LPG Bobtail Delivery Vehicle Remote Shutdown System (RSS)

Instruction Manual

⚠ WARNING

THIS MANUAL MUST BE CAREFULLY READ BY ALL INDIVIDUALS WHO HAVE OR WILL HAVE THE RESPONSIBILITY FOR USING OR SERVICING THE PRODUCT. Like any piece of complex equipment, this instrument will perform as designed only if it is used and serviced in accordance with the manufacturer's instructions. OTHERWISE, IT COULD FAIL TO PERFORM AS DESIGNED AND PERSONS WHO RELY ON THIS PRODUCT FOR THEIR SAFETY COULD SUSTAIN SEVERE PERSONAL INJURY OR DEATH.

The warranties made by Mine Safety Appliances Company with respect to the product are voided if the product is not used and serviced in accordance with the instructions in his manual. Please protect yourself and others by following them. We encourage our customers to write or call regarding this equipment prior to use or for any additional information relative to use or repairs.

In North America, to contact your nearest stocking location, dial toll-free 1-800-MSA-INST
To contact MSA International, dial 1-412-967-3354

This manual is available on the internet at www.msanet.com

Manufactured by

MSA INSTRUMENT DIVISION

P.O. Box 427, Pittsburgh, Pennsylvania 15230

(L) Rev 0 **10060144**

MSA Permanent Instrument Warranty

1. **Warranty-** Seller warrants that this product will be free from mechanical defect or faulty workmanship for a period of three years from date of shipment, provided it is maintained and used in accordance with Seller's instructions and/ or recommendations. The flash lamp is warranted for ten years from the date of shipment. The Seller shall be released from all obligations under this warranty in the event repairs or modifications are made by persons other than its own or authorized service personnel or if the warranty claim results from physical abuse or misuse of the product. No agent, employee or representative of the Seller has any authority to bind the Seller to any affirmation, representation or warranty concerning the goods sold under this contract. Seller makes no warranty concerning components or accessories not manufactured by the Seller, but will pass onto the Purchaser all warranties of manufacturers of such components. **THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED, IMPLIED OR STATUTORY, AND IS STRICTLY LIMITED TO THE TERMS HEREOF. SELLER SPECIFICALLY DISCLAIMS ANY WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE.**
2. **Exclusive Remedy-** It is expressly agreed that Purchaser's sole and exclusive remedy for breach of the above warranty, for any tortious conduct of Seller, or for any other cause of action, shall be the repair and/ or replacement at Seller's option, of any equipment or parts thereof, which after examination by Seller is proven to be defective. Replacement equipment and/ or parts will be provided at no cost to Purchaser, F.O.B. Seller's Plant. Failure of Seller to successfully repair any nonconforming product shall not cause the remedy established hereby to fail of its essential purpose.
3. **Exclusion of Consequential Damage-** Purchaser specifically understands and agrees that under no circumstances will seller be liable to purchaser for economic, special, incidental or consequential damages or losses of any kind whatsoever, including but not limited to, loss of anticipated profits and any other loss caused by reason of non-operation of the goods. This exclusion is applicable to claims for breach of warranty, tortious conduct or any other cause of action against seller.

General Warnings

⚠ WARNING

1. The instruments described in this manual must be installed, operated, and maintained in strict accordance with its labels, cautions, warnings, instructions, and within the limitations stated.
2. Do NOT connect to any electrical service greater than 12 VDC.
3. Always perform a complete safety shutdown test prior to putting the vehicle into service.
4. This product must be installed, tested and used by a competent Automotive/Heavy equipment technician.
5. The 12 VDC-power supply connected to the black and red wires in the power harness (black and red wired cable) must be wired so that the electronic module is powered only when the vehicle ignition is switched ON and the Bobtail is set up to deliver propane. When correctly installed, the electronic module must NOT be powered up when the vehicle is in motion or is not set up to deliver propane.
6. These installation instructions are written as a guide; it is not possible in a general installation manual to provide specific connection locations relating to particular vehicle models. The installer must refer to the actual vehicle manufacturer's manual for detailed information. It is the installer's responsibility to ensure that the shutdown device is correctly installed and that its operation is in accordance with the system checklist at the end of this manual.
7. The output relay contacts in the Interface Unit module is rated at a maximum current of 20 amps for 12-VDC electrical systems. Where any vehicle control circuit switched by this module exceeds these parameters then an intermediate slave relay must be used.

Failure to follow the above can result in serious personal injury or death.

Table of Contents

Chapter 1, Introduction

This Manual provides installation and operating information for the Liquefied Petroleum Gas (LPG) Bobtail Delivery Vehicle - Remote Shutdown System.

When properly installed, the wireless remote control device described in this manual enables an operator to command a remote emergency shut-down. When activated, this device stops the vehicle engine, causing the internal valve to automatically close.

Depending on the model chosen, two additional commands are available; these can be used to control a:

- Throttle set function and
- Power Take Off (PTO) clutch command.

The remote shutdown device consists of a:

- Small hand-held radio Transmitter and
- Fixed, vehicle-mounted plastic enclosure containing the remote electronics and control relays.
    - The remote electronics enclosure can be mounted inside the vehicle cab.

The ability to remotely initiate a shutdown of the Liquefied Petroleum Gas (LPG) dispensing process is a Federal code requirement. The LPG Remote Shutdown System uses radio frequency (RF) technology for a wireless method to stop LPG delivery from a remote location (up to 300 feet) from the actual delivery vehicle controls.

The Remote Shutdown System

The REMOTE SHUTDOWN SYSTEM is a permanently installed ("fixed") system, directly connected to the vehicle's electrical (and possibly pneumatic) controls. The system consists of two major components, the:

- Hand-held Transmitter unit and
- Receiver/Interface unit

The interface hardware operates as a single system to provide a remote safety shutdown of the LPG dispense process.

To reset the device, remove the 12 VDC supply from the electronic module. Depending on installation,this is done by:

- Switching OFF the vehicle ignition or
- Cycling the parking brake.

Interface Hardware

The minimum interface hardware is a four-wire harness wired into the delivery vehicle engine electrical system. Once connected to the Receiver/interface unit, this harness:

- Provides the required power to the Receiver/interface unit and
- Can now interrupt the vehicle engine system to disable the flammable liquid delivery process.

Available Configurations

The LPG bobtail shutdown system is available in three configurations, depending on the specific vehicle requirements and the desired remote control features. All configurations use the same Hand-held Transmitter and an appropriate configuration of the Receiver/interface unit.

RSS Basic System:

- Provides minimum hardware to provide vehicle engine system shutdown only.

RSS Basic Plus System:

- Includes additional hardware to provide a pneumatic output for Belly valve control in addition to vehicle engine system shutdown.
    - The Receiver/interface unit includes a solenoid valve to control a pneumatic output; the pneumatic air for the Belly valve is routed through the Receiver/interface unit to allow for remote shutdown of the vehicle engine and the Belly valve.

RSS Deluxe System:

- Adds two additional pneumatic outputs to the Basic Plus system.
    - Vehicle engine and belly valve shutdown control is provided *and* the two bottom-row buttons of the Hand-held unit provide ON/OFF control for the vehicle PTO and throttle.

