take up to a minute before green Power LED displays on the control module.

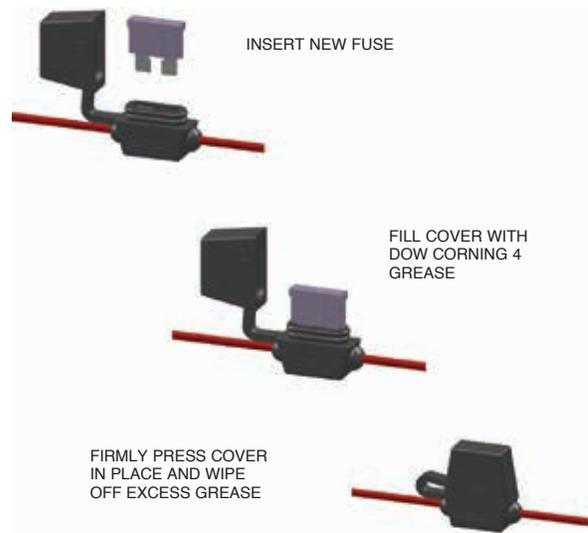


FIGURE 5-45
FUSE INSTALLATION
009228

NOTICE

Anytime fuse cover is opened or fuse is removed, review steps (a-e) to confirm fuse and cover is correctly replaced.

Cover must be completely refilled with Dow Corning #4 or equal (dielectric) grease before closing to maintain IP67 rating. Press cover firmly in place and wipe off excess grease.

DIGITAL 3.3 VDC ALARM OUTPUT CIRCUIT LEAD

The Digital 3.3 VDC Alarm Output Circuit Lead (Yellow plug) on the CHECKFIRE 110 Control Module is an 18 AWG, two conductor polarity sensitive cable assembly. The white conductor is positive and the black conductor is negative.

This circuit is initiated by an alarm condition. The output is not intended to directly operate analog devices such as audible horns, strobes and relays. However, the installer or OEM can use the circuit as a logic input to a vehicle operating system or Programmable Logic Controller to manage engine shutdown, cooling fans, hydraulic pumps, notification devices, relays, etc.

The vehicle operating system, control configuration, and field wiring must be provided and installed by others.

Note: Removal of the yellow plug on the Alarm Output Circuit Lead may compromise the IP67 rating for this circuit.

NOTICE

Do not remove the yellow plug unless circuit is intended for use.

► **VEHICLE SYSTEM PRESSURE SWITCH**

The Vehicle System Pressure Switch is a manually resettable 3-conductor SPDT switch, rated for 6A when used with voltages between 12 VDC and 36 VDC nominal. The switch can be used to perform several different tasks on system actuation, including equipment shutdown, turning on notification appliances, or providing “Pressure Switch Feedback” to a vehicle control panel. The switch has one integral cable, sealed to the end of the switch housing with 3-conductors (NO/C/NC) for field connections. See Figure 5-46.

3-CONDUCTOR CABLE

- Common (COM) – BLUE
- Normally Closed (N.C.) – BLACK
- Normally Open (N.O.) – WHITE

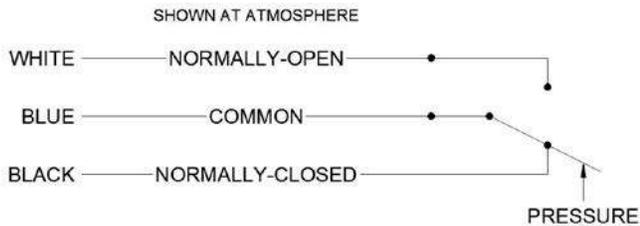


FIGURE 5-46
PRESSURE SWITCH CONDUCTORS
009351

CAUTION

The location of the Discharge Pressure Switch must be at the expellant gas inlet port of the agent tank. Failure to comply may result in damage to the switch and cause the switch to not function properly.

Installation of the Vehicle System Pressure Switch is as follows (see Figure 5-47):

1. The pressure switch installs in a standard 1/4 in. NPT female fitting. The pressure switch must be installed in the expellant gas line using the included 1/4 in. tee at the inlet port of the agent tank. Use Teflon tape on the male threads.

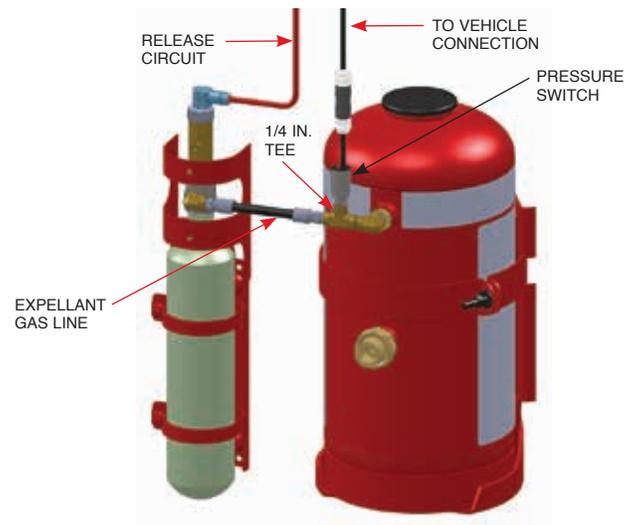


FIGURE 5-47
INSTALLED PRESSURE SWITCH
009230

CAUTION

When threading the switch into the expellant gas line tee, DO NOT apply torque directly to the metal switch body. Failure to comply may result in damage to the switch. Tighten ONLY by applying torque to the 1/4 in. NPT male pressure fitting. See Figure 5-48.

CAUTION

DO NOT install the pressure switch in the fire hazard area or in any area where the ambient temperature will exceed 175 °F (79 °C). Failure to comply may prevent the pressure switch from functioning properly.

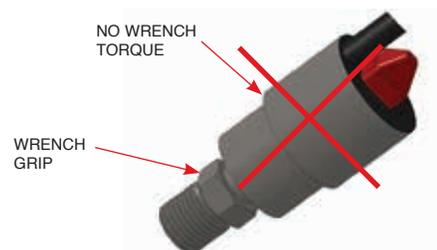


FIGURE 5-48
WRENCH GRIP AREA
009231

VEHICLE SYSTEM PRESSURE SWITCH (Continued)**Pressure Switch Reset**

2. To reset pressure switch, press the red plunger located on the back of the switch. An audible click should be heard. See Figure 5-49.

Connection of 4-Conductor Cable

3. A Pressure Switch Connector Kit (Part No. 440086) is provided with each switch to ensure adequate weather-proofing of electrical connections associated with the pressure switch. The following components from that kit will be required to complete the installation of the 4-conductor cable (see Figure 5-49):

- Two Strain Reliefs
- One Splice Body
- Three 22-18 AWG Butt Splice Terminals

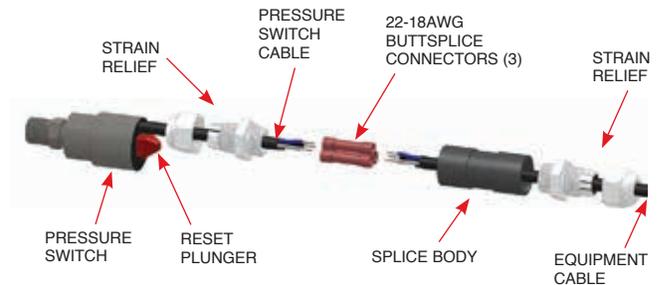
Note: The 3-conductor cable and the field cable wiring may also be wired and enclosed within a weather-proof electrical box (not supplied) using weather-proof fittings appropriate for the cable size. The allowable cable outside diameter is 0.08 in. (2 mm) minimum and 0.24 in. (6 mm) maximum.

- a. Begin by trimming 3 conductors on the pressure switch to a length of 3/4 in. (19 mm) from the end of the outer jacket. Trim the outer jacket on the equipment cable to the same length. **Note:** Brown conductor is not used in this application.
- b. Strip 1/4 - 3/8 in. (6 - 10 mm) of insulation from each conductor in both cables.
- c. Loosen the lock nut on the strain relief connectors and slide both the lock nuts and connectors over the ends of both wires.
- d. Slide the enclosed splice body over the end of one of the cables.

NOTICE

Before performing the next step, double check the equipment and pressure switch wiring to ensure the proper connections are being made for your intended application. Refer to the pressure switch wire color-coding for proper terminal designation.

- e. Using the supplied 22-18AWG Butt Splice Terminals, crimp the splices onto each pressure switch wire being used. Once complete, crimp the splices to the corresponding equipment wiring.

**FIGURE 5-49
WIRE SPLICING**

009255

- f. Once crimps are complete, apply Dow Corning 737 sealant (or equivalent) to strain relief threads going into splice body.
- g. Securely tighten the one strain relief into the splice body. **Note: Do not tighten the compression nut onto the wire at this time.**
- h. Slide the splice body assembly near the recently crimped butt splice terminals. Fill the splice body approximately half full with Dow Corning 737 sealant (or equivalent) and pull the splice body assembly over the terminals so the terminals are located approximately halfway inside the splice body. This should result in the terminals being enclosed in the sealant.
- i. If needed, fill the remainder of the cavity with sealant.
- j. Apply Dow Corning 737 sealant (or equivalent) to the thread on the unattached strain relief lock nut and thread this strain relief assembly into the splice body.
- k. With a wrench on both strain relief locks, simultaneously tighten both ends.
- l. Complete the assembly operation by securely tightening the strain relief to both the pressure switch and equipment cables. See Figure 5-50.

**FIGURE 5-50
CONNECTOR KIT INSTALLED**

009178

4. For **PRESSURE SWITCH FEEDBACK:** Make connections to a field-wireable on the vehicle.

LABEL PACKAGE

Part No. 440798

Provides reminders for vehicle operators and service personnel on system operation and protection.

Attach appropriate labels as needed in the specified locations. See Figures 5-51 thru 5-54.

If automatic vehicle shutdown is part of the CHECKFIRE System, install Label No. 440799 near the operator's line of vision. Cut out the correct time delay value from Label No. 440800, remove backing to expose adhesive, and attach to Label 440799 in the space provided. See Figure 5-51.



FIGURE 5-51
LABEL FOR ENGINE SHUTDOWN AND TIME DELAY
009174

If automatic vehicle shutdown is **NOT** part of the CHECKFIRE System, install Label No. 440801 near the operator's line of vision. See Figure 5-52.

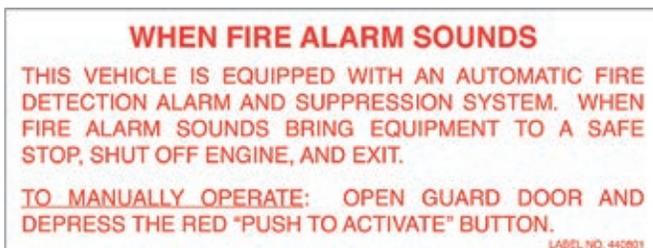


FIGURE 5-52
LABEL TO STOP VEHICLE AND EXIT
009175

As a reminder to service and maintenance personnel, install this CAUTION (Label No. 71455) in the area protected by the Linear Detector. See Figure 5-53.

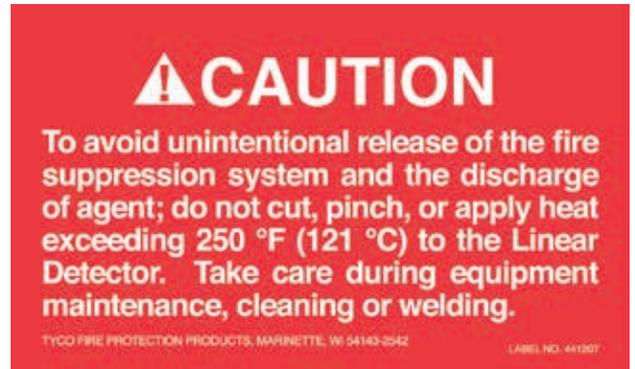


FIGURE 5-53
LABEL FOR PROTECTING LINEAR DETECTOR
009325

Install this label next to every Electric Manual Actuator (EMA). See Figure 5-54.



FIGURE 5-54
INSTRUCTION LABEL FOR EMA
009324

FINAL CONNECTIONS

Electric actuation: Refer to Section 6 – Test and Place in Service for final electric actuation connections.

Combined electric and pneumatic actuation: Connect both pneumatic actuator hose(s) and Release Circuit Drop Cable(s) with installed PAD(s) (electric actuation instructions in Section 6 – Test and Place in Service).

