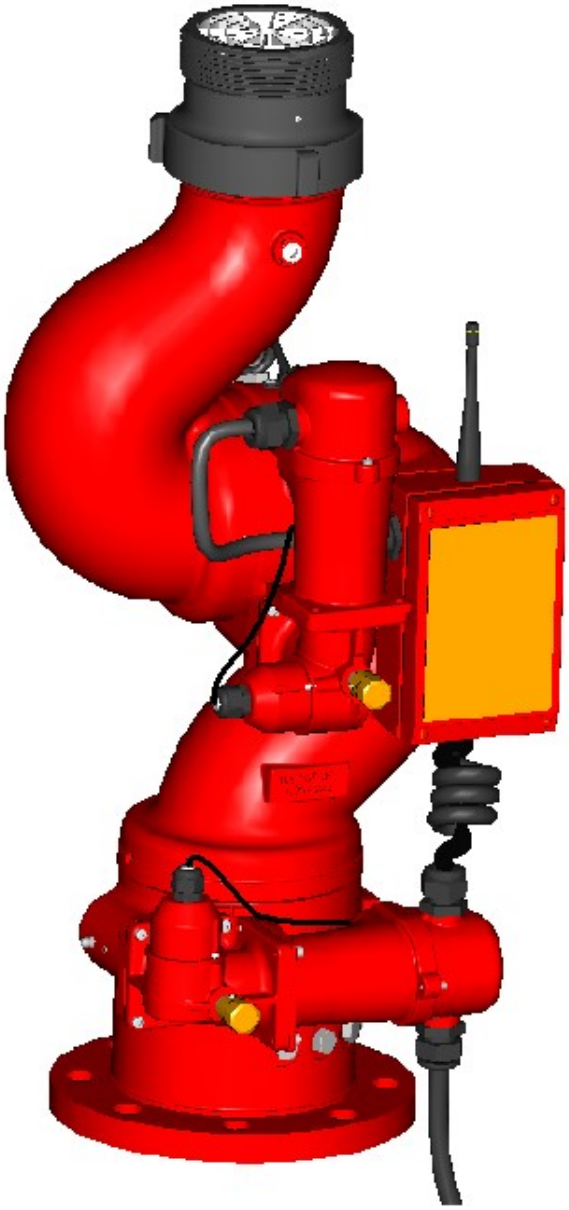
Installation, Operating, & Maintenance Instructions



Model 8294-07

Scorpion® RF

Monitors

98291073 Rev. A

1-574-295-8330
www.elkhartbrass.com

ELKHART BRASS
FIRE FIGHTING EQUIPMENT A SAFE FLEET BRAND

System Information:

Monitor Serial Number: _____

Monitor Accessories (nozzle gallonage and type, types of transmitters, Etc.) :

_____

_____

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TABLE OF CONTENTS

I. PRODUCT SAFETY

Important:

Before installing and operating this equipment, read and study this manual thoroughly. Proper installation is essential to safe operation. In addition, the following points should be adhered to in order to ensure the safety of equipment and personnel:

1. All personnel who may be expected to use this equipment must be thoroughly trained in its safe and proper use.

2. Before flowing water from this device, check that all personnel (fire service and civilian) are out of the stream path. Also, check to make sure stream direction will not cause avoidable property damage.

3. Become thoroughly familiar with the hydraulic characteristics of this equipment, and the pumping system used to supply it. To produce effective fire streams, operating personnel must be properly trained.

4. Whenever possible, this equipment should be operated from a remote location. Do not needlessly expose personnel to dangerous fire conditions.

5. Open water valve supplying this equipment slowly, so that the piping fills slowly, thus preventing possible water hammer occurrence.

6. After each use, and on a scheduled basis, inspect equipment per instructions in section VII.

7. Any modifications to the enclosure will destroy the NEMA 4 rating and void warranty coverage of the enclosure and all components within.