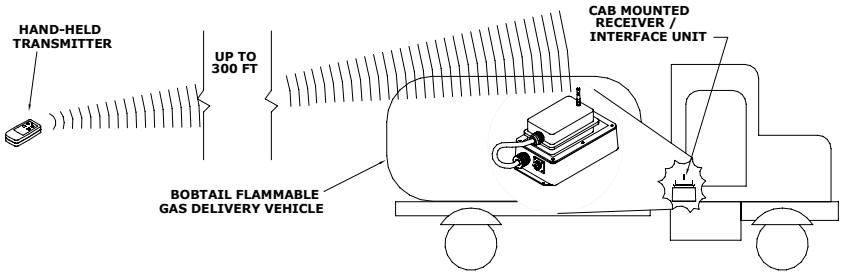

Figure 1-1. The Remote Shutdown System

The Hand-held Unit

The Hand-held unit (or Transmitter):

- Travels with the dispense operator
- Provides the required shutdown controls.
- Has additional controls for other optional operational features
- Is small, light-weight, and can easily be looped to a belt or placed in a pocket for accessibility .

The Receive/Interface Unit

The Receive/interface unit:

- Is Installed in the delivery vehicle cab and
- Connects to the appropriate vehicle systems to enable shutdown.

The Hand-held remote Transmitter:

- Communicates to the Receive/interface unit over a wireless RF link
- Can cause the Receiver/interface unit to Disable the flammable liquid delivery.

The Remote Shutdown System:

- Provides a remote means of closing the internal valve and shutting down the vehicle engine when correctly installed and wired.
- Once activated, will lockout the shutdown function and effectively prevent the vehicle from being remotely.reactivated.

Safety Considerations

Unpacking

On receipt, carefully unpack and refer to the packing slip to determine that all parts are present and no transit damage has occurred.

The remote shutdown device should consist of the following items:

- Blue Hand-held Transmitter 1, 2, 3, or 4 function
- Receiver/interface enclosure - Black/blue
- Installation Instructions - (this manual)

Chapter 2, Specifications

Table 2-1. Specifications

Overall System Specifications	
RF SCHEME	Operating Frequency - 331.165 MHz, FSK
	FCC Part-15, non-licensed, On-Demand
CONTROL RESPONSE TIME(S)	>100 m-sec (RF and electrical response)
	~500 m-sec (when including pneumatic components)
SECURITY	32 bit security code
OPERATING RANGE	Up to 325 ft (100 meters)
WARRANTY	12 months from date of shipment

Hand Held Transmitter Specifications	
PHYSICAL DATA	4.75" L x 2.15" W x 1.1" T, 155 grams w/ batteries
PACKAGE	Fiber Reinforced Nylon, MSA overlay labeling. IP65
POWER	~10 mW, 3VDC - from 2 x AA batteries
RF COMMUNICATIONS	331.165 MHz, non-licensed, FCC Part-15.
INPUTS	4 discrete inputs (buttons)
OUTPUTS	1 discrete output (Status LED)

Receiver/Interface Unit Specifications	
PHYSICAL DATA	8.25" L x 5.0" W x 5.35" T; 2.5 lbs. (1,100 grams)
PACKAGE	Fire Retardant ABS Plastic / Fiber reinforced Nylon.
REQUIRED UTILITIES	12 VDC, 2 AMP, from switched source and
	Pneumatic air supply (when required)
RF COMMUNICATIONS	331.165 MHz, non-licensed, FCC Part-15.
INPUTS	RF Only
OUTPUTS	One relay, 20 Amp max (Engine Disable)
	Up to Three Pneumatic (Optional)
PNEUMATIC AIR SUPPLY (WHEN REQUIRED)	Clean and Dry
	Minimum 25 psig.
	Maximum 150 psig

Chapter 3,
Physical Description and Installation

The Hand-held Transmitter

The operator uses the Hand-held Transmitter remote control unit to initiate a Shutdown. Depending on the configuration of your system, the Transmitter may have other remote functions. It is powered by two alkaline batteries that should give months of service.

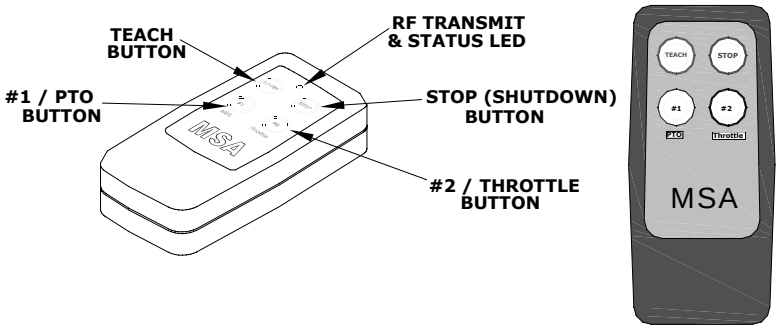

Figure 3 1: The Hand-held Transmitter

Transmitter Setup

The Transmitter:

- Requires two AA size alkaline batteries
- LED flashes Green when battery power is sufficient.
- LED flashes Red when battery power is low.

When batteries are low:

- Operating distance shortens
- Replace with new batteries.

The STOP button:

- Is used to initiate the remote Shutdown:
    - When the STOP button is pushed, the engine shutdown relay opens the truck engine run circuit and (when present) provides the appropriate pneumatic output to stop all LPG delivery.

The TEACH Button:

- Is used for teaching the receiver the appropriate 16-bit identification code to work with a given Transmitter Interface Unit.
- See Chapter 4, "Operating Procedures" for the specific Teach procedures.

The #1 (PTO) Button:

- This #1 (or PTO, when present) button is used in the Teach procedure.
- This button is also used to operate the vehicle Power Take Off (PTO) or vehicle clutch, when that optional configuration is present.

The #2 (Throttle) Button:

- This #2 (or Throttle, when present) button is used in the Teach procedure.
- This button is also used to operate the vehicle Throttle to step up the engine idle speed (when that optional configuration is present.)

The Receiver/Interface Unit

The receiver/interface unit is made up of two separate modules that each provide a dedicated function. The modules are wired and bolted together (there is no reason to service or separate them). The functional modules are:

- The Radio Receiver module and
- The Vehicle Interface module.

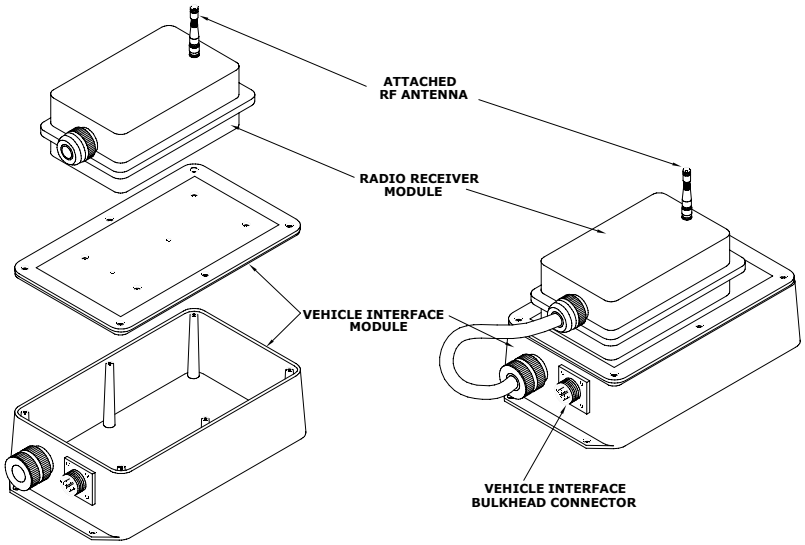

Figure 3-2. The Receiver/Interface Unit

- The Vehicle Interface Module:
  - Contains hardware and wiring connections for the shutdown system-to-vehicle interface.
    - All wiring connections to the vehicle are done through the vehicle interface bulkhead connector and the provided vehicle interface cable assembly (FIGURE 3-3).

