Overfill Prevention Control Unit with Ground Verification & Vehicle Identification Options
# Table of Contents

## Introduction

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## General

1.1 Description

1.2 Monitoring Functions

1.3 Output Capabilities

1.4 Communications

1.5 Bypass

1.6 Additional Equipment

1.7 Display Panel

1.8 Approvals

1.9 Constraints

1.10 Internal Architecture

1.11 Technical Specifications

1.12 Configurations

---

## Mechanical Installation

2.1 Warnings

2.2 Water Proofing

---

## Electrical Installation

3.1 Non-Intrinsically Safe (IS) Connections

3.2 Intrinsically Safe (IS) Connections

3.3 EMI Shield Kit Installation Instructions

---

## System Setup

4.1 CPU Jumper Settings

4.2 VIP List

4.3 Bypass Key, Add/Erase Procedures
# Table of Contents

## Initial System Check

- **5.1 Inspect Wiring**  
  Page 23.

- **5.2 Recommended Test Equipment**  
  Page 23.

- **5.3 Model ST-2-DSWJ Tester**  
  Page 24.

- **5.4 Fault Conditions During Initial Testing**  
  Page 25.

## System Operation

- **6.1 Normal Loading**  
  Page 27.

- **6.2 After a Normal Load**  
  Page 27.

- **6.3 Intellitrol Not Permitting**  
  Page 27.

- **6.4 Bypassing Normal Operating Modes**  
  Page 27.

## Maintenance

- **7.1 Preventative Maintenance**  
  Page 28.

- **7.2 Warranty**  
  Page 28.

- **7.3 Troubleshooting Guide**  
  Page 29.

- **7.4 Installing Replacement Parts**  
  Page 32.

- **7.5 Parts Available**  
  Page 32.

## Technical Service Hot-Line/Notes

Page 35.

## Diagram Appendix

- **9.1 DWG 63038 – Intellitrol Enclosure Outline, Model Series IC**  
  Page 36.

- **9.2 DWG 63039 – Sculcon Plug and Cable Assembly Outline**  
  Page 37.

- **9.3 DWG 61337 – Mech. Installation, Intellitrol Model Series IC**  
  Page 38.

- **9.4 DWG 61335 – (2-Wire, Optic or Therm.) Sculcon Field Wiring Diagram**  
  Page 39.

- **9.5 DWG 61336 – (5-Wire, Optic) Sculcon Field Wiring Diagram**  
  Page 40.

- **9.6 DWG 61394 – Multiple Sculcon (2-wire and 5-wire) Field Wiring Diagram**  
  Page 41.

- **9.7 DWG 61506 – Multi-Drop Communications Field Wiring Diagram**  
  Page 42.

- **9.8 DWG 63040 – Intellitrol Control Module Outline, Model Series IC**  
  Page 43.

- **9.9 DWG 61659 – Installation Drawing, Intellitrol FMC with Entity Parameters**  
  Page 44.
Introduction

Scully® Signal Company was incorporated in 1936 with the invention of the Ventalarm Signal®, a whistling tank-fill signal designed to replace float devices for high level liquid indication and overfill prevention. It was an immediate success in the United States and Canada and soon replaced unreliable floats in many tank applications.

Scully Signal Company then followed in 1950 with an Automatic and Continuous Self-Checking concept and patents. This brought a new level of fail-safe operations to Automatic Level Control and Overfill Prevention Systems with its "Dynamic Self-Checking®" patents and controls, which are installed worldwide with major oil and chemical companies plus military aviation refueling operations.

Scully's level controls check their own operation around the clock and have been applied to numerous monitoring operations in several industries such as flame safeguard control monitoring systems in refineries for both oil and chemical operations as well as top and bottom loading operations for terminals and tank trucks worldwide.

Summing up an astonishing fail-safe record worldwide in petrochemical operations this past quarter of a century, Dynamic Self-Checking, the electronic heart-beat system that fails safe "unless incorrectly installed or deliberately bypassed!"
1.1 Description

The Intellitrol is intended to serve as a secondary overfill protection system for loading operations. It is intended for use in hazardous locations and is packaged in an explosion-proof (flameproof) enclosure and has both International and US approvals and certifications.

The Intellitrol performs a variety of monitoring functions and provides a number of outputs to control valves, pumps and other systems including Terminal Automation Systems (TAS). It has an integrated display to indicate system and monitoring status, a bypass capability, and communications for integration with TAS and other systems.

The Intellitrol contains a pair of microprocessors, each with its own relay that monitors critical functions. Only when both processors detect a safe condition will both relays close and make outputs permissive.

The Intellitrol is designed to be Faylsafe® and in the event of a failure (power, sensors, or internal electronics) the unit will enter a non-permissive (safe) state.

This state-of-the-art Dynamic Self-Testing® system controller provides overfill prevention and optional vehicle ground verification and vehicle identification operating in a single enclosure. The Intellitrol also provides the user with comprehensive diagnostic information, both locally on the exterior of the control unit housing and remotely to the terminal automation system via RS-485 communications.

1.2 Monitoring Functions

1.2.1 Overfill
The Intellitrol monitors 5-wire optic sensors, 2-wire optic and 2-wire thermistor sensors that are compliant with API-1004 standards. The Intellitrol does not support 3-wire thermistor sensors such as the SP-BLH.

The system automatically determines which sensor type is attached. The Intellitrol is compatible with on-vehicle electronics like the Intellicheck® and the Scully Load Anywhere® and interprets their output signals according to the interface used.

1.2.2 Ground
The Intellitrol can be configured via an internal jumper setting to monitor static ground verification based on:
- Ground Bolt/Ground Ball using Scully pioneered Dynamically Self-Testing® ground verification systems or
- Resistive ground verification systems
1.2.3 **Vehicle Identification Prover**
The Intellitrol is capable of monitoring Scully Truck Identification Modules (T.I.M.®). The TIM is a small truck-mounted device which gives every vehicle a unique identifier that can be read by the Vehicle Identification Prover (VIP) feature of the Intellitrol. This identification can be compared to a program table list stored in the non-volatile RAM on the CPU of the Intellitrol for a Go/No-Go decision or can be read by a TAS and used for other functions such as billing and automatic compartment size determination for loading using preset meters.

1.2.4 **Deadman Switch**
The Intellitrol is capable of monitoring a deadman switch which must be held closed by an operator to obtain a permissive state. If the deadman handle is released, the switch will open and the Intellitrol will go non-permissive. (Note: The form C relay use is restricted to only NO and common contacts when using deadman input.)

1.3 **Output Capabilities**

1.3.1 **Form A (Powered) Relay contacts**
One set of fuse-protected relay contacts is available for output. These contacts are also used for internal monitoring of relays and must only be used for AC power switching. If a TAS requires voltage-free switching, the Form C contacts should be used. The Main Display on the front panel indicates relay status.

1.3.2 **Form C (Volt free) Relay contacts**
A set of volt free contacts is available for low voltage switching applications. These contacts are switched together with the Form A contacts and cannot operate separately. (Note: NC contact cannot be used when deadman input used.)

1.3.3 **Truck Present**
A transistor switch is available to indicate that a truck is connected. Typical use is to control a gate to prevent drive-offs while connected to the Intellitrol. (Alternatively, this switch can be configured to indicate a good ground present instead of truck present. Contact Technical Services for details.)

