



Universal Linear

Owners Manual

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EC DECLARATION OF CONFORMITY



We: **Valmont Industries, Inc.**
28800 Ida Street
Valley, NE 68064
+1 402.359.6312
+1 402.359.6143 (Facsimile)

Serial Number:

Purchase Order:

declare under our sole responsibility that the product,

Crop Irrigation System

to which this documentation relates, is in conformity with the following documents:

Machinery Directive 2006/42/EC
Low Voltage Directive 2014/35/EU
Electromagnetic Compatibility Directive 2014/30/EU

The above-referenced equipment is in conformity with all safety-related clauses (Not all clauses reflecting commercial preference are met) of the following documents:

EN 60204-1:2006 Safety of Machinery – Electrical Equipment of Machines
EN 12100:2010 Safety of Machinery
EN 909:1998+A1 Irrigation Machines

Statement regarding **Pressure Equipment Directive 97/23/EC:**

The Crop Irrigation System is excluded from the scope of the Pressure Equipment Directive, by the language of Article 1, Sections 3.2, 3.6 & 3.10. This equipment is classified less than Category 1.

Statement regarding **RoHS Directive 2011/65/EC:**

The Crop Irrigation System is excluded from the scope of the RoHS Directive, by the language of Article 2, Section 4(e), being a "Large Scale Fixed Installation."

Person Authorized to Compile the Technical File in Europe:
Relevant information will be transmitted via e-mail
in response to a reasoned request by national authorities

Philipp Schmidt-Holzmann
Valmont S.A.U.
28840 Mejordada del Campo
Madrid, ES 28840
+34 91 679 4300

Ron Pollak
Senior Electrical Engineer
Valmont Industries, Inc.

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ELECTRICAL SAFETY STATEMENT

Installation of the Valley Electric Irrigation Machine - European Union Only

Valmont Industries Inc. does not install a differential (ground fault) circuit breaker in the control panel of the Valley electric irrigation machine because the standards of protection vary according to country of destination. The distributor must provide and install a differential (ground fault) circuit breaker that meets the standards of the country where the Valley irrigation machine is installed.

In the European Union, differential circuit breaker protection is fixed at a maximum of 24 volts.

Good grounding of the Valley irrigation machine is required.

- If resistance to ground is lower than 80 ohms, a differential (ground fault) circuit breaker of 300 mA will meet requirements.
- If resistance to ground is between 80 and 800 ohms, a differential (ground fault) circuit breaker of 30 mA will meet requirements.

The power supply installation and inspection of equipment protection components or systems are the responsibility of the installer. Valmont Industries, Inc. is not responsible for the failure of equipment protection components or systems not of their manufacture.

Valley pivot irrigation machines receiving power from a generator must have a cable connected from the irrigation machine structure to a ground rod and another cable from the irrigation machine structure to the ground terminal on generator in order for the differential (ground fault) circuit breaker to work.

About This Manual

Information contained in this manual applies to Valley Universal Linear hose drag or ditch feed Irrigation Machines.

All information in this manual is based on information available at the time of printing. Valmont Industries Inc. reserves the right to make changes 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.

Ancillary Equipment Warranty

The owner is responsible for warranty registration of all ancillary equipment such as engines, pumps and generators with its respective manufacturer.

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.

SAFETY

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.

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.

SAFETY

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.

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 fly-wheels, 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.

SAFETY

Operate Safely

Valley Irrigation machines are designed with safety in mind. However, if this machine is operated incorrectly, it may pose a safety threat to the operator. A good safety program is much like a chain, it is only as strong as its weakest link. The manufacturer, dealer, and operator must maintain and improve all safety programs. Following is a list of safety operating tips which you and all other persons servicing or operating the machine must read and understand.

CAUTION

- DO NOT OPERATE THIS MACHINE WITHOUT FIRST READING THE OWNER'S MANUALS FOR THE MACHINE.
- READ ALL SAFETY MESSAGES IN THIS MANUAL AND SAFETY SIGNS ON THE MACHINE.
- DO NOT LET ANYONE OPERATE THIS MACHINE WITHOUT PROPER INSTRUCTIONS.
- UNAUTHORIZED MODIFICATIONS MAY IMPAIR THE FUNCTION AND/OR SAFETY OF THE MACHINE.
- IF YOU DO NOT UNDERSTAND ANY PART OF THIS MANUAL, CONTACT YOUR VALLEY DEALER.

EMPLOYEE INSTRUCTION ON SAFETY

It is very important to instruct your employees on the safe use of this equipment at the time of their initial assignment to operate it. DO NOT let anyone operate this equipment without proper instructions.

Safety training should be presented annually and the service manager should ensure employees fully understand the safety messages and what to do in case of emergencies.

EMERGENCY STOPPING

The machine can be stopped at any time at any tower by turning the disconnect switch, located underneath the tower box, to the OFF position. See Figure 14-1.

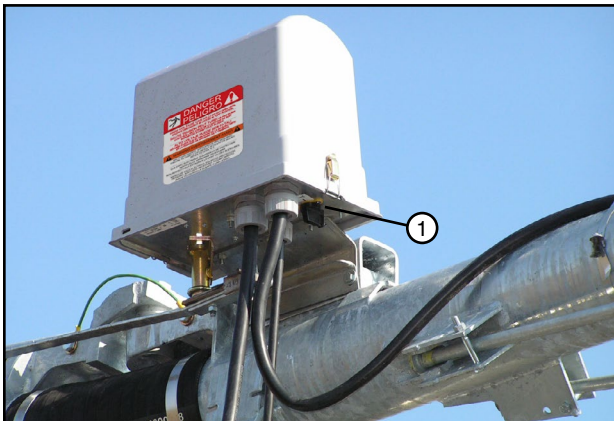


Figure 14-1 1. Disconnect Switch

WARNING

PROPER GROUNDING

DO NOT attempt to start the machine until the electrical service is properly installed and grounded by a qualified electrician as per the electrical standards.

If the power supplied to the machine is not grounded properly, severe injury or death can result should an electrical malfunction occur.

It is your responsibility to ensure that your power supplier and/or electrical contractor has grounded the irrigation machine as required by the National Electrical Code and by applicable local electrical codes. If a machine is properly grounded and fuse sizing is correct, there is extremely low probability of an individual being injured by electrical shock.

NOTE

- All 480 VAC, 60 Hz. (380 VAC, 50 Hz.) power supply services MUST be a 4 conductor service. Three 480 VAC (380 VAC) power lines and one ground conductor which is as large as the power carrying conductors for that service.

Operate Safely

DANGER

DISCONNECT POWER WHEN SERVICING

ALWAYS disconnect electrical power before servicing or performing maintenance to the machine.

If you are going to perform maintenance on the machine, YOU MUST shut off and lock the main power disconnect as shown below. See Figure 15-1.



Figure 15-1 1. Main Power Disconnect
2. Lock

The blue (OSHA safety color code) tag shown below should also be filled out and attached to the disconnect after locking. See Figure 15-2.

The tag should reveal the name of a person to contact before restoring power to the machine.



Figure 15-2

CAUTION

QUALIFIED SERVICE PERSONNEL

If you do not understand electricity or other parts of the machine, have qualified service personnel perform any hazardous repairs or maintenance.

CAUTION

GUARD ALL POWER TAKE-OFF DRIVES

This includes all belt and power line drives.

Replace any guards and shields removed for maintenance.

WARNING

MARK AND GUARD ALL POWER LINES

Do NOT deep rip or chisel near the buried power service wires.

Do NOT deep rip in a circle at the drive unit. The deep chisel track will cause severe stresses on the structure.

If you do deep rip your field, run the machine with the percent timer at 100% for the first revolution.

WARNING

SUSPECTED SHORT CIRCUITS

DO NOT touch the machine if you suspect a short-circuit situation. Call a qualified electrician or an authorized Valley dealer immediately.

Circumstances which may cause you to suspect hazardous voltage situations may include:

- Physical damage to the machine or span cable
- Recent electrical storms (lightning)
- Unusual operating characteristics of the machine

If you suspect a short circuit due to feeling a rippling tingle when touching the machine, DO NOT touch the machine again. Call a qualified electrician or an authorized Valley dealer immediately.

SAFETY

Operate Safely

WARNING

LIGHTNING AND THE MACHINE

Stay away from the machine during an electrical storm. An irrigation machine makes a good path to earth. It is also probably the tallest object in the field, which makes it a good lightning receptor!

CAUTION

DO NOT OVERSIZE FUSES

Fuses are sized for the protection of a specific machine.

Be certain you have the proper fuse sizes in place before initial start-up and when replacing fuses.

CAUTION

PLUG - IN CONNECTORS

Disconnect power before connecting or disconnecting any plug-in connectors.

CAUTION

DO NOT OPERATE AT FREEZING TEMPERATURES

Spraying water has a cooling effect and water will freeze even though the air temperature is slightly above freezing.

Shut the machine down at 40 degrees Fahrenheit (4.5 degrees Celsius). Do not operate machine when temperature is below 40° F (4.5° C).

- **DAMAGE TO EQUIPMENT RESULTING FROM FREEZE-UP IS NOT COVERED UNDER WARRANTY.**
- **IT IS IMPORTANT TO MAKE SURE ALL PIPE DRAINS FUNCTION PROPERLY TO PREVENT PIPELINE FREEZE-UP DURING COLD WEATHER.**

CAUTION

AVOID HIGH PRESSURE WATER STREAMS

Avoid body contact with high pressure water streams.

WARNING

AVOID CHEMICALS

Avoid exposure to sprinkler spray while chemicals are being injected into the water. Read EPA Label Improvement Program (PR Notice 87-1) and all instructions for chemical applications.

If you plan on chemigating, make certain you have complied with state or local regulations in regard to safety equipment, certification, operation and calibration of the injector pump. Make certain you have first aid and fresh water available in case of an accident. You must also be familiar with the correct cleanup procedures in case of a spill.

- **USE OF PROTECTIVE CLOTHING IS RECOMMENDED WHEN HANDLING CHEMICALS. SAFETY GLASSES, GLOVES, AND PROTECTIVE OUTERWEAR SHOULD BE WORN WHEN HANDLING CHEMICALS.**
- **CONTAMINATION OF THE WATER SUPPLY MAY OCCUR IF EFFECTIVE SAFETY DEVICES ARE NOT INSTALLED/USED IN CONNECTION WITH INJECTION EQUIPMENT FOR CHEMIGATION.**

DANGER

DRIVE SHAFTS START WITHOUT WARNING

An electric motor on each tower of the center pivot powers two or more drive shafts connected to wheel gear drives. These drive shafts start and stop without warning.

- **DO NOT TOUCH ROTATING DRIVE SHAFT OR SHIELD, CLOTHING OR LIMBS MAY BECOME ENTANGLED, RESULTING IN SEVERE INJURY.**
- **DO NOT SERVICE THE MACHINE UNTIL THE MAIN DISCONNECT IS LOCKED IN THE OFF POSITION.**
- **ALWAYS REPLACE DRIVE SHAFT SHIELDS AFTER SERVICING.**
- **DRIVE SHAFT SHIELDS MUST ALWAYS BE IN PLACE WHEN OPERATING THE MACHINE.**

Operate Safely

CAUTION

CHECK WHEEL TRACKS BEFORE STARTING

Make sure all objects, livestock or persons are clear of the machine before starting. Drive trains are powerful and can climb over vehicles, equipment, etc.

CAUTION

KEEP CHILDREN AWAY

Irrigation Machines are NOT playground equipment.

Prevent children from playing or climbing around on the machine. This can be extremely dangerous, especially if the machine is operating.

CAUTION

CHECK MACHINE DIRECTION

DO NOT operate the machine if it moves in the direction opposite to that which was chosen.

Forward should be clockwise and reverse counter-clockwise.

CAUTION

KEEP WATER OFF ROADWAYS

It is against the law in most states to allow water to spray on state and county roadways. This is a serious hazard to passing motorists.

If end guns are used, make sure you read and understand the correct procedures for setting the on and off positions to avoid watering the roadways.

If an end gun is watering a roadway, immediately discontinue use and adjust the shutoff setting or call your Valley dealer to repair the end gun shut off mechanism.

CAUTION

AUTO REVERSE OPERATION SAFETY

If the machine reverses direction at a roadway or a physical object such as a building, tree line, power pole, etc., then you MUST provide a backup device to stop the machine if the reversing mechanism were to fail. See Figure 17-1.

Contact your Valley dealer for more information concerning physical barricades for machines under these circumstances.



Figure 17-1 1. Physical Barricade

CAUTION

PROPER USE OF THE SAFETY OVERRIDE

Caution MUST be taken by the operator when using the safety override function as it will bypass or disable all of the machine's automatic safety shutdown circuits.

- **NEVER DEPRESS AND HOLD THE START/STOP SAFETY OVERRIDE SWITCH IN THE START POSITION FOR MORE THAN 3 TO 5 SECONDS.**

If the machine is not in full view by the operator, do not use the Safety Override function.

The operator MUST inspect the entire machine between each safety override start attempt.

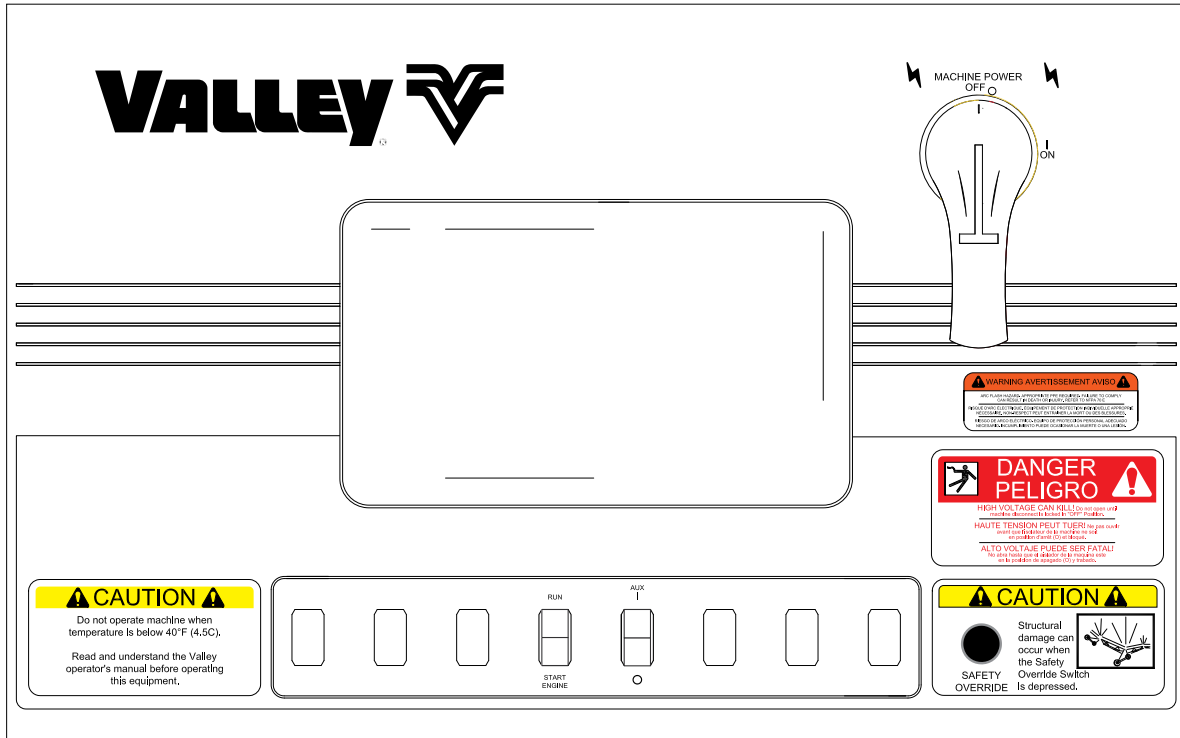
Repeated safety override start attempts can cause severe structural damage.

Call your Valley dealer if the machine fails to start.

SAFETY

Safety Decals

These Danger, Warning, and Caution decals appear in various locations on a Valley irrigation machine. You MUST familiarize yourself and other operator's with these safety decals. For replacement of any decal, contact your local Valley dealer.



CAUTION

Do not operate machine when temperature is below 40°F (4.5C).
Read and understand the Valley operator's manual before operating this equipment.

WARNING AVERTISSEMENT AVISO

ARC FLASH HAZARD. APPROPRIATE PPE REQUIRED. FAILURE TO COMPLY CAN RESULT IN DEATH OR INJURY. REFER TO NFPA 70 E
RISQUE D'ARC ÉLECTRIQUE. ÉQUIPEMENT DE PROTECTION INDIVIDUELLE APPROPRIÉ NÉCESSAIRE. NON-RESPECT PEUT ENTRAÎNER LA MORT OU DES BLESSURES.
RIESGO DE ARCO ELÉCTRICO. EQUIPO DE PROTECCIÓN PERSONAL ADECUADO NECESARIO. INCUMPLIMIENTO PUEDE OCASIONAR LA MUERTE O UNA LESIÓN.

DANGER PELIGRO

HIGH VOLTAGE CAN KILL! Do not open until machine disconnect is locked in "OFF" Position.
HAUTE TENSION PEUT TUER! Ne pas ouvrir avant que l'isolateur de la machine ne soit en position d'arrêt (O) et bloqué.
ALTO VOLTAJE PUEDE SER FATAL! No abra hasta que el aislador de la maquina este en la posición de apagado (O) y trabado.

CAUTION

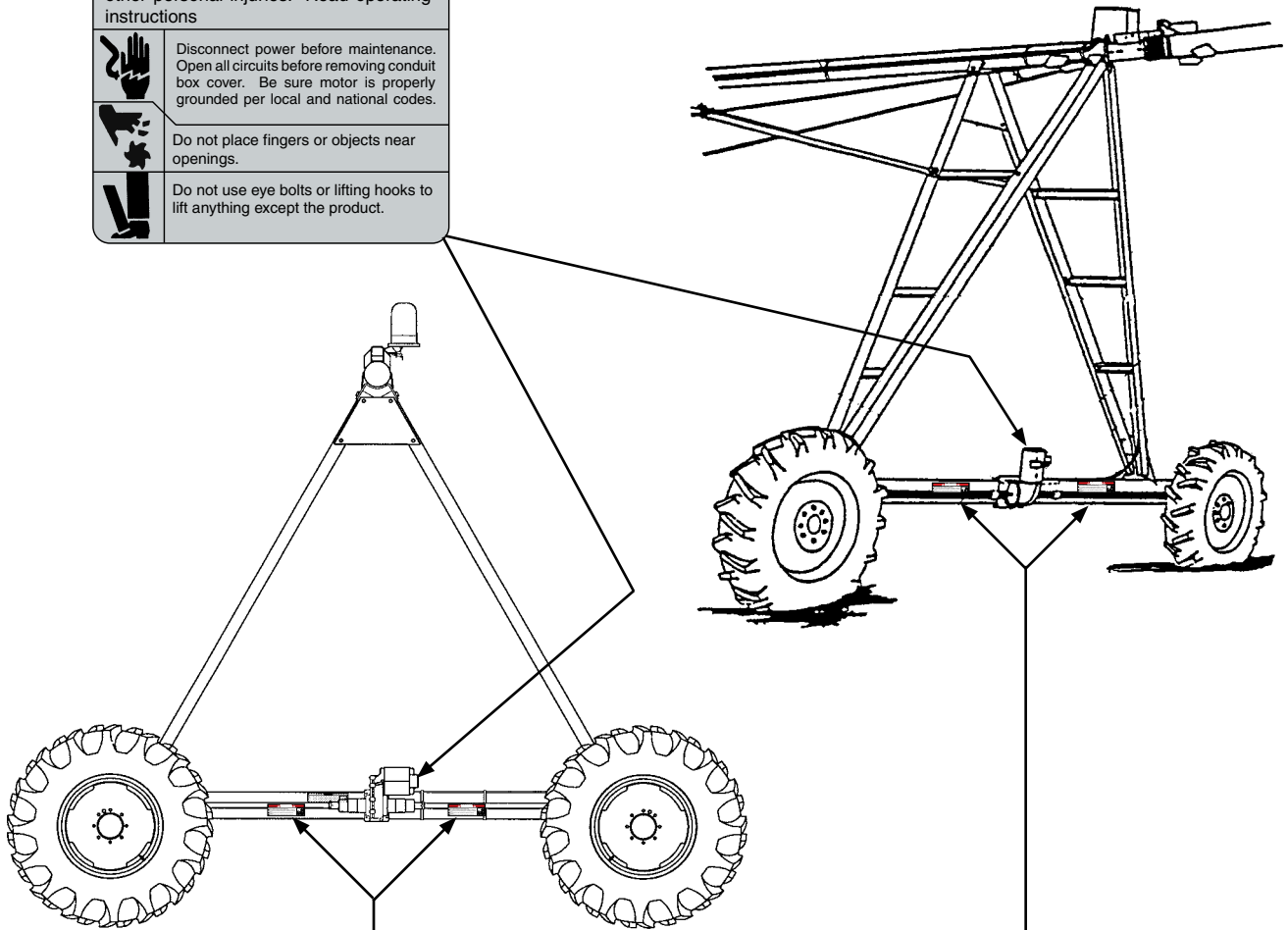
Structural damage can occur when the Safety Override Switch is depressed.

Safety Decals

⚠ WARNING

Improper installation of this motor may result in fire, explosion, electrical shock or other personal injuries. Read operating instructions

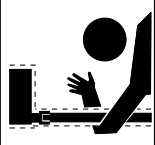
	Disconnect power before maintenance. Open all circuits before removing conduit box cover. Be sure motor is properly grounded per local and national codes.
	Do not place fingers or objects near openings.
	Do not use eye bolts or lifting hooks to lift anything except the product.



⚠ DANGER ⚠

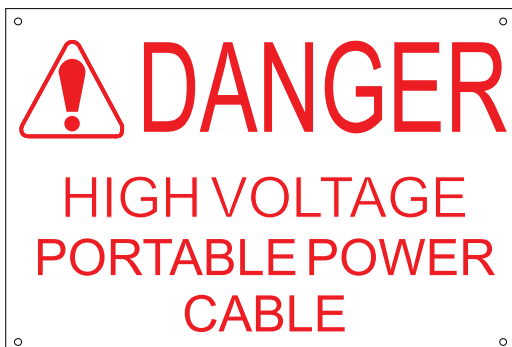
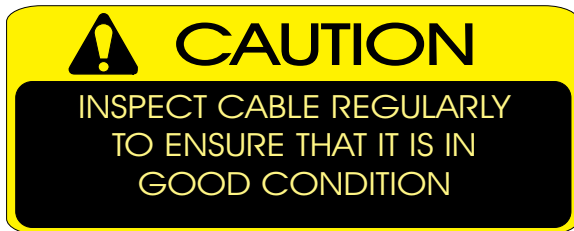
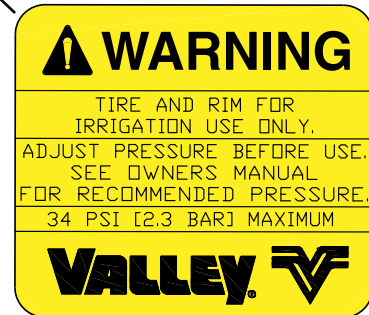
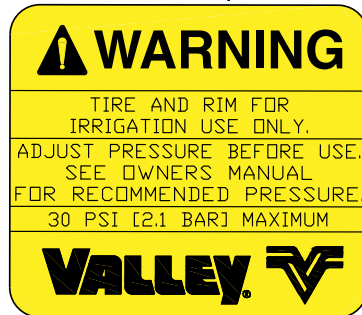
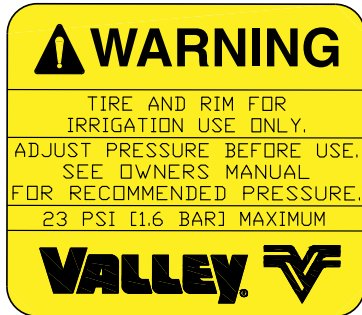
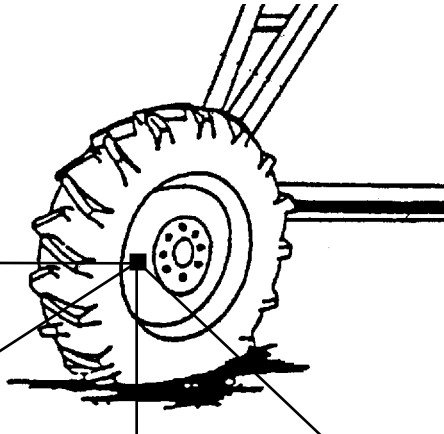
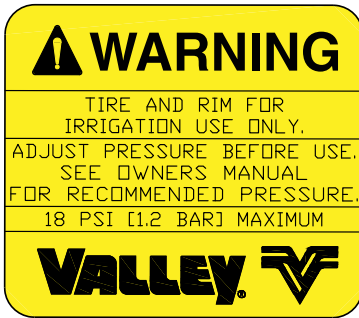
Drive Shaft Starts Without Warning!

- Do not touch rotating drive shaft or shield. Clothing or limbs may become entangled, resulting in severe injury.
- Do not service until machine is locked in the off position.
- Always replace drive shaft shield after servicing.



SAFETY

Safety Decals



THEORY OF OPERATION

The Universal Linear

The Valley Universal Linear is a mechanized irrigation machine that operates as a swing-around Linear for irrigating adjacent fields or fields perpendicular to one another.

Major components of the Universal Linear include a series of spans, drive units and a pivot structure integrated with a mobile cart. Spans incorporated into the Linear are basically the same as those used on a Center Pivot.

The Universal cart is positioned at one end of the machine. The cart includes an engine and generator unit for powering the machine, a 4-wheel drivetrain for propelling the cart, a control panel for starting, setting the operational parameters and stopping the machine and a hose attachment assembly and riser for supplying water to the Linear. Water is supplied to the Universal Linear through a hose connected to one of a series of risers along the edge of the field. As the Linear moves across the field, the hose is pulled behind the cart. An “end-of-hose stop” shuts the Linear off as the cart moves to a distance from the supply riser that is slightly less than the length of the hose. The supply hose is then disconnected from that riser and moved to the next riser to continue irrigation of the field. Once the Linear reaches the end of the field, the Linear spans can be pivoted to an adjacent field or started back across the field that has just been irrigated.

Linear Operation

The Universal Linear includes an alignment system for maintaining straight alignment between the spans and a guidance system for guiding the Linear across the field. In addition, each includes a safety system to automatically shut the machine off should a malfunction occur. One of three types of Linear guidance systems are used for Universal Linear guidance: furrow guidance, below ground guidance and above ground guidance.

Furrow Guidance

The furrow guidance system utilizes a “V” shaped furrow, 4 in to 6 in deep, running the length of the field. Resting in and following this furrow are front and rear guide wheels, each attached to long, square tubes called guidance arms. These, in turn, are attached to the Universal cart. Positioned above the inner ends of the guidance arms are steering and guidance safety control boxes. Should the cart move away from or toward the furrow, the actuator arm will move the steering arms and activate a steering switch to move the machine back into the proper position. If the machine continues to move outside the guidance parameters, a guidance safety switch will shut the machine off.

Below Ground Guidance

The below ground guidance begins with a buried loop of single conductor wire running down the center of the field. The ends of the wire loop attach to an oscillator box. The oscillator provides a signal that is given off by the wire loop.

Suspended from the truss rods at the center span of the machine is a tube with five antenna attached. Two safety and one reference antenna are positioned in the center of the tube. Mounted at each end are the forward and reverse steering antenna.

The reference antenna is directly above the buried guidance wire. As the forward or reverse antenna move to the left or the right of the guidance wire, it will become out-of-phase with the reference antenna. This will cause the Linear to steer and move back over the guidance wire until the steering antenna and the reference antenna are in phase.

The two guidance safety antenna are positioned on each side of the guidance wire. As long as the guidance wire stays between the two safety antenna, the Linear will continue to operate. Should the Linear move away from the wire in one direction or another, causing one of the safety antenna to cross the guidance wire, the safety circuit will open and shut off the machine.

The guidance system allows the Linear to know its position in relation to the buried signal wire. As long as the steering and reference antenna are moving over the wire, no steering takes place. Both the end tower or drive unit and the Universal Linear cart will move simultaneously when told to by the control panel percentage timer (timer responsible for the speed and the amount of water applied by the machine).

THEORY OF OPERATION

Pivot Operation/Adjacent Field

The Universal Linear can be pivoted 180° for irrigating an adjacent field or 90° for irrigating fields that are perpendicular to one another (the cart swivel option is required for 90° Linear positioning and operating mode).

The Linear cart must be precisely positioned at the end-of-field pivot point. This is accomplished with the end-of-hose stop. In addition, the wheel tracks in the field must be no more than 4 in deep to allow the machine to move out of the existing wheel tracks.

Once the cart is properly positioned, it is secured to pivot anchor chains. The machine is started in the appropriate pivoting direction [Forward (Clockwise) or reverse (Counter Clockwise) depending on the end of the field from which the Linear is being pivoted] by placing the "Linear/Pivot Switch" in the "Pivot" position. This shuts the cart drive-train off allowing the spans to pivot around the cart to the next field. The machine will automatically shut off once the machine has moved 180°.

This is accomplished through the controls on the pivoting swivel and swivel bearing. Once the machine is properly positioned in the next field, the cart is released from the pivot anchors and prepared for Linear irrigation. See Figure 22-1.

Pivot Operation/Perpendicular Fields

Pivoting the Linear between fields that are 90° to one another requires one additional process. Once the machine and cart have been precisely positioned at the end of the field it was operating across, the cart must be rotated 90° in the direction the machine is going to be operated. This is accomplished by raising the cart with the four jacks, placing the cart wheels in the cart rotating position, lowering and rotating the cart 90° then placing the cart wheels back into the Linear operating position. The cart must be precisely positioned and secured with anchor chains prior to start-up and rotation of the machine. Once the machine has been rotated to the second field and the cart has been disconnected from the anchor chains the machine can be prepared for linear operation. See Figure 22-1.

NOTE

- Fields perpendicular to one another require the cart to be turned 90° in the direction the machine will be rotating. The cart must be turned and secured down before the machine is rotated.

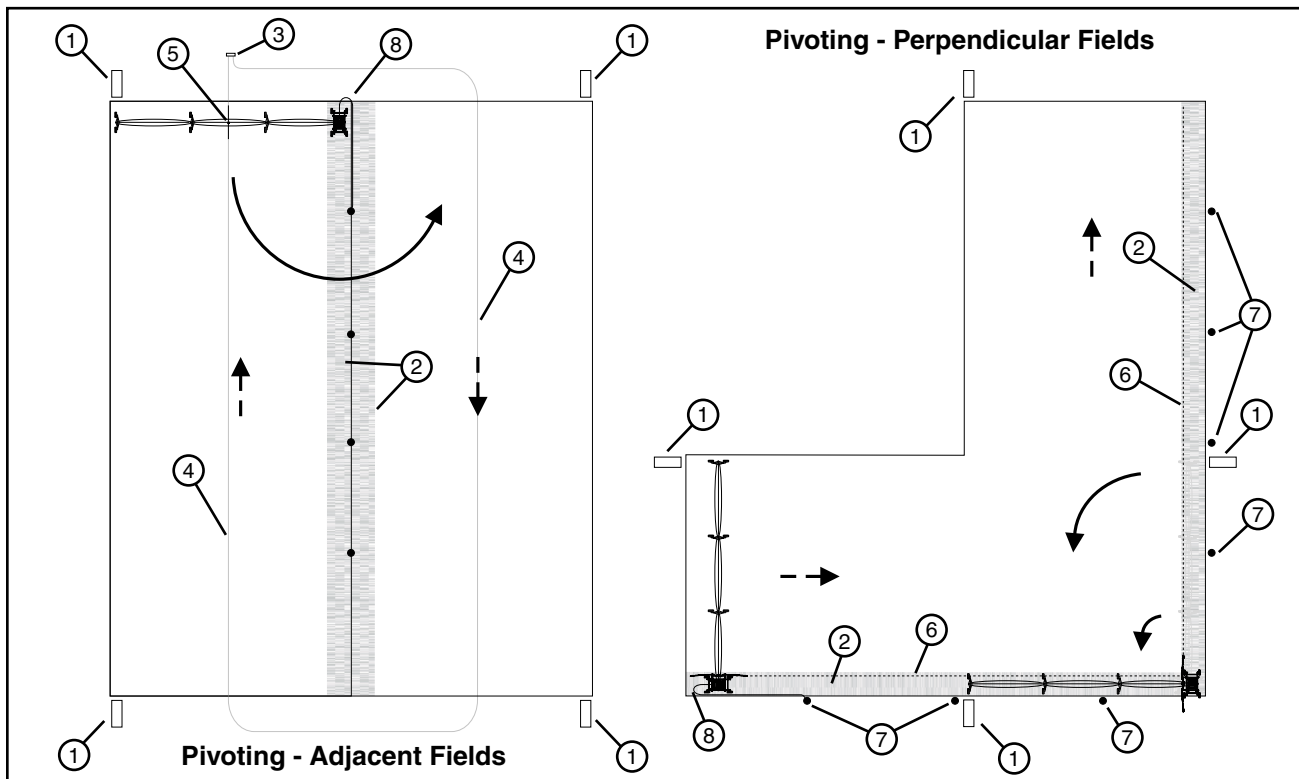


Figure 22-1 1. End-of-Field Stop 4. Buried Guidance Wire 7. Riser
2. Travel Lane 5. Guidance Antenna 8. Hose
3. Oscillator 6. Furrow Guidance

THEORY OF OPERATION

Principles of Operation

During normal operation a Linear travels at 90° to the guidance cable or wire. If, for some reason, this angle changes, the machine must “steer” itself back to the right angle operating position.

A Linear steers by stopping one of the machine’s end towers allowing the opposite end or side of the Linear to catch up bringing the machine directly over and at right angles to the guidance cable or wire. When a “steer” is in process it is necessary to pulse or slow down the end of the machine which is leading or ahead. The pulse timer performs this function.

When a “steer” occurs the leading end tower of the machine will only run a percentage of the time the opposite or trailing end tower runs. This pulse design has been integrated into the Valley Universal Linear to eliminate sharp or dramatic steers while at the same time reducing drive unit and pipeline stress caused by wheel tracks, tillage practices, etc.

On furrow guidance Linear machines, the pulse timer box is located on the next-to-last tower while on buried guidance Linears, it is located on the center tower.

In addition to machine steering, the Universal Linear cart must also steer. This is necessary because the cart is attached to the machine through a pivoting swivel rather than being rigidly attached like a drive unit is to a span.

During normal operation the Linear cart travels parallel with the drive units on the machine (perpendicular to the Linear spans). If this angle changes, the cart must “steer” itself back to a parallel operating position.

Steering of the Linear cart is accomplished through proximity switches and an activation bar or tab located on the pivot swivel and bearing. Should the cart begin moving away from parallel operation with the other drive units, the proximity switches will immediately sense this and initiate the steering of the cart. The cart is steered by reversing the panel side drive or non-panel side drive depending on the direction the cart needs to move. Once the cart is back in alignment with the rest of the machine, both the outer and inner cart drivetrain will move simultaneously when told to do so by the percentage timer in the control panel.

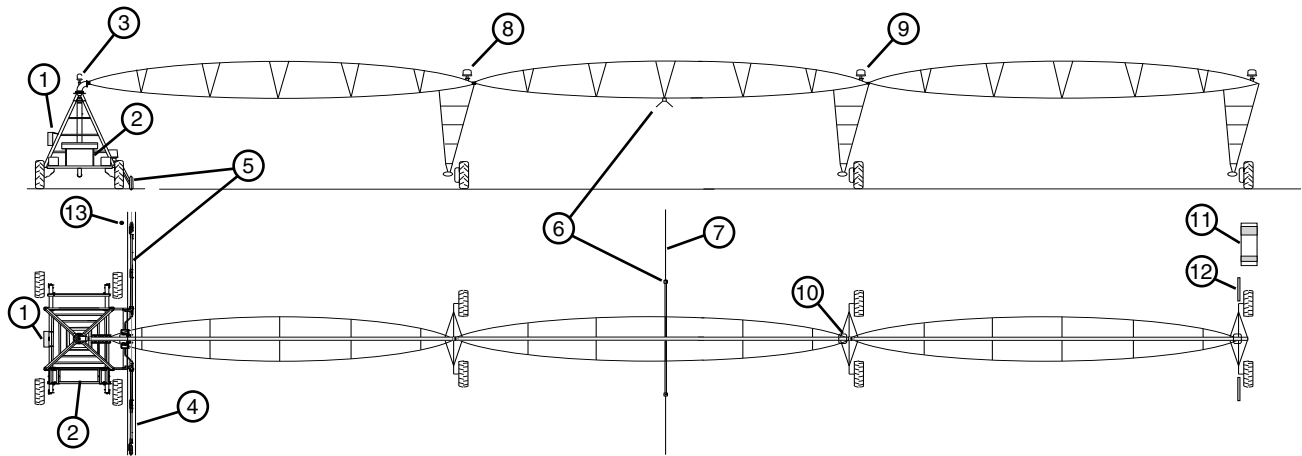


Figure 23-1 1. Main Control Panel
2. Engine/Generator
3. Cart Guidance
4. Furrow
5. Furrow Guidance

6. Below Ground Guidance
7. Buried Wire
8. Alignment Control Boxes
9. Pulse Tower Box
10. Central Pulse Timer

11. End-of-Field Stop Barricade
12. End-of Field Stop
13. Hose Stop Stake

THEORY OF OPERATION

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Universal Linear

The “Linear” is named because of its straight line or “linear” movement across the field. This provides for uniform distribution and a consistent application rate of irrigation water down the entire length of the machine. The Linear is one of the most efficient methods of distributing water, fertilizers and other chemicals.

The Valley “Universal Linear” not only has the ability to irrigate laterally straight down the field, but can also be rotated to irrigate an adjacent field or fields that are perpendicular to one another.

Major components of the Valley Universal Linear include a mobile cart with a pivot structure mounted to it, an on-board engine/generator for supplying electrical power, ditch or hose configurations for supplying water to the machine, a series of spans supported by towers or drive units and guidance systems for steering the unit.



Figure 25-1 1. Universal Linear

Universal Cart

The “Universal Cart” is a 4-wheel electromechanically powered frame assembly with a slightly modified pivot structure attached to it. Mounted at one end of the cart is an engine/generator set for supplying 480 volts/3-phase power to the machine. The other end of the cart has mounting space available for fertilizer or chemical injection equipment.

Water inlets at each end of the cart connect to a riser at the center of the pivot structure. One of the inlets is attached to the water supply line by a rubber transition hose. The supply line, a rubber or polyethylene hose, is connected to the cart by two high strength chain assemblies allowing the cart to pull the hose along.

Mounted to the cart pivot structure is an electrical control panel. All operating controls are located in the control panel.

Positioned at the cart pivot swivel are controls for maintaining alignment of the cart with the rest of the machine. These components include a proximity switch box, a proximity “dog bone” and a box tab.



Figure 25-2 1. Universal Linear Cart

OVERVIEW

Universal Linear

There are three different types of Universal Linear cart: Standard, Swivel or Swing Around. The Swing Around has a swivel on the cart and can only be an End Feed system. A closed delivery hose drag or open delivery ditch feed may be used with either type of cart. The closed delivery hose drag cart may have a side or center inlet. The placement of the tower boxes varies depending on the type of machine and guidance system.

Closed Delivery Hose Drag / Open Delivery Ditch Feed

The Universal cart is located next to the water supply pipeline or ditch and is always at the end of the machine. The central pulse tower box is always on the opposite end of the system from the four wheel cart. Its location varies depending on the total number of spans or the type of guidance system.

- When there are 3 spans or less the central pulse tower box is located one tower in from the end tower for furrow or above ground guidance.
- When there are 4 spans or more the central pulse tower box is located two towers from the end tower for furrow or above ground guidance.
- With a Below Ground Guidance System the central pulse tower box is located on the first driveunit outside of the guidance antenna.

There is no tower box on the span directly over the cart and only one end tower box located on the other end of the system. All other tower boxes are intermediate tower boxes. See Figure 26-1.

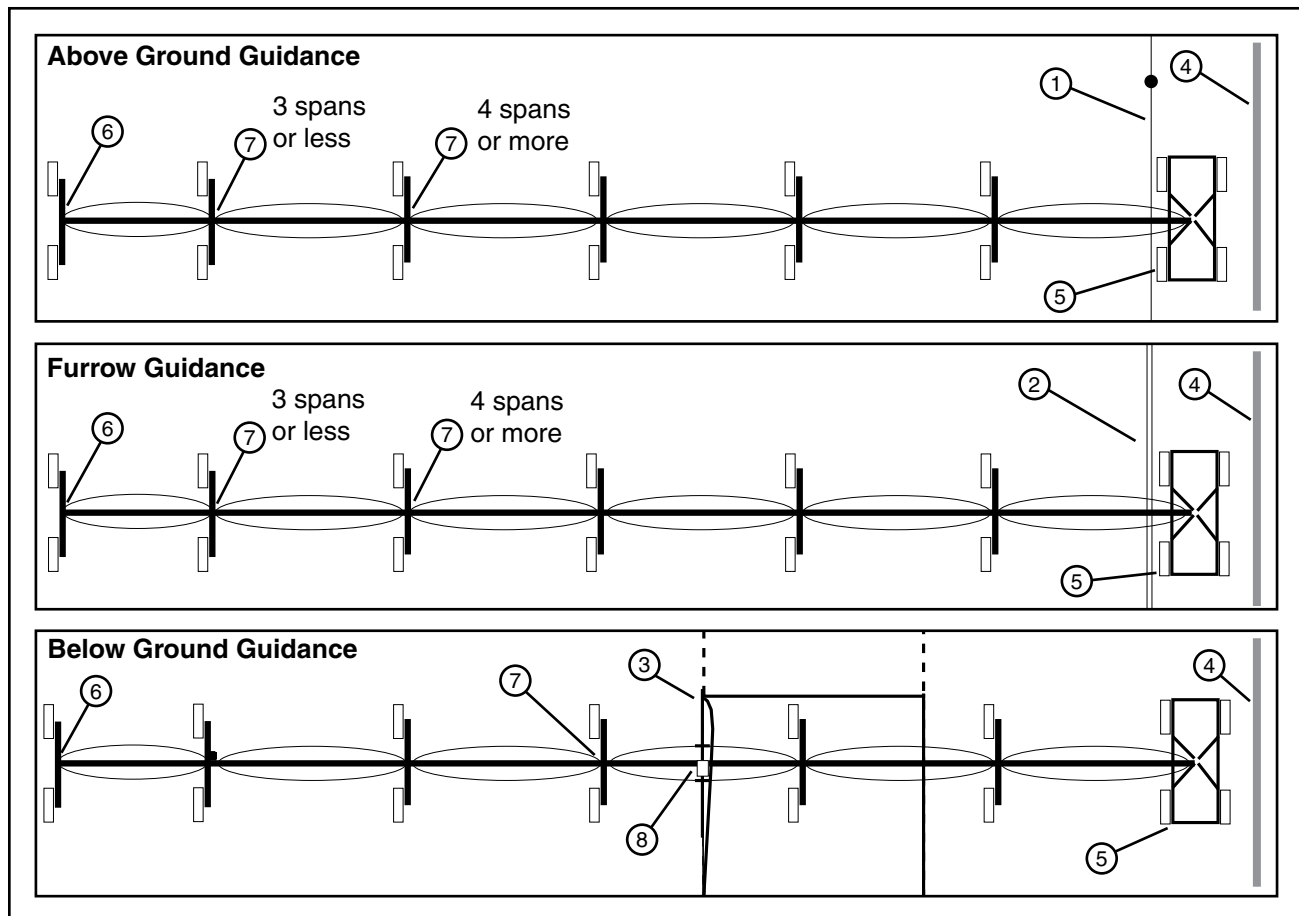


Figure 26-1 1. Above Ground Guidance 4. Water Supply 7. Central Pulse Tower Box
 2. Furrow Guidance 5. Universal Linear Cart 8. Antenna
 3. Below Ground Guidance 6. End Tower Box

Drive Motor RPM			
Motor Type	Cart Motor RPM	Intermediate Drive Unit Motor RPM	Last Regular Drive Unit Motor RPM
Standard Speed	34	43	34
High Speed	56	68	56

Spans

Water is transported across the field through a pipeline. The pipeline is made up of a series of spans which are connected together. Each span consists of truss assemblies and truss rods to support the span a tower box that acts as a junction box for the span cable and motor lead, and a drive tower which moves the pipeline across the field. See Figure 27-1.

