STANDARD BULK TRUCK SYSTEM INSTALLATION PROCEDURES

LectroCount³

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1. System Overview

The LectroCount^3 On-Board Truck Computer system works in conjunction with many models of Positive Displacement Flow Meters. It accurately measures fuel deliveries, prints priced receipts, and streamlines driver record keeping. It can be equipped with accessories that allow for temperature volume compensation, deliveries to be made (net volume), and delivery information to be exchanged between the truck computer and an office computer.

The basic system consists of:

1. Remote Supervisory Control Box/Remote Electronic Counter Assembly (RSCB/REC) that is mounted in place of mechanical registration equipment on the meter.
2. Supervisory Control Module and Printer that are mounted in the truck cab.
3. Lap Pad operator interface.

For trucks equipped with two meters, a dual meter configuration is available that allows two RSCB/RECs to be connected to a single truck computer.

This manual describes the installation of these components and their accessories. **Read this entire installation manual before beginning the installation to make sure that you understand the total scope of the project.** Specific installation requirements will vary with the model of truck. Meter type, configuration of existing metering equipment, selected options, and the type of fluid being metered, all influence installation. Make sure that the RSCB/REC, Electronic Temperature Volume Compensation kit (ETVC), pulser, and valves can be installed in such a manner so as to not interfere with routine service of the meter, the strainer, and the meter compartment door.

The conduit and wiring for the above components need to be routed with similar concerns in mind. If a dual meter system is being installed, the RSCB/REC, ETVC, pulser, and valve work must be duplicated for the second meter.

NOTE: Power, input and output (I/O) wiring must be in accordance with Class I, Division 2, wiring methods in Article 501-4(b) of the National Electrical Code, NFPA 70 and in accordance with the authority having jurisdiction.

WARNING: **Explosion Hazard - Substitution of Components May Impair Suitability for Class I, Division 2.**

WARNING: **Explosion Hazard - When in Hazardous Locations, Turn Off Power Before Replacing or Wiring Modules;**

WARNING: **Explosion Hazard - Do NOT Disconnect Equipment Unless Power Has Been Switched Off or the Area is Known to be Non-hazardous.**

2. Installation Overview

- Ensure that the truck electrical system meets specifications and can provide at least 5 Amps for the LectroCount^3 with all truck accessories operating.
- Electrically ground the truck seats.
- Mount supervisory control module and printer in cab.
- Install battery/accessory cables.
- Install odometer kit (optional).
- Remove any existing mechanical registration equipment.
- Remove any existing manual preset valve.
- Install an electronically controlled security valve or solenoid kit.
- Mount RSCB / REC
- Install pulser assembly (optional)
- Install Electronic Temperature Volume Compensation Kit (optional).
- Route Meter Signal Cable to truck cab.

3. Parts Requirements

3.1 LIQUID CONTROLS SUPPLIED COMPONENTS

- RSCB / REC
- Meter Signal Cable (pre-wired to RSCB)
- Battery/Accessory Cable
- Supervisory Control Module
- Lap Pad (driver key pad)
- Ticket Printer with cables

3.2 LIQUID CONTROLS SUPPLIED OPTIONS

- ETVC Kit
- Pulse Output Device (pulser)
- Odometer Pulser
- Dual Meter Switch Box
- RAM Interface Module
- Two Stage Valve or 3-Way Solenoid

3.3 INSTALLER SUPPLIED PARTS

- Protective Sheathing/Conduit for cables
- All Fittings
- Hardware for Truck Computer Mounting Brackets

4. Electrical Check

Before beginning to install the LectroCount^3, it is essential that you complete the following checklist. If the vehicle electrical system cannot meet the following requirements, corrective action must be taken before installing the LectroCount^3. This checklist is also included with the system. That copy should be filled out and filed with the distributor or truck builder. NOTE: Contact the factory if the truck has a positive ground.

The truck system must meet the following requirements:

- Battery terminals and cables must be in good condition with clean, corrosion free connections.
- Battery must be charged in accordance with manufacturer's specifications.
- The alternator must be large enough to meet the total demands of the truck, including the LectroCount^3. LectroCount^3 requires 5A minimum for proper operation. A typical alternator size is 90 amperes.
- If the truck has a history of electrical problems, make sure that these problems have been corrected before installing the LectroCount^3.
- Inspect all truck electrical/electronic equipment for proper installation.
- Determine if the truck is positive or negative ground. (If the system is positive ground, contact the factory).
- Be sure that the radio antennas were installed in accordance with the manufacturer's specifications to prevent RF interference.

To ensure that these requirements are met, check the voltage across the battery terminals under the following conditions:

LectroCount^3
Vehicle Inspection Check List

With the truck running at low idle, and all accessories off, the voltage should be between 12.6 and 18 VDC.

With all the accessories (lights, heater, radio, and radio mike) on, the voltage must be between 12.6 and 18 VDC. If the voltage drops significantly when the accessories are turned on, it may indicate that the alternator will not be able to support the LectroCount^3.

Extend the delivery hose to its full length, engage the hose reel and measure the voltage as the hose is reeled in. It shouldn't drop below 10VDC.

With the truck running at high idle, and all accessories off, check the voltage. Again it should be between 12.6 and 18 VDC.

Repeat the hose reel test with the truck at high idle. Make sure that the voltage does not drop below 10 VDC.

5. Truck Cab Computer Installation

5.1 GENERAL REQUIREMENTS

A minimal truck cab computer system includes:

1. A supervisory control module (SCM) that is mounted between two right angle brackets
2. A dot matrix ticket printer
3. A Lap Pad (key pad/display).

Systems equipped with the RAM card option will have a RAM interface module mounted atop the supervisory control module. Dual meter systems will have a Dual Meter Switch mounted below the SCM. (See Figure to the right)

The truck computers are shipped with the components and brackets assembled. The installer has to bolt the brackets to the cab floor, ground the SCM to the truck electrical system, and route the power and signal cables to the appropriate connectors on the SCM and Dual Meter Switch.

The printer also needs to be mounted in the truck cab, usually on top of the SCM "stack". The Lap Pad is secured in a holder on the side of one of the brackets.

5.2 LOCATING COMPONENTS

The SCM bracket should be mounted in a location where:

- Both the front and back can be accessed to connect cables
- The Lap Pad and printer will be accessible to the driver.
- The Supervisory Control Module fuses can be replaced.
- There is enough room to insert and remove a RAM card from the RAM interface module. (RAM systems only)

Truck Cab
Component Configuration

Single Meter/Non-RAM Configuration

Single Meter / RAM Configuration

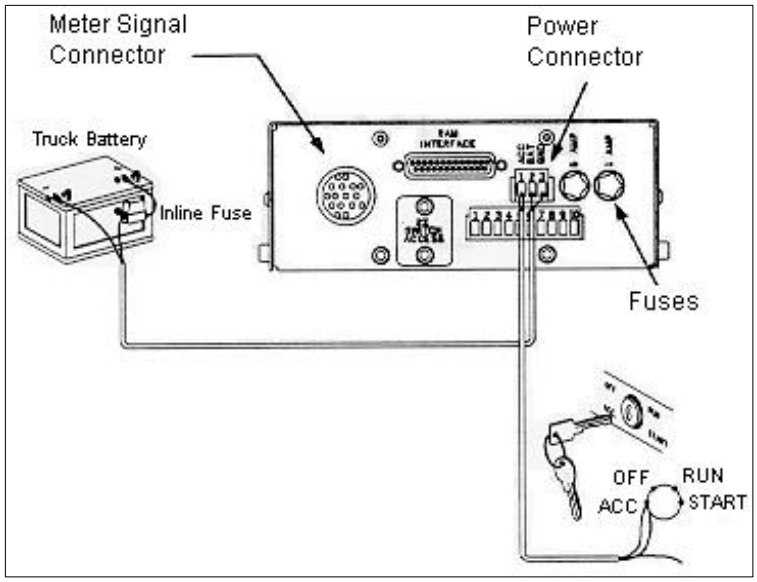
Dual Meter / RAM System

5.3 ELECTRICAL POWER CONNECTIONS

5.3.1 Overview

The LectroCount^3 is designed to run only when the ignition switch is in the “on” or “accessory” position. This prevents the LectroCount^3 from being damaged by the voltage spikes or electrical noise that occur when the starter is engaged, or from draining the truck battery power when the truck isn’t running.

Voltage from the battery is switched by a relay that is controlled by the truck’s accessory circuit. It is vital that the battery and accessory cables be properly connected and fused, and that the SCM is properly grounded.



5.3.2 Run Battery Cable

(Part Number 81232)

The battery cable is supplied with heavy-duty ring terminals that must be installed directly to the battery posts.

Make sure that the truck’s electrical system has been properly checked. Clean the battery terminals for a good electrical connection.

- Remove the ATO 7.5 amp fuse from the battery cable’s black splash-proof fuse holder so that the wire is not live while the cable is routed and terminated.
- Attach the **black** cable to the negative (**-**) terminal of the battery.
- Connect the **orange** cable terminal to the positive (**+**) terminal of the battery.
- On truck systems with several batteries connected in parallel, the last battery in the system usually has the least number of connections and will be the best location to attach the battery cable.
- Route the cable to the supervisory control module in the truck cab.
- Seal any holes that you may have made in the cab wall.

(continued next page)

- Make sure that you route the cable in such a manner so as not to interfere with the operation or maintenance of the truck.
- The wires will be connected to a three pin terminal block on the back of the SCM.
- The block can be removed from the SCM to ease the process.
- Use a 1/8” screwdriver to back off the terminal block screws.
- Strip 7/32” of insulation from the wires.
- Connect the white wire to Pin 2 on the block and connect the black wire to Pin 3.
- Make sure that the screws are re-tightened and that no loose strands of wire are exposed.

5.3.3 Install Accessory Cable

(Part Number 80747)

The accessory cable consists of a **RED** and a **BLACK** conductor in a shielded cable. The conductors are both connected to the same ring terminal on one end. They are not terminated on the other end.

The accessory cable must be wired to the truck’s accessory circuit. The power to this circuit should be:

- **OFF** when the ignition is off or the engine is cranking,
- **ON** when the truck is running or the ignition switch is in the “accessory” position:

Key Switch OFF	**0VDC**
Key Switch ON	**12 VDC (battery voltage)**
Key Switch ACCESSORY	**12 VDC (battery voltage)**
Key Switch or starter button CRANKING	**0 VDC**

- Check the voltage using an accurate multi-meter.
- Be sure to use a good ground to avoid false readings.
- The voltage should drop momentarily to 0 as the engine is cranked.

If the ignition switch is accessible:

- Connect the ring terminal on the accessory cable to the accessory stud on the switch.
- It is usually best to install the ring terminal over the stud and the nut that hold the existing accessory wires in place.
- An additional nut should then be used to hold the LC accessory cable on the stud.

If the ignition switch is not accessible:

- Install a voltage tap on the accessory fuse.
- Remove the ring terminal from the accessory cable.
- Connect both the red and black conductors in the cable to the fuse tap.
- Trim back the drain wire and foil shield at the outer insulation on the cable.
- Use electrical tape or heat shrinkable tubing to insulate the edge of the shield.
- Route the cable to the rear of the supervisory control module.
- Trim the cable to the appropriate length and strip back the outer insulation, foil shield, and drain wire.
- Use electrical tape or heat shrinkable tubing to insulate the edge of the shield.
- Remove 7/32" of insulation from both the red and black conductors, twist the wires together, and insert them in Pin 1 of the three pin terminal block.
- Tighten the terminal block screw using 1/8" flat blade screwdriver.
- Plug the terminal black back into the SCM.

5.4 TRUCK SEAT GROUNDING

5.4.1 Static Electricity and Grounding

Static electricity can build up on drivers and truck seats, especially during cold, dry weather. Adjustable, shock-absorbing seats add to the problem because they isolate the seat cushion from an electrical ground. If the static is discharged on or near the LectroCount^3, it can cause the truck computer to reset and/or cause a number of other hard to trace faults. The discharge can occur when the driver touches the LectroCount^3 or a part of the truck that provides a good ground path.

WARNING

To prevent the occurrence of electrostatic discharge (ESD), it is mandatory that the truck seat(s) be properly grounded. This allows the static electricity to "bleed off' the driver and seat before it can build up to the point where a discharge can interfere with the operation of the LectroCount^3 (or cause an explosion in hazardous environments!)

5.4.2 Installation of Ground Strap Kit

- Locate a good ground point near the back of the seat frame. The bottom of the seat base bracket is usually a good spot.
- Drill a 9/32” hole in the seat frame near the back of the base.
- Attach one end of the ground strap to the bracket using the lock washer, flat washer and nut provided. The lock washer should penetrate any paint on the bracket to ensure a good electrical connection.
- Attach the other end of the strap to a metal part of the seat frame at a point where it contacts the seat cushion. Make sure that there are no intervening pivot points, guides, adjustment mechanisms, etc., which could interfere with the ground path between the seat cushion and the ground strap.
- If the seat cushion has a wooden base, use a wood screw and washer to attach the strap lug to the bottom of the seat at a point where the seat fabric is attached to the wood. There must be good contact between the seat fabric and ground strap lug.
- Make sure that the strap is positioned so that it doesn’t interfere with the movement of the seat or is exposed to physical damage.