1.4 **Communications**
The Intellitrol has an RS-485 interface which can be used to perform maintenance and serves as a communications interface for Terminal Automation Systems. Through this interface, the TAS can obtain Intellitrol status including truck present, sensor, and ground status as well as directly reading TIM information. For more details on the operation of this interface please contact Technical Services.
1.5  Bypass

The Intellitrol has the capability to be bypassed for some fault conditions when connected to a vehicle. The bypass capability is accessed using a bypass key, sold separately. The bypass key is compared to an internal list stored in non-volatile RAM for authorization. If the key is authorized to bypass the unit, the Intellitrol will recognize it and bypass the fault (overfill, ground or vehicle ID). An overfill sensor that becomes wet while loading cannot be bypassed.

1.6  Additional Equipment

1.6.1  Sculcon Junction Box
A Sculcon Junction Box is highly recommended because it is used to interface between the Intellitrol’s intrinsically safe connections and a vehicle connection. It comes with a plug and cable assembly for truck connection. The Sculcon Box enables cable replacement without requiring that the Intellitrol door be opened or the seal on the Intellitrol door be broken.

1.6.2  Deadman Control Switch
A Deadman Control Switch is used with the Intellitrol when the operator must be present and actively involved at all times during the loading operation. Thus, the operator must hold the deadman switch closed during the entire loading operation; otherwise the Intellitrol will go non-permissive. The Deadman is optional.

1.7  Display Panel
The Intellitrol Display Panel is designed to be seen at the terminal by an operator located in the lane area of the tanker delivering or receiving a load. The display contains sections with unique functions which are listed in Figure 1.

![Figure 1: Main Status and Diagnostic Display Panel Indicators](image-url)
1.7.1 Display Panel Indicators

Note: References below to flashing slow and fast are compared to Dynacheck® flashing rate.

Main Status Bars
- **Red Bar On**, (Non-Permissive)
  - Flashing slow, faulty sensor bypassed
  - Flashing fast, main output relay shorted
- **Green Bar On**, (Permissive)
  - Flashing, ground or vehicle identification bypassed

Compartment 8-LED's (Fault Indicators)
- **Off**, No truck/dry sensor
- **Red**, Wet or warming sensor
  - Flashing slow = open 2-wire sensor
  - Flashing fast = shorted 2-wire sensor

*Note: When a compartment fault is detected:*

A compartment LED on indicates a fault. It may be faulty wiring, thermistor sensors not warmed up, or wet compartments.

- **For 2-wire only**, 6 or 8 compartments are monitored, depending on jumper settings. LED's on indicate that one or more compartments are faulty and produces a non-permissive condition preventing product transfer.

- **For 5-wire only**, 1 to 12 compartments are monitored and one compartment at a time is displayed. Up to two compartment LED's are displayed per faulty compartment and produces a non-permissive condition preventing product transfer. 1-8 compartments are monitored. 1-8, and 9-12 are indicated by LED No.8 on plus one additional LED 1-4. Adding the two LED numbers, (8+1) = 9, and (8+1+2+3+4) = 12, and so on indicates which of 12 compartments is faulty. (Note: The Intellitol can support up to 15 compartments, however, above writeup is restricted to 12 compartments to support EN13922 maximum.)

**Ground**, 1 LED
- **Red**, No ground bolt/ground ball detected or no resistive short detected
- **FLAShING Red**, Ground verification function bypassed

**Communication**, 2 LED’s
Requires RS485 com link and VIP/TIM Connection
- "**Terminal**" - Yellow, Communications in progress to TAS
- "**Vehicle**" - Yellow, Communications in progress to TIM

**Optic Pulse**, 2 LED’s
- "**In**" - Green, Receiving pulses from 5-wire sensors
- "**Out**" - Green, Transmitting pulses to 5-wire sensors
Service, 1 LED
- FLAShING Red, Operational problem with the Intellitrol

Dynacheck, 1 LED
- FLAShING Yellow, Normal operation, once per second
- OFF, Operational problem with the Intellitrol

Vehicle Identification Prover, 3 LED’s
- "AUTHORIZED" - Green, Truck Identification Module (TIM) serial number has been read and found in authorization list.
  - Flashing Green, VIP function bypassed
- "UNAUTHORIZED" - Red, Truck Identification Module (TIM) serial number is not found in authorization list.
- "STANDBY" - Yellow, Truck Identification Module (TIM) has not been read.

1.8 Approvals
All Intellitrol units fall under the approvals for:

- FM Approvals for US & Canadian Standards
  Explosion-proof with Intrinsically Safe outputs for Class I, Division I, Group C & D; NEMA enclosure type 4X (watertight & corrosion resistant).

1.9 Constraints
The Intellitrol Control Unit has been designed to be impact-resistant, however, do not subject it to excessive mechanical or thermal stresses. Do not allow the unit to come in contact with aggressive substances.

The Intellitrol may only be repaired by qualified technical personnel by replacing the internal control or display module with equivalent modules. The internal control module and display board modules are not field repairable.

Do not open the Intellitrol door when an explosive gas atmosphere is present. To avoid static discharge buildup, clean only with a damp cloth.
Figure 2: Intellitrol Block Diagram
1.11 Technical Specifications

1.11.1 Temperature
Operating: -40 to +140 Degrees F
Storage: -50 to +185 Degrees F

1.11.2 Power Requirements
Voltage: 230 V +/-10% 50Hz
or
120V +/- 5% 60Hz
Consumption: 50 Watts maximum

1.11.3 Outside Dimensions
See Appendix 9.1 & 9.2 for mounting details.

1.11.4 Weight
31 lbs.

1.12 Configurations
The following models of the Scully Intellitrol are available. All fall under Section 1.8 Approvals and Section 1.11 Technical Specifications.

1.12.1 FM Table
FM series uses 3/4” NPT SAE conduit threads.
Default Configuration: (120VAC)

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC-O</td>
<td>Overfill Prevention Only</td>
<td>08907</td>
</tr>
<tr>
<td>IC-OG</td>
<td>Overfill Prevention and Ground Verification</td>
<td>08908</td>
</tr>
<tr>
<td>IC-OGV</td>
<td>Overfill Prevention, Ground Verification and Vehicle Identification Prover</td>
<td>08909</td>
</tr>
</tbody>
</table>
Mechanical Installation

When choosing a location on the loading rack for the Intellitrol, keep in mind that, while it can be exposed to the elements, the main status indicators and diagnostic display panel on the front of the Intellitrol should be readily visible and within easy reach to the user. The control unit should be mounted vertically, at eye level, in a location where the front cover can open 120 degrees for servicing.

Refer to the Intellitrol Enclosure Outline and Sculcon Plug and Cable Assembly Drawings in Appendices 9.1 - 9.3 for physical dimensions, location of mounting bolts, electrical cable gland entry locations, and enclosure bonding stud. The enclosure bonding stud is provided for proper electrical bonding of the enclosure to earth ground. Use only the three conduit entry holes provided for wiring. The left and right side holes are for power and control wiring. The bottom hole is for intrinsically safe sensor wiring only. Do not drill any additional holes in the enclosure, as doing so violates the enclosure's hazardous location approval and voids the warranty.

2.1 Warnings

- All electrical conduits entering the enclosure must have a seal fitting installed within 18" of the enclosure to comply with the approval requirements.
- The electrical conduit entry in the bottom of the enclosure marked “Intrinsically Safe Entry” is for the sensor wiring between the Intellitrol plug and cable assembly and for the optional deadman switch wiring only. To maintain intrinsic safety, this cable entry must not be used for any other wiring.