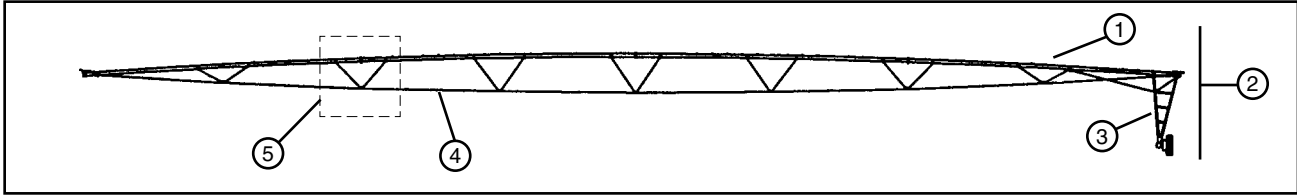


Figure 27-1 1. Pipeline 2. Span 3. Drive tower 4. Truss rod 5. Truss assembly

Drive Towers

Power to the electric motor on the center drive gearbox is supplied by the tower box. The center drive gearbox drives the wheel gearboxes. See Figure 27-2.

Hitch

The spans are attached to each other with a ball hitch and cup assembly which gives lateral, rotational, and vertical flexibility between the spans. See Figure 27-3.

The span pipeline is connected together with a flexible hose and held in place with band clamps. See Figure 27-3.

Overhang

Typically an overhang is attached to the end of the last span pipe and used for irrigation beyond the span/drive unit. Support ears and cables provide support for the overhang. See Figure 27-4.

End Gun

Typically a booster pump is installed and an end gun is attached at the end of the overhang and used to increase the area irrigated beyond the end of the machine. See Figure 27-5.

The end gun is set to cover a specified area. This area is determined by the forward and backward angles, which are referred to as the end gun arc settings.

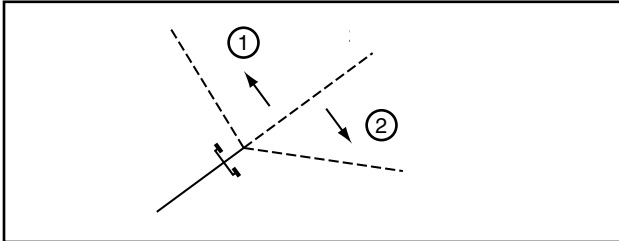


Figure 27-6 1. Backward Angle 2. Forward Angle

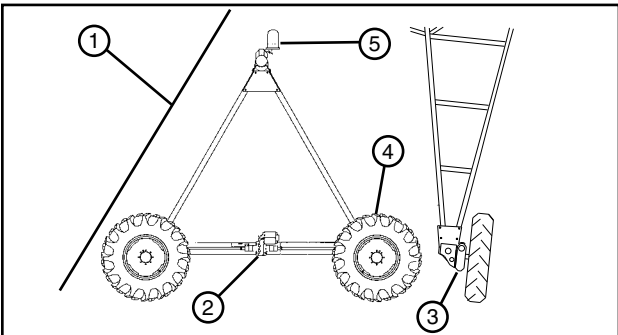


Figure 27-2 1. Drive Tower 2. Center Drive Gearbox 3. Wheel Gearbox 4. Tire And Wheel Assy 5. Tower Box

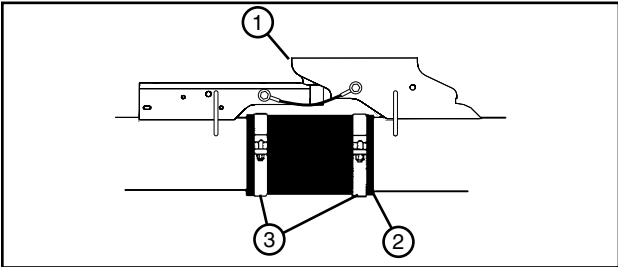


Figure 27-3 1. Ball Hitch And Cup Assembly 2. Flexible Hose 3. Band Clamp

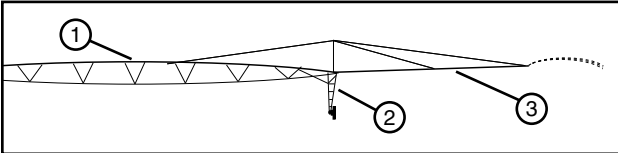


Figure 27-4 1. Span 2. Drive Tower 3. Overhang

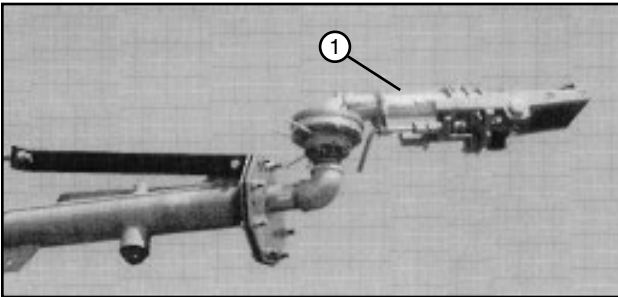


Figure 27-5 1. End Gun

OVERVIEW

Water Application

A sprinkler chart provides the operator with information about water application depths and pass times at different percent timer settings.

Water is applied to the field through the sprinklers. Sprinklers can be mounted on top of the pipeline or on drop tubes that hang below the pipeline. See Figure 28-1.

Span Cable

A cable with color coded wires enters and leaves each tower box. The cable runs the entire length of the machine and is referred to as span cable. See Figure 28-2.

The span cable can carry multiple voltages including high voltage depending on control panel and the country of use.

Intermediate Tower Boxes

The intermediate tower control boxes provide power to the center drive gear motors depending on the tower box position in relationship to the next tower in the system. See Figure 28-2.

Last Tower Box

The last tower control box provides power to the center drive gear motor depending on the percent timer setting at the control panel. It also completes the safety circuit. See Figure 28-2.

Safety Circuit

The safety circuit is a 120 volt AC control circuit that starts in the control panel and runs the entire length of the machine. See Figure 28-3.

Each drive tower box contains a safety microswitch. The safety microswitches must be closed to complete the safety circuit.

When the machine is in alignment, the safety microswitches are closed. If the machine ever becomes too far out of alignment, a safety microswitch opens, breaking the safety circuit. This stops the machine to prevent structural damage.

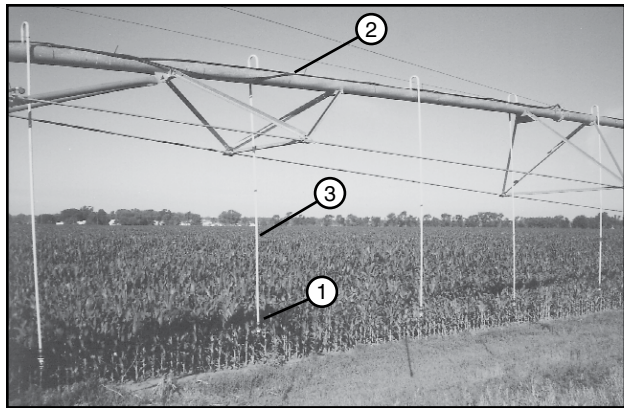


Figure 28-1 1. Sprinkler 2. Pipeline 3. Drop Tube

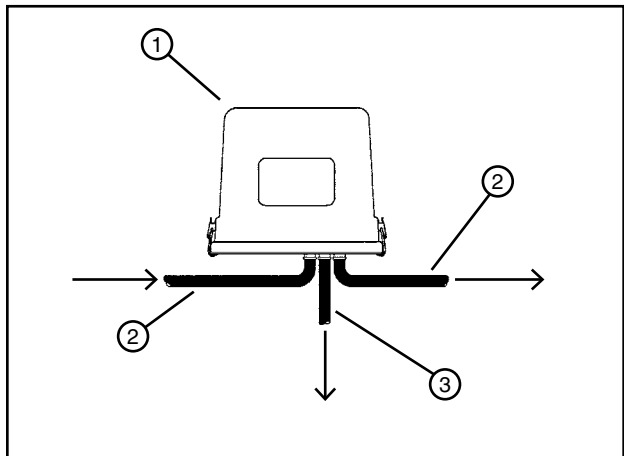


Figure 28-2 1. Tower Box 2. Span Cable 3. Cable To Drive Motor

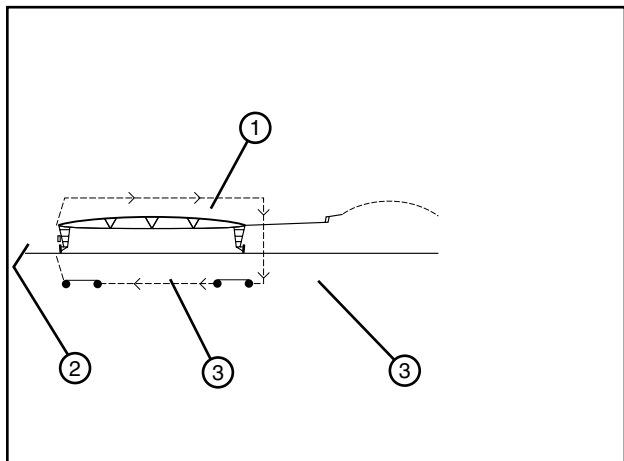


Figure 28-3 1. Safety circuit 2. Control panel 3. Safety Microswitch

Central Pulse Tower Box

The central pulse tower box provides power to the center drive gear motor depending on its position in relationship to the last tower and the machine's angle to the guidance system.

The basic components include safety microswitch, run microswitch, motor contactor, terminal block, disconnect, overwatering timer, and pulse timer. See Figure 29-1.

Overwatering Timer

The overwatering timer is a safety device used to shut the system off if one of the end towers fail to move during the overwatering timer cycle. See Figure 29-2.

The overwatering timer cycle is adjustable from 0 to 60 minutes.

Each time the central pulse tower moves, the overwatering timer is reset and another timer cycle begins.

Pulse Timer

The pulse timer is part of the linear steering system. See Figure 29-3.

During operation, the linear machine moves at a 90° angle to the guidance system. If this angle changes, the linear irrigation machine must steer itself back to the correct operating position.

When the linear machine steers, the pulse timer restricts the run time of the leading end tower to a percentage of the run time of the tower where the pulse timer is located. This allows the trailing end tower to catch up, while minimizing radical steering and possible structural damage.

The pulse timer dial is factory set to 20 percent and sealed in position.

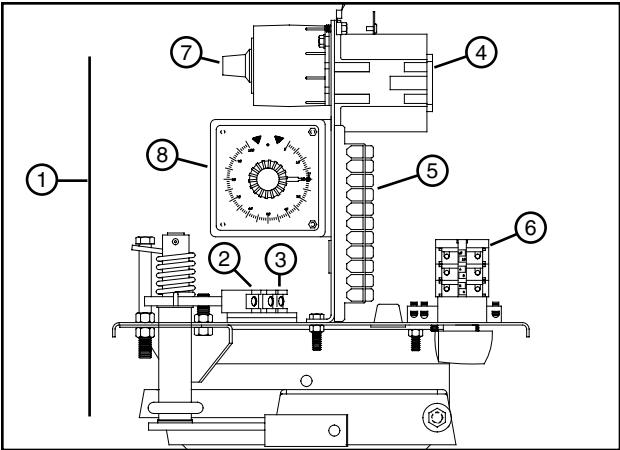


Figure 29-1 1. Central pulse tower box 5. Terminal block
2. Safety microswitch 6. Disconnect
3. Run microswitch 7. Overwatering timer
4. Motor contactor 8. Pulse timer

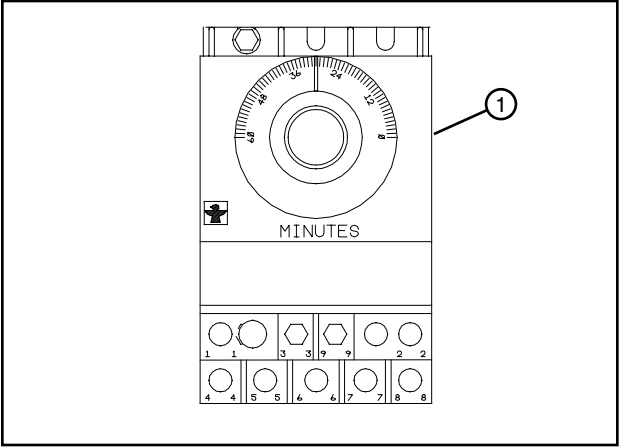


Figure 29-2 1. Overwatering timer

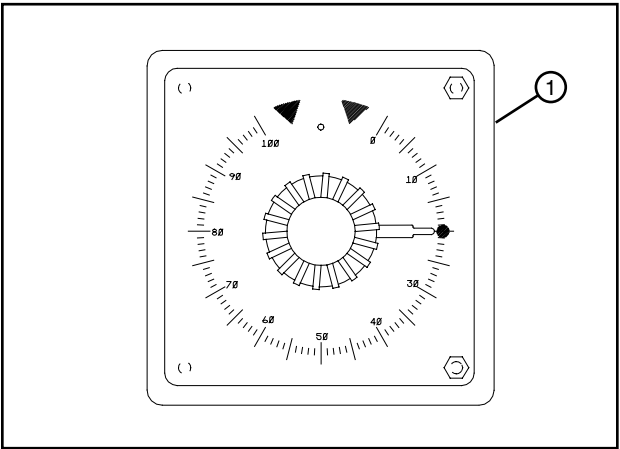


Figure 29-3 1. Pulse timer

OVERVIEW

Safety Circuit

The safety circuit is a 120 volt AC control circuit that starts in the control panel and runs the entire length of the machine. See Figure 30-1.

Each drive tower box contains a safety microswitch. The safety microswitches must be closed to complete the safety circuit.

Modified Alignment

Span alignment for universal linear machines use modified alignment only. See Figure 30-2.

The cart and the end tower are the controlling towers. As the end tower moves, all of the other towers between the cart move to maintain straight alignment.

When the end towers move, they create an angular deflection with the next tower, this closes the run microswitches and causes the next tower to move.

This cycle repeats itself throughout the length of the entire machine.

The result of these cycles is that any tower can be moving at any time, depending on its relationship with the next outer span.

See Maintenance section for adjustment procedure.

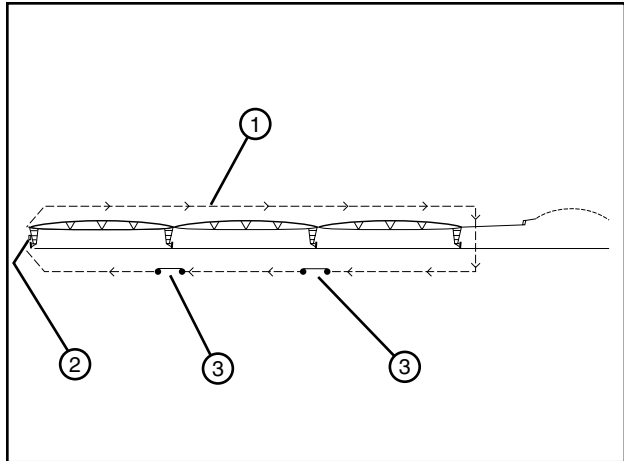


Figure 30-1 1. Safety circuit
2. Control panel
3. Safety Microswitch

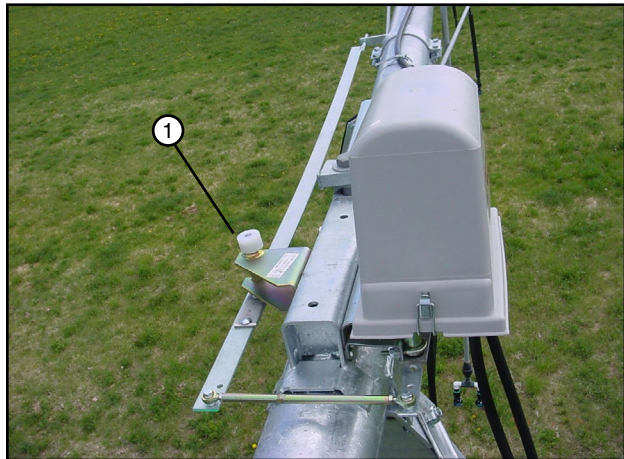


Figure 30-2 1. Modified alignment

Guidance

There are 3 types of guidance for Universal Linear machines, above ground cable, furrow or below ground guidance. Either type of guidance can be used.

Above Ground Cable Guidance (Option)

The above ground cable guidance system consists of an above ground cable supported by posts running parallel with the ditch or the water supply pipeline. Two guidance boxes, attached to the linear cart. See Figure 31-1.

As the machine travels through the field, the control arm rides the cable. If the machine moves off course, movement of the control arms will call for a steer in the appropriate direction.

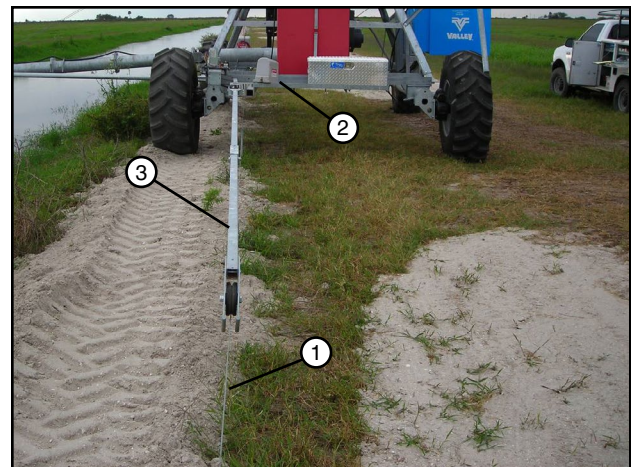


Figure 31-1 1. Cable 2. Guidance Box 3. Control Arm

Furrow Guidance (Option)

The furrow guidance system consists of two furrow guidance boxes, arms, and skids mounted on the linear cart. See Figure 31-2.

The skids follow a “V” shaped furrow, 4 in to 6 in (101.6 mm - 152.4 mm) deep, running the length of the field. See Maintenance section for detailed instructions on furrow maintenance and construction.

When the linear cart moves away from the furrow, the guidance arm will actuate a steer switch bringing the linear cart back into the correct position. If the steer switch should fail, a back-up safety switch would shut the machine down.

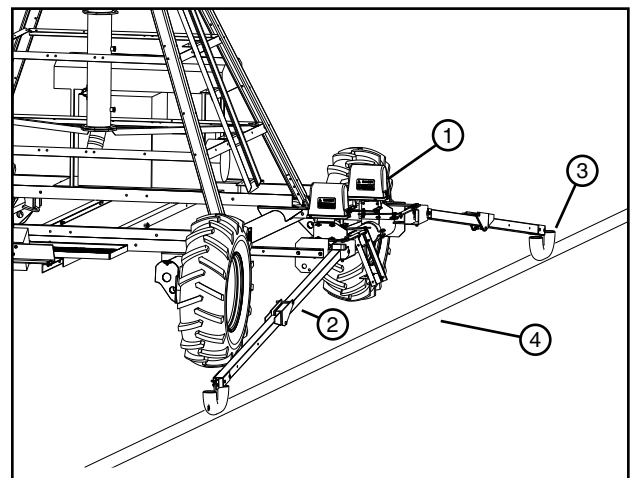


Figure 31-2 1. Guidance Box 2. Guidance Arm 3. Skid 4. Furrow

Below Ground Guidance (Option)

The below ground guidance system consists of a buried single loop wire running through the center of the field, a guidance box, five antennas mounted on the machine and an oscillator to energize the buried wire. The buried wire emits a signal when the oscillator is ON. Make sure the oscillator is turned ON before using the machine.

The reference antenna sits directly above the buried wire monitoring its signal. As the forward or reverse steering antenna moves to the left or right of the buried wire it will become in phase or out of phase with the reference antenna and cause the system to steer back onto the wire. See Figure 31-3.

The phase loss antennas are located on each side of the buried wire. As long as the wire stays between these two antennas the machine will continue to run. If either phase loss antenna crosses over the wire, the safety circuit will open and the machine will shut down. See Figure 31-3.

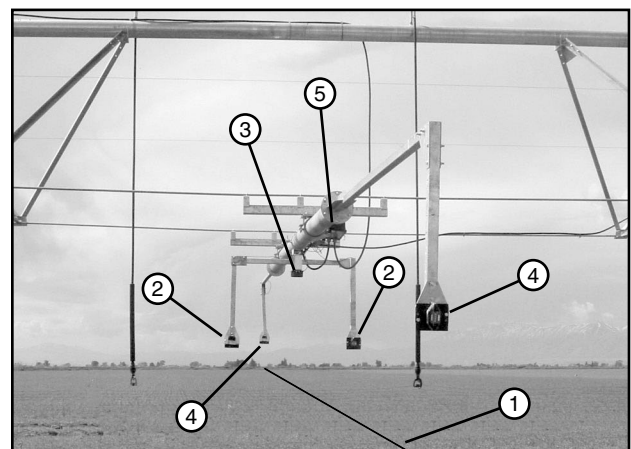


Figure 31-3 1. Buried wire location 2. Phase Loss antenna 3. Reference antenna 4. Steering antenna 5. Guidance box

OVERVIEW

Control Panel

The control panel allows the operator to control the machine. The control panel is located at the linear cart. See Figure 32-1.

Basic functions controlled by the panel include:

1. Starting/Stopping
2. Selecting forward or reverse running direction
3. Selecting machine speed (which controls the amount of water being applied).

When the machine is started, the AC power is sent through the span cable to the tower boxes. The control circuit distributes the power to the drive motors through the motor contactors and the machine moves depending on the control panel settings.

Refer to the control panel owner's manual for detailed information about the control panel operation.

Electric Cord Mounting

Closed Delivery Hose Drag

The electric cord mounting with safety switch can be mounted horizontally or vertically on the cart. See Figure 32-2.

The electric cord is spring loaded. If the electric cord is pulled beyond the limits of the safety switch setting, the safety switch opens to shut down the machine.

Open Delivery Ditch Feed

The electric cord mounting with safety switch is mounted horizontally or vertically on the cart between the cart disconnect panel, pump panel and junction box. See Figure 32-3.

The electric cord is spring loaded. If the electric cord is pulled beyond the limits of the safety switch setting, the safety switch opens to shut down the machine.

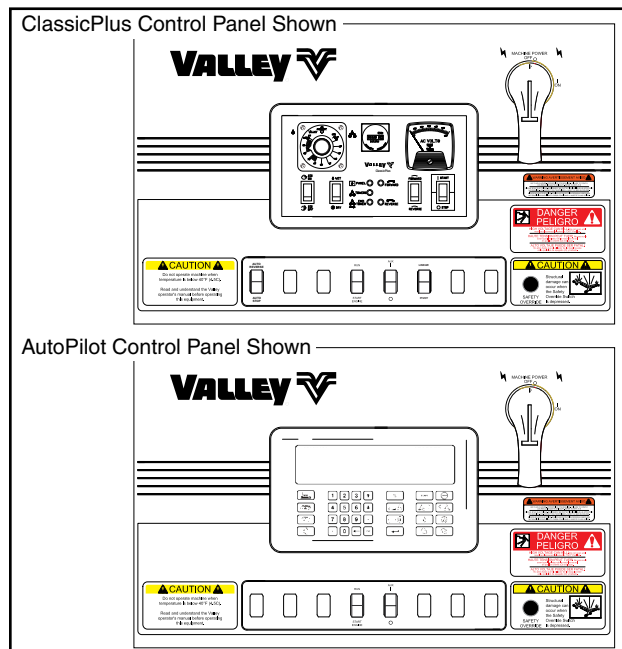


Figure 32-1

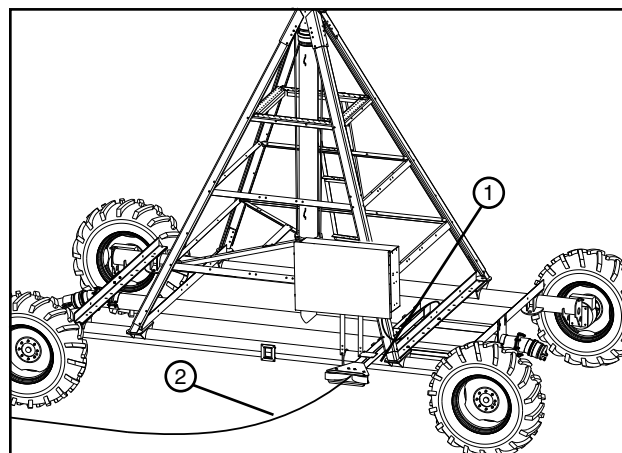


Figure 32-2 Closed Delivery
1. Electric Cord Mounting
(Horizontal Mounting Shown) 2. Electric Cord

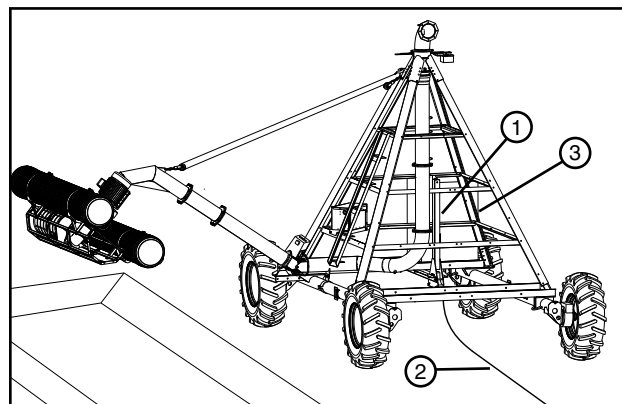


Figure 32-3 Open Delivery
1. Electric Cord Mounting 3. Cart Disconnect Panel
2. Electric Cord

Above Ground Cable End of Field Stop (Option)

The Above Ground Cable Guidance End of Field Stops are positioned on the above ground cable at each end of the field. See Figure 33-1.

When the leading control arms reach the triangular end of field stop plate they begin to separate and eventually trip the safety switch which shuts down the machine.

Cart Mounted End of Field Stop/ End of Hose Stop (Option)

The End-Of-Field Stop/End Of Hose Stop has a single stage switch to stop the cart at the end of the field or end of hose.

When used as an end of field stop, an end of field stop post is placed as desired at each end of the field. When the swivel arm deflects against the stop post, the machine will stop. See Figure 33-2.

When used as an end of hose or cord stop, an end of hose stop post is placed at required intervals along the cart path. When the swivel arm deflects against the stop post, the machine will stop. The stop post must be removed before the machine can be restarted. See Figure 33-2.

Auto Reverse/Auto Stop Box (Option)

The Auto Reverse/Auto Stop box provides the machine the ability to Auto Reverse and Auto Stop.

The Auto Reverse/Auto Stop Box is mounted on the drive unit mounted end of field stop and is only used with the Auto Reverse/Auto Stop option. See Figure 33-3.

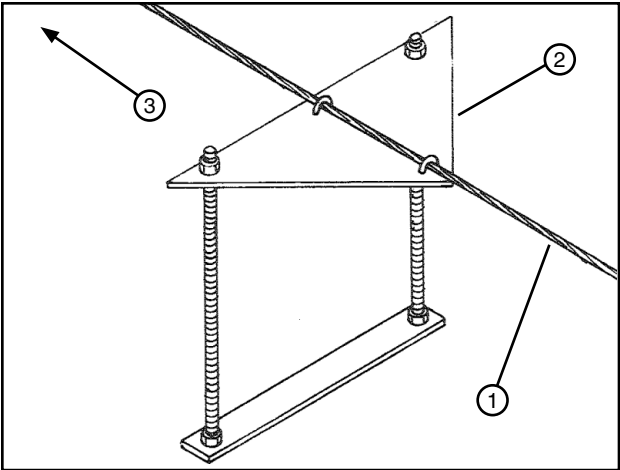


Figure 33-1 1. Above Ground Cable
2. End of Field Stop Plate

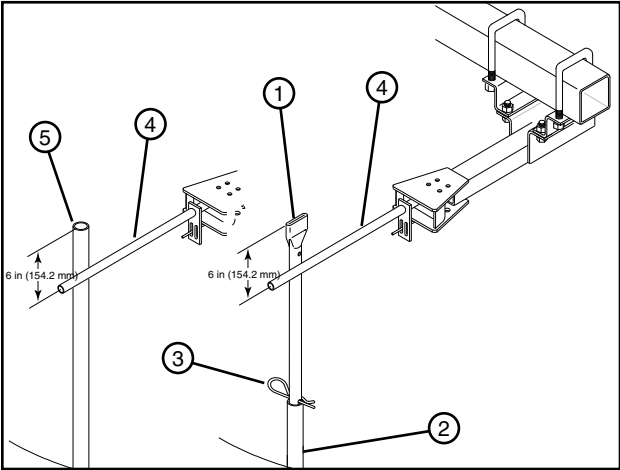


Figure 33-2 1. End Of Hose Stop Post Upper 4. Swivel Arm
2. End Of Hose Stop Post Lower 5. End Of Field Stop Post
3. 5/32 in Hair Pin

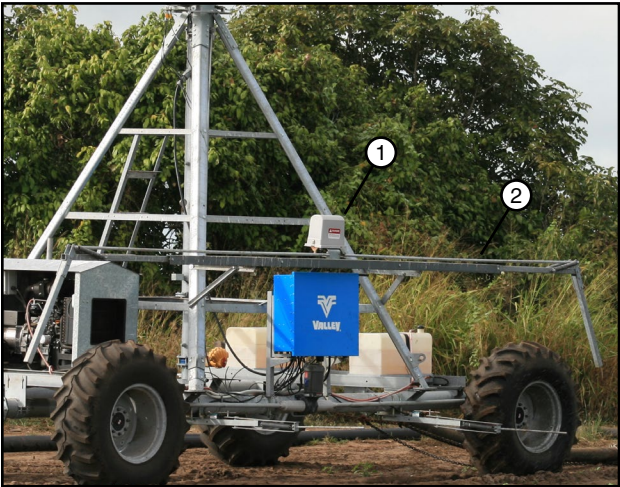


Figure 33-3 1. AR/AS Internal Switch Box
2. End of Field Stop

OVERVIEW

Electric Cord Drag (Option)

The electric cord mounting with safety switch can be mounted horizontally or vertically on the cart. See Figure 34-1.

The electric cord is spring loaded. If the electric cord is pulled beyond the limits of the safety switch setting, the safety switch opens to shut down the machine.

Engine Generator (Option)

The engine generator option is attached to the universal cart. See Figure 34-2.

Fuel Tank (Engine Generator Only)

The fuel tank has a capacity of 30 gallons and is equipped with a vented cap. Two fuel tanks can be mounted on the universal linear cart. See Figure 34-2.

End of Field Stop/Auto Reverse (Option)

The drive unit mounted end of field stop is used with both the end of field stop and end of field auto reverse option. See Figure 34-3.

This mechanism will stop the system when the actuator arm contacts the barricade.

If the auto reverse option is installed, the operator can choose to either have the system stop or automatically reverse its direction of travel and continue to run.

CAUTION

- NEVER USE THE SAFETY OVERRIDE BUTTON TO WALK THE MACHINE OFF OF THE BARRICADE. STRUCTURAL DAMAGE MAY RESULT.
- SOIL MAY BUILD UP IN THE WHEEL TRACK RESULTING IN A RAMP EFFECT ALLOWING THE ACTUATOR ARM TO GO OVER THE BARRICADES. REGULARLY MAINTAIN THE WHEEL TRACK TO INSURE THE ACTUATOR ARM ALWAYS CONTACTS THE BARRICADE.

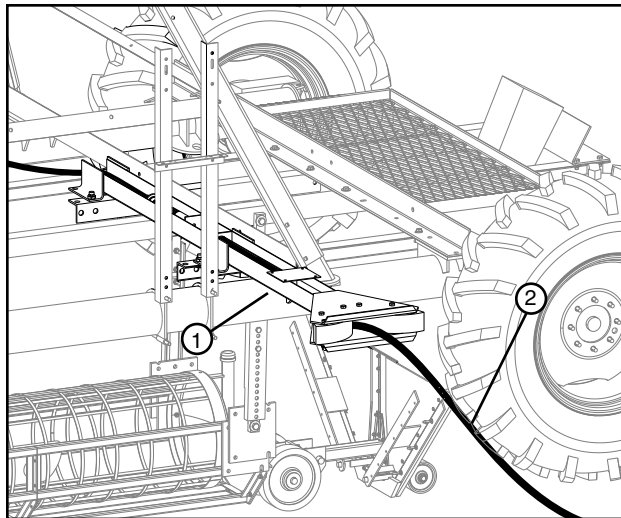


Figure 34-1 1. Electric Cord Mounting with Safety Switch
2. Electric Cord

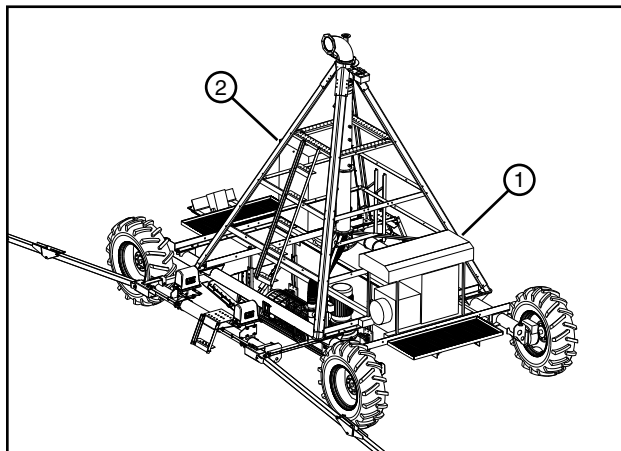


Figure 34-2 1. Engine Generator
2. Fuel Tank

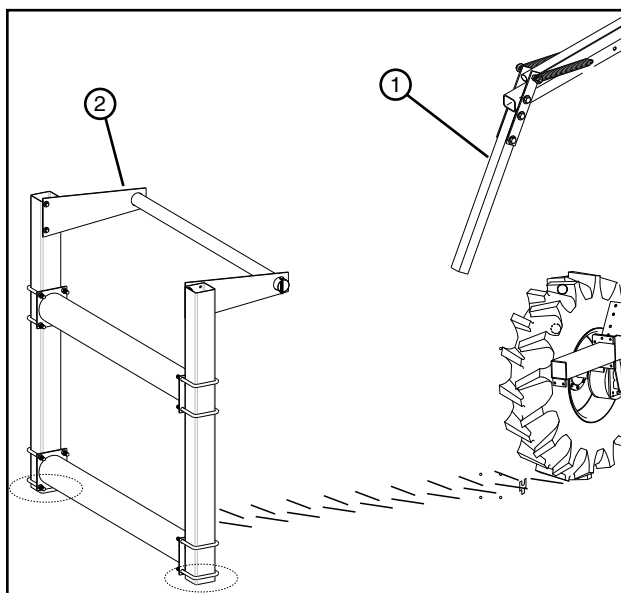


Figure 34-3 1. Actuator arm
2. Barricade

Machine Operation

The Universal Linear was designed to be used on relatively level fields should not be used on any severe rolling or sloping terrain. The cart path must be maintained flat and free of any ruts or tracks which would force side loads into the cart frame. Should ruts develop in the cart path, the owner/operator should grade the surface smooth and maintain cart path flat and free of ruts or tracks during irrigation season.

For proper operation of the Universal Linear machine, the Control Panel Owner's Manual and Universal Linear Owner's Manual must be used together.

The Control Panel Owner's Manual includes safety guidelines and explains the basic operation of the control panel itself, including how to start/stop the machine, change running direction and change water application amounts.

The Universal Linear Owner's Manual includes safety guidelines and explains the operation of the Universal Linear machine including how to establish wheel tracks, methods of operation, closed delivery operation, open delivery operation, swing around operation, electric cord drag operation with hose and cord positioning.

All owner's, operators and maintenance personnel MUST read and understand the Control Panel Owner's Manual and the Universal Linear Owner's Manual.

Overwatering Timer

The overwatering timer located in the central pulse tower box is a safety device used to shut the machine off should one or both of the end towers fail to move. The overwatering timer is set by the operator. See Figure 35-1.

⚠ DANGER

- **THE TOWER BOXES CONTAIN HIGH VOLTAGE! 480 VOLTS CAN KILL.**
- **ALWAYS DISCONNECT ELECTRICAL POWER BEFORE SETTING THE OVERWATERING TIMER.**
- **ALWAYS REPLACE ANY COVER THAT WAS REMOVED TO MAKE OVERWATERING TIMER ADJUSTMENT.**

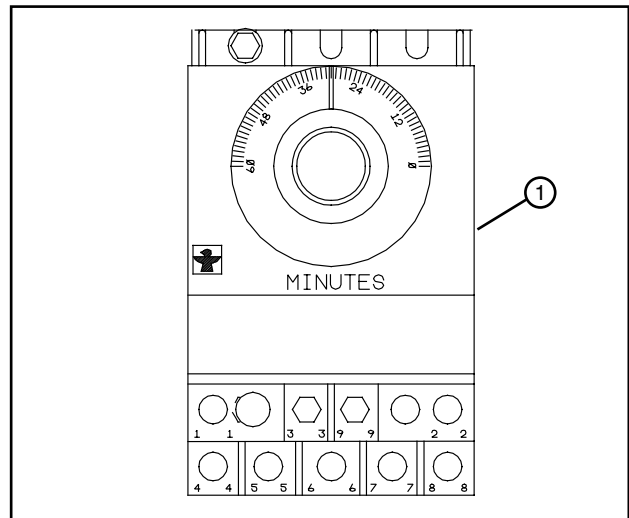


Figure 35-1 1. Overwatering timer

Refer to the chart for suggested overwatering timer settings based on the control panel percent timer setting. The times shown in the chart are actual minutes that the overwatering timer will allow the central pulse tower box drive unit to stand still before it shuts the machine off. See Figure 35-2.

NOTE

- **An overwatering timer setting of less than the Suggested Overwatering Timer Setting may be used when chemigating.**

Each time the central pulse tower box drive unit moves the overwatering timer is reset and another time out cycle begins.

OVERWATERING TIMER SETTINGS	
The overwatering timer should be set in relationship to the percent timer setting.	
Percent Timer Setting	Suggested Overwatering Timer Setting
90%	20 Minutes
80%	20 Minutes
60%	20 Minutes
40%	20 Minutes
30%	28 Minutes
10%	36 Minutes

Figure 35-2

OPERATION

Water Shut Off Valve (Closed Delivery Hose Drag Only)

The Water Shut Off Valve is typically used to prevent overwatering by automatically shutting off the flow of water if the machine shuts down due to a break in the safety circuit. The Water Shut Off Valve is a hydraulically operated sleeve type control valve with a function selector and an electric solenoid. See Figure 36-1.

The function selector has three positions; Open, Close and Auto.

- When the function selector handle is pointed to the Open position the water shut off valve will open completely.
- When water pressure exists on the up stream side of the water shut of valve and the function selector handle is pointed to the Close position the sleeve chamber is pressurized, closing the water shut off valve completely.
- When the function selector handle is pointed to the Auto position then the electric solenoid is used to automatically open or close the water shut off valve if wired to do so. The electric solenoid must be energized to open the water shut off valve and de-energized to close the water shut off valve. The water shut off valve is either in the completely opened or the completely closed (shut off) when operated electrically. Pointing the function selector handle to open or close will override the auto control.
- To hold the water shut off valve partly open, use the function selector to open the water shut off valve part way and then point the function selector handle midway between open and close.

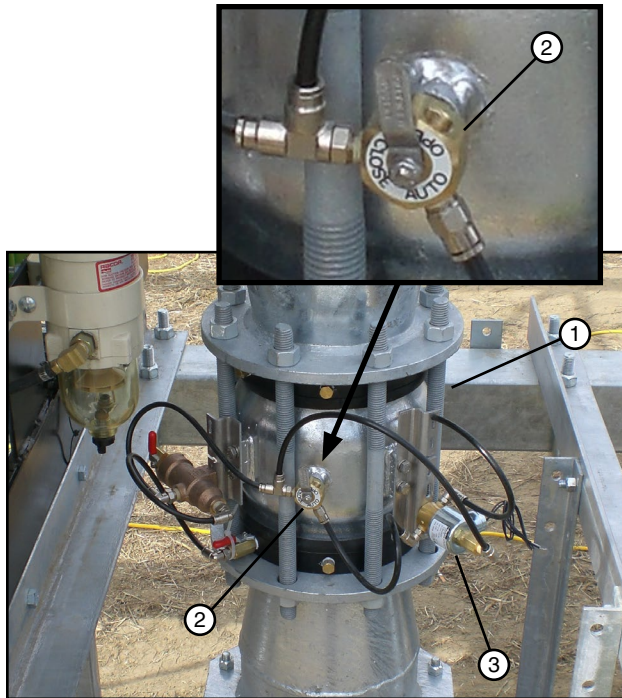


Figure 36-1 1. Water Shut Off Valve
2. Function Selector
3. Electric Solenoid

Starting and Stopping the Machine

Starting the Machine

Refer to the control panel owner's manual for information about starting the machine.

Emergency Stopping

To stop the machine in an emergency situation, shut off any one of the following:

- Main Service Disconnect Switch from public power to the control panel. See Figure 37-1.
- Control Panel Main Disconnect Switch. See Figure 37-1.
- Any Tower Box Disconnect Switch. See Figure 37-1.

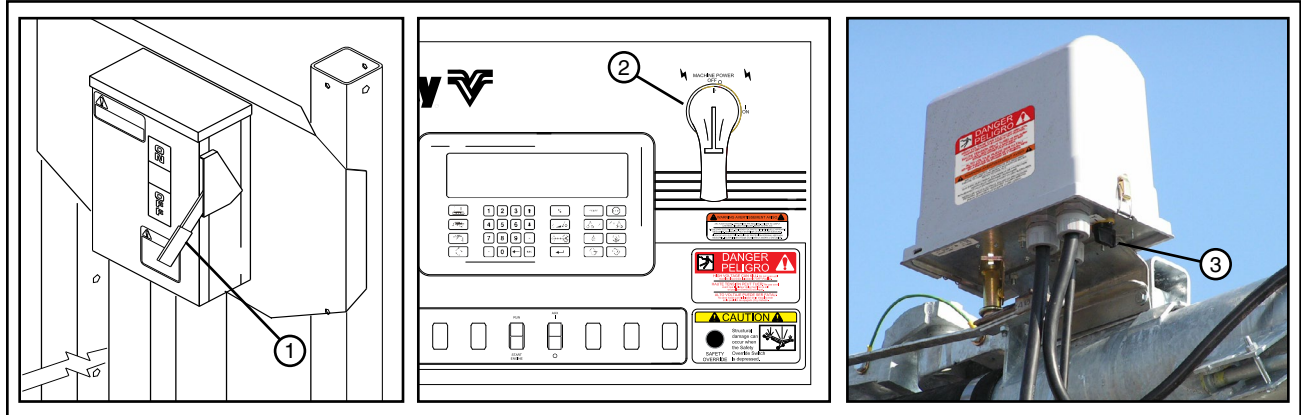


Figure 37-1 1. Main Service Disconnect Switch
2. Control Panel Main Disconnect Switch
3. Tower Box Disconnect Switch

Stopping Under Normal Conditions

1. Press the STOP key. See Figure 37-2.
2. Turn the main disconnect switch to the OFF position. See Figure 37-2.
3. Turn the pumping unit OFF (if not automatic).
4. If an engine generator set is utilized, place the Engine Run/Start switch to the Start position for the next start-up sequence.