II. SYSTEM FEATURES

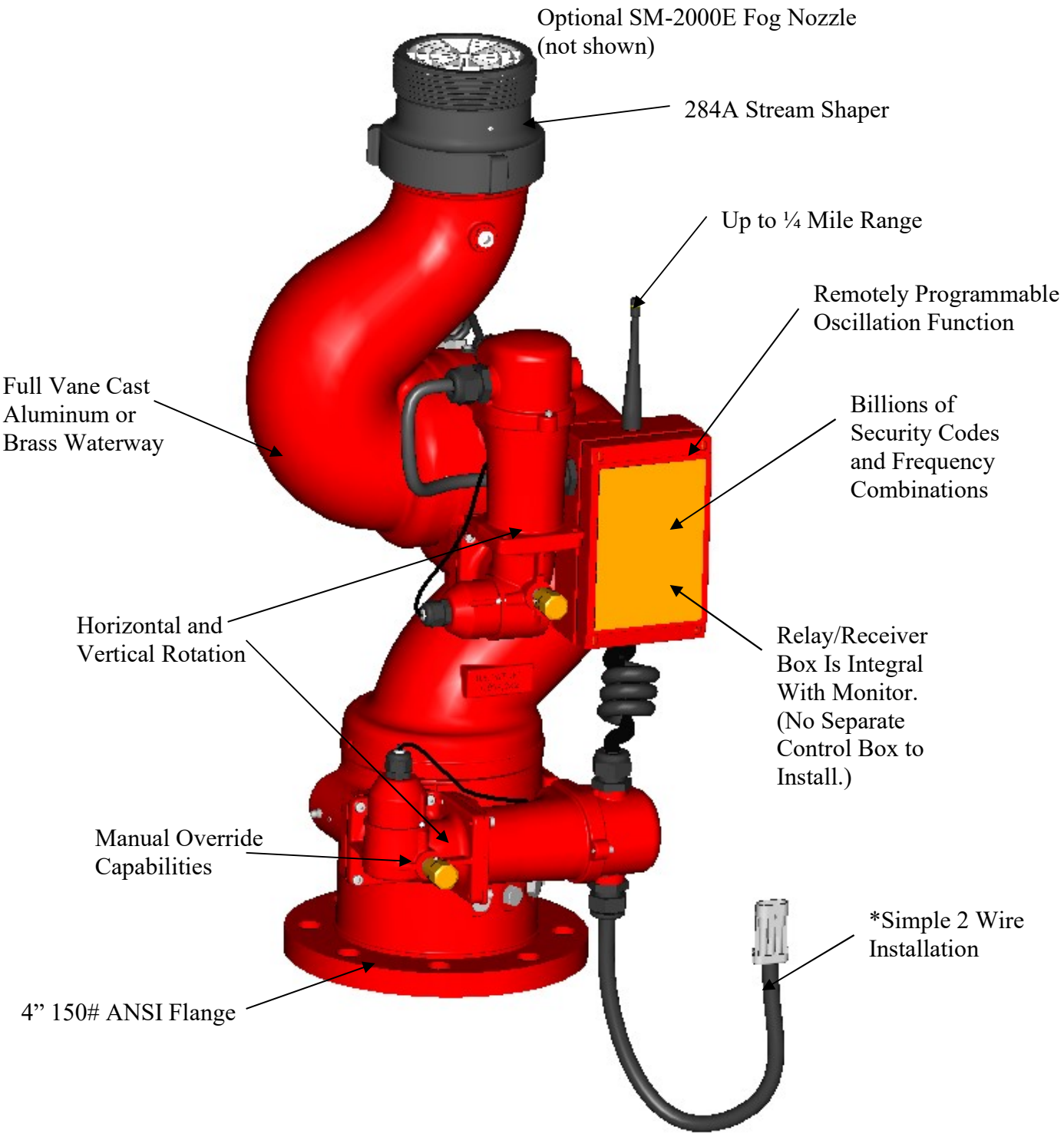

Figure 1

8294-07 Scorpion® RF w/284-A Stream Shaper

* 3rd wire provided for optional customer provided stow indicator lamp.

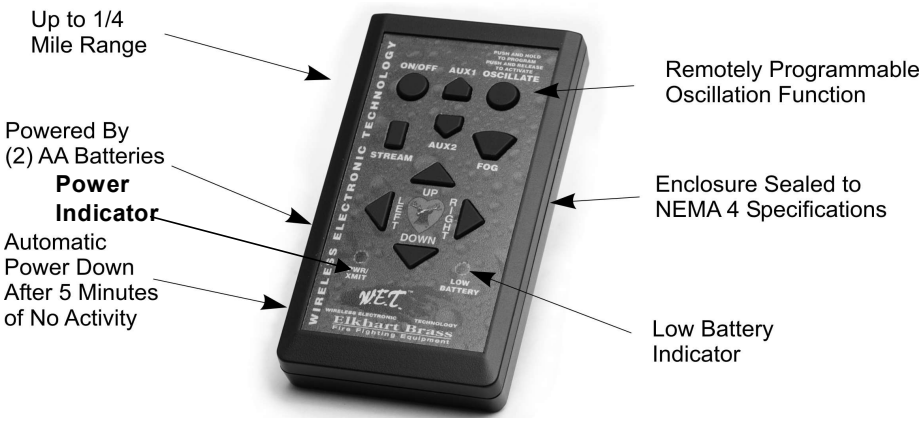

Figure 2
81282001 Handheld RF transmitter Features

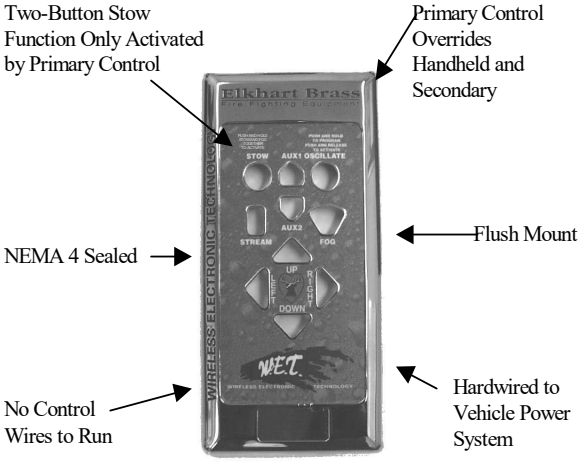

Figure 3
81327011 Primary Panel Mount
Control Features

III. SYSTEM COMPONENT DESCRIPTIONS

8294-07 Scorpion RF Monitors

(Figure 4) The 8294-06 Scorpion is a cast aluminum monitor with 4" waterway. The waterway contains a central vane to minimize large-scale turbulence and provide superior fire streams. Monitor water supply connection is a 4 inch 150 lb. ANSI pattern flange. The discharge nozzle connection is 3-1/2 inch National Hose thread. Nozzle stream direction is controlled by two permanent magnet type planetary gear motors, one controlling rotation about the axis of the water inlet, and the other controlling nozzle elevation and depression. Right angle gear cases between the gear motor and the monitor allow for convenient manual override of the electric motors in the event of a power failure during firefighting operations. All gearing is enclosed within the monitor housings.