2.2 Water Proofing

To avoid future maintenance issues regarding water infiltration into the housing via the electrical cable entries, we strongly recommend the following precautions:

- Minimize long vertical conduit runs into the sides of the enclosure as they promote condensation in the conduit system accumulating above the seal fitting packing.
- Carefully install the conduit seal fittings on the sides of the enclosure, taking extra precaution to make certain that the installation is correct and sealed properly (as required by code).
- To maintain NEMA 4X rating, all threaded joints of the conduits entering the enclosure must be sealed with a copper or lead based anti-seize / sealant.
Refer to the Installation Wiring Diagrams for the Intellitec Control Module and Sculcon Junction Box Plug and Cable Assemblies in Appendices 9.4 - 9.6.

3.1 Non-Intrinsically Safe (IS) Connections
All Non-IS connections are at the top of the control module and must never be intermixed with IS wiring.

3.1.1 Power Selection
The Intellitec is field selectable for either 120 or 230 VAC by setting red jumper(s) J10 and J11 at the top of the board.
- **120 VAC**, Insert 2 horizontal jumpers, one in J10 and one in J11
- **230 VAC**, Insert a single vertical jumper between J10 and J11

*Note: Refer to Appendix 9.8. See J10 and J11 configurations.*

3.1.2 Ground
- **TB1-1**, Green wire door ground
- **TB1-2**, Green wire box ground
- **TB1-3**, AC power ground
- **TB1-4**, Extra AC power ground

It is imperative to Intrinsic Safety that the unit be connected to earth ground. A green terminal block is located at the top left of the control module to terminate an incoming ground connection. Do not modify the other connections on this terminal block.

3.1.3 AC Power Connection
- **TB2-1**, Neutral
- **TB2-2**, Hot

3.1.4 Switched Outputs
- **Powered**
  - **TB2-3**, Power in
  - **TB2-4**, Power out

These connections are used internally to monitor relay status and use a normally open switch for line voltage use.

*Caution: Must be the same phase as the power in.
Must not be used for low voltage DC switching.*

- **Unpowered**
  - **TB3-1**, Normally Open (NO)
  - **TB3-3**, Normally Closed (NC)
  - **TB3-2**, Common (COM)

This set of dry Single Pole Double Throw (SPDT) relay contacts are available for connection of low voltage devices. In the event of a failure all switched power and the NO connections of the unpowered output will fail safe. The NC contact of the unpowered output will remain closed should power be lost and is not fail safe. The NC contact should NOT be used for safety related functions or for deadmen operation.
3.1.5 Status Output/Input

Truck Connected Output
- **TB3-5**, Transistor Emitter
- **TB3-6**, Transistor Collector, via a fuse and resistor

This output is a low side transistor switch and will conduct when a truck is detected. Connection is as shown below.

*Caution: Must be the same phase as the power in.*

![Diagram of TB3, 5-6 Opto-Coupler](image)

*Figure 3: TB3, 5-6 Opto-Coupler*

Some typical wiring diagrams to interface this truck connected output to a programmable logic controller’s (PLC) input channel or a load amplifying solid state relay are shown in fig.4.

![Diagram of Typical Output Wiring Diagram](image)

*Figure 4: Typical Output Wiring Diagram*
3.1.6 RS-485 Communications Terminal
- TB5-1, ground terminal
- TB5-2, (TD/RD) "B" terminal
- TB5-3, (TD/RD) "A" terminal.

Remote communications are available through connector TB5. Appendix 9.7 shows a typical Intellitrol multi drop communications wiring scheme for connection details.

While it is possible for an Intellitrol to share a RS-485 communications line with other equipment, we recommend that each Intellitrol controller have a dedicated RS-485 communications line to simplify troubleshooting.

3.2 Intrinsically Safe (IS) Connections
Caution: DO NOT RUN WIRES connected to Intrinsically Safe connections next to Non Intrinsically Safe wires or connections. Doing so creates risk and an explosion may occur under adverse conditions.

All Intrinsically Safe (IS) connections are made from connectors TB4 and TB6 through the hole at the bottom of the box. Connections from TB4 are typically wired one-to-one from the Intellitrol to the terminal block in the Sculcon box. Different cable configurations are required for connection to 2-wire or 5-wire trucks.

3.2.1 Sculcon Junction Box Plug and Cable Assembly
The Sculcon Junction Box is the preferred way to connect to the IS-Interface. Refer to Appendix 9.2 for the typical Sculcon junction box outline diagram showing physical dimensions, location of mounting bolts and cable gland entry location details. Refer to Appendices 9.4 - 9.6 for wiring diagrams showing the interconnection details for the Sculcon junction box plug and cable assembly to the Intellitrol.

3.2.2 Standard Sensor Wiring Connections
- 2-wire trucks use an 8- or 10-pin plug on a 10-pin cable.
- 5-wire trucks use a 6-pin plug on a 6-pin cable wired to the same connection.
Table 1 below describes the connections and function of TB4, Pins 1-10.
### Overfill Prevention Control Unit (with Ground Verification & Vehicle Identification Option)

#### Electrical Installation

<table>
<thead>
<tr>
<th>Connection</th>
<th>Pin Number</th>
<th>TB4 Pins</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-Wire 8 Compartment</td>
<td></td>
<td>Sensor 1, Sensor 2, Sensor 3, Sensor 4, Sensor 5, Sensor 6, Sensor 7, Sensor 8, GND/TIM Verify, GND</td>
</tr>
<tr>
<td>2-Wire 6 Compartment</td>
<td>Sensor 1, Sensor 2, Sensor 3, Sensor 4, Sensor 5, Sensor 7, Sensor 8, GND/TIM Verify, GND</td>
<td></td>
</tr>
<tr>
<td>5-Wire 12 Compartment</td>
<td></td>
<td>Pulse to Sensors, Diag., Pulse from Sensors, Power from Sensors, GND/TIM Verify, GND</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Terminal Number</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Connection</strong></td>
<td>Sculcon Junction Box &amp; Cable Plug Pin / Socket Receptacle</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 3.2.3 Deadman Control
- **TB6-3**, NO, Deadman Switch Input
- **TB6-4**, Return

This Normally Open (NO) connection can optionally be used for a Deadman (switch closure) input signal. When this option is enabled, the Intellitrol will permit only when the deadman switch is closed.

### 3.2.4 J1 Front Display Panel Connection
J1 is located at the bottom left corner of the control board. J1 is a 6-pin ribbon header that provides an IS connection from the controller to the Front Display Panel.

*Caution: Make sure to note the orientation of this connector before removing.*
3.3 **EMI Shield Kit Installation Instructions**

In order to minimize Electro Magnetic Interference (EMI), ferrite filters need to be installed on the three access cables entering the Intellitrol Controller. To reduce susceptibility to external EMI, the snap-on ferrite filters should be installed after the wiring connections are completed inside the Intellitrol. Make sure to leave only enough wire near the connectors to accommodate the snap-on ferrites.

Simply snap one EMI filter over all of the wires exiting the control box located in the three locations shown.

**Control Module:**
1. Power in on the left side
2. Control out/Modbus in on the right side
3. I.S. outputs at bottom

*KEEP ALL LEADS AS SHORT AS POSSIBLE*
4.1 **CPU Jumper Settings**

The Intellitrol has a number of features and functions that can be enabled through internal jumper settings. The jumpers on the CPU board are listed below.