Checking for a good ground

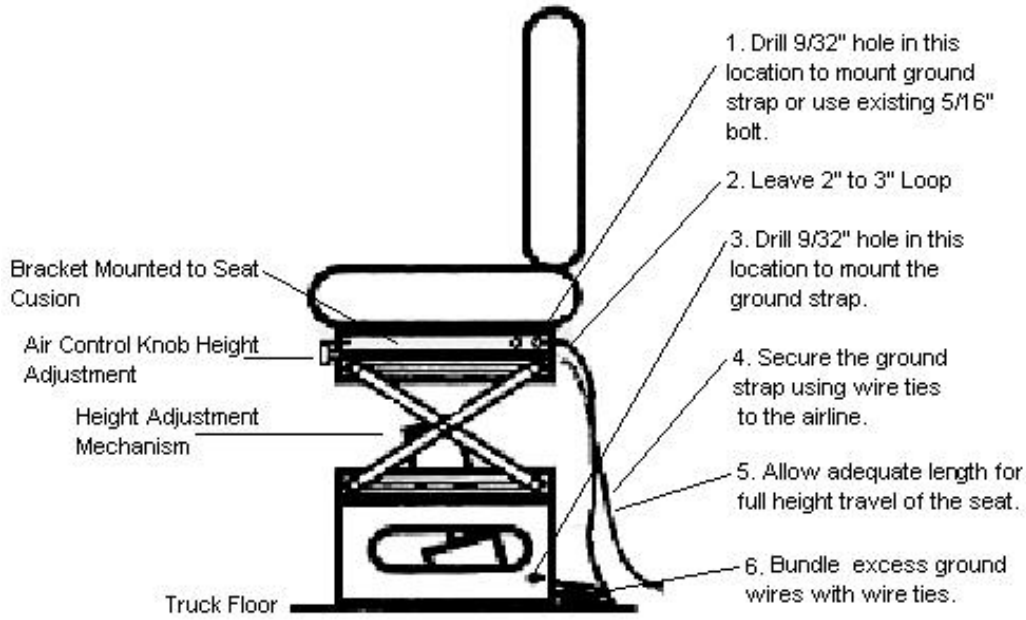
The resistance should be checked. Use a multi-meter to test the resistance between a bare spot on the seat frame and PIN 3 on the SCM power connector.
(The ground terminal should be connected directly to the negative terminal of the battery on a negative ground system)
The test should be done with all accessories, including the dome light, turned OFF. This will prevent other currents from distorting the measurement.

If the resistance is less than 3 ohms:
The system is grounded sufficiently and no further action is necessary.

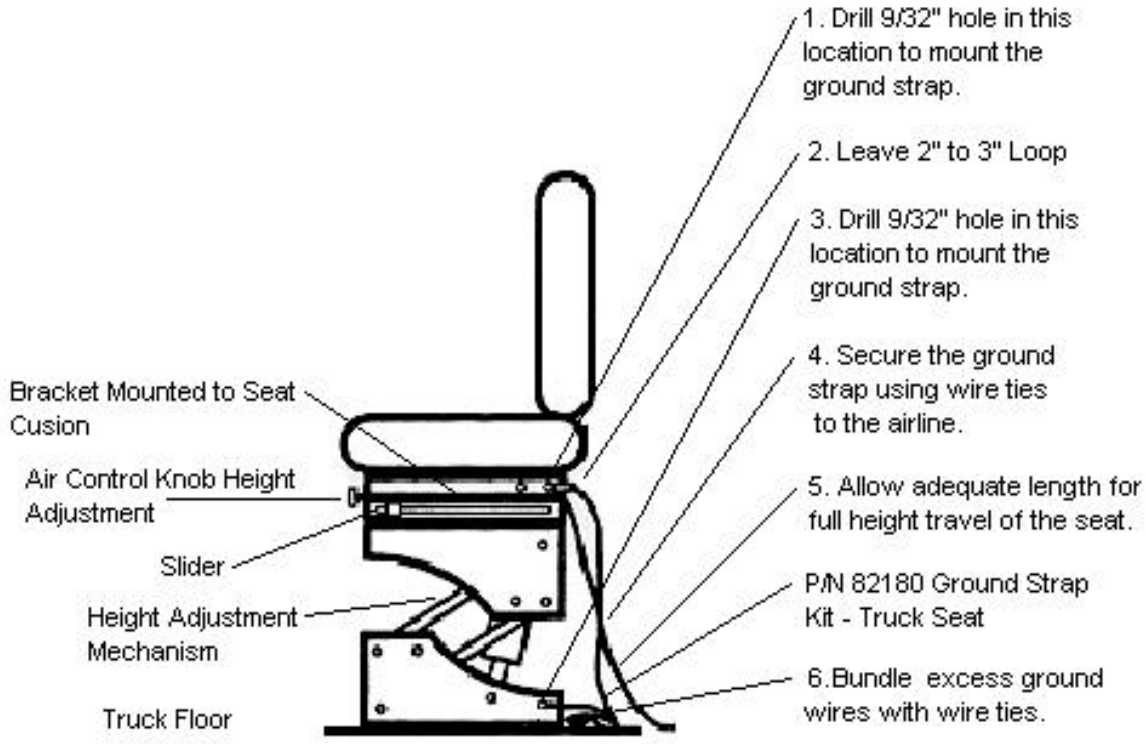
If the resistance is greater than 3 ohms:
Locate a better ground on the base of the seat or at some other point in the cab.

“Fan fold” the excess ground strap and tie it with a wire tie to the back of the seat frame. Make sure that you have left enough slack in the strap to accommodate the seat’s full range of adjustment.

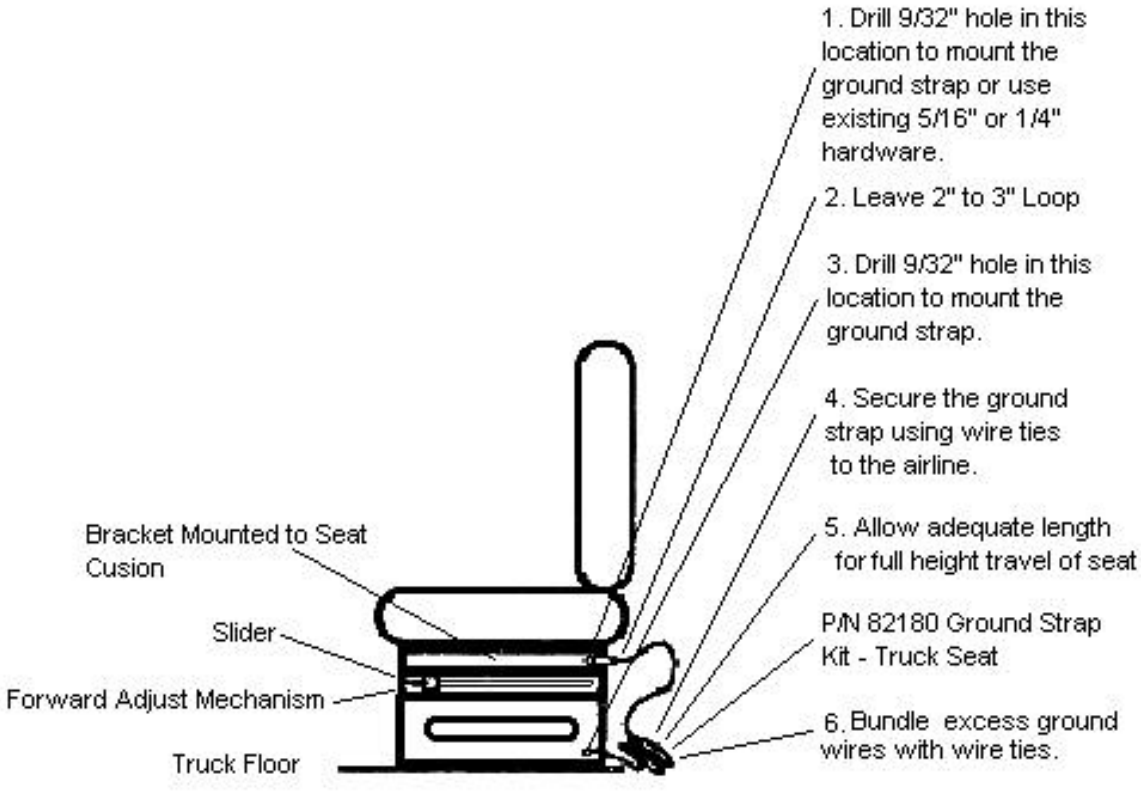
A. Air Cushion Type Seat-Adjustable for Height (Bostrom 914 Series Seat or Equivalent)



B. Air Cushion Type Seat-Adjustable for Height (This includes Dura-Form Seats or equivalent)



C. Bench Style Seats-Adjustable for Distance to Steering Wheel (Includes Manufacturers Standard Production Seats



6. Supervisory Control Module Grounding

The Supervisory Control Module (SCM) case must be grounded to a good chassis ground on the truck to ensure proper operation. Usually, a good ground path is established from the SCM case through the mounting brackets and bolts to the chassis.

The ground effectiveness can be reduced over time due to corrosion, dirt, etc., leading to electrostatic discharge problems.

The ground path should be checked, whenever the LectroCount³ is serviced. This ensures that the SCM's case remains properly grounded.

Checking for a good ground:

Resistance should be checked using a multi-meter. Testing should be done with all accessories, including the dome light, turned OFF to prevent other currents from distorting the measurement.

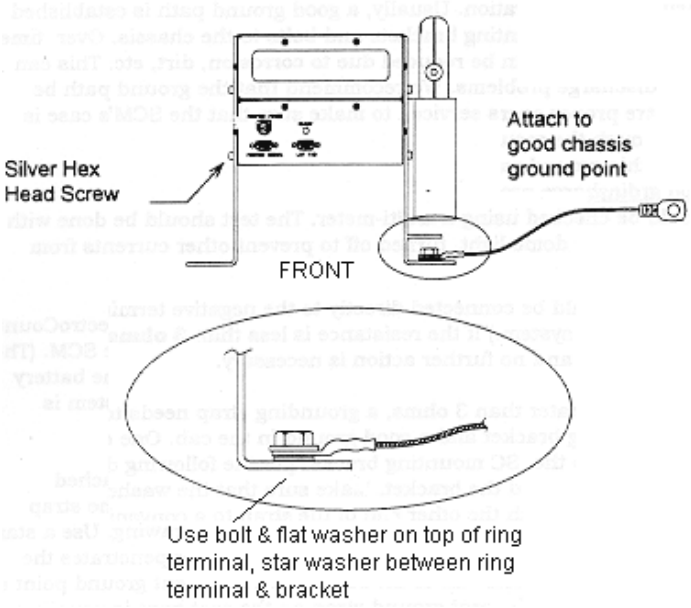
Measure the resistance between one of the silver hex head screws on the LectroCount³ mounting bracket and the ground terminal (**Pin 3**) on the power plug of the SCM. (The ground terminal should be connected directly to the negative terminal of the battery on a negative ground system.)

If the resistance is less than 3 ohms:
The system is grounded sufficiently and no further action is necessary.

If the resistance is greater than 3 ohms:
A grounding strap needs to be attached between the mounting bracket and a good ground in the cab.

6.1 GROUNDING STRAP INSTALLATION

Mobile Installations
One end of the strap should be attached to the SCM mounting bracket per the following picture:



Use a star washer between the lug and the bracket. Make sure that the washer penetrated the paint on the bracket. Attach the other end of the strap to a convenient ground point in the cab.

The bolt used to ground the seat ground strap on the seat base is usually a good location. Measure the resistance between the silver hex head screw and **(Pin3)** again to make sure that the system is grounded sufficiently.

If the resistance is still greater than 3 ohms:

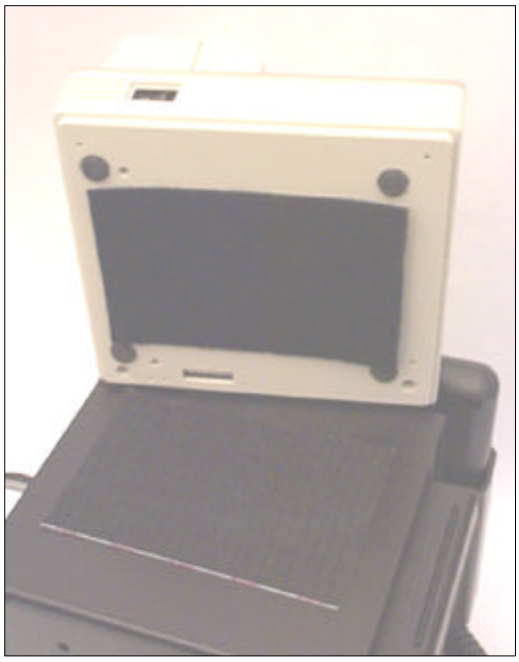
- Make sure that the proper metal to metal contact is being made on both ends of the grounding strap. Clean any paint or oxidation that may have accumulated on the grounding point. Recheck the resistance again.
- Attach the ground strap to another ground point in the cab and repeat the process.

Fixed Installations
If the LectroCount^3 is being installed in a fixed installation, a ground wire should be connected between one of the silver hex head screws on the SCM chassis and earth ground on the power supply.

7. Lap Pad Connection

The “D” connector on the end of the Lap Pad’s coiled cable should be plugged into the socket labeled “Lap Pad” on the front of the supervisory console. Tighten the two captive screws on the connector to hold it in place.

8. Printer Mounting



The printer is usually mounted on top of the top module of the SCM bracket assembly. It can also be mounted on the dash, the passenger seat, or any other location in the cab that is:

- Level
- Not subject to physical abuse
- Easy for the driver to reach
- Within reach of the printer’s data and power cables

Industrial strength Velcro (supplied with the printer) is used to hold the printer in place. Always place the same type of Velcro (hook or loop) on the printer to enable easy replacement.