PNEUMATIC MANUAL ACTUATION (Optional)

If layout drawing includes an optional pneumatic manual actuator in the operator's compartment, confirm the operator has access to the red strike button on the actuator. For detailed installation guidelines, refer to the appropriate system manual (latest edition).

LT-A-101-10/20/30 Manual (Part No. 24327)

LT-A-101-50/125/250 Manual (Part No. 427865)

LVS Manual (Part No. 427109)

CAUTION

Before performing any operational test(s), protect the fire suppression system from unintentional actuation. Verify Electric-Pneumatic Actuators are not connected to Release Circuit Drop Cables and any pneumatic manual actuators are ring-pinned for safety and/or actuation cartridges removed.

The following tables are step-by-step instructions to complete testing and place the system in service.

TABLE 6-1: PREPARATION – OPERATIONAL TEST

Release Circuit

CAUTION

When handling the PAD, always point actuating end away from yourself and others. On electrical initiation, PAD operates very quickly and a small brass disk forcefully separates from actuating end. Physical injury may occur from contact with the actuating pin and/or the detaching disk.

Before conducting the OPERATIONAL TEST, confirm all installed Release Circuit Drop Cables have a Release Circuit Tester (RCT) (Part No. 441021) and if needed, a Release Circuit Test Plug (Part No. 440912) installed.

- ▶ 1. Insert Release Circuit Test Plug in socket of Release Circuit Drop Cable. (If installed remove PAD.)
- ▶ 2. On last Release Circuit Drop Cable in main trunk insert RCT. (If installed remove PAD.)

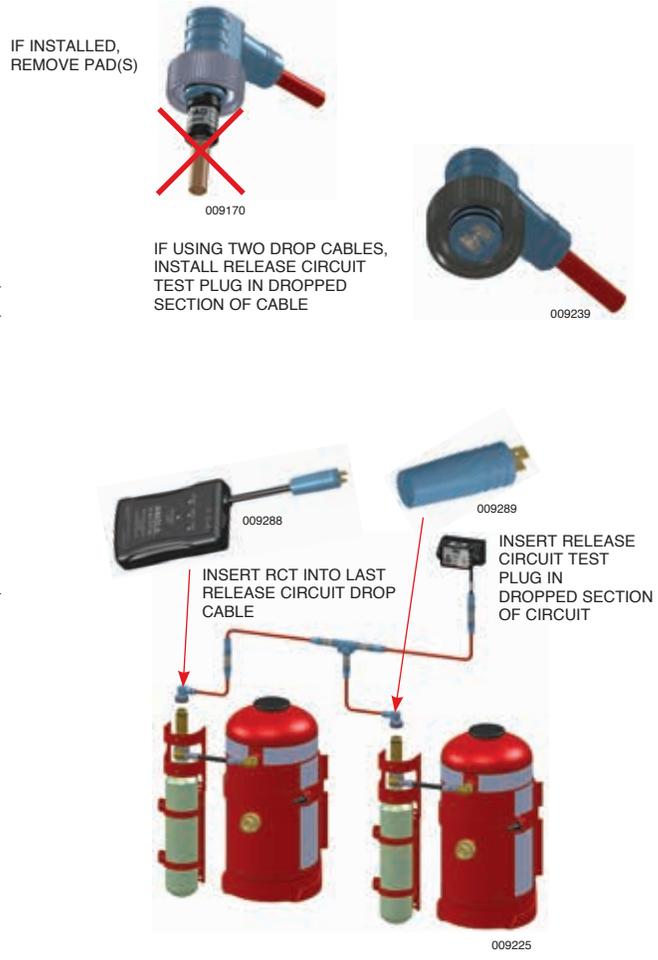
Switch on top of RCT must be turned on for testing. LEDs on front indicate status: Ready, Pass, Fail, and replace RCT battery.

After RCT indicates pass or fail, press switch on top to reset the tester.

Note: If there is a single Electric-Pneumatic Actuator, connect RCT to Release Circuit Drop Cable. Release Circuit Test Plug is not installed.

CAUTION

When performing any operational test(s), make certain RCT and Release Circuit Test Plug(s), as required, are attached to the release circuit.



Detection Circuit

Before conducting OPERATIONAL TEST, install the Detection Circuit Tester (DCT) (Part No. 440097).

- 1. Remove the Detection Circuit EOL Device from the detection circuit.
- 2. Set DCT to "Normal" condition, then install DCT.

REMOVE DETECTION CIRCUIT EOL DEVICE

009161

SET DCT TO "NORMAL" AND INSTALL

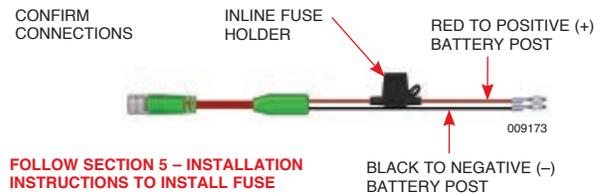
009287

TABLE 6-1: PREPARATION – OPERATIONAL TEST (Continued)

Power Up

Before conducting the OPERATIONAL TEST, make certain external power is properly connected to CHECKFIRE 110 Control Module (see Section 5 - Installation, page 5-14).

- If fuse is not installed, follow instructions in Section 5 – Installation, page 5-14 (step 5).
- May take up to a minute before green Power LED displays



Reset to Normal: Press and hold the “DELAY/Reset/Silence” button for 3 seconds; Power LED and Sounder quickly pulse 3 or 5 times, then Power LED remains GREEN steady-on.

Note: On reset the electronics perform a Self Diagnostic Routine (SDR) and LED test. The LED and Sounder indicate the end of the test and pulse according to the Release Time Delay setting. (3 = factory default, 5 = optional setting).

RESET TO NORMAL

PRESS AND HOLD 3 SECONDS
 POWER LED IS GREEN STEADY-ON



TABLE 6-2: ISOLATION FEATURE

The CHECKFIRE 110 Control Module includes an Isolation Feature for vehicle/equipment service personnel to help minimize the possibility of a false fire suppression system discharge when service or maintenance takes place on the protected vehicle/equipment (not intended for CHECKFIRE 110 System maintenance).

The control module must be in Isolate Mode to change the Release Time Delay setting. Refer to Table 3 - Programming the Release Time Delay.

CAUTION

When placed in Isolate Mode, the Release Circuit cannot be initiated by an automatic detection circuit input.

In the event of fire, manual actuation bypasses Isolate Mode. To operate manually:

- Press “PUSH to Activate/ Alarm When Lit” button

Or

- Pull ring pin and operate RED Strike button on an EMA or a pneumatic manual actuator

Continues Next Page

TABLE 6-2: ISOLATION FEATURE (Continued)

Place the CHECKFIRE 110 Control Module in Isolate Mode then confirm: system will not auto release and will manually actuate while in Isolate Mode.

Note: While in Isolate Mode service personnel can perform service and maintenance on the vehicle as needed.

1. Press and hold the “DELAY/Reset/Silence” button for approximately 8 seconds causing two consecutive resets; control module cycles through two SDR and LED tests.

PLACE IN ISOLATE MODE

PRESS AND HOLD 8 SECONDS



2. Amber Detection Fault LED and sounder quickly pulse 2 x 30 seconds indicating Isolate Mode.

3. If desired, push the “DELAY/Reset/Silence” button to silence sounder.

ISOLATE MODE

LED AND SOUNDER QUICKLY PULSE 2 X 30 SECONDS



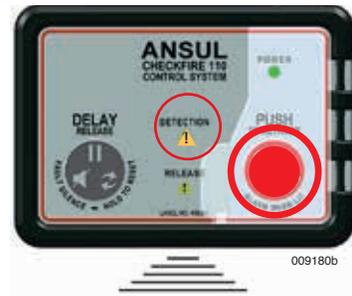
4. Set DCT switch to “Alarm” position. Red “Push to Activate / Alarm When Lit” LED and sounder pulse 2 x 1 second; Amber Detection Fault LED and sounder pulse 2 x 30 seconds.

Verify time delay does not start.

ALARM CONDITION
 DCT = ALARM

RED LED AND SOUNDER PULSE 2 X 1 SECOND,
 AMBER LED PULSES 2 X 30 SECONDS

VERIFY TIME DELAY DOES NOT START



5. After 30 seconds of indication, open the protective guard door and push the “PUSH to Activate / Alarm When Lit” button. Release Activated starts immediately.

Note: There is no time delay upon manual activation.

OPEN DOOR

PUSH BUTTON

RELEASE ACTIVATED

RED LED AND SOUNDER STEADY-ON FOR 10 SECONDS; AMBER LED PULSES 2 X 30 SECONDS



Continues Next Page

TABLE 6-2: ISOLATION FEATURE (Continued)

7. **Post Release Activated** – The Red “PUSH to Activate / Alarm When Lit” LED and sounder pulse 1 x 10 seconds; and Amber Detection Fault LED pulses 2 x 30 seconds.

8. Push the “DELAY/Reset/Silence” button to test sounder silence. Sounder silences and LEDs continue.

9. Confirm successful release signal (Pass) on RCT.

10. Reset DCT to “Normal” position.

11. Reset RCT.

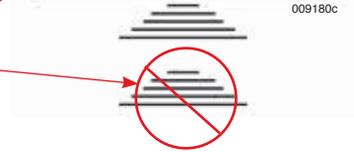
POST RELEASE ACTIVATED

RED/AMBER LEDs AND SOUNDER PULSE
1 X 10 SECONDS,
AMBER RELEASE LED PULSES
2 X 30 SECONDS



PUSH BUTTON

SOUNDER STOPS



12. Cancel Isolate Mode. Reset control module to Normal: Press and hold the “DELAY/Reset/Silence” button for 3 seconds; Power LED and Sounder quickly pulse 3 or 5 times, then Power LED remains GREEN steady-on.

RESET TO NORMAL

PRESS AND HOLD 3 SECONDS

POWER LED IS GREEN STEADY-ON



TABLE 6-3: PROGRAMMING THE RELEASE TIME DELAY

At the start of an alarm condition the red “PUSH To Activate / Alarm When Lit” LED and Sounder notify operator of pending release. The CHECKFIRE System activates the release circuit at end of time delay, unless the “DELAY/Reset/Silence” button is pushed to restart time delay cycle **before the time delay expires**. The time delay can be re-started multiple times if more time is needed for safety.

Note: The release time delay only applies to a detection device input. The time delay is bypassed when the CHECKFIRE 110 Control Module or an EMA is manually actuated.

Options for the release time delay are either 5 seconds or 15 seconds. The CHECKFIRE 110 Control Module is factory set for a 5-second time delay.

1. Verify time delay setting: press and hold the “DELAY/Reset/Silence” button for 3 seconds (reset to normal). At the end of reset, the GREEN Power LED and Sounder quickly pulse 3 times indicating a 5-second time delay or 5 times for a 15-second time delay.

Power LED and Sounder Quickly Pulse	Indicates Seconds of Time Delay
3	5
5	15

VERIFY TIME DELAY SETTING

PRESS AND HOLD 3 SECONDS

TIME DELAY SETTING INDICATION:

LED AND SOUNDER PULSE	TIME DELAY SECONDS
3	5
5	15



009180b

2. To change the time delay place in Isolate Mode. Refer to Table 2 - Isolation Feature, Steps 1-3, then continue.
3. The time delay toggles between 5 to 15 seconds by rapidly pushing the “DELAY/Reset/Silence” button 3 x 1 second. The GREEN Power LED and Sounder quickly pulse 3 times for a 5-second time delay or 5 times for a 15-second time delay.

SEE TABLE 2, TO PLACE MODULE IN ISOLATE MODE

THEN PUSH 3 X 1 SECOND

POWER LED AND SOUNDER PULSE 3 OR 5 TIMES



009180b

4. Reset control module to Normal: Press and hold the “DELAY/Reset/Silence” button for 3 seconds; Power LED and Sounder quickly pulse 3 or 5 times, then Power LED remains GREEN steady-on.

RESET TO NORMAL

PRESS AND HOLD 3 SECONDS

POWER LED IS GREEN STEADY-ON



009180

5. To change time delay again, repeat above procedure.

TABLE 6-4: OPERATIONAL TEST

The following tests verify system operation for:

1. Circuit Supervision: Confirm supervisory function of each circuit.
2. Detection Input: Receive electrical signal from a detection device (simulated fire condition).
3. Time Delay: Verify accuracy of time delay setting.
4. Spot Thermal Detectors: Verify contact closure.
5. Electric Manual Activation: Receive electrical signal from an EMA.

If noted results are not attained, refer to Section 9 - Troubleshooting for corrective action.