### 4.1.1 Jumper Selectable Options

- J5  OPERATING MODE SETTINGS (see 4.1.2 below)
- J8 & J1  COMM MODBUS ADDRESS (see 4.1.3 below)
- J7  COMM PROTOCOL (see 4.1.4 below)

### 4.1.2 J5, OPERATING MODE SETTINGS

**Enable/Disable** (purchased options only).

The Intellitrol options which are purchased can be disabled via jumper plugs on the CPU board. Moving jumpers for non purchased options has no effect.

<table>
<thead>
<tr>
<th>J5</th>
<th>Function Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TB3-5/6 CONFIG</td>
<td>Configures External Truck Bypass Indicator on TB3 Pins 5-6</td>
</tr>
<tr>
<td>3</td>
<td>DEADMAN ENABLE</td>
<td>Enable Deadman Switch Input</td>
</tr>
<tr>
<td>5</td>
<td>DEADMAN DISABLE</td>
<td>Disable Deadman Switch Input</td>
</tr>
<tr>
<td>7</td>
<td>VAPOUR ENABLE</td>
<td>Not Used</td>
</tr>
<tr>
<td>9</td>
<td>VAPOUR DISABLE</td>
<td>Not Used</td>
</tr>
<tr>
<td>11</td>
<td>VIP ENABLE</td>
<td>Enable Vehicle Identification Proving</td>
</tr>
<tr>
<td>13</td>
<td>VIP DISABLE</td>
<td>Disable Vehicle Identification Proving</td>
</tr>
<tr>
<td>15</td>
<td>GND ENABLE</td>
<td>Enable Ground Proving</td>
</tr>
<tr>
<td>17</td>
<td>GND DISABLE</td>
<td>Disable Ground Proving</td>
</tr>
<tr>
<td>19</td>
<td>ADD KEY S/N</td>
<td>Add Bypass Key Serial Number</td>
</tr>
<tr>
<td>21</td>
<td>NORMAL OPERATION</td>
<td>Normal Operation</td>
</tr>
<tr>
<td>23</td>
<td>ERASE KEY LIST</td>
<td>Erase Bypass Key Serial Number List</td>
</tr>
</tbody>
</table>

Note: The last three jumpers control Enrolling Bypass Key serial numbers into the Intellitrol's nonvolatile memory. Refer to Section 4.3 for more detail.

### 4.1.3 J1 & J8, COMM MODBUS ADDRESS

**Setting communications speeds and feeds**

Two sets of jumpers are used for setting device Modbus. Jumper J8 sets the tens group and jumper J1 sets the ones group. The Modbus address is the sum of the two jumpers.
4.1.4  **J7, COMM PROTOCOL**

RS485 (J7 Jumper Setup)
- **J7**, allow the user to select:
  - **Parity**, (NONE/ODD/EVEN)
  - **Baud Rate**, (1.2, 2.4, 4.8, 9.6, 19.2 KB/S)
  - **Data Pack**, (7 or 8 Bits)

---

**Figure 5: CPU Board Layout**

*Note: Jumper Terminals: Black denotes default installed jumpers, except J5, operating mode settings are dependent on options purchased.*
4.1.5 **Control Board Jumper Settings**

Several modes can be selected using jumpers on the main Control Board.

*Note: Refer to Appendix 9.9 for jumper locations on the Intellitrol Control Module.*

**CHANNEL, (Number of Compartments)**

- **J31, Blue**
  - Sets 6 channel mode for 2-wire Sensors
- **J32, Blue**
  - Sets 8 channel mode for 2-wire Sensors

**GND BOLT/BALL OR RESISTIVE, (Type of ground system check)**

- **J8, Black**
  - Inserted sets resistive ground; otherwise ground bolt/ground ball

**THRESHOLD**

- **J4, Black**
  - In the factory default FM model the jumper is removed. This sets the thermistor threshold at 3.5V for SP-BL & BLU type sensors. Inserted jumper sets thermistor threshold at 3.8V for SP-BLK & BLUK type sensors.

**JUMP START**

- **J21, 22 and 23, Red**
  - In the factory default FM model the jumpers are removed. This enables Jump Start for installations requiring preheating of thermistor sensors. Inserted jumpers disables Jump Start limiting IS output voltage for ATEX applications. All three jumpers MUST always be in for ATEX installations.

4.2 **VIP List**

This feature is optional and must be ordered. Trucks and Tankers can be outfitted with a Truck Identification Module (TIM) that gives the vehicle a unique serial number. These numbers may be stored on the Intellitrol in non-volatile RAM so that the information may be passed to a terminal controller that works in conjunction with the Intellitrol system. The serial numbers must be entered into the Intellitrol via the RS-485 communication port.

4.3 **Bypass Key, Add/Erase Procedures**

Before use, each Bypass Key must first be programmed into the Intellitrol’s permanent memory. Power must be on.

*Warning: The following procedure must not be performed in a flammable hazardous environment. The Intellitrol door cannot be open while fuel or a tanker carrying flammable substances is present.*
4.3.1 Adding Bypass Key entries:
1. Unbolt and open the Intellitrol door. Store the bolts in a safe place.
2. Move the "Normal Operation" jumper on J5 to the "Add Key S/N" position (refer to Figure 5: CPU Board Layout).
3. Push the "Reset" button (top center of CPU board).
4. Close the door and wait for both Optic Pulse and Communications to blink together continuously at double the Dynacheck rate. The Intellitrol is now ready for entering a bypass key serial number.
5. Position a bypass key up to the bypass port. The Intellitrol will read the bypass key serial number incrementing the "Compartment Number" LED. After all 8 compartment LED’s light up, the large green permissive light will flash briefly to indicate that the bypass key serial number has been stored in memory.
6. To add additional bypass keys, repeat Step 5 above. When all bypass key serial numbers have been added, proceed to Step 7.
7. Open the Intellitrol door and return the jumper on J5 to the "Normal Operation" position.
8. Push the "Reset" button.
9. Close and properly secure the Intellitrol door using the original bolts.

4.3.2 Erasing Bypass Key entries:
It may at some point be necessary to delete the list of "authorized" Bypass Key serial numbers store within the Intellitrol’s permanent memory (i.e. if a Bypass Key is lost). To delete the list of "authorized" Bypass Keys, do the following:

Warning: The following procedure must not be performed in a flammable hazardous environment. The Intellitrol door cannot be open while fuel or a tanker carrying flammable substances is present.

Caution: All bypass key entries will be erased.

1. Unbolt and open the Intellitrol door. Store the bolts in a safe place.
2. Move the "Normal Operation" jumper J5 to the "ERASE KEY LIST" position (refer to Figure 5: CPU Board Layout).
3. Push the "Reset" button (top center of CPU board).
4. The large red non-permissive indicator will flash briefly and the Compartment, Optic Pulse, and Communication LED’s will blink at double the Dynacheck rate to indicate that all bypass key entries have been deleted from memory.
5. Return the jumper on J5 to the "Normal Operation" position.
6. Push the "Reset" button.
7. Close and properly secure the Intellitrol door using the original bolts.

4.3.3 External Bypass key entry/deletion
Bypass key serial numbers may be added or deleted one by one from the Intellitrol remotely via external software through the communications port.
Performing an Initial System Check is essential and proves that the Intellitrol installation is performing safely and correctly.

5.1 **Inspect Wiring**
Inspect all field wiring for neat professional installation, and adherence to all wiring instructions above. Verify that all wiring terminals are tightened securely by tugging on each connection. Close the control unit’s cover and fasten securely. Tighten the cover bolts in a criss-crossing pattern.

