

Fire Suppression — Gen2

SECTION_03-10



LDG2-S-V-FR-EN.0001

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Preface

This Manual is provided as a guide to personnel involved with the operation, maintenance and repair of Komatsu Mining Corp. equipment. We recommend that such personnel review and become familiar with the general procedures and information contained within this manual. In addition, we recommend that this manual be kept readily available for reference when repairs or maintenance are necessary.

Read and become familiar with this Manual and any other general safety practices before attempting any procedures.

Due to the complexities of mining equipment and the environment in which it operates, situations may arise which are not directly discussed in detail in this Manual. When such a situation arises, past experience, availability of equipment and common sense play a large part in what steps are to be taken. In addition, a Komatsu Mining Corp. service center representative is available to answer your questions and assist you upon request.

Komatsu Mining Corp. reserves the right to continually improve its products and associated documentation. Therefore, physical alterations to Komatsu equipment may not be identified in this Manual. Revisions may be frequently made to this Manual in an effort to ensure that information contained within is current as alterations occur to the equipment. If you find an error or have other feedback regarding this Manual, please contact Product Training and Publications at *Pro.Train.Pub@mining.komatsu*.

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Scope of This Publication

This publication and vendor support documentation contains information about the fire suppression system. The operator and maintenance personnel should read all instructions carefully and understand them before operating or performing maintenance operations to the machine. The entire fire suppression system must be maintained per its manufacturer recommendations.

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Safety

This publication contains special instructions that pertain to safety, operation, maintenance, and repair of the machine. Listed below are the signal words and symbols that precede these instructions and their meanings:



DANGER

The danger label indicates a hazardous situation which, if not avoided, will result in death or serious injury.



WARNING

The warning label indicates a hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION

The caution label, used with the safety alert symbol indicates a hazardous situation which, if not avoided, could result in minor or moderate injury (includes the safety alert symbol



).

CAUTION

The caution label (without safety alert symbol) is used to address practices not related to personal injury – only equipment damage.

NOTICE

The NOTICE graphic is to indicate areas of importance to the reader that are not related to personal injury or machine damage.

Safety, Warnings, and Cautions



WARNING

CRUSH HAZARD

- Crush hazard exists if the machine is started or moved while work processes are being performed on the machine. Place bucket flat and level on the ground. Place frame lock in the locked position and lock out the machine's starting capability before performing any work process. Follow all applicable lockout procedures and local rules and regulations for performing work processes. **ANYONE** performing inspections or service procedures to the machine should be familiar with **ALL** instructions and procedures contained in the machine's **SERVICE MANUAL**. Crush hazard could occur if the machine is started or moves while any type of work process is being conducted on the machine, resulting in serious injury or death.

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- Crush hazard exists in machine pivot area and area between the tires. Do not enter these areas unless it is verified that the operator has control over the steering and that personnel locking the frame lock have good communication with the operator. Entering the pivot area and area between the tires while the machine is moving or pivoting (articulating) could cause crush hazards resulting in serious injury or death.
- Crush hazard exists if standing under, or placing any body part under hoisted/suspended components. Never stand under hoisted/suspended components. Ensure appropriate lifting devices are used, and blocking is adequate to prevent the component from unexpectedly moving during transportation. Refer to **SAFETY, WARNINGS, AND CAUTIONS** before attempting to remove the operator's cab. Failure to stay out from under hoisted/suspended components can cause crush hazard resulting in serious injury or death.

FALL HAZARDS

- Fall hazard exists when removing the switch. Do not attempt to climb on the machine to remove the switch. Use a man lift, scaffolding, or other locally acceptable method to reach the fire suppression system manifold. Failure to use appropriate lifting method can cause fall hazards resulting in serious injury or death.
- Fall hazard exists when working at heights on the machine. Be sure to take appropriate safety precautions when working at heights on the rear and front frames. Use fall restraint when appropriate. Follow all required statutory regulations for working at height. Failure to use fall restraint when working at heights on the machine can cause fall hazards resulting in serious injury or death.

EYE INJURY HAZARD

- Eye injury hazard exists when working with compressed gasses. Injury from puncture by flying debris is possible when working with compressed gasses. Do not work with compressed gasses without wearing appropriate Personal Protective Equipment (PPE). Punctures from pressurized gas and eye injury from flying debris are possible, resulting in serious injury or death.

EXPLOSION HAZARDS

- **Explosion hazard exists when working on the fire suppression system. Only personnel trained by the system's manufacturer should service the system. Certain components of the system contain a compressed charge that can cause serious personal injury if not handled properly. Failure to use trained personnel when working on the fire suppression system can cause explosion hazard resulting in serious injury or death.**



CAUTION

INHALATION HAZARD

- **Inhalation hazard exists if the fire suppression system is discharged. The discharge of the dry chemical fire suppression agent may create personnel hazards such as obscured vision or temporary breathing difficulties. Bring the machine to a complete stop and shut down engine before deploying. System actuation will result in immediate discharge, which may obscure vision. Exit the area as quickly as safely possible if the system is discharged. Failure to exit the area can cause inhalation hazards resulting in injury.**

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Theory of Operation

The vendor support documentation provides typical concepts for fire suppression systems. It should be read before using the system. The entire fire suppression system must be maintained per its manufacturer recommendations.

Fire Prevention and Control

In the event of a fire, the machine is optionally equipped with either a manually operated hand held fire suppressor or a manually activated fire suppression system.

Fire Prevention

Proper machine inspection and maintenance is **CRITICALLY IMPORTANT** to prevent a disastrous fire. The following guidelines should be followed to reduce the chances of a fire:

- Step 1:** Daily inspection and preventive maintenance at points where fires are most likely to start - engine block, electrical system, turbochargers, exhaust manifolds, brake system, and hydraulic gearbox/pump area is critically important.
- Step 2:** Regular cleaning of all areas where flammable materials such as fuel, oil, grease, hydraulic fluid, and combustible debris may collect is also critically important.

NOTICE

Refer to "PREVENTIVE MAINTENANCE", Section 02 in the Service Manual for tips on cleaning your machine.

- Step 3:** NEVER smoke while checking fuel level or refueling. Unguarded trouble lights, flames, or spark-producing devices should be kept at a safe distance while refueling. ALWAYS stop the engine before refueling the machine.
- Step 4:** Keep all fuel and lubricants stored in properly marked containers and away from unauthorized persons.
- Step 5:** Store oily rags or other flammable material in a protective container, located in a safe place.
- Step 6:** Make sure all clamps, guards and heat shields are installed correctly to prevent vibration, rubbing against other parts, and excessive heat during operation.

Step 7: DO NOT weld or cut on pipes, tubes, or reservoirs that contain flammable liquids or gases.

NOTICE

As installed at the Komatsu factory, the fire suppression system is manually actuated. The LINC'S II computer system or a Komatsu factory-installed fire system, WILL NOT automatically discharge the fire suppressant in the event of a fire. When fire detection and suppression discharge occurs, the operator is audibly and visually alerted by the system monitor mounted inside the cab.

An electronic fire detection option that WILL automatically discharge the suppression system is available through fire detection and suppression system manufacturers. Some machines may have this feature installed.

Before operating the machine, check to determine whether the fire suppression system will automatically discharge if a "need for discharge" condition is detected.

NOTICE

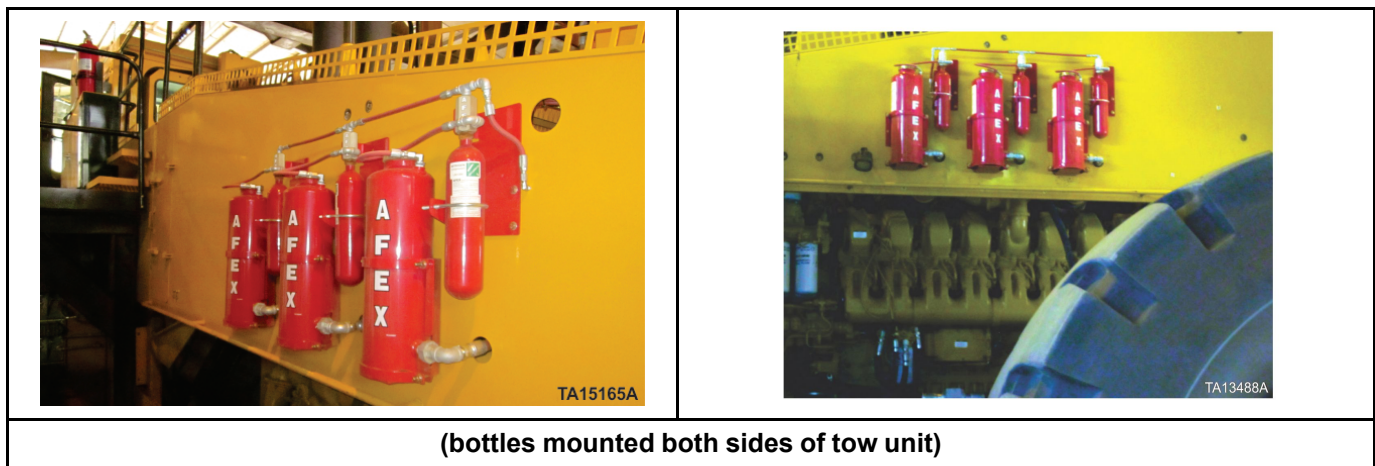
Before operating, and before performing maintenance or repair procedures, refer to the appropriate manufacturer vendor support literature for further information on subjects such as vehicle fire preventive maintenance, and how the system works and system maintenance.

Component Description

Fire Suppression System - AFEX or ANSUL Systems (Optional)

The machine is equipped with a manually activated fire suppression system. Operator safety is greatly enhanced; however, the operator's cab is not protected. It is the responsibility of the equipment owner to ensure operators and service technicians read and understand the manufacturer's fire suppression system owner's manual.

Figure 1: Fire suppression system bottles - AFEX system shown



CAUTION

Inhalation hazard exists if the fire suppression system is discharged. The discharge of the dry chemical fire suppression agent may create personnel hazards such as obscured vision or temporary breathing difficulties. Bring the machine to a complete stop and shut down engine before deploying. System actuation will result in immediate discharge, which may obscure vision. Exit the area as quickly as safely possible if the system is discharged. Failure to exit the area can cause inhalation hazards resulting in injury.

CAUTION

The fire suppression system is a **MANUALLY DISCHARGED** system. Fire detection is optionally provided, but the fire suppression system **WILL NOT** automatically discharge unless that option is available and installed by the manufacturer of the fire suppression system or by mine site personnel.

CAUTION

The fire system provided on the machine is a suppression system only and is not designed or intended to extinguish all fires, particularly when unusual amounts of combustible materials and an ample oxygen supply are present. It is extremely important that alternative firefighting equipment be available in case the system does not totally extinguish a fire.

CAUTION

Use extreme care to prevent the accumulation of debris, combustible materials, and fluids that could intensify the fire or cause it to spread to areas where there was no previous potential for fire.

CAUTION

If modifications are made to the machine, or if the fire suppression system is disconnected for any reason, make sure the fire equipment is immediately inspected and tested by an authorized distributor for the system's manufacturer.

CAUTION

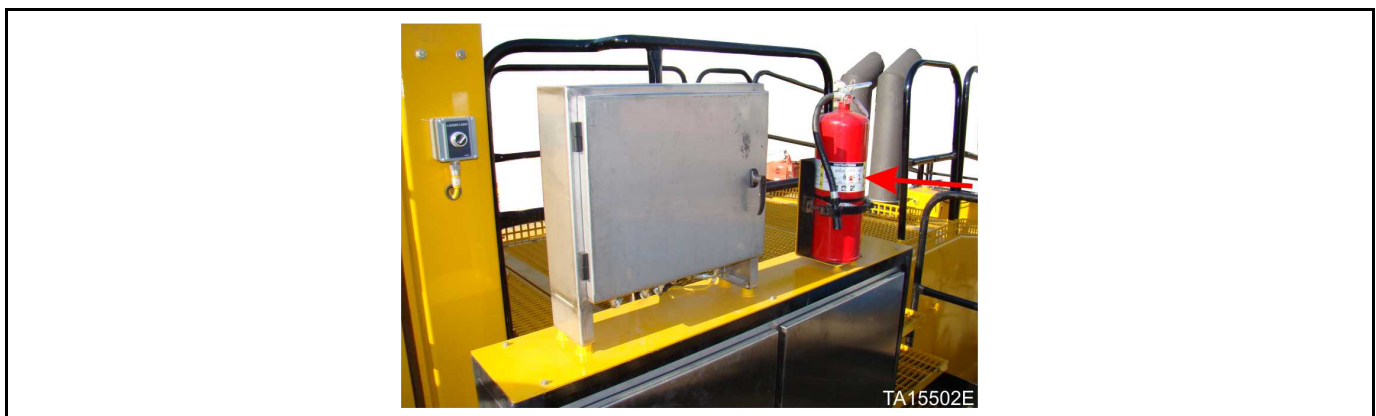
The fire suppression system's dry chemical dispersion nozzles are strategically located inside the front and rear frames. The operator's cab is NOT protected. The fire suppression system will NOT suppress fires outside the machine or in the operator's cab. The hand-held portable fire suppressor is recommended and is useful if re-ignition occurs or when fires originate independently of the machine or outside the protected areas.

Manual Fire Suppressor

Inspect the machine's manual hand-held fire suppressor regularly; read and understand its operation before using. This fire suppressor is capable of suppressing fires in the following materials: wood, paper, cloth, electrical, gasoline and oil.

- Step 1:** If the suppressor is equipped with a gauge, ensure the needle is in the green portion of the gauge.
- Step 2:** Ensure the pin is installed and the seal has not been broken.
- Step 3:** Have the fire suppressor inspected and serviced by licensed personnel at the required interval or immediately if it has been discharged.
- Step 4:** Read and understand your employer's policy in regards to extinguishing fires before attempting to manually extinguish any fire.

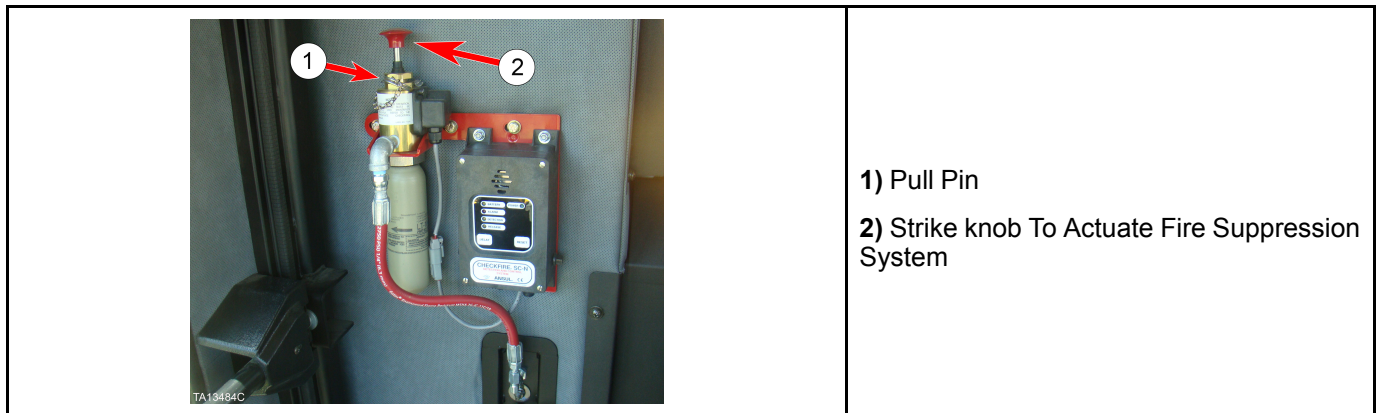
Figure 2: Hand-held portable fire suppressor



ANSUL Fire Detection System Circuit Monitor Panel (Optional)

The fire detection system circuit monitor panel (optional) is mounted on the rear inside cab wall (refer to illustration “ANSUL FIRE DETECTION CIRCUIT MONITOR PANEL (OPTIONAL)”). The circuit monitor’s function is to monitor the fire suppression system’s electrical detection and manual actuation circuits and provide the operator with both visual and audible warnings of a fire.

Figure 3: ANSUL cab mounted discharge mechanism



Visual indicators:

The circuit monitor panel provides LED indicators for battery, alarm, detection, release, and power to the panel. In the event of fire detection, an audible alarm accompanies the LED Alarm indicator.

Controls:

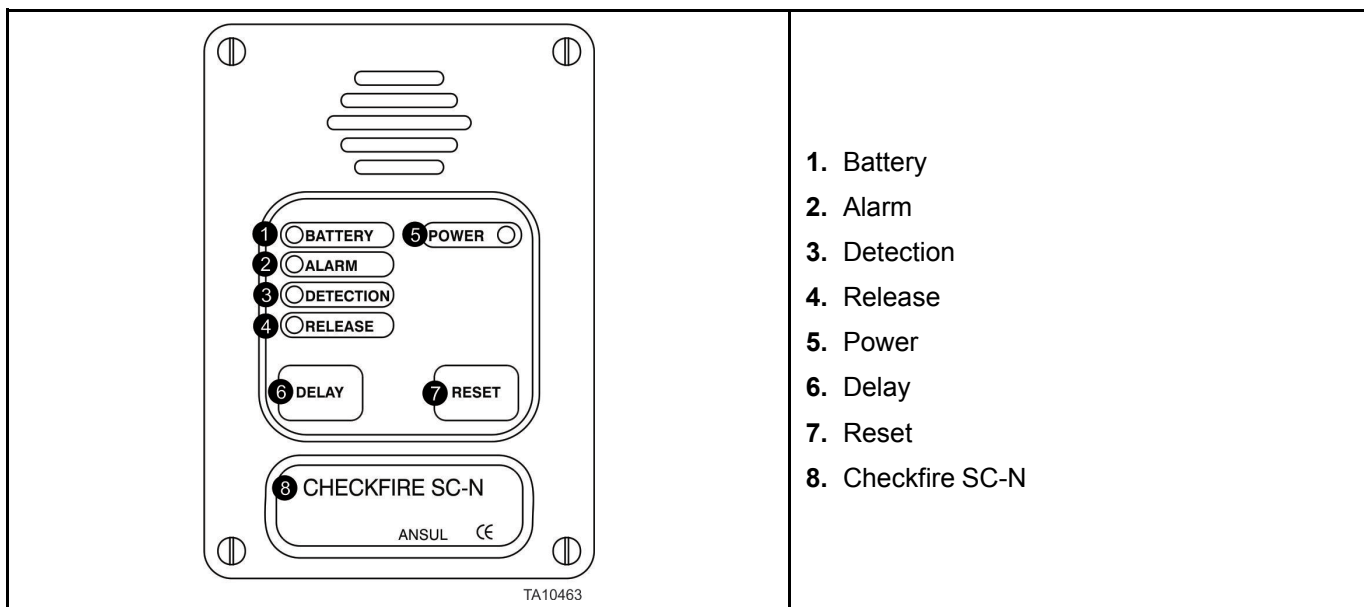
The front panel contains a “DELAY” and “RESET” button. The DELAY button is non-functional.

The RESET button is used to reinitialize the control panel when depressed; it provides an indication that all LEDs and the audible alarm are functional.

Sequence of Operation:

Upon receiving an input signal indicating a fire, the alarm LED will flash and the audible alarm will pulse at the rate of two times per second. Refer to “Manual Actuation – AFEX and ANSUL Systems”, located within this section.

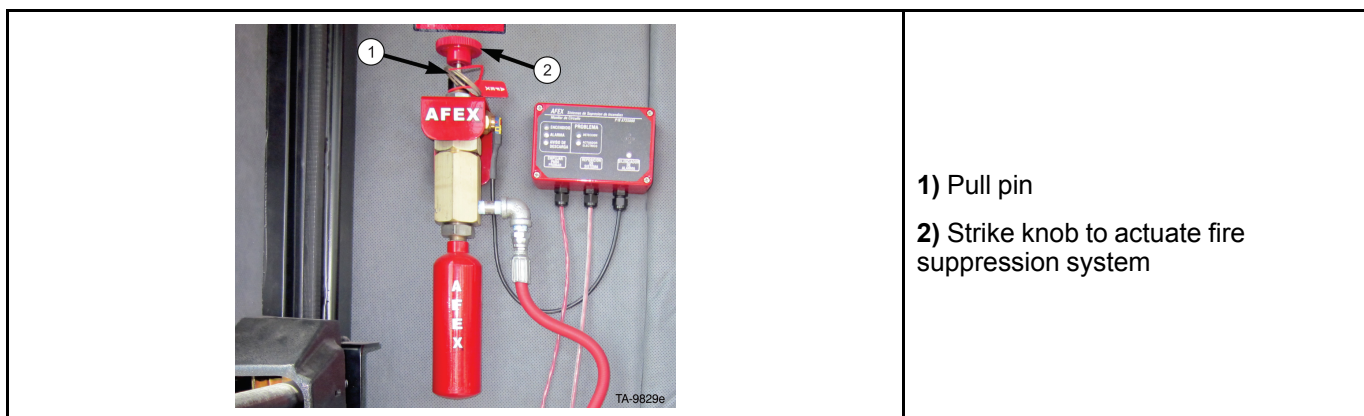
Figure 4: ANSUL fire detection circuit monitor panel (optional)



AFEX Fire Detection System Circuit Monitor Panel (Optional)

A circuit monitor panel is mounted on the rear inside cab wall. Refer to ANSUL FIRE DETECTION CIRCUIT MONITOR PANEL (OPTIONAL)”. The circuit monitor’s function is to monitor the fire suppression system’s electrical detection and actuation circuits, including the power source, squib (compressed charge which actuates the discharge of the fire suppression agent), and continuity of the detection wiring.