NOTICE

If the system is connected to a vehicle shut-down device through the pressure switch, verification needs to be made at the pressure switch.

NOTICE

During testing, verify any devices connected to the Alarm Circuit Lead function as intended.

CAUTION

Before performing any operational test(s), protect the fire suppression system from unintentional actuation. Verify Electric-Pneumatic Actuators are not connected to Release Circuit Drop Cables and any pneumatic manual actuators are ring-pinned for safety and/or actuation cartridges removed.

CAUTION

When performing any operational testing, make certain the RCT (Part No. 441021) and Release Circuit Test Plug(s) (Part No. 440912) are attached to the release circuit.

Detection Circuit - Supervision Test

Set DCT switch to "Fault" position. The CHECKFIRE 110 Control Module indicates the following:

1. Detection Fault LED pulses AMBER 1 x 10 seconds.
2. Sounder pulses 1 x 10 seconds.

DETECTION FAULT INDICATION (DCT SWITCH = FAULT)

AMBER LED AND SOUNDER PULSE 1 X 10 SECONDS



Test silence function: push the "DELAY/Reset/Silence" button.

3. Sounder silences and Detection Fault LED continues to pulse AMBER 1 x 10 seconds.

SILENCE FUNCTION DETECTION FAULT INDICATION

PUSH TO SILENCE SOUNDER (LED CONTINUES)

AMBER LED PULSES 1 X 10 SECONDS



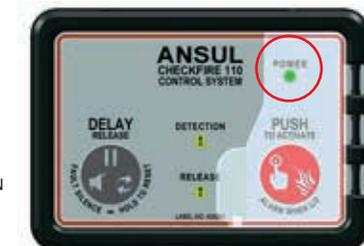
Reset the DCT to the "Normal" position.

4. CHECKFIRE 110 Control Module returns to Normal status; Power LED is GREEN steady-on.

RESET DCT TO NORMAL

MODULE RETURNS TO NORMAL STATUS

POWER LED IS GREEN STEADY-ON



009180

TABLE 6-4: OPERATIONAL TEST (Continued)

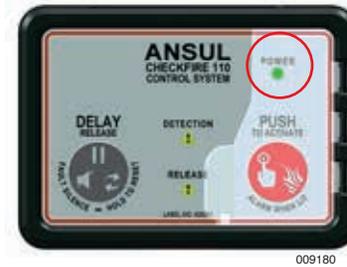
<p>Release Circuit - Supervision Test</p> <p>Remove RCT from the Release Circuit. The CHECKFIRE 110 Control Module indicates the following.</p> <ol style="list-style-type: none"> 1. Release Fault LED pulses AMBER 1 x 10 seconds. 2. Sounder pulses 1 x 10 seconds. 	<p>RELEASE FAULT INDICATION (RCT REMOVED)</p> <p>AMBER LED AND SOUNDER PULSE 1 X 10 SECONDS</p>	 <p>009180b</p>
<p>Test silence function; push the "DELAY/Reset/Silence" button.</p> <ol style="list-style-type: none"> 3. Sounder silences and Release Fault LED continues to pulse AMBER 1 x 10 seconds. 	<p>SILENCE FUNCTION RELEASE FAULT INDICATION</p> <p>PUSH TO SILENCE SOUNDER (LED CONTINUES)</p> <p>AMBER LED PULSES 1 X 10 SECONDS</p>	 <p>009180b</p>
<p>Reconnect RCT to release circuit.</p> <ol style="list-style-type: none"> 4. CHECKFIRE 110 Control Module returns to Normal status; Power LED is GREEN steady-on. 	<p>RECONNECT RCT</p> <p>MODULE RETURNS TO NORMAL STATUS</p> <p>POWER LED IS GREEN STEADY-ON</p>	 <p>009180</p>

TABLE 6-4: OPERATIONAL TEST (Continued)

<p>Internal Power Circuit – Supervision Test</p> <p>Disconnect the external power circuit connection at the CHECKFIRE 110 Power Circuit Lead.</p> <ol style="list-style-type: none"> 1. Power LED pulses AMBER 1 x 30 seconds. 2. Sounder pulses 1 x 30 seconds for 10 minutes then auto-silences to conserve energy. 	<p>POWER SUPERVISION (REMOVE POWER CABLE)</p> <p>AMBER LED AND SOUNDER PULSE 1 X 30 SECONDS</p> <p>AFTER 10 MINUTES SOUNDER AUTO-SILENCES</p>	 <p>009180c</p>						
<ol style="list-style-type: none"> 3. Repeat supervision tests on internal power: <ul style="list-style-type: none"> • Detection Circuit – Supervision Test (page 6-6) • Release Circuit – Supervision Test (page 6-7) 4. Reconnect external power circuit connection at the Power Circuit Lead. The CHECKFIRE 110 Control Module returns to Normal status; Power LED is GREEN steady-on. (may take up to 10 seconds) 	<p>REPEAT ABOVE TESTS ON INTERNAL POWER</p> <p>RECONNECT EXTERNAL POWER AND MODULE RETURNS TO NORMAL STATUS</p> <p>POWER LED IS GREEN STEADY-ON</p>	 <p>009180</p>						
<p>Verify Time Delay</p> <p>Reset control module to Normal: Press and hold the “DELAY/Reset/Silence” button for 3 seconds; Power LED and Sounder quickly pulse 3 or 5 times, then Power LED remains GREEN steady-on.</p> <p>The number of pulses at end of reset indicates length of time delay.</p> <p>3 Pulses – 5 Second Time Delay 5 Pulses – 15 Second Time Delay</p>	<p>VERIFY TIME DELAY SETTING</p> <p>PRESS AND HOLD 3 SECONDS</p> <p>POWER LED IS GREEN STEADY-ON</p> <p>TIME DELAY SETTING INDICATION:</p> <table border="1"> <thead> <tr> <th>LED AND SOUNDER PULSE</th> <th>TIME DELAY SECONDS</th> </tr> </thead> <tbody> <tr> <td>3</td> <td>5</td> </tr> <tr> <td>5</td> <td>15</td> </tr> </tbody> </table>	LED AND SOUNDER PULSE	TIME DELAY SECONDS	3	5	5	15	 <p>009180b</p>
LED AND SOUNDER PULSE	TIME DELAY SECONDS							
3	5							
5	15							

TABLE 6-4: OPERATIONAL TEST (Continued)

Detection Circuit: Alarm Condition Test

CAUTION

Before beginning this test, verify:

- Release Circuit Test Plug(s) and RCT are connected in the Release Circuit.
- DCT replaces the EOL Device in the Detection Circuit.

1. Simulate alarm condition by turning switch on DCT to ALARM position.
2. Verify accuracy of time delay:
 - a. **15-Second Time Delay:** The “PUSH to Activate / Alarm When Lit” RED LED and Sounder pulse 2 x 1 second until last 5 seconds of time delay period.

5 seconds before end of 15-second time delay period, pulse rate increases to 4 x 1 second.
 - b. **5-Second Time Delay:** The “PUSH to Activate / Alarm When Lit” RED LED and Sounder pulse 4 x 1 second.
3. Release Circuit Activation: Upon expiration of the time delay, the Release Circuit activates.

CAUTION
 VERIFY RCT AND DCT
 INSTALLED!

**START OF DETECTION
 CIRCUIT ALARM
 CONDITION
 (DCT = ALARM)**

RED LED AND
 SOUNDER PULSE
 2 X 1 SEC. FOR
 10 SECONDS
 (15 SECOND TIME
 DELAY ONLY)

5 SECONDS BEFORE
 END, RED LED AND
 SOUNDER PULSE
 4 X 1 SEC. FOR
 5 SECONDS
 (NOTE: 5 SECOND TIME
 DELAY STARTS AT THIS
 LEVEL)



009180c_RED

4. **Release Activated:** The “PUSH to Activate / Alarm When Lit” RED LED and Sounder remain steady-on for 10 seconds.

RELEASE ACTIVATED

RED LED AND SOUNDER
 REMAIN STEADY-ON
 FOR 10 SECONDS



009180d

5. **Post Release Activated:** The RED “PUSH to Activate / Alarm When Lit” LED and Sounder pulse 1 x 10 seconds.
6. Push “DELAY/Reset/Silence” button to test Sounder silence.
7. RED LED continues to pulse 1 x 10 seconds.
8. Confirm RCT displays “PASS.”

**POST RELEASE
 ACTIVATED**

RED LED AND
 SOUNDER PULSE
 1 X 10 SECONDS

PUSH TO SILENCE
 SOUNDER
 (LEDs CONTINUE)



009180b

TABLE 6-4: OPERATIONAL TEST (Continued)

Detection Circuit: Test Time Delay Restart

1. Reset DCT to normal position.
2. Reset RCT - press reset button.
3. Reset control module to Normal: Press and hold the “DELAY/Reset/Silence” button for 3 seconds; Power LED and Sounder quickly pulse 3 or 5 times, then Power LED remains GREEN steady-on.

RETURN TO NORMAL STATUS

RESET DCT, RCT, AND CONTROL MODULE
 POWER LED IS GREEN STEADY-ON



009180

4. Initiate alarm condition by turning DCT switch to ALARM.
5. Before time delay period expires (5 or 15 seconds), push “DELAY/Reset/Silence” button to restart time delay (3 or 5 pulses indicate time is reset). Time delay resets to full delay period. (Time delay reset may be repeated multiple times. Press and release.)

Note: Holding button down does **not** pause time delay.

SET DCT TO ALARM TO TEST TIME DELAY

BEFORE END OF TIME DELAY, PUSH BUTTON TO RESTART TIME DELAY (MAY PUSH BUTTON MULTIPLE TIMES AS NEEDED)



009180b

6. Allow Control Module to complete time delay cycle then during Release Activated (“PUSH to Activate / Alarm When Lit” RED LED and Sounder remain steady-on for 10 seconds) push the “DELAY/Reset/Silence” button. Verify:

- a. Time delay will not restart.
- b. Sounder will not silence.

7. Confirm successful release signal on RCT.

CONTROL MODULE COMPLETES TIME DELAY

PUSH BUTTON DURING RELEASE ACTIVATED (RED LED AND SOUNDER ARE STEADY-ON)

- VERIFY NO RESPONSE TO PUSHING BUTTON



009180d

8. Return to normal:

- a. Reset DCT to normal position.
- b. Reset RCT - press reset button.
- c. Reset control module to Normal: Press and hold the “DELAY/Reset/Silence” button for 3 seconds; Power LED and Sounder quickly pulse 3 or 5 times, then Power LED remains GREEN steady-on.

RETURN TO NORMAL STATUS

RESET DCT, RCT, AND CONTROL MODULE
 POWER LED IS GREEN STEADY-ON



009180

TABLE 6-4: OPERATIONAL TEST (Continued)

Manual Activation Release Circuit Test

1. Open the protective guard door and push the “PUSH to Activate / Alarm When Lit” button. Release Activated starts immediately.

Note: There is no time delay upon manual activation.

2. **Release Activated** – The “PUSH to Activate / Alarm When Lit” RED LED and Sounder are steady-on for 10 seconds.

MANUAL ACTIVATION

OPEN GUARD DOOR AND PUSH RED BUTTON

10 SECOND RELEASE STARTS IMMEDIATELY

RED LED AND SOUNDER REMAIN STEADY-ON FOR 10 SECONDS



009241

3. **Post Release Activated** – The “PUSH to Activate / Alarm When Lit” LED and Sounder pulse 1 x 10 seconds.
4. Push the “DELAY/Reset/Silence” button to test Sounder silence.
5. The LED continues to pulse 1 x 10 seconds.
6. Confirm successful release signal on RCT.

POST RELEASE ACTIVATED

CONTINUES UNTIL MODULE IS RESET

RED LED AND SOUNDER PULSE 1 X 10 SECONDS

PUSH TO SILENCE SOUNDER (LEDs CONTINUE)



009180b

7. Reset RCT.
8. Reset control module to Normal: Press and hold the “DELAY/Reset/Silence” button for 3 seconds; Power LED and Sounder quickly pulse 3 or 5 times, then Power LED remains GREEN steady-on.

RETURN TO NORMAL STATUS

RESET RCT, AND CONTROL MODULE

POWER LED IS GREEN STEADY-ON



009180

TABLE 6-4: OPERATIONAL TEST (Continued)

Field Test Spot Thermal Detectors

This field test procedure is **not** intended to determine the exact operating temperature of any detector. It is designed to test functionality only.