8.1 PRINTER CONNECTION

The printer is connected to the supervisory console via data cable and a power cable.

The data cable is terminated with a 25 Pin D-connector on the printer end.

This plugs into the socket labeled “RS-232” on the back of the printer, and into

the socket labeled “Printer Signal” on the supervisory console.

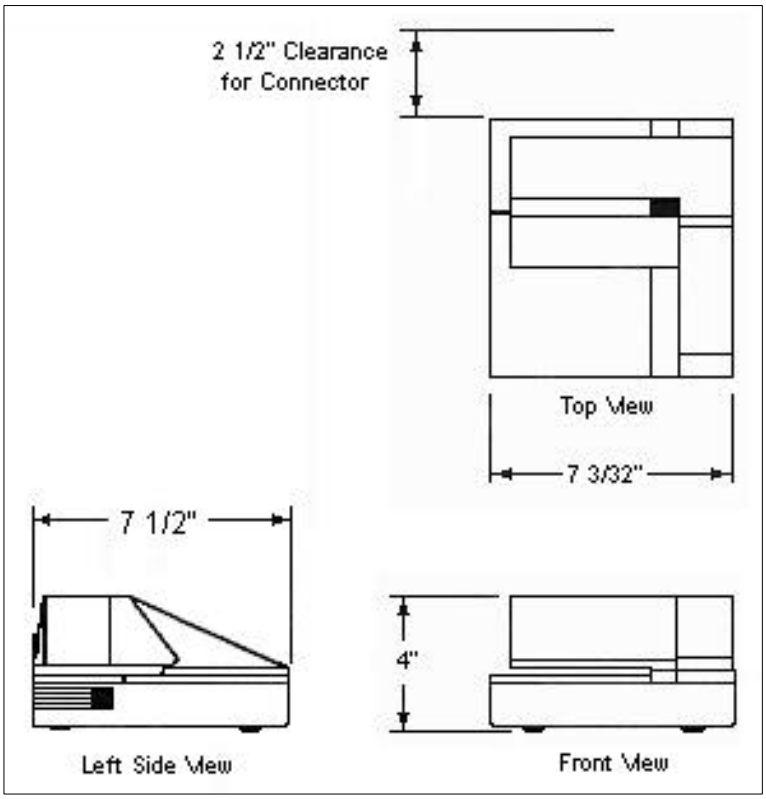
The power cable is terminated in round, 3 conductor connectors on both ends.

The printer end plugs into the socket labeled ‘24VDC” on the back of the printer and the socket labeled “Printer Power” on the front of the supervisory console.

Avoid placing undue stress on the cable connectors. (i.e. avoid tight bends, make sure that the cable is properly supported independently from the connector.)

The Sockets labeled “KD” (telephone style connector) and “FG” on the back of the printer are NOT used.

E-4900-1 Printer Dimensional Drawing



9. Removal of Mechanical Registration Equipment

Remove the existing mechanical register components (if present) by removing the four bolts that attach the register “stack” to the meter and lifting the stack off of the meter.

If you are retrofitting to Neptune Meters, remove all of the mechanical components from the meter, leaving just the star shaped gear and two square-headed studs.

If the system is equipped with a mechanical temperature volume compensation system, remove all of the mechanical TVC components.

10. Install Electronic Temperature Volume Compensator

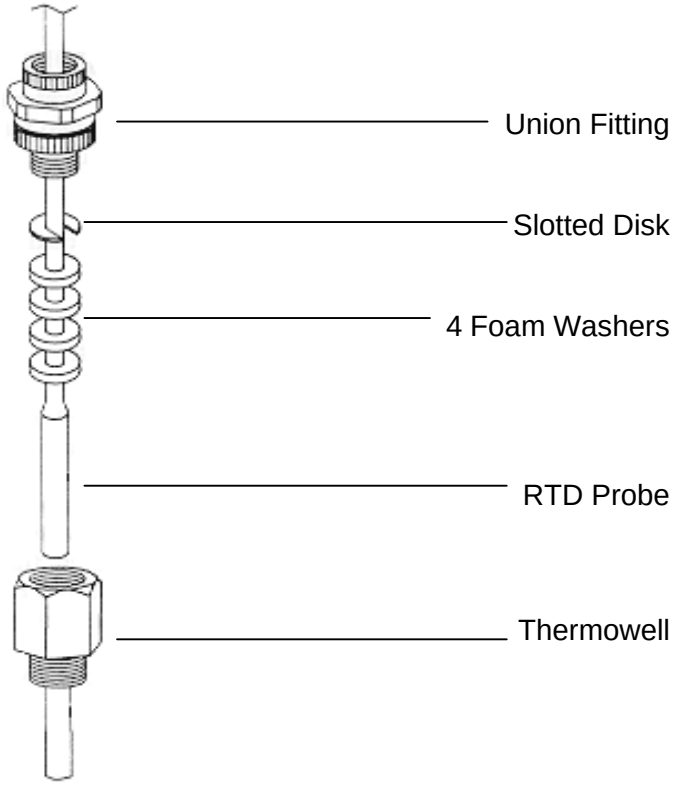
Nine different ETVC kits are available for use with the LectroCount^3 System. Nine of the kits are designed for installation on common strainers. One is for use on systems where a strainer cover is not available, or when physical constraints prevent its installation.

CAUTION!!!

Be sure to relieve all pressure on the system before installing the ETVC.

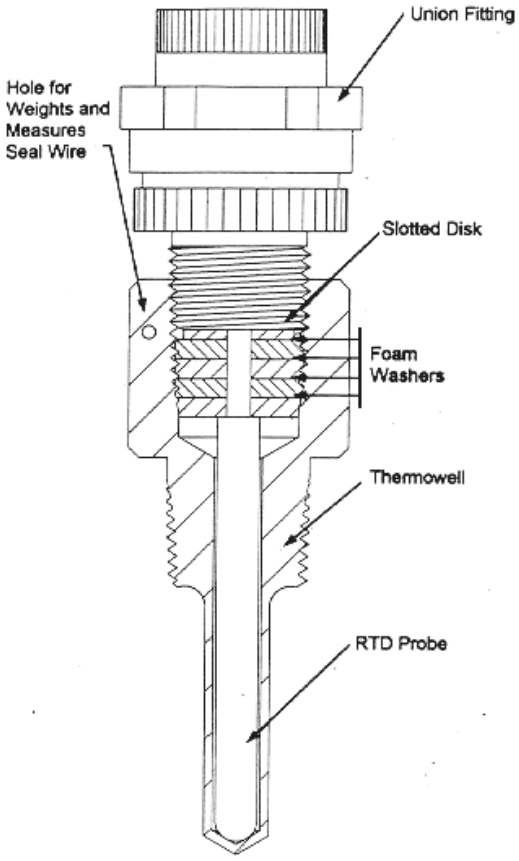
10.1 INSTALLATION OF STRAINER COVER MOUNTED THERMOWELLS

- Remove the old cover from the strainer.
- While the cover is off, remove the strainer basket, clean it thoroughly, and then reinstall it.
- Lightly coat the new cover O-ring with grease and place in position on the strainer.
- Bolt the strainer cover in place, ensuring that the weights and measures thermowell tip points downwards in the strainer.
- On some cover castings the designation “this side up” or an arrow is cast in the cover to indicate the proper orientation.
- The weights and measures thermowell will be filled with appropriate oil at the time of inspection. Until then, coat the supplied 3/8-inch NPT pipe plug with thread sealant and thread it into the hole.



RTD PROBE / THERMOWELL INSTALLATION

INSTALLATION OF STRAINER COVER MOUNTED THERMOWELLS (CONT.)



RTD INSTALLED IN THERMOWELL

- The aluminum thermowell will be used for the 3-wire platinum RTD temperature probe.
- Before inserting the probe into the aluminum thermowell, thoroughly coat the entire probe length with the copper, heat transfer grease that is supplied.
- Insert, then remove, the probe from the thermowell. Re-coat the end of the RTD with the heat transfer grease. Repeat the insertion/removal process 2 or 3 times. This will provide a uniform coating inside the thermowell that ensures the proper heat transfer from the liquid to the probe inside the thermowell.
- The kit includes four foam washers and a slotted metal disc. Slide the foam washers down the RTD wires and position them at the tail end of the RTD.
- Re-coat the RTD probe and insert it into the thermowell for the final time. Position it as far down in the thermowell as possible.
- The foam washers should “bottom out” inside the hex nut body of the thermowell. The disc should be positioned on top of the foam washers with the RTD wires running through its slot.
- Next, feed the RTD wires through the explosion proof union. Thread the male ½ NPT side of the union into the thermowell until the union contacts the disc and compresses the foam washers. The number of washers can be added or subtracted to provide an optimum fit.
- The slotted disk will prevent the RTD from being removed from the thermowell, without removing the union. After attaching the conduit, the union should be sealed with the seal wire kit.

10.2 INSTALLATION OF PIPE MOUNTED THERMOWELLS

Thermowells can also be installed in half couplings that are welded in place on the fluid line.

The two thermowells should be located within 3” to 6” of each other and within 3 ft. of the meter inlet or outlet.

Avoid placing thermowells directly in line, or a vortex may form behind the first thermowell. This could affect the temperature reading of the second thermowell.

Both thermowell tips must point to the center of the pipe.

A ½” NPT half coupling should be used for the RTD stainless steel ½” NPT thermowell.

The RTD well must be filled with the copper, heat transfer grease (supplied).

The RTD must be positioned within 90 degrees of vertical. There must be enough clearance to allow the RTD and its electrical conduit to be installed, or removed for service.

The stainless steel thermowell is used for the 3-wire platinum RTD temperature probe. Before inserting the probe into the thermowell, thoroughly coat the entire probe length with the copper, heat transfer grease.

- Insert, then remove the probe from the thermowell. Re-coat the end of the RTD with the copper grease and repeat the inserting/removal process 2 or 3 times. This will help make the grease coating uniform inside the thermowell, ensuring the heat transfers from the liquid to the probe inside the thermowell.
- The Thermowell Installation kit also includes four foam washers and a slotted metal disc.
- Slide the foam washers down the RTD wires and position them at the tail end of the RTD.
- Re-coat the RTD probe with the grease and insert it into the thermowell for the final time, positioning it as far down in the thermowell as possible.

The foam washers should “bottom out” inside the Hex nut body of the thermowell.

The disc should be positioned on top of the foam washers, with the RTD wires running through its slot.

- Next, feed the RTD wires through the explosion proof union. Thread the male ½" NPT side of the union into the thermowell until the union contacts the disc and compresses the foam washers.

The washers can be added or subtracted to provide an optimum fit. The slotted disc will prevent the RTD from being removed from the thermowell without removing the union.

After attaching the conduit, the union should be sealed with the seal wire kit.

10.2.1 For Canadian Installations

- A 3/8” NPT half coupling must be welded in place to accommodate the brass or stainless 3/8” NPT Weights and Measures thermowell.
- The thermowell will be filled with a light oil
- It needs to be positioned with 60 degrees of vertical to allow it to be filled.
- Make sure that there is enough clearance (typically 4 to 8 in.) to allow the weights and measures temperature probe to be inserted and remove.

11. Mounting the Remote Supervisory Control Box (RSCB)

The RSCB can be mounted directly on, or near, a liquid flow meter. To accommodate the variety of different meter styles, the RSCB is available in two styles:

1. With internal pulser.
2. Without internal pulser

Installation kits are available from Liquid Controls to facilitate the RSCB installation on many industry standard meters.

Specific installation instructions are available for mounting the RSCB on the following:

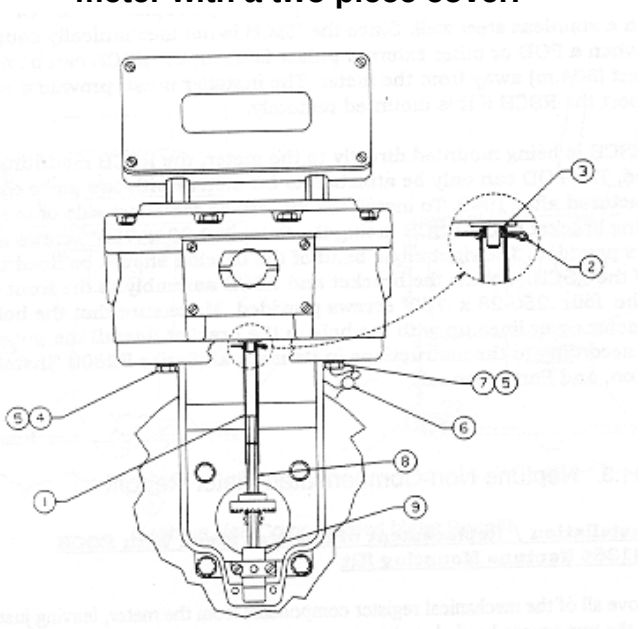
- Liquid Controls Positive Displacement Meters
- Neptune Meters
- Neptune Meters w/Temp Compensator

11.1 LIQUID CONTROLS METERS/RSCB WITH INTERNAL PULSERS

The internal pulser version of the RSCB allows traditional mechanical registration equipment to be easily replaced with the LectroCount³ electronic register. (Requires Part Number 81369 Mounting Kit, LC Meter)

- Remove the mechanical register components from the counter bracket by removing the 4 bolts that attach them to the meter flange.
- Remove the adjuster (and adjuster mounting plate, if present) from the counter bracket.
- Replace the old meter drive shaft and bearing with new drive shaft, (**item#8)**, and bearing, (**item #9)**, using the original face gear in either right to left of left to right positions.

