915 Series Tank Alarm

Installation, Operation, and Maintenance Instructions

The 915 Alarm Console is designed to provide a visible and audible alarm for above ground storage tanks. The 915 Series Alarm Console may be purchased to support either one or two 915 Sensors or any other Normally-Open or Normally-Closed, dry contact inputs. The 915 provides two independent form single pole, double throw (SPDT) relay outputs. Additionally, a dedicated output has also been provided for a Remote Horn with Beacon (915HB) option allowing a visual and audible alarm to be located at a convenient remote location; two of these devices may be daisy-chained. Two possible applications for the 915 series Tank Alarm are use as an overfill alarm or as low level alarm.

Failure to follow any or all of the warnings and instructions in this document could result in a hazardous liquid spill, which could result in property damage, environmental contamination, fire, explosion, serious injury or death.

Contents

Specifications

IMPORTANT: *Not approved for use in explosive atmosphere locations.*

IMPORTANT: *Install in accordance with all applicable local, state and federal regulations.*

IMPORTANT: *Never use with highly flammable liquids as defined by OSHA/GHS.*

Description
The 915 Series Alarm Console is intended to be located in an Ordinary Location. Its inputs are NOT intrinsically safe and are NOT intended for use with hazardous location. The inputs may be configured to accommodate either Normally-Open or Normally-Closed dry contacts.

Output Contact Rating
48 VDC Maximum
0.5 Amps Maximum

Output Power Rating (available to each output)
12 VDC
0.4 Amps Maximum

Tank Alarm Input Power
Nominal Input Voltage: 12 VDC
Maximum Current Draw: 2 Amps
Maximum Power Consumption: 24 Watts

Operating Environment
-4°F to 104°F (-0°C to 40°C) to 100% humidity non-condensing
Indoor, Ordinary location only.

Maximum Wiring Distance
Maximum wiring distance between Alarm and input device is 500 ft.

Chemical Compatibility
The 915 Sensor is compatible with automotive fluids such as:

- Oil
- Waste Oil
- Windshield Washer Fluid
- Diesel
- Transmission Fluid
- Brake Fluid
- Antifreeze
- B-20 (Biodiesel)

Installation and Testing

WARNINGS

- Any modification of this unit beyond what is outlined in this instruction will void product warranty.
- For your safety, it is important to follow local, state, federal and/or OSHA rules that apply to working inside, above, or around the storage tank and piping area. Use all personal protective equipment required for working in the specific environment.
- Install in accordance with all applicable local, state and federal regulations and codes.
- This device is intended to be used as an auxiliary warning to the operator of an abnormal condition of the system, such as a possible overfill situation and should not be the only system in place to prevent an unwanted condition, such as preventing a tank from overfilling. It is the sole responsibility of the operator to continuously prevent any spillage regardless of the situation.
- In the event of malfunction, remove from service immediately and contact Morrison Bros. Customer Service.

Mounting

NOTE: *This device is NOT intended to mounted at an outside location.*

In order to prevent contamination from entering the enclosures, follow these instructions:

1. Mount the enclosures to a stable vertical surface using the mounting flanges of the enclosure. Do not make additional holes in the enclosure.
2. Morrison has provided an opening with wire gland in the bottom of the enclosure. All wiring should enter and exit through this opening. Do not make additional openings in the enclosure.
3. Once the enclosure is securely mounted on a stable surface and the wiring is complete, place the enclosure cover in the proper orientation on the enclosure base and secure in place by snugging each of the cover screws. These are captured screws and are not intended to be removed. We have found it best to partially thread each screw in place and then move from screw-to-screw to do the final snugging of the screws.

Steps to Wire and Configure the 915 Tank Alarm Console

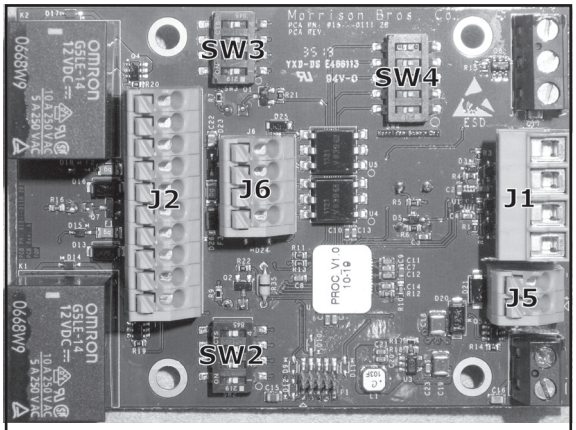


Figure 1—Connectors and DIP Switches on the Tank Alarm

Preparation

NOTE: *The corner screws that hold the front cover in place are captive screws and are not intended to be removed from the front cover.*

Open the front cover of the Alarm Console by first loosening the captive screws at each corner, then fully unscrewing them. This allows the front cover to be carefully removed.