The maximum monitor flow capacity is 2000 gallons per minute. Monitors can be supplied with the SM-1250E X-STREAM™ constant pressure (automatic) type master stream nozzle. This nozzle has a flow range of 300 to 1250 gallons per minute at 75 psi and has an electric drive mechanism for RF control of the spray pattern from a straight stream to wide fog. A similar nozzle, the SM-2000E, provides a flow range of 500 to 2000 gallons per minute at 80 psi. For optimum straight stream performance, stream shapers are provided as part of the monitor and nozzle system. Solid stream nozzles are also available for use with these monitors.

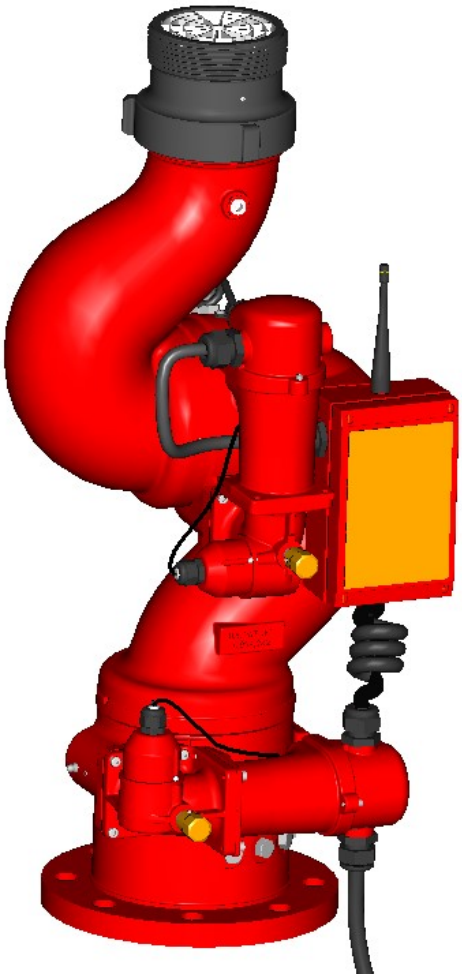

Figure 4
8294-06 Monitor with 284-A and SM-2000E

A. RF Receiver/Control Module

The monitor control circuit uses a state-of-the-art PIC (Programmable Integrated Circuit) chip design. This device allows numerous control features while keeping circuit board size to a minimum. Relays within this box provide motor reversing control for the Up/Down, Left/Right and Straight Stream/Fog functions.

All functions are sent to the RF Receiver/Control Module via an encoded radio frequency link. The radio link reduces the number of control wires down to just the two power leads, dramatically simplifying the installation procedure. The link also allows wireless control up to ¼ mile away using a battery powered handheld transmitter.

An encoder, part of the horizontal motor, provides horizontal motion control feedback. The counter in combination with the PIC controller enables the monitor to oscillate between programmable endpoints that are set directly from the remote transmitter.

The ten turn potentiometer enables the PIC controller to remember a home or stow position. This stow position can be used as a storage position for the monitor during transport. Once the "Stow" feature is activated, the monitor will automatically return to the home or stow position.
The control system also provides secondary motor protection with the use of electronic current sensing circuitry. If the monitor encounters an obstruction before reaching a limit, this circuitry quickly senses motor stall current and automatically shuts off power to the motor. As soon as the control switch is released, the circuit resets to allow subsequent operation of the monitor.

⚠ Caution:
Any modification of the enclosure will destroy the NEMA 4 rating and will void the warranty coverage of the RF Receiver/Control Module.

The following additional functions/features are provided in the RF Receiver/Control Module:

Reverse Polarity Protection: If battery connections are reversed, this feature prevents power from being applied to circuits, and prevents damage to electronic components.

Circuit Board Moisture Protection: The circuit board and circuit components are protected from moisture by an acrylic resin conformal coating. All relays have sealed covers.

B. RF Transmitters

The 8294-07 monitors use W.E.T. (Wireless Electronic Technology), an innovative wireless radio link, to send all commands from the RF transmitters to the monitor controller. This new wireless link gives the operator the ability to view the discharge stream and target from virtually any point of view within ¼ mile of monitor.