WARNING

- **DO NOT SHUT THE MACHINE OFF BY SLOWLY IDLING DOWN THE ENGINE GENERATOR SET. THIS PRACTICE CAUSES LOW VOLTAGE AND WILL DAMAGE MACHINE COMPONENTS.**
- **ALWAYS STOP THE IRRIGATION MACHINE PRIOR TO SHUTTING DOWN THE ENGINE-GENERATOR SET.**

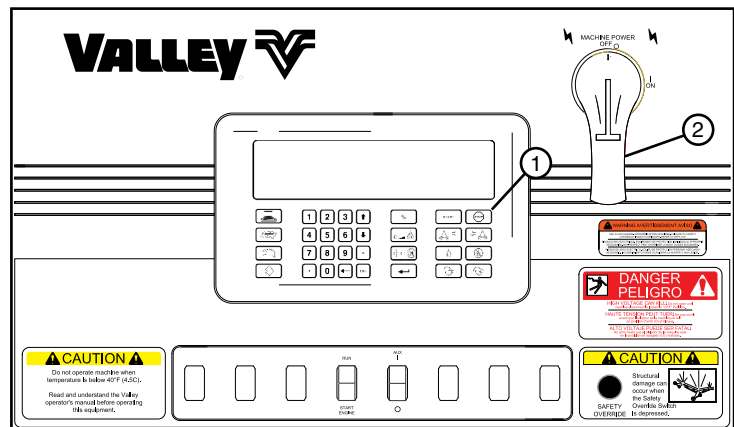


Figure 37-2 AutoPilot Control Panel Shown
1. Stop Key
2. Main Disconnect Switch OFF

OPERATION

Wheel Tracking

It is very important to establish proper wheel tracks for the Universal Linear. Wheel tracks have a significant effect on the machine's ability to steer.

Wheel track depths must not be allowed to exceed 6 inches. Drive unit boom backs, track fillers, tillers, discs or flotation tires are some ways to manage and control this depth.

NOTE

- **Special care should be taken with the Universal Linear at its pivoting points. The depth of the drive unit wheel tracks must not exceed 4 inches.**

Direction Of Travel

Your field tillage practices have a direct effect on the Linear and the maintenance of the wheel tracks. Prior to planting or seed bed preparation the following must be considered.

The Universal Linear should typically operate or run perpendicular to the crop rows. However, if the crop irrigated requires a bed which exceeds 4 inches, the run or direction of travel should be parallel to the crop rows.

If the machine operates parallel to the beds or rows, one of the following methods should be implemented:

I

- A. Operate the machine **dry** the entire length of the field prior to planting and/or irrigating. This will establish the Universal Linear's wheel tracks.

NOTE

- **It is recommended no water be applied on the first pass to better establish the initial drive unit wheel tracks.**

- B. Using the wheel tracks as a guide, plant the crop or crops parallel to the tracks allowing 10 inches of clearance space between each wheel track and the first crop row on either side of each track.

II

- A. Plant the entire crop parallel to the Linear's "run".
- B. Operate the machine dry across the freshly planted field.
- C. Remove or flatten the rows at and 10 inches on either side of the wheel tracks.

The methods above will help prevent deep wheel

tracks, avoid hopping of drive units between the crop rows and allow the Universal Linear to "steer" as required.

NOTE

- **The machine should not cross furrows or rows at a shallow angle.**

Establishing Wheel Tracks

1. The first pass across the field should be dry and at a 100% percentage timer setting.
2. The second pass should be at the 80-100% percentage timer setting while applying water.
3. Subsequent passes at any desired setting. It is best, however, to make more frequent, lighter applications than fewer heavier applications.

If the Universal Linear is operating in tracks that have become too deep, the tracks must be filled in and the machine run dry at the 100% percentage timer setting. The return pass is made while watering at the 80-90% setting. If any portion of the old tracks still remain, repeat this procedure until the machine is operating on a flat, level track. See Figure 38-1.

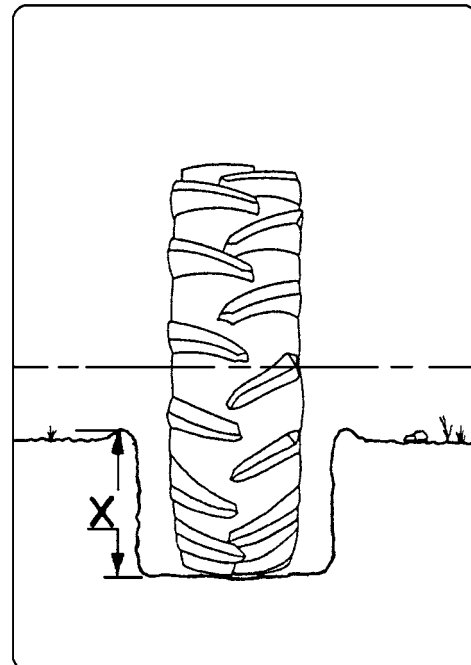


Figure 38-1 X = Maximum Wheel Track Depth

- 4 inches for standard Linear operation.
- 2 inches at the end of field run for swing-around Linear operation.
- Do not allow wheel tracks at the cart.

Methods of Operation

The following information presents some of the many possible operating methods. None of them should be considered as a “RECOMMENDED” method for your machine operation. We suggest you discuss this matter with your Valley dealer who can assist you in determining soil types, crop water requirements and machine capacity.

Method I

Fields parallel to one another allow for continuous irrigation across ground that has had an opportunity to dry thus making it easier to maintain shallow wheel tracking. If the machine is started at the end of the first field and operated wet to the other end, it can be rotated to the second field for irrigating. Once the second field is irrigated, the machine can again be rotated to the first field and stopped or begin irrigation on ground that has had an opportunity to dry. See Figure 39-1

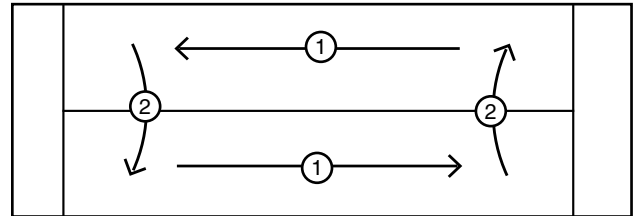


Figure 39-1 Method I
1. WET
2. DRY

Method II

Perpendicular fields provide the opportunity, in one direction, to irrigate and rotate over ground that is dry. Once both fields have been irrigated then it would be necessary for the machine to be stopped for a period of time to allow the ground to dry before the return pass or adopt a combination of operating suggestions in Methods III through VII. Again, your local Valley dealer can assist you in your particular application. See Figure 39-2.

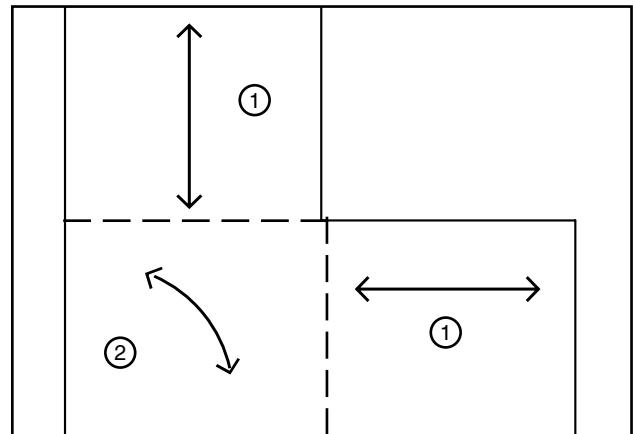


Figure 39-2 Method II
1. WET
2. DRY

Method III

Method III is a good method for many fields and soils. The Universal Linear is started at one end of the field and run to a point somewhere in the middle of the field “wet”, or irrigating as it moves. At the middle point, the machine is stopped; the speed control is set at 100%, and the machine is moved “dry” to the other end of the field. At this end, the machine is reversed and speed is reset to desired application depth, and the machine is returned to the middle point. At the middle point, the Linear is stopped. By the time the machine reaches this point, the first part of the field that was irrigated has probably dried sufficiently to let the machine speed be reset to 100% and allow the Linear to be run “dry” to the original end of the field without danger of deep rutting caused by running across recently irrigated wet ground. See Figure 39-3.

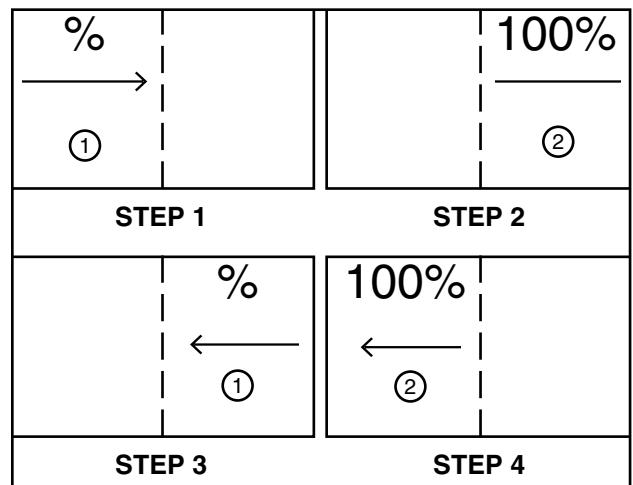


Figure 39-3 Method III
1. WET
2. DRY

NOTE

- The machine operator must be present at the completion of each step in the process in order to change mode (wet or dry), direction (forward or reverse), and set speed (change percentage timer). If the operator was only 30 minutes late each time the machine reached the end of a step of the cycle (even if it was 3 a.m.), two hours of time would be used without accomplishing any irrigation.

OPERATION

Method IV

Method IV is a good method where only one field is being irrigated and minimal operator attention is available and/or irrigation is largely supplemental in nature. The Linear is started at one end of the field and run “wet” to the opposite end. To avoid deep ruts from running the machine back over the newly irrigated field, the machine is allowed to “rest” for a period of time sufficient to let the field dry out a bit. Because there is no immediate need for machine reversal at the completion of step 1, no critical attendance by the Linear operator is required. Also, maintenance can be performed on the machine during the “rest” period, step 2. At the end of the step 2 period, the machine is returned quickly and “dry” to the starting point. See Figure 40-1.

Method V

Method V is probably limited to frequent shallow applications on relatively sandy soils. The machine is run “wet” back and forth across the field, and is reversed over freshly irrigated ground — a practice that is probably allowable only where applications have been shallow and where soil type (sandy) does not readily “rut” when wet. See Figure 40-2.

Method VI

Method VI is similar to Method III, except it is probably more suitable in situations where the water source cannot be independently controlled by the machine operator and/or it is not desired or possible to turn the water “off” while the machine is being repositioned in the cycle. The Linear is started at one end and run “wet” with a fairly deep application to a middle point. At the middle point the speed is increased so that a shallower amount is applied to the second part of the field. Upon reaching the end of the field, the machine is reversed and slowed down to apply the deep application. If the previous shallow application and soil type are compatible, wheel track rutting may be minimized even though the machine is crossing freshly irrigated ground. This situation will obviously be worse right at the end of the field; as the machine progresses through step 3 it will be irrigating progressively dryer soil. When the machine reaches the middle point, the speed is increased to apply the shallow depth while the machine is moving to the original point. See Figure 40-3.

For example, if the machine has a capacity for applying 0.4 inch depth at 100% speed, and it is desired to apply a total of 2 inches, the application would be:

Steps 1 and 3 = 1.6 in (25% setting)
 Steps 2 and 4 = 0.4 in (100% setting)

Total = 2 inches

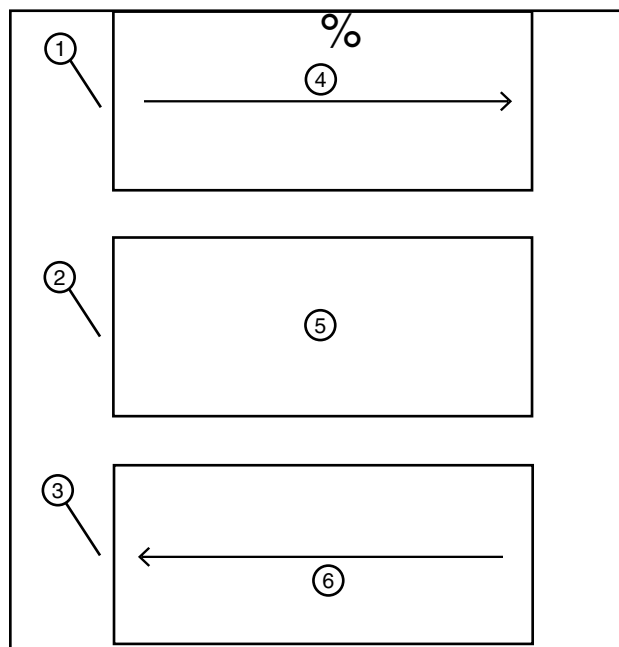


Figure 40-1 1. Step 1 4. WET
 2. Step 2 5. REST
 3. Step 3 6. DRY

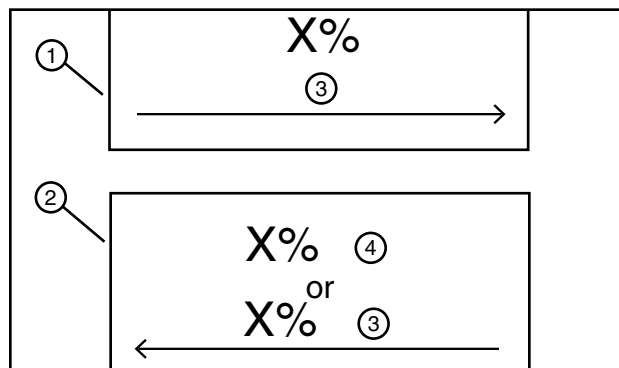


Figure 40-2 1. Step 1 3. WET
 2. Step 2 4. DRY

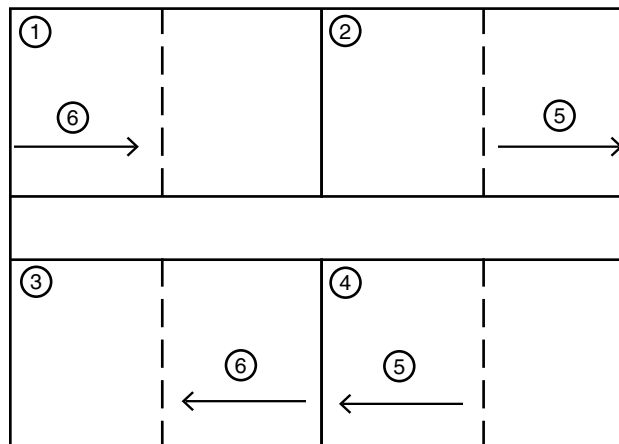


Figure 40-3 1. Step 1 5. Wet Shallow
 2. Step 2 6. Wet Deep
 3. Step 3
 4. Step 4

Method VII

Method VII can be used where it is desired to harvest one portion of a field while irrigating the other. This has proven popular on forage crops such as alfalfa. A variety of options are available in the groups of steps 1, 2, 3, 4 and 5, 6, 7, 8, with the machine running wet, alternating wet and dry, or whatever mode is desired while fieldwork is under way on the other portion of the field. In essence, each part of the field should be examined in the proper method of operation just as if it were a separate field — and then the two (or more) portions must be added together to determine the total irrigation requirement for the field. See Figure 41-1.

Other Methods

Because the Universal Linear is a very versatile machine, and because specific field requirements vary widely, an almost endless combination of machine management methods are possible.

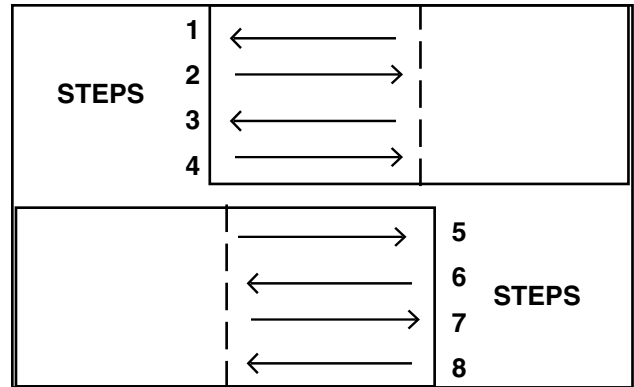


Figure 41-1 1. Method VII

OPERATION

Water Application - Percentage Timer Calculations

The methods of applying irrigation water with a Linear machine vary widely depending on the initial design. Variables included in the design and the “method of operation” for your particular machine and its application include the gallonage or water application capability of the Linear, the number of acres being irrigated, the type of sprinkler package, the kinds and rotation of crops, the crop water requirements, the soil type(s) and the irrigating vs. non-irrigating time to name a few. You need to consult with your Valley dealer to determine the operating method(s) that best fit your application. The design of your Linear along with the appropriate method of operation will optimize your investment in equipment and materials.

The percentage timer regulates the speed of the Linear which determines the amount of water being applied per pass. A percent timer setting of 100% would indicate the cart and the end tower move continuously. A setting of 50% would indicate the cart and the end tower run 50% of the time or 60 seconds out of two minutes, therefore, doubling the amount of water being applied.

Application per pass of the Linear must be calculated based on the design of the Linear installation (i.e.: length of machine, speed, gallonage, field size(s), crop(s), soil type, etc.). The sprinkler chart for your machine will provide you the machine length, the gallonage, the operating pressure, the end gun radius (if so equipped), the application capability, the acres covered, the GPM or gallons per minute per acre, the center drive type (standard or high speed), and the tire type (standard, high float, or maxi-float). The amount of non-irrigating time will vary from installation to installation. Non-irrigating time may include moving the hose from one riser to another, dry run time, rest time, time to rotate from one field to another, maintenance time, management contingency time and downtime to name a few. These must all be taken into consideration in establishing the method of operation.

Knowing the length of the run for the field(s), the gallonage, the machine length and the machine speed will allow you to calculate the application rate, the hours per pass and the percent timer settings for applying the amount of water desired. It is strongly recommended the machine be run to establish actual times for each of these variables (time per pass and irrigating vs. non-irrigating time). This information will allow for establishing actual operating modes that will meet the needs of your application.

Below is the process for calculating application amounts for various machine speeds. This information must be integrated with actual operating characteristics to establish the method of operation for your particular application.

SPRINKLER SETUP CHART			
NAME	CUSTOMER	MODEL NUMBER	800U
ADDRESS	ABC FARMS	LENGTH	836.0
CT/ST/ZP	PO 775	GALLONAGE	800
	LYONS NE 68137	PIVOT PRESSURE	33
		END GUN RADIUS	
NUMBER	DEALER	APPL RATE (IN/DAY)	
NAME	909449	TOTAL ACRES COVERED	
	VALLEY IRRIGATION	GPM/ACRE	

NUMBER	LENGTH	DIAMETER	DESCRIPTION
5	160	6 5/8	UNIFORM SPACED PIPE
1	36	6 5/8	UNIFORM SPACED PIPE

BOOSTER PUMP SELECTED: NONE			
TIRE TYPE DESCRIPTION: HIGH FLOAT			
DRIVE TYPE DESCRIPTION: STANDARD SPEED			

Figure 42-1 SAMPLE SPRINKLER CHART

Water Application - Percentage Timer Calculation Example

- Determine the Total Machine Length (TML includes the overhang and the end gun radius if so equipped). The "LENGTH" listed in the chart is the distance from the cart to the end of the overhang or the machine length (ML).

Example: ML* = 836 ft
 EGR = 0 ft
 TML** = 836 ft

*ML = Distance to Last Regular Drive Unit (DLRDU) + Overhang Length (OH)

**TML = Distance to Last Regular Drive Unit (DLRDU) + Overhang Length (OH) + End Gun Radius (EGR)

- Determine the Linear speed from the following chart:

CART AND LAST REGULAR DRIVE UNIT WHEEL ROTATION SPEEDS

CENTER DRIVE OUTPUT RPM	STANDARD TIRES 11.2 x 24	HIGH FLOAT 14.9 x 24	MAXI-FLOAT 16.9 x 24
30	6.10 FT/MIN	6.77 FT/MIN	7.22 FT/MIN
56	11.39 FT/MIN	12.63 FT/MIN	13.48 FT/MIN

Speed of the machine = 6.77 feet/minute (30 RPM and high float tires)

- Determine the Inches Per Day the Linear will apply:

(The LENGTH of RUN is Field 1 plus Field 2 in this example.)

$$\text{Inches/Day} = \frac{(\text{GPM}) \times (2310)}{\text{TML} \times \text{Length of Run}} = \frac{800 \times 2310}{836 \text{ ft} \times 3650 \text{ ft}} = 0.60 \text{ Inches/Day}$$

- Determine the Hours/Pass at 100 Percent Timer Setting*.

$$\text{Hours/Pass @ 100\%} = \frac{(\text{Length of Run})}{60 \times (\text{Speed in Ft/Min})} = \frac{3650 \text{ ft}}{60 \times 6.77} = 9.0 \text{ Hours/Pass}^*$$

- Determine the Inches/Pass at 100 Percent Timer Setting.

$$\text{Inches/Pass} = \frac{(\text{Hours/Pass}) \times (\text{Inches/Day})}{24} = \frac{9.0 \times .60}{24} = 0.23 \text{ Inches/Pass}$$

- Determine the Inches/Pass and the Hours/Pass for any Percent Timer Setting.

$$\text{Inches/Pass @ 50\%} = \frac{(\text{Inches/Pass @ 100\%}) \times (100)}{\text{Percent Timer Setting}} = \frac{.23 \times 100}{50} = 0.46 \text{ Inches/Pass}$$

$$\text{Hours Per Pass @ 50\%} = \frac{(\text{Hours/Pass @ 100\%}) \times (100)}{\text{Percent Timer Setting}} = \frac{9.0 \times 100}{50} = 18 \text{ Hours/Pass}^*$$

NOTE

- The example shown does not include non-irrigating time for moving the supply hose from one riser to the next, the time to rotate the machine to the next field or any other non-irrigating time. The Linear design, the crop(s), the soil types and other factors will impact the application capability of the machine and thus the irrigation scheduling you do. Consult with your local Valley dealer about the design of and irrigation scheduling with your Linear as it relates to your application.

OPERATION

Water Application - Percentage Timer Calculation Example

- Determine the Total Machine Length (this includes the overhang and the end gun radius if so equipped). The "LENGTH" listed in the chart is the distance from the cart to the end of the overhang (ML).

$$ML^* = \text{_____ Feet}$$

$$EGR = \text{_____ Feet}$$

$$TML^{**} = \text{_____ Feet}$$

*ML = Distance to Last Regular Drive Unit (DLRDU) + Overhang Length (OH)

**TML = Distance to Last Regular Drive Unit (DLRDU) + Overhang Length (OH) + End Gun Radius (EGR)

- Determine the Linear speed from the chart.

$$(\text{_____ RPM} \ \& \ \text{_____ Tires}) \quad \text{Speed of the machine} = \text{_____ Feet/Minute}$$

- Determine the Hours/Pass or Cycle at 100 Percent Timer Setting*

$$\text{Hours/Pass or Cycle @ 100\%} = \frac{\text{Length of Run(s)}}{60 \times (\text{Speed in Ft/Min})} + \text{Non-Irrigating Time} =$$

$$\frac{\text{Length of Run(s)}}{60 \times (\text{_____})} + \text{Non-Irrigating Time} = \text{_____ Hours/Pass or Cycle}^*$$

- Determine the Inches Per Day the Linear will apply:

$$\text{Inches/Day} = \frac{(\text{GPM}) \times (2310)}{\text{TML} \times \text{Length of Run}} = \frac{(\text{_____}) \times 2310}{(\text{_____}) \times (\text{_____})} = \text{_____ Inches/Day}$$

- Determine the Inches/Pass or Cycle at 100 Percent Timer Setting.

$$\text{Inches/Pass} = \frac{(\text{Hours/Pass}^*) \times (\text{Inches/Day})}{24} = \frac{(\text{_____}) \times (\text{_____})}{24} = \text{_____ Inches/Pass or Cycle}$$

- Determine the Inches/Pass or Cycle and the Hours/Pass or Cycle for any Percent Timer Setting.

$$\text{Inches/Pass @ 50\%} = (\text{Inches/Pass @ 100\%}) \times \% \text{ Timer Setting} = \text{_____} \times 0.50 = \text{_____ Inches/Pass or Cycle}$$

$$\text{Hours Per Pass @ 50\%} = (\text{Hours/Pass @ 100\%}) \times \% \text{ Timer Setting} = \text{_____} \times 0.50 = \text{_____ Hours/Pass or Cycle}^*$$

(% timer setting expressed as decimal)

NOTE

- Determining the Hours Per Pass or Cycle must include the non-irrigating time. This is best determined by actual irrigation with the machine at 100% timer setting for one complete irrigation cycle (starting at one end of the first field, rotating to the next field, irrigating across the second field and rotating back to the starting point of the first field). Consult with your Valley dealer for specifics regarding your particular machine and its application.

OPERATION

PERCENTAGE TIMER SETTINGS*

	Hours/Cycle** @ 100%		Hours /Cycle		Inches/Cycle @ 100%		In /Cycle
100%	_____				_____		
90%	_____	÷ 0.9 =	_____		_____	÷ 0.9 =	_____ 90%
80%	_____	÷ 0.8 =	_____		_____	÷ 0.8 =	_____ 80%
70%	_____	÷ 0.7 =	_____		_____	÷ 0.7 =	_____ 70%
60%	_____	÷ 0.6 =	_____		_____	÷ 0.6 =	_____ 60%
50%	_____	÷ 0.5 =	_____		_____	÷ 0.5 =	_____ 50%
40%	_____	÷ 0.4 =	_____		_____	÷ 0.4 =	_____ 40%
30%	_____	÷ 0.3 =	_____		_____	÷ 0.3 =	_____ 30%
20%	_____	÷ 0.2 =	_____		_____	÷ 0.2 =	_____ 20%
10%	_____	÷ 0.1 =	_____		_____	÷ 0.1 =	_____ 10%
5%	_____	÷ 0.05 =	_____		_____	÷ 0.05 =	_____ 5%

*The sprinkler chart supplied for your Linear will include a table of percentage timer data. The information in this table does not include non-irrigating time as every application will vary. Be sure the Hours Per Cycle and the Inches Per Cycle include this time. This will provide operating speeds and water application to meet the needs of your application.

** Must include non-irrigating time (hose changes, machine rotation, etc.). Add to Time Per Pass as applicable.

OPERATION

Closed Delivery Hose Drag Start Up

1. Inspect the wheel tracks to insure no vehicles or other equipment will be contacted upon start-up or operation.
2. If the machine is equipped with below ground guidance, turn the oscillator ON.
3. Connect or start power source.
 - If equipped with an Electric Cord, refer to Electric Cord Handling and Operation Section, then return to this instruction and continue with step 9.
 - If equipped with an Engine/Generator, continue with step .4
4. Check the engine fuel, coolant, and oil levels.
5. If equipped with a centrifugal pump, check the centrifugal pump oil reservoir level.
6. At the engine control panel, move the Remote Shutdown toggle switch to the Bypassed position. See Figure 46-1.
7. Push the Reset button on the water pressure gauge.
8. Push and hold the red Safety button in while turning the Engine Start switch to START. When the engine starts, turn the Engine Start switch to the ON position and the safety button will hold itself in.
9. Turn the control panel disconnect to the ON position.
10. If equipped with an Engine/Generator, check the voltmeter reading and verify that the generator is producing the correct Nominal Supply Voltage for this machine. See Figure 46-2.



Figure 46-1 1. Safety Button 3. Engine Start Switch
2. Toggle Switch 4. Water Pressure Gauge Reset

⚠ CAUTION

- **DO NOT OPERATE THE MACHINE IF THE VOLT METER READS BELOW THE MINIMUM ALLOWED VOLTAGE OR ABOVE THE MAXIMUM ALLOWED VOLTAGE. SEE FIGURE 46-2.**
- **OPERATING THE MACHINE OUTSIDE THESE LIMITS COULD CAUSE DAMAGE TO THE DRIVE MOTORS AND OTHER ELECTRICAL COMPONENTS.**
- **CORRECT THE LOW VOLTAGE PROBLEM BEFORE RESUMING OPERATION.**

Nominal Supply Voltage	Maximum Allowed Voltage	Minimum Allowed Voltage
480 VAC @ 60Hz	505 VAC	440 VAC
415 VAC @ 50Hz	420 VAC	375 VAC
400 VAC @ 50Hz	420 VAC	365 VAC
380 VAC @ 50Hz	420 VAC	355 VAC
230 VAC @ 60Hz	253 VAC	220 VAC
120 VAC @ 60Hz	132 VAC	105 VAC
110 VAC @ 50Hz	121 VAC	95 VAC

Figure 46-2

Closed Delivery Hose Drag Start Up (continued)

11. Determine how the machine will be run.
 - If running the machine wet, with water, refer to Side Inlet Hose and Cord Positioning beginning on page 53 or Center Inlet Hose and Cord Positioning beginning on page 56, then return to this instruction and continue with step 12.
 - If running the machine dry, without water continue with step 14 or if applicable, refer to Side Inlet Hose and Cord Positioning beginning on page 53 or Center Inlet Hose and Cord Positioning beginning on page 56, then return to this instruction and continue with step 14.
12. Slowly fill the system with water.
13. If equipped with an Engine/Pump to boost pressure after the hose, follow steps 4 through 8 to start the engine/pump.
14. Refer to the appropriate Control Panel Owner's Manual for control panel operating procedures.
15. If equipped with an Engine/Generator and or Pump, hold the safety button in and move the remote shutdown toggle switch to the enabled position when the system is running.

With the remote shutdown toggle switch in the engaged position the engine will stop running if the system shuts down. See Figure 47-1.

16. If equipped with an Engine/Generator, check the voltmeter reading again while the generator is under load to verify that the generator is producing the correct Nominal Supply Voltage for this machine. See Figure 47-2.

⚠ CAUTION

- **DO NOT OPERATE THE MACHINE IF THE VOLT METER READS BELOW THE MINIMUM ALLOWED VOLTAGE OR ABOVE THE MAXIMUM ALLOWED VOLTAGE. SEE FIGURE 47-2.**
- **OPERATING THE MACHINE OUTSIDE THESE LIMITS COULD CAUSE DAMAGE TO THE DRIVE MOTORS AND OTHER ELECTRICAL COMPONENTS.**
- **CORRECT THE LOW VOLTAGE PROBLEM BEFORE RESUMING OPERATION.**



Figure 47-1 1. Safety Button 3. Engine Start Switch
2. Toggle Switch 4. Water Pressure Gauge Reset

Nominal Supply Voltage	Maximum Allowed Voltage	Minimum Allowed Voltage
480 VAC @ 60Hz	505 VAC	440 VAC
415 VAC @ 50Hz	420 VAC	375 VAC
400 VAC @ 50Hz	420 VAC	365 VAC
380 VAC @ 50Hz	420 VAC	355 VAC
230 VAC @ 60Hz	253 VAC	220 VAC
120 VAC @ 60Hz	132 VAC	105 VAC
110 VAC @ 50Hz	121 VAC	95 VAC

Figure 47-2

OPERATION

Closed Delivery Hose Drag Electric Cord Handling

DANGER

- NEVER HANDLE THE ELECTRIC CORD WHEN THE POWER IS ON.
- THE DISCONNECT SWITCH MUST BE IN THE “OFF” POSITION WHEN INSERTING OR REMOVING THE PLUG FROM THE RECEPTACLE.
- NEVER ALLOW THE ELECTRIC CORD TO KINK.
- NEVER ALLOW THE HOSE TO DRAG OVER THE ELECTRIC CORD ALWAYS LAY THE ELECTRIC CORD OVER THE HOSE.
- REGULARLY INSPECT THE ELECTRIC CORD FOR NICKS OR CUTS. REPLACE A DAMAGED ELECTRIC CORD IMMEDIATELY. DO NOT ATTEMPT TO SPLICE A DAMAGED ELECTRIC CORD.

WARNING

- DO NOT DRIVE ANY VEHICLE OVER THE CORD AT ANY TIME UNLESS THE CORD IS PROTECTED FROM PHYSICAL DAMAGE.
- REMOVE ALL SHARP OBJECTS FROM THE TRAVEL LANE THAT MAY CAUSE DAMAGE TO THE ELECTRIC CORD.
- ALWAYS INSURE THAT THE ELECTRIC CORD MECHANICAL SAFETY CABLE IS ROUTED THROUGH CABLE HOOK ON POWER PEDESTAL EACH TIME THE ELECTRIC CORD IS PLUGGED INTO THE RECEPTACLE.
- INSURE THAT THE MECHANICAL SAFETY CABLE IS FUNCTIONAL EACH TIME THE ELECTRIC CORD IS PLUGGED INTO POWER PEDESTAL. THE PLUG MUST ALWAYS BE FREE SO THAT THE MECHANICAL SAFETY CABLE CAN PULL THE PLUG FROM RECEPTACLE IF NECESSARY.
- ALWAYS ATTACH THE CAP TO PLUG WHEN MOVING THE ELECTRIC CORD AND PLUG FROM ONE POWER PEDESTAL TO ANOTHER, OR WHEN STORING THE CORD.
- THE PLUG CAP COLLAR IS FOR ATTACHMENT OF THE PLUG CAP ONLY! DO NOT ATTACH THE PLUG CAP COLLAR TO THE RECEPTACLE. THE PLUG MUST ALWAYS BE FREE SO THAT THE MECHANICAL SAFETY CABLE CAN PULL THE PLUG FROM RECEPTACLE IF NECESSARY.

Electric Cord Operation

1. Ensure that the danger signs are in place and visible at each end of the travel lane. See Figure 48-1.
2. Check the electric cord for nicks, cuts, or abrasions. DO NOT use the electric cord or start the system if any of these defects are found. Contact your local Valley dealer.

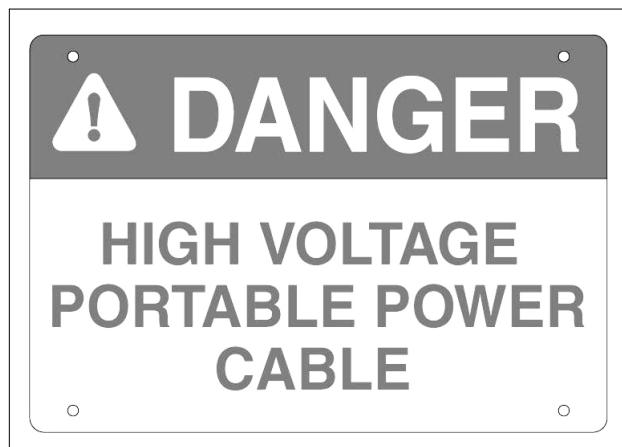


Figure 48-1 Danger Sign

Closed Delivery Hose Drag Electrical Cord Operation (continued)

- Turn the power pedestal disconnect switch to the OFF position. See Figure 49-1.

⚠ DANGER

- THE DISCONNECT SWITCH MUST BE IN THE "OFF" POSITION WHEN INSERTING OR REMOVING THE PLUG FROM THE RECEPTACLE.

- Remove plug cap from electric cord plug, and insert the electric cord plug into the power pedestal receptacle. See Figure 49-1.

⚠ WARNING

- ALWAYS ATTACH THE PLUG CAP TO THE PLUG WHEN MOVING THE ELECTRIC CORD FROM ONE POWER PEDESTAL TO ANOTHER OR WHEN STORING THE ELECTRIC CORD.

- Place the cord anchor cable through the mechanical cable anchor ring on the power pedestal.

For proper operation of the cord anchor cable disconnect, there must be slack in the electric cord between the cord grip and plug when the cord anchor cable is pulled taut. See Figure 49-2.

⚠ WARNING

- DO NOT ATTACH ELECTRIC CORD PLUG TO POWER PEDESTAL RECEPTACLE WITH PLUG CAP COLLAR.

- Turn the power pedestal disconnect switch to the ON position to energize the cart disconnect panel.

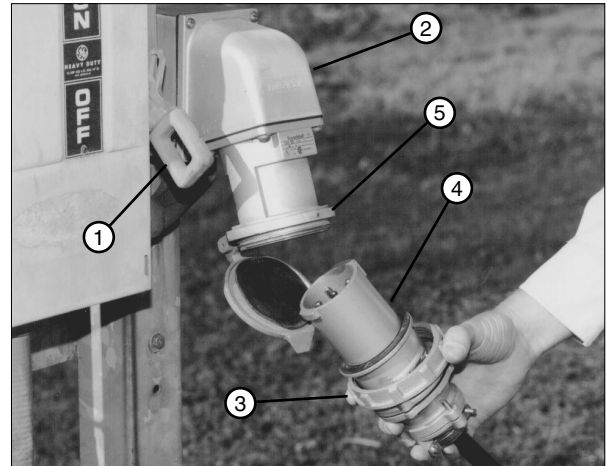


Figure 49-1 1. Disconnect Switch 2. Power Pedestal 3. Plug Cap Collar 4. Plug 5. Receptacle

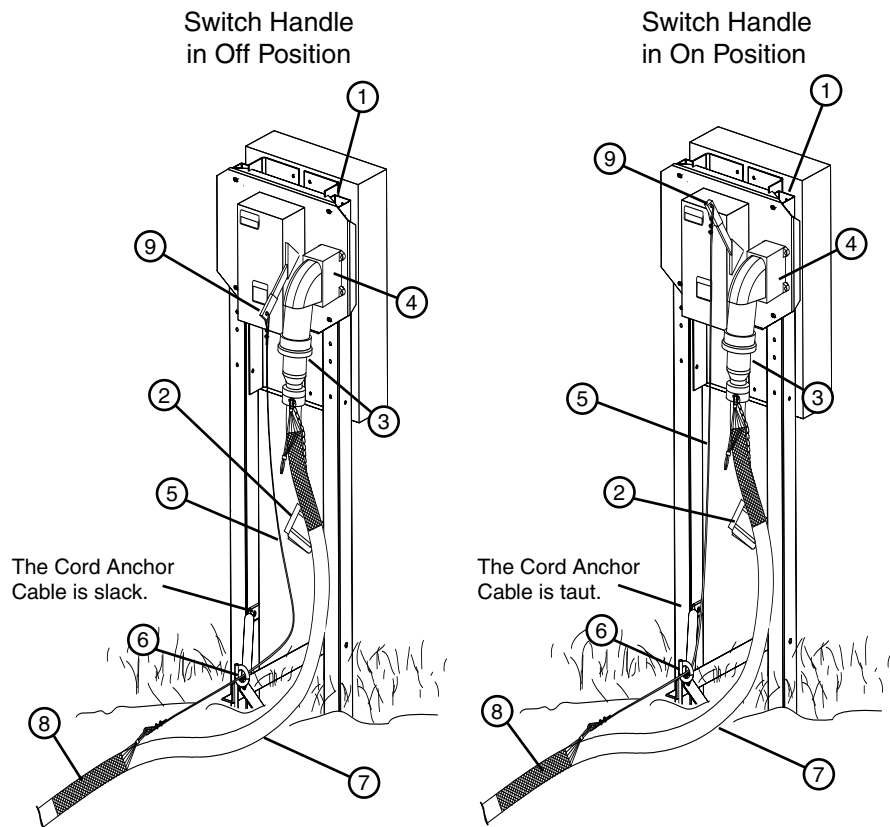


Figure 49-2 1. Power Pedestal 2. Plug Cap 3. Electric Cord Plug 4. Power Pedestal Receptacle 5. Cord Anchor Cable 6. Cable Anchor Ring 7. Electric Cord 8. Cord Grip 9. Disconnect Switch

OPERATION

Closed Delivery Hose Drag Cart Path

The cart path must be maintained in a smooth, hard condition to allow the poly hose to slide freely over the surface.

Poly Hose

The standard poly hose wall thickness varies depending on which inlet the hose is used on and the size of hose.

Inlet	Size	Wall Thickness
Side Inlet	4.75 in	SDR 17
	6 in	SDR 11
Center Inlet	8 in	SDR 17

A heavier wall SDR 11 – 6 in poly hose is used with the side inlet because of the tighter bending radius of the hose and the stresses of auto reversing.

Moving Poly Hose

Use a 5 ft (1.5 m) nylon sling as shown when moving poly hose. See Figure 50-1.

Pump

To boost water pressure after the hose, the Universal Linear hose drag cart can be equipped with an engine driven pump. See Figure 50-2.

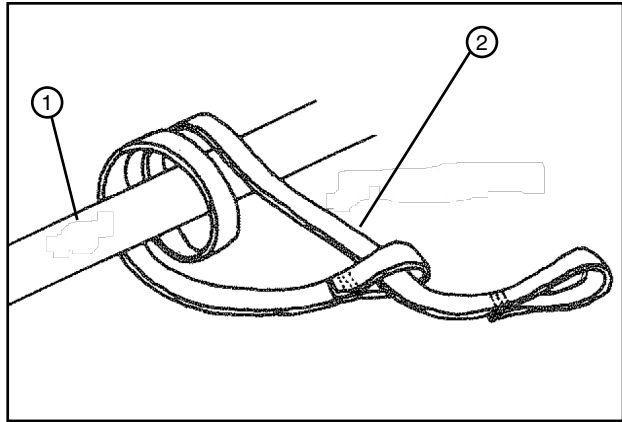


Figure 50-1 1. Poly Hose
2. Sling

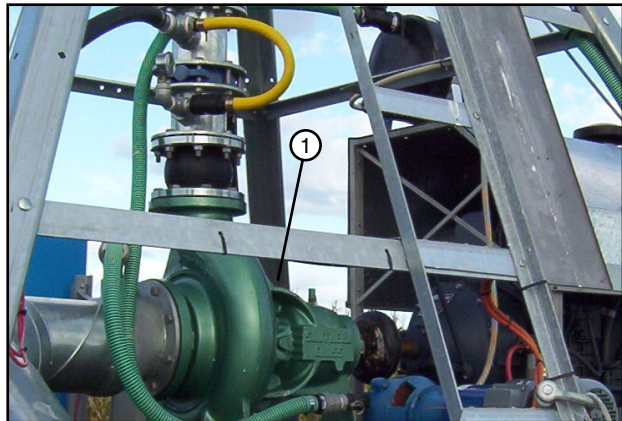


Figure 50-2 1. Engine Driven Booster Pump

Closed Delivery Hose Drag Hose Inlets and Couplers

There are two different hose inlets, the Swivel Inlet, and the Center Inlet.

Swivel Inlet

- Side Inlet hose layout and basic method of operation begins on the next page.
- Hose coupler design varies depending on the type and size of the hose. See Figure 51-1.
- Side inlet hose couplers are secured to the inlet with pull straps. See Figure 51-1.

Center Inlet

- Center Inlet hose layout and basic method of operation begins on page 56.
- Hose coupler design varies depending on the type and size of the hose. See Figure 51-1.
- Center inlet hose couplers are secured to the inlet with a circle lock ring. See Figure 51-1.
- The center inlet uses soft hose on the inlet end of the hose. See Figure 51-2.
- Soft hose requires the use of chains to pull the poly hose. See Figure 51-2.