RSCB with an internal pulser mounted on a LC meter with a two piece cover.



- Remove the cotter pin from the drive shaft on the bottom of the RSCB, taking care not to lose the washer. Avoid pushing shaft into housing until drive shaft adapter, **item #1**, is pinned onto shaft.
- Place the o-ring; **item #3**, onto the pulser drive shaft of the RSCB.
- Place the drive shaft adapter, **item #1**, over the pulser drive shaft and o-ring, lining up the cross-drilled holes. Make sure that the shaft adapter is pushed up over the o-ring. Secure the Drive Shaft Adapter to the Pulser Drive Shaft, with a cotter pin **item #2**.
- Place the RSCB on the counter bracket, sliding the drive shaft adapter over the drive shaft of the meter. Check for shaft engagement.
- Attach RSCB to counter bracket with 4 screws, **items #4** and **#7**, and 4 washers, **item #5**. (Two of the screws have been cross drilled to accommodate a Weights and Measures seal.)

11.2 LC METER WITH EXTERNAL PULSE OUTPUT DEVICE

The pulse output device replaces the dynamic seal of a packing gland with a static seal.

The motion of the meter rotor is magnetically coupled to the meter when a POD or other external pulser is used.

The RSCB is not mechanically coupled to the meter when a POD or other external pulser is used. The RSCB can be mounted up to 1000 feet (304.m) away from the meter. The installer must provide a suitable bracket to support the RSCB if it is mounted remotely.

If the RSCB is being mounted directly to the meter, the RSCB mounting kit is required.

The POD can only be attached to LC meters with two piece covers that were manufactured after 1990.

<u>To install the RSCB mounting kit</u>:

- Attach the short side of the RSCB mounting bracket to the RSCB using the four .250-20 x .750” screws and lock washers provided.
- The right angle bend of the bracket should be lined up with the front of the RSCB.
- Attach the bracket and RSCB assembly to the front meter cover using the four .250-28 x .750” screws provided.
- Make sure that the hole in the meter cover center, lines up with the hole in the bracket.
- Install the pulse output device according to the instructions in its manual (Series E2800”Installation, Operation, and Parts Manual).

11.3 NEPTUNE NON-COMPENSATED METER RETROFIT

Field Installation / Replacement of Register Stack With RSCB
Using 81364 Neptune Mounting Kit

- Remove all of the mechanical register components from the meter. Leave just the star-shaped gear and the two square-headed studs.
- Screw the two cone-tipped clamping screws, **(item #7)** into sides of adapter bracket, **(item #6)**, until the conical tip is protruding inside of the bracket.
- Place the bracket onto Neptune meter. Place the square-headed studs through the holes on the same legs as the cone-tipped screws. Place mounting screws, **(item #4)**, with washers, **(item #3)**, through the other two holes in the bottom of the bracket. Screw them into the Neptune meter. Make sure that the bracket is flush with the meter casting.
- Tighten the cone-tipped clamping screws until the conical tips engage firmly against the tapered sides of the square-headed studs.
- Remove the cotter pin from the drive shaft on the bottom of the RSCB, taking care not to lose the washer. Place the driver, **(item #5)**, onto the drive shaft and secure with the cotter pin, **(item #1)**. Avoid forcing the shaft into the RSCB housing.
- Place RSCB on the adapter bracket. Carefully align the four-pronged driver with the star-shaped gear. Make sure that all four of the driver's prongs are properly aligned with the teeth of the star gear. Fasten the RSCB to the bracket using four screws, **(item #2)**, and four washers, **(item #9)**.

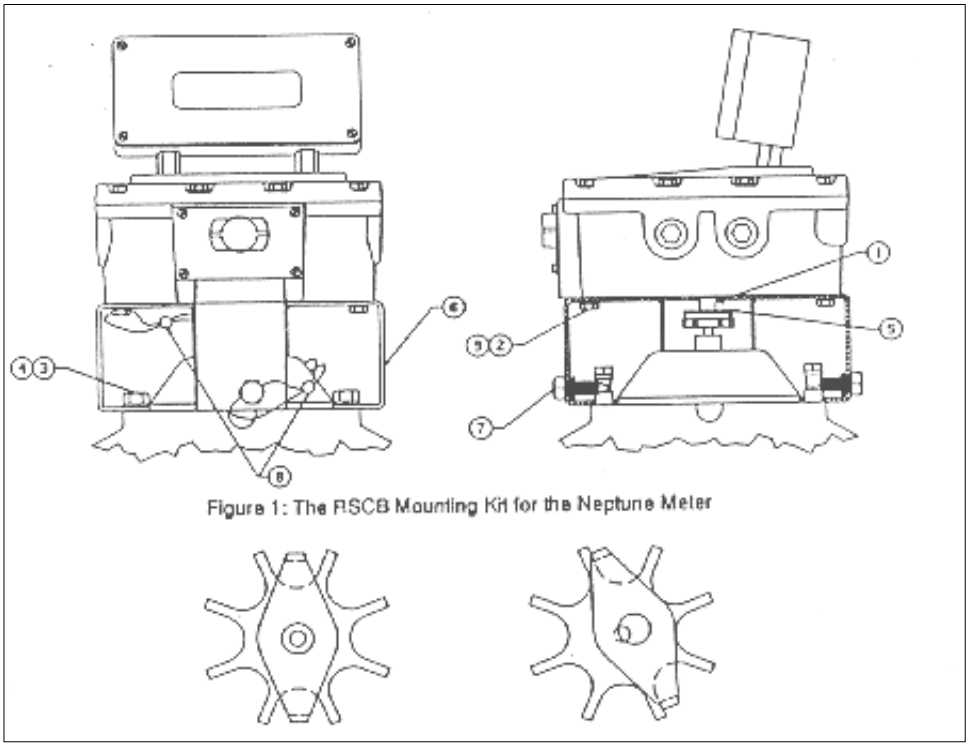


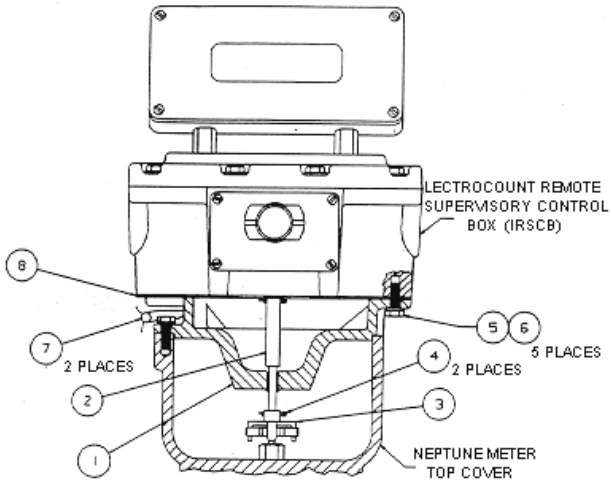
Figure 1: The RSCB Mounting Kit for the Neptune Meter

Correct **INCORRECT!**
Alignment of Star-Shaped Gear and RSCB Driver

11.4 NEPTUNE TEMPERATURE COMPENSATED METER RETROFIT KIT

Remove the mechanical registration equipment and the mechanical Temperature Volume Compensator from the top of the meter.

- Remove the cotter pin from the drive shaft on the bottom of the RSCB, taking care not to lose the washer.
- Position the adapter shaft **(item #2)** over the pulser shaft. Align the cross-drilled holes. Secure them in position with a cotter pin. Remove the cotter pin from the drive shaft on the bottom of the RSCB, taking care not to lose the washer. Place the driver, **(item #5)**, onto the drive shaft and secure with a cotter pin **(item #1)**. Avoid forcing the shaft into the RSCB housing.
- Position the weather plate **(item #8)** on the bottom of the RSCB.
- Install the Adapter Flange Assembly, **(item #1)**, on the bottom of the RSCB. Secure it and the weather plate with four screws and washers.
- Attach the Neptune Driver Adapter to the bottom of the adapter shaft with a cotter pin.
- Position the adapter flange assembly on top of the meter. Be sure to center the four arms of the driver adapter over the meter's star gear.
- Fasten the adapter flange to the meter using 4 screws and washers.



1	Adapter Flange Assembly
2	Adapter Shaft
3	Neptune Driver Adapter
4	Pin, Cotter
5	Screw
6	Lock Washer
7	Seal Wire Kit
8	Weather Plate

RSCB Mounting Kit for Neptune Meter with Mechanical Temperature Compensation

11.5 RSCB MOUNTING BOLT PATTERN

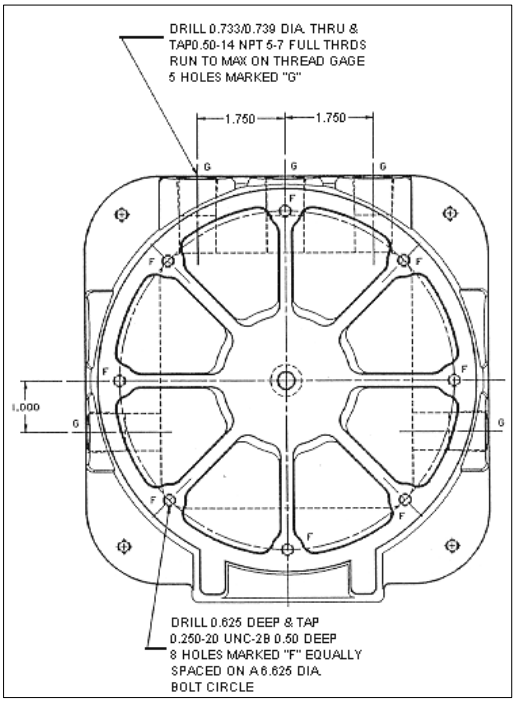
The RSCB base casting contains eight mounting holes in an industry standard bolt pattern that allow it to be easily attached to a number of common meters. All of the holes are ½" deep and will require .250-20 screws.

- When mounting the RSCB leave the cover assembly fastened to the base to protect the internal components.

- Before securely fastening the RSCB to the meter or bracket, make sure that:
  - The remote electronic counter (REC) is visible.
  - The multi-position switch can be easily operated.

- If the RSCB will be exposed to the elements before the installation is complete, make sure that the cover gasket is in place and that all (12) 7/16" mounting bolts and washers are installed.

- Remove all of the pipe plugs from the RSCB's seven ½" NPT conduit hubs. Apply pipe sealant or Teflon tape to the threads, then re-install the plugs in the ports.



Refer to the above drawing if you will need to fabricate a mounting bracket for the LectroCount^3 RSCB. Brackets and adapters are available for many common meters.

NOTE: If the RSCB was not pre-wired from the factory then refer to the wiring diagram in the back of this manual to assist in field wiring. Terminal block numbers, signal functions, and wire colors can be found there. Please read the special notes listed on the drawing.

Liquid Controls will not honor any warranty claims for damage due to negligence during the installation of the LectroCount^3 system.

12. Wiring the RSCB

Once the control valves, pulser, and ETVC kit (if so equipped) have been mechanically installed, they need to be wired to the RSCB. The RSCB has seven ½" NPT ports to accommodate the wires and cables that enter it. Typically, the ports in the back are used for the signal cables that run to the truck cab and for the optional three-way solenoid. The installer must choose the ports that best fit the requirements of a particular installation.

- Remove the 12 bolts that secure the cover of the RSCB.
- Gently lift the cover off of the RSCB until the black coiled wire is accessible.
- Remove the telephone style connector from socket **J8** on the RSCB terminal board.
- Place the top cover assembly out of the way.

The wires from the valve, ETVC kit, and pulser need to be routed through suitable conduit to the RSCB.

The type of conduit used depends on the physical constraints of the installation and the safety rating required.

Thin wall conduit, Liquid-Tight, and Synflex are among the choices.
The conduit hubs on the RSCB, solenoids, and pulser are all ½ "-14 NPT.

The conduit/cable entrances must be sealed inside and out using appropriate cable glands to prevent moisture from accumulating in the RSCB.

Avoid chaffing or nicking the cables when pulling them through conduit or compression fittings.

When routing the conduit, allow ample clearance for service access to the meter and strainer.

If the system is installed inside a meter box, make sure that there is enough clearance to close the door.