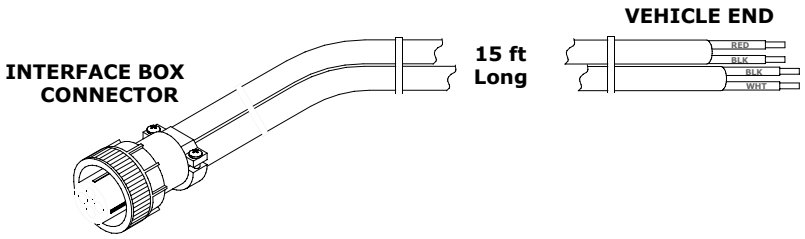

Figure 3-3. Vehicle Interface Cable Assembly

- Is designed primarily to provide a remote shutdown function.
  - When correctly installed and wired, it can provide the operator with a remote means of closing the internal valve and shutting down the vehicle engine.
  - Once activated, the remote shutdown device will lockout the shutdown function and effectively prevent the vehicle from being remotely reactivated.
  - To reset the device, remove the 12-VDC supply from the electronic module (depending on the actual installation) by:
    - Switching OFF the vehicle ignition or
    - Releasing the park brake.

- In the **BASIC** system configuration:
  - The vehicle interface module houses only the engine shutdown relay, which is:
    - Mounted to the lid of the module enclosure and
    - Pre-wired to the radio Receiver module and the vehicle interface bulkhead.

- In the **PLUS** system configuration:
  - The Vehicle Interface module houses the engine shutdown relay and the required primary pneumatic output hardware, which includes:
    - Two pneumatic bulkhead connectors mounted on the opposite end from the electrical connectors
      - The top bulkhead is for incoming pneumatic air and
      - The bottom one is for the primary pneumatic output
    - The pilot-operated solenoid valve that controls the primary pneumatic output air
      - This valve is pre-wired to the radio Receiver module and actuates when power is applied to the unit
      - Pushing the STOP button on the remote causes this valve to exhaust
    - The breather is installed in the box to allow venting pneumatic air to exit the enclosure.

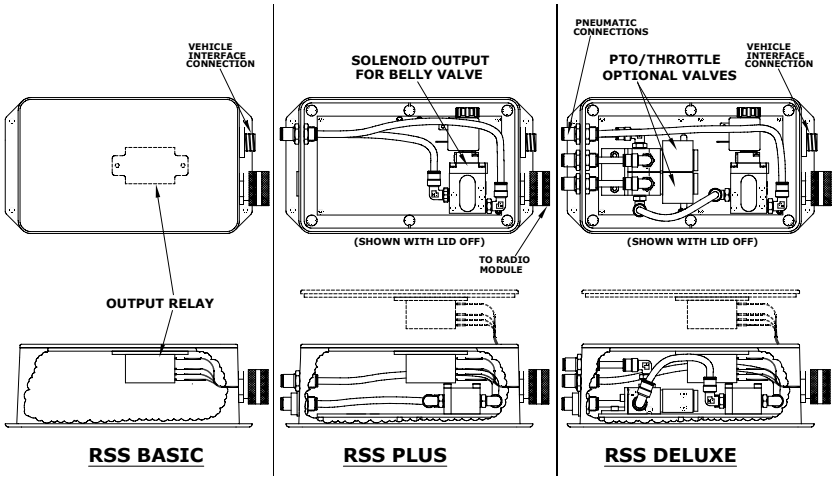

Figure 3-4. Vehicle Interface Module Configurations

- In the **DELUXE** (fully optioned) configuration, the vehicle interface module houses the:
  - Engine shutdown relay

    Required primary pneumatic output hardware
  - Two additional solenoid valves for PTO and Throttle outputs

    Two pneumatic bulkhead connectors mounted on the opposite end from the electrical connectors.
- The additional pneumatic hardware includes:
  - Two additional pneumatic bulkhead connectors for the PTO and Throttle air outputs. Supply air to the two valves comes from, and is controlled by, the primary pneumatic solenoid valve
  - Two electric actuated solenoid valves (for PTO and Throttle) pre-wired to the radio receiver module.

Installation Details

Pre-Installation Checks

Prior to installing the emergency shutdown device, make the following pre-installation checks:

- Check Transmitter operation:
  1. Turn the Transmitter over and open the battery access cover with a coin (FIGURE 3-5).

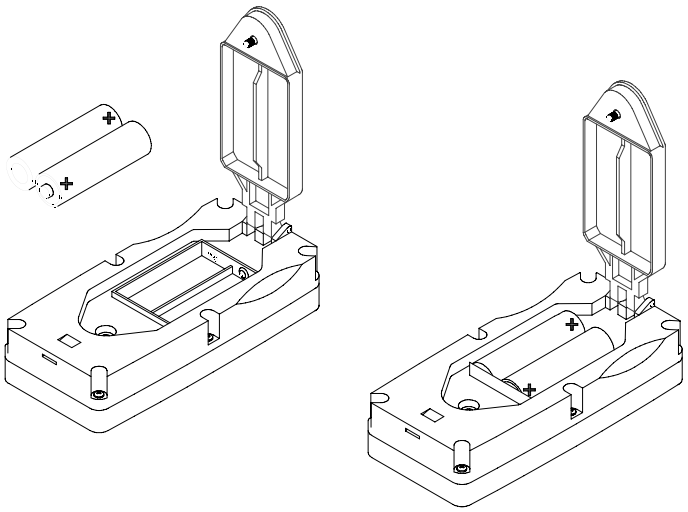

Figure 3-5. Transmitter Battery Access

  2. Install two AA cell batteries (Duracell or equivalent) and close the battery access cover.
  3. Press the RED Shutdown button and simultaneously check that GREEN LED at the center top of the case, next to the RED button (FIGURE 3-1) is flashing brightly.
  4. Release the RED button.
     - The LED should stop flashing
  5. Repeat this test with each of the remaining BLACK buttons
  6. If the Transmitter passes these tests, set it aside until later in the installation process.

Installation Checklist

1. Place the enclosure at the rear of the vehicle cab, in the selected mounting location.
2. Position the enclosure so the end with the wire compression fitting faces the cab location where the wire harness will be run.