NOTE: *The wires that connect the Alarm Console body (Beacon) to the main PCA on the front cover are not intended to be used to suspend the front cover. Always support the front cover by some other means.*

Installation

Basic Connection Instructions

Most of the connections to the Alarm Console are made using the screwless connector block. Please follow the connection instructions provided below when making connection to these connection blocks. See Figure 2 for an illustration.

IMPORTANT: ***These connectors are rated to be used with 24AWG to 18AWG wire ONLY.*** All connections to these connectors must adhere to these requirements.

Figure 2—Connecting wires to a screwless connector block

Wire Preparation

1. Strip the wire to be connected to the connector 8mm/0.315inches.
2. Twist the strands of wire together.

Wire Connection

1. Fully depress the connector's plunger using a suitable tool.
2. Fully insert the wire into the connector.
3. Release the connector's plunger while maintaining the wire's position in the connector.
4. Gently tug on the wire to verify that it has been captured by the connector

Console Power

The Alarm Console is powered by a single, wall mounted AC-DC Wall Adapter.

IMPORTANT: ***Do NOT plug in the wall adapter until the entire installation is complete including final inspection.***

NOTE: *Refer to "Basic Connection Instructions" for the following steps.*

1. Prepare the ends of the two conductors that make up the wall adapter's power cable.
2. Bring the AC-DC Wall Adapter's cable into the console's enclosure through the cable gland provided in the bottom of the enclosure base.

Figure 3—Power Adapter Cable's White Stripe and the Tank Alarm Console's Power Connector

3. Inspect the wall adapter's cable and locate the conductor that has the **white stripes** on it (see Figure 3).
4. Connect the power cable conductor WITH the white stripes to pin two (2), the side labeled with a MINUS sign (-) (see Figure 3).
5. Connect the other power cable conductor (WITH OUT the white stripes) to pin one (1), the side labeled with a PLUS sign (+) (see Figure 3).

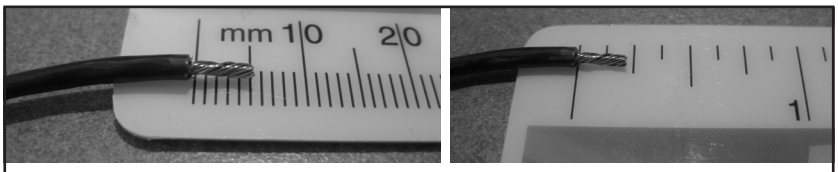
Inputs

There are up to two independent inputs in the 915 Alarm Console depending on the model purchased. These are individually configurable to work with sensors with either Normally-Open or Normally-Closed contacts.

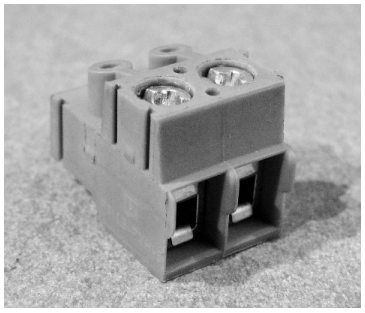
Wiring

1. Run two 18 to 24 AWG oil resistant wires from each input device to the location where the Alarm Console will be mounted. Enter the enclosure through the cable gland provided in the bottom of the enclosure base. If a junction box is used, do NOT attach the wires of the input device(s) at this time. If the input device is a Normally-Closed contact, connect the two wires together at the device end. If the device is a Normally-Open contact, verify that the two wires are not connected to one another.
2. Remove the pluggable terminal block from the Alarm Console's J1 to facilitate the wiring process.