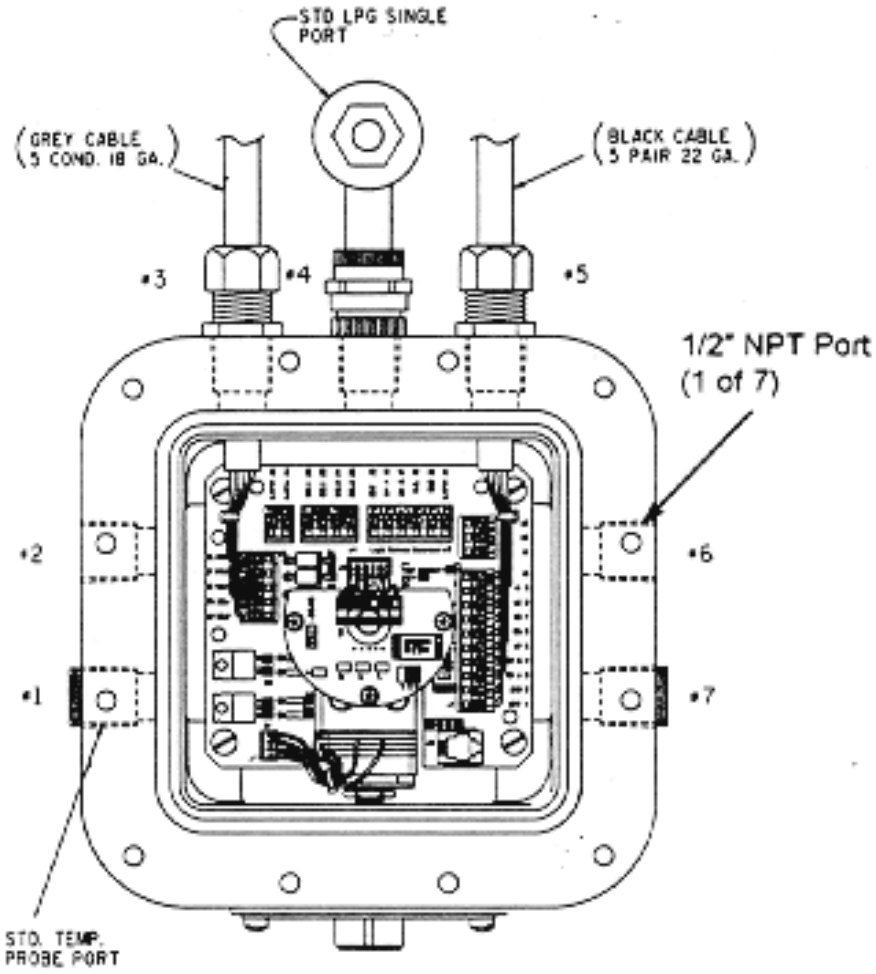
The RSCB terminal board has six removable terminal blocks **(J1-J6)** for ease of field wiring.

Once the wires have been routed into the RSCB, they should be connected to the appropriate terminal block.

When routing wires to respective terminal block, cut wire to length (always leave 1"-2" extra length).

When attaching wires to the terminal blocks, remove the terminal block by pulling it straight up from the circuit board.

- Use a 1/8-inch screwdriver to back off the screw at the desired terminal block location.
- Strip 7/32" inch of the insulation from the end of the wire and insert the wire into the desired location on the terminal block.
- Retighten the screw and check to make sure that the wire is fully inserted and that none of the strands are loose.
- Insert the terminal block onto corresponding mating connector on the RSCB terminal board.



Note: The numbers and wires on the wiring blocks face towards the outside of the box.

12.1 WIRING OF VALVE SOLENOIDS TO RSCB

The solenoid conduit hubs should be positioned to allow the conduit to be efficiently routed to the RSCB.

Loosening the 11/8" Hex nut on top of the solenoid rotates the hubs.

- Then turn the hub.
- Loosen the nut a half turn, position the hub, and then re-tighten.

When wiring the solenoids into the RSCB junction box, the wires may have to be spliced in order to reach the appropriate terminal strip location.

Use stranded 18 GA wire.

It is recommended that red wire be used for main connections, though black can be used as a substitute.

Green 18 GA stranded wire should be used for the case ground.

Use an in-line twist solder splice (Western Union style splice). Stagger the splice to make the wires easy to pull.

Leave a small amount of excess wire to allow for future servicing of the junction box wiring. Secure the excess wire with wire ties.

12.1.1 "Diddle" Valve Wiring

(Part Numbers: A29251 for 2" and A39251 for 3")

One of the solenoids' green case grounds can be attached to terminal block **J5-24** and the other to **J5-25**. Solenoid 1 **(S1)** is on the inlet to the bonnet solenoid. Solenoid 2 **(S2)** connects the bonnet to the outlet. The wires from S1 connect to terminal block J-4-SOL1. The wires from S2 connect to terminal block J-4-SOL2.

12.1.2 Liquid Controls Dual Stage Valve Wiring

(Part Number: A284811 for 2")

Solenoid S1 is hard piped to the top of the differential valve and represents the first stage of the closure. Solenoid S2 connects the inlet of the differential directly to the outlet of the differential valve. The second stage and shut-off is controlled here. The wiring of these solenoids is the same as the "diddle" valve wiring described above in section 12.1.1.

12.1.3 Single Stage Valve and Three Way Solenoid Wiring

Wire the solenoid to J4-SOL2. Wire the case ground to J5-24 or J5-25.

12.2 WIRING OF RTD TEMPERATURE PROBE TO THE RSCB

Make sure that there is enough slack in the conduit leading from the RSCB to the strainer mounted RTD to allow the strainer cover to be removed.

Feed the cable from the back of the RTD through the conduit to the RSCB.

Cut the cable on the RSCB end, leaving enough slack for about two loops of cable inside the RSCB.

Trim back the Teflon sheathing enough to expose a few inches of the wires inside.

Strip the insulation from the wires and connect them to terminal block J2 as follows:

- **22GA Red Wire J2 - 11**
- **22GA Red Wire J2 - 12**
- **22GA White Wire J2 - 13**

12.3 POD WIRING

Install the pulse output device according to the instructions in its manual (Series E2800 "Installation, Operation and Parts manual).

Wire the POD to terminal block J3 in the RSCB. The pulser cable is usually best installed with the conduit hub facing down and the wires routed to one of the ½" NPT conduit hubs on the left side of the RSCB, using right angle fittings. It can, however, be wired through any of the ½" NPT conduit hubs.

12.4 INTERNAL PULSER WIRING

If the system is equipped with an internal pulser, the pulser circuit board should already be connected to the RSCB circuit board through connector J9.

12.5 TRUCK CAB CABLE ROUTING

The RSCB is supplied with a cable assembly, consisting of two cables, which connect it to the truck computer.

The two cables are terminated on the RSCB end with connectors that have been routed through RSCB hubs and connected to the RSCB circuit board at locations J1 and J6.

On the cab side of the cable assembly, the two cables join in a black 16 pin circular connector. This connector is supplied with a red plastic cover, which should be kept in place during the installation. The cable is available in a variety of lengths, ranging from 25 to 500 feet. In most cases, the RSCB is shipped with these two cables attached. If the cable has not been terminated and connected on the RSCB end, you should connect the wires to terminal blocks J1 and J6 per the wiring diagram in the back of this manual. The black cable has a drain wire and a foil shield that must be cut off even with the outer cable insulation. The edge of the foil must be taped with electrical tape to ensure a proper floating shield. (The drain wire is connected to pin 16 on the truck computer end, which in turn is connected to chassis ground.)

- Install all exposed cable in ¾" automotive plastic corrugated loom (wire tubing).
- Run the cable down the inside edge of the truck's frame rail.
- Secure the cable to the frame rail every 18 to 24 inches with wire ties.
- Install rubber grommets to protect the cable where it passes through the cab wall, meter box, etc.
- Keep the cable away from heat sources such as the engine exhaust manifold, exhaust pipe, mufflers, etc.
- When routing the cable, avoid suspension parts, springs, shocks, rotating shafts, linkages, etc., which could crush, pinch, or rub the cable.
- Avoid installing the cable where it will be exposed to excessive flexing.
- Do not pull the cable too tight in areas where it will be moved. For example: in cab-over trucks, leave enough slack in the cable so that the cab can be tilted forward without damaging the cable.
- Leave enough slack in the cable to allow for easy removal and installation of the Supervisory Console and RSBC should they require servicing.
- In the meter box, avoid leaving the cable unsecured. Be sure that it won't be snagged when tools or other items are moved. Keep loose cable from lying on the meter box floor.
- On some trucks, extra harness cable can be secured in the frame rail. Otherwise, coil up extra cable and securely fasten it to the back wall of the cab. **DO NOT** place cable on the floor of the cab or where it may be damaged. Also, **DO NOT** attach to cable seats that can be moved.

We recommend that the following installation practices be followed when routing the cables to the cab:

12.6 CONNECT THE METER SIGNAL CABLE

12.6.1 Single Meter Systems

- **Remove the cover from the 16 pin circular connector on the meter signal cable.**
- Insert the connector into the 16-pin socket on the back of the supervisory console.

The connectors are keyed to ensure that the pins are properly aligned.

Do Not Force the Connector In!

- After the connector has been properly inserted, turn the securing ring clockwise at least ½ turn.

12.6.2 Dual Meter Systems

- Remove the covers from the meter signal cables.
- Connect the cable that you had labeled “M1” into the “Meter 1”connector on the back of the dual meter switch box.
- Connect the cable that you had labeled “M2” into the “Meter 2” connector.

Do Not Force the Connector In!

The connectors are keyed to ensure that the pins are properly aligned.

- After the connector has been properly inserted, turn the securing ring clockwise at least ½ turn.
- Each dual meter system is shipped with a short signal cable connecting the Dual Meter switch to the Supervisory Control Module.

The dual meter systems also have the 4-pin connector on the switch box wired to the 10-pin connector on the SCM.

13. System Start Up

- Re-install the in-line ATO 7.5 amp in the battery cable line.
- Place the ignition switch in the accessory position. This will initiate the computer’s start up routine.
- After 15 seconds, the unit will fully power-up.
- The **“READY”** lamp on the SCM will illuminate.
- The Lap Pad will display:

“NET VOLUME GALLONS"
(Or LITRES).

The installation is now complete.
Refer to the owner’s manual for instructions on setting-up and calibrating the system

14. SOFTWARE PART NUMBERING SYSTEM

Prefix	Product Dispensed	Security Valve Type	Temperature Compensation	Portable Ram	# of Products / # of Meters	Application
SC	1 LPG	0 Single/Dual Stage	0 Linear/degree F	0 Required	0 single/single	Three digit
	2 Refined Fuels	1 Diddle Valve	1 Linear/degree C	1 Not Req'd	1 multi-/single	e.g. 158
	3 Aviation Apps.	2 Selectable in Prover	2 Table 54B/D API 2540		2 multi-/dual	
	4 NH3		3 Table 54 API 2540		3 single/dual	
			4 NH3 Table Canada		4 24 product	
			5 Mass Flow (No Comp)			
			6 Table 54B/C & Methanol			

15. TROUBLESHOOTING

Troubleshooting Rules

1. Before attempting to troubleshoot the LectroCount^3 System, become familiar with the operation and program of the specific installation.

2. Make sure all electrical connections are secure.

3. Make sure all circuit cards are firmly connected.

4. **ALWAYS** use a good digital multimeter. Voltage levels are critical to proper system operation. Use an accurate, reliable multimeter to test for proper voltages at the start of any service procedures. Voltage requirements are listed under each component.

NOTE: Check for proper operating voltages before changing modules.

5. Enter Mode 7 – diagnostics by pushing M#, 7, and ENTER. Make sure all field programming entries are accurate, e.g., pulses per unit volume, temperature coefficient, base temperature, and maximum pulser reversals.

6. **NEVER** remove a connector with the power on.

7. **NEVER** install a connector with the power on.

8. **NEVER** force a connector into a connector receptacle.

9. **NEVER** exchange or reposition components on circuit boards.

10. In case of a major problem, such as a burned circuit board, evaluate possible causes before replacing the module and turning on the power.

11. Isolate the problem before changing modules.

12. Be careful when handling ribbon cable. Ribbon cables can be easily damaged.

13. Return all faulty modules with the proper forms, concisely completed.

TROUBLESHOOTING

There may be several probable causes for a system malfunction. Listed below are several probable causes to aid in returning the system to operation as quickly as possible. This list is not all-inclusive and should be only used as a guide.

LectroCount^3 Troubleshooting

PROBLEM: Unit will not power-up (no ready light).

PROBABLE CAUSE: No +12VDC to the Supervisory Control Module.
Low Battery voltage.

SOLUTION:
1) Check the 5A fuse for continuity, replace if necessary. (part # 70946)
2) Check battery voltage to the Supervisory Control Module at TB1 # 2 using TB1 #3 as a DC ground. While LectroCount^3 will power-up at 10VDC, it is recommended that the input be at least +12.6VDC or higher. Refer to the LectroCount^3 installation manual and wiring diagram for more detailed information. If voltage is not present, inspect the battery cable (part # 81232) for damage.
3) Check the 7.5A in-line fuse (part # 70985) (located near the positive battery terminal) for continuity and replace if necessary.
4) Check the accessory line voltage at TB1 #1 using TB1 #3 as a DC ground. The DC voltage should be +12VDC or higher. If the voltage is present, (ignition key in accessory) replace the power supply board (part # 81213). If voltage is not present, trace the accessory line back to its source, inspecting any in-line fuses for breaks.

PROBLEM: Unit blows 7.5A fuse.

PROBABLE CAUSE: +12VDC Battery line shorted to ground.

SOLUTION:
1) For safety reasons, Remove the 7.5 Amp in-line fuse from the battery cable (connected to the positive battery post)
2) Remove the 3-pin power connector (TB1) and inspect for stray wire strands and visible shorts.
3) Inspect the full length of the battery cable, looking for damaged insulation which may cause shorting between the cable and ground potential (i.e.: truck frame, chassis) If the battery cable is damaged, replace it. (part #81232)
4) Replace the 7.5 Amp fuse (part # 70985)

PROBLEM: Unit blows 5.0A fuse.

PROBABLE CAUSE: Excessive current on 5A circuit.

SOLUTION:
1) Remove the cable marked PRINTER POWER from the rear panel of the EPSON printer and replace the 5A fuse. (part # 70946) If the READY light remains on, replace the EPSON printer.(part # E4900-1) If the 5A fuse blows, replace the printer power cable (part # 81233). If the 5A fuse continues to blow, replace the power supply board. (part #81213)

TROUBLESHOOTING

PROBLEM: Unit blows 1.0A fuse / Lap-Pad is blank.