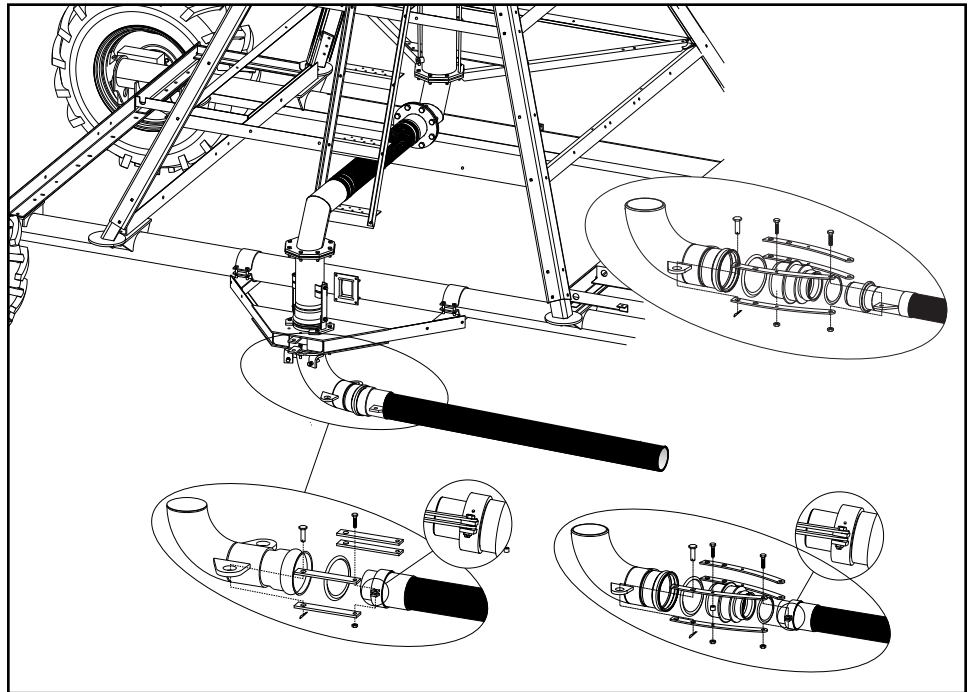


Figure 51-1 Side Inlet Hose Couplers

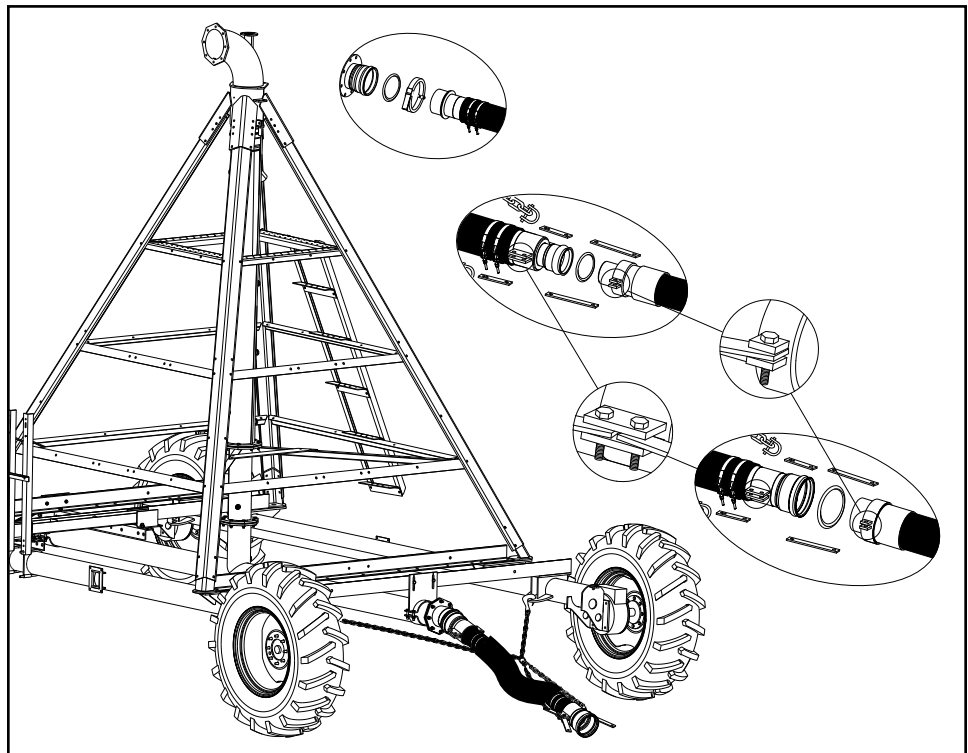


Figure 51-2 Center Inlet Hose Couplers, Soft hose and Chains

OPERATION

Closed Delivery Hose Drag Side Inlet

Hose and Cord Layout

When using the side inlet, position the hose as shown. See Figure 52-1.

- The hose layout distance from the water pipeline varies depending on hose diameter.
- The cart path must be maintained in a smooth, hard condition, to allow the poly hose to slide freely over the surface.
- The side inlet hose drag is designed to reverse at the ends of the field without disconnecting the poly hose from the cart.
- The side inlet swivel elbow should be adjusted outward to an angle of at least 10° in order for the machine to reverse consistently.
- The side inlet configuration can greatly reduce hose handling labor compared to the center inlet configuration, but should not be expected to auto-reverse completely unattended.
- Due to the tight bending radius in the poly hose, and the stresses of auto-reversing, it is recommended to use heavier (SDR 15.5 or SDR 13.5) wall poly hose for side inlet hose drags.
- At the ends of the field, where reversing direction takes place, maintain a smooth, hard area on the inlet side of the cart, so that the poly hose can slide freely over the surface when reversing.

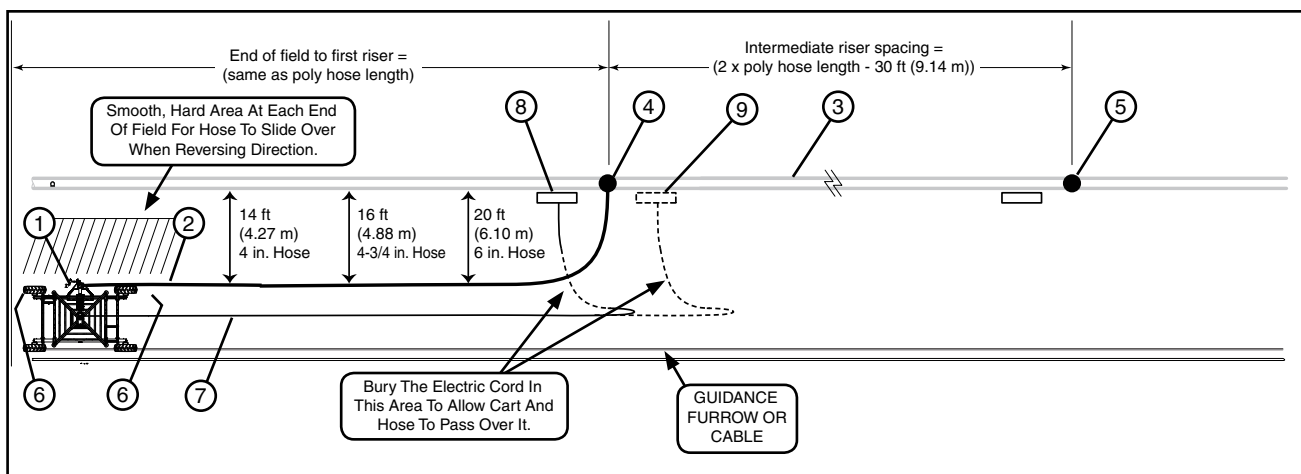


Figure 52-1 Side Inlet Hose Layout

- | | |
|-----------------------|---|
| 1. Side Inlet | 6. Electric Cord (optional) |
| 2. Hose | 7. Power Pedestal |
| 3. Water Pipeline | 8. Alternate Power Pedestal Location and Electric Cord Position |
| 4. First Riser | |
| 5. Intermediate Riser | |

Closed Delivery Hose Drag Side Inlet Hose and Cord Positioning

The following instructions describe a basic method of positioning which includes how to position the hose and optional electric cord for the side inlet depending on direction of machine movement, position of machine in relationship to the pipeline and power pedestals as the machine moves across the field.

1. Connect the first hose to the pipeline shut off valve and linear cart side inlet, then latch in place. See Figure 53-1.
2. Set the end of field/hose stop post for the length of the hose being used.
3. If using the optional electric cord drag:
 - (a) Make sure the power pedestal disconnect is in the OFF position.
 - (b) Position the electric cord far enough away from the hose, so that the hose will not drag over it. To prevent interference between the electric cord, cart tires and hose, bury the electric cord in the area where interference will occur or when applicable, position the electric cord over the top of hose. See Figure 53-1.
 - (c) Connect the electric cord to the power pedestal.
 - (d) When ready, switch the power pedestal disconnect switch into the ON position.
4. At the machine/control panel:
 - (a) Set the direction of travel.
 - (b) Set the percentage timer to the desired application rate or speed.
 - (c) If applicable set the Auto Reverse/Auto Stop control as desired.
5. When ready, start the machine. If applicable, start pipeline pump and open the water shut off valve for the hose. The machine should start and run in the desired direction and auto reverse or stop at the end of field/hose stop post which was set for the length of the hose.
 - (a) As the cart moves, the side inlet begins to pivot. See Figure 53-2.
 - (b) As the side inlet pivots the hose is pushed out away from the cart and guided by either the side walls of the cart tires. See Figure 53-3.
 - (c) After the side inlet has pivoted completely the hose is being pulled by the side inlet and guided by either the side walls of the cart tires. See Figure 53-4.

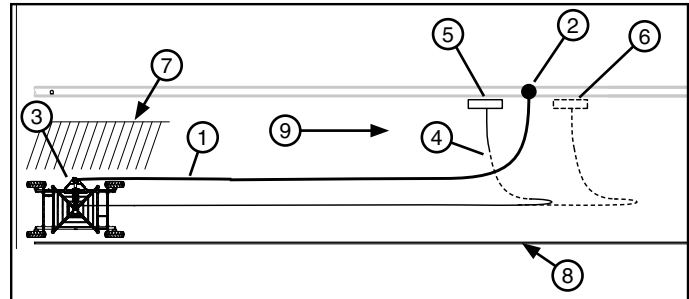


Figure 53-1 1. First Hose
2. Shut Off Valve
3. Side Inlet
4. Electric Cord (optional)
5. Power Pedestal
6. Alternate Power Pedestal Location
7. Smooth Packed Area
8. Furrow Guidance or Cable
9. Direction of Travel

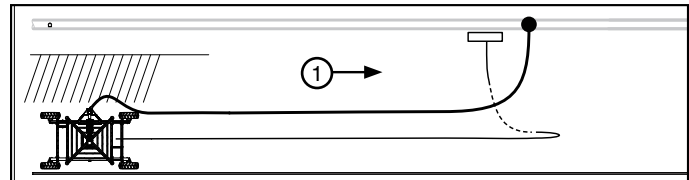


Figure 53-2 1. Direction of Travel

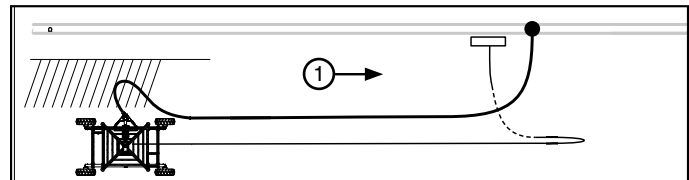


Figure 53-3 1. Direction of Travel

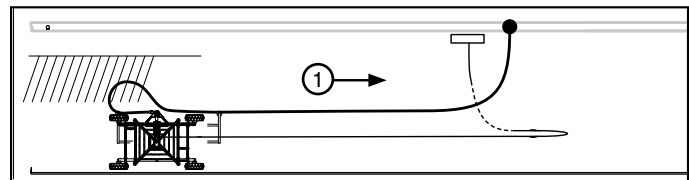


Figure 53-4 1. Direction of Travel

OPERATION

Closed Delivery Hose Drag Side Inlet Hose and Cord Positioning

6. As the machine approaches the end of field/hose stop post, Stop the machine and close the water shut off valve for the hose.
7. Disconnect the first hose from the pipeline shut off valve so that water from the hose drains away from the cart path.
 - If more than one hose is being used, disconnect first hose from side inlet. Connect second hose to next pipeline shut off valve, position second hose, connect and secure to side inlet. See Figure 54-1.
 - If only one hose is being used, reposition the hose and connect to the next pipeline shutoff valve.
8. Reposition the end of field/hose stop for the length of the hose being used.
9. If using the optional electric cord drag:
 - (a) Make sure the power pedestal disconnect is in the OFF position.
 - (b) Disconnect the electric cord from the power pedestal.
 - (c) Position the electric cord far enough away from the hose, so that the hose will not drag over it. To prevent interference between the electric cord, cart tires and hose, bury the electric cord in the area where interference will occur or when applicable, position the electric cord over the top of hose. See Figure 54-1.
 - (d) Make sure the second power pedestal disconnect is in the OFF position.
 - (e) Connect the electric cord to the second power pedestal.
 - (f) When ready, switch the second power pedestal disconnect switch into the ON position.
10. At the machine/control panel:
 - (a) Select the original direction of travel.
 - (b) Set the percentage timer to the desired application rate or speed.
 - (c) If applicable set the Auto Reverse/Auto Stop control as desired.
11. When ready, start the machine. If applicable, start pipeline pump and open the water shut off valve for the hose. The machine should start and run in the desired direction and auto reverse or stop at the end of field/hose stop post which was set for the length of the hose.
12. Repeat the steps 6-11 as needed to cross the field.

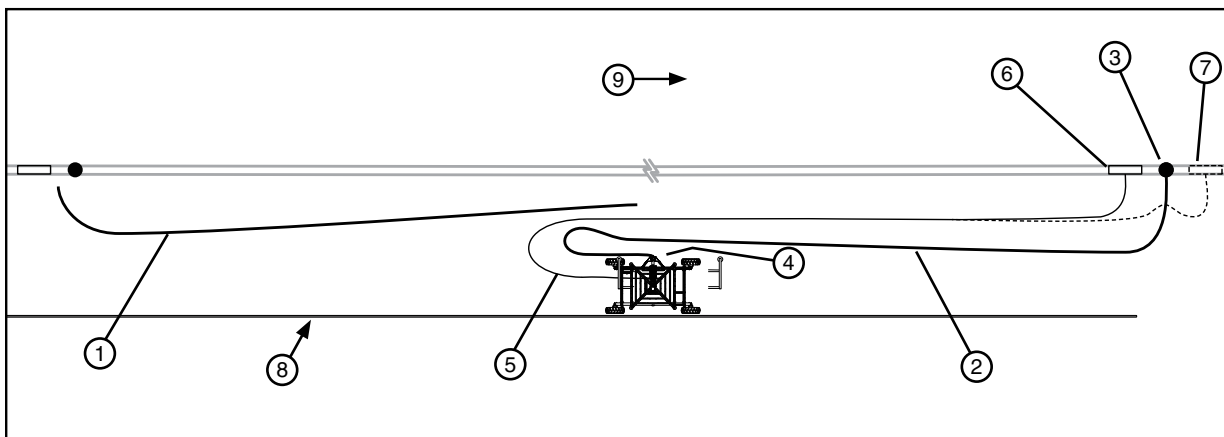


Figure 54-1 1. First Hose 4. Side Inlet 7. Alternate Power Pedestal Location and Electric Cord Position
2. Second Hose 5. Electric Cord (optional) 8. Furrow Guidance or Cable
3. Shut Off Valve 6. Power Pedestal 9. Direction of Travel

Closed Delivery Hose Drag Side Inlet Hose and Cord Positioning

13. As the machine approaches the edge of the field do one of the following:
 - **If Auto Reverse is on**, monitor and assist the auto reverse process as needed, shutting pipeline valve for the hose off and on as required.
 - (a) Reposition the end of field/hose stop for the length of hose being used.
 - (b) The machine should start and run in the desired direction and stop at the end of field/hose stop post which was set for the length of the hose.
 - **If Auto Stop is on**, monitor and assist the auto stop process as needed, shutting pipeline valve for the hose off as required.
 - (a) If this is a standard linear machine continue with step 14 of this instruction to run machine back across the field in the opposite direction.
 - (b) If this is a swing around linear machine and the operator intends to swing the machine around to the other field, proceed to the Swing Around section, follow the Swing Around procedure and swing the machine around to the other field. After swinging machine around, return to this instruction and continue with step 14 to run machine back across the field in the opposite direction.
14. Reposition the end of field/hose stop for the length of hose being used.
15. If using the optional electric cord drag:
 - (a) Make sure the power pedestal disconnect, that the electric cord is connected to, is in the OFF position.
 - (b) Position the electric cord far enough away from the hose, so that the hose will not drag over it. To prevent interference between the electric cord, cart tires and hose, bury the electric cord in the area where interference will occur or when applicable, position the electric cord over the top of hose. See Figure 55-1.
 - (c) When ready, switch the power pedestal disconnect switch into the ON position.
16. At the machine/control panel:
 - (a) Select the desired direction of travel.
 - (b) Set the percentage timer to the desired application rate.
 - (c) If applicable set the Auto Reverse/Auto Stop control as desired.
17. When ready, start the machine. If applicable, start pipeline pump and open the water shut off valve for the hose. The machine should start and run in the desired direction and auto reverse or stop at the end of field/hose stop post which was set for the length of the hose.
18. Repeat the steps 13-17 as needed to cross the field in the opposite direction.

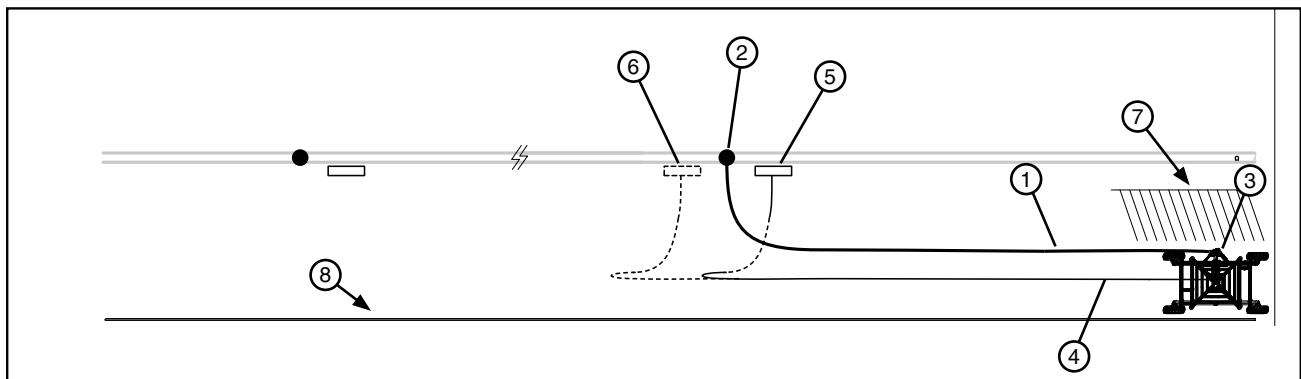


Figure 55-1 1. Hose 3. Side Inlet 5. Power Pedestal 7. Smooth Hard Area
2. Shut Off Valve 4. Electric Cord (optional) 6. Alternate Power Pedestal Position 8. Furrow Guidance or Cable

OPERATION

Closed Delivery Hose Drag Center Inlet Hose and Cord Positioning

Position 1: Start of Run

1. Turn all power disconnects to the OFF position (main power supply, power pedestal and machine disconnects).
2. Attach water supply hose to first riser.
3. Connect the supply hose to the cart transition hose using the tie straps. Be sure the Pierce gasket is properly installed and there is no debris in the connection that could cause it to leak.
4. The hose must be positioned outside the cart path and on the side opposite the guidance furrow or cable.
5. Position the electrical supply cord outside of the supply hose as shown below.
6. Connect the power supply cord to the power pedestal. Be sure the disconnect switch is in the **OFF** position.
7. Turn the power pedestal disconnect switch to the ON position.
8. Install the end-of-hose stop stake at the next stop position.
9. The universal linear can now be started. Follow the start-up procedures in the appropriate control panel section.

NOTE

- Electric cord positioned behind hose and is laying outside hose loop.
- Cord connected to cart on side opposite pedestals.
- Electrical cord must be longer than Hose.

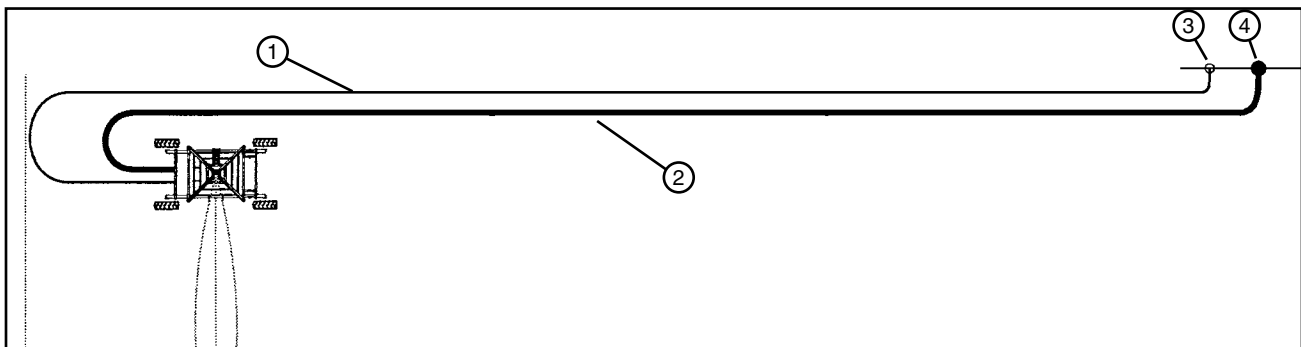


Figure 56-1 1. Universal Linear Cart 3. Hose 5. Riser
2. Electrical Cord 4. Power Pedestal

Position 2: End of First Run/Start of Second Run

1. Make sure the universal linear, the power supply and the water supply pump are shut off.
2. Turn off all electrical disconnect switches.
3. Disconnect the water supply hose from the first riser then shut off or plug that riser. Be sure there is no water pressure in the supply line before removing the hose.
4. Disconnect the power supply cord from the power pedestal. Be sure all electrical power has been shut off prior to disconnecting the power supply cord from the power pedestal.
5. Place a sling around the supply hose to pull the end of the hose to the second or next riser (hose must be outside the cart path).
6. Connect the supply hose to the riser.
7. Move and connect the power supply cord to the next power pedestal. Be sure the power pedestal disconnect switch is in the **OFF** position.
8. Position the electrical supply cord as shown in Position 1 - "Start of Run".
9. Turn the power pedestal disconnect switch ON.

Closed Delivery Hose Drag Center Inlet Hose and Cord Positioning Position 2: End of First Run/Start of Second Run (Continued)

10. Move the end-of-hose stop stake to the next position.
11. Initiate the Linear and water supply start-up procedure.
This process will be repeated across the field.

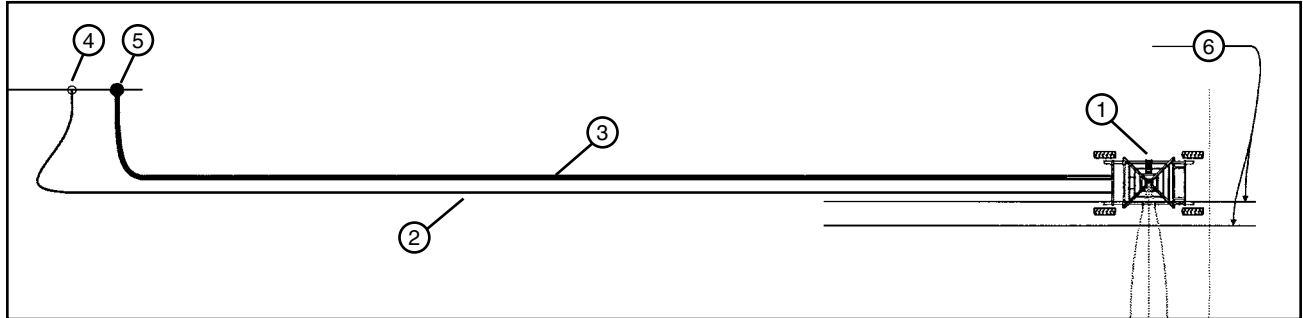


Figure 57-1 1. Universal Linear Cart 3. Hose 5. Riser
2. Electrical Cord 4. Power Pedestal 6. Cable or Furrow Guidance

Position 3: End of Run - Reposition Hose and Cord

The last pass to the end of the field requires a slightly different procedure for starting a return pass.

1. Make sure the Linear and the water supply pump are shut off.
2. Turn off all electrical disconnect switches.
3. Disconnect the water supply hose from the cart transition hose.

CAUTION

- CHECK TO MAKE SURE THERE IS NO WATER PRESSURE IN THE SUPPLY LINE BEFORE REMOVING THE HOSE.

4. Move the cart transition hose to the other end of the cart.
5. Remove the plug from the "T" pipe and attach the transition hose to the "T" pipe and the cart frame.
6. Attach the "T" pipe plug to the other end of the "T" pipe.
7. Move the electrical supply cord to the other side of the water supply hose. The water supply hose will have to be moved out of the cart path so be sure to position the power supply cord accordingly. The power supply cord must be placed over the supply hose at the riser end and at the cart end of the hose (see drawing below).
8. Move the main supply hose out of the cart path.
9. Start the Linear in the dry mode of operation and begin the return pass. Stop the machine once it has reached a point where the main supply hose can be attached to the cart transition hose.
10. Stop the machine once it has reached a point where the main supply hose can be attached to the cart transition hose.

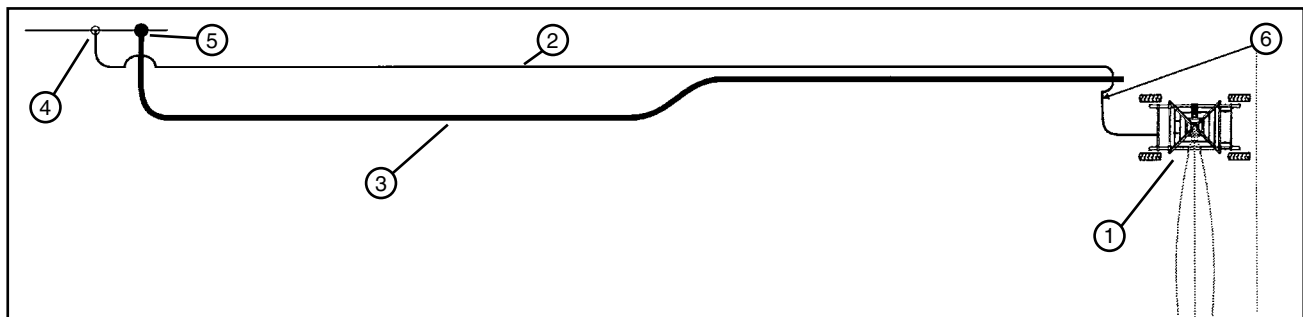


Figure 57-1 1. Universal Linear Cart 3. Hose 5. Riser
2. Electrical Cord 4. Power Pedestal 6. Protect Electric Cord Location

OPERATION

Closed Delivery Hose Drag Center Inlet Hose and Cord Positioning

Position 4: Reverse Direction - Hose and Cord Hookup at Start of Return Run

1. Attach the main supply hose to the transition hose. Be sure to install the "T" pipe plug in the other end of the "T" pipe.
2. Move the water supply hose out of the cart path.
3. Position the power supply cord over the top of the hose on the riser end of the run.
4. Position the power supply cord outside the hose loop on the cart end.
5. Initiate the Linear and water supply start-up procedures.

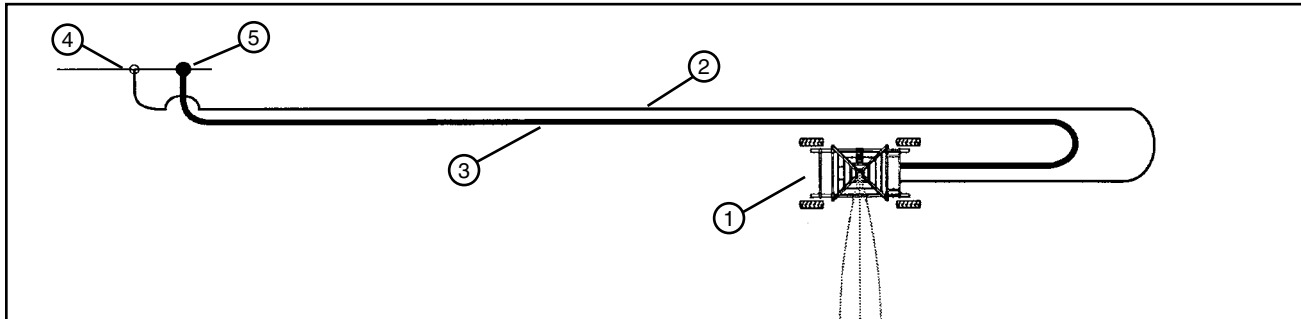


Figure 58-1 1. Universal Linear Cart 3. Hose 5. Riser
2. Electrical Cord 4. Power Pedestal

Position 5 - End of Run

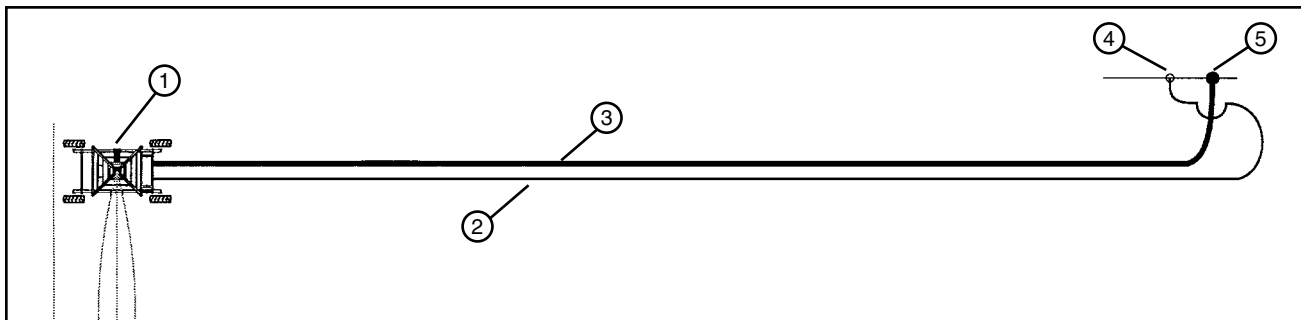


Figure 58-1 1. Universal Linear Cart 3. Hose 5. Riser
2. Electrical Cord 4. Power Pedestal

Position 6: End of Run - Reposition Hose and Cord

1. Make sure the Linear and the water supply pump are shut off.
2. Turn off all electrical disconnect switches.
3. Disconnect the water supply hose from the cart transition hose.

CAUTION

- CHECK TO MAKE SURE THERE IS NO WATER PRESSURE IN THE SUPPLY LINE BEFORE REMOVING THE HOSE.

Move the cart transition hose to the other end of the cart.

4. Remove the plug from the "T" pipe and attach the transition hose to the "T" pipe.
5. Attach the plug to the other end of the "T" pipe.
6. Move the main supply hose out of the cart path.
7. Move the electrical supply cord to the other side of the water supply hose (see drawing on following page).
8. Turn on the power disconnect switches, then start the Linear in the dry mode of operation and begin the return pass. The power supply cord must be protected from the cart drive tires as the cart must pass over the cord as the cart is moved for the return water supply hose connection.

Closed Delivery Hose Drag Center Inlet Hose and Cord Positioning Position 6: End of Run - Reposition Hose and Cord (Continued)

9. Stop the machine once it has reached a point where the main supply hose can be attached to the cart transition hose.
10. Reconnect the water supply hose to the cart transition hose and the chains to the cart frame (refer to Position 1 - Start of Run).

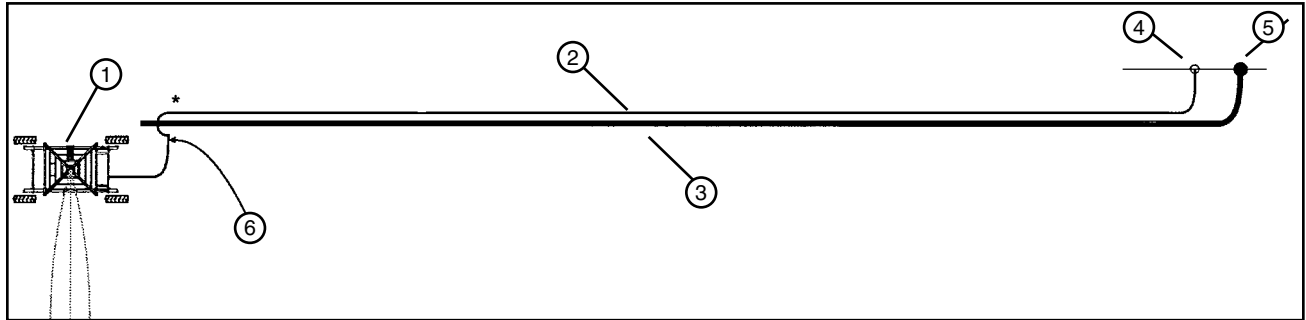


Figure 59-1 1. Universal Linear Cart 3. Hose 5. Riser
2. Electrical Cord 4. Power Pedestal 6. Protect Electric Cord Location

11. Position the power supply cord as shown in the Position 1 layout.
12. Initiate the Linear and water supply start-up procedures.

OPERATION

Closed Delivery Hose Drag Center Inlet

Rotating the Universal Linear spans to an adjacent field or the cart and spans to a perpendicular field requires the main water supply hose and power supply cord be moved out of their path or protected as the linear drive units or cart and drive units are rotated.

The electrical supply line (electric cord drag linear option) must remain connected between a power pedestal and the Linear cart to allow the Linear spans to be pivoted to the next field. If a power pedestal is located between the first drive unit and the cart, the total length of the electrical supply line can be placed between them thus eliminating the Linear drive units from having to cross/run over the electrical supply line. When this is not the case, the electrical supply line must be protected.

In addition, the hose and electrical supply cord must be protected from the cart wheels and, if used, the tractor tires when the cart is rotated for fields that are “L” shaped or 90° to one another. Main supply hose and power supply cord damage may occur if the drive units or cart and tractor tires are allowed to move across the hose or power cord.

The supply hose should be completely pulled out of the path of the drive units. Disconnecting the transition hose will also make it easier to rotate the cart for fields that are 90° to one another.

The handling of the electrical supply cord depends on whether the fields are parallel or perpendicular to one another. Following are the alternative methods that can be used for pivoting to parallel or perpendicular fields.

Parallel or Perpendicular Fields Pivoting Drive Units

Method I: Ramps

Place ramps over the electrical supply line at the points where the drive units will cross the electrical line (the cart is not rotated on parallel fields).

Method II: Repositioning of the electrical supply line

- (a) Start the Universal Linear in the Pivot Mode. Move drive units up to the electrical supply line then stop the machine.
- (b) Shut off the Linear, turn off the control panel, the power pedestal and the main power supply fused disconnect switches then disconnect the electrical supply line plug from the electrical receptacle on the power pedestal.
- (c) Move the electrical supply line to the other side of the linear spans/drive units. It will be necessary to pull the electrical supply line between the first drive unit and the cart then lay it back out on the opposite side of the spans and drive units and back to the power pedestal.
- (d) Reconnect the electrical supply line to the power pedestal.
- (e) Turn on all fused disconnect switches then restart the Linear in the Pivot Mode to complete the transition to the next field.
- (f) Once the Linear is positioned in the next field, properly lay out and connect the water supply between the appropriate riser and the cart. On a cord drag Linear, lay out the water supply hose and the electrical power cord per hose and cord handling procedures.

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OPERATION

Open Delivery Ditch Feed

Start Up - Engine Generator Pump Applications

1. Inspect the wheel tracks to insure no vehicles or other equipment will be contacted upon start-up or operation.
2. Turn on the oscillator, if the system has below ground guidance.
3. Check the engine fuel, coolant, and oil levels. Fill as needed.
4. Check the centrifugal pump oil reservoir level. Fill as needed.
5. At the engine control panel, move the Remote Shutdown toggle switch to the Bypassed position. See Figure 62-1.
6. Push the Reset button on the water pressure gauge.
7. Push and hold the red Safety button in while turning the Engine Start switch to START. When the engine starts, turn the Engine Start switch to the ON position and the safety button will hold itself in.
8. Turn the control panel disconnect to the ON position.
9. Check the voltmeter reading and verify that the generator is producing the correct Nominal Supply Voltage for this machine. See Figure 62-2.



Figure 62-1 1. Safety Button 3. Engine Start Switch
2. Toggle Switch 4. Water Pressure Gauge Reset

⚠ CAUTION

- **DO NOT OPERATE THE MACHINE IF THE VOLT METER READS BELOW THE MINIMUM ALLOWED VOLTAGE OR ABOVE THE MAXIMUM ALLOWED VOLTAGE. SEE FIGURE 62-2.**
- **OPERATING THE MACHINE OUTSIDE THESE LIMITS COULD CAUSE DAMAGE TO THE DRIVE MOTORS AND OTHER ELECTRICAL COMPONENTS.**
- **CORRECT THE LOW VOLTAGE PROBLEM BEFORE RESUMING OPERATION.**

Nominal Supply Voltage	Maximum Allowed Voltage	Minimum Allowed Voltage
480 VAC @ 60Hz	505 VAC	440 VAC
415 VAC @ 50Hz	420 VAC	375 VAC
400 VAC @ 50Hz	420 VAC	365 VAC
380 VAC @ 50Hz	420 VAC	355 VAC
230 VAC @ 60Hz	253 VAC	220 VAC
120 VAC @ 60Hz	132 VAC	105 VAC
110 VAC @ 50Hz	121 VAC	95 VAC

Figure 62-2

10. Determine if the machine will be run wet or dry.
 - If running the machine wet, with water,
 - (a) Lower suction inlet into ditch until the inlet lift cables go slack. See Figure 62-3.
 - (b) Prime the centrifugal pump. See Exhaust Primer on page 64 or 12 VDC Electric Primer on page 65. After the pump is primed return to this instruction.
 - (c) Continue with step 11.
 - If running the machine dry, without water, raise the suction inlet completely out of the ditch, then continue with step 12.

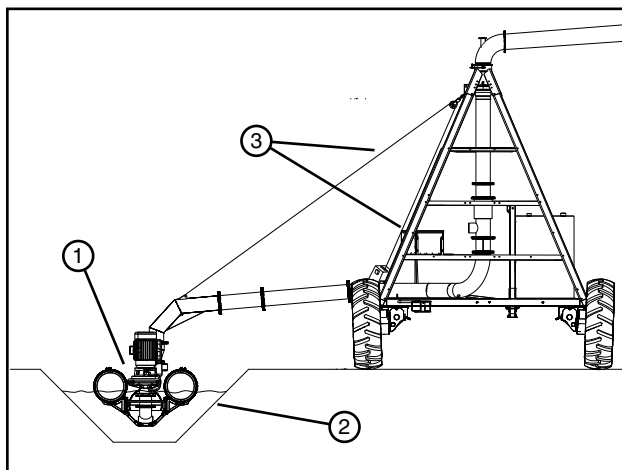


Figure 62-3 1. Suction Inlet 3. Lift Cable
2. Ditch (Side Ditch Feed Shown)

Open Delivery Ditch Feed

Start Up - Engine Generator Pump Applications (continued)

11. Slowly fill the system with water. Alternate between slowly opening the riser valve and increasing the engine RPM so that the pump does not loose prime.
12. Refer to the appropriate Control Panel Owner's Manual for control panel operating procedures.
13. When the system is running and while holding the safety button in, move the remote shutdown toggle switch to the enabled position. See Figure 63-1.

With the remote shutdown toggle switch in this position the engine will stop running if the system shuts down.

14. Check the voltmeter reading again while the generator is under load to verify that the generator is producing the correct Nominal Supply Voltage for this machine. See Figure 63-2.



Figure 63-1 1. Safety Button 3. Engine Start Switch
2. Toggle Switch 4. Water Pressure Gauge Reset

CAUTION

- **DO NOT OPERATE THE MACHINE IF THE VOLT METER READS BELOW THE MINIMUM ALLOWED VOLTAGE OR ABOVE THE MAXIMUM ALLOWED VOLTAGE. SEE FIGURE 63-2.**
- **OPERATING THE MACHINE OUTSIDE THESE LIMITS COULD CAUSE DAMAGE TO THE DRIVE MOTORS AND OTHER ELECTRICAL COMPONENTS.**
- **CORRECT THE LOW VOLTAGE PROBLEM BEFORE RESUMING OPERATION.**

Nominal Supply Voltage	Maximum Allowed Voltage	Minimum Allowed Voltage
480 VAC @ 60Hz	505 VAC	440 VAC
415 VAC @ 50Hz	420 VAC	375 VAC
400 VAC @ 50Hz	420 VAC	365 VAC
380 VAC @ 50Hz	420 VAC	355 VAC
230 VAC @ 60Hz	253 VAC	220 VAC
120 VAC @ 60Hz	132 VAC	105 VAC
110 VAC @ 50Hz	121 VAC	95 VAC

Figure 63-2

OPERATION

Open Delivery Ditch Feed Exhaust Primer

The exhaust primer is used for priming of pump installations with suction inlets in an Engine Generator Pump Application. See Figure 64-1.

1. Close the riser pipe valve.
2. Start the engine and insert the primer slide into the primer assembly, diverting exhaust to the exhaust primer. See Figures 64-1.

As the exhaust passes through the exhaust primer it creates a vacuum in the hose running to the inlet pipe. The vacuum pressure is displayed on the engine control panel vacuum gauge.

3. Adjust the engine RPM to achieve the maximum vacuum reading possible on the engine control panel vacuum gauge.

The vacuum will pull air out of the inlet pipe and pull water into the cavity. The inlet and pump cavity will be full of water and primed when water begins to spray out of the exhaust primer.

4. Remove the primer slide from the primer assembly.
5. Slowly open the riser pipe valve to fill the system with water.
6. After riser pipe valve is completely open and the system is full of water, bring the engine up to its operating RPM.

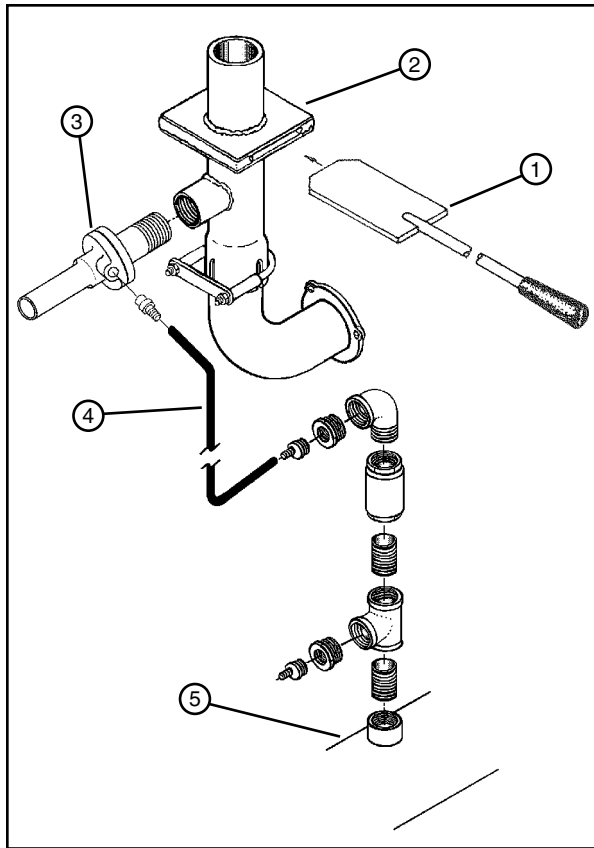


Figure 64-1 1. Primer Slide
2. Primer Assembly
3. Exhaust Primer
4. Hose
5. Inlet Pipe

Open Delivery Ditch Feed 12 VDC Electric Primer

The 12 VDC Electric primer is used for priming of pump installations with suction inlets in an Engine Generator Pump Application. See Figure 65-1.

1. Fill the automatic bearing oiler with lightweight oil, SAE 10W. See Figure 65-1.
2. Close the riser pipe valve.
3. Open the ball valve on the electric primer. See Figure 65-1.
4. Engine Generator Start Up: Refer to the Start Up - Engine Generator Pump Applications instructions for Open Delivery in the Operation section of this manual.
5. Close the single throw switch to start the electric primer. See Figure 65-1.
6. When water squirts from the ball valve, open the single throw switch to stop the electric primer.
7. Slowly fill the system with water. Alternate between slowly opening the riser valve and increasing the engine RPM so that the pump does not loose prime.
8. Close the ball valve on the electric primer.

If water enters and fills the water trap on the electric primer. The water trap valve will close, the relief valve will open, and no priming will occur.

To re-establish prime:

1. Open the single throw switch to stop the electric primer.
2. Depress the manual plunger on top of the water trap to allow water to draw-down. See Figure 65-2.
3. If necessary, open the drain cock valve for full drainage. See Figure 65-2.
4. When fully drained repeat steps 2-8.

Refer to Troubleshooting section for additional solutions to problems that may occur with the electric primer.