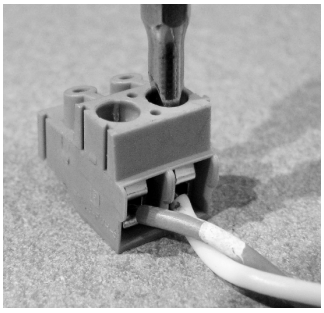
NOTE: *The wires are intended to exit the pluggable terminal block vertically from the circuit board.*



Strip off about ¼ inch (5mm) of insulation from the wire and twist the ends of the wire.



The Channel Input Connector



Insert the wire fully into the connector & snug the screw.

Figure 4—Wiring the Channel Input Connector

3. Connect the two wires from each input device to the two screw terminals for each channel input of the Channel Input Connector (J1) for each Input. J1 pins 1 and 2 are channel 1 with pin 2 being the ground reference. J1 pins 3 and 4 are channel 2 (if you are using a two channel version) with pin 4 being the ground reference for the input.

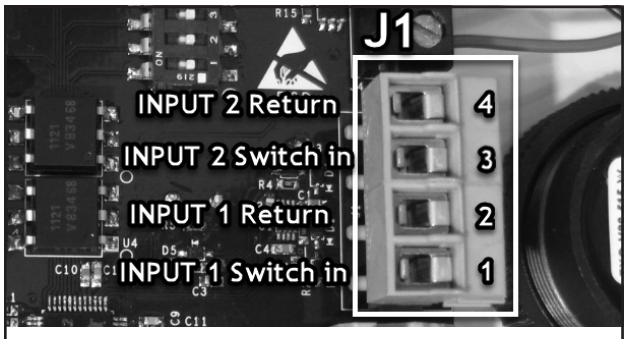


Figure 5—INPUT connector J1

4. Verify that each wire is securely held in the connector by gently tugging on them.
5. Plug the connector onto the Channel Input pins of the Alarm Console's J1 with the wires vertical to the PC Board.

Configuration

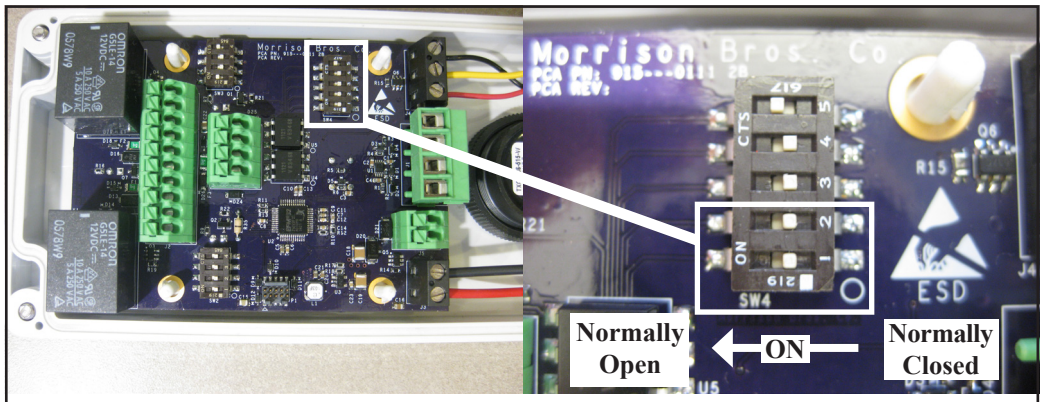


Figure 6—Configuring Input Mode with SW4 – Position 1 is for Channel 1 and Position 2 is for Channel 2

Position	SW4 Setting (see Figure 6)	
	ON	OFF
1	Configures input 1 for **Normally-Closed contacts**	Configures input 1 for **Normally-Open contacts**
2	Configures input 2 for **Normally-Closed contacts**	Configures input 2 for **Normally-Open contacts**

Outputs

There are two independent Output Channels available on the 915 Alarm Console. These outputs are a set of both Normally-Open and Normally-Closed dry contacts (SPDT).

IMPORTANT: ***Do not exceed 48 Volts AC/DC and 500 mA current maximum.***

In addition to these switch contacts, a current limited (400 mA), +12VDC power source is available to be used with each output. The +12V power supply pin is connected with a jumper wire to the COM of each relay to power the 915S or 915ST solenoid units. Remove this jumper if it is not required.

IMPORTANT: ***Do not place a load on this current limited output that exceeds 400mA. These are fused outputs.***

While the 915 Alarm Console is designed to accommodate many different possible applications, it was also designed to interface to the Morrison Bros. Co. 915S (Solenoid without Timer) and 915ST (Solenoid with Timer) devices. The wiring and configuration for these will be covered below.