PROBABLE CAUSE: Excessive current on 1 Amp circuit

SOLUTION:
Isolate the problem by disconnecting the following devices until the problem is resolved. *After removing each device, re-install a fresh 1Amp fuse.*

1) **Lap-Pad:** Disconnect the Lap-Pad from the Supervisory Console. Replace the fuse. If the fuse remains intact, this may indicate a defective Lap-Pad. (part# E4030-1) Swap the suspect unit with a known working unit for verification.
2) **Ram-Card:** Remove the Ram-Card from the Ram-Card module. Replace the fuse. If the fuse remains intact, this may indicate a defective Ram-Card. (part # E4101-X) Swap the suspect unit with a known working unit for verification. (part # E4101-X)Verify also that the ribbon cable located on the rear of the Ram-Card module (part # 81248) is not damaged.
3) **Odometer Cable:** (if equipped) (from 10-pin connector on rear of the Supervisory Console) Replace the fuse. If the fuse remains intact, this may indicate a defective odometer assembly and cable. (part # 821251) Replace the assembly with a known-working unit for verification.
4) **Pulser Assembly:** If after replacing the above units the fuse continues to blow, it is possible that the pulser assembly is defective. Replace the pulser board (part # 811521 for internal pulser, part # 81159 for POD type pulsers) with a known working pulser. Note: For dual-meter systems, it is important to note which pulser may be causing the problem. Always check the METER 1 and METER 2 LED indicators on the Dual Meter Switch Box to determine which pulser may be at fault.

PROBLEM: "Power Loss Stop" appears on Lap-Pad.

PROBABLE CAUSE: Power to LectroCount^3 Interrupted during delivery
Static Discharge

SOLUTION:
1) Check battery and accessory cables for damage. Ensure that the Battery, Accessory, and Ground wires on power connector TB1 (rear of supervisory console) are secure.
2) Turn on all truck accessories. (headlamps, 2-way radio, heater, etc.) Engage the hose reel and monitor DC voltage at TB1 #2, using TB1 # 3 as a ground. If the voltage drops below +10 VDC, the truck electrical system may not be adequate to handle the current load for the LectroCount^3. It may be necessary to upgrade the electrical system to accommodate the 5 Amp LectroCount^3 current requirements.
3) Verify proper grounding of the LectroCount^3, including the driver's seat. Refer to the LectroCount^3 Installation manual for proper grounding procedures.

TROUBLESHOOTING

PROBLEM: EPSON printer release Light Flashes.

PROBABLE CAUSE: Low voltage to the EPSON printer.

SOLUTION:

1) Check battery voltage for +12.6VDC reading or higher.
2) If voltage is present, replace the LectroCount^3 power supply, (part # 81213), located in the supervisory console.
3) If the release light continues to flash, replace the EPSON printer (part # E49001).

PROBLEM: No power / indicator lights to the EPSON printer.

PROBABLE CAUSE: No power to the EPSON printer.

SOLUTION:
1) Verify that the power switch (located on the left-hand side of the EPSON printer) is in the ON position.
2) Check the printer power cable (part # 81233) to ensure that it is seated properly. If this does not correct the problem, replace the power cable (part # 81233), followed by the EPSON printer (part # E49001).

PROBLEM: "Temperature Over-Range Failure" or "Temperature Under-Range Failure" appears on Lap-Pad **(Single-Meter Configuration)**

PROBABLE CAUSE: Open or shorted circuit between RTD probe and Supervisory Control Module.

SOLUTION:
Check the RTD probe & Signal harness for continuity.

Remove the signal harness (gray / black cable) from the Supervisory Control Module. On the ***cable***, measure and record the resistance in ***ohms*** between the following pins on the cable:

Pin #		Pin #	Reading
14	to	15	100 Ω ±20
14	to	13	100 Ω ±20

If the readings are *not* within the above tolerances, replace the RTD probe (part #70229).
If the problem is not corrected, replace the signal harness. (part # 81340)

PROBLEM: "Temperature Over-Range Failure" or "Temperature Under-Range Failure" appears on Lap-Pad. **(Dual-Meter Configuration)**

PROBABLE CAUSE: Open or shorted circuit between RTD probe and Supervisory Console.

SOLUTION:
1) **Determine which meter is causing the problem.** Attempt to make a delivery for products assigned to *both* Meter 1 and Meter 2. The Lap-Pad will show a temperature failure for the suspect meter.
2) **Isolate the Dual Meter Switch box**. After determining which meter is causing the problem, (meter #1 or meter # 2) isolate the Dual Meter Switch Box by removing the wiring harness for

the suspect meter from the METER #1 or METER #2 position. (located on the rear panel of the Dual Meter Switch Box) Plug the cable directly into the Supervisory Console. To do this, first remove the 10" signal harness (grey / black cable) with 15-pin connector (part # 81242) from J2 on the rear panel of the Supervisory Console. Attempt to make a delivery. If the problem is resolved, replace the Dual Meter Switch Box (Part # E2535-1).

Check the RTD probe & Signal harness for continuity.
Remove the Meter #1 or Meter #2 signal harness from the Supervisory Console. On the ***cable***, measure and record the resistance in ***ohms*** between the following pins on the cable:

Pin #		Pin #	Reading	If the readings are not within these tolerances, replace RTD
14	to	15	100 Ω ±20	probe (part#70229). If the problem is not corrected, replace the
14	to	13	100 Ω ±20	signal harness. (part#81340)

PROBLEM: "Temperature Calibration Error" appears on Lap-Pad

PROBABLE CAUSE: Missing temperature calibration information

SOLUTION: Contact the Liquid Controls Service Department @ 1(800) 458-5262

PROBLEM: "Temperature Out Of Table Domain" appears on Lap-Pad

PROBABLE CAUSE: Missing temperature calibration information

SOLUTION: Contact the Liquid Controls Service Department @ 1(800) 458-5262

PROBLEM: REC Counter does not reset / register / counts intermittently

PROBABLE CAUSE: Counter is not receiving pulses during delivery.

SOLUTION:
1) Set up a delivery in Mode #1 and ensure that product flow is registering on the *Lap-Pad*. If not, see **Product flow does not register on Lap-Pad or REC display**
2) Loosen the screws on the REC display cover and gently pull the cover outward to expose the 2 fiber-optic cables. Loosen one of the collars securing the fiber-optic cables to the display board. Slide the collar away from the fiber-optic cable end approximately ¼" and reseat the cable. Tighten the collar on the fiber-optic connector 'finger tight'. Using the same method, re-seat the remaining cable. Attempt a delivery and check the rear display to see if it is counting properly.
3) Remove the (12) 7/16" bolts securing the REC cover. Dis-connect the coiled phone cable and set it aside. Remove the 2 screws securing the metal 'L' bracket to the under-side of the REC cover. Using the above method, Reset the fiber-optic cables on the I/R driver board. (part # 81316) Re-install the metal bracket.
4) If the problem persists, replace the following assemblies with known working units until the problem is resolved:

   I / R Driver Bd. (Part # 81316)
   Display Bd. (Part # 81277)
   Coiled Cable (Part #81330)
   Signal Harness (Part # 81340)
   REC Bd. (Part # 81268)

Dual Meter Switch Box (if applicable, Part # E2535-1)

TROUBLESHOOTING

PROBLEM: Product flow does not register on Lap-Pad or REC display. (Units with POD type pulser)

PROBABLE CAUSE: Pulser shaft is not turning with product flow
Pulser Failure

SOLUTION:
1) In Mode # 1, select a product code and initiate a delivery. Do not flow product.
2) Remove the cover from the POD pulser assembly by rotating the cover counter-clockwise.
3) Remove the 3 phillips screws securing the pulser assembly and gently pull the pulser out, taking care not to damage the attached wiring harness.
4) Manually spin the pulser shaft and monitor the REC display.
5) If the REC display counts, this may indicate a mechanical problem. Contact your local Liquid Controls Service Center or the Liquid Controls Service Department for additional assistance.
6) If the REC display does not count, see PULSER FAILURE.

PROBLEM: REC Counter display is blank

PROBABLE CAUSE: 9VDC Lithium Battery is low / dead

SOLUTION:
If the display goes blank during the first year of service, replace the display board(LC Part# 81277) If the display goes blank after more than a year, replace the display board battery (LC Part# 71022)

PROBLEM: "Pulser Failure" appears on Lap-Pad

PROBABLE CAUSE: Missing pulse counts / excessive reversals

SOLUTION:
1) **Determine which meter is causing the problem.** Attempt to make a delivery for products assigned to *both* Meter 1 and Meter 2. The Lap-Pad will show a failure for the suspect meter.
2) **Isolate the Dual Meter Switch box**. After determining which meter is causing the problem, isolate the Dual Meter Switch Box by removing the wiring harness (grey / black cable) from either the Meter #1 or Meter #2 position and plug the cable directly into the Supervisory Console. To do this, first remove the grey / black cable from the back of the Supervisory Console. Attempt to make a delivery. If the problem is corrected, replace the Dual Meter Switch Box (Part # E2535-1).
3) **Check the pulser output**
Select a product code in Mode #1 for the suspect meter. Remove the 12 bolts securing the REC cover. Lift the cover and remove the coiled phone cable. Set the cover to the side, taking care not to damage the phone cable connector. Using a reliable voltmeter, measure the following DC voltages on the REC board (part # 81268)

Terminal #	Voltage
J3 #19	+12.6VDC
J3 #18	+6VDC±.5 or 0VDC
J3 #17	+6VDC±.5 or 0VDC

If any of the readings below are observed, check for loose pulser wiring connections. If no loose connections are found, replace the signal harness. (part # 81340)

Terminal #	Voltage
J3 #19	0VDC
J3 #18	2VDC (or higher)
J3 #17	12VDC (or higher)

Select a product code corresponding to the suspect meter. Insert a ticket into the EPSON printer , and begin a delivery. With product flowing through the meter, measure the following DC voltages on the REC board (part # 81268)

Terminal #	Voltage
J3 #19	+12.6VDC
J3 #18	+3VDC± .5VDC
J3 #17	+3VDC± .5VDC

If the following voltages are observed, ensure that the pulser shaft is rotating. Look for any mechanical problems which may cause either the meter or pulser shaft to lock-up.

Terminal #	Voltage
J3 #19	+12.6VDC
J3 #18	+6VDC±.5 or 0VDC
J3 #17	+6VDC±.5 or 0VDC

If the Lap-Pad continues to indicate a pulser failure, replace the pulser board (part # 811521 or 81159 for POD pulsers)

PROBLEM: Valve will not open (single-stage)

PROBABLE CAUSE: Solenoids Inactive / Inoperative

SOLUTION:
1) In Mode # 1, select a product code, insert a delivery ticket into the EPSON printer and start a delivery.
1) Move the selector switch from '**RUN**' to the '**EMERGENCY STOP**' and back to the '**RUN**' position, listening for an audible 'clicking' from the solenoid.

If the solenoid clicks:
This may indicate a mechanical problem with the valve or its associated components. Refer the problem to a qualified Liquid Controls Service Center.

If the solenoid does not click:
1) Remove the (12) 7/16" bolts securing the REC cover. Lift the cover and remove the coiled phone cable. Set the cover to the side, taking care not to damage the phone-type cable connector.
2) Using a reliable voltmeter, measure the following DC voltages on the REC board (part # 81268)

Terminal #	Voltage
J4 # 20	1.0VDC ± .5VDC
J4 # 21	12.0VDC ± 1.5VDC
J4 # 22	1.0VDC ± .5VDC
J4 # 23	12.0VDC ± 1.5VDC

If the above voltages are correct:
This may indicate a mechanical problem with the valve or its associated components. Refer the problem to a qualified Liquid Controls Service Center.

If the above voltages are *NOT* correct:
Replace the following components with known-working units until the problem is resolved:

CPU Board* (part # 81204)
Signal Harness (part # 81340)

*Contact your local Liquid Controls Service Center or contact the Liquid Controls Customer Service Department for assistance.

PROBLEM: Valve will not open (Dual Stage).

PROBABLE CAUSE: Solenoids Inactive / Inoperative.

SOLUTION:
1) Remove the (12) 7/16" bolts securing the REC cover. Lift the cover and remove the coiled phone cable. Set the cover to the side, taking care not to damage the phone-type cable connector.
2) Using a reliable voltmeter, measure the following DC voltages on the REC board (part # 81268)

Terminal #	Voltage
J4 # 20	1.0VDC ± .5VDC
J4 # 21	12.0VDC ± 1.5VDC
J4 # 22	1.0VDC ± .5VDC
J4 # 23	12.0VDC ± 1.5VDC

If the above voltages are correct:
This may indicate a mechanical problem with the valve or its associated components. Refer the problem to a qualified Liquid Controls Service Center.

If the above voltages are not correct:
Replace the following components with known-working units until the problem is resolved:

CPU Board* (part # 81204)
Signal Harness (part # 81340)

*Contact your local Liquid Controls Service Center or contact the Liquid Controls Service center for assistance.