1. 81282001 Handheld RF Transmitter

(Figure 5) A sealed handheld RF transmitter contains all the controls necessary for operation of the monitor. The handheld remote allows the operator to direct the monitor from a significantly improved point of view. With the wireless remote, the operator can view the stream from the side and confirm that the stream is hitting its target. Separate push button switches are provided for up, down, left, right, fog, and stream functions. The handheld remote has user selectable frequency and security codes that allow multiple monitors to operate on the same fire ground at the same time. The remote has an automatic power down feature that will shut down the power after 5 minutes of no activity. As an additional power saving feature the radio signal is only transmitted while a button is pushed. The handheld remote case has a NEMA 4 rating.

Figure 5
81282001 Handheld RF Transmitter

2. 81327011 Primary Panel Mount RF Transmitter

(Figure 6) The fixed RF transmitter sends signals to the monitor via an encoded radio signal, requiring no wires between the RF transmitter and the monitor. It is powered by the 12V or 24V vehicle electrical system. The faceplate is intended for a flush mount onto the pump or aerial ladder control panel. Separate sealed push button switches are provided for up, down, left, right, fog, and stream functions. This fixed RF transmitter provides two-button access to the Stow feature. It will override any low-priority controls, allowing the apparatus operator to retain ultimate control over the monitor.

Figure 6
81327011 Primary Panel Mount RF Transmitter

Caution: Any modification of the enclosure of any of the transmitters or switch box control will destroy the NEMA 4 rating, and will void the warranty coverage of the RF transmitter. Ensure all O-ring and gaskets are properly installed when closing receiver or controller enclosures.

IV. CONTROL SYSTEM SPECIFICATIONS

Handheld Transmitter Specifications

- Input power — 2 AA batteries (Alkaline recommended)
- Output power — Meets FCC part 15 requirements for license free operation
- Transmitter dimensions — 6" x 3 1/4" x 1 3/8"
- Transmitter weight — 10 ½ oz.
- Operating temperature range — -40ºF to 150ºF (-40ºC to 65ºC)
- FCC ID — QT8PTSS2003

Fixed Transmitter Specifications

- Input power — 12 VDC (11VDC to 14 VDC)
- Output power — Meets FCC part 15 requirements for license free operation
- Transmitter dimensions — 7 5/8" x 3 7/8" x 2 3/8"
- Operating temperature range — -40ºF to 150ºF (-40ºC to 65ºC)
- FCC ID — QT8PTSS2003

Receiver Specifications

- Power requirements — 12VDC (11VDC to 14VDC) at the controller under full load
- Control current — 0.07 A*
- Operating temperature range — -40ºF to 150ºF (-40ºC to 65ºC)

Table 1

Motor Current Specifications

Monitor	Left/Right	Up/Down	Nozzle
Run I	1.0-1.5 A* at 200 psi	1.0 A* at 200 psi	0.5 A
Stall I	33.3 A	33.3 A	NA
Current Trip Point	13 A	10 A	4 A

Shock:

- 30 G's (55 Hz. @ .2 inch double amplitude).

Vibration:

- 15.5 G's (55 Hz. @ .05 inch double amplitude) continuous operation.

Drop Test:

- The handheld transmitter must meet operating specifications after drop from 1-meter height onto concrete surface.

Environmental:

- All enclosures have a NEMA 4 rating (must withstand a 1 inch stream of water (65 gpm) from a distance of ten feet for five minutes, with no water entering the enclosure).

* All current ratings are at 12 volts

V. INSTALLATION INSTRUCTIONS

A. Component Mounting

1. Monitor

4” NPT Base: Apply an appropriate thread sealant to the 4” NPT nipple. Thread the monitor base onto the nipple. Install with the "straight ahead" position properly aligned.

Warning: When installing monitor on a raised face companion flange, it is critical that bolts be tightened uniformly to prevent cocking of the monitor relative to the flange or valve. If the monitor becomes cocked, (see Figure 7) the monitor cast flange base will fracture and fail when the bolts on the "high" side are tightened.