The outputs have three possible configuration choices to be made. These will be covered in the CONFIGURATION section to follow.

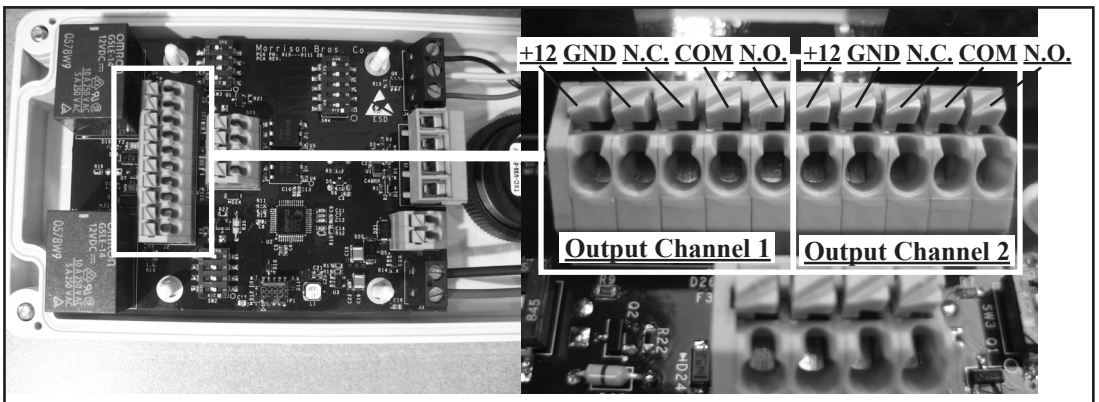


Figure 7—OUTPUT connector, J2

Wiring (see Figure 7 and Figure 2 for details)

The specific connections that need to be made to the output connector is highly dependent on the specific application for the 915 Alarm Console. All connections for either Output Channel 1 or Output Channel 2 will be made via the Alarm Console's J2 connector. Instructions for making connections to this connector may be found in **Basic Connection Instructions**, above.

NOTE: *Refer to "Basic Connection Instructions" for the following steps.*

The table below shows the pin connections for each output of the 915 Alarm Console. In addition, the connections required for connecting a 915S or 915ST are shown. The pin connections of J1 are common to both the 915S and 915ST.

	915		915S/915ST
Signal Name	OUTPUT 1	OUTPUT 2	SOLENOID CONTROLLER
+12V	J2 pin 1 *	J2 pin 6 *	
Power Return	J2 pin 2	J2 pin 7	J1 pin 2
N.C.	J2 pin 3	J2 pin 8	
COM	J2 pin 4 *	J2 pin 9 *	
N.O.	J2 pin 5	J2 pin 10	J1 pin 1

**A jumper wire is installed between +12V and COM for each output, capable of providing +12VDC current limited to 400mA.*

NOTE: *Up to 10 solenoids can be wired to each output in a daisy-chain or parallel configuration.*

Configuration

Each Output Channel has its own Configuration DIP switch. Output Channel One uses SW2 and Output Channel Two uses SW3.

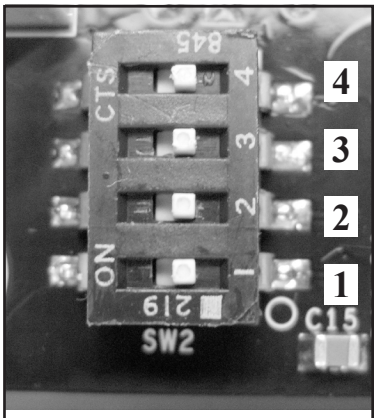


Figure 8—OUTPUT Configuration DIP Switch (SW2 shown here)

1. CHANNEL(s) TO RESPOND TO (positions 1 & 2)

   Each OUTPUT may be configured to respond to either Input Channel One or Input Channel Two or BOTH.

	SW2(OUT1)/SW3(OUT2) Setting	
Position	**ON**	**OFF**
1	Responds to Channel 1 input	Does NOT respond to Channel 1 input
2	Responds to Channel 2 input	Does NOT respond to Channel 2 input

2. NORMALLY ACTIVATED/NORMALLY DEACTIVATED (position 3)

   When we say "NORMALLY" in this context, this means in the "non-alarming condition." When an Output is configured as NORMALLY ACTIVATED, this means that if the power is applied to the Alarm Console AND there is no alarming condition on the Input Channel that the output is supposed to respond to, then the relay itself will be energized. In this position, the Normally-Open contacts of the Output are now Normally-Closed and the Normally-Closed Contacts are Normally-Open. This configuration may be chosen as a failsafe implementation in the case of a power failure.