   NOTE: Install the Receiver/interface unit where it is not susceptible to damage from tool boxes, fire extinguishers and general clutter. To improve communication reliability and prevent damage, keep the receiver antenna as clear of clutter as possible. Then, mark the position of the four mounting holes (by using the enclosure as a template or by working from the dimensions shown in FIGURE 3-6).

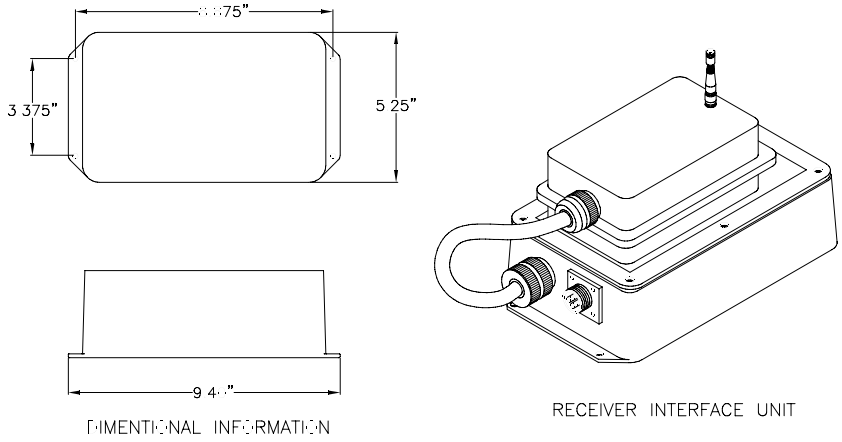

Figure 3-6. Receiver/interface Enclosure

2. Drill four, 1/8-inch pilot holes for #6 sheet metal screws.
3. Using suitable (customer-provided) mounting screws, securely mount the electronic module enclosure at the desired location.
4. When drilling any holes through the vehicle cab, ensure that the sealing is restored once the enclosure is mounted.

Pneumatic Connections (FIGURES 3-7 through 3-9)

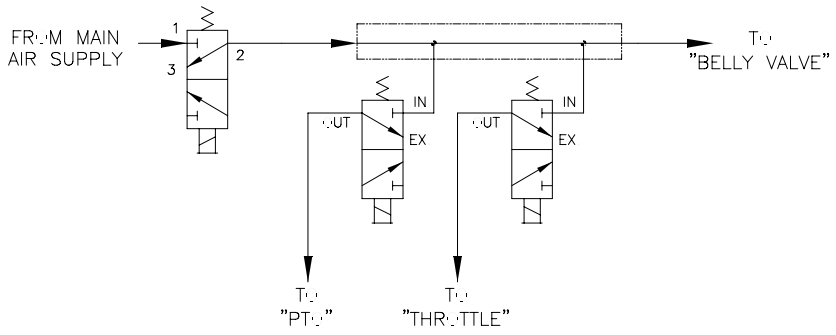

Figure 3-7. Basic Pneumatic Connections

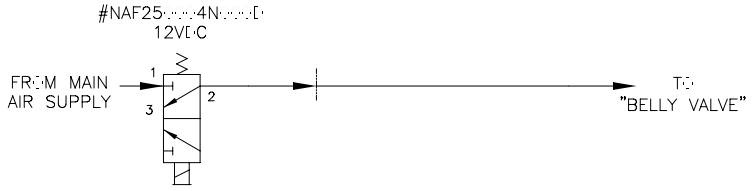

Figure 3-8. RSS Plus Pneumatic Diagram

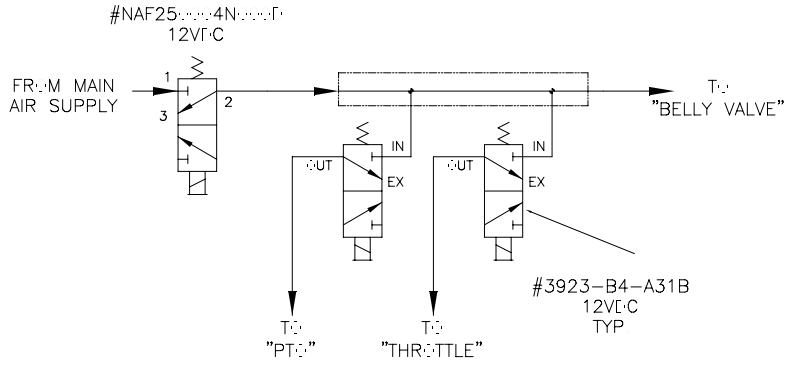

Figure 3-9. RSS Deluxe Pneumatic Diagram

- All remote system pneumatic connections are made at the two bulkhead air fittings mounted in the enclosure base (FIGURE 3-7):
  - Air "IN" is terminated at the upper-right side bulkhead fitting
  - Air "OUT" to the internal valve operating cylinder is terminated at the bottom-right hand side bulkhead fitting.
- The following assumes that a suitable air cylinder exists to provide the mechanical force to operate the internal valve.
- These pneumatic connections form an integral part of the "Emergency Shutdown" system. When correctly installed, Emergency Shutdown feature activation switches OFF the engine and causes the internal valve to close.

⚠ CAUTION

All pneumatic fittings and connection tubing used for this installation must be DOT-approved; substitution with components of a lesser standard is expressly forbidden.

While referring to the pneumatic connection diagram shown in FIGURE 3-7, perform the following installation:

1. Locate the tubing run that connects the internal valve air cylinder directly to the main air supply.
2. At a suitable location, cut or disconnect one end of this tubing so that the air supply for the internal valve air cylinder can be rerouted

through the interface enclosure.

3. Using 1/4" DOT-approved tubing, reconnect the air cylinder to the air supply by routing the air supply into the remote enclosure at the upper right-hand fitting (AIR IN) and out to the cylinder at the left-hand fitting (INTERNAL VALVE) as shown in FIGURE 3-7.
4. All air lines should be secured in place with suitable ties and protected from abrasion and wear when passing through bulkheads and fire walls.

Operational Test

Before running the following test, ensure that:

- Installation is complete
- All access covers are replaced
- All additional electrical wiring and pneumatic piping is neatly installed and clipped in place (where necessary)
- All cable joints are protected.

1. Start the truck.
2. Engage the emergency brake.
   - The internal valve should now open.
3. Press the RED Emergency Shutdown button on the remote handset and check that the:
   - Engine stops
   - Internal valve closes.
4. Press the RED Emergency Shutdown button on the remote again and confirm that nothing happens.
5. Switch OFF the vehicle ignition and release the emergency brake.
6. Make sure the power LED on the Receiver turned OFF.
   - The installation is now complete.

Wiring Checklist

NOTE: Disconnect the battery before using any power tools or making any modifications to the vehicle.

When making connections to the vehicle electrical system, ensure that all cabling is routed away from any heat source and adequately protected where wires and cables pass through steel bulkheads and/or firewalls.

1. To correctly install the shutdown device, locate the following connection points on the vehicle:
   - A key switch-controlled 12 VDC supply (live only when the Bobtail is setup to deliver product); a pressure switch in the park brake system or similar device could provide this function.
   - The switch contacts must always be:
     - connected into the 12-VDC feed wire (RED wire) and
     - fed by the keyed 12-VDC supply.