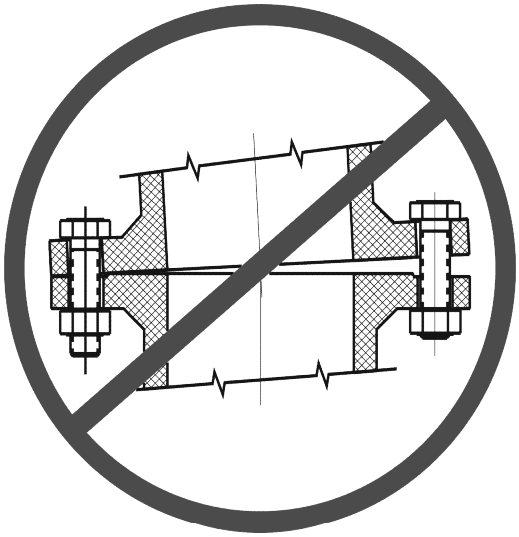

Figure 7
Improper Flange Installation

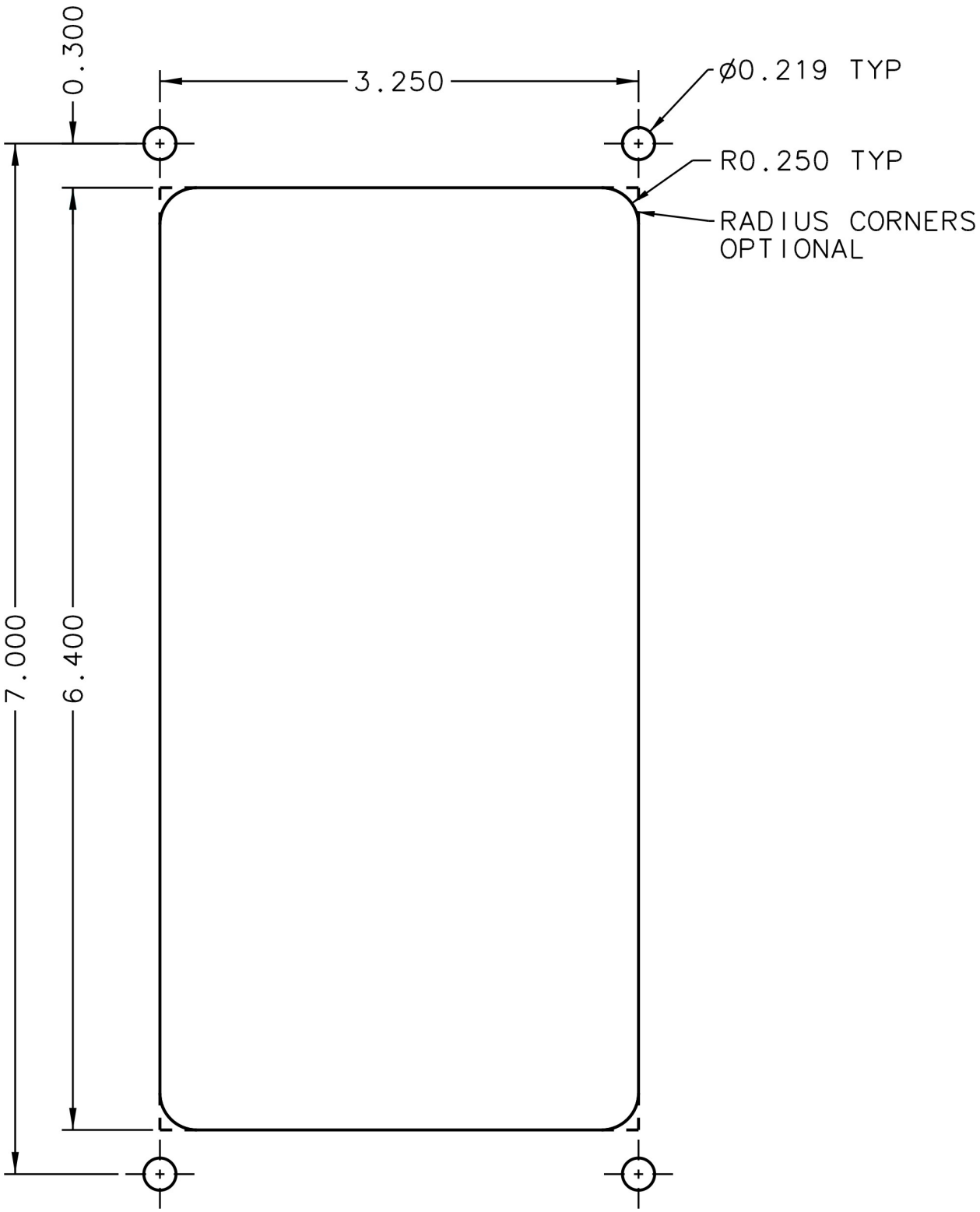

Figure 8
81327001 and 81327011 Fixed RF Transmitter Panel Template

2. Monitor Wiring

a) Place a 10A fuse for the 8294-07 monitor between the red lead (pin C) of the monitor and a switched positive power lead on the vehicle. Attach the black lead (pin A) from the monitor base to the vehicle ground.

b) The white lead (pin B) is for an optional "Stow indicator" which could be attached to a relay or LED supplied by the OEM. The circuit switches in a ground when the monitor is in a non-stowed position. – See warning at end of section A.

c) All control functions are sent to the monitor via an encoded RF signal from the RF transmitter; no control wiring is needed.

3. 81327011 Panel Mount RF Transmitter

a) Mark the panel cutout and mounting screw pattern per dimensions in Figure 8

b) Cut a rectangular clearance opening and drill four ∅0.219" (7/32" drill) holes.

c) Insert fixed RF transmitter case through panel cutout. Secure the unit to the panel with four #10-32 screws. The length of the screws should be the panel thickness plus 3/16". The screws supplied are ¼" in length. Apply Loctite #242 to the threads of the screws before tightening them.

d) Place a 1A fuse between the red lead of the RF transmitter and a switched positive power lead on the vehicle. Attach the black lead from the monitor base to the vehicle ground.

e) All control functions are sent to the monitor via an encoded RF signal from the RF transmitter.

f)

⚠ Warning:

It is up to the system designer to appropriately handle the open circuit condition of the stow signal. In the open circuit mode there is no source to turn off the stow signal load; which may lead to erroneous signal indications if not handled properly.
The stow signal is capable of sinking 250mA maximum. Exceeding this value may blow the internal fuse and the stow output will no longer be able to provide a ground. Note – Most test lights draw in excess of 1A