To properly perform the following test procedure, the following materials will be required:

- Programmable heat gun
- Appropriate source of AC power (or converters)
- Appropriate safety gear (safety glasses, heat resistant hand protection, etc.)



CAUTION

Do NOT apply any direct flame or other unregulated heat sources to the detector head as this could damage the temperature-sensing element. Damage to the temperature-sensing element in the detector head will result in system impairment.

CAUTION

This test procedure requires the use of test equipment that can develop hazardous temperatures capable of causing injury to personnel. Persons conducting the testing must read and follow all safety rules that are included in the operating manual for the particular heat gun being used prior to beginning this test procedure.

CAUTION

This test procedure requires personnel to work around potential hazardous temperatures and voltages. Ensure all equipment, around the detectors to be tested, is de-energized and properly locked-out prior to beginning this test procedure.

TABLE 6-4: OPERATIONAL TEST (Continued)

Field Test Spot Thermal Detectors (Continued)

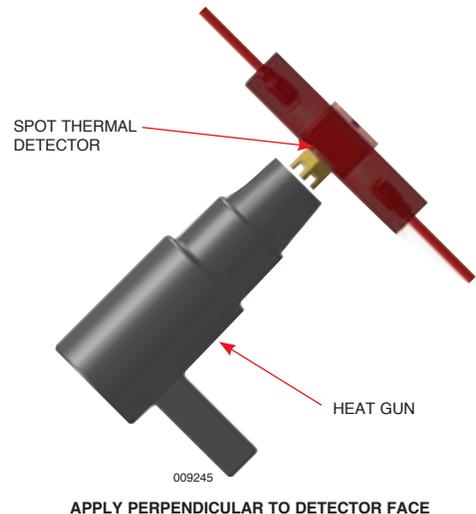
To test the functionality of the Spot Thermal Detector:

1. Disable the fire suppression system by disconnecting the Release Circuit Cable from the Release Circuit Lead on the control module. (CHECKFIRE Control Module will display a Release Circuit Fault.)

CAUTION

Disconnecting the Release Circuit will disable the fire suppression system. The system will not be able to actuate the Release Circuit in the event of a fire. Secondary fire suppression measures should be implemented before disabling the system.

2. Ensure the heat gun is properly connected per the manufacturer's recommendations and turn it on. The applied temperature for the 250 °F (121 °C) detector should not exceed 400 °F (204 °C), and the applied temperature for the 350 °F (176.6 °C) detector should not exceed 500 °F (260 °C).
3. Position the tip of the heat gun as close to the detector head as possible and begin applying heat to the unit. The direction of the applied heat should be as perpendicular to the face of the detector head as possible.
4. Continue to apply heat to the detector head until contact closure occurs. An audible click should be heard from the detector head and the CHECKFIRE 110 Control Module should go into alarm. **Note:** Reaction times between detectors will vary. Air movement in the vicinity of the detectors should be minimized to the greatest extent possible. Excessive air movement will affect heat transfer to the detector which may extend activation times.
5. As soon as contact closure occurs, immediately and carefully remove the tip of the heat gun from the detector head. **Note:** Detector will remain in alarm for several seconds before contacts re-open.
6. Allow the control module to complete the alarm and release cycle then reset control module after the detector has cooled enough for the contacts to re-open. (Reset control module to Normal: Press and hold the "DELAY/Reset/Silence" button for 3 seconds; Power LED and Sounder quickly pulse 3 or 5 times, then Power LED remains GREEN steady-on.) Release circuit fault will continue.
7. Repeat Steps 2–6 for each detector that requires testing.
8. Once all detectors have been tested and contacts are re-opened, the detection system should be returned to normal operation (see step 6). Reconnect Release Circuit Cable to control module Release Circuit Lead.



APPLY PERPENDICULAR TO DETECTOR FACE

TABLE 6-4: OPERATIONAL TEST (Continued)

Electric Manual Actuator (EMA) Test

CAUTION

If the system includes Pneumatic Manual Actuator(s), **DO NOT TEST** these components. The actuators also have ring pins and red strike buttons. Actuation can cause fire suppression system release.

1. Pull ring pin and strike red button to manually operate EMA.

Note: There is no time delay upon manual activation.

2. **Release Activated** – The “PUSH to Activate / Alarm When Lit” RED LED and Sounder are steady-on for 10 seconds.

PULL RING PIN AND STRIKE RED BUTTON

10 SECOND RELEASE STARTS IMMEDIATELY

RED LED AND SOUNDER REMAIN STEADY-ON FOR 10 SECONDS



009140



009180d

3. **Post Release Activated** – The “PUSH to Activate / Alarm When Lit” LED and Sounder pulse 1 x 10 seconds.

RED LED AND SOUNDER PULSE 1 X 10 SECONDS

POST RELEASE ACTIVATED CONTINUES UNTIL MODULE IS RESET



009180b

4. Reset EMA by pulling red strike button up to set position, re-install ring pin. Do not reseal at this time.
5. Reset RCT.
6. Reset control module to Normal: Press and hold the “DELAY/Reset/Silence” button for 3 seconds; Power LED and Sounder quickly pulse 3 or 5 times, then Power LED remains GREEN steady-on.
7. Repeat Test for each remaining EMA following above steps.

RESET EMA: PULL RED BUTTON UP, INSERT RING PIN



009217

CAUTION

If the system includes Pneumatic Manual Actuator(s), **DO NOT TEST** these components. The actuators also have ring pins and red strike buttons. Actuation can cause fire suppression system release.

RETURN TO NORMAL STATUS

RESET RCT, AND MODULE

POWER LED IS GREEN STEADY-ON



009180

TABLE 6-5: SUMMARY ALARM CONDITION INDICATORS

	"PUSH To Activate / Alarm When Lit" LED and Sounder Indications			
Manual Action (Release Circuit Activation)	2 x 1 sec. for 10 sec.	4 x 1 sec. for 5 sec.	Steady-on for 10 sec.	1 x 10 sec. until reset*
Push the "PUSH to Activate / Alarm When Lit" button Or: Pull ring pin and push an EMA (Immediate release for either action)				
Post discharge				
Detection Circuit Input				
15-Second Time Delay (1st 10 seconds)				
5-Second Time Delay And 5 Seconds to release for 15 Second Time Delay				
Release Circuit Activation (Time Delay Expired)				
Post discharge				

- ▶ *Release Fault Indicator also pulses at this rate during post discharge. When release circuit test device is installed,
- ▶ Release Fault Indicator does not pulse.

TABLE 6-6: INTERNAL POWER CIRCUIT – OPERATIONAL TEST

<p>Disconnect external power circuit connection at the CHECKFIRE 110 Power Circuit Lead.</p> <ol style="list-style-type: none"> 1. Power LED pulses AMBER 1 x 30 seconds. 2. Sounder pulses 1 x 30 seconds for 10 minutes then auto-silences to conserve energy. Do not wait for auto-silence to begin, move to next step. 3. Push the "DELAY/Reset/Silence" button to test Sounder silence. The LED continues to pulse 1 x 30 seconds. 4. Repeat the following tests (pages 6-9 thru 6-13) with control module on internal power: <ul style="list-style-type: none"> • Detection Circuit: Alarm Condition Test • Detection Circuit: Test Time Delay Restart • Field Test Spot Thermal Detectors • Manual Activation Release Circuit Test • Electric Manual Actuator (EMA) Test <p>Note: For above tests the Power LED continues to pulse AMBER 1 x 30 seconds.</p>	<p>INTERNAL POWER TESTING (REMOVE POWER CABLE)</p> <p>AMBER POWER LED AND SOUNDER PULSE 1 X 30 SECONDS</p> <p>PUSH TO SILENCE SOUNDER (LED CONTINUES)</p> <p>REPEAT TESTS PAGES 6-9 – 6-13 ON INTERNAL POWER</p>	
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TABLE 6-7: PLACING CHECKFIRE 110 CONTROL MODULE IN SERVICE

1. Reconnect external power circuit. The Power LED returns to GREEN steady-on. (At completion of testing return all devices to normal status.)

RECONNECT EXTERNAL POWER, LED IS GREEN STEADY-ON



2. Confirm all EMAs are in the up / ring-pinned positions and properly re-sealed with a visual seal.

ALL EMAs IN UP/PINNED POSITION AND SEALED



3. Close guard door for "PUSH To Activate / Alarm When Lit" button and install visual seal.

SEAL GUARD DOOR PROTECTING RED BUTTON



4. Replace DCT with Detection EOL Device in the detection circuit. Detection fault indication starts and then clears.

REPLACE DCT WITH EOL DEVICE IN DETECTION CIRCUIT



5. Remove RCT and/or Release Circuit Test Plug from Release Circuit Drop Cable. **Note:** Release fault indication starts and remains in fault until installation of PAD(s).

REMOVE RCT AND RELEASE CIRCUIT TEST PLUG



Continues Next Page

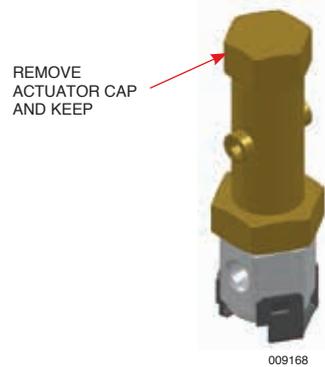
TABLE 6-7: PLACING CHECKFIRE 110 CONTROL MODULE IN SERVICE (Continued)

6. Remove actuator cap on top of Electric-Pneumatic Actuator and retain for future use.

Before installing PAD(s) place control module in Isolate Mode, see Table 2 – Isolate Mode.

CAUTION

When handling the PAD, always point actuating end away from yourself and others. On electrical initiation, PAD operates very quickly and a small brass disk forcefully separates from actuating end. Physical injury may occur from contact with the actuating pin and/or the detaching disk.



7. Write installation date on PAD, DO NOT cover manufacturing date on label. Install PAD into Release Circuit Drop Cable. Verify o-ring is in place on PAD.

NOTICE

The PAD (Protracting Actuation Device) must be replaced after being in-service for five years.

- a. The in-service date should be recorded in installation and maintenance records and written on the PAD label with permanent marker at the time of installation.
- b. The PAD has a 10 year shelf life when stored in an environmentally stable location. The 5 year in-service life may not extend beyond the 10 year shelf life. (The month and year of manufacture is printed on the label located on the PAD body).

WRITE INSTALL DATE ON PAD LABEL

MAKE SURE MANUFACTURING DATE IS READABLE



PAD FIELD INSTALLED IN CABLE

Install all PADs in the Release Circuit Drop Cable(s) then confirm all faults are cleared prior to installing Release Circuit Drop Cable(s) to actuator(s).

8. Attach Release Circuit Drop Cable to Electric-Pneumatic Actuator, hand-tighten connector. (Keep actuator cap for recharge and maintenance procedures.)

NOTICE

Be sure the control module does not have any faults or alarms before installing Release Circuit Drop Cable to Electric-Pneumatic Actuator.

CAUTION

FOR ELECTRIC ACTUATION ONLY 1/4 IN. BRASS PLUGS MUST REMAIN IN PLACE OR FIRE SUPPRESSION SYSTEM WILL NOT OPERATE.



Continues Next Page

TABLE 6-7: PLACING CHECKFIRE 110 CONTROL MODULE IN SERVICE (Continued)

- 9. If needed complete installation of optional pneumatic manual actuator(s). Refer to Section 5 – Installation.
- 10. Re-install pneumatic manual actuator cartridge(s) if previously removed.

ELECTRONIC ACTUATION
INSTALLATION COMPLETE

IF REMOVED, RE-INSTALL
MANUAL ACTUATOR
CARTRIDGE(S)



009171

- 11. Reset control module to Normal: Press and hold the “DELAY/Reset/Silence” button for 3 seconds; Power LED and Sounder quickly pulse 3 or 5 times, then Power LED remains GREEN steady-on.
- 12. Record results of testing.

RESET TO
NORMAL

PRESS AND
HOLD
3 SECONDS

POWER LED
IS GREEN
STEADY-ON



009151

IN CASE OF FIRE

Read these instructions and precautions carefully until they are clearly understood. All equipment operators or anyone who has any responsibility for the equipment should understand how the CHECKFIRE 110 Electric Detection and Actuation System operates. Every operator should be completely trained in these procedures.

- When the detection circuit alarm sounds, bring the equipment to a safe controlled stop, shut off the engine, and exit.
Note: Equipment left running may add fuel to the fire or reignite the fire with heat or sparks.
- If possible, safely exit and move a safe distance from vehicle, and stand by with hand portable extinguisher.