   NOTE: this connection is important when controlling vehicles with Fisher pneumatically-operated internal valves.

   a. Connect the black wire of the red and black power cable wires to a good clean chassis ground.

   b. Use the vehicle wiring diagram to locate the feed wire which controls the engine run device; when this connection is broken, the vehicle engine shuts down.
      - Depending on engine type, the run device could be:
      - the ignition system on a gas engine or
      - an electrically-controlled fuel pump or solenoid on a diesel engine.

Once the connection points are located, wiring installation is as follows:

1. Disconnect the vehicle battery.
2. Disconnect or cut the feed wire to the engine run device (see vehicle service manual).
3. Extend the connections by using suitably-rated extension wires.
   - This will allow the normally-closed relay contacts on the truck interface relay to control the engine shutdown function.
   - Any wire splices should be made with insulated crimped or soldered connections.

4. Route the power and control cables to the Receiver/interface unit and connect the four-pin cannon plug to the mating connector in the end of the interface enclosure using a 1/4-turn.
5. Once these connections are made:
    a. Reconnect the vehicle battery and start the engine.
    b. Check that the electronic module is not powered up (assumes vehicle is road-ready) by making sure the RED power ON LED, is *not* ON.
    c. Using the remote Transmitter to operate the remote shutdown function, press the RED shutdown button.
        - The vehicle engine should continue to run.
6. Set the bobtail into its product-delivery configuration and again press the RED shutdown button.
    - The vehicle engine should now shutdown and lockout.
    - Continued operation of the RED shutdown button should have no further effect; to ensure this, check the RED power ON LED and the RED relay status LED .
        - These LEDs should be ON and remain ON for repeated operation of the RED shutdown button.
7. If the engine does not shutdown when the RED shutdown button is pressed, see Chapter 5, "Troubleshooting Guidelines".
8. This completes the installation of the basic remote shutdown system for a vehicle fitted with a REGO Flowmatic® internal valve.

Electrical Installation Test

Before running the following tests, ensure that the:

- Installation is complete
- Access covers have been replaced
- Additional electrical wiring and pneumatic piping is neatly installed and clipped in place where necessary
- Cable joints are suitably protected.

1. With the vehicle in road-ready condition, start the engine.
2. Use the remote transmitter and attempt to shutdown the engine.
    - Operation of the shutdown function should have no effect
    - Engine should continue operating normally.

3. Set up the Bobtail as it would be set for normal propane delivery; again, operate the shutdown function.
    - This time, the engine should stop running and the internal valve (belly) should close.
4. Once the shutdown function is activated, it should not be possible to re-open the internal valve (belly) with the RED shutdown button.
5. On installations with multiple auxiliary functions, these will be disabled after an emergency shutdown has been instigated.
6. If everything checks out, reset the electronic module and restart the engine.
7. Move away from the vehicle to a distance of 300 ft and again operate the shutdown device.
    - The engine should again shut down.
8. Where additional pneumatic components have been added to the control system, refer to the installation manual for those components to complete this installation.

Final Installation Checklist

Before running the following tests, ensure that:

- Installation is complete
- All access covers are replaced
- All additional electrical wiring and pneumatic piping is neatly installed and clipped in place (where necessary)
- All cable joints are suitably protected.

1. Start the engine of a road-ready vehicle.
2. Using the remote Transmitter, attempt to turn OFF the engine.
    - This shutdown function should have no effect; the engine should continue operating normally.

Chapter 4,
Operating Procedures

Basic Operation

NOTE: The user must understand and follow all local operational procedures and regulations.

The internal valve is ready to deliver product when:

- Power is applied to the system
- The truck is parked and
- The engine is running.

On the Basic Plus and the optioned systems:

- The Internal (belly) valve output from the interface unit pressurizes and opens the actuator cylinder on the belly valve
- When the PTO is engaged, the pump allows for delivery of product.

In the event as of an accidental discharge of Flammable product, the system waits for a Transmitter command to:

- Turn OFF the engine of an LPG delivery truck (parked, with its engine running, and prepared to deliver product) and
- Close the internal valve on the tank.

To provide this Transmitter command, press the Transmitter's red STOP pushbutton (FIGURE 3-1) from up to 300 feet away from the truck. The engine will shutdown which stops the pump from pumping:

- The internal valve is closed by the pump shutdown (Rego Flowmatic ® valves) or
- A pneumatic actuating cylinder is exhausted through the interface unit to retract and close the internal valve.

On the optional PTO and Throttle control systems (Optioned systems):

- The added safety of remote pump engagement and idling up the engine RPMs, is added to the system
- The system is first powered when the truck is parked
- At this time, the PTO and Throttle pneumatic outputs are exhausting
- A single press of the PTO and/or Throttle button maintains a pressurized output for these functions.

Daily Functional Safety Inspection Test

1. Start the truck.
2. Engage the emergency brake.
   - The internal valve should now open.
3. Next, press the RED Emergency Shutdown button on the remote handset.
4. Check that the:
   - Engine stops
   - Internal valve closes.
5. Press the RED Emergency Shutdown button on the remote again and confirm nothing happens.
6. Finally, switch off the vehicle ignition and release the emergency brake.
7. Make sure the power LED on the Receiver turned OFF.
8. On the RSS Deluxe system:

   If everything functions correctly in the above tests, press the PTO button and make sure the pump starts to operate.

   NOTE: When the PTO button is pressed again, the pump should stop operating.
9. When you press the Throttle button, the engine RPM should rise up to the predetermined point for pumping safely.

   NOTE: When the Throttle button is pressed again, the engine RPMs should lower back down to the truck's nominal speed.

"Teaching" a Receiver a new Transmitter

Remote Setting

Remote setting allows you to pair the new Transmitter and Receiver if either becomes damaged. In order for the radios to work, the Transmitter and Receiver must have the same ID codes and frequency. Using remote setting will set the Transmitter and Receiver to have the same ID codes.

Ensure the following conditions are met before attempting the Remote Setting procedure.

- The Transmitter and Receiver are of the same model and frequency.
- Place the Transmitter as close as possible to the Receiver to avoid any interference.
- Turn OFF the Receiver power; then, turn it ON again.
- Complete the "Remote Setting" procedure within four minutes after turning ON the Receiver.
    - The Receiver will NOT accept the remote setting signal after four minutes have passed.

Remote Setting Instructions (see FIGURE 3-1)

1. Press and hold the Transmitter STOP pushbutton.
2. Press and hold the #2 THROTTLE pushbutton.
3. Press the TEACH pushbutton four times.
4. Release STOP and DOWN pushbuttons when the red light flashes.
5. Start the system by following the "Basic Operation" procedure earlier in this chapter.

NOTE: In case the remote setting procedure fails, repeat the instructions above within four minutes.

The remote setting procedure will update the ID code only. It will not change function settings or frequency.

All same model systems on the same frequency will be paired with the Transmitters ID code within the operating distance.

⚠ WARNING

Inspect the unit daily. Inspection must include testing the emergency stop and other safety devices and functions. If there is any doubt, operation must be stopped immediately and problems be corrected before operation is resumed. Failure to follow this warning can result in serious personal injury or death.