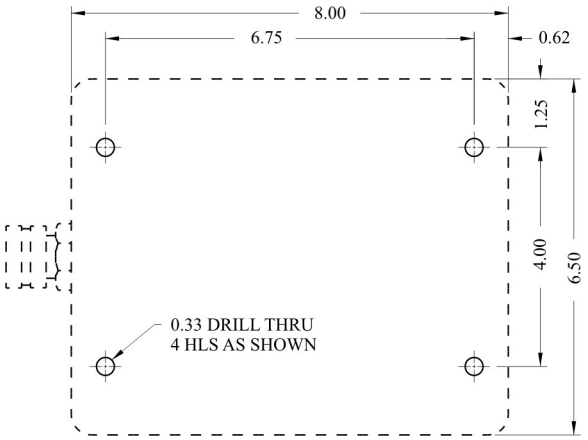

Figure 9
Mounting Hole Pattern

B. Communication Address Setup

A RF transmitter controls one 8294-07 monitor. The transmitter is digitally encoded with a security code to ensure that it does not accidentally control the wrong monitor. The receiver has a matching decoder and security code that instantaneously decodes and interprets commands. The security code is a 15-bit selectable code that is set on both the remote transmitter and the receiver.

The 8294-07 monitors are tested and shipped with a security code based upon the monitor serial number, ensuring each monitor leaves the factory with a unique code assigned to it. The security settings will normally not need to be changed. In the case of a lost transmitter or replaced control board, use the following instructions to change the security settings.

Danger: Using two W.E.T. monitors with the same, security code may cause the inadvertent control of the wrong monitor, resulting in possible property damage and injury to personnel. Using the factory specified codes will prevent this problem.

Caution: Do not pinch wires when attaching back panel to front panel of the handheld enclosure. Ensure all O-ring and gaskets are properly installed when closing receiver or transmitter enclosures.

C. RF Settings

Caution: The RF Receiver/Control Module and all transmitters' communication addresses have been set at the factory. They should not require any additional address settings.

1. RF Receiver/Control Module Settings

Remove the cover from the RF receiver/control module. SW4 (Figure 10) allows this board to be used in different product applications. The firmware has been programmed such that SW4 rotary position has no affect programming, so the dial should remain in position 1.

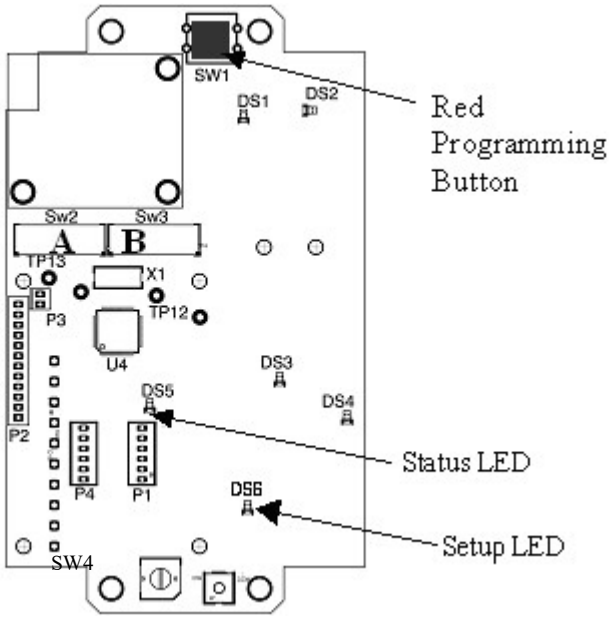

Figure 10
24263001 Receiver Layout

Caution: Do not change switch A position 1 switch position. This switch is used to set the priority setting of the transmitter and changing this switch may remove override capabilities.

2. 81282001 Handheld RF Transmitter Settings

a) Remove the battery cover from the handheld RF transmitter. Remove the four screws holding the two halves of the cover together using a #1 size Pozidriv® screwdriver (use caution with a standard Phillips screwdriver as it may eventually strip the heads of the screws).

b) Locate the security code switches on the transmitter circuit board (Figure 11).

c) Change the switches to match the settings of the RF Receiver/Control Module except switch A1. One incorrect setting will prevent the system from working.

d) Ensure the battery lead connector is securely fastened to the transmitter circuit board.

e) Check that no wires will be pinched, close the cover halves and replace the screws. Do not exceed 6 in-lbs of torque. The screws should just be snug, do not over tighten the screws, or the plastic enclosure could strip.

Caution: Do not change the switch A position 1 on any transmitter. This switch is used to set the priority of the transmitter and changing this switch may remove override capabilities.

Caution: While reassembling the handheld remote, ensure both battery and antenna leads do not become pinched.