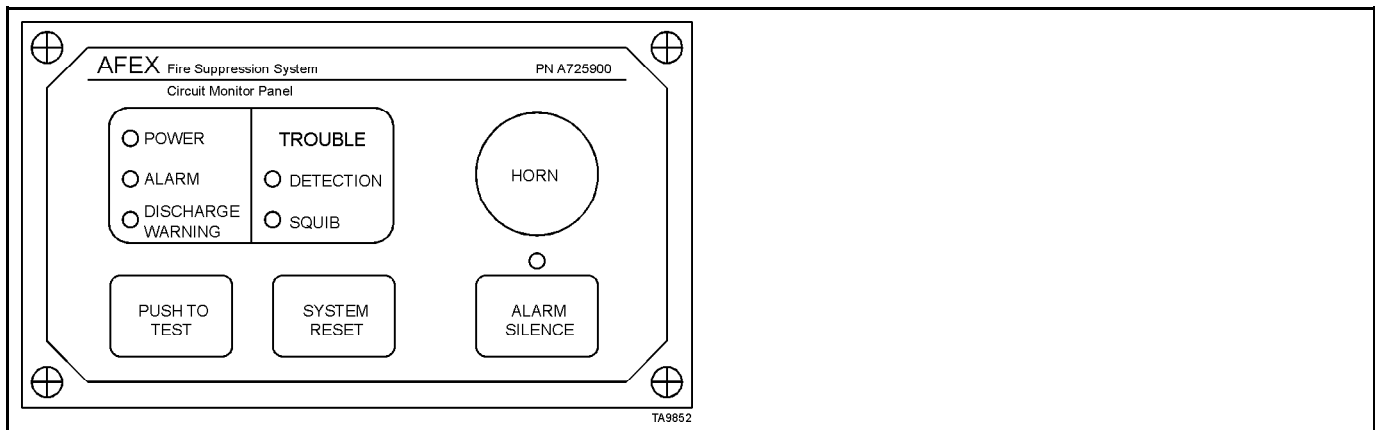
Figure 5: AFEX cab mounted firing mechanism with circuit monitoring panel (optional)



NOTICE

The AFEX fire suppression system retains its manual discharge capabilities should the circuit monitor panel or any of its internal circuitry fail. If the circuit monitor panel must be removed for any reason, the fire suppression system can be wired to retain its manual actuation feature. Refer to the manufacturer’s owner’s manual through their respective website.

Figure 6: AFEX fire detection circuit monitor panel (optional)



The circuit monitor panel provides audible and visual indicators of alarm conditions. The operator can monitor detection and release circuits and power supply. A system reset button and restart time delay is also provided.

Visual indicators:

- Green LED - Power to circuit monitor panel
- Red LED - Alarm
- Amber LED - Alarm silence activated - Trouble with squib - Trouble with detection circuit

Controls:

- Alarm Silence
- Push to Test
- System Reset
- Push-ON, Push-OFF operation (flush mounted behind panel cover)

Manual Actuation - AFEX and ANSUL Systems

The machine is equipped with manual firing mechanisms. Firing mechanisms are located:

- Operator cab (inside)
- Right side of machine (hydraulic reservoir)
- Left side, near left rear access ladder area.

Figure 7: Fire suppression system actuator switches - AFEX systems

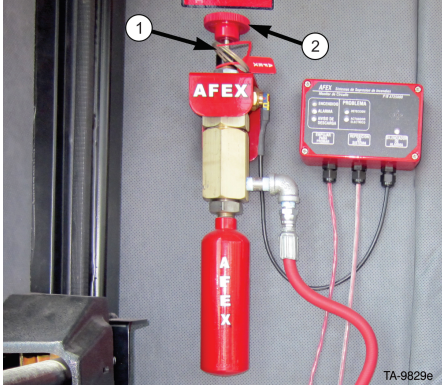

 <p>1) Pull Pin 2) Strike knob to actuate fire suppression system</p>	 <p>1) Pull pin and strike knob to activate</p>
<p>AFEX cab mounted firing mechanism with circuit monitoring panel (typical) (charge bottle not shown)</p>	<p>AFEX ground level manual firing mechanism (typical) (mounted on converter cabinet left side of tow unit – additional mechanism mounted on hydraulic reservoir right side) and electrical cabinet</p>

Figure 8: Fire suppression system actuator switches - ANSUL systems

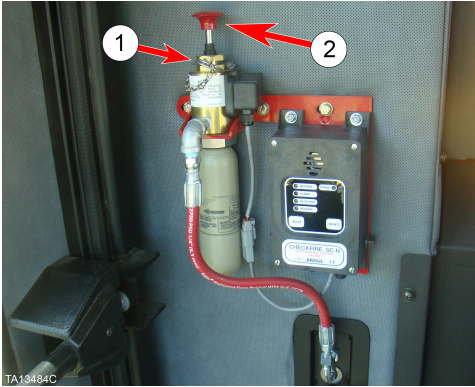
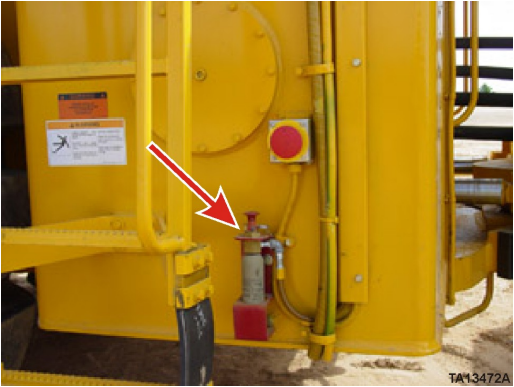
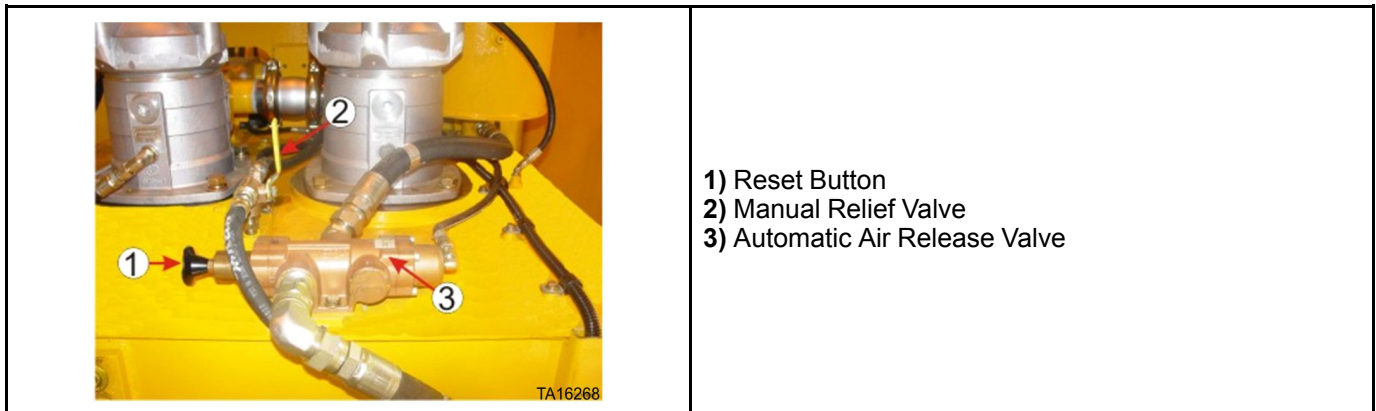
 <p>1) Pull Pin 2) Strike knob to actuate fire suppression system</p>	 <p>Fire suppression system-pull pin & strike knob To actuate</p>
<p>ANSUL cab mounted discharge mechanism</p>	<p>ANSUL ground level manual firing mechanism (both sides of machine)</p>

Figure 9: Hydraulic reservoir air release valves



If the operator notices or is alerted to a fire, the following actions should be taken:

1. Quickly bring the machine to a complete stop, set the park brakes, and shut down the engine.
2. Manually actuate the fire suppression system by pulling the safety pin from the neck of the firing mechanism and strike down hard on the push knob.
3. Quickly exit the machine and move to a safe distance away from the machine.
4. Call fire department or mine safety personnel to extinguish the fire.

NOTICE

When the fire suppression system is discharged, the hydraulic reservoir automatic air release will be tripped. This will release the air pressure in the hydraulic reservoir. The automatic air release valve must be manually reset by pushing the knob IN to the closed position (refer to Section 01, "SAFETY INSTRUCTIONS").

Figure 10: Locations of fire suppression system actuation switches (typical locations)

	1) Rear Cab Wall
	2) Left Rear of Machine
	3) Hydraulic Reservoir

NOTICE

Check your machine and make note of all switch locations before operating machine.

Fire Detection Engine Shutdown

The LINCS II computer system employs an engine shutdown feature that will stop the machine and shut down the engine when fire suppression system discharge occurs.

CAUTION

Unless automatic detection system is present in the fire suppression system, the discharge of fire suppressant and actuation of the Fire Detection Engine Shutdown feature must be actuated by manually discharging the fire suppressant with any of the fire suppression system actuator switches.

NOTICE

Before operation of the machine, all operators should be trained in the operation and capabilities of the fire suppression system.

The following events will occur following discharge of the fire suppressant:

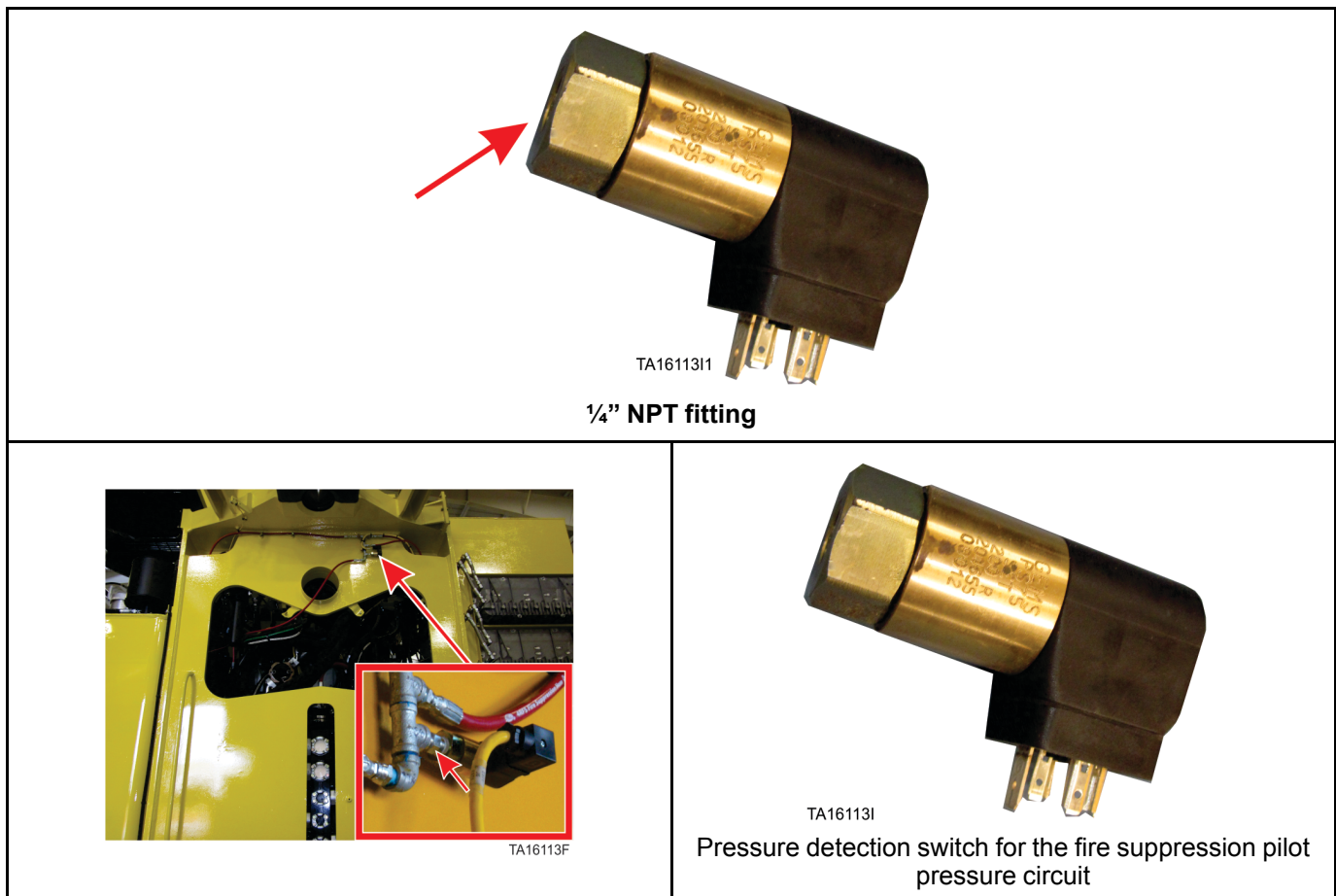
1. Propulsion is disabled.
2. Dynamic braking is actuated.
3. The automatic air release valve will release hydraulic reservoir air pressure.
4. The engine will shut down once wheel motor speed is less than a set point rpm.
5. Park brakes will set.

Testing the “Fire Suppression System Engaged” Detection Switch

The normally open switch being tested is closed by pressure in the fire suppression system pilot pressure circuit. It is located in the fire suppression pilot pressure circuit manifold, normally positioned in the articulation area.

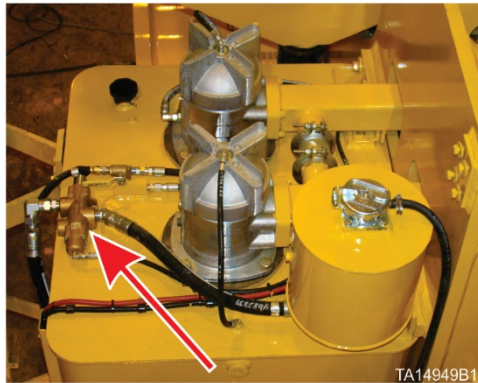
- This switch does not activate the fire system
- This switch closes when pressure in the fire suppression system pilot pressure circuit reaches 200 psi (13.79 bar).
- The machine control system (LINCS) responds to the condition of the switch (open or closed).

Figure 11: Plumbing manifold location in articulation area

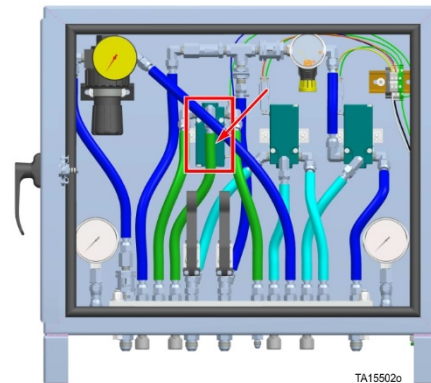


During normal machine operation, if pressure in the fire suppression system pilot pressure circuit reaches 200 psi (13.79 bar), the switch closes and the following processes occur.

1. The switch immediately actuates the “hydraulic reservoir pressure release” solenoid (SOL TD).
 - The switch and the solenoid are hard wired together.
 - The solenoid sends pilot pressure to the “hydraulic reservoir pressure release valve” (typical Versa valve).
 - Hydraulic reservoir air pressure release valve (Versa valve) vents air pressure inside the hydraulic reservoir, out to atmosphere.



Hydraulic reservoir pressure release valve (typical Versa valve shown) on top of hydraulic reservoir



The solenoid is located in the air box on current production machines

2. LINCS determines the switch is closed and generates a “Fire Suppression System Engaged or Detected” red alarm on the operator screen, and activates the alarm buzzer inside the cab.
 - The machine slows down
 - The park brake is set.
 - The engine shuts down.

The testing verifies the switch is:

- Mechanically sensing pilot pressure in the fire suppression system pilot pressure circuit.
- Electrically actuating the hydraulic reservoir air release solenoid (SOL TD).
- Being sensed as “actuated” (closed) by the machine control system (LINCS).

Conditions of the Test Procedure

- Machine is not running.
- Machine is capable of booting control system (LINCS).
- The machine air system is pressurized to machine operating pressure.
- Any type of heat producing maintenance work should not be performed on the machine during the test, to reduce chance of fire while the fire suppression system is de-activated.
- The test should be performed on a “cold” machine to reduce the possibility of fire occurring during the test.
- The switch to be tested is removed from the fire suppression pilot pressure circuit manifold.
- The switch is reinstalled after the test is successful and it is determined to be functioning properly.

Safety Preparations for Task

Use the following procedure to isolate energy sources before performing any removal, replacement, or installation procedures described in this document.



WARNING

Crush hazards exist if the machine is started or moved while work processes are being performed on the machine. Place bucket flat and level on the ground. Place frame lock in the locked position and lock out the machine's starting capability before performing any work process. Follow all applicable lockout procedures and local rules and regulations for performing work processes. ANYONE performing inspections or service procedures to the machine should be familiar with ALL instructions and procedures contained in the machine's SERVICE MANUAL. Crush hazard could occur if the machine is started or moves while any type of work process is being conducted on the machine, resulting in serious injury or death.

Step 1: Stop the wheel loader on flat level ground.

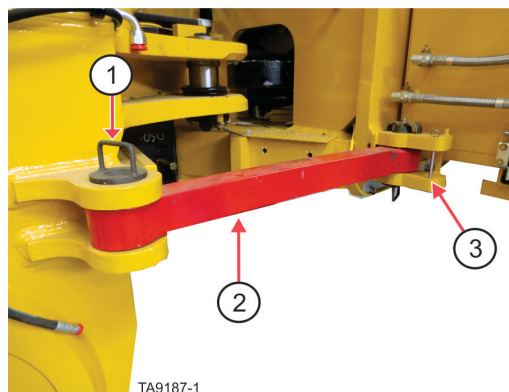


WARNING

Crush hazards exist in machine pivot area and area between the tires. Do not enter these areas unless it is verified that the operator has control over the steering and that personnel locking the frame lock have good communication with the operator. Entering the pivot area and area between the tires while the machine is moving or pivoting (articulating) could cause crush hazards resulting in serious injury or death.

Step 2: Move the frame lock to the locked position so that the frame cannot be steered.

Figure 12: Frame lock in locked position



1) Retaining pin for locked position, 2) Frame lock - shown in locked position, 3) Retaining pin bracket for un-locked position

Step 3: Place wheel chocks in front and behind each wheel.

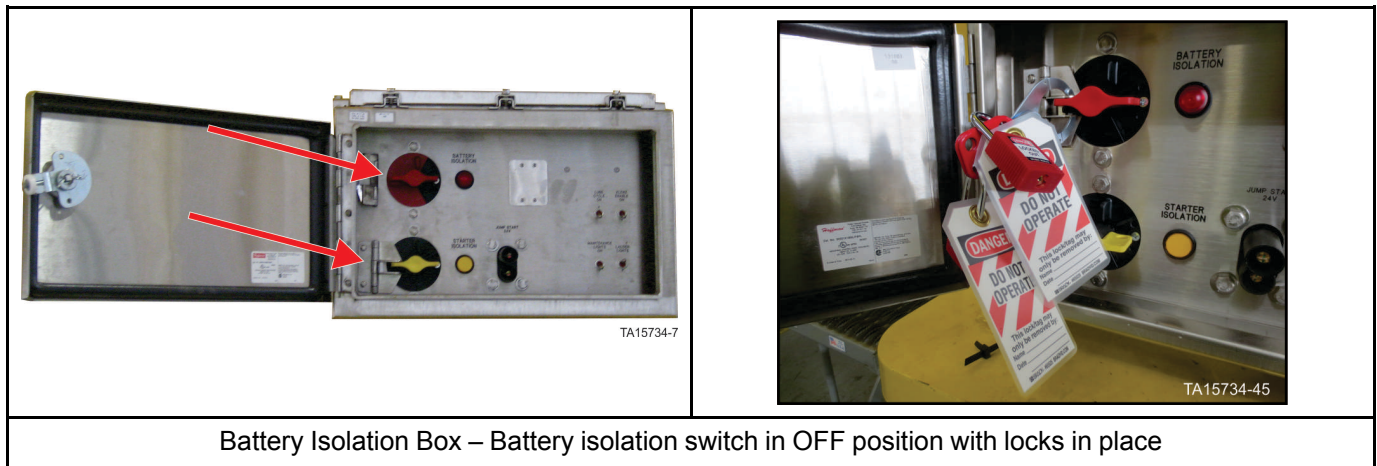
Step 4: Set bucket flat and level on the ground.

Step 5: Set the parking brakes.

Step 6: Shut off the engine.

Battery and Engine Isolation Switches, Additional Safety Preparations

Step 1: Turn the battery and engine isolation switches to the off position and install locks on the battery isolation switch.

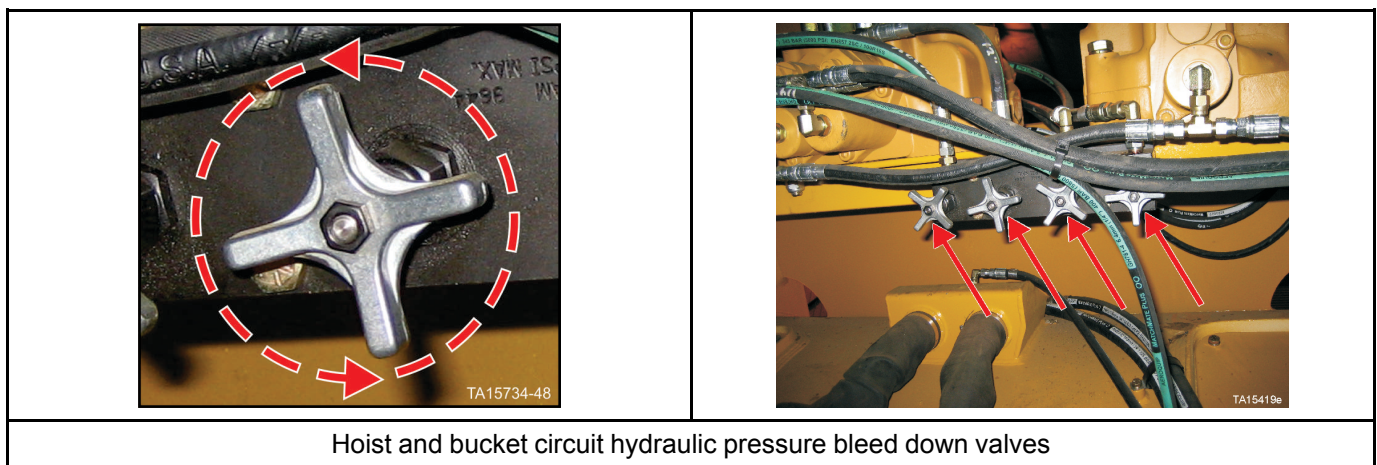


Hydraulic Hoist and Bucket Circuit Pressure Relief, Additional Safety Preparations

Step 1: Use the hydraulic pressure bleed down valves located in the front frame underneath the Husco valves to bleed any stored pressure in the hoist and bucket cylinders.

Step 2: Turn each valve slowly counterclockwise as shown below and allow the pressure to bleed down.

Step 3: Open the valve completely and leave it open during this procedure.



Safety Preparations, Removing Charge Bottles

Use the additional following processes to isolate energy sources before performing any removal, replacement, or installation procedures described in this document.

CAUTION

During the time the switch is being tested, the fire suppression system will not function if a fire occurs on the machine (while the fire suppression system charge bottles are removed). A fire could seriously damage the machine.



WARNING

Fall hazard exists when removing the switch. Do not attempt to climb on the machine to remove the switch. Use a man lift, scaffolding, or other locally acceptable method to reach the fire suppression system manifold. Failure to use appropriate lifting method can cause fall hazards resulting in serious injury or death.