NOTE: *For the 915S and 915ST, verify that the Output Channel configuration is set for NORMALLY ACTIVATED operation: DIP switch position three (3) is turned ON.*

	SW2(OUT1)/SW3(OUT2) Setting	
Position	**ON**	**OFF**
3	Normally **Activated** (failsafe)	Normally **Deactivated**

3. PERSIST / NON_PERSIST (position 4)
An Output may be configured to remain active as long as the alarm condition continues to exist; this is referred to as being Persistent. Conversely, you may desire the Output to remain active only until the alarm condition has been acknowledged by pressing the Test/Cancel Button on the front of the Alarm Console.

NOTE: *For the 915S and 915ST, verify that the Output Channel configuration is set for PERSISTENT operation: DIP switch position four (4) is turned OFF.*

Position	SW2(OUT1)/SW3(OUT2) Setting	
	ON	OFF
4	Non-persist	Persist

Remote Horn with Beacon (915HB)

The 915 Alarm Console allows up to two Remote Horn with Beacon external alarms attached to a single dedicated output. With a two Input Channel 915, this output may be configured to respond to Input Channel One or Input Channel Two or BOTH. With a single Input Channel 915, this output may be configured to either respond to or not respond to Input Channel 1 only. The Alarm Console connector associated with the 915HB Remote Horn with Beacon is J6, located in the center of the main PC board.

Wiring (see Figure 2 for details)

NOTE: *Refer to "Basic Connection Instructions" for the following steps.*

The table below shows the pin connections required for connecting a 915HB to the dedicated output of the 915 Alarm Console.

915HB	915
J1 pin 1	J6 pin 1
J1 pin 2	J6 pin 2
J1 pin 3	J6 pin 3
J1 pin 4	J6 pin 4

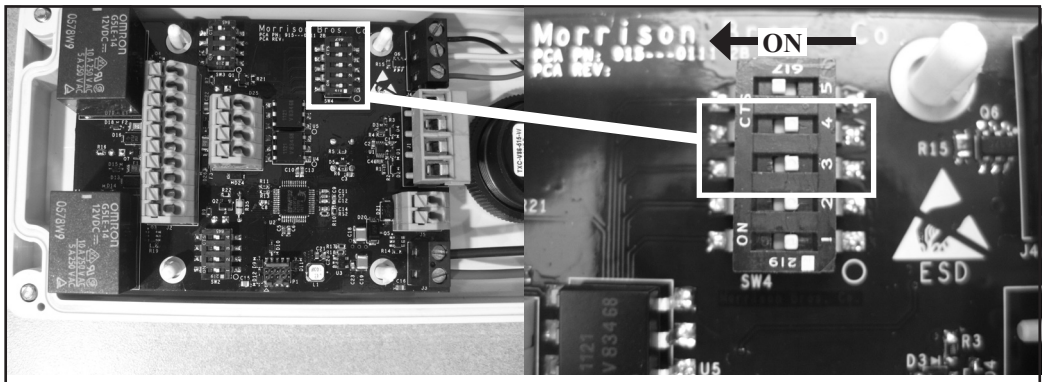


Figure 9—Configuring Remote Horn with Beacon output with SW4 – Position 3 selects Input Channel 1 and Position 4 selects Input Channel 2

Configuration

Configuration consists of choosing which input the Remote Horn with Beacon is going to respond to. With the single channel 915 Alarm Console it is a choice of either responding to or not responding to the single channel (Input Channel 1). With the two channel 915 Alarm Console, it is a choice between either responding to Input Channel One, Input Channel Two or both.

Position	SW4 (Remote Horn with Beacon) Setting	
	ON	OFF
3	Responds to Channel 1 input	Does NOT respond to Channel 1 input
4	Responds to Channel 2 input	Does NOT respond to Channel 2 input

Auto-Silence Feature

The 915 Alarm Console has the capability of silencing itself after 10 minutes in the case of an alarm condition. "Silencing itself" means that the Horn/Buzzer ceases to sound; all visual alarms will continue to be active until either the alarm condition ceases, or the alarm condition is acknowledged by pressing the Test/Silence button on the front of the Alarm Console.