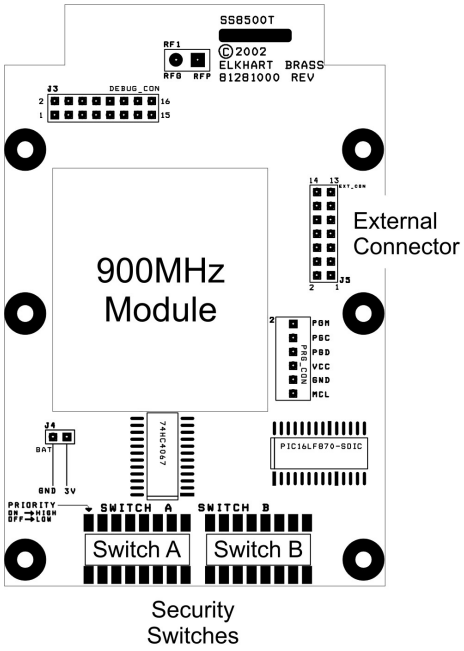

Figure 11
Transmitter Security Settings

3. 81327011 Primary Panel Mount RF Transmitters

a) Disconnect the power connector to the panel-mounted transmitter at the back of the panel.

b) Open the back cover of the transmitter after loosening the screws.

c) Remove the red and black power leads from the power conversion board and place the cover to the side.

d) Locate the security code switches on the transmitter circuit board (Figure 11).

e) Change the switches to the settings of the RF Receiver/Control Module except switch A1. One incorrect setting will prevent the system from working.

f) Reconnect the power leads. The Red lead is attached to the Positive (+) terminal; the black lead is attached to the Negative (-) terminal.

g) Close the transmitter cover and replace the screws.

h) Reconnect the power connector

Caution: While reassembling the transmitter, ensure wires and antenna leads do not become pinched.

D. Travel Limits and Stow Position Programming

Caution: To prevent damage to the monitor controller, keep all metallic objects away from the receiver circuit board while it is energized. Ensure all O-ring and gaskets are properly installed when closing receiver enclosure.

Monitor can be rotated 90E left or 90E right of straight ahead. Stops are mechanically fixed by a stop screw and milled slot in base. Stop screw must remain in place in monitor base.

Programming limits and stow position are completed during the same sequence of steps and not independently. This is a unique programming feature to this Scorpion RF with position feedback.

1) Move the monitor to the lower left position of the travel window.
2) Press and release the red programming switch, SW1 (Figure 10). The setup LED DS6 will blink twice.
3) Move the monitor to the upper right position of the travel window.
4) Press and release the red programming switch. The setup LED will blink three times.
5) Move the monitor to the stow position.
6) Press and release the red programming switch. The setup LED will blink four times.
7) Programming of travel limits and stow position are now set.

Caution: Limits must be programmed prior to use to avoid a collision between the monitor discharge and the horizontal position sensor.

VI. OPERATING INSTRUCTIONS

A. Normal Operation

The Scorpion Monitor uses the standard Left/Right, Up/Down, and Fog/Stream commands to provide stream direction and pattern adjustments.

a) To move the monitor left or right, press and hold the left or right button until the monitor discharge is in the correct position or a mechanical stop is reached.

b) To move the monitor up or down, press and hold the up or down button until the monitor is in the correct position or a mechanical stop is reached.

c) To adjust the stream pattern, press and hold the fog or stream button until the desired stream pattern is reached. Elkhart electric nozzles have a unique ball screw drive which when it reaches the extents of travel will continue spinning until the button is released.

Any combination of left or right, fog or stream, and up or down can be used to achieve motion horizontal, vertical, or nozzle commands simultaneously. If the left and right buttons are pressed at the same time, the monitor will stop all motion. To continue motion, release both buttons and repress the desired direction button. This is also true for the up/down and fog/stream commands.

The handheld remote transmitter has a power saving feature that turns the transmitter power off if no signal is sent for 5 minutes. Press and hold the "ON/OFF" button until the Power LED illuminates to reactivate the transmitter. The "Low Battery" LED will flash slowly when the battery voltage drops below a predetermined level. When the low battery LED flashes rapidly, the batteries are nearly discharged and should be replaced immediately.

B. Oscillation Function

This version of the Scorpion supports oscillation in either a square or sine wave pattern (both motors moving at the same time). The first pin of switch block A designates whether the monitor will oscillate in a square or sine wave pattern. Selecting up will oscillate in a square pattern while selecting down will oscillate in a sine pattern.

a) Position the monitor at either the left or the right limit of oscillation.

b) Press and release the oscillate button.

c) Move the monitor to the other limit of oscillation.

d) Press and release the oscillate button.

e) The monitor will oscillate between the limits until the oscillation button is pressed again.

f) Pressing the left or right button on one of the controls will also stop the oscillation.

For safety reasons, once oscillation has stopped the oscillation limits need to be reprogrammed before it can be re-engaged. The nozzle fog, stream, and discharge elevation functions can be operated while the monitor is oscillating.

C. Manual Override

In the event of power failure to the monitor, the motors may be actuated manually. To operate a function manually, simply apply a ¾" ratcheting type wrench (either socket type or ratcheting box end type) to the hex fitting on the motor shaft.

⚠ Warning:

Using the horizontal override nut when the power to the receiver is off or the horizontal motor is disconnected will move stow position from its original programmed position. See section titled V.D Travel Limits and Stow Position Programming to realign stow position even if stow feature is not utilized.

⚠ Caution:

Do not use impact drivers to operate manual override nuts. Serious damage to motor gear heads will result.