! WARNING

In case of fire, evacuate area to lessen risk of injury from flames, heat, hazardous vapors, explosions, or other hazards.

Automatic Detection and System Actuation

The CHECKFIRE 110 Electric Detection and Actuation System includes a thermal detection device(s) located in each protected area. On detecting a fire alarm condition, the CHECKFIRE Control Module starts the time delay cycle; at the end of the cycle an electrical release signal initiates the fire suppression system.

Manual System Operation

Bring equipment to a safe stop, shut off engine, and manually actuate system.

Perform one of the following to manually operate the system:

- Open guard door on CHECKFIRE 110 Control Module (break visual seal), and push the “PUSH To Activate / Alarm When Lit” button, see Figure 7-1.
- Pull ring pin and strike red strike button on an Electric Manual Actuator (EMA), see Figure 7-1.
- If an optional pneumatic actuation system is installed, pull ring pin and strike red button on the pneumatic manual actuator.

Safely exit and move a safe distance from vehicle, and stand by with hand portable extinguisher.

! CAUTION

Manual system operation will result in immediate system discharge which may obscure vision. Make certain vehicle is stopped safely before manually operating system.

Automatic Equipment Shutdown

The fire suppression system may be equipped with a pressure switch. This switch operates when the fire suppression system expellant gas cartridge is released. If a shutdown device is connected to the pressure switch, make certain all responsible

personnel understand shutdown device operation, and when it will operate with reference to a release/discharge condition.

If the “DELAY/Reset/Silence” button (on the control module) is pushed and released **before the end of time delay cycle** (5 or 15 seconds), the time delay repeats the delay cycle, delaying eventual system discharge and pressure switch operation. This delay can be repeated (using the “DELAY/Reset/Silence” button) as many times as necessary to safely stop the vehicle before the system discharges and automatically shuts down the vehicle. **Note:** Press and hold will not pause the time delay.

! WARNING

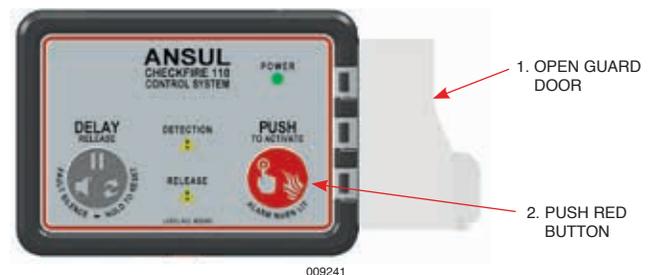
Delay of system operation may allow the fire to intensify, which could result in a more difficult fire to suppress.

Exit Vehicle and Move Safely Away

Bring equipment to a safe controlled stop as soon as possible.

If fire suppression system has not yet operated, manually operate system (refer to Manual System Operation in this section).

Exit the vehicle (with hand portable fire extinguisher), and move away from the equipment. Stand by with hand portable fire extinguisher to guard against any fire that may reignite after fire suppression system has been discharged. Remain alert until equipment cools and possibility of re-ignition is no longer a threat.



OR

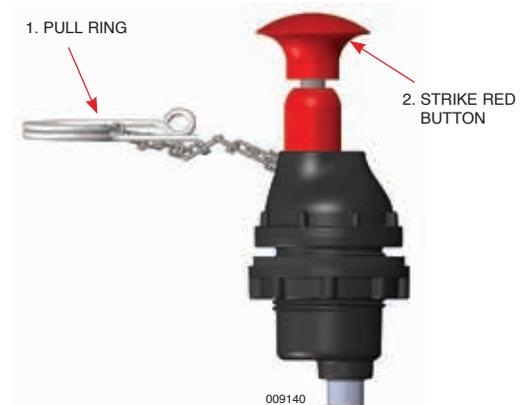


FIGURE 7-1
IMMEDIATE RELEASE OPTIONS

NOTES:

RECHARGE

- ▶ Individuals responsible for recharging, inspecting, and maintaining a CHECKFIRE 110 System, must hold current ANSUL
- ▶ Certification from an ANSUL A-101 or LVS training program.

For continued protection, the CHECKFIRE 110 System and fire suppression system must be recharged immediately after activation.

Before performing the recharge steps, inspect the CHECKFIRE 110 Detection and Actuation System to determine cause of system release.

1. Disconnect the CHECKFIRE 110 Control Module Release Circuit Lead from release circuit.
2. Check all Electric Manual Actuators (EMAs) for evidence of operation and determine if visual inspection seal is intact. For EMAs needing reset and/or re-sealing complete the following:
 - a. Reset switch to normal position (pull button out)
 - b. Insert ring pin
 - c. Wait to seal until after system test
3. If optional pneumatic actuation is part of the system follow recharge instructions in the appropriate A-101 or LVS Design, Installation, Recharge, and Maintenance manual (latest edition).

LT-A-101-10/20/30 Manual (Part No. 24327)
LT-A-101-50/125/250 Manual (Part No. 427865)
LVS Manual (Part No. 427109)
4. Closely examine all Detection Circuit Cable, Linear Detector, and Spot Thermal Detectors for loose connectors and damage (i.e. cut, abraded, burnt, blackened, melted, deformed, etc.) The Detection Circuit Fault LED on the CHECKFIRE 110 Control Module will indicate a fault condition if there is an open or grounded circuit in the Detection Circuit.
 - a. Inspect all Detection Circuit Cable for damage and replace if there are visible and mechanical signs of damage (brittleness, deformation, discoloration, etc.).

CAUTION

Failure to replace damaged cable can result in unintended discharge.

- b. If a fire event was the cause of discharge, all Linear Detector cables in the hazard area must be replaced; otherwise, inspect for damage and replace if damaged. **Note:** Splicing of Linear Detector cable is **not allowed**.

- c. If a fire event was the cause of discharge, all Spot Thermal Detectors and related cable installed in immediate area(s) of fire must be replaced. When subject to high temperatures, set-point drift and damage may occur that is not visible for field observation. (The “resettable” feature of the detector is for field-testing (with appropriate test equipment), not for resetting after a fire.) **Note:** Spot Thermal Detectors will be field-tested in step 8.

CAUTION

Failure to replace spot thermal detectors can result in system failure.

- d. The Detection Circuit Fault clears once all faulty components have been replaced.
5. Closely examine all Release Circuit Cables for loose connectors and damage (cut, abraded, burnt, blackened, melted, deformed, etc.). Replace cables as needed.
6. Check and perform maintenance on each Electric-Pneumatic Actuator (Part No. 439569) (installed on each agent tank expellant gas cartridge): **Note:** If system was electrically operated all of the PADs should be actuated.
 - a. If attached, remove Release Circuit Drop Cable from Electric-Pneumatic Actuator.

CAUTION

When handling the PAD, always point actuating end away from yourself and others. On electrical initiation, PAD operates very quickly and a small brass disk forcefully separates from actuating end. Physical injury may occur from contact with the actuating pin and/or the detaching disk.

CAUTION

The Release Circuit Drop Cable with PAD must be removed from Electric-Pneumatic Actuator to retract actuator puncture pin. An actuated PAD can lock the Electric-Pneumatic Actuator puncture pin in the actuated position until removed from actuator.

- b. Confirm PAD o-ring is in place; if absent, check inside actuator and remove. (New PAD comes with new o-ring.) See Figure 8-1.

CAUTION

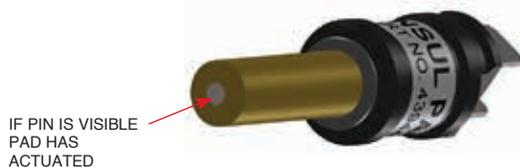
Failure to remove loose o-ring from inside actuator body can result in improper positioning of the PAD and incorrect system operation.

RECHARGE (Continued)

- c. Examine actuating end of PAD to determine if PAD has actuated. **Note:** Occasionally the actuating pin will pull back into the PAD. Look directly at actuating end where pin extends. If pin is visible PAD has actuated. See Figure 8-2.
- d. If PAD actuated, remove PAD from the connector and discard. See Figure 8-1. **Do not install new PAD until testing is complete, see Step 10.** Find and discard small brass disk ejected from actuating end of PAD during release.
- e. If PAD has not actuated (system actuated with optional pneumatic manual actuator), refer to Five-Year PAD Replacement instructions, page 8-7, and replace if needed.



**FIGURE 8-1
 ACTUATED PAD**
 009242



**FIGURE 8-2
 CHECK END OF PAD**
 009243

- f. If needed, remove 1/4 in. gas actuation hose(s). Loosen and slide base of Electric-Pneumatic Actuator sideways to remove from each expellant gas cartridge.

CAUTION

If Electric-Pneumatic Actuator is difficult to remove puncture pin is not fully retracted. Do not force.

- g. Disassemble actuator and inspect for damage. Using small wood dowel gently push puncture pin and spring out of body being careful not to bend puncture pin. Retain all parts for re-assembly. See Figure 8-3.



**FIGURE 8-3
 ELECTRIC-PNEUMATIC ACTUATOR**
 009244

- h. Inspect and replace all damaged components (i.e. o-rings, flat gaskets, etc.).
 - i. Lubricate all o-rings and gaskets with Dow Corning #4 (or equal) and reinstall. Include o-ring on PAD.
 - ▶ j. Replace flat gasket semi-annually.
 - k. Install spring on puncture pin and insert into body. Push down several times to confirm ease of movement.
 - l. Reassemble actuator.
 - m. Install actuator cap and pressure test using dry air or nitrogen.
7. Recharge the fire suppression system in accordance with the appropriate A-101 or LVS Design, Installation, Recharge and Maintenance manual (latest edition).
- LT-A-101-10/20/30 Manual (Part No. 24327)
 LT-A-101-50/125/250 Manual (Part No. 427865)
 LVS Manual (Part No. 427109)
8. After fire suppression system recharge is complete:
- a. Confirm puncture pin is completely retracted on the Electric-Pneumatic Actuator. See Figure 8-4.

⚠ WARNING

Before attaching Electric-Pneumatic Actuator to expellant gas cartridge, **verify the cartridge is properly secured and confirm actuator puncture pin is in the completely retracted position.** If puncture pin is not completely retracted the cartridge seal can become damaged or pierced which can result in system actuation or serious personal injury or death.

RECHARGE (Continued)

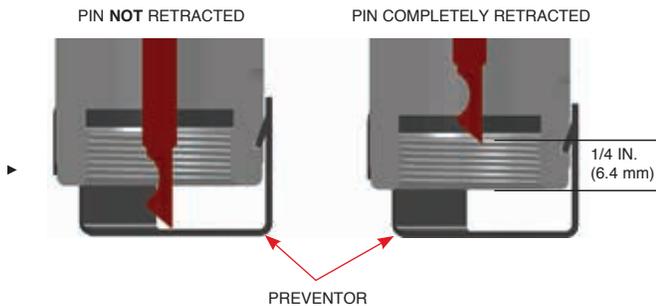


FIGURE 8-4
RETRACT ACTUATOR PISTON
009220

- b. Re-install Electric-Pneumatic Actuator on expellant gas cartridge. See Section 5 – Installation, page 5-9 and 5-10 for correct procedure.
9. Reconnect the CHECKFIRE 110 Control Module Release Circuit Lead to release circuit. Release Circuit Fault clears once all faulty components have been replaced. **Note:** If Release Circuit Fault LED indicates an un-intentional fault condition, there may be an open or grounded circuit. Refer to Section 9 – Troubleshooting to determine cause of fault. Replace cables as needed.
10. Test system and place into service by completing all steps in Section 6 - Test and Place in Service.
11. Complete steps 1 – 3 in the Maintenance Section.
12. Confirm all system equipment has been properly serviced and recharged, and visual inspection seals are in place on all EMAs and CHECKFIRE 110 Control Module.
13. Record date of recharge on tag and in permanent record file. Notify operating personnel system is back in service.

INSPECTION AND MAINTENANCE

To help ensure the CHECKFIRE 110 Detection and Actuation System will operate as intended, proper inspection and maintenance procedures must be performed at the specified intervals.

DAILY INSPECTIONS

The vehicle operator must check the system daily by visually verifying:

- Power LED is GREEN and steady-on, see Figure 8-5
- All other LEDs are off (not steady-on or pulsing)
- Sounder is silent

If any other conditions exist, contact the local Authorized ANSUL Distributor or a person who has been trained and authorized by Tyco Fire Protection Products to perform inspection and maintenance service on the CHECKFIRE 110 System.