Step 1: Follow all local rules and regulations for lockout tag out procedures.

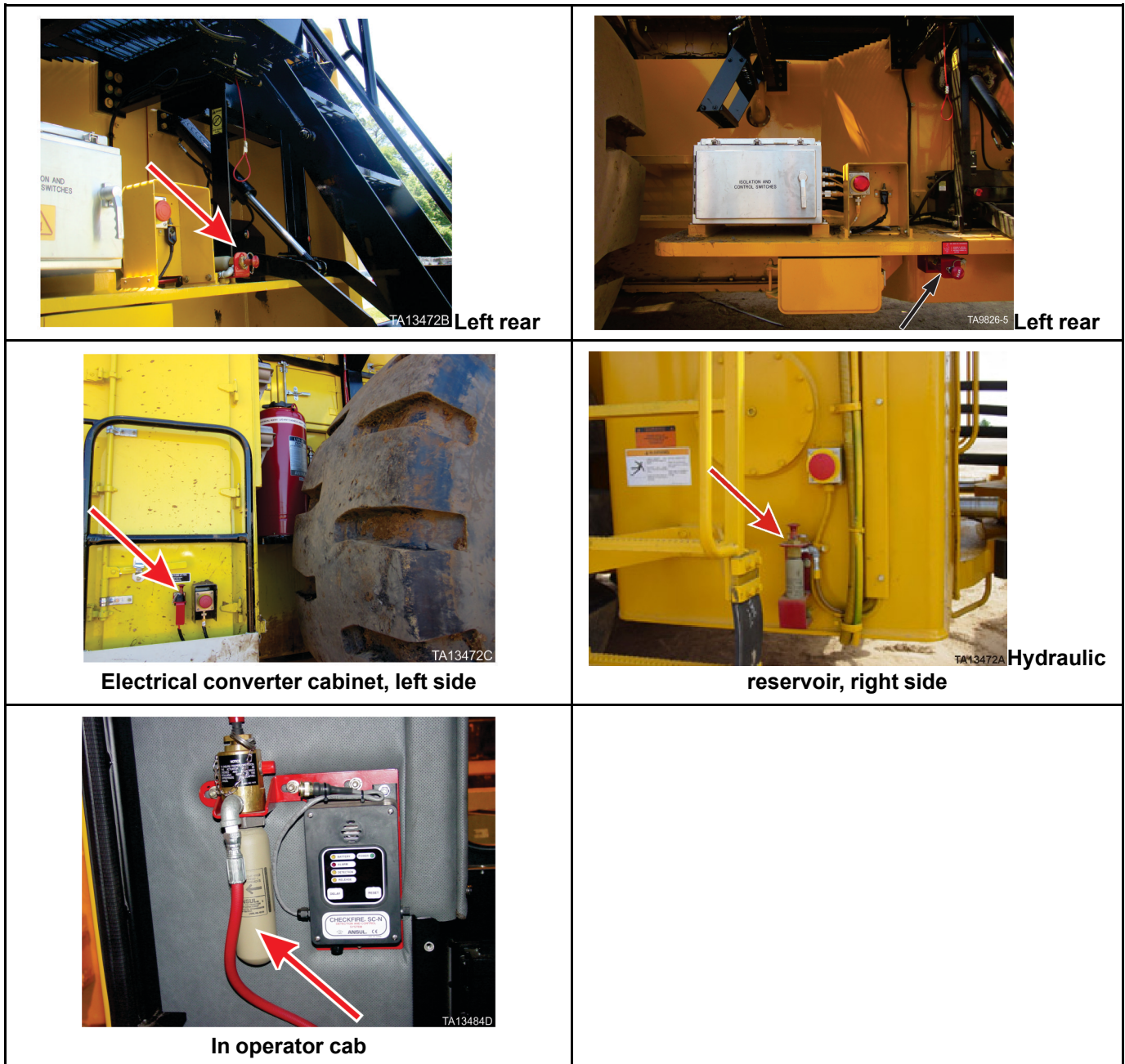
CAUTION

Check local safety authority and specific fire suppression system manufacturer representative to ensure removing the charge bottles does not affect operation or warranty. Improper handling of the charge bottles could cause them to discharge.

Step 2: Remove all the charge bottles from the fire suppression system.

- Mark the bottles.
- After the switch test, they should be reinstalled in the original location.

Figure 13: Charge bottles (typical locations and types)



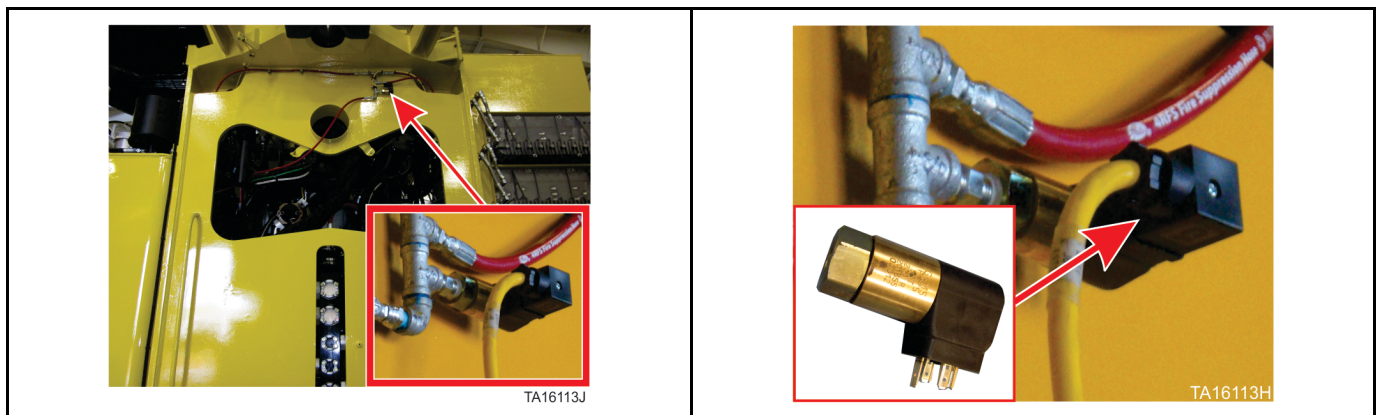
Testing the Switch

WARNING

Fall hazard exists when removing the switch. Do not attempt to climb on the machine to remove the switch. Use a man lift, scaffolding, or other locally acceptable method to reach the fire suppression system manifold. Failure to use appropriate lifting method can cause fall hazards resulting in serious injury or death.

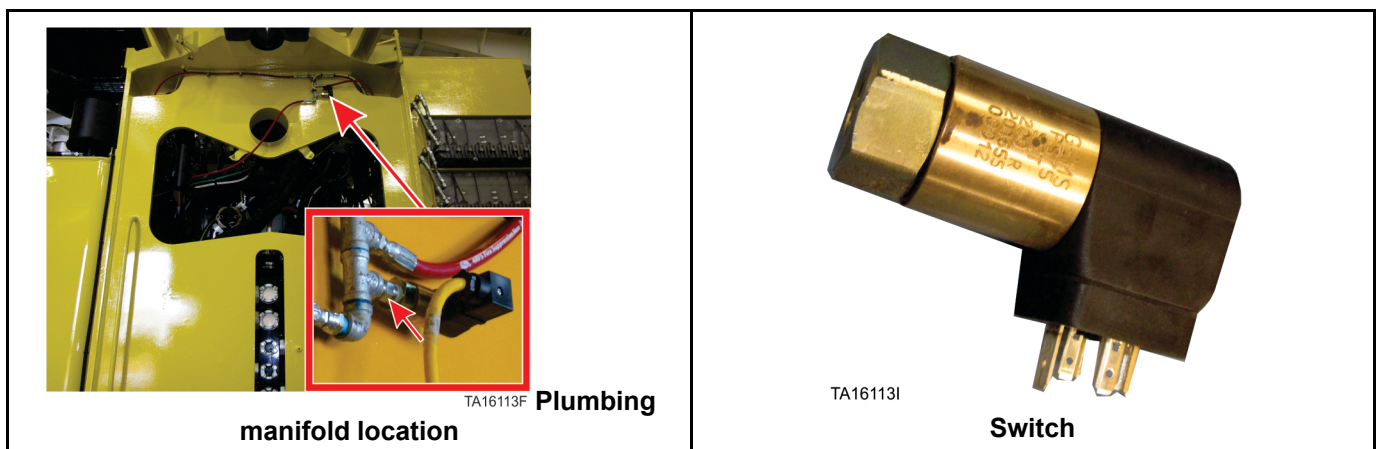
- Step 1:** Remove the Turck cable connector from the switch.
- Use a man lift or scaffolding to access the manifold.

Table 1: Figure 16. Remove Turck cable from switch



- Step 2:** Remove the switch from the plumbing manifold.
- The switch is tested while removed from the system.

Table 2: Figure 17. Remove switch from plumbing manifold



Step 3: Plug the fitting from which the switch was removed.

- Tighten hand tight.
- To prevent debris or insects from entering the pilot system.



WARNING

Eye injury hazard exists when working with compressed gasses. Injury from puncture by flying debris is possible when working with compressed gasses. Do not work with compressed gasses without wearing appropriate Personal Protective Equipment (PPE). Punctures from pressurized gas and eye injury from flying debris are possible, resulting in serious injury or death.

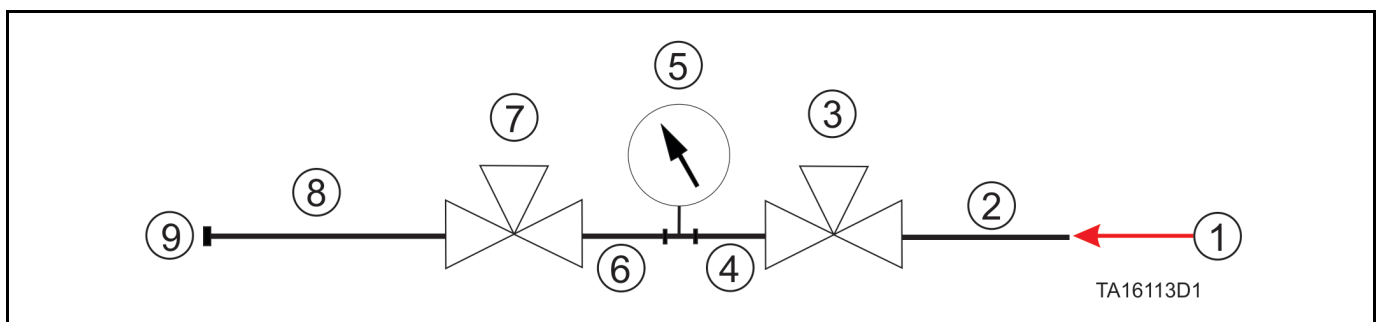
Step 4: Plumb the switch to a testing assembly.

- The regulated gas or air source should not be greater than 220 PSI (15.17 bar) maximum for this test.
- The switch is tested at 200 PSI \pm 20 PSI (13.79 bar \pm 1.38 bar).
- Ensure the regulator is closed (no pressure applied to exit port).
- Use an appropriately sized regulator to control the pressure.
- Gauge capable of reading 220 PSI (15.17 bar)

NOTICE

If the gas or air supply has a regulator capable of regulating the supply line at 200 PSI \pm 20 PSI (13.79 bar \pm 1.38 bar), the three-way valve (3), the hose (4), the regulator (5) and the hose (6) shown in the figure “Pneumatic test assembly diagram” may not be necessary when constructing the test assembly. The need for the test assembly is to safely apply 200 PSI \pm 20 PSI (13.79 bar \pm 1.38 bar), to the switch, and be able to safely bleed off the pressure after the test is complete. Since the test requires the electrical wiring Turck connector to be connected to the switch during the test, it is recommended that the test assembly have its own regulator for close proximity to the testing area. The Turck connector wiring is not long enough to reach the ground level where the gas cylinder or air supply regulator might be located.

Figure 14: Pneumatic test assembly diagram



For numbers in parenthesis in following text, refer to illustration “Pneumatic test assembly diagram”.

The test assembly must be supplied by a regulated nitrogen cylinder gas supply or air supply (1). Either type of supply must be able to produce and regulate the pressure to the test assembly at 200 PSI \pm 20 PSI (13.79 bar \pm 1.38 bar). A hose (2) connects the gas or air supply to the three-way valve (3). A three-way valve (3) is used to bleed the pressure from the gas or air supply once the test is complete. A hose (4) connects the three-way valve to the regulator (5). The regulator (5) is used to apply 200 PSI \pm 20 PSI (13.79 bar \pm 1.38 bar) to the switch. A hose (6) is used to connect the regulator to the three-way valve (7). A three-way valve (7) is used to bleed pressure from the switch (9) after the test is complete. A hose with a ¼" NPT fitting (8) is used to connect the three-way valve (7) to the switch (9).

1) Regulated gas or air supply [200 PSI \pm 20 PSI (13.79 bar \pm 1.38 bar)], **2)** Hose from gas or air supply to three-way valve, **3)** Three-way valve, **4)** Hose, **5)** 250 PSI (17.24 bar) regulator with gauge, **6)** Hose, **7)** Three-way valve, **8.)** Hose with ¼" NPT fitting, **9)** Switch with ¼" NPT fitting.

Step 5: Reconnect the Turck cable to the switch.

Step 6: Boot up LINCS by turning on the machine ignition switch key.

- Do not start the machine.
- Wait for the operator screen to appear.

Step 7: Open the pressure source to the regulated test assembly.

Step 8: Adjust regulator to apply 200 psi (13.79 bar) to the switch.

The switch test range is 200 PSI \pm 20 PSI (13.79 bar \pm 1.38 bar).

- It should be expected to actuate within this range.

Observe the Results of the Switch Test

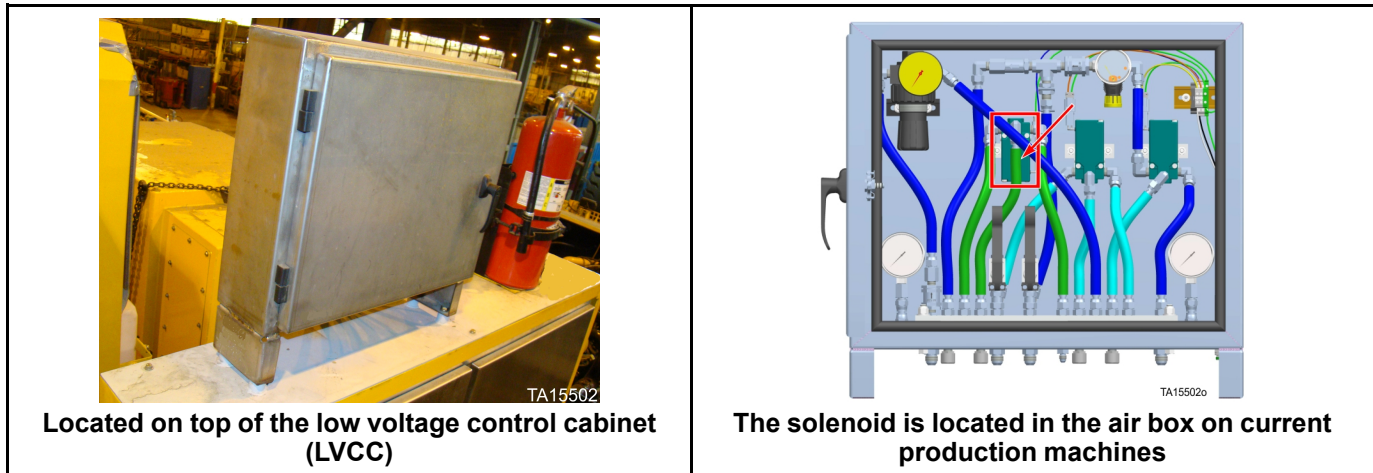
If all of the following results do not occur once the switch is pressurized to 200 PSI \pm 20 PSI (13.79 bar \pm 1.38 bar), check all hoses, wiring connections and components of the circuits that are expected to respond. If all components are found to be in working condition, replace the switch and perform the test again. Do not operate the machine if the switch is not working properly.

When the switch actuates the following results should be noted.

1. The hydraulic reservoir air release solenoid (SOL TD) energizes.

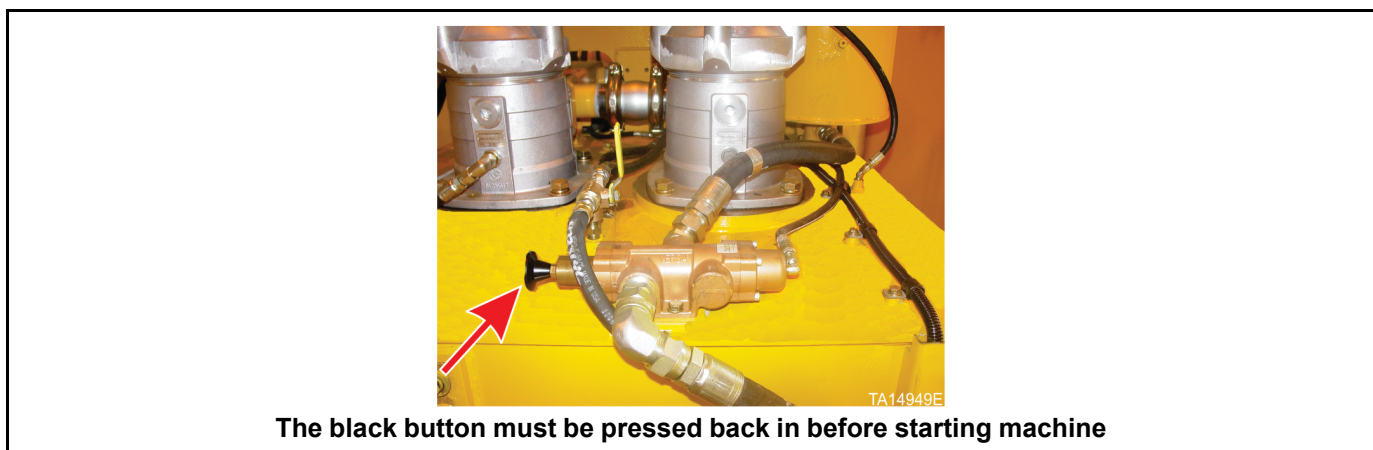
- The solenoid provides air from the machine air system to pressurize the hydraulic reservoir air release valve (typical Versa valve) located on top of the hydraulic reservoir.
 - The valve releases hydraulic reservoir air pressure to atmosphere through a hose positioned down the length of the reservoir.

Figure 15: Hydraulic reservoir dump solenoid (SOL TD) location.



2. The hydraulic reservoir air release valve (typical Versa valve) relieves air pressure from the hydraulic reservoir.
 - After the test, this valve must be manually reset by pushing the black button back into original position.
 - It cannot be reset until the hydraulic reservoir air release valve (typical Versa valve) pilot air pressure is relieved.
 - The solenoid (SOL TD) relieves the pilot pressure to the hydraulic reservoir air release valve once conditions are met for normal operation.

Figure 16: Hydraulic reservoir air pressure release valve reset button must be pushed in to reset



3. Once pressure on the switch reaches 200 psi (13.79 bar) and the switch closes, LINCS responds to the closed switch and displays a red alarm – “Fire Suppression System Engaged or Detected” on the operator screen. The alarm buzzer inside the cab is also activated.

Figure 17: Fire suppression system engaged or detected red alarm screen

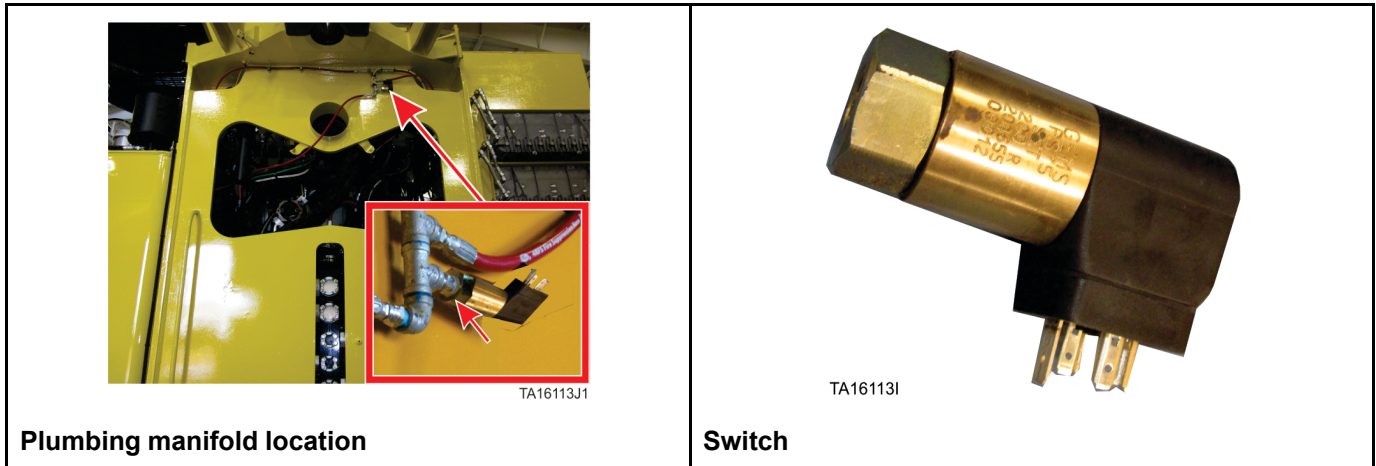


Return the Machine to Operation

- Step 1:** Turn off ignition switch key.
- LINCS boots down.
- Step 2:** Turn off the air or gas pressure supply to the regulated test assembly.
- Step 3:** Open both three-way bleed valves on the regulated test assembly.
- Open the valves slowly.
 - Ensure all personnel are clear of the vent.
- Step 4:** Disconnect the Turck cable from the pressure switch.
- Step 5:** Remove the switch from the regulated test assembly.
- Step 6:** Clean the area around the plug in the fire suppression pilot circuit manifold.
- To prevent debris from entering the manifold.
 - Located in the port from which the switch was removed.
- Step 7:** Remove the plug from the plumbing manifold.