Figure 65-1 1. Electric Primer
2. Automatic Bearing Oiler
3. Ball Valve
4. Single Throw Switch

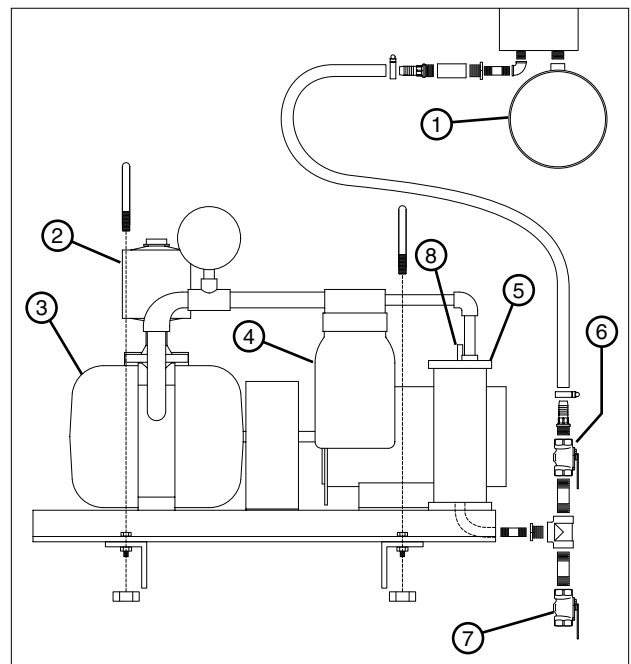


Figure 65-2 1. Suction Inlet Pipe
2. Oiler
3. Vacuum Pump
4. Oil Trap
5. Water Trap
6. Ball Valve
7. Drain Cock Valve
8. Manual Plunger

OPERATION

Open Delivery Ditch Feed Electric Cord Handling

DANGER

- NEVER HANDLE THE ELECTRIC CORD WHEN THE POWER IS ON.
- THE DISCONNECT SWITCH MUST BE IN THE “OFF” POSITION WHEN INSERTING OR REMOVING THE PLUG FROM THE RECEPTACLE.
- NEVER ALLOW THE ELECTRIC CORD TO KINK.
- NEVER ALLOW THE HOSE TO DRAG OVER THE ELECTRIC CORD ALWAYS LAY THE ELECTRIC CORD OVER THE HOSE.
- REGULARLY INSPECT THE ELECTRIC CORD FOR NICKS OR CUTS. REPLACE A DAMAGED ELECTRIC CORD IMMEDIATELY. DO NOT ATTEMPT TO SPLICE A DAMAGED ELECTRIC CORD.

WARNING

- DO NOT DRIVE ANY VEHICLE OVER THE CORD AT ANY TIME UNLESS THE CORD IS PROTECTED FROM PHYSICAL DAMAGE.
- REMOVE ALL SHARP OBJECTS FROM THE TRAVEL LANE THAT MAY CAUSE DAMAGE TO THE ELECTRIC CORD.
- ALWAYS INSURE THAT THE ELECTRIC CORD MECHANICAL SAFETY CABLE IS ROUTED THROUGH CABLE HOOK ON POWER PEDESTAL EACH TIME THE ELECTRIC CORD IS PLUGGED INTO THE RECEPTACLE.
- INSURE THAT THE MECHANICAL SAFETY CABLE IS FUNCTIONAL EACH TIME THE ELECTRIC CORD IS PLUGGED INTO POWER PEDESTAL. THE PLUG MUST ALWAYS BE FREE SO THAT THE MECHANICAL SAFETY CABLE CAN PULL THE PLUG FROM RECEPTACLE IF NECESSARY.
- ALWAYS ATTACH THE CAP TO PLUG WHEN MOVING THE ELECTRIC CORD AND PLUG FROM ONE POWER PEDESTAL TO ANOTHER, OR WHEN STORING THE CORD.
- THE PLUG CAP COLLAR IS FOR ATTACHMENT OF THE PLUG CAP ONLY! DO NOT ATTACH THE PLUG CAP COLLAR TO THE RECEPTACLE. THE PLUG MUST ALWAYS BE FREE SO THAT THE MECHANICAL SAFETY CABLE CAN PULL THE PLUG FROM RECEPTACLE IF NECESSARY.

Electric Cord Operation

1. Ensure that the danger signs are in place and visible at each end of the travel lane. See Figure 66-1.
2. Check the electric cord for nicks, cuts, or abrasions. DO NOT use the electric cord or start the system if any of these defects are found. Contact your local Valley dealer.

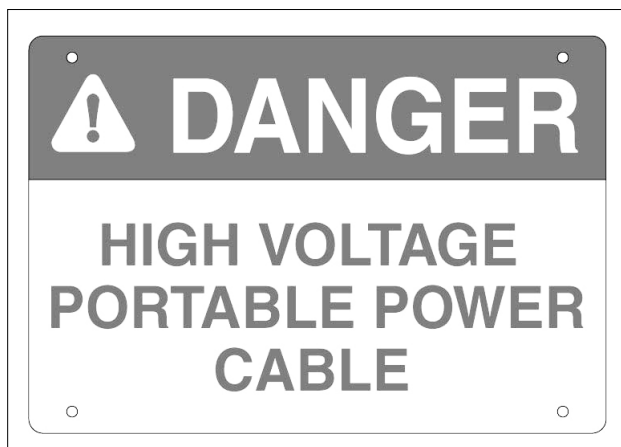


Figure 66-1 Danger Sign

Open Delivery Ditch Feed Electrical Cord Operation (continued)

- Turn the power pedestal disconnect switch to the OFF position. See Figure 67-1.

⚠ DANGER

- THE DISCONNECT SWITCH MUST BE IN THE "OFF" POSITION WHEN INSERTING OR REMOVING THE PLUG FROM THE RECEPTACLE.

- Remove plug cap from electric cord plug, and insert the electric cord plug into the power pedestal receptacle. See Figure 67-1.

⚠ WARNING

- ALWAYS ATTACH THE PLUG CAP TO THE PLUG WHEN MOVING THE ELECTRIC CORD FROM ONE POWER PEDESTAL TO ANOTHER OR WHEN STORING THE ELECTRIC CORD.

- Place the cord anchor cable through the mechanical cable anchor ring on the power pedestal.

For proper operation of the cord anchor cable disconnect, there must be slack in the electric cord between the cord grip and plug when the cord anchor cable is pulled taut. See Figure 67-2.

⚠ WARNING

- DO NOT ATTACH ELECTRIC CORD PLUG TO POWER PEDESTAL RECEPTACLE WITH PLUG CAP COLLAR.

- Turn the power pedestal disconnect switch to the ON position to energize the cart disconnect panel.

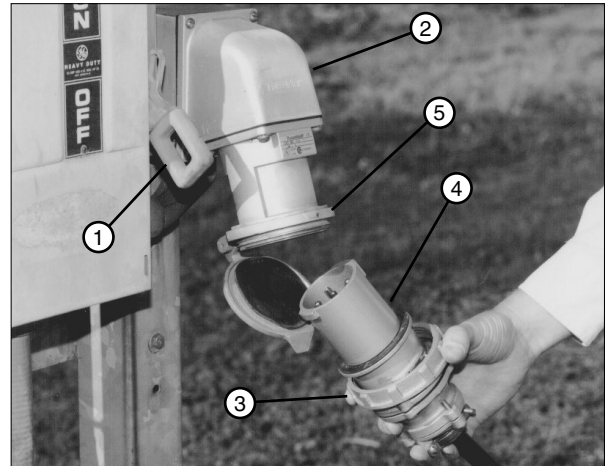
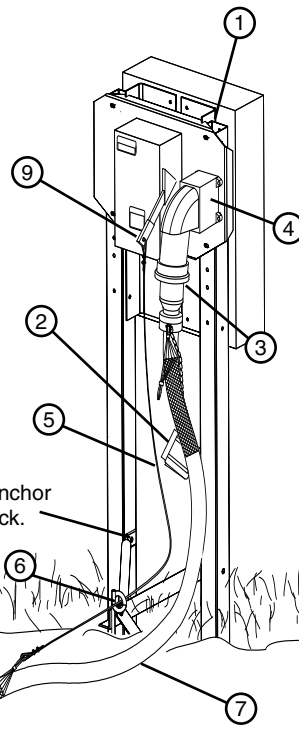


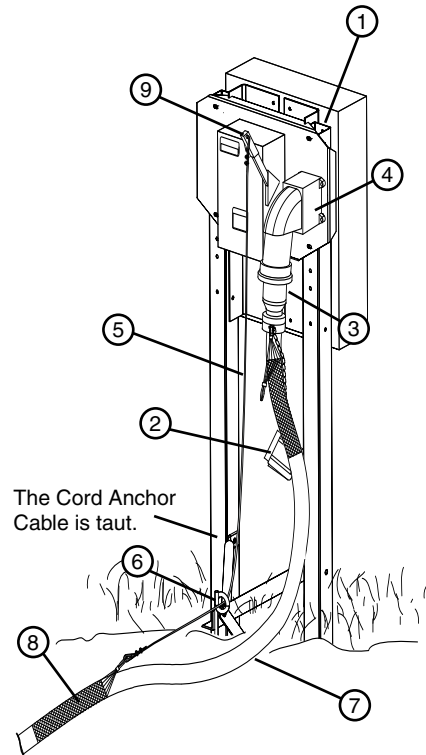
Figure 67-1 1. Disconnect Switch 2. Power Pedestal 3. Plug Cap Collar 4. Plug 5. Receptacle

Switch Handle
in Off Position



The Cord Anchor
Cable is slack.

Switch Handle
in On Position



The Cord Anchor
Cable is taut.

Figure 67-2 1. Power Pedestal
2. Plug Cap
3. Electric Cord Plug
4. Power Pedestal Receptacle
5. Cord Anchor Cable

6. Cable Anchor Ring
7. Electric Cord
8. Cord Grip
9. Disconnect Switch

OPERATION

Open Delivery Ditch Feed

Start Up - Electric Cord / Motor Pump Applications

1. Inspect the wheel tracks to insure no vehicles or other equipment will be contacted upon start-up or operation.
2. If the machine has below ground guidance, turn the oscillator ON.
3. Connect electric cord to power source. Refer to Open Delivery Ditch Feed Electric Cord Handling and Operation beginning on page 66, then return to this instruction and continue with step 4.
4. Check the centrifugal pump oil reservoir level.
5. Move the cart disconnect panel switch to the ON position.
6. Move the pump panel disconnect switch to the ON position.
7. Turn the control panel disconnect switch to the ON position.
8. Check the voltmeter reading and verify that the Nominal Supply Voltage is correct for this machine. See Figure 68-1.
9. Determine if the machine will be run wet or dry.

- If running the machine wet, with water:

- (a) Lower suction inlet into ditch until the inlet lift cables go slack. See Figure 68-2.
- (b) Prime the centrifugal pump. See 50/60 Hz AC Voltage Electric Primer on the next page. After the pump is primed return to this instruction and continue with step c).
- (c) Start the pump using the control panel. Refer to the appropriate Control Panel Owner's Manual for control panel operating procedures.
- (d) Slowly fill the system with water. Slowly open the riser valve so that the pump does not loose prime.
- (e) Refer to the appropriate Control Panel Owner's Manual for control panel operating procedures.
- (f) Also refer to Open Delivery Ditch Feed Cord Handling and Operation, Electric Cord Positioning beginning on page 70 as needed.

- If running the machine dry, without water, make sure the suction inlet is raised out of the ditch/water,

- (a) Refer to the appropriate Control Panel Owner's Manual for control panel operating procedures.
- (b) Also refer to Open Delivery Ditch Feed Cord Handling and Operation, Electric Cord Positioning beginning on page 70 as needed.

CAUTION

- DO NOT OPERATE THE MACHINE IF THE VOLT METER READS BELOW THE MINIMUM ALLOWED VOLTAGE OR ABOVE THE MAXIMUM ALLOWED VOLTAGE. SEE FIGURE 68-2.
- OPERATING THE MACHINE OUTSIDE THESE LIMITS COULD CAUSE DAMAGE TO THE DRIVE MOTORS AND OTHER ELECTRICAL COMPONENTS.
- CORRECT THE LOW VOLTAGE PROBLEM BEFORE RESUMING OPERATION.

Nominal Supply Voltage	Maximum Allowed Voltage	Minimum Allowed Voltage
480 VAC @ 60Hz	505 VAC	440 VAC
415 VAC @ 50Hz	420 VAC	375 VAC
400 VAC @ 50Hz	420 VAC	365 VAC
380 VAC @ 50Hz	420 VAC	355 VAC

Figure 68-1

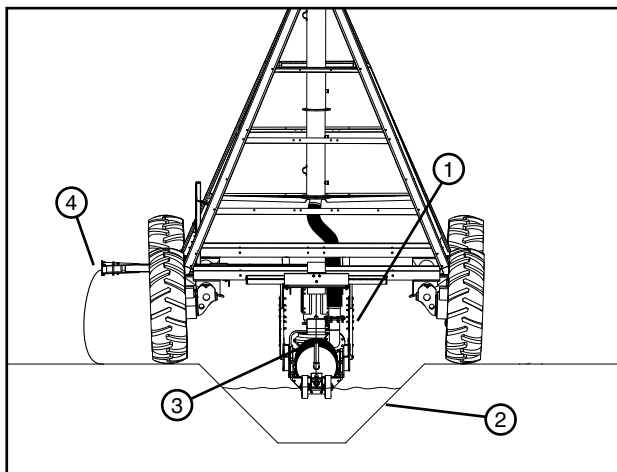


Figure 68-2 1. Suction Inlet 3. Lift Cable
2. Ditch 4. Electric Cord
(Straddle Ditch Shown)
Up position

Open Delivery Ditch Feed 50/60 Hz AC Voltage Electric Primer

The 50/60 Hz AC Voltage Electric primer is used for priming of pump installations with suction inlets in an Electric Cord / Motor Pump Application. See Figure 69-1.

1. Fill the automatic bearing oiler with lightweight oil, SAE 10W. See Figure 69-1.
2. Close the riser pipe valve.
3. Open the ball valve on the electric primer. See Figure 69-1.
4. Cord Drag Start Up: Refer to the Start Up - Electric Cord / Motor Pump Applications instructions for Open Delivery in the Operation section of this manual.
5. Start the electric primer. At the control panel switch the auxiliary control for the electric primer to ON.
6. When water squirts from the ball valve, stop the electric primer. At the control panel switch the auxiliary control for the electric primer to OFF.
7. Slowly fill the system with water. Slowly open the riser valve so that the pump does not loose prime.
8. Close the ball valve on the electric primer.

If water enters and fills the water trap on the electric primer. The water trap valve will close, the relief valve will open, and no priming will occur.

To re-establish prime:

1. Stop the electric primer. At the control panel switch the auxiliary control for the electric primer to OFF.
2. Depress the manual plunger on top of the water trap to allow water to draw-down. See Figure 69-2.
3. If necessary, open the drain cock valve for full drainage. See Figure 69-2.
4. When fully drained repeat steps 2-8.

Refer to Troubleshooting section for additional solutions to problems that may occur with the electric primer.

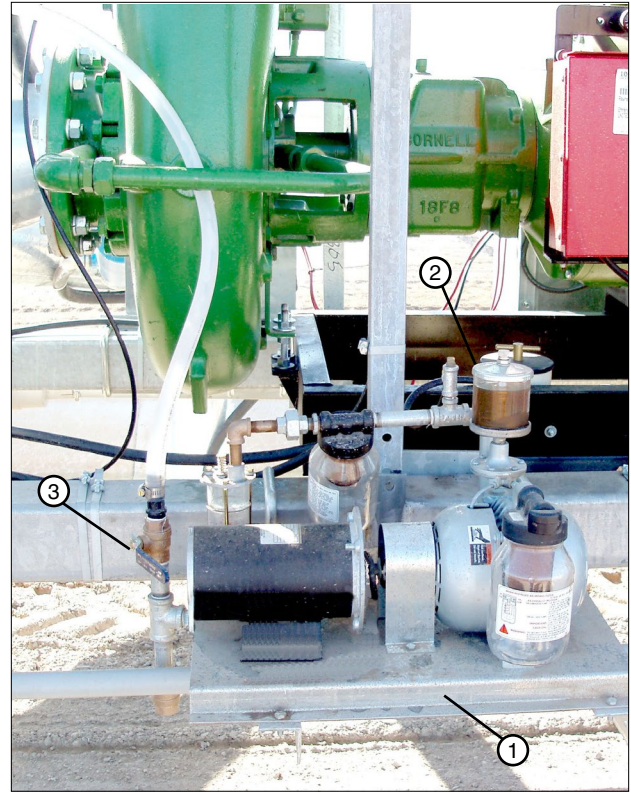


Figure 69-1 1. Electric Primer
2. Automatic Bearing Oiler
3. Ball Valve

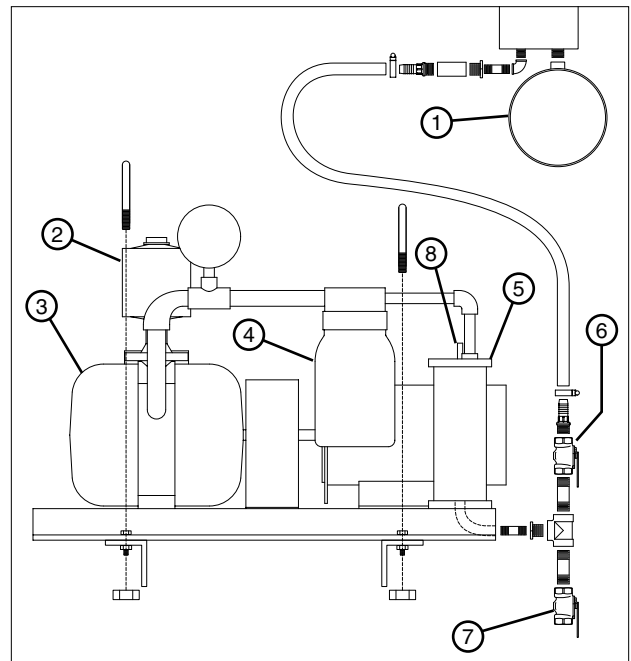


Figure 69-2 1. Suction Inlet Pipe 5. Water Trap
2. Oiler 6. Ball Valve
3. Vacuum Pump 7. Drain Cock Valve
4. Oil Trap 8. Manual Plunger

OPERATION

Open Delivery Ditch Feed Cord Handling and Operation Electric Cord Positioning

The following instructions describe a basic method of positioning the electric cord for open delivery depending on direction of machine movement and position of power pedestals as the machine moves across the field. (Ditch Feed Option Shown)

1. Connect electric cord:
 - (a) Make sure the power pedestal disconnect is in the OFF position.
 - (b) Position the electric cord between the cart wheel tracks. To prevent interference between the electric cord and cart tires, bury the electric cord in the area where interference will occur or when applicable. See Figure 70-1.
 - (c) Connect the electric cord to the power pedestal.
 - (d) When ready, switch the power pedestal disconnect switch into the ON position.
2. Follow the instructions for Open Delivery Cord Drag Start Up.
3. When ready, start the machine. The machine should start and run in the desired direction and auto reverse or stop at the end of field stop post which was set for the length of the electric cord.
4. As the machine approaches the end of field stop post, Stop the machine and close the water shut off valve on the riser if applicable.
5. Move the electric cord:
 - (a) Make sure the power pedestal disconnect is in the OFF position.
 - (b) Disconnect the electric cord from the power pedestal.
 - (c) Position the electric cord far enough away from the hose, so that the hose will not drag over it. To prevent interference between the electric cord, cart tires and hose, bury the electric cord in the area where interference will occur or when applicable, position the electric cord over the top of hose. See Figure 70-1.
 - (d) Make sure the second power pedestal disconnect is in the OFF position.
 - (e) Connect the electric cord to the second power pedestal.
 - (f) When ready, switch the second power pedestal disconnect switch into the ON position.

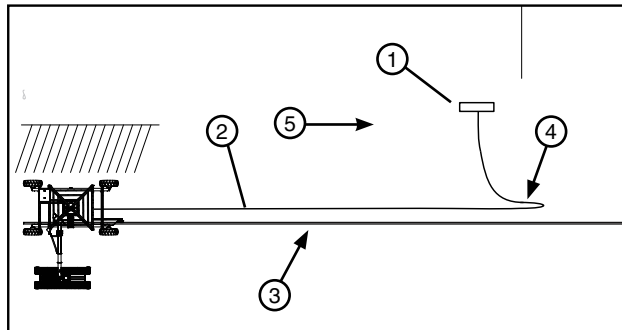


Figure 70-1 1. Power Pedestal
2. Electric Cord
3. Guidance Furrow or Cable
4. Buried Electrical Cord Area
5. Direction of Travel

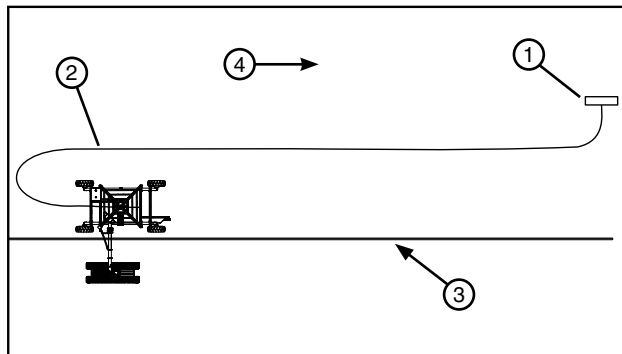


Figure 70-2 1. Power Pedestal
2. Electric Cord
3. Guidance Furrow or Cable
4. Direction of Travel

Open Delivery Ditch Feed Cord Handling and Operation Electric Cord Positioning (continued)

6. At the machine/control panel:
 - (a) Select the original direction of travel.
 - (b) Set the percentage timer to the desired application rate or speed.
 - (c) If applicable set the Auto Reverse/Auto Stop control as desired.
7. When ready, start the machine. If applicable, open the water shut off valve on the riser. The machine should start and run in the desired direction and auto reverse or stop at the end of field stop post which was set for the length of the electric cord.
8. Repeat the steps 9-13 as needed to cross the field.
9. As the machine approaches the edge of the field do one of the following:
 - **If Auto Reverse is on**, monitor and assist the auto reverse process as needed, closing and opening the riser valve as required.
 - (a) Reposition the end of field stop for the length of electric cord.
 - (b) The machine should start and run in the desired direction and stop at the end of field stop post which was set for the length of the electric cord.
 - **If Auto Stop is on**, monitor and assist the auto stop process as needed, closing the riser valve as required.
 - (a) If this is a standard linear machine continue with step 14 of this instruction to run machine back across the field in the opposite direction.
 - (b) If this is a swing around linear machine and the operator intends to swing the machine around to the other field, proceed to the Swing Around section, follow the Swing Around procedure and swing the machine around to the other field. After swinging machine around, return to this instruction and continue with step 14 to run machine back across the field in the opposite direction.
10. Reposition the end of field stop for the length of electric cord.
11. Move electric cord:
 - (a) Make sure the power pedestal disconnect, that the electric cord is connected to, is in the OFF position.
 - (b) Position the electric cord far enough away from the hose, so that the hose will not drag over it. To prevent interference between the electric cord, cart tires and hose, bury the electric cord in the area where interference will occur or when applicable, position the electric cord over the top of hose. See Figure 71-1.
 - (c) When ready, switch the power pedestal disconnect switch into the ON position.

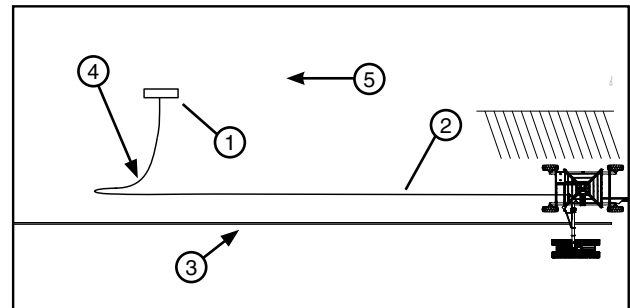


Figure 71-1 1. Power Pedestal
2. Electric Cord
3. Guidance Furrow or Cable
4. Buried Electrical Cord Area
5. Direction of Travel

12. At the machine/control panel:
 - (a) Select the desired direction of travel.
 - (b) Set the percentage timer to the desired application rate.
 - (c) If applicable set the Auto Reverse/Auto Stop control as desired.
13. When ready, start the machine. If applicable, open the riser water shut off valve. The machine should start and run in the desired direction and auto reverse or stop at the end of field/hose stop post which was set for the length of the hose.
14. Repeat the steps 6-11 as needed to cross the field in the opposite direction.

OPERATION

ClassicPlus

This section covers the operation of your Valley ClassicPlus in conjunction with the Valley Universal Linear. You must read and understand the other sections of this manual for overall Linear operation. The guidelines in this section are for use of the ClassicPlus and ClassicPlus with Auto Reverse/Auto Stop only. Sections related to safety, principles and methods of operation are covered in this section. Familiarize yourself with the capabilities of the Universal Linear in order to obtain optimum machine performance. It should be remembered the Universal Linear will perform according to your knowledge of the equipment, soil and water relationships and equipment application concepts.

NOTE

- THE CLASSICPLUS CONTROL PANEL IS DESIGNED TO BE USED WITH ALL TYPES OF VALLEY IRRIGATION EQUIPMENT: CENTER PIVOTS, CORNER MACHINES AND LINEARS. SOME OF THE CAPABILITIES OF THE CLASSICPLUS PANEL ARE NOT APPLICABLE TO LINEARS (i.e.: YOU WILL SEE SOME CONTROLS AND SOME FEATURES ON THE PANEL THAT CANNOT BE USED WITH A LINEAR; THESE WILL BE NOTED IN THE APPROPRIATE SECTIONS).

⚠ DANGER

- 480 VOLTS - DO NOT OPEN THE INTERIOR PANEL DOOR. ELECTRICAL SHOCK MAY OCCUR. ALL NEEDED CONTROLS AND MONITORING DEVICES ARE ON THE OUTSIDE OF THE INTERIOR CONTROL PANEL DOOR. SERVICE WORK DONE ON THE CONTROL PANEL IS TO BE PERFORMED BY QUALIFIED SERVICE PERSONNEL ONLY!

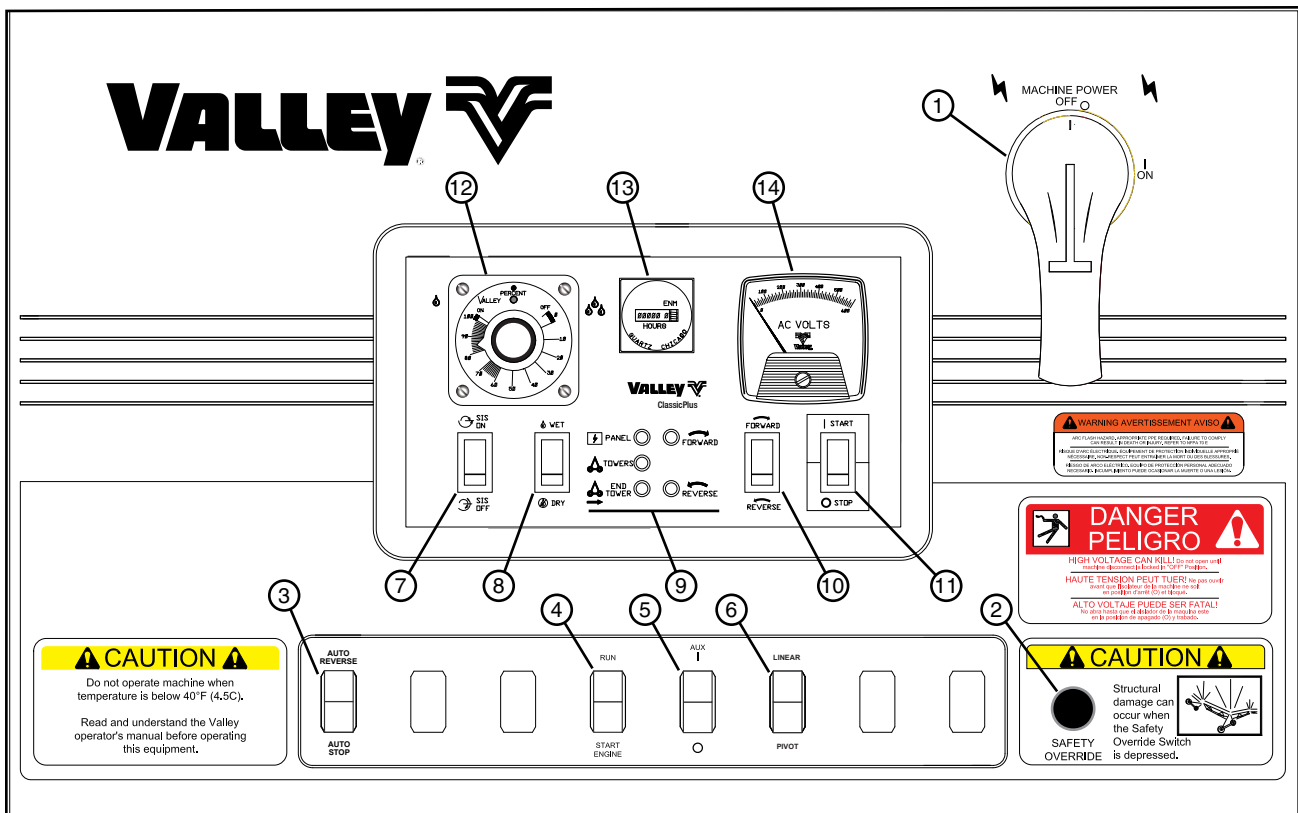


Figure 72-1 1. Main Disconnect 6. Linear/Pivot Switch 11. Start/Stop
 2. Safety Override 7. Stop-In-Slot On/Off 12. Percentage Timer
 3. Auto Reverse/Auto Stop 8. Wet/Dry Pressure By-pass 13. Hour Meter
 4. Engine Run/Start 9. Indicator Lights 14. Voltage Meter
 5. (Optional) Auxiliary Switch 10. Forward/Reverse Direction Selection

ClassicPlus

Auto Reverse/Auto Stop Switch

This switch will only be installed if the optional drive unit mounted auto reverse/auto stop is ordered as illustrated in Figure 73-1.

In the Auto Reverse position, the system will run continuously, automatically reversing when either actuator arm is tripped.

In the Auto Stop position, the system will Stop when the actuator arm is tripped.

The Drive Unit Mounted Auto Reverse/Auto Stop assembly is used for both drive unit mounted end of field auto stop and drive unit mounted end of field auto reverse/auto stop (combined options). See Figure 73-2.

The auto stop option will stop the system when the actuator arm contacts the barricade.

If the auto reverse/auto stop option is installed, the operator may choose to either stop the system when it reaches the barricade or have the system automatically reverse its direction of travel and continue to run.

This can be selected with the Auto Reverse/Auto Stop switch as illustrated in Figure 73-1.

NOTE

- Care must be taken when this option is used.
- The operator **MUST** ensure the actuator arm contacts the tripping structure. Under certain conditions, soil may build up in the wheel track resulting in a ramp effect allowing the actuator arm to go over the tripping structure without tripping the actuator arm.

Linear/Pivot Switch

Allows the machine to be set in the Linear operating mode or the pivot operating mode. When the switch is in the Linear mode, the cart drive is engaged, the linear guidance and the linear guidance safety is energized. Moving the switch to the pivot mode disengages these control systems allowing the cart to act as a pivot point and the spans to rotate to an adjacent field or a field positioned perpendicular to the field the machine has been operating on.

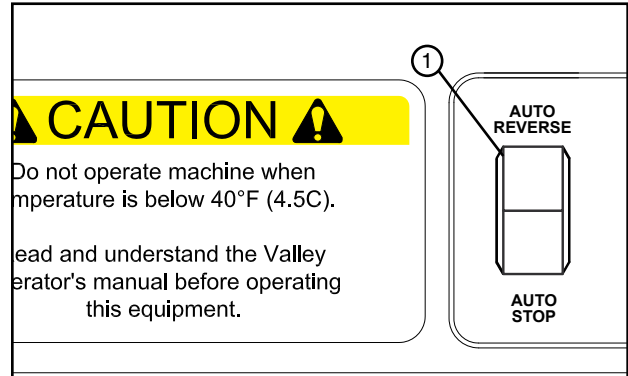


Figure 73-1 1. Auto Reverse/Auto Stop

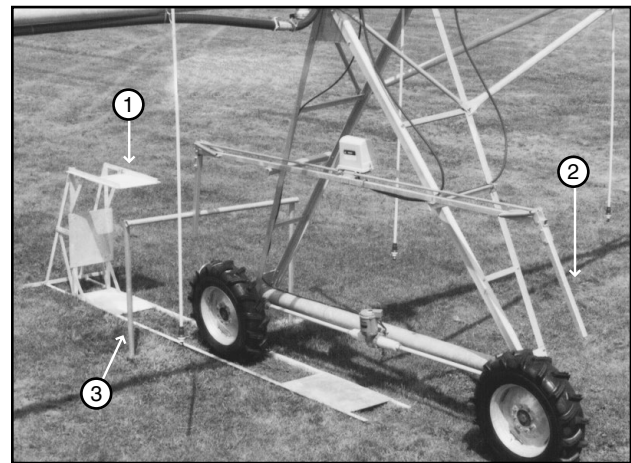


Figure 73-2 1. Physical Barricade
2. Actuator Arm
3. Actuator Arm Trip Structure

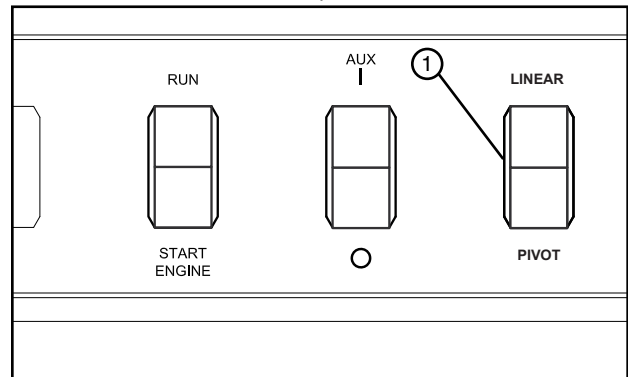


Figure 73-3 1. Linear/Pivot Switch

OPERATION

ClassicPlus

Linear Start-Up Wet (With Water)

1. Inspect the wheel tracks to ensure there are no vehicles or other equipment which will obstruct the system upon start-up or operation.
2. Select LINEAR at the Linear/Pivot switch.
3. Place the WET/DRY switch in the WET position to bypass the low pressure switch.
4. If an engine shutdown circuit is utilized, place the Engine RUN/START switch in the START position.
5. Partially close the mainline valve to the system. This will help to prevent “water hammer” if the pump is powered by an electric motor.
6. Start the pump. (The pump may be wired such that when the START switch on the center pivot control panel is pressed, the pump automatically starts. Check with your Valley dealer to determine how your pump has been wired into your control panel.)
7. Slowly introduce more water into the system by either opening the mainline valve or by increasing the engine speed. Examine the Valley System’s pressure gauge to ensure the desired operating pressure.
8. Turn the main disconnect switch to the ON position. If the power is supplied by an engine driven generator, adjust the RPM of the generator until the voltmeter reads 480 – 505 volts. DO NOT EXCEED 505 VOLTS.
9. Place the WET/DRY switch in the WET position.
10. Select the direction of travel by placing the FORWARD/REVERSE switch in either the FORWARD or REVERSE position. Remember, Forward is clockwise and Reverse is counter-clockwise.
11. Press the START-STOP switch to the START location for 1 – 2 seconds and release. The system should now start.
12. Place the Engine RUN/START switch in the RUN position.
13. Set the percentage timer to the desired speed setting.
14. If the system is equipped with the optional stop-in-slot, place the SIS ON/OFF switch in the desired position.
15. If the system is equipped with the optional drive unit mounted auto reverse/auto stop hardware, place the Auto Reverse/Auto Stop switch in the desired position.

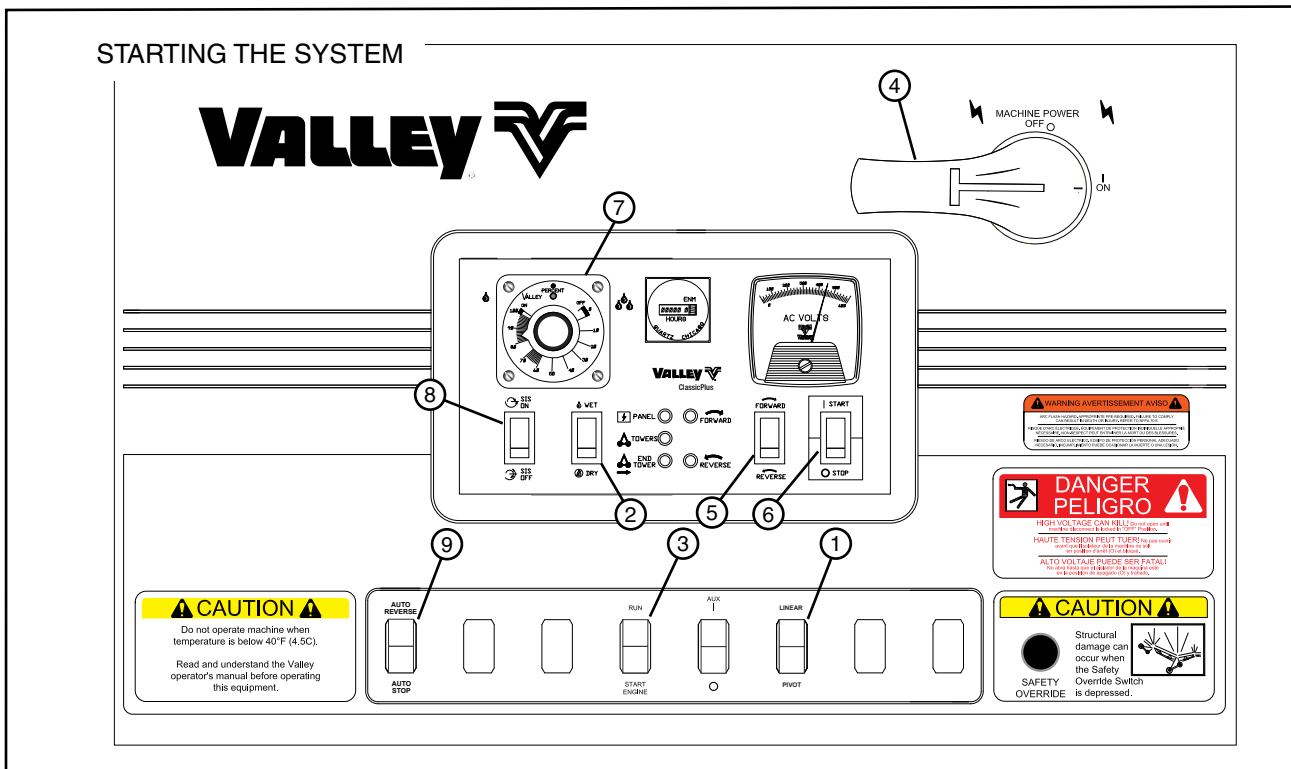


Figure 74-1 1. LINEAR/PIVOT Switch
 2. WET/DRY Switch
 3. RUN/START Switch
 4. Main Disconnect Switch
 5. FORWARD/REVERSE Switch
 6. START/STOP Switch
 7. Percentage Timer
 8. Stop-In-Slot Switch
 9. AUTO Reverse/AUTO Stop Switch (if equipped)

ClassicPlus

Linear Start-Up Dry (Without Water)

1. Inspect the wheel tracks to ensure there are no vehicles or other equipment which will obstruct the system upon start-up or operation.
2. Select LINEAR at the Linear/Pivot switch.
3. Place the WET/DRY switch in the DRY position to by-pass the low pressure switch.
4. If an engine shutdown circuit is utilized, place the Engine RUN/START switch in the START position.
5. Turn the main disconnect switch to the ON position. If the power is supplied by an engine driven generator, adjust the RPM of the generator until the voltmeter reads 480 – 505 volts. DO NOT EXCEED 505 VOLTS.
6. Select the direction of travel by placing the FORWARD/REVERSE switch in either the FORWARD or REVERSE position. Remember, Forward is clockwise and Reverse is counter-clockwise.
7. Press the START-STOP switch to the START location for 1 – 2 seconds and release. The system should now start.
8. Place the Engine RUN/START switch in the RUN position.
9. Set the percentage timer to the desired speed setting.
10. If the system is equipped with the optional stop-in-slot, place the SIS ON/OFF switch in the desired position.
11. If the system is equipped with the optional drive unit mounted auto reverse/auto stop hardware, place the Auto Reverse/Auto Stop switch in the desired position.

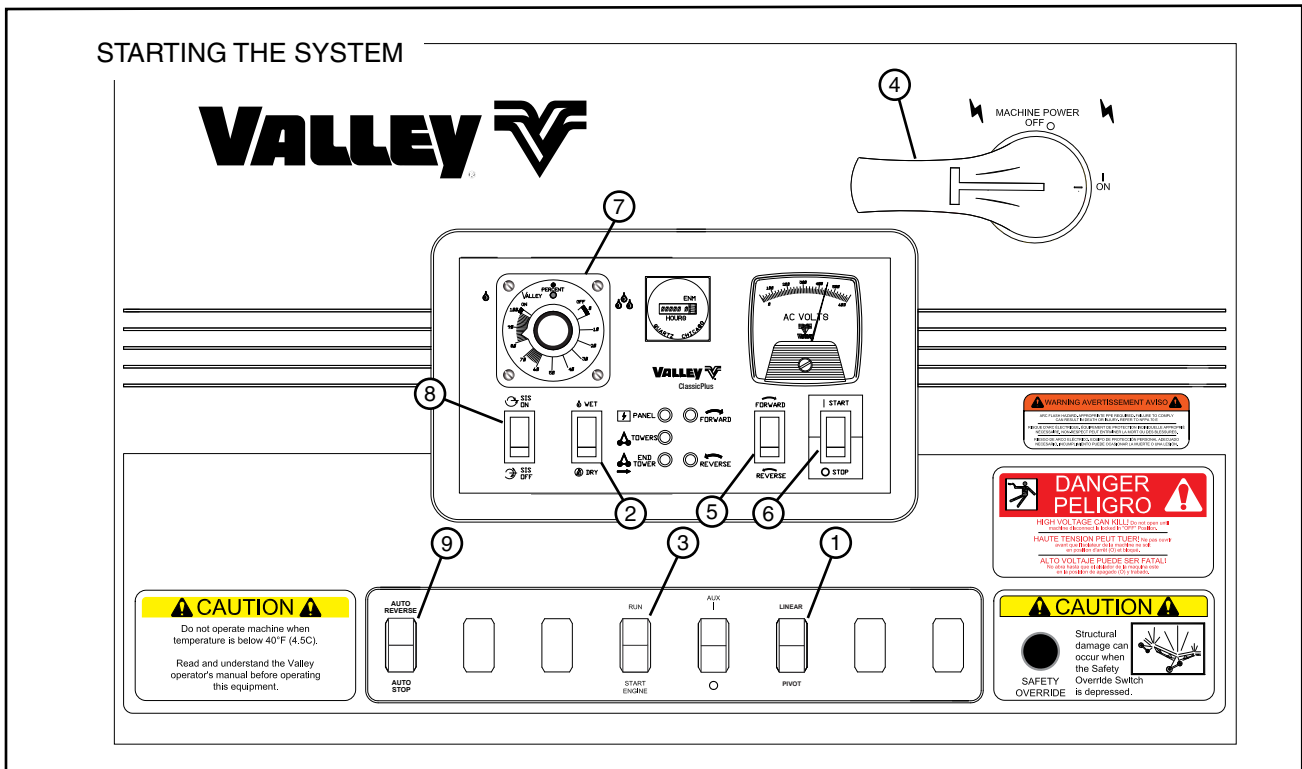


Figure 75-1

1. LINEAR/PIVOT Switch	6. START/STOP Switch
2. WET/DRY Switch	7. Percentage Timer
3. RUN/START Switch	8. Stop-In-Slot Switch
4. Main Disconnect Switch	9. AUTO Reverse/AUTO Stop Switch (if equipped)
5. FORWARD/REVERSE Switch	

OPERATION

ClassicPlus

Stopping The Machine Emergency Stopping

To stop the machine in an emergency situation, shut off any one of the following:

- Main Service Disconnect Switch from public power to the control panel. See Figure 76-1.
- Control Panel Main Disconnect Switch. See Figure 76-1.
- Any Tower Box Disconnect Switch. See Figure 76-1.