TROUBLESHOOTING

PROBLEM: "Ram-Card Disconnected" appears on Lap-Pad

PROBABLE CAUSE: Ram-Card is disconnected from the Supervisory Console

SOLUTION:

Reseat the Ram-Card. If this does not correct the problem, replace the following components until the problem clears:
Ram-Card (Part # E4101x)
Ram Module (Part # E4310-1)
Cable (Part #81248)

PROBLEM: "Invalid Ram-Card Status" appears on Lap-Pad

PROBABLE CAUSE: Ram-Card contains invalid account information

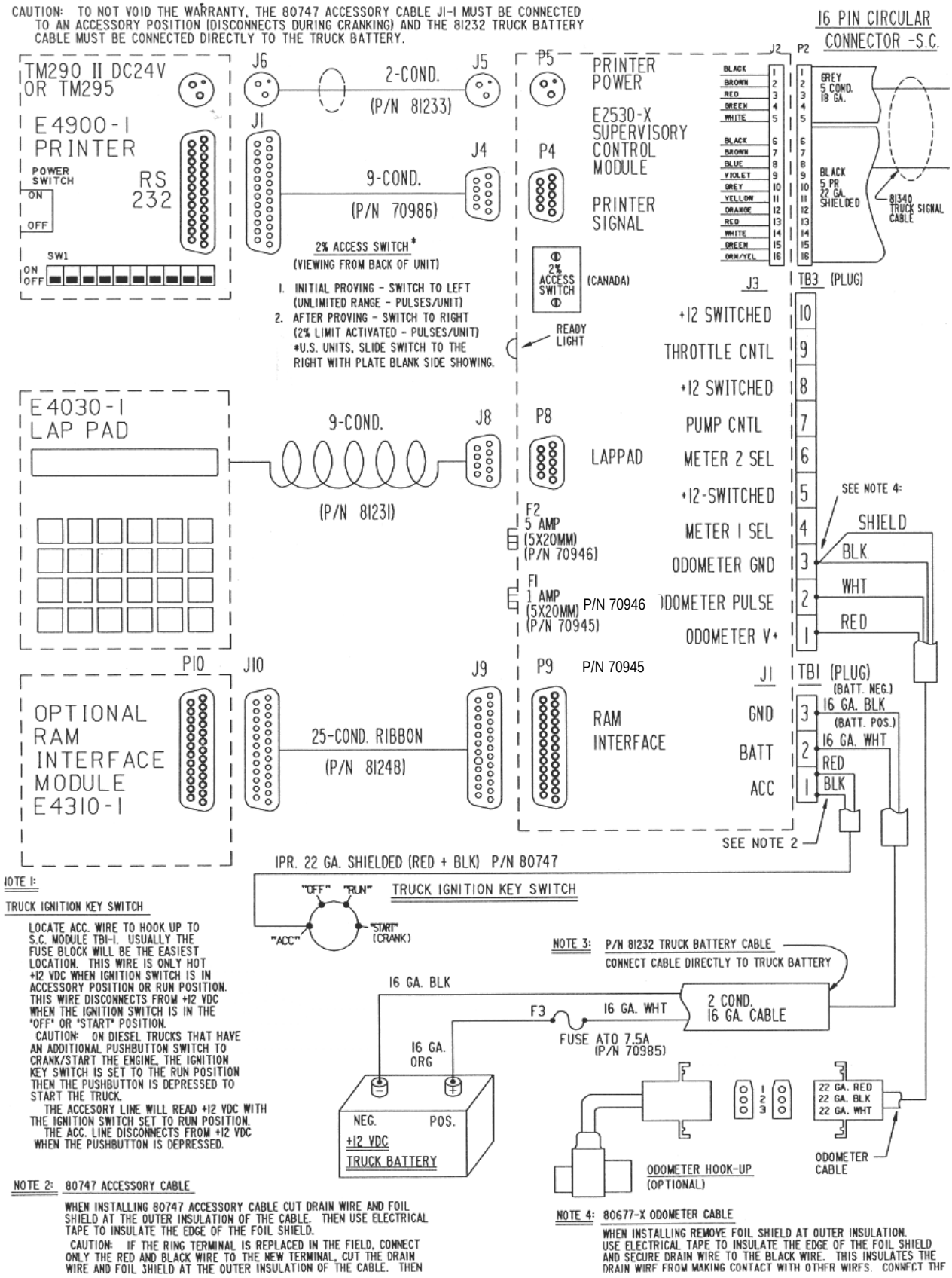
SOLUTION:
Refer to the LectroCount^3 Owner's Manual for instructions on clearing the Ram-Card

Due to the complexity of the LectroCount^3 system, this trouble-shooting guide cannot cover all possible situations. Call your local Liquid Controls Service Center or the Liquid Controls Electronic Customer Service department for any problems which are not covered by this guide.

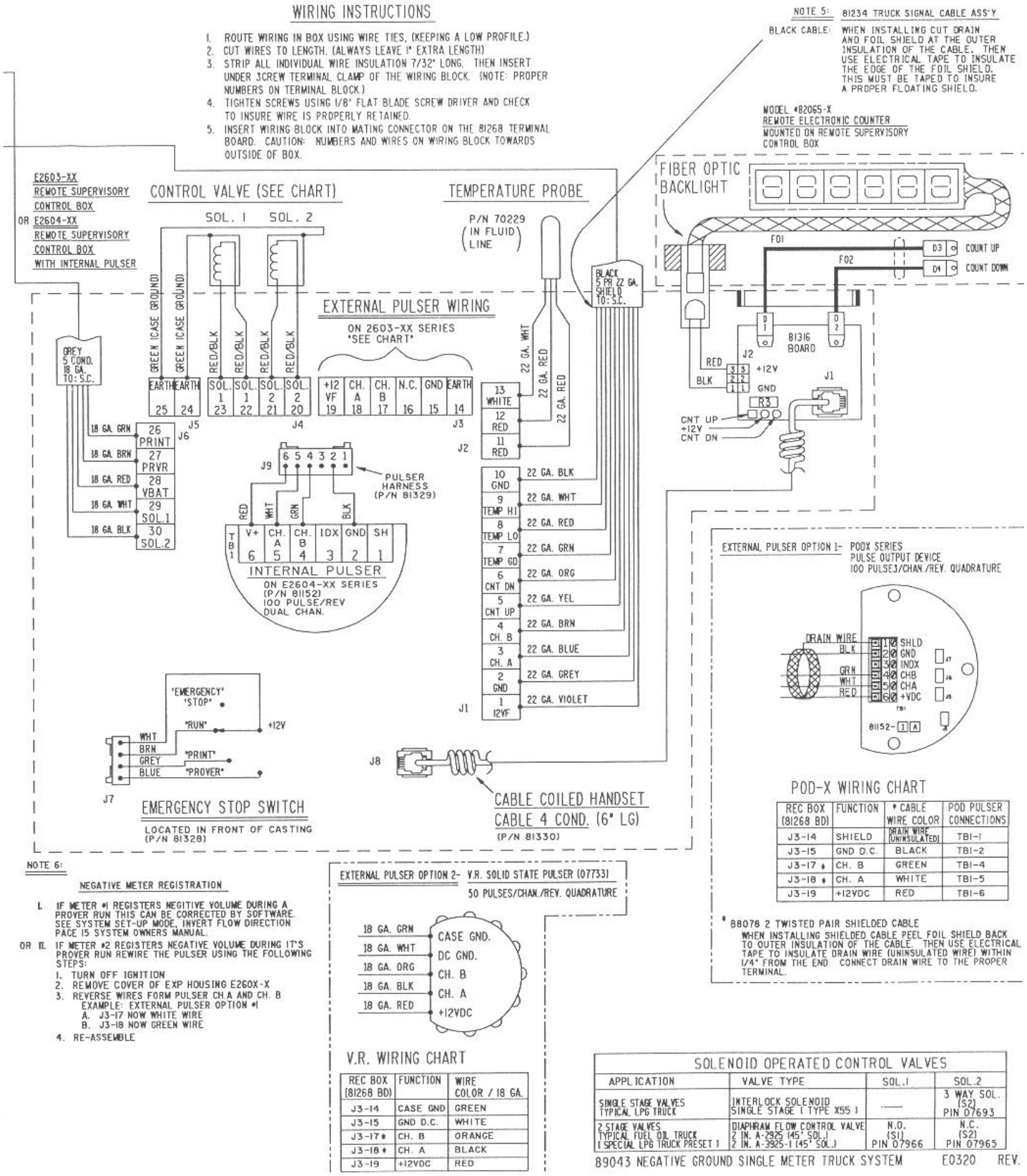
It may be necessary to break Weights & Measure seals to perform certain trouble-shooting steps in this guide. Contact your local Weights & Measures authorities for information before breaking any seals.

Use extreme caution when taking any and all electrical measurements in hazardous environments to avoid potential electrical shorts and / or sparking.
When taking measurements, always use a reliable digital volt-meter.