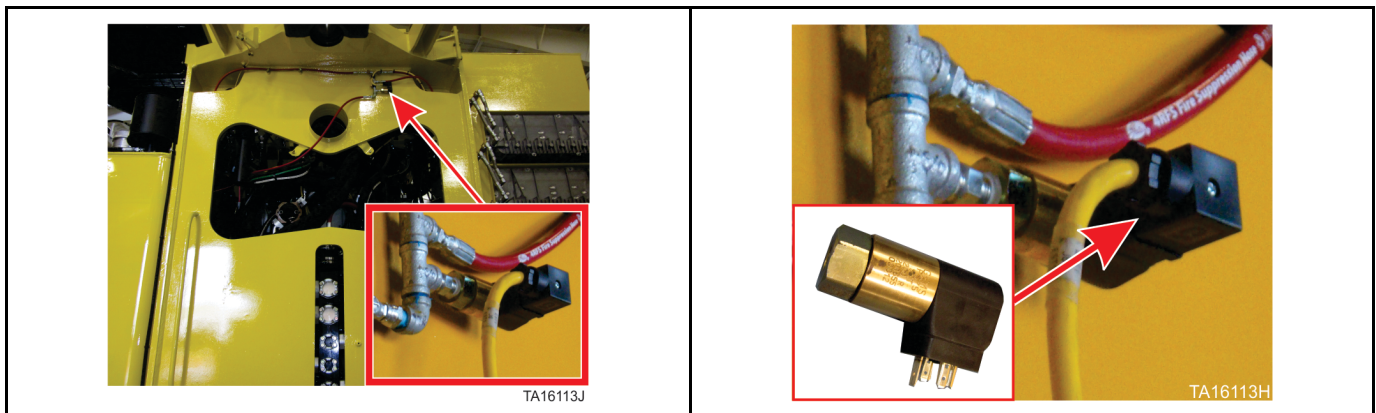
Step 8: Reinstall the switch into the plumbing manifold.

Figure 18: Switch reinstalled into plumbing manifold



Step 9: Reconnect the Turck cable connector to the switch.

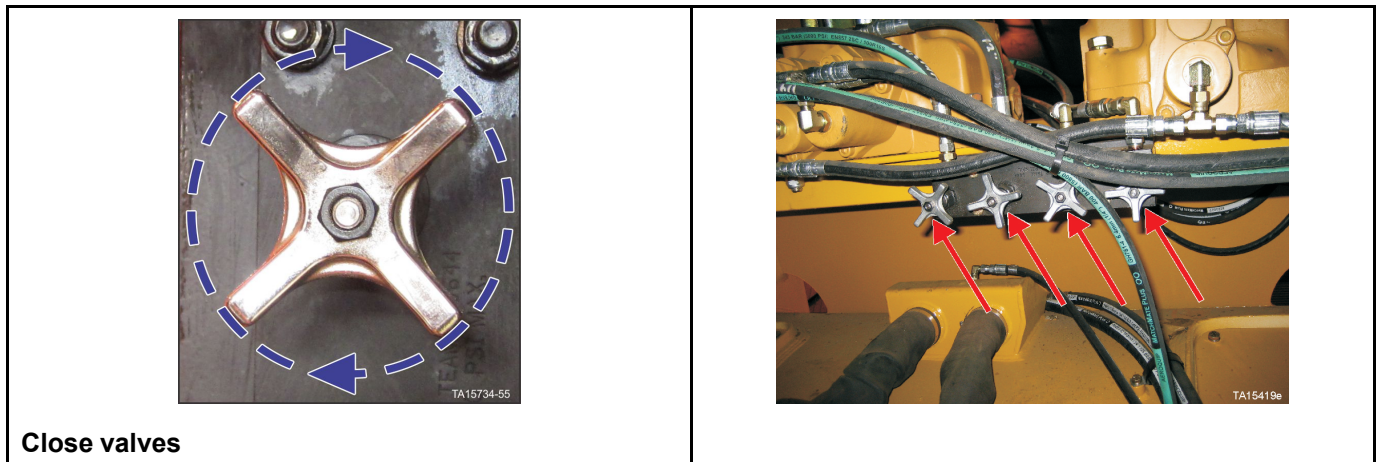
Figure 19: Turck cable reconnected to pressure switch



Step 10: Close the hydraulic circuit bleed valves.

- Located inside the front frame.

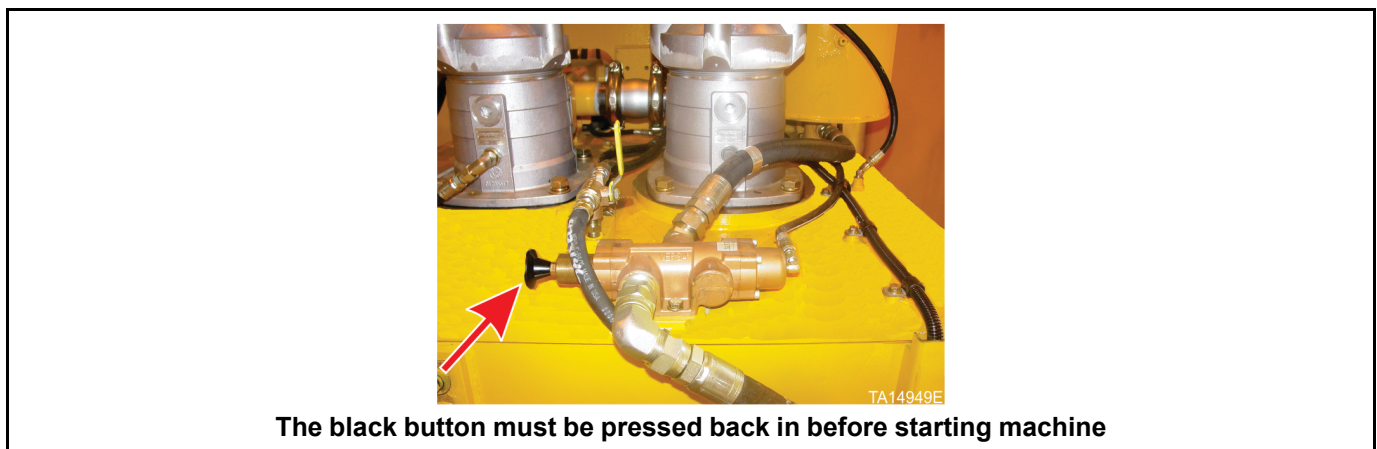
Figure 20: Close hydraulic circuit pressure bleed down valves



Step 11: Reset the hydraulic reservoir pressure release valve (Versa valve).

- Push the black button back into the original position.

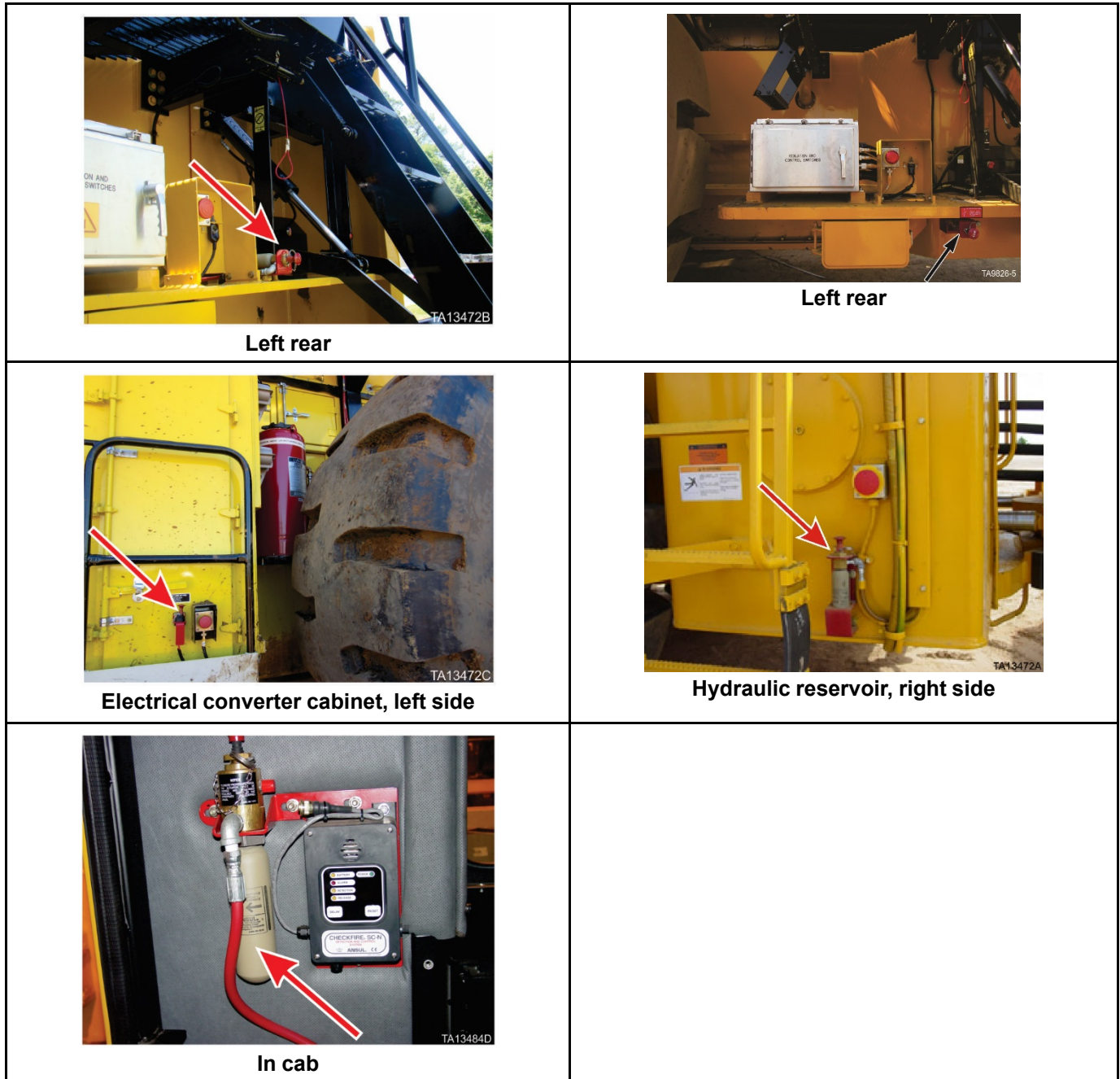
Figure 21: Versa valve reset button must be pushed in to reset



Step 12: Replace the fire suppression system charge bottles.

- Reinstall the bottles into the original location.

Figure 22: Charge bottles (typical locations and types)

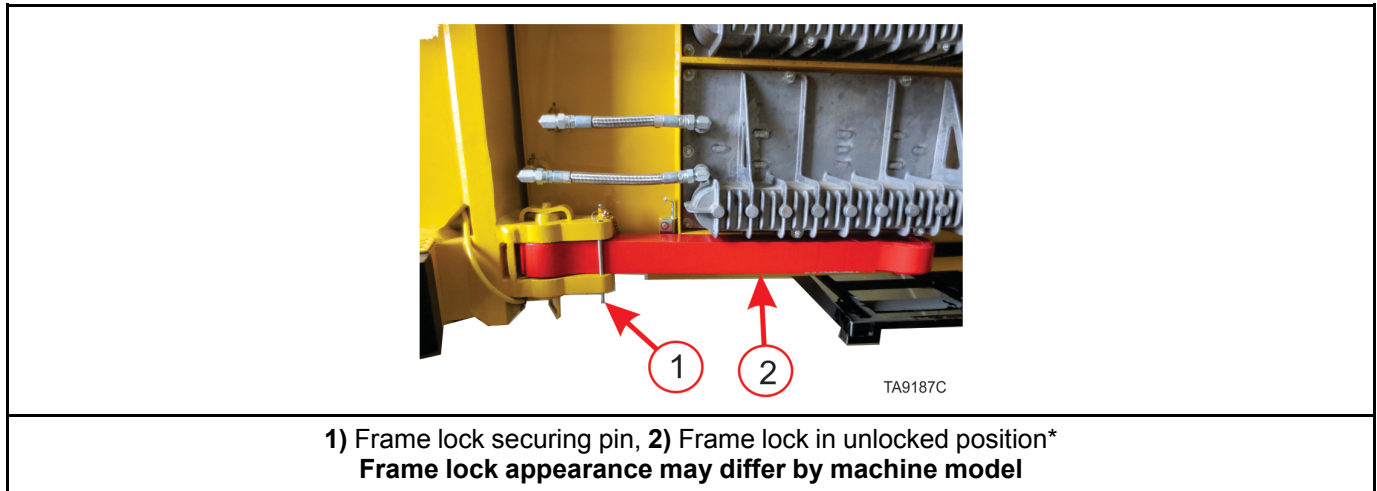


Step 13: Unlock the frame lock.

CAUTION

Be sure to unlock the frame lock before operating the machine. Equipment damage will occur if the machine is articulated before unlocking the frame lock.

Figure 23: Unlock the frame lock (typical)

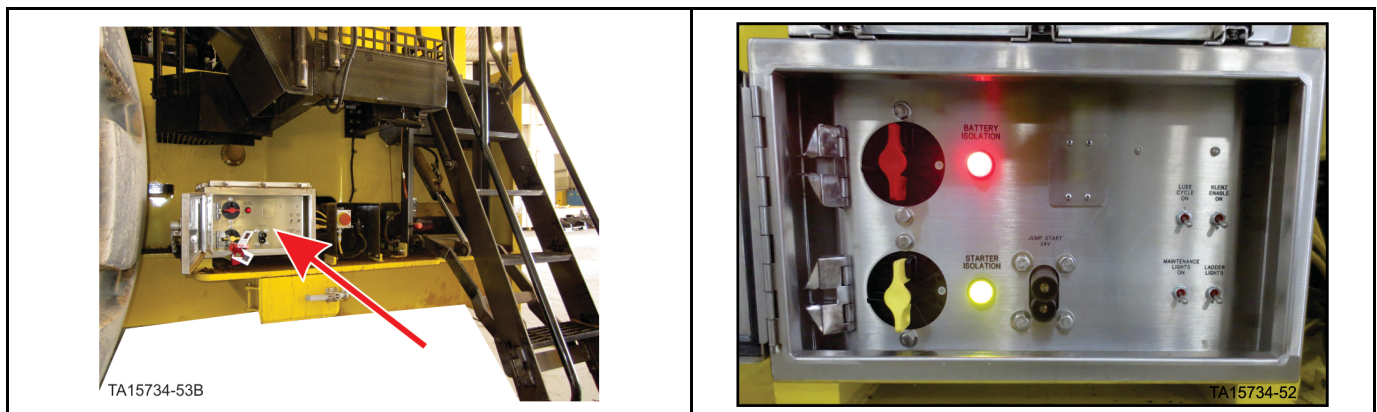


Step 14: Follow all local rules and regulations for returning a machine to operation.

- Follow all local lockout tag out procedures.

Step 15: Remove tags and turn on the “starter isolation” switch.

Figure 24: Remove tags and locks and place starter isolation switch in “ON” position.



CAUTION

If locally required, the fire suppression system should be inspected by the system manufacturer to determine proper operation, before machine operation.

Suggested Tool List

All valves, fittings, and hoses, on the pressure regulated test assembly must be pressure rated for at least 1–1/2 times the greatest pressure that can possibly be produced by the air or gas supply.

- Open ended wrench set (up to 1") (25.4 mm).
- Various wrenches for plumbing the regulated test assembly.
- Pressure regulated test assembly capable of controlling pressure up to 250 psi (17.24 bar) with three-way bleed down valves.
- One (1) plug for plugging the fire system manifold when the switch is temporarily removed during the test.
- Various hoses and fittings for plumbing the switch into a regulated test assembly for testing.
- A man lift or scaffolding to gain safe access to the fire suppression system manifold while removing, installing, and testing the switch.

Troubleshooting

System Maintenance and Troubleshooting

The fire suppression system requires regular inspection and maintenance. The manufacturer’s recommended maintenance schedules are also located in the owner’s manual, which may be obtained from the manufacturer’s website. System troubleshooting and wiring information is also provided in the manufacturer’s owner’s manual appended to this publication.

WARNING

Explosion hazard exists when working on the fire suppression system. Only personnel trained by the system’s manufacturer should service the system. Certain components of the system contain a compressed charge that can cause serious personal injury if not handled properly. Failure to use trained personnel when working on the fire suppression system can cause explosion hazard resulting in serious injury or death.

CAUTION

Electronic components of the fire suppression system can also be damaged if not handled in the proper manner. Only trained personnel should be performing maintenance or repair procedures to the system.

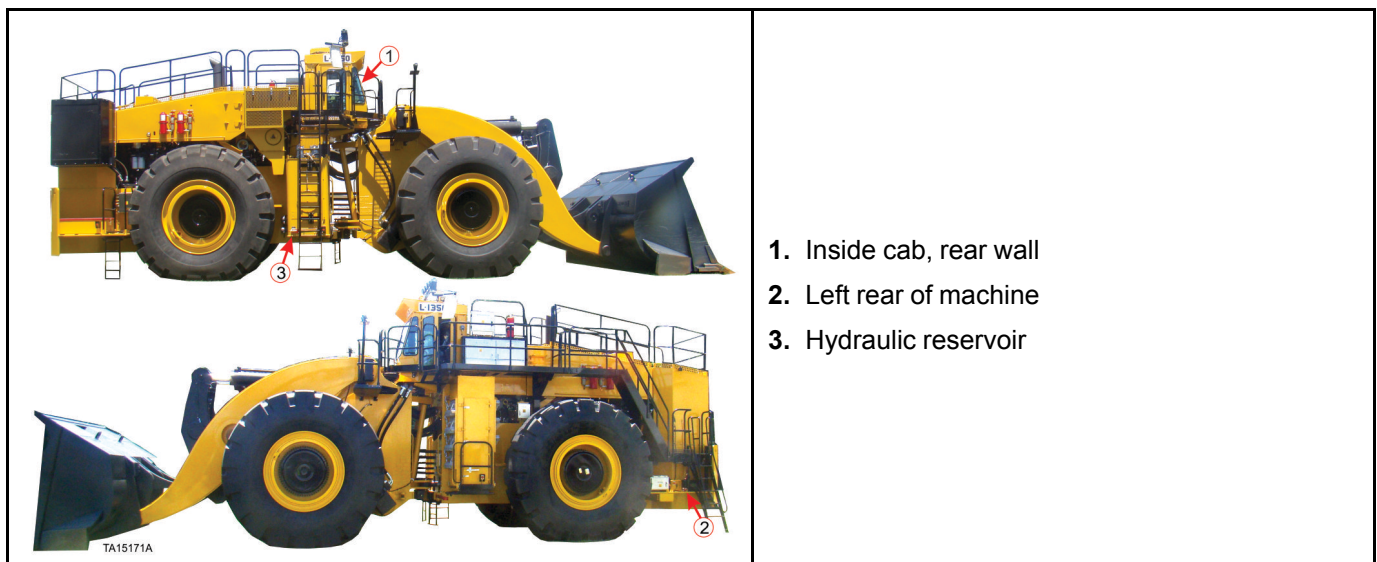
CAUTION

Before performing welding operations or jump starting the machine, the circuit monitor panel’s in-line fuse must be removed. Failure to do so may cause the system to actuate and/or damage the solid-state components of the system. Replace the in-line fuse before starting the machine or when welding operations have been completed.

NOTICE

Check your machine and make note of all switch locations before operating machine.

Figure 25: Locations of fire suppression system actuation switches (typical locations - standard installation)



1. Inside cab, rear wall
2. Left rear of machine
3. Hydraulic reservoir

CAUTION

Before performing a heat generating process such as grinding, cutting, or welding on a machine, the fire suppression system circuit monitors panel's in-line fuse must be removed. The fuse is located in the battery box on the loader. Failure to do so may cause the system to actuate and/or damage the solid-state components of the system. Replace the in-line fuse before the machine has been started or after all welding operations have been completed.

NOTICE

Some fire suppression systems have an internal battery and are not hard wired to the machine batteries. This fuse will not exist on these machines. Before beginning any heat producing work on the machine, appropriate steps must be taken to prevent the heat producing activity from activating the fire suppression system.



Fire suppression in-line fuse located in loader battery box.



WARNING

Fall hazard exists when working at heights on the machine. Be sure to take appropriate safety precautions when working at heights on the rear and front frames. Use fall restraint when appropriate. Follow all required statutory regulations for working at height. Failure to use fall restraint when working at heights on the machine can cause fall hazards resulting in serious injury or death.



WARNING

Crush hazard exists if standing under, or placing any body part under hoisted/suspended components. Never stand under hoisted/suspended components. Ensure appropriate lifting devices are used, and blocking is adequate to prevent the component from unexpectedly moving during transportation. Refer to SAFETY, WARNINGS, AND CAUTIONS before attempting to remove the operator's cab. Failure to stay out from under hoisted/suspended components can cause crush hazard resulting in serious injury or death.

CAUTION

Have qualified fire watch personnel present, and keep a fire extinguisher that meets all statutory regulations nearby during all cutting and welding operations.

Vendor Literature

VL 15 – ANSUL Checkfire SC Electric Detection and Actuation System

VL 15A – ANSUL Checkfire 210 Detection and Actuation System

VL 15B - ANSUL Checkfire 210 Detection and Actuation System Owners Guide

VL 59A – AFEX Fire Suppression Systems

VL 97A – ANSUL Vehicle Fire Protection

NOTICE

Do not modify the fire suppression system without the permission of the manufacturer.

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by Tyco Fire Suppression & Building Products

CHECKFIRE SC-N ELECTRIC DETECTION AND ACTUATION SYSTEM

Data/Specifications

FEATURES

- FM Approved
- Self Contained – Internal 3.6 VDC Power Source
- External 12/24 VDC Power Source Connection Available
- Battery Back-up Available
- Power Fault Monitoring for Both Internal and External Power
- Euro-Style Terminal Block for Field Connections
- Two Part Enclosure Design Simplifies Installation and Servicing
- Environmentally Sealed Enclosure
- Mounting Feet for Mounting to Any Suitable Flat Surface
- Microprocessor Based Circuitry
- Sealed, Membrane Push Button for Reset and Delay
- Vibration and Shock Resistant Design
- Electronic Circuitry That Meets the IEC Standards for Electromagnetic Compatibility in Heavy Industrial Environments
- Form “C” Relay Output Connection for Both Auxiliary Alarm and Shutdown Functions
- Normally Open Trouble Contacts Available for Remote Trouble Annunciation
- Two Supervised Initiating Circuits – One for Detection and One for Either Manual Electric Actuation or Pressure Switch Feedback
- One Supervised Release Circuit
- Manually Field Programmable Circuits (can optionally be PC programmed)
- History File to Record the Last 50 Alarm and Trouble Events
- Built-in Diagnostic Function Identifies the Source of Trouble
- Programmable Time Delays (Alarm to Shutdown, Shutdown to Release)

APPLICATION

The CHECKFIRE SC-N Electric Detection and Actuation System furnishes fire detection for equipment hazard areas. Its unique actuator allows actuation of a pneumatically-actuated fire suppression system either manually or automatically.