Chapter 5, Troubleshooting

Troubleshooting Guidelines

Table 5-1. Troubleshooting Guidelines

ERROR CODES	CHECK	ACTION
Red LED flashing quickly (every 0.2 sec) when any pushbutton is pressed	One of the pushbuttons is jammed	If a problem is found, contact the distributor for repair
	System is not properly powered according to the instructions.	If a problem is found, contact the distributor for repair
Transmitter LED flashes slowly (every 0.5 secs)	Transmitter memory is defective.	Contact the distributor for repair.
Receiver Error LED* flashes slowly (every 0.5 sec)	Receiver memory is defective.	Contact the distributor for repair.
When truck parked and set to deliver product, engine does not shut down when transmitter RED STOP button is pressed	1) Is receiver main power LED ON?	YES- go to check # 2
		NO- See Chapter 3, "Receiver Interface Unit" and check power cable connections. Check receiver power fuse
	2) Is receiver cover relay activation LED ON?	YES- Receiver successfully received & acted on a transmitter command. Go to check #3
		NO- Go to check #4
	3 Does receiver cover Emergency Shutdown LED turn ON when pressing RED transmitter button?	YES- System is working properly. See Chapter 3, "Receiver Interface Unit" & check the shut down interface connections
		NO- Go to check #4
	4) Does transmitter front status LED flash RED when a button is pressed on the transmitter?	YES- Transmitter battery is low or unit requires service. No indicator lit on transmitter also means same as stated above
		NO- Go to check #5
	5) Does transmitter front status LED slowly flash green when a button is pressed on the transmitter?	YES- Go to check #6
		NO- transmitter requires service. Go to check #8

***The receiver Error LED is inside the receiver; observe appropriate precautions when opening the unit.**

ERROR CODES	CHECK	ACTION
code receiver	6) Does receiver inside cover squelch LED go OFF when transmitting to it?	YES- Transmitter & receiver ID codes don't match; go to check #8
		NO- Transmitter & receiver are not on same channel. Possible bad transmitter crystal. Possible interference on that channel. Or, go to check #7
	7) Does the receiver inside-cover error LED flash?	YES- Receiver requires service
		NO- Go to check #8
	8) Does a spare transmitter set up for this system properly operate the system?	YES- Transmitter requires service
		NO- Check the receiver fuses; If problem persists, receiver requires service
Vehicle engine shuts down when RED STOP transmitter button is pressed & truck is NOT set to deliver product	9) See Chapter 3, "Receiver Interface Unit" & check the power cable connections. Ensure that power to system is ON only when truck is parked, running, & set to deliver product	Use 12-volt source that is hot only when ignition switch is ON; run that source through a pressure switch that is closed when park brake is set or PTO is engaged
Vehicle engine shuts down when the transmitter RED STOP button is pressed, but only at close range from the truck parked & set to deliver product	10) Does receiver inside-cover squelch LED turn OFF when transmitter is not transmitting?	YES- External interference source on system's operating frequency; Change channel on this system to eliminate interference
		NO- Go to check #11
	11) Does transmitter front status LED flash RED?	YES- Low batteries effect system range
		NO- Go to check #12
	12) Does spare transmitter set up for this system properly operate the system?	YES- Transmitter requires service
		NO- Go to check #13
	13) Any obstructions (metallic) on or near the receiver antenna? Is the antenna broken?	YES- Remove obstructions; broken antenna requires repair
		NO- receiver requires service

ERROR CODES	CHECK		ACTION
Vehicle engine shuts down when transmitter RED STOP button pressed & truck is set to deliver product, but internal (belly) valve doesn't close	14)	Identify valve type used on delivery truck	A Rego Flowmatic® closes when pump pressure is lower than tank pressure. RSS system shuts down engine (& pump); problem is with truck, not with system. Any other valve requires air pressure through actuator to open it. Releasing actuators air closes the valve via a spring. Solenoid valve used for the internal valve control is stuck, exhaust port is plugged, or the actuator or spring is stuck
	15)	Is air exhausting through truck interface enclosure vent, removing air pressure from the air out port?	YES- System OK; problem is else-where on the truck
			NO- Solenoid valve for internal valve control stuck; exhaust port plugged or requires service
The internal (belly) valve does not open when truck is parked and set to deliver product	16)	Is there at least 25 PSI of air feeding receiver INPUT port?	YES- Go to check #17
			NO- 25 PSI required to properly operate internal valve. Go to check #1
	17)	Is receiver main power LED ON ?	YES- Go to check #18
			NO- With no power to system, the solenoid valve used for controlling internal valve cannot open. See Chapter 3, "Receiver Interface Unit"
	18)	Is air coming out of the OUT port feeding the belly valve actuator?	YES- Problem is else-where on truck or in the air plumbing
			NO- receiver/interface requires service
Throttle output does nothing when transmitter Throttle button pressed; emergency stop works	19)	Is receiver throttle LED ON?	YES- Go to check #20
			NO- If a spare transmitter fixes the problem, transmitter requires service. If spare transmitter does not fix problem, receiver/interface requires service

ERROR CODES	CHECK	ACTION
	20) Is air coming out of the Throttle output port?	YES- Problem is else-where on truck or in the air plumbing
		NO- receiver/interface unit requires service
PTO output does nothing when transmitter PTO button pressed; emergency stop works	21) Is receiver PTO LED ON?	YES- Go to check #22
		NO- If spare transmitter, fixes problem, transmitter requires service. If spare transmitter does not fix the problem, receiver/interface unit requires service
	22) Is air coming out of the PTO output port?	YES- Problem is else-where on truck or air plumbing
		NO- The receiver/interface unit requires service

Change Fuses

1. Remove the four, 10 mm nuts and their washers from the Receiver enclosure.
   - To remove the 1.5 amp power fuse (located by the Receiver cable harness entry) press the fuse cover and turn counter-clockwise with a flat screwdriver to open.
2. Remove the old fuse and insert a new fuse (of the same rating and style) into the cover first; then, place this fuse (with the cover) into the fuse holder base.
3. Press the fuse cover and turn clockwise with flat screwdriver.

NOTE: The control voltage fuse is a yellow, 20-amp blade automotive style fuse near the antenna side of the Receiver fuse.

Obtaining Replacement Parts

To obtain replacement parts, address the order or inquiry to:

- **Mine Safety Appliances Company**
  Instrument Division
  P.O. Box 427
  Pittsburgh, PA 15230-0427
  or call, toll-free, 1-800-MSA-INST.

⚠ WARNING

Use only genuine MSA replacement parts when performing any maintenance procedures provided in this manual. Failure to do so may seriously impair instrument performance. Repair or alteration of this system, beyond the scope of these maintenance instructions or by anyone other than authorized MSA service personnel, could cause the product to fail to perform as designed and persons who rely on this product for their safety could sustain serious personal injury or death.