FIGURE 8-5
NORMAL CONDITION
009151

MAINTENANCE

To help ensure the system will operate as intended, maintenance shall be performed semi-annually or sooner, depending on the operating and/or environmental conditions. Maintenance should be performed by an Authorized ANSUL Distributor or a person who has been trained and authorized by Tyco Fire Protection Products to perform maintenance checks.

Visually inspect system to confirm it is adequate for the vehicle hazard areas.

1. Check condition of the CHECKFIRE 110 Control Module.
 - a. Confirm securely mounted, either in the CHECKFIRE 110/210 Mounting Bracket or surface mounted. Verify all fasteners are tight and control module Enclosure Nut is hand-tight.
 - b. If secured in bracket, check bracket for damage or wear to ratchet teeth.
 - c. Check control module for damage or undue wear.

MAINTENANCE (Continued)

2. Check cable connectivity and integrity.
 - a. Confirm cable connections are tight (hand-tighten only).
 - b. Inspect all cables and connections for wear, abrasion or other physical damage.
 - c. Confirm all cables are properly secured within 1 ft (0.3 m) on both sides of each connection and every 3 ft (0.9 m) along cable length.
3. Check integrity of each component.
 - a. Confirm Electric Manual Actuator (EMA) is:
 - Securely mounted
 - No damage, wear, or abrasions
 - Red strike button intact
 - Ring pin intact and in place
 - Rubber boot intact
 - Connector secure
 - Visual inspection seal intact
 - Bracket secure
 - b. Confirm Electric-Pneumatic Actuator is:
 - Securely mounted
 - All actuator components appropriately tightened
 - Release Circuit Drop Cable connection tight
 - 1/4 in. brass plugs securely tightened in pneumatic ports OR - if optional pneumatic actuation, 1/4 in. actuation hose fittings securely in place
 - c. Confirm Spot Thermal Detector is:
 - Securely mounted and heat shields in place
 - Proper location
 - Inspect for damage to face of detector
 - Verify tightness of the heat shield and retaining nut. Torque not to exceed 25 in-lb (2.82 N•m).
4. If optional Pneumatic Manual Actuator is part of system refer to appropriate system manual for inspection and maintenance instructions (latest edition):
 - LT-A-101-10/20/30 Manual (Part No. 24327)
 - LT-A-101-50/125/250 Manual (Part No. 427865)
 - LVS Manual (Part No. 427109)
5. If system includes optional pneumatic manual actuator(s), carefully remove the LT-10-R cartridge(s) from the pneumatic manual actuator(s), install shipping cap(s), and set aside in a safe location.

6. Check and perform maintenance on each Electric-Pneumatic Actuator (Part No. 439569) (installed on each agent tank expellant gas cartridge):
 - a. If attached, remove Release Circuit Drop Cable from Electric-Pneumatic Actuator.

CAUTION

When handling the PAD, always point actuating end away from yourself and others. On electrical initiation, PAD operates very quickly and a small brass disk forcefully separates from actuating end. Physical injury may occur from contact with the actuating pin and/or the detaching disk.

- b. Check PAD and maintenance records for installation date of PAD to determine if PAD needs replacement. Refer to Five-Year PAD Replacement instructions, page 8-7.
- c. Confirm PAD o-ring is in place; if absent, check inside actuator and remove. (New PAD comes with new o-ring.) See Figure 8-7.

CAUTION

Failure to remove loose o-ring from inside actuator body can result in improper positioning of the PAD and incorrect system operation.

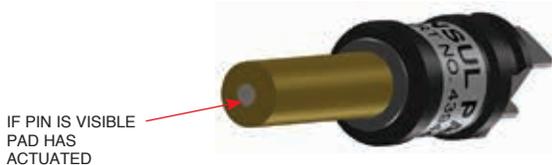
- d. Examine actuating end of PAD to determine if PAD has actuated. See Figure 8-8. **Note:** Occasionally the actuating pin will pull back into the PAD. Look directly at actuating end where the pin extended. If pin is visible PAD has actuated.

MAINTENANCE (Continued)

- e. If PAD actuated, remove PAD from the connector and discard. If possible, determine why PAD was actuated. **Do not install new PAD until testing is complete, see Step 9.** Find and discard small brass disk ejected from actuating end of PAD during release.



**FIGURE 8-7
CHECK PAD**
009246



**FIGURE 8-8
CHECK END OF PAD**
009243

- f. If needed, remove 1/4 in. gas actuation hose(s). Loosen and slide base of Electric-Pneumatic Actuator sideways to remove from each expellant gas cartridge.

CAUTION

If Electric-Pneumatic Actuator is difficult to remove puncture pin is not fully retracted. Do not force.

- g. Disassemble actuator and inspect for damage. Using small wood dowel gently push puncture pin and spring out of body being careful not to bend puncture pin. Retain all parts for re-assembly. See Figure 8-9.



**FIGURE 8-9
ELECTRIC-PNEUMATIC ACTUATOR
RETAIN ALL PARTS FOR RE-ASSEMBLY**
009244

- h. Inspect and replace all damaged components (i.e. o-rings, flat gaskets, etc.).
- i. Lubricate all o-rings and gaskets with Dow Corning #4 (or equal) and reinstall. Include o-ring on PAD.
- ▶ j. Replace flat gasket semi-annually.
- k. Install spring on puncture pin and insert into body. Push down several times to confirm ease of movement.
- l. Reassemble actuator.
- m. Install actuator cap (if needed) and pressure test using dry air or nitrogen.
7. Re-install Electric-Pneumatic Actuator on expellant gas cartridge. See Section 5 – Installation, page 5-9 and 5-10 for correct procedure.
8. Test system and place into service by completing all steps in Section 6 - Test and Place in Service. **Note:** If Release Circuit Fault LED indicates an un-intentional fault condition, there may be an open or grounded circuit. Replace cables as needed.
9. For fire suppression system maintenance refer to appropriate system manual (latest edition)
- LT-A-101-10/20/30 Manual (Part No. 24327)
 - LT-A-101-50/125/250 Manual (Part No. 427865)
 - LVS Manual (Part No. 427109)
10. Confirm all system equipment has been properly serviced and recharged, and visual inspection seals are in place on all EMAs and CHECKFIRE 110 Control Module.
11. Record date of maintenance on tag and in permanent record file. Notify operating personnel system is back in service.

MAINTENANCE (Continued)

Five-Year PAD Replacement

1. The PAD (Protracting Actuation Device) must be replaced after being in-service for five years.
 - a. The in-service date must be recorded in installation and maintenance records and written on the PAD label with permanent marker at the time of installation. See Figure 8-10.
 - b. The PAD has a 10-year shelf life when stored in an environmentally stable location. The 5-year in-service life may not extend beyond the 10-year shelf life. The month and year of manufacture is printed on the label, see Figure 8-11.
 - c. For proper disposal, the PAD must be actuated before discarding. Actuate the PAD in a safe manner consistent with site safety policies.



FIGURE 8-10
WRITE DATE ON PAD
009169



FIGURE 8-11
PAD MANUFACTURING DATE
009247

CAUTION

When handling the PAD, always point actuating end away from yourself and others. On electrical initiation, PAD operates very quickly and a small brass disk forcefully separates from actuating end. Physical injury may occur from contact with the actuating pin and/or the detaching disk.

2. Write installation date on new PAD(s). DO NOT cover manufacturing date on label. See Figure 8-10. Do not install PAD(s) until testing is complete.
3. Follow instructions in Section 5 – Installation, page 5-9 and 5-10, to complete re-installation of the Electric-Pneumatic Actuator.
4. Place in service by completing Table 7 – Placing CHECKFIRE 110 Control Module in Service, pages 6-13 – 6-15 (Section 6 – Test and Place in Service).
5. Record date of PAD replacement in a permanent record file. Notify operating personnel the system is back in service.

TROUBLESHOOTING

The following tables provide information on normal operating and fault condition indications for the CHECKFIRE 110 Detection and Actuation System. Refer to Table 5 for detailed circuit testing procedures. When all faults are cleared, confirm proper operation of the entire CHECKFIRE 110 System by completing Section 6 - Test and Place in Service.

TABLE 9-1: POWER LED INDICATIONS

<p>Normal Operating Condition</p> <p>Power LED is GREEN steady-on indicating a normal condition.</p> <p>System is monitoring all circuits and is ready to respond to a fault/fire condition.</p>	<p>NORMAL CONDITION</p> <p>LED GREEN STEADY-ON</p>	 <p>009180</p>
<p>External Power Fault</p> <p>Power LED pulsing AMBER with Sounder 1 x 30 seconds indicating External Power Circuit fault.</p> <p>After 10 minutes Sounder auto-silences to conserve the internal power source.</p>	<p>EXTERNAL POWER FAULT</p> <p>PULSING 1 X 30 SECONDS</p>	 <p>009180b</p>
<p>Power LED pulsing AMBER 1 x 30 seconds and Sounder is OFF (after 10 minutes to conserve power) indicating External Power Circuit fault.</p> <p>The system continues to operate on internal reserve power to supervise the power, detection, and release circuits; remains ready to respond to a fault/fire condition.</p> <ul style="list-style-type: none"> • Check Power Circuit Cable and Fused Power Circuit Cable for proper connections • Confirm fuse is good and installed correctly. (See Section 5 – Installation, page 5-14 for correct removal and replacement of fuse.) • Check external power supply for proper voltage • Replace cables if unable to clear fault indication 	<p>EXTERNAL POWER FAULT, SOUNDER OFF</p> <p>PULSING 1 X 30 SECONDS</p>	 <p>009180b</p>
<p>Loss of All Power</p> <p>Power LED shows no indication for more than 30 seconds – CHECKFIRE 110 has lost all power.</p> <div style="background-color: yellow; text-align: center; padding: 5px;">CAUTION</div> <p>System is not providing protection until power is restored.</p> <ul style="list-style-type: none"> • Check external power connections, fuse, and cables • Check external power supply for proper voltage • If proper voltage is verified at the module, and Power LED remains off, replace module 	<p>LOSS OF ALL POWER</p>	 <p>009180</p>

TABLE 9-2: RELEASE CIRCUIT FAULT

<p>Release Circuit Fault</p> <p>Release Circuit Fault LED and Sounder pulsing 1 x 10 seconds indicating Release Circuit Fault.</p> <ul style="list-style-type: none"> • Check Release Circuit Cables for an open circuit or a ground fault; replace cables as needed • Check connections • Check for activated or missing PAD(s); replace as needed following Section 8 – Recharge instructions 	<p>RELEASE CIRCUIT FAULT</p> <p>PULSING 1 X 10 SECONDS</p>  <p>009180b</p>
<p>Post Discharge Mode/Release Circuit Fault</p> <p>Release Circuit Fault LED, “PUSH to Activate / Alarm When Lit” LED and Sounder pulsing 1 x 10 seconds indicating Post Discharge Mode, and Release Circuit fault.</p> <ul style="list-style-type: none"> • Check for activated or missing PAD(s), replace as needed following Section 8 – Recharge instructions • If fault does not clear, check Release Circuit Cables for an open circuit or a ground fault; replace cables as needed 	<p>POST DISCHARGE MODE</p> <p>PULSING 1 X 10 SECONDS</p>  <p>009180b</p>

TABLE 9-3: DETECTION CIRCUIT FAULT

<p>Detection Circuit Fault</p> <p>Detection Circuit Fault LED and Sounder pulsing 1 x 10 seconds indicating Detection Circuit fault.</p> <ul style="list-style-type: none"> • Check connections • Check Detection Circuit Cables for an open circuit or a ground fault; replace cables as needed • Verify Linear Detector or Spot Thermal Detector continuity or ground fault condition. Replace as needed. 	<p>DETECTION CIRCUIT FAULT</p> <p>PULSING 1 X 10 SECONDS</p>  <p>009180b</p>
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TABLE 9-3: DETECTION CIRCUIT FAULT (Continued)

Isolate Mode Condition

Detection Circuit Fault LED and Sounder pulsing quickly 2 x 30 seconds indicate CHECKFIRE 110 Control Module is in ISOLATE MODE.

Placing the control module in Isolate Mode minimizes occurrence of a false discharge during service or maintenance procedures on the protected vehicle.

CAUTION

When control module is in Isolate Mode, the Release Circuit cannot be initiated by an automatic detection circuit input.

In the event of fire, manual actuation will bypass Isolate Mode for immediate release. To operate manually:

- Press “PUSH to Activate/ Alarm When Lit” button
- Or**
- Pull ring pin and operate RED Strike button on an EMA or a pneumatic manual actuator

Note: If a fault or alarm condition occurs while in Isolate Mode the condition will be displayed and the module will remain in Isolate Mode.