The CHECKFIRE SC-N system is typically used with an ANSUL A-101 Vehicle Fire Suppression system for 24-hour protection of equipment. The system is particularly suited for protection of equipment that is subjected to extreme environmental and physical conditions such as vehicles used in forestry, mining, agriculture, construction, public transportation, public utilities, land fill, and waste disposal.

The control module can be utilized as a self contained system, powered by its own internal Lithium battery. This allows the detection system to operate around-the-clock without use of external power. Optionally, external power can be connected to the control module. With external power connected, the internal power source provides battery back-up. When connected to an external 12/24 VDC supply with the internal battery also connected, the external power source becomes the primary supply, while the internal source is maintained in a standby mode of operation.

The control module may be installed where the ambient temperature is between -40 °F to 140 °F (-40 °C to 60 °C).



002710

DESCRIPTION

The complete CHECKFIRE SC-N system is composed of components which are combined to provide automatic fire detection and actuation. The electric detection and actuation system is designed for use with the ANSUL fire suppression systems that use pneumatic actuation as a means of system actuation.

The first of two initiating circuits is the supervised detection circuit designed to be connected to linear (wire) and/or spot type thermal detectors that provide a contact closure input to initiate a fire detected condition. A second option for this circuit is the addition of Triple IR Flame Detector(s) added to the linear or thermal detection circuit. The second initiating circuit is designed to accept a contact closure type of actuating device such as a manual electric pull station input or a pressure switch to initiate the module when the system is actuated with the pneumatic/manual actuator or a manual/electric pull station device. The initiating circuits are low impedance and designed to eliminate nuisance alarms associated with contact bounce.

First Initiating Circuit

Two field programmable time delays provide timing of shutdown and release functions associated with the operation of the detection and electric manual pull/pressure switch input initiating circuits. The first time delay is field programmed to assign the time between the initial alarm condition from the detection circuit and the operation of the shutdown relay. The first time delay is programmable for 5, 10, 20, or 30 seconds. The second time delay is field programmed to assign the time between the completion of the first time delay (when the shutdown relay operates) and operation of the release circuit. The second time delay is field programmable for 0, 10, 20, or 30 seconds.

DESCRIPTION

Second Initiating Circuit

The second initiating circuit is field programmable to be used as an electric manual pull or as a pressure switch feedback circuit. If selected as an electric manual actuation input circuit, its operation will override the first time delay function and initiate a second time delay condition, causing the shutdown relay to immediately operate and the release to occur upon expiration of the second delay. Additionally, the control module can be field programmed, if it is so desired, to shorten the second time delay when a manual actuation occurs. The time delay options associated with the manual actuation are 0, 10, 20, and 30 seconds, with the condition that it can only be less than or equal to the time delay associated with the detection circuit.

Selection of the second initiating circuit as a pressure switch feedback circuit will result in the operation of the alarm relay and shutdown relay, but will not operate the release circuit. Additionally, a trouble condition will occur on the control module, indicating the need for service.

The front panel contains a "DELAY" and "RESET" button. Operation of the DELAY button will repeat the first time delay if initiated while time delay one is active. Once time delay two has started, operation of the DELAY switch has no affect. The delay button also serves the dual function of silencing the auxiliary alarm relay, but is only effective for this function 30 seconds after release, or after pressure switch feedback operation has occurred.

The RESET button is used to re-initialize the control panel. When depressed, it provides an indication that all LEDs and the sounder are functional. It is also used to upload the manual programming into the control module.

The front panel also contains LEDs for visual annunciation of alarm, trouble, release, and power conditions.

EMI filtering is provided on all inputs, outputs, and power circuitry.

CONSTRUCTION

The enclosure consists of a cover assembly and back box which is constructed of Noryl SE1GFN3 with a flammability rating of UL94 V-1. The back box contains the field interface terminal block, battery, and field wiring entrance ports. The cover assembly contains the control PC board assembly, sounder, operator interface panel, and environmental seal. The enclosure meets IEC 529 requirements for dust and water spray in all directions. Mounting feet allow mounting to any suitable flat surface. Steel mounting brackets are also available.

All circuitry, relays, switches, and LEDs are contained on a single PC board. A board mounted receptacle mates with the plug-in terminal block mounted in the back box. A high pitch sounder is threaded into the cover and plugged into the PC board. The PC board is encapsulated to provide added protection against moisture and dust. An RS232 connector is provided for field programming from a PC and for data retrieval from a trouble and alarm event history file. The PC board assembly contains a DIP switch for optional manual programming functions without the use of a PC.

INTERNAL CONNECTIONS

The internal battery is connected to the PC board via a single plug. The external power is connected to the field connection terminal strip located in the back box.

The field connection terminal strip located in the back box is a 16 position terminal block containing the following terminations:

Position	Circuit Description
1	+ External 12/24 VDC Power
2	- External 12/24 VDC Power
3	+ Detection Input
4	- Detection Input
5	+ Manual Input
6	- Manual Input
7	+ Release Input
8	- Release Input
9	Trouble Common
10	Trouble NO
11	Alarm NO
12	Alarm Common
13	Alarm NC
14	Shutdown NO
15	Shutdown Common
16	Shutdown NC

OPERATIONAL ENVIRONMENTAL SPECIFICATIONS

- Operating Temperature Rating: -40 °F to 140 °F (-40 °C to 60 °F)
- Humidity: 24 Hours at 85% +/- 5% at 86 °F (30 °C)
- Shock: In accordance with UL1254
- Vibration: In accordance with UL1254
- Electromagnetic Compatibility: Meets EN 55011 and EN 50082-2 for heavy industrial environments
- Moisture and Dust: Meets IEC 529 for direct water spray

SEQUENCE OF OPERATION

Upon receiving an input signal from either a shorted detection wire or a closed thermal detector, the following functions will be performed automatically:

1. The Alarm LED will flash, the internal sounder will pulse at a rate of 2 times per second. The alarm relay will transfer resulting in remote alarm operation, and the shutdown time delay begins. (The operator can repeat the shutdown time delay if the DELAY button is depressed before the shutdown time delay has expired).
2. After the shutdown time delay has expired, the Alarm LED pulse rate and the sounder pulse rate will change to 4 times per second. The shutdown relay will transfer resulting in equipment shutdown (when provided), and the discharge time delay begins (when set).
3. After the discharge time delay has expired, the control module release circuit operates, resulting in the fire suppression system actuation.

After system discharge, the Alarm LED and sounder will continue to pulse at a rate of 4 times per second for 30 seconds. After that, it will switch to the trouble mode and pulse once every 10 seconds.

If manual actuation is performed through operation of the manual input circuit, the first time delay will be by-passed and either immediate release will occur or the second time delay will begin.

If manual actuation is performed by operating the mechanical actuator, the fire suppression system will immediately discharge. The shutdown function will take place through the pressure switch circuit (if provided).

APPROVALS

Factory Mutual (JI0B8A8.AF)

ORDERING INFORMATION

Part No.	Shipping Assembly
436302 (436303 TC)	CHECKFIRE SC-N Electric Detection and Actuation System Includes: Control Module, Manual/Automatic Actuator, Mounting Bracket, Protracting Actuation Device, Connector/Cable Assembly, LT-10-R Cartridge, 1/4 in. Check Valve, Hardware Kit, Label Package, and Owners Manual (Battery must be ordered separately)
71230	Linear Detection Wire, 356 °F (180 °C), 100 ft (30.5 m)
71231	Linear detection Wire, 356 °F (180 °C), 500 ft (152.4 m)
426520	End-of-Line Resistor Assembly
416218	Spot Detector – 270 °F (132 °C)
416219	Spot Detector – 325 °F (163 °C)
416220	Spot Detector – 360 °F (182 °C)
416213	Spot Detector Package (one required per detector)
416221	Spot Detector Bracket – one required for each detector
416113	Pneumatic/Linear Detector, 35 ft (10.7 m) (Model 808-DRV)
416216	Cable Assembly, 15 ft (4.6 m) (for pneumatic/linear detector)
436242	Cable Assembly – 20 ft (6.1 m)
436114	Connector/Cable Assembly – 20 in. (51.0 cm)
432480	Triple IR (IR ³) Flame Detector Shipping Assembly includes Spectrex Model 20/20MI-32-S-F; Triple IR (IR ³) Flame Detector, Part No. 434941; Detector Mounting Bracket, Part No. 434116
434102	Triple IR CHECKFIRE Detection Interface Kit includes Interface Module, Part No. 434108; Module Mounting Bracket, Part No. 423528; End-of-Line (EOL) Cable Assembly, Part No. 434107
434103	10 ft (3.1 m) Receptacle-Plug Cable Assembly (Triple IR)
434104	20 ft (6.1 m) Receptacle-Plug Cable Assembly (Triple IR)
434105	30 ft (9.1 m) Receptacle-Plug Cable Assembly (Triple IR)
434107	End-of-Line (EOL) Cable Assembly (Triple IR)
434106	“Y” Connector Cable (Triple IR)
434108	Triple IR CHECKFIRE Detection Interface Module
434109	Cover, Triple IR CHECKFIRE Detection Interface Module
432485	Triple IR Flame Detector User and Maintenance Manual
419780	Power Wiring Assembly – 15 ft (connector on one end only)
419781	Power Wiring Assembly – 15 ft (connector on both ends)
419782	Power Wiring Assembly – 10 ft (connector on both ends)
423520	Battery Shipping Assembly
419783	Battery Connection
426461	End-of-Line Resistor Assembly (10 of Part No. 426520)
423541	Release Circuit Test Module
436243	Protracting Actuation Device Test Adaptor
423522	Operation and Maintenance Manual – SC-N System
432485	Operation and Maintenance Manual – Triple IR (IR ³) Detection System

CHECKFIRE 210 Detection and Actuation System

Features

- Supervised power, detection, release, and communication circuits
- Display module with LED system status indicators
- Adjustable mounting bracket (display module)
- 85 dB internal sounder
- Compact size
- Automatic and/or manual actuation
- Electric "DELAY/Reset/Silence" button
- "PUSH To Activate / Alarm When Lit" electric manual activation button
- Interface control module for all color-coded "Plug and Play" cable connections
- Cables provide quick installation and easy replacement
- Internal power source with optional external power
- Auxiliary power output when external power is connected
- Manual programming at interface control module
- Computer programming available through mini USB port
- Two programmable release time delays
- Two analog detection circuits
- Detection circuits are programmable for multiple detection methods
- Detection circuit #2 may be programmed for pressure switch feedback
- Two internal programmable SPDT Form C relays (5 A @ 30 VDC nominal automotive)
- Downloadable 4000+ event history log with real-time stamp
- System isolate feature
- Dust and water tight (IP67 rated)
- Designed for harsh environments



009266

Application

The CHECKFIRE 210 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 and equipment in extreme environmental and physical conditions.

Industries where vehicles use CHECKFIRE 210 Systems:

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

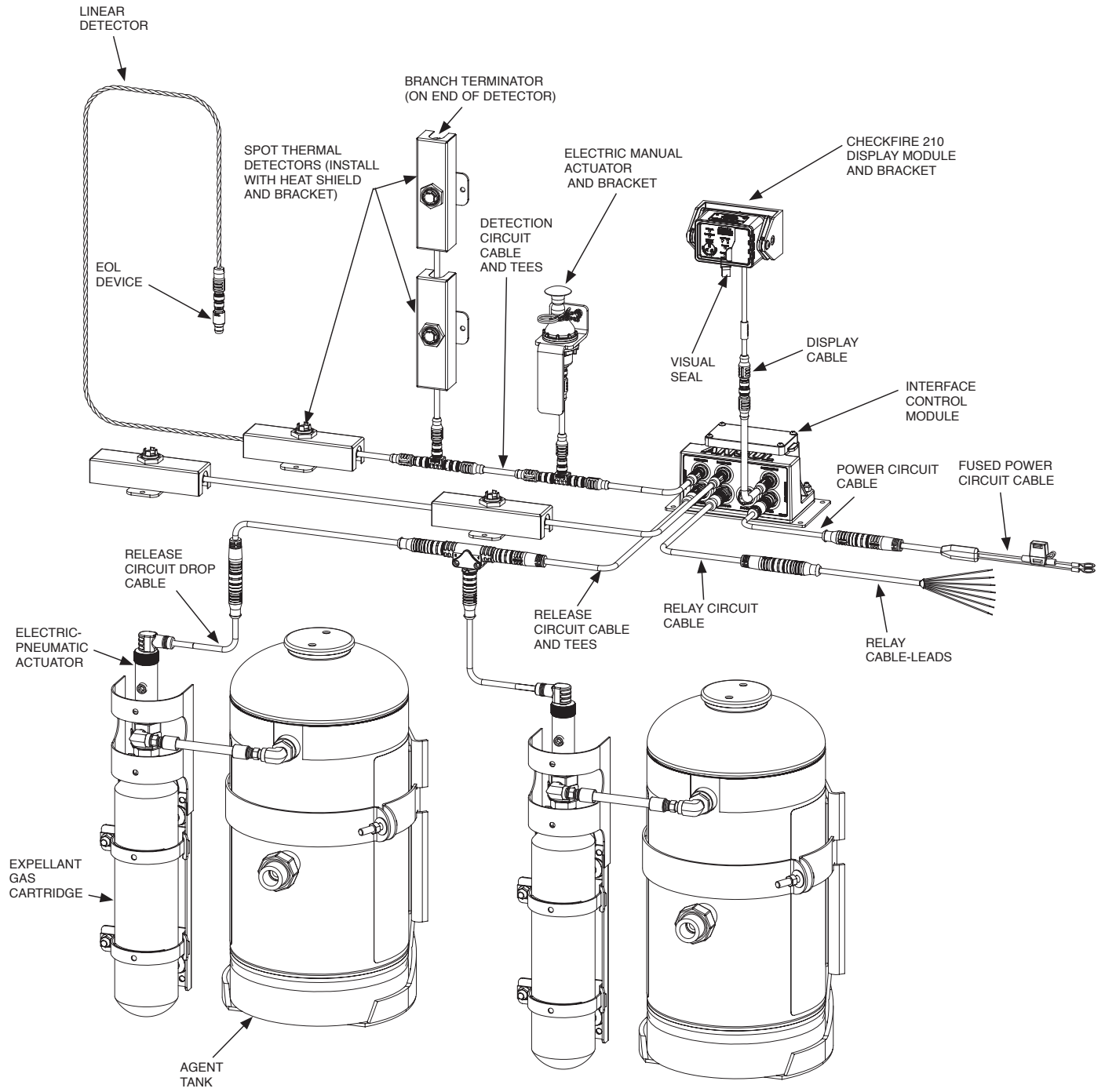
Description

The CHECKFIRE 210 Automatic Detection and Actuation System provides supervised input/output circuits to activate an ANSUL® fire suppression system. Upon detecting a fire condition, the interface control module activates the release circuit, resulting in the discharge of an expellant gas cartridge, initiating fire suppression system operation.

Green, amber, and/or red pulsing LEDs, and the internal sounder notify operator of system status. The sounder only activates for faults, isolate mode, and system release.

Operating components include the display module, interface control module, spot thermal detectors, linear detectors, electric manual actuators, protracting actuation devices (PAD), electric-pneumatic actuators, and cables for power, detection, and release circuits. The entire system is electronics based for supervision, communication, and control of system components.

CHECKFIRE 210 SYSTEM – SAMPLE CONNECTIONS



009269

Typical System Connections

The CHECKFIRE 210 Display Module communicates with the CHECKFIRE 210 Interface Control Module (ICM) through the display cable using threaded circular connectors. Color-coded receptacles in the ICM are the central connection point for all system cables.

System Cabling: Enables communication and control of components.

- IP67 connectors
- Color-coded, anti-vibration connections
- Integral connectors on each end of cable
- Multiple lengths for versatility
- Temperature rating: 302 °F (150 °C)

Detection Circuits #1 and #2: Permits multiple-detection options using detection circuit cable and tees for the main detection trunk and branch lines.

- Electric manual actuators
- Linear detectors
- Spot thermal detectors
- Pressure switch (detection circuit #2 only)

Release Circuit: Connects to a maximum of 10 electric-pneumatic actuators installed on agent tank expellant gas cartridges using release circuit cable(s), tee(s), and release circuit drop cable(s).

External Power Circuit: Provides a direct connection to the vehicle power source using power circuit cable(s) and a single fused power circuit cable, when external power is required.

Auxiliary Output Circuit: Connects to external notification devices.

Display Circuit: Connects display module with ICM.

Relay Circuit: Provides connection for two independent internal relay contacts for connection by others.

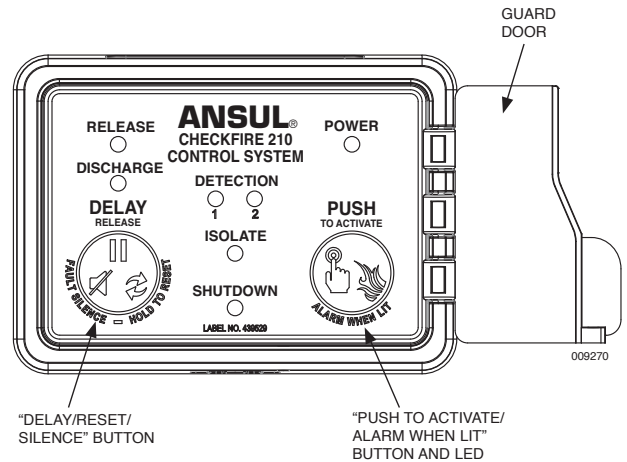
Detection

A Linear Detector with an activation temperature rating of 356 °F (180 °C) provides fire detection in the protected area. Two twisted spring steel conductors separated by a heat-sensitive insulator are limited to a minimum bend radius of 2 1/2 in. (64 mm). For easy installation, red color-coded connectors match the red connectors of the entire detection circuit.

Spot Thermal Detectors have the temperature rating stamped on the detector and are color-coded blue for 250 °F (121 °C) and red for 350 °F (177 °C) operating temperatures. The included retaining nut securely holds the detector in the required bracket and heat shield.

Display Module

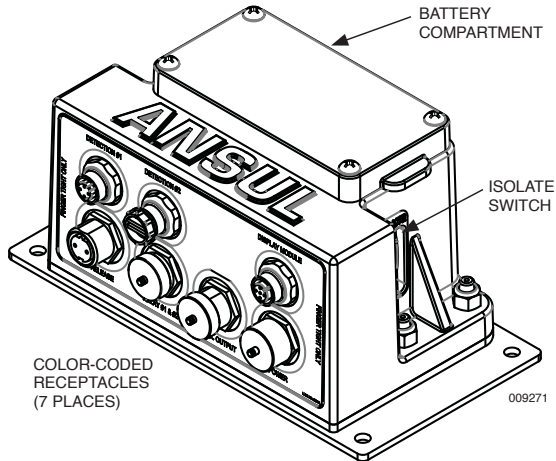
The CHECKFIRE 210 Display Module communicates with the Interface Control Module (ICM) to indicate system status. Installation within reach of the operator provides easy access to operator controls.



- Dust and water tight (IP67 rated)
- Durable high-strength glass-filled nylon material
- Surface or bracket mounted
- Two index pins on back for secure mounting
- Ambient temperature range: – 40 °F to 185 °F (– 40 °C to 85 °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
 - Provides manual actuation (immediate release)
 - Indicates alarm condition
- Guard door with visual seal to protect manual-activation button
- “DELAY/Reset/Silence” Button
 - Restarts Time Delay #1 (TD1) before TD1 sequence expires
 - Resets system (during non-alarm status)
 - Silences internal sounder during fault conditions and isolate mode

Interface Control Module (ICM)

The CHECKFIRE 210 Interface Control Module (ICM) is the central connection point for input/output circuits. Through communication with the display module, operators receive continuous system status updates, and operator input commands go directly to the ICM. Color-coded receptacles match with color-coded cable connectors providing quick visual confirmation of proper circuit connections.



The protective battery compartment cover is held in place with 4 captive screws. Besides the internal power supply, the battery compartment includes the battery cable, a mini USB connection port, and the programming interface (button and LEDs). The system programming may be accomplished with the manual programming button and indicator LEDs or by using a computer with the ANSUL CHECKFIRE 210 Programmer software communicating through the mini USB port.

An isolate switch on the side of the ICM provides ease of access to temporarily disable the automatic system release function. While disabled, manual system release is still available. An amber isolate LED on the display module continues to pulse until the switch is returned to normal.

- Dust and water tight (IP67 rated)
- Durable high-strength glass-filled nylon
- UL94 Flame rating
- Ambient temperature range: - 40 °F to 185 °F (- 40 °C to 85 °C)
- Internal battery compartment with IP67 cover
- System isolate switch
- Steel mounting plate



Battery Module

A supervised 3.6 VDC lithium CHECKFIRE 210 Battery Module provides internal power for the CHECKFIRE 210 System. A connector pigtail extending from the top of the battery connects to the ICM battery cable.

Electric-Pneumatic Actuator

With a focus on ease of installation and safety, the Electric-Pneumatic Actuator reduces system complexity. The Protracting Actuation Device (PAD) directly actuates the electric-pneumatic actuator pin eliminating the need for pneumatic actuation.

The re-designed PAD with plug-in spade connectors is easy to install and replace without tools. After plugging the PAD into the release circuit drop cable, the cable is hand-tightened to the top of the electric-pneumatic actuator.



For installer safety during assembly of the Electric-Pneumatic Actuator to an expellant gas cartridge, the actuator includes a new preventor. The integral preventor reduces the possibility of attaching the actuator with the pin not completely retracted. It also provides a metal to metal seat with the expellant gas cartridge eliminating the spacing washer.

If required, optional pneumatic actuation is available.

Electric Manual Actuator

The newly designed Electric Manual Actuator (EMA) provides electrical activation of the fire suppression system. Pulling the pin and striking the red button sends a signal to the interface control module for immediate actuation of the electric-pneumatic actuator. Upon actuation, the expellant gas cartridge initiates fire suppression system operation.



009262

EMAs are typically accessible from ground level and/or in a path of egress. An index nub ensures the EMA remains at the proper angle for access to the pull pin.