5.2 **Recommended Test Equipment**
Scully Signal Company suggests the use of our Universal Loading Rack Tester Model ST-2-DSWJ for individual compartment checks, cable continuity or float switch detection. While use of Scully test equipment is not required, the test equipment provide all of the proper overfill prevention system signals required to verify the new installation without requiring actual vehicles for the testing.
5.3 **Model ST-2-DSWJ Tester**
The Model ST-2-DSWJ Tester provides a rotary switch to select the following functional safety checks:

- Cable Continuity
- Float Switch Detection
- Thermistor Sensor Detection
- Optical Sensor Detection

5.3.1 **Operational Testing Sequence**
1. No vehicle or tester connected to Intellitrol.
2. Power up Intellitrol.
3. Intellitrol will go through a power up sequence, including the testing of all internal functions and operating parameters.
4. Checks and enables display panel LED’s in sequence.
5. Red non-permissive indicator will light after 15 seconds.
6. Yellow Dynacheck LED will flash indicating that the Intellitrol is ready to accept a vehicle.
   If the Intellitrol is connected to a terminal automation system, the yellow terminal LED will also flash each time the Intellitrol is polled by the automation system.

5.3.2 **Equipment Attachment**
Set the ST-2-DSWJ tester to Thermistor Sensor Detection mode. Attach the black or green 2-wire thermistor or 2-wire optic plug from the Intellitrol to the socket (SJ-8S-4 bayonet pin style) on the right side of the housing.

5.3.3 **Two-Wire Thermistor Sensor Operation Testing**
The ST-2-DSWJ tester uses one "Channel Test" button/switch per thermistor sensor and each corresponding sensor will be tested when that button is depressed.

When the tester is attached to the thermistor socket, the Intellitrol will detect that it is attached to a “thermistor” equipped vehicle and proceed to warm up the sensors (the tester has traditional thermistor sensors inside). While the sensors are warming up, the 8 red compartment indicator lights at the top of the Intellitrol’s diagnostic display panel will light, indicating 8 wet sensors. As each thermistor sensor warms up, the red compartment indicator corresponding to that sensor, will go out indicating a dry sensor. When all of the thermistor sensors are warmed up (up to 75 seconds required) the Intellitrol will permit, and the green main status indicator will come on. Verify that the Intellitrol’s main output relay contact has closed (turned on) and that product can be transferred. This can be done by verifying that this permissive signal is available at the product meter(s) external permissive input terminal(s). Some metering systems also have a visible indicator (LED) to indicate that the external permissive signal is satisfied.

For each thermistor sensor selected, verify that the Intellitrol goes non-permissive and shuts down the gantry. The corresponding compartment indicator light on the Intellitrol diagnostic display panel will light when the test button/switch is pushed. If more than one plug (or two different styles of plugs) is used on this installation for 2-wire thermistor or 2-wire optic operation, repeat the above tests for the other plug.
5.3.4 Five-Wire Optic Sensor Operation Testing
Set the ST-2-DSWJ tester to Optic Sensor Detection mode. If the installation uses a single plug for both 2-wire thermistor or 2-wire optic and 5-wire optic modes, leave the plug connected as per the above. If the installation uses separate plugs for 2-wire thermistor or 2-wire optic and 5-wire optic operating modes, attach the optic plug from the Intellitrol to the optic socket. This will be either the SJ-6W-3 bayonet pin style socket on the left side of the housing for a blue "6W" style optic plug, or the SAE J-560 style socket on the back of the tester housing for a "6X" style optic plug. When attached to this optic socket, the Intellitrol will detect that it is attached to a 5-wire optic equipped vehicle and proceed immediately to permit. The Intellitrol's diagnostic display panel will light, indicating an "optic out" pulse from the Intellitrol and an "optic in" pulse from the tester. As the Intellitrol permits, the green main status indicator will light up. Verify that the output to the metering system again turns on and that product can be transferred. Verify that when push-button/switch no. 2, no. 4 or no. 6 on the tester is pushed, the Intellitrol goes non-permissive and shuts down product flow. Compartment indicator light no. 1 on the Intellitrol diagnostic display panel will light when one of these tester buttons is pushed.

If more than one plug (or two different styles of plugs) is used on this installation for 5-wire optic operation, repeat the above tests for the other plug.

5.4 Fault Conditions During Initial Testing
If the Intellitrol does not permit the tester in either of the above testing modes, refer to the diagnostic display panel for specific information on identifying the cause of the problem.

If the Intellitrol fails the power up diagnostic test, the Service LED will flash ON-OFF and the Dynacheck light will be off. After making sure that the Intellitrol’s plug(s) are not connected to a truck, remove power from the unit for 15 seconds and reapply. See that the Intellitrol goes through the power-up sequence per above. If not, refer to the Troubleshooting Guide in Section 7.3. There can not be a vehicle attached to the Intellitrol during power-up (or during a reset). If there is a vehicle attached during power-up, the Intellitrol will fail its diagnostic tests.
Most of the detailed instructions and cautions for operation of the Intellitrol system and accessories have already been discussed. The basics of loading a vehicle are described below. Refer to Figure 6 for details of the Intellitrol’s main status indicators and diagnostic display panel.

**Figure 6: Main Status and Diagnostic Display Panel Indicators**
6.1 Normal Loading
The Intellitrol is capable of automatically detecting the presence of 2-wire and 5-wire overfill sensors. In operation it constantly monitors the truck plug while running diagnostics. Once a truck is detected the system determines the sensor type and monitors for dry condition.

Optic sensors are detected within a second. Thermistor sensors must heat up before indicating a dry condition. The heat-up time for thermistor sensors can take up to 75 seconds. This is a normal condition.

6.2 After a Normal Load
Disconnect the plug from the vehicle to be loaded. The Intellitrol will return to its non-permissive state and the diagnostic display panel will first flash all of the 8 compartment indicators and then clear (go blank) within a few seconds. This indicates that the Intellitrol's plug is ready to be connected to the next vehicle.

6.3 Intellitrol Not Permitting
If the Intellitrol main display does not go green, the reason for the problem will be indicated in the front panel display (see Section 7.3 Troubleshooting Guide for details).

This condition can be bypassed with the use of a properly registered bypass key.

6.4 Bypassing Normal Operating Modes

6.4.1 Bypassing in General
Before bypassing always verify that it is safe to do so.

To bypass a detected fault condition the bypass key must be held against the side of the Intellitrol front panel at the bypass port for 10-30 seconds.

When in bypass mode the main display will blink. When blinking red, faulty sensors are bypassed.

When blinking green the ground or VIP is bypassed.

- The maximum bypass time is settable via the communications port from 15 to 60 minutes.
- Bypass operation automatically ends when the vehicle is disconnected.
- If more than one fault condition exists preventing loading (e.g. ground and VIP), the bypass key must be pulled away from the bypass port and placed up to the port a second time.
- A faulty sensor can only be bypassed at initial truck hookup.
- A Deadman cannot be bypassed.
- A sensor wet during loading can never be bypassed.
7.1 Preventative Maintenance
The Intellitrol should be inspected annually. The o-ring and corrosion pack should be replaced at this time. It is recommended that maintenance on Scully equipment be carried out by Scully certified technicians.

7.2 Warranty

7.2.1 Intellitrol Control Unit
The Intellitrol Control Unit is warrantied by Scully Signal Company (“Scully”) to be free from defects in material and workmanship under normal use and service for a period of three years.

Warranty covers manufacturing defects. Damage specifically resulting from improper use or incorrect installation is not covered.