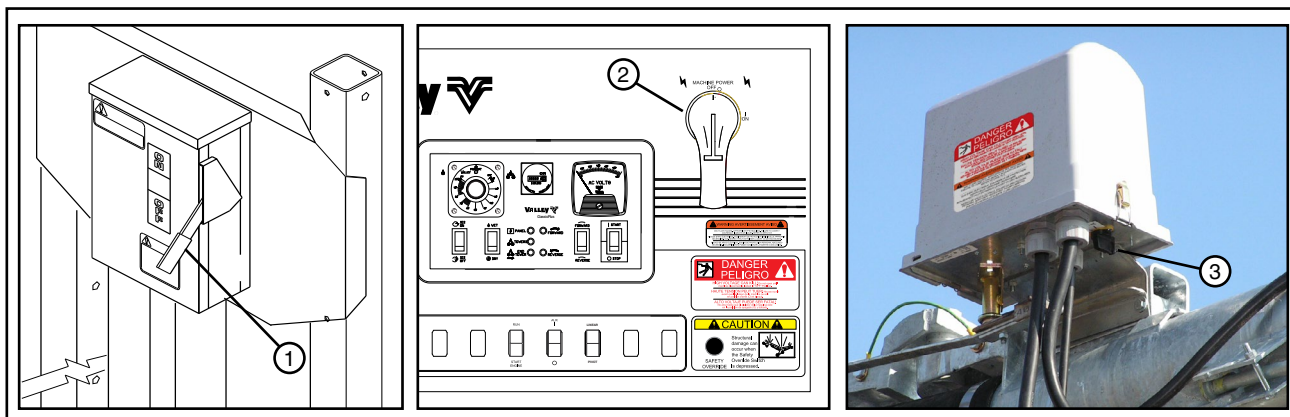


Figure 76-1 1. Main Service Disconnect Switch
2. Control Panel Main Disconnect Switch
3. Tower Box Disconnect Switch

Stopping Under Normal Conditions

1. Press the START-STOP switch to the STOP position. See Figure 76-2.
2. Turn the main disconnect switch to the OFF position. See Figure 76-2.
3. Turn the pumping unit OFF (if not automatic).
4. If an engine generator set is utilized, place the Engine Run/Start switch to the Start position for the next start-up sequence.

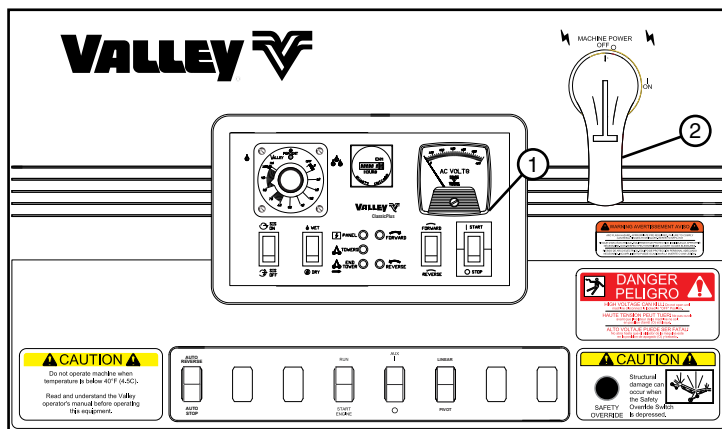


Figure 76-2 1. START-STOP Switch
2. Main Disconnect Switch OFF

⚠ WARNING

- **DO NOT SHUT THE MACHINE OFF BY SLOWLY IDLING DOWN THE ENGINE GENERATOR SET. THIS PRACTICE CAUSES LOW VOLTAGE AND WILL DAMAGE MACHINE COMPONENTS.**
- **ALWAYS STOP THE IRRIGATION MACHINE PRIOR TO SHUTTING DOWN THE ENGINE-GENERATOR SET.**

ClassicPlus Pivot Procedure

NOTE

- Fields that are perpendicular or 90° to one another, the Universal Linear cart must be rotated 90° in the direction the machine will be rotated. This must be done prior to moving or rotating the machine the 90° to the next field! To provide proper proximity switch position for guidance, Hose and Electric Cord section for Precautions and Handling Procedures

The following is a guide for pivoting the Universal Linear machine to operate on fields that are adjacent or perpendicular to one another. Insure the Universal cart is precisely positioned at the pivoting point. If the machine has stopped at a position other than the pivoting point, it will be necessary to move or relocate the cart to the correct position. The drive units must rotate in the same position (wheel tracks) each time the machine is pivoted to the next field; this will put less load on the machine structure while minimizing crop damage by maintaining one set of wheel tracks.

It is imperative routine maintenance of the pivot area be performed. The pivot area must be kept free of weeds and other debris. This will make cart rotation much easier when moving between perpendicular fields. In addition, be sure the drive unit wheel tracks are kept at a minimum depth at the point of rotation (4 inch maximum depth). The drive units must move out of the Linear tracks and into the pivoting wheel tracks as the machine rotates to the adjacent field.

1. Disconnect the water supply and transition hose from the cart. Move them out of the path of the Linear cart and drive units. See Figure 77-1.
2. Fold up the guidance arms and secure with the rubber straps (machines equipped with furrow guidance). See Figure 77-2.
3. Rotate the jacks to the vertical down position. See Figure 77-3.

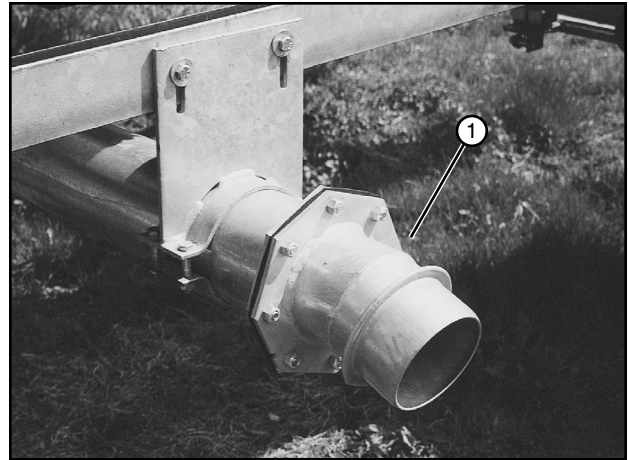


Figure 77-1 1. Water Outlet

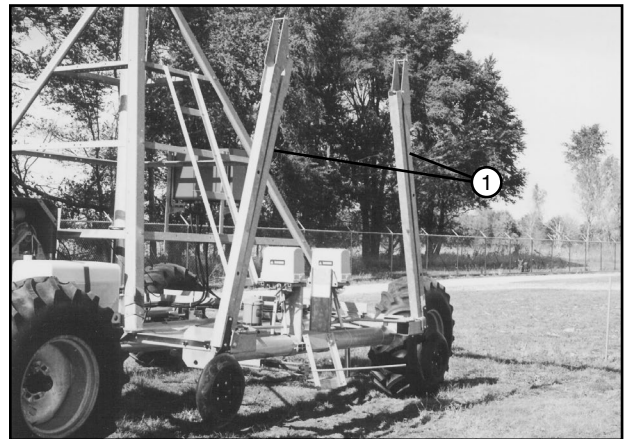


Figure 77-2 1. Furrow Guidance Arms (Up Position)

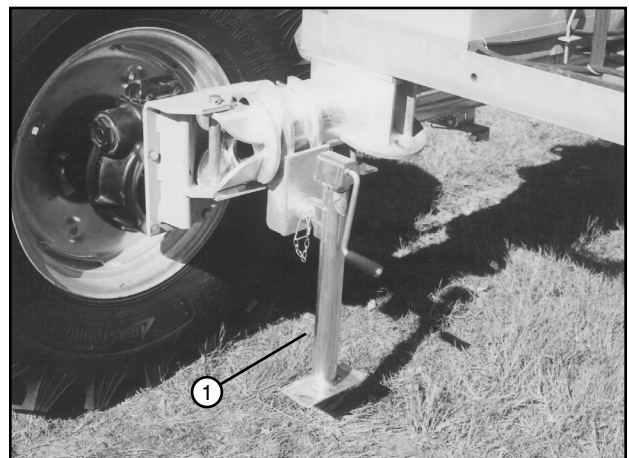


Figure 77-3 1. Jack

OPERATION

ClassicPlus

Pivot Procedure (continued)

4. Raise the cart, then release the towable gearbox mounting brackets from the keepers. Rotate the wheel assembly approximately 60°. See Figure 78-1.
5. Remove a torque pin from the towable gearbox hub, then align the swivel mount link with the hole in the swivel mount tongue and insert the torque pin (be sure to use the middle hole in the link to attain the 60° angle). Repeat steps 3 through 5 on the other wheel/gearbox assemblies. See Figure 78-2.
6. Lower the cart, rotate the jacks to the horizontal position then pivot the cart 90° in the direction the machine will be rotated. See Figure 78-3

NOTE

- See **Electric Cord Precautions and Handling Procedures Section.**

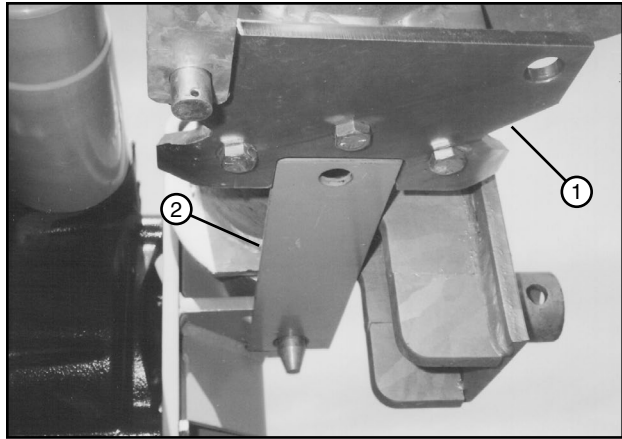


Figure 78-1 1. Mounting Bracket
2. Keeper

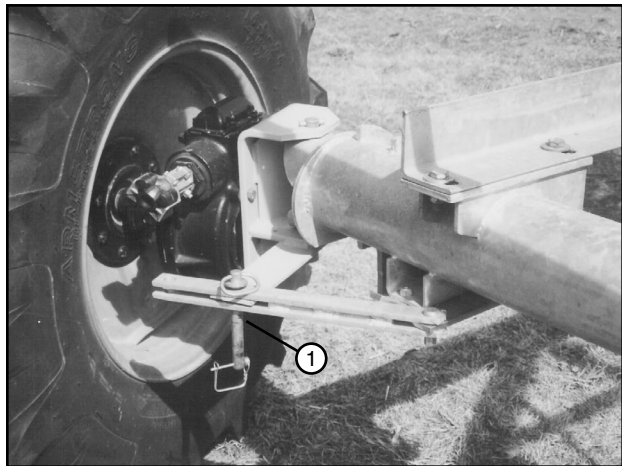


Figure 78-2 1. Swivel Mount Lock



Figure 78-3 Rotate cart 90°
(must be rotated in direction of travel of machine).

ClassicPlus

Pivot Procedure (continued)

7. Raise the cart and return the swivel mounts to the operating position. See Figure 79-1.

NOTE

- Be sure the drive line flex couplers are aligned, the towable mounts are locked into the operating position and the torque pins are reinstalled into the towable hubs. In addition, the jacks must be placed in the vertical up position to allow for clearance of the water supply hose tow chains during normal Linear operation.

8. Lower the furrow guidance arms. See Figure 79-2.

Anchoring Cart

1. Attach the anchor chains and secure the cart to the pivot point. See Figure 79-1.

NOTE

- The cart must be precisely positioned at the pivot point. Failure to do so will result in undo stress on the cart and machine which can result in structural damage or failure!

2. The Linear design and the field layout for fields that are parallel and, in some instances, perpendicular to one another may require the drive units to cross the water supply hose and the electrical supply line. See Figure 79-2.

⚠ WARNING

- NEVER ALLOW THE DRIVE UNITS TO DIRECTLY CROSS OR RUN OVER THE WATER SUPPLY HOSE OR THE ELECTRICAL SUPPLY CORD AS DAMAGE TO THE HOSE AND ELECTRICAL CORD MAY OCCUR!

The water supply hose should be moved out of the path of the drive units, when possible.

NOTE

- Refer to Hose and Electrical Cord Precautions and Handling Procedures for machine rotation!

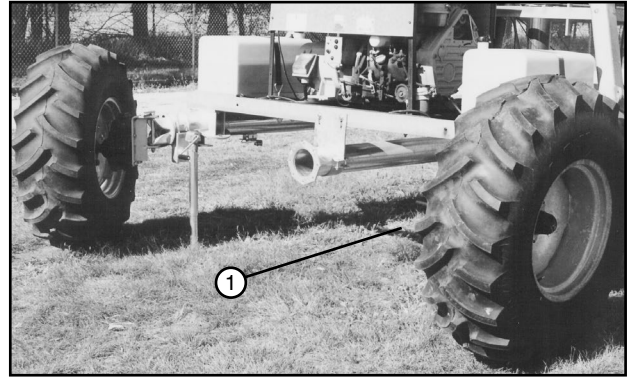


Figure 79-1 1. Return mounts to operating position.

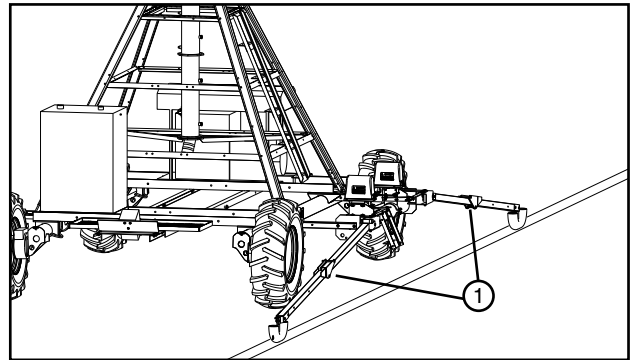


Figure 79-2 1. Furrow Guidance

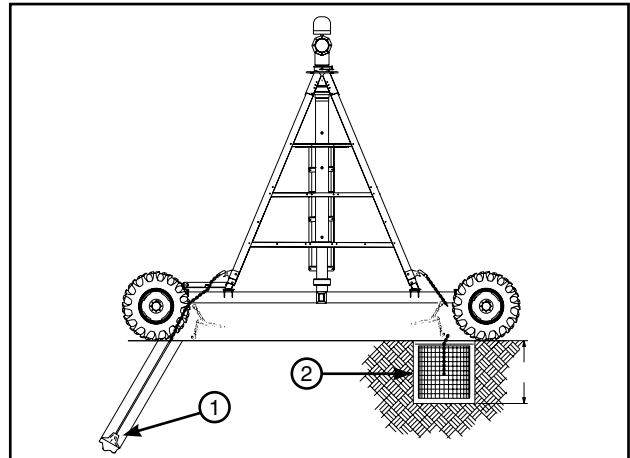


Figure 79-3 1. Earth Anchor
2. Concrete Anchor

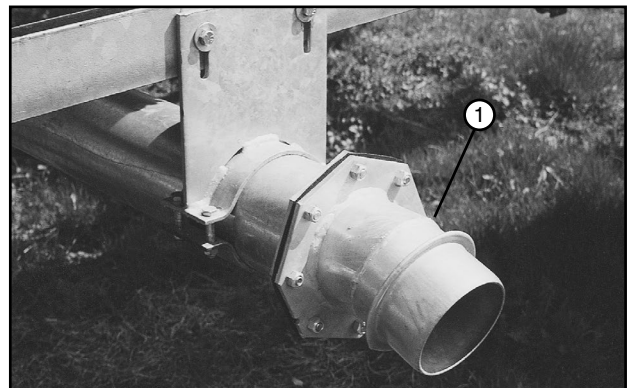


Figure 79-4 1. Water Supply Inlet

OPERATION

ClassicPlus Pivot Mode Start-Up

1. Inspect the wheel tracks to ensure there are no vehicles or other equipment which will obstruct the system upon start-up or operation.
2. Select PIVOT at the Linear/Pivot switch.
3. Place the WET/DRY switch in the DRY position.
4. If an engine shutdown circuit is utilized, place the Engine RUN/START switch in the START position.
5. Turn the main disconnect switch to the ON position. If the power is supplied by an engine driven generator, adjust the RPM of the generator until the voltmeter reads 480 – 505 volts. **DO NOT EXCEED 505 VOLTS.**
6. Place the WET/DRY switch in the WET position.
7. Select the direction of travel by placing the FORWARD/REVERSE switch in either the FORWARD or REVERSE position. Remember, Forward is clockwise and Reverse is counter-clockwise.
8. Set the percentage timer to 100%.
9. Press the START-STOP switch to the START location for 1 – 2 seconds and release. The system should now start. Rotate to the end of the adjacent field, the proximity switches or the End-of-Field Stop will automatically stop the machine.
10. Place the Engine RUN/START switch in the RUN position.
11. If the system is equipped with the optional stop-in-slot, place the SIS ON/OFF switch in the desired position.
12. If the system is equipped with the optional drive unit mounted auto reverse/auto stop hardware, place the Auto Reverse/Auto Stop switch in the desired position.

NOTE

- On fields that are perpendicular or 90° to one another, the Universal Linear cart must be rotated 90° in the direction the machine will be rotated. **THIS MUST BE DONE PRIOR to rotating the machine 90° to the next field!**

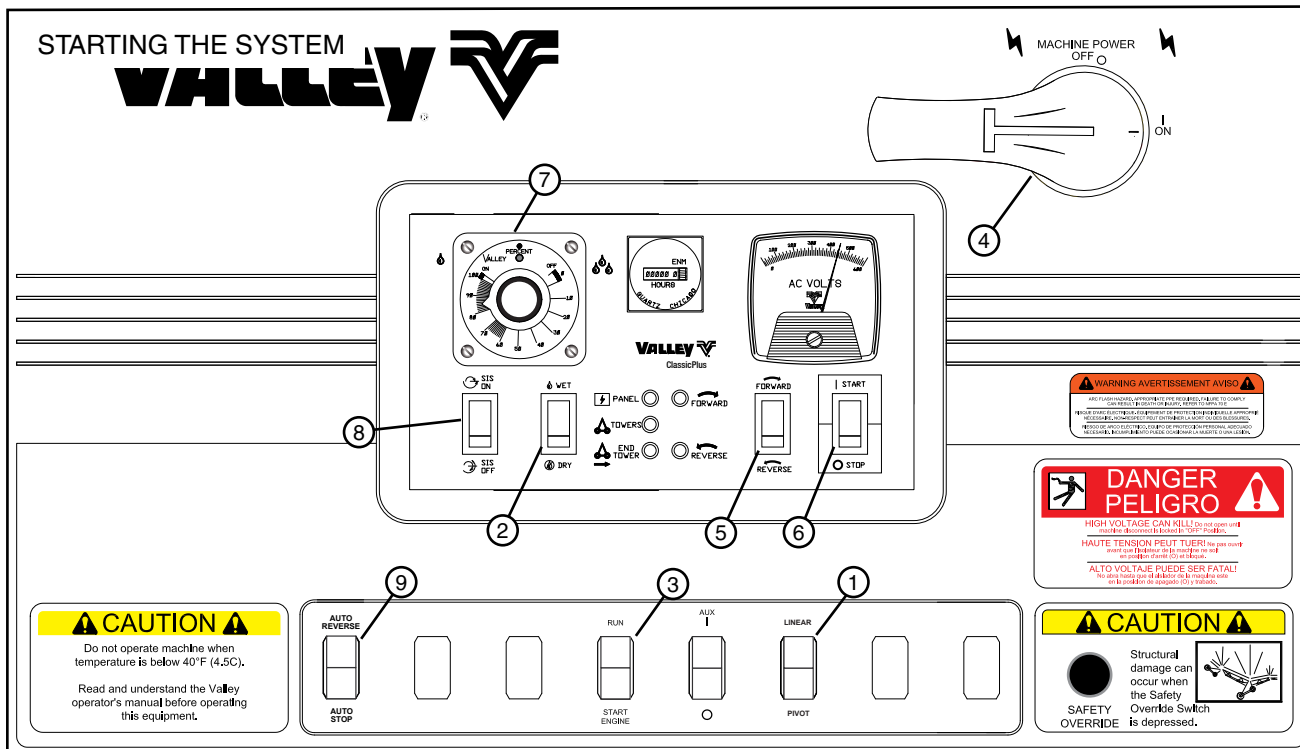


Figure 80-1 1. LINEAR/PIVOT Switch
2. WET/DRY Switch
3. RUN/START Switch
4. Main Disconnect Switch
5. FORWARD/REVERSE Switch
6. START/STOP Switch
7. Percentage Timer
8. Stop-In-Slot Switch
9. AUTO Reverse/AUTO Stop Switch (if equipped)

ClassicPlus

Pivot Mode Start-Up (continued)

*The **End-of-Hose Stop** switch breaks the safety circuit when activated. Release the End-of-Hose Switch by lifting the upper section of the End-of-Hose Stop out of the lower section. This allows the switch actuator arm to return to its center position. When the machine has been rotated to the adjacent field and moved away (linear mode) from the stop, replace the upper section of the stop back in to the lower section!

*If the **End-of-Field Stop** shut the Linear off, it will be necessary to reverse the direction of operation then hold the **START** button and the **SAFETY OVERRIDE** button to allow the drive unit with the End-of-Field Stop to move away from the End-of-Field barricade. **DO NOT** hold the Override Button for more than 3 seconds at any one time. In addition, be sure the Linear/Pivot Switch is in the PIVOT mode.

Once the machine has been pivoted to the next field (cart rotated if applicable), it must be prepared for operation.

13. Release the tension on and disconnect the anchor chains if this has not been done.
14. Reposition and reattach the water supply line (it may be necessary to move the machine to accomplish this). (Refer to the Hose/Electrical Cord Handling Procedure section for detailed information.)
15. Reposition and reattach the electrical supply cord (Refer to the Hose/Electrical Cord Handling Procedure section for detailed information).
16. Lower the guidance arms to the operating position (furrow guidance only).
17. Place the LINEAR/PIVOT switch in the **LINEAR** position.
18. Restart the machine as covered in the ClassicPlus Start-Up section.

OPERATION

AutoPilot

Linear Mode Start-Up Wet (With Water)

NOTE

- This Universal Linear start-up is shown using a shutoff valve installed in the Universal cart riser, a low pressure shutoff on the machine and a high and low pressure shutoff at the pump. In addition, the following procedure is based on Pressure Delay start. If your application or installation is other than this, contact your local Valley service representative or dealer representative for specific start-up procedures.

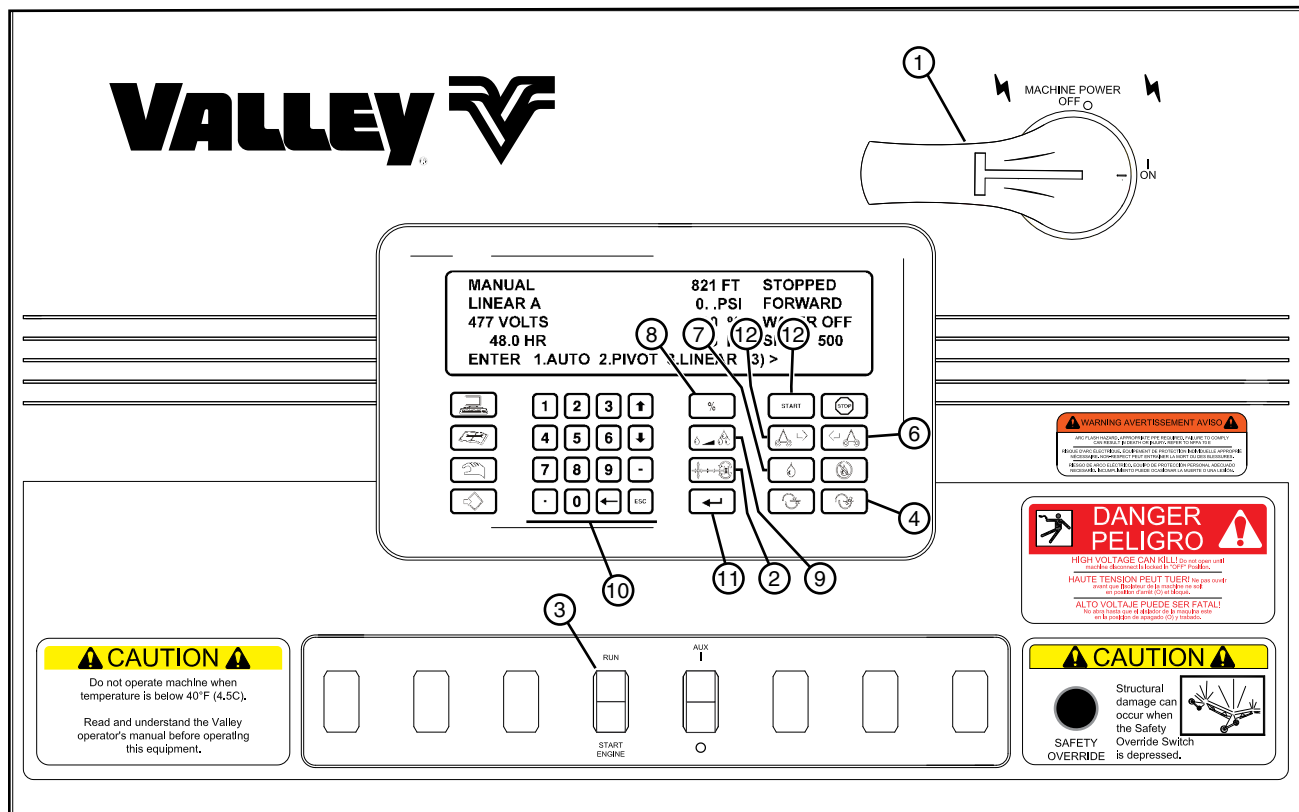


Figure 82-1 1. Disconnect ON 2. Pivot/Linear Key 3. Start/Run 4. Stop-In-Slot OFF Key 5. Water ON Key 6. Forward Key 7. Reverse Key 8. Percent Key 9. Depth Key 10. Number Keys 11. Enter Key 12. Start Key

- Turn the Main Disconnect Switch to the **ON** position.
- Select **LINEAR** at the Linear/Pivot switch.
- Select **START** on the engine/generator control panel Start/Run switch.
- Start the engine/generator set.
- Press the **Stop-in-Slot OFF** key.
- Select **WATER ON** key.
- Select the appropriate direction of operation - **FORWARD** or **REVERSE** - by pressing the appropriate "Start Forward" or "Start Reverse" key (as you face the Main Control Panel, forward is to the right and reverse is to the left).
- Select **PERCENTAGE** or **DEPTH** for setting speed or water application amount desired.
- Set the **SPEED** or **DEPTH** using the **NUMERIC KEY-PAD** then press **ENTER**.
- Depress the **START** key and hold for 1-2 seconds. (The Linear controls will be engaged but the machine will not move until pressure builds up in the pipeline.)
- Place the Engine/Generator control panel **START/RUN** switch in the **RUN** position.
- At the pump, **PARTIALLY CLOSE** the main line valve to the Linear. This will prevent "water hammer" if the pump is powered by an electric motor.
- START** the pump (place the **PUMP LOW PRESSURE SWITCH** in **BYPASS**).
- SLOWLY INTRODUCE** more water to the Linear by either opening the valve or increasing the engine RPM. Once the spans are filled, fully open the valve or increase the engine/pump RPM to the proper operating speed.
- Place the pump **LOW PRESSURE BYPASS** switch in the **RUN** position.
- Return to the Linear and check for proper operation.

AutoPilot

Start-Up/Linear Mode/Wet

NOTE

• The following start-up procedure is for a typical Universal Linear installation. There are a number of variables in the design of a Linear machine: options, ancillary equipment, irrigation practices, etc. For example, most installations include a 6 inch shutoff valve at the cart, which will shut off the flow of water to the machine if the Linear should shut down. A high pressure and a low pressure switch are typically used to control the pump. The high pressure switch will shut off the pump if the Linear shuts down (cart riser valve closes) and the low pressure switch will shut off the pump if a supply line leak or break occurs. This type of an installation may be started differently than one that includes other options or ancillary equipment. Talk to your local Valley representative concerning operating instructions for your specific or particular application or installation.

1. Select **LINEAR** on the Linear/Pivot switch.
2. Select **START** on the engine/generator control panel Start/Run switch.
3. **START** the engine/generator set (refer to the engine manufacturer's Operators Manual for specific engine start-up procedures).
4. Turn the Main Disconnect Switch to the **ON** position. The Voltage Meter should show between 460 and 505 volts.
5. Press the **Stop-In-Slot OFF** key.
6. Select **WATER ON** key.
7. Select the appropriate direction of operation - **FORWARD** or **REVERSE** - by pressing the appropriate "Start Forward" or Start Reverse" key (as you face the Main Control Panel, forward is to the right and reverse is to the left).
8. Select **PERCENTAGE** or **DEPTH** for setting speed or water application amount desired.
9. Set the **SPEED** or **DEPTH** on the **NUMERIC KEYPAD** then press **ENTER**.
10. Depress the **START** key and hold for 1 - 2 seconds. The Linear controls will be engaged but the machine will not move until pressure builds up in the pipeline. The display screen will flash "WAITING" meaning it is waiting for the pump to be started and pressure to build to the appropriate level before the Linear will begin to move.
11. Place the engine/generator control panel START/RUN switch in the **RUN** position.
12. At the pump, **PARTIALLY CLOSE** the main line valve to the Linear. This will prevent "water hammer" if the pump is powered by an electric motor.
13. **START** the pump (place the PUMP LOW PRESSURE SWITCH in **BYPASS**).
14. **SLOWLY INTRODUCE** more water to the Linear by either opening the valve or increasing the engine RPM. Once the spans are filled, fully open the valve or increase the engine/pump RPM to the proper operating speed.
15. Place the **LOW PRESSURE BYPASS** switch in the **RUN** position.
16. Return to the Linear and check for proper operation.

Start-Up/Linear Mode/Dry

To operate the Linear dry (without water), follow the previous "Start-Up/Linear Mode/Wet" procedure eliminating steps 11 through 15. The **WATER OFF** key must be pressed (step 2).

OPERATION

AutoPilot Stopping the Linear

NOTE

- Do Not shut the Linear off by turning the MAIN DISCONNECT to the OFF position or by slowly idling down the ENGINE/GENERATOR set. Always press the START/STOP switch to STOP then turn the MAIN DISCONNECT to OFF!

1. Press the **STOP** key.
2. Turn the MAIN DISCONNECT to the **OFF** position.
3. Shut the pumping unit OFF (if not automatic).
4. Shut OFF all power supply, power pedestal and main fused disconnect switches.

NOTE

- The Universal Linear will automatically stop when the END-OF-HOSE STOP arm contacts the END-OF-HOSE STOP stake. Prior to re-starting the machine, press the Stop switch to STOP then turn the MAIN DISCONNECT to the OFF position.

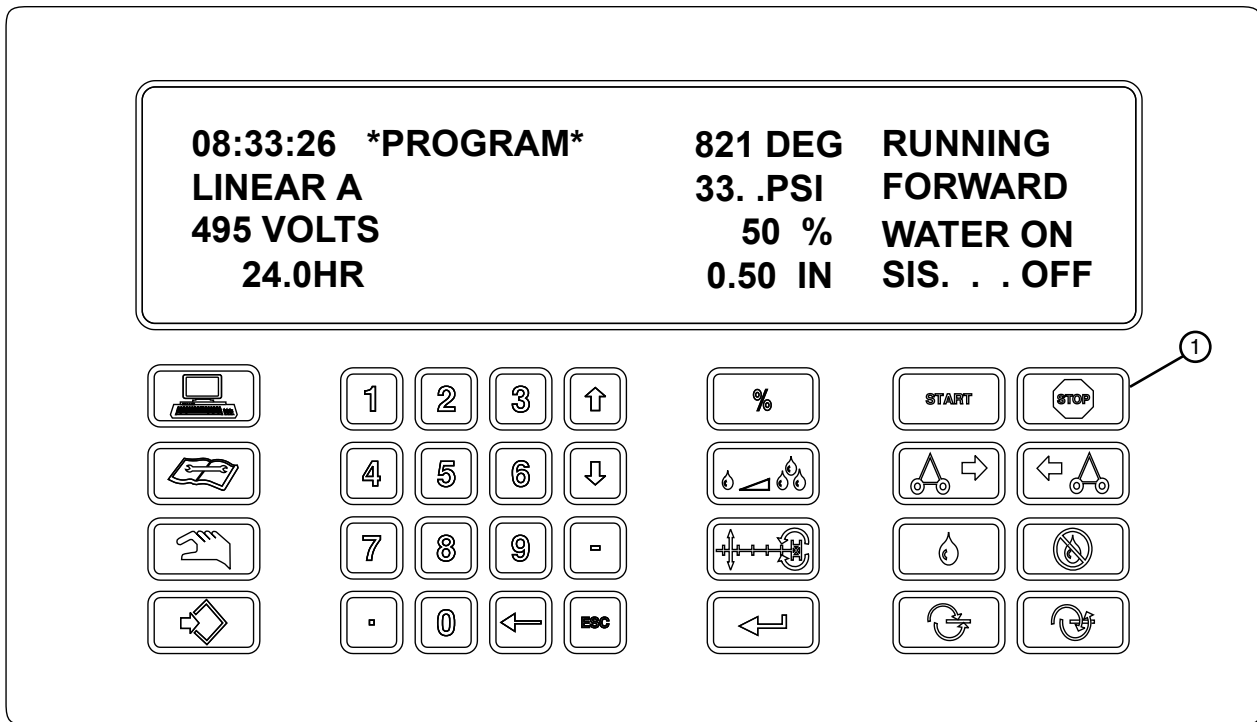


Figure 84-1 1. Stop Key

AutoPilot Pivot Procedure

NOTE

- On fields that are perpendicular or 90° to one another, the Universal Linear cart must be rotated 90° in the direction the machine will be rotated. **THIS MUST BE DONE PRIOR to moving or rotating the machine the 90° to the next field!** To provide proper proximity switch position for guidance.

The following is a guide for pivoting the Universal Linear machine to operate on fields that are adjacent or perpendicular to one another. You must ensure the Universal cart is precisely positioned at the pivoting point. If the machine has stopped at a position other than the pivoting point, it will be necessary to move or relocate the cart at the correct position. The drive units to rotate in the same position (wheel tracks) each time the machine is pivoted to the next field; this will put less load on the machine structure while minimizing crop damage by maintaining one set of wheel tracks.

It is imperative routine maintenance of the pivot area be performed. The pivot area must be kept free of weeds and other debris. This will make cart rotation much easier when moving between perpendicular fields. In addition, be sure the drive unit wheel tracks are kept at a minimum depth at the point of rotation (4 in maximum depth). The drive units must move out of the Linear tracks and into the pivoting wheel tracks as the machine rotates to the adjacent field.

1. Disconnect the water supply and transition hose from the cart. Move them out of the path of the Linear cart and drive units. See Figure 85-1.
2. Fold up the guidance arms and secure with the rubber straps (machines equipped with furrow guidance). See Figure 85-2.
3. Rotate the jacks to the vertical down position. See Figure 85-3.
4. Raise the cart, then release the towable gearbox mounting brackets from the keepers. Rotate the wheel assembly approximately 60°. See Figure 85-4.

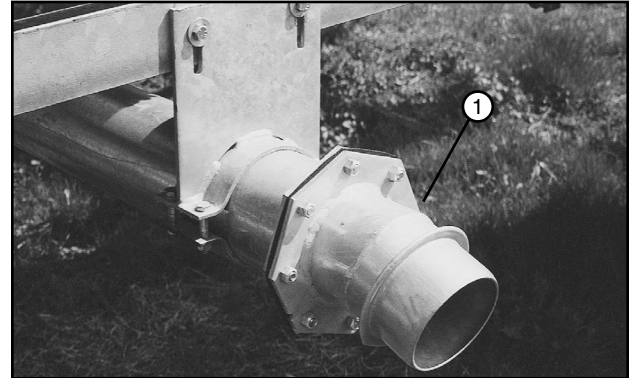


Figure 85-1 1. Hose Inlet



Figure 85-2 1. Furrow Guidance Arms- Up

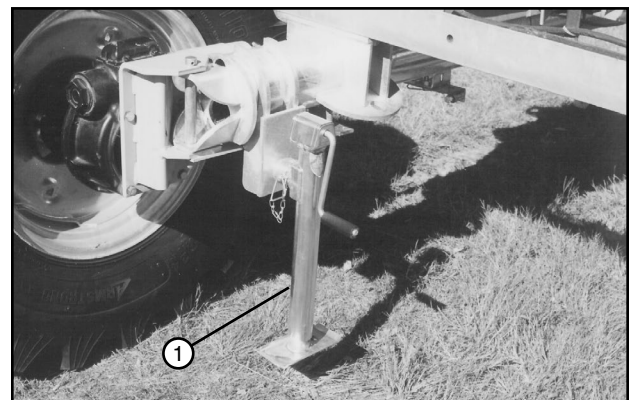


Figure 85-3 1. Jack

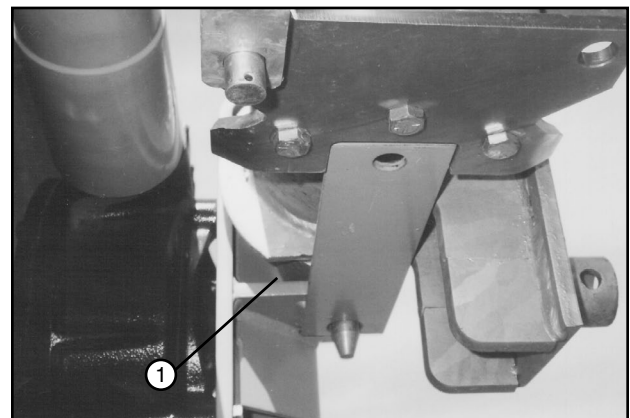


Figure 85-4 1. Swivel Mount

OPERATION

AutoPilot

Pivot Procedure (Continued)

5. Remove a torque pin from the towable gearbox hub, then align the swivel mount link with the hole in the swivel mount tongue and insert the torque pin (be sure to use the middle hole in the link to attain the 60° angle). Repeat steps 3 through 5 on the other wheel/gearbox assemblies. See Figure 86-1.
6. Lower the cart, rotate the jacks to the horizontal position then pivot the cart 90° in the direction the machine will be rotated. See Figure 86-2.
7. Raise the cart and return the towable mounts to the operating position.

NOTE

- Be sure the drive line flex couplers are aligned, the towable mounts are locked into the operating position and the torque pins are reinstalled into the towable hubs.

In addition, the jacks must be placed in the vertical up position to allow for clearance of the water supply hose tow chains during normal Linear operation. See Figure 86-3.

8. Lower the furrow guidance arms. See Figure 86-4.

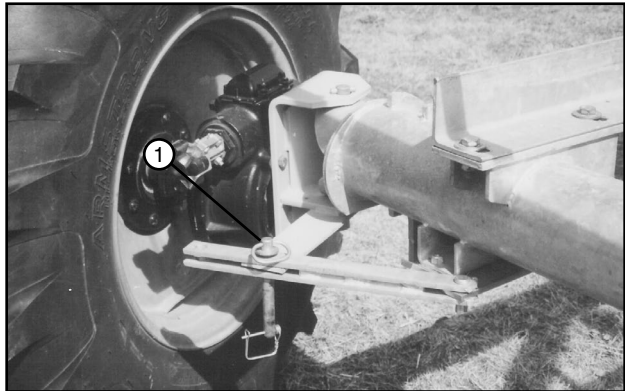


Figure 86-1 1. Lock Swivel Mounts

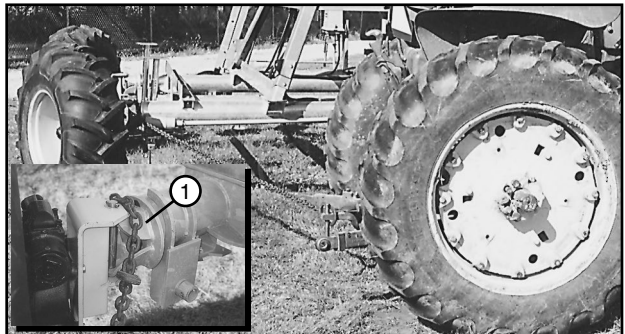


Figure 86-2 1. Chain Placement for Towing



Figure 86-3

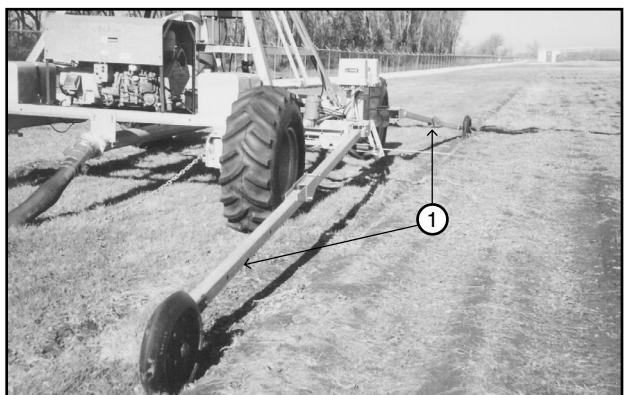


Figure 86-4 1. Furrow Guidance

AutoPilot Anchoring Cart

1. Attach the anchor chains and secure the cart to the pivot point. See Figure 87-1.

CAUTION

- THE CART MUST BE PRECISELY POSITIONED AT THE PIVOT POINT. FAILURE TO DO SO WILL RESULT IN UNDO STRESS ON THE CART AND MACHINE WHICH CAN RESULT IN STRUCTURAL DAMAGE OR FAILURE.
2. The Linear design and the field layout for fields that are parallel and, in some instances, perpendicular to one another may require the drive units to cross the water supply hose and the electric cord.

WARNING

- NEVER ALLOW THE DRIVE UNITS TO DIRECTLY CROSS OR RUN OVER THE WATER SUPPLY HOSE OR THE ELECTRIC CORD AS DAMAGE TO THE HOSE AND ELECTRICAL CORD MAY OCCUR!

The water supply hose should be moved out of the path of the drive units, when possible. See Figure 87-2.