Table 5-2. Replacement Parts List

PART	PART NO.
RSS Basic System Receiver	10061256
RSS Plus System Receiver	10061257
RSS Deluxe System Receiver	10061258
RSS Transmitter	10061255

Appendix A, Drawings

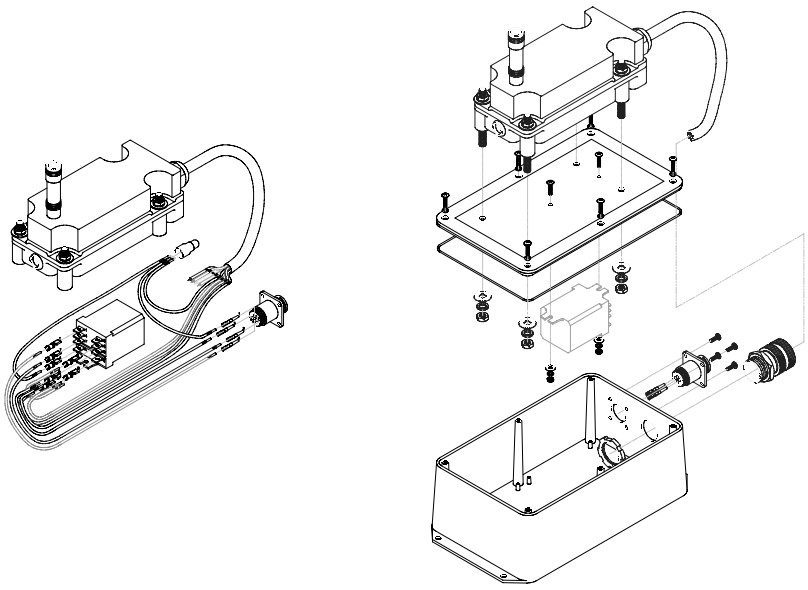

Figure A-1. Basic Configuration

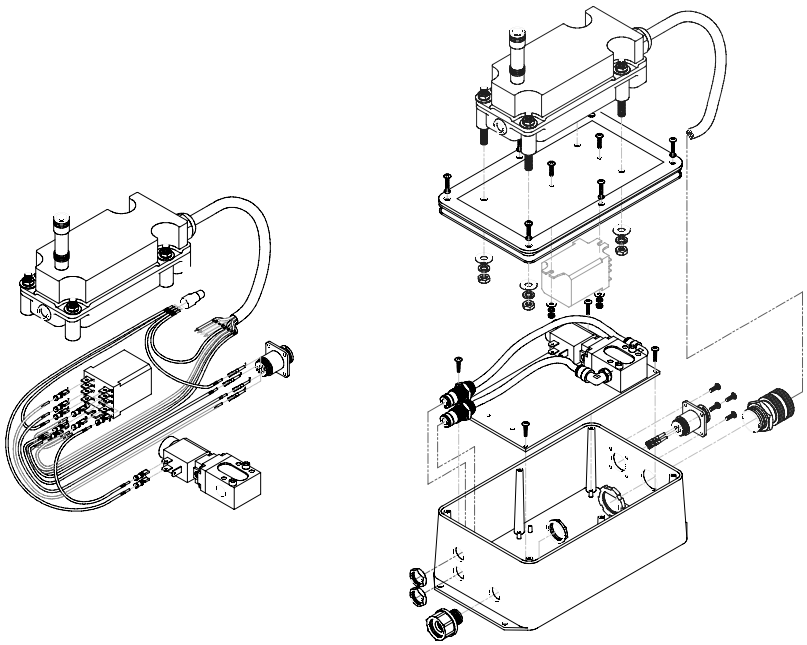

Figure A-2. Basic Plus Configuration