***Note:** The SM-1250E and SM-2000E nozzles have a unique ball screw drive that allows motor to "free wheel" at the end of pattern travel in either the straight stream or wide fog positions. No slip clutch or current limiting feature is used with these nozzle drives.

D. Storing the Monitor

These monitors have a user selectable stow position (see V.D for setting instructions). After the water supply to the monitor has been turned off, simultaneously press the "Stow" and "Fog" buttons on the primary panel mount RF transmitter (buttons must be held down for a minimum of 3 seconds). The monitor will automatically rotate horizontally to the stow position previously programmed and either lower or raise the discharge to its mechanical stop (depending on the position of switch A position 1 on the receiver board). Prior to stowing the monitor the stow signal output provides a ground signal. There are two settings for stow signal output.

Switch 4 position 1 (Signal mode)
Once the monitor starts to move to the stow position, the stow signal output will alternately supply and remove the ground, at approximately a 1 second rate, while the monitor is moving to the stow position. Once the monitor has completed the stow sequence the stow signal output will be an open circuit - see warning at the end of this section.

Switch 4 position 2 (interlock mode)
Once the monitor starts to move to the stow position, the stow signal output will continue to supply a ground while the monitor is moving to the stow position. The ground will be removed after the monitor reaches the stow position and the stow signal output will be an open circuit. - see warning at the end of this section.

Note: If the stow indicator does not turn off, see the V.D section to realign the stow position.

Any directional command (left, right, up, down, fog or straight stream) will cancel the "stow" command, and the stow output signal will continue to provide a ground. To stow the monitor the stow command must be reactivated.

Warning:
Never activate the "Stow" feature while water is flowing. Serious injury to personnel and damage to apparatus could result.

Warning:
It is up to the system designer to appropriately handle the open circuit condition of the stow signal. In the open circuit mode there is no source to turn off the stow signal load; which may lead to erroneous signal indications if not handled properly.
The stow signal is capable of sinking 250mA maximum. Exceeding this value may blow the internal fuse and the stow output will no longer be able to provide a ground. Note – Most test lights draw in excess of 1A

VII. MAINTENANCE & INSPECTION

A. Monitor

1. Preventive Maintenance

The complete monitor and control system should be inspected during each apparatus check. Careful inspection for damage to the monitor or nozzle is especially important after use in emergency operations.

a) Operate each function (left-right, up-down, stream-fog, stow) with each of the transmitters.

b) Remove nozzle and check for debris lodged between the nozzle stem and body, or in the stream shaper inlet. Remove debris.

c) During nozzle flow test, inspect monitor swivel joints for leaks.

d) With the water off, operate the stow function, looking for any possible obstructions and check the final stow position.

e) Inspect all exposed wiring for signs of damage.

Note: Grease fittings are provided for the up-down and left-right rotation joints, routine greasing should be performed to expel water & other contaminants that can get into the rotation joints. If the monitor is exposed to a high level of radiant heat for a prolonged period, it may be possible for the factory grease to thin and run out of the rotation joints. In such an event, fresh grease should be applied. Use Mobilux EP2 or equivalent. Start at one end of travel range and apply grease through the fitting of each joint until fresh grease comes out the joint. Repeat every 30 degrees throughout the full range of travel on each rotation joint. Wipe off any expelled grease when done.

Caution: Always check stow position after any repairs to the monitor. It is possible that during repair work stow position could be moved lost and will need to be reprogrammed. If necessary, reprogram stow position by following the instructions in Section V.D.

2. Understanding the Controller LEDs

LED Notations
DS1 (Figure 10) - Lights when either nozzle direction is engaged.
DS2 (Figure 10) – Lights when either of the AUX buttons are pushed.
DS3 (Figure 10) – Comes on when the UP or the DOWN button is depressed.
DS4 (Figure 10) – Comes on with any horizontal movement.
DS5 (Figure 10) – See Table 2.
DS6 (Figure 10) – Lights when power is applied, blinks to indicate limit/stow programming.

DS5 Status Indicator LED (Indication VS. Meaning)

Reference	Indication	Meaning
1	Blinks 6 times rapidly during startup	Visual indication that the controller is initializing - normal operation.
2	Blinks 6 times rapidly during startup then blinks at ¼ second rate continuously	SW4 (Figure 10) in wrong position – must be in position 1 or 2 for proper 8294-06 or 8394-07 or position 3 for 8294-06 EXT operation.
3	Blinks at ½ second rate	Truck battery voltage <8 volts - light will blink until power is lost or is restored

Table 2

B. Handheld Transmitter

1. Battery Type

The Scorpion handheld transmitter uses two AA alkaline batteries. The low battery light will illuminate with approximately two hours of transmission time remaining before the batteries are completely discharged. Due to the time-voltage characteristics of rechargeable batteries, this time could be drastically reduced if rechargeable batteries are used.

2. Battery Replacement

The batteries can be replaced with any standard fresh AA alkaline batteries.

a) Turn the transmitter power off.

b) Remove the battery cover.

c) Remove the old AA batteries.

d) Insert the new AA alkaline batteries.

e) Replace the battery cover.

VIII. REPAIR PARTS

See print 98291072 for repair parts.

Elkhart Brass

Fire Fighting Equipment

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