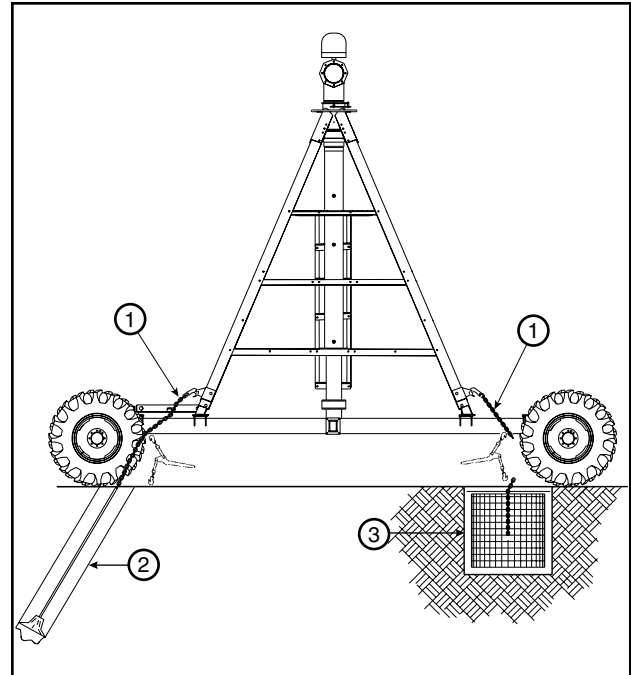


Figure 87-1 1. Chains
2. Earth Anchor
3. Concrete Anchor

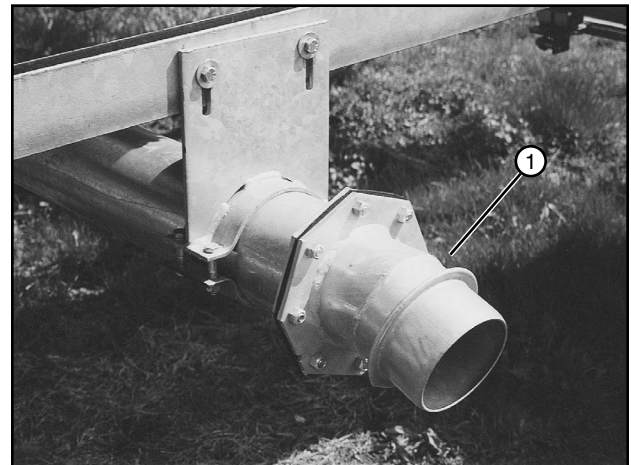


Figure 87-2 4. Water Inlet

OPERATION

AutoPilot Pivot Mode Start-Up

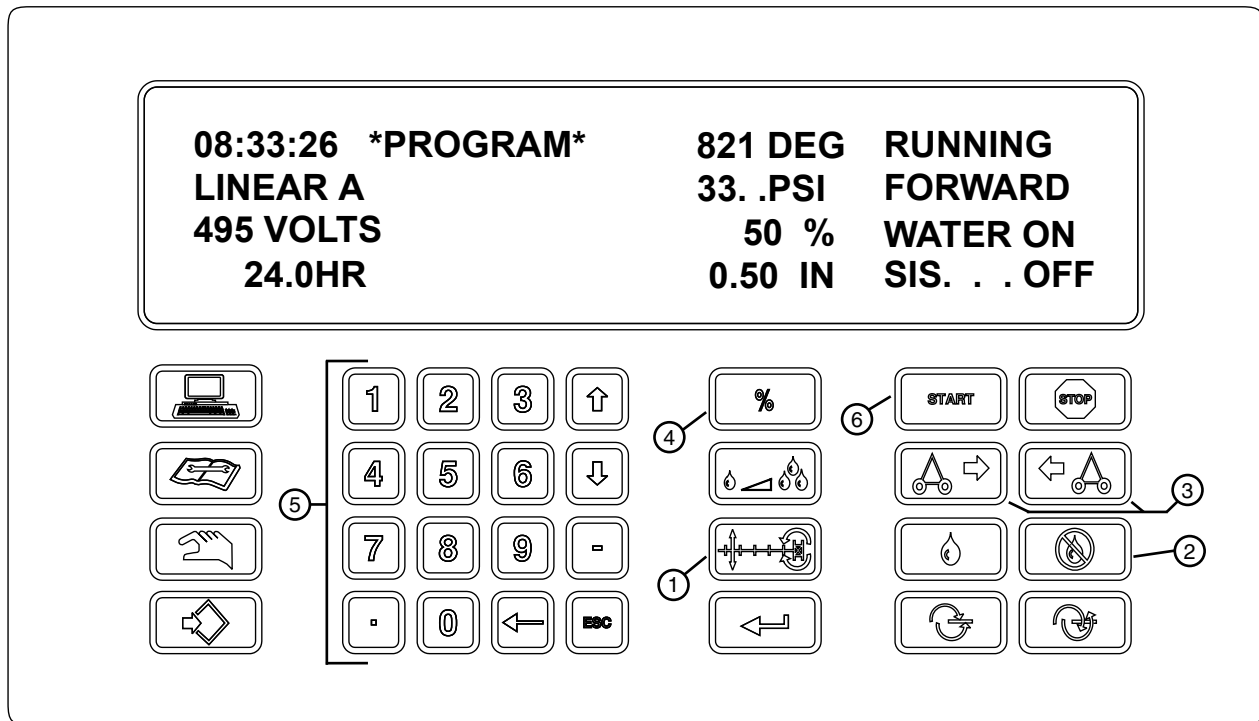


Figure 88-1 1. Pivot Mode Key 3. Direction Keys 5. Numeric Key-Pad
2. Water OFF Key 4. Percent Key 6. Start Key

NOTE

• Numbers in bold print reference control panel functions or settings.

1. Select **PIVOT** at the Linear/Pivot switch.
2. Select **START** on the Engine/Generator control panel “Start/Run” switch.
3. **Start** the engine/generator set.
4. Turn the Main Disconnect Switch to the **ON** position.
5. Select **WATER OFF** at the “Water On/Off” pad.
6. Select the appropriate direction of operation - **FORWARD** or **REVERSE** (if looking down on the field from above, FORWARD is clockwise and REVERSE is counter-clockwise).
7. Select **PERCENTAGE** for setting speed.
8. Set the **SPEED** at 100% on the **NUMERIC KEY- PAD** then press **ENTER**.
9. Press **START** pad and hold for 1-2 seconds.
10. Place the Engine/Generator control panel START/RUN switch in the **RUN** position.

*The **End-of-Hose Stop** switch breaks the safety circuit when activated. Release the End-of-Hose Switch by lifting the upper section of the End-of-Hose Stop out of the lower section. This allows the switch actuator arm to return to its center position. When the machine has been rotated to the adjacent field and moved away (linear mode) from the stop, replace the upper section of the stop back into the lower section!

AutoPilot

Pivot Mode Start-Up (Continued)

*If the **End-of Field Stop** shut the Linear off, it will be necessary to reverse the direction of operation then hold the START button and the SAFETY OVERRIDE button to allow the drive unit with the End-of-Field Stop to move away from the End-of-Field barricade. **DO NOT** hold the Override Button for more than 3 second at any one time. In addition, be sure the Linear/Pivot Switch is in the PIVOT mode.

Once the machine has been pivoted to the next field (cart rotated if applicable), it must be prepared for operation.

11. Release the tension on and disconnect the anchor chains if this has not been done.
12. Reposition and reattach the water supply line (it may be necessary to move the machine to accomplish this). Refer to the Hose and Cord Handling Procedure.
13. Reposition and reattach the electrical supply cord.
14. Lower the guidance arms to the operating position.
15. Place the **LINEAR/PIVOT** switch in the **LINEAR** position.
16. Restart the machine using the Start-Up Procedure Linear Mode Wet.

OPERATION

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Safety

DANGER

- **THE CONTROL PANEL CONTAINS HIGH VOLTAGE! 480 VOLTS CAN KILL.**
- **ALWAYS DISCONNECT ELECTRICAL POWER BEFORE SERVICING OR PERFORMING MAINTENANCE TO THE MACHINE.**
- **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

Before performing service or maintenance on any part of the machine, 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. See Figure 91-1.

FILL OUT the blue (OSHA safety color code) tag and attach to the disconnect after locking. See Figure 91-1.

2. SHUT OFF and lock the control panel main power disconnect. See Figure 91-2.

FILL OUT the blue (OSHA safety color code) tag and attach to the disconnect after locking. See Figure 91-2.

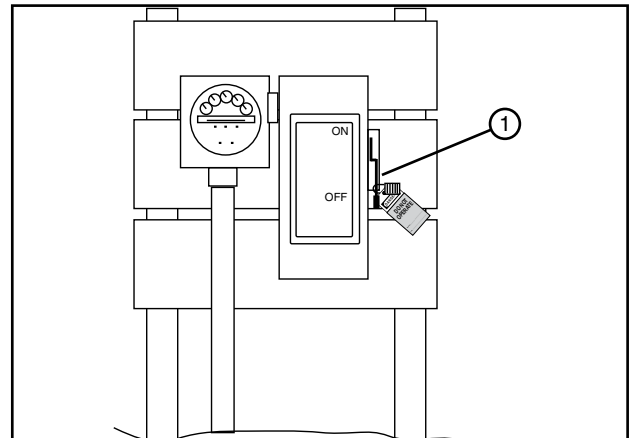


Figure 91-1 1. Public Power Service Disconnect

DANGER

- **BE AWARE OF HIGH WATER PRESSURE. TURN OFF THE PUMP AND ALLOW THE MACHINE TO DRAIN COMPLETELY BEFORE REPAIRING OR PERFORMING MAINTENANCE TO THE MACHINE.**



Figure 91-2 1. Main Disconnect
2. Lock
3. Blue OSHA Tag

MAINTENANCE

Wheel Gearbox

NOTE

- After the first operating season, change the oil in all of the wheel gearboxes.
- After the first oil change, change the wheel gearbox oil every third year or 3000 operating hours, whichever occurs first.
- At the end of each operating season, drain the wheel gearboxes of any condensation or contaminated oil that may have accumulated in the gearbox and refill to its normal level.

3. Remove the drain plug from the bottom of the wheel gearbox and drain the oil into a container. See Figure 92-1.
4. Install the drain plug after draining oil.
5. Clean all of the dirt away from the expansion chamber cap and remove the expansion chamber cap. Do not allow dirt to fall into the gearbox when removing the cap. See Figure 92-2.
 - Make sure the vent holes on each side of the expansion chamber cap are open and unobstructed.

NOTE

- Use only Valley Gear Lube. Other brands of lubricants may contain corrosive extreme pressure additives, which may damage bronze worm gears.
- The oil in worm gear cases may reach temperatures up to 200° F (94° C) without alarm.

6. Fill the wheel gearbox with Valley Gear Lube. The capacity is approximately 5 quarts (4.7 liters).
 - Fill gearbox to the top of worm gear shaft or remove the check plug and fill until the oil begins to flow out of the check plug hole. See Figure 92-3.
7. Install the expansion chamber cap after refilling the gearbox. Secure with original hardware and torque to 8 lb-ft (10.8 N-m).

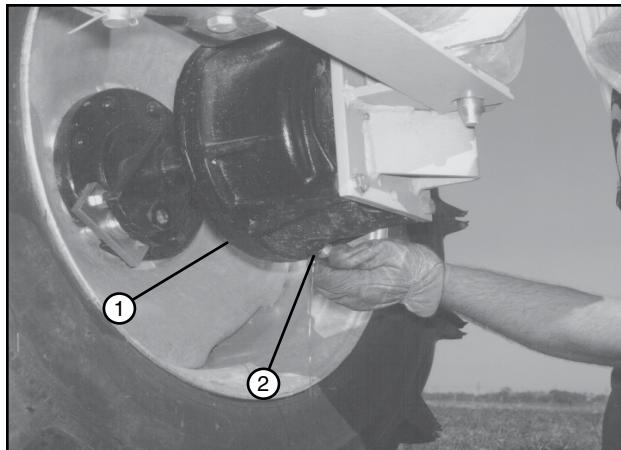


Figure 92-1 1. Wheel Gearbox
2. Drain Plug

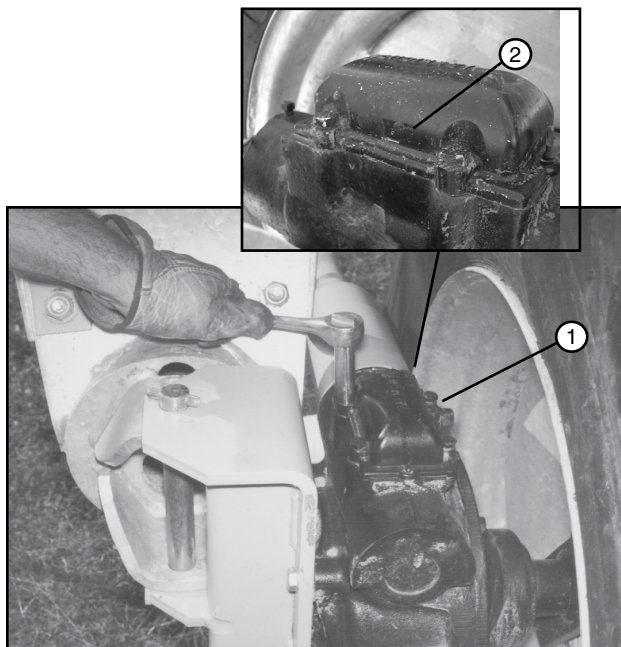


Figure 92-2 1. Expansion Chamber Cap
2. Vent Hole

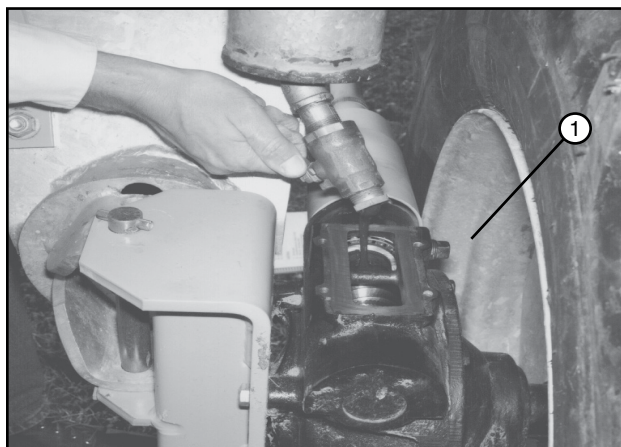


Figure 92-3 1. Check Plug

Center Drive Gearmotors Helical Gearmotor

After EACH season of operation, change the oil in all of the helical gearmotor gearboxes.

1. Remove the drain plug and the fill plug. Drain the oil and install the drain plug. See Figure 93-1.

NOTE

- Use only Valley Gear Lube. Other brands of lubricants may contain corrosive extreme pressure additives, which may damage bronze worm gears.

2. Fill the gearbox 1-7/8 in (48 mm) from the bottom of fill plug hole with Valley Gear Lube. The capacity of the gearbox is approximately 44 oz (1.3 liter). See Figure 93-1.

NOTE

- OIL LEVEL SHOULD BE 1-7/8 IN (48 MM) BELOW FILL PLUG WHEN FULL.

⚠ WARNING

- INPUT SEAL FAILURE CAN OCCUR IF OIL CAPACITY IS EXCEEDED.

Worm Gearmotor

After EACH season of operation, change the oil in all of the worm gearmotor gearboxes.

1. Remove the drain plug and the fill plug. Drain the oil and install the drain plug. See Figure 93-2.

NOTE

- Use only Valley Gear Lube. Other brands of lubricants may contain corrosive extreme pressure additives, which may damage bronze worm gears.

2. Fill the gearbox to within 1/2 in (12.7 mm) of the bottom of the fill plug hole with Valley Gear Lube. The capacity of the gearbox is approximately 1 quart (0.9 liter). See Figure 93-2.

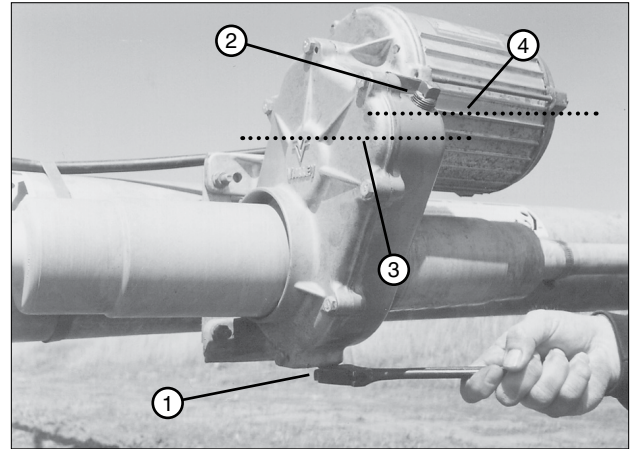


Figure 93-1 1. Drain Plug
2. Fill Plug
3. Oil Level
4. Bottom of Fill Plug Hole

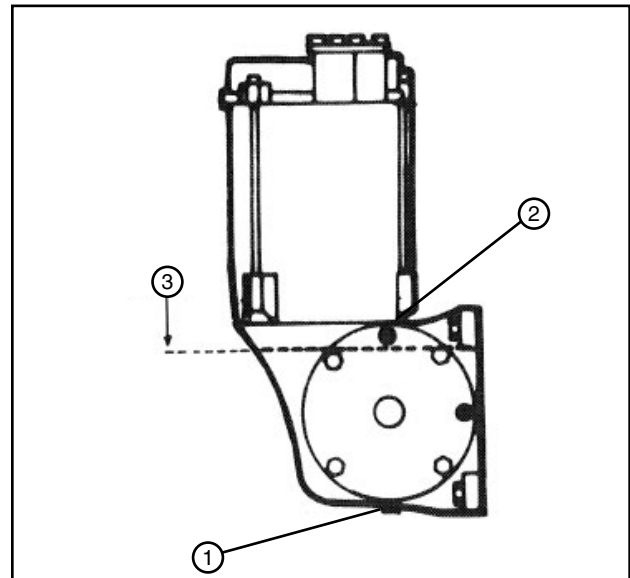


Figure 93-2 1. Drain Plug
2. Fill Plug
3. Oil Level

MAINTENANCE

Swing Around Cart Lubrication

It is **IMPORTANT** to keep the pivot swivel grease fittings lubricated with water resistant lithium-type grease. This prevents “jerking” movements of the swivel when the machine is being rotated. See Figure 94-1.

Tire and Wheel

Wheel Lug Nut Torque

Wheel lug nuts should be torqued to 125 lb-ft (169.47 N-m). See Figure 94-2.

Check the wheel lug nut torque annually, preseason; at spring start-up.

Tire Pressures

Proper tire pressure is important! Operating with low tire pressure will damage the tires and the drive train.

Check tire pressure several times a year:

- Pre-season: At spring start-up.
- During-season: Check tire pressure monthly.
- Post-season: When performing fall winterization.

For the correct tire pressure refer to the decal on the rim or the tire pressure chart. See Figure 94-3.

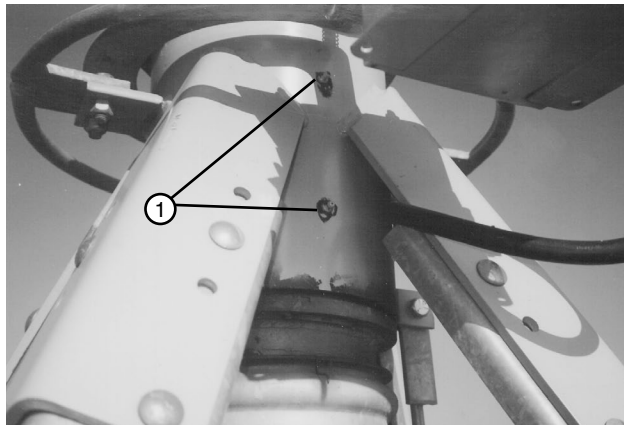


Figure 94-1 1. Grease Fitting

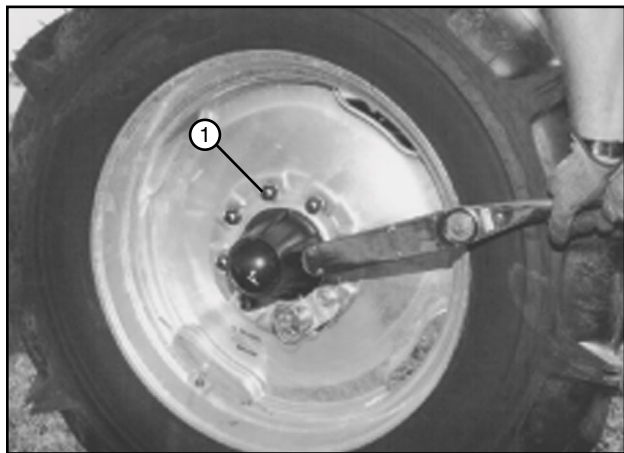


Figure 94-2 1. Wheel Lug Nut



WARNING

- **TIRES ARE SHIPPED AT A PRESSURE OF 30 TO 35 PSI (206 TO 241 KPA).**
- **BE SURE THE TIRES HAVE BEEN DEFLATED TO THE CORRECT PRESSURE (SHOWN ON DECAL) BEFORE THE TIRE IS USED.**

NOTE

- **When replacing tires be sure the ply rating of the new tire is equal to or greater than the ply rating of the old tire.**

TIRE PRESSURE CHART

Hose Drag Cart		
Tire Size	Pounds per Square Inch	Kilo pascal
(Inches)	(PSI)	(kPa)
14.9 X 24 Float Tire	18	124
14.9 X 24 Turf Tire	18	124
Span Drive Units		
Tire Size	Pounds per Square Inch	Kilo pascal
(Inches)	(PSI)	(kPa)
11.2 X 38 Tire	23	152
14.9 X 24 Float Tire	18	124
14.9 X 24 Turf Tire	18	124
16.9 X 24 Float Tire	16-18*	110-124
16.9 X 24 Turf Tire	16-18*	110-124

*Tire pressure may be reduced to 16 psi (110 kPa) for increased flotation.

Figure 94-3

Centrifugal Pump Lubrication

The following are general centrifugal pump lubrication recommendations and may not apply to the centrifugal pump included with this irrigation machine. Always refer to the centrifugal pump Owner's Manual or centrifugal pump manufacturer for the proper lubricant, lubrication frequency and lubrication procedures.

Grease Lubricated Frames

Use Lithium based grease equivalent to one of the following manufacturer's products:

G.E. Long Life Grease No. D682C5

Mobil Mobilux No. EP2

Shell Alvania EP2

Texaco Multifak No. 2

When adding grease be sure that grease fittings and end of grease gun are clean. See Figure 95-1.

Use a hand operated grease gun only.

Refer to the table below for general lubrication frequency.

	Frame Size		
	2-5-11 EM309	6-7-8-16 60B4 though 68B4	10-12 18-18D
Total Running Time	2<000 hours	1,500 hours	1,000 hours
8-Hour Day Service	36 weeks	27 weeks	18 weeks
24-Hour Day Service	12 weeks	9 weeks	6 weeks
	3 pumps	6 pumps	12 pumps

Run-Dry Reservoirs

Use an oil or fluid equivalent to one of the following manufacturer's products:

- Chevron Turbine Oil GST 32
- Transmission Fluid
- Hydraulic Fluid
- Royal Purple Barrier Fluid FDA 22
- Synthetic White Oil 22

Fill and maintain the reservoir fluid level up to the middle of the top sight glass. See Figure 95-1.

When filling the reservoir with fluid, be sure the air has been purged out of the upper circulation hose to reduce the possibility of vapor lock.

Change the reservoir oil every 1000 hours or once a year.

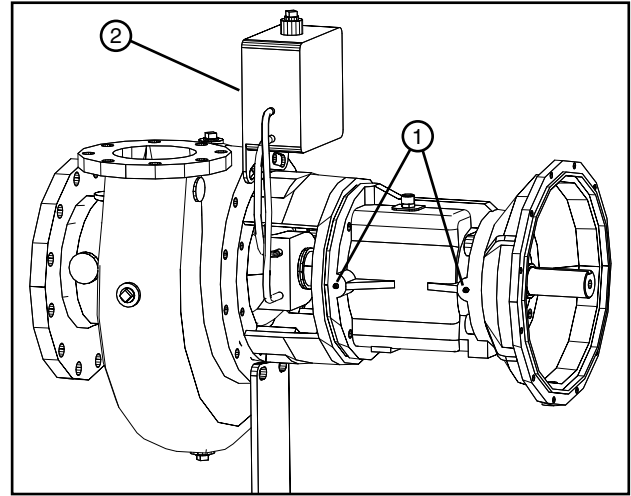


Figure 95-1 1. Grease Fitting
2. Run-Dry Reservoir

MAINTENANCE

Furrow

The furrow must be maintained perfectly straight and unobstructed. The skid must slide in the furrow at a minimum depth of 3 in (75 mm) and a maximum of 6 in (150 mm). See Figure 96-1.

The furrow guidance arm pivot points must be aligned with the furrow and the furrow guidance arm neutral position must be adjusted so that it is straight in line with the furrow guidance arm pivot point.

WARNING

- NEVER TRY TO REPOSITION THE SYSTEM WHEN THERE ARE ESTABLISHED WHEEL TRACKS.

A three foot wide path on each side of the furrow must be kept clear of any obstructions that could prevent the system guidance hardware from functioning properly.

This path should have no parallel or perpendicular ridges or furrows through it.

Furrow End of Field Shutdown

An optional method of providing an additional end of field shutdown is to place an angle in the furrow where you want the system to stop.

The furrow must be angled away from the drive unit enough that when the leading skid has traveled forward 10 ft (3.05 m) it has angled over 2 ft (0.61 m). See Figure 96-2.

CAUTION

- DO NOT ALLOW THE STRAIGHT PORTION OF THE FURROW TO GO BEYOND WHERE THE ANGLED END OF THE FIELD STOP FURROW IS PLACED.

NOTE

- If either skid gets out of the furrow it will cause the system to shut down after the furrow guidance arm moves approximately 18 in (457 mm) out of alignment with the furrow guidance arm pivot point.

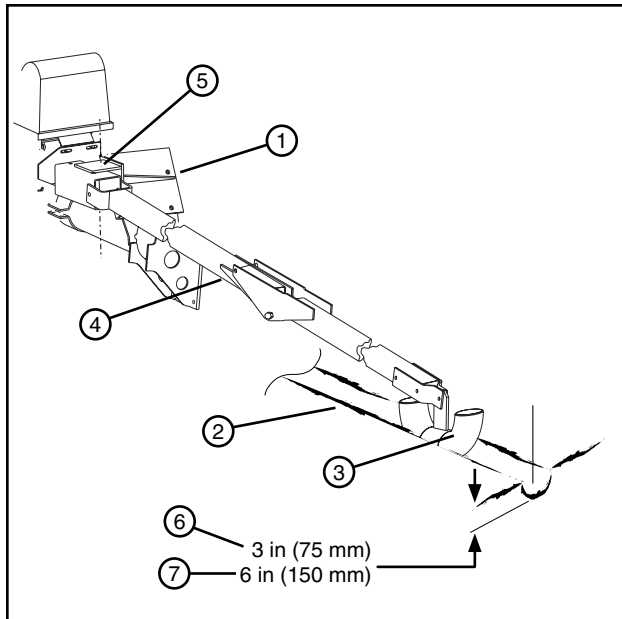


Figure 96-1 1. Drive Unit Side 2. Furrow 3. Skid 4. Guidance arm 5. Guidance arm pivot point 6. Minimum depth 7. Maximum depth

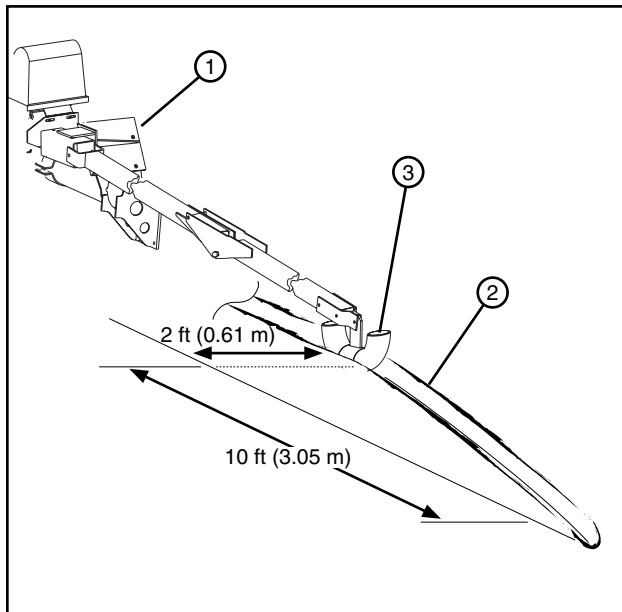


Figure 96-2 1. Drive Unit Side 2. Furrow 3. Skid

Cart Path

The cart path must be kept clean and free of debris that may damage tires, hoses, or the linear machine.

- To reduce the possibility of structural damage to the irrigation machine, the cart path should always be graded flat and level so that the cart will not tip to either side as it travels down the cart path. The cart path should not have a crown or be graded at an angle. Structural damage to the irrigation machine may result.
- When changing hoses, always disconnect and drain the hose at the pipe line valve before disconnecting the hose from the cart to prevent water puddles from forming on the cart path.
- Do not allow wheel tracks to form on the cart path. The presence of wheel tracks in the cart path may cause inconsistent steering and unplanned machine stoppage. If left in a state of disrepair, wheel tracks can cause structural damage to the irrigation machine.

Barricade

Maintain the barricade structure and area.

Inspect the barricade structure for failure and tighten any loose hardware completely.

Ensure that the actuator arm contacts the tripping structure. Under certain conditions, soil may build up in the wheel track resulting in a ramp effect. This may allow the actuator arm to go over the top of the structure which trips the actuator arm. See Figure 97-1.

Should this happen, the machine will not stop but continue to move and can result in damage to the machine. Remove any build up of soil in the barricade area.

Wheel Tracks

It is important to maintain wheel tracks. See Figure 97-2.

- Wheel tracks affect the linear machine's ability to steer.
- Ensure correct tire pressure to help reduce the possibility of deep wheel tracks.
- Wheel track depth:
 - » Regular drive units must not exceed 4 in (100 mm).
 - » Single span swing around drive unit must not exceed 2 in (50 mm).
 - » Do not allow wheel tracks at the cart.
- Wheel track depth can be controlled by using track fillers, tillers, discs, or flotation tires.

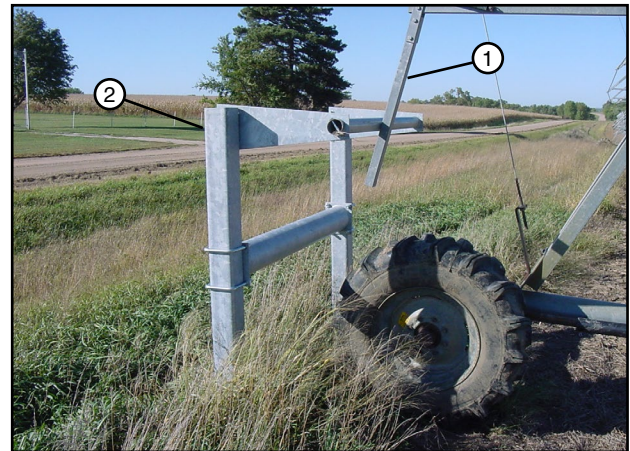


Figure 97-1 1. Actuator arm
2. Barricade



Figure 97-2 1. Wheel Track
2. Drive Unit

Engine/Generator

Refer to the Owner's Manual supplied with engine/generator for specific details on maintenance, operation, and winterizing of the engine/generator.

CAUTION

- A PARTIALLY FILLED FUEL TANK WILL PERMIT CONDENSATION WHICH WILL CONTAMINATE THE FUEL AND ACT TO DAMAGE THE INJECTION PUMP AND INJECTORS.

MAINTENANCE

Poly Hose Repair

Hoses should be repaired as soon as possible after damage is discovered to prevent further deterioration.

NOTE

- Pin holes in the hose should be marked with a quick burst of bright colored spray paint while there is pressure in the line to assist in locating the hole later for repair.

Large tears or cuts, that interrupt operation, can be temporarily repaired by using a rigid mender. A rigid mender is a straight steel nipple that fits inside the two hose ends to be joined. Clamps secure the hoses to the nipple. Although rigid menders satisfactorily join the sections, they do introduce a rigid section in the hose which encumbers free travel of the hose on the cart path.

Permanent hose repairs require special equipment. Contact your Valley Dealer for permanent repair of hose or training and use of the special equipment.

Rigid Mender Installation

1. Place the rigid mender between the two sections of hose. See Figure 98-1.
2. Insert the mender halfway into the first hose section. See Figure 98-1.
3. Slide the other hose section into the mender. See Figure 98-1.
4. Secure both hoses onto rigid mender with band clamps. See Figure 98-1.

Flex Joint Hose Replacement

No extra support is needed when changing the flex joint hose. See Figure 98-2.

1. Loosen the band clamps and slide out of way.
2. Remove the old flex joint hose.
3. Insert the new flex joint hose.
4. Position the band clamps and tighten completely.

NOTE

- Position the band clamps so that they do not interfere with the alignment mechanism.

Bonding Ground Wire

Bonding ground wire **MUST** be installed for proper ground between individual spans. See Figure 98-2.

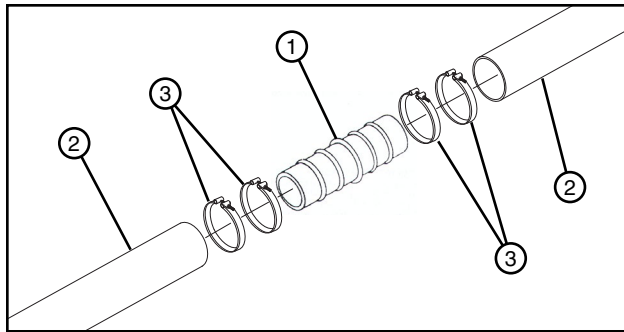


Figure 98-1 1. Rigid Mender
2. Hose
3. Clamp

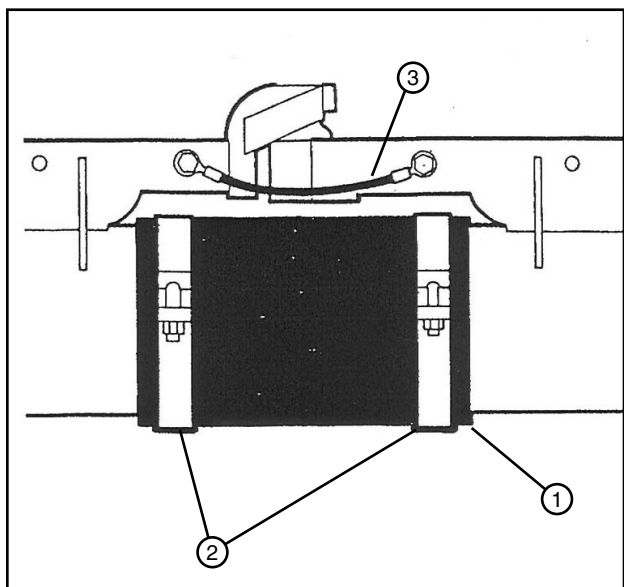


Figure 98-2 1. Flex joint hose
2. Band clamp
3. Bonding ground wire

Above Ground Guidance Cable Adjustment

1. Attach a 40 ft to 50 ft pigtail loop or smooth cable grip to the guidance cable. Attach a 2 ton cable puller to the pigtail loop/cable grip and end post. Use the cable puller to apply approximately 2000 lb of tension to the guidance cable. See Figure 99-1.
2. Take a static measurement of the guidance cable distance from the ground at the halfway point between support stakes. See Figure 99-1.

3. Hook a 0 to 50 lb fish scale on guidance cable at the halfway point between support stakes. See Figure 99-1.

OR

Hang 33 lb of weight in a 5 gallon bucket on the guidance cable at the halfway point between support stakes.

4. Pull the fish scale toward the ground, hold it at 33 lb of tension and measure the deflected height of cable from the ground at the halfway point between support stakes. See Figure 99-1.

OR

Let 33 lb of weight in a 5 gallon bucket hanging on guidance cable, deflect the cable, measure the deflected height of cable from the ground at the halfway point between support stakes.

5. Subtract the deflected measurement from the static measurement. See Figure 99-1.

The guidance cable deflection should be no more than 4 in maximum. If the deflection is more than 4 in apply more tension to guidance cable with cable puller and repeat steps 3 through 5. See Figure 99-1.

Static Measurement _____

Deflected Measurement _____

Guidance Cable Deflection _____

6. After setting guidance cable tension, remove slack from guidance cable and attach to the end post with one 3/16 in cable thimble and three 3/16 in cable clamps. Remove cable puller and pigtail. See Figure 99-1.

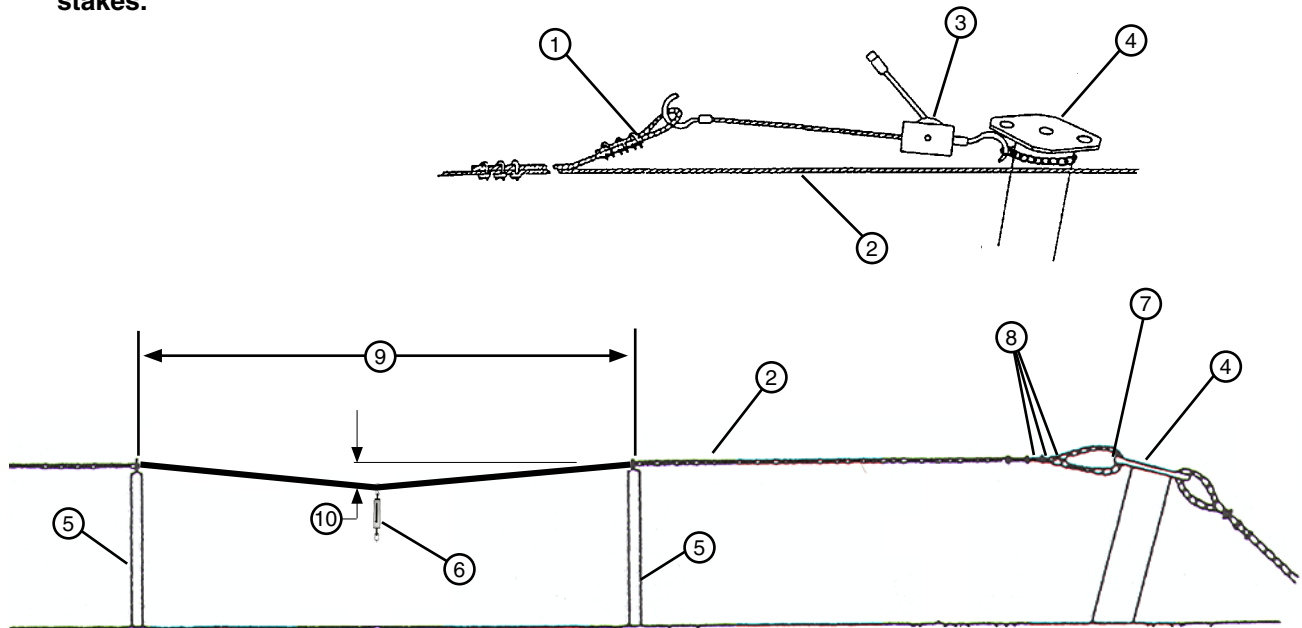


Figure 99-1 1. Pigtail Loop or Smooth Cable Grip
2. Guidance Cable
3. Cable Puller
4. End Post

5. Support Stake
6. Fish Scale
7. 3/16 in Cable Thimble
8. 3/16 in Cable Clamp

9. 80 ft (24384 mm)
10. 4 in (101.6 mm) Maximum

MAINTENANCE

Span Safety Box Cable Tension Adjustment

1. Check safety cable tension.

Use a truss spreader part number 9360055 to check the cable tension. The truss spreader is 115 in (292 cm) long and weighs 23.4 lb (10.6 kg).

2. Position the truss spreader across the safety cables at approximately 58 in (147 cm) from the alignment mounting bracket. See Figure 100-1.
3. Hold and support the truss spreader across the safety cables and measure the distance from the truss spreader to the span pipe. This is the ORIGINAL measurement. See Figure 100-1.
4. Lower the spreader angle onto the safety cables and allow the safety cables to support the full weight of spreader angle.

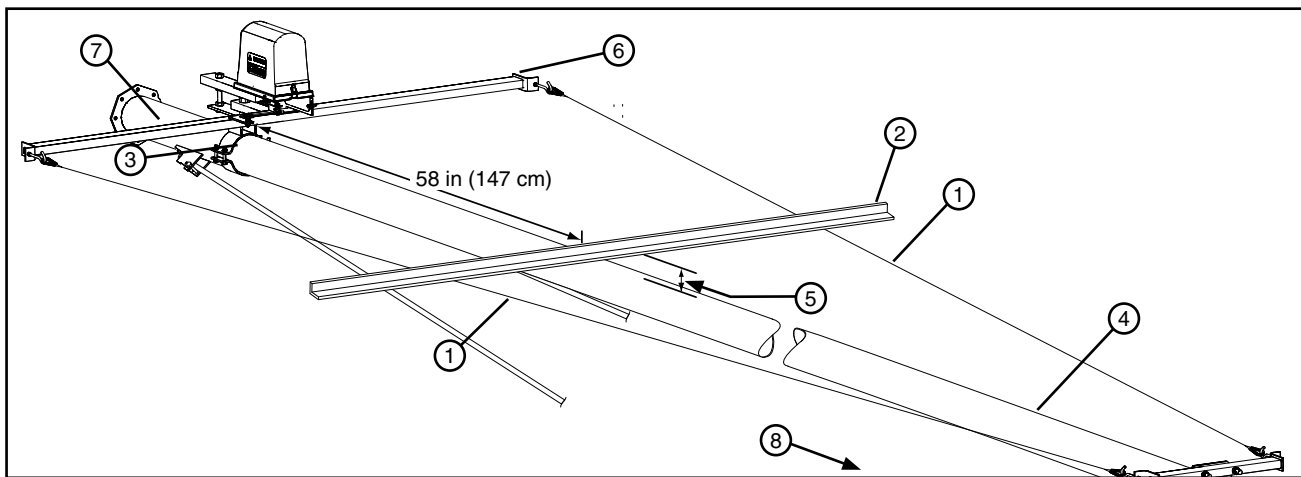


Figure 100-1 1. Safety Cable 2. Truss Spreader 3. Alignment Mounting Bracket 4. Span Pipe 5. Original Measurement 6. "T" Bar 7. Cart End of Span 8. Drive Unit End of Span

5. Measure the distance from the spreader angle to the span pipe. This is the DEFLECTED measurement.

The full weight of the spreader angle should deflect the safety cables downward approximately 1-3/4 in to 2 in (41 mm to 51 mm) when the DEFLECTED measurement is compared to the ORIGINAL measurement. Adjustment of deflection is made at the fixed end cable mount hook bolts. See Figure 100-2.

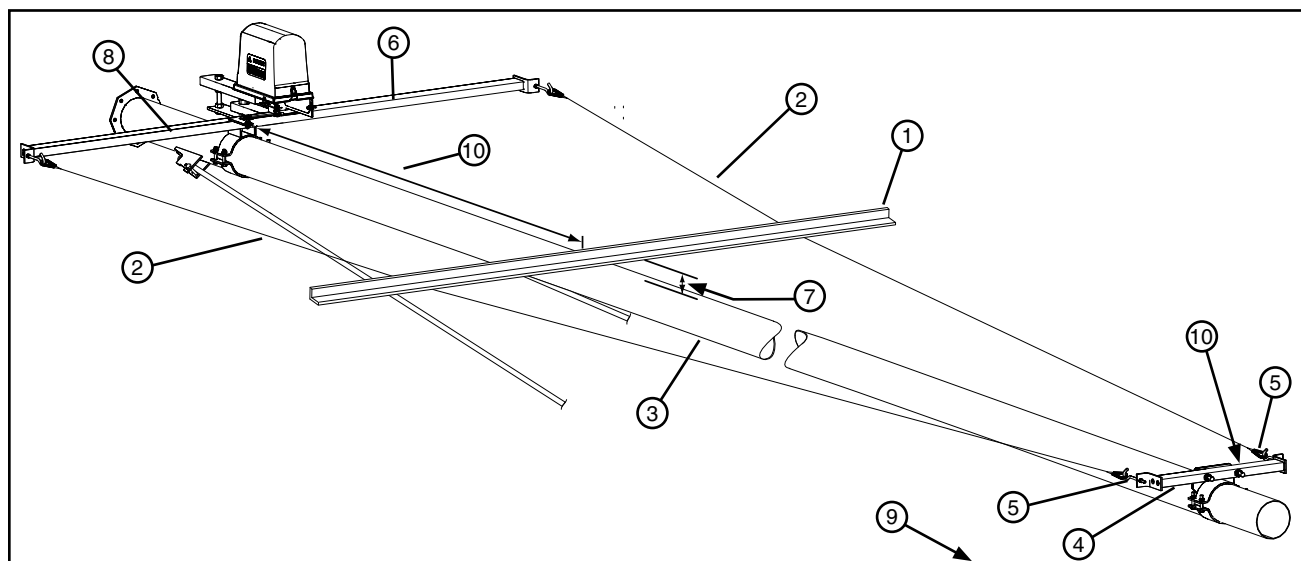


Figure 100-2 1. Spreader Angle 2. Safety Cable 3. Spreader Angle 4. Safety Cable 5. Hook Bolt 6. "T" Bar 7. Deflected Measurement 8. Cart End 9. Drive Unit End 10. 58 in (147 cm) 11. Fixed End Cable Mount

Span Safety Box Cable Adjustment

6. Adjust the fixed end cable mount hook bolts until both the proper deflection of safety cable is achieved and the "T" bar is perpendicular (90 degrees) to the span pipe. See Figure 101-1.
7. After adjustment, tighten all hook bolt hardware completely.

Side Inlet Elbow Adjustment

To insure that the swivel inlet elbow works correctly when the machine is reversed the inlet elbow angle must be angled away from the cart at approximately 10 degrees. See Figure 101-2

To Adjust the side inlet elbow angle do the following:

1. Loosen jam nuts on 1/2 in x 3 in cap screw at each stop bracket
2. Set the side inlet elbow in one direction so that it angles away from the cart at approximately 10 degrees.
3. Adjust 1/2 in x 3 in cap screw until the head contacts the stop tab on inlet elbow, then tighten the jam nuts.
4. Repeat steps 2 and 3 for the other direction.