Alternatively, you may choose to have the Horn/Buzzer continue to sound until either the alarm condition ceases, or the alarm condition is acknowledged by pressing the Test/Silence button on the front of the Alarm Console.

Position	SW4 (Auto-Silence) Setting	
	ON	OFF
5	The audible alarm will automatically silence after 10 minutes of alarming.	The audible alarm will continue to sound until either the alarm condition ceases to exist, or the alarm condition has been acknowledged by pressing the Test/Silence button on the front panel.

Completion

1. Inspect all of the wiring to verify that it has been done properly. Correct any discrepancies and re-inspect.
2. When the installation has passed inspection, reinstall the front panel of the Alarm Console.
    a. Place the front panel on the enclosure base being careful to orient the panel in the upright position, carefully folding the wires into the enclosure.
    b. Partially thread in the four screws that hold the front cover in place.
    c. Verify the proper seating of the cover.
    d. Snug the four screws in place.

IMPORTANT: ***Do NOT apply power to the 915 or any of the system components until the entire installation is complete and the wiring has passed final inspection.***

Testing

Testing the system should only be performed after the entire system has been inspected, verifying both the wiring and the configuration.

NOTE: *When power is first applied to the Alarm Console, the Beacon on top of this console and the Beacon(s) on any Remote Horn with Beacon should go through a quick "hello" flash, demonstrating that it is powered up and ready.*

Power Up Verification

Apply power to the system by plugging in each of the AC-DC Wall Adapters.

Verify that:

- The Beacon on the 915 Tank Alarm Console does its quick flash.
- The Beacon on any Remote Horn with Beacon units also does their quick flash.
- The GREEN Power Indicator is brightly illuminated on the front panel of the 915 Tank Alarm Console.
- The RED Channel Alarm Indicators on the 915 Tank Alarm Console are not blinking or illuminated.
- The Horn/Buzzer on the 915 Tank Alarm Console is silent.
- The Horn/Buzzer on any Remote Horn With Beacon units are also silent.
- The GREEN Active Indicator on each 915S and/or 915ST unit(s) associated with the system are brightly illuminated.

Solenoid Output Verification

915S (if installed):

Ensure all proper connections are made with downstream air activated device.

Verify that:

- The downstream air activated device is fully functional.

915ST (if installed):

1. Set the Timer for 1 minute run time by turning the dial to the 1.
2. Press and release the Start/Stop button in the front panel of the 915ST.

Verify that:

- The Active Indicator now blinks … about one second on, one second off.
- The downstream air activated device is fully functional

3. Wait for the one minute then

Verify that:

- The ACTIVE Indicator stops blinking.
- The downstream air activated device is no longer functional.

Channel Alarm Verification

The following test should be performed on each Input Channel:

1. If the input device utilizes Normally-Open contacts, then connect the two wires together at the tank. If the input device utilizes Normally-Closed contacts, then disconnect the two wires at the tank.

Verify that:

- The Channel indicator associated with the channel is blinking
- The Horn/Buzzer is sounding
- The Beacon is illuminated
- The Output Devices associated with the channel are in their alarm condition

> **EXAMPLE:** If the channel is associated with Morrison Bros. Co. 915S or 915ST Solenoid unit(s), the GREEN Active light should be extinguished

2. Acknowledge the alarm by pressing the "Test/Cancel" button on the front of the Solenoid Valve Unit.
3. Remove the alarm condition at the tank.
4. Connect the two Tank Sensor wires to the Tank Sensor
5. Simulate an alarm condition by moving the Tank Sensor float into the alarming position

Verify that:

- The Channel indicator associated with the channel is blinking
- The Horn/Buzzer is sounding
- The Beacon is illuminated
- The Output Devices associated with the channel are in their alarm condition

> **EXAMPLE:** If the channel is associated with Morrison Bros. Co. 915S or 915ST Solenoid unit(s), the GREEN Active light should be extinguished.

6. Acknowledge the alarm by pressing the "Test/Cancel" button on the front of the Solenoid Valve Unit.
7. Remove the alarm condition at the tank.

Failure to follow any or all of the warnings and instructions in this document could result in a hazardous liquid spill, which could result in property damage, environmental contamination, fire, explosion, serious injury or death.