CAUTION

If an Alarm condition has occurred in Isolate Mode resetting the control module results in an immediate start of the Time Delay leading to a Release.

Return Control Module to normal: Press and hold the “DELAY/Reset/Silence” button for 3 seconds; Power LED and Sounder quickly pulse 3 or 5 times, then Power LED remains GREEN steady-on.

DETECTION
CIRCUIT FAULT –
ISOLATION MODE

PULSING QUICKLY
2 X 30 SECONDS

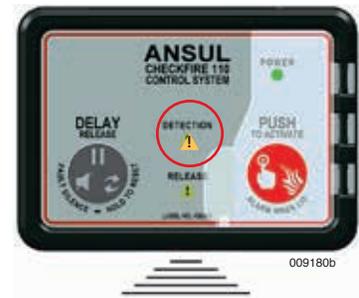


TABLE 9-4: MULTIPLE CIRCUIT FAULTS

Multiple Circuit Faults

Detection Circuit Fault, Release Circuit Fault, "PUSH to Activate / Alarm When Lit" LEDs, and Sounder pulsing 1 x 10 seconds indicate Post Discharge Mode, Detection Circuit fault, and/or Release Circuit fault.

When multiple fault conditions exist, check each circuit as previously described (clear circuit faults in this order: Power, Release, Detection). Determine fire system status.

- Check connections on all cables
- Check Release Circuit Cables for an open circuit or a ground fault; replace cables as needed
- Check Detection Circuit Cables for an open circuit or a ground fault; replace cables as needed
- Check for activated or missing PAD(s); replace as needed following Section 8 – Recharge instructions

Note: The Power LED could also be pulsing AMBER if there is a fault in the External Power Circuit.

**MULTIPLE
CIRCUIT FAULTS**

ALL LEDS
PULSING
1 X 10 SECONDS



TABLE 9-5: SPECIFIC CIRCUIT TESTING PROCEDURES

General Instructions

Test the connecting cables if faults are indicated on the CHECKFIRE 110 Control Module, and end of circuit devices (EMAs, EOL Device, branch terminators, PADs, etc.) are properly connected to the system.

Before testing specific circuits, confirm completion of a thorough visual inspection. Inspect all cables for damage and replace if there are visible and mechanical signs of damage (brittleness, deformation, discoloration, etc.). Test all connections for loose or disassembled connectors.

Note: Once all faults are cleared, confirm proper operation of the entire CHECKFIRE 110 System by completing Section 6 - Test and Place in Service.

If faults cannot be cleared, test each circuit and cable individually with the following procedures.

TABLE 9-5: SPECIFIC CIRCUIT TESTING PROCEDURES (Continued)

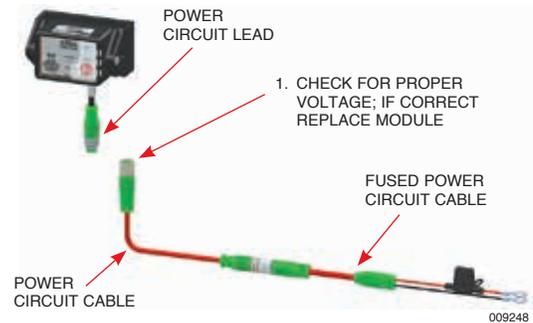
Power Circuit

If Power LED is pulsing AMBER or showing no indication for more than 30 seconds check external power connections.

Required Test Equipment

- New Fuse (3 amp inline ATO/ATC blade style automotive fuse)
- Digital Multimeter

1. Disconnect Power Circuit Cable at the control module power circuit lead (green connector). Use the Digital Multimeter to confirm proper voltage is available at the end of the Power Circuit Cable. If voltage on Power Circuit Cable is correct, there is a control module internal problem and the CHECKFIRE 110 Control Module must be replaced.



2. If voltage on Power Circuit Cable is not correct, use the Digital Multimeter to check for proper voltage at the vehicle power source (battery).

- a. If voltage is correct move to step 3.
- b. If power source voltage is incorrect or indicates no power, contact vehicle service personnel to correct. When voltage is restored reconnect entire power circuit to see if power fault clears. If fault does not clear return to step one.

2. CONFIRM CORRECT VOLTAGE AT POWER SOURCE

FOLLOW SECTION 5 – INSTALLATION INSTRUCTIONS TO REPLACE FUSE

3. CHECK FUSE, IF NEEDED REPLACE

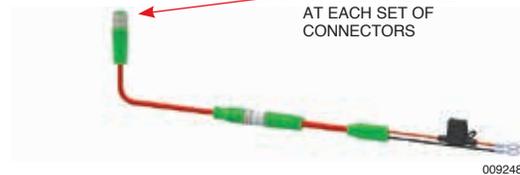
4. CONFIRM VOLTAGE AT CONNECTOR



3. Check fuse in the Fused Power Circuit Cable connected to vehicle power source. If needed replace fuse following instructions in Section 5 – Installation, page 5-14 (step 5).

4. After confirming correct voltage at the power source and a good fuse, disconnect Fused Power Circuit Cable connector from power circuit and check for proper voltage with the Digital Multimeter. If voltage on Fused Power Circuit Cable is correct, the cable is functioning properly. If voltage is incorrect the Fused Power Circuit Cable must be replaced.

5. CONFIRM VOLTAGE AT EACH SET OF CONNECTORS



5. After confirming correct voltage at end of Fused Power Circuit Cable continue checking the remaining power circuit at each set of connectors for proper voltage from the power source. Replace non-functioning cable with an identical new part.

Continues Next Page

TABLE 9-5: SPECIFIC CIRCUIT TESTING PROCEDURES (Continued)

Power Circuit (Continued)

6. After replacing non-functioning cable and confirming correct voltage through entire power circuit, reconnect to Control Module. Power LED returns to GREEN steady-on.

If all faults are clear, verify proper operation of the CHECKFIRE 110 System by completing Section 6 – Test and Place in Service.

Note: Specific jurisdictions or customer procedures may require documentation of all components replaced. Keep a record of all changes to the system as required.

Release Circuit

If Release Circuit Fault LED is pulsing AMBER and cannot be cleared check release circuit cable.

Required Test Equipment (Confirm test equipment is new and functioning properly)

- 2 - Release Circuit Terminators (Part No. 439436)
- 2 - Release Circuit Test Plugs (Part No. 440912)

1. Disconnect Release Circuit Cable at the control module release circuit lead (blue connector). Install Release Circuit Terminator on the blue lead. If Release Circuit Fault LED continues pulsing AMBER, there is a control module internal problem and the CHECKFIRE 110 Control Module must be replaced.

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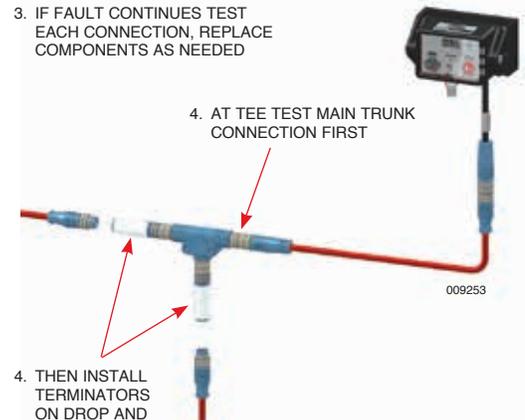


TABLE 9-5: SPECIFIC CIRCUIT TESTING PROCEDURES (Continued)

Release Circuit (Continued)

2. If Release Circuit Fault clears, the CHECKFIRE 110 Control Module is functioning properly. Re-install complete release circuit to the control module release circuit lead and complete an SDR (Self Diagnostic Routine: Press and hold "DELAY/Reset/Silence" button for 3 seconds; Power LED and Sounder quickly pulse 3 or 5 times, then Power LED remains GREEN steady-on).
3. If Release Circuit Fault does not clear, continue testing the release circuit at each set of connectors starting at the next set from the control module. Separate connectors and install Release Circuit Terminator on control module side. If fault does not clear, replace non-functioning component with an identical new part and retest. If fault clears, part is good; re-install and move to next set of connectors. **Note: Be sure to add only one new component (cable, tee, etc.) at a time to help identify the specific part causing the fault.**
4. At a Release Circuit Tee remember to first check the main trunk connector leading to the tee; then re-connect to check the tee. Install a Detection Circuit Terminator on each side of tee. If fault clears tee is good. If fault does not clear replace tee.

2. IF FAULT CLEARS, RECONNECT AND COMPLETE SDR
3. IF FAULT CONTINUES TEST EACH CONNECTION, REPLACE COMPONENTS AS NEEDED



4. AT TEE TEST MAIN TRUNK CONNECTION FIRST
4. THEN INSTALL TERMINATORS ON DROP AND MAIN TRUNK CONNECTORS

5. After checking a Release Circuit Tee, continue testing components to the end of the drop line.
6. To test the Release Circuit Drop Cable at the end of a drop or end of the main trunk, reconnect cable to the original location. If there is no fault indication, the Release Circuit Drop Cable and PAD are working properly.
7. If the Release Circuit Drop Cable causes a fault, remove cable from the Electric-Pneumatic Actuator and replace the PAD with the Release Circuit Test Plug.
 If the fault clears, replace the PAD.
 If the fault continues, replace the Release Circuit Drop Cable.

5. AFTER TEE, CONTINUE TESTING DROP
6. CONNECT RELEASE CIRCUIT DROP CABLE, IF NO FAULT CABLE AND PAD ARE GOOD



7. IF FAULT, REMOVE CABLE FROM ACTUATOR, REPLACE PAD WITH RELEASE CIRCUIT TEST PLUG
 IF FAULT CLEARS REPLACE PAD
 IF FAULT CONTINUES REPLACE CABLE

Continues Next Page

TABLE 9-5: SPECIFIC CIRCUIT TESTING PROCEDURES (Continued)

Release Circuit (Continued)

- ▶ 8. After the drop is clear, return to the last connection that was good and continue testing the main trunk and any drop lines in the same manner until release circuit fault is clear.

8. AFTER DROP IS CLEAR, CONTINUE TESTING IN SAME MANNER UNTIL ENTIRE CIRCUIT IS CLEAR

If all faults are clear, verify proper operation of the CHECKFIRE 110 System by completing Section 6 – Test and Place in Service.

Note: Specific jurisdictions or customer procedures may require documentation of all components replaced. Keep a record of all changes to the system as required.

Detection Circuit

If Detection Circuit Fault LED is pulsing AMBER and cannot be cleared check detection circuit cable.

Required Test Equipment (Confirm test equipment is new and functioning properly)

- Detection Circuit EOL Device (Part No. 439396)
 - Detection Circuit Tester (DCT) (Part No. 440097)
 - Detection Circuit Branch Terminator (Part No. 439398)
1. Disconnect Detection Circuit Cable at the control module detection circuit lead (red connector). Install EOL Device or DCT on the red lead. If Detection Circuit Fault LED continues pulsing AMBER, there is a control module internal problem and the CHECKFIRE 110 Control Module must be replaced.



2. If Detection Circuit Fault clears, the CHECKFIRE 110 Control Module is functioning properly. Re-install complete detection circuit to the control module detection circuit lead and complete an SDR (Self Diagnostic Routine: Press and hold "DELAY/Reset/Silence" button for 3 seconds; Power LED and Sounder quickly pulse 3 or 5 times, then Power LED remains GREEN steady-on).

2. IF FAULT CLEARS, RECONNECT AND COMPLETE SDR

Continues Next Page

TABLE 9-5: SPECIFIC CIRCUIT TESTING PROCEDURES (Continued)

Detection Circuit (Continued)

3. If Detection Circuit Fault does not clear, continue testing the detection circuit at each set of connectors starting at the next set from the control module. Separate connectors and install EOL Device or DCT on control module side. If fault does not clear, replace non-functioning component with an identical new part and retest. If fault clears, part is good; re-install and move to next set of connectors. **Note: Be sure to add only one new component (cable, tee, EMA, etc.) at a time to help identify the specific part causing the fault.**
4. At a Detection Circuit Tee remember to first check the main trunk connector leading to the tee, then re-connect to check the tee. Install a Detection Circuit Branch Terminator on branch side of tee, and the EOL Device or DCT on main trunk side. If fault clears tee is good; if fault does not clear replace tee.

3. IF FAULT CONTINUES
TEST EACH
CONNECTION, REPLACE
COMPONENTS AS
NEEDED

4. AT TEE TEST MAIN TRUNK
CONNECTION FIRST



5. After checking a Detection Circuit Tee, continue testing components to the end of the branch.

If a non-functioning component is found and replaced on a branch and the entire branch is not causing a fault, reconnect the complete detection circuit to determine if that is the only fault in the circuit.