Electric Primer Maintenance

- The Vacuum Pump requires occasional flushing. Remove the pressure gauge and run 1/4 cup of flushing solvent (GAST AH225 or equivalent) through the pump. See Figure 101-3.
- If the pump fails to produce a vacuum when it is first turned on, a brief warm-up may free the blades and restore the normal function.
- LUBRICATION: The automatic bearing oiler should be refilled as needed with a high detergent automotive engine oil with a viscosity equivalent to SAE 10W or less. See Figure 101-3.
- AIR FILTER: Clean the air filter regularly. Remove air filter from its holder and wash thoroughly in solvent and let dry completely, then re-install air filter in its holder. Replace air filter every year. See Figure 101-3.
- CONNECTIONS: Be sure all connections between primer pump and centrifugal pump are tight.

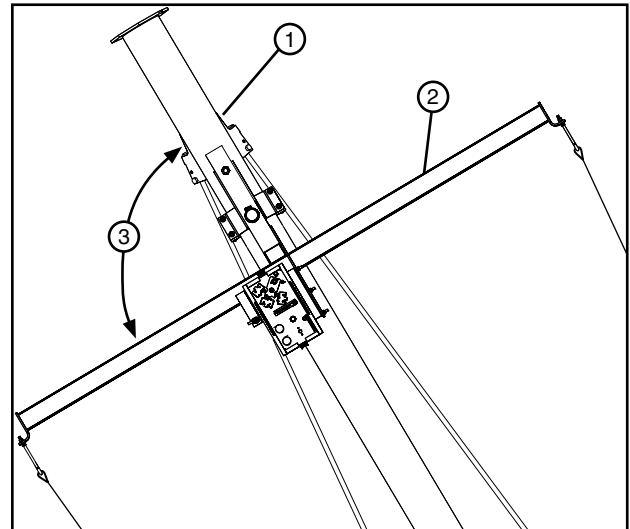


Figure 101-1 1. Span Pipe
2. "T" Bar
3. 90 Degrees

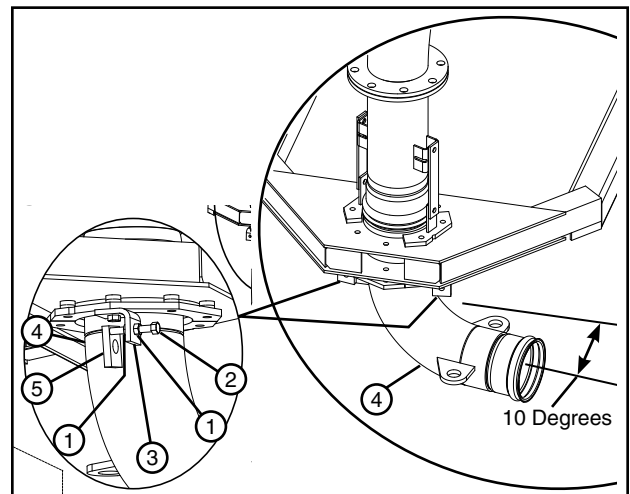


Figure 101-2 1. Jam Nut
2. 1/2 in x 3 in Cap Screw
3. Stop Bracket
4. Side Inlet Elbow
5. Stop Tab

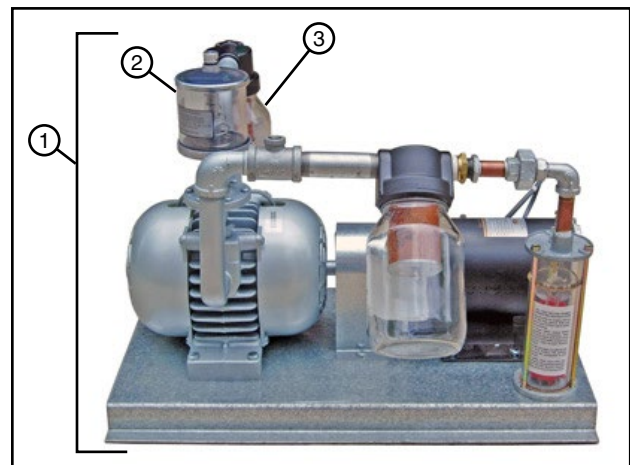


Figure 101-3 1. Electric primer pump
2. Bearing Oiler
3. Air Filter

MAINTENANCE

Machine Alignment

The machine is initially aligned when it is installed. However, for various reasons it may become necessary to adjust the alignment.

WARNING

- DO NOT ALIGN THE MACHINE WHEN THERE ARE ESTABLISHED WHEEL TRACKS. WHEEL TRACKS MUST BE REMOVED BEFORE ALIGNING THE MACHINE TO REDUCE THE POSSIBILITY OF STRUCTURAL DAMAGE.

Alignment should be checked annually and adjusted before there are wheel tracks.

Alignment is an important factor in the operation of the machine. A misaligned machine develops very high stresses which could cause structural damage and reduce expected motor and gearbox life.

A leading bow creates extreme tension or linear pulling force over the entire machine. See Figure 102-1.

A trailing bow creates extreme compressing or linear pushing force on the entire machine. When the spans are compressed, they lose their inherent strength. See Figure 102-1.

WARNING

- A TRAILING BOW IN EITHER DIRECTION IS NEVER ACCEPTABLE AND MAY RESULT IN SEVERE STRUCTURAL DAMAGE.

NOTE

- If the irrigation machine is operated in forward and reverse, a leading bow in one direction becomes a trailing bow in the other direction. Therefore, such a machine should be aligned to operate in as straight a line as possible.

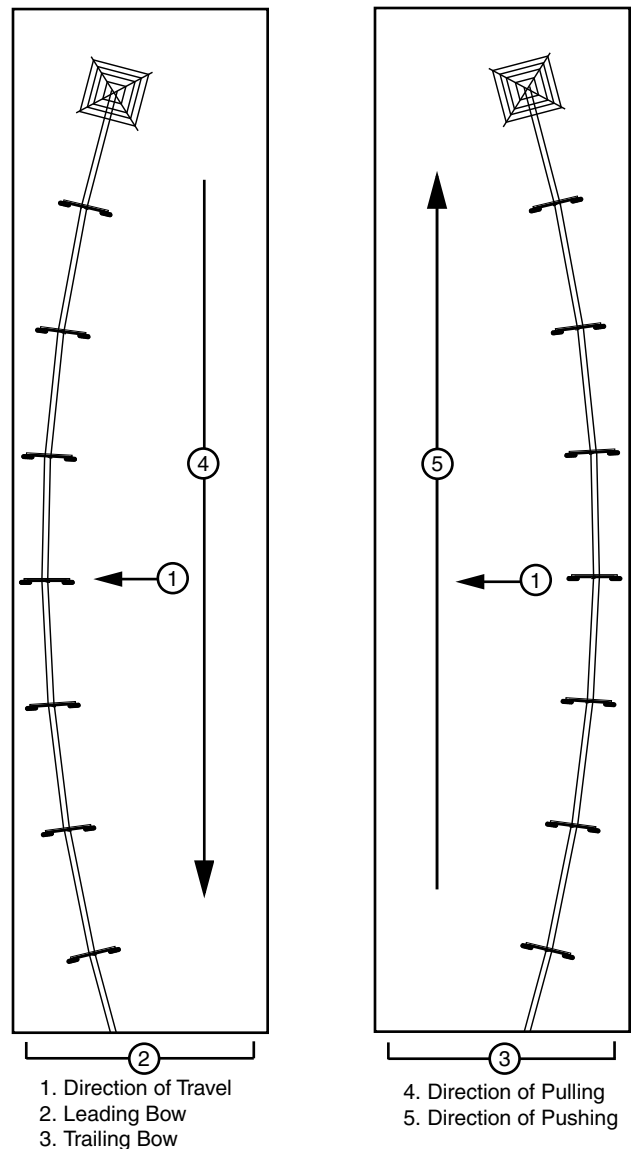


Figure 102-1

Machine Alignment

Tower Alignment - Three Tower Method

The three tower alignment method is used to identify towers that start or stop in a position that is either leading or trailing in relationship to the other two towers.

This procedure works best with two people:

- One person at tower 1 sighting the tower alignment.
 - One person at tower 2 adjusting the alignment.
1. At the control panel, set the percent timer at 50% and start the machine in either the forward or the reverse direction.
 2. Begin the alignment procedure from an end tower. Identify the first three towers as 1, 2, and 3. Use towers 1 and 3 to align tower 2. See Figure 103-1.
 3. Sight an imaginary center line between the center of the tower drive motor 1 to the center of the tower drive motor 3. See Figure 103-1.
 4. Observe the movement of the tower drive motor 2. It should start and stop equal distances from the imaginary center line. See Figure 103-1.
If it does not, the alignment linkage at tower box 2 needs to be adjusted.
 5. If adjustments are necessary, stop the machine and make adjustments using the Floating or Modified Alignment Adjustment procedures, located in the Adjustments Section of this manual.

CAUTION

- **ADJUSTMENTS TO THE CENTER TOWERS CAN CAUSE THE SYSTEM TO GO INTO A STEER. AFTER ADJUSTING THE ALIGNMENT WAIT FOR THE SYSTEM TO CYCLE TWICE BEFORE MOVING ON TO THE NEXT TOWER.**

6. After tower 2 is aligned, move in to the next tower and repeat steps 3, 4, and 5 of this procedure.
Continue this process to the other end of the machine.

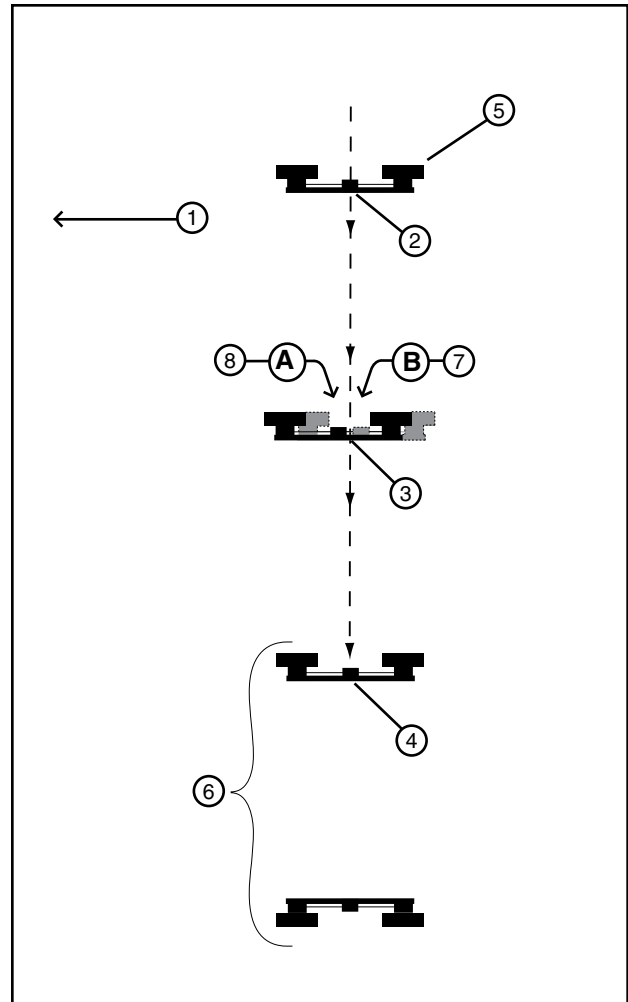


Figure 103-1 1. Direction of Travel 5. End Tower
2. Tower 1 6. Free Standing Span
3. Tower 2 7. Start
4. Tower 3 8. Stop

MAINTENANCE

Machine Alignment Modified Alignment Adjustment

When a machine is equipped with modified alignment the tower box is located on the side of the tower with a mechanical linkage between the tower box and the control bar.

NOTE

- All adjustments shown are made from the tower box side of drive unit.

1. From the tower box side of drive unit, loosen the jam nut at each end of the connection rod. See Figures 104-1 and 104-2.
2. To adjust the distance between the control bar and the switch pivot arm, rotate the connection rod clockwise or counter-clockwise no more than 1/8 of a turn at one time. See Figures 104-1 and 104-2, and the adjustment chart below.

ADJUSTMENT CHART

Direction of travel	Condition	Adjust Nuts
Forward	Leading Bow	**Counter-clockwise
	Trailing Bow	*Clockwise
Reverse	Leading Bow	*Clockwise
	Trailing Bow	**Counter-clockwise

* Clockwise - From the tower box side of the drive tower, rotate the connection rod clockwise to increase the distance between the control bar and the switch pivot arm.

** Counter-clockwise - From the tower box side of the drive tower, rotate the connection rod counter-clockwise to decrease the distance between the control bar and the switch pivot arm.

CAUTION

- NEVER ADJUST THE CONNECTION ROD MORE THAN 1/8 OF A TURN AT ONE TIME.
- ALWAYS RE-TIGHTEN THE JAM NUTS AND ALLOW THE TOWER TO CYCLE TWICE (START AND STOP) TO DETERMINE IF THE TOWER IS STILL LEADING OR TRAILING.

3. Adjust the connection rod until the tower is in alignment.
 - Sensitivity can be adjusted by repositioning the connection rod. See Figure 104-3.
4. Continue the Three Tower Method of alignment down the entire length of the machine, make adjustments as necessary to individual towers.



Figure 104-1 1. Tower box side of drive unit

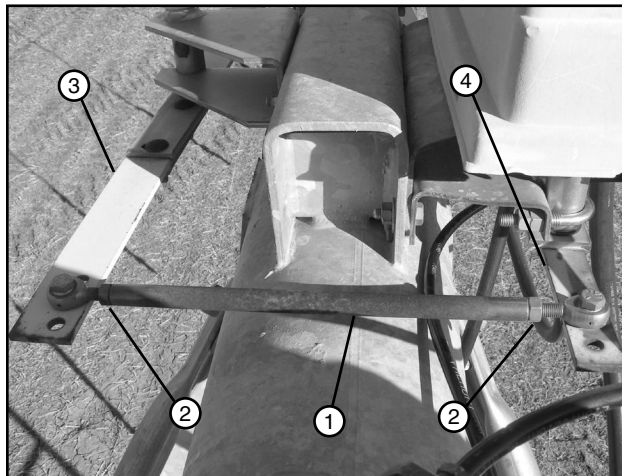


Figure 104-2 1. Connection rod 2. Jam nut 3. Control bar 4. Switch pivot arm

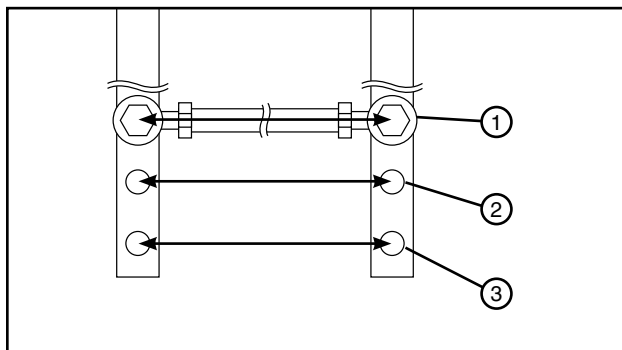


Figure 104-3 Connection Rod Sensitivity
1. Position 1 - Most Sensitive
2. Position 2 - Less Sensitive
3. Position 3 - Least Sensitive

Span Flushing Procedure

The purpose of flushing the machine is to remove sand and debris from the pipeline. Excessive accumulation of sand in the machine also adds weight and can cause structural damage to the machine.

The Flushing Process Should Be Performed:

- After system installation.
- After pump repair.
- After structural repair.
- Seasonally - prior to operating the system and after the operating season is over.
- As often as necessary according to debris or sand content in the water. Excessive sprinkler problems (clogging) could be an indication of high debris or sand content.

NOTE

- Excessive sprinkler problems (clogging) could be an indication of high debris or sand content.

⚠ DANGER

- DO NOT START THE FLUSHING PROCEDURE WHILE THE SYSTEM IS UNDER WATER PRESSURE. REMOVING SAND TRAP PLUGS WHILE THE SYSTEM IS UNDER PRESSURE MAY CAUSE PERSONAL INJURY OR DEATH.

1. Turn the pump is off and make sure machine is completely drained.

⚠ DANGER

- BE AWARE OF HIGH WATER PRESSURE. TURN OFF THE PUMP AND ALLOW THE MACHINE TO DRAIN COMPLETELY BEFORE REPAIRING OR PERFORMING MAINTENANCE TO THE MACHINE.

2. Turn the control panel main disconnect switch off. Only water is required for this procedure - the machine does not need to run.

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. FILL OUT the blue (OSHA safety color code) tag and attach to the disconnect after locking. See Figure 105-1.
- (b) 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 105-2.

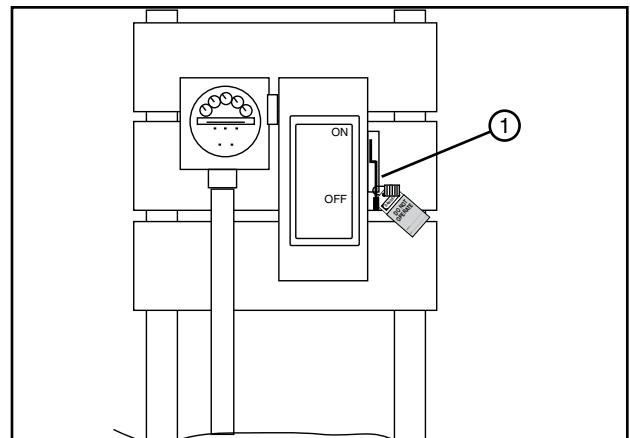


Figure 105-1 1. Public Power Service Disconnect



Figure 105-2 1. Main Disconnect
2. Lock
3. Blue OSHA Tag

MAINTENANCE

Span Flushing Procedure

3. Remove the pipe drains at each drive unit tower. Clean sand and foreign particles from these drains. Turn the rubber drain seal over when reinstalling. See Figure 106-1.

NOTE

- The rubber drain seals should be turned over when being reinstalled. This practice helps to increase the seal life.

4. Remove and clean the sand trap at the last regular drive unit. See Figure 106-2.
5. Remove plugs from the overhang drains. Clean sand and foreign particles from these drains. Turn the rubber drain seal over when reinstalling. See Figure 106-3.
6. Start the pump and allow the machine to flush thoroughly.

NOTE

- After flushing for winterization, ensure the water has been allowed to drain completely before replacing the pipe drains and plugs to prevent freezing and splitting of the pipeline.

7. Turn off the water supply and re-install the pipe drains, sand trap and overhang plugs.

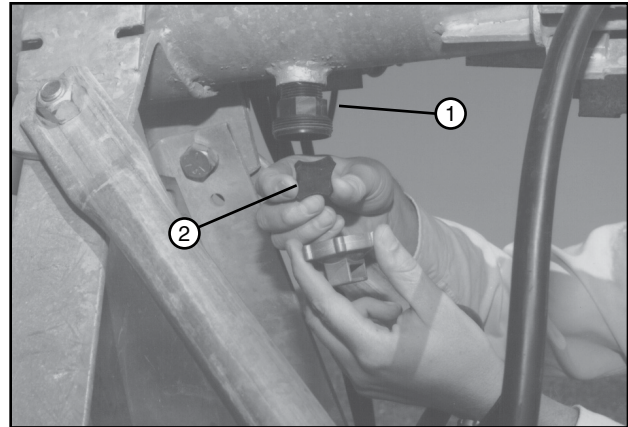


Figure 106-1 1. Pipe Drain
2. Rubber Seal

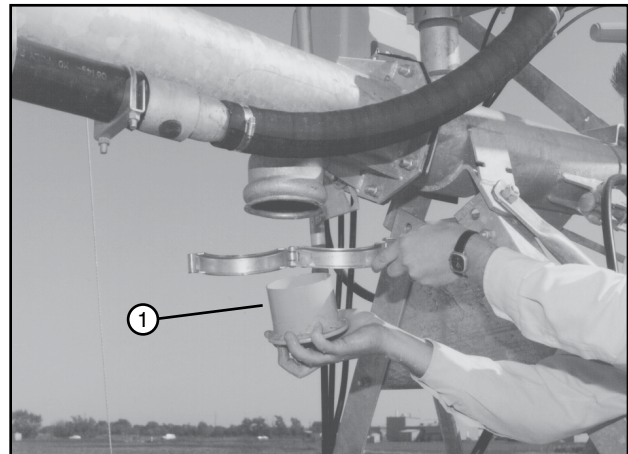


Figure 106-2 1. Sand Trap

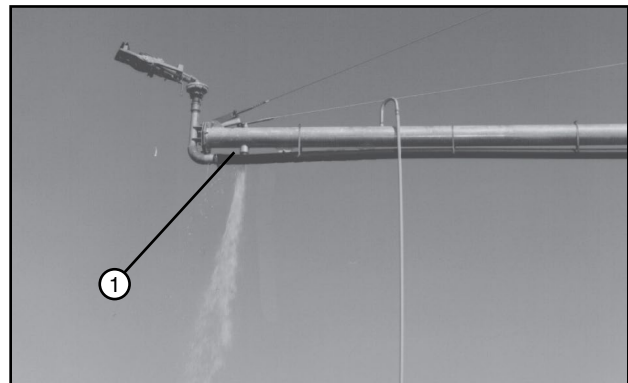


Figure 106-3 1. Sand Trap

Span Flushing Procedure

8. If the machine is equipped with an end gun:
 - Make sure the booster pump hose drain is not plugged with sand or debris and the hose is completely drained See Figure 107-1.
 - Clean the end gun shut off solenoid valve cross filter or optional dirty water filter. See Figures 107-2 and 107-3.
 - Clean the water shut off valve external filter. See Figure 107-4.

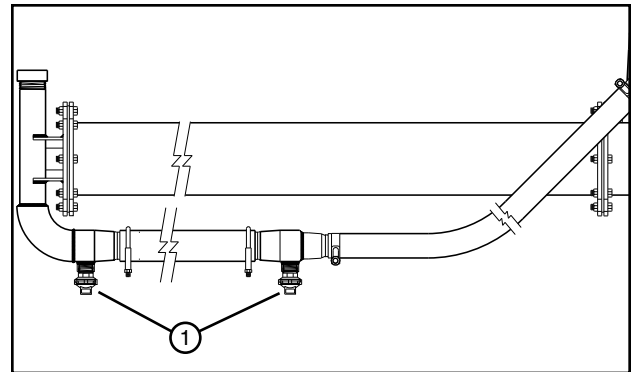


Figure 107-1 1. Booster Pump Hose Drain

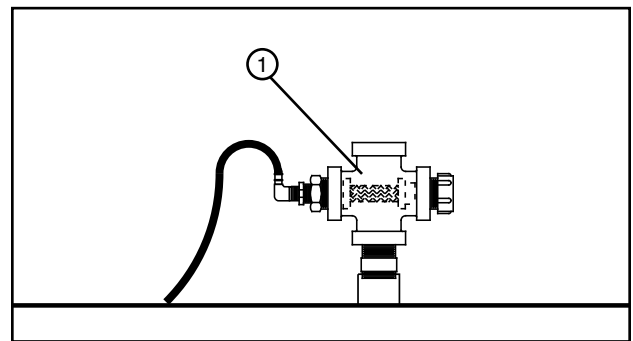


Figure 107-2 1. Cross Filter

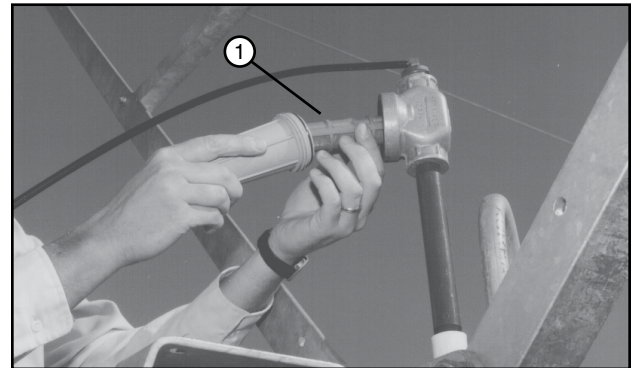


Figure 107-3 1. Optional Dirty Water Filter



Figure 107-4 1. Water Shut Off Valve
2. External Filter

MAINTENANCE

Winterization

In regions where the temperature during the winter months will drop below 40°F (4°C) and/or the growing season is 6 months or less, the irrigation machine must be winterized.

- Flush and drain the irrigation machine and all plumbing components as specified in the flushing procedure section. After flushing for winterization, ensure the water has been allowed to drain completely from all drains and plumbing components before replacing drains and plugs to prevent freezing and splitting of the pipeline.
- All underground pipe **MUST** be drained below the frost line. When drainage is complete, re-install all plugs to prevent rodent infestation.
- Perform all post-season maintenance as specified in the recommended maintenance section.
- Winterize auxiliary equipment such as pumps, power units, mainline pipes and hoses according to the auxiliary equipment manufacturers recommendations.

Parking the Machine

The metal in the irrigation machine will expand and contract with variances in temperature. When the machine is being operated, this poses no threat. However, if the machine is parked in the wheel tracks which were created during the year, shrinking due to the contraction of the metal could cause structural damage.

The possibility of structural damage due to metal contraction increases as the machine length increases. Machines which are 1500 ft (457 m) or longer are susceptible to these stresses, especially where extreme temperature variances occur (90°F (32°C) down to -0°F (-17°C)) and when wheel tracks are present.

To reduce the possibility of structural damage due to expansion and contraction of the metal, the operator should consider one of the following methods when parking the machine in the off season:

1. Park the machine in an area where the wheel tracks have been eliminated.
2. Place wooden 2 in x 12 in planks over the wheel tracks. Park the machine with the tires on the center of the planks.
3. Towable Drive Units – Place every third drive unit's wheels in the tow position.
4. Remove all wheel tracks and run the machine dry (without water) for approximately 100 yards (92 m) to 200 yards (183 m) monthly. Only run the pivot if the temperature is above 40°F (4°C).
5. If an irrigation machine has more than 8 spans of 10 in (254 mm) pipe, the spans must be disconnected. Each span should be supported off the end of the previous span with chains to allow for contraction during cold weather.

Contact your Valley dealer for other winter storage/parking information and tips.

Off Season Storage of Hose

Never leave the hose laying in the field during the winter. The hose can be easily covered by snow, mud, or dust and can quickly become damaged by farm equipment. Driving over the top of the hose can cause damage. Since some hoses contain PVC or rubber, extended exposure to sunlight can lead to cracking or checking problems.

After the final irrigation pass of the season, purge the hose of any remaining water.

Store the hose in a protected area where it will be sheltered from the weather and safe from livestock and rodents. Store the hose away from gas or diesel fuels, contaminants, transformers, and welding areas that can produce ozone.

Off Season Storage of Electric Cord

Never leave the electric cord laying in the field during the winter. The electric cord can be easily covered by snow, mud, or dust and can quickly become damaged by farm equipment. Driving over the electric cord can cause damage.

After the final irrigation pass of the season, shut off power and disconnect electric cord plug from power receptacle. Install cap on plug and carefully coil and hang electric cord on machine.

MAINTENANCE

Recommended Maintenance

Part Replacement

If replacement parts are needed, use only VALLEY REAL PARTS.

Regular Maintenance

Time, humidity, vibration, sand, and machine operation all contribute to wear on your Valley irrigation machine. To keep the machine operating properly with a minimum amount of down time, establish a regular preventative maintenance program using the recommended maintenance charts in this section.

Cart Maintenance				
	1st Pass	4th Pass	Pre-Season	Remarks
Check all nuts and bolts. Tighten as required.			X	
Check anchor or chains.			X	
Check equipment grounding conductors. Tighten or clean as required.			X	
Grease pivot swivel.		X	X	
Check condition of power conductors from engine/generator to control panel.			X	
Check condition of hose.			X	
Check collector ring base drain for proper drainage.			X	Also check at end of season shutdown.
Visually check reversing contactors for arcing. Ensure disconnect is in the "OFF" position.			X	Burned or pitted contact points indicate low voltage. Check generator belts for proper tension.
Drain riser assembly,			X	Also check at end of season shutdown.
Check and clean strainer.			X	
Grease the furrow guidance wheel bear- ings.			X	
Check condition of electrical conductors and bonding jumpers.			X	Replace if frayed, worn or weather checked.
Check pivot flex bonding jumper.			X	

Span Maintenance				
	1st Pass	4th Pass	Pre-Season	Remarks
Check flanges for leaks and tighten as necessary.			X	
Check pipe drains for proper drainage and invert the seal when applicable (See Winterization Procedure)			X	These must be checked at end of season shutdown.
Check structural components for tight- ness.			X	
Check power cable for damage and proper banding to ensure proper attach- ment.			X	

MAINTENANCE

Recommended Maintenance

Drive Unit and Cart Drivetrain Maintenance				
	1st Pass	4th Pass	Pre-Season	Remarks
Check pivot flex and flex joint boots for leaks and tighten bands as required.			X	See Flex Hose section.
Check motor lead cable for damage			X	Call your Valley dealer if the outer insulating sheath is cracked.
Check for proper ground connections on motors and motor leads.			X	
Check motor drain holes for proper drainage.			X	
Drain and replace gearmotor lubricant.				See Valley Center Drive Gearmotor in the Maintenance Section.
Check/change gearbox lubricant.				See Valley Gearboxes in the Maintenance Section.
Check gearmotor seals and gaskets.			X	
Check drive shaft U-joints and U-joint covers.			X	
Check gearbox seals and gaskets			X	
Check and tighten wheel lug bolts (125 lb-ft torque).			X	
Check cart and drive unit tire pressure.			X	Check at least once during season.(See tire pressures in maintenance section).
Clean gearbox ventilation hole in expansion chamber (3 times a year).		X	X	Ventilation holes must be kept open.

Sprinkler Maintenance				
	1st Pass	4th Pass	Pre-Season	Remarks
Check the pivot pressure to make sure it matches the sprinkler package pressure.			X	Notify your Valley Dealer of any changes.
Check sprinkler and nozzles for tightness.			X	
Check sprinklers for free movement.		X		
Check sprinkler nozzles for wear.			X	Increasing the engine RPM or drop in pressure indicates wear.
Check pressure gauge or pressure transducer for proper operation.			X	
Check for plugged nozzles.	X	X	X	
Flush entire machine.			X	See Flushing Procedure. End of season.

MAINTENANCE

Recommended Maintenance





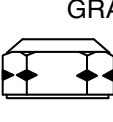
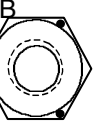


Alignment Maintenance				
	1st Pass	4th Pass	Pre-Season	Remarks
Check all nuts and bolts and tighten as required.			X	
Check connection of bonding jumpers between spans.			X	Pitted or burned contact points indicate low voltage.
Visually check for contactor wear and/or pitting. Make sure power is OFF.			X	
Visually check suppressor connection.			X	
Align Linear and check all safety switches.				As needed. Call your Valley dealer.

Overhang/Booster Pump Maintenance				
	1st Pass	4th Pass	Pre-Season	Remarks
Check overhang cables for broken cable strands.			X	Replace if cables are damaged.
Clean and ensure operation of end gun drain.			X	Always check at end of season shutdown.
Check and clean sand trap.			X	As needed. See Winterization Procedure.
Check end gun arc settings.			X	Refer to the sprinkler chart.
Check end gun bearing and brake.			X	
Check end gun nozzle for wear.			X	
Drain booster pump and ensure booster pump is drained completely.				See Winterization Procedure.

MAINTENANCE

Recommended Maintenance

Ancillary Equipment						
	Pre season	1st Pass	4th Pass	Mid season	Post season	Remarks
Perform all maintenance as required or recommended by the ancillary equipment manufacturer.	X	X	X	X	X	Refer to the ancillary equipment owner's manual or manufacturer for required or recommended maintenance and service intervals

Hardware Identification - SAE Grade - Inch Size					
CAP SCREW		NUT		LOCKNUT	
GRADE 5	GRADE 8	GRADE 5	GRADE 8	GRADE B	GRADE C
					
		* Vendor's Mark		Use With Grade 5 Screw	Use With Grade 8 Screw
					

Torque Chart - Hex Head Cap Screws								
SIZE INCH	GRADE 5				GRADE 8			
		ACCEPTABLE RANGE		ACCEPTABLE RANGE		ACCEPTABLE RANGE		ACCEPTABLE RANGE
	lb-ft	lb-ft	N·m	N·m	lb-ft	lb-ft	N·m	N·m
1/4	9	8-9	12	11-12	12	11-13	16	15-17
5/16	18	16-19	24	22-25	25	22-27	34	30-36
3/8	31	28-33	42	38-44	43	39-47	58	53-64
7/16	49	44-53	66	60-71	69	63-75	94	85-101
1/2	75	68-81	102	92-109	106	96-115	144	130-156
9/16	108	98-117	146	133-158	152	139-166	206	188-225
5/8	149	135-162	202	183-219	210	191-229	285	259-310
3/4	264	240-297	358	325-402	372	338-406	504	458-550
7/8	426	387-464	577	525-629	601	546-655	815	740-888
1	637	579-695	863	785-942	900	818-982	1220	1109-1331

Special Torque Applications				
SPANS & DRIVE UNITS	GRADE 5		GRADE 8	
	lb-ft	N·m	lb-ft	N·m
Hitch ball bolts*	750	1016.8	1050	1423.6
Wheel lug nuts	125	169.4		
Gear Box mounting bolts	75	101.6		

***DO NOT reuse this hardware after removal. Always replace hardware that has been removed with new hardware of the correct grade and size.**

Types of Shutdowns

Basic types of shutdowns that can occur:

1. In-Line Shutdown

Machine angled in field - end tower ahead with cart behind

Machine angled in field - cart ahead with end tower behind

Machine properly oriented with field - machine in line

2. Intermediate Tower Behind Shutdown

3. Intermediate Tower Ahead Shutdown

4. Cart Rotated Toward or Away from Machine

All electrical troubleshooting should only be performed by your Valley Dealer. Contact your local Valley Dealer for electrical troubleshooting assistance. Providing as much information as possible on the symptoms of the malfunction will greatly assist the service personnel in analysis and correction of the problem.

(Examples are given for machine running in **Forward** or to the **Right**)

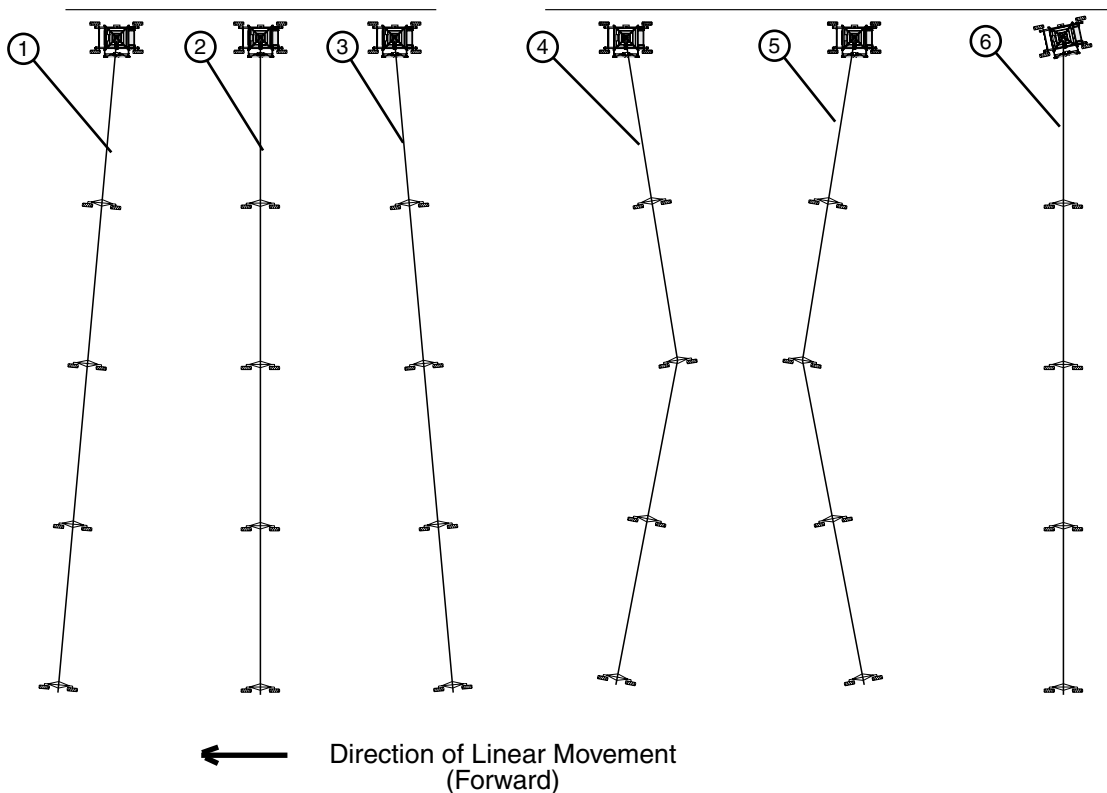


Figure 113-1 1. End Tower Ahead
2. In Line

3. End Tower Behind
4. Intermediate Tower Behind

5. Intermediate Tower Ahead
6. Cart Rotated

TROUBLESHOOTING

Inline Shutdowns

In an end tower or cart ahead situation, either the unit that is ahead has failed to stop or the unit that is behind has failed to move or keep up. **Never Attempt to Start the Machine in the same direction it was moving prior to the shutdown.** Once the necessary repairs are made, you must reverse the direction of travel and operate until the machine is square with the field prior to assuming the original direction of travel.

Machine Angled in Field - End Tower Ahead/Cart Behind

Cart		
	Stuck	Fill in wheel tracks with dry soil or rock
	Flat tire	Repair tire
	U-joint failure	Replace U-joint
	Gearbox failure	Repair or replace gearbox
	Motor failure	Call your Valley Dealer
	Contactactor failure	Call your Valley Dealer
	Steering failure	Call your Valley Dealer
End Tower		
	Contactactor stuck closed	Call your Valley Dealer

Machine Angled in Field - Cart Ahead/End Tower Behind

End Tower		
	Stuck	Fill in wheel tracks with dry soil or rock
	Flat tire	Repair tire
	U-joint failure	Replace U-joint
	Gearbox failure	Repair or replace gearbox
	Motor failure	Call your Valley Dealer
	Contactactor failure	Call your Valley Dealer
	Steering failure	Call your Valley Dealer
Cart		
	Contactactor stuck closed	Call your Valley Dealer

Machine Properly Oriented with Field - Machine In Line

Power Failure		
	Engine/generator	Check engine fuel, oil level, coolant level, cooling system air flow, etc. - correct as required.
	Public power	Contact utility company
	Power cord pulled from pedestal	Set end-of-hose shutoff stake/Call your Valley Dealer
Machine Failure		
	End-of-hose stop	Move stake
	Low pressure	Check water supply source and delivery system
	Overwatering timer	Call your Valley Dealer
	Blown fuse(s)	Call your Valley Dealer
	Percent timer	Call your Valley Dealer
	Oscillator signal	Call your Valley Dealer
	Receiver/antenna	Call your Valley Dealer

TROUBLESHOOTING

Intermediate Tower Ahead Shutdown

In a tower ahead situation, the tower which is out of line the farthest or leading has failed to shut off and has broken the machine safety circuit. **Never Reverse the Direction of Travel** in a tower ahead shutdown as this can cause serious structural damage. Always, upon repair, begin machine operation in the same direction of travel prior to the shutdown.

Tower contactor stuck closed	Call your Valley dealer
Tower contactor suppressor failed	Call your Valley dealer
Tower microswitch failed	Call your Valley dealer
Tower alignment failure	Call your Valley dealer

Intermediate Tower Behind Shutdown

Tower behind shutdowns are caused by the trailing tower failing to run and breaking the machine safety circuit. **Never Attempt to Start** the machine in the same direction of travel as it was operating prior to the shutdown! Once the necessary repairs are made, you must reverse the direction of travel and operate until the machine is straight prior to assuming the original direction of travel.

Flat tire	Repair or replace
Tower stuck	Fill in wheel track with dry soil
U-joint	Repair or replace
Wheel or center drive gearbox	Repair or replace
Drive motor	Call your Valley dealer
Contactors	Call your Valley dealer
Microswitch	Call your Valley dealer
Tower alignment	Call your Valley dealer

Cart Rotated Toward or Away from Machine

Proximity switch	Call your Valley dealer
Failed contactor	Call your Valley dealer
Drive failure	Call your Valley dealer
Steering failure	Call your Valley dealer

TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	SOLUTION
Hose pulls in two	Hose cut in two.	Make sure runways are clear of debris and are level and grassy.
	Hose caked heavily with mud or clay.	Clean hose after each pull.
	Hose stretched to maximum length when water pressure is turned off.	Leave some slack in hose to allow for 2% to 3% elongation (13 ft to 20 ft in a 660 ft length).
	Hose used as "tow rope"	Never use the hose as a towrope to pull equipment.
Couplings pulling off.	Coupling improperly applied.	Cut hose and reapply coupling.
	Excessive mud on hose.	Clean hose of excessive mud buildup.
Longitudinal scratches or cuts of hose.	Sharp objects in runway.	Keep lanes clean. Check equipment for sharp edge or protrusions.
Vertical breaks in hose	Improper bend at loop, causing hose to kink	Maintain recommended bend diameter.
	Insufficient water pressure	Increase pressure at pump to minimum 70 psi
Water blister forming behind coupling	Improperly applied couplings	Take care to apply correctly according to coupling manufacturer's instructions.
	Tube cut while hose is being coupled	
Traveler hose cover checking (crazing) at edges.	Stored incorrectly near electrical equipment.	Store 150 ft from electrical motors.
	Stored for long periods in direct sunlight.	Store in cool, dry protected area
Snaking (a certain amount is acceptable)	Hose under excess pressure.	Don't exceed recommended 150 lb water pressure.
	Improper layout.	Lay hose out in a straight line at edge of runway with recommended bend diameter. Pull hose taut, removing all slack before pressurizing.
Cover blisters	Kinking - insufficient bend radius.	Increase loop diameter
	Poor cover adhesion	Cut out affected area and apply a cover repair.
	Pinhole leak	Remove blistered area and splice hose or apply a pinhole plug using Goodyear plug gun kit.
Cover gouges, cuts, scrapes, abrasions.	Foreign obstruction in the runway.	Keep runway clean.
	Running over traveler hose with cart or other equipment.	Don't run over hose or walk on it.
Peeling or stripping cover repairs.	Foreign objects in runway.	Keep runway clean. Repair cover with cover repair kit.
	Improperly applied cover repairs.	Reapply cover repair following instructions carefully.

TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	SOLUTION
System will not hold the safety.	Drive unit out of alignment, breaking the Span Safety Box switch.	Move drive unit back into alignment and determine cause.
	Flat or low tire causing misalignment of drive units.	Repair or replace.
	Gearbox motor failure.	Contact your local Valley dealer.
	Electrical component failure.	Contact your local Valley dealer
	Center drive gearbox failure.	Repair or replace
	Wheel gearbox failure.	Repair or replace
	Drive shaft/U-joint failure.	Repair or replace
	Guidance control box microswitch failure.	Contact your local Valley dealer
	Pulse tower box microswitch failure.	Contact your local Valley dealer
	Span safety box microswitch failure.	Contact your local Valley dealer
	Machine not positioned correctly with guidance system.	Align the machine, then attempt to restart in the opposite direction of travel to align the machine with guidance system.
Oscillator power supply failure.	Contact your local Valley dealer	
System holds safety, but the end tower will not move in the run mode.	Low pressure switch defective.	Contact you local Valley dealer.
	Bad relay on relay board.	Contact your local Valley dealer.
Machine shut down in-line.	Engine/generator stopped.	Check fuel supply.
		Check fuel filter.
		Check water separator.
		Check oil level.
		If no problems are discovered, turn the control panel disconnect to the off position and attempt to restart the engine/generator.
	Incoming power failure.	
	Plug pulled out of receptacle.	Make sure the cord is long enough.
		Make sure the end of cord stop is set correctly.
Loss of water pressure.	Check pump for proper operation.	
Low voltage or intermittent low voltage.	Engine RPM too slow.	Adjust the engine/generator as needed. Refer to the engine/generator owner/operator's manual.
	Intermittent excessive load.	Attempt restart of machine. If the machine restarts, monitor the voltage and continue operation

TROUBLESHOOTING

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