Valley GPS Pivot Position
For
ICON Control Panels v1.01 or Later

Installation Manual
0980331_C

Includes
Optional PLC End Gun 3 & 4

www.valleyirrigation.com

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General Information

About This Manual

This manual illustrates the proper installation of the Valley GPS Pivot Position on a pivot irrigation machine that is equipped with an ICON control panel, running software version 1.01 or later.

Specifications, descriptions and illustrative material contained in this manual were based on information available at the time this publication was approved for printing.

Valmont Industries Inc. reserves the right to change specification or design at any time without notice and without incurring any obligation. Specifications are applicable to equipment sold within the United States and may vary outside of the United States.

⚠ WARNING

- **THE ASSEMBLY OF THESE COMPONENTS, INCLUDING ADJUSTING, TESTING AND TROUBLESHOOTING SHOULD BE PERFORMED ONLY BY AN AUTHORIZED VALLEY DEALER.**
- **IF ANY WIRE IS NOT CONNECTED TO A TERMINAL OR COMPONENT IN THE CONTROL PANEL, PROTECT THE END OF THE WIRE WITH A WIRE NUT OR EQUIVALENT TO PREVENT DAMAGE FROM SHORT CIRCUIT OR ARCING.**

Tools Needed

- Small Straight Screwdriver
- 1/2 in Wrenches
- 9/16 in Wrenches
- Adjustable Wrench
- Pliers
- Wire Cutter/Stripper

Installing Valley GPS - ICON Control Panels v1.01 or later

To install the Valley GPS, read and follow all warnings and instructions in this guide and in the Valley GPS installation manual. Safety warnings are listed throughout this guide.

⚠ DANGER

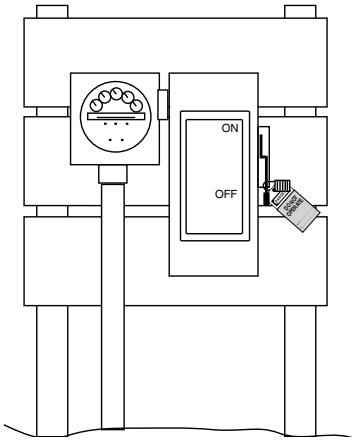
- **THE CONTROL PANEL, COLLECTOR RING AND TOWER BOXES CONTAIN HIGH VOLTAGE! 480 VOLTS CAN KILL.**
- **ALWAYS DISCONNECT ELECTRICAL POWER BEFORE SERVICING OR PERFORMING MAINTENANCE TO THE MACHINE.**
- **INSTALLATION OF THIS KIT, INCLUDING TESTING AND TROUBLESHOOTING SHOULD BE PERFORMED ONLY BY AN AUTHORIZED VALLEY DEALER.**
- **ALWAYS REPLACE ANY GUARDS OR SHIELDS THAT ARE REMOVED FOR PERFORMING MAINTENANCE.**

1. Disconnect All Power

Follow the MINIMAL LOCKOUT/TAGOUT PROCEDURE located in the SAFETY section of this manual and do the following:

a) SHUT OFF and LOCK the public power service disconnect to the irrigation machine.

b) SHUT OFF the control panel main power disconnect and open the control panel inner door.



2. Install Power Line Carrier In Control Panel

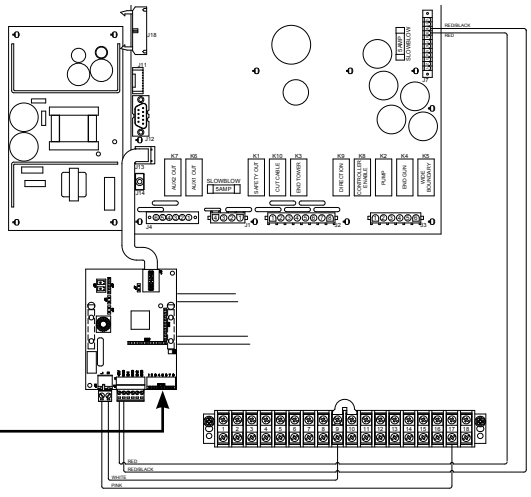
a) Attach the Power Line Carrier (PLC) to the existing din rail in control panel.

b) Refer to the ICON Field Wiring Power Line Carrier in Control Panel pn 9312976 and wire the PLC to the control panel.

NOTE

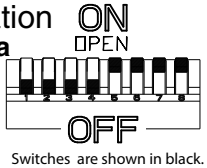
- **The pink wire is used for communication between the PLC and the Valley GPS. Communication signals on the pink wire will not interfere with end gun operation.**

c) Set the dip switches as shown for the frequency band regulations in the country of use.



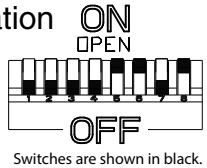
Dip Switch Settings

FCC Regulation
North America



Switches are shown in black.

CENELEC Regulation
International (select countries)



Switches are shown in black.

Quick Install Guide

Installing Valley GPS - ICON Control Panels v1.01 or later

3. Install Valley GPS

⚠ CAUTION

•ALWAYS IDENTIFY POTENTIAL FALL HAZARDS AND DETERMINE IF FALL PROTECTION EQUIPMENT IS APPROPRIATE FOR THE TASK, BEFORE BEGINNING THE WORK.

The Valley GPS is typically installed over the last regular drive unit (LRDU) within 5 ft (1524 mm) of the last tower box or Precision Corner LRDU control panel.

On a machine with a corner, make sure the Valley GPS does not interfere with the corner or any linkage.

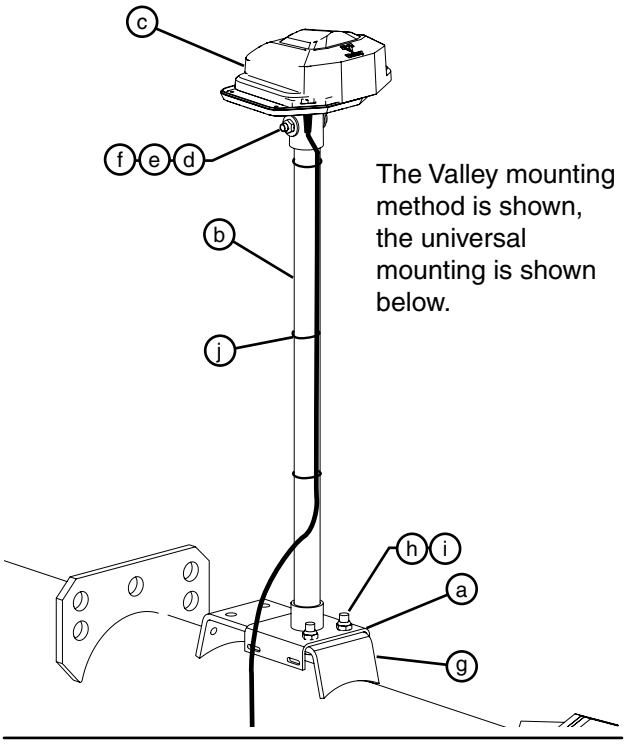
There are two methods for mounting the Valley GPS, the Valley mounting uses the control box mounting bracket (when available) on the last span and the universal mounting that uses band clamps to secure the mounting bracket to the span pipe. Choose the method that works for the application.

Valley Mounting (when avalable): Refer to Tower Box Field Install and Wiring for Valley GPS pn 9312971. Assemble the following components and mount them on the control box mounting bracket.

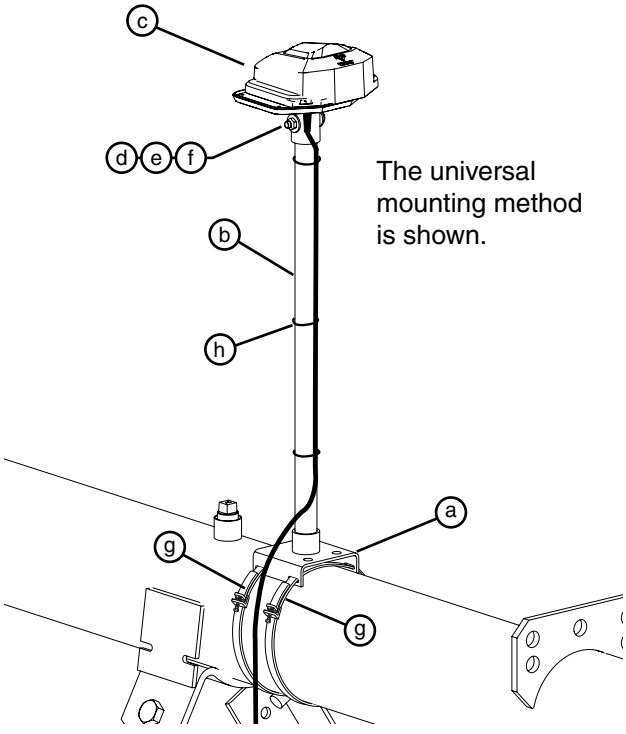
a) GPS Mounting Bracket
b) GPS Mount
c) Valley GPS
d) One 5/16 in X 2 in Cap Screw
e) Two 5/16 in Flat Washers
f) One 5/16 in Lock Nut
g) Control Box Mounting Bracket
h) Two 3/8 in x 1 in Cap Screws
i) Two 3/8 in Lock Nuts
j) Wire Ties (as needed)

Universal Mounting: Refer to Tower Box Field Install and Wiring for Valley GPS pn 9312971. Assemble the following components and mount them on the span pipe.

a) GPS Mounting Bracket
b) GPS Mount
c) Valley GPS
d) One 5/16 in X 2 in Cap Screw
e) Two 5/16 in Flat Washers
f) One 5/16 in Lock Nut
g) Two Band Clamps
h) Wire Ties (as needed)



The Valley mounting method is shown, the universal mounting is shown below.



The universal mounting method is shown.

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4. Install Electrical Components

Assemble the following components on the existing din rail in the tower box or the Precision Corner LRDU control panel.

a) Din Rail (use only if needed)

b) #8 Hex Nut (for din rail mounting if needed)

c) #8 X 1/2 Screw (for din rail mounting if needed)

d) Fuse Block End Cover

e) Fuse Block

f) Fuse, 1.0 Amp, 250V

g) Terminal Block End Cover

h) Three Terminal Blocks

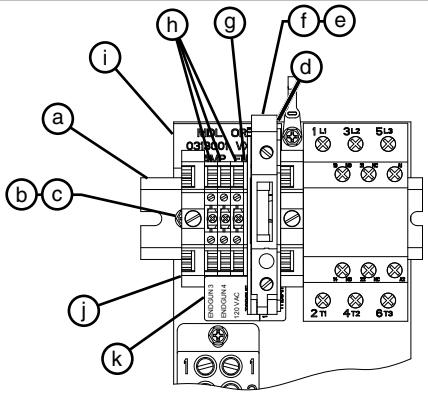
i) Decal 1.0 Amp Fuse

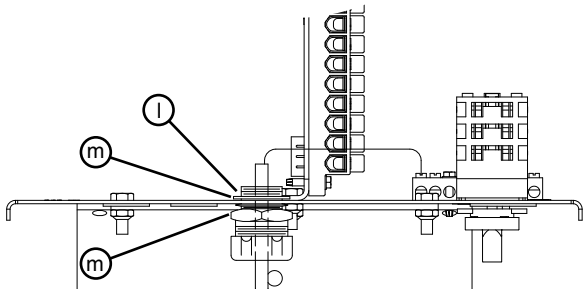
j) Din Rail End Stop

k) Decal Valley GPS Terminals

l) Cord Connector

m) Two Washer Reducers (use only if needed)





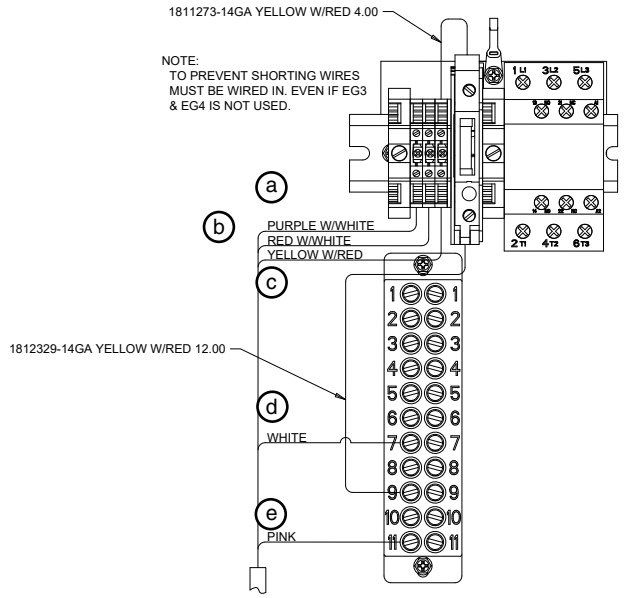
5. Wiring

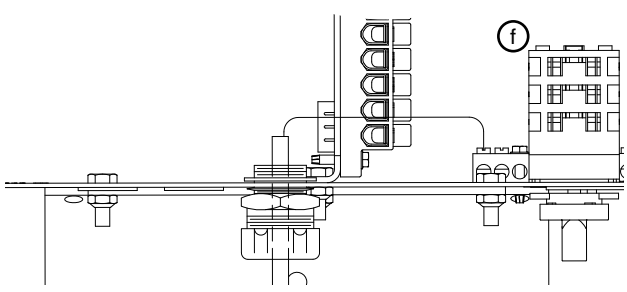
⚠ DANGER

- **THE CONTROL PANEL, COLLECTOR RING AND TOWER BOXES CONTAIN HIGH VOLTAGE! 480 VOLTS CAN KILL.**
- **ALWAYS DISCONNECT ELECTRICAL POWER BEFORE SERVICING OR PERFORMING MAINTENANCE TO THE MACHINE.**

Refer to Tower Box Field Install and Wiring for Valley GPS pn 9312971 or Precision Corner LRDU Control Panel Field Wiring for Valley GPS pn 9312998 and wire the Valley GPS to the existing tower box or Precision Corner LRDU control

	Wire Color	Function
a	Purple w/white	End Gun 3
b	Red w/white	End Gun 4
c	Yellow w/red	Power
d	White	Neutral
e	Pink	Communications
f	Shield	Ground





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6. Setup the Control Panel using the Edit Method

NOTE

•The Edit Method is used below. Refer to the Valley GPS Pivot Position Install Manual for the Set Current Method.

a) **Ensure that any other machine that shares the same 480 VAC source, has either been running longer than 5 minutes or is powered off.**

b) Turn **Water** and **End Guns** off.

c) Set the **Dry % Timer** to 0.0 (zero percent).

d) Push a **Start** button to start the machine, energize the safety circuit and the Valley GPS. The machine should not move.

e) Go to RJ11 screen, push **Menu / Setup / Comm Port / RJ11**.

f) Select the **RJ11 Protocol** field and choose **Valley GPS** from the drop-down list.

g) Push the **Valley GPS Device List** button.

h) Enter the **Number of Devices Installed**.

- When only one Valley GPS is installed, enter 1.
- When other Valley GPS options are installed, enter the total number of devices, up to 254.

i) Push the **Discover Devices** button and the control panel attempts to locate the devices. The discovery of devices can typically take between three and six minutes.

NOTE

•The Discover Devices button must be pushed within four minutes of starting the machine. Device Discovery will only find devices that were powered up in the last five minutes. If the machine has been running longer than five minutes, stop the machine and restart it.

j) After the devices have been discovered, note the PLC ID of the Valley GPS.

k) Push ⊗ or **Return** to close the Valley GPS Device List.

l) **ICON5 and X only**, push the Valley GPS Setup button.

m) Check the **Valley GPS** checkbox and enter the **PLC ID** from step “j”.

n) Optional: Check the **PLC End Gun 3 & 4** checkbox and enter the **PLC ID**. (if utilizing this option)

o) Optional: Check the **VGPS Water Pressure** checkbox and enter the **PLC ID**. (if utilizing this option)

p) Go to the GPS Setup screen, push **Menu / Setup / Constants / Position / GPS Setup**.

q) Enter the Pivot Point GPS position Longitude and Latitude.

r) Enter the **Length to GPS (feet)** (the distance from pivot point to the Valley GPS) including the **Radius +** and **Radius -** tolerance.

s) Go to the Position Loss screen, push **Menu / Setup / Constants / Position / Position Loss Setup**.

t) Check the **Runtime Fallback Position** checkbox, then enter the **LRDU Pivot Speed** and **Length to LRDU**.

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7. Test GPS Position

NOTE

•Every time the machine is started, the Valley GPS goes through a startup cycle that lasts approximately one minute. The Valley GPS will not communicate with the control panel until the startup cycle has completed.

a) Turn Water off.

b) Set the Dry % Timer to 0.0 (zero percent).

c) Push a **Start** button to start the machine, energize the safety circuit and the Valley GPS. The machine should not move.

d) Go to the Pivot Position screen, push **Menu / Setup / Constants / Position**. When GPS Position is working, the **GPS is Communicating** and the **GPS in Tolerance** lights will both be green indicating proper operation.

- If the **GPS is Communicating** light is off (gray), there are no communications between the Valley GPS and the control panel. Check all wiring and refer to the Troubleshooting Section.
- If the **GPS in Tolerance** light is Off (gray) and/or the Present Position value is flashing, push the **GPS Setup** button and verify that the Pivot Point GPS Latitude, Longitude, Length to GPS, Radius +, and Radius - values are correct.

e) Go to the GPS Setup screen, push **GPS Setup**.

- Verify DGPS Satellite Lock, If there is no DGPS lock continue waiting. Depending on location, it can take 15 minutes or longer for the Valley GPS to lock on to the satellite signal and obtain DGPS accuracy.
- When GPS Position is lost or not found, the word **NONE**, or **No GPS** is displayed in the Satellite Lock field.

f) Optional: To set the Present Position of the pivot span in degrees, go to the Position screen.

g) Push **Calibrate** and enter the pivot span position in degrees and push **Enter**.

h) Run the machine in either direction to verify that the position displayed on the Status screen changes periodically as the machine moves. If it does, the setup is complete.

» If GPS position is not working, verify proper wiring and menu setup, ensure machine is running and refer to the troubleshooting section.

NOTE

•If utilizing PLC End Gun 3 & 4, refer to Optional PLC End Gun 3 & 4 on page 40 for installation and setup.

Safety

Recognize Safety Information

This irrigation equipment can be powered by high voltage, which can be extremely dangerous if used improperly. For maximum safety and optimum performance of the machine, all owner/operators and maintenance personnel must read and understand the owner/operator manual(s), all safety messages in this manual and safety signs/decals on the machine before operating this equipment.

Anyone assembling, operating, servicing or maintaining this machine must read and understand all operation, maintenance, troubleshooting, testing, installation, assembly instructions and all safety messages in this manual before operating the machine or beginning any maintenance, troubleshooting, testing, installation or assembly of components.

These instructions alert you to certain things you should do carefully; if you don't, you could hurt yourself or others, hurt the next person who operates the equipment, or damage the equipment.

Safety Messages

Safety messages in this manual are preceded by the hazard symbol and one of three words: DANGER, WARNING or CAUTION. These messages alert you to potential hazards that could hurt you or others and or cause property damage.

This HAZARD SYMBOL is used to alert you to information about unsafe actions or situations, and may be followed by the word DANGER, WARNING or CAUTION.

⚠ DANGER

The HAZARD SYMBOL used with the word DANGER describes immediate hazards that can result in severe personal injury or death.

⚠ WARNING

The HAZARD SYMBOL used with the word WARNING describes unsafe actions or situations that can result in severe injury, death and/or major equipment or property damage.

⚠ CAUTION

The HAZARD SYMBOL used with the word CAUTION describes unsafe actions or situations that can result in injury, and/or minor equipment or property damage.

Information Messages

Important information messages in this manual are preceded by the word NOTE.

NOTE

The word NOTE is used to alert you to information that describes procedures or tips to help you install, operate or maintain your equipment properly.

Use of Personal Protective Equipment

- People working in areas where there are potential electrical hazards must use, personal protective equipment that is appropriate for the specific parts of the body to be protected and for the work to be performed. Refer to U.S. Occupational Safety & Health Administration (OSHA) Regulations (Standards - 29 CFR) Safeguards for personnel protection. - 1910.335, or applicable national, state or local regulations, for additional information.
- Personal protective equipment must be maintained in a safe, reliable condition and periodically inspected or tested.
- Protective shields, protective barriers, or insulating materials must be used to protect each person from shock, burns, or other electrically-related injuries while that person is working near exposed energized parts which might be accidentally contacted or where dangerous electric heating or arcing might occur. When normally enclosed live parts are exposed for maintenance or repair, they must be guarded to protect unqualified persons from contact with the live parts.
- Safety signs and tags. Safety signs, safety symbols, or accident prevention tags must be used where necessary to warn people about electrical hazards which may endanger them.

Conductive Materials and Equipment

Materials and equipment that can conduct electricity must be handled in a way that will prevent them from contacting energized power lines, exposed conductors or circuit parts.

- When handling long conductive objects (such as but not limited to truss rods, pipes, angles and ladders) in areas with energized power lines, exposed conductors or circuit parts, work practices (such as the use of insulation, guarding, and material handling techniques) must be used to minimize the hazard.
- Portable ladders must have non-conductive side rails.
- Do not wear conductive articles of jewelry and clothing (such as but not limited to watch bands, bracelets, rings, key chains, necklaces, metalized aprons, cloth with conductive thread, or metal headgear) that could come in contact with energized power lines, exposed conductors or circuit parts.

Fall Protection

Identify potential fall hazards and determine if fall protection equipment is appropriate for the task, before beginning the work. Pay attention to hazards associated with routine and non-routine tasks. Inspect fall protection equipment (harnesses, lanyards) and devices (guardrails, tie-off points) before each use. Use fall protection equipment if required for the job. Be sure the fall protection equipment is right for the task, fits properly, and is in good condition. Refer to U.S. Occupational Safety & Health Administration (OSHA) Regulations Standards - 29 CFR 1926.500, 1926.501 and 1926.502, or applicable national, state or local regulations for more information.

- When using scaffolds, make sure there is proper access, full planking, stable footing, and guard railing.
- When using a boom lift, keep feet firmly on the platform of a boom lift, use fall protection equipment tied-off at all times to the guardrail or tie-off point.
- When using a ladder, make sure the ladder is non-conductive and the correct size for the task. Read the ladder user instructions and be sure the ladder is in good condition. Make sure ladder is set on stable footing and at the correct angle.

Safety

Minimum Working Clearance

To reduce the risk of injury, all persons require adequate working clearance around the electrical panel or other electrical equipment. The table below identifies the minimum working clearance needed. Refer to U.S. Occupational Safety & Health Administration (OSHA) Regulations (Standards - 29 CFR) Safeguards for personnel protection. -1910.303(g)(1)(i), or any other applicable national, state or local regulations, for additional information.

MINIMUM WORKING CLEARANCE 0-600 VOLTS				
WIDTH OF WORKING CLEARANCE AREA	HEIGHT OF WORKING CLEARANCE AREA	★MINIMUM WORKING CLEARANCE IN FRONT OF ELECTRICAL PANEL/EQUIPMENT		
		EXPOSED LIVE PARTS ON ONE SIDE OF WORK SPACE AND NO LIVE GROUNDED PARTS ON THE OTHER SIDE.	EXPOSED LIVE PARTS ON ONE SIDE OF WORK SPACE AND LIVE GROUNDED PARTS ON THE OTHER SIDE.	EXPOSED LIVE PARTS ON ONE SIDE OF WORK SPACE AND EXPOSED LIVE PARTS ON THE OTHER SIDE.
30 in (760 mm) MINIMUM OR WIDTH OF ENCLOSURE, WHICH EVER IS GREATER	78 in (1980 mm) MINIMUM OR HEIGHT OF ENCLOSURE, WHICH EVER IS GREATER	36 in (915 mm) MINIMUM	42 in (1065 mm) MINIMUM	48 in (1220 mm) MINIMUM

★Concrete, brick or tile walls shall be considered as grounded.