7.2.2 General Terms
All equipment returned to Scully that has a manufacturing date code that exceeds the warranty period should be accompanied by an invoice or work order that states the date of installation. Under these warranties, Scully shall be responsible only for actual loss or damage suffered and then only to the extent of Scully's invoiced price of the product. Scully shall not be liable in any case for labor charges for indirect, special, or consequential damages. Scully shall not be liable in any case for the removal and/or reinstallation of defective Scully equipment.

These warranties shall not apply to any defects or other damages to any Scully equipment caused by misuse or negligence, and this warranty shall not apply to any Scully equipment that has been altered or tampered with by anyone other than Scully factory representatives.

These warranties are the only warranties, expressed or implied, upon which products are sold by Scully, and Scully makes no warranty of suitability for any particular purpose in respect to the products sold.

Scully products or parts thereof assumed to be defective by the purchaser within the stipulated warranty period should be returned to the seller, local distributor, or directly to Scully for evaluation and service. Whenever direct factory evaluation, service, or replacement is necessary, the customer must first, by either email or phone, obtain a Returned Material Authorization Number (RMA) from Scully Company directly. No material may be returned without an RMA number assigned to it or without proper factory authorization.

Any returns must be returned freight prepaid to:

Scully Signal Company
70 Industrial Way
Wilmington, MA 01887 U.S.A.
Attention: Service Dept.

Returned warranty items will be repaired or replaced at the discretion of the Scully Service Department according to Scully Product Warranty Policy and the Scully Returned Materials Procedure. Any Scully items under the Scully Warranty Policy that are deemed not repairable by the Scully Service Department will be replaced at no charge or a credit issued for that item subject to the customer’s request.
The following table summarizes errors indicated via the front panel and their most likely causes. Problems covered are the:
- Intellitrol Self Check failure
- Unit’s plug and cable assembly(s)
- Vehicle trying to get a permissive signal to load at the rack.

This chart and the troubleshooting guide should be consulted prior to requesting technical service help. If after consulting the chart you are unable to resolve the problem contact Scully Technical Services at 1-800 Scully and be prepared to communicate the status of the indicators on the front panel.

**Warning:** Certain checks may require access to the inside of the control unit to verify or change configuration jumpers. Any activity requiring the opening of the unit should only be performed by qualified personnel. The area must be secured and vapour free before opening the enclosure to avoid explosion.
### Table-2: Front Panel Display Trouble Shooting Chart

**Assumes ground proving and VIP enabled, lights for disabled options will always be off**

<table>
<thead>
<tr>
<th>Red Only Permit Bar</th>
<th>Green Permit Bar</th>
<th>Compartment LEDs</th>
<th>Optic Out</th>
<th>Optic In</th>
<th>Ground</th>
<th>Service</th>
<th>Comm. Terminal</th>
<th>Comm. Vehicle</th>
<th>Authorized</th>
<th>Unauthorized</th>
<th>Standby</th>
<th>Dynacheck</th>
<th>Operating Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>On</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Rack not permitting or deadman open</td>
</tr>
<tr>
<td>On Off</td>
<td>On</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Vehicle connected, and indicated sensor is wet or thermistor sensor still warming</td>
</tr>
<tr>
<td>On Off</td>
<td>**</td>
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<td></td>
<td>No vehicle connected; an I/O pin (1-8) of the Scully connector is shorted</td>
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<tr>
<td>On Off</td>
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<td></td>
<td></td>
<td></td>
<td>Vehicle connected; 2-wire sensor is shorted</td>
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<td>On Off</td>
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<td></td>
<td></td>
<td>2-wire sensor open</td>
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<tr>
<td>@ Off</td>
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<td></td>
<td></td>
<td>Shorted output relay</td>
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<td>@ Off</td>
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<td></td>
<td></td>
<td></td>
<td>Vehicle connected and bypassing faulty sensor</td>
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<tr>
<td>Off On</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Vehicle connected and rack permitting, all sensors dry</td>
</tr>
<tr>
<td>Off @</td>
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<td></td>
<td></td>
<td></td>
<td>Vehicle connected and bypassing Ground Proving and/or VIP</td>
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<td></td>
<td></td>
<td></td>
<td>Vehicle connected; main processor pulsing 5-wire optic sensors</td>
</tr>
<tr>
<td>@ Off</td>
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<td></td>
<td></td>
<td>Main processor not receiving 5-wire optic pulses back from 5-wire sensors</td>
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<td>@ @</td>
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<td></td>
<td></td>
<td></td>
<td>Vehicle connected; main processor pulsing 5-wire optic sensors and optic return being sensed</td>
</tr>
<tr>
<td>Off</td>
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<td></td>
<td></td>
<td></td>
<td>Vehicle not connected or vehicle connected and ground proving successful</td>
</tr>
<tr>
<td>On</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td>Vehicle connected and ground proving fault. Either open or Ground Bolt / Ground Ball shorted</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td>Vehicle connected; Ground proving bypassed</td>
</tr>
<tr>
<td>Off</td>
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<td></td>
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<td></td>
<td>No system error detected</td>
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<td></td>
<td>System error detected</td>
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<tr>
<td>@</td>
<td>Flashing</td>
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<td></td>
<td>Flashing at Dynacheck rate (once per second)</td>
</tr>
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<td></td>
<td>Flashing slow (once every two seconds)</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td>Flashing fast (twice per second)</td>
</tr>
</tbody>
</table>

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*Page 30.*
**Table-2b: Front Panel Display Trouble Shooting Chart**

<table>
<thead>
<tr>
<th>Red Non Permit Bar</th>
<th>Green Permit Bar</th>
<th>Compartment LEDs</th>
<th>Optic Out</th>
<th>Optic In</th>
<th>Ground</th>
<th>Service</th>
<th>Comm. Terminal</th>
<th>Comm. Authorized</th>
<th>Unauthorized</th>
<th>Standby</th>
<th>Dynacheck</th>
<th>Vehicle Id</th>
</tr>
</thead>
<tbody>
<tr>
<td>On</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Terminal communications line faulty</td>
</tr>
<tr>
<td>Off</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Intellitrol not communicating with terminal</td>
</tr>
<tr>
<td>*</td>
<td>*</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Intellitrol communicating with terminal</td>
</tr>
<tr>
<td>On</td>
<td>*</td>
<td></td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Vehicle communications error</td>
</tr>
<tr>
<td>Off</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Vehicle not connected/not communicating</td>
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<td></td>
<td></td>
<td></td>
<td>Intellitrol communicating with the vehicle</td>
</tr>
<tr>
<td>On Off Off</td>
<td>*</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Vehicle connected, TIM good, and authorized</td>
</tr>
<tr>
<td>* Off Off</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Vehicle connected, VIP bypassed</td>
</tr>
<tr>
<td>Off On Off</td>
<td>*</td>
<td></td>
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<td></td>
<td></td>
<td>Vehicle connected, TIM good but not unauthorized, i.e. ID not in VIP list</td>
</tr>
<tr>
<td>Off * Off</td>
<td>*</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>With vehicle connected, unable to see TIMs</td>
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<td></td>
<td></td>
<td>Intellitrol waiting for TAS command</td>
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<td></td>
<td></td>
<td></td>
<td>Intellitrol operational</td>
</tr>
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<td></td>
<td>Off</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Unrecoverable system error occurred</td>
</tr>
<tr>
<td>Off Off Off Off Off Off Off Off Off Off Off</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No Power; front panel bad/not connected</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>All other displays = bad front panel or unit</td>
</tr>
</tbody>
</table>

©  Flashing

*  Flashing at Dynacheck rate (once per second)

#  Flashing slow (once every two seconds)

**  Flashing fast (twice per second)
7.4 Installing Replacement Parts

Warning: Opening the Intellitrol exposes Non-Intrinsically safe circuits to the atmosphere. Always assure the location is secured and is non-hazardous before opening an explosion proof housing.