009268

System Specifications

Interface Control

Module Power: Internal power source
and/or: 12/24 VDC nominal
external power
(24 hour operation)

Operating
Temperature Range: - 40 °F to 185 °F
(- 40 °C to 85 °C)

Shock: In accordance with UL1254

Vibration: In accordance with UL1254

Moisture and Dust: IP67 per IEC 60529

Electromagnetic
Compatibility: Heavy Industrial EMC Directive
Compliant (2004/108/EC)

Approvals

FM Approved and CE Marked

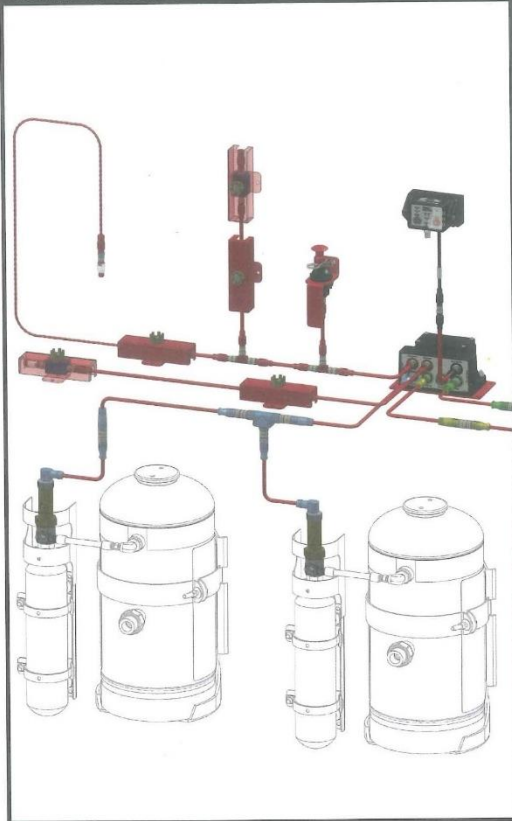
Ordering Information

Part No.	Description	Part No.	Description
	System Components		Display Cables
439560	Display Module, CHECKFIRE 210	439452	Cable, Display, 2 ft (0.61)
439564	Mounting Bracket, CHECKFIRE 110/210	439454	Cable, Display, 5 ft (1.53)
439561	Interface Control Module, CHECKFIRE 210	439456	Cable, Display, 10 ft (3.05)
439569	Electric-Pneumatic Actuator (normally supplied with agent tanks)	439458	Cable, Display, 20 ft (6.10)
439400	Electric Manual Actuator (EMA)	439460	Cable, Display, 30 ft (9.15)
440537	Electric Manual Actuator Bracket	439462	Cable, Display, 50 ft (15.24)
	Detection Circuit Cables and Fittings	439449	Connector, Bulkhead, Display Cable
439384	Cable, Detection Circuit, 2 ft (0.61 m)		Relay #1 & #2 Circuit Cable
439386	Cable, Detection Circuit, 5 ft (1.53 m)	439466	Cable, Relay Cable-Leads, 3 ft (0.91)
439388	Cable, Detection Circuit, 10 ft (3.05 m)	440410	Cable, Backup Power/Relay Circuit, 2 ft (0.61 m)
439390	Cable, Detection Circuit, 20 ft (6.10 m)	440413	Cable, Backup Power/Relay Circuit, 5 ft (1.53 m)
440759	Cable, Detection Circuit, 30 ft (9.15 m)	439482	Cable, Backup Power/Relay Circuit, 10 ft (3.05 m)
440762	Cable, Detection Circuit, 50 ft (15.24 m)	440416	Cable, Backup Power/Relay Circuit, 20 ft (6.10 m)
439394	Connector, Tee, Detection Circuit (MxFxF)		Auxiliary Output Circuit Cable
439396	Connector, EOL Device, Detection Circuit	439450	Cable, Auxiliary Power Output Circuit, 3 ft (0.91)
439398	Connector, Branch Terminator, Detection Circuit		Power Circuit Cables and Fittings
439404	Connector, Bulkhead, Detection Circuit	439438	Cable, Power Circuit, 2 ft (0.61 m)
	Linear Detectors	439440	Cable, Power Circuit, 5 ft (1.53 m)
439406	Linear Detector, 2 ft (0.61 m)	439442	Cable, Power Circuit, 10 ft (3.05 m)
439478	Linear Detector, 5 ft (1.53 m)	439444	Cable, Power Circuit, 20 ft (6.10 m)
439480	Linear Detector, 10 ft (3.05 m)	439446	Cable, Power Circuit, 30 ft (9.15 m)
439408	Linear Detector, 20 ft (6.10 m)	440187	Cable, Power Circuit, 50 ft (15.24 m)
439410	Linear Detector, 30 ft (9.15 m)	439405	Connector, Bulkhead, Release and Power Circuits
440765	Linear Detector, 50 ft (15.24 m)	439492	Cable, Fused Power Circuit, (w/Inline Fuse Holder), 3 ft (0.91 m)
	Release Circuit Cables and Fittings		Accessory Equipment
439418	Cable, Release Circuit, 2 ft (0.61 m)	440362	ICM Battery Module, CHECKFIRE 210
439420	Cable, Release Circuit, 5 ft (1.53 m)	438280	Spot Thermal Detector, 250 °F (121 °C)
439422	Cable, Release Circuit, 10 ft (3.05 m)	438281	Spot Thermal Detector, 350 °F (177 °C)
439424	Cable, Release Circuit, 20 ft (6.10 m)	440905	Spot Thermal Detector Bracket and Heat Shield
439426	Cable, Release Circuit, 30 ft (9.15 m)		Pressure Switch
439428	Cable, Release Circuit, 50 ft (15.24 m)	440389	
439430	Cable, Release Circuit Drop, 30 in. (0.77 m)	440737	Double-Loop Cable Ties (Pkg. of 50)
439432	Cable, Release Circuit Drop, 38 in. (0.97 m)	56692	Rubber Sleeve (Pkg. of 20)
439434	Connector, Tee, Release Circuit (MxFxF)		Label Package
439436	Connector, Release Circuit Terminator	440798	
439405	Connector, Bulkhead, Release and Power Circuits	440097	Detection Circuit Tester (DCT)
439448	Protracting Actuation Device (PAD), w/Spade Connectors	441021	Release Circuit Tester (RCT)
		440912	Release Circuit Test Plug (Pkg. of 3)

**CHECKFIRE 210
DETECTION AND
ACTUATION SYSTEM**



OWNERS' GUIDE



tyco
Fire Protection Products

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Part No. 442045

IN CASE OF FIRE: Manual Actuation



PUSH RED BUTTON FOR IMMEDIATE ACTIVATION

- 1) Safely bring equipment to complete stop, set brake and shut off engine.
- 2) Break visual seal and open guard door.
- 3) Push the red "PUSH To Activate / Alarm When Lit" button.
- 4) Release circuit immediately activates the connected fire suppression system (if included, pressure switch activates auxiliary operation). **See Note below.**
- 5) Safely exit equipment and stand-by with supplemental firefighting equipment.
- 6) Optional manual actuation: Pull ring pin and strike red button on electric or pneumatic manual actuator.

Note: The red "PUSH To Activate / Alarm When Lit" LED and sounder remain steady-on for 10 sec. during initiation (release) of fire suppression system. **Post release:** Detection 1 and/or Detection 2, Shutdown, and Release LEDs and sounder continue to pulse 1 x 10 sec. If safe to re-enter equipment, push "DELAY/Reset/Silence" button to silence sounder for two hours.

Fill-In System Information (as installed)
Electric or Pneumatic Manual Actuator Location(s):

IN CASE OF FIRE: Automatic System Operation

- 1) Detector(s) registers alarm condition in hazard area and initiates the time delay notification on display module.
- 2) "PUSH To Activate / Alarm When Lit" plus Detection 1 and/or Detection 2 LEDs plus sounder:
 - a. Pulse 2 x 1 sec. until last 5 sec. of TD1; then pulse 4 x 1 sec. with Shutdown LED at start of final 5 sec. **(See DELAY/RESET/SILENCE (grey) button below for TD1 restart)**; then, only Shutdown LED is steady-on for 1 sec. indicating TD1 transferring to TD2 (restart no longer available).
 - b. Pulse 4 x 1 sec. with Shutdown LED during TD2.
 - c. Steady-on 10 sec. with Shutdown LED during initiation (release) of fire suppression system (if included, pressure switch activates auxiliary operation).
- 3) As soon as time delay begins: Safely stop equipment, set brake, shut off engine, and exit. Standby with supplemental firefighting equipment.
- 4) Post release: LEDs and sounder pulse 1 x 10 sec.

PUSH GREY
BUTTON TO
RESTART
TIME DELAY
(TD1 ONLY)

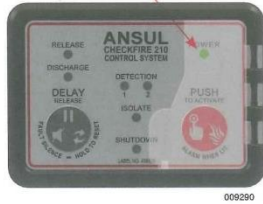


DELAY/RESET/SILENCE (Grey) Button

- 1) **Restart Time Delay:** Press and release for each restart of TD1 during alarm condition. (Limit: 2 restarts or Unlimited, see page 1.)
 - a. Must be initiated before last second of TD1. (No response after TD1 until post release.)
 - b. **Note:** Press and hold will not extend time delay period.
- 2) **Silence sounder (post discharge or fault notification) for two hours:** Press and release to silence sounder; LED fault indication will continue until fault is cleared. Any new fault or detection event will reactivate sounder.
- 3) **Reset function** is for Authorized ANSUL Distributor service technician.

FRONT PANEL INDICATORS

POWER LED:
GREEN, AMBER OR OFF



- 1) Power LED
 - a. Green steady-on indicates normal **external** power.
 - b. Green pulsing 1 x 3 sec. indicates normal **internal** power.
 - c. Amber pulsing 1 x 3 sec. indicates external power fault; system is operating on internal power. Contact Authorized ANSUL Service Technician.
 - d. Amber pulsing 1 x 10 sec. with sounder indicates internal or external power fault. Contact Authorized ANSUL Distributor for service.
 - e. Off indicates no system power. Contact Authorized ANSUL Distributor for service.
- 2) All other LEDs
 - a. LED off indicates normal status.
 - b. Amber or red pulsing with sounder: Contact Authorized ANSUL Distributor for service.

CAUTION

Any fault indication may cause the fire detection and actuation system to not function properly; immediately contact an Authorized ANSUL Distributor for service.

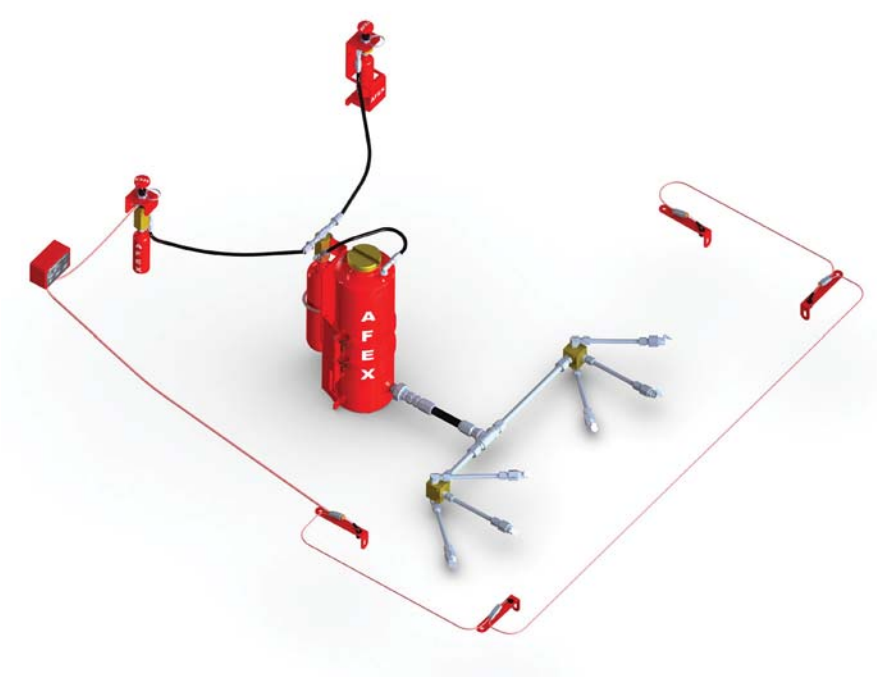
AFEX
FIRE SUPPRESSION SYSTEMS

OWNER/OPERATOR'S MANUAL
PN A100001



AFEX 2000 Series Pre-Engineered Multipurpose
Dry Chemical Fire Suppression System

AFEX W Series Pre-Engineered
Liquid Agent Fire Suppression System



5808 LEASE LANE
RALEIGH, NC 27617
TEL (919) 781-6610 FAX (919) 787-3915
WWW.AFEXSYSTEMS.COM

Revised July 2012

This fire suppression system unit is to be installed, inspected and maintained in accordance with NFPA Standard No. 17 and the **AFEX** Installation, Operation, Maintenance, and Service Manual.

AFEX 2030 Series System

This system, when installed according to this manual, can be considered an integrated fire detection and fighting system as defined in EN 13478:2001, article 6.3.

Conforms with the EC standards:

DIN EN ISO 14982:2009

ISO 13766:2006

ISO 10605:2001

ISO 11452-2:2004

ISO 7637-2:2004

EN 894-1:1997

EN 894-2:1997

EN 1127-1:2007

EN 1127-2:2002

EN 13478:2001

EN 842:1996

ISO 7731:2003

EN 981:1996

The following Notified Body has issued a positive Statement of Opinion.

Identification of NB Statement of Opinion

Report No.: 31160512.001

Name and address of NB

TUV Rheinland of North America, Inc.

762 Park Avenue, Youngsville, NC 27596-9470

This manual should be carefully read by all individuals who have or will have responsibility for using the product.

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IMPORTANT:

AFEX fire suppression systems are made up of units tested within limitations contained in the *Installation, Operation, Maintenance, and Service Manual*. No modifications are to be made to the system. The system designer must be consulted whenever changes are planned for the system or area of protection. An authorized installer or system designer must be consulted after the system has discharged.

This system is limited to use on mobile equipment, when installed and maintained as described in the *Installation, Operation, Maintenance, and Service Manual*. Other uses are not permitted. **AFEX** automatic fire suppressions systems are not "intrinsically safe" and are therefore not suitable for use in potentially explosive atmospheres such as underground coal mines. The **AFEX** system has not been tested to comply with the ATEX 95 directive and is therefore not permitted for use in any underground mine that requires adherence to this directive.



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Introduction

Heavy duty mobile equipment is larger and more expensive than ever before. Production losses from downtime coupled with high repair and replacement costs increase the importance of adequate fire protection.

Because of the location of the operator on modern equipment, together with noise suppression and personnel guarding, a fire on board can become severe before it is even noticed. The size of the machines makes operator egress difficult and protective guarding hampers the use of hand portable fire extinguishers.

As a permanent part of the vehicle, the **AFEX** system allows effective fire suppression in normally inaccessible areas. Operator safety is also greatly enhanced. Detection and automatic actuation allow for early system activation, alerting the operator and protecting the capital investment.

This manual is intended to acquaint you with the **AFEX** Fire Suppression System. This manual is not to be considered a detailed installation guide and this manual provides no instructions for the installation, recharging, or regular inspection and maintenance of an **AFEX** system. A detailed *Installation, Operation, Maintenance, and Service Manual* is available upon request from **AFEX**. Should you have any questions, please direct them to **AFEX** or an authorized **AFEX** distributor.

Fire Suppression System Overview

A fire suppression system is a heavy equipment accessory that is designed to help reduce damage and losses related to fire. Its purpose is to suppress a fire long enough to allow access to, or the arrival of fire fighting equipment. Fire suppression systems are not designed or intended to extinguish all fires, particularly when unusual amounts of combustible materials and an ample oxygen supply are present.

Fire conditions could occur which exceed the extinguishing capacity of the fire suppression system, possibly resulting in temporary suppression but not total extinguishment. Therefore, it is extremely important that alternative fire fighting equipment be available in case the system does not totally extinguish a fire.

The **AFEX** vehicle fire suppression system discharges A:B:C dry chemical powder and/or **AFEX** liquid agent into the protected areas of the machine, typically the engine and transmission compartments. The system is installed as part of the vehicle and consists of detection, actuation, and distribution components.

AFEX offers two types of system actuation: automatic & manual only. Automatic systems may also be manually actuated.

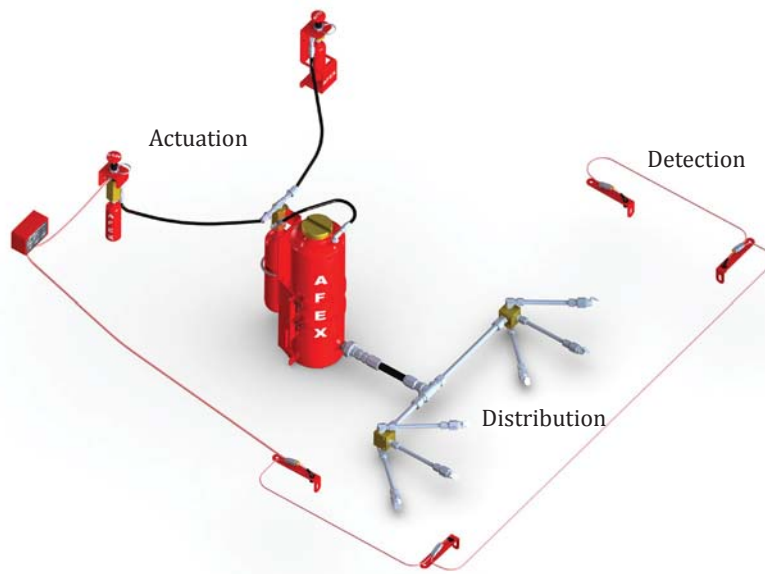
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The system is installed as part of the vehicle and consists of detection (automatic systems only), actuation, and distribution components.

Detection components include sensors and/or linear detection wire, the circuit monitor panel, and wire.

Actuation components include the firing mechanism or manual actuators, electric actuator, nitrogen cartridges, slave actuators, and hose.

Distribution components include the agent tank, hose, stainless steel tubing, and nozzles.



System Features

Familiarize yourself with the features of the **AFEX** system. If you need help identifying these features, contact your local distributor.

Your system may include some or all of the following:

- Automatic Detection
- Circuit Monitor Panel
- Automatic Actuator with Manual Override
- Exterior Remote Actuator
- A:B:C Dry Chemical Powder
- **AFEX** Liquid Agent
- Stainless Steel Distribution
- Automatic Engine Shutdown
- External Horn and/or External Lights

Reducing the Risk of Fire

Your risk of equipment fires, and the damage resulting from a fire, can be reduced by following the tips below:

- Maintain vehicles properly and regularly.
 - Frequently clean combustible debris and fuels from belly pans and engine and transmission compartments.
 - Check all oil, hydraulic fluid and gas lines for cuts, abrasions, or wear. Replace as needed.
 - Inspect all oil, hydraulic, and gas line fittings for tightness. Clean off all residue and tighten.
 - Check braking system for proper adjustment especially if brakes overheat when not engaged.
 - Check all possible ignition points (engine block, exhaust manifolds, turbochargers, etc.). Make sure oil, hydraulic fluid, and gas lines are not in contact with these ignition points.
 - Clean vehicle of all combustible debris, dry vegetation, grain particles, coal dust, etc. Remove any oil and fuel drippings.
 - Check all electrical lines and connections for tight fit, wear or abrasion. Replace any defective electrical equipment or wiring.
- Have fire response plan in place.
 - Train personnel on the use of fire suppression systems and portable fire extinguishers.
 - Follow proper fire suppression system maintenance intervals.
 - Have additional fire fighting equipment available on-site.
 - Avoid parking equipment side by side at night.

What Operators Need to Know

- The Circuit Monitor Panel & firing mechanism (or manual actuator) are located in the cab, typically within your view and arm's reach.
- The agent dispersion nozzles are typically located in the engine and transmission and other hazard areas.
 - The operator's cab is not protected.
 - The system will not suppress fires outside the machine.
- Bring the vehicle to a stop and shut down the machine immediately when a fire condition is observed.
- Manually actuate the system immediately when a fire condition is observed, even if it is an automatic system, if it has not already actuated automatically.
- Hand portable fire extinguishers are recommended and are useful if re-ignition occurs or if fires originate outside of the protected area.
- In the event of a fire, the immediately inform the appropriate on-site personnel in order to maximize fire fighting efforts.

What Maintenance Personnel Need to Know

- Fire suppression system components are installed on the machine to protect the engine and transmission compartments against fire.
 - Tampering with, repositioning, removing or damaging components can adversely affect the fire suppression system's performance or even prevent the system from functioning properly.
 - Should you have concerns regarding the fire suppression system installation, certification or repair, contact the local **AFEX** distributor or service agent immediately.
- To avoid damage to the Circuit Monitor Panel (if equipped), disconnect power to the panel prior to welding on or jump starting the machine.
- After performing major maintenance procedures or repairs to the equipment, the engine, or transmission, contact the local distributor to inspect and restore the fire system to proper operating condition.

IMPORTANT:

This system is made of units tested within limitations contained in the detailed installation manual. The system designer must be consulted whenever changes are planned for the system or area of protection. An authorized installer or system designer must be consulted after the system has discharged.

System Operation

1. A fire starts in the protected area of the machine.
2. The system is automatically or manually actuated.
IMPORTANT: If you see signs of a fire before the system automatically actuates, manually actuate the system. Rapid response is critical in successfully suppressing the fire.
 - a. (Automatic Actuation) The heat from the fire activates the sensors or linear detection wire, which sends a signal to the Circuit Monitor Panel to fire the electric actuator.
NOTE: **AFEX** sensors activate at 300°F (148.89°C) and reset at 275°F (135°C). **AFEX** linear detection wire is rated at 356°F (180°C).
 - b. (Manual Actuation) The operator manually actuates the system by pulling the safety pin and striking the push knob on the cab or exterior actuator.
3. The seal on the actuation cartridges is punctured, releasing the nitrogen gas which flows through the actuation lines.
4. The nitrogen gas activates the slave actuator, puncturing the seal on the pressurizing cartridge(s), pressurizing the agent tank.
5. The agent flows through the distribution network and sprays out of the nozzles into the protected area of the machine.

Circuit Monitor Panel Operation

1. A sensor (or the linear detection wire) is activated.
2. The ALARM light illuminates and audible alarm sounds. The discharge delay cycle begins.
 - a. The discharge delay cycle may be set from 0 to 30 seconds. Pushing the SYSTEM RESET button will reset the discharge delay cycle.
NOTE: The audible alarm remains on, even after the system discharges, unless the sensor resets or the ALARM SILENCE button is pressed.
The ELECTRIC ACTUATOR light illuminates.
3. At 65% of the discharge delay cycle, the DISCHARGE WARNING light illuminates.
4. At the end of the discharge delay cycle, the electric actuator fires.

Pre-shift System Checklist

If any of the following are found in a condition that is not as indicated, immediately notify the proper safety and/or maintenance personnel, as the system may not be operational:

- There are no signs of a fire having occurred on the machine.
- There is no sign of the A:B:C dry chemical or **AFEX** liquid agent on the machine or the ground, indicating a possible system discharge.
- The safety seal and safety pin are in place in all system actuators.
- The green POWER light on the Circuit Monitor Panel is illuminated.
- None of the TROUBLE lights on the Circuit Monitor Panel are illuminated.