Operation

The 915 Alarm Console may be used in applications where one to two sets of Normally-Open or Normally-Closed dry contacts are available. Two possible applications are used as an overfill alarm or as a low level alarm. These two uses are addressed below.

Use as an Overfill Alarm

Use with the Morrison Bros. Co. 915 Tank Sensor or other similar input device.

1. At the beginning of each work shift press and hold the Test/Cancel button on the front of the 915 Alarm Console for more than 3 seconds.

Verify that:

- The front panel Channel Indicator(s) blink
- The Beacon on top of the console is illuminated
- The Horn/Buzzer in the console sounds
- The Remote Horn with Beacon follows the action of the Alarm Console's Horn and Beacon
- All attached output devices go into the alarm condition

EXAMPLE: If a 915S or 915ST Solenoid device is installed as part of the system, the GREEN Active light should extinguish.

Use as Low Level Alarm

1. Should the contacts associated with a Low Level Tank Sensor be activated, the Alarm Console will immediately go into an alarm state; it will illuminate the Channel Alarm Indicator associated with the alarm condition, the Alarm Console Beacon will illuminate and Horn/Buzzer will sound.
2. If the 915 Alarm Console is configured to "auto-silence" and the alarm is not silenced manually by pressing the "Test/Cancel" button, the 915 Alarm Console will continue in this alarm state for no more than 10 minutes at which point it will silence itself. All visual Indicators will remain illuminated in the alarming state showing a new, un-acknowledged alarm.
3. If an operator acknowledges the alarm condition by pressing the "Test/Cancel" button, the 915 tank Alarm will silence the audible enunciator, extinguish the Beacon and the channel alarm indicator will illuminate continuously until the alarm condition is removed.
4. To check for an alarm state once the Alarm has silenced itself simply observe the front panel. A blinking channel indicator and no audible alarm tells you that there is an existing, auto-silenced alarm on that channel. A channel indicator which is continuously illuminated indicates that there is an existing, acknowledged (silenced) alarm.

Maintenance

WARNINGS

- Any modification of this unit beyond what is outlined in this instruction will void product warranty.
- For your safety, it is important to follow local, state, federal and/or OSHA rules that apply to working inside, above, or around the storage tank and piping area. Use all personal protective equipment required for working in the specific environment.
- Install in accordance with all applicable local, state and federal regulations and codes.
- This device is intended to be used as an auxiliary warning to the operator of an abnormal condition of the system, such as a possible overfill situation and should not be the only system in place to prevent an unwanted condition, such as preventing a tank from overfilling. It is the sole responsibility of the operator to continuously prevent any spillage regardless of the situation.
- In the event of malfunction, remove from service immediately and contact Morrison Bros. Customer Service

There are two scheduled maintenance operations:

- **At the Beginning of Each Work Shift:** Test the overall operation of the 915 Tank Alarm System
- **YEARLY:** Simulate an alarm condition and verify the operation of the System

At the Beginning of Each Work Shift

Test the overall operation of the 915 Tank Alarm System **<u>at the beginning of each work shift.</u>**

1. Press and hold the "Test/Cancel" button while listening to the audible alarm and observing the Channel Alarm indicator(s) and the Beacon.
   - Audible Alarm is sounding
   - Channel Alarm Indicator(s) is (are) blinking
   - Beacon is operating
   - GREEN ACTIVE Indicator(s) on all 915S and 915ST Solenoid Valve Units is extinguished.
2. If alarm does not sound, the Channel Alarm Indicator(s) do not blink, the Beacon is not operating or the ACTIVE Indicators on Solenoid Valve Units remain illuminated, verify that power is applied to the Tank Alarm and that there are not wiring faults between the 195 Tank Alarm Console and the 915S and/or 915ST Solenoid Valve Units and re-test. If the alarm still does not sound or the Solenoid Valve Units do not disable, call Morrison Bros. Co. Customer Service.