If reconnecting the remaining detection circuit causes a fault, return to the last connection that was good and continue testing the main trunk and any branch lines in the same manner until detection circuit fault clears.

If all faults are clear, verify proper operation of the CHECKFIRE 110 System by completing Section 6 – Test and Place in Service.

5. IF FAULT IS CORRECTED IN BRANCH
LINE, RECONNECT ENTIRE CIRCUIT;

IF FAULT OCCURS, CONTINUE
TESTING CIRCUIT FROM LAST GOOD
CONNECTION UNTIL FAULT CLEARS

Note: Specific jurisdictions or customer procedures may require documentation of all components replaced. Keep a record of all changes to the system as required.

NOTES:

COMPONENT INDEX

Part No.	<u>Description</u>	Part No.	<u>Description</u>
System Components		Accessory Equipment	
439559	Control Module, CHECKFIRE 110	▶ 438280	Spot Thermal Detector, 250 °F (121 °C)
439564	Mounting Bracket, CHECKFIRE 110/210	438281	Spot Thermal Detector, 350 °F (177 °C)
439569	Electric-Pneumatic Actuator (normally supplied with agent tanks)	▶ 440905	Spot Thermal Detector Bracket and Heat Shield
439400	Electric Manual Actuator (EMA)	▶ 440090	Pressure Switch
440537	Electric Manual Actuator Bracket	440737	Double-Loop Cable Ties (Pkg. 50)
Detection Circuit Cables and Fittings		56692	Rubber Sleeve (Pkg. 20)
439384	Cable, Detection Circuit - 2 ft (0.61 m)	440798	Label Package
439386	Cable, Detection Circuit - 5 ft (1.53 m)	440097	Detection Circuit Tester (DCT)
439388	Cable, Detection Circuit - 10 ft (3.05 m)	441021	Release Circuit Tester (RCT)
439390	Cable, Detection Circuit - 20 ft (6.10 m)	440912	Release Circuit Test Plug
440759	Cable, Detection Circuit - 30 ft (9.15 m)	440768	Label, Branch Circuit (Pkg. of 10)
440762	Cable, Detection Circuit - 50 ft (15.24 m)	440082	Guard Door, Control Module
439394	Connector, Tee, Detection Circuit (MxFxF)	440083	Enclosure Nut, Control Module
439396	Connector, EOL Device, Detection Circuit		
439398	Connector, Branch Terminator, Detection Circuit		
439404	Connector, Bulkhead, Detection Circuit		
Linear Detector			
▶ 439406	Linear Detector - 2 ft (0.61 m)		
439478	Linear Detector - 5 ft (1.53 m)		
439480	Linear Detector - 10 ft (3.05 m)		
439408	Linear Detector - 20 ft (6.10 m)		
439410	Linear Detector - 30 ft (9.15 m)		
▶ 440765	Linear Detector - 50 ft (15.24 m)		
Release Circuit Cables and Fittings			
439418	Cable, Release Circuit - 2 ft (0.61 m)		
439420	Cable, Release Circuit - 5 ft (1.53 m)		
439422	Cable, Release Circuit - 10 ft (3.05 m)		
439424	Cable, Release Circuit - 20 ft (6.10 m)		
439426	Cable, Release Circuit - 30 ft (9.15 m)		
439428	Cable, Release Circuit - 50 ft (15.24 m)		
439430	Cable, Release Circuit Drop - 30 in. (0.77 m)		
439432	Cable, Release Circuit Drop - 38 in. (0.97 m)		
439434	Connector, Tee, Release Circuit (MxFxF)		
439436	Connector, Release Circuit Terminator		
439405	Connector, Bulkhead, Release and Power Circuits		
439448	Protracting Actuation Device (PAD), w/Spade Connectors		
Power Circuit Cables and Fittings			
439438	Cable, Power Circuit - 2 ft (0.61 m)		
439440	Cable, Power Circuit - 5 ft (1.53 m)		
439442	Cable, Power Circuit - 10 ft (3.05 m)		
439444	Cable, Power Circuit - 20 ft (6.10 m)		
439446	Cable, Power Circuit - 30 ft (9.15 m)		
440187	Cable, Power Circuit - 50 ft (15.24 m)		
439405	Connector, Bulkhead, Release and Power Circuits		
439492	Cable, Fused Power Circuit, (w/Inline Fuse Holder) - 3 ft. (0.91 m)		

CABLE AND BULKHEAD DIMENSIONS

Cable Type	Largest Diameter on Connector		Cable Diameter		Hole Size to Pass Connector Through		Images
	in.	(mm)	in.	(mm)	in.	(mm)	
Linear Detector	0.64	(16.3)	0.130 0.172	(3.30) (4.37)	11/16	(17.5)	 009157
Detection Circuit Cable	0.64	(16.3)	0.300	(7.62)	11/16	(17.5)	 009158
Release Circuit Cable	0.75	(19.1)	0.300	(7.62)	3/4	(19.1)	 009163
Power Circuit Cable	0.75	(19.1)	0.300	(7.62)	3/4	(19.1)	 009172
Bulkhead Type	Maximum Panel Thickness		Overall Bulkhead Length		Panel Mounting Hole Size		Images
Detection Circuit Bulkhead Connector (Includes Linear Detector)	3/8	(9.5)	1 7/8	(47.6)	5/8	(15.9)	
Release & Power Circuit Bulkhead Connector	1	(25)	2 7/16	(61.9)	21/32	(16.7)	 009166

LINEAR DETECTOR FLUID RESISTANCE CAPABILITY

Resistance Rating Key:

G = GOOD

L = LIMITED

C = CONDITIONAL (Service conditions must be outlined to Tyco Fire Protection Products for approval of cable suitability for applications.)

U = UNACCEPTABLE (Not to be used)

Agent	Rating	Agent	Rating	Agent	Rating
Acetate Solvents, Crude	U	Diesel Oil, Light	L	Naphtha	C
Acetate Solvents, Pure	U	Ethers	U	Naphthalene	U
Acetic Acid, Dilute (20%)	U	Ethyl Acetate	U	Nickel Chloride	G
Acetic Acid, Glacial	U	Ethyl Alcohol	C	Nickel Sulfate	G
Acetone	U	Ethyl Chloride	U	Nitric Acid, 10%	L
Air	G	Ethylene Dichloride	U	Nitric Acid, 70%	U
Alcohols	C	Ethylene Glycol	L	Nitrobenzene	U
Aluminum Chloride	G	Ferric Chloride	G	Oleic Acid	C
Aluminum Fluoride	G	Ferric Sulfate	G	Oleum Spirits	U
Aluminum Sulfate	G	Ferrous Salt Solutions	G	Perchloroethylene	C
Ammonia Liquid (Anhydrous)	U	Formaldehyde	L	Picric Acid, Molten	U
Ammonia, Chloride	G	Formic Acid	L	Picric Acid, Solution	U
Ammonium Hydroxide	L	Fuel Oil	L	Potassium Chloride	G
Ammonium Nitrate	G	Furfural	U	Potassium Cyanide	G
Ammonium Phosphate	G	Gasoline	C	Potassium Hydroxide	C
Ammonium Sulfate	G	Glycerine, Glycerol	L	Potassium Sulfate	G
Amyl Acetate	U	Grease, Petro	L	Soda Ash Sodium Carbonate	G
Amyl Alcohol	L	Heptane	C	Sodium Bisulfate	G
Asphalt	C	Hexane	L	Sodium Chloride	G
Barium Chloride	G	Hydraulic Fluids & Lubricating Oils,		Sodium Cyanide	G
Barium Hydroxide	G	Straight Petroleum Base	L	Sodium Hydroxide	C
Barium Sulfide	G	Water and Petroleum Oil		Sodium Hypochlorite	C
Benzene, Benzol	C	Emulsion (FR)	L	Sodium Nitrate	G
Benzene (Petroleum Ether)	C	Water and Glycol Solution	L	Sodium Peroxide	C
Benzene (Petroleum Naphtha)	C	Straight Phosphate-Ester (FR)	L	Sodium Phosphate	G
Borax	L	Silicone Oils	L	Sodium Silicate	G
Boric Acid	L	Hydrobromic Acid	U	Sodium Sulfate	G
Bromine	U	Hydrochloric Acid, Cold	C	Sodium Sulfide	C
Butyl Acetate	U	Hydrochloric Acid, Hot	U	Sodium Thiosulfate, "Hypo"	G
Butyl Alcohol, Butanol	L	Hydrocyanic Acid	C	Soybean Oil	L
Calcium Bisulfite	L	Hydrofluoric Acid, Cold	C	Stannic Chloride	G
Calcium Chloride	G	Hydrofluoric Acid, Hot	C	Stearic Acid	L
Calcium Hydroxide	G	Hydrogen Peroxide (Dilute)	G	Sulfur Dioxide	C
Calcium Hypochlorite	L	Hydrogen Peroxide (Concentrated)	C	Sulfur Trioxide	C
Carbolic Acid Phenol	C	Hydrogen Sulfide	C	Sulfuric Acid, 10%, Cold	L
Carbon Dioxide	G	Kerosene	L	Sulfuric Acid, 10%, Hot	L
Carbon Disulfide	U	Lacquer Solvents	U	Sulfuric Acid, 75%, Cold	L
Carbon Monoxide, Hot	U	Lactic Acid	C	Sulfuric Acid, 75%, Hot	L
Carbon Tetrachloride	L	Linseed Oil	L	Sulfuric Acid, 95%, Cold	U
Carbonic Acid	G	Magnesium Chloride	G	Sulfuric Acid, 95%, Hot	U
Castor Oil	C	Magnesium Hydroxide	G	Sulfuric Acid, Fuming	U
Chlorinated Solvents	C	Magnesium Sulfate	G	Sulfurous Acid	L
Chlorine, Dry	U	Mercuric Chloride	U	Tannic Acid	G
Chlorine, Wet	U	Mercury	L	Tartaric Acid	G
Chloroacetic Acid	U	Methyl Alcohol, Methanol	L	Toluene	U
Chloroform	U	Methyl Chloride	U	Trichloroethylene	U
Chlorosulphonic Acid	U	Methyl Ethyl Ketone	U	Turpentine	L
Chromic Acid	U	Methyl Isopropyl-Keytone	U	Varnish	U
Citric Acid	L	Mineral Oil	L	Xylene	U
Copper Chloride	G			Zinc Chloride	L
Copper (II) Sulfate	G			Zinc Sulfate	G
Creosote	U				

CHEMICAL RESISTANT CHART

(For Linear Detector material)

This chemical resistance chart cannot predict the effect on the outer covering to complex chemical mixtures. The appropriate chemical resistance tests using a representative sample of the chemical(s) or a trial installation of the Linear Detector should be performed to determine acceptable product performance.

Chemical	Percent Concentration	Maximum Temperature	
		°F	(°C)
Acids			
Hydrochloric	37	302	(150)
Hydrofluoric	50	302	(150)
Nitric	65	151	(66)
Phosphoric	85	302	(150)
Bases			
Ammonium hydroxide	30	302	(150)
Potassium hydroxide	30	250	(121)
Sodium hydroxide	50	250	(121)
Sodium hypochlorite	5 - stabilized at pH 12	302	(150)
Hydrocarbons			
n-Hexane	100	302	(150)
Toluene	100	151	(66)
Alcohols and Ethers			
Methanol	100	149	(65)
Ethanol	100	57	(14)
Organic Acids, Esters and Ketones			
Acetic acid	100	>221	(>100)
	50	>250	(>121)
Acetone	100	151	(66)
Acetophenone	100	122	(50)
Ethyl Acetate	100	122	(50)

Chemical	Percent Concentration	Maximum Temperature	
		°F	(°C)
Classic Polymer Solvents			
Dimethyl formamide	100	122	(50)
Dimethyl sulphoxide	100	212	(>100)
N-Methylpyrrolidone	100	77	(25)
Halogenated Solvents			
Chlorobenzene	100	151	(66)
Chloroform	100	Not resistant	
Amines and Nitriles			
Acetonitrile	100	>212	(>100)
Aniline	100	212	(100)
Dimethyl amine	100	77	(25)
Peroxides			
Hydrogen peroxide	30	>190	(>88)
Automotive Fluids			
Crude Oils	100	302	(150)
Dexron II (gear oil)	100	302	(150)
Gasoline	100	302	(150)
Diesel Fuels	100	302	(150)
Mineral Oil	100	302	(150)