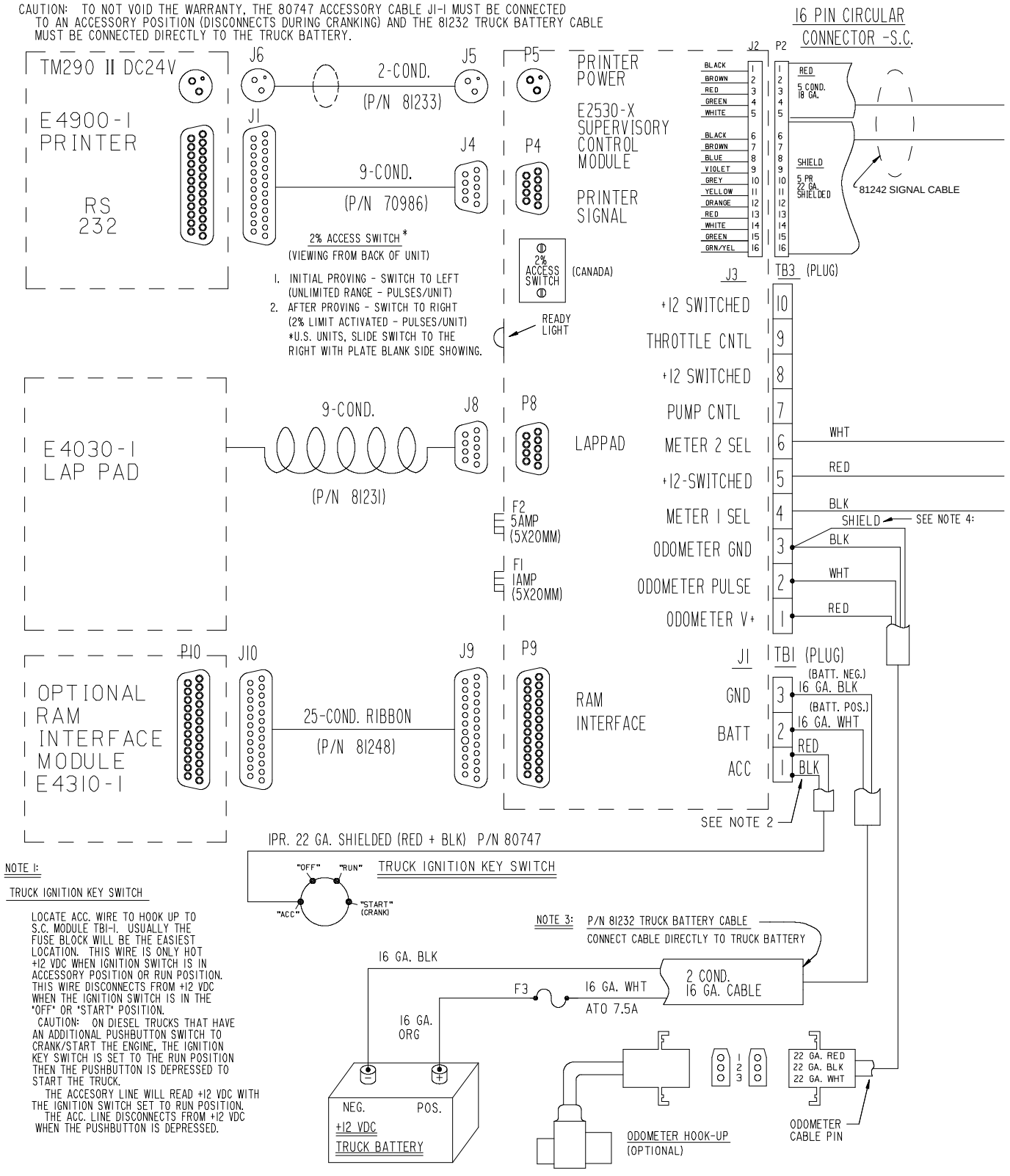
SINGLE METER TRUCK SYSTEM WIRING DIAGRAM - NEGATIVE GROUND



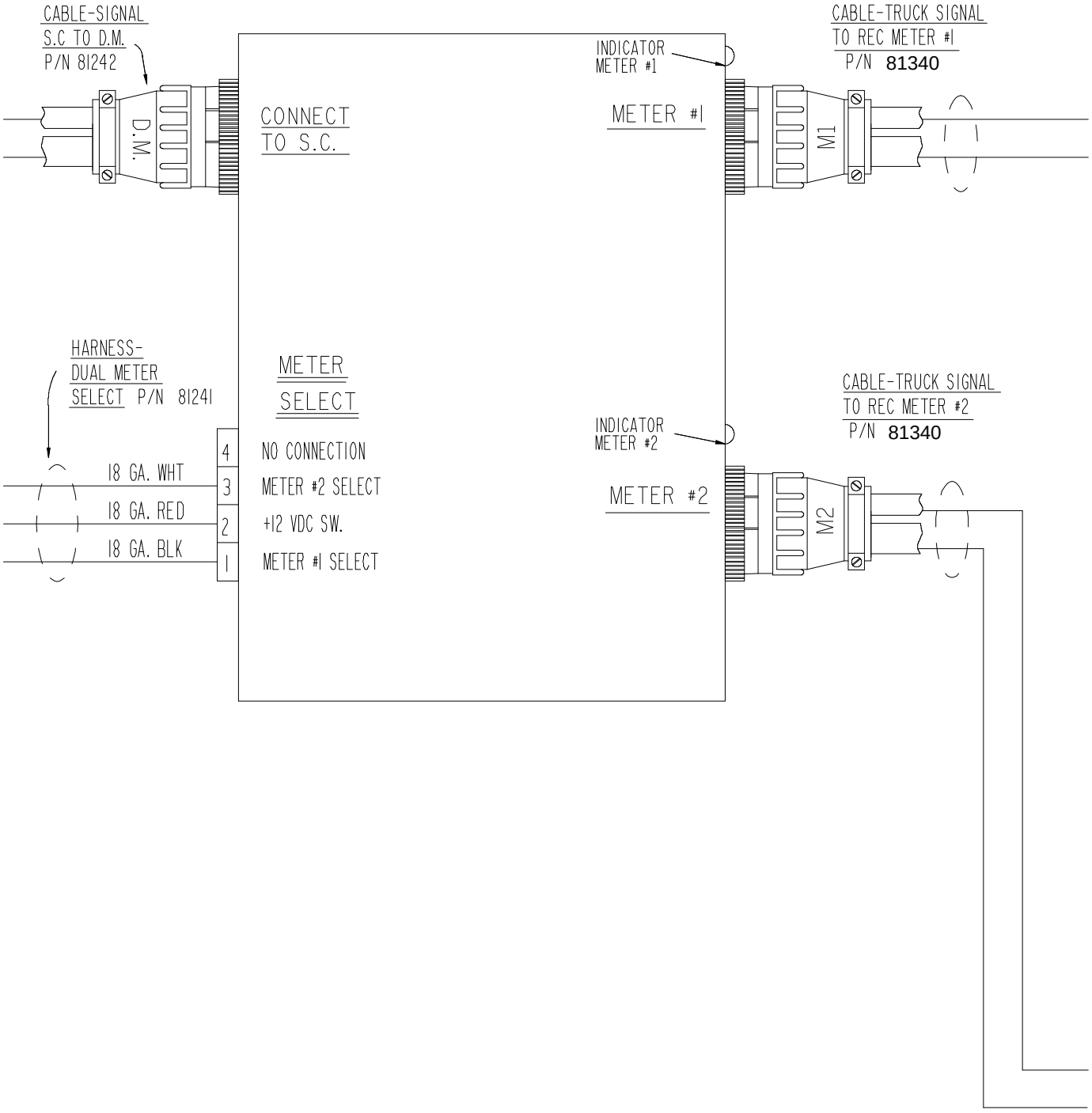
METER #1 REMOTE S.C. CONTROL BOX WIRING



DUAL METER TRUCK SYSTEM WIRING DIAGRAM – NEGATIVE GROUND

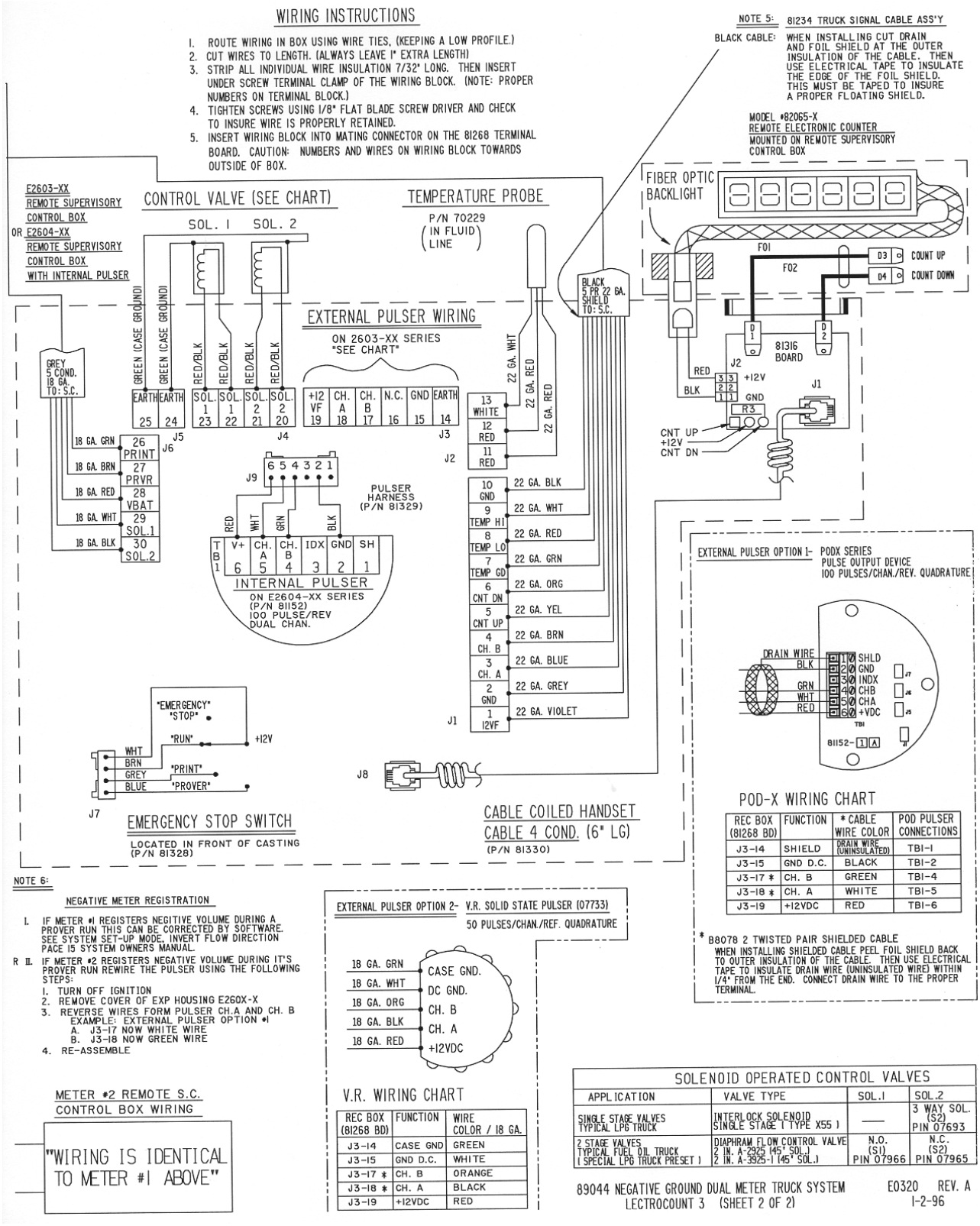


E2535 –1 DUAL METER SWITCH ASSEMBLY

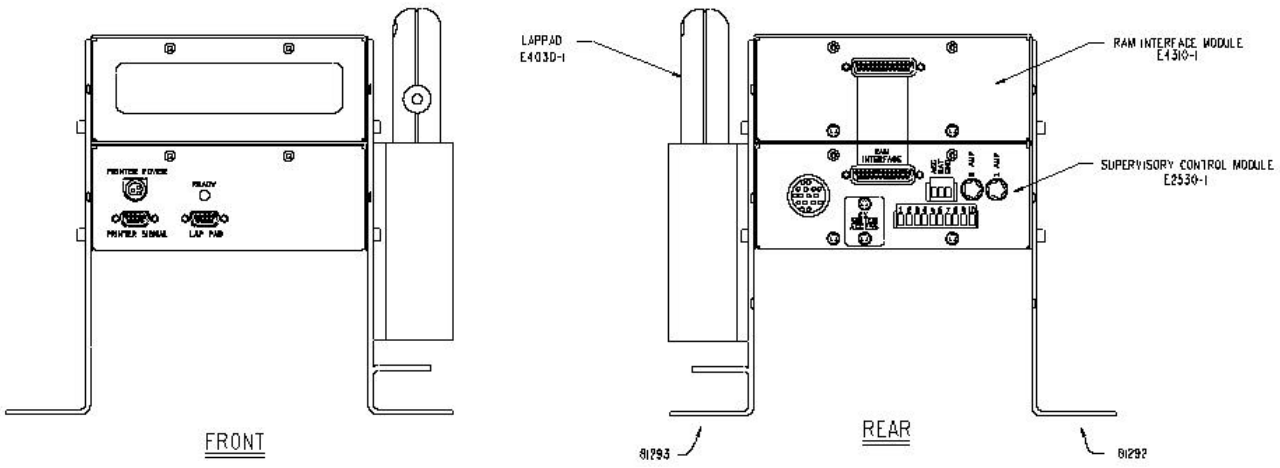


89044 NEGATIVE GROUND DUAL METER TRUCK SYSTEM EO 320 REV. A
LECTROCOUNT (SHEET 1 OF 2) 1-2-96

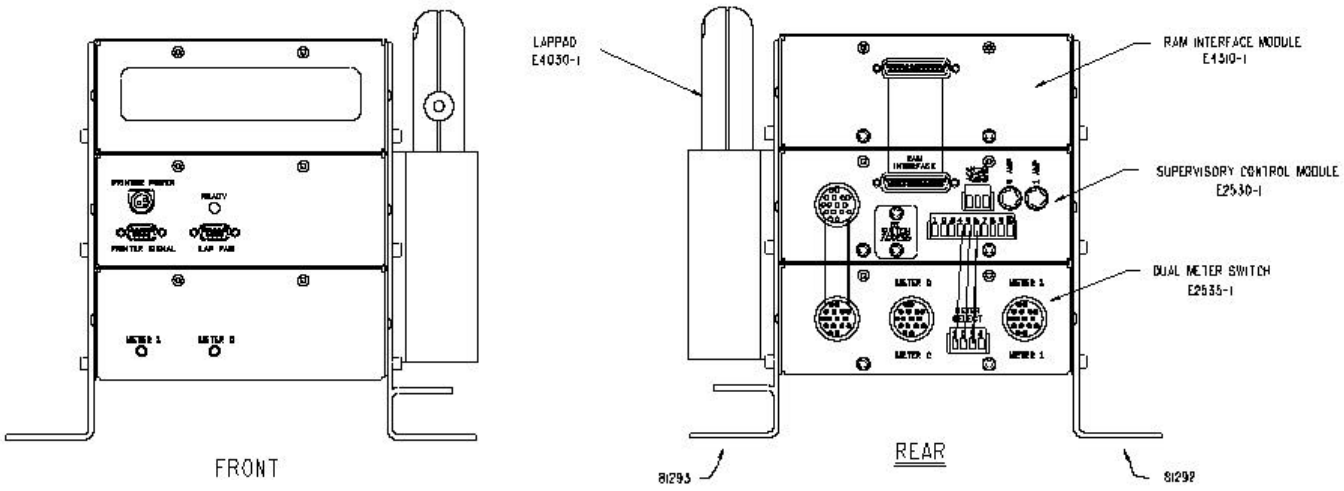
METER #1 REMOTE S.C. CONTROL BOX WIRING



MOUNTING ARRANGEMENT
FOR SYSTEMS WITH MOUNTING BRACKETS



SINGLE METER SYSTEM



DUAL METER SYSTEM

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Backed By Our Worldwide Reputation For Quality, Accuracy and Advanced Design.

Warranty:
Liquid Controls, L.L.C. ("Seller") products are warranted against defects in materials or workmanship for a period of one (1) year from date of installation, provided that the warranty shall not extend beyond twenty-four (24) months from the date of original shipment from seller. Seller's obligations, set forth below, shall apply only to failure(s) to meet the foregoing obligations provided that seller is given written notice within (30) days of any occurrence from which a claim of defect arises. If a warranty dispute occurs, the purchaser shall be required to provide Seller with proof of date of sale. The minimum requirement to establish date of sale shall be a copy of the Seller's invoice. In the event that a factory inspection by Seller or its designee(s) supports the validity of a claim, at the discretion of Seller, repair, replacement or refund shall be sole remedy for defect and shall be made, free of charge, ex-works factory. In no event shall Seller be liable for any special, consequential, incidental, indirect or exemplary damages arising out of warranty, contract, tort, (including negligence) or otherwise, including but not limited to, loss of profit or revenue, loss of use of the product or any associated products and/or equipment, cost of substitute goods or services, downtime costs or claims of or by Purchaser's clients or customers. In any event, the total liability of Seller for any and all claims arising out of or resulting from the performance, non-performance or use of the product shall not exceed the purchase price of the individual product giving rise to the claim. All other guaranties, warranties, conditions and representations, either express or implied, whether arising under any statute, common law, commercial usage or otherwise are excluded. Electronic Products require Installation, start-up and servicing by local factory-trained service representatives. In the absence of installation, start-up and servicing of Electronic Products by Seller trained service representatives, this warranty is null and void. Seller's obligations as set forth above shall not apply to any product, or, or any component part thereof, which is not properly installed, used, maintained or repaired, or which is modified other than pursuant to Seller's instructions or approval. NOTE: The above warranty applies only to products manufactured by Liquid Controls, Lake Bluff, Illinois. Private label, OEM, and/or products manufactured by Liquid Controls licensee(s) are specifically excluded from the above warranty. Consult the factory for all non-Liquid Controls manufacturers' warranties. NO IMPLIED OR STATUATORY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE SHALL APPLY.

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