The Intellitrol contains only two field replaceable modules. Order a replacement with the correct part number corresponding to the options purchased.

- Control Module
- Front Panel display

7.4.1 Control Module Replacement Procedure

- Disconnect the unit from power
- Unbolt and open the Intellitrol door
- Unplug all connectors, noting orientation of J1 ribbon to front panel
- Remove factory grounds from TB1 cable to front panel from green J1 terminal
- Remove the four screws on the corners of the control module which secure it.
- Lift the control module from the enclosure and remove the blue and black wires from the terminal strips on the back of the module which connect to the IS Barrier Heat sink assembly.
- Make note of jumper settings

7.4.2 Control Module Reassembly

- Inspect new module and reset jumpers to match the unit removed. While most will match particular attention should be paid to CHANNEL jumper J31 & J32 which sets 6/8 compartment mode. The jumpers are always shipped in the 8 Compartment mode and must be reset on site if 6 compartment mode is used.
- Re-assemble unit in the reverse order used for removal.

Warning: The blue and black wires from the IS Barrier Heat sink assembly are an integral part to safety and MUST all be reconnected to assure continued Intrinsic Safety!

7.4.3 Front Panel Replacement

- Disconnect the unit from power
  - Remove the front cover screws and front panel assembly
  - Note orientation of connector on rear of front panel
  - Re-assemble in reverse direction

7.5 Parts Available

The following lists contain the common spare field replaceable parts available for the Intellitrol control unit and accessory items. Please consult the factory for any parts not mentioned below.
### Table-3: List of Replacement Parts

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Part Number</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Module Assembly, IC-O</td>
<td>08979O</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Module Assembly, IC-OG</td>
<td>08979OG</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Module Assembly, IC-OGV</td>
<td>08979OGV</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Cover Bolt, M8 x 1.25 x 25mm</td>
<td>50005</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>Contact Fuse (F5, F8), 5A, Hi-interrupt</td>
<td>26372</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>Cover O-ring (gasket)</td>
<td>31340</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Corrosion Inhibitor</td>
<td>40268</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>Lens Assembly (with 6 mounting screws)</td>
<td>08980</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>Display Module (with backing plate)</td>
<td>08981</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>Display Cable Feed-through</td>
<td>08982</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>Lens Mounting Screw, 8-32 x 3/4</td>
<td>50080</td>
<td>6</td>
</tr>
<tr>
<td>11</td>
<td>Retaining Ring, Cover Hinge</td>
<td>54039</td>
<td>2</td>
</tr>
<tr>
<td>12</td>
<td>Text Mask (English), Overfill and Ground</td>
<td>32085*</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Text Mask (English), Overfill, Ground and Vehicle ID</td>
<td>32086*</td>
<td></td>
</tr>
</tbody>
</table>

*To order lens mask in text other than English, add:
  - S for Spanish
  - F for French
  - G for German
  - I for Italian
  - D for Danish

Example: 32085S = Lens Mask, Spanish Text, Overfill & Grounding
### 7.5.2 Table-4: List of Accessories

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>08939</td>
<td>Bypass Key Authorizer</td>
</tr>
<tr>
<td>08863</td>
<td>Deadman Control Switch Assembly</td>
</tr>
<tr>
<td>08951</td>
<td>Intelliview® 2 Terminal Software</td>
</tr>
<tr>
<td>09001</td>
<td>RS-232 to RS-485 Converter Kit (for communications)</td>
</tr>
<tr>
<td>08958</td>
<td>SC-8OB Sculcon Junction Box with 8B Style Black Poly Plug and 6 meter (20 ft) Blue Straight Cable (for 2-wire or 5-wire sensors - 4-bayonet pins - 10 contact pins)</td>
</tr>
<tr>
<td>08959</td>
<td>SC-8B Sculcon Junction Box with 8B Style Green Poly Plug and 6 meter (20 ft) Blue Straight Cable (for 2-wire or 5-wire sensors - 4 bayonet pins - 10 contact pins)</td>
</tr>
<tr>
<td>08729</td>
<td>SC-8A Sculcon Junction Box with 8A Style Green Poly Plug and 9 meter (30 ft) Orange Coiled Cable (for 2-wire sensors - 2 bayonet pins - 10 contact pins)</td>
</tr>
<tr>
<td>08156</td>
<td>SC-6A Sculcon Junction Box with 6A Style Green Poly Plug and 9 meter (30 ft) Orange Coiled Cable (for 2-wire sensors - 2 bayonet pins - 8 contact pins)</td>
</tr>
<tr>
<td>08159</td>
<td>SC-6W Sculcon Junction Box with 6W Style Blue Poly Plug and 9 meter (30 ft) Blue Coiled Cable (for 5-wire sensors - 3 bayonet pins - 6 contact pins)</td>
</tr>
</tbody>
</table>
Technical Service Hot-Line
Scully’s Technical Service Department can be reached at the corporate headquarters in Wilmington, MA U.S.A. by telephone at (617) 692-8602; by FAX at (617) 692-8620; and by email at Techservice@scully.com. If calling from within the United States, our toll free Technical Service Hot-Line Number is (800) 272-8559.

Our technical service department staff is available from 8 AM to 5 PM Eastern Standard Time to answer any questions which may arise regarding the installation, operation or service of the Scully Intellitrol and accessories.

Notes
9.1 DWG 63038 – Intellitrol Enclosure Outline, Model Series IC
EQUIPMENT SCHEDULE (TYPICAL)

1. INTELLITROL CONTROL UNIT.
2. SCULCON PLUG AND CABLE UNIT.
3. EXPLOSION PROOF CONDUIT UNION.
4. EXPLOSION PROOF CONDUIT OUTLET BODY.
5. CONDUIT SEAL FITTING WITH INTEGRAL DRAIN.
6. EXPLOSION PROOF JUNCTION BOX (IF REQUIRED).
7. WATERTIGHT INDUSTRIAL ENCLOSURE CONDUIT HUB.

INSTALLATION NOTES

1. SEAL FITTINGS MUST BE INSTALLED WITHIN 18 INCHES OF THE INTELLITROL ENCLOSURE. PLUG ALL UNUSED CONDUIT ENTRIES.
2. INSTALLATION MUST COMPLY WITH ALL FEDERAL, STATE AND LOCAL REGULATIONS FOR INSTALLATIONS IN HAZARDOUS LOCATIONS. DETAILS SHOWN ARE FOR REFERENCE ONLY AND ARE NOT INTENDED TO REPRESENT CODE COMPLIANCE.
3. THE INTRINSICALLY SAFE WIRING BETWEEN THE BOTTOM CONDUIT PORT OF THE INTELLITROL HOUSING AND THE SCULCON PLUG AND CABLE JUNCTION BOX MUST BE RUN IN DEDICATED CONDUIT. NO OTHER CONDUCTORS ARE TO BE RUN IN THIS CONDUIT.
4. MINIMIZE LONG VERTICAL RUNS OF CONDUIT INTO THE TOP CONDUIT PORTS OF THE INTELLITROL HOUSING TO AVOID CONDENSATION.
5. APPLY ANTISEIZE / SEALANT TO THE CONDUIT THREADS AT ALL THREADED JOINTS TO PREVENT WATER INFILTRATION INTO CONDUIT.
JUMPER/FUSE FUNCTIONAL DETAILS:

1. J10/J11 - AC INPUT POWER SELECTOR JUMPERS. FACTORY SET FOR 120 VAC OPERATION. FOR 240 VAC OPERATION, REMOVE J10 & J11. REINSTALL ONE JUMPER VERTICALLY IN 240 VAC POSITION. REMANUFACTURING JUMPER.