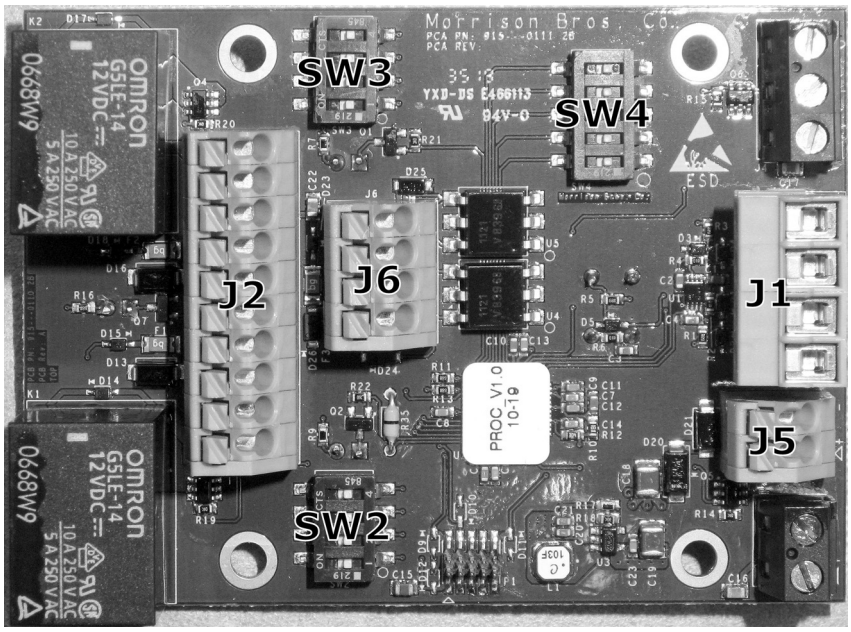
Yearly

This check is to be performed **<u>no less than once per year.</u>**

1. Perform per-work shift check as outlined above to verify the overall operation of the Tank Alarm System.
2. It is recommended to simulate an alarm condition and manually trigger the alarm using input device (915 Sensor, Clock Gauge, float switch or other dry contact device). If it does not respond as with an alarm condition, check wiring at junction box and verify that the installation procedure was performed correctly. The alarm can be silenced after being activated by pressing the "Test/Cancel" button.

Failure to follow any or all of the warnings and instructions in this document could result in a hazardous liquid spill, which could result in property damage, environmental contamination, fire, explosion, serious injury or death

Appendix A:
Dip Switch Configuration Tables



DIP SWITCHES

	SW2—Output 1 Setting	
Position	**ON**	**OFF**
1	Responds to Channel 1 input	Does NOT respond to Channel 1 input
2	Responds to Channel 2 input	Does NOT respond to Channel 2 input
3	Normally **Activated** (failsafe)	Normally **Deactivated**
4	Non-persist	Persist

	SW3—Output 2 Setting	
Position	**ON**	**OFF**
1	Responds to Channel 1 input	Does NOT respond to Channel 1 input
2	Responds to Channel 2 input	Does NOT respond to Channel 2 input
3	Normally **Activated** (failsafe)	Normally **Deactivated**
4	Non-persist	Persist

		SW4 Setting	
Position		**ON**	**OFF**
1	**INPUTS**	Configures input 1 for **Normally-Closed contacts**	Configures input 1 for **Normally-Open contacts**
2		Configures input 2 for **Normally-Closed contacts**	Configures input 2 for **Normally-Open contacts**
3	**915HB**	Responds to Channel 1 input	Does NOT respond to Channel 1 input
4		Responds to Channel 2 input	Does NOT respond to Channel 2 input

	SW4 Setting	
Position	**ON**	**OFF**
5	The audible alarm will automatically silence after 10 minutes of alarming.	The audible alarm will continue to sound until either the alarm condition ceases to exist, or the alarm condition has been acknowledged by pressing the Test/Silence button on the front panel.

CONNECTORS

	J1 Pin Assignments
Position	**Description**
1	INPUT 1 Switch in
2	INPUT 1 Return
3	INPUT 2 Switch in
4	INPUT 2 Return

	J2 Pin Assignments	
Position		**DESCRIPTION**
1	**OUTPUT 1**	+12V power OUT; Current limited and fused
2		Power return
3		Normally-Closed contact
4		**COMMON** contact
5		Normally-Open contact
6	**OUTPUT 2**	+12V power OUT; Current limited and fused
7		Power return
8		Normally-Closed contact
9		**COMMON** contact
10		Normally-Open contact

J5 Pin Assignments	
Position	**Description**
1	+12V in
2	Power Return

J6 Pin Assignments	
Position	**Description**
1	915HB Power
2	Beacon Enable
3	915HB Power Return
4	Horn Enable