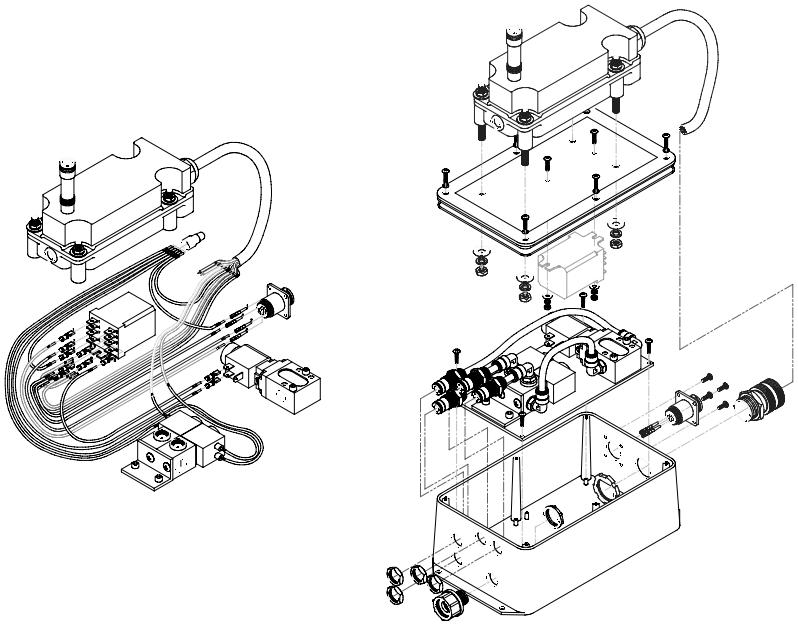

Figure A-3. Deluxe Configuration

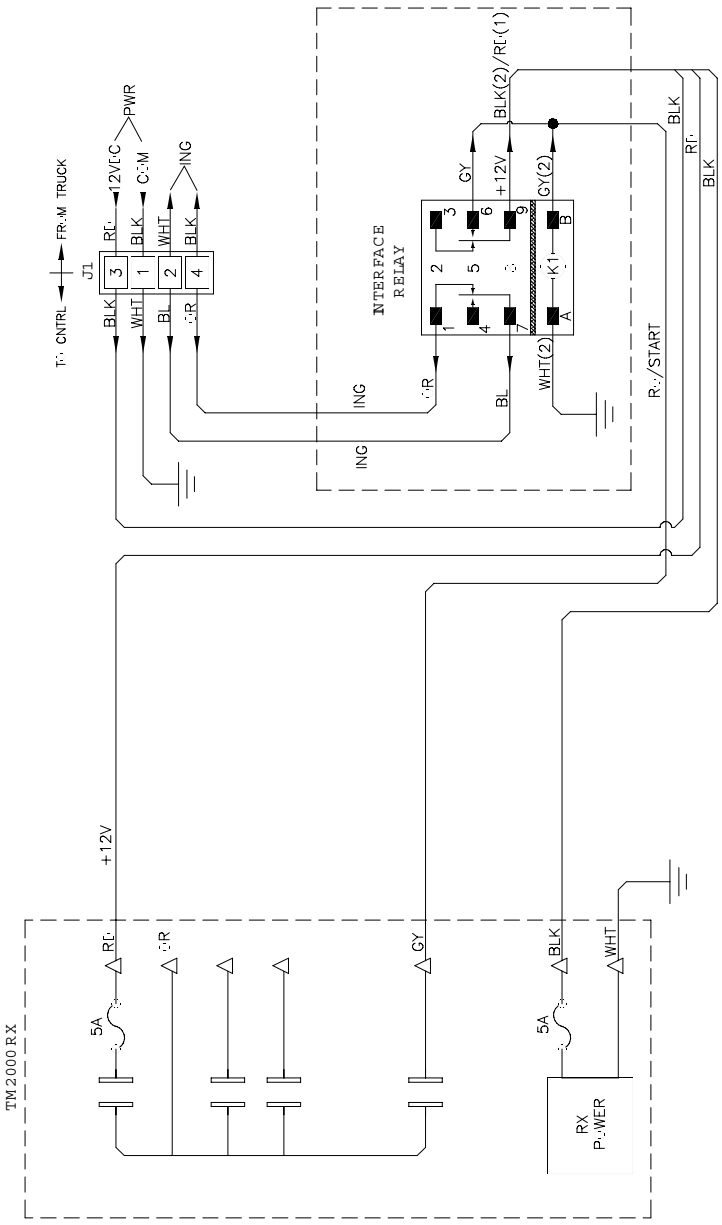

Figure A-4. RSS Basic Wiring

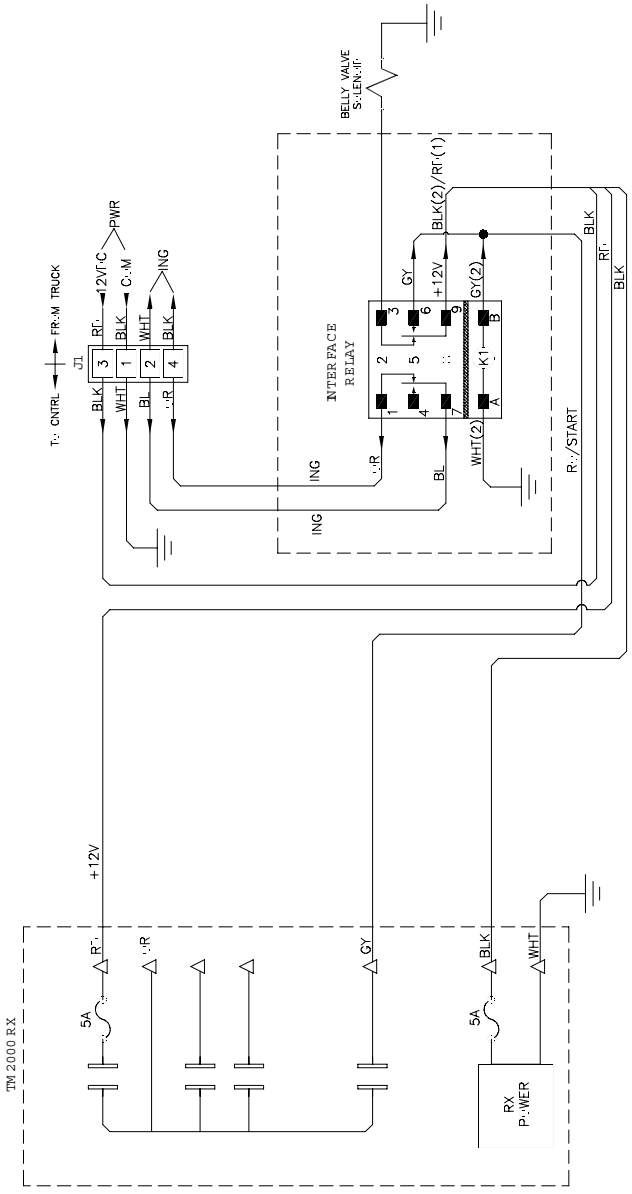

Figure A-5. RSS Plus Wiring

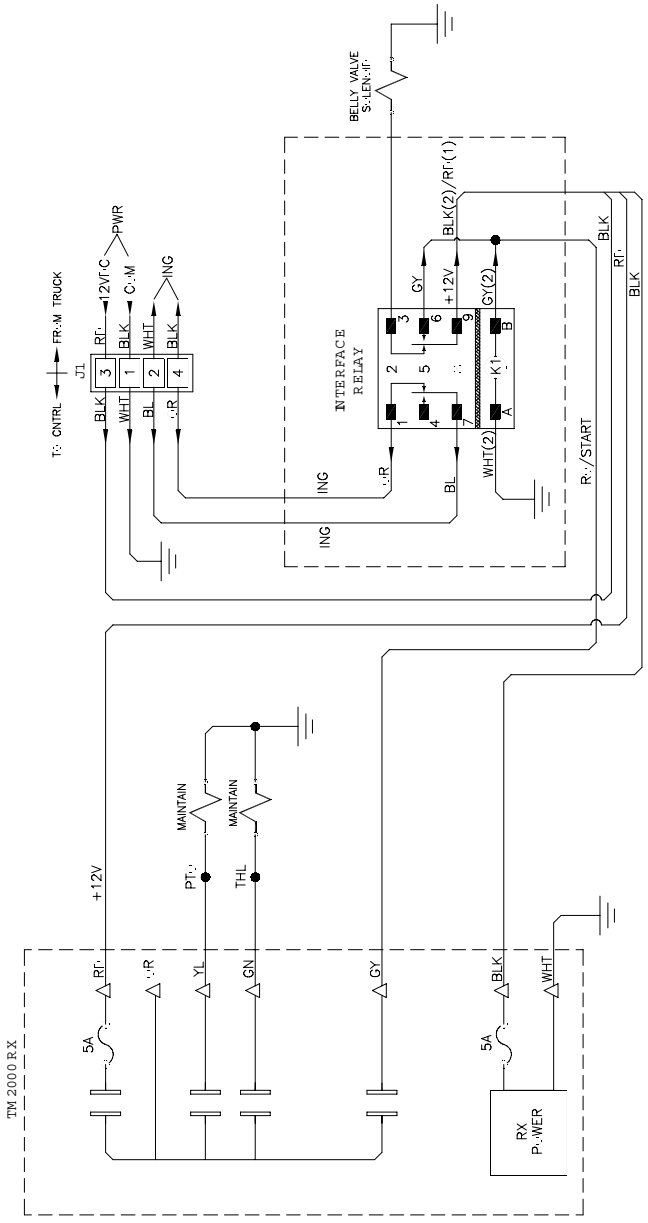

Figure A-6. RSS Deluxe Wiring

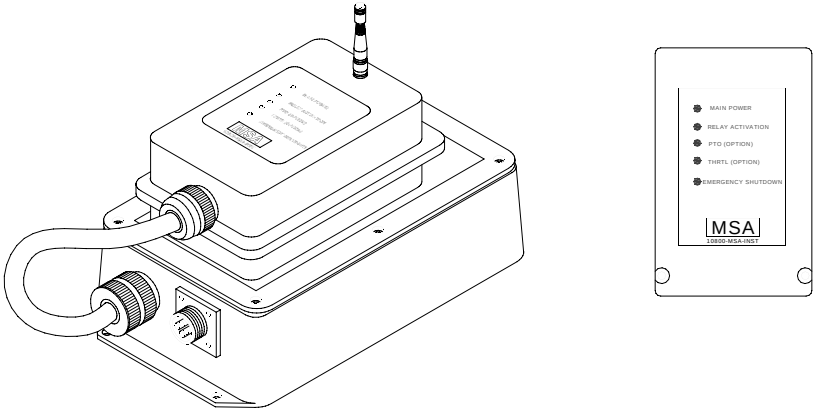

Figure A-7. Unit LED Detail