2. J71, J72 & J73 - EARTH (GROUND) ISOLATION JUMPERS. THESE JUMPERS ARE ALWAYS INSTALLED, DO NOT REMOVE.

3. FUSES:
   F-8, MAIN OUTPUT RELAY (5A, 1/4" X 1-1/4" CERAMIC HINTERRUPT)
   F-5, FORM-A AUX. OUTPUT (5A, 1/4" X 1-1/4" CERAMIC HINTERRUPT)

4. J8 - GROUND VERIFICATION JUMPER:
   REMOVE IF ALL VEHICLES EQUIPPED WITH SCULLY GROUND BOLT - FACTORY SETTING. LEAVE IN PLACE IF ALL VEHICLES ARE WIRING WITH SOCKET PIN NO. 9 & 10 CONNECTED TO THE VEHICLE CHASSIS.

5. J31/J32 - 6 OR 8 SENSOR CHANNELS OPERATING MODE:
   LOCATION J32 - 6 SENSOR CHANNEL OPERATION
   LOCATION J31 - FOR 8 SENSOR CHANNELS OPERATION

6. J4 - 3.5/3.8 VOLT SENSOR THRESHOLD JUMPER:
   LEAVE IN PLACE FOR 3.8 VOLT SENSOR THRESHOLD OPERATION (TYPICAL FOR AUSTRALIA, EUROPE, HONG KONG & NEW ZEALAND). REMOVE FOR 3.5 VOLT SENSOR THRESHOLD OPERATION (TYPICAL FOR NORTH AMERICA & SOUTH AMERICA) - FACTORY SETTING.

7. J21, J22 & J23 - MAXIMUM SENSOR OUTPUT VOLTAGE JUMPER:
   REMOVE FOR MANUFACTURED MODELS - FACTORY SETTING.
9.9 DWG 61659 - Installation Drawing, Intellitrol FMC with Entity Parameters

NOTES:
1. NO RELEASE OF REVISION CHANGE WITHOUT PRIOR FAL APPROVAL.
2. SEAL FITTINGS MUST BE INSTALLED WITHIN 18 INCHES OF AN EXPLOSION PROOF ENCLOSURE IN A HAZARDOUS LOCATION.
3. THE IMPORTANCE OF MAINTAINING ABSOLUTE SEPARATION BETWEEN INTRINSICALLY SAFE AND NON-INTRINSICALLY SAFE WIRING CANNOT BE OVER EMPHASIZED!
4. CONTROL EQUIPMENT CONNECTED TO ASSOCIATED APPARATUS MUST NOT USE OR GENERATE MORE THAN 3 V/MS OR VDC.
5. THE ENTITY CONCEPT ALLOWS INTERCONNECTION OF INTRINSICALLY SAFE APPARATUS WITH ASSOCIATED APPARATUS WHEN THE FOLLOWING IS TRUE:
   \[ V_{max} + U_i \geq V_{oc} + V_i \]
   \[ I_{max} \geq I_{oc} \]
   \[ P_{max} \geq P_{oc} \]
   \[ C_{max} \geq C_{oc} \]
   \[ L \geq L \]
6. RESISTANCE BETWEEN INTRINSICALLY SAFE GROUND AND EARTH GROUND MUST BE LESS THAN 1.0 OHM.
7. INSTALLATION SHOULD BE IN ACCORDANCE WITH ANSI/IEEE RP12.06.01 "INSTALLATION OF INTRINSICALLY SAFE SYSTEMS FOR HAZARDOUS (CLASSIFIED) LOCATIONS" AND THE NATIONAL ELECTRICAL CODE (ANSI/NFPA 70).
8. LS. DEVICE MAY CONNECT TO MULTIPLE OUTPUTS PINS 1-8 PROVIDED ENTITY PARAMETERS COMPLY TO CHARTS.
INTELLITROL I.S. OUTPUT ENTITY PARAMETERS

<table>
<thead>
<tr>
<th>TB4 - X W.R.T. TB4, PIN 10</th>
<th>U₀</th>
<th>I₀</th>
<th>P₀</th>
<th>Cᵢ</th>
<th>Lᵢ</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>11.6V</td>
<td>191mA</td>
<td>0.55W</td>
<td>0.011µF</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>11.6V</td>
<td>191mA</td>
<td>0.55W</td>
<td>0.011µF</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>11.6V</td>
<td>191mA</td>
<td>0.55W</td>
<td>0.011µF</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>11.6V</td>
<td>191mA</td>
<td>0.55W</td>
<td>0.011µF</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>11.6V</td>
<td>191mA</td>
<td>0.55W</td>
<td>0.011µF</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>11.6V</td>
<td>191mA</td>
<td>0.55W</td>
<td>0.011µF</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>11.6V</td>
<td>191mA</td>
<td>0.55W</td>
<td>0.011µF</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>11.6V</td>
<td>191mA</td>
<td>0.55W</td>
<td>0.011µF</td>
<td>0</td>
</tr>
<tr>
<td>9</td>
<td>9V</td>
<td>209mA</td>
<td>0.61W</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

AUXILIARY I.S. INPUTS & DEADMAN SWITCH INPUT

<table>
<thead>
<tr>
<th>TB6 - X TB6, PIN 4</th>
<th>U₀</th>
<th>I₀</th>
<th>P₀</th>
<th>Cᵢ</th>
<th>Lᵢ</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>39V PEAK</td>
<td>190mA</td>
<td>0.55W</td>
<td>0.011µF</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>39V PEAK</td>
<td>190mA</td>
<td>0.55W</td>
<td>0.011µF</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>39V PEAK</td>
<td>12mA</td>
<td>0.04W</td>
<td>0.011µF</td>
<td>0</td>
</tr>
</tbody>
</table>

DEVICE 1

DEVICE 2

DEVICE 3

DEVICE 4

DEVICE 5

DEVICE 6

DEVICE 7

DEVICE 8

DEVICE 9

DEVICES 1-8
DEVICE WITH I.S. PARAMETER
SEE NOTE 9

Vₓₓₓ ≥ 11.6V
Iₓₓₓ ≥ 191mA
Cᵢ ≤ 0.011µF
Lᵢ = 0 mH

DEVICE 9
DEVICE WITH I.S. PARAMETER
SEE NOTE 8

Vₓₓₓ ≥ 9V
Iₓₓₓ ≥ 209mA
Iₓ = 0 mH
Cᵢ ≤ 0.011µF
Scully - Setting Standards in Safety and Dependability since 1936.

For over seventy-five years Scully has been engineering and building products to the highest safety and reliability standards. We design and manufacture all of our systems under one roof to ensure complete quality control over our manufacturing and testing operations. Scully is ISO certified and all of our products are 100% made in the U.S.A. In addition, we back up our products with the best service in the industry. We have direct sales and service personnel in the U.S.A., The United Kingdom, and Europe and are represented in over 50 countries.

For more information and 24 hour technical assistance, call Scully Signal Company at 1-800-SCULLY (1-800-272-8559).

Scully Headquarters in Wilmington, MA U.S.A.

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