Qualified Person

A Qualified Person is one who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated his/her ability to solve or resolve problems related to the subject matter, the work, or the project.

Only qualified persons may work on electric circuit parts or equipment that have not been de-energized.

Refer to U.S. Occupational Safety & Health Administration (OSHA) Regulations Standards - 29 CFR 1926.32(m) and 1910.333, or applicable national, state or local regulations for additional information.

Irrigation Equipment near Airports and Crop Dusting Aircraft

- If any part of the irrigation machine comes within 3200 ft (975 m) of an airport runway, especially the approach (ends) of the runway, additional warning markers may be required. In the United States, CFR Title 14, Chapter I, Subchapter E, Part 77 – Safe, Efficient Use, and Preservation of the Navigable Airspace describes when marking is needed.

  This document is available at: www.ecfr.gov

- Marking requirements vary depending on the location of the irrigation equipment relative to the runway, the type of airport (Civil, Military, or Heliport) and other factors. Contact the local airport authority for guidance and specific recommendations. In the United States, guidelines for marking structures near airports are published by the Federal Aviation Administration in Advisory Circular AC 70/7460-1L – Obstruction Marking and Lighting.

  Available here: www.faa.gov/regulations_policies/advisory_circulars

- For irrigation machines near private or unregulated airfields, including farm-based airstrips, Valley strongly recommends complying with the same standards and requirements as Civil airports as shown in Part 77.

- Regulations vary by country, contact your local aviation authority for guidance.

  Overhang cables, including overhang back cables are a particular danger. In locations where low-flying aircraft are likely, such as within 1,500 ft (457 m) of an end of an airport runway, or where crop dusting aircraft are common, Valley recommends adding obstruction markers to overhang cables to improve their visibility.

  For large overhangs (36 ft / 10.97 m Heavy Duty and longer), five 12 in (300 mm) or 20 in (500 mm), aviation orange marker balls are sufficient. One near the rabbit ears, two in the middle of the back cables and two in the middle of the highest overhang cables. Refer to Section 3.5 in AC70/7460-1 for additional details. Aviation marker balls are available online and from a variety of aviation and airport safety equipment providers.

Overhead Power Lines

Assembling, towing or transporting irrigation machine components such as but not limited to the pivot point, linear cart, span/drive unit assemblies, overhangs and/or corner assemblies underneath or near power lines is extremely dangerous because of the risk of electrocution.

Operating equipment that elevates irrigation machine components, such as but not limited to an aerial lift or crane, near power lines is extremely dangerous because of the risk of electrocution. Only qualified personnel should operate this type of equipment. Before operating the equipment, qualified personnel must read the equipment manufacturers' operating and safety instructions.

Refer to U.S. Occupational Safety & Health Administration (OSHA) Regulations (Standards - 29 CFR) Cranes and derricks. - 1926.550, or any other applicable national, state or local regulations for additional information.

- Always presume that any overhead power line is an energized line unless and until the person(s) owning the line and/or the electrical utility authorities indicate that it is not an energized line and it has been visibly grounded.
- Before operating any equipment near any power line make sure the line has been de-energized and visibly grounded at the point of work.
- Electrocution can occur without touching an electrical power line. Electricity, depending on the magnitude, can jump or become induced into equipment or conductive materials that come in close proximity to, but do not touch a power line. High wind, lightning, wet ground and other environmental conditions will increase the possibility of electrocution and require additional consideration.
- Transmitter towers can induce the equipment or materials being handled with an electrical charge. Before working or operating equipment near transmitter towers, make sure the transmitter is de-energized.
- Select the location where the span/drive unit will be assembled to ensure that neither the irrigation machine, or the equipment used during the assembly process, will violate the minimum clearance guidelines.
- Never operate equipment or allow the load, ropes or tag lines within 10 ft (3.05 m) of any power line rated 50 kV or lower whether it is energized or not. For lines rated over 50 kV, the minimum clearance shall be 10 ft (3.05 m) plus 0.4 in (1.1 cm) for each kV over 50 kVs.
- Never assemble, tow, transport or allow irrigation machine components underneath or within 10 ft (3.05 m) of any power line rated 50 kV or lower whether it is energized or not. For lines rated over 50 kV, the minimum clearance shall be 10 ft (3.05 m) plus 0.4 in (1.1 cm) for each kV over 50 kVs. Overhang support angles, cables and spinner drive components regularly extend 10 ft to 12 ft (3.1 m to 3.7 m) above the irrigation pipeline (span).
- Use barricades to identify areas where interference with overhead power lines could occur. Keep the assembly, towing or transporting of irrigation machine components and the operation of equipment including load, ropes or tag lines away from any power line, in the distances described above, whether the line is energized or not.
- Always designate a person to observe clearance between the power line and all equipment being operated or moved in order to give timely warning for all operations to STOP if the minimum clearance is violated.

Safety

Minimal Lockout / Tagout Procedure

The following procedure establishes the minimum requirements for the lockout of energy isolating devices whenever maintenance or servicing is done on machines or equipment. It is used to ensure that the machine or equipment is stopped, isolated from all potentially hazardous energy sources and locked out before personnel perform any servicing or maintenance where the unexpectedly energized or start-up of the machine or equipment or release of stored energy could cause injury. All personnel, upon observing a machine or piece of equipment which is locked out to perform servicing or maintenance shall not attempt to start, energize, or use that machine or equipment.

When the energy isolating devices are not lockable, tagout should be used and affected personnel must wear full personal protection.

Refer to U.S. Occupational Safety & Health Administration (OSHA) Regulations (Standards - 29 CFR) Typical minimal lockout procedures - 1910.147 App A, or applicable national, state or local regulations, for additional information.

Sequence of Lockout

1. Notify all affected personnel that servicing or maintenance is required on a machine or equipment and that the machine or equipment must be shut down and locked out to perform the servicing or maintenance.
2. The authorized personnel shall identify the type and magnitude of the energy that the machine or equipment utilizes, shall understand the hazards of the energy, and shall know the methods to control the energy.
3. If the machine or equipment is operating, shut it down by the normal stopping procedure (depress the stop button, open switch, close valve, etc.).
4. De-activate the energy isolating device(s) so that the machine or equipment is isolated from the energy source(s).
5. Lock out the energy isolating device(s) with assigned individual lock(s).
6. Stored or residual energy (such as that in capacitors, springs, elevated machine members, rotating flywheels, hydraulic systems, and air, gas, steam, or water pressure, etc.) must be dissipated or restrained by methods such as grounding, repositioning, blocking, bleeding down, etc.
7. Ensure that the equipment is disconnected from the energy source(s) by first checking that no personnel are exposed, then verify the isolation of the equipment by operating the push button or other normal operating control(s) or by testing to make certain the equipment will not operate.

> **⚠ CAUTION**
>
> **• RETURN OPERATING CONTROL(S) TO NEUTRAL OR "OFF" POSITION AFTER VERIFYING THE ISOLATION OF THE EQUIPMENT.**

8. The machine or equipment is now locked out.

> **⚠ DANGER**
>
> **• WHEN PERSONNEL WILL BE EXPOSED TO CIRCUIT ELEMENTS AND ELECTRICAL PARTS, A QUALIFIED PERSON MUST USE TEST EQUIPMENT TO VERIFY THAT THE CIRCUIT ELEMENTS AND EQUIPMENT PARTS OF THE EQUIPMENT ARE DE-ENERGIZED.**

Restoring Equipment to Service

When the servicing or maintenance is completed and the machine or equipment is ready to return to normal operating condition, the following steps shall be taken:

1. Check the machine or equipment and the immediate area around the machine to ensure that non-essential items are removed and that the machine or equipment components are operationally intact.
2. Check the work area to ensure that all personnel are safely positioned or removed from the area.
3. Verify that the controls are in neutral.
4. Remove the lockout devices and re-energize the machine or equipment.
5. Notify affected personnel that the servicing or maintenance is completed and the machine or equipment is ready to be used.

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Installation Instructions

⚠ DANGER

- **THE CONTROL PANEL, COLLECTOR RING AND TOWER BOXES CONTAIN HIGH VOLTAGE! 480 VOLTS CAN KILL.**
- **ALWAYS DISCONNECT ELECTRICAL POWER BEFORE SERVICING OR PERFORMING MAINTENANCE TO THE MACHINE.**
- **INSTALLATION OF THIS KIT, INCLUDING TESTING AND TROUBLESHOOTING SHOULD BE PERFORMED ONLY BY AN AUTHORIZED VALLEY DEALER.**
- **ALWAYS REPLACE ANY GUARDS OR SHIELDS THAT ARE REMOVED FOR PERFORMING MAINTENANCE.**

Disconnect All Power

Follow the MINIMAL LOCKOUT/TAGOUT PROCEDURE located in the SAFETY section of this manual and do the following:

1. SHUT OFF and LOCK the public power service disconnect to the irrigation machine. FILL OUT the blue (OSHA safety color code) tag and attach to the disconnect after locking. See Figure 16-1.
2. SHUT OFF the control panel main power disconnect and open the control panel inner door. See Figure 16-2.
3. Valley GPS requires an OPMC5 Power Line Carrier (PLC) installed in the control panel.
   - If a PLC OPMC5 has not been installed, continue with Install Power Line Carrier In Control Panel on page 17.
   - If a PLC OPMC5 was previously installed, continue with Set Control Panel Power Line Carrier Dip Switches on page 18.

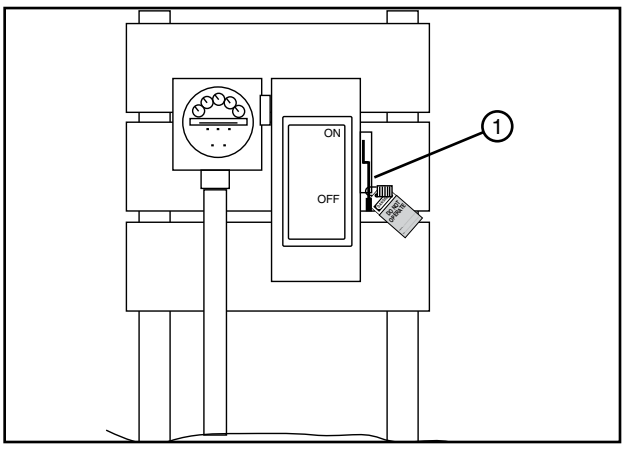


Figure 16-1 1. Public Power Service Disconnect

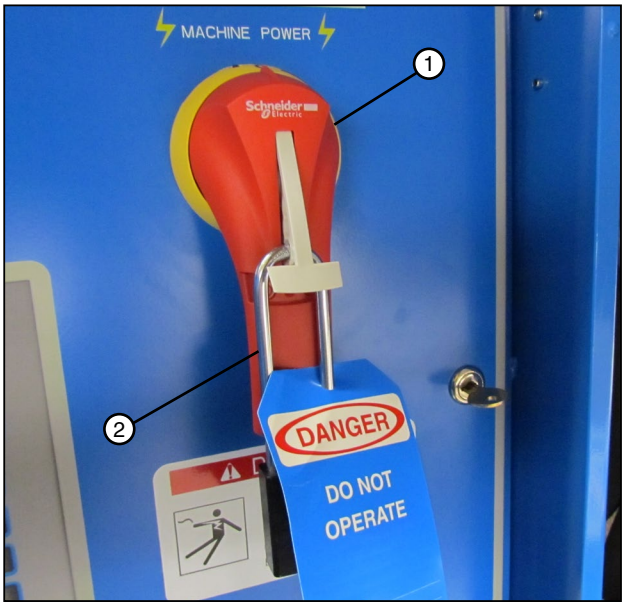


Figure 16-2 1. Main Power Disconnect
2. Lock

Install Power Line Carrier In Control Panel

Refer to Figure 17-1 and do the following:

1. Attach the Power Line Carrier (PLC OPMC5) to existing din rail in control panel.
2. Connect the communication cable from the power line carrier to the Smart Relay Board (SRB). Refer to the Field Install and Wiring Diagrams section as needed.
3. Wire the power line carrier to the control panel terminal strip and smart relay board. Refer to ICON Field Wiring Power Line Carrier in Control Panel pn 9312976 as needed.

> **NOTE**
>
> **•The pink wire is used for communication between the PLC and the Valley GPS. Communication signals on the pink wire will not interfere with end gun operation**

4. Continue with Set Control Panel Power Line Carrier Dip Switches on the next page.

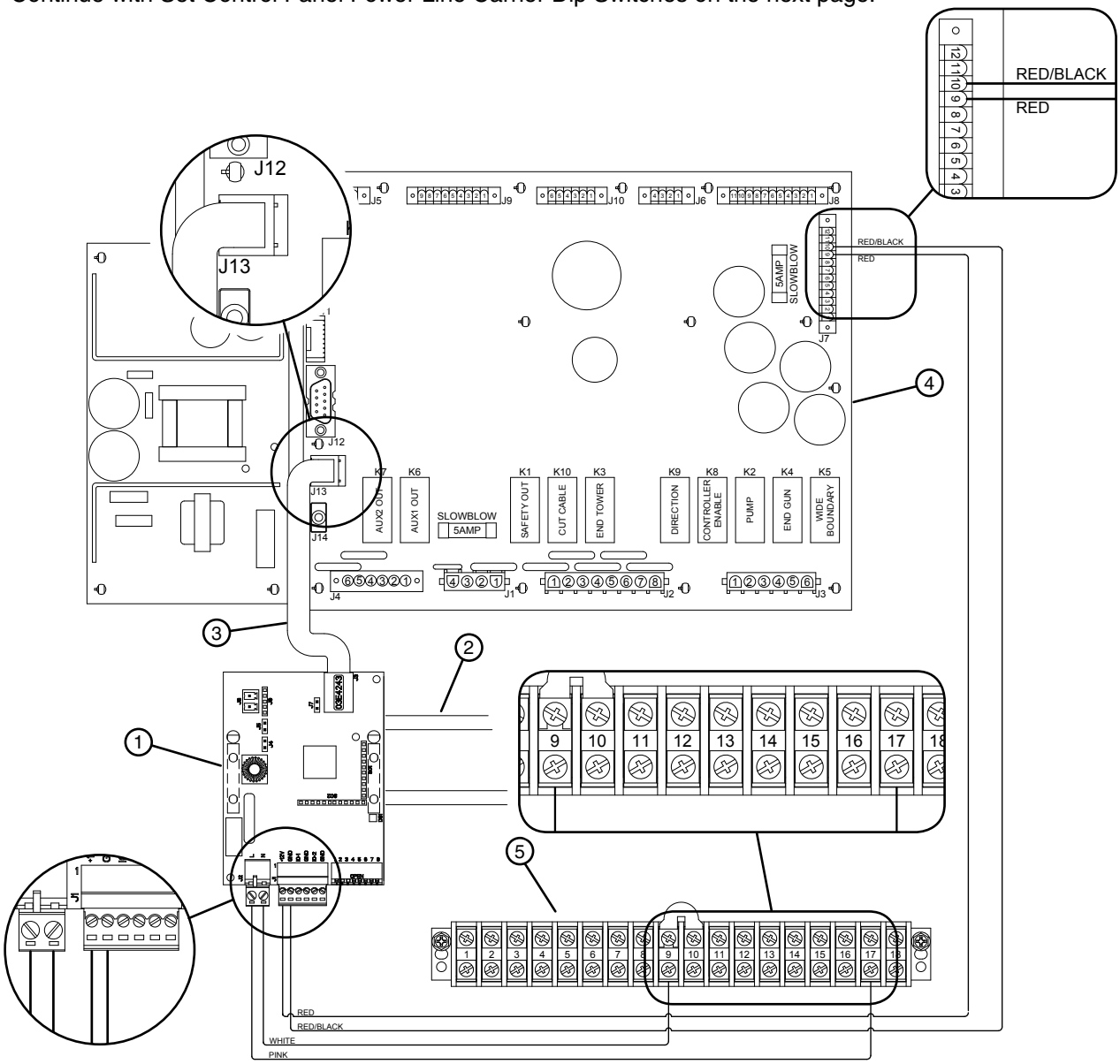


Figure 17-1 1. PLC OPMC5 2. Din Rail 3. Communication Cable 4. SRB 5. Terminal Strip

Installation Instructions

Install Power Line Carrier In Control Panel (continued)

Set Control Panel Power Line Carrier Dip Switches

The PLC OPMC5 dip switches must be set for use in the ICON control panel and the correct telecommunications frequency band regulation based on country of use.

Refer to Figure 18-1 and set the dip switches:

Dip Switches 1-4 (master or slave designation)

- The PLC in the control panel is the master. Dip switches 1-4 must be in the off position.

Dip Switches 5-6 (network ID)

- The PLC network ID can be set to 0, 1, 2 or Random from 3 to 254.

  The recommended setting is Random 3 to 254. Both dip switches should be in the on position.

Dip Switch 7 (frequency band)

- The PLC supports FCC and CENELEC regulations for frequency bands and by default is set to FCC frequency bands.

  Follow the frequency band regulations for the country of use.

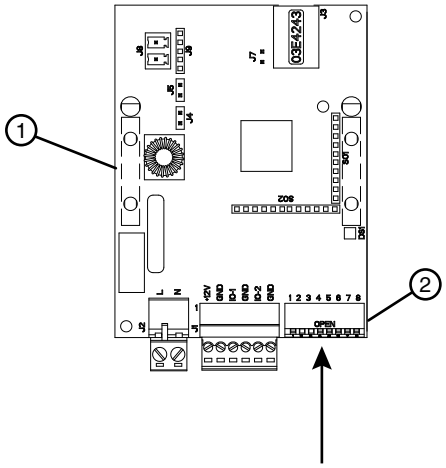
  To change the range of frequency bands to CENELEC, move dip switch number 7 to the off position.

Dip Switch 8 (discovery)

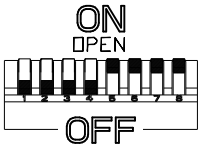
- The PLC can automatically discover compatible hardware on the machine. For the ICON control panel application dip switch 8 must be left in the on position.

Continue with Temporary Valley GPS Installation on the next page.

Dip Switch Settings
for ICON Control Panel

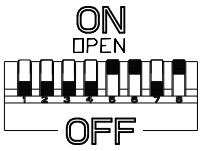


FCC Regulation
North America



Switches in this illustration are shown in black.

CENELEC Regulation
International
(select countries)



Switches in this illustration are shown in black.

Figure 18-1 1. ICON Control Panel PLC
2. Dip Switches

Temporary Valley GPS Installation

Use 14 gauge Green, Yellow w/Red, Pink and White jumper wires, each 6 ft long to temporarily connect the Valley GPS to a 120 VAC power source in the control panel or collector ring. Choose a method of connection based on the application.

- If the control panel is at the pivot point use the Temporary Connection to Control Panel on this page.
- If the control panel is at a remote location away from the pivot point use the Temporary Connection to Collector Ring on page 20.

⚠ DANGER

•THE CONTROL PANEL, COLLECTOR RING AND TOWER BOXES CONTAIN HIGH VOLTAGE! 480 VOLTS CAN KILL. ALWAYS DISCONNECT ELECTRICAL POWER BEFORE SERVICING OR PERFORMING MAINTENANCE TO THE MACHINE.

⚠ CAUTION

•ALWAYS IDENTIFY POTENTIAL FALL HAZARDS AND DETERMINE IF FALL PROTECTION EQUIPMENT IS APPROPRIATE FOR THE TASK, BEFORE BEGINNING THE WORK.

Temporary Connection to Control Panel

1. Connect the conductor cable to the Valley GPS.
2. At the end of the conductor cable, locate the **red w/white wire** and the **purple w/white wire**. **Install wire nuts on these wires to prevent arcing and shorting of wires**.
3. Use the temporary wires between the control panel terminals and the Valley GPS:
   (a) Green wire: Attach to shield wire with wire nut, and then connect to control panel ground lug.
   (b) Yellow w/red wire: Attach to Yellow w/red wire with wire nut, and then connect to control panel terminal 7, Safety Out. See Figure 19-1.
   (c) Pink wire: Attach to pink wire with wire nut, and then connect to control panel terminal 17, End Gun. See Figure 19-1.
   (d) White wire: Attach to white wire with wire nut, and then connect to control panel terminal 9, Common. See Figure 19-1.
5. Continue with Temporary Location on page 21.

Valley GPS Connection to Control Panel

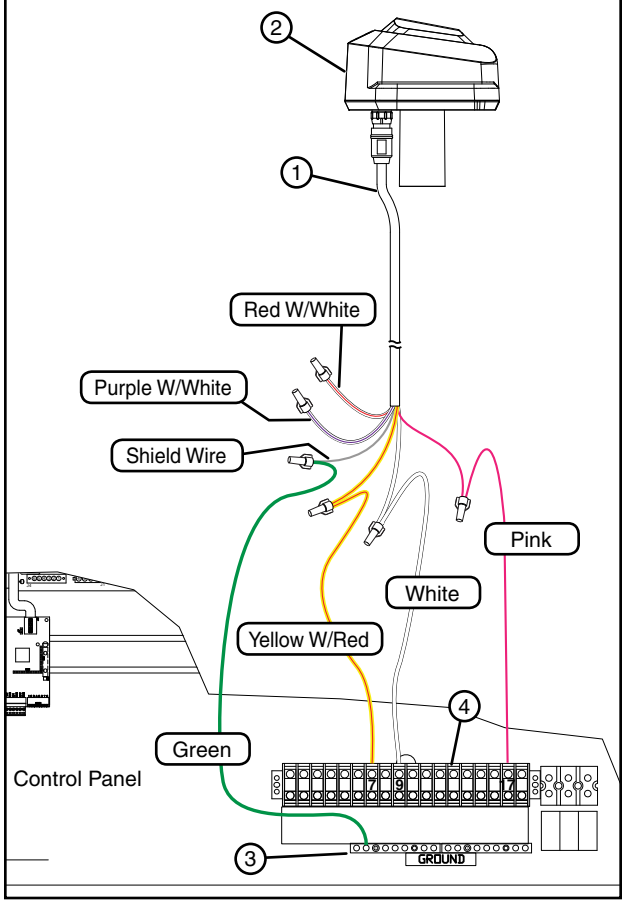


Figure 19-1 1. Conductor Cable
2. Valley GPS
3. Ground Terminal - Control Panel
4. Terminal Strip - Control Panel

Installation Instructions

Temporary Valley GPS Installation

Temporary Connection to Collector Ring

1. Remove the collector ring cover.
2. Connect the conductor cable to the Valley GPS.
3. At the end of the conductor cable, locate the **red w/white wire** and the **purple w/white wire**. **Install wire nuts on these wires to prevent arcing and shorting of wires**.
4. Use the temporary wires between the collector ring terminals and the Valley GPS:
   (e) Green wire: Attach to shield wire with wire nut, and then connect to collector ring terminal 1.
   (f) Yellow w/red wire: Attach to Yellow w/red wire with wire nut, and then connect to collector ring terminal 4, Safety Out. See Figure 20-1.
   (g) Pink wire: Attach to pink wire with wire nut, and then connect to collector ring terminal 8, End Gun. See Figure 20-1.
   (h) White wire: Attach to white wire with wire nut, and then connect to collector ring terminal 2, Common. See Figure 20-1.
9. Continue with Temporary Location on the next page.