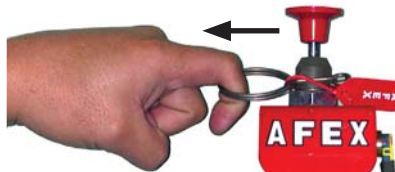


- The Circuit Monitor Panel's audible alarm is silent.
- There is no visible damage to any of the following components:
 - The agent tanks and mounting brackets
 - Hose and hose fittings
 - Detection components
 - Actuators and mounting brackets
 - Nozzles
- The fire suppression system components are not in contact with other parts of the machine.
- The portable fire extinguisher is charged and in its proper place.
- Any required repairs to the machine have been made.

In the Event of a Fire

In the event of a fire, **remain calm**, and **do not panic**. The actions taken by the operator can directly affect the effectiveness of the fire suppression system as well as the overall outcome of the fire.

1. Safely bring the vehicle to a complete stop in a safe location.
2. Turn off the machine's motor and set the brake.
IMPORTANT: Failure to turn off the vehicle may:
 - Allow the pumps to feed fuel or hydraulic oil onto the fire.
 - Allow energized electrical circuits to re-ignite the fire.
 - Allow the cooling system fan to exhaust some of the A:B:C dry chemical powder, thereby reducing effectiveness.
3. Manually actuate the fire suppression system.
 - a. Remove safety pin from the actuator.



- b. Strike push knob with force. Use a closed fist or the base of your palm to generate the most force.
NOTE: The firing mechanism and/or remote actuator may not always be mounted in a vertical orientation.



IMPORTANT: Even if your system is equipped with an automatic actuation package, DO NOT wait for the system to automatically actuate! Actuate the system manually as soon as you are safely parked with the engine off.

(continued on next page)

4. There will be a noise from the release of the nitrogen gas.
5. The agent(s) will be discharged into the protected area of the machine. An A:B:C dry chemical powder discharge will be visible as a large yellow cloud, a liquid agent discharge will not be visible from outside the protected area.



NOTE: Breathing the A:B:C dry chemical is not toxic, however it may cause temporary irritation to the eyes, skin, or respiratory system.

6. Exit the machine and move to a safe distance away from the machine.
7. Standby with a portable fire extinguisher to make sure that any smoldering debris has been extinguished and there is no fire re-ignition.
8. Call your local fire department, and site supervisor and/or maintenance department to alert them to the situation and follow any applicable fire response procedures.
9. In the event of fire re-ignition or suppression only, additional fire fighting equipment will be necessary to ensure fire extinguishment.

After the Fire is Out

1. Use water or compressed air to clean the equipment.
2. Determine the cause of the fire and make the required repairs.
3. Contact your local **AFEX** distributor to schedule a service and recharge of your fire suppression system.

IMPORTANT:

DO NOT place the vehicle back in service until it has been repaired and the cause of the fire has been determined and rectified.

DO NOT place the vehicle back in service until the fire suppression system has been serviced and recharged.

Routine Fire Suppression System Maintenance

AFEX fire suppression systems are designed and built to withstand adverse environmental and operating conditions; however, periodic inspection and maintenance is necessary to insure that the system is fully operational when required.

AFEX fire suppression systems are to be installed, inspected, maintained, and tested in accordance with NFPA 17, the National Fire Protection Association's Standard for Dry Chemical Fire Extinguishing Systems. It is the responsibility of the owner to make sure the required daily, monthly and semiannual inspection and maintenance procedures are performed.

This standard requires the following:

1. DAILY INSPECTIONS

- Check the tubing, nozzles, nitrogen cartridges, and other system components for loose mountings or obstructions. Tighten as required.
- Check the sensors and wiring for damage, broken wires or broken connections. Repair as required.
- Ensure that all manual actuation rods are secured with a safety pin and seal.
- Ensure that portable fire extinguishers are available and fully charged.
- Check that any oil leaks or electrical problems on the vehicle are corrected.
- Remove all debris accumulation from the vehicle's protected areas.

2. THIRTY (30) TO NINETY (90) DAYS INSPECTION

On a monthly basis, this inspection shall include verification of the following:

- That the extinguishing system is in its proper place.
- The manual actuators are unobstructed.
- The tamper indicators and seals are intact.
- The maintenance tag or certificate is in place.
- No obvious physical damage or condition exists that might prevent operation.
- Nozzle covers are intact and undamaged.

3. SEMIANNUALLY

(To be performed by a trained service technician)

- Examine the dry chemical agent.
- Examine all detectors, nitrogen cartridges, agent tanks, actuators, hose assemblies, tubing, nozzles, alarms, and all auxiliary equipment.
- Verify that the agent distribution network is not obstructed.
- Ensure the fire hazard has not changed.

4. INTERVALS NOT TO EXCEED TWELVE (12) YEARS

- All hose assemblies shall be hydrotested to the following pressures:

Actuation hose 1250 psi

Distribution hose 565 psi

(continued on next page)

- The agent tank(s) shall be hydrotested to the following pressures:

PN A200720	20 Lb. Dry Chemical Agent Tank	585 psi
PN A200505	30 Lb. Dry Chemical Agent Tank	585 psi
PN A202000	60 Lb. Dry Chemical Agent Tank	585 psi
PN A200507	125 Lb. Dry Chemical Agent Tank	520 psi
PN A200511	15 Gallon Liquid Agent Tank	520 psi
PN A201000	5 Gallon Liquid Agent Tank	585 psi

In addition to NFPA requirements, the DOT requires:

INTERVALS NOT TO EXCEED TEN (10) YEARS

- All nitrogen cartridges larger than 2 oz. shall be hydrotested.

In addition to the previously mentioned inspections, **AFEX** requires the following supplemental maintenance:

1. INTERVALS NOT TO EXCEED FIVE (5) YEARS

- Replace the electric actuator, PN A709500. (automatic systems only)
- Replace the liquid agent, PN A200515. (liquid agent systems only)
- Hydrotest or replace hoses.

2. INTERVALS NOT TO EXCEED TEN (10) YEARS

- Replace all 1 oz. (PN A320000) and 2 oz. (PN A360000) nitrogen cartridges.

IMPORTANT: Make sure the machine is off before inspecting or servicing the fire suppression system. Always wear the proper safety equipment.

Maintenance Interval Considerations

Based on your local environmental and/or operating conditions, system inspection and maintenance services may be required in shorter intervals than those previously described. In our experience, a complete inspection every 3-4 months or 1,000-1,200 operating hours (whichever comes first) is optimal for ensuring the system is fully operational. Please consult with your local service provider and local authority having jurisdiction to determine an appropriate inspection and maintenance interval for your systems

Per NFPA 17, system inspections and recharges should be performed by a factory trained **AFEX** system technician. Procedures for inspection, maintenance and recharge can be found in the *System Inspection and Recharge Instructions*, available from **AFEX**.

Choosing a Service Provider

We recommend that you work with your local **AFEX** distributor or service agent. If you don't know who your local **AFEX** distributor is, please contact our office to find out.

Regardless of who you choose to perform your service, they should:

- Be experienced and comfortable working on fire suppression systems for heavy equipment in heavy duty environments – not a general fire protection service provider for buildings, restaurants or simply, portable extinguishers.
- Have factory training for installation and maintenance on the products they carry.
- Maintain an inventory of recharge and repair parts for prompt installation and service.
- Respond promptly with on-site service.
- Provide training and help develop a fire response plan.

Your local **AFEX** representative is:



Warranty

AFEX warrants its Fire Suppression System against manufacturing defects for six (6) months from the date of purchase (hereinafter “the warranty period”) by the user **PROVIDED THAT** the user gives written notice to **AFEX** within thirty (30) days of discovery of such defect and within the warranty period and **FURTHER PROVIDED THAT** if **AFEX** so instructs, such part is promptly returned, freight prepaid, to **AFEX**. In the event proper notice of defect occurs within the warranty period, **AFEX** will repair and/or replace any part which, in its opinion, contains a manufacturing defect and has not been tampered with or misused or exposed to corrosive conditions. **IN NO CASE SHALL AFEX BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES OR FOR LOSS OF PROFITS.**

Disclaimer of All Other Warranties

THE EXPRESSED WARRANTY ABOVE IS THE EXCLUSIVE REMEDY AND IS IN LIEU OF ALL OTHER WARRANTIES WHETHER EXPRESS OR IMPLIED. AFEX SPECIFICALLY EXCLUDES ANY WARRANTIES OF MERCHANTABILITY AND ANY WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE. AFEX does not assume, or authorize any person to assume for it, any other liability in connection with the sale of its products.

Limitation of Liability

Notwithstanding the Warranty and Disclaimer of All Other Warranties, **AFEX** limits any liability it may have to the purchase price of the fire suppression system.



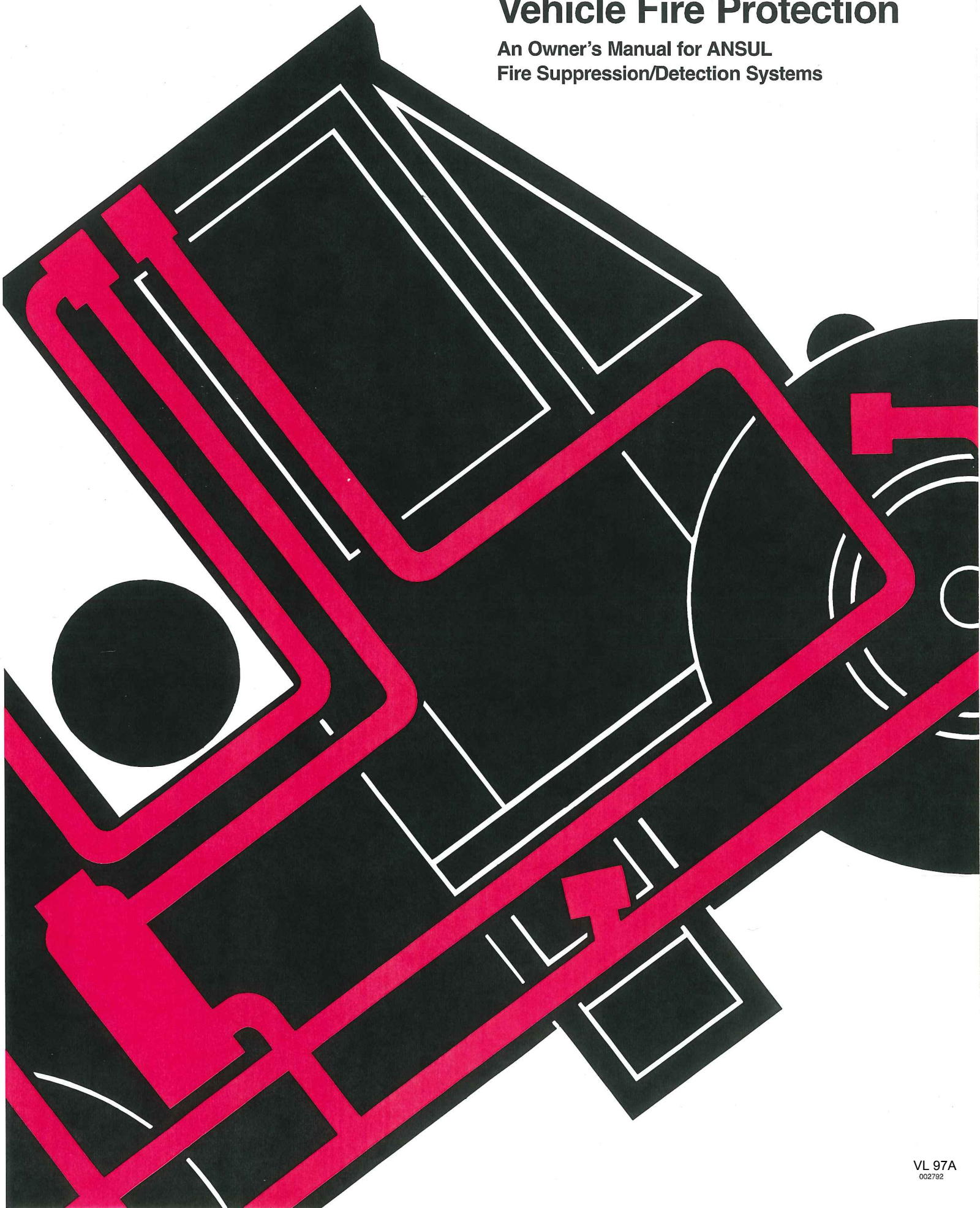
AFEX
FIRE SUPPRESSION SYSTEMS

5808 LEASE LANE
RALEIGH, NC 27617
TEL (919) 781-6610 FAX (919) 787-3915
WWW.AFEXSYSTEMS.COM

SM-4-OOM-B

Vehicle Fire Protection

An Owner's Manual for ANSUL
Fire Suppression/Detection Systems



Off-road vehicles do have fires

Statistics show that off-road vehicles burn...with alarming frequency. These vehicles are susceptible to fire for several reasons. They often operate steady for several hours at a time (sometimes around the clock). They use flammable liquids – lubricating oil, gasoline, diesel oil, greases and hydraulic fluids – in their normal operation. They also generate heat – from engine blocks, manifolds, turbochargers and brake systems – which can ignite these flammable liquids and debris.

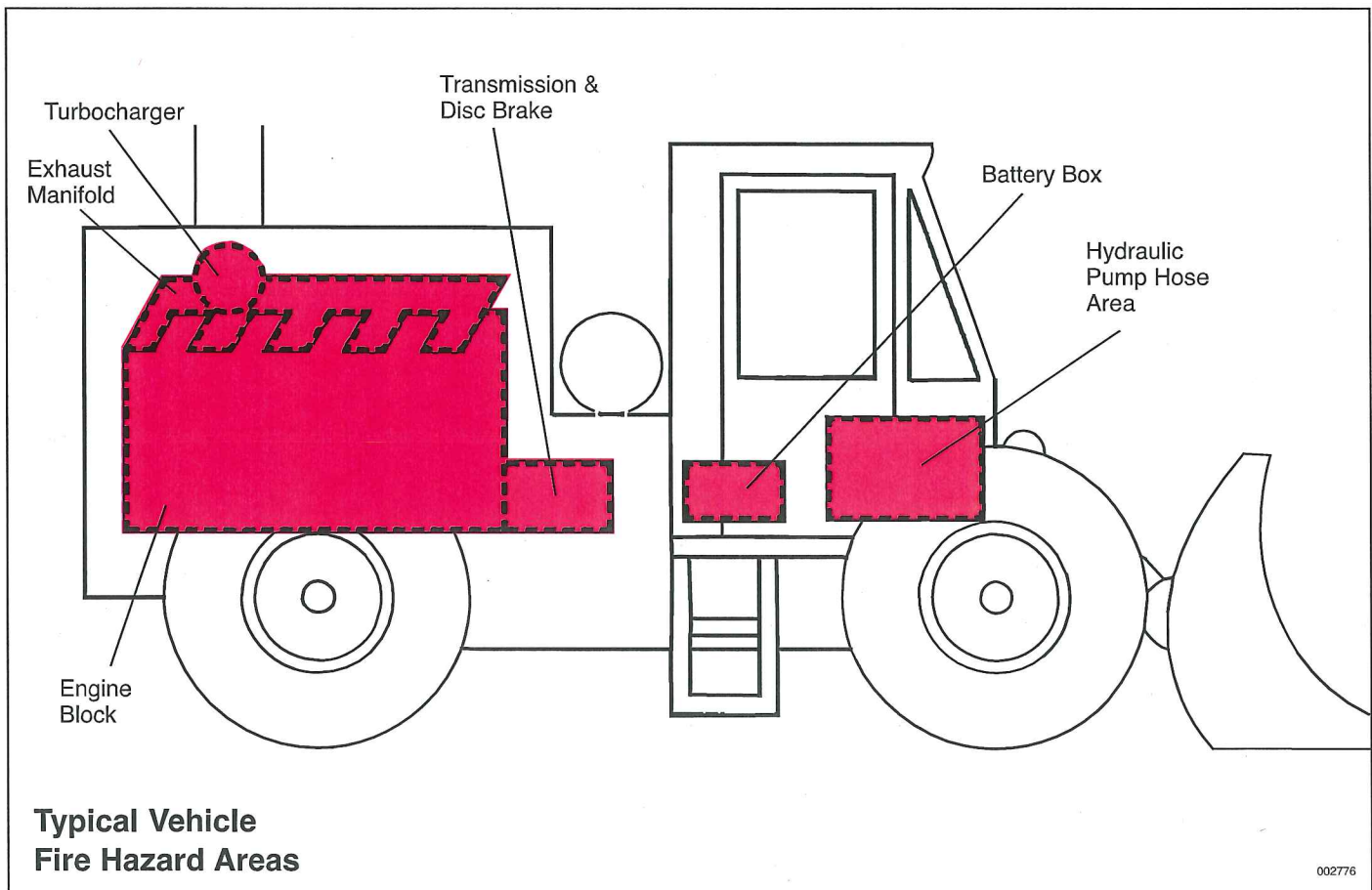
Since the passage of the federal and state clean air acts, many vehicles, including most busses operated by mass transit authorities and state agencies, have been converting to cleaner burning fuels such as LPG, LNG, and CNG instead of gasoline or diesel fuel. Use of these fuels is an essential component of improving our environment, but their use raises the possibility of dangerous gas leaks.

When fire breaks out, it can result in expensive repair or replacement of valuable equipment, costly downtime or loss of business continuity. Worse yet, it can mean serious personal injury to vehicle operators or passengers.

Insurance companies are well aware of these facts. That's why insurance rates are skyrocketing.

As the owner of a vehicle equipped with an ANSUL Fire Detection/Suppression System, you've taken an important step in facing the fire problem. You are dramatically reducing your potential fire loss and helping to ensure personnel safety.

This owner's guide has been provided to help you understand how your ANSUL Fire Detection/Suppression System works, your responsibilities for fire prevention and maintenance, and what to do in case of fire. In no way is this guide intended to provide detailed installation instructions. Should you have any questions or require assistance, contact your nearest authorized ANSUL products distributor or ANSUL Technical Services.



SAFETY PRECAUTIONS

The fire system described in these materials is a suppression system only and is not designed or intended to extinguish all fires, particularly when unusual amounts of combustible materials and an ample oxygen supply are present. It is extremely important that alternative firefighting equipment be available in case the system does not totally extinguish a fire.

Use extreme care to prevent the accumulation of debris, combustible materials and fluids which could intensify the fire or cause it to spread to areas where there was no previous potential for fire.

If modifications are made to the equipment being protected or if the fire detection and/or suppression system is disconnected for any reason, make certain the fire equipment is immediately inspected and tested by an authorized ANSUL vehicle systems distributor.

If an automatic fire detection and actuation system has not been supplied or has been disconnected, system actuation and discharge will not occur unless the fire suppression system is manually actuated. Reliance on a manual release system usually results in a slower reaction to fire.

Your role in protecting your vehicle from fire

Your ANSUL Fire Suppression System is custom-designed to protect specific hazard areas on your vehicle. It's been carefully engineered for reliability and built to the highest quality standards. Every component has been tested to ensure long life and dependable performance.

With proper maintenance, your ANSUL Fire Suppression System should give you years of fire protection.

The main purpose of the manual, however, is to explain the most basic form of fire protection – fire prevention. It outlines steps you can take to prevent a disastrous fire. Precautions which can greatly reduce the risk of serious fire damage.

Fire prevention on vehicles relies upon two basic factors:

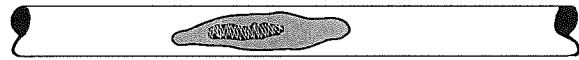
1. Inspection and preventative maintenance at points where fires are most likely to start – engine blocks, electrical systems, turbochargers, exhaust manifolds and brake systems.
2. Regular cleaning of all areas where flammable materials such as fuel, oil, grease, hydraulic fluid and combustible debris may collect.

Vehicle Fire Prevention Maintenance

The following is a suggested daily maintenance outline which can help reduce the risk of fire on your vehicle.

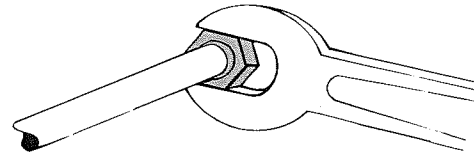
CAUTION: Take care during vehicle maintenance, cleaning, or welding. To avoid unintentionally setting off the system and the discharge of agent, do not cut, pinch, or apply heat exceeding 200 °F (93 °C) to the detection lines of the system.

1. Check all oil, hydraulic fluid and gas lines for cuts, abrasions or undue wear. Replace as needed.



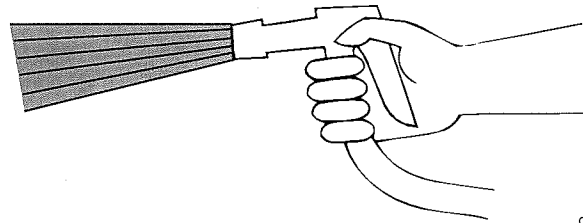
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2. Inspect all oil, hydraulic and gas line fittings for tightness. Clean off all residue and tighten.



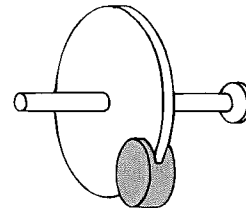
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3. Inspect and clean engine area. Depending upon the operation of the vehicle, use water or steam to clean it. Schedule cleaning for the end of the work shift when heat buildup may occur after the engine is shut down.



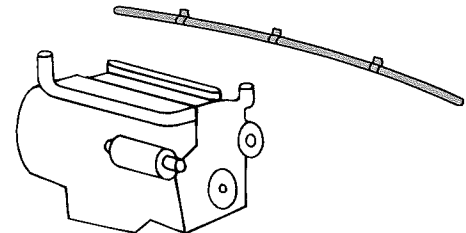
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4. Check braking system for proper adjustment – especially if brakes overheat when not engaged.



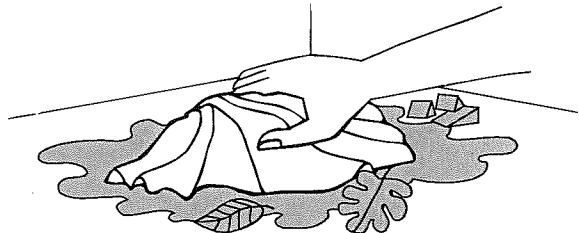
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5. Check all possible ignition points (engine block, exhaust manifolds, turbochargers, etc.). Make sure oil, hydraulic fluid and gas lines are not in contact with these ignition points.



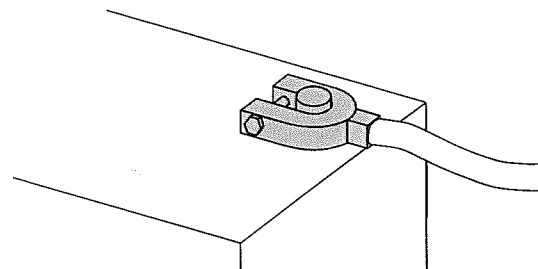
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6. Clean vehicle of all combustible debris – dry vegetation, grain particles, coal dust, etc. Also, remove any oil and fuel drippings.



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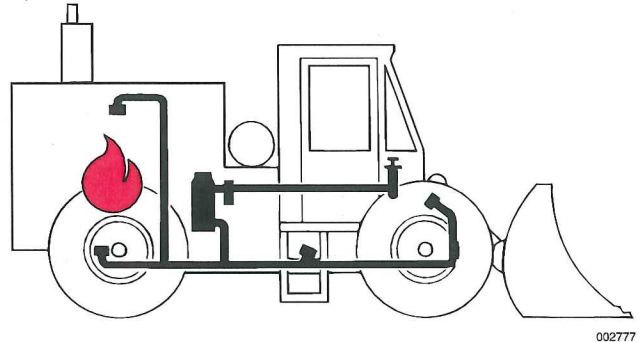
7. Check all electrical lines and connections for tight fit, wear or abrasion. Replace any defective electrical equipment or wiring.



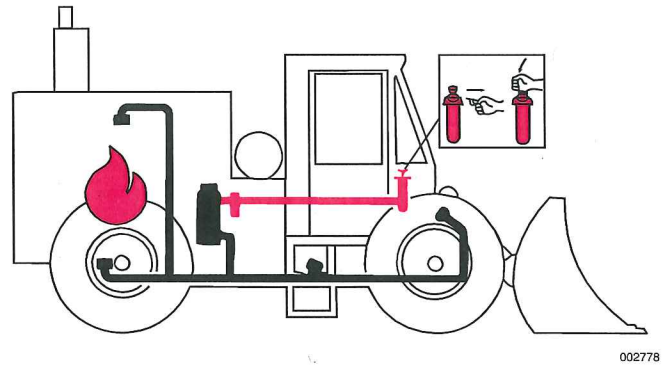
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How your ANSUL Fire Suppression System works . . . manually

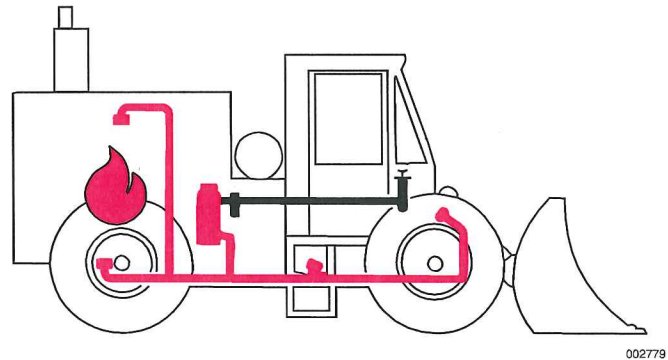
1. A fire starts in the protected area. Equipment operator should bring equipment to a complete stop, set the brake, and turn off the engine.



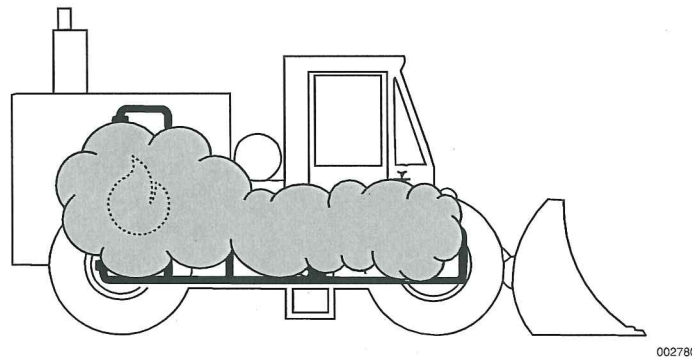
2. Equipment operator pulls the ring pin and strikes the plunger on the manual actuators. Pressure from the actuator causes the ANSUL Fire Suppression System to actuate.



3. Expellant gas pressure "fluidizes" the dry chemical extinguishing agent and propels it through distribution hose.



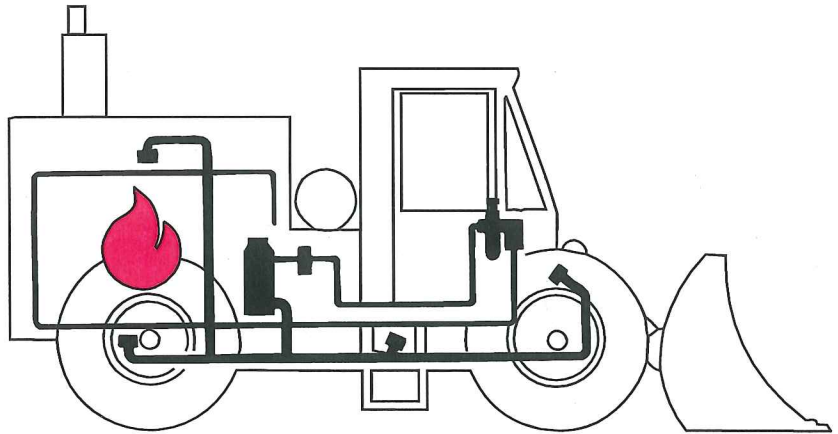
4. Dry chemical extinguishing agent is discharged through fixed nozzles into protected areas, suppressing the fire.



And you can have automatic 24 hour protection with ANSUL CHECKFIRE Detection and Actuation Systems . . .

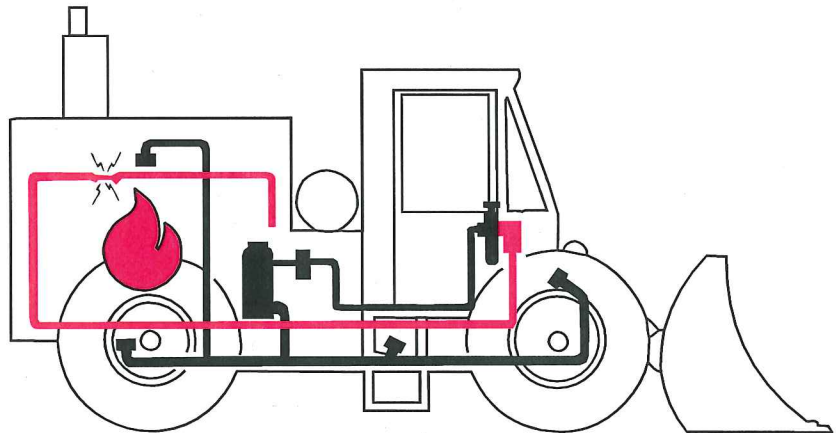
How the system works with optional CHECKFIRE Electric Detection and Actuation

1. A fire starts in the protected area.



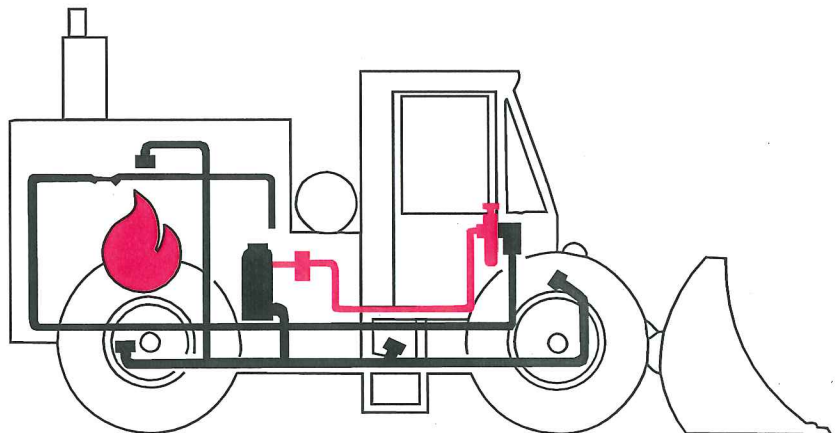
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2. Linear, spot detectors, or Triple IR flame detectors signal the system control module indicating that a fire has started in the protected area.



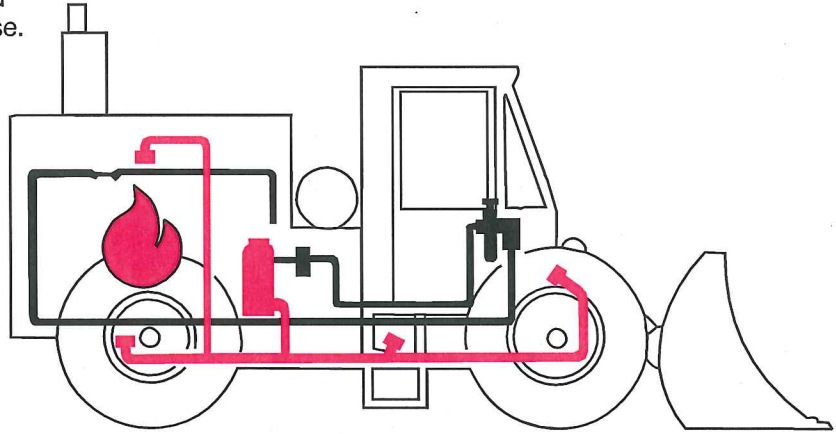
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3. The Control Module actuates the fire suppression system. The module will also provide time delay, shut down functions and activation of auxiliary vehicle components in accordance with your installation.



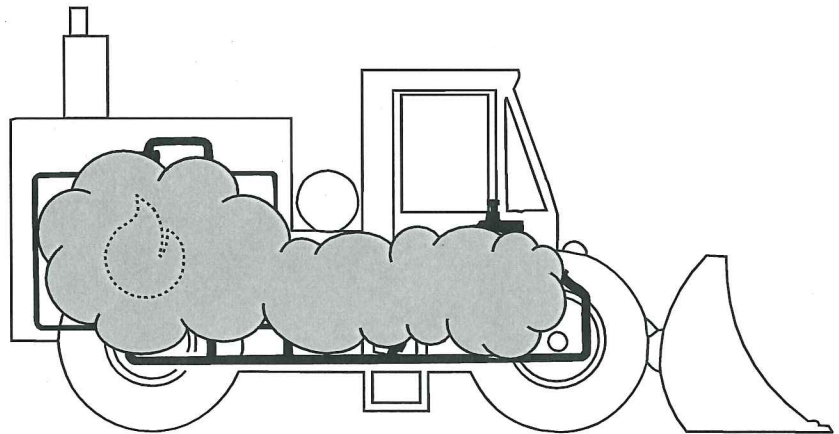
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-
4. Expellant gas pressure “fluidizes” the dry chemical extinguishing agent and propels it through the distribution hose.



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-
5. Dry chemical extinguishing agent is discharged through fixed nozzles into protected areas, to suppress the fire.



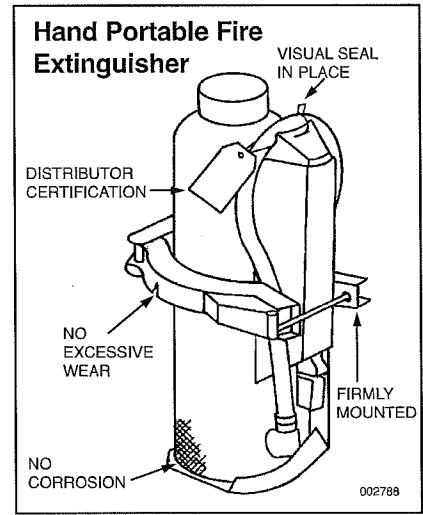
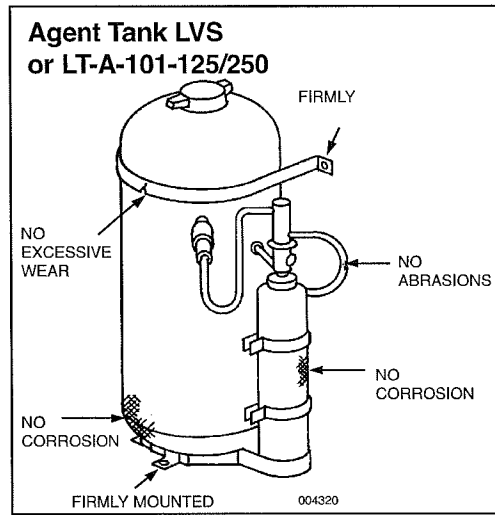
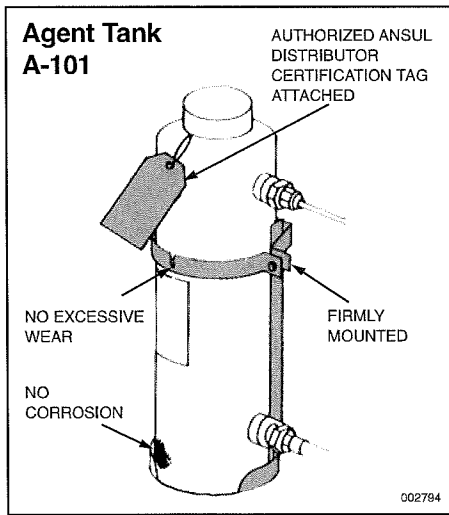
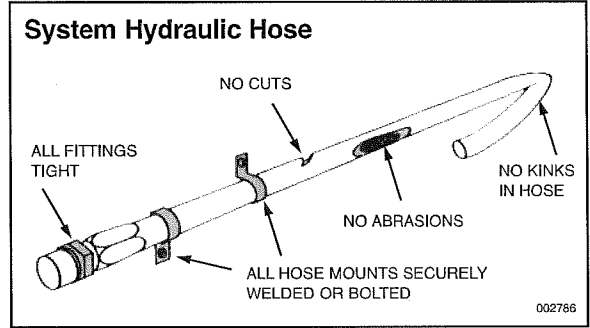
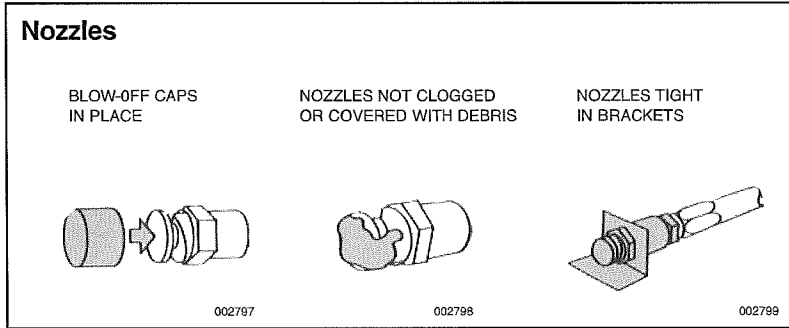
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Optional LVS (Twin Agent) Fire Suppression System

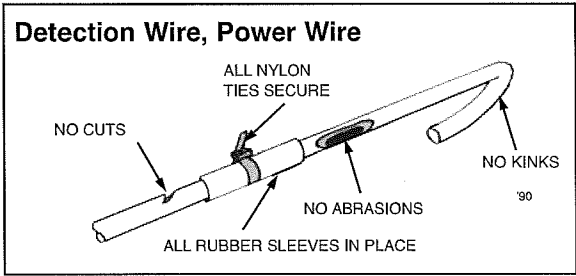
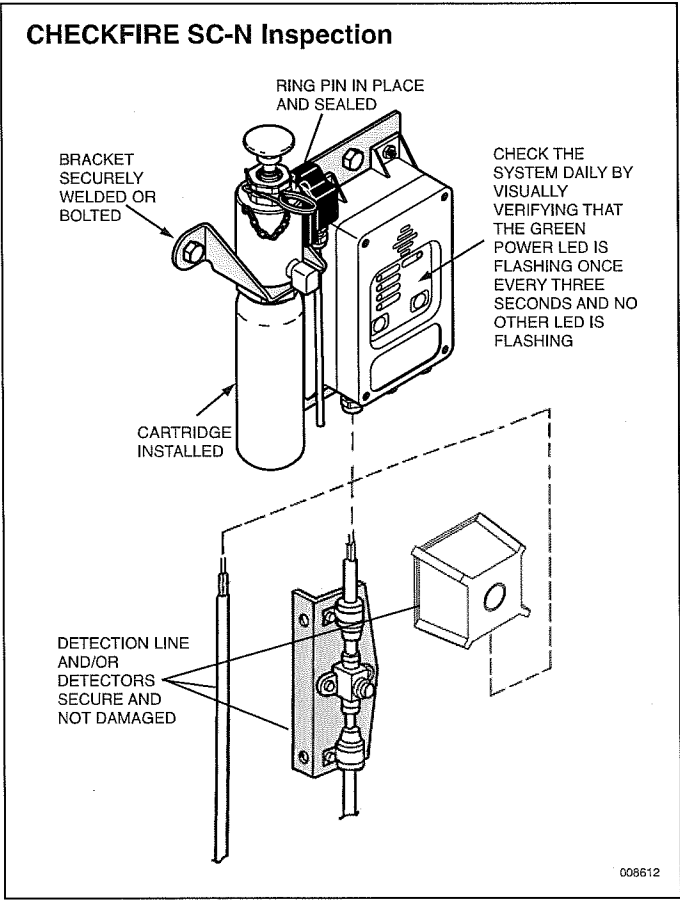
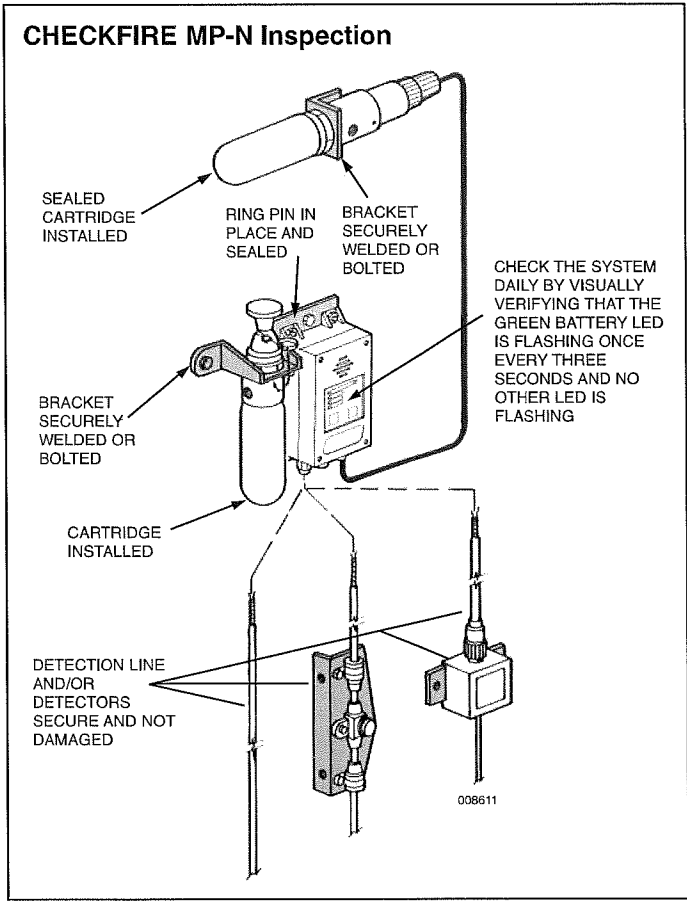
Along with dry chemical fire suppression system protection, some vehicles, because of their size, require an additional type of system. This type of system is called a twin agent system. An ANSUL LVS, Liquid Agent System, is designed to discharge wet chemical into the protected hazard areas simultaneously with the dry chemical discharge. The addition of the wet chemical produces a cooling effect onto the flammable fuel and the surrounding surface areas. The wet chemical can flow into hard to reach areas where fuels may have flowed into.

Make sure your ANSUL Fire Suppression System is

The ANSUL Fire Suppression System is your second line of fire defense in case your fire prevention efforts are not enough. However, in order to perform properly, your ANSUL System requires periodic inspection and maintenance.



kept in good working order.



Provide for vehicle modification

Your ANSUL Fire Suppression System was custom designed and installed on your vehicle to protect specific hazard areas from fire. Should you add accessory equipment to your vehicle at a later date, or make major mechanical modifications, you may be reducing the capabilities of the ANSUL Fire

Suppression System. When such modifications are made, contact your ANSUL distributor. He can reevaluate your ANSUL System to ensure it protects all hazard areas from fire.

Provide for periodic maintenance

Periodic maintenance is essential to ensure that your ANSUL Fire Suppression System is operational. Contact your ANSUL distributor for periodic follow-up, in-depth inspection and maintenance.

Protect against fires outside of the hazard area

Hand portable fire extinguishers are an effective way to suppress fires which may occur away from the vehicle, or in areas not protected by the ANSUL Fire Suppression System. Your ANSUL distributor can recommend the proper size, type and placement of hand portable extinguishers and train your personnel in their operation, inspection and maintenance.

Should fire occur in an area not protected by the ANSUL Fire Suppression System, a hand portable fire extinguisher should be employed as follows:

- 1.** Shut off the vehicle's engine and set brakes.
- 2.** Evacuate the vehicle and secure a hand portable fire extinguisher.
- 3.** Approach the fire from the upwind side.
- 4.** Actuate the hand portable fire extinguisher per instructions printed on the extinguisher's nameplate.
- 5.** Once the fire is extinguished, stand by in case the fire reflash.

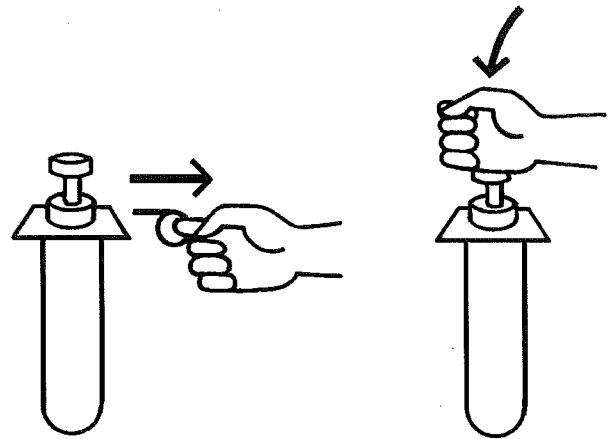
In the event of a fire on your vehicle

To manually operate system:

1. Shut off the vehicle

2. Set the brakes

3. Pull the ring pin on manual actuator and strike the red button



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4. Evacuate the vehicle

5. Stand by with a fire extinguisher

Inspection and Maintenance Record

Date	Authorized ANSUL Distributor	Recharge	Inspection	Action Taken

Your Authorized ANSUL Distributor

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