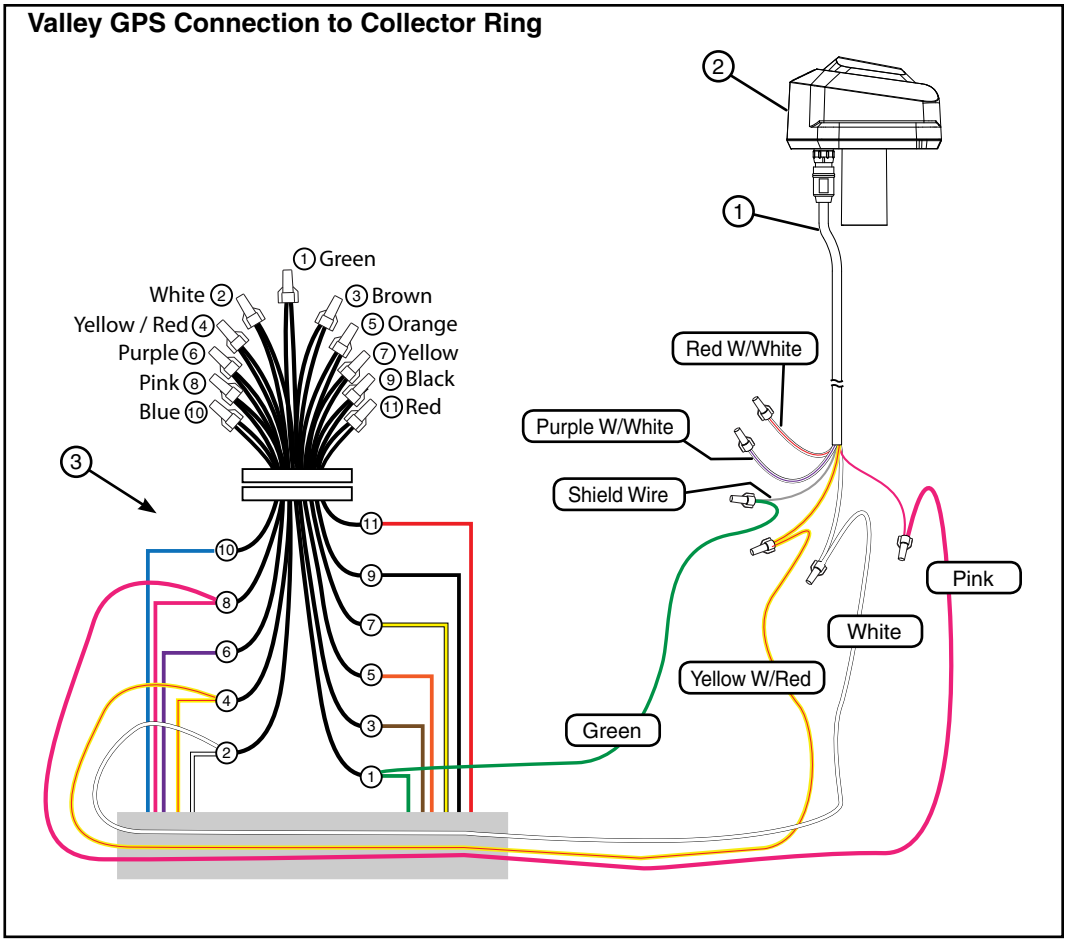


Figure 20-1 1. Conductor Cable
2. Valley GPS
3. Collector Ring Terminals

Temporary Valley GPS Installation

Temporary Location

⚠ CAUTION

•ALWAYS IDENTIFY POTENTIAL FALL HAZARDS AND DETERMINE IF FALL PROTECTION EQUIPMENT IS APPROPRIATE FOR THE TASK, BEFORE BEGINNING THE WORK.

1. Position the Valley GPS as shown near the collector ring. See Figure 21-1.
2. Turn the public power service disconnect and control panel main disconnect switch on.

   The LED on the PLC OPMC5 inside of the control panel should be on. See Figure 21-2.
3. Continue with Verify Control Panel Software on the next page.

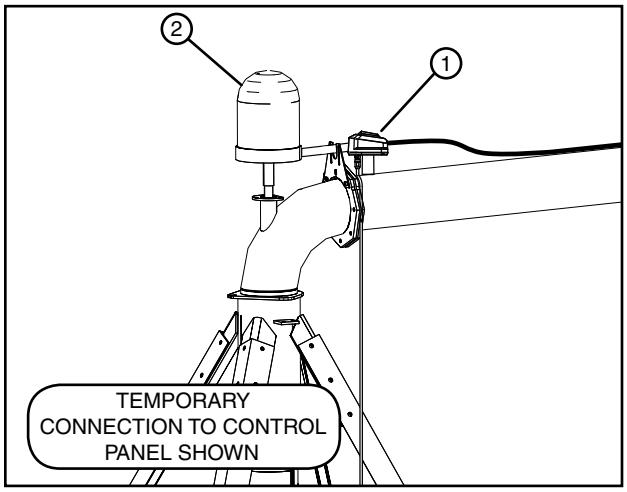


Figure 21-1 1. Valley GPS
2. Collector Ring

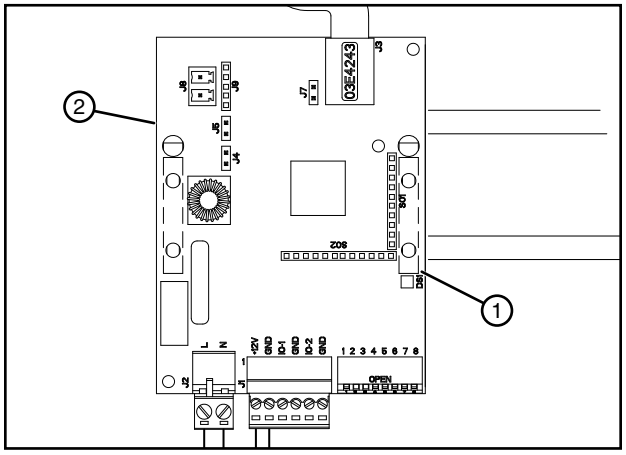


Figure 21-2 1. PLC OPMC5
2. LED

Installation Instructions

Verify Control Panel Software

Verify that the ICON control panel software and Smart Relay Board (SRB) software are version 1.01 or later. If not, obtain the latest versions of software and update the control panel.

Setup Control Panel for GPS Position

Do the following:

- Obtain the last tower speed and pivot length information from the VChart report for this machine or measure the span length from pivot to last regular drive unit not including the overhang and use the Estimated Drive Unit Speed Table in the Troubleshooting section.
- Measure and record the distance from the pivot point to the Valley GPS.
- If you know the GPS coordinates for the pivot point, continue with **Use Edit to Setup Control Panel for GPS Position** in the **Troubleshooting** section for ICON5 / ICONX on page 57 or ICON10 / ICON1 on page 59. If not, continue with one of the set up procedures listed below.

Setup Control Panel for GPS Position

ICON5 / ICONX - Set Current Method

To setup Valley GPS in the control panel do the following.

1. **Ensure that any other machine that shares the same 480 VAC source, has either been running longer than 5 minutes or is powered off.**
2. Make sure the Valley GPS is positioned near the collector ring.
3. Turn Water and End Guns off.
4. Set the Dry % Timer to 0.0 (zero percent).
5. Push a Start button to start the machine, energize the safety circuit and the Valley GPS. The machine should not move.

> **NOTE**
>
> **•Every time the machine is started, the Valley GPS goes through a startup cycle that lasts approximately one minute. The Valley GPS will not communicate with the control panel until the startup cycle has completed.**

6. Comm Port setup, push **Menu / Setup / Comm Port** and **RJ11**.
7. Select the **RJ11 Protocol** field and choose **Valley GPS** from the drop-down list. See Figure 23-1.
8. Push the **Valley GPS Device List** button. See Figure 23-2.
9. Enter the Number of Devices Installed. See Figure 23-1.

   When only one Valley GPS is installed, enter 1.

   When other Valley GPS options are installed, enter the total number of devices, up to 254.
10. Push the Discover Devices button. The control panel attempts to locate the devices.

    Discovery of devices can typically take between three and six minutes.

> **NOTE**
>
> **•The Discover Devices button must be pushed within four minutes of starting the machine.**
>
> **•Device Discovery will only find devices that were powered up in the last five minutes. If the machine has been running longer than five minutes, stop the machine and restart it.**

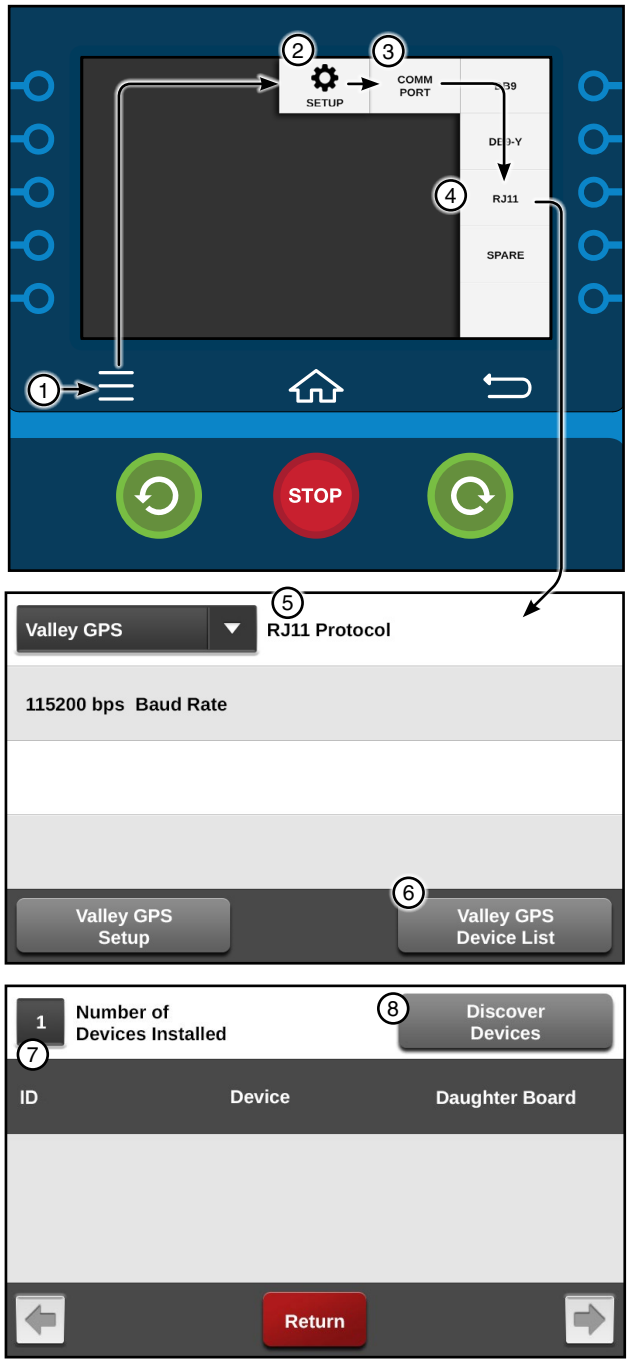


Figure 23-1

1. Menu
2. Setup
3. Comm Port
4. RJ11
5. RJ11 Protocol (Valley GPS)
6. Valley GPS Device List
7. Enter Number of Devices
8. Push Discover Devices

Installation Instructions

Setup Control Panel for GPS Position

ICON5 / ICONX - Set Current Method

11. After the devices have been discovered, note the PLC ID of the Valley GPS.
12. Push **Return** to close the Valley GPS Device List.
13. Push the **Valley GPS Setup** button.
14. Check the **Valley GPS** checkbox to enable GPS position.
15. Enter the PLC ID for Valley GPS.
16. **Optional: Enable PLC End Gun 3 & 4.**
    (a) If PLC End Gun 3 & 4 will be utilized, Check the **PLC End Gun 3 & 4** checkbox to enable it.
    (b) Enter the PLC ID for PLC End Gun 3 & 4.
17. **Optional: Enable VGPS Water Pressure.**
    (a) If VGPS Water Pressure will be installed, Check the **VGPS Water Pressure** checkbox to enable it.
    (b) Enter the PLC ID for VGPS Water Pressure.

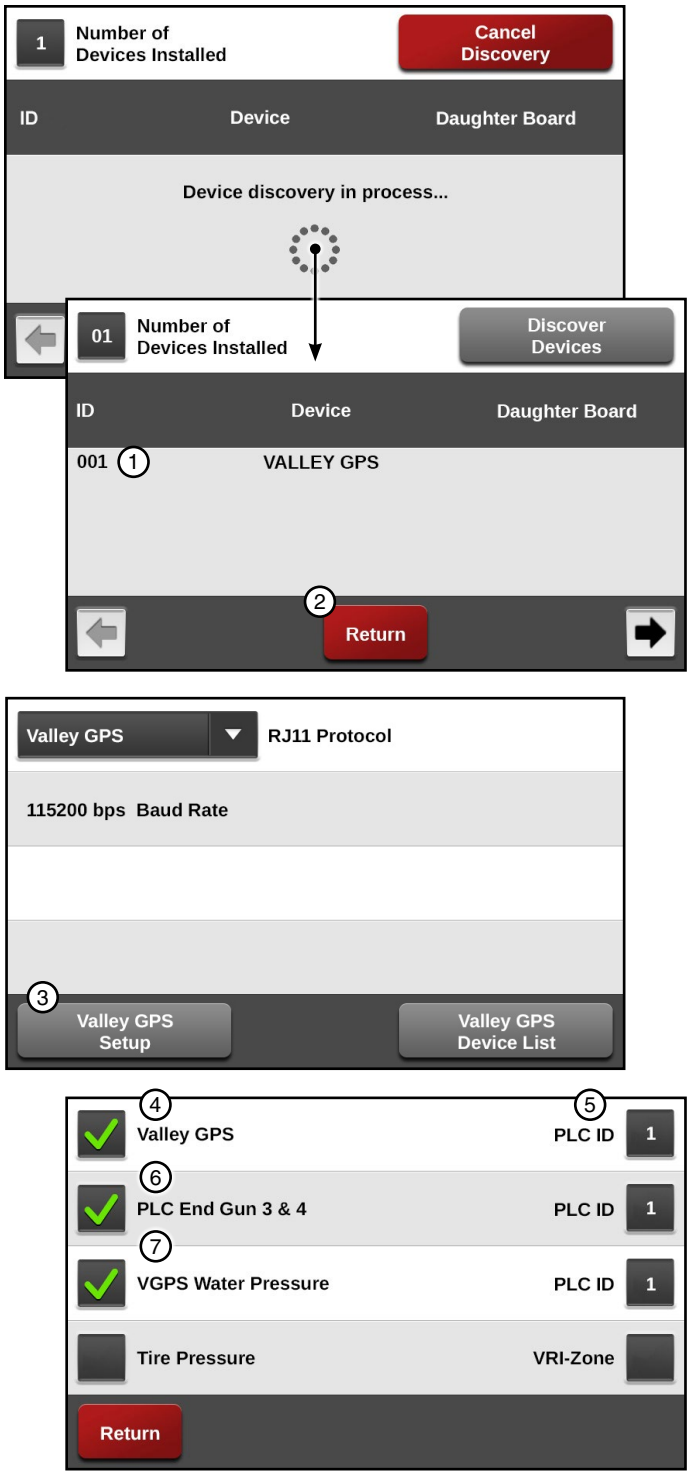


Figure 24-1
1. Note PLC ID
2. Push Return
3. Push Valley GPS Setup
4. Check Valley GPS
5. Enter PLC ID
6. Optional: Check PLC End Gun 3 & 4 and Enter PLC ID
7. Optional: Check VGPS Water Pressure and Enter PLC ID

Setup Control Panel for GPS Position
ICON5 / ICONX - Set Current Method

18. Check for satellite DGPS lock and satellite count.

    Push **Menu / Setup / Constants / Position** and **GPS Setup** to see if the GPS antenna is locked on the DGPS satellite signal.

    If it is not locked on DGPS continue waiting.

    Depending on location, it can take 15 minutes or longer for the GPS receiver to lock on to the satellite signal and obtain DGPS accuracy.

    If GPS position is not working, see the Trouble-shooting section.

19. After the GPS receiver is locked on the satellite signal, set the current Pivot Point position.

    (a) Push the **Set Coordinates to Pivot Point** button to set the Pivot Point position to the current position.

    (b) Record the Pivot Point GPS Latitude and Longitude on the inside of control panel door.

20. Set the Distance to GPS (the distance from pivot point to the Valley GPS antenna).

    (a) Select the **Length to GPS (ft)** field and enter the length from the pivot point to the GPS antenna. Do not enter the pivot length.

    The default is 1320 ft (402.3 m), and the range is 10 to 6554 ft (3.0 to 1997.6 m).

    (b) Select the **Radius +** field and enter the plus tolerance which is the acceptable satellite data retrieved outside the GPS receiver.

    The default is 50 ft (15.2 m) and the range is 10 to 6554 ft (3.0 to 1997.6 m).

    A setting of 50 ft (15.2 m) or more is recommended to allow for variation in the GPS signal if Wide Area Application Services (WAAS) is unavailable.

    (c) Select the **Radius -** field and enter the minus tolerance which is the acceptable satellite data retrieved inside the GPS receiver.

    The default is 50 ft (15.2 m) and the range is 10 to 6554 ft (3.0 to 1997.6 m).

    A setting of 50 ft (15.2 m) or more is recommended to allow for variation in the GPS signal if WAAS is unavailable.

Figure 25-1 1. Menu
2. Setup
3. Constants
4. Position
5. GPS Setup
6. Satellite Lock
7. Set Coordinates to Pivot Point
8. Length to GPS
9. Radius +
10. Radius -

Setup Control Panel for GPS Position

ICON5 / ICONX - Set Current Method

21. Set the Run Time Fallback Position.
    (a) Push **Menu / Setup / Constants / Position** and **Position Loss Setup**.
    (b) Check the **Runtime Fallback Position** checkbox.
    (c) Select the **LRDU Pivot Speed** field.
    (d) Enter the pivot speed. The default is 15.56 ft/min (4.732 m/min) and push **Enter**.
    (e) Select the **Length to LRDU** field.
    (f) Enter the pivot length. The default is he default is 1320 ft (402.3 m) and push **Enter**.
    (g) Push the **Home** button to go back to the Main Screen.
22. Proceed to Permanently Install Valley GPS on page 31.

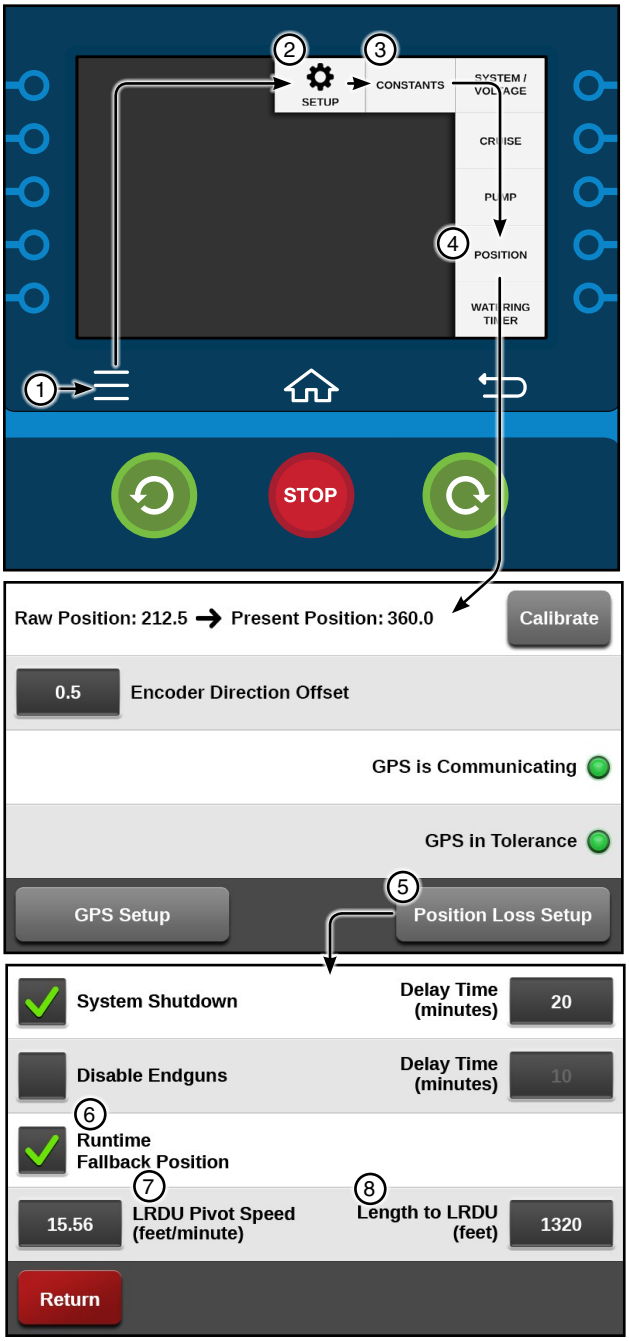


Figure 26-1
1. Menu
2. Setup
3. Constants
4. Position
5. Position Loss Setup
6. Fallback Position
7. LRDU Pivot Speed
8. Length to LRDU

Setup Control Panel for GPS Position

ICON10 / ICON 1 - Set Current Method

To setup Valley GPS in the control panel do the following.

1. **Ensure that any other machine that shares the same 480 VAC source, has either been running longer than 5 minutes or is powered off.**
2. Make sure the Valley GPS is positioned near the collector ring.
3. Turn Water and End Guns off.
4. Set the Dry % Timer to 0.0 (zero percent).
5. Push a Start button to start the machine, energize the safety circuit and the Valley GPS. The machine should not move.

> **NOTE**
>
> •**Every time the machine is started, the Valley GPS goes through a startup cycle that lasts approximately one minute. The Valley GPS will not communicate with the control panel until the startup cycle has completed.**

6. Comm Port setup, push **Menu / Setup / Comm Port** and **RJ11**.
7. Select the **RJ11 Protocol** field and choose **Valley GPS** from the drop-down list. See Figure 27-1.
8. Push the **Valley GPS Device List** button. See Figure 27-1.

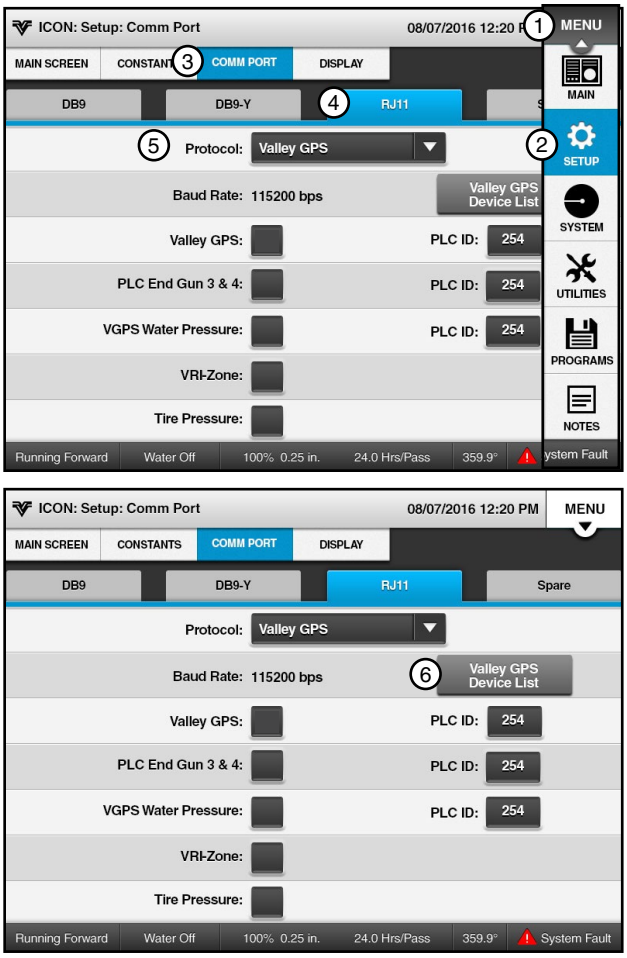


Figure 27-1
1. Menu
2. Setup
3. Comm Port
4. RJ11
5. Protocol Valley GPS
6. Valley GPS Device List

Setup Control Panel for GPS Position

ICON10 / ICON 1 - Set Current Method

9. Enter the Number of Devices Installed. See Figure 28-1.

   When only one Valley GPS is installed, enter 1.

   When other Valley GPS options are installed, enter the total number of devices, up to 254.

10. Push the Discover Devices button. The control panel attempts to locate the devices.

> **NOTE**
>
> - **The Discover Devices button must be pushed within four minutes of starting the machine.**
> - **Device Discovery will only find devices that were powered up in the last five minutes. If the machine has been running longer than five minutes, stop the machine and restart it.**

   Discovery of devices can typically take between three and six minutes.

11. After the devices have been discovered, note the PLC ID of the Valley GPS.
12. Close the Valley GPS Device List.
13. Check the **Valley GPS** checkbox to enable GPS position.
14. Enter the PLC ID for Valley GPS.
15. **Optional: Enable PLC End Gun 3 & 4**.
    (a) If PLC End Gun 3 & 4 will be utilized, Check the **PLC End Gun 3 & 4** checkbox to enable it.
    (b) Enter the PLC ID for PLC End Gun 3 & 4.
16. **Optional: Enable VGPS Water Pressure.**
    (a) If VGPS Water Pressure will be installed, Check the **VGPS Water Pressure** checkbox to enable it.
    (b) Enter the PLC ID for VGPS Water Pressure.

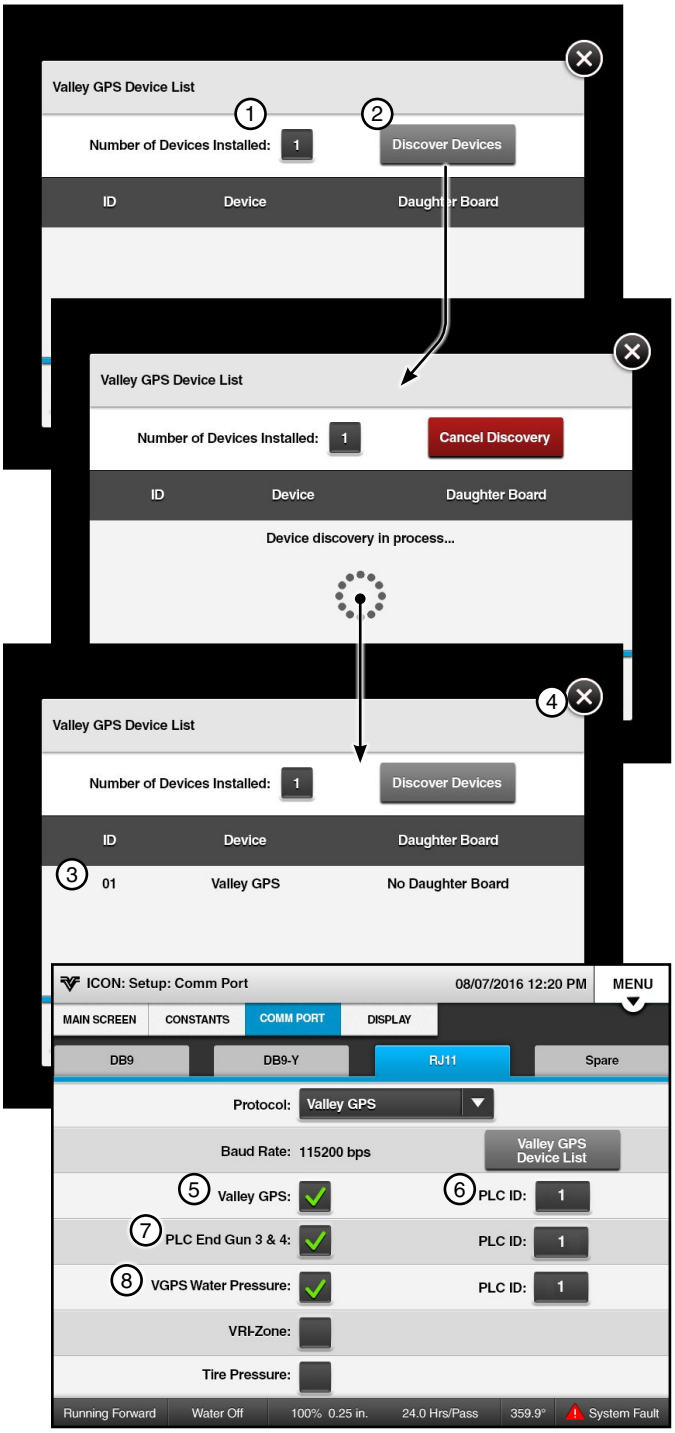


Figure 28-1
1. Enter Number of Devices
2. Push Discover Devices
3. Note PLC ID
4. Close Valley GPS Device List
5. Check Valley GPS
6. Enter PLC ID
7. Optional: Check PLC End Gun 3 & 4 and Enter PLC ID
8. Optional: Check VGPS Water Pressure and Enter PLC ID

Setup Control Panel for GPS Position

ICON10 / ICON 1 - Set Current Method

17. Check for satellite DGPS lock and satellite count.

    Push **Menu / Setup / Constants / Position** and **GPS Setup** to see if the GPS antenna is locked on the DGPS satellite signal.

    If it is not locked on DGPS continue waiting.

    Depending on location, it can take 15 minutes or longer for the GPS receiver to lock on to the satellite signal and obtain DGPS accuracy.

    If GPS position is not working, see the Trouble-shooting section.

18. After the GPS receiver is locked on satellite signal, set the current Pivot Point position.

    (a) Push the **Set Coordinates to Pivot Point** button to set the Pivot Point position to the current position.

    (b) Record the Pivot Point GPS Latitude and Longitude on the inside of control panel door.

19. Set the Distance to GPS (the distance from pivot point to the Valley GPS antenna).

    (a) Select the **Length to GPS (ft)** field and enter the length from the pivot point to the GPS antenna. Do not enter the pivot length.

    The default is 1320 ft (402.3 m), and the range is 10 to 6554 ft (3.0 to 1997.6 m).

    (b) Select the **Radius +** field and enter the plus tolerance which is the acceptable satellite data retrieved outside the GPS receiver.

    The default is 50 ft (15.2 m) and the range is 10 to 6554 ft (3.0 to 1997.6 m).

    A setting of 50 ft (15.2 m) or more is recommended to allow for variation in the GPS signal if Wide Area Application Services (WAAS) is unavailable.

    (c) Select the **Radius -** field and enter the minus tolerance which is the acceptable satellite data retrieved inside the GPS receiver.

    The default is 50 ft (15.2 m) and the range is 10 to 6554 ft (3.0 to 1997.6 m).

    A setting of 50 ft (15.2 m) or more is recommended to allow for variation in the GPS signal if WAAS is unavailable.

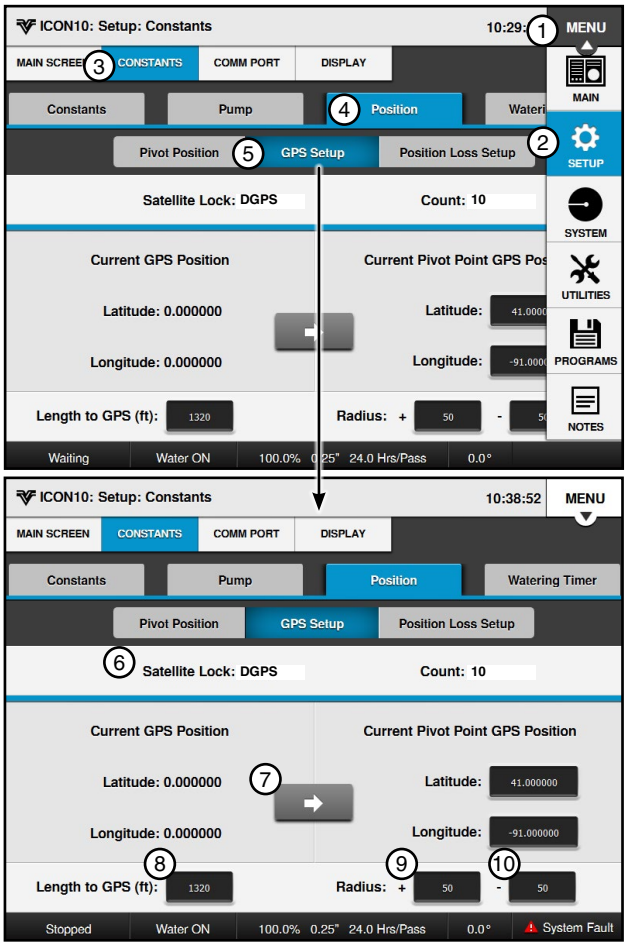


Figure 29-1

1. Menu
2. Setup
3. Constants
4. Position
5. GPS Setup
6. Satellite Lock
7. Set Coordinates to Pivot Point
8. Length to GPS
9. Radius +
10. Radius -

Setup Control Panel for GPS Position

ICON10 / ICON 1 - Set Current Method

20. Set the Run Time Fallback Position.
    (a) Push **Position Loss Setup**.
    (b) Check the **Runtime Fallback Position** checkbox.
    (c) Select the **LRDU Pivot Speed** field.
    (d) Enter the pivot speed. The default is 15.56 ft/min (4.732 m/min) and push **Enter**.
    (e) Select the **Length to LRDU** field.
    (f) Enter the pivot length. The default is he default is 1320 ft (402.3 m) and push **Enter**.
    (g) Push the **Home** button to go back to the Main Screen.
21. Proceed to Permanently Install Valley GPS on page 31.

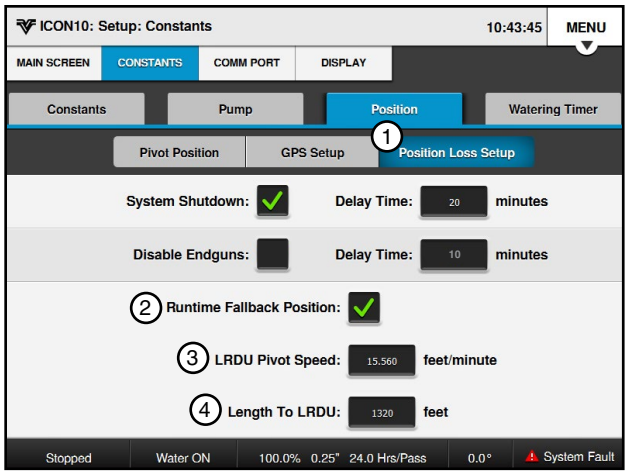


Figure 30-1
1. Position Loss Setup
2. Runtime Fallback Position
3. LRDU Pivot Speed
4. Length to LRDU

Permanently Install Valley GPS

⚠ DANGER

- **THE CONTROL PANEL, COLLECTOR RING AND TOWER BOXES CONTAIN HIGH VOLTAGE! 480 VOLTS CAN KILL.**
- **ALWAYS DISCONNECT ELECTRICAL POWER BEFORE SERVICING OR PERFORMING MAINTENANCE TO THE MACHINE.**
- **INSTALLATION OF THIS KIT, INCLUDING TESTING AND TROUBLESHOOTING SHOULD BE PERFORMED ONLY BY AN AUTHORIZED VALLEY DEALER.**
- **ALWAYS REPLACE ANY GUARDS OR SHIELDS THAT ARE REMOVED FOR PERFORMING MAINTENANCE.**

Disconnect All Power

Follow the MINIMAL LOCKOUT/TAGOUT PROCEDURE located in the SAFETY section of this manual and do the following:

1. SHUT OFF and LOCK the public power service disconnect to the irrigation machine. FILL OUT the blue (OSHA safety color code) tag and attach to the disconnect after locking. See Figure 31-1.
2. SHUT OFF and LOCK the control panel main power disconnect. FILL OUT the blue (OSHA safety color code) tag and attach to the disconnect after locking. See Figure 31-2.

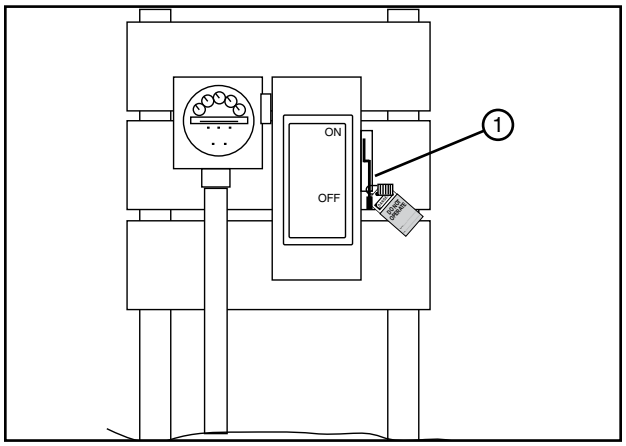


Figure 31-1 1. Public Power Service Disconnect

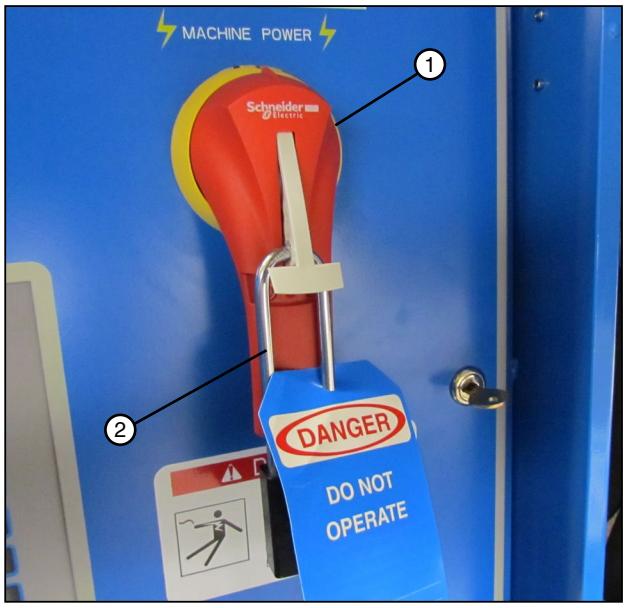


Figure 31-2 1. Main Power Disconnect
2. Lock

Installation Instructions

Permanently Install Valley GPS

Disconnect Valley GPS

⚠ CAUTION

•ALWAYS IDENTIFY POTENTIAL FALL HAZARDS AND DETERMINE IF FALL PROTECTION EQUIPMENT IS APPROPRIATE FOR THE TASK, BEFORE BEGINNING THE WORK.

1. Take the Valley GPS down from the temporary position near the collector ring. See Figure 32-1.
2. Disconnect the temporary wiring from the control panel or collector ring and Valley GPS.

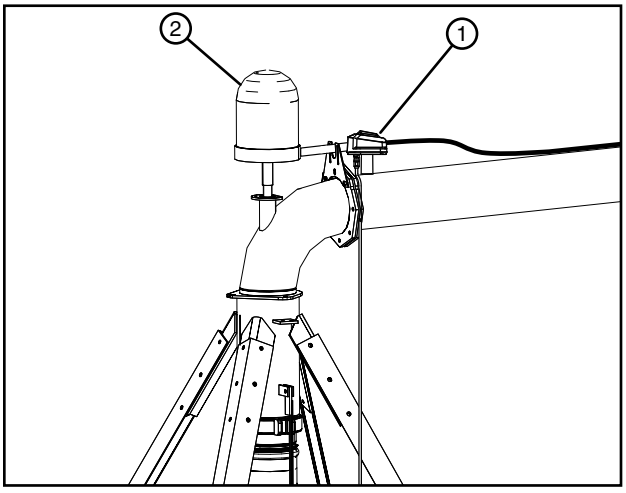


Figure 32-1 1. Valley GPS Temporary Position
2. Collector Ring

Install Valley GPS

The Valley GPS is typically installed over the last regular drive unit (LRDU) within 5 ft (1524 mm) of the last tower box or Precision Corner LRDU control panel. Refer to Figures 32-2 and 33-1.

On a machine with a corner, make sure the Valley GPS does not interfere with the corner or any linkage.

There are two methods for mounting the Valley GPS, the Valley mounting uses the control box mounting bracket (when available) on the last span and the universal mounting (shown on the next page) that uses band clamps to secure the mounting bracket to the span pipe. Choose the method that works for the application.

Valley Mounting

1. Assemble the GPS mounting bracket and GPS mount.
2. Attach the Valley GPS to the mount with one 5/16 in x 2 in cap screw, two flat washers and a lock nut.
3. Position on control box mounting bracket as shown. Secure with two 3/8 in cap screws and lock nuts.
4. Secure conductor cable to mount with wire ties as needed.

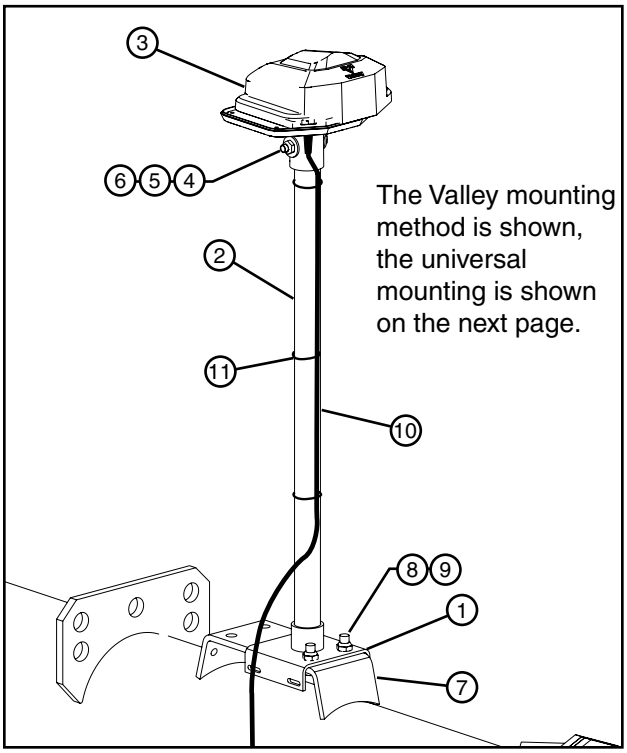


Figure 32-2
1. GPS Mounting Bracket
2. GPS Mount
3. Valley GPS
4. 5/16 x 2 Cap Screw
5. 5/16 Flat washer
6. 5/16 Lock Nut
7. Control Box Mounting Bracket
8. 3/8 x 1 Cap Screw
9. 3/8 Lock Nut
10. Conductor Cable
11. Wire Tie

Permanently Install Valley GPS

Install Valley GPS

⚠ CAUTION

•ALWAYS IDENTIFY POTENTIAL FALL HAZARDS AND DETERMINE IF FALL PROTECTION EQUIPMENT IS APPROPRIATE FOR THE TASK, BEFORE BEGINNING THE WORK.

Universal Mounting

1. Assemble the GPS mounting bracket and GPS mount.
2. Attach the Valley GPS to the mount with one 5/16 in x 2 in cap screw, two flat washers and a lock nut.
3. Position on span pipe as shown. Secure with two band clamps. Tighten band clamp up to 60 lb-in of torque. Do not over tighten.
4. Secure conductor cable to mount with wire ties as needed.

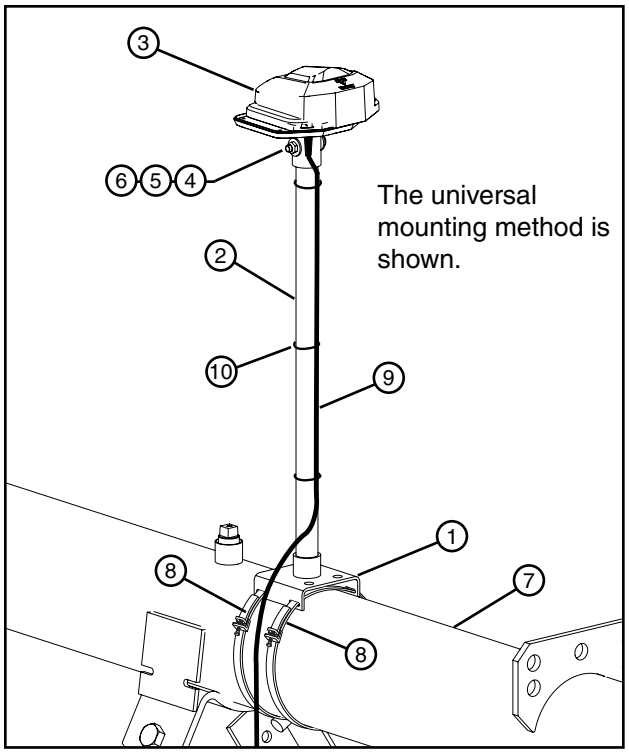


Figure 33-1
1. GPS Mounting Bracket
2. GPS Mount
3. Valley GPS
4. 5/16 x 2 Cap Screw
5. 5/16 Flat washer
6. 5/16 Lock Nut
7. Span Pipe
8. Band Clamp
9. Conductor Cable
10. Wire Tie

Installation Instructions

Permanently Install Valley GPS

Install Electrical Components

1. Refer to Figure 34-1 and assemble the following components on the existing din rail in the tower box or the Precision Corner LRDU control panel:

NOTE

•Depending on the application there may not be room in the tower box to install more components. In this case, install the components in an optional junction box mounted near the Valley GPS or install the Valley GPS on the next to last drive unit.

- Din Rail (use only if needed)
- #8 Hex Nut (for din rail mounting if needed)
- #8 X 1/2 Screw (for din rail mounting if needed)
- Fuse Block End Cover
- Fuse Block
- Fuse, 1.0 Amp, 250V
- Terminal Block End Cover
- Three Terminal Blocks
- Decal 1.0 Amp Fuse
- Din Rail End Stop
- Decal Valley GPS Terminals
- Cord Connector
- Two Washer Reducers (use only if needed)

Wiring

2. Refer to the field install and wiring diagrams beginning on page 41 and wire the Valley GPS to the existing tower box or Precision Corner LRDU control panel.
3. After the wiring is completed continue with Test GPS Position on the next page.

Tower Box Application Shown

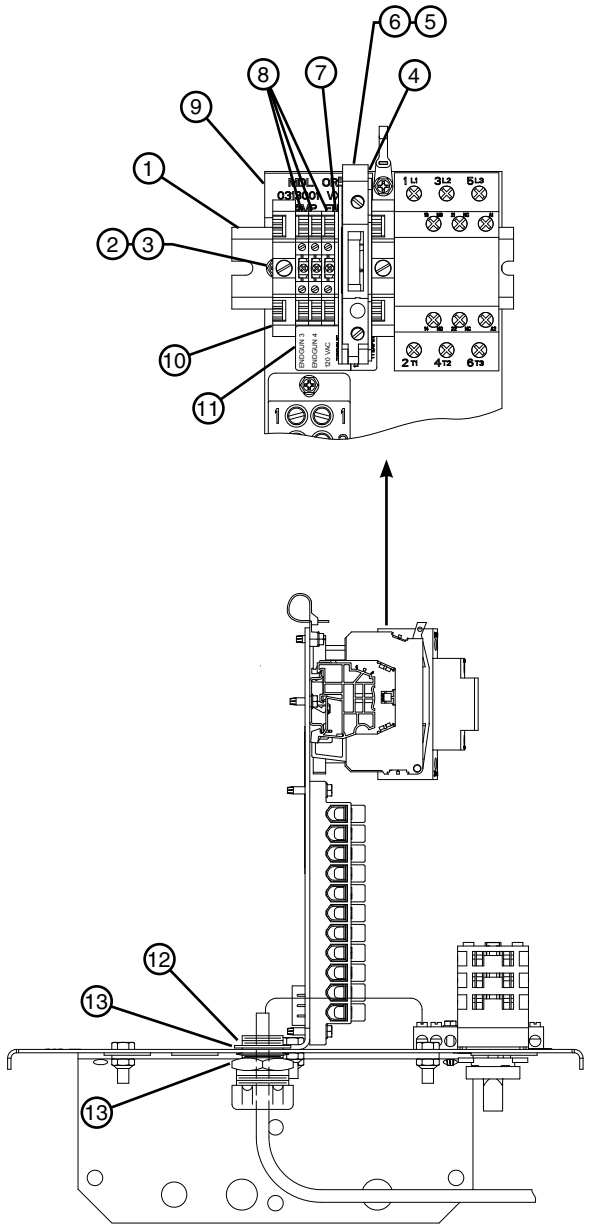


Figure 34-1
1. Din Rail (use only if needed)
2. #8 Hex Nut (for din rail mounting if needed)
3. #8 X 1/2 Screw (for din rail mounting if needed)
4. Fuse Block End Cover
5. Fuse Block
6. Fuse, 1.0 Amp
7. Terminal Block End Cover
8. Terminal Block
9. Decal 1.0 Amp Fuse
10. Din Rail End Stop
11. Decal Valley GPS Terminals
12. Cord Connector
13. Washer Reducer (use only if needed)

Test GPS Position

Based on the control panel type, use the ICON5 / ICONX procedure on this page or the ICON10 / ICON1 procedure on the next page to view the position screen and verify that the Valley GPS is working.

ICON5 / ICONX

NOTE

- **Every time the machine is started, the Valley GPS goes through a startup cycle that lasts approximately one minute. The Valley GPS will not communicate with the control panel until the startup cycle has completed.**

Do the following to verify that GPS Position is working.

1. Turn Water off.
2. Set the Dry % Timer to 0.0 (zero percent).
3. Push a **Start** button to start the machine, energize the safety circuit and the Valley GPS. The machine should not move.
4. Push **Menu, Setup, Constants** and **Position**.
5. When GPS Position is working, the **GPS is Communicating** and the **GPS in Tolerance** lights will both be green indicating proper operation.
   - If the **GPS is Communicating** light is off (gray), there are no communications between the Valley GPS and the control panel. Check all wiring and refer to the Troubleshooting Section.
   - If the **GPS in Tolerance** light is Off (gray) and/or the Present Position value is flashing, push the **GPS Setup** button and verify that the Pivot Point GPS Latitude, Longitude, Length to GPS, Radius +, and Radius - values are correct.
6. To verify DGPS Satellite Lock, go to the GPS Setup screen. If there is no DGPS lock continue waiting.

   Depending on location, it can take 15 minutes or longer for the Valley GPS to lock on to the satellite signal and obtain DGPS accuracy.

   When GPS Position is lost or not found, the word **NONE**, or **No GPS** is displayed in the Satellite Lock field.
7. To set the Present Position of the pivot span in degrees, go to the Position screen.

   (h) Push **Calibrate**.

   (i) Enter the pivot span position in degrees and push **Enter**.
10. Run the machine in either direction to verify that the position displayed on the Status screen changes periodically as the machine moves. If it does, the setup is complete.
    - If GPS position is not working, verify proper wiring and menu setup, ensure machine is runningand refer to the troubleshooting section.

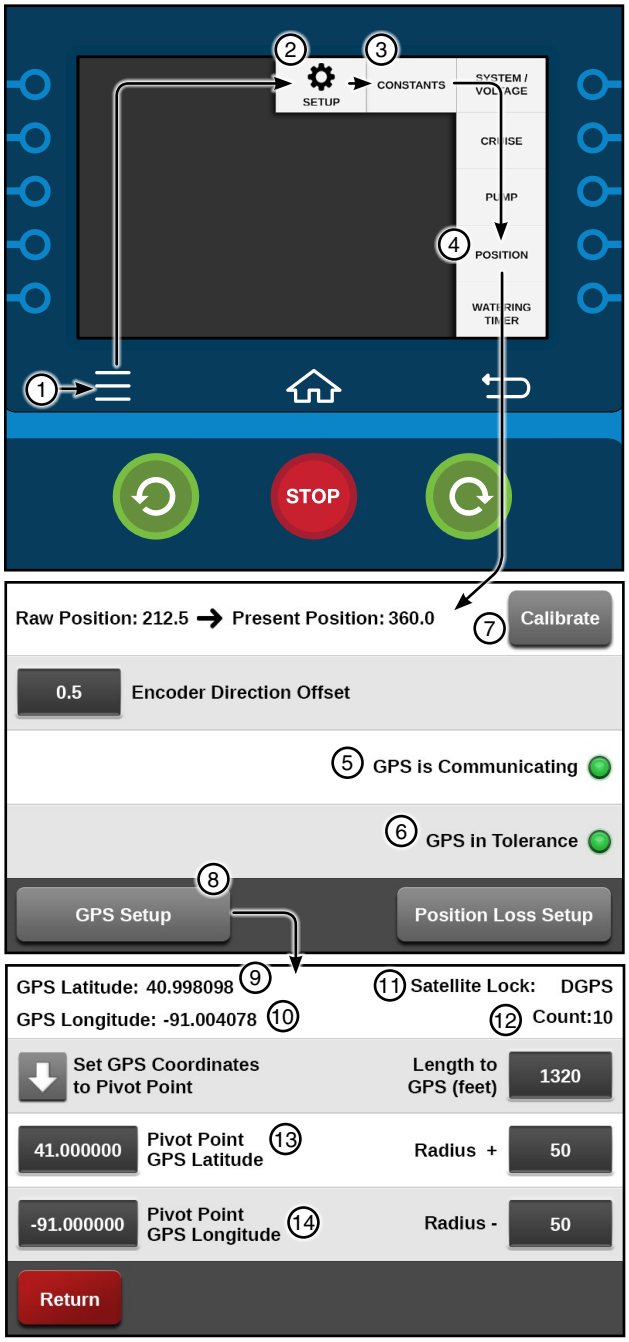


Figure 35-1

1. Menu
2. Setup
3. Constants
4. Position
5. GPS is Communicating
6. GPS in Tolerance
7. Calibrate Button
8. GPS Setup
9. GPS Latitude
10. GPS Longitude
11. Satellite Lock
12. Count
13. Pivot Point Latitude
14. Pivot Point Longitude

Installation Instructions

Test GPS Position

ICON10 / ICON1

NOTE

•Every time the machine is started, the Valley GPS goes through a startup cycle that lasts approximately one minute. The Valley GPS will not communicate with the control panel until the startup cycle has completed.

Do the following to verify that GPS Position is working.

1. Turn Water off.
2. Set the Dry % Timer to 0.0 (zero percent).
3. Push a **Start** button to start the machine, energize the safety circuit and the Valley GPS. The machine should not move.
4. Push **Menu, Setup, Constants, Position** and **Pivot Position**.
5. When GPS Position is working, the **GPS is Communicating** and the **GPS in Tolerance** lights will both be green indicating proper operation.
   - If the **GPS is Communicating** light is off (gray), there are no communications between the Valley GPS and the control panel. Check all wiring and refer to the Troubleshooting section.
   - If the **GPS in Tolerance** light is Off (gray) and/or the Present Position value is flashing, push the **GPS Setup** button and verify that the Pivot Point GPS Latitude, Longitude, Length to GPS, Radius +, and Radius - values are correct.
6. To verify DGPS Satellite Lock, go to the GPS Setup screen. If there is no DGPS lock continue waiting.

   Depending on location, it can take 15 minutes or longer for the Valley GPS to lock on to the satellite signal and obtain DGPS accuracy.

   When GPS Position is lost or not found, the word **NONE**, or **No GPS** is displayed in the Satellite Lock field.
7. To set the Present Position of the pivot span in degrees, go to the Position screen.

   (h) Push **Calibrate**.

   (i) Enter the pivot span position in degrees and push **Enter**.
10. Run the machine in either direction to verify that the position displayed on the Status screen changes periodically as the machine moves. If it does, the setup is complete.
    - If GPS position is not working, verify proper wiring and menu setup, ensure machine is running and refer to the troubleshooting section.

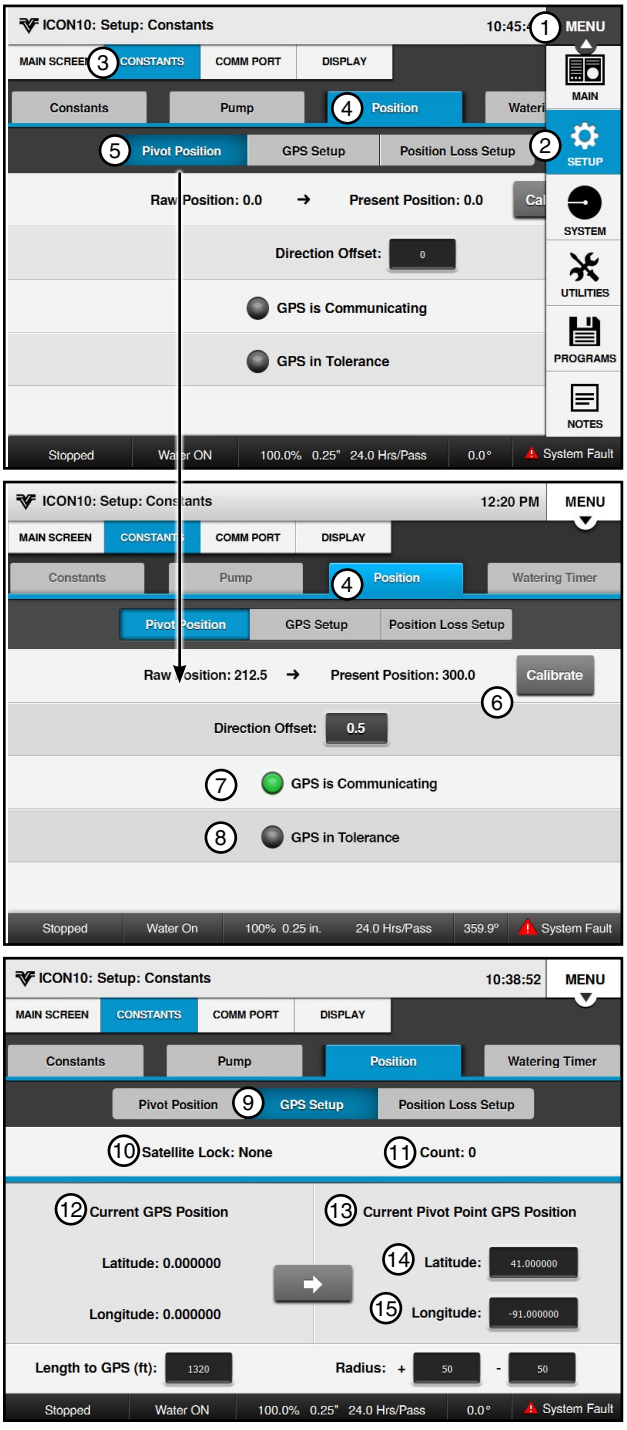


Figure 36-1

1. Menu
2. Setup
3. Constants
4. Position
5. Pivot Position
6. Calibrate
7. GPS is Communicating
8. GPS in Tolerance
9. GPS Setup
10. Satellite Lock
11. Count
12. Current GPS Position
13. Current Pivot Point GPS Position
14. Latitude
15. Longitude

Optional PLC End Gun 3 & 4 Installation

The PLC End Gun 3 & 4 (wide boundary) sequences can be used to control a second end gun, a span of sprinklers, or other electrically controlled devices with a voltage of 120 VAC that does not exceed a continuous load current of 2 amps maximum.

Electrically controlled devices can be connected to the ENDGUN 3 or ENDGUN 4 din rail terminal block associated with the Valley GPS. Refer to Figure 37-1.

These terminal blocks are located in the tower box or the Precision Corner LRDU Control Panel.

ENDGUN 3 = 120 VAC Purple w/white wire from Valley GPS

ENDGUN 4 = 120 VAC Red w/white wire from Valley GPS

Tower Box Application Shown

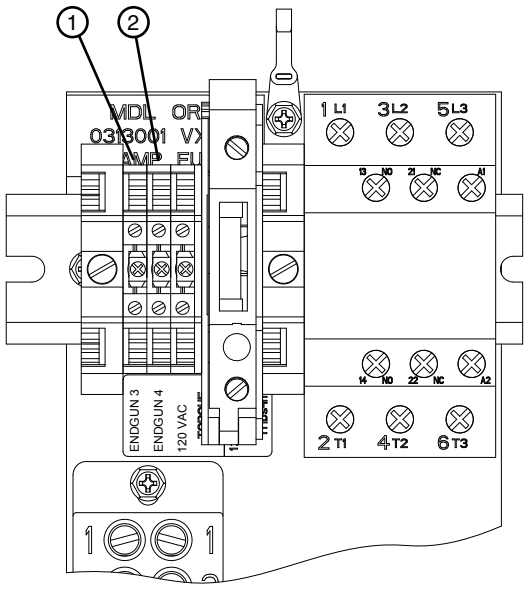


Figure 37-1 1. ENDGUN 3 Terminal Block
2. ENDGUN 4 Terminal Block

Setting Sequences

End gun sequences are numbered 1 through 9.

Each sequence has a left angle and a right angle. The wedge between the left and right angle is where the device will be turned on.

The sequence number does not affect when the end gun is turned on or off. The end gun turns on or off based on the left angle and right angle entries. Figure 37-2 illustrates end gun on/off sequences.

End gun sequences operate the same whether or not the machine is running in the forward or reverse direction through a sequence or whether water is on or off.

- In forward, the end gun turns on at the left angle and off at the right angle.
- In reverse, the end gun turns on at the right angle and off at the left angle.

Angles can be entered in tenths to fine tune the end gun setting.

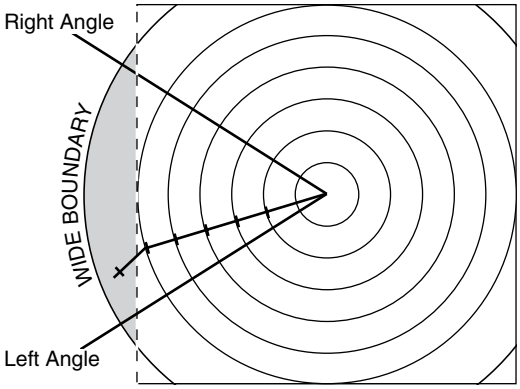


Figure 37-2

Optional PLC End Gun 3 & 4 Setting Sequences

ICON5 / ICONX

To set sequences, refer to Figure 38-1 and follow these steps:

1. Push **Menu** and **End Guns** to display the End Guns screen.
2. Check the **Checkbox** for the End Gun to enable it.
3. Push the **Configure** button for the End Gun being configured and the EG screen is displayed.
4. To configure the first sequence pair, select the Pair 1 **Left Angle** field.
5. Enter the left angle.
6. Select the Pair 1 **Right Angle** field.
7. Enter the right angle.
8. Repeat steps 3 through 8 for the rest of the Pairs/ Sequences.

   Use the **Next** and **Previous** buttons at the bottom of the configuration screen to scroll through all 9 sequence pairs.
9. Continue with Testing on page 40.

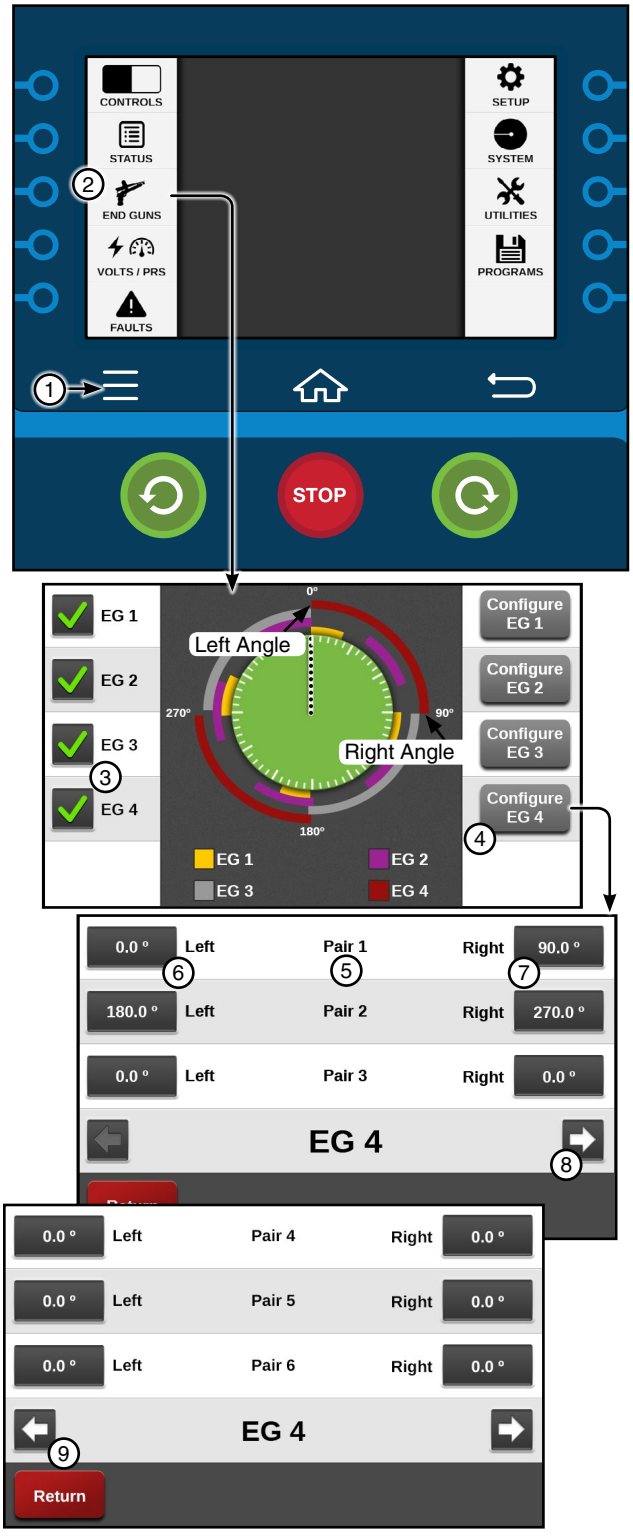


Figure 38-1
1. Menu
2. End Guns
3. End Gun Checkbox
4. Configure
5. Sequence Pair
6. Left
7. Right
8. Next
9. Previous

Optional PLC End Gun 3 & 4 Setting Sequences

ICON10 / ICON1

To set sequences, refer to Figure 39-1 and follow these steps:

1. Push **Menu** and **Utilities** to display the End Guns screen.
2. Check the **Checkbox** for the End Gun to enable it.
3. Push the **Configure** button for the End Gun being configured and the EG screen is displayed.
4. To configure the first sequence pair, select the Pair 1 **Left Angle** field.
5. Enter the left angle.
6. Select the Pair 1 **Right Angle** field.
7. Enter the right angle.
8. Repeat steps 3 through 8 for the rest of the Pairs/ Sequences.
9. Continue with Testing on page 40.

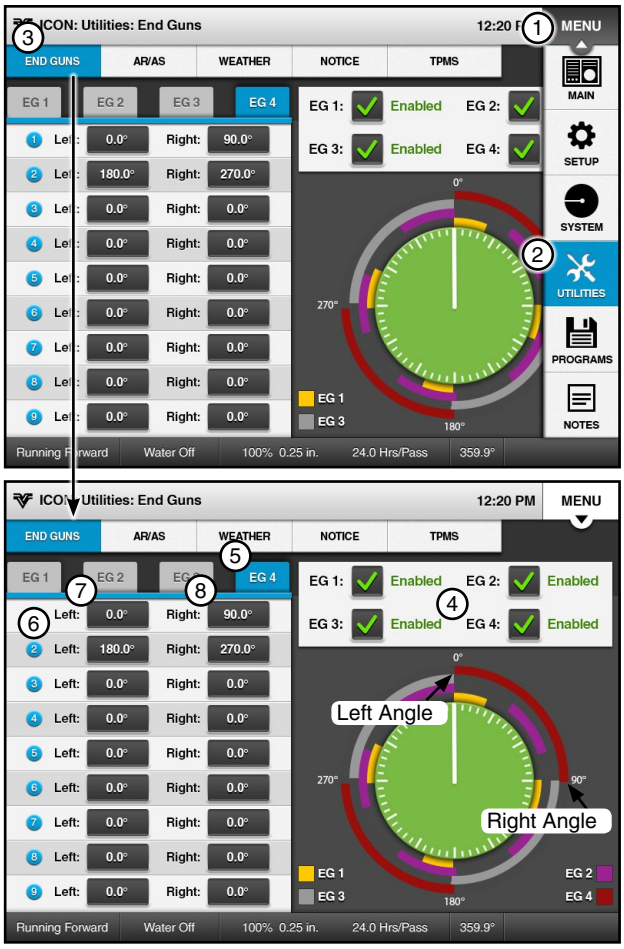


Figure 39-1

1. Menu
2. Utilities
3. End Guns
4. End Gun Checkbox
5. Configure
6. Sequence Pair
7. Left
8. Right

Optional PLC End Gun 3 & 4

Testing

Run the machine through an area where the PLC End Gun 3 & 4 sequence is supposed to turn on and off. If it does, the setup is complete.

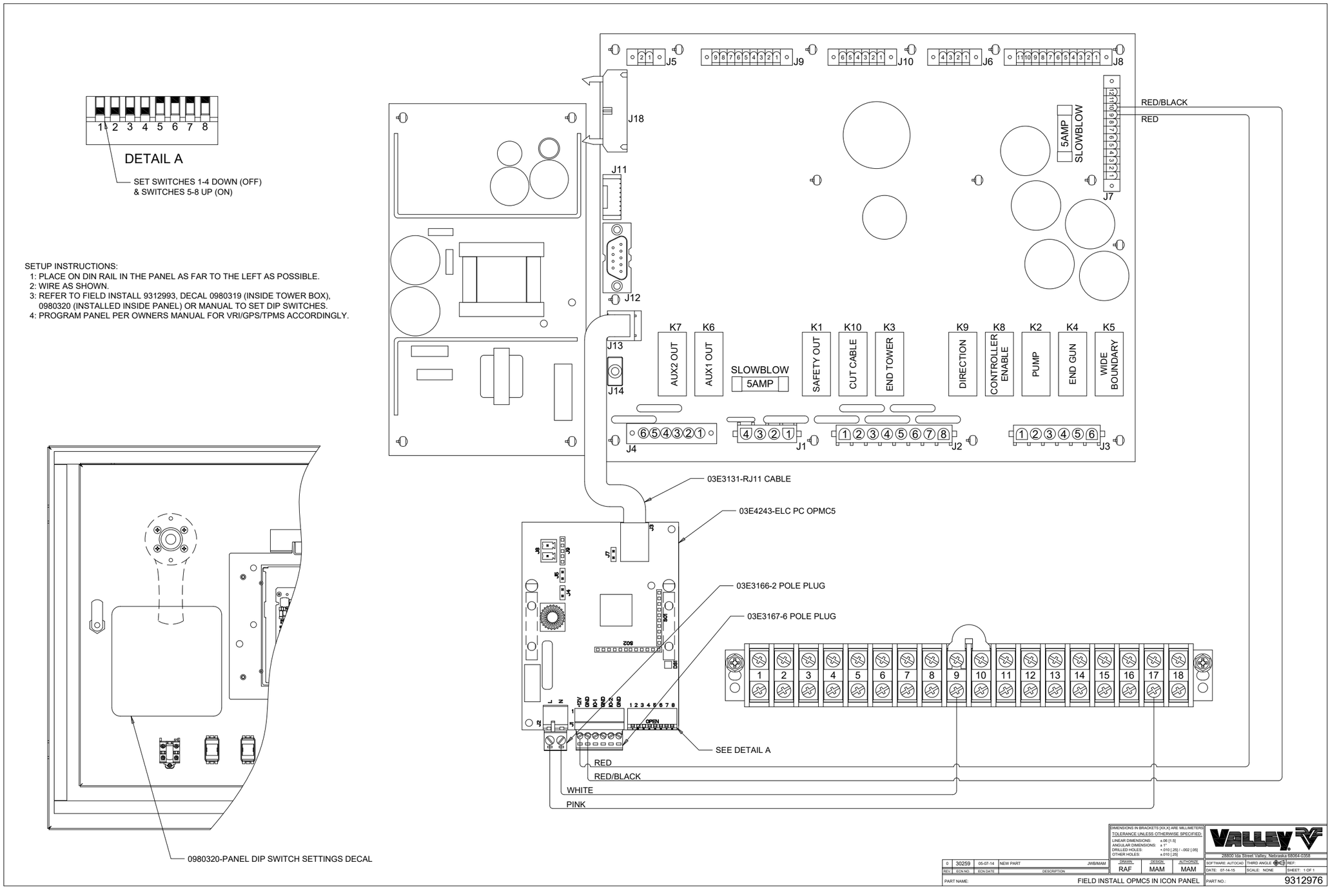
- If it not does not work, verify proper wiring and menu setup, ensure machine is running and refer to the Troubleshooting section.

Field Install and Wiring Diagrams

Contents

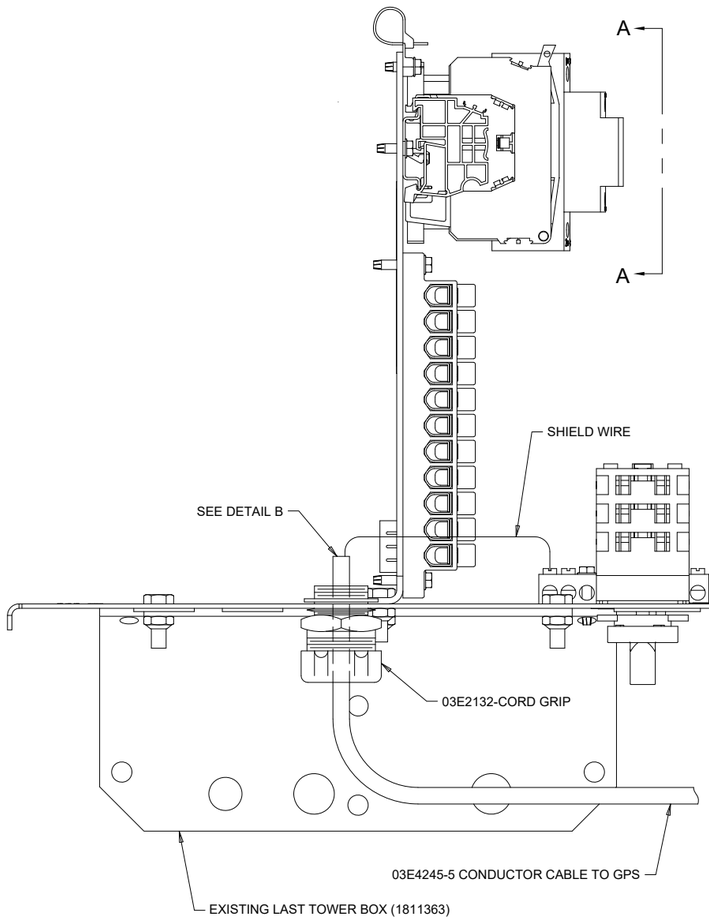
Field Install and Wiring Diagrams

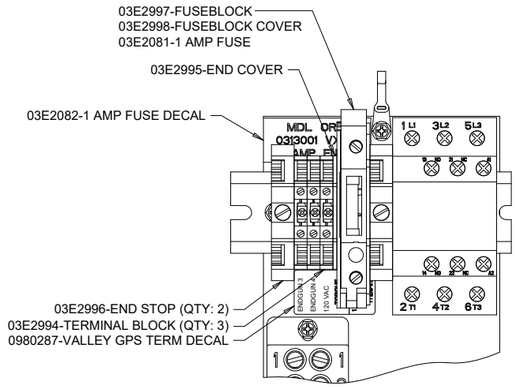
ICON Field Wiring Power Line Carrier in Control Panel pn 9312976



Field Install and Wiring Diagrams

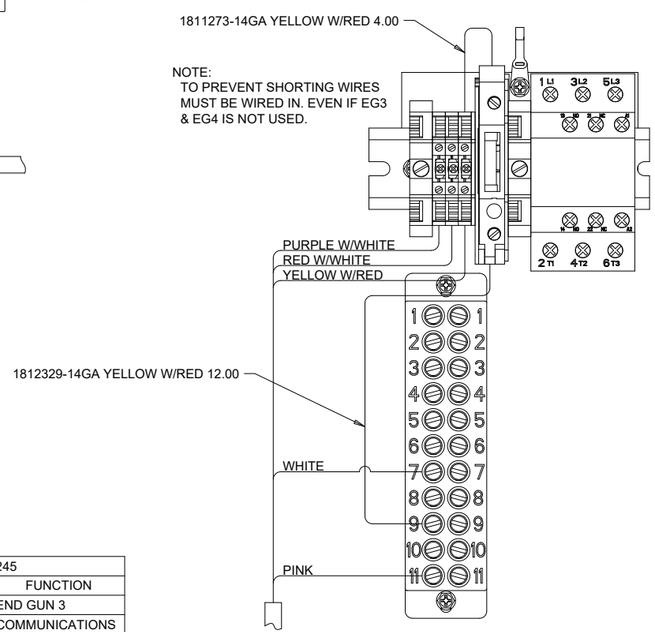
Tower Box Field Install and Wiring for Valley GPS pn 9312971





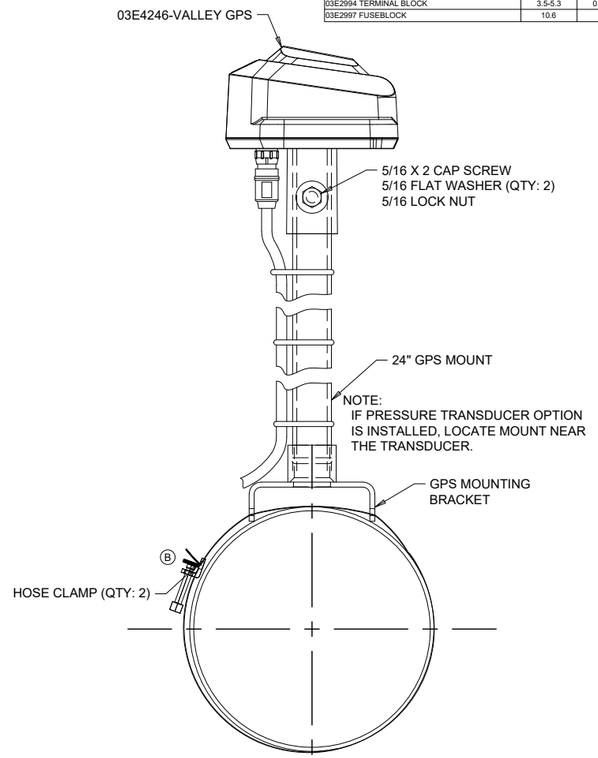
VIEW A-A

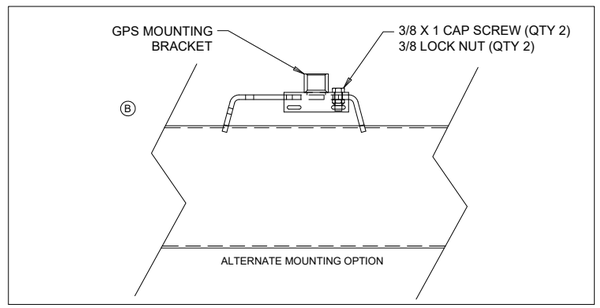
NOTE:
IF USED ON OLDER COMPETITIVE MACHINE OR MOUNT, USE ENCLOSED DIN RAIL & MOUNT WHERE THERE IS ROOM.



DETAIL B

TORQUE REQUIREMENTS		
	lbs-in	N-m
ALL WIRES UNLESS NOTED	10-15	1.13-1.69
SELF-TAPPING SCREWS UNLESS NOTED	22-28	2.49-3.16
0315120 GROUND LUG WIRING: 10-14 AWG	35	3.95
0315120 GROUND LUG WIRING: 8 AWG	40	4.52
0315120 GROUND LUG WIRING: 4-6 AWG	45	5.08
03E2994 TERMINAL BLOCK	3.5-5.3	0.4-0.6
03E2997 FUSEBLOCK	10.6	1.2





INSTRUCTIONS:

1. FOLLOW THE MINIMAL LOCKOUT/TAGOUT PROCEDURE LOCATED IN THE SAFETY SECTION OF THE OWNERS MANUAL.
2. SHUT OFF AND LOCK THE PUBLIC POWER SERVICE DISCONNECT TO THE IRRIGATION MACHINE.
3. SHUT OFF THE CONTROL PANEL MAIN POWER DISCONNECT.
4. MOUNT VALLEY GPS AS SHOWN.
5. WIRE VALLEY GPS AS SHOWN.

VALLEY GPS
- DURING POWER LINE ACTIVITY
  - RED: TRANSMISSION AND 100 MS AFTER
  - ORANGE: POWER LINE RECEPTION
- DURING NO POWER LINE ACTIVITY
  - STEADY RED: NO GPS MESSAGE RECEIVED IN LAST MINUTE
  - STEADY ORANGE: NO GPS FIX
  - STEADY GREEN: GPS FIX
  - BLINK GREEN: DGPS FIX

03E4245	
WIRE COLOR	FUNCTION
PURPLE W/WHITE	END GUN 3
PINK	COMMUNICATIONS
YELLOW W/RED	POWER
WHITE	NEUTRAL
RED W/WHITE	END GUN 4

DIMENSIONS IN BRACKETS [XX.X] ARE MILLIMETERS
TOLERANCE UNLESS OTHERWISE SPECIFIED:
LINEAR DIMENSIONS: ±.06 [1.5]
ANGULAR DIMENSIONS: ± 1°
DRILLED HOLES: +.010 [.25] / -.002 [.05]
OTHER HOLES: ±.010 [.25]

REV.	ECN NO.	ECN DATE	DESCRIPTION	DRAWN	DESIGN	AUTHORIZE
B	32123	04-24-19	CHANGE HALF CLAMPS TO HOSE CLAMPS ADD ALTERNATE MOUNTING OPTION RAF/BBB	JWB	MAM	BBB

VALLEY
28800 Ida Street Valley, Nebraska 68064-0358

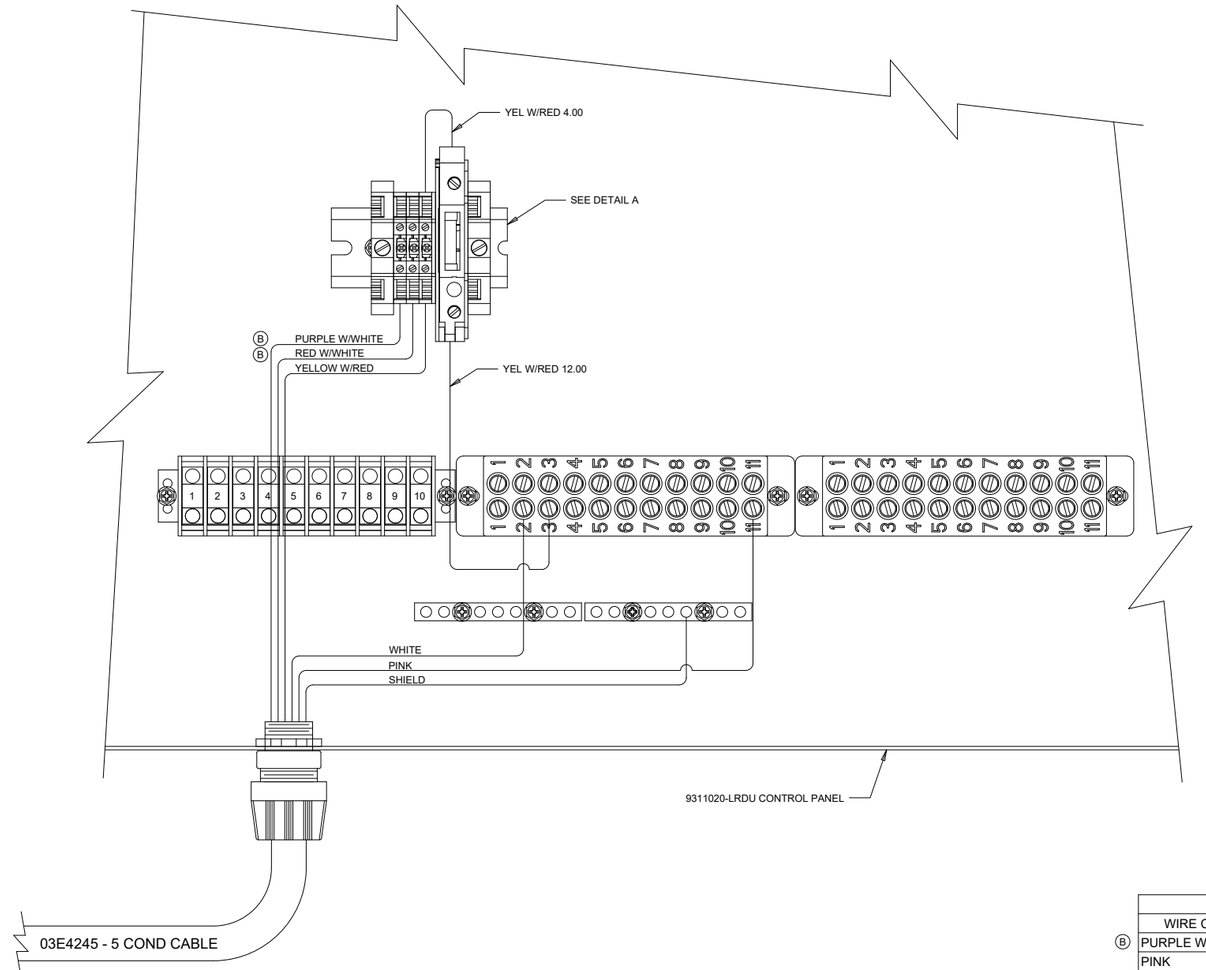
SOFTWARE: AUTOCAD | THIRD ANGLE | REF:
DATE: 06-28-17 | SCALE: NONE | SHEET: 1 OF 1

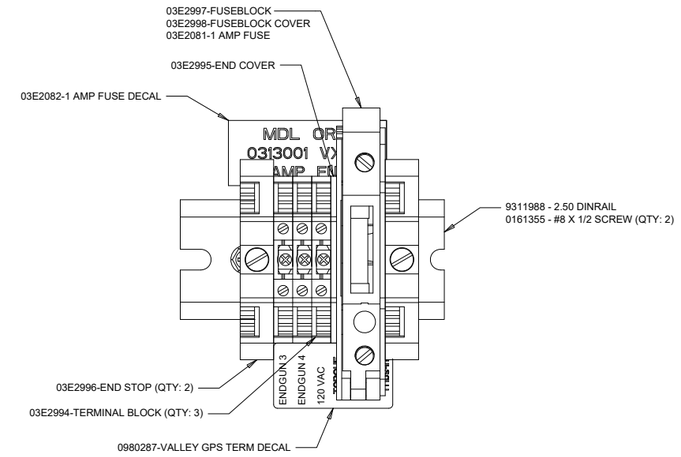
PART NAME: FIELD INSTALL VALLEY GPS
PART NO.: 9312971

Field Install and Wiring Diagrams

Precision Corner LRDU Control Panel Field Wiring for Valley GPS pn 9312998

PRECISION CORNER VALLEY GPS FIELD INSTALL





DETAIL A

03E4245	
WIRE COLOR	FUNCTION
B PURPLE W/WHITE	END GUN 3
PINK	COMMUNICATIONS
YELLOW W/RED	POWER
WHITE	NEUTRAL
B RED W/WHITE	END GUN 4

INSTRUCTIONS:

1. FOLLOW THE MINIMAL LOCKOUT/TAGOUT PROCEDURE LOCATED IN THE SAFETY SECTION OF THE OWNERS MANUAL.
2. SHUT OFF AND LOCK THE PUBLIC POWER SERVICE DISCONNECT TO THE IRRIGATION MACHINE.
3. SHUT OFF THE CONTROL PANEL MAIN POWER DISCONNECT.
- (B) 4. MOUNT VALLEY GPS AS SHOWN ON DRAWING 9312971.
5. WIRE VALLEY GPS AS SHOWN.

Valley GPS
During power line activity
Red: Transmission and 100 ms after
Orange: Power line reception
During no power line activity
Steady RED: No GPS Message received in last minute
Steady Orange: No GPS fix
Steady Green: GPS fix
Blink Green: DGPS fix

LAST REGULAR DRIVE UNIT CONTROL PANEL

REV	ECN NO.	ECN DATE	DESCRIPTION
B	31923	08-30-18	WIRING CORRECTION. PURPLE W/WHITE AND RED W/WHITE WERE REVERSED (2 PLACES). ADDED 9312971 TO NOTE 4. -BAB/BTS

DIMENSIONS IN BRACKETS [XX.X] ARE MILLIMETERS
TOLERANCE UNLESS OTHERWISE SPECIFIED:
LINEAR DIMENSIONS: ±.06 [1.5]
ANGULAR DIMENSIONS: ± 1°
DRILLED HOLES: +.010 [.25] / -.002 [.05]
OTHER HOLES: ±.010 [.25]

DRAWN	DESIGN	AUTHORIZE
JWB	MAM	MAM

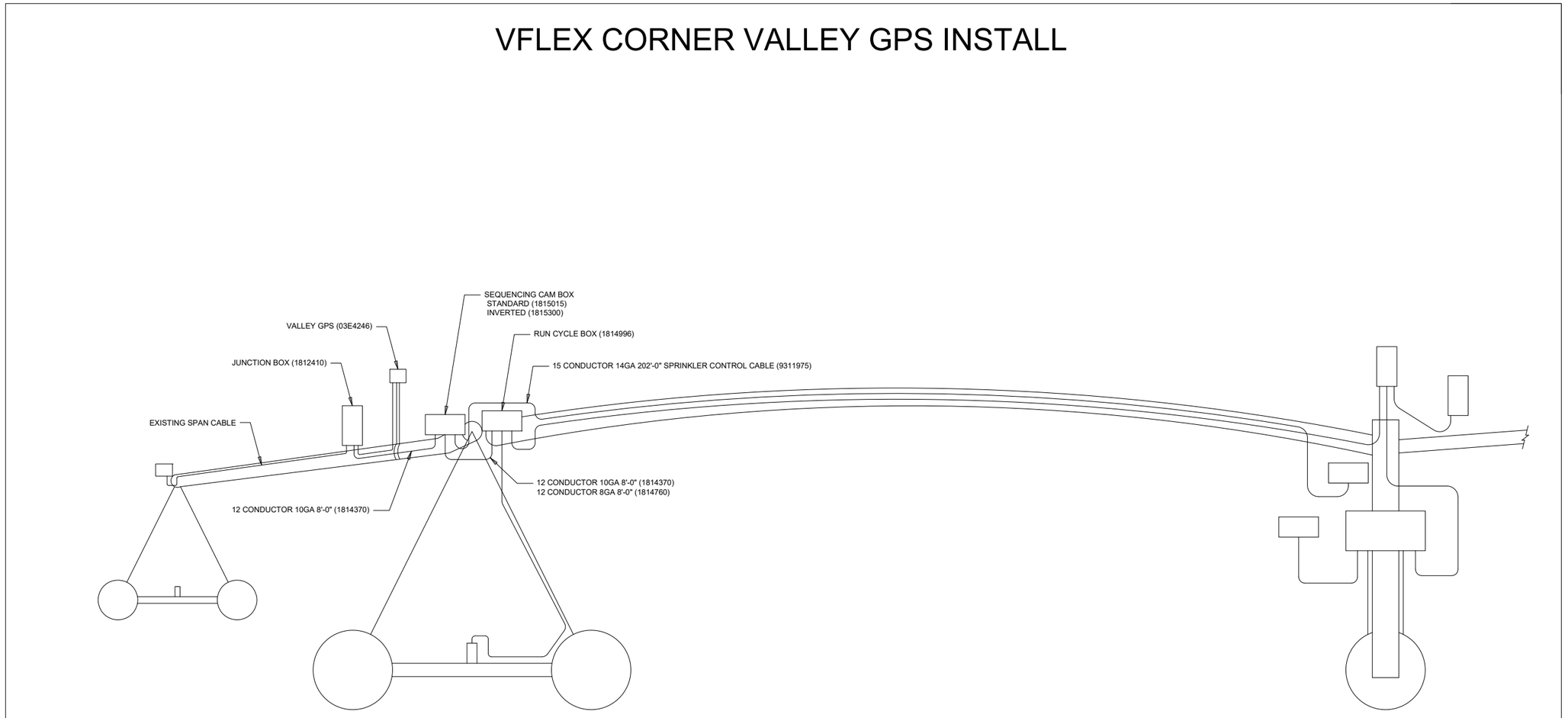
VALLEY
28800 Ida Street Valley, Nebraska 68064-0358

SOFTWARE: AUTOCAD	THIRD ANGLE	REF:
DATE: 09-15-17	SCALE: NONE	SHEET: 1 OF 1

PART NAME: FIELD INSTALL VALLEY GPS UPDATE - PREC CORNER
PART NO.: 9312998

Field Install and Wiring Diagrams

VFlex Corner Field Install and Wiring for Valley GPS and Junction Box pn 1751369



DIMENSIONS IN BRACKETS [XX.X] ARE MILLIMETERS
TOLERANCE UNLESS OTHERWISE SPECIFIED:
LINEAR DIMENSIONS: ±.06 [1.5]
ANGULAR DIMENSIONS: ± 1°
DRILLED HOLES: +.010 [.25]/-.002 [.05]
OTHER HOLES: ±.010 [.25]

VALLEY
28800 Ida Street Valley, Nebraska 68064-0358

REV	ECN NO.	ECN DATE	DESCRIPTION	DRAWN
0	31555	10-23-17	NEW PART	JWB/MAM

DRAWN:	DESIGN:	AUTHORIZE:
JWB	MAM	MAM

SOFTWARE: AUTOCAD | THIRD ANGLE | REF:
DATE: 10-23-17 | SCALE: NONE | SHEET: 1 OF 1

PART NAME: FIELD INSTALL VFLEX VALLEY GPS

PART NO.: 1751369

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⚠ DANGER

- **THE CONTROL PANEL CONTAINS HIGH VOLTAGE! LIVE VOLTAGE CAN KILL.**
- **ALWAYS DISCONNECT ELECTRICAL POWER BEFORE SERVICING OR PERFORMING MAINTENANCE TO THE MACHINE.**
- **INSTALLATION OF THIS KIT, INCLUDING TESTING AND TROUBLESHOOTING SHOULD BE PERFORMED ONLY BY AN AUTHORIZED VALLEY DEALER.**
- **ALWAYS REPLACE ANY GUARDS OR SHIELDS THAT ARE REMOVED FOR PERFORMING MAINTENANCE.**

Theory of Operation for GPS Position with Valley GPS

GPS position requires one power line carrier OPMC5 (PLC OPMC5) board in addition to the Valley GPS on the end of the machine. In a typical installation there would be one PLC board in the main control panel powered by 12 VDC and a Valley GPS on the end of the machine powered by 120 VAC that contains a GPS antenna.

An **LED on the PLC OPMC5** displays different colors that indicate power, transmitting and receiving.

- Green = Power/idle
- Red = Transmitting
- Orange = Receiving

An **LED on the Valley GPS** displays different colors to indicate the following:

- Red = No GPS message received in the last minute
- Orange = No GPS fix / startup cycle
- Steady Green = GPS fix
- Blinking Green = DGPS fix

Communication for GPS position originates at the main control panel. Communication data between the PLC OPMC5 board and the Valley GPS is through the pink wire (end gun). The Valley GPS typically gets power from the yellow w/red wire (safety out). However, on a 10 wire machine power is from the Yellow wire (safety return).

When the control panel is locked in and running, it will make a request to the Valley GPS on the end of the machine. When the control panel makes the request, the control panel PLC LED should display red indicating it is transmitting. At the same time the Valley GPS LED should display orange indicating it is receiving the control panel's request for position.

After the machine has been running for 1 minute the control panel will request for position and end pressure (optional) every 1-1/2 seconds.

- The dipswitch settings of the tower box PLC OPMC5s are important for the Discovery mode to properly identify PLC OPMC5 boards especially on machines that have multiple boards. Dipswitches 1-4 ID the board, 5-8 are typically set to match dipswitch settings on the PLC OPMC5 in the control panel of the machine.
- The recommended setting for the control panel PLC OPMC5 dipswitches can be found in the Installation Instructions and field install pn 9312976 contained within this manual.

Troubleshooting

GPS Antenna Accuracy

Accuracy of the GPS antenna is dependent on the positioning service available for the machine location. Listed below are the positioning services that the GPS receivers recognize.

- GPS Standard Positioning Service (SPS) Available any where in the world.
  - Position Accuracy: < 15 meters, 95% typical (with Selective Availability OFF).

- DGPS Wide Area Augmentation System (WAAS) Available in North America with limited availability Internationally.
  - Position Accuracy: < 3 meters, 95% typical.

GPS Signal Errors

Listed below are several factors that can degrade the GPS signal and affect accuracy.

- Ionosphere and troposphere delays — The satellite signal slows as it passes through the atmosphere. The GPS system uses a built-in model that calculates an average amount of delay to partially correct for this type of error.
- Signal multipath — This occurs when the GPS signal is reflected off objects such as tall buildings or large rock surfaces before it reaches the receiver. This increases the travel time of the signal, causing errors.
- Receiver clock errors — A very slight timing error between the receiver's built-in clock and the very accurate atomic clocks onboard the GPS satellites.
- Orbital errors — Are inaccuracies of the satellite's reported location.
- Number of satellites visible — The more satellites a GPS receiver can see, the better the accuracy. Buildings, terrain, electronic interference, or sometimes even dense foliage can block signal reception, causing position errors or possibly no position reading at all. GPS units typically will not work indoors, underwater or underground.
- Satellite geometry/shading — This refers to the relative position of the satellites at any given time. Ideal satellite geometry exists when the satellites are located at wide angles relative to each other. Poor geometry results when the satellites are located in a line or in a tight grouping.
- Intentional degradation of the satellite signal — Selective Availability (SA) is an intentional degradation of the signal once imposed by the U.S. Department of Defense. SA was intended to prevent military adversaries from using the highly accurate GPS signals. The government turned off SA in May 2000, which significantly improved the accuracy of civilian GPS receivers.

Theory of Operation for PLC End Gun 3 & 4

PLC End Gun 3 & 4 is included with Valley GPS. Contained within the Valley GPS are two 120 VAC outputs that are controlled by the PLC inside the Valley GPS. They are commanded on or off by the control panel using the PLCs.

PLC End Gun 3 & 4 must be enabled in the comm port Valley GPS protocol and end gun 3 and/or 4 must be setup in the control panel for them to function.

When the machine enters and exits a sector the panel sends a corresponding on or off command every 2 minutes while in the sector. If after 5 minutes the PLC does not get an update, it will shut off the outputs, de-energizing the relays. A typical 120 VAC solenoid could be wired to the contacts of the relays and controlled.

The outputs function regardless of the water on/off setting in the control panel.

GPS System Faults

The GPS related System Faults that can that shut the machine down are shown below in Figure 49-1, along with a description, possible causes and corrective action.

System Fault	Threshold	Shut Down	Corrective Action
GPS Com • GPS not communicating	With GPS Position and Shutdown On Position Loss enabled, while the machine is waiting/running there has been no GPS communications and the Shutdown On Position Loss Delay time has expired.	Yes	Check the GPS connection and the power supply.
GPS Lock • GPS signal loss	With GPS Position and Shutdown On Position Loss enabled, while the machine is waiting/running the GPS Lock Status is None and the Shutdown On Position Loss Delay time has expired.	Yes	Check for a clear path above the GPS antenna. Contact your Valley dealer.

Figure 49-1

Viewing System Faults

ICON Control Panels

To view the current System Fault do one of the following;

- Push **Menu, System, Diagnostics** and **System Faults**.
- Push the **Fault Notice** icon that appears on the pivot graphic.
- Push **Menu** and **Faults** (ICON5 and ICONX Control Panel only).

Clearing Faults

The fault and fault notice icon are automatically cleared from the main screen the next time the machine runs successfully.

Troubleshooting

GPS Error Codes

Listed below are the GPS related error codes with the description, threshold for the error to occur, whether the machine will shutdown if the error occurs and possible causes or corrective action to take. See Figures 50-1 and 51-1.

Error	Description	Threshold	Shut Down	Possible Causes Corrective Actions
E12	Valley GPS pressure sensor out of range high • This error is only logged if it is not already active.	When Valley GPS pressure is greater then the calculated Max Sensor Pressure. The Valley GPS pressure sensor must be selected for the Stopped input.	No	The pressure sensor has failed. Contact your Valley Dealer.
E13	Valley GPS pressure sensor out of range low • This error is only logged if it is not already active.	When Valley GPS pressure is < -6 psi the Valley GPS pressure sensor must be selected for the Stopped input.	No	The pressure sensor has failed or is not installed. Calibrate pressure sensor to zero (0). Contact your Valley Dealer.
E18	GPS Communication Error	When a transition occurs from GPS communicating to GPS not communicating. GPS Position must be enabled.	Yes - if Shut Down System is selected.	When GPS option is powered by safety circuit, a loss of power will cause this error.
E19	GPS Signal Loss • The Satellite Count is logged with the error.	When the GPS Lock Status transitions from Standard to DGPS or None. GPS Position must be enabled.	Yes - if Shut Down System is selected.	Check for clear path above the GPS antenna. Verify that GPS antenna is operating properly.
E20	DGPS Signal Loss • The Satellite Count is logged with the error.	When the GPS Lock Status transitions from DGPS to Standard GPS Position must be enabled.	No	Check for clear path above the GPS antenna.
E25	GPS Coordinates Out of Range • The Satellite Count is logged with the error.	When GPS coordinates are out of range.	Yes, if Shut Down System is selected.	Verify that Distance to GPS, Radius + or Radius -,values are correct. Verify that pivot point coordinates are correct. Crosstalk from another GPS device on the same channel. Perform a new device discovery to automatically assign a different channel to avoid crosstalk.

Figure 50-1

GPS Error Codes

Error	Description	Threshold	Shut Down	Possible Causes Corrective Actions
E29	Valley GPS communication error, master OPMC	The SRB was unable to communicate to the master OPMC.	No	Contact your Valley Dealer.
E30	Valley GPS Error Report message received	When a communication Error Report message is recieved from the PLC.	No	An error report was generated in response to a command. View the Error Report in System/Diagnostics/Error Codes/Valley GPS.

Figure 51-1

Viewing Error Codes

ICON Control Panels

To view the Error Codes do the following:

1. Push **Menu, System, Diagnostics, Error Codes** and **System**.
2. Push View All Errors or View Active Errors to display the Error Codes screen.

   For this example, push **View Active Errors** to view only the active errors.

   Viewing an error code will clear it from the number of errors shown next to the Error icon in the status area of the Main Screen.
3. To access the desired error code do one of the following;
   - Push the **Next** button to search forward through the error codes.
   - Push the **Previous** button to search backward through the error codes.

Resetting Error Count

To set the Error Count to 0 (zero), push **Reset Count**. See Figure 51-1.

The error count is reset to zero, and the first and last error occurrences are set to the current time and date.

Troubleshooting

Valley GPS Error IDs and Descriptions

ID	Description
000	No Error
001	No Comm Mode
003	Invalid Security Key
004	Invalid Communications Mode
005	Block Status Already Set
010	Invalid Request Length
011	Invalid Data Request
012	Invalid ID Request
013	Production Mode Not Activated
014	Record Noise After Packet Reception
015	No Device To Be Discovered In MAC List
016	No Device To Be Recovered In Routing Table
017	FLASH Error
018	FLASH Verification Error
021	Serial Rx Buffer Full
022	GPS Buffer Full
023	Tx Error
030	Cannot Commit When GPS message In Progress
031	No Answer From External Serial Device
033	Cannot Reach First Router
034	No Answer From Destination
035	Cannot Reach Destination
036	Answer From Destination Invalid
040	Invalid Request For Current Board ID
050	Invalid Page In EEPROM Access
051	EEPROM Write Error
052	External PLP Process Running
053	OS Task Running
082	Cannot Reach First Router
0C1	Cannot Reach PLC Destination
0FD	Boot Loader Flash Error
0FE	Not Supported
0FF	NACK
	Unknown error code

Figure 52-1

Viewing Error Codes

ICON Control Panels

To view the Valley GPS errors push **Menu**, **System**, **Diagnostics**, **Error Codes** and **Valley GPS**.

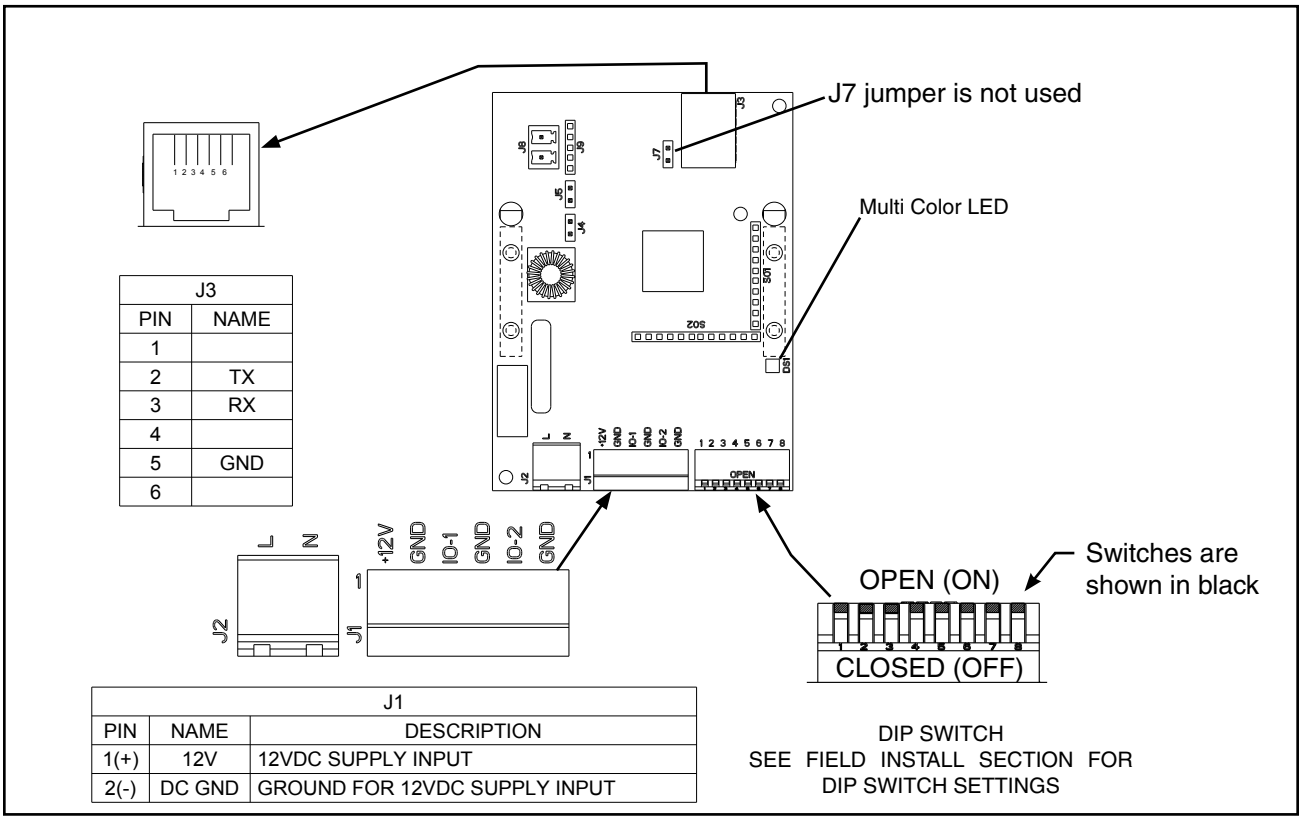
A maximum of six errors are listed on the screen, with the newest error at the top.

Clearing Error Codes

Clearing error codes will clear all Valley GPS errors.

To clear the errors, push **Clear Errors** and then push **Clear**.

PLC OPMC5 Modem Card - Pin/Terminal Call Out/Dip Switch pn 03E4243



J3	
PIN	NAME
1	
2	TX
3	RX
4	
5	GND
6	

J1		
PIN	NAME	DESCRIPTION
1(+)	12V	12VDC SUPPLY INPUT
2(-)	DC GND	GROUND FOR 12VDC SUPPLY INPUT

Figure 53-1

Multi Color LED

PLC OPMC5 in Main Control Panel (address 0)

During Discovery/Reordering Process

Blink Green on/off then Red on/off, repeat pattern

Normal Mode (not in Discovery)

During power line activity

Red: Transmission

Orange: Power line reception

During no power line activity

If Devices were found during Discovery:

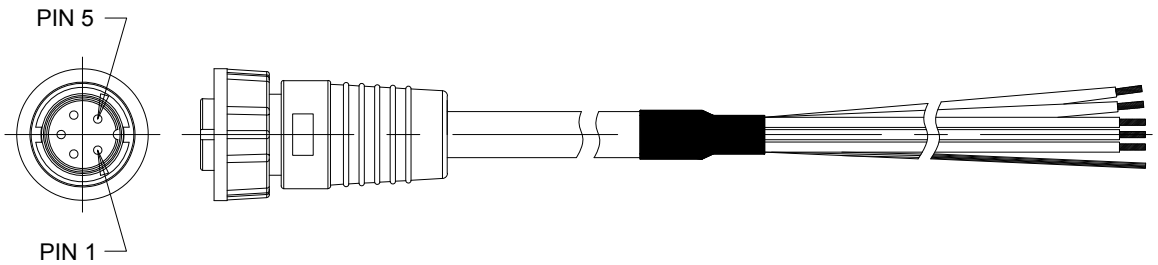
Blink Green the number of times equal to the number of devices on the machine

If No Devices are found during Discovery:

Blink Red on and off

Troubleshooting

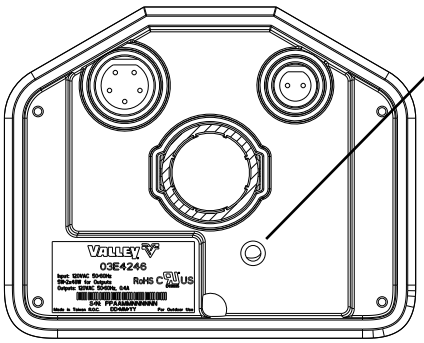
Valley GPS Conductor Cable pn 03E4245 - Pin Call Out



PINOUTS		
PIN	WIRE COLOR	FUNCTION
1	PURPLE W/WHITE	END GUN 3
2	PINK	TX/RX
3	YELLOW W/RED	LINE
4	WHITE	NEUTRAL
5	RED W/WHITE	END GUN 4

Figure 54-1

Valley GPS LED



Multi Color LED

During initial power up:

Red: Bootup

During normal operation:

Steady Red: No GPS Message received in last minute

Steady Orange: No GPS fix

Steady Green: GPS fix

Blink Green, Red, Orange: DGPS fix

NOTE

- **The LED will blink green, red and orange during normal operation with DGPS fix and power line activity.**

Figure 54-2

GPS Angular Conversion Table

Use the GPS Angular Conversion table to convert the GPS angular degrees from minutes and seconds to decimal degrees when manually setting up the GPS coordinates in the control panel. Refer to Figure 55-1.

Minutes and Seconds into Decimals of a Degree

(Based on 1 second = 0.00027778 degrees)

Minutes into Decimals of a Degree						Seconds into Decimals of a Degree					
Min.	Deg.	Min.	Deg.	Min.	Deg.	Sec.	Deg.	Sec.	Deg.	Sec.	Deg.
1	0.0167	21	0.3500	41	0.6833	1	0.0003	21	0.0058	41	0.0114
2	0.0333	22	0.3667	42	0.7000	2	0.0006	22	0.0061	42	0.0117
3	0.0500	23	0.3833	43	0.7167	3	0.0008	23	0.0064	43	0.0119
4	0.0667	24	0.4000	44	0.7333	4	0.0011	24	0.0067	44	0.0122
5	0.0833	25	0.4167	45	0.7500	5	0.0014	25	0.0069	45	0.0125
6	0.1000	26	0.4333	46	0.7667	6	0.0017	26	0.0072	46	0.0128
7	0.1167	27	0.4500	47	0.7833	7	0.0019	27	0.0075	47	0.0131
8	0.1333	28	0.4667	48	0.8000	8	0.0022	28	0.0078	48	0.0133
9	0.1500	29	0.4833	49	0.8167	9	0.0025	29	0.0081	49	0.0136
10	0.1667	30	0.5000	50	0.8333	10	0.0028	30	0.0083	50	0.0139
11	0.1833	31	0.5167	51	0.8500	11	0.0031	31	0.0086	51	0.0142
12	0.2000	32	0.5333	52	0.8667	12	0.0033	32	0.0089	52	0.0144
13	0.2167	33	0.5500	53	0.8833	13	0.0036	33	0.0092	53	0.0147
14	0.2333	34	0.5667	54	0.9000	14	0.0039	34	0.0094	54	0.0150
15	0.2500	35	0.5833	55	0.9167	15	0.0042	35	0.0097	55	0.0153
16	0.2667	36	0.6000	56	0.9333	16	0.0044	36	0.0100	56	0.0156
17	0.2833	37	0.6167	57	0.9500	17	0.0047	37	0.0103	57	0.0158
18	0.3000	38	0.6333	58	0.9667	18	0.0050	38	0.0106	58	0.0161
19	0.3167	39	0.6500	59	0.9833	19	0.0053	39	0.0108	59	0.0164
20	0.3333	40	0.6667	60	1.0000	20	0.0056	40	0.0111	60	0.0167

Figure 55-1 GPS Angular Conversion Table

Angular Degree Examples

An angular degree in degrees, minutes, seconds will look like the following examples:

- **10° 11´ 37˝, reads as 10 degrees, 11 minutes, 37 seconds.**
  - (a) Convert minutes and seconds to a decimal degree value using the table in Figure 55-1.

    11 minutes = 0.1833 degrees

    37 seconds = 0.0103 degrees

  - (b) Add all decimal degree values together.

    10 degrees = 10.0000 degrees

    11 minutes = 0.1833 degrees

    37 seconds = 0.0103 degrees

    10˚ 11' 37" = 10.1936 degrees

- **12° 5.245´, read as 12 degrees, 5.245 minutes**.
  - (a) Convert decimals of a minute to decimal degrees using the table in 55-1 and multiply the decimal of a minute by 0.0167.

    5 minutes = 0.0833 degrees

    0.245 minutes =

    0.245 × 0.0167 = 0.0041 degrees

  - (b) Add all decimal degree values together.

    12 degrees = 12.0000 degrees

    5 minutes = 0.0833 degrees

    0.245 minutes = 0.0041 degrees

    12˚ 5.245' = 12.0874 degrees

Troubleshooting

Estimated Drive Unit Speed Tables

Use these tables to estimate the Intermediate Drive Unit and End Drive Unit speed based on the drive unit motor output RPM, tire size, and machine voltage. Refer to Figure 56-1.

Estimated Drive Unit Travel Speed Feet/Minute (60 Hz)*

Motor Output 60 Hz	Tire Size: 10R X 22.5	11.2 X 24	11R X 22.5	11R X 24.5	14.9 X 24 Non Directional	14.9 X 24 **	16.9 X 24 **	18.4 X 26 **	11.2 X 38 or Non Directional	12.4R X 38	Valley Revolution
	Feet/Minute										
30	5.91	6.11	6.33	6.33	6.95	7.28	7.74	8.17	8.34	8.46	6.96
34	6.70	6.92	7.18	7.18	7.88	8.25	8.77	9.26	9.45	9.59	7.89
37	7.29	7.53	7.81	7.81	8.57	8.98	9.55	10.08	10.28	10.44	8.58
43	8.48	8.75	9.08	9.08	9.96	10.43	11.09	11.71	11.95	12.13	9.97
56	11.04	11.40	11.82	11.82	12.98	13.59	14.45	15.26	15.56	15.79	12.99
68	13.40	13.84	14.36	14.36	15.76	16.50	17.54	18.53	18.90	19.18	15.77
86	16.95	17.50	18.16	18.16	19.93	20.87	22.19	23.43	23.90	24.26	19.95
100	19.71	20.35	21.12	21.12	23.17	24.26	25.80	27.24	27.79	28.21	23.19
136†	26.81	27.68	28.72	28.72	31.52	33.00	35.09	37.05	37.80	38.36	31.54

Estimated Drive Unit Travel Speed Feet/Minute (50 Hz)*

Motor Output 50 Hz	Tire Size: 10R X 22.5	11.2 X 24	11R X 22.5	11R X 24.5	14.9 X 24 Non Directional	14.9 X 24 **	16.9 X 24 **	18.4 X 26 **	11.2 X 38 or Non Directional	12.4R X 38	Valley Revolution
	Feet/Minute										
25	4.93	5.09	5.28	5.28	5.79	6.07	6.45	6.81	6.95	7.05	5.80
28	5.58	5.77	5.98	5.98	6.57	6.87	7.31	7.72	7.87	7.99	6.57
31	6.08	6.28	6.51	6.51	7.15	7.48	7.96	8.40	8.57	8.70	7.15
36	7.06	7.29	7.57	7.57	8.30	8.69	9.25	9.76	9.96	10.11	8.31
47	9.20	9.50	9.85	9.85	10.81	11.32	12.04	12.71	12.97	13.16	10.82
57	11.17	11.53	11.97	11.97	13.13	13.75	14.62	15.44	15.75	15.98	13.14
72	14.13	14.59	15.13	15.13	16.61	17.39	18.49	19.52	19.92	20.21	16.62
83	16.43	16.96	17.60	17.60	19.31	20.22	21.50	22.70	23.16	23.50	19.33
136†	26.81	27.68	28.72	28.72	31.52	33.00	35.09	37.05	37.80	38.36	31.54

$$\text{Drive Unit Speed(ft/min)} = \frac{\text{(Tire rolling Circumference x Motor Speed(RPM))}}{\text{(Gearbox Reduction(52) x 12)}}$$

*These speeds are estimates only. Actual speeds will vary according to inflation pressure and field conditions. Machine speed should be measured after installation to determine the actual performance.

**Includes turf tires of the same nominal size.

† Valley X-Tec

Figure 56-1 Estimated Drive Unit Speed Tables

Use Edit to Setup Control Panel for GPS Position

ICON5 / ICONX Control Panel Setup-Edit Method

To setup GPS pivot position, do the following:

- Obtain the last tower speed and pivot length information from the VChart report for this machine or measure the span length from pivot to last regular drive unit, excluding the overhang, and use the Estimated Drive Unit Speed table in this section.
- Use a handheld GPS receiver to obtain the GPS coordinates for the Pivot Point position.
- If necessary, use the GPS Angular Conversion table in this section to convert the GPS coordinate values into decimals of degree.

1. Turn Water off.
2. Set the Dry % Timer to 0.0 (zero percent).
3. Push a Start button to start the machine, energize the safety circuit and the Valley GPS. The machine should not move.

> **NOTE**
>
> **•Every time the machine is started, the Valley GPS antenna goes through a startup cycle that lasts approximately one minute. The Valley GPS antenna will not communicate with the control panel until the startup cycle has completed.**

4. Comm Port setup, push **Menu / Setup / Comm Port** and **RJ11**.
5. Select the **RJ11 Protocol** field and choose **Valley GPS** from the drop-down list. See Figure 57-1.
6. Push the **Valley GPS Device List** button.
7. Enter the Number of Devices Installed.

   When only one Valley GPS is installed, enter 1.

   When other Valley GPS options are installed, enter the total number of devices.
8. Push the Discover Devices button. The control panel attempts to locate the devices.

> **NOTE**
>
> **•The Discover Devices button must be pushed within four minutes of starting the machine.**

   Discovery of devices can typically take between three and six minutes.
9. After the devices have been discovered, note the PLC ID of the Valley GPS.
10. Push **Return** to close the Valley GPS Device List.
11. Push the **Valley GPS Setup** button.
12. Check the **Valley GPS** checkbox to enable GPS position.
13. Enter the PLC ID for Valley GPS.

Continued on the next page.

Use Edit to Setup Control Panel for GPS Position

ICON5 / ICONX Control Panel Setup-Edit Method

NOTE

- **Latitude and longitude positions displayed on a handheld GPS receiver are usually displayed as North, South, East or West.**
- **The direction displayed affects how the position is entered into the control panel.**
- **If the position is shown as West or South the position MUST be entered as a Negative Degree.**
- **In North America, latitude positions are always positive, and longitude positions are always negative.**

14. Go to the GPS Setup screen.

    Push **Menu, Setup, Constants, Position** and **GPS Setup** to display the GPS Setup screen.

15. Set the Pivot Point GPS position.
    (a) Select the **Pivot Point GPS Latitude** field and enter the pivot point latitude on the numeric keypad.
    (b) Select the **Pivot Point GPS Longitude** field and enter the pivot point longitude on the numeric keypad.
16. Set the Distance to GPS (the distance from pivot point to GPS tower box) including the plus and minus tolerance.
    (a) Select the **Length to GPS (feet)** field and enter the length from the pivot point to the GPS tower box. Do not enter the pivot length. The default is 1320 ft (402.3 m), and the range is 10 to 6554 ft (3.0 to 1997.6 m).
    (b) The Radius +/- setting corresponds to the Length to GPS and Pivot Point Coordinates.

    It's the range inside (-) and outside (+) the GPS device that the panel will communicate with.

    The control panel filters the information provided by the GPS device to verify that it is within tolerance. The default setting is 50 ft (15.2 m), in most situations these values will not need to be adjusted unless there is a specific option on the machine that requires a different setting.

Set Runtime Fallback Position

To set up the fallback position, do the following.

1. Check the **Runtime Fallback Position** checkbox.
2. Select the **LRDU Pivot Speed** field and enter the speed on the numeric keypad. The default is 15.56 ft/min.
3. Select the **Pivot Length** field and enter the length on the numeric keypad. The default is 1320 ft.
4. Continue with Permanently Install Valley GPS on page 31.

Use Edit to Setup Control Panel for Valley GPS

ICON10 / ICON1 Control Panel Setup-Edit Method

To setup Valley GPS, do the following:

- Obtain the last tower speed and pivot length information from the VChart report for this machine or measure the span length from pivot to last regular drive unit, excluding the overhang, and use the Estimated Drive Unit Speed table in this section.
- Use a handheld GPS receiver to obtain the GPS coordinates for the Pivot Point position.
- If necessary, use the GPS Angular Conversion table in this section to convert the GPS coordinate values into decimals of degree.

1. Turn Water off.
2. Set the Dry % Timer to 0.0 (zero percent).
3. Push a Start button to start the machine, energize the safety circuit and the Valley GPS. The machine should not move.

> **NOTE**
>
> **•Every time the machine is started, the Valley GPS antenna goes through a startup cycle that lasts approximately one minute. The Valley GPS antenna will not communicate with the control panel until the startup cycle has completed.**

4. Comm Port setup, push **Menu / Setup / Comm Port** and **RJ11**.
5. Select the **RJ11 Protocol** field and choose **Valley GPS** from the drop-down list. See Figure 59-1.
6. Push the **Valley GPS Device List** button.
7. Enter the Number of Devices Installed.

   When only one Valley GPS is installed, enter 1.

   When other Valley GPS options are installed, enter the total number of devices.
8. Push the Discover Devices button. The control panel attempts to locate the devices.

> **NOTE**
>
> **•The Discover Devices button must be pushed within four minutes of starting the machine.**

   Discovery of devices can typically take between three and six minutes.
9. After the devices have been discovered, note the PLC ID of the Valley GPS.
10. Close the Valley GPS Device List.
11. Check the **Valley GPS** checkbox to enable GPS position.
12. Enter the PLC ID for Valley GPS.

Continued on the next page.

Use Edit to Setup Control Panel for Valley GPS

ICON10 / ICON1 Control Panel Setup-Edit Method

NOTE

- **Latitude and longitude positions displayed on a handheld GPS receiver are usually displayed as North, South, East or West.**
- **The direction displayed affects how the position is entered into the control panel.**
- **If the position is shown as West or South the position MUST be entered as a Negative Degree.**
- **In North America, latitude positions are always positive, and longitude positions are always negative.**

13. Go to the GPS Setup screen.

    Push **Menu, Setup, Constants, Position** and **GPS Setup** to display the GPS Setup screen.

14. Set the Pivot Point GPS position.
    (a) Select the **Pivot Point GPS Latitude** field and enter the pivot point latitude on the numeric keypad.
    (b) Select the **Pivot Point GPS Longitude** field and enter the pivot point longitude on the numeric keypad.
15. Set the Distance to GPS (the distance from pivot point to GPS tower box) including the plus and minus tolerance.
    (a) Select the **Length to GPS (feet)** field and enter the length from the pivot point to the GPS tower box. Do not enter the pivot length. The default is 1320 ft (402.3 m), and the range is 10 to 6554 ft (3.0 to 1997.6 m).
    (b) The Radius +/- setting corresponds to the Length to GPS and Pivot Point Coordinates.

        It's the range inside (-) and outside (+) the GPS device that the panel will communicate with.

        The control panel filters the information provided by the GPS device to verify that it is within tolerance. The default setting is 50 ft (15.2 m), in most situations these values will not need to be adjusted unless there is a specific option on the machine that requires a different setting.

Set Runtime Fallback Position

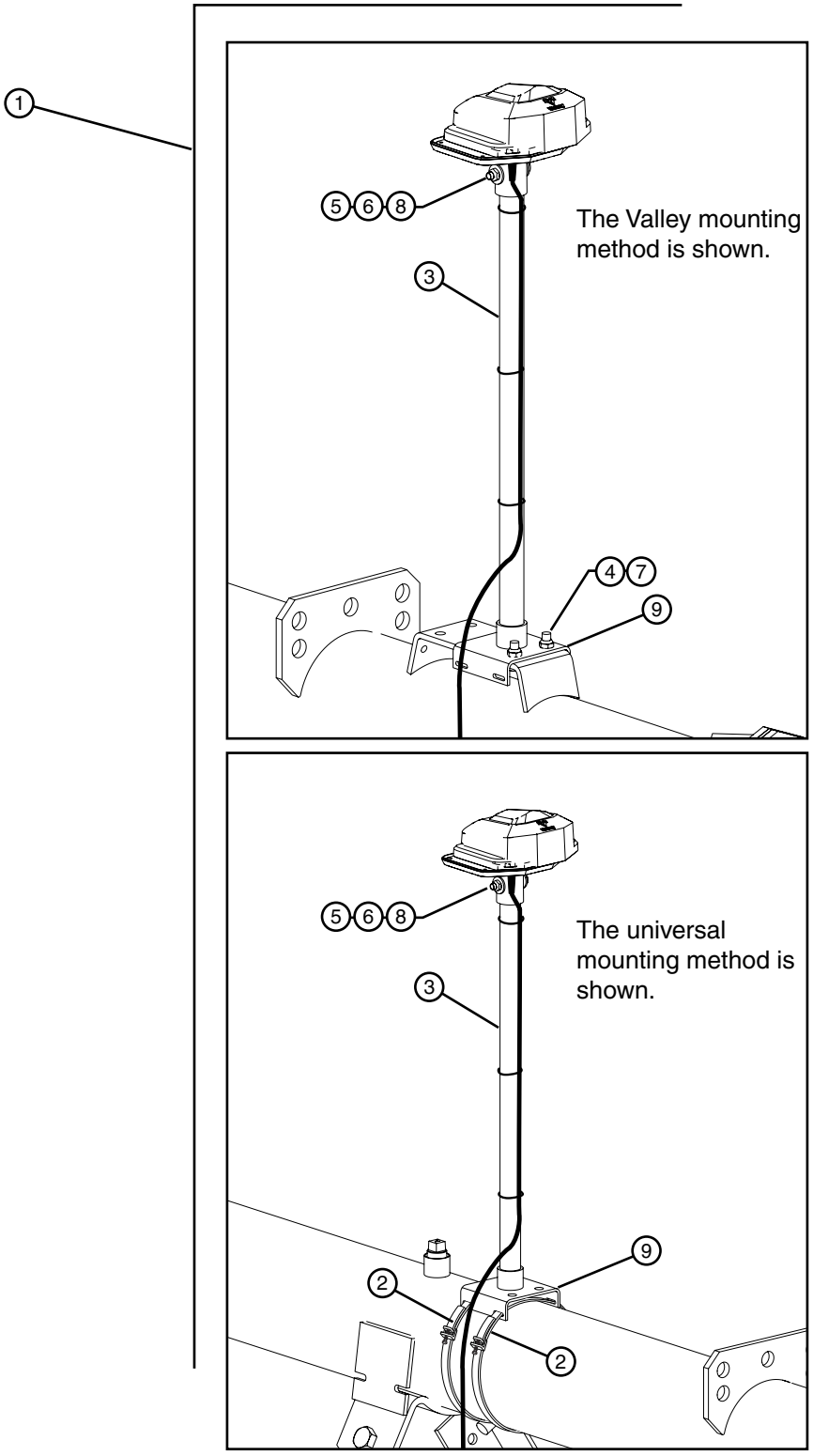
To set up the fallback position, do the following.

1. Check the **Runtime Fallback Position** checkbox.
2. Select the **LRDU Pivot Speed** field and enter the speed on the numeric keypad. The default is 15.56 ft/min.
3. Select the **Pivot Length** field and enter the length on the numeric keypad. The default is 1320 ft (402.3 m).
4. Continue with Permanently Install Valley GPS on page 31.

Contents

Parts

Valley GPS Mounting Hardware Kit



Valley GPS Mounting Hardware Kit

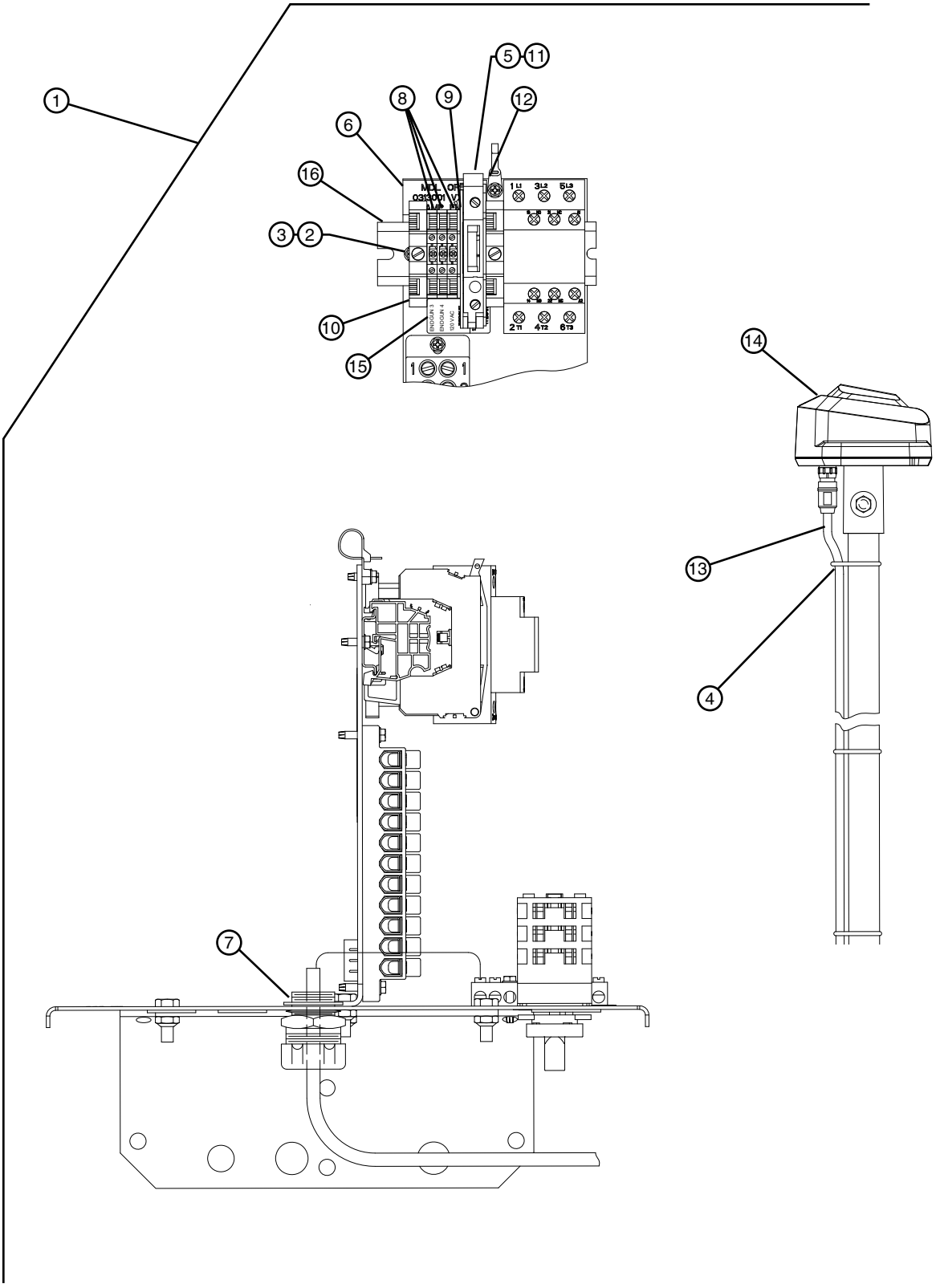
Item	Part No.	Description	Qty
1	KA02774	Valley GPS Mounting Hardware	1
2	•0271051	Clamp-Hyd Tube-42 in for 10 in Pipe	2
3	•1704300	Valley GPS Mounting Pipe	1
4	•0133006	Nut Lock 3/8-16 UNC-2B PLT Grade B	2
5	•0133007	Nut Lock 5/16-18 UNC-2B PLT Grade B	1
6	•0142017	Washer Flat 5/16 PLT Wide .083 X .375 X .875	2
7	•0161045	Screw Cap 3/8 X 1-16 UNC-2A PLT Grade 5	2
8	•0161079	Screw Cap 5/16 X 2-18 UNC-2A PLT Grade 5	1
9	•9365000	Assm GPS Mount	1

• Denotes Item Is Included In The Preceding Assembly

† Not Illustrated

Parts

Valley GPS Electrical Hardware Kit



Valley GPS Electrical Hardware Kit

Item	Part No.	Description	Qty
1	KA02667	Valley GPS Electrical Hardware Kit	1
2	•0134059	Nut #8 Hex With External Tooth Lock Washer PLT	2
†	•0143046	Washer Reducer 1.00-.500	2
3	•0161355	Screw #8 X 1/2 Phillips Head Self Tapping	2
4	•0314225	Ty Wrap Tyton T50R Black	4
5	•03E2081	Fuse, 1.0 Amp, 250V	1
6	•03E2082	Decal 1.0 Amp Fuse	1
7	•03E2132	Cord Connector, 1/2 Hub, .17 - .47 Cable	1
8	•03E2994	Terminal Block Din Rail Mount	3
9	•03E2995	Terminal Block End Cover	1
10	•03E2996	Din Rail End Stop	2
11	•03E2997	Fuse Block Din Rail Mount	1
12	•03E2998	Fuse Block End Cover	1
13	•03E4245	Valley GPS Conductor Cable	1
14	•03E4246	Valley GPS	1
15	•0980287	Decal Valley GPS Term Decal	1
†	•1811273	14 Ga Yellow W/Red 4.00 .38/.38	1
†	•1812329	14 Ga Yellow W/Red 12.00 .38/.38	1
16	•9311988	Channel Din Rail Mount 2.50	1
†	•9312971	Field Install Valley GPS	1
†	•9312998	Field Install Valley GPS Update - Prec Corner	1

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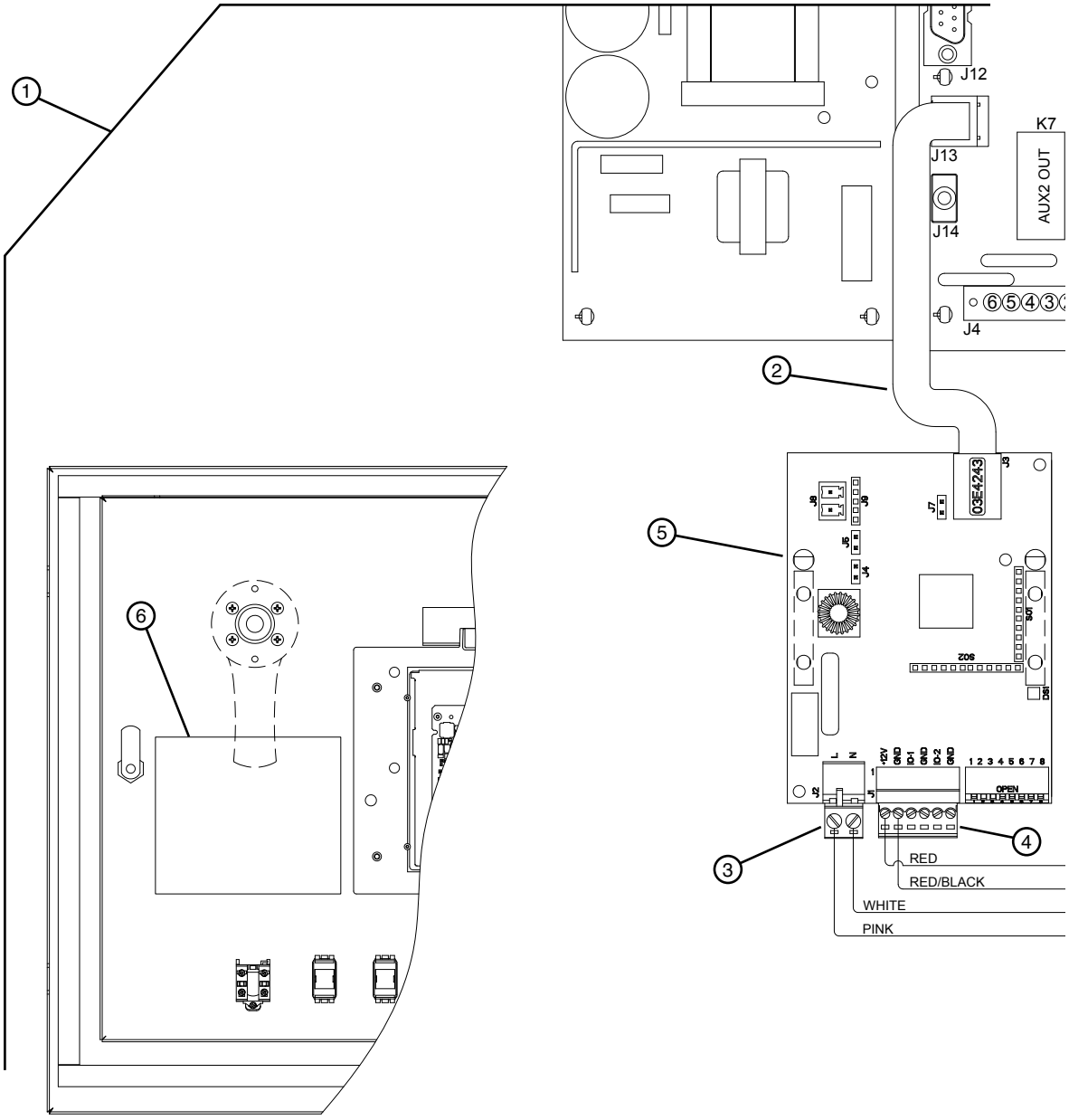
† Not Illustrated

Parts

Power Line Carrier in ICON Control Panel



Power Line Carrier in ICON Control Panel

Item	Part No.	Description	Qty
1	KA02670	OPMC5 in Panel for ICON	1
	1813611	Cable 4 Conductor. 14 Ga (12 ft-0 in) 314828	1
†	•0178009	Screwdriver 2.0 mm-2.5 mm Blade	1
†	•0314151	Scotchlok Connector Type Y 18-12	2
†	•0314225	Ty Wrap Tyton T50R Black	4
†	•03E1605	Cable Tie 5.50 Long Plastic Tie	5
2	•03E3131	Flat Cable RJ11 X RJ11 12.00	1
3	•03E3166	Terminal Strip Plug, 5.08 mm, 2 Pole	1
4	•03E3167	Terminal Strip Plug, 3.5 mm, 6 Pole	1
5	•03E4243	OPMC5 PLC	1
6	•0980320	Decal Panel Dip Switch Settings	1
†	•1814482	18 Ga Pink 27.00 .38/.38	1
†	•1814700	18 Ga White 24.00 .203/.38	1
†	•1815333	18 Ga Red 23.00 .28/.28	1
†	•1815334	18 Ga Red W/Black 23.00 .28/.28	1
†	•9312976	Field Install PLC OPMC5 in ICON Panel	1

• Denotes Item Is Included In The Preceding Assembly

† Not